

Safety manual for Qualified Maintenance Personnel

Tapping center TC-S2B

**Please read this safety manual carefully before
operating the tapping center.**

Brother Industries, Ltd. Machinery & Solution Company.

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Outline of the safety manual

Read this manual

All people who use the tapping center, including those who install the tapping center at the factory, who process materials by operating the tapping center, who adjust and repair the tapping center, are requested to read this safety manual.

In this safety manual, all people who use the tapping center are expressed as the user.

Purpose

The tapping center consists of high voltage electric circuits, tools which rotate at high speed, and tables and ATC magazines which move with powerful force. Therefore, various hazards are associated with the machine. The purpose of this safety manual is to protect users from these hazards.

Therefore, the safety manual explains the following:

Warnings: types of hazards

Preventive measure: ways to prevent any hazards from occurring

Contents of Safety Manual and Relationship with Other Manuals

Each instruction manual, other than the programming manual, includes a safety manual. Safety manuals are given to each respective personnel group.

Please read the main text of the instruction manual for machine functions and operation methods.

1.Operation manual	"Safety Manual for Operator" "Safety manual for those who install and set-up the tapping centre" "DOORINTERLOCKFUNCTION" " Operation manual: Operation of the machine necessary for set-up and machine. " Conversational programming machine Japanese part code :690972001 English part code :690978001 NC language programming machine Japanese part code :690974001 English part code :690980001
2.Instruction manual	"Safety manual for those who install and set-up the tapping centre" " Instruction manual: Installation and assembly of the machine and its options" Japanese part code :690700001 English part code :690976001
3.Programmingmanual	"Programming manual:Creating machine programs" Conversational programming machine NC language Japanese part code :690692001 Japanese part code :690709001 English part code :690698001 English part code :690715001
4.Maintenance manual	"Safety manual for those qualified for tapping centre maintenance attached to the maintenance manual." "Maintenance manual:Adjustment and repair of the machine" The maintenance manual is not distributed to customers.

Relationship to safety labels

Items of particular importance that appear in this safety manual are also attached to the machine as safety labels.

An explanation of the safety labels is provided at the end of this safety manual. If any safety labels have peeled off the machine, obtain new safety labels and attach them correctly.

Language

Machines shipped domestically within Japan are provided with safety manuals and safety labels written in Japanese.

Machines shipped abroad from Japan are provided with safety manuals and safety labels written in three languages: English, German, and French.

For manuals and labels in other languages, consult the dealer from which you purchased the machine.

Purchasing

When the safety manuals or safety labels have been lost, obtain these items from the dealer you have purchased the machine from.

If you do not know of a dealer, consult the offices specified below.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN

BROTHER INDUSTRIES, LTD. Machinery & Solution Company.

phone +81-52-824-2232

fax +81-52-811-0469

Handling the safety manual

Be careful not to lose the safety manuals, and keep them handy at all times.

Also, when the machine changes hands, pass the manuals to the new owner together with the machine.

Degree of danger

The degree of danger is classified into three categories depending upon the level of damage that may occur when instructions are not observed.

1. DANGER

DANGER

Damage which may result in death or severe injury to persons.

2. WARNING

WARNING

Damage which may lead to a serious injury.

3. CAUTION

CAUTION

Damage less serious than that above.

Explanation order

The safety instructions are explained in the following order:

1. Signal words (DANGER, WARNING, CAUTION) and symbols indicating the degree of danger
2. Type of danger (Subject)
3. Type of predicted damages
4. Preventive measure

Meaning of symbols

Symbols are used on the safety labels and in the warnings in the safety manual to intuitively explain possible dangers.

1. Hazard



Slippery



Moving parts



Stumble



Electric shock



Electric shock



Caught



Hand pinched



High temperature



High temperature



Cut



Cut



Burst



Sharp point



Falling object



Falling object



Rotating object



Fall



Splash



Splash



Fire

2. Preventive measures



Protect ears.



Protect hands.



Protect feet.



Remove power plug.



Do not touch.



Protect head.



Connect grounding cable.



Do not disassemble.



Protect eyes.

Manual: c:TC31マニュアル/安全マニュアル/証明ビデオプログラム

各部の名称		Section names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
	日本語	English	Deutsch	Français	中文
1.	制御箱	control box	Steuerschrank	armoire de commande	控制箱
2.	スパラッシュガード	splash guard	Spitzblech	tôle pare-copeaux	火花防溅箱
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt	停止按钮
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt	停止指示灯
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage	机门连动装置按钮
7.	正面扉	front door	Arbeitstür	porte de travail	正面门
9.	ドアインタロッキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage	机门连动装置钥匙
10.	スピンドル	spindle	Spindel	broche	主轴
11.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin	ATC 送料装置
12.	とって	handle	Griff	poignée	把手
13.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande	控制箱内书架
14.	レベルングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine	水平调节螺栓
15.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe	润滑油喷嘴
16.	工具	tool	Werkzeug	outil	加工机具
17.	工具ホルダ	tool holder	Werkzeughalter	support à outil	加工机具架
18.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche	主轴头
19.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence	紧急停止按钮
20.	テーブル	table	Tisch	table	台
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale	主电源开关
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe	润滑油罐
23.	スパラッシュガードサイドカバー	Splash guard side cover	Spitzblechseitenschutz	couvercle latéral de la tôle antiéclaboussures	火花防溅箱侧面罩板
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice	再生电阻罩
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération	操作板
28.	グリップカバー	grip cover	Griffschutz	couverture de jambe	夹钳套
29.	ケーブルカバー	cable cover	kabelschutz	couvre câble	揽绳套
30.	自動間欠給油ポンプ	automatic intermittent lubricating unit	automatische Intervallschmieranlage	Pompe de graissage en discontinu	自动间歇加油泵

Warnings and preventive measures

The numbers in () such as 1, 2 correspond to the names of each part.

Danger



- MD1 Various hazards are associated with the tapping centre.
- MD1-1 Read the safety manual before operating the machine to understand these hazards and preventive measures.
- MD1-2 All users must know the position of the emergency stop(19) switch and its operation.



- MD2 High voltage parts are present in the control box (1). Touching such parts by mistake may result in serious injury or death.
- MD2-1 Only operators qualified for electrical work and familiar with the electrical circuits of this machine are allowed to maintain and inspect electrical components.
- MD2-2 Turn off the main power breaker (21) before operation. Put up a signboard which says 'Under maintenance.'
- MD2-3 When leaving the machine, close the control box door and bolt it.



MD3 You may be caught in the machine during machining, resulting in a serious injury.

MD3-1 Do not enter within the splash guard (2) during operation.

MD3-2 Press the stop switch (3) or the reset key. Visually check that the stop lamp (4) is lit and then you can put your hands, feet and body into the machine.

MD3-3 Visually check that nobody is inside the splash guard before starting machine operation.

MD3-4 Keep your hands, feet, and body away from moving parts during operation.

MD3-5 When you have to enter the machine, turn off the main power breaker and padlock it so that the main power breaker (21) cannot be turned on.



MD4 When the door interlock switch (5) is invalid, the machine moves even when the front door (7) is open.

You may cut yourself on a rotating tool (16) or be caught in the machine.

MD4-1 During machine maintain, pay extreme attention to the machine motion so that you can stop the machine whenever required. After finishing maintenance and set-up, return the door interlock switch to valid. Pull out the door interlock key (9) for storage.

MD4-2 Do not leave the machine with the door interlock switch invalid.



- MD5 When the door interlock switch (5) is invalid, the table (20) may move. You may be caught by the table or in the machine, resulting in injury.
- MD5-1 During maintenance, pay extreme attention to the machine motion so that you can stop the machine whenever required. When you have finished maintenance, return the door interlock switch to ON. The door interlock key (9) must be pulled out and kept by the supervisor.



- MD7 Grounding the machine incorrectly may result in an electric shock, causing serious injuries or death.
- MD7-1 Ground the machine according to the designated procedure.



- MD-8 Using oil-based coolant for machines equipped with a Coolant Through Spindle (CTS) system may cause a fire.
- MD-8-1 Be sure to use wafer-soluble coolant.

Warning

Warning

⚠ WARNING

MW1 Touching rotating tools (16) results in injury.

MW1-1 Keep away from rotating tools.



MW2 You may be injured due to broken tools (16) or parts flung out.

MW2-1 Close the front door (7) and start machine operation.



MW3 You may be caught in the rotating part, resulting in an injury.

MW3-1 Keep away from rotating tools (16), the spindle (10), and the ATC magazine (11).

MW3-2 Wear snug-fitting clothes. Put long hair up in cap.

Do not wear gloves except for set-up operations carried out with the machine stopped.

Do not wear any accessories. Do not hold the rotating part.



- MW4 If the safety device is modified, its function may be altered, thus you may be caught in the machine, hit your body against the machine, or get an electric shock.
- MW4-1 Do not modify safety devices. Do not alter the safety device in such a way that it does not function.



- MW5 When chips scatter and get into the eyes, you may damage your eyeballs and lose your eyesight.
- MW5-1 Wear safety goggles against the chips.
- MW5-2 Do not blow the chips by air.



- MW6 If you touch chips with bare hands, you may have your hand cut or burnt.
- MW6-1 Do not touch chips with bare hands. Do not touch sharp edges of workpieces.
- MW6-2 Wear gloves and use a brush when cleaning cutting chips.
- MW6-3 Clean cutting chips when machine is stopped.



MW7 If you grip the tool (16) blade, you may cut your hand.

MW7-1 Do not touch the edge of the tool. Always hold the shank (17) of the tool.



MW8 Dropping a heavy object onto your foot may fracture your foot bones.

MW8-1 When lifting heavy objects, wear safety shoes.

MW9 Lifting heavy objects may cause a hernia of vertebral disk.

MW9-1 When lifting heavy objects, ask for help.

MW9-2 Lift object with the strength of your legs instead of your back.



MW10 Hearing ability is reduced when ears are exposed to excessive noise for a long period of time.

MW10-1 Use protection such as earplugs when working in a noisy environment.



- MW11 You may hurt your eyes and ears due to high pressure air bursts.
- MW11-1 People other than those qualified in high pressure air handling and who understand the piping of this machine are not allowed to install or change the high pressure air piping.
- MW11-2 To repair the high pressure air hose, disconnect the pressure source and release remaining pressure first. Put up a signboard which says “Under maintenance”



- MW12 You may hit your head when standing up.
- MW12-1 Wear a helmet when working in and around the machine.



- MW13 When the machine is operated while any tools are left in the machine, the tools may scatter and you may be injured.
- MW13-1 Do not leave hand tools in the machine.



- MW14 You may get your hand caught in the front door (7) if you do not hold the door by the handle (12) to open and close the door.
- MW14-1 Hold the handle when opening and closing the doors.



- MW15 High temperature parts are present in the control box (1).
Therefore, if papers protrude from the control box document holder (12), these papers may catch fire.
- MW15-1 Do not put in papers larger than A4 or letter size in the control box document case.



- MW16 If tools are placed on the control box (1) or the machine, these may fall down due to vibration.
- MW16-1 Do not place any objects on the control box and the machine.



MW17 You may fall down and be injured when climbing on the machine or the coolant tank (22).

MW17-1 Do not climb on the machine or the coolant tank.



MW18 When putting your hand under the leveling bolts (14), you may have your hand caught, resulting in an injury.

MW18-1 Do not put your hands under the leveling bolt. Use tools to adjust the level.



MW19 When the cable is hanging down or is not covered, you may stumble or slip and fall.

MW19-1 Remove any slack in the cable. Cover the cable when placing the cable on the floor.



- MW20 Remodeling the machine may affect the safety device, rendering all given warnings invalid.
- MW20-1 Do not modify the machine. When modification is required, contact Brother Industries, Ltd. beforehand and ask for permission in writing.



- MW21 You may have your eyes hurt if coolant splashes into your eyes.
- MW21-1 When adjusting the coolant nozzle (15), wear safety goggles.
- MW21-2 When coolant has splashed into your eyes, wash your eyes with clean water, and see a doctor.



- MW22 If you put your finger in the clearance of the machine, you may have your finger caught, resulting in an injury.
- MW22-1 Do not put fingers between grip covers (28).
- MW22-2 Do not put the finger in the clearance between the tool (16) or the tool holder (17) and the ATC magazine (11).



- MW23 When coolant, oil, or chips are scattered, you may slip and fall down or hit yourself against something, resulting in an injury.
- MW23-1 Turn off the power of the machine, clean inside and the surroundings of the machine, and then start operation.
- MW23-2 Wear a helmet and safety shoes during machine installation.



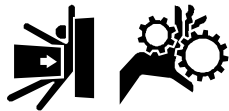
- MW24 When attaching and detaching tools holder (17), you may cut your hand on the edge of a tool (16) or hit your hand against the machine.
- MW24-1 Do not hold the edge of the tool. Wear leather gloves. Hold the tool and tool holder with both hands.



- MW25 The machine may suddenly move or tools may fall down.
- MW25-1 When the stop lamp (4) is not lit, do not put your hands, feet, and body under the spindle head (18).
- MW25-2 For table movement machines, move the table to the front before starting set-up.
For column movement machines, move the column to the rear before starting set-up.
- MW25-3 Turn off the main power breaker (21), padlock the main power breaker so that it cannot be turned on, and supply the grease to the machine.



- MW26 When machining workpiece using an oil type coolant, the machined part may heat up and catch fire.
- MW26-1 When using an oil type coolant, install a fire alarm and an automatic fire extinguisher.
- MW26-2 When machining the workpiece, an operator must attend the machine.



- MW27 If you lean on the machine, you may be caught or hit yourself against the machine when the machine moves, resulting in an injury.
- MW27-1 Do not lean on the machine.
- MW28 When objects are hung on the emergency stop switch (19), the emergency stop switch may not be pressed.
- MW28-1 Do not hang any objects on the emergency stop switch.



- MW29 The Y-axis rear cover at the rear of the machine suddenly protrudes from the machine when the table (20) moves. The cover may hit you, resulting in injuries.
- MW29-1 Turn off the main circuit breaker (21) before removing cutting chips.



- MW30 Because the coolant tank (22) is heavy, you may suffer from a herniated vertebral disk or drop the tank on your feet when lifting the tank.
- MW30-1 Do not lift the coolant tank even when removing chips.



- MW31 When entering the machine, you may slip and fall down or be caught in the machine.
- MW31-1 When entering the machine, be sure to turn off the main circuit power breaker (21), padlock the breaker to prevent it being turned on by other persons, and remove any coolant and chips.
- Also, wear safety shoes and a helmet. Put up a signboard which says “Under maintenance” near the machine.



- MW32 If the splash guard (2) side cover (23) is not attached, you may be caught in the machine or injured due to broken tools.
- MW32-1 Visually check that the side cover is attached before turning on the power.



- MW33 Tools (16) or tool holder (17) whose weight and size exceed the specified limit may spring out while being used.
- MW33-1 Use tools and tool holder whose weight and size are within the specified limit.
- MW33-2 For the limit of the tools, see the tool label attached on the machine or the operation manual.



- MW34 If you touch the regenerative resistor, you may be burned because the regenerative resistor is heated during operation.
- MW34-1 Do not remove the regenerative resistor cover (24).
- MW35 If you touch the motor, you may be burned because the motor is heated during operation.
- MW35-1 Do not touch the motor for 30 minutes after operation is finished.



- MW36 If an incorrect fuse is set, a fire may break out because the protective device does not function.
- MW36-1 Replace with the same rating fuse.
- MW37 If the setting of thermal relay is changed, a fire may break out because the protective device does not function.
- MW37-1 Do not change the setting of the thermal relay.



- MW38 If the ATC magazine (11) rotates, tools (16) may hit machined workpieces, jigs, or the machine, and may be broken.
- MW38-1 Set the tool length so that the tools do not contact machined workpieces, jigs, or the machine even if the ATC magazine rotates.



- MW39 If the control box (1) or the operation panel (25) are wet, you may get an electric shock.
- MW39-1 Do not sprinkle coolant, water, or chips on the control box and the operation panel.
- MW39-2 Do not touch the control box with wet hands.

- MW40 When the power PE line wired from outside is too short, the PE line may come off when the cable is pulled and you may get an electric shock.
- MW40-1 Make the power PE line longer than other lines (L1, L2, L3) allowing some slack.



- MW41 If the power is turn on or workpieces are machined in an explosive atmosphere, an explosion may occur due to a spark from the machine.
- MW41-1 Do not install the machine in an explosive atmosphere.
- MW41-2 Do not turn on the power of the machine, machine workpieces, or carry out set-up in an explosive atmosphere.



- MW42 If you forget to mount the splash guard side cover (23), you may be caught in the machine, resulting in injury.
- MW42-1 Before turning on the power, visually check that the maintenance cover is mounted.



- MW43 If you touch the cable crushed by a heavy object, you may get an electrical shock. The crushed cable may cause a short circuit.
- MW43-1 The person qualified for electrical work must lay the cables so that these are not crushed, and replace the cables if crushed.



- MW44 Cutting chips may catch fire or explode depending on the workpiece material(e.x.Magnesium).
- MW44-1 Remove any cutting chips immediately.
- MW44-2 Install a fire extinguisher near the machine when machining a workpiece made of such material, and never perform unmanned operation.



- MW45 The milling inserts may come off the tool, resulting in serious injury.
- MW45-1 Firmly secure the milling inserts tip on tools.



- MW49 Fire may occur when a 3-wire sensor that includes an exclusive power line is used.
- MW49-1 Use a 2-wire sensor, instead of a 3-wire sensor.
- MW49-2 If it is not possible to avoid using 3-wire sensors, add a fuse(1 A or less) to the power line of each sensor.



MW50 Any impact on the pipes may result in leakage and coolant entering your eyes may result in loss of eyesight.

MW50-1 Do not allow any impact on the pipes.



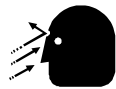
MW51 When adjusting the direction of the coolant nozzle, you may cut your hand on the edge of a tool or hit your hand against the machine.

MW51-1 Wear leather gloves.



MW52 Moving the machine with the cables connected may result in an electric shock.

MW52-1 Disconnect the cables from the machine main body and the water supply unit (22) before moving the machine.



MW55 Because the automatic intermittent lubricating unit(30) is in a high location, oil may spill out when refilling the tank and enter your eyes.

MW55-1 Be sure to wear protective glasses when refilling the tank.



MW56 As a large amount of mist is generated, the operator may feel sick when replacing the workpiece.

MW56-1 Attach a mist collector.



MW57 Coolant may splash and injure your eyes when performing filter cleaning or replacement, or similar maintenance on machines equipped with a Coolant Through Spindle (CTS) system.

MW57-1 Be sure to bleed residual pressure before performing maintenance.



- MW58 You may hit your head on the tool if you enter the machine while the tool is attached to the magazine.
- MW58-1 Be sure to wear a helmet when entering the machine.



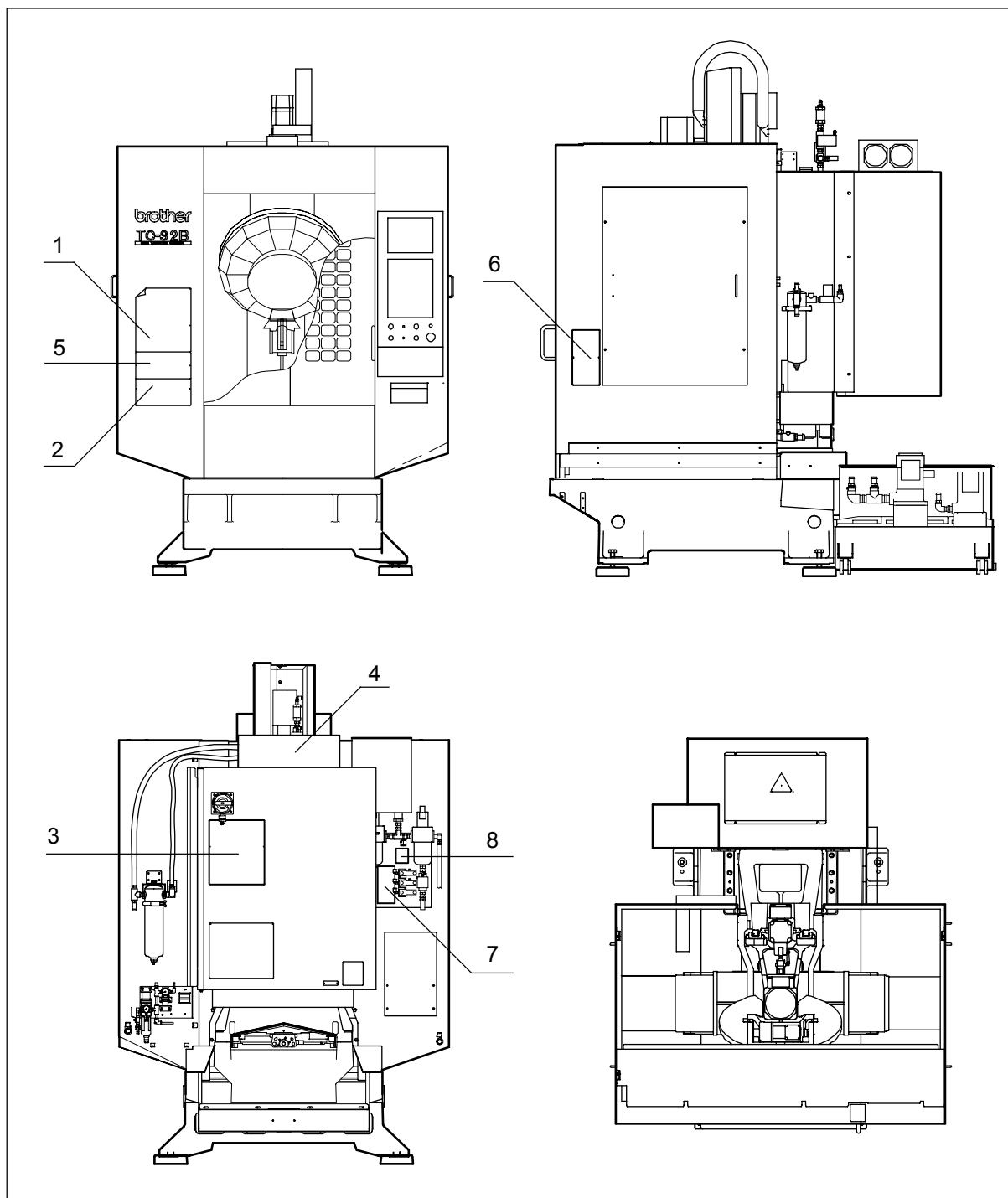
- MW59 Fluorescent light and cover (transparent glass) may break if excessive force is applied, causing you to cut your hands.
- MW59-1 Do not hit the fluorescent light and cover (transparent cover) with any object or apply excessive force.
- MW59-2 Be sure to wear gloves when replacing the fluorescent light.



- MW60 If the terminal block screws are loose after wiring, heat may be generated due to faulty contact, causing a fire.
- MW60-1 Make sure that there are no loose screws after wiring.

Safety label check

Safety labels are attached to the machine at the positions shown in the drawing.
Check that the safety labels are firmly attached. If any labels have peeled off, obtain new labels and attach them correctly.



TS2BSA01-01.ai

[1] Safety label on front cover

Description on safety label vary depending on language.

Language**Part code**

Japanese, Chinese, English

690723001

English, German, French.

691042001

This machine has hazards.

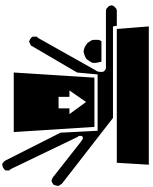
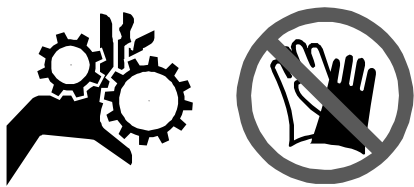
Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

⚠ DANGER 	⚠ WARNING 	⚠ WARNING 
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
⚠ GEFAHR Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	⚠ WARNUNG Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	⚠ WARNUNG Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
⚠ DANGER En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	⚠ AVERTISSEMENT Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	⚠ AVERTISSEMENT Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

691042-1.wmf

[2] Tool label on front cover

Descriptions on the tool label vary depending on the spindle speed.

Language

Japanese, Chinese, English

Part code

653379001

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。

If use beyond the limitation of the tool and spindle speed, machine may be broken.

Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min ⁻¹ / 16000 min ⁻¹		Max Spindle Rotation Speed
	主軸テーパ	7 / 24 No.30		Spindle Taper
	ツールシャンク	MAS-BT30		Tool Shank
	ブルスタッド	MAS-P30T-2 (30°)		Retension Knob
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)		Total in Magazine
	工具の制限	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 80 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 3 kg MxH ≤ 180 kgmm	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 55 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 2 kg MxH ≤ 100 kgmm	Limitation of Tool
	工具バランス制限	100 grmm	50 grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min ⁻¹	16000 min ⁻¹	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

653379001(1-3).wmf

[3] Safety label, Back**Language**

Japanese, Chinese, English

English, German, French.

Part code

690730001

691045001

⚠ DANGER 	⚠ WARNING 
Hazardous voltage will cause severe injury or death. Never attempt to adjust or repair electrical circuits unless you are familiar with circuits and qualified to work safely on electrical circuits. Turn off main power before working. Post notice you are working.	Spilt coolant, lubricant, or chips are slippery and can cause injury. Turn off main power and clean in and around machine before servicing. Wear head protector and safety shoes while servicing.
⚠ GEFAHR Hochspannung kann Sie schwer oder tödlich verletzen. Nicht versuchen, Einstellungen oder Reparaturen am elektrischen Stromkreis ohne Fachkenntnisse oder Qualifikation vorzunehmen. Vor dem Eingreifen Hauptschalter ausschalten und für Dritte kenntlich machen, daß an der Maschine gearbeitet wird.	⚠ WARNUNG Auf Kühlmittel oder Schmierstoffen, bzw. Spänen könnten Sie ausrutschen und sich verletzen. Vor dem Warten der Maschine Hauptschalter ausschalten und den Innenraum sowie die Umgebung der Maschine säubern. Während der Wartung Kopfschutz und Sicherheitsschuhe tragen.
⚠ DANGER Haute tension causera des blessures graves et des risques de mort. Les réparations et les réglages des circuits électriques ne doivent être effectués que par du personnel qualifié. Coupez l'alimentation principale avant de travailler sur les circuits électriques. Apposez une affiche spécifiant que vous êtes en train de travailler.	⚠ AVERTISSEMENT Les huiles de coupe ou de lubrification et les copeaux peuvent vous faire glisser et vous blesser. Coupez l'alimentation principale et nettoyez dans et autour de la machine avant de mettre en service. Portez un casque et des chaussures de sécurité en mettant en service.

691045001 / 0302 (2)

691045-1.wmf

[4] Label, Regenerative resister**Language**

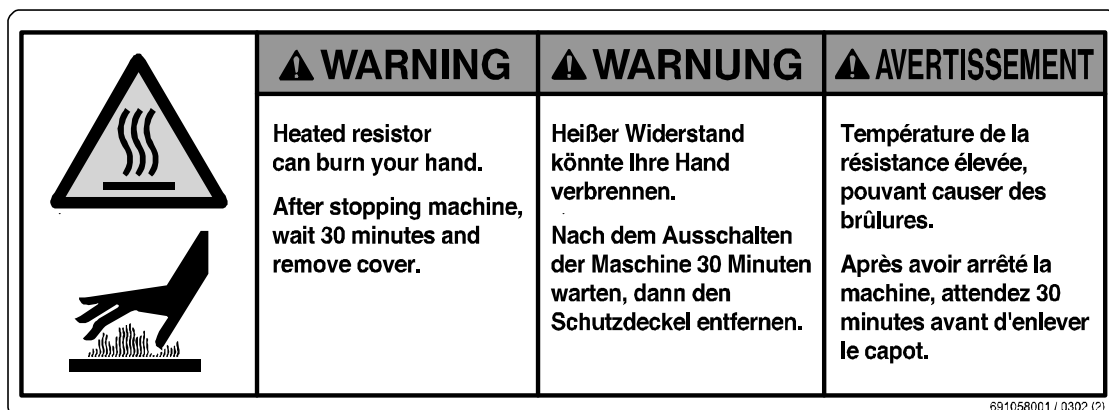
Japanese, Chinese, English

English, German, French.

Part code

690729001

691058001



691058001-1.ai

[5] Label, Tool removing**Language**

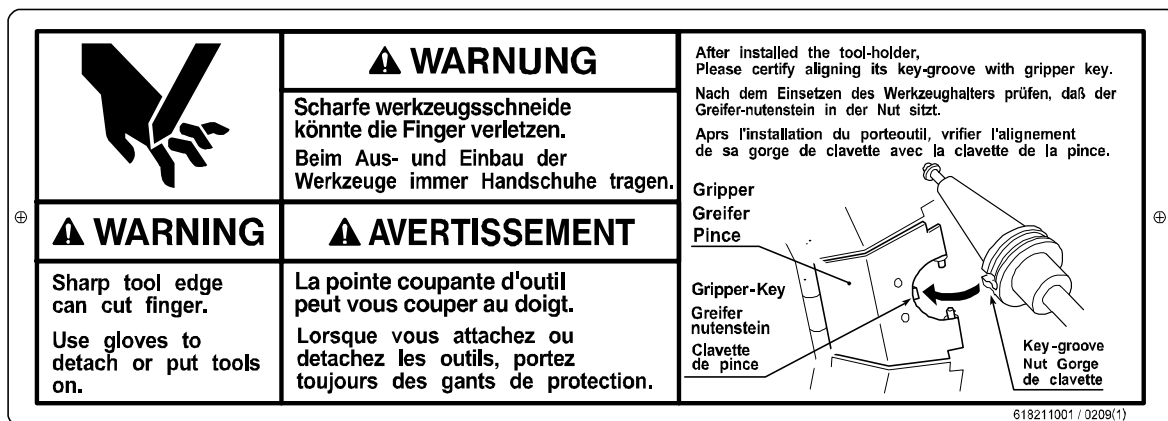
Japanese, Chinese, English

English, German, French.

Part code

618210001

618211001



618211001 / 0209(1)

61821100-1.ai

[6] Safety label on side maintenance cover

Language

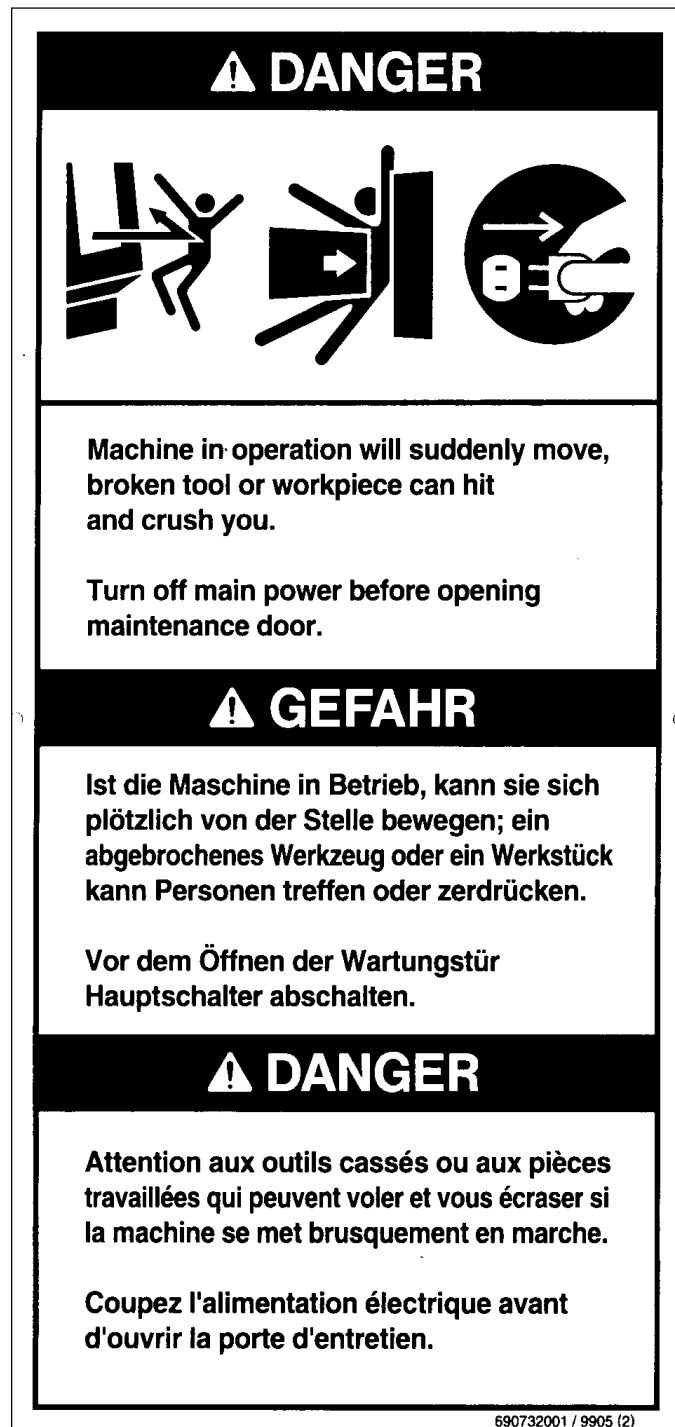
Japanese, Chinese, English

English, German, French.

Part code

690731001

690732001



[7] Label safety 1, CTS

Language

Japanese, Chinese, English

English, German, French.

Part code

693001001

693002001



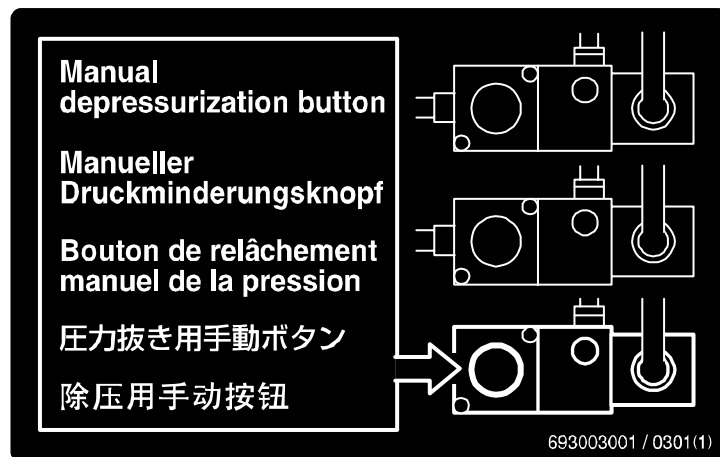
693002001-1.ai

[8] Label 2, CTS**Language**

Japanese, Chinese, English, German, French

Part code

693003001



693003001(1-1).ai

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Sicherheitsvorschrift für qualifiziertes Wartungspersonal

Tapping Centre TC-S2B

**Lesen Sie bitte aufmerksam diese
Sicherheitsvorschrift, bevor Sie die Tapping Centre
benutzen.**

Brother Industries, Ltd. Machinery & Solution Company.

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Was ist die Sicherheitsvorschrift?

Bitte lesen Sie!

Alle Leute, die die Tapping Centre benutzen, einschließlich der Leute, die die Tapping Centre in einer Fabrik installieren, die mit der Tapping Centre arbeiten, und die die Tapping Centre warten oder reparieren, sind aufgefordert, diese Sicherheitsvorschrift zu lesen.

In der Sicherheitsvorschrift werden alle Leute, die die Tapping Centre benutzen, als Benutzer bezeichnet.

Zweck

Die Tapping Centre ist eine Hochspannungsstrommaschine mit schnell umlaufenden Werkzeugen, und einem Tisch und einem ATC-Magazin, die sich mit starker Kraft bewegen. Deshalb bestehen verschiedene Gefahren bei der Benutzung dieser Maschine.

Der Zweck dieser Sicherheitsvorschrift ist es, vor Gefahren die Benutzer zu schützen.

In der Sicherheitsvorschrift wird Folgendes erklärt:

Warnung: Welche Gefahren bestehen?

Preventivmaßnahme: Wie kann man die Gefahren vermeiden?

Zusammenstellung der Sicherheitsvorschriften und der Zusammenhang mit anderen Manuals

Jedem Manual (außer der Programmierungsanleitung) ist eine Sicherheitsvorschrift für die betreffenden Benutzer beigelegt.

Für die verschiedenen Funktionen oder das Betriebsverfahren der Maschine lesen Sie bitte das entsprechende Manual.

1. Betriebsanleitung	"Die Sicherheitsvorschrift für Operateure" "Die Sicherheitsvorschrift für Personen, die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre" "TÜRVERRIEGELUNGS FUNKTION" "Betriebsanleitung: Notwendige Betriebsmaßnahmen für die Aufstellung und die Bearbeitung."		
	Dialogorientierte Programmierung	NC-Sprache	
	Japanischer Teil-Code : 690972001	Japanischer Teil-Code : 690974001	
	Englischer Teil-Code : 690978001	Englischer Teil-Code : 690980001	
2. Installierungsanleitung	"Die Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen für Tapping Centre" "Installierungsanleitung: Installation und Zusammensetzung der Maschine und ihrer Zubehöre."		
	Japanischer Teil-Code : 690970001	Englischer Teil-Code : 690976001	
3. Programmierungsanleitung	"Programmierungsanleitung: Programmierung der Bearbeitung" Dialogorientierte Programmierung NC-Sprache		
	Japanischer Teil-Code : 690692002	Japanischer Teil-Code : 690709002	
	Englischer Teil-Code : 690698002	Englischer Teil-Code : 690715002	
4. Wartungsvorschrift	"Die Sicherheitsvorschrift für qualifiziertes Wartungspersonal; Für Tapping Centre ist der Wartungsvorschrift beigelegt." "Wartungsvo Nachstellung und Reparatur der Maschine" Die Wartungsvorschrift wird an die Kunden nicht verteilt.		

Beziehung mit Sicherheitsschildern

Die wichtigsten Vorschriften der Sicherheitsvorschriften sind in Form von Sicherheitsschild an der Maschine angebracht.

Eine Erklärung für die Sicherheitsschilder gibt es am Ende der Sicherheitsvorschrift.

Falls sich die Sicherheitsschilder von der Maschine lösen sollten, informieren Sie uns. Wir schicken Ihnen sofort Ersatzschilder zu.

Sprache

Die Maschinen für den japanischen Markt werden mit den Sicherheitsvorschriften und den Sicherheitsschildern auf japanisch ausgestaltet. Die im Ausland vertriebenen Maschinen werden mit den Sicherheitsvorschriften und den Sicherheitsschildern dreisprachig; Englisch, Deutsch und Französisch, ausgestaltet.

Fordern Sie deshalb die für Sie entsprechenden Vorschriften und Schilder, einschließlich dieser in anderen Sprachen, bei Ihrem Händler an.

Kundendienst

Sollten die Sicherheitsvorschriften oder die Sicherheitsschilder verloren gehen, bekommen Sie diese bei Ihrem Händler.

Wenn Sie Ihren Händler nicht kennen sollten, rufen Sie beim nachfolgenden Büro an.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN

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Handhabung der Sicherheitsvorschrift

Geben Sie acht, daß Sie die Sicherheitsvorschriften nicht verlieren, und bewahren Sie diese immer griffbereit auf. Sollte die Maschine den Besitzer wechseln, dann müssen auch die Sicherheitsvorschriften an den neuen Besitzer zusammen mit der Maschine übergeben werden.

Gefahrenstufe

Die auftretenden Schäden bei Nichteinhaltung der Sicherheitsvorschriften werden in drei Stufen klassifiziert.

1. GEFAHR



Lebensgefahr oder schwere Körperverletzungsgefahr.

2. WARNUNG



Schwere Verletzungsgefahr.

3. ACHTUNG



Leichte Verletzungsgefahr.

Reihenfolge der Erklärung

Hier wird Folgendes erklärt:

1. Stichwörter (GEFAHR, WARNUNG, ACHTUNG), die die Gefahren anzeigen, und Bildzeichen
2. Gefahrengruppe
3. Möglicher Verletzungsgrad
4. Preventivmaßnahme

Bedeutung der Bildzeichen

Auf den Sicherheitsschildern und in den Sicherheitsvorschriften werden die Gefahren und deren Preventivmaßnahmen mit Bildzeichen anschaulich erklärt. Hier wird ihre Bedeutung erklärt.

1. Gefahr



Rutschen



Laufender Teil



Stolpern



Stromschlag



Stromschlag



Hineingezogen



Hand geklemmt



Heiß



Heiß



Sich schneiden



Sich schneiden



Explosion



Sich stechen



Fallender Gegenstand



Fallender Gegenstand



Umlaufender Gegenstand



Sturz



Spritzen



Spritzen



Feuer

2. Preventivmaßnahmen



Ohren schützen



Hände schützen



Füße schützen



Netzstecker abziehen



Nicht berühren



Kopf schützen



Erden

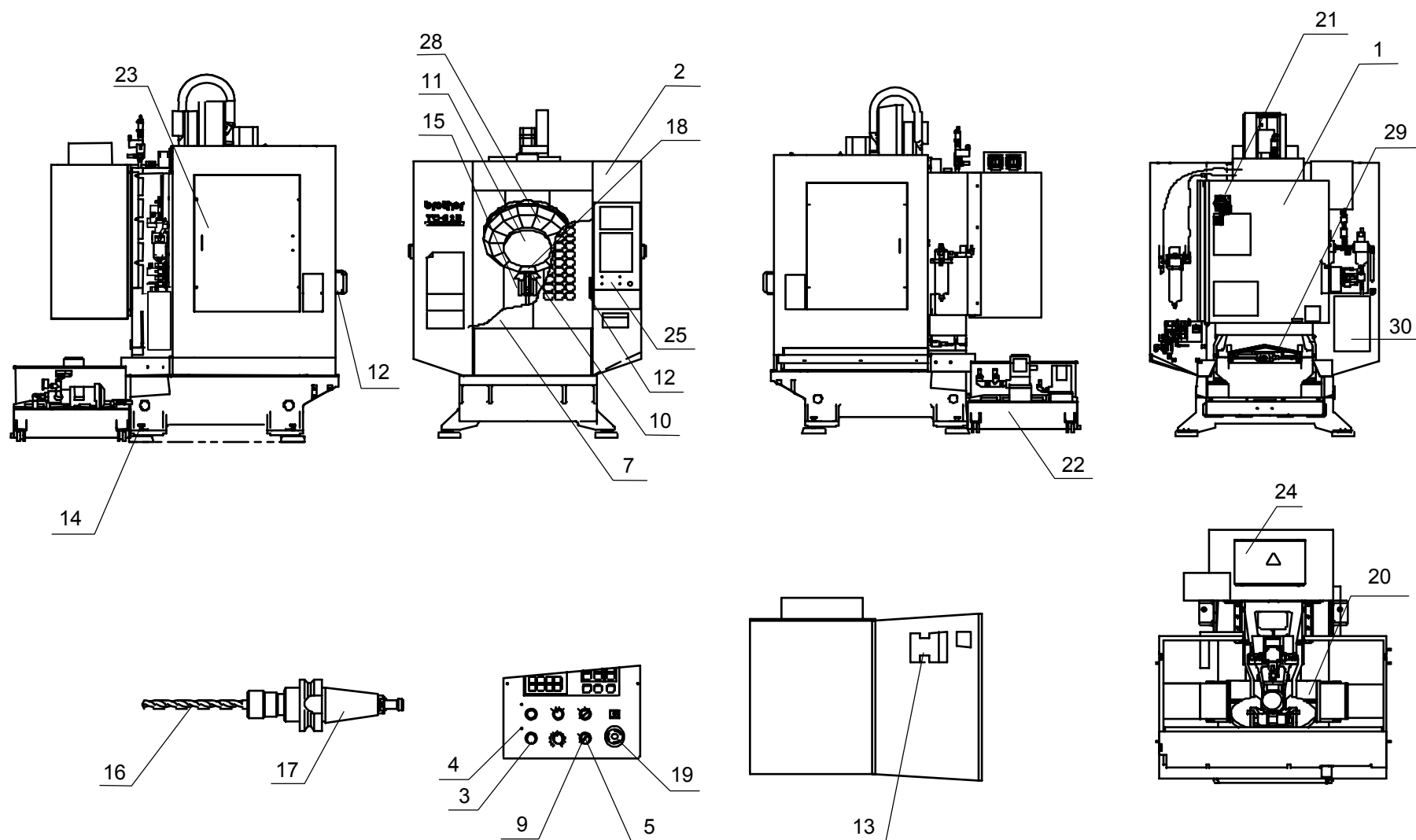


Nicht zerlegen



Augen schützen

Manual: c:TC31マニュアル-安全マニュアル証明プログラム



S2B3-8. 1-1~6.wmf

各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
No. 各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
日本語	English	Deutsch	Français	中文
1. 制御箱	control box	Steuerschrank	armoire de commande	控制箱
2. スplashガード	splash guard	Spitzblech	tôle pare-copeaux	火花防溅箱
3. 停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt	停止按钮
4. 停止ランプ	stop lamp	stop Lampe	lampe d'arrêt	停止指示灯
5. トアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage	机门连动装置按钮
7. 正面扉	front door	Arbeitstür	porte de travail	正面门
9. トアインタロックキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage	机门连动装置钥匙
10. スピンドル	spindle	Spindel	broche	主轴
11. ATC マガジン	ATC magazine	ATC Magazin	ATC magasin	ATC 送料装置
12. とって	handle	Griff	poignée	把手
13. 制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande	控制箱内书架
14. レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine	水平调节螺栓
15. クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe	润滑油喷嘴
16. 工具	tool	Werkzeug	outil	加工机具
17. 工具ホルダ	tool holder	Werkzeughalter	support à outil	加工机具架
18. スピンドルヘッド	spindle head	Spindelkopf	tête de la broche	主轴头
19. 非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence	紧急停止按钮
20. テーブル	table	Tisch	table	台
21. 主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale	主电源开关
22. クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe	润滑油罐
23. スplashガードサイドカバー	Splash guard side cover	Spitzblechseitenschutz	couvercle latéral de la tôle antiéclaboussures	火花防溅箱侧面罩板
24. 回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice	再生电阻罩
25. 操作パネル	operation panel	Betriebstafel	panneau d'opération	操作板
28. グリップカバー	grip cover	Griffschutz	couverture de jambe	夹钳套
29. ケーブルカバー	cable cover	kabelschutz	couvre câble	揽绳套
30. 自動間欠給油ポンプ	automatic intermittent lubricating unit	automatische Intervallschmieranlage	Pompe de graissage en discontinu	自动间歇加油泵

Warnungen und Preventivmaßnahmen

Jede Zahl in Klammern wie (1)(2) entspricht der Nummer der Namen jedes Teils.

Gefahr **GEFAHR**

- MD1 In der Tapping Centre bestehen verschiedene Gefahren.
- MD1-1 Vor Inbetriebnahme der Maschine die Sicherheitsvorschrift lesen, um die Risiken zu erkennen und die Preventivmaßnahmen zu verstehen.
- MD1-2 Alle Benutzer müssen wissen, wo der Notfall-stop-Schalter(19) ist, und wie er benutzt wird.



- MD2 Im Steuerschrank (1) gibt es einen Hochspannungsteil.
Bei versehntlicher Berührung besteht die Gefahr, sich schwer oder lebensgefährlich zu verletzen.
- MD2-1 Nur hochqualifizierte Elektriker dürfen die elektrischen Teile dieser Maschine warten und reparieren.
- MD2-2 Vor Wartung den Hauptschalter (21) ausschalten. Für Dritte kenntlich machen, daß es gearbeitet wird.
- MD2-3 Beim Verlassen der Maschine die Tür des Steuerschranks zumachen und zuschrauben.



- MD3 Es besteht die Gefahr, von laufenden Maschinenteilen geklemmt zu werden und sich dabei schwer zu verletzen.
- MD3-1 Während die Maschine in Betrieb ist, darf kein Körperteil in die innere Seite des Spitzblechs(2) gelangen.
- MD3-2 Bevor man in die Maschine greift oder sich in die Maschine begibt, den stop-Einschalter (3) oder die reset-Taste drücken und sich mit eigenen Augen vergewissern, daß die stop-Lampe (4) leuchtet.
- MD3-3 Vor Anwerfen der Maschine sich mit eigenen Augen vergewissern, daß niemand innerhalb des Spitzblechs ist.
- MD3-4 Während die Maschine in Betrieb ist, von laufenden Teilen Hände, Füße und sonstige Körperteile fernhalten.
- MD3-5 Wenn man in die Maschine eintreten muß, muß der Hauptschalter (21) ausgeschaltet und verschlossen werden, damit ihn niemand mehr einschalten kann.



- MD4 Wenn der Verriegelungsschalter (5) außer Kraft sein sollte, läuft die Maschine trotzdem weiter, wenn die Türen (7) geöffnet wird. Es besteht deshalb die Gefahr, von einem umlaufenden Werkzeug (16) geschnitten, oder von den Maschinenteilen geklemmt und verletzt zu werden.
- MD4-1 Während der Wartung auf die Bewegung der Maschine achten, damit die Maschine zu jeder Zeit angehalten werden kann. Nach einer Wartung oder einer Aufstellung den Verriegelungsschalter wieder in Kraft setzen, den Verriegelungsschlüssel (9) abziehen und aufbewahren.
- MD4-2 Während die Verriegelung außer Kraft ist, darf man die Maschine nicht verlassen.



- MD5 Bei außer Kraft gesetzter Verriegelung (5) kann sich der C-Achse Tisch (20) bewegen. Es besteht die Gefahr, vom C-Achse Tisch oder von anderen Maschinenteilen geklemmt und verletzt zu werden.
- MD5-1 Während der Wartung auf die Bewegung der Maschine achten, damit die Maschine zu jeder Zeit angehalten werden kann. Nach der Wartung die Tür zumachen, und den Verriegelungsschalter wieder in Kraft setzen. Den Schlüssel (9) muß der Betriebsleiter aufbewahren.



- MD7 Wenn die Maschine nicht richtig geerdet ist, kann ein elektrischer Schlag, eine schwere Verletzung oder der Tod herbeigeführt werden.
- MD7-1 Die Maschine auf die festgelegte Weise erden.



- MD-8 Wenn man Kühlmittel auf Ölbasis für Maschinen mit einem Kühlmittel in der Spindel (CTS) System verwendet, besteht Feuergefahr.
- MD-8-1 Nur wasserlösliche Kühlmittel verwenden.

Warnung**⚠ WARNUNG**

- MW1 Wenn man umlaufende Werkzeuge (16) berührt, wird man verletzt.
- MW1-1 Von umlaufenden Werkzeugen sich fernhalten.



- MW2 Es besteht Verletzungsgefahr durch abgebrochene Werkzeuge (16) oder
herausspringende Werkstücke.
- MW2-1 Nur bei geschlossener Außentür (7) die Maschine in Betrieb nehmen.



- MW3 In umlaufenden Teil können die Finger hineingezogen und verletzt werden.
- MW3-1 Von umlaufendem Werkzeug (16), dem Spindel (10) und dem ATC-Magazin (11) sich fernhalten.
- MW3-2 Körperanliegende Bekleidung tragen. Lange Haare müssen in einem Hut aufgesteckt werden. Beim Arbeiten an der laufenden Maschine keine Handschuhe tragen. Keinen Schmuck tragen. Umlaufende Teile nicht berühren.



- MW4 Wenn die Sicherheitsvorrichtung abgeändert wird, funktioniert sie nicht mehr richtig. Es besteht die Gefahr, einen Stromschlag zu erhalten, von den Maschinenteilen geklemmt zu werden oder sich zu stoßen.
- MW4-1 Die Sicherheitsvorrichtung nicht abändern. Die Sicherheitsvorrichtung nicht unbeweglich festmachen.



- MW5 Wenn Stahlspäne in die Augen hineinspringen, werden die Augen verletzt. Es besteht die Gefahr, die Sehkraft zu verlieren.
- MW5-1 Einen Augenschutz gegen Stahlspäne tragen.
- MW5-2 Stahlspäne nicht mit einer Luftdruckpistole wegfegen.



- MW6 Wenn man Stahlspäne mit bloßen Händen berührt, kann man sich schneiden oder verbrennen.
- MW6-1 Stahlspäne nicht mit bloßen Händen berühren. Die Spitze der Werkstücke nicht mit bloßen Händen berühren.
- MW6-2 Beim Reinigen der Schneidechips Handschuhe tragen und eine Bürste benutzen.
- MW6-3 Schneidechips nur bei angehaltener Maschine reinigen.
- MW7 Wenn man die Schneide der Werkzeuge (16) berührt, wird die Hand geschnitten.
- MW7-1 Die Schneide der Werkzeuge nicht berühren. Die Werkzeuge immer am Schaft des Werkzeughalters (17) halten.



- MW8 Wenn schwere Gegenstände auf die Füße fallen, besteht die Gefahr, sich den Fuß zu brechen.
- MW8-1 Beim Heben schwerer Gegenstände Schutzschuhe tragen.
- MW9 Beim Heben schwerer Gegenstände besteht die Gefahr, sich einen Bruch zu heben.
- MW9-1 Beim Heben schwerer Gegenstände immer jemanden um Hilfe bitten.
- MW9-2 Beim Heben schwerer Gegenstände nicht die Rückenkraft sondern die Bein kraft benutzen.



- MW10 Lange Zeit dauernder oder großer Lärm ist für die Ohren schädlich.
- MW10-1 Bei der Arbeit unter Lärm einen Gehörschutz, z.B. Stöpsel, tragen.



- MW11 Hochdruckluft kann explodieren und Augen oder Ohren verletzen.
- MW11-1 Nur hochqualifizierte Fachkräfte dürfen an dieser Maschine Hochdruckluftrohrleitungen installieren oder verändern.
- MW11-2 Vor der Arbeit an den Hochdruckluftrohrleitungen die Druckquelle abtrennen und den Restdruck ablassen. Bekannt machen, daß an der Druckleitung gearbeitet wird.



- MW12 Beim Aufstehen besteht die Gefahr, sich den Kopf anzustoßen und dabei zu verletzen.
- MW12-1 Beim Arbeiten in der Maschine oder in ihrem Bereich einen Schutzhelm tragen.



- MW13 Wenn Werkzeuge in der Maschine liegenbleiben sollten und die Maschine in Betrieb genommen wird, besteht die Gefahr, daß diese Werkzeuge herumgeschleudert werden und jemanden verletzen.
- MW13-1 In der Maschine keine Werkzeuge bleiben lassen.



- MW14 Es besteht die Gefahr, sich die Finger zu klemmen, wenn die Außentür(6) (7) (8) nicht mit der Klinke (12) auf- und zugemacht wird.
- MW14-1 Nur mit der Klinke die Außentür auf- und zumachen.



- MW15 Im Steuerschrank (1) gibt es einen heißen Teil. Deshalb besteht die Gefahr, daß sich die im Dokumentenbehälter (12) im Steuerschrank nicht ordentlich aufbewahrten Papiereentzünden.
- MW15-1 Im Dokumentenbehälter im Steuerschrank dürfen keine größere Papiere als A4 aufbewahrt werden.



- MW16 Wenn man Werkzeuge auf dem Steuerschrank (1) oder auf der Maschine liegenläßt, besteht die Gefahr, daß diese wegen der Vibration der Maschine herunterfallen.
- MW16-1 Auf dem Steuerschrank und auf der Maschine nichts liegenlassen.



MW17 Wenn man auf die Maschine oder auf den Kühlmittelbehälter (22) steigt, besteht die Gefahr, zu stürzen und sich zu verletzen.

MW17-1 Nicht auf die Maschine und den Kühlmittelbehälter steigen.



MW18 Wenn man unter den Nivellierbolzen (14) greift, besteht die Gefahr, sich zu klemmen und zu verletzen.

MW18-1 Nicht unter den Nivellierbolzen greifen. Nur mit zweckmäßigem Werkzeug den Nivellierbolzen einstellen.



MW19 Wenn das Kabel hängt oder nicht ordentlich verlegt ist, besteht die Gefahr, darüber zu stolpern.

MW19-1 Das Kabel darf nicht locker sein. Das Kabel auf dem Fußboden muß mit einem Schutz bedeckt werden.



- MW20 Wenn an der Maschine Modifikationen vorgenommen werden, dann tritt die Sicherheitsvorrichtung außer Kraft, und alle angegebenen Warnungen gelten nicht mehr.
- MW20-1 Die Maschine nicht modifizieren. Wenn eine Modifikation notwendig sein sollte, muß man die BROTHER INDUSTRIES., LTD. vorher informieren und ihr schriftliches Einverständnis einholen.



- MW21 Kühlmittel ist augenschädlich.
- MW21-1 Bei der Einstellung der Kühlmitteldüse (15) einen Augenschutz tragen.
- MW21-2 Wenn die Augen mit dem Kühlmittel in Berührung kommen, dann die Augen mit sauberem Wasser auswaschen und den Arzt konsultieren.



- MW22 In jeder Spalte der Maschine besteht Klemm- und Verletzungsgefahr.
- MW22-1 Nicht zwischen den Griffschutz fassen.
- MW22-2 Nicht mit den Fingern zwischen das Werkzeug (16) oder den Werkzeughalter (17) und das ATC-Magazin kommen (11).



- MW23 Wenn Kühlmittel, Schmierstoff oder Stahlspäne auf dem Fußboden ist, kann man rutschen und sich verletzen.
- MW23-1 Vor Inbetriebnahme bei ausgeschalteter Maschine deren Innenseite und den Fußboden um die Maschine herum sauber machen.
- MW23-2 Bei der Installierung einen Schutzhelm und Schutzschuhe tragen.



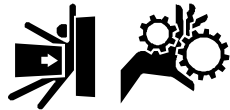
- MW24 Beim Einsetzen und Herausnehmen des Werkzeughalters (17) besteht die Gefahr, sich zu schneiden oder sonstig zu verletzen.
- MW24-1 Beim Austausch der Werkzeuge Lederhandschuhe tragen und die Schneide der Werkzeuge nicht berühren. Das Werkzeug und den Werkzeughalter mit beiden Händen halten.



- MW25 Die Maschine kann plötzlich zum Laufen anfangen, und die Werkzeuge können aus der Haltung herausfallen.
- MW25-1 Wenn die stop-Lampe (4) nicht leuchtet, darf man mit keinem Körperteil unter den Spindelkopf (18) kommen.
- MW25-2 Bei der Aufstellung des Arbeitsprozesses den Tisch nach vorne ziehen oder die Säule ins Innere drücken.
- MW25-3 Vor dem Eintritt in die Maschine den Hauptschalter (21) ausschalten und verschließen, damit ihn niemand mehr einschalten kann. Dann die Maschine mit Schmiere versorgen.



- MW26 Bei der Bearbeitung der Werkstücke mit Ölkühlmittel besteht Brandgefahr.
- MW26-1 Wenn Werkstücke mit Ölkühlmittel bearbeitet werden, müssen ein Feuersalarm und eine automatische Feuerlöschanlage installiert werden.
- MW26-2 Bei der Bearbeitung muß der Operateur an der Maschine sein.



- MW27 Wenn man sich an die Maschine anlehnt, besteht die Gefahr, daß man beim Lauf der Maschine gequetscht oder gestoßen und verletzt werden kann.
- MW27-1 Sich nicht an die Maschine anlehnen.
- MW28 Wenn man etwas an den Notfall-stop-Schalter (19) hängt, besteht die Gefahr, bei Notfall den Schalter nicht drücken zu können.
- MW28-1 Nichts an den Notfall-stop-Schalter hängen.



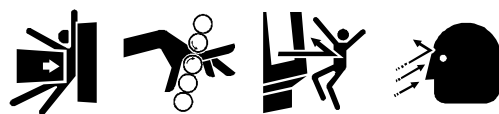
- MW29 Wenn der Tisch (20) sich bewegt, kann die Y-Achsen-Hinterabdeckung auf der Rückseite der Maschine unerwartet aus der Maschine herausspringen. Es besteht die Gefahr, gestossen und verletzt zu werden.
- MW29-1 Vor dem Entfernen der Späne den Hauptausschalter (21) ausschalten.



- MW30 Der Kühlmittel-tank (22) ist sehr schwer. Wenn man versucht zu heben, besteht die Gefahr, sich einen Bruch zu heben oder sich an die Füße durch Fallen des Tanks zu verletzen.
- MW30-1 Auch beim Aufräumen der Stahlspäne darf der Kühlmittel-tank nicht aufgehoben werden.



- MW31 Beim Eintreten in die Maschine besteht die Gefahr, zu rutschen oder von den Maschinenteilen geklemmt zu werden.
- MW31-1 Vor dem Eintreten in die Maschine muß der Hauptschalter (21) ausgeschaltet und verschlossen werden, damit ihn niemand mehr einschalten kann. Kühlmittel und Stahlspäne aufräumen. Kühlmittel und Stahlspäne aus dem Boden räumen. Schutzschuhe und einen Schutzhelm tragen. An der Betriebstafel der Maschine anzeigen, daß in der Maschine gearbeitet wird.



- SW32 Wenn man vergißt, die Seitenabdeckung (23) des Spritzschutzes (2) aufzusetzen, besteht die Gefahr, geklemmt oder von einem gebrochenen Werkzeug verletzt zu werden.
- SW32-1 Vor Einschalten der Maschine sich mit eigenen Augen vergewissern, daß der Seitenschutz aufgesteckt ist.



- MW33 Wenn Werkzeuge (16) oder Werkzeughalter (17), deren Gewicht oder Größe die vorgeschriebene Beschränkung überschreitet, benutzt werden, besteht die Gefahr, daß die Werkzeuge herausspringen.
- MW33-1 Die vorgeschriebene Gewicht- und Größebeschränkung der Werkzeuge und Haltereinhalten.
- MW33-2 Das auf den Werkzeugsschildern angegebene Vorschriften für die Beschränkung der Werkzeuge lesen, Betriebsanleitung.



- MW34 Das Rückkopplungswiderstandsgerät wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.
- MW34-1 Den Rückkopplungswiderstandsschutz (24) nicht abnehmen.
- MW35 Der Motor wird während des Betriebs sehr heiß. Es besteht die Gefahr, daß man sich die Finger bei Berührung verbrennt.
- MW35-1 Innerhalb von 30 Minuten nach dem Ausschalten der Maschine den Motor nicht berühren.



- MW36 Bei Verwendung eines falschen Schmelzdrahts funktioniert die Schutzvorrichtung nicht. Es besteht Feuergefahr.
- MW36-1 Einen zerrissenen Schmelzdraht mit einem Draht der selben Norm austauschen.
- MW37 Wenn der Sollwert des Thermorelais geändert wird, funktioniert die Schutzvorrichtung nicht. Es besteht Feuergefahr.
- MW37-1 Das Sollwert des Thermorelais nicht ändern.



- MW38 Beim Umlauf des ATC-Magazins (11) besteht die Gefahr, dass diese Werkzeuge (16) an das Werkstück, die Vorrichtung oder die Innenwand der Maschine anstosen und abbrechen.
- MW38-1 Die Länge der Werkzeuge muss genau eingestellt werden, damit die Werkzeuge beim Umlauf des ATC-Magazins an das Werkstück, die Vorrichtung oder die Innenwand der Maschine nicht anstosen.



- MW39 Wenn der Steuerschrank (1) oder die Betriebstafel (25) naß ist, besteht die Gefahr, einen Stromschlag zu erhalten.
- MW39-1 Den Steuerschrank und die Betriebstafel vor Flüssigkeit wie Kühlmittel, Wasser und Stahlspäne schützen.
- MW39-2 Mit naßen Händen den Steuerschrank nicht berühren.

- MW40 Wenn die von außen verdrahtete Kraft-PE-Linie zu kurz ist, kann sie durch einen Ruck des Kabels abreißen, und es besteht die Gefahr, einen Stromschlag zu erhalten.
- MW40-1 “Die Kraft-PE-Linie länger als die anderen Linien (L1, L2, L3) halten und lockerverbinden.”



- MW41 Wenn man beim Bestehen der Explosionsgefahr den Schalter der Maschine einschaltet oder Werkstücke bearbeitet, besteht die Gefahr, daß ein überspringender Funke eine Explosion auslösen.
- MW41-1 Beim Bestehen der Explosionsgefahr nicht die Maschine installieren.
- MW41-2 Beim Bestehen der Explosionsgefahr die Maschine nicht warten.



- MW42 Wenn man vergißt, den Wartungsdeckel (23) aufzusetzen, besteht Verletzungsgefahr.
- MW42-1 Vor dem Einschalten des Schalters sich mit eigenen Augen vergewissern, daß der Wartungsdeckel richtig aufgesetzt ist.



- MW43 Beim Berühren des zerdrückten Kabels besteht die Gefahr, einen Stromschlag zu erhalten. Zerdrücktes Kabel kann einen Kurzschluß haben.
- MW43-1 Qualifizierte Elektriker müssen das Kabel fachgerecht verlegen, damit das Kabel nicht zerdrückt oder beschädigt wird. Wenn das Kabel beschädigt ist, muß das mit einem neuen ausgetauscht werden.



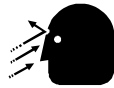
- MW44 Je nach Material des Werkstücks kann der Schneidesplitter Feuer fangen oder explodieren (z.B. Magnesium).
- MW44-1 Schneidesplittersofortentfernen.
- MW44-2 Wenn mit feuergefährlichen Werkstücken gearbeitet wird, Feuerlöscher griffbereit halten. Betrieb niemals unbeobachtet lassen.



- MW45 Bei Werkzeugen, deren Spitze ersetzt werden kann, kann sich die Spitze während der Spindeldrehung lösen und schwere Verletzungen verursachen. Die Spitze muss gut befestigt werden.
- MW45-1 Sicherstellen, dass die Spitze gut befestigt wird, bevor das Werkzeug eingesetzt wird.



- MW49 Es besteht Feuergefahr, wenn ein 3-Draht-Sensor mit einer Starkstromleitung verwendet wird.
- MW49-1 Keinen 3-Draht- sondern einen 2-Draht-Sensor benutzen.
- MW49-2 Falls ein 3-Draht-Sensor trotzdem notgedrungen benutzt werden muss, muss zusätzlich eine Sicherung (1 A oder geringer) an der Starkstromleitung jedes Sensors angebracht werden.



- MW50 Wenn man an die Röhre anstösst, kann das Kühlmittel auslaufen und die Augen bis hin zum Verlust der Sehkraft verletzen.
- MW50-1 Die Röhre nicht berühren.



- MW51 Beim Einstellen der Kühlmitteldüse besteht Schnittgefahr für die Hände. Achtung am Rand des Werkzeugs! Die Hände nicht an der Maschine stoßen.
- MW51-1 Lederhandschuhetragen.

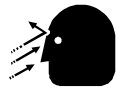


- MW52 Wenn die Maschine mit angeschlossenen Kabeln bewegt wird, kann ein elektrischer Schlag verursacht werden.
- MW52-1 Bevor die Maschine bewegt wird, Kabel aus dem Hauptteil der Maschine und der Wasserversorgung herausziehen (22).



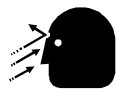
MW55 Wenn Öl nachgefüllt wird, kann durch die Höhe der automatischen Intervallschmieranlage Öl überlaufen und in die Augen kommen.

MW55-1 Beim Öl-Nachfüllen immer eine Schutzbrille tragen.



MW56 Es gibt eine starke Nebelerzeugung. Dem Benutzer kann beim Auswechseln eines Werkstückes schlecht werden.

MW56-1 Nebelkollektor anbringen.



MW57 Bei der Wartung oder der Filterreinigung oder beim Filterwechsel können bei Maschinen mit einem Kühlmittel in der Spindel (CTS) System Kühlmittelspritzer Augenverletzungen verursachen.

MW57-1 Vor der Wartung den Restdruck ganz entlüften.



- MW58 Wenn Werkzeug in der Maschine eingesetzt ist, kann man sich beim Eintreten in die Maschine den Kopf daran stoßen.
- MW58-1 Beim Eintreten in die Maschine immer einen Helm tragen.



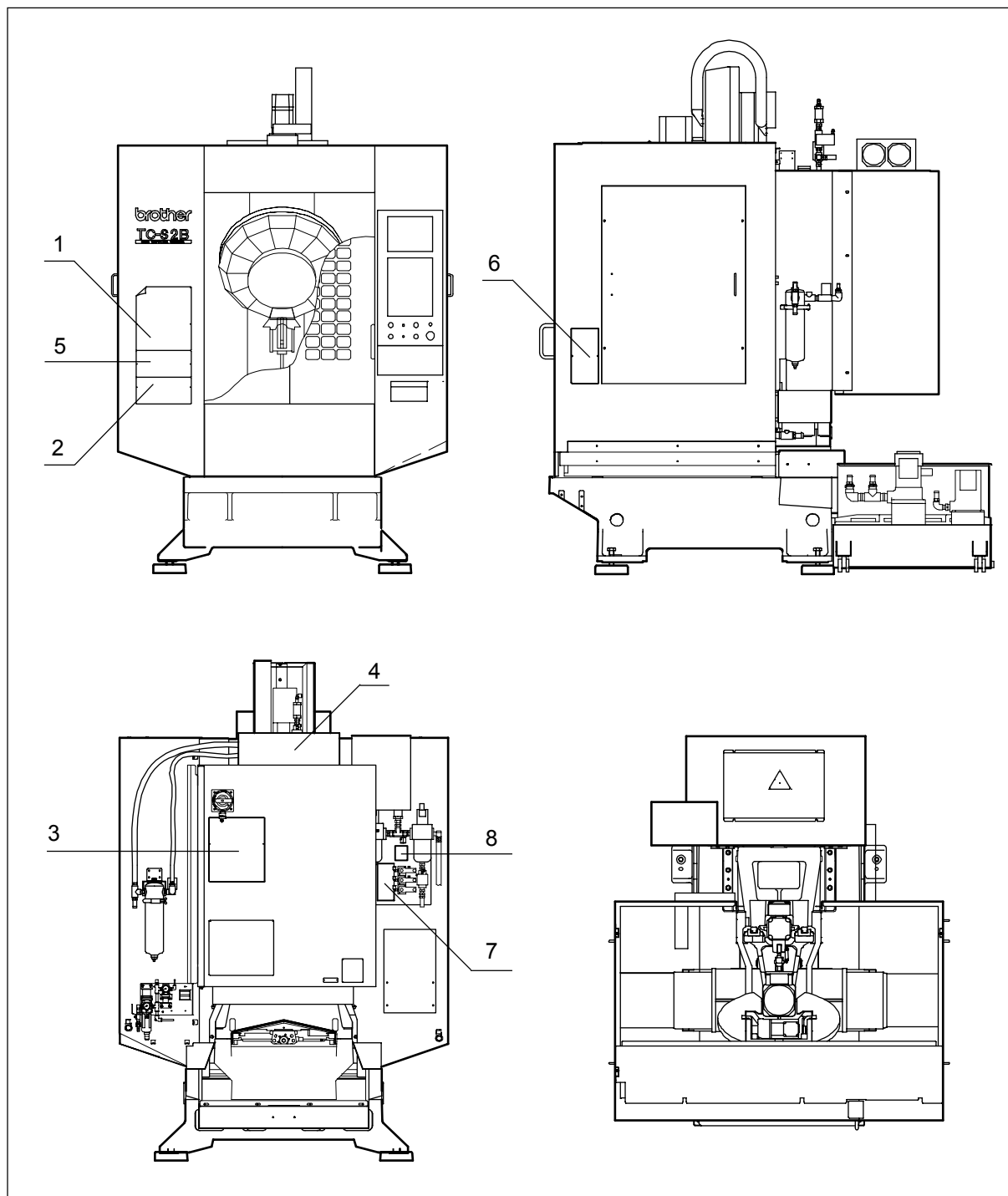
- MW59 Die Fluoreszenzlampe und die Abdeckung (durchsichtiges Glas) können durch Gewaltanwendung zerbrechen, was Handverletzungen hervorrufen kann.
- MW59-1 Niemals die Fluoreszenzlampe und die Abdeckung (durchsichtig) mit einem Gegenstand schlagen oder Gewalt anwenden.
- MW59-2 Beim Auswechseln der Fluoreszenzlampe immer Handschuhe tragen!



- MW60 Wenn die Schrauben der Anschlussklemmleiste nach der Verdrahtung lose sind, kann durch den fehlerhaften Anschluss Hitze erzeugt werden und es besteht Feuergefahr.
- MW60-1 Bei der Verdrahtung darauf achten, dass alle Schrauben fest angezogen sind.

Prüfen der Sicherheitsschilder

Die Sicherheitsschilder sind an der im Bild gezeigten Stelle der Maschine angebracht. Prüfen Sie, ob sie da fest angeklebt sind. Wenn sie sich von der Maschine lösen sollten, bekommen Sie Ersatzschilder und kleben Sie sie an die Maschine an.



TS2BSA01-01.ai

[1] Safety label on front cover

Description on safety label vary depending on language.

Language

Japanese, Chinese, English

English, German, French

Part code

690723001

691042001

This machine has hazards.

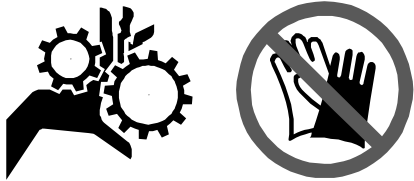
Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

⚠ DANGER	⚠ WARNING	⚠ WARNING
		
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
⚠ GEFAHR	⚠ WARNUNG	⚠ WARNUNG
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
⚠ DANGER	⚠ AVERTISSEMENT	⚠ AVERTISSEMENT
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

691042-1.wmf

[2] Tool label on front cover

Descriptions on the tool label vary depending on the spindle speed.

Language

Japanese, Chinese, English

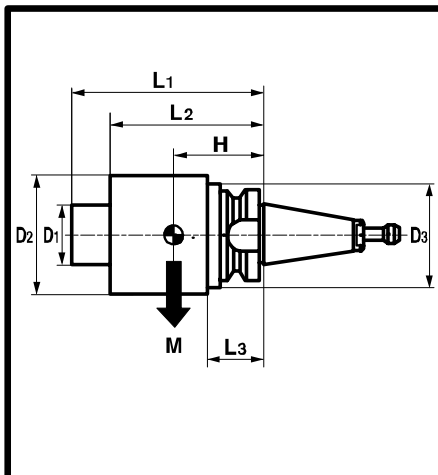
Part code

653379001

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。

If use beyond the limitation of the tool and spindle speed, machine may be broken.

Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min ⁻¹ / 16000 min ⁻¹		Max Spindle Rotation Speed
	主軸テーパ	7 / 24 No.30		Spindle Taper
	ツールシャンク	MAS-BT30		Tool Shank
	ブルスタッド	MAS-P30T-2 (30°)		Retension Knob
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)		Total in Magazine
	工具の制限	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 80 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 3 kg MxH ≤ 180 kgmm	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 55 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 2 kg MxH ≤ 100 kgmm	Limitation of Tool
	工具バランス制限	100 grmm	50 grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min ⁻¹	16000 min ⁻¹	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

653379001(1-3).wmf

[3] Safety label, Back

Language

Japanese, Chinese, English
English, German, French.

Part code

690730001
691045001

⚠ DANGER  Hazardous voltage will cause severe injury or death. Never attempt to adjust or repair electrical circuits unless you are familiar with circuits and qualified to work safely on electrical circuits. Turn off main power before working. Post notice you are working.	⚠ WARNING  Spilt coolant, lubricant, or chips are slippery and can cause injury. Turn off main power and clean in and around machine before servicing. Wear head protector and safety shoes while servicing.
⚠ GEFAHR Hochspannung kann Sie schwer oder tödlich verletzen. Nicht versuchen, Einstellungen oder Reparaturen am elektrischen Stromkreis ohne Fachkenntnisse oder Qualifikation vorzunehmen. Vor dem Eingreifen Hauptschalter ausschalten und für Dritte kenntlich machen, daß an der Maschine gearbeitet wird.	⚠ WARNUNG Auf Kühlmittel oder Schmierstoffen, bzw. Spänen könnten Sie ausrutschen und sich verletzen. Vor dem Warten der Maschine Hauptschalter ausschalten und den Innenraum sowie die Umgebung der Maschine säubern. Während der Wartung Kopfschutz und Sicherheitsschuhe tragen.
⚠ DANGER Haute tension causera des blessures graves et des risques de mort. Les réparations et les réglages des circuits électriques ne doivent être effectués que par du personnel qualifié. Coupez l'alimentation principale avant de travailler sur les circuits électriques. Apposez une affiche spécifiant que vous êtes en train de travailler.	⚠ AVERTISSEMENT Les huiles de coupe ou de lubrification et les copeaux peuvent vous faire glisser et vous blesser. Coupez l'alimentation principale et nettoyez dans et autour de la machine avant de mettre en service. Portez un casque et des chaussures de sécurité en mettant en service.

691045001 / 0302 (2)

691045-1.wmf

[4] Label, Regenerative resister**Language**

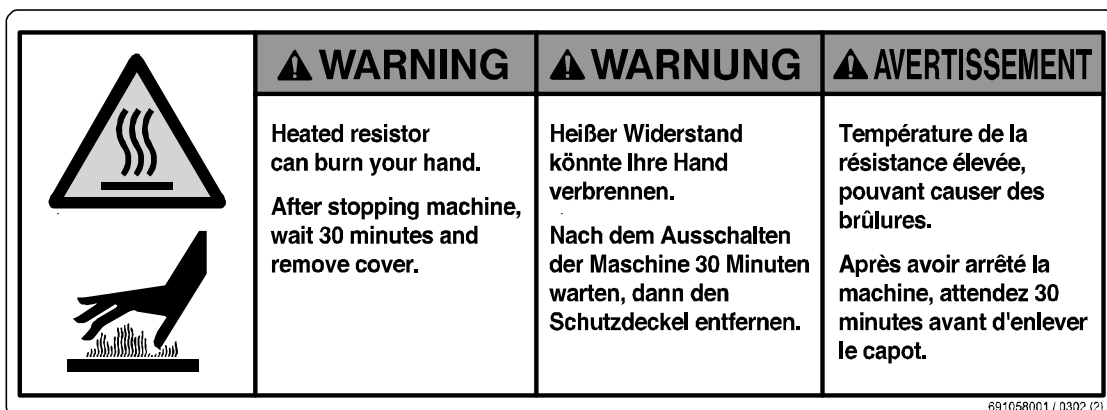
Japanese, Chinese, English

English, German, French

Part code

690729001

691058001



691058001-1.ai

[5] Label, Tool removing**Language**

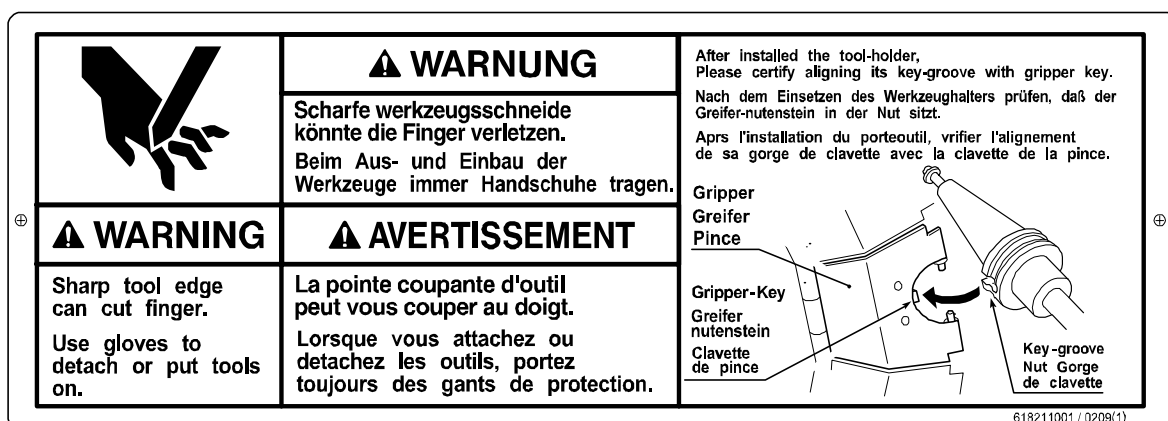
Japanese, Chinese, English

English, German, French

Part code

618210001

618211001



618211001 / 0209(1)

61821100-1.ai

[6] Safety label on side maintenance cover

Language

Japanese, Chinese, English

English, German, French

Part code

690731001

690732001



[7] Label safety 1, CTS**Language**

Japanese, Chinese, English

English, German, French

Part code

693001001

693002001



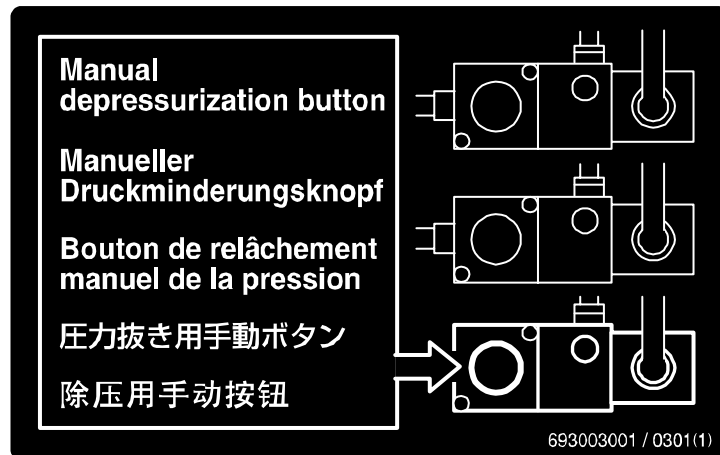
693002001-1.ai

[8] Label 2, CTS**Language**

Japanese, Chinese, English, German, French

Part code

693003001



693003001(1-1).ai

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Manuel de sûreté pour Personnel Qualifié pour Maintenance

Centreur tapant TC-S2B

**Lisez ce manuel de sûreté soigneusement
avant l'opération de le centreur tapant, s'il
vous plaît.**

Brother Industries, Ltd. Machinery & Solution Company.

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Les grandes lignes du manuel de sûreté

Lisez ce manuel

Tout le monde qui utilise le centreur tapant, y compris eux qui installent le centreur tapant dans l'usine, qui manient le centreur tapant et façonnent des pièces en travail, qui ajustent et réparent le centreur tapant, est requis de lire ce manuel de sûreté.

Dans ce manuel de sûreté, tout le monde qui utilise le centreur tapant s'exprime comme utilisateur.

Intension

Le centreur tapant consiste en circuits électriques de voltage haut, outils qui tournent avec une grande vitesse, et tables et ATC magasins qui se meuvent avec une force puissante. Pour cela, des hasards divers s'associent à la machine.

L'intension de ce manuel de sûreté est de protéger les utilisateurs contre ces hasards.

Le manuel de sûreté explique ci-dessous:

Avertissements: des types de hasards

Mesures préventives : des manières d'empêcher les hasards de surgir

Le contenu de manuel de sûreté et la relation avec les autres manuels

Chaque manuel d'instruction, sauf le manuel de programmation, contient le manuel de sûreté.

Les manuels de sûreté sont donnés à chaque groupe de personnel.

Lisez le texte du manuel d'instruction pour connaître des fonctions et des méthodes d'opération de la machine.

- 1.Manuel de opération "Manuel de sûreté pour opérateurs"
 "Manuel de sûreté pour eux qui installent et arrangent le centreur tapant"
 "FONCTION DEL 'ENCLenchement AVEC VERROUILLAGE DEL A
 PORTE"
 "Manuel de opération:
 opération de la machine necessaire pour arrangement et faconnement."
 La machine de programmation à conversation NC langage
 Code de parties pour japonais :690972001 Code de parties pour japonais :690974001
 Code de parties pour anglais :690978001 Code de parties pour anglais :690980001
- 2.Manuel d'installation "Manuel de sûreté pour eux qui installent et arrangent le centreur tapant"
 "Manuel d'installation: Installation et assemblage de la machine et ces accessoires."
 Code de parties pour japonais :690970001
 Code de parties pour anglais :690976001
- 3.Manuel de programmation"Manuel de programmation: création de programme de façonnement"
 La machine de programmation à conversation NC langage
 Code de parties pour japonais :690692002 Code de parties pour japonais :690709002
 Code de parties pour anglais :690698002 Code de parties pour anglais :690715002
- 4.Manuel de maintenance "Manuel de sûreté pour eux qui sont qualifiés pour maintenance de centreur
 tapantattaché au manuel de maintenance."
 " Manuel de maintenance: Ajustement et réparation de la machine."
 Le manuel de maintenance n'est pas distribué aux clients.

Relation à des instructions de sûreté

Les articles d'importance particulier qui apparaissent dans ce manuel de sûreté s'attachent aussi à la machine comme instructions de sûreté.

Une explication des instructions de sûreté se prépare à la fin de ce manuel de sûreté. Si des instructions de sûreté se sont détachées de la machine, obtenez des nouvelles instructions de sûreté et les attachez correctement.

Langage

Des machine envoyées à l'intérieur du Japon sont pourvues de manuels de sûreté et d'instructions de sûreté écrits en japonais. Des machines envoyées à l'étranger du Japon sont pourvues de manuels de sûreté et d'instructions de sûreté écrits en trois langages: anglais, allemand, et français. Obtenez les manuels et les instructions écrits en un langage que vous pouvez comprendre.

Sur manuels et instructions en autres langages, consultez le vendeur auquel vous avez acheté la machine.

Comment d'acheter

Quand les manuels de sûreté et les instructions de sûreté ont été perdus, obtenez-les du vendeur auquel vous avez acheté la machine.

Si vous ne savez pas le vendeur, consultez les bureaux spécifiés ci-dessous.

1-1-1 Kawagishi, Mizuho-ku, Nagoya 467-8562, JAPAN
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fax +81-52-811-0469

Maniement du manuel de sûreté

Gardez-vous de perdre les manuels de sûreté, et mettez-les sous la main toujours. Quand la machine change de main, passez les manuels de sûreté à la nouvelle propriétaire avec la machine.

Degré de danger

Les degrés de danger se classent en trois catégories d'après le niveau de dommage qui peut surgir quand des instructions ne sont pas observées.

1.DANGER **DANGER**

Domage qui peut causer une mort ou une blessure sévère.

2.AVERTISSEMENT

AVERTISSEMENT

Domage qui peut entraîner une blessure sérieuse.

3.ATTENTION

ATTENTION

Domage moins sérieux que cela ci-dessus.

Ordre d'explication

Les instructions de sûreté s'expliquent dans l'ordre ci-dessous.

- 1 Mots de signal (DANGER, AVERTISSEMENT, ATTENTION) et symboles indiquant le degré de danger
- 2 Type de danger (Sujet)
- 3 Type de dommages prévus
- 4 Mesure préventive

Significations des symboles

Les symboles sont utilisés sur les instructions de sûreté et dans les avertissements du manuel de sûreté pour expliquer des dangers possibles et leurs mesures préventives.

1. Danger



Glissement



Parties se mouvant



Trébuchement



Commotion électrique



Commotion électrique



Pris



Main coincée



Température haute



Température haute



Coupe



Coupe



Eclatement



Pointe aiguë



Objet tombant



Objet tombant



Objet tournant



Tomber



Jaillissement



Jaillissement



Feu

2. Mesures préventives



Protégez vos oreilles.



Protégez vos mains.



Protégez vos pieds.



Coupez la prise de courant.



Ne touchez pas.



Protégez votre tête.



Connectez le
coupe-circuit.

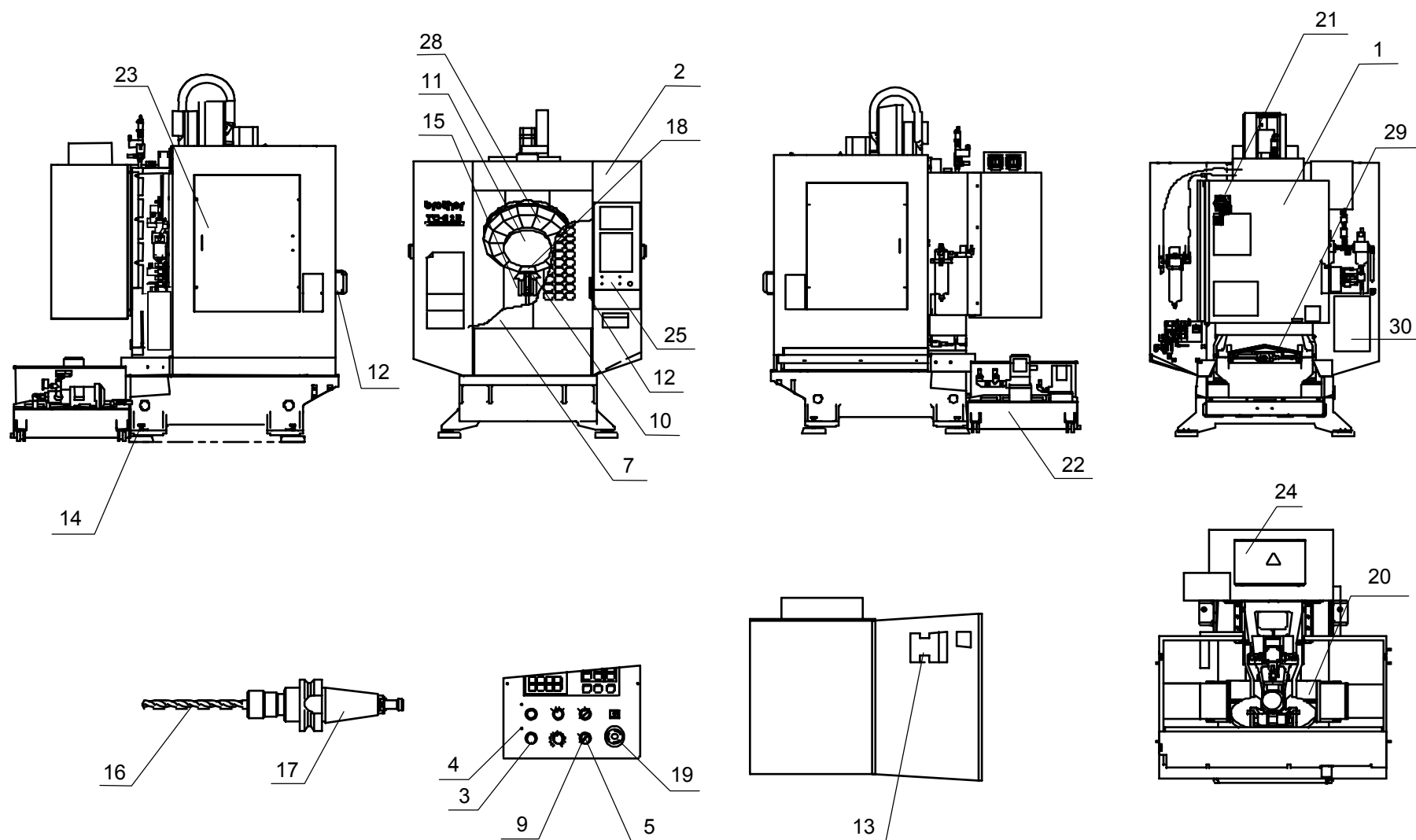


Ne Désassemblez pas.



Protégez vos yeux.

Manual: c:TC31マニュアル-安全マニュアル証明:レポート



S2B3-8. 1-1~6.wmf

各部の名称		Section names	Namen jedes Teils	Noms de sections	各部件名称
No.	各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
	日本語	English	Deutsch	Français	中文
1.	制御箱	control box	Steuerschrank	armoire de commande	控制箱
2.	スパラッシュガード	splash guard	Spitzblech	tôle pare-copeaux	火花防溅箱
3.	停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt	停止按钮
4.	停止ランプ	stop lamp	stop Lampe	lampe d'arrêt	停止指示灯
5.	ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage	机门连动装置按钮
7.	正面扉	front door	Arbeitstür	porte de travail	正面门
9.	ドアインタロッキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage	机门连动装置钥匙
10.	スピンドル	spindle	Spindel	broche	主轴
11.	ATC マガジン	ATC magazine	ATC Magazin	ATC magasin	ATC 送料装置
12.	とって	handle	Griff	poignée	把手
13.	制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande	控制箱内书架
14.	レベルングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine	水平调节螺栓
15.	クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe	润滑油喷嘴
16.	工具	tool	Werkzeug	outil	加工机具
17.	工具ホルダ	tool holder	Werkzeughalter	support à outil	加工机具架
18.	スピンドルヘッド	spindle head	Spindelkopf	tête de la broche	主轴头
19.	非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence	紧急停止按钮
20.	テーブル	table	Tisch	table	台
21.	主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale	主电源开关
22.	クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe	润滑油罐
23.	スパラッシュガードサイドカバー	Splash guard side cover	Spitzblechseitenschutz	couvercle latéral de la tôle antiéclaboussures	火花防溅箱侧面罩板
24.	回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice	再生电阻罩
25.	操作パネル	operation panel	Betriebstafel	panneau d'opération	操作板
28.	グリップカバー	grip cover	Griffschutz	couverture de jambe	夹钳套
29.	ケーブルカバー	cable cover	kabelschutz	couvre câble	揽绳套
30.	自動間欠給油ポンプ	automatic intermittent lubricating unit	automatische Intervallschmieranlage	Pompe de graissage en discontinu	自动间歇加油泵

Avertissements et mesures préventives

Les nombres dans () tels que 1, 2 correspondent aux noms de chaque section.

Danger



- MD1 Hasards divers s'associent au centreur tapant.
- MD1-1 Lisez le manuel de sûreté avant l'opération de la machine pour connaître ces hasards et les mesures préventives.
- MD1-2 Tous les utilisateurs doivent connaître la position du bouton d'arrêt d'urgence(19) et l'opération.



- MD2 Les sections de voltage haut sont presents dans l'armoire de commande(1).
Si vous les touchez par erreur, vous pouvez se blesser sérieusement ou mourir.
- MD2-1 Personnes qui ont la connaissance suffisante sur les circuits électriques de cette machine et qualité d'électromécanicien sont seulement admises à faire la maintenance et la révision des composants électriques. Des opérateurs ne doivent pas ouvrir l'armoi
- MD2-2 Coupez le contacteur de l'alimentation principale (21) avant l'opération.
Apposez une affiche spécifiant 'En train de maintenance.'
- MD2-3 Quand vous quittez la machine, fermez la porte de l'armoire de commande et fixez-la avec des vis.



- MD3 Vous pouvez se prendre dans la machine en opération et se blesser sérieusement.
- MD3-1 N'entrez pas dans le tôle-pare copeaux (2) en opération.
- MD3-2 Appuyez sur la touche d'arrêt (3) ou la touche de reproduction, assurez-vous visuellement que la lampe d'arrêt (4) allume, et mettez-vous les mains, les pieds, et le corps dans la machine.
- MD3-3 Assurez-vous visuellement que personne n'entre dans le tôle-pare copeaux avant de mettre la machine en marche.
- MD3-4 Ne vous approchez pas les mains, les pieds, et le corps de sections se mouvant en opération.
- MD3-5 Quand il est nécessaire d'entrer dans la machine, coupez le contacteur de l'alimentation principale et cadenassez-le pour que le contacteur de l'alimentation principale (21) ne soit pas mis en.



- MD4 Lorsque la fermeture de sécurité de la porte (5) est invalide, la machine continue à marcher même si la porte avant (7) est ouverte. Attention de ne pas vous blesser avec l'outil tournant (16) ou de ne pas vous faire coincer dans la machine.
- MD4-1 En cours de maintenance de la machine, faites attention extrême au mouvement de la machine pour que vous pouvez arrêter la machine n'importe quand requis. Après le travail de disposition s'est achevé, remettez l'interrupteur de la porte d'embrayage valable. Le superviseur doit décrocher la clef (9) et la garder.
- MD4-2 Ne quittez pas la machine où l'interrupteur de la porte d'embrayage n'est pas valable.



MD5 Lorsque la fermeture de sécurité de la porte (5) est invalide, la table (20) risque de bouger. Vous risquez d'être blessé si vous vous faites coincer dans la table ou dans la machine.

MD5-1 La machine risque de se déplacer pendant l'entretien. Faites en sorte de pouvoir l'arrêter à tout moment. A la fin de l'entretien fermez la porte et activez la fermeture de sécurité. Retirez la clé (9) du verrou de sécurité qui sera gardée par le superviseur.



MD7 Fondement incorrect de la machine peut aboutir à secousse électrique et vous pouvez se blesser sérieusement ou mourir.

MD7-1 Fondez la machine suivant la procédure désignée.



MD-8 Risque d'incendie en cas d'utilisation d'un réfrigérant à base d'huile sur les machines équipées d'un système de refroidissement traversant la broche (CTS).

MD-8-1 Toujours utiliser un réfrigérant soluble dans l'eau.

Avertissement

⚠ AVERTISSEMENT



- MW1 En touchant des outils tournant (16), vous vous blesserez.
- MW1-1 Ne vous approchez pas d'outils tournant.



- MW2 Attention de ne pas être blessé par les outils cassés (16) ou par les éclats de pièces.
- MW2-1 Ne mettez la machine en marche que si la porte avant (7) est fermée.



- MW3 Vous pouvez être pris dans le section tournant et se blesser.
- MW3-1 Ne vous approchez pas d'outils (16) tournant, de broche (10), et de ATC magasin (11).
- MW3-2 Portez des vêtements tout justes. Mettez des cheveux longs dans un bonnet.
Ne portez pas de gants sans que vous n'arrêtiez la machine et ni ne fassiez l'arrangement. Ne portez pas de bijoux. Ne tenez pas le section tonrnant.



- MW4 Si le dispositif de sûreté est modifié, il peut ne pas travailler précisément. Donc vous pouvez être happé par la machine, se heurter contre la machine, ou recevoir une commotion électrique.
- MW4-1 Ne modifiez pas le dispositif de sûreté. Ne fixez pas le dispositif de sûreté pour que le dispositif de sûreté ne marche pas.



- MW5 Quand des copeaux s'éparpillant vous sont mis dans les yeux, vous pouvez se blesser les globes oculaires et perdre la vue.
- MW5-1 Portez des lunettes de protection.
- MW5-2 Ne enlevez pas de copeaux en air.



- MW6 Si vous touchez des copeaux de la main nue, vous pouvez se couper la main ou se brûler.
- MW6-1 Ne touchez pas de copeaux de la main nue. Ne touchez pas de sections pointues de pièces en travail.
- MW6-2 Quand vous enlevez des copeaux, utilisez une brosse.
- MW6-3 Nettoyez copeaux de coupe quand machine est arrêtée.
- MW7 Si vous tenez le tranchant d'outil (16), vous pouvez se couper la main.
- MW7-1 Ne touchez pas le tranchant d'outil. Tenez le pied de la garde d'outil (17) toujours.



- MW8 En laissant tomber un objet lourd sur vos pieds, vous pouvez se fracturer les pieds.
- MW8-1 Quand vous levez des objets lourds, portez des chaussures de protection.
- MW9 En levant des objets lourds, vous pouvez souffrir du lumbago.
- MW9-1 Quand vous levez des objets lourds, demandez de l'aide.
- MW9-2 Levez des objets avec la force de vos jambes au lieu de votre dos.



- MW10 En travaillant dans un bruit infernal ou pendant de longues heures, vous pouvez avoir des légers troubles de l'audition.
- MW10-1 Quand vous travaillez dans le bruit, portez des protections telles que les protège-oreilles.



- MW11 Vous pouvez se blesser les yeux ou les oreilles dans un éclatement d'un air à haute pression.
- MW11-1 Vous ne devez pas installer ou changer la tuyauterie d'un air à haute pression, que vous ne soyez qualifié pour manipuler l'air à haute pression et ne compreniez la tuyauterie de la machine.
- MW11-2 Pour réparer la tuyauterie d'un air à haute pression, coupez la source de pression et enlevez la pression restante. Posez l'affiche qui dit d'en maintenance.



- MW12 Vous pouvez se frapper la tête en levant.
- MW12-1 Portez un casque de protection quand vous travaillez dans et autour de la machine.



- MW13 Si vous faites fonctionner la machine en laissant des outils dans la machine, les outils peuvent jaillir et vous blesser.
- MW13-1 Ne laissez pas des outils dans la machine.



- MW14 Vous risquez de vous coincer les mains dans la porte avant (7) si vous essayez de l'ouvrir ou de la fermer autrement qu'avec la poignée (12).
- MW14-1 Tenez la poignée de la porte extérieure, quand vous la ouvrez et fermez.



- MW15 L'armoire de commande (1) a des sections de haute température. Pour cela, si des papiers dépassent de la boîte à papiers (12) de l'armoire de commande, ils peuvent prendre feu.
- MW15-1 Ne mettez pas de papiers excédant la grandeur de papiers de A4 ou de lettre.



- MW16 Si des outils sont mis sur l'armoire de commande (1) ou la machine, ils peuvent tomber à cause de la vibration de la machine.
- MW16-1 Ne mettez pas d'objets sur l'armoire de commande ou la machine.



MW17 Si vous montez sur la machine ou le tank d'huile de coupe (22), vous pouvez tomber et se blesser.

MW17-1 Ne montez pas sur la machine ou le tank d'huile de coupe.



MW18 Si vous vous mettez la main sous les boulons à régler le niveau de la machine (14), vous pouvez avoir la main pris et se blesser.

MW18-1 Ne mettez-vous pas la main sous le boulon à régler le niveau de la machine. Utilisez des outils pour ajuster le boulon à régler le niveau de la machine.



MW19 Si le câble pend ou n'est pas couvert, vous pouvez s'en prendre ou glisser et tomber.

MW19-1 Ne donnez pas de jeu au câble. Couvrez le câble, quand il est placé sur le plancher.



MW20 La modification de la machine peut affecter le dispositif de sécurité et faire les expressions de tous les avertissements donnés inutiles.

MW20-1 Ne modifiez pas la machine. Si la modification est requise, contactez Brother Industries, Ltd. d'avance et demandez la permission par écrit.



MW21 Si de l'huile de coupe rejaillit dans vos yeux, vous pouvez se blesser les yeux.

MW21-1 Quand vous ajustez l'ajutage d'huile de coupe (15), portez les lunettes de protection.

MW21-2 Quand de l'huile de coupe rejaillit dans vos yeux, vous devez se laver les yeux à l'eau claire et consulter un médecin.



MW22 Si vous vous mettez les doigts dans un espace de la machine, vous pouvez avoir les doigts pris et se blesser.

MW22-1 Ne mettez pas les doigts entre couverture de jambe.

MW22-2 Ne vous mettez pas les doigts entre l'outil (16) ou le support à outil (17) et ATC magasin (11).



- MW23 Si de l'huile de coupe, de l'huile, ou des copeaux sont dispersés, vous pouvez glisser, tomber, ou se heurter et se blesser.
- MW23-1 Coupez le secteur de la machine, nettoyez dans et autour de la machine, et travaillez.
- MW23-2 Portez un casque de protection et des chaussures de sûreté, pendant que vous installez la machine.



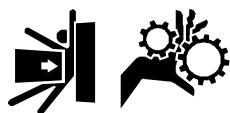
- MW24 Quand vous attachez la garde d'outil (17) à la machine ou les en détachez, vous pouvez se couper à la main en un tranchant d'outil (16) ou se heurter la main contre la machine, se heurter la main contre la machine.
- MW24-1 Ne tenez pas le bout de l'outil. Portez des gants en cuir. Tenez l'outil et la garde d'outil dans vos mains.



- MW25 La machine peut marcher brusquement, ou des outils peuvent tomber.
- MW25-1 Quand la lampe d'arrêt (4) n'allume pas, Ne vous mettez pas les mains, les pieds, et le corps sous la tête de la broche (18).
- MW25-2 Lors du réglage de la machine repoussez les colonnes vers l'arrière dans le cas d'une machine à colonne ou ramener la table vers l'avant dans le cas d'une machine à table.
- MW25-3 Avant d'entrer dans la machine, coupez le contacteur de l'alimentation principale, cadénassez-le pour qu'il ne soit pas mis en, et alimentez graisse à la machine.



- MW26 Quand vous façonnez des pièces en travail à la machine en utilisant de l'huile de coupe, la section façonnant peut chauffer et prendre feu.
- MW26-1 En utilisant de l'huile de coupe, installez un avertisseur d'incendie et un extincteur automatique.
- MW26-2 En façonnant des pièces en travail, il faut que un opérateur se tienne prêt de la machine.



- MW27 En s'appuyant à la machine, vous pouvez se prendre dans la machine ou s'y heurter et se blesser.
- MW27-1 Ne vous appuyez pas à la machine.
- MW28 Si des objets s'accrochent au bouton d'arrêt d'urgence (19), vous pouvez ne pas appuyer le doigt sur le bouton d'arrêt d'urgence.
- MW28-1 Ne accrochez pas d'objet au bouton d'arrêt d'urgence.



- MW29 Le couvercle arriere de l'axe Y a l'arriere de la machine ressort brusquement de la machine lorsque la table (20) avance. Le couvercle risque de vous heurter et de vous blesser.
- MW29-1 Coupez le contacteur de la puissance principale (21) avant de retirer les copeaux.



- MW30 Comme le réservoir d'huile de coupe (22) est lourd, en levant le réservoir d'huile de coupe vous pouvez souffrir du lumbago ou le laisser tomber sur les pieds.
- MW30-1 Ne levez pas le réservoir d'huile de coupe, quand vous enlevez des copeaux même.



- MW31 Quand vous entrez dans la machine, vous pouvez tomber en glissant et se happer dans la machine.
- MW31-1 Avant d'entrer dans la machine, coupez le contacteur de l'alimentation principale, cadenassez-le pour qu'il ne soit pas mis en, et enlevez l'huile de coupe et les copeaux. Portez un casque de protection et des chaussures de sûreté. Posez l'affiche qui dit d'en maintenance près de la panneau d'opération.



- MW32 Si la couverture à côté(23) du tôle pare-copeaux (2) n'est pas attaché, vous pouvez se prendre dans la machine ou se blesser en jaillissant des outils cassés.
- MW32-1 Assurez-vous visuellement que le couvre côté du tôle pare-copeaux est attaché avant de mettre le contact.



- MW33 Si des outils (16) ou la garde d'outil (17) dont le poids et la grandeur excèdent la limite spécifiée sont utilisés, ils peuvent sauter.
- MW33-1 Utilisez des outils et la garde d'outil dont le poids et la grandeur excèdent la limite spécifiée.
- MW33-2 Pour connaître la limite d'outils, regardez l'instruction attachée à l'outil manuel de operation.



- MW34 Si vous touchez la résistance régénératrice, vous pouvez se brûler parce que la résistance chauffe en opération.
- MW34-1 Ne enlevez pas la couverture pour a résistance régénératrice (24). .
- MW35 Si vous touchez le moteur, vous pouvez se brûler parce que le moteur chauffe en opération.
- MW35-1 Ne touchez pas le moteur dans 30 minutes après l'arrêt de la machine.



- MW36 Si un plomb de sécurité incorrect est disposé, un feu peut éclater parce que le dispositif de protection ne marche pas.
- MW36-1 Remplacez un plomb épuisé par le même plomb.
- MW37 Si la disposition du relais thermique est incorrecte, un feu peut éclater parce que le dispositif de protection ne marche pas.
- MW37-1 Ne changez pas la disposition du relais thermique.



- MW38 Si le ATC magasin (11) tourne, des outils (16) peuvent heurter des pièces en travail, une gigue, ou la machine et casser.
- MW38-1 Fixez la longueur des outils pour que les outils ne heurtent pas les pièces en travail, la gigue, ou la machine même si le ATC magasin tourne.



- MW39 Si l'armoire de commande (1) ou le panneau d'opération (25) sont mouillées, vous pouvez recevoir une commotion électrique.
- MW39-1 Ne arrosez pas l'armoire de commande et le panneau d'opération d'huile de coupe, d'eau, et de copeaux.
- MW39-2 Ne touchez pas l'armoire de commande de la main mouillée.

- MW40 Si le fil de force motrice, fil de PE, installé à l'extérieur est court, en cause du tirage du câble le fil de PE se décroche et vous pouvez recevoir une commotion électrique.
- MW40-1 Utilisez le fil plus long que autres fils (L1, L2, L3) et connectez le fil en donnant le fil du jeu.



- MW41 Si vous mettez le contact de la machine ou façonnez des pièces en travail dans une atmosphère explosible, une explosion peut survenir en cause d'une étincelle de la machine.
- MW41-1 Ne installez pas dans une atmosphère explosible.
- MW41-2 N'entretenez pas la machine dans une atmosphère explosible.



- MW42 Ne pas oublier de reposer le couvercle latéral de l'anti-éclabousseur (23) car vous risquez de vous blesser si vous restez coincé dans la machine.
- MW42-1 Avant une mise en alimentation, assurez-vous visuellement que le capot de maintenance est monté.



- MW43 Si vous touchez le câble écrasé par un objet lourd, vous pouvez recevoir une commotion électrique. Le câble écrasé peut causer un court-circuit.
- MW43-1 Une personne qualifiée doit tracer les câbles sans que les câbles soient écrasés, et rechanger les câbles si les câbles sont écrasés.



- MW44 Copeaux de coupe peuvent prendre feu ou exploser selon matériel de pièce travaillée(cas.magnésium).
- MW44-1 Enlevez tous copeaux de coupe immédiatement.
- MW44-2 Installez extincteur auprès de la machine en usinant une pièce travaillée faite de tel matériel, et ne réalisez jamais opération inhabitée.



- MW45 Pour les outils dont la pointe est amovible, la pointe risque de se détacher pendant la rotation de la broche si elle n'est pas bien fixée sur l'outil et de provoquer des blessures graves.
- MW45-1 Vérifiez que la pointe est bien fixée sur l'outil avant de fixer l'outil.



- MW49 Un feu risque de se déclencher si l'on utilise un capteur à 3 fils qui comprend une ligne d'alimentation exclusive.
- MW49-1 Utiliser un capteur à 2 fils à la place d'un capteur à 3 fils.
- MW49-2 Si l'on ne peut éviter d'utiliser des capteurs à 3 fils, ajouter un fusible (1 A ou moins) à la ligne d'alimentation de chaque capteur.



MW50 Quelque impact sur les pipes peut aboutir à fuite et arrosage entrant dans vos yeux peut aboutir à perte de vue.

MW50-1 Ne permettez pas quelque impact sur les pipes.



MW51 Quand vous réglez la direction de la lance d'arrosage, vous pouvez se couper à la main en un tranchant d'outil ou se heurter la main contre la machine.

MW51-1 Portez des gants en cuir.



MW52 Déplacement de la machine avec les câbles joints peut aboutir à secousse électrique.

MW52-1 Déconnectez les câbles de corps principal de la machine et l'unité d'alimentation (22) à eau avant de déplacer la machine.



- MW55 La pompe de graissage en discontinu est située en hauteur : faire attention de ne pas recevoir des éclaboussures d'huile dans les yeux lors du remplissage du réservoir.
- MW55-1 Toujours porter des lunettes de protection pour remplir le réservoir.



- MW56 Du fait de la grande quantité de brouillard cela provoque, l'opérateur risque de se sentir mal lors du remplacement de la pièce.
- MW56-1 Fixez un collecteur de brouillard.



- MW57 Risque de projection de réfrigérant dangereux pour les yeux au cours du nettoyage ou du remplacement du filtre ou de toute autre intervention de ce type sur les machines équipées d'un système de refroidissement traversant la broche (CTS).
- MW57-1 Avant une intervention d'entretien, ne pas oublier de purger la pression résiduelle.



- MW58 Attention de ne pas vous cogner la tête contre l'outil lorsque vous pénétrez dans la machine sans avoir détaché l'outil du magasin.
- MW58-1 Ne pas oublier de porter un casque pour pénétrer dans la machine.



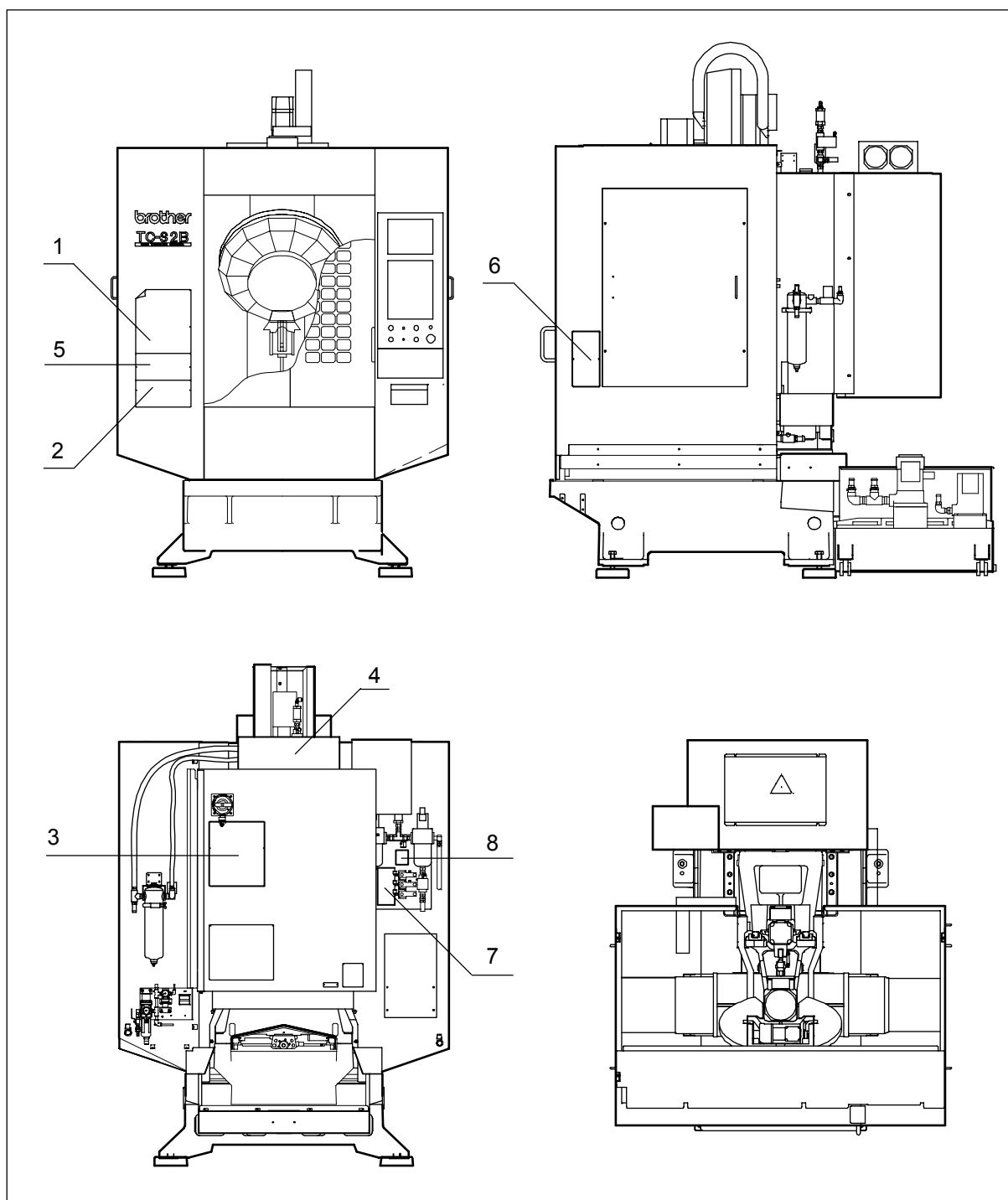
- MW59 Si vous appuyez trop fort sur la lampe fluorescente ou sur le cache transparent en verre ils risquent de se casser et de vous blesser les mains.
- MW59-1 Attention de ne pas cogner ou appuyer trop fort sur la lampe fluorescente ou son cache transparent en verre.
- MW59-2 Toujours porter des gants pour remplacer la lampe fluorescente.



- MW60 Les mauvais contacts qui se produisent lorsque les bornes ne sont pas correctement serrées après la pose des fils électriques risquent de provoquer un incendie.
- MW60-1 Après la pose des fils électriques, vérifier soigneusement le serrage des vis.

Vérification des instructions de sûreté

Les instructions de sûreté sont attachées à la machine. Leurs positions sont indiquées dans le dessin ci-dessous.



TS2BSA01-01.ai

[1] Safety label on front cover

Description on safety label vary depending on language.

Language

Japanese, Chinese, English

English, German, French

Part code

690723001

691042001

This machine has hazards.

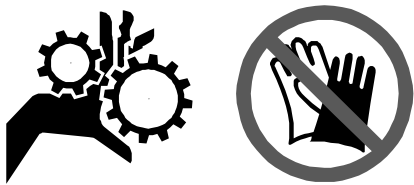
Read instruction manuals to understand hazards and avoid them before operation.

Diese Maschine birgt Gefahren.

Um Risiken zu erkennen und vermeiden, vor dem Einschalten die Betriebsanleitung lesen.

L'utilisation de cette machine comporte des risques.

Lisez les manuels d'instruction pour connaître les risques et les éviter avant d'utiliser cette machine.

⚠ DANGER	⚠ WARNING	⚠ WARNING
		
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
⚠ GEFAHR	⚠ WARNUNG	⚠ WARNUNG
Maschine in Betrieb kann plötzlich laufen und Sie stoßen. Beim Betrieb der Maschine von allen bewegenden Teilen sich fernhalten, um Verletzungen zu vermeiden.	Gebrochene Werkzeuge oder Werkstücke könnten Sie treffen und verletzen. Vor dem Start der Maschine Tür schließen.	Umlaufende Teile könnten Sie fassen und verletzen. Von umlaufendem Werkzeug, Spindel und Magazin sich fernhalten. Rotierende Teile nicht berühren. Während des Bedienens keine Handschuhe tragen.
⚠ DANGER	⚠ AVERTISSEMENT	⚠ AVERTISSEMENT
En opération, cette machine bougera soudainement et provoquera des risques d'écrasement. Ne vous approchez jamais des parties mobiles.	Les outils cassés ou les pièces usinées peuvent être projetés et risquent de vous frapper et de vous blesser. Fermez la porte avant de faire démarrer la machine.	Les parties tournantes peuvent vous accrocher et vous blesser. Ne vous approchez jamais des outils tournant, de la broche et du magasin. Ne saisissez jamais les parties en mouvement. Ne portez pas de gants pendant l'utilisation.

691042001 / 0302 (2)

691042-1.wmf

[2] Tool label on front cover

Descriptions on the tool label vary depending on the spindle speed.

Language

Japanese, Chinese, English

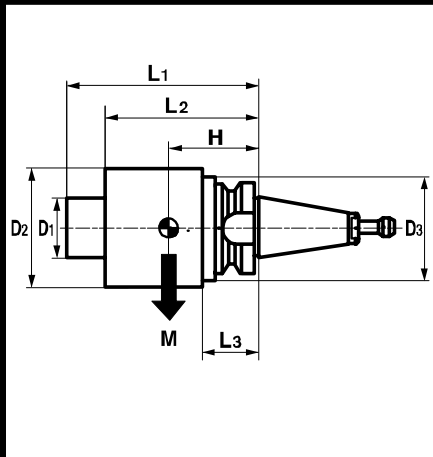
Part code

653379001

工具、主軸回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。

If use beyond the limitation of the tool and spindle speed, machine may be broken.

Check the details by the operation manual before operation.

	最高主軸回転速度	10000 min ⁻¹ / 16000 min ⁻¹		Max Spindle Rotation Speed
	主軸テーパ	7 / 24 No.30		Spindle Taper
	ツールシャンク	MAS-BT30		Tool Shank
	ブルスタッド	MAS-P30T-2 (30°)		Retension Knob
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)		Total in Magazine
	工具の制限	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 80 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 3 kg MxH ≤ 180 kgmm	D1 ≤ 40 mm L1 ≤ 200 mm D2 ≤ 55 mm L2 ≤ 160 mm D3 ≤ 46 mm L3 ≤ 30 mm M ≤ 2 kg MxH ≤ 100 kgmm	Limitation of Tool
	工具バランス制限	100 grmm	50 grmm	Limitation of Tool Balance
	主軸回転数制限	10000 min ⁻¹	16000 min ⁻¹	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

653379001(1-3).wmf

[3] Safety label, Back

Language

Japanese, Chinese, English
English, German, French

Part code

690730001
691045001

⚠ DANGER  Hazardous voltage will cause severe injury or death. Never attempt to adjust or repair electrical circuits unless you are familiar with circuits and qualified to work safely on electrical circuits. Turn off main power before working. Post notice you are working.	⚠ WARNING  Spilt coolant, lubricant, or chips are slippery and can cause injury. Turn off main power and clean in and around machine before servicing. Wear head protector and safety shoes while servicing.
⚠ GEFAHR Hochspannung kann Sie schwer oder tödlich verletzen. Nicht versuchen, Einstellungen oder Reparaturen am elektrischen Stromkreis ohne Fachkenntnisse oder Qualifikation vorzunehmen. Vor dem Eingreifen Hauptschalter ausschalten und für Dritte kenntlich machen, daß an der Maschine gearbeitet wird.	⚠ WARNUNG Auf Kühlmittel oder Schmierstoffen, bzw. Spänen könnten Sie ausrutschen und sich verletzen. Vor dem Warten der Maschine Hauptschalter ausschalten und den Innenraum sowie die Umgebung der Maschine säubern. Während der Wartung Kopfschutz und Sicherheitsschuhe tragen.
⚠ DANGER Haute tension causera des blessures graves et des risques de mort. Les réparations et les réglages des circuits électriques ne doivent être effectués que par du personnel qualifié. Coupez l'alimentation principale avant de travailler sur les circuits électriques. Apposez une affiche spécifiant que vous êtes en train de travailler.	⚠ AVERTISSEMENT Les huiles de coupe ou de lubrification et les copeaux peuvent vous faire glisser et vous blesser. Coupez l'alimentation principale et nettoyez dans et autour de la machine avant de mettre en service. Portez un casque et des chaussures de sécurité en mettant en service.

691045001 / 0302 (2)

691045-1.wmf

[4] Label, Regenerative resister**Language**

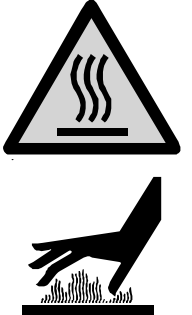
Japanese, Chinese, English

English, German, French

Part code

690729001

691058001

	⚠ WARNING	⚠ WARNUNG	⚠ AVERTISSEMENT
	Heated resistor can burn your hand. After stopping machine, wait 30 minutes and remove cover.	Heißer Widerstand könnte Ihre Hand verbrennen. Nach dem Ausschalten der Maschine 30 Minuten warten, dann den Schutzdeckel entfernen.	Température de la résistance élevée, pouvant causer des brûlures. Après avoir arrêté la machine, attendez 30 minutes avant d'enlever le capot.

691058001 / 0302 (2)

691058001-1.ai

[5] Label, Tool removing**Language**

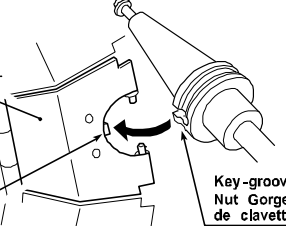
Japanese, Chinese, English

English, German, French

Part code

618210001

618211001

	⚠ WARNUNG Scharfe werkzeugsschneide könnte die Finger verletzen. Beim Aus- und Einbau der Werkzeuge immer Handschuhe tragen.	After installed the tool-holder, Please certify aligning its key-groove with gripper key. Nach dem Einsetzen des Werkzeughalters prüfen, daß der Greifer-nutenstein in der Nut sitzt. Après l'installation du porteoutil, vérifier l'alignement de sa gorge de clavette avec la clavette de la pince.
	⚠ AVERTISSEMENT La pointe coupante d'outil peut vous couper au doigt. Lorsque vous attachez ou détachez les outils, portez toujours des gants de protection.	Gripper Greifer Pince Gripper-Key Greifer nutenstein Clavette de pince Key-groove Nut Gorge de clavette 

618211001 / 0209(1)

61821100-1.ai

[6] Safety label on side maintenance cover

Language

Japanese, Chinese, English

English, German, French

Part code

690731001

690732001



[7] Label safety 1, CTS

Language

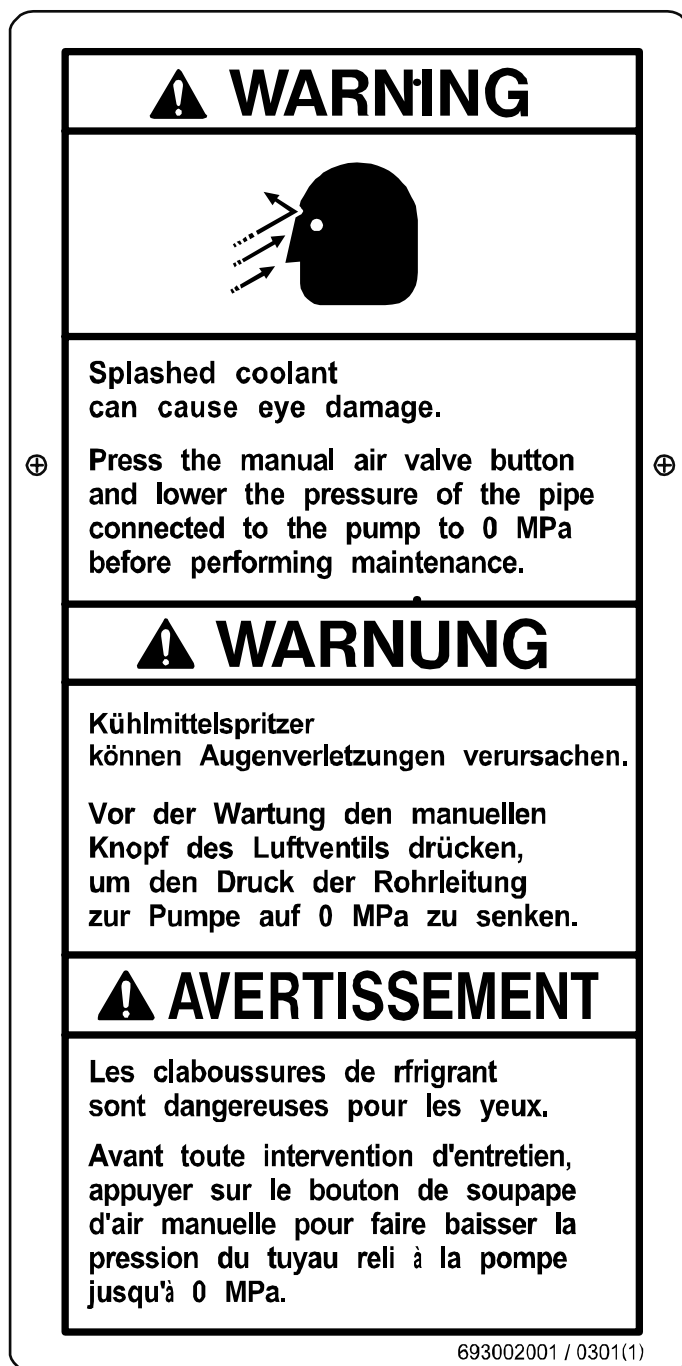
Japanese, Chinese, English

English, German, French

Part code

693001001

693002001



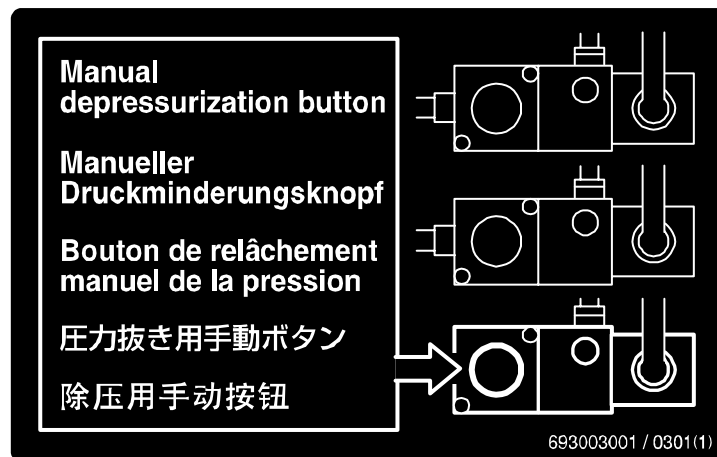
693002001-1.ai

[8] Label 2, CTS**Language**

Japanese, Chinese, English, German, French

Part code

693003001



693003001(1-1).ai

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受过培训的维修人员的安全操作规程

攻丝中心 TC-S2B

请在接触攻丝中心前仔细阅读本安全操作规程。

兄弟工业公司
玛西纳丽和苏琉雄公司

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什么是安全操作规程

务必阅读本规程

凡接触攻丝中心的人员,诸如在工厂安装攻丝中心的人员、使用攻丝中心进行加工的人员和调整修理攻丝中心的人员,务必阅读本安全操作规程。
本规程把接触攻丝中心的所有人员称为「使用者」。

目的

攻丝中心由使用高电压的电器回路、高速旋转机具、大功率移动台和 ATC 送料装置组成。所以该机器带有许多危险因素。
制订本规章的目的是保护使用者免受攻丝中心所带危险因素的伤害。
为此本安全操作规程对下述问题进行说明。

警告: 有什么危险
回避方法: 如何回避其危险

安全操作规程的内容以及和其他规程的关系

安全操作规程按使用对象进行分类, 附在各说明书里 (程序控制缝纫机除外)。您想知道机器的功能和操作方法, 请阅读说明书本篇。

- 1 操作说明书
 - 「操作人员安全操作规程」
 - 「安装和做准备作业人员的安全操作规程」
 - 「机门连动机能」
 - 「操作说明书」(准备和加工所需要的机械操作方法)
 - (操作) 日文零件编码 : 690972001 英文零件编码 : 690978001
 - (数据) 日文零件编码 : 690974001 英文零件编码 : 690980001
- 2 安装说明书
 - 「安装作业人员和准备作业人员的安全操作规程」
 - 「安装说明书」(机械和配件的安装及其组装方法)
 - 日文零件编码 : 690970001 英文零件编码 : 690976001
- 3 编制程序说明书
 - 「编制程序说明书」(加工程序的制作方法)
 - (对话) 日文零件编码 : 690692001
 - 英文零件编码 : 690698001
 - (NC 语言) 日文零件编码 : 690709001
 - 英文零件编码 : 690715001
- 4 维修说明书
 - 「受过培训的维修作业人员安全操作规程」
 - 「维修说明书」(机械的调整和修理方法)
 - 对顾客不发维修说明书。

和安全签条的关系

安全操作规程中特别重要的部分被制作成安全标签,贴在机器上。

安全操作规程的最后部分是关于安全标签的说明。如果机器上的安全签条脱落,请设法索取签条后重新贴上。

语言

日本国内销售的机器,所贴的安全操作规程和安全签条均用日文。

销售到国外的机器,用的是英文、德文、法文和中文四国文字。

请设法取得所懂语言的安全操作规程和安全签条。

关于其他国家的安全操作规程和语言签条,请询问您所购买的机器销售店。

索取方法

如果安全操作规程或安全签条遗失,请到您所购买的机器销售店索取。

如销售店无法解决,请向下列单位咨询。

日本国外联系地址

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安全操作规程的使用

安全操作规程应注意妥善保存,做到随时可以阅读。如机器更换所有人,请转交机器的新持有人。

危险程度

如无视警告,所引起的危险的程度按受害程度可分 3 种。

1. 危险

危 险

招致死亡或不可复原的严重疾患的危险。

2. 警告

警 告

招致重伤的危险。

3. 注意

注 意

轻度危险

说明的顺序

按下列顺序进行说明。

1. 表示危险程度的文字标记(危险、警告、注意)和象图
2. 危险的种类
3. 伤害的预测
4. 回避方法

象形图的意思

安全签条和安全操作规程的警告语言使用象图,形象地说明其危险程度和回避方法。现将图像的意义说明如下。

1. 危险



当心滑倒



活动部件



当心绊倒



注意触电



当心触电



当心夹入



夹进手里



注意高温



注意高温



谨防割断



谨防断裂



注意破裂



当心刺伤



有物落下



有物落下



旋转物体



当心坠落



注意飞散



注意飞散



谨防火灾

2. 回避方法



保护耳朵



保护双手



保护双脚



拔掉电源



严禁触摸



保护头部



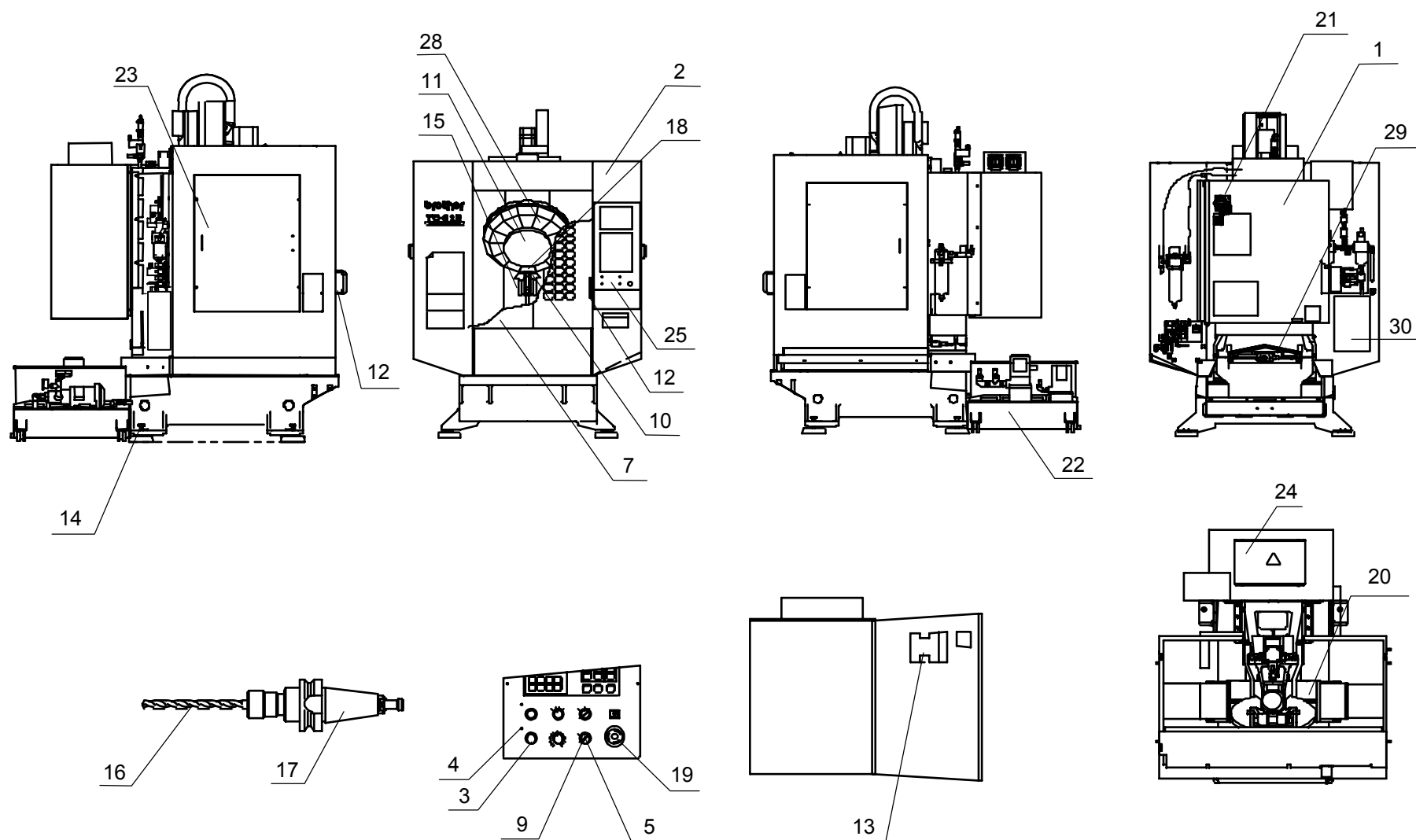
需接地线



不准分解



保护眼睛



S2B3-8. 1-1~6.wmf

各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
No. 各部の名称	Section names	Namen jedes Teils	Noms de sections	各部件名称
日本語	English	Deutsch	Français	中文
1. 制御箱	control box	Steuerschrank	armoire de commande	控制箱
2. スプラッシュガード	splash guard	Spitzblech	tôle pare-copeaux	火花防溅箱
3. 停止スイッチ	stop switch	stop Einschalter	bouton d'arrêt	停止按钮
4. 停止ランプ	stop lamp	stop Lampe	lampe d'arrêt	停止指示灯
5. ドアインタロックスイッチ	door interlock switch	Verriegelungsschalter	interrupteur de la porte d'verrouillage	机门连动装置按钮
7. 正面扉	front door	Arbeitstür	porte de travail	正面门
9. ドアインタロッキー	door interlock key	Verriegelungsschlüssel	clef de la porte d'verrouillage	机门连动装置钥匙
10. スピンドル	spindle	Spindel	broche	主轴
11. ATC マガジン	ATC magazine	ATC Magazin	ATC magasin	ATC 送料装置
12. とって	handle	Griff	poignée	把手
13. 制御箱内部書類入れ	control box document	Dokumentenbehälter im Steuerschrank	boîte à papiers de l'armoire de commande	控制箱内书架
14. レベリングボルト	leveling bolt	Nivellierbolzen	boulon à régler le niveau de la machine	水平调节螺栓
15. クーラントノズル	coolant nozzle	Kühlmitteldüse	ajutage d'huile de coupe	润滑油喷嘴
16. 工具	tool	Werkzeug	outil	加工机具
17. 工具ホルダ	tool holder	Werkzeughalter	support à outil	加工机具架
18. スピンドルヘッド	spindle head	Spindelkopf	tête de la broche	主轴头
19. 非常停止スイッチ	emergency stop switch	Notfall-stop-Schalter	bouton d'arrêt d'urgence	紧急停止按钮
20. テーブル	table	Tisch	table	台
21. 主電源ブレーカ	main power breaker	Hauptschalter	disjoncteur d'alimentation principale	主电源开关
22. クーラントタンク	coolant tank	Kühlmitteltank	réservoir d'huile de coupe	润滑油罐
23. スプラッシュガードサイドカバー	Splash guard side cover	Spitzblechseitenschutz	couvercle latéral de la tôle antiéclaboussures	火花防溅箱侧面罩板
24. 回生抵抗カバー	regenerative resistor cover	Rückkopplungs- widerstandsschutz	couverture pour la résistance régénératrice	再生电阻罩
25. 操作パネル	operation panel	Betriebstafel	panneau d'opération	操作板
28. グリップカバー	grip cover	Griffschutz	couverture de jambe	夹钳套
29. ケーブルカバー	cable cover	kabelschutz	couvre câble	揽绳套
30. 自動間欠給油ポンプ	automatic intermittent lubricating unit	automatische Intervallschmieranlage	Pompe de graissage en discontinu	自动间歇加油泵

警告和回避方法

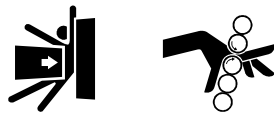
() 中的数字 1, 2 与各部分的名称号码相对应。

危险 危险

- MD1 在攻丝中心里隐藏着许多危险。
 MD1-1 为了熟知危险的内容和回避方法, 请在操作机器前阅读安全操作规程。
 MD1-2 所有使用者均须知道紧急停止开关 (19) 的位置和操作方法。



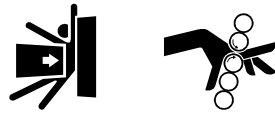
- MD2 控制箱 (1) 中有高电压装置, 不慎触摸该装置, 会引起重大伤亡事故。
 MD2-1 电气系统的维修检查作业, 只允许具有本机械电气回路知识、持有电工执照的人员才能操作。
 MD2-2 应关掉主电源总开关 (21) 后进行作业, 并设置「正在作业」的表示牌
 MD2-3 运转中的机器, 都有被其夹住而受重伤的危险。



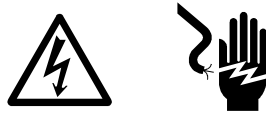
- MD3 运转中的机器, 都有被其夹住而受重伤的危险。
 MD3-1 机器在运转时, 不能将身体伸入火花飞溅箱 (2) 中去。
 MD3-2 只有在按了停止按钮 (3) 或按了回零按钮并确认停止指示灯 (4) 已经点亮后, 才能将身体或手伸入火花飞溅箱中。
 MD3-3 亲眼确认火花飞溅箱中确实无人后, 才能开动机器。
 MD3-4 在机器运转时, 手足和身体不能靠近机器的转动部分。
 MD3-5 在万不得已必须进入机器进行操作时, 应切断主电源控制板 (21) 的电源, 并加铁锁保护, 以免电源接入。



- MD4 机门联动装置的开关 (5) 处于无效状态时, 即便打开了正门 (7), 机器还是照常转动。
 这时有可能被转动的刀具 (16) 割伤或被机器夹伤。
 MD4-1 在维修时, 应注意机械的动作情况, 做到能随时停机。
 维修工作结束后, 应关闭机门, 将门联锁装置拨到有效位置。
 门联锁并取下门联锁装置的钥匙 (9), 交管理人员保管。
 MD4-2 不能在机门联动装置处于无效状态下离开机器。



- MD5 机门连动装置的开关(5)处于无效状态时,台面(20)有时也会移动。因而有被台面夹伤的危险。也有被机器夹伤的危险。
- MD5-1 正在进行保养作业,应密切注意机器的运转情况,做到能随时停机。保养作业结束后,应将机门连动装置的开关回复到有效位置。并拔去机门连动装置的钥匙(9),交监督人员保管。



- MD7 如不按规定方法将机器接上地线,有可能发生触电和重大伤害事故。
- MD7-1 应按规定方法加接地线。



- MD-8 装载有空心主轴装置的机器如果使用油性切削液的话,有可能引火而造成火灾。
- MD-8-1 必须使用水溶性切削液。

警告



- MW1 触摸转动中的加工机具(16)会受伤。
- MW1-1 不准靠近转动中的加工机具。



- MW2 折断的加工机具(16)和工件弹出会造成伤害。
- MW2-1 应关闭正门(7)后再开机。



- MW3 夹进转动部件而受伤。
- MW3-1 勿靠近转动部件(16)、主轴(10)和ATC送料装置(11)
- MW3-2 应穿合身服装。长发应拢入工作帽内。除非停机作准备工作,不能戴手套。不能戴首饰。勿模弄转动部件。



- MW4 改装安全装置,会带来安全装置失灵、触电、被夹和被打等危险。
MW4-1 勿改装安全装置。勿固定安全装置,以免安全装置失灵。



- MW5 切削碎屑飞入眼内,会伤及眼球而失明。
MW5-1 应戴用铁屑防护眼镜。
MW5-2 勿用压缩空气清扫切削碎屑。



- MW6 用手触摸切削碎屑,会造成外伤或烫伤。
MW6-1 勿用手触摸切削碎屑。勿用手触摸加工件的尖厉部分。
MW6-2 清理切削碎屑应戴手套,使用刷子。
MW6-3 应在停机后清理切削碎屑。



- MW7 勿握模加工机具(16)的刀刃,以免手被割破。
MW7-1 勿握模加工机具的刀刃。拿取加工机具时应拿住加工机具的套柄(17)部分。



- MW8 重物跌落脚上,会造成足部骨折。
MW8-1 抬拿重物时应穿安全鞋。

- MW9 抬拿重物时,注意闪腰。
MW9-1 抬拿重物时,应请他人协助。
MW9-2 抬拿重物时,应双脚用力而非腰部用力。



- MW10 长时间身处噪音之中或巨大的噪声之中,会造成双耳失聪。
MW10-1 在噪音中作业时,应戴耳塞等保护器具。



- MW11 高压设备有可能爆裂而伤及眼目。
 MW11-1 没有接受过高压设备使用方法培训 不懂该机器配管的人员,不能安装和改装高压设备。
 MW11-2 在进行高压设备的配管作业时,应切断高压电源,放去残留高压空气后再进行作业。并设置「正在作业」的表示牌。



- MW12 站起时注意碰伤头。
 MW12-1 在机器内部或周围进行作业时应戴安全帽。



- MW13 开机时,机器中有未取出的加工工具时,加工工具有可能飞散而造成工伤。
 MW13-1 勿将加工工具遗忘在机器中。



- MW14 开闭正门(7)时,如不持握门上的把手(12),手可能会被机器夹住。
 MW14-1 开闭门时,应持握把手(12)。



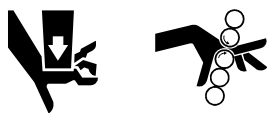
- MW15 控制箱(1)中有些机具处于高温状态,如控制箱内部的文件架(13)上的资料露出文件架,有起火燃烧的危险。
 MW15-1 文件架上不能放置超过 A4 尺寸或信笺尺寸的资料。



- MW16 在控制箱(1)和机器上放置工具时,工具会震落。
 MW16-1 在控制箱和机器上勿放置物品。



- MW17 攀登机器和润滑油储存罐 (22), 须注意坠落受伤。
MW17-1 勿攀登机器和润滑油储存罐。



- MW18 把手伸进水平调节螺栓 (13) 的下面, 须注意手被夹伤。
MW18-1 勿将手伸进水平调节螺栓的下面去。调节水平调节螺栓应使用工具。



- MW19 缆绳下垂或不加缆绳护罩, 会发生绊滑跌倒等工伤事故。
MW19-1 应收紧缆绳的松余部分, 沿地板拖放时应加缆绳护罩。



- MW20 擅自改装机器, 会使安全装置失灵, 安全操作规程和安全签条的警告事项将失去作用。
MW20-1 勿改装机器。需要改装时, 应事先和兄弟工业公司联系, 取得兄弟工业公司的书面允许。



- MW21 润滑油进入眼睛, 会损伤眼睛。
MW21-1 调整润滑油喷头 (14) 时, 应配戴防护眼镜。
MW21-2 润滑油进入眼睛后, 应用清水洗眼, 接受医生诊治。



- MW22 如果把手指放入机器的夹缝里, 有可能会被夹住而受伤。
MW22-1 不要把手指放入夹钳套 (30) 的中间。
MW22-2 不要把手指放入工具 (16) 或工具夹子 (17) 以及 ATC 刀库 (11) 之间。



- MW23 如润滑液、机油或切削碎屑被打翻, 会因滑脚、跌倒、碰撞而受伤。
 MW23-1 应切断电源, 并清扫机器内部和机器周围以后, 再进行作业。
 MW23-2 安装作业应戴安全帽和穿安全鞋。



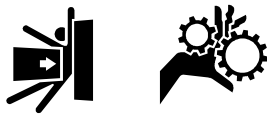
- MW24 拆卸加工机具套柄(17)时, 须注意手可能会被加工机具(16)的刀刃所伤或手被机器打着。
 MW24-1 不得握模加工机具的刀刃。拿加工机具时应戴皮手套。应用双手持拿加工机具。



- MW25 机器可能突然停机, 加工机具可能突然脱落。
 MW25-1 停止指示灯(4)不亮时, 不要将手脚、身体伸到主轴头(18)下面去。
 MW25-2 应将工作台拉到身前, 进行安排工作。
 将小棍向里扳动, 然后进行安装。
 MW25-3 切断主电源总开关(21), 加锁以防止总开关打开, 然后补充润滑液。

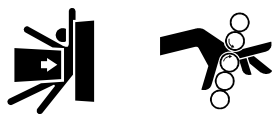


- MW26 如使用油性润滑液加工, 加工部位可能受热起火。
 MW26-1 使用油性润滑液时, 应设置火警预报器和自动灭火装置。
 MW26-2 加工时, 操作人员不得离开机器。



- MW27 机器开动时, 人傍靠在机器上, 会有被夹、被打致伤的危险。
 MW27-1 勿傍靠在机器上。

- MW28 紧急停止开关(19)上挂有物品时, 紧急停止开关会按不进去。
 MW28-1 不得在紧急开关上钩挂物品。



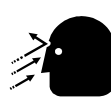
- MW29 移动工作台(20)的话, 有因碰撞到从机器背面飞出的缆绳套(29)而受伤的危险。
 MW29-1 在切断主电源断流器(21)之后, 要把其碎片清扫干净。



- MW30 润滑油罐 (22) 很重, 抬拿时须注意闪腰或脚被砸伤。
MW30-1 清理切削铁屑时也不得抬拿润滑油罐。



- MW31 进入机器时, 须注意滑倒或被机器夹住。
MW31-1 进入机器前, 应先切断主电源开关 (21), 加锁以防止总开关被打开。清扫润滑油和铁屑时, 应穿戴安全鞋和安全帽。并在操作盘附近置放「正在作业」的标牌。



- MW32 别忘记安装火花飞溅箱 (2) 的侧面护板 (23), 以免操作人员被夹或被断裂的加工机具打伤。
MW32-1 在打开电源前应亲自确认是否装上了侧面护板。



- MW33 如果使用超重超大的加工机具 (16)、加工机具套柄 (17), 该机具或该机具的套柄有可能飞脱。
MW33-1 应使用重量和尺寸都在规定以内的加工机具和套柄。
MW33-2 加工机具的限制条件请见加工机具签条和操作说明书。



- MW34 机器在运转过程中, 再生电阻会发热, 须注意触摸再生器会被烫伤。
MW34-1 勿拆卸再生电阻罩 (24)。

- MW35 机器在运转过程中, 马达会发热, 须注意触摸马达可能会被烫伤。
MW35-1 在停止运转后的 30 分钟内不要触摸马达。



- MW36 使用规定以外的保险丝, 会使保护装置失灵, 可能酿成火灾。
MW36-1 调换保险丝时, 使用的保险丝规格应和刚用完的相同。

- MW37 当改变热传导器的设定时, 保护装置将失灵, 有可能发生火灾。
MW37-1 勿改变热传导器的设定值。



- MW38 在旋转 ATC 刀库(11)时, 工具(16)会碰到工作物、夹具或者机器而折断。
 MW38-1 将刀长设定在即使在旋转 ATC 刀库时, 也不会让工具碰到工作物、夹具或机器的位置。



- MW39 如控制箱(1)和操作盘(25)潮湿, 须注意有可能触电。
 MW39-1 不能将润滑油、水、切削铁屑撒到控制箱和操作盘上。
 MW39-2 不能用潮湿的手触摸控制箱。
- MW40 为防止触电, 应确确实实地连接地线。
 MW40-1 从外部引进的动力线的 PE 线过短的话, 当拉动电缆线时, PE 线有可能松脱而触电。
 MW40-2 接续 PE 线时, 应留有余地, 长于其他电线(L1、L2、L3)。



- MW41 如果在有爆炸危险的环境下打开机器电源, 或进行加工作业, 有可能因机器的火花而引起爆炸。
 MW41-1 不要将机器安装在有爆炸危险的环境下。
 MW41-2 不在有爆炸危险的环境下打开机器电源, 或进行加工作业。



- MW42 别忘加火花防溅装置侧面盖罩, 否则会被夹伤。
 MW42-1 在打开电源前, 应亲自确认维修罩是否已经装好。



- MW43 接触被重物压坏的电缆线时有可能被麻电, 或电缆线被重物压坏而造成短路。
 MW43-1 应让持有电工执照的人员进行电缆线的铺设, 以防止电缆线被弄坏。电缆线破损时应调换新的电缆线



- MW44 有些被加工件的材料切削碎屑有可能引火或爆炸。
 MW44-1 切削碎屑应立即清除。
 MW44-2 在加工上述材料时, 机器附近应放置灭火设备或进行无人作业。



- MW45 使用脱卸式固定斜楔的工具时, 如固定斜楔安装不牢固, 主轴旋转时, 有可能飞脱砸人, 造成工伤。
 MW45-1 务必先确认固定斜楔是否安装牢固以后再安装工具。



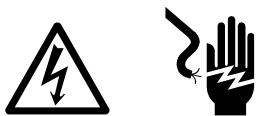
- MW49 使用设有电源线专用的配线的 3 线式感应器的时候, 有引火的危险。
 MW49-1 请不要使用 3 线式感应器, 应使用 2 线式感应器。
 MW49-2 不得已使用 3 线式感应器的时候, 应在电源线部追加个别保险丝 (1A 以下)。



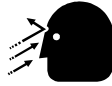
- MW50 撞击配管部可能造成配管泄漏, 润滑油进入眼睛有可能引起失明。
 MW50-1 使用时应注意避免撞击配管。



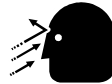
- MW51 在调整润滑油储存罐的喷头时, 应注意手被加工刀具割伤, 或被打到机器上去。
 MW51-1 调整时应戴皮手套。



- MW52 移动机器时, 如电缆线原封不动地接在机器上, 电缆线有可能脱落而触电。
 MW52-1 移动前应拆下机器本体及润滑油储存罐 (22)。



- MW55 由于自动间歇加油泵放置于高处，加油时要防止油飞入眼睛。
MW55-1 加油时要戴防护眼镜。



- MW56 由于发生大量的喷雾，作业人员在工作交换时可能会产生恶心。
MW56-1 一定要戴防雾面具。



- MW57 装载有空心主轴装置的机器，在清扫、交换过滤网等进行保养时，要防止切削液飞入眼睛而受伤。
MW57-1 放掉残压后进行作业。



- OW58 将带有工具的刀库放入机器内时，要防止工具打到头而受伤。
OW58-1 进入机器里面时要戴安全帽。



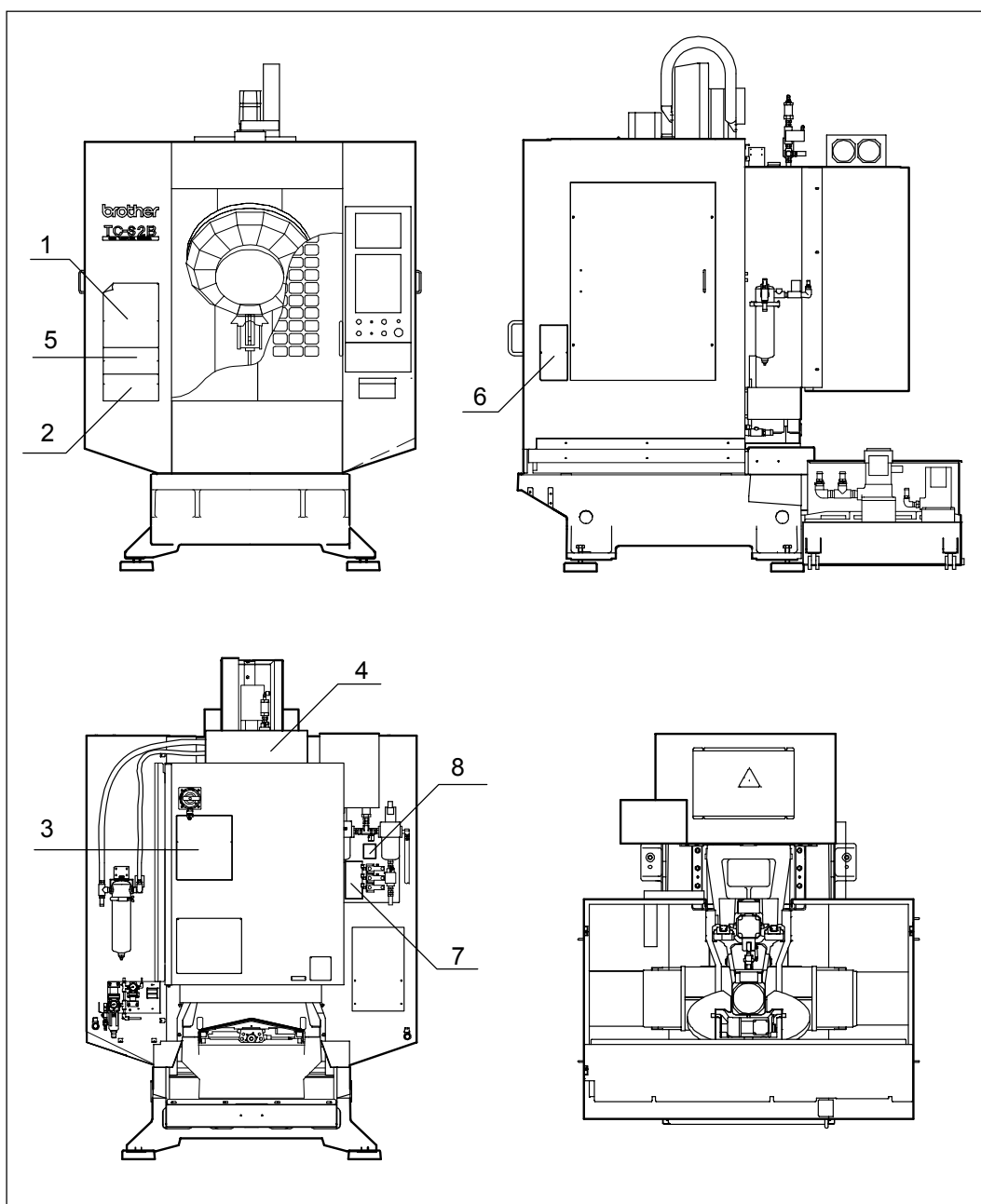
- MW59 如果给荧光灯和透明玻璃无端施加压力的话，就会使其破损并有可能将手弄伤。
MW59-1 不要使物品碰撞到荧光灯和透明玻璃，也不要无端对其施加压力。
MW59-2 交换时要戴手套。。



- MW61 配线时，端子台的螺丝锁得不紧的话，会导致由于接触不良引起发热、起火的危险。
MW61-1 配线时，螺丝应无松缓。

安全签条的说明

机器上贴有安全签条, 安全签条是安全操作规程中特别重要的部分。
请在充分理解了安全签条的内容以后再进行机器的操作。
安全签条贴在机器的下述位置, 请确认安全签条有否脱落。如有脱落, 请索取后重贴。



0907-1.ai

[1] [前面] 安全签条

语言

和中英文

零件编码

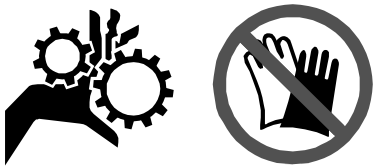
690723001

This machine has hazards.

Read instruction manuals to understand hazards and avoid them before operation.

危険の内容と回避方法を理解するため、取扱説明書を読んでから、機械を操作してください。

由于有必要了解危险的内容和避免的方法，请仔细阅读完使用说明书后，再操作机器。

⚠ DANGER	⚠ WARNING	⚠ WARNING
		
Machine in operation will suddenly move and crush you. Keep away from moving parts.	Broken tool or workpiece can hit and wound you. Shut door before starting machine.	Rotating parts can catch and injure you. Keep away from rotating tool, spindle, and magazine. Never hold moving parts. Do not wear gloves while operating machine.
⚠ 危険	⚠ 警告	⚠ 警告
Ⓢ 機械が、とつぜん、動き、はさまれて大けがをする。動くところに、手足や、からだを近づけないこと。	Ⓢ おれた工具や工作物がとびだし、ぶつかって、けがをする。とびらをしめてから運転すること。	Ⓢ 回転部分にまきこまれて、けがをする。回転している工具、スピンドル、マガジンに近づかないこと。回転部分を、つかまないこと。運転作業中は手ぶくろをしないこと。
⚠ 危険	⚠ 警告	⚠ 警告
被机器突然运行所夹住，会致人重伤。 在机器运转时，手足切勿靠近。	折损的刀具或工件飞出，会伤人。 请务必关上门之后，运行机器。	被回转部分夹住，会受伤。 不要靠近正在运行中的主轴，旋转头。 不要抓住回转部分。在操作时不许戴手套。

690723001 / 9411 (1)

[2] 前面刀具标签

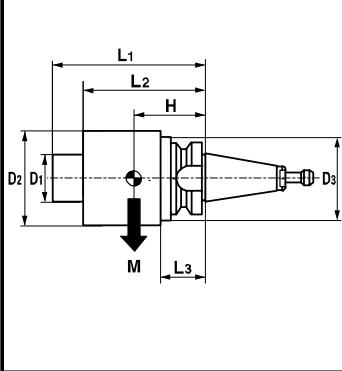
根据刀库的最大刀具收纳把数及主轴回转次数, 更改记载内容。

语言

和中英文

零件编码

653379001

工具、主轴回転数の制限を超えて使用すると、機械が破損する場合があります。操作前に、取扱説明書で詳細を確認して下さい。 If use beyond the limitation of the tool and spindle speed, machine may be broken. Check the details by the operation manual before operation.			
	最高主轴回転速度	10000 min ⁻¹ / 16000 min ⁻¹	Max Spindle Rotation Speed
	主轴テーパ	7 / 24 No.30	Spindle Taper
	ツールシャンク	MAS-BT30	Tool Shank
	プルスタッド	MAS-P30T-2 (30°)	Retension Knob
	マガジン全工具合計	M total 25 kg (14Tools) / 35 kg (21Tools)	Total in Magazine
	工具の制限	D1 ≦ 40 mm L1 ≦ 200 mm D2 ≦ 80 mm L2 ≦ 160 mm D3 ≦ 46 mm L3 ≦ 30 mm M ≦ 3 kg MxH ≦ 180 kgmm	D1 ≦ 40 mm L1 ≦ 200 mm D2 ≦ 55 mm L2 ≦ 160 mm D3 ≦ 46 mm L3 ≦ 30 mm M ≦ 2 kg MxH ≦ 100 kgmm
	工具バランス制限	100grmm	50grmm
主轴回転数制限		10000 min ⁻¹ 16000 min ⁻¹	Limitation Spindle Rotation Speed

653379001 / 0210 (2)

[3] 背面安全签条

语言

和中英文

零件编码

690730001

⚠ DANGER	⚠ WARNING
	
Hazardous voltage will cause severe injury or death. Never attempt to adjust or repair electrical circuits unless you are familiar with circuits and qualified to work safely on electrical circuits. Turn off main power before working. Post notice you are working.	Spilt coolant, lubricant, or chips are slippery and can cause injury. Turn off main power and clean in and around machine before servicing. Wear head protector and safety shoes while servicing.
⚠ 危 険	⚠ 警 告
高 電 圧 感電死することがある。 電気の保守・点検作業は、この機械の電気回路の知識があり、電気安全の教育を受けた人間だけが、おこなうこと。 主電源を切ってから、作業すること。 作業中であることを表示すること。	切削液、油、または切りくずのこぼれで、ころんだり、ぶつかって、けがをする。 機械の電源を切り、機械の中やまわりをそうじしてから、作業すること。 すえつけ作業のときは、ヘルメットと安全靴を使うこと。
⚠ 危 険	⚠ 警 告
高 圧 電 触电会致死。 电器的保养，检查的实施，仅限于了解该机器电路知识，受过电器安全教育的人员。 主电源切断之后，进行作业。 要作好正在作业的标志。	切削液，机油，切削粉末溢出后，迭倒碰撞会受伤。 切断机器的电源，把机内和四周打扫干净之后，再工作。 安装作业时，要戴上安全帽，穿上防护鞋。

690730001 / 9709 (1)

[4] 再生阻抗器罩签条

语言

和中英文

零件编码

6907290001

	⚠ WARNING Heated resistor can burn your hand. After stopping machine, wait 30 minutes and remove cover.	⚠ 警告 熱い抵抗器 さわるとやけどする。 運転が終り、 30分たってから、 カバーをはずすこと。	⚠ 警告 热电阻 触摸会烫伤。 停止运行 30 分钟之后， 才可取下安全罩。

690729001 / 9709 (1)

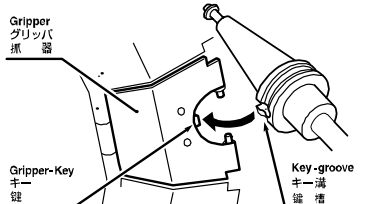
[5] 加工机具装脱签条

语言

和中英文

零件编码

6182110001

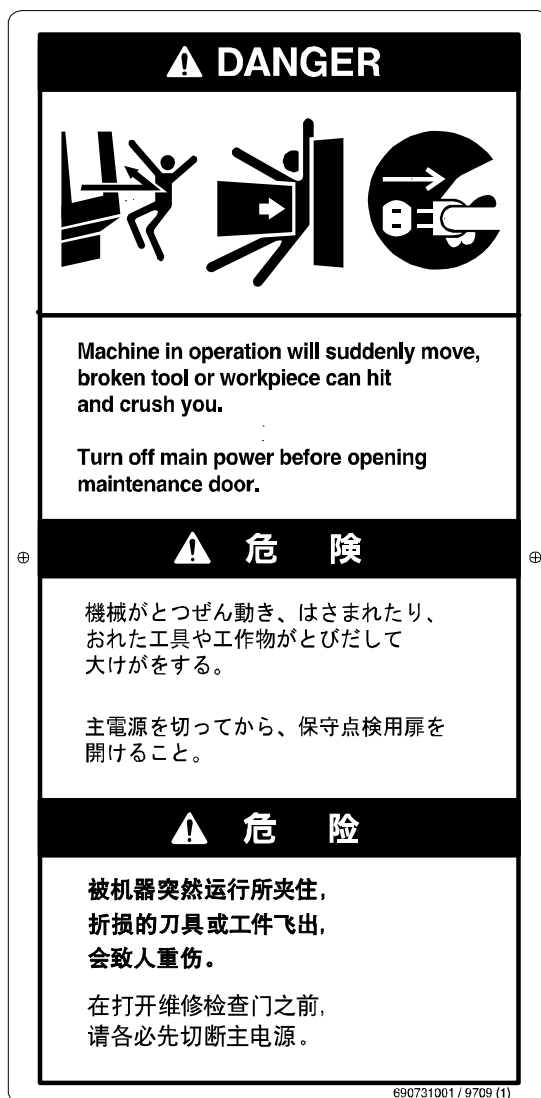
	⚠ WARNING Sharp tool edge can cut finger. Use gloves to detach or put tools on.	After installed the tool-holder, Please certify aligning its key-groove with gripper key. 工具の取付け後は、工具ホルダーのキー溝が グリップバのキーと合致していることを確認してください。 工具安装后请，确认工具支架的键槽 与 抓器的键是否吻合。 
⚠ 警告	⚠ 警告	
工具の刃先で手を切る。 工具の着脱作業時には 作業用手袋を装着すること。	刀头可能切伤手指， 在进行工具的装卸作业时， 应戴作业套手。	

6182110001 / 0209 (1)

[6] 側面修罩安全条

语言
和中英文

零件编码
690731001

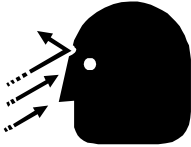


[7] 有空心主轴（CTS）安全签条 1

语言
和中英文

零件编码
6903001001

⚠ WARNING



**Splashed coolant
can cause eye damage.**

⊕ **Press the manual air valve button
and lower the pressure of the pipe
connected to the pump to 0 MPa
before performing maintenance.** ⊕

⚠ 警告

切削液が飛散して目を傷つける。
メンテナンス時には、
エアバルブの手動ボタンを押し、
ポンプにつながる配管の圧力を
0MPaに下げて作業すること。

⚠ 警告

切削液飞散弄伤眼睛
维修时按气体活门的手动按钮，
将连接打气筒的配管压力降低至
0 MPa

693001001 / 0301(1)

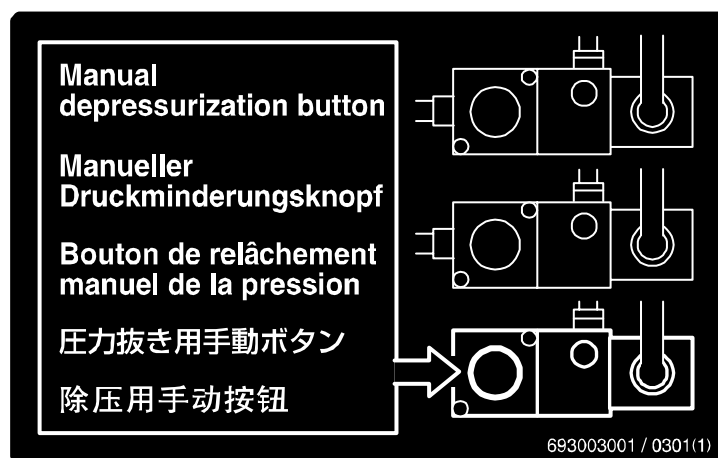
[8] 有空心主轴（CTS）签条 2

语言

零件编码

和中英文

6903003001



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DOOR INTERLOCK FUNCTION

1. General Precautions
2. Overall View
3. Inspection of Door Interlock
4. Function Details

1 General Precautions

⚠ DANGER

When the door interlock switch is invalid, the machine moves even when the work door is open. You may cut yourself on a rotating tool or be caught in the machine. When the door interlock switch is invalid, do not put your hands, feet, and body in the machine. Report it to the supervisor.

When the door interlock is invalid, the supervisor must not allow anybody to operate the machine.

Visually check by yourself that the door interlock switch is valid before starting machine operation.

If the door interlock key is attached, report it to the supervisor.

The supervisor must always keep the door interlock key.

⚠ DANGER

When the door interlock switch is turned off, the table may move.

Mechanical parts inside the inner door move even if the inner door is open. You may be caught and injured on the table. You may be caught in the machine.

When the door interlock switch is invalid, do not put your hands, feet, and body inside the outer door.

When the door interlock is invalid, the supervisor must not allow anybody to operate the machine.

If the door interlock key is attached, report it to the supervisor.

⚠ DANGER

When the inner door is open, you may cut yourself on a rotating tool or have your hand caught in the machine.

The operator must not open the inner door.

When the inner door is open, do not put your hands and feet inside the machine. The supervisor must apply a padlock to the inner door. The supervisor must always keep the inner door key.

The supervisor should not allow the operator to use the machine when the inner door is not padlocked.

Visually check by yourself that the door interlock switch is valid before starting machine operation.

When you find that the inner door is not padlocked, you must inform your supervisor of it.

⚠ WARNING

Touching rotating tools results in injury.

Keep away from rotating tools.

⚠ WARNING

You may be caught in the rotating part, resulting in an injury.

Keep away from rotating tools, the spindle, and the ATC magazine.

Wear snug-fitting clothes. Put long hair up in cap. Do not wear gloves except for set-up operations carried out with the machine stopped. Do not wear any accessories. Do not hold the rotating part.

Purpose

The door interlock function protects workers from being caught in the machine while tools are rotating and parts are moving.

Unit Description

The interlock is activated so that the outer door is locked and the maximum speed is limited to suit the situation.

Unit Structure

The door interlock unit is composed of the following:

1. Door limit switch
2. Door lock

Using the Door Interlock Function

1. During daily operation

Always keep the door interlock function switch (1) on.

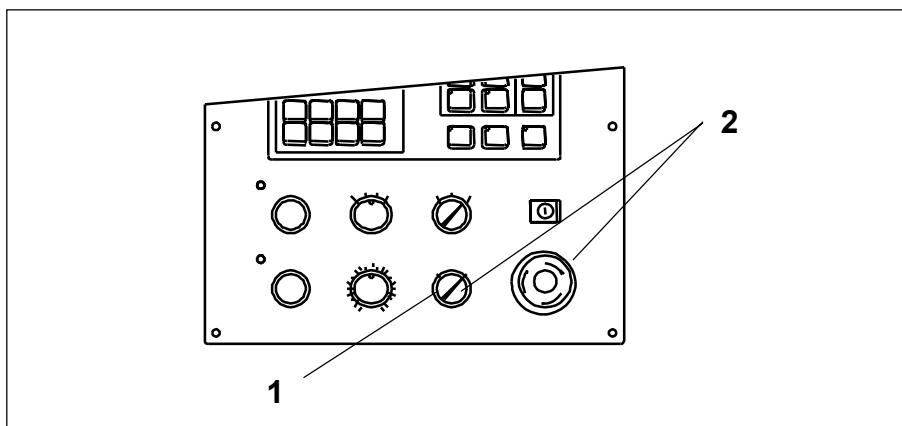
2. During set-up and maintenance

Turn the switch off only when it is necessary to release the interlock function during set-up and maintenance.

Read the 'Safety manual for those who install and set-up the tapping center' and the 'Safety manual for those qualified for tapping center maintenance' before starting set-up and maintenance.

Please observe the following when the interlock function is off.

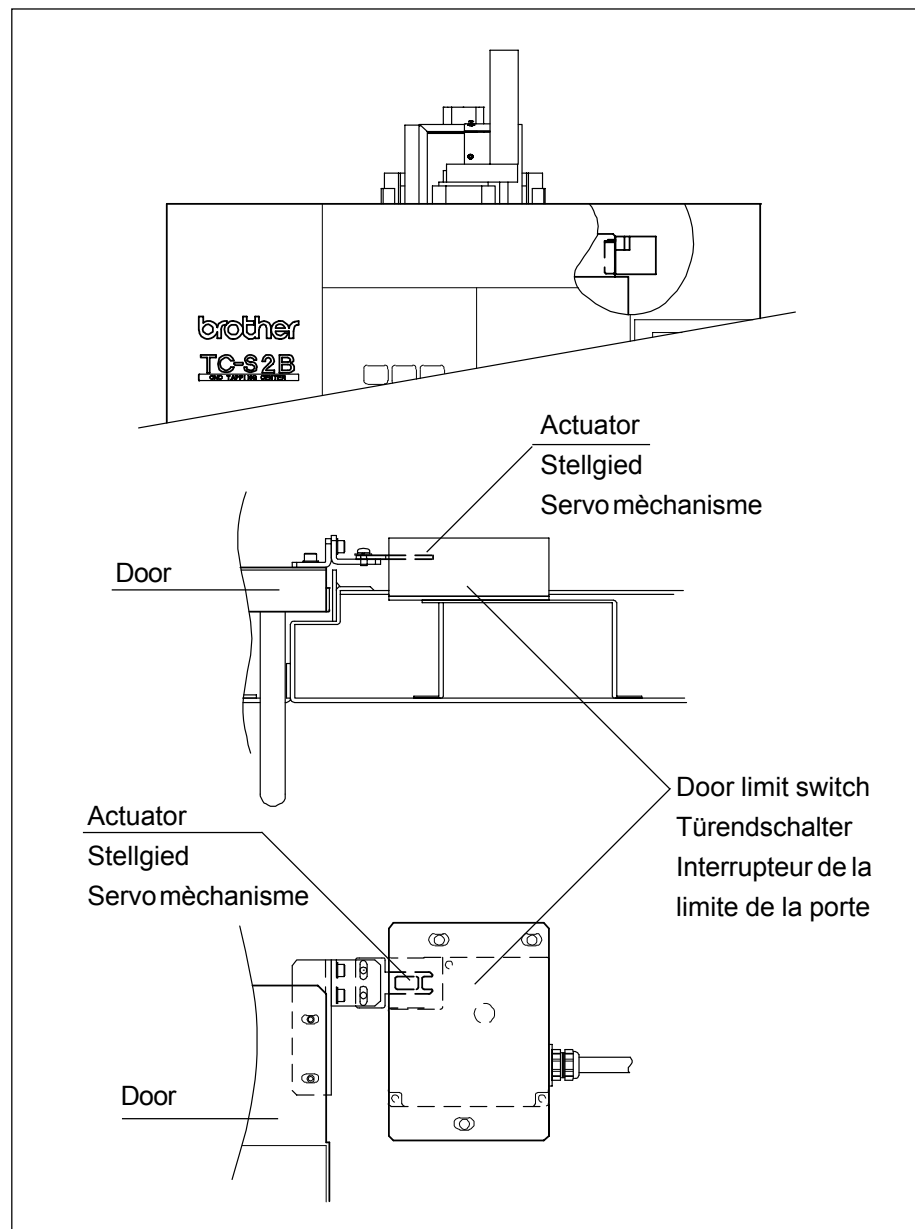
- When the door interlock function is off, be extremely careful not to be caught on a rotating tool or any moving parts.
- After set-up or maintenance, turn the switch on.
- The supervisor is responsible for keeping the key (2).



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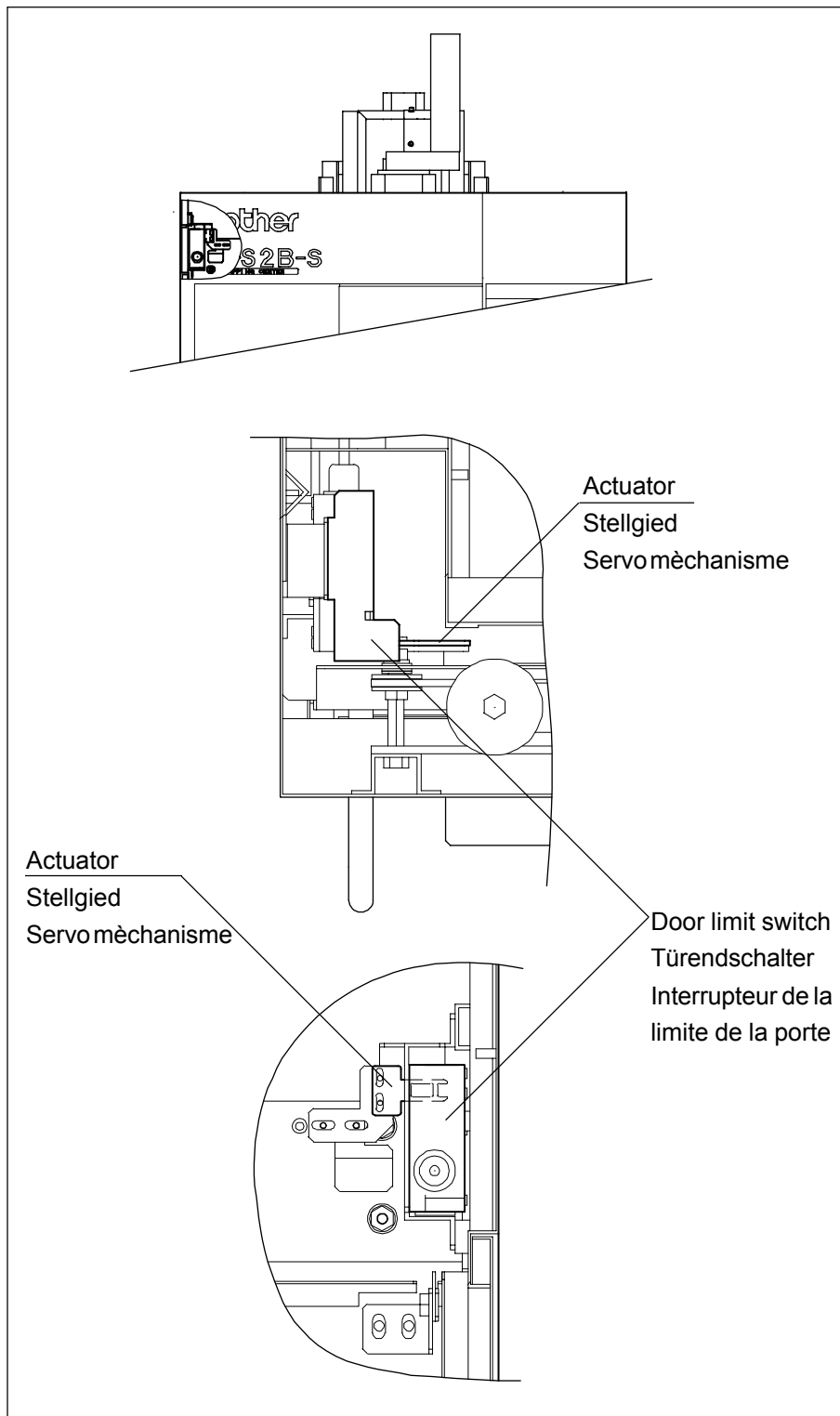
2 Overall View

TC-S2B



TS2BDoor01-01.ai

TC-S2B short



TS2BDoor01-02.ai

3 Door Interlock Inspection

Before starting machine operation, be sure to inspect the door interlock.

Inspection steps

Inspection of operation stoppage

1. Close the door completely, then turn the power on and conduct home position return.
Check that the door interlock switch is validated.
2. Open the outer door.
3. If the door interlock is operating correctly, the machine does not move even when the [-X] key on the operation panel is pressed.
At this time, an alarm indicating the door is open is output.
If the alarm is not output, the interlock function is faulty. Repair it.
After verifying that the door interlock is operating correctly, proceed to the next step.

Inspection of door lock

4. Close the outer door.
5. Rotate the spindle.
6. If the door lock operates correctly, the outer door is locked and cannot be opened. If the door can be opened, the door is not locked and the interlock function is faulty. Repair it.

Emergency stop inspection

7. Rotate the spindle in manual mode.
8. If the door interlock is operating correctly, the machine stops and the [*EMERGENCY SW ON] alarm is displayed when the emergency stop button is pressed. If the machine does not stop or no alarm message is displayed, the interlock function is faulty. Repair it.

4 Function Details

Door condition (*6)	Door interlock	Door lock(*6)	Machine operation
Closed	Invalid	Will not be locked	All operations are possible.
	Valid	During machine operation (axis movement, spindle rotation, MDI operation, MEMORY operation, or when the manual pulse generator is on .)(*4)	
Open	Invalid	Will not be locked	·Spindle rotation, magazine swivel, ATC, and tapping are impossible.(*2) ·Axis movement, spindle stop, and spindle orientation are possible.(*1) ·MEMORY operation is possible only in single operation mode. ·MDI operation stops at each block end. Not come out coolant.
	Valid		All operations are impossible.(*2)(*5) Not come out coolant.
Closed ↓ Open	Invalid		All operations (including spindle rotation) stop immediately.(*3) Coolant stops immediately.
	Valid		All operations (including spindle rotation) stop immediately.(*3)(*5) Coolant stops immediately.
Open	Invalid ↓ Valid		

- *1. The rapid traverse feed speed is preset by the MAX RAPID SPEED (DOOR OPEN) of machine parameter.
The cutting feed speed is restricted to the speed preset by the MAX RAPID SPEED (DOOR OPEN) of machine parameter.
Additional axes (A, B, C) are also restricted to the speed preset by the MAX H. SPDROTN 4,5,6 (DOOR OPEN) of machine parameter.
- *2. The “NOT CLOSING DOOR” error occurs when the front door is open when operation is attempted
- *3. Operations, including tapping, spindle orientation, ATC, or magazine swivel, stop at each block end. When the door is opened during spindle rotation, the “DR OPEN SPNDL STOP” error occurs and the spindle stops. When the door is closed and operation is resumed, the rotating condition prior to stopping is recovered.
However, when the following operations are carried out, the “DR OPEN SPNDL STOP” error is reset. Even if the door is closed and operation is resumed, the rotating condition prior to stopping is not recovered when:
 - 1) The **[RST]** key is pressed.
 - 2) Spindle operation is carried out in manual mode.

Note

When the door is opened during spindle rotation after the end mill tap first motion (XY-axes movement and spindle rotation), the spindle stops but the “DR OPEN SPNDL STOP” error does not occur. Even if the door is closed and operation is resumed, the rotating condition prior to stopping is not recovered. The spindle automatically rotates when the Z-axis moves while cutting from point “R”.
- *4. During machine operation
The term machine operation here includes both temporary stop and block stop (it does not include when the program has finished and during program stop) for MDI operation and MEMORY operation.
- *5. When the door is opened while the door interlock is activated, the servomotor turns off. When the door is opened before MEMORY operation or during program stop (M00), the “NOT CLOSING DOOR” error occurs and the servomotor turns OFF. Close the door or deactivate the door interlock to reset the error and turn the servo motor ON.
When the door is opened during MEMORY operation, however, the “SERVO MOTOR STOPPED” or “DR OPEN MACHINE STOP” error occurs. This error cannot be reset even when the door is closed.
Press the **[RST]** key.

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TÜRVERRIEGELUNGSFUNKTION

1. **Allgemeine Vorsichtsmaßnahmen**
2. **Äußere Ansicht**
3. **Inspektion der Türverriegelung**
4. **Einzelheiten der Funktion**

1 Allgemeine Vorsichtsmaßnahmen

⚠ GEFAHR

Umlaufende Werkzeuge und Laufende Teile können Sie verletzen.

Wenn der Verriegelungsschalter außer Kraft ist, darf man mit keinem Körperteil in die Maschine kommen. Den Betriebsleiter verständigen.

Bei außer Kraft gesetzter Verriegelung darf der Betriebsleiter niemanden die Maschine benutzen lassen.

Vor Inbetriebnahme der Maschine sich mit eigenen Augen vergewissern, daß die Verriegelung in Kraft ist.

Sollte der Verriegelungsschlüssel im Schloß stecken, muß der Betriebsleiter darüber informiert werden.

Den Verriegelungsschlüssel muß der Betriebsleiter aufbewahren.

⚠ GEFAHR

Bei außer Kraft gesetzter Verriegelung kann sich der Tisch bewegen. Die Innenteile der Innentür bewegen sich, auch wenn die Innentür geöffnet ist. Es besteht die Gefahr, vom Tisch oder von anderen Maschinenteilen geklemmt und verletzt zu werden.

Bei außer Kraft gesetzter Verriegelung mit keinem Körperteil in die Innenseite der Außentür kommen.

Bei außer Kraft gesetzter Verriegelung darf der Betriebsleiter niemanden die Maschine benutzen lassen.

Sollte der Verriegelungsschlüssel im Schloß stecken, muß der Betriebsleiter darüber informiert werden.

⚠ GEFAHR

Bei offener Innentür besteht Verletzungsgefahr an rotierendem Werkzeug und anderen Maschinenteilen. Der Maschinenbediener darf die Innentür nicht öffnen. Bei offener Innentür mit keinem Körperteil in die Maschine kommen. Der Bediener muß den Betriebsleiter davon benachrichtigen, daß die Innentür offen ist. Der Betriebsleiter muß die Innentür verschließen und den Schlüssel aufbewahren. Bei nicht verschlossener Innentür darf der Betriebsleiter niemanden die Maschine bedienen lassen. Vor Inbetriebnahme der Maschine sich mit eigenen Augen vergewissern, daß die Verriegelung in Kraft ist. Wenn die Innentür nicht verschlossen sein sollte, muß der Betriebsleiter davon benachrichtigt werden.

⚠ WARNUNG

Umlaufende Werkzeuge könnten Sie verletzen.
Von umlaufenden Werkzeugen sich fernhalten.

⚠ WARNUNG

Umlaufende Teile könnten Sie hineinziehen und verletzen.
Von umlaufenden Teilen; Werkzeugen, der Spindel und dem ATC-Magazin, sich fernhalten.
Körperanliegende Bekleidung tragen.
Lange Haare müssen unter einem Hut aufgesteckt werden.
Beim Arbeiten an der laufenden Maschine keine Handschuhe tragen.
Keinen Schmuck tragen.
Umlaufende Teile nicht berühren.

Zweck

Die Türverriegelungsfunktion schützt die Benutzer der Maschine vor der Gefahr, durch umlaufende Werkzeuge oder laufende Teile verletzt zu werden, oder durch umlaufende Teile in die Maschine hineingezogen zu werden.

Einrichtungsbeschreibung

Bei in Kraft gesetzter Verriegelung wird die Außentür verriegelt, und die Höchstgeschwindigkeit entsprechend der Situation vermindert.

Einrichtungsaufbau

Die Türverriegelungseinrichtung besteht aus folgenden:

1. Türendschalter
2. Türschloß

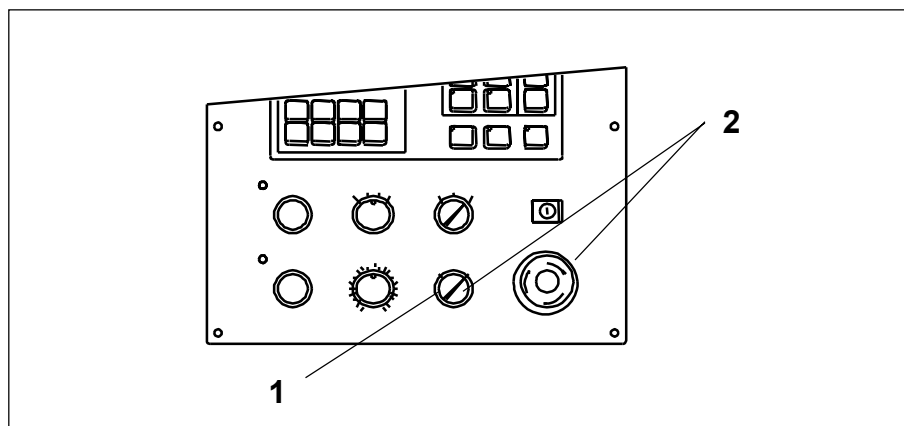
Benutzung der Funktion

1. Beim täglichen Betrieb muß der Verriegelungsschalter (1) immer in Kraft gesetzt sein.
2. Beim Einstellen der Arbeitsprozesse und Warten darf man den Schalter nur notwendigenfalls außer Kraft setzen.

Lesen Sie bitte vor dem Einstellen und Warten der Maschine "Sicherheitsvorschrift für Personen, die die Maschine installieren und den Arbeitsprozeß aufstellen" und "Sicherheitsvorschrift für qualifiziertes Wartungspersonal".

Bitte halten Sie Folgendes bei außer Kraft gesetzter Verriegelung ein.

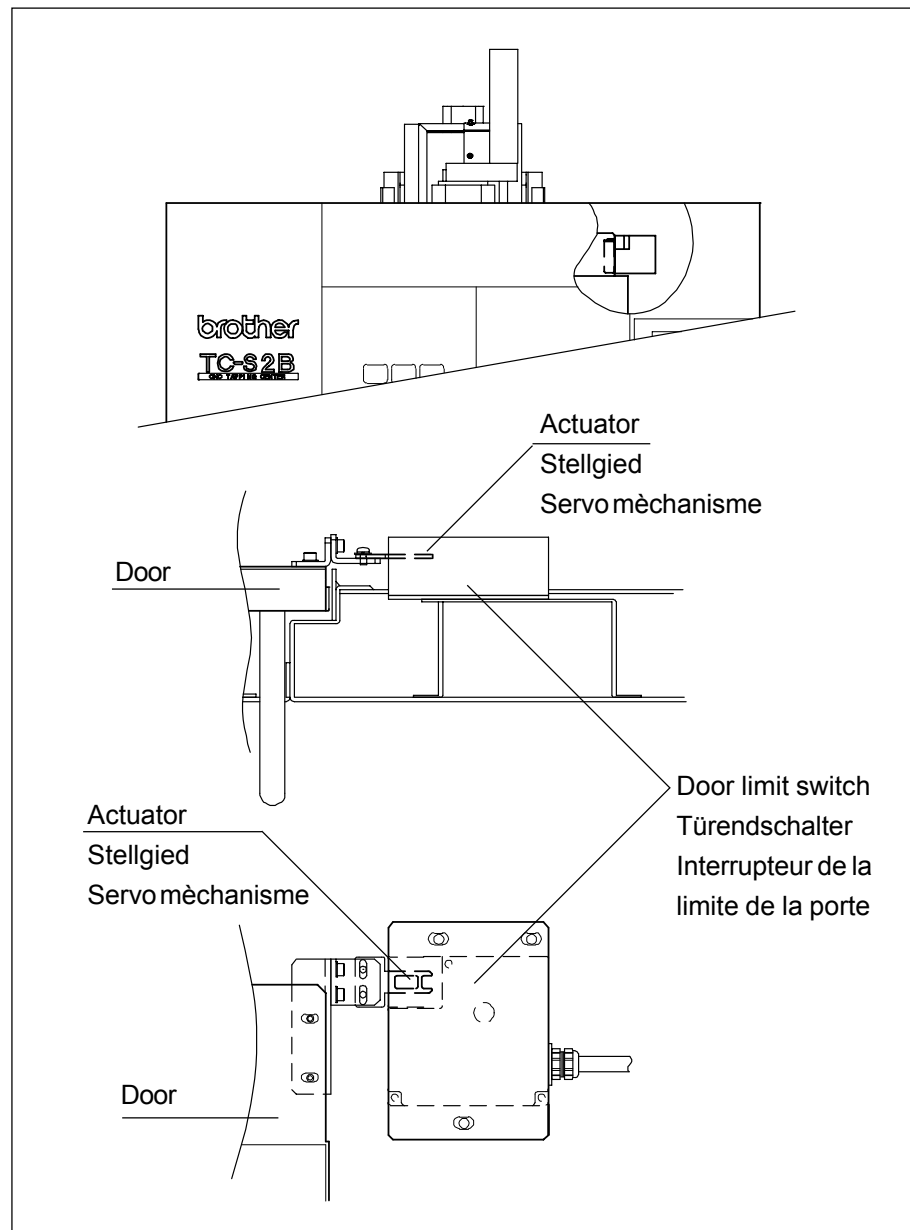
- Umlaufende Werkzeuge und andere laufende Teile beachten.
- Nach dem Einstellen und Warten den Schalter in Kraft setzen.
- Den Schlüssel (2) muß der Betriebsleiter aufbewahren.



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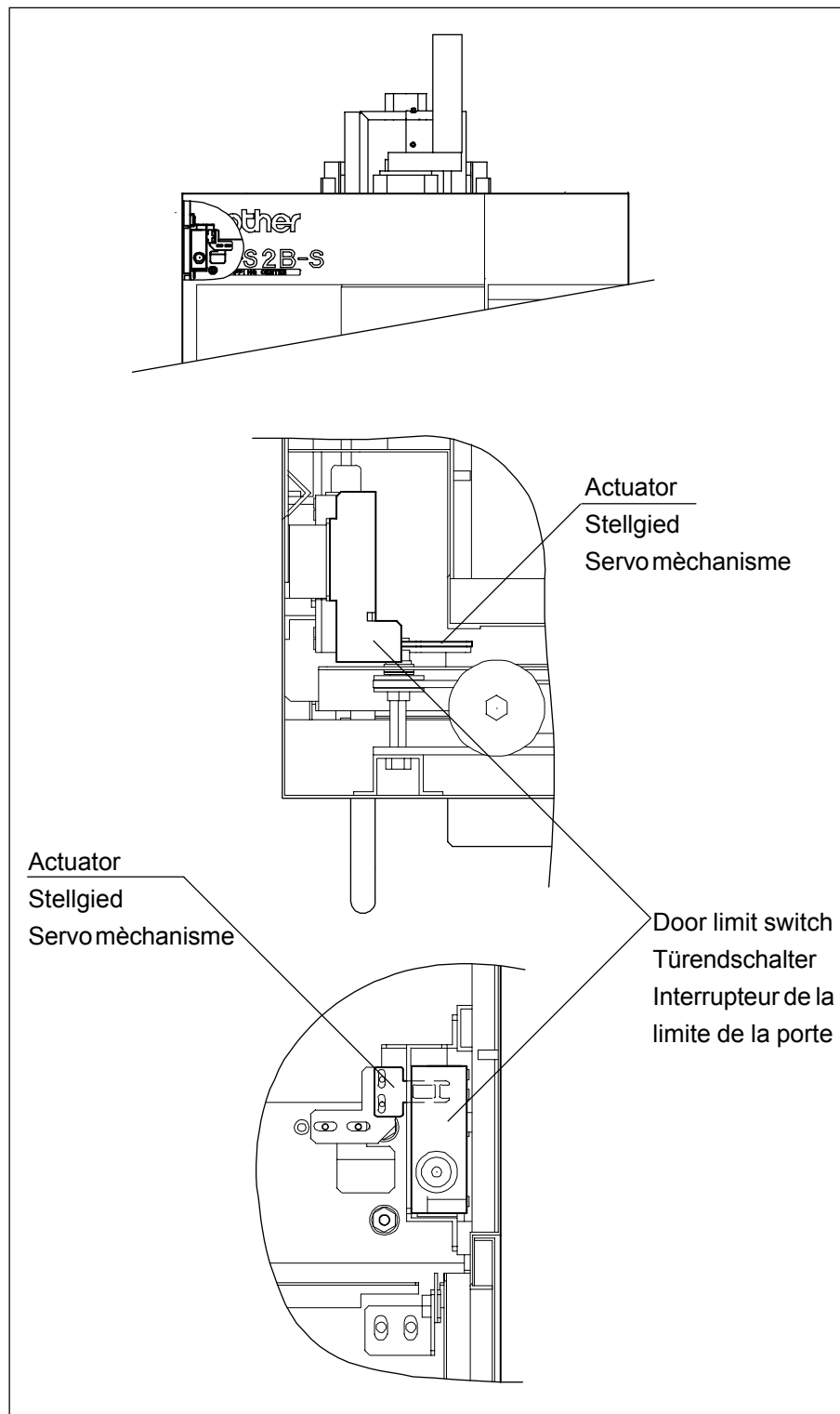
2 Äußere Ansicht

TC-S2B



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TC-S2B short



TS2BDoor01-02.ai

3 Inspektion der Türverriegelung

Vor Inbetriebnahme der Maschine muß die Türverriegelungseinrichtung geprüft werden.

Inspektionsschritte

Inspektion von Betriebsstörungen

1. Die Tür gut schließen, den Strom anschalten und auf Nullstellung zurückführen.
Überprüfen, dass der Türverriegelungsschalter eingeschaltet ist
2. Die Außentür öffnen.
3. Wenn die Türverriegelung richtig aktiviert ist, bewegt sich die Maschine nicht; auch nicht, wenn der [-X] Schalter auf dem Schaltbrett gedrückt ist.
Wird ein Alarm gegeben, wird angezeigt, dass die Tür offen ist.
Wird der Alarm nicht angezeigt, ist die Türverriegelung defekt. Sie muss repariert werden.

Nachdem geklärt ist, dass die Türverriegelung richtig arbeitet, zum nächsten Schritt weitergehen.

Inspektion der Türverriegelung

4. Die Außentür schließen
5. Die Spindel rotieren lassen.
6. Wenn die Außentürverriegelung richtig arbeitet, ist die Außentür verriegelt und kann nicht geöffnet werden. Wenn die Tür geöffnet werden kann, ist die Tür nicht verriegelt und die Türverriegelung ist defekt. Sie muss repariert werden.

Not Stopp Inspektion

7. Spindel im Handmodus rotieren.
8. Arbeitet die Türverriegelung richtig und die Maschine hält an, wobei der [*NOT STOP EIN] Alarm angezeigt wird, ist der Not Stopp Knopf gedrückt. Wenn die Maschine nicht anhält oder keinen Alarm anzeigt, ist die Verriegelungsfunktion fehlerhaft. Sie muss repariert werden.

4 Function Details

Door condition (*6)	Door interlock	Door lock(*6)	Machine operation
Zu	außer Kraft	nicht verriegelt	Jeder Betrieb ist möglich.
	in Kraft	Verriegelt während des Maschinenbetriebs (Achsenverschiebung, Spindelrotation, Tastatureingabe-und Programmierbedienung oder wenn der manuelle Impulsgeber in Kraft gesetzt ist).(*4)	
Auf	außer Kraft	nicht verriegelt	- Spindelrotation, Magazindrehung,ATC und Gewindebohren sind nicht möglich.(*2) - Achsenverschiebung,Spindelhalt und Spindelausrichtung sind möglich.(*1) - Programmierbedienung ist nur bei Einzelbetriebsart möglich. - Tastatureingabebedienung hält an jedem Satzende.
	in Kraft		Die ganze betrieb ist unmöglich.(*2)(*5)
Zu ↓ Auf	außer Kraft		Der ganze Betrieb (einschließlich der Spindelrotation)hält sofort an.(*3)
	in Kraft		Der ganze Betrieb (einschließlich der Spindelrotation)hält sofort an.(*3) (*5)
Auf	außer Kraft ↓ in Kraft		

- *1. Die Eilgangsgeschwindigkeit ist bei MAX EILGANG (TÜR AUF) vom Maschinenparameter voreingestellt.
Die Geschwindigkeit des Schneidevorschubs wird auf die Geschwindigkeit von MAX EILGANG (TÜR AUF) der Maschinenparameter eingeschränkt.
Die Drehzahl zusätzlicher Achsen (A, B, C) ist auch auf die voreingestellte Drehzahl MAX SCHNELLDREH-5,6 (TÜR AUF) der Maschinenparameter eingeschränkt.
- *2. Beim Versuch zu bedienen, kommt der Fehler "TÜR SCHL. NICHT", wenn die vordere.
- *3. Bedienungsschritte, die Gewindebohren, Spindelausrichtung, ATC oder Magazindrehung beinhalten, halten an jedem Satzende. Wenn die Tür während der Spindelrotation geöffnet werden sollte, kommt der Fehler "TÜR OFFEN SP HALT" und die Spindel hält an. Wenn man die Tür zumacht und die Maschine wieder anlaufen lässt, steigt die Spindelzahl wieder auf den vorprogrammierten Wert.
Mit folgenden Bedienungsschritten wird der Fehler "TÜR OFFEN SP HALT" ausgelöst.
Auch wenn die Tür geschlossen ist und der Betrieb wieder angelaufen ist, steigt die Spindeldrehzahl nicht wieder auf den vorprogrammierten Wert.
- 1) Wenn die [RST]-Taste gedrückt wird.
 - 2) Wenn die Spindel manuell bedient wird.
- (Anmerkung)**
Wenn die Tür während der Spindelrotation nach der ersten Bewegung vom Gewindebohrfräsen (XY-Achsenverschiebung und Spindelrotation) geöffnet wird, hält die Spindel an, aber der Fehler "TÜR OFFEN SP HALT" kann nicht vorkommen. Auch wenn die Tür zugemacht und der Betrieb wiederaufgenommen wird, wird der Rotationszustand von vor dem Stopp nicht wiederhergestellt. Die Spindel rotiert automatisch, wenn die Z-Achse sich während des Schnittes vom Punkt "R" entfernt.
- *4. Während des Maschinenbetriebs
Der betreffende Maschinenbetrieb beinhaltet hier einen temporalen Stopp sowie einen Blockstopp (ausgenommen bei Programmende und beim Programmstopp) für die Tastatureingabe und Dateibedienung.
- *5. Besondere Spezifikationen
Wenn die Tür geöffnet ist, während die Türverriegelung aktiviert ist, werden die Servomotoren abgeschaltet. Wenn die Tür vor der Dateibedienung oder während des Programmstopps (M00) geöffnet ist, kommt der Fehler "TÜR SCHL. NICHT" und die Servomotoren schalten ab. Dann die Tür schließen oder die Türverriegelung deaktivieren. Dann werden die Servomotoren auf AN geschaltet und der Fehler wird gelöscht. Wenn die Tür während der Dateibedienung geöffnet ist, kommt der Fehler "SERVOMO TOR AUS", "TÜR OFFN MSCHIN STOP". Dieser Fehler kann nicht gelöscht werden, auch wenn die Tür geschlossen wird. Dann die [RST]-Taste drücken.

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FONCTION DE L'ENCLENCHEMENT AVEC VERROUILLAGE DE LA PORTE

- 1. Précautions générales**
- 2. Vue d'apparence**
- 3. Contrôle**
- 4. Détails de la fonction**

1 Précautions générales

DANGER

En touchant des outils tournant et des parties mobiles, vous vous blesserez.

Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est invalable, Ne vous mettez pas les mains, les pieds, et le corps dans la machine.

Avertissez-en le superviseur.

Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est invalable, le superviseur ne doit pas admettre personne à travailler.

Assurez-vous visuellement que l'enclenchement avec verrouillage de la porte est valable avant l'opération de la machine.

Si la clef de l'enclenchement avec verrouillage de la porte est attachée, avertissez-en le superviseur.

Le superviseur doit garder toujours la clef de l'enclenchement avec verrouillage de la porte.

DANGER

Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est tourné sur OFF, la table peut bouger. Les parties mécaniques dans la porte intérieure bougent même si la porte intérieure est ouverte. Vous pouvez être pris à la table et vous blesser. Vous pouvez être pris dans la machine.

Quand l'interrupteur de l'enclenchement avec verrouillage de la porte est OFF, ne vous mettez pas les parties du corps dans la porte extérieure.

Quand le commutateur de la porte d'embrayage est invalable, le superviseur ne doit pas admettre personne à travailler.

Si la clef de la porte d'embrayage est attachée, avertissez-en le superviseur.

** DANGER**

Quand la porte intérieure est ouverte, vous pouvez vous couper par l'outil tournant ou vous pouvez avoir la main pris dans la machine.

L'opérateur ne doit pas ouvrir la porte intérieure.

Quand la porte intérieure est ouverte, ne vous mettez pas les mains, les pieds dans la machine. Le superviseur doit cadenasser la porte intérieure. Le superviseur doit toujours garder la clef de la porte intérieure.

Le superviseur ne doit pas admettre l'opérateur à utiliser la machine, quand la porte intérieure n'est pas cadenassée.

Assurez-vous visuellement que le commutateur de la porte d'embrayage est valable avant l'opération de la machine.

Quand vous vous apercevez que la porte intérieure n'est pas cadenassée, vous devez en avvertir le superviseur.

** AVERTISSEMENT**

En touchant des outils tournant, vous vous blesserez.

Ne vous approchez pas d'outils tournant.

** AVERTISSEMENT**

Vous pouvez être pris dans la section tournant et se blesser.

Ne vous approchez pas d'outils tournant, de broche, et de COA magasin.

Portez des vêtements tous justes. Mettez des cheveux longs dans un bonnet. Ne portez pas de gants sans que vous n'arrêtiez la machine et ni ne fassiez l'arrangement. Ne portez pas de bijoux. Ne tenez pas la section tonrnant.

Intention

La fonction de l'enclenchement avec verrouillage de la porte vous évite d'être pris dans les outils tournant et les parties mobiles.

Description de la fonction

L'enclenchement avec verrouillage de la porte fonctionne pour que la porte extérieure est verrouillée et que le maximum de vitesse est limité selon les circonstances.

Structure de l'unité

L'enclenchement avec verrouillage de la porte est constitué par des éléments ci-dessous.

- 1.l'interrupteur de la limite de la porte
- 2.le verrou de la porte

Comment se servir de l'enclenchement avec verrouillage de la porte

1. en opération ordinaire

L'interrupteur de la fonction de l'enclenchement avec verrouillage de la porte(1) doit toujours être placé sur "on".

2. en réglage et maintenance

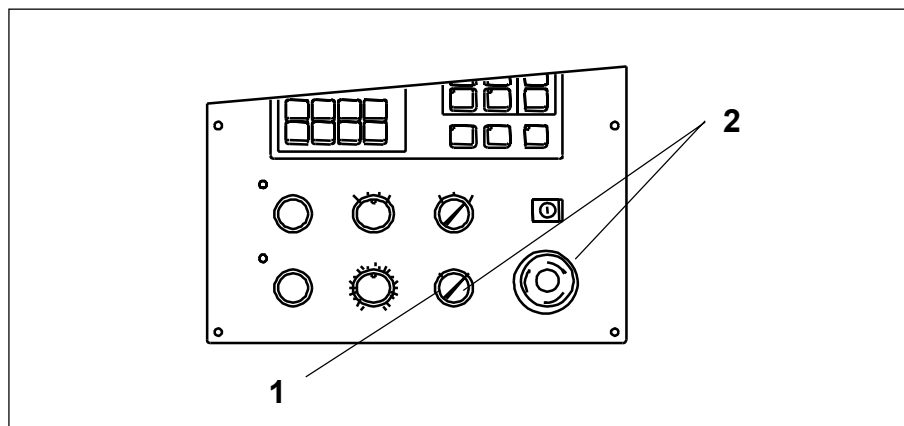
Tournez l'interrupteur sur "off" seulement en cours de réglage et maintenance. Lisez le "Manuel de sûreté pour ceux qui installent et arrangent le centreur tapant" et le "Manuel de sûreté pour ceux qui sont qualifiés pour maintenance du centreur tapant" avant du réglage et de la maintenance.

Observez cela ci-dessous, quand la fonction de l'enclenchement avec verrouillage de la porte est OFF.

Prenez garde de ne pas être pris dans l'outil tournant ou les parties mobiles.

Tournez l'interrupteur sur "on" après le réglage et la maintenance.

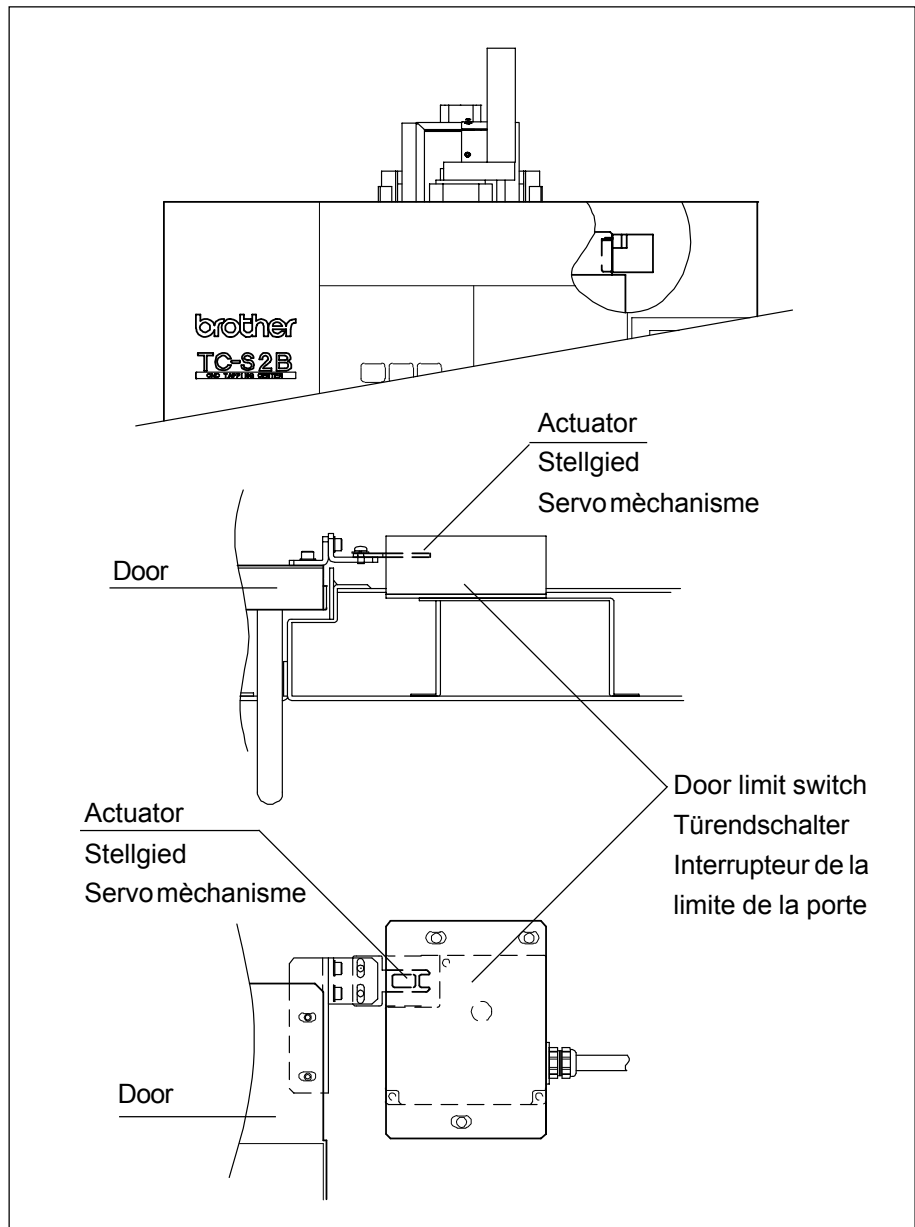
Le superviseur doit garder la clef (2).



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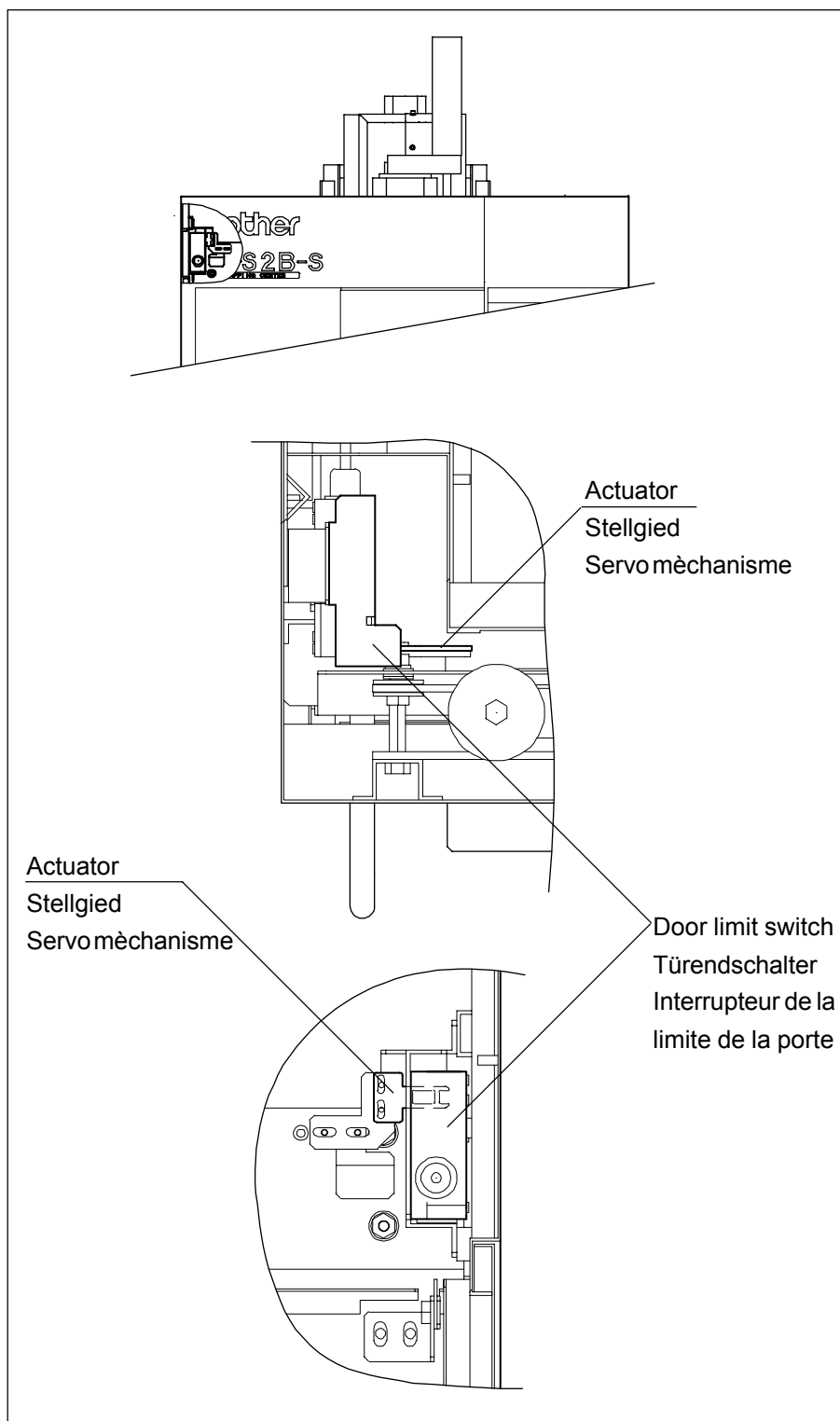
2 Vue d'apparence

TC-S2B



TS2BDoor01-01.ai

TC-S2B short



TS2BDoor01-02.ai

3 Contrôle

Méthode de contrôle

Contrôle d'arrêt de fonctionnement

1. Fermer toutes les portes. Mettre ensuite sous tension afin de rétablir la position d'origine.
Vérifier également la bonne marche du commutateur de verrouillage des portes.
2. Ouvrir la porte extérieure.
3. Si le verrouillage de la porte fonctionne normalement la machine ne doit pas se déplacer quand on appuie sur la touche [-X].
Normalement l'avertisseur d'ouverture de porte doit se déclencher.
Si l'alarme ne se déclenche pas cela signifie que le verrouillage de porte ne fonctionne pas normalement et doit être réparé.

Procéder aux vérifications qui suivent si aucune anomalie n'est constatée à cette étape.

Contrôle du verrouillage de porte

4. Fermer la porte extérieure.
5. Faire tourner la broche.
6. Normalement, si le verrouillage fonctionne bien, on ne doit pas pouvoir ouvrir la porte. Si elle s'ouvre c'est que le système est défectueux et nécessite une réparation.

Contrôle d'arrêt de secours

7. Faire tourner la broche en mode manuel.
8. Normalement si le verrouillage fonctionne bien la machine doit s'arrêter de tourner et l'avertissement [*ARRET URGCE ACTIF] s'affiche quand on appuie sur le bouton d'arrêt de secours. Si la machine ne s'arrête pas et que le message d'avertissement ne s'affiche pas c'est que le système est défectueux et nécessite une réparation.

4 Détail de la fonction

Condition de la porte(*6)	Verrouillage de la porte	Verrou de la porte(*6)	Opération de la machine
Fermée	OFF	Ne sera pas verrouillé	Toutes les opérations sont possibles.
	ON	Verrouillé en cours opération de la machine quand (mouvement d'un axe, rotation de la broche, opération par IMD, opération par mémoire, ou quand l'impulseur manuel est mis sur ON).(*4)	
Ouvverte	OFF	Ne sera pas verrouillé	- Rotation de la broche ,pivotement du magasin, COA, action de tarauder sont impossibles.(*2) - EMouvement d'un axe, arrêt de la broche, et orientation de la broche sont possibles.(*1) - L'opération par mémoire est possible seulement en mode d'opération simple. - L'opération par IMD arrê à chaque fin d'un bloc.
	ON		Touts les opérations sont impossibles.(*2)(*5)
Fermée ↓ Ouvverte	OFF		Toutes les opérations, y compris la rotation de la broche, arrêtent immédiatement.(*3)
	ON		Toutes les opérations, y compris la rotation de la broche, arrêtent immédiatement.(*3)(*5)
Ouvverte	OFF ↓ ON		

- *1. La vitesse d'avance de course rapide est réglée par "MAX AVANCE RAP(PORTE OUVRE)" du paramètre mécanique.
La vitesse d'avance de coupe est restreinte à la vitesse réglée par "MAX AVANCE RAP(PORTE OUVRE)".
La vitesse de rotation des axes additionnels (A,B,C) est aussi restreinte à la vitesse réglée par "MAX VITESSE 4,5,6 AXE (PORTE OUVRE)" du paramètre mécanique.
- *2. L'essai d'opération cause "PORTE OUVERTE" erreur quand la porte de devant est ouverte.
- *3. Les opérations, y compris taraudage, orientation de la broche, COA, et pivotement du magasin, arrêtent à chaque fin d'un bloc. Quand la porte ouvre en cours de rotation de la broche, "OUV PTE ARRET BCHE" erreur apparaît et la broche arrête. Quand la porte ferme et l'opération est remise à la même vitesse rotation que précédant à l'arrêt de la broche, la condition de rotation précédant l'arrêt de la broche est recouvrée.

Cependant, quand les opérations ci-dessous sont effectuées, "OUV PTE ARRET BCHE" erreur est remise à zéro. Même si la porte ferme et l'opération est remise à la même vitesse de rotation que précédant à l'arrêt de la broche, la condition de rotation précédant l'arrêt de la broche n'est pas recouvrée.

- 1) La clef [RAZ] est pressée.
- 2) L'arrêt de la broche est effectué en mode manuelle.

(Note)

Quand la porte ouvre en cours de rotation de la broche après le premier mouvement de fraise en bout taraud (XY-axes mouvement et rotation de la broche), la broche arrête mais "OUV PTE ARRET BCHE" erreur n'apparaît pas. Même si la porte ferme et l'opération est remise, la condition de rotation précédant l'arrêt de la broche n'est pas recouvrée. La broche

- *4. En cours d'opération de la machine
L'opération de la machine mentionnée ici contient l'arrêt temporaire et l'arrêt de bloc (excluant quand le programme a fini et en cours d'arrêt du programme) pour l'opération par IMD et l'opération par mémoire.
- *5. Caractéristiques techniques spéciales
Quand la porte est ouverte pendant que verrouillage de la porte est activé, le servomoteur est mis sur OFF.
Quand la porte est ouverte avant l'opération par mémoire ou pendant arrêt de programme (M00), "PORTE OUVERTE" erreur apparaît et le servomoteur est mis sur OFF.
Fermez la porte ou désactivez le verrouillage de la porte, et le servomoteur sera mis sur ON et l'erreur est remise à zéro.
Quand la porte est ouverte pendant l'opération par mémoire, cependant, "SERVO EST ARRETE", "STOP MACH. PTE/OUV." erreur apparaît. Cette erreur ne peut pas être remise à zéro quand bien même la porte est fermée. Pressez la clef [RAZ].

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机门连动器机能

1. 操作注意事项
2. 外观图
3. 检查
4. 规格的详细内容

1 操作注意事项

 危险

机门连动器开关无效时，即使门呈开启状态机器依然运转。
手可能会被旋转的机具划破、夹住和受伤。机门连动器开关无效时，手脚和身体不能伸进机器。
应向管理员汇报情况。
机门连动器开关无效时，管理员不能让作业人员操作机器。
应亲眼确认机门连动器开关有效后，才能进入操作。
发现机门连动器上挂有钥匙时，应向管理员汇报。
机门连动器钥匙应由管理员保管。

 危险

机门连动器开关无效时，手脚和身体不能伸进机器。应向管理员汇报情况。
管理员应将机门连动器开关调到有效位置。
机门连动器无效时，管理员不能让作业人员操作机器。
发现机门连动器上挂有钥匙时，应向管理员汇报。

 警告

小心转动工具伤人。
别靠近转动工具。

 危险

小心卷入转动机件而受伤。
别靠近转动中的机具、机轴和送料装置。
服装要合身。
长发应梳理进工作帽内。
除非停机做准备工作，不准戴用手套。
不戴首饰。
不用手抓摸转动机件。

目的

机门连动器机能是保护作业人员，避免卷入转动的机具、可动部

装置说明

在外门关闭状态下能锁机或 限制机器动作 但视情况不同而各异。

结 构

机门连动器由下列部件构成。

1. 机门限位开关
2. 机门锁定装置

用法

1. 平时

机门连动器机能开关(1)置于有效位置。

2. 准备作业和维修作业时

在做准备作业和维修作业时，如确有必要，才可把开关置于无效位置。

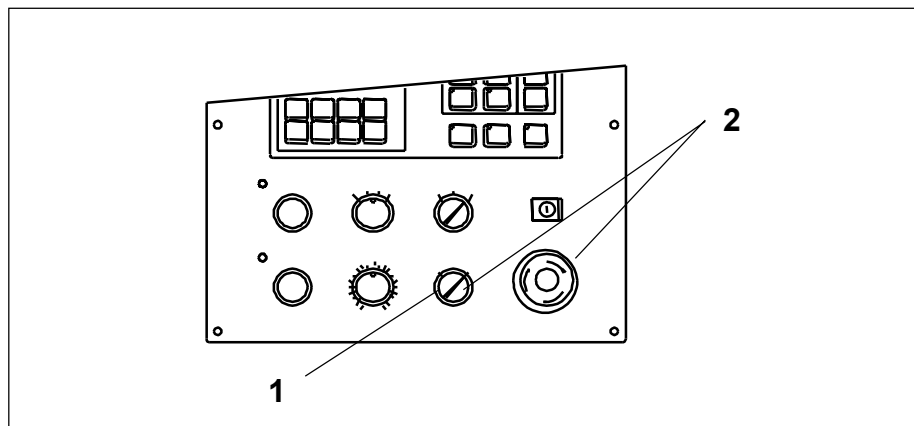
请先阅读「在安装和 做准备工作时操作人员安全操作规程」「经培训后的操作人员安全操作规程」后，再进行准备工作和维修作业。

机门连动器开关无效时需遵守下列事 项。

注意别卷入转动的机具、可动部件和转动部件中去。

作业结束后应将开关回复到有效位置。

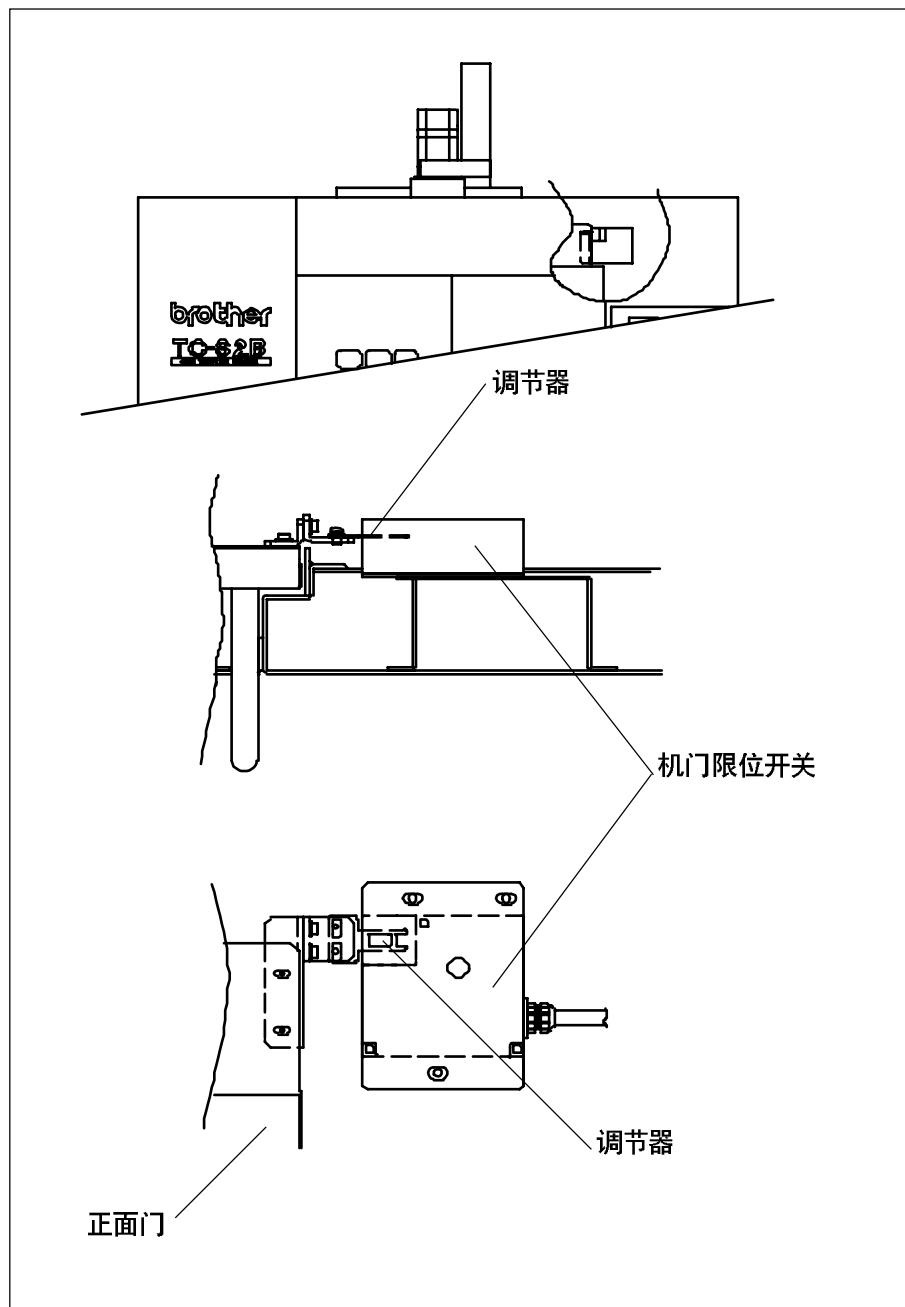
钥匙(2)请管理员保管。



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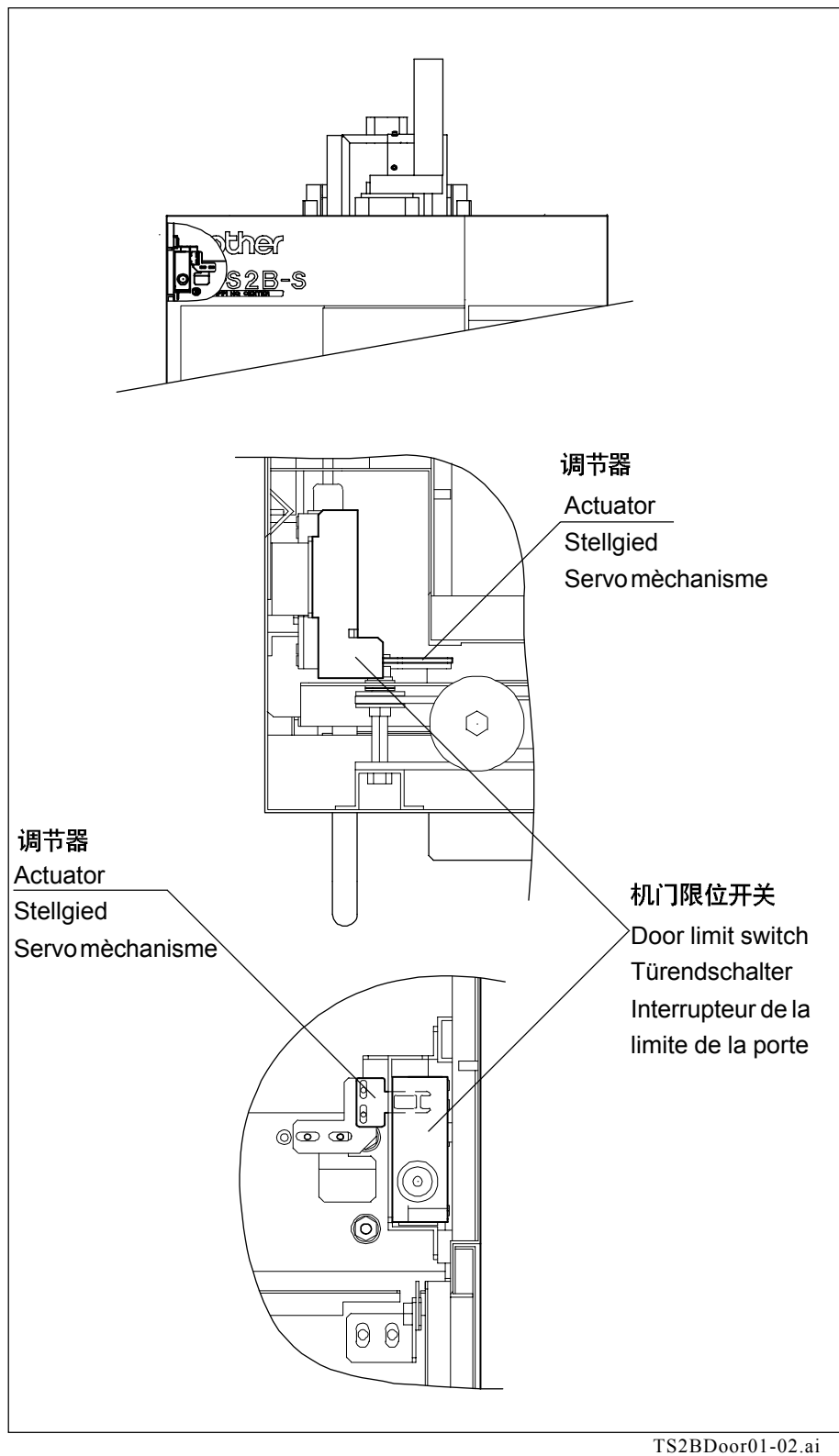
2 外观图

TC-S2B



TS2Bdoor01.wmf

TC-S2B short



3 检查

开机前, 务必先检查机门连动器。

检查方法

发生停机时的检查

1. 关闭全部机门。然后打开开关, 回复原点。再确认机门连动装置开关是否有效。
2. 打开外门。
3. 如机门连动装置机能正常, 按下X轴的移动钮[—X], 机器不应该发生移动。此时如果有表示机门已经关闭的音响信号属情况正常。如情况异常, 属故障, 应予修理。
如机门连动装置机能正常, 可继续下述检查。

机门闭锁检查

4. 关闭外门。
5. 让主轴转动。
6. 如机门闭锁机能正常, 因外门已经闭锁, 应无法打开。如外门没有闭锁, 还能够打开, 属故障, 应予修理。

紧急停止开关的点检

7. 以手动运转方式运转主轴。
8. 联锁开关如果正常的话, 一按紧急SW机器就会停止运转, 画面上出示「*紧急停止开关关上」的警报。如果运转不停止, 或者画面上不出示警报的话, 则为出现故障, 需要修理。

4 规格的详细内容

门	机门连动器开关	机门锁定	动作
关闭	无效	未锁定	全部动作正常
	有效	而处于工作状态(机轴移动、主轴转动、MDI、计量器呈工作状态、手动脉冲发生器有效)(※4)	
开启	无效	未锁定	主轴旋转、送料装置转动、ATC、不能作攻丝动作。(※1) 轴移动、主轴停止、主轴可定位。(※2) 计量功能只有单一计量功能 MDI 运转, 整个指令停止执行
	有效		所有动作停止(※2)(※5)
关闭 ↓ 开启	无效		动作(包括主轴转动)立即停止(※3)
	有效		动作(包括主轴转动)立即停止(※3)(※5)
开启	无效 ↓ 有效		

- *1. 快速递送的移动速度即变为机器参数的「高速移动速度(机门开启状态)」所设定的速度。

切削移动速度也受「高速移动速度(机门开启状态)」所设定的速度的限制(同样附加轴(A, B, C轴)的速度也受机器参数的「第4、5、6轴高速转动速度(机门开启状态)」速度的限制。

- *2. 想使其动作时, 即发生「*门未关」故障。

- *3. 丝锥、主轴定位、ATC、送料装置转动时, 整个指令停止执行。主轴正在转动而机门开启后, 发出「门开 主轴停转」故障, 主轴停转。再关闭机门, 重新起动后, 回复主轴停止前的转动状态。

但在进行了下列操作后, 「门开 主轴停转」故障消失, 即使关闭机门, 再次起动, 仍不能回复到主轴停转前的状态。

- 1) 撤回复键
- 2) 用手动方式进行主轴操作

(注意)

在立铣刀丝锥的XY轴移动的同时主轴也在转动时, 开启机门后, 主轴会停止, 但不会发生「门开 主轴停转」的故障。

此外, 即使关闭机门再次起动, 也不能回复主轴停转前的状态。

再从R点进行切削移动时, 主轴会自动转动。

- *4. 机器工作状态

MDI、计量功能暂停、整个指令处于停止执行状态(程序结束时、不包括程序暂停)也包括在机器工作状态中。

- *5. 机门连动器有效时, 打开门, 他全部机轴的随动马达。

在运转前关闭随动马达时, 只须关闭机门即能复原, 出现「*机门未关」故障。

此时, 如关闭机门或将机门连动器拨至无效, 则随动马达开动, 故障消失。

此时即使关闭机门, 随动马达也不会起动, 故障也不消失。(如不关闭机门或将机门连动器拨至无效, 重按回复键, 无法回复原状。)

但在运转中打开门出现「*随动马达关闭」, 「*门开 主轴停转」故障(停机)。

此时即使关闭机门, 随动马达也不会起动, 故障也不消失。(如不关闭机门或将机门连动器拨至无效, 重按回复键, 无法回复原状。)

TC-S2B

MAINTENANCE MANUAL

Please read this manual carefully before starting operation.

brother®

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Chapter 1 Troubleshooting

1.1 Problem with the power ON

1.1.1 Power ON not available

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Power is not available even by the POWER on switch. (Neither the MAIN POWER lamp nor the LED of the POWER switch on the operation panel lights up.)	The main power breaker handle is not turned ON.	Turn the main power breaker handle ON.			
		The connector CNSVP or CNSW on the IO board is disconnected.	Connect the connector CNSW and CNSVP .			
		The connector CNSW in the operation box is disconnected.	Connect the connector CNSW .			
		By the overload or the short-circuited of the 200V for control power, -the breaker (Q2) blown out (Except EU) -the circuit protector (Q4; on the T2) blown out. (EU)	After making sure of no overloaded and short-circuited, -repair the breaker/circuit breaker.			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
		DC power unit AVR2 is defective.	Rreplace the AVR2.	3.1.7		
	Power is not available even by the POWER on switch. (The MAIN POWER lamp on the operation panel lights up, but the LED of the POWER switch doesn't.)	External power OFF for the extended I/O terminal block XTIO on the IO board is used.	When the external power OFF is not used, short circuit No.3 and No.4 of the XTIO terminal.			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
	Power is not available even by the POWER on switch. (The MAIN POWER lamp and the LED of the POWER switch on the operation panel lights up.)	The relay KC1 is not ON.	Rreplace the relay KC1.			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
		The NC board's DC 5V is defective. (DC5V $\pm$ 0.15V at NC board.)	Check the AVR1, the connection and adjust AVR1. Rreplace the AVR1 at the time of inferiority.	3.1.6		
		The KEY board's DC powers are defective. (DC5V $\pm$ 10%, DC12V $\pm$ 10%)	Check the AVR3 and the connection. Rreplace the AVR3 at the time of inferiority.	3.2.2		
2	The POWER ALARM lamp lights up.(The MAIN POWER lamp is blinking.)	Power voltage is exceeding the specification range.	Adjust the power voltage within the specification range (+/-10%). Check the transformer tap. In case that input 400V to the 200V system specification machine, replace the varistor assy.	3.1.7		
		The IO board is defective.	Rreplace the IO board.	3.1.5		
	The POWER ALARM lamp lights up.(The MAIN POWER lamp isn't blinking.)	Power voltage exceeded the specification range.	Adjust the power voltage within the specification range (+/-10%).			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
3	The POWER ALARM lamp light is blinking. (The MAIN POWER lamp is blinking, too.)	Power voltage between R/S/T and PE is exceeding the specification range.(The voltage between the pins of the connector CN200 at IO board and PE exceed AC230V +15%.)	Check the grounding method. Adjust the voltage between R/S/T and PE within the specification range (230V+10%).			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
	The POWER ALARM lamp light is blinking. (The MAIN POWER lamp isn't blinking.)	Power voltage between R/S/T and PE exceeded the specification range.	Check the grounding method. Adjust the voltage between R/S/T and PE within the specification range (230V+10%).			
		The IO board is defective.	Rreplace the IO board.	3.1.5		
4	Even when the [POWER] switch is turned on, the [POWER] lamp blinks and power is not supplied immediately.	This is normal. When the [POWER] switch is turned on within 15 seconds after the [POWER] switch was turned on and then off, a suppression circuit is activated to prevent rush current from continuing.				

1.1.2 Earth leakage breaker trip (Other than EU type)

## No	Problem	Cause	Measure	Replac- ment	Adjust- ment	Refer- ence
1	The main breaker QF1 trips when only the main breaker is turned on.	When the error occurs even when fuse Q2 and breaker Q1 circuit is opened.	The varistor located below the breaker is defective.	Remove the varistor and check it.		
			When the peripheral equipment is defective. Chip-conveyor, high-pressure coolant unit, etc	Remove the peripheral equipment connected to the secondary side of the breaker and check it.		
		When the error no longer occurs when breaker Q2 circuit is opened.	When the error no longer occurs when CN1 of AVR2 is disconnected.	Replace the AVR2.	3.1.7	
			The T2 is defective.	Disconnect the primary wiring of transformer T2, and check it.		
		When the error no longer occurs when fuse Q3 circuit is opened.	When coolant power system circuit is defective.	Disconnect the connector CNCLM of the coolant unit, and check it.		
			Insulation of the spindle motor-fan is defective.	Replace the spindle motor-fan.		
2	When power is turned on while the [EMERGENCY STOP] switch is pressed, the earth leakage breaker trips.	When the error no longer occurs when "Y" and "COM" terminals of terminal block TB2 for the spindle driver are disconnected.	Insulation of the regenerative resistor is defective.	Check the external regenerative resistor connection. Replace the regenerative resistor.		
		When the error no longer occurs when "CP" and "CN" terminals of terminal block TB1 for the spindle driver are disconnected.	Insulation of the servo system for each axis is defective. Disconnect "CP" and "CN" terminals from the terminal block in order for each axis to determine the defective driver axis.	Replace the driver for each axis.	3.1.9	
		When the error no longer occurs when "r" and "t" terminals of terminal block TB4 for the spindle driver are disconnected.	Insulation of the driver for spindle is defective.	Replace the driver for spindle.	3.1.9	
		When the error no longer occurs when CN1 of AVR1 is disconnected.	The AVR1 is defective.	Replace the AVR1.	3.1.6	
		When the error no longer occurs when CN1 of AVR3 is disconnected.	Insulation of the AVR3 is defective. Insulation of the regenerative resistor is defective.	Check the external AVR3 connection.		
3	When the earth leakage breaker trips when the servomotor is turned on.	When the error no longer occurs when "Y" and "COM" terminals of terminal block TB2 for the spindle driver are disconnected.	Insulation of the regenerative resistor is defective.	Check the external regenerative resistor connection. Replace the regenerative resistor.		
		When the error no longer occurs when "MP" and "MN" terminals of terminal block TB1 for the spindle driver are disconnected.	Insulation of the servo system for each axis or inverter is defective.	When the error no longer occurs when the motor power cable is disconnected, check the wiring of motor power cable or replace the motor.	2.1.2 2.1.3 2.3.1 2.4.1 2.4.3 2.4.5 2.6.3	
				Replace the driver.	3.1.9	
				Check the inverter terminal block of the inverter. Replace the inverter.	3.1.10	
		When the error no longer occurs when "R", "S" and "T" terminals of terminal block TB2 for the spindle driver are disconnected.	Insulation of the driver for spindle is defective.	Replace the driver for spindle.	3.1.9	
		When the error no longer occurs when "U", "V" and "W" terminals of ATC inverter are disconnected.	Insulation of the ATC motor power system circuit is defective.	Check the ATC motor connection. Replace the ATC motor.	2.2.5	
4	When the earth leakage breaker trips during operation.	When the error occurs when the axis starts moving or cutting conditions are too strict.	Breaker capacity is exceeded.	When any peripheral equipment is connected, check its capacity.		

1.1.3 Breaker trip (Only for EU type)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	The main breaker QF1 trips when only the main breaker is turned on.	When the error occurs even when breaker Q1 and breaker Q2 circuit is opened.	The noise filter is defective.	Remove the noise filter and check it.		
			The varistor located below the breaker is defective.	Remove the varistor and check it.		
			When the peripheral equipment is defective.	Remove the peripheral equipment connected to the secondary side of the breaker and check it.		
		When the error no longer occurs when breaker Q2 circuit is opened.	When the error no longer occurs when CN1 of AVR2 is disconnected.	Replace the AVR2.	3.1.7	
			The T2 is defective.	Disconnect the primary wiring of transformer T2, and check it.		
		When the error no longer occurs when breaker Q1 circuit is opened.	The T1 is defective.	Disconnect the primary wiring of transformer T1, and check it.		
			The CTS system is defective.	Turn off KP3, and check it.		
			Fuse Q3 is defective.	Turn off fuse Q3, and check it.		
		When the error no longer occurs when fuse Q3 circuit is opened.	When coolant power system circuit is defective.	Disconnect the connector CNCLM of the coolant unit, and check it.		
			Insulation of the spindle motor-fan is defective.	Replace the spindle motor-fan.	2.1.2	
2	When the earth leakage breaker Q1 trips when the servomotor is turned on.	When the error no longer occurs when "Y" and "COM" terminals of terminal block TB2 for the spindle driver are disconnected.	Insulation of the regenerative resistor is defective.	Check the external regenerative resistor connection. Replace the regenerative resistor.		
		When the error no longer occurs when "MP" and "MN" terminals of terminal block TB1 for the spindle driver are disconnected.	Insulation of the servo system for each axis is defective.	When the error no longer occurs when the motor power cable is disconnected, check the wiring of motor power cable or replace the motor.	2.1.2 2.1.3 2.3.1 2.4.1 2.4.3 2.6.3	
				Replace the driver.	3.1.9	
				Check the inverter terminal block. Replace the inverter.	3.1.10	
		When the error no longer occurs when "R", "S" and "T" terminals of terminal block TB2 for the spindle driver are disconnected.	Insulation of the driver for spindle is defective.	Replace the driver for spindle.	3.1.9	
		When the error no longer occurs when "U", "V" and "W" terminals of ARM inverter are disconnected.	Insulation of the ATC motor power system circuit is defective.	Check the external ATC motor connection. Replace the ATC motor.	2.2.5	
3	When the earth leakage breaker Q1 trips during operation.	When the error occurs when the axis starts moving or cutting conditions are too strict.	Breaker capacity is exceeded.	When any peripheral equipment is connected, check its capacity.		

1.2 Problem with axis travel

1.2.1 X,Y,Z,5,6,M axes servo error (1/5)

When the error occurs
0059.## X axis servo error (**)
is displayed on the alarm message screen, possible to choose alarms with ## and (**).

Alarm No.		<NC>	
<Conv.>			
0059	X-axis	5059	X-axis
0060	Y-axis	5060	Y-axis
0061	Z-axis	5061	Z-axis
0063	5 axis ☐	5063	5 axis ☐
0064	6 axis ☐	5064	6 axis ☐
0066	M axis	5066	M axis

It will be change to set the axis name.

It will be change to set the axis name.

1.2.1 X,Y,Z,5,6,M axes servo error (2/5)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	OC Over current	When the servo is turned off.	The digital I/F board is defective.	Replace the driver.	3.1.9	
		When the servo is turned on.	The motor insulation has deteriorated.	Replace the motor.	2.3.1 2.3.4 2.3.7 2.5.3	4.3.2 4.4.1 4.4.2 4.4.3
			Motor's power cable wiring is incorrect or a short circuit has occurred.	Check the wiring.	3.1.9	
			The driver's power TR or current feedback circuit is defective.	Replace the driver.	3.1.9	
		When the motor is started or stopped.	The servo parameter is set incorrectly.	Check the parameter. (servo)		
3	EOH External regenerative resistor over heat	This error is peculiar to the spindle.				
4	OV Over voltage	Occurs when only control power is turned on.	The digital I/F board is defective.	Replace the driver.	3.1.9	
		The error occurs for multiple axes after the servomotor is turned on or during the operation.	Input power voltage is too high or wave form is deformed.	Check the power voltage and wave form.		
			The converter circuit or regenerative circuit inside the spindle driver is defective.	Check the connection and resistance value.		
			External regenerative resistance is incorrect.	Replace the driver for spindle .	3.1.9	
		The error occurs for only one axis after the servomotor is turned on or during the operation.	The alarm detection circuit inside the driver is defective.	Replace the driver.	3.1.9	
6	CPE Control power error	Occurs when only control power is turned on.	The input power has decreased or momentary interruption has occurred.	When this error frequently occurs, check the power system.		
			Defective wiring to driver terminals CPand CN.	Check the wiring.		
			The driver is defective.	Replace the driver.	3.1.9	
		Occurs for multiple axes when only control power is turned on.	The converter circuit for the spindle driver is defective.	Replace the driver for spindle.	3.1.9	
			Defective wiring to driver terminals CPand CN.	Check the wiring.		
		The error occurs when an axis (particularly the spindle) starts.	The input power has decreased.	Check the power source.		
7	DE 1 Detector error 1 of encoder line.		Wires between the encoder and driver are disconnected or connected incorrectly.	Check the encoder cable.		
				Check the encoder connection inside the motor terminal box.		
				Check the wiring of CN2 driver.		
		[0] is not set for [DIS-PLACEMENT PULSE] on the <I/O> screen or a pluse error simultaneously occurs.	The pulse circuit inside the encoder is defective.	Replace the motor.	2.3.1 2.3.7 2.5.3	4.3.2 4.4.1 4.4.2 4.4.3
8	DE2 Detector error 2 of This error is peculiar to the M axis.	Serial communication is not possible between the absolute encoder and the driver.	Serial signal cord connected to pin #13 or 14 of CN2 is damaged.	Check the encoder cable.		
			The encoder serial communication circuit is defective.	Replace the motor for M-axis .	2.3.1	4.3.2
			The driver is defective.	Replace the driver for M-axis .	3.1.9	

*The indexer manufacturer shall provide measures for defective parts identified in the 5 axis and 6 axis.

1.2.1 X,Y,Z,5,6,M axes servo error (3/5)

## No	Problem		Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
9	OL Over load	Occurs when only control power is turned on.	The servo parameter is set incorrectly.	Check type of the mortar of the machine parameter (servo).			
		Occurs during operation.	Too many program patterns are used. Cutting load is excessive.	Review the program patterns and cutting conditions.			
			Motor brake and mechanical clamp are not released.	Check the brake and clamp.			
			The dynamic brake is kept applied.	Replace the driver.	3.1.9		
			Mechanically overloaded. Bearings are burnt-out. Ball screws are abraded. Foreign matters are stuck to the ball screws.	Check the mechanical part.			
			Motor's power cable wiring is incorrect (incorrect wiring, defective connection and disconnection).	Check the wiring.			
			The servo parameter is set incorrectly.	Check type of the mortar of the machine parameter (servo).			
			When temperature is low. This error is peculiar to the C axis or additional axis.	Warm up the machine.			
		Occurs during the adjustment work. (The motor oscillates.)	The servo motor is turned on under the condition that there is no load in the motor.	Connect the load. Make the current limiter effective when you rotate the motor in the simple substance.		5.2	
10	OS Over speed The maximum speed of 120% is exceeded.	When the motor is start, the overshoot is excessive.	Mechanically overloaded.	Check the mechanical part.			
			Excessive load is applied to the table.	Review the load.			
			The input power is decreased.	Check the power source.			
			Too much acceleration.	Reduce the time constant.			
			The servo parameter is set incorrectly.	Check the parameter (servo). Type of the mortar, KVP and TVI etc.			
11	MPE Main power error.	Occurs when only control power is turned on.	The digital I/F board is defective.	Replace the driver.	3.1.9		
		Occurs after the servo is turned on.	Defective wiring to driver terminals CPand CN.	Check the wiring.			
		Occurs during operation.	The input power has decreased or momentarily interruption has occurred.	Check the power source.			
12	FP Failure of phase.	The error is peculiar to the spindle.					
13	RGE Regenerative resistor over load.	The error is peculiar to the spindle.					
14	DSPE DSP error		The digital I/F board is defective. Driver's 5 V power has decreased.	Replace the driver.	3.1.9		
15	ROME ROM error		The digital I/F board is defective. Driver's 5 V power has decreased.	Replace the driver.	3.1.9		
16	PARE Parameter error		The servo parameter is set incorrectly.	Check type of the mortar of the machine parameter (servo).			
			The type of driver is incorrect.	Install the correct amplifier.	3.1.9		
			The driver's select switch is set incorrectly.	Set the switch correctly.			

*The indexer manufacturer shall provide measures for defective parts identified in the 5 axis and 6 axis.

1.2.1 X,Y,Z,5,6,M axes servo error (4/5)

## No	Problem		Cause	Measure	Replace ment	Refer- ence	Adjust- ment
17	BATT DROP Battery error *This error is peculiar to the M-axis. The M-axis battery back-up voltage has dropped and the back-up data was damaged.	1.Power was cut for long periods. The battery low power mark was indicated.	Battery voltage has dropped.	Replace the alkaline battery. The battery polarity is reversed. Check that the battery cable is connected to connector CN6 of the M-axis driver.	3.1.8		
		2.The motor is replaced with new one.		Check that the battery cable is connected to connector CN6 of the M-axis driver.			
		3.The M-axis the motor was disconnected for 30 minuts or longer. (This error does not occur in S2B.)	The battery cable connected to the M-axis motor is broken.	Check the wiring for the M-axis motor.			
			The back-up circuit inside the M-axis motor is defective.	Replace the M-axis motor.	2.3.1		
			The back-up time for the M-axis motor is approximately 30 minuts, thus the data was damaged.	Clear the start-point data in ATC maintenance mode and adjust the magazine position again.	4.2.1		
18	CSE Commutation sensor error	Occurs when only control power is turned on.	The servo parameter is set incorrectly.	Check type of the encoder of the machine parameter (servo).			
			When between the encoder and driver are disconnected or connected incorrectly.	Check the encoder cable.			
				Check the connector connection inside the motor terminal box.			
				Check the wiring.			
19	MOC When turn off the servo power, feed back power current *for only PZ, PE driver.		The driver is defective.	Replace the driver.	3.1.9		
20	DTO Data time out		The command was not transmissible from the NC unit for 4ms.	Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
				Replace the amplifier cable.			
21	STO Slave time out		The response data was not transmissible from the driver for 4ms.	Check the driver's select switch.			3.1.9
				Check the connection CP,CN driver.			
				Replace the amplifier cable.			
				Replace the driver.	3.1.9		
22	SYS1 System error 1		The servo error was input but no corresponding status exists.	Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
				Check the external noise.			
23	SYS2 System error 2		The servo error status was turned on but no corresponding status exists.	Replace the driver.	3.1.9		
24	INI Initial error		Communication between the NC and amplifier was not successful.	Check the driver's select switch.			3.1.9
				Replace the amplifier cable.			
				Check the connection CP,CN driver.			
				Replace the driver.	3.1.9		

*The indexer manufacturer shall provide measures for defective parts identified in the 5 axis and 6 axis.

1.2.1 X,Y,Z,5,6,M axes servo error (5/5)

## No	Problem		Cause	Measure	Replacement	Reference	Adjustment
25	SS Slave send		Communication state was on when transferring the data to the amplifier was attempted.	Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
26	SR Slave receive		Receiving state was on when transferring the data to the amplifier was attempted.	Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
27	CRCE CRC error		The contents of communication data were affected by noise.	Check the driver's select switch.			3.1.9
				Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
28	FRME Framing error		Communication framing error.	Check the driver's select switch.			3.1.9
				Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
29	VERE 1 Verify error (Data bank of servo amplifier 3,4,5.)		Parameters that are not supported by the driver were sent.	Check the parameter (Servo).			
				The type of driver is incorrect.			3.1.9
30	ATO Amplifier time out error		Communication time elapsed.	Check the driver's select switch.			3.1.9
				Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
31	RSTM RST monitor error	This error is peculiar to the spindle.					
32	SCE Synchronous frame CRC error		Communication is defective.	Check the driver's select switch.			3.1.9
				Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
33	RECD Disable encoder signal reading error		Permission signal for encoder signal reading is not sent even after the specified time has elapsed.	Replace the motor.	2.3.1 2.4.1 2.4.4 2.4.7	4.3.2 4.4.1 4.4.2 4.4.3	
				Replace the driver.	3.1.9		
34	VERI The error occurs only in the PV type of driver.	The error occurs when replacing the PV type of driver.	Error may occur immediately after the PV type of driver.	This is normal. Turn on the power again.			
		The error occurs when the servo parameter is changed.	The servo parameter was changed. Type of motor and encoder.	This is normal. Turn on the power again.			
35	SRE	This error is peculiar to the spindle.					
36	PSE Encoder stopped receiving serial signal.		Wiring of the encoder defective	Check the encoder cable. Check the encoder connection inside the motor terminal box. Check the wiring of CN2 driver.			
			The motor is defective.	Replace the motor.	2.3.1 2.4.1 2.4.4 2.4.7	4.3.2 4.4.1 4.4.2 4.4.3	
			The amplifier is defective.	Replace the driver.	3.1.9		
37	VERE2 Verify error (Data bank of servo amplifier 6,7.)		Parameters that are not supported by the driver were sent.	Check the parameter (Servo).			
				The type of driver is incorrect.			3.1.9
38	DEII Encoder quick stop	This error does not occur.					

*The indexer manufacturer shall provide measures for defective parts identified in the 5 axis and 6 axis.

1.2.2 X,Y,Z,5,6,M axes deviation error

Alarm No.
<Conv.>

<NC>

0559	X-axis deviation error 1	5059	X-axis deviation error 1
0560	Y-axis	5060	Y-axis
0561	Z-axis	5061	Z-axis
0563	5-axis	5063	5-axis
0564	6 axis	5064	6 axis
0566	M axis	5066	M axis

The axis name on the screen varies in accordance with axis selection.

No	Problem	Cause	Measure	Replacement	Reference	Adjustment
1	This error occurs soon after the servo motor is turned on or when the axis is not activated even if jog key operation is performed.	Position deviation limit value of the parameter is not properly set.	Modify the data properly.			
		Even when the motor is rotated by hand, the deviation data displayed on the screen does not change. (The encoder feedback system is defective.)	Check the connecting part of the amplifier cable and the encoder cable.			
			The amplifier cable and the encoder cable is defective.			
			Reconnect the connector on the slave PCB side to the other axis to check.	3.1.4		
			Replace the motor.	2.4.1 2.4.4 2.4.7	4.4.1 4.4.2 4.4.3	
		The motor drive is defective.	Check the cable and the connector.			
			Replace the motor.	2.4.1 2.4.4 2.4.7	4.4.1 4.4.2 4.4.3	
			Replace the driver.	3.1.9		
		Mechanical parts are locked.	Attempt to move the mechanical unit by hand.			
			Check that the brake and/or clamp are released.			
2	The error occurs during high-speed traveling or cutting.	Position deviation limit value of the parameter is not properly set.	Modify the data properly.			
		Load of the cutting condition is too large.	Modify the cutting condition.			
		Excessive load is applied to the table.	Review the load.			
		Mechanically overloaded. Foreign matters are stuck to the ball screws. Bearings are burnt-out.	Reduce the time constant.			
			Check that the current command monitor value is not larger than the normal level on the <IO>screen.			
			Attempt to move the mechanical unit by hand.			
		Malfunction of the brake. The brake cannot be released unless the brake axis servomotor is turned on. The servomotor is turned on when the 6 th bit from the left for [STATUS] of [AMPLIFIER RESPONSE] on the <I/O>screen is set to [1].	Check that 24 VDC is applied to the brake terminal block inside the motor terminal box.			
			Check that 24 VDC is applied to both ends of the CNYB terminal on the IO board.			
			Replace the motor.	2.4.1 2.4.4 2.4.7	4.4.1 4.4.2 4.4.3	
		Power voltage decreases by 10% or more.	Check the capacity of the user power source and the cables.			
		It forgets to return the current limiter after the adjustment.	Undo the parameter of the current limiter.		5.2	

1.2.3 Pulse error

Alarm No.

<Conv.>

<NC>

0094 **PULSE ERROR (SPINDLE)

5094 **PULSE ERROR (SPINDLE)

0095 **PULSE ERROR (X-AXIS)

5095 **PULSE ERROR (X-AXIS)

0096 **PULSE ERROR (Y-AXIS)

5096 **PULSE ERROR (Y-AXIS)

0097 **PULSE ERROR (Z-AXIS)

5097 **PULSE ERROR (Z-AXIS)

0099 **PULSE ERROR (*-AXIS)

5099 **PULSE ERROR (*-AXIS)

0100 **PULSE ERROR (*-AXIS)

5100 **PULSE ERROR (*-AXIS)

0102 **PULSE ERROR (M-AXIS)

5102 **PULSE ERROR (M-AXIS)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Pulse error occurs.	Parameter of motor pulse check allowance of machine parameter is set.	Check the feed back pulse from I/O screens.			
			Set new data.			
		Disconnection of the connector of amplifier.	Check contact of the connector.			
		Amplifier cord, encoder cord is defective.	Replace the cord.			
		The motor is defective.	Replace the motor.	2.1.1 2.3.1 2.3.4 2.3.7 2.5.3	4.1.3 4.1.4 4.3.1 4.3.2 4.3.3	
		The driver is defective.	Replace the driver.	3.1.9		
		The slave PCB is defective.	Replace the slave PCB.	3.1.4		

1.2.4 Other problems with X, Y, Z, 5, 6,M axes

No	Problem	Cause	Measure	Replace-ment	Adjust-ment	Refer-ence
1	When the origin point return, "OVERRUN" is displayed on the alarm message screen. <Conversational><NC> +X 0505 5505 -X 0506 5506 +Y 0507 5507 -Y 0508 5508 +Z 0509 5509 -Z 0510 5510 +5 0579 5579 -5 0580 5580 +6 0581 5581 -6 0582 5582	The [RELSE] and [Z.RTN] keys are not pressed after NC PCB replacement or NC critical error.	Move the axis to the stroke center and press the [RELSE] and [Z.RTN] keys.			
		Origin LS signal input is incorrect.	Check the LS.			
			Check the LS cord.			
			Replace the IO board.	3.1.5		
2	When power on, "OVERRUN" is displayed on the alarm message screen.	Connection of CNX, CNY and CNZ of IO board is incorrect.	Check the conector.			
3	"OVERRUN" (No axis name) <Conversational><NC> 0578 5578	The IO board is defective.	Replace the IO board.	3.1.5		
4	When the origin point return, "ORIGIN POINT ERROR X (X,Y)" is displayed on the alarm message screen. <Conversational><NC> X axis 1163 6163 Y axis 1164 6164 Z axis 1165 6165 5 axis 1168 6168 6 axis 1169 6169 The axis could not decelerate and stop while the origin limit switch was on.	The origin point LS is defective.	Check the origin point LS and the dog.			
			Replace the origin point LS.	2.4.1 2.4.3 2.4.5 2.6.2		
		Origin LS signal input is incorrect.	Check the LS cord.	2.5.1 2.5.2 2.5.3 2.6.2		
			Replace the IO board.	3.1.5		
		Origin return speed is too fast. The time constant is too large.	Check that the overrun limit switch is not contacting the dog.			
5	Traverse speed at the time of the origin point return is low.	The door has been open.	Close the door.			
		The LS is kept ON.	Check with the input/output screen.			
			Malfunction of the origin point LS due to chips or the like.			
			Check the LS cord.			
6	Axes don't move by the following keys but no alarm message is displayed.	Stop signal is input.	Check with the input/output screen.			
		No signal is input by the axis travel keys.	Check with the input/output screen. Replace the Key PCB when the signal is not input.			
		The rapid feed override switch is set to [1].	Check the switch. Check with the input/output screen.			
		The soft switch is set to [Motor not provided].	Check the soft switch.			
7	It oscillate by simple substance when change the motor.	Normal operating (Cause of unconnect loading)	Follow the manual to adjusting.		5.2	

1.2.5 X, Y, and Z feed axis error

State when error occurred:

Feed axis stopped during operation.

Abnormal noise generated during operation.

Machining accuracy poor.

Error contents:

X, Y, and Z axes deviation errors 1 and 2

X, Y, and Z axes servo error

No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Feed axis does not move.	Feed axis does not move.	Replace motor.	2.4.1 2.4.4 2.4.7	4.4.1 4.4.2 4.4.3	
		Coupling is loose.	Tighten coupling.		4.4.1 4.4.2 4.4.3	
		Ball screw surface is “burnt” (lubrication is inadequate).	Replace ball screw.	2.4.3 2.4.6 2.4.9	4.4.1 4.4.2 4.4.3	
2	Abnormal noise or vibration is generated during operation.	Ball screw is defective.	Replace ball screw.	2.4.3 2.4.6 2.4.9	4.4.1 4.4.2 4.4.3	
		Foreign matter has entered (e.g. chips).	Remove foreign matter.			
		Snap ring has dropped, causing bearing to come off.	Attach bearing. Replace snap ring.	2.4.3 2.4.6 2.4.9	4.4.1 4.4.2 4.4.3	
		Coupling concentricity is incorrect	Replace coupling.	2.3.2 2.3.5 2.3.9	4.4.1 4.4.2 4.4.3	
		Motor is defective.	Replace motor.	2.4.1 2.4.4 2.4.7	4.4.1 4.4.2 4.4.3	
		Amplifier is defective.	Replace driver.	3.1.9		
3	Machining accuracy is inadequate.	Ball screw is abraded.	Replace ball screw.	2.4.3 2.4.6 2.4.9	4.4.1 4.4.2 4.4.3	
		LM guide is abraded.	Replace LM guide.			
		The Torque observer control is invalid.	Make the Torque observer control effective.		5.2	
4	Z-axis has dropped.	Brake is defective.	Replace Z-axis motor.	2.4.7	4.4.3	
5	Origin return operation is inconsistent.	Origin offset pulse is incorrect.	Change parameter.		4.4.3	

1.3 Spindle error

1.3.1 Spindle servo error (1/4)

When an alarm occurs, "0058.## Spindle Servo Error (**)" is displayed on the <Alarm> screen. You can determine the alarm type by "##" and (**).

Alarm No.

<Conv.>

<NC>

0058

5058

## No		Problem	Cause	Measure	Replacement	Adjustment	Reference
1	OC Over Current	When the servo is turned off.					
		When the servo is turned on.	The digital I/F board is defective.	Replace the driver.	2.1.1 3.1.9		
			The motor insulation has deteriorated.	Replace the motor.		4.1.3 4.1.4	
			The motor's power cable wiring is incorrect, or a short circuit has occurred.	Check the wiring. Replace the driver.	3.1.9		
			The driver's power TR or circuit feedback circuit is defective.				
		When the motor is started or stopped.	The servo parameter is set incorrectly.	Check the machine parameter (servo).			
3	EOH External regenerative resistor over heat	Occurs when only control power is turned on.	The part between driver terminals H1 and H2 is open.	Check the wiring to the regenerative resistor.			
				Replace the regenerative resistor.			
		The regenerative resistor produces heat when only the servo is turned on.	The driver's regenerative transistor is defective.	Replace the driver.	3.1.9		
		Occurs during operation.	Too many program patterns are used.	Review the program patterns.			
			External fan wind volume has reduced.	Check the wind volume.			
			Power voltage is too high.	Check the voltage.			
4	OV Over voltage	Occurs when only control power is turned on.	The digital I/F board is defective.	Replace the driver.	3.1.9		
		The error occurs after the servomotor is turned during operation.	The input power voltage is too high or wave form is deformed.	Check the power voltage and wave form.			
			External regenerative resistance is incorrect.	Check the connection and resistance value.			
			The converter circuit or regenerative circuit inside the spindle driver is defective.	Replace the spindle driver.	3.1.9		
			The alarm detection circuit inside the driver is defective.	Replace the driver.	3.1.9		
6	CPE Control power error	Occurs when only control power is turned on.	The input power has decreased or momentary interruption has occurred. (Tends to occur when the spindle is started.)	When this error frequently occurs, check the power system.			
			Defective wiring to the driver terminals "r" and "t".	Check the wiring.			
			The driver is defective.	Replace the driver.	3.1.9		
		Occurs for multiple axes when only control power is turned on.	The driver is defective.	Replace the driver.	3.1.9		
			Defective wiring to the driver terminals "CP" and "CN".	Check the wiring.			
		This error occurs when an axis (particularly the spindle) starts.	The input power has decreased.	Check the power source.			

1.3.1 Spindle servo error (2/4)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
7	DE1 Detector error 1 of encoder line	Wires between the encoder and driver are disconnected or connected incorrectly.	Check the encoder cable. Check the connector connection inside the motor terminal box. Check the wiring.			
		[0] is not set for [DIS-PLACEMENT PULSE] on the <I/O> screen or a pluse error simultaneously occurs.	Replace the motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		The motor is extremely hot. (The error no longer occurs when the motor has cooled down.)	Eliminate the cause of excessive temperature rise of the motor.			
8	DE2 Detector error 2	The error does not occur in the spindle.				
9	OL Over load	Occurs when only control power is turned on.	The servo parameter is set incorrectly.	Check type of the motor of the machine parameter.		
		Occurs during operation.	Too many program patterns are used. Cutting load is excessive.	Review the program patterns and cutting conditions.		
			The dynamic brake is kept applied.	Replace the driver.	3.1.9	
			Mechanically overloaded. Bearings are burnt-out clamp system.	Check the mechanical part.		
			Motor's power cable wiring is incorrect (incorrect wiring, defective connection, and disconnection).	Check the wiring.		
			The servo parameter is set incorrectly.	Check type of the motor of the machine parameter.		
10	OS Over speed The maximum speed of 120% is exceeded.	Occurs when the motor is started. (The over shoot is excessive.)	Mechanically overloaded.	Check the mechanical part.		
			Excessive load is applied to the table.	Review the load.		
			The input power has decreased.	Check the power source.		
			Acceleration is too great.	Reduce the time constant.		
			The servo parameter is set incorrectly.	Check type of the motor, KVP and TVI of the parameter.		
		Occurs during operation.	The motor is demagnetized. The motor terminal voltage (U-V) decreased by 20% or more compared to the normal voltage when rotating at the max. rotation speed.	Replace the motor.	2.1.1 4.1.1 4.1.3 4.1.4	
11	MPE Main power error	Occurs when only control power is turned on.	The digital I/F board is defective.	Replace the driver.	3.1.9	
		Occurs after the servo is turned on.	Defective wiring to the driver terminals "MP" and "MN".	Check the wiring.		
		Occurs during operation.	The input power has decreased or momentary interruption has occurred. (Tends to occur when the spindle is started.)	Check the power source.		
12	FP Failure of phase	Occurs after the servo is turned on.	Power source lacks one phase.	Check the power line.		
		Occurs during operation.	The input power has decreased or momentary interruption has occurred. (Tends to occur when the spindle is started.)	Check the power source.		

1.3.1 Spindle servo error (3/4)

## No	Problem		Cause	Measure	Replacement	Adjustment	Reference
13	RGE Regenerative register over load	Occurs after the servo is turned on.	The driver's regenerative transistor is defective.	Replace the driver.	3.1.9		
		Occurs during operation.	Too many program patterns are used. Cutting load is excessive.	Review the program patterns and cutting conditions.			
			Power voltage is too high.	Check the voltage.			
			The servo parameter is set incorrectly.	Check type of the motor of the machine parameter.			
14	DSPE DSP error		The digital I/F board is defective. Driver's 5V DC power has decreased.	Replace the driver.	3.1.9		
15	ROME ROM error		The digital I/F board is defective. Driver's 5V DC power has decreased.	Replace the driver.	3.1.9		
16	PARE Parameter error		The servo parameter is set incorrectly.	Check type of the motor of the machine parameter (servo).			
			Type of driver is incorrect.	Install the correct amplifier.			3.1.9
			The driver's select switch is set incorrectly.	Set the switch correctly.			3.1.9
17	Battery voltage drop	This error does not occur in the spindle.					
18	CSE Communication sensor error	Occurs when only control power is turned on.	The servo parameter is set incorrectly.	Check type of the encoder, etc. of the machine parameter (servo).			
			Wires between the encoder and driver are disconnected or connected incorrectly.	Check the encoder cable.			
				Check the connector connection inside the motor terminal box.			
				Check the wiring.			
19	MOC Current feedback error when the servo motor is off.		The driver is defective.	Replace the driver.	3.1.9		
20	DTO Data time out		The command was not transmissible from the NC unit for 4 ms.	Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
				Replace the amplifier cable.			
21	STO Slave time out		The response data was not transmissible from the driver for 4 ms.	Check the driver's select switch.			3.1.9
				Replace the driver.	3.1.9		
				Replace the amplifier cable.			
22	SYS 1 System error 1		The servo error was input but no corresponding status exists.	Replace the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
23	SYS 2 System error 2		The servo error status was turned on but no corresponding status exists.	Replace the driver.	3.1.9		
24	INI Initial error		Communication between the NC and driver was not successful.	Check the driver's select switch.			3.1.9
				Check the amplifier cable.			
				Check the wiring.			
				Replace the driver.	3.1.9		
25	SS Slave send		Communication state was on when transferring the data to the driver was attempted.	Check the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
26	SR Slave receive		Receiving state was on when transferring data to the driver was attempted.	Check the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		
27	CRCE CRC error		The contents of communication data were affected by noise.	Check the driver's select switch.			3.1.9
				Check the amplifier cable.			
				Replace the driver.	3.1.9		
				Replace the SLAVE board.	3.1.4		

1.3.1 Spindle servo error (4/4)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
28	FRME Framing error	Communication framing error.	Check the driver's select switch.			3.1.9
			Check the amplifier cable.			
			Replace the driver.	3.1.9		
			Replace the SLAVE board.	3.1.4		
29	VERE Verify error	Parameters that are not supported by the driver were sent.	Check the machine parameter(servo).			3.1.9
			Type of the driver is incorrect.			
30	ATO Amplifier time out error	Communication time elapsed.	Check the driver's select switch.			3.1.9
			Check the amplifier cable.			
			Replace the driver.	3.1.9		
			Replace the SLAVE board.	3.1.4		
31	RSTM RST monitor error	The driver's main circuit input has decreased while the servo is on.	Check the operation of servo relay KS1.			
			Check the power source.			
			Check the wiring of main power circuit.			
			For EU specifications, check the door limit switch input circuit.			
			Replace the IO board.	3.1.5		
			Replace the driver.	3.1.9		
32	SCE Synchronous frame CRC error.	Communication error.	Check the driver's select switch.			3.1.9
			Check the amplifier cable.			
			Replace the driver.	3.1.9		
			Replace the SLAVE board.	3.1.4		
33	RECD Disable encoder signal reading error.	Permission signal for encoder signal reading is not sent even after the specified time has elapsed.	Replace the motor.	2.1.1	4.1.1 4.1.3 4.1.4	
			Replace the driver.	3.1.9		
34	VERI	This error does not occur in the spindle.				
35	SRE	This error is peculiar to the spindle.				
36	PSE Encoder stopped receiving serial signal.	This error is peculiar to the spindle.	Wires between the encoder and driver are disconnected or connected incorrectly.			
		The motor is defective.	Replace the motor.	2.3.1 2.4.1 2.4.4 2.4.7	4.3.2 4.4.1 4.4.2 4.4.3	
		The amplifier is defective.	Replace the driver.	3.1.9		
37	VERE2 Verify error (Data bank of servo amplifier 6,7.)	Parameters that are not supported by the driver were sent.	Check the parameter (Servo).			3.1.9
			The type of driver is incorrect.			
38	DEII Encoder quick stop	This error does not occur.				

1.3.2 Spindle motor deviation error

Alarm No.

<Conv.>

<NC>

0511 Spindle motor deviation error 1 5511 Spindle motor deviation error 1

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	This error occurs soon after the servo motor is turned on or when the spindle is not activated even if [S.CW] key operation is performed.	Position deviation limit value of the parameter is set incorrectly.	Modify the data properly.			
		Even when the motor is rotated by hand, the deviation data displayed on the screen does not change. (The encoder feedback system is defective.)	Check the connection of the amplifier cable and the encoder cable.			
			Amplifier cable and the encoder cable are defective.			
			Replace the SLAVE board.	3.1.4		
			Replace the motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		The motor drive is defective.	Check the cable and the connector.			
			Replace the driver.	3.1.9		
			Replace the motor.	2.1.2 3.1.9	4.1.1 4.1.3 4.1.4	
		Mechanical parts are locked.	Attempted to move the mechanical unit by hand.			
2	The error occurs during high-speed traveling or cutting.	Position deviation limit value of the parameter is set incorrectly.	Modify the data properly.			
		Load of the cutting condition is too large.	Modify the cutting condition.			
		Tool inertia is too large.	Review the tool weight and outer diameter.			
		Mechanically over loaded. Bearings are burnt-out. Lubrication error.	Reduce the time constant.			
			Check that the current command monitor value is not larger than the normal level on the <I/O> screen.			
			Attempted to move the mechanical unit by hand.			
		Power voltage decreases by 10% or more. (Low power) (This error occurs most often when the axis is starting.)	Check the power source.			
		Output torque of the motor was reduced.	Replace the motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		The driver is defective.	Replace the driver.	3.1.9		

1.3.3 Thermal error (spindle motor)

Alarm No.

<Conv.>

<NC>

0048 Thermal error (spindle motor) 5048 Thermal error (spindle motor)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	During spindle stop, "THERMAL ERROR (SPINDLE MOTOR) " is displayed on the alarm message screen. (This error occurs although the spindle motor is not heated.)	Defect or disconnection of the spindle motor thermal relay.	Check the wiring of the motor thermal relay.			
			Replace the motor.	2.1.1		
		The IO board is defective.	Replace the IO board.	3.1.5		
2	During spindle rotation, "THERMAL ERROR (SPINDLE MOTOR) " is displayed on the alarm message screen. (The spindle motor is heated.)	Load of the cutting condition is too large.	Cool the motor and then ease the cutting conditions and operation pattern.			
		The spindle motor cooling is defective.	Check the spindle motor fan operation.			
			The spindle motor fan is clogged.			
		Mechanically over loaded.	Review the tool weight and outer diameter.			
			Attempted to move the mechanical unit by hand.			
			Check that the current command monitor value is not larger than the normal level on the <I/O> screen.			
		The spindle motor heat generation increased.	Check the ACL type.			
			The spindle motor is demagnetized.	2.1.1		

1.3.4 Spindle error(1/2)

State when error occurred:

Spindle stops during operation.

Abnormal noise is generated during operation.

Machining accuracy is inadequate.

Tool drops.

Error contents:

Spindle servo error

Spindle deviation error

No.	Problem	Cause	Measure	Replace-ment	Adjust-ment	Refer-ence
1	Abnormal noise or vibration is generated during operation.	Bearing is “burnt”.	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Spindle is not balanced.	Balance spindle.		4.1.4	
		Tool is not balanced.	Use well balanced tool.			
		Coupling is defective.	Replace coupling.	2.1.2	4.1.1 4.1.3 4.1.4	
		Motor is defective.	Replace motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		Amplifier is defective (electromagnetic noise, etc.).	Replace driver.	3.1.9		
		Foreign matter is entered.	Remove the foreign matter.			
		Pull stud is loose.	Tighten pull stud.			
		Tool holder is defective.	Replace tool holder.			
		Piping for air purge and air blast is incorrect.	Correct piping. (Air purge, air blast)			
2	Spindle is “burnt” (heat is generated).	Bearing lubrication is inadequate.	Replace spindle.	2.1.3		
		Bearing pressure is excessive.	Replace spindle.	2.1.3		
		Head and bearing engagement is incorrect.	Replace spindle.	2.1.3		
		Foreign matter is entered.	Replace spindle.			
		Motor is defective (e.g. Fan stop).	Replace motor.	2.1.1 2.1.4	4.1.1 4.1.4	
3	Tool drops.	Steel ball does not move smoothly due to flaw, wear, etc. on oscillation surface.	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Draw-bar is defective.	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Spring is damaged.	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Slide spacer does not move smoothly.	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Tapered section is defective (flaw, indentation).	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Pull bolt is broken due to tool imbalance	Replace spindle. Replace tool holder and use well-balanced tool.	2.1.4	4.1.1 4.1.4	

1.3.4 Spindle error(2/2)

No.	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
4.	Deflection accuracy is poor.	Tapered section is defective (flaw, indentation).	Replace spindle.	2.1.3	4.1.1 4.1.4	
		Foreign matter is adhered to tapered section.	Remove foreign matter.		4.1.1 4.1.4	
		Fitting of head and bearing is incorrect (excessive clearance).	Replace bearing and adjust fitting.	2.1.3	4.1.1 4.1.4	
		Backlash occurs in bearing due to wear.	Replace bearing.	2.1.3	4.1.1 4.1.3 4.1.4	
		Coupling concentricity is incorrect.	Replace coupling.	2.1.2	4.1.1 4.1.3 4.1.4	
		Motor attachment is inadequate.	Align motor with spindle center and attach motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		Spindle accuracy is inadequate.	Replace spindle.	2.1.3	4.1.1 4.1.4	
5.	Spindle does not rotate.	Coupling slips because it is damaged.	Replace coupling.	2.1.2	4.1.1 4.1.3 4.1.4	
		Motor is defective.	Replace motor.	2.1.1	4.1.1 4.1.3 4.1.4	
		Encoder is defective.	Replace motor.	2.1.1	4.1.1 4.1.3 4.1.4	

1.4 Problem with ATC

1.4.1 ATC problem (in the vicinity of magazine rotation)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	MAGAZINE NO. ERROR is displayed on the alarm message screen. <Conversation> Alarm No. 1194 <NC> Alarm No. 6194	All the encoder signals are "0".	1. Replace the address sensor. 2. Repair disconnection of the cable. 3. Replace the IO board.	2.2.4 3.1.3		
		When 14 tools type is used, the 16s encoder signal is input.	Remove the CNXI2 when it joints.			9.4.4
2	After Z axis comes up into the magazine area, MAGAZINE POSITION ERROR is displayed on the alarm message screen. <Conversation> Alarm No. 1196 <NC> Alarm No. 6196 (ATC origin point LS is not on.)	The grid shift amount of the parameter No.2 in the data bank is not set properly.	Measure the grid shift amount and set it in the parameter No.2 of the data bank.		4.3.3	9.4.6
		The ATC origin point LS is broken.	Replace the ATC origin point LS.	2.4.7	4.2.4 4.2.5	9.4.6
		Z axis origin point comes out of the position by 16 mm.	Adjust the location of the Z axis origin point LS.		4.3.4	
3	MAGAZINE INDEX ERROR is displayed on the alarm message screen. <CONVERSATION> Alarm No. 1195 <NC> Alarm No. 6195 (In case that the LED Of the barrel cam proximity switch is not off, axis movement can not be performed even after the alarm is reset.)	The magazine stops out the position.	Turn the magazine to the correct position.			
		Malfunction of the barrel cam proximity switch.	1. Adjust mounting position (clearance) of the switch. 2. Remove chips from the switch. 3. Check the cables of the switch. 4. Replace the ATC board. 5. Replace the barrel cam proximity switch.	3.1.5 3.1.3	4.2.2 4.2.3	
	I/O MAIN 1 INPUT 2 FE.....6.....0 X..... 0: normal	The sense input part of IO board is defective.	Replace the IO board.	3.1.5		

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1.4.2 ATC abnormal (in magazine rotation) (1/3)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	After the magazine rotation, "MAGAZINE NO. ERROR" is displayed on the alarm message screen. <Conversation> Alarm No.1194 <NC> Alarm No.6194 (Encoder signal is not input correctly.)	The address sensor is not mounted correctly.	Correctly mount the address sensor.		4.2.2	
		The slit board is mounted inside.	Correctly mount the slit board.	2.2.4		
		The address sensor is defective.	Replace the address sensor.	2.2.4		
		The IO board is defective.	Replace the IO board.	3.1.1		
		The encoder cable is defective.	Repair connection or replace the cable.			7.5
2	The magazine doesn't rotate at all. "ATC TIME OVER ERROR" is displayed on the alarm message screen. <Conversation> Alarm No.1199 <NC> Alarm No.6199 (1 pitch is indexed within 5sec.)	The cable to the terminal on the inverter is not properly connected.	Check the connection between following connectors and the cable. 1. Inverter CNA ARM			7.3.11 9.4.7
		Disconnection at the ATC terminal block.	Check and repair connection between the terminal block and the cables.			2.2.6
		Inverter setting is defective.	Check inverter parameter . Check that the inverter drive mode lamp is FREE.	3.1.10		
		The motor runs idle.	1. Repair the looseness of the coupling. 2. Replace the gears.			2.2.5
		The cam follower is broken.	Replace the cam follower.	3.1.5		
		The IO board is defective.	Replace the ATC IO board.			
		Spindle amplifier is defective.	Replace the spindle driver.	3.1.9		

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1.4.2 ATC abnormal (in magazine rotation) (2/3)

## No	Problem	Cause	Measure	Repla ceme nt	Adjus tment	Refer ence
3	During the magazine rotation, "ATC TIME OVER ERROR" is displayed on the alarm message screen. <CONVERSATION> Alarm No.1199 <NC> Alarm No.6199	Chips stick to the barrel cam.	Remove chips and clean the cam.			2.2.5
		The slit board and the photoelectric sensor touch with each other. (All the signals of the address sensor become "0")	Replace the address sensor.	2.2.4		
		Weight of the mounted tools exceed the specified value.	Instruct the user on the proper setting.			9.4.7
		Weights of the tools mounted on the magazine are out of the balance.	In order to balance the magazine, 1. Exchange positions of the tools or 2. Mount a balancer.			9.4.7
		The barrel cam proximity switch doesn't turn ON.	1. Adjust the location of the switch. (Clearance between the switch and the slit board) 2. Check the cable of the switch. 3. Replace the switch.		4.2.3	
		Declaration signal of the address sensor is kept to "0" or "1".	Check that the address sensor is properly mounted.		4.2.2	
4	The motor runs in the reverse rotation.	The cable to the terminal on the inverter is not properly connected.	Repair the wiring.			
		Disconnection at the ATC terminal block.	Replace the motor.	2.2.6		
		Cord connection of the inverter terminal is defective.	Connect the cord correctly.			7.3.11

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1.4.2 ATC abnormal (in magazine rotation) (3/3)

## No		Problem	Cause	Measure	Repla ceme nt	Adjus tment	Refer ence
5	THERMAL ERR (ATC MOTOR) <Conversational> 0053 <NC> 5053	Weight of the mounted tools exceeds the specified value.	The ATC capacity is exceeded.	Instruct the user on the proper setting.			
		The tool requirements are satisfied.	Mechanically overloaded. Gear. Bearing. Cam follower.	Check the mechanical part. Check that abrasion, chip clogging, or tool being stuck is not identified.			
			The ATC inverter is defective.	Replace the ATC inverter.	3.1.10		
			The cam motor is defective.	Replace the cam motor.	2.2.5		
			ATC is used too frequently.	Review the program patterns.			
6	INVERTER ERR (ATC) <Conversational> 0520 <NC> 5520	The latest error log of the ATC inverter indicates OL1 or OL2.	The ATC motor is overloaded.	Refer to the section on "THERMAL ERR (ATC MOTOR)".			
			The ATC inverter is defective.	Replace the ATC inverter.	3.1.10		
		The latest error log of the ATC inverter indicates OP2 or OP3.	The power voltage is too high.	Check the voltage.			
			The ATC inverter is defective.	Replace the ATC inverter.	3.1.10		
		The latest error log of the ATC inverter indicates OCA or OCL.	Motor's power cable wiring is incorrect or a short circuit has occurred.	Check the cables.	3.1.10		
			The ATC inverter is defective.	Replace the cam motor.			
		The latest error log indicates an item other than the above.	The inverter input voltage is abnormal.	Check the inverter input voltage.			
			The ATC inverter is defective.	Replace the ATC inverter.	3.1.10		

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1.4.3 Dropping of tool (1/1)

Error occurrence state:

Tool drops during the tool change single action.

Tool drops during MDI operation and memory operation.

## No	Problem	Cause	Measure	Replacem ent	Adjustme nt	Reference
1	The motion of the grip is abnormal.	The grip or supporting point board is defective.	Replace the grip assy.	2.2.2		
2	The motion of the spindle is deviated.	The coupling is deviated.	Adjust the orientation.		4.1.1	
		The encoder of the spindle motor is defective.	Replace the spindle motor.	2.1.1	4.1.1	

1.4.4 Problem with the magazine cover

Error occurrence state:

- 1) The magazine cover does not open or close.
- 2) The magazine cover is caught midway.

Error name: MGZN COVER TIMEOVER

No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	The magazine cover is caught midway.	Rails are not correctly adjusted.	Adjust the rails.	2.8.3		
		The cover is faulty.	Replace the cover.	2.8.1		
		Cylinder operation is faulty.	Replace the cylinder.	2.8.2		
2	The signal of the open/ limit switch is not input. (Check this on the <I/O>screen.)	The open /close limit switch is faulty.	Replace the limit switch.	2.8.4		
		The input circuit of the I/O board is faulty.	Replace the I/O board.	3.1.5		
		Connector contact is faulty. (Relay box, I/O board.)	Check the connector. joint. If it is correct, replace the cable.			
3	The valve does not operate. (The cover can be opened and closed when the valve is operated by hand with the valve connector disconnected.)	The valve is faulty.	Replace the valve.			
		The output circuit of the I/O board is faulty.	Replace the I/O board.	3.1.5		
		Connector contact is faulty. (Relay box, I/O board)	Check the connector. joint. If it is correct, replace the cable			

1.5 Problem with the NC board

1.5.1 Problem with the NC, MEM board (1/3)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	ROM Error (MAIN) ROM Error (LOCAL) ROM Error (SLAVE)	The MEM board is defective.	Replace the MEM board.	3.1.3		
		The MEM board is connected incorrectly.	Check the MEM board.			
	ROM Error (****) Other than (MAIN- SLAVE)	The NC board is defective.	Replace the NC board.	3.1.2		
	ROM Error (MAIN- SLAVE)	The NC board is defective.	Replace the NC board.	3.1.2		
		The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
		The SLAVE board is connected incorrectly.	Check the SLAVE board.			
	The system does not start while [CNCA00] is displayed on the screen.	The NC board is defective.	Replace the NC board.	3.1.2		
	The screen stays dark and the system does not start.	The dip switch setting is incorrect.	Set the dip switches correctly.			
		The key cord is disconnected.				
		The NC board is defective.	Replace the NC board.	3.1.2		
	[MAIN INITIAL IMPSBLE] is displayed on the alarm message screen.	The NC board is defective.	Replace the NC board.	3.1.2		
	[SLV INITIAL IMPSBLE] is displayed on the alarm message screen.	The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
	WATCH DOG (***)	The NC board is defective.	Replace the NC board.	3.1.2		
		The MEM board is defective.	Replace the MEM board.	3.1.3		
		The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
	M EXCPT INTRPT, L EXCPT INTRPT,	The NC board is defective.	Replace the NC board.	3.1.2		
		The MEM board is defective.	Replace the MEM board.	3.1.3		
		The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
2	The screen display is defective. (Characters are converted incorrectly, the screen is flickering, etc.)	The dip switch setting is incorrect.	Set the language correctly.	3.1.2		
		The NC board is defective.	Replace the NC board.	3.1.2		
		The CNKEY cord is connected incorrectly.	Check that the cable connector is inserted until it is locked.			
		The CNKEY cord is broken.	Replace the CNKEY cord.	3.1.2		
		The KEY board is defective.	Replace the KEY board.	3.2.1		
3	NC or Conversation cannot be switched.	The cable of the NC/ Conversation select switch is disconnected.	Insert the cable correctly.			
		The connector CNLANG of lower IO board is disconnected.	Insert the CNLANG correctly.			
		The CNSW cord is broken.	Replace the CNSW cord.			
		The IO board is defective.	Replace the IO board.	3.1.5		
		The NC board is defective.	Replace the NC board.	3.1.2		
	The memory writing [PROTECT OFF] or [PROTECT ON] cannot be switched.	The cable of the NC/ Conversation select switch on the operation panel is disconnected.	Insert the cable correctly.			
		The CNKEY cord is broken.	Replace the CNKEY cord.			
		The NC board is defective.	Replace the NC board.	3.1.2		

1.5.1 Problem with the NC, MEM board (2/3)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
4	RS232C communication is impossible.	The setting for communication parameters is incorrect.	Set the parameter appropriately for the communication device.			Operation manual
		The RS232C connector cable on the operation panel is disconnected or broken.	Check the cable connection or replace the cable.			
		The KEY board is defective.	Replace the KEY board.	3.2.1		
		The CNKEY cord is broken.	Replace the CNKEY cord.			
		The NC board is defective.	Replace the NC board.	3.1.2		
5	[SERVO RELAY1 ERROR] is displayed on the alarm message screen.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNIO cord is broken.	Replace the CNIO cord.			
		The relay KS1 is defective.	Replace the relay KS1.			
		The IO board is defective.	Replace the IO board.	3.1.5		
	The Z-axis brake cannot be released.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNIO cord is broken.	Replace the CNIO cord.			
		The IO board is defective.	Replace the IO board.	3.1.5		
		The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
		The amplifier for Z axis is defective.	Replace the driver for Z axis.	3.1.9		
		The Z amplifier cord is broken.	Replace the Z amplifier cord.			
		The Z motor is defective.	Replace the Z motor .	2.4.7		
	The lock of the emergency stop switch is released, but the error cannot be cleared using the [RESET] key.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNIO cord is broken.	Replace the CNIO cord.			
		The IO board is defective.	Replace the IO board.	3.1.5		
	The EXIO board is mounted, but the data input and output is not recognized.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNIO cord is broken.	Replace the CNIO cord.			
		The CNEXIO cord is broken.	Replace the CNEXIO cord.			
		The IO board is defective.	Replace the IO board.	3.1.5		
	[I/O TIMEOVER *] is displayed on the alarm message screen.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNIO cord is broken. (* = 3,4)	Replace the CNIO cord.			
		The CNEXIO cord is broken. (* = 5)	Replace the CNEXIO cord.			
		The IO board is defective. (* = 3,4)	Replace the IO board.	3.1.5		
		The EXIO board is defective. (* = 5)	Replace the EXIO board.			
		The KEY board is defective. (* = 1,2)	Replace the KEY board.	3.2.1		
		The CNKEY cord is broken. (* = 1,2)	Replace the CNKEY cord.			
		The NC board is defective. (* = 1,2,3,4,5)	Replace the NC board.	3.1.2		
	The pulse of the manual pulser cannot be input.	The NC board is defective.	Replace the NC board.	3.1.2		
		The CNKEY cord is broken.	Replace the CNKEY cord.			
		The operation panel is disconnected.	Insert the cable correctly.			
		The SLAVE board is defective.	Replace the SLAVE board.	3.1.4		
	The error LED of LINK I/O IC of NC PCB blinks.	Communication error due to noise has occurred.	Replace the NC board or CNIO, CNKEY cord.	3.1.2		

1.5.1 Problem with the NC, MEM board (3/3)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
6	NO AUTO THERM COMP (*) <Conversational> <NC> X 1328 6328 Y 1329 6329	The version of the NC board is incorrect. (Before B52J090-2)	Replace the NC board. (After BJ52090-3)	3.1.2		
7	NC board can't be fixed because the hole to install it is small.	The version of the NC board is incorrect.	Replace the NC board. (B52J090-4 Rev.Bor higher)	3.1.2		

1.5.2 Problem with slave board

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	**WATCH DOG (SLAVE) No.0001(Conv.)No.5001(NC)	DC5V is defective.	Check and adjust AVR1.		5.1.1	
	**ROM ERROR (SLAVE) No.0006(Conv.)No.5006(NC)	Disconnection of the CNSLV1, CNSLV2 of the slave board.	Check contact of the connector.			
	**RAM ERROR (SLAVE) No.0005(Conv.)No.5005(NC)	Disconnection of the CNROM1, CNROM2 of the MEM board.	Check contact of the connector.			
	**RAM ERROR (MAIN-SLV) No.0011(Conv.)No.5011(NC)	Dip switches are set incorrectly.	Check the setting.			
	**TIMER ERROR (SLAVE) No.0012(Conv.)No.5012(NC)	The slave board is defective.	Replace the slave board.	3.1.4		
	**CALC ERROR (SLAVE) No.0015(Conv.)No.5015(NC)	The NC board is defective.	Replace the NC board.	3.1.2		
	**SLV INITIAL IMPOSBLE No.0018(Conv.)No.5018(NC)	The MEM board is defective.	Replace the MEM board.	3.1.3		
	**COMMAND ERROR No.0052(Conv.)No.5052(NC)					
	**SYSTEM ERROR (SLV) No.1150(Conv.)No.6150(NC)					
	**COMMAND ERROR (SP) No.1172(Conv.)No.6172(NC)					

1.5.3 Problem with IO board (1/2)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	AC POWER SUPPLY DROP is displayed on the alarm message screen. Alarm No.0019(Conv.)/5019(NC)	AC power supply voltage dropped by more than 10%.	Check the power supply voltage, change the tap the transformer or the power supply capacity.			
		The fuse (Q3, except EU) or the circuit protector (Q3,EU) blown out by overload or short-circuit of the coolant pump, the chipflow pump, spindle fan or KPH.	After making sure of no short-circuited external wiring, replace the fuse (Q3, except EU) or turn the protector ON(Q3,EU) .	3.1.11 2.1.2		
		The connector CN200 of the IO board disconnected.	Connect the connector CN200.			
		Q1(EU) is tripped.	After making sure of no short-circuited external wiring, turn ON Q1(EU) .			
		Q1(EU) is difective.	Replace the Q1(EU).			
		The IO board is difective.	Replace the IO board.	3.1.5		
2	DC POWER SUPPLY ERROR (24V) is displayed on the alarm message screen. Alarm No.0020(Conv.)/5020(NC) (In case that DC24V between No.1 and No.10 of XTIO terminal drops more than 10%.)	The DC power supply unit AVR2 is defective.	Replace the AVR2.	3.1.7		
		The IO board is difective.	Replace the IO board.	3.1.5		
	DC POWER SUPPLY ERROR (24V) is displayed on the alarm message screen. Alarm No.0020(Conv.)/5020(NC) (In case that DC24V between No.1 and No.10 of XTIO terminal within 10%.)	Short-circuit between IO24 and IOG. Short-circuit of the relay or the valve.	Eliminate the cause of short circuit. (Disconnect the IO board connector while measuring the resistance between IO24 and IOG to determine the short-circuited location.)			
		Too many loads are connected to XTPW and XTO of the IO board terminal block. (Overload of 24 VDC power supply AVR2)	Reduce the number of loads. Increase the AVR2 capacity.			
		The DC power supply unit AVR2 is defective.	Replace the AVR2.	3.1.7		
		The IO board is difective.	Replace the IO board.	3.1.5		
3	100V POWER SUPPLY ERROR is displayed on the alarm message screen. Alarm No.0027(Conv.)/5027(NC)	Interrupt of the circuit protector Q4 (except EU) or Q5 (EU) on the T2 by overload or short-circuit of AC 100V line.	After making sure of no short-circuited external wiring turn the protector ON.			
		The connector CN100 of IO board disconnected.	Connect the connector CN100 .			
		The IO board is difective.	Replace the IO board.	3.1.5		
4	SYSTEM ERROR (MAIN) is displayed on the alarm message screen at POWER switch ON. Alarm No.0501(Conv.)/5501(NC)	The IO cord connected to CNEXIO on the IO board.	Connect the IO cable to CNIO on the IO board.			
		The IO board is difective.	Replace the IO board.	3.1.5		
5	IO TIMEOVER 3 or 4 is displayed on the alarm message screen. Alarm No. 0035/0037(Conv.) 5035/5037(NC) (Other input/output timeover error does not occur.)	The IO cord between IO board and NC board is difective.	Check the connector CNIO . Replace the IO cord.			
		The IO board is difective.	Replace the IO board.	3.1.5		

1.5.3 Problem with IO board (2/2)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
6	The emergency stop does not release.	External emergency stop function is used. (External emergency contact is defective.)	When using this function, use a dry contact rated 3A. When not using this function, short between Nos. 23 and 24 of IO board terminal block XTIO.			
		The IO board is defective.	Replace the IO board.	3.1.5		
7	The emergency stop is not applied even when the [EMERGENCY STOP] switch is pressed.	The [EMERGENCY STOP] switch contact block in the operation box is disconnected.	Attach the contact block to the switch block.			
		The IO board is defective.	Replace the IO board.	3.1.5		
8	The system does not boot even when the [START] or [E. STA] button is pressed.	The [EXSTIN] (external start) or [EXOUSTIN] (external outer start) function is used. N-BUS I/F board is used.	When not using this function, short between 5 and 6 (external start), and 7 and 8 (external outer start) of terminal block XTIO. Check the ladder when using N-BUS.			

1.5.4 Problem with ATC inverter (1/2)

Alarm No.

<Conversational>

<NC>

0520 INVERTER ERROR(ATC) 5520 INVERTER ERROR(ATC)

See "6.10 Inverter error (ATC) content check procedure" to check the inverter's alarm indication.

## No	Alarm indication	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1.	Uv (blink) or Uv1 Low voltage	Main voltage (terminal block +1,-) has fallen below approx. 200V.	Check the connection of the power cable to the inverter.			
			Check the MP and MN voltage of the spindle driver. (Approx. 280 VDC)			
			Check the main power voltage.			
2.	oV Over voltage	Main power voltage (terminal block +1,-) has exceeded approx. 410V. Check that the servo error (oV) has occurred. If not, the inverter may be faulty.	Check the power supply voltage. (Voltage is too high.)			
			Check the wiring of the spindle driver's regenerative resistor and its resistance value.			
			If the spindle driver's regenerative circuit is faulty, replace the spindle driver.	3.1.9		
			Replace the inverter.	3.1.10		
3.	oH Cooling fin over heat	Cooling fan temperature or ambient temperature has risen due to inverter's overload operation.	Check the inverter's built-in fan. If the fan is not operating replace the inverter.	3.1.10		
			Check the cooling fan inside the control panel, especially the side fan.			
			Check the ambient temperature. (It should be 40 °C or less.)			
			Check the mechanical section. (The cam is difficult to move, etc.)			
4.	oC Over current	Over current occurred at output terminal.	Check the connection to the inverter output terminal. (Check for short circuit.)			
			Check the phases of the cam motor. If short circuited, replace the motor.	2.2.5		
			Replace the inverter. (The detection circuit or power module is faulty.)	3.1.10		
5.	OL1 Motor over load OL2 Inverter overload OL3 Over torque detection	The overload protection circuit inside the inverter is activated.	Check the mechanical section. (The cam is difficult to move, etc.)			
			Replace the inverter. (The detection circuit is faulty.)	3.1.10		

1.5.4 Problem with ATC inverter (2/2)

## No	Alarm indication	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
6.	GF Ground fault	Ground fault is detected on the inverter output side.	Check the wiring of output side. (Grounding , and U,V, and W phases.)			
			Check the cam motor. (Grounding , and U,V, and W phases.) If a ground fault is identified, replace the cam motor.	2.2.5		
			Replace the inverter.	3.1.10		
7.	F00 Control circuit fault (Initial fault) F01 ROM fault F04 EEPROM fault F05 A/D converter fault	The control circuit inside the inverter is faulty.	Replace the inverter.	3.1.10		
8.	Not lit	Power is not supplied. (Nothing is displayed when the servo is off.)	Reset the emergency stop and alarm. and turn on the servo.			
			Connect the CNIVP.			
			Check the MP and MV voltage of the spindle driver. (Approx .280 VDC)			
		The inverter control circuit is faulty.	Replace the inverter.	3.1.10		

1.6 Problem with operation box

1.6.1 Problem with operation panel

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	The [IO timeover 1] or [IO timeover 2] error is displayed on the screen. Alarm No. 0031/0033(Conv.) 5031/5033(NC)	The Key board is defective.	Replace the Key board.	3.2.1		
		The CNKEY cord connecting the Key board and NC board is defective.	Check the CNKEY cord connection or replace the CNKEY cord.			
2	No response is made even when the key is pressed.	[MODE PROTECT ON] is selected.	Switch to [MODE PROTECT OFF].			
		“Mode changeover prohibited (MDLOCK)” or “Key operation prohibited (KYLOCK)” of the external input signal is input.	Check that such a signal is actually input.			
		The Key board is defective.	Replace the Key board.	3.2.1		
		The NC board is defective.	Replace the NC board.	3.1.2		
3	The LED does not light. (The alarm is not displayed on the screen.)	The Key board is defective.	Replace the Key board.	3.2.1		
		The NC board is defective.	Replace the NC board.	3.1.2		
4	“S OVR RD NO CONNECTED” is displayed on the screen. Alarm No.1300(Conv.)/6300(NC)	CNSPOV connector on the Key board is not connected.	Check the connection of the CNSPOV connector.			
5	FACIT power does not turn on.	The Key board fuse has blown.	Replace the fuse.	3.2.5		
		CNRS cable of the Key board is connected incorrectly.	Check the CNRS cable connection or replace the cable.			

1.6.2 Problem with screen

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	The screen is completely dark. (Even the LCD fluorescent lamp is unlit.)	CNKEY cord connecting the NC board and the Keyboard is defective.	Check the CNKEY cord connection and replace the cord if necessary.			
		The AVR3 is defective.	Replace the AVR3.	3.2.2		
		CN5V cord connecting the Key board and the AVR3 is defective.	Check the CN5V connection and replace the cord if necessary.			
		The Key board is defective.	Replace the Key board.	3.2.1		
		The NC board is defective.	Replace the NC board.	3.1.2		
2	The screen is dark, but characters are displayed. (The LCD fluorescent lamp is unlit.)	The LCD inverter is defective.	Replace LCD inverter.	3.2.4		
		The fluorescent lamp inside the LCD is faulty (including the cable connecting the LCD and the inverter).	Replace the LCD fluorescent lamp.	3.2.6		
		CNBKLT cord connecting the Key board and the LCD inverter is defective.	Check the CNBKLT cord connection and replace the cord if necessary.			
		The NC board is defective.	Replace the NC board.	3.1.2		
3	The screen is bright, but characters are not displayed. (The LCD fluorescent lamp is lit.)	The Key board is defective.	Replace the Key board.	3.2.1		
		The NC board is defective.	Replace the NC board..	3.1.2		
		CNKEY cord connecting the Key board and the NC board is defective.	Check the CNKEY cord connection and replace the cord if necessary.			
		The LCD is defective.	Replace the LCD.	3.2.3		
		Contrast is not adjusted correctly (particularly when temperature is low).	Adjust the contrast according to the instruction manual.			
4	The screen becomes orange. Some white and black lines appear on the screen.	CNKEY cord connecting the NC board and the Key board is defective.	Check the CNKEY cord connection and replace the cord if necessary.			
5	Some white lines appear on the completely dark screen.	CNKEY cord connecting the NC board and the Key board is defective.	Check the CNKEY cord connection and replace the cord if necessary.			
6	Screen becomes completely white.	Contrast is not adjusted correctly (particularly when temperature is high).	Adjust the contrast according to the instruction manual.			
		The Key board is defective.	Replace the Key board.	3.2.1		
7	The cursor appears, but characters are not displayed.	ROM Character Generator on the NC board is defective.	Replace the NC board or the ROM Character Generator.	3.1.2		

1.7 Problem with peripheral equipment

1.7.1 Problem with coolant unit (1/2)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	THERMAL (COOLANT) is displayed on the alarm message screen. Alarm No. 0049(Conv.)/5049(NC)	Overload of the coolant pump.	Lower viscosity of coolant.			
		Improper setting of the thermal value.	Setting of the thermal value refer to installation manual.			
		Power voltage is high.	Set the power voltage to the rated value or set the thermal value appropriate for the voltage.			
		Phase fault of the pump motor.	1. In case that the fuse Q3 is brown out, replace it. 2. In case that the wiring to the motor is not performed sufficiently, repair it.	3.1.11		
2	The coolant motor doesn't rotate.	The [CLT.P] key on the key board is turned OFF. (The LED has put out lights)	Turn the [CLT.P] key ON. (The LED lights up.)			
		The EMERGENCY SW is pushed.	Release the EMERGENCY SW.			
		Disconnection of the connector CNKP1 or CNCLM of the coolant protection unit.	Check the CNKP1 connection and coolant protection unit connection (IO board connector CNBIO).			
		The fuse (Q3, except EU) or the circuit protector (Q3, EU) blown out by overload or short-circuit of the coolant pump or the chipflow pump.	After making sure of no short-circuited external wiring, replace the fuse or turn the protector ON.	3.1.11		
		The relay KP1 in the coolant protection unit doesn't work.	Replace the coolant protection unit.			
		Improper setting of the dip SW1.	No.1 bit is OFF.			
		The IO board defective.	Replace the IO board.	3.1.5		

1.7.1 Problem with coolant unit (2/2)

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
3	The solenoid valve of the coolant unit doesn't work.	Command M08 is not given.	Execute M08 by the key input operation or by the program.			
		The NC determines that the door is open. QT type 1.Both outer and inner doors are open. 2.The QT is at the non-indexing position with the outer door open. 3.The QT is not at the origin with the outer door open. Non QT type (22A etc.) 1.The front and/or side door is open.	QT type 1.Close the outer door. 2.When the outer door is open, close the inner door to move the QT to the indexing position. Non QT type (22A etc.) 1.Close both the front and side doors.			
		Disconnection of the connector CNYVC on the IO board.	Check the connector connection (Is the CNYVA connector connected mistakenly?). Also check the solenoid valve connection.			
		The IO board defective.(Although the above matter is correct, 24 VDC is not output to both ends of CNYVC.)	Replace the IO board.	3.1.5		
		The solenoid valve is defective.(Although the 24 VDC is output to CNYVC, the solenoid valve is not operated.)	Check connection to the solenoid valve. Replace the solenoid valve.			
4	The air assist valve does not work. (The solenoid valve works.)	Air piping is defective.	Check air piping.			
		The air assist valve is defective.	Replace the air assist valve.			
5	Flow of the coolant is not sufficient.	The mechanical valve of the coolant unit is closed.	Open the mechanical valve.			
		The coolant motor rotates in the reverse direction.	Exchange two of the three phases on the motor side.			
		The coolant nozzle is stopped up with chip.	Remove chips and clean the nozzle.			

1.7.2 Problem with chip shower unit

## No	Problem	Cause	Measure	Replac- ment	Adjust- ment	Refer- ence
1	THERMAL (CHIP SHOWER) is displayed on the alarm message screen. Alarm No.0046(Conv.)/5046 (NC)	Overload of the chip flow pump.	Lower viscosity of coolant.			
		Improper setting of the thermal value.	Setting of the thermal value refer to installation manual .			
		Power voltage is high.	Set the power voltage to the rated value or set the thermal value appropriate for the voltage.			
		Phase fault of the pump motor.	1. In case that the fuse Q3 is brown out, replace it. 2. In case that the wiring to the motor is not performed sufficiently, repair it.	3.1.11		
2	The coolant motor doesn't rotate.	The [CHIP.F] key on the key board is turned OFF. (The LED has put out lights)	Turn the [CHIP.F] key ON. (The LED lights up.)			
		Command M400 is not given.	Execute M400 by the key input operation or by the program.			
		The EMERGENCY SW is pushed.	Release the EMERGENCY SW.			
		Disconnection of the connector CNKP2 or CNCLM of the coolant protection unit.	Check the CNKP2 connection. Also check the coolant protection unit wiring (IO board connector CNBIO).			
		The fuse (Q3, except EU) or the circuit protector (Q3, EU)) blown out by overload or short-circuit of the coolant pump or the chipflow pump.	After making sure of no short-circuited external wiring, replace the fuse or turn the protector ON.	3.1.11		
		The relay KP2 in the coolant protection unit doesn't work.	Replace the coolant protection unit.			
3	The motor starts only by pressing the chip shower key on the operation panel. (M400 is not activated.)	The IO board defective.	Replace the IO board.	3.1.5		
		Improper setting of the dip SW1.	No.2 bit is OFF.	3.1.5		
4	Flow of the chip flow is not sufficient.	The motor capacity is insufficient.	Use the next largest coolant unit.			
		The coolant viscosity is high.	Reduce the coolant viscosity.			
		The chip shower pipe is clogged with chips.	Remove chips and clean the nozzle.			
		The coolant motor rotates in the reverse direction.	Exchange two of the three phases on the motor side.			

1.7.3 Tool breakage error

State when error occurred:

Tool breakage detection device does not work.

Tool breakage detection device does not detect tool breakage.

Tool breakage detection device does not stop.

Error contents:

Tool breakage error

Tool breakage timeover

Tool breakage sensor error

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Tool breakage detection device does not work.	Air is not supplied.	Supply air.			
		Valve is defective.	Replace valve.			
		Cylinder is defective.	Replace cylinder.			
		Bearing is damaged.	Replace bearing.			
		Foreign matter has entered.	Remove foreign matter.			
		Speed controller is not adjusted correctly.	Adjust speed controller.			
2	Sensor does not detect tool breakage.	Sensor pin is damaged.	Replace sensor pin.			
		Sensor is damaged (wire is broken).	Replace sensor.			
		Arm mounting is deviated.	Adjust the arm position			
3	Tool breakage detection device does not stop.	Stopper has come off.	Mount stopper.			

1.7.4 Automatic door error

State when error occurred:

Automatic door does not open or close.

Automatic door does not decelerate.

Automatic door does not open or close smoothly.

Error contents:

Door error

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Automatic door does not open or close.	Air is not supplied.	Supply air.			
		Speed controller is not adjusted correctly.	Adjust speed controller.			
		Valve is defective.	Replace valve.			
		Cylinder is defective.	Replace cylinder.			
		Air leaks from tube or coupler.	Connect tube and coupler correctly.			
2	Automatic door does not decelerate.	Decelerate-valve is defective. The arm of decelerate-valve is deviated.	Replace decelerate-valve. Adjust arm.			
		AD dog is defective (deformed or damaged).	Replace AD dog.			
		Speed controller is not adjusted correctly.	Adjust speed controller.			
3	Automatic door does not open or close smoothly.	Air pressure is low.	Adjust air pressure.			
		Air is not supplied.	Supply air.			
		Automatic door makes contact with obstacle.	Remove obstacle.			

1.7.5 Intermittent lubricator error

State when error occurred:

Pump does not operate.

Oil leaks.

Oil is not supplied

Error contents:

External error

## No	Problem	Cause	Measure	Replace- ment	Adjust- ment	Refer- ence
1	Pump does not operate.	Cord connection is incorrect (or wire is broken).	Connect cord correctly (or replace it).			
		Pump is defective (wire is broken).	Replace pump unit.			
		Oil has run out.	Replenish oil.			
	Oil leaks.	Tube is damaged.	Replace tube.			
		Gasket is damaged.	Replace gasket.			
		Manifold connection is incorrect.	Connect hose correctly.			
	Oil is not supplied.	Foreign matter entered oil route, causing clogging.	Remove foreign matter (or replace tube).			

1.7.6 Problem with CTS unit (1/2)

## No	Problem	Cause	Measure	Replacement	Adjustment	Reference
1	THERM ERR (CTS PUMP) is displayed on the alarm message screen. (Protector KP3 is OFF.)	CTS pump is broken.	Replace the CTS pump.			
		The corresponding motor is overloaded.	Lower viscosity of coolant.	Installation manual		
		Improper setting of the thermal value. CTS pump : KP3	Setting of the thermal value refer to installation manual . Check a.c. power supply voltage.			
		Phase fault of the pump motor.	1. In case that the fuse Q3 is brown out, replace it. 2. In case that the wiring to the motor is not performed sufficiently, repair it.			
		KP3 is turned OFF.	KP3 to be ON.			
	THERM ERR (CTS PUMP) is displayed on the alarm message screen. (Protector KP3 is ON.)	The IO board is defective.	Replace the IO board.	3.1.5		
2	LINE FILTER ERROR is displayed on the alarm message screen.	The back washing or line filter of the CTS unit is clogged.	Replace the line filter or wash the back washing filter.	Installation manual		
		The filter pressure sensor is defective.	Replace the pressure sensor.			
3	CTS pump motor doesn't rotate.	The [CLT.P] key on the operation panel is turned OFF. (LED does not light up.)	Turn the [CLT.P] key ON. (LED lights up.)			
		M-code command is not given.	Execute M-code by the key input operation or by the program refer to the operation manual.			
		During emergency stop.	Release and reset of emergency stop.			
		The NC determines that the door is open. 1.The front door is open.	1.Close the front door.			
		The relay KP3 is defective.	Replace the relay KP3.			
		CTS cord is defective.	Check connection from connector CNSPT HR on the IO board to the CTS connector control box.			
		The IO board is defective.	Replace the IO board.	3.1.5		
4	CTS pump motor rotates, but coolant is not dispensed.	The tool is defective.	Use a tool satisfying the requirements in the instruction manual.			
		The coolant valve system is defective. 1.The solenoid valve is connected incorrectly. 2.The solenoid valve is defective. 3.The air pipe connecting the coolant valve and the solenoid valve are defective. 4.The coolant valve is defective. 5.The IO board is defective. 6.Air is not coming.	1.Check the solenoid valve connection. (Relay cord connected to CNSPT HR and CNXO of the IO board.) 2.Replace the solenoid valve. 3.Reconnect the air pipe. 4.Replace the coolant valve. 5.Replace the IO board. 6.Check the piping and air generator.			
		Piping is defective.	Adjust piping.	3.1.5		

1.7.6 Problem with CTS unit (2/2)

## No	Problem	Cause	Measure	Replac ement	Adjus tment	Refer ence
5	CTS ERROR is displayed on the alarm message screen. 1.Pressure of CTS is not increase during discharge.)	Just after Installation or maintenance.	Just after Installation, or maintenance, there is no coolant in the pipe. Cause of that pressure is not increase. At least three times will be occur. Four to five times to repeat.			
		Parameter setting value is defective.	Check the parameter setting value. [M490 COOLANT BLOWING TIME]default value is 1.0. [M492 COOLANT BLOWING TIME]default value is 1.0. [M494 COOLANT BLOWING TIME]default value is 1.0.			
		During back washing, order the CTS discharge (M494) command.	Change the program. Set [BACK WASHING AT PROGRAM END 0:NO 1:YES] at [BACK WASHING AT PROGRAM END] User Parameter (switch 1). Back wash command M496 was finished. After that if M494 CTS discharge commanded that cause of not increase the pressure of the CTS.			
		1.Piping is defective. 2.Valve A,B or C is defective. 3Pump damage. 4.Pressure sensor failure. 5.Check valve damage. 6. Coolant level low. 7.Pump damage. Motor is move but pressure is not enough standard level. 8.Cause of tank leakage, coolant flowing to the pump is not enough.	1.Check the piping. 2.Replace the valve. 3.Replace the pump. 4.Replace the pressure sensor. 5.Replace the check valve. 6.Check the connector CNSPTH to SPCTS on the IO board. 7.Replace the pump. 8.Wash the tank filter.			
		Coolant level low.	Replenish the coolant.			
	2.Pressure of CTS does not decrease when discharge is not performed.	CTS(discharge) command is executed when a tool not for CTS is used. Foreign matter is clogged in the piping. (Pressure of the pipe between the discharge control valve and the spindle does not decrease.	-Use tools for CTS. -Don't execute CTS discharge command when a tool not for CTS is used. -Remove foreign matter. Piping-cleaning Spindle motor-Replace Spindle-Replace			

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Chapter 2 Replacement procedure (mechanical parts)

2.1 Spindle

2.1.1 The spindle motor replacement (1/4)



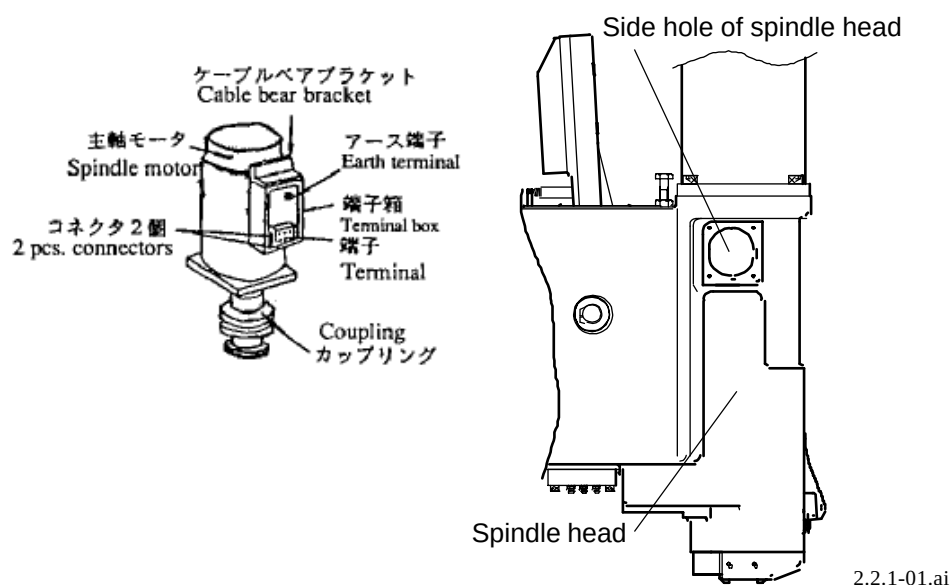
Spindle motor

2-11.jpg

Spindle head cover

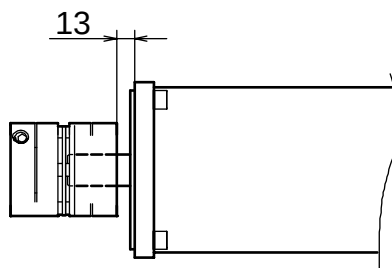
Spindle motor terminal box

2.1.1 The spindle motor replacement (2/4)

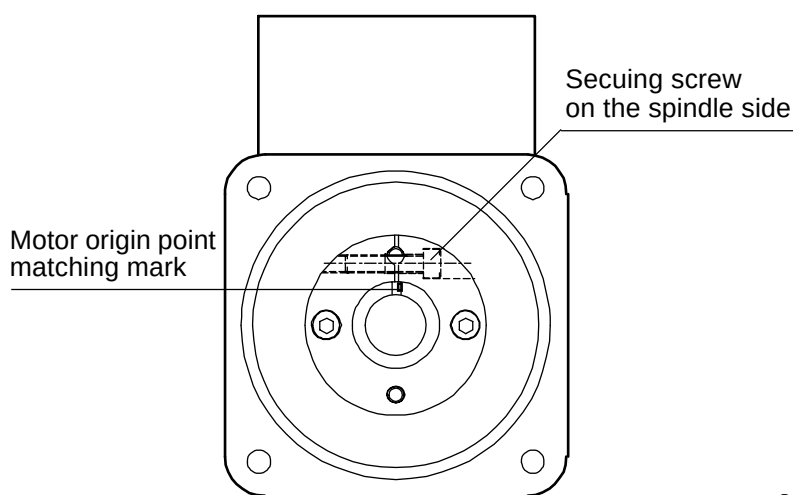


1. Turn on the <POWER> switch and then the keys **[MANU]** and **[ATC]** to perform the Z axis zero position return and the spindle orientation.
2. Press the **[-Z]** key to lower the spindle head until the cover of the 22A on the spindle head left side appears. Then, remove the 22A spindle cover.
(Bolt, Socket M6, 4pcs.)
3. Loosen the M8 bolt on the coupling spindle side.
4. By pressing the **[ATC]** key, move the spindle head up to the upper limit of the Z axis.
5. Turn off the <POWER> switch and turn off the breaker for the control box.
6. Remove the Spindle head cover R, L.
7. Remove the terminal box cover of the spindle motor. Remove all of the cable in the terminal box.
8. Remove the C bracket 251 S on the top of the terminal box .
9. Remove the cord rock fixed plate that under face of the terminal box.

2.1.1 The spindle motor replacement (3/4)



2.1.2-01.ai



2.1.2-02.ai

10. Remove the spindle motor from the spindle head. (Bolt, Socket M10, 4pcs.)
(Weight of the motor) 20~31kg

[NOTE]

Pull up the motor vertically.

Pay utmost care not to put any excessive force on the coupling.

11. Loosen the M8 bolt and remove the coupling.
12. Mount the coupling on a new spindle motor.
 - (1) Insert the coupling into the motor shaft and keep the distance between the motor mounting surface and the coupling end surface as follows:
TC-S2B ... 13 mm
 - (2) Tighten the coupling so that the fixing screw on the spindle side matches with the side hole of the spindle head.
The torque to tighten M8 bolt is 29.4Nm (300kgf/cm).
13. Mount the spindle motor on the spindle head.
Tentatively, tighten the spindle motor with four screws.

[NOTE]

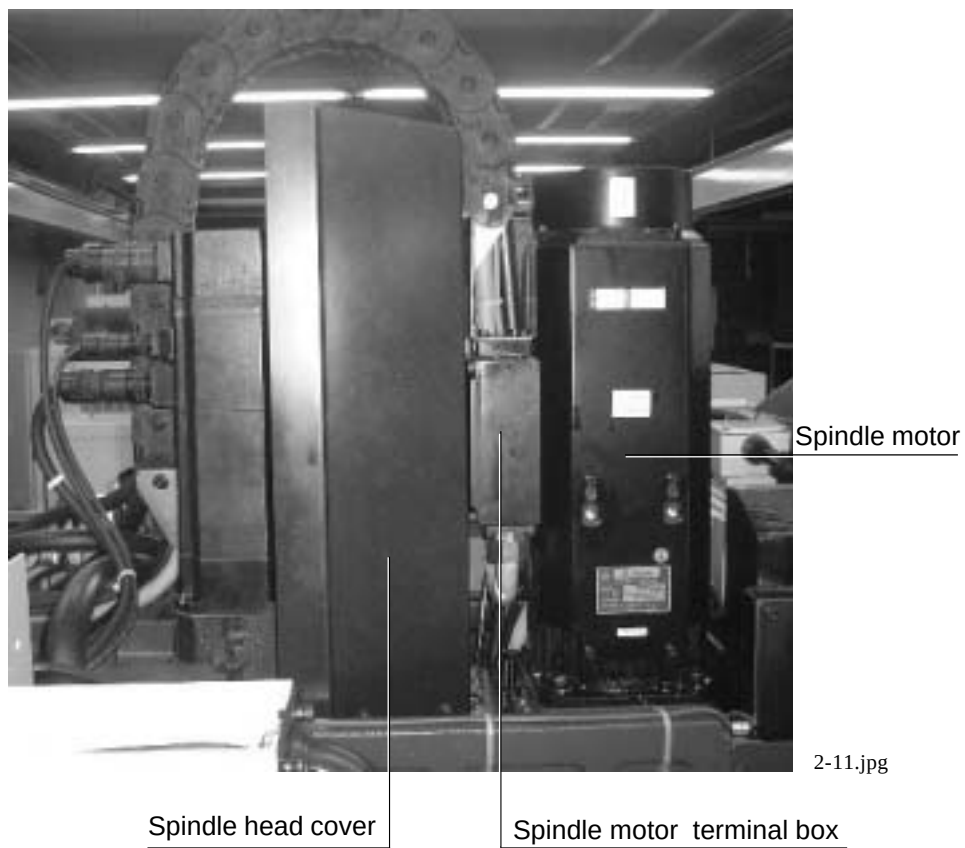
Insert the motor vertically while paying utmost care not to put any excessive force on the coupling.

2.1.1 The spindle motor replacement (4/4)

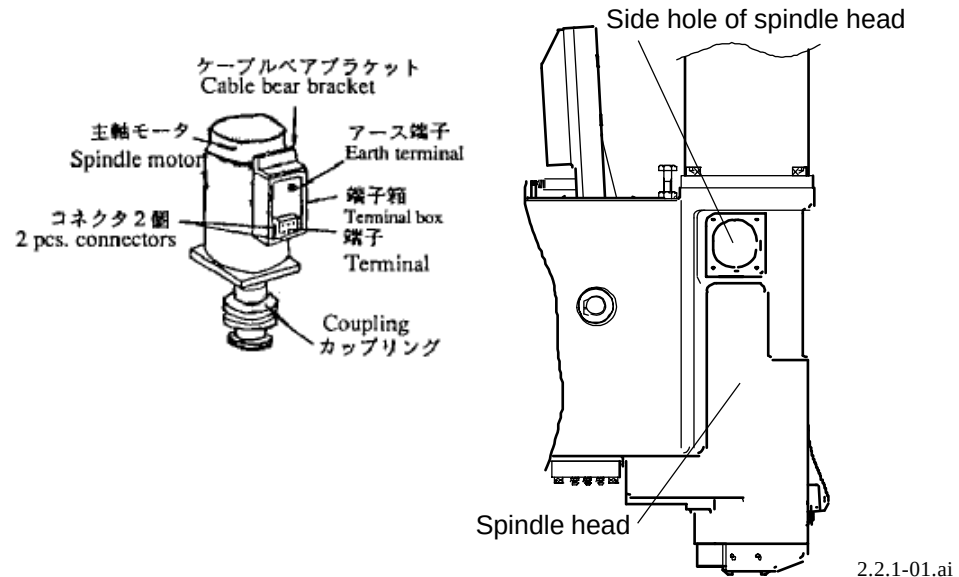
14. Set the cord rock board and adjust the C bracket 251 S.
15. Take place to the cable that removed at 7. Adjust the terminal cover.
16. Turn on the breaker for the control box and turn on the <POWER> switch.
While pressing the **[RELSE]** key, press the **[-Z]** key to lower the spindle head below the Z axis zero position.
17. By pressing the **[ATC]** key, perform the Z axis zero position return and the spindle orientation.
18. By pressing the **[-Z]** key, lower the spindle head until the side hole of the spindle head appears.
19. Check if the the side of the key at the end of the spindle becomes parallel to the Y axis. If not, loosen screws on the coupling to turn the spindle manually until the side of the key comes to the parallel position to the Y axis. Tighten the M8 bolt by 29.4Nm(300kg.cm) on the spindle side (lower part) of the coupling thorough the side hole of the spindle head.
20. Gradually, speed up a spindle from 100 to 1000min⁻¹ by manual mode.
Tighten screws for spindle motor when the spindle is aligned with the motor.
21. Perform the spindle orientation adjustment. (Refer to 4.1.1 Spindle orientation adjustment.)
22. Adjust the spindle balance when rotaion throb is big, 16000min⁻¹ type or 10000min⁻¹ type (Refer to 4.1.4 Spindle balance adjustment.)
23. Tighten the M6 four bolts to the SP cover 22A that light side of the spindle head.
24. Adjust the Spindle head cover R, L.

Replacement parts		Tools to be
Name	Parts code	
SP MOTOR251 10K	618180001	Small test 1/100
SP MOTOR251 10KC	618181001	Hexagonal wrench set
SP MOTOR31B 16K	6A0093001	Phillips screw driver(+,-)
SP MOTOR251 16KC	618182001	15cm straight edge
		M10T wrench (over L400mm)
		M8 T wrench

2.1.2 The spindle coupling replacement (1/4)

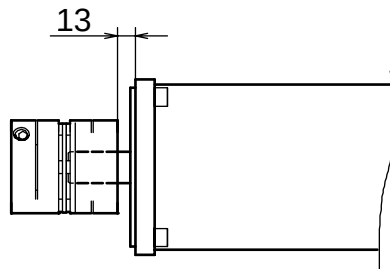


2.1.2 The spindle coupling replacement (2/4)

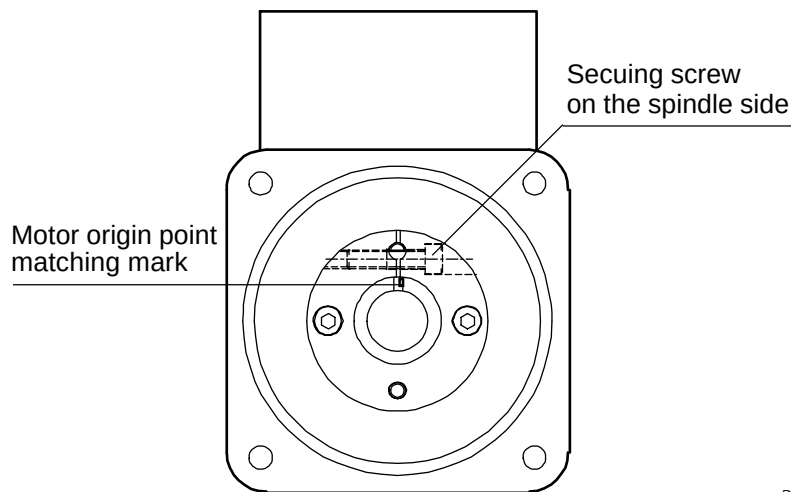


1. Turn on the <POWER> switch and then the keys **[MANU]** and **[ATC]** to perform the Z axis zero position return and the spindle orientation.
2. Press the **[-Z]** key to lower the spindle head until the cover of the 22A on the spindle head left side appears. Then, remove the 22A spindle cover. (Bolt, Socket M6, 4pcs.)
3. Loosen the M8 bolt on the coupling spindle side.
4. By pressing the **[ATC]** key, move the spindle head up to the upper limit of the Z axis.
5. Turn off the <POWER> switch and turn off the breaker for the control box.
6. Remove the spindle head cover R, L.
7. Remove the terminal box cover of the spindle motor. Remove all of the cable in the terminal box.
8. Remove the C bracket 251 S on the top of the terminal box.
9. Remove the cord rock fixed plate that under face of the terminal box.

2.1.2 The spindle coupling replacement (3/4)



2.1.2-01.ai



2.1.2-02.ai

10. Remove the spindle motor from the spindle head. (Bolt, Socket M10, 4pcs.)
(Weight of the motor) 20~31kg

[NOTE]

Pull up the motor vertically.

Pay utmost care not to put any excessive force on the coupling.

11. Loosen the M8 bolt and remove the coupling.
12. Mount a new coupling.
 - (1) Insert the coupling into the motor shaft and keep the distance between the motor mounting surface and the coupling end surface as follows:
TC-S2B ... 13 mm
 - (2) Tighten the coupling so that the fixing screw on the spindle side matches with the side hole of the spindle head.
The torque to tighten M8 bolt is 29.4Nm (300kgf/cm).
13. Mount the spindle motor on the spindle head.
14. Tentatively, tighten the spindle motor with four screws.

[NOTE]

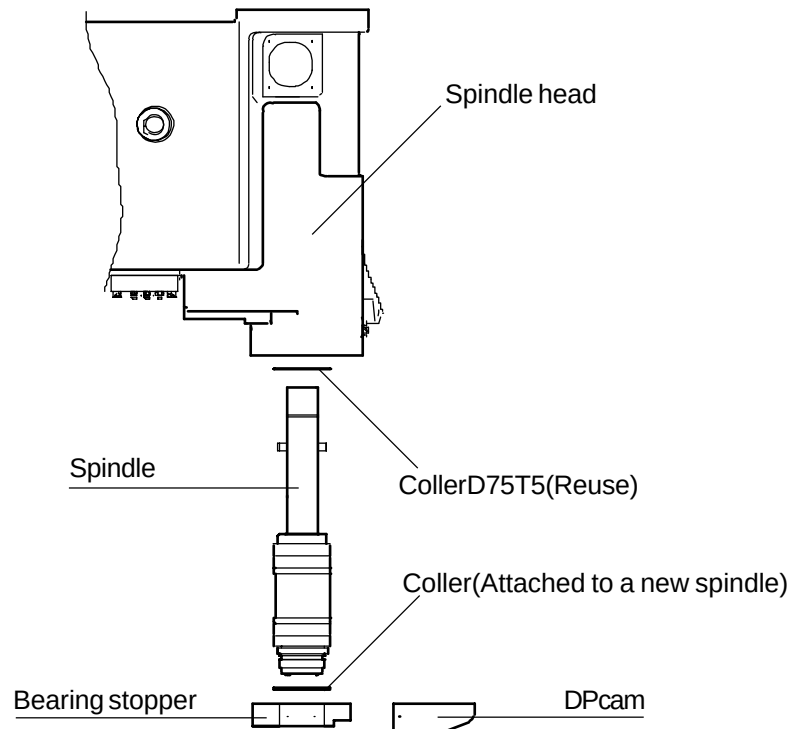
Insert the motor vertically while paying utmost care not to put any excessive force on the coupling.

2.1.2 The spindle coupling replacement (4/4)

15. Set the cord rock board and adjust the C bracket 251 S.
16. Take place to the cable that removed at 7. Adjust the terminal cover.
17. Turn on the breaker for the control box and turn on the <POWER> switch. While pressing the **[RELSE]** key, press the **[-Z]** key to lower the spindle head below the Z axis zero position.
18. By pressing the **[ATC]** key, perform the Z axis zero position return and the spindle orientation.
19. By pressing the **[-Z]** key, lower the spindle head until the side hole of the spindle head appears.
20. Check if the the side of the key at the end of the spindle becomes parallel to the Y axis. If not, loosen screws on the coupling to turn the spindle manually until the side of the key comes to the parallel position to the Y axis. Tighten the M8 bolt by 29.4Nm(300kg.cm).
21. Gradually, speed up a spindle from 100 to 1000min⁻¹ by manual mode. Tighten screws for spindle motor when the spindle is aligned with the motor.
22. Perform the spindle orientation adjustment. (Refer to 4.1.1 Spindle orientation adjustment.)
23. Adjust the spindle balance when rotaion throb is big, 16000min⁻¹ type or 10000min⁻¹ type (Refer to 4.1.4 Spindle balance adjustment.)
24. Tighten the M6 four bolts to the SP cover 22A that light side of the spindle head.
25. Adjust the spindle head cover R, L.

Replacement parts		Tools to be
Name	Parts code	
Coupling 250	653036001	Small test 1/100 Hexagonal wrench set Phillips screw driver(+,-) 15cm straight edge M10T wrentch (over L400mm) M8 T wrentch

2.1.3 The spindle replacement (1/3)

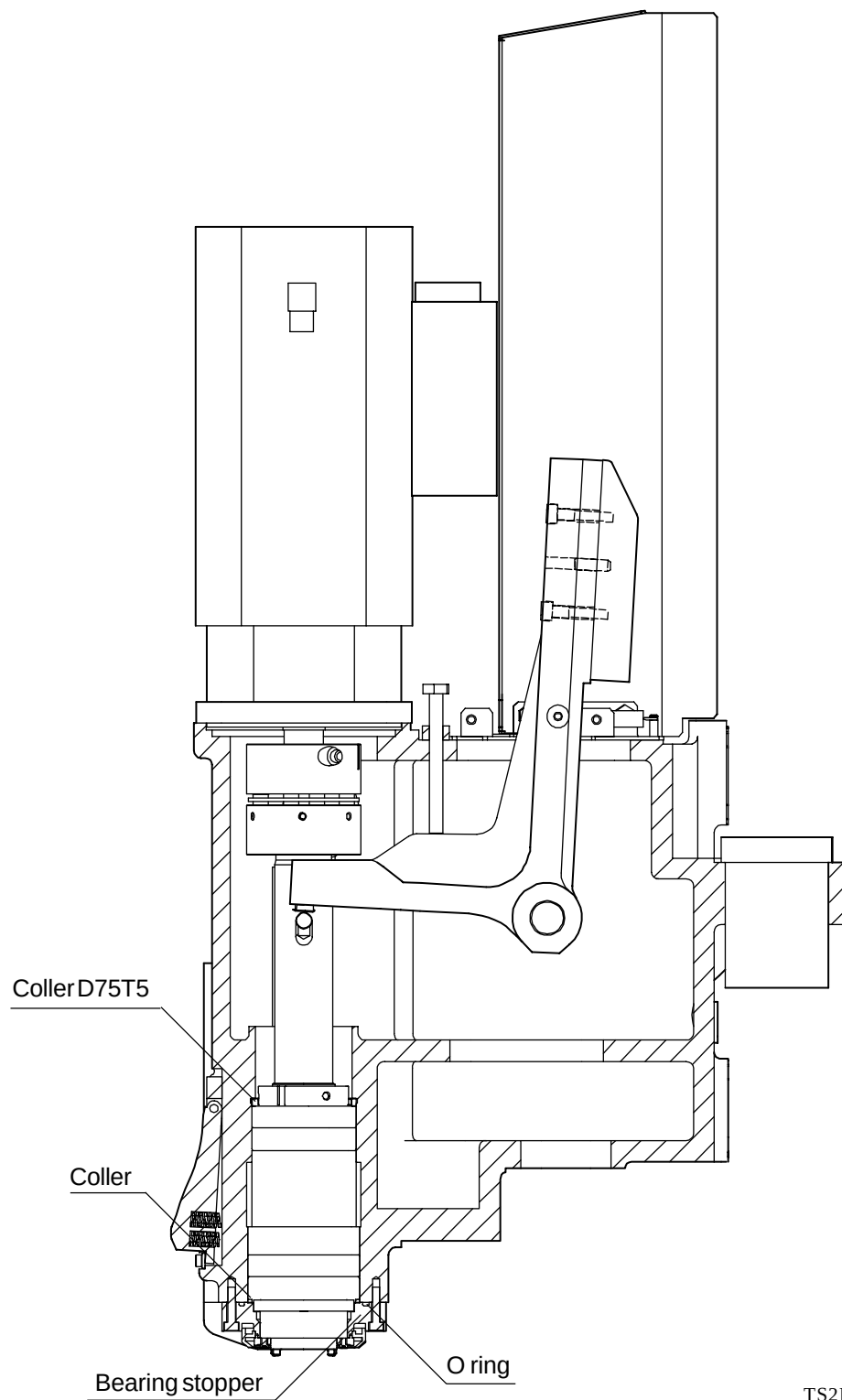


2.1.3-01.ai

1. After mounting a tool on the spindle, measure the Z axis current position with a height pre-setter and take a note of the machine coordinate position on the screen.
2. Press the **[-Z]** key to lower the spindle head until the cover of the hole on the spindle head side appears. (Bolt, Socket M6, 4pcs.)
3. Loosen the M8 bolt on the spindle side (the lower part) of the coupling.
4. Move the spindle head up to the position where the spindle can be pulled out from the spindle head. (The appropriate distance between the table or the jig surface to the spindle edge is around 400mm.)
5. Turn off the <POWER> switch.
6. Turn off the air. Remove the air piping tube and coolant piping tube for the bearing stopper. (air purge and tool washing)
7. Remove the DP cam.
8. Remove the bearing stopper.
(Straight pin 8×26×M5, 2pcs. Bolt, Socket M6, 6pcs.)
9. Pull out the spindle and catch the spindle as it falls. Remove the collar on the bottom edge of the spindle bearing.
Do not mix the removed collar with the new one.
10. When the spindle is pulled out, the COLLAR D75T5 appears on the upper side of the spindle bearing or the back side of the spindle head.

[NOTE] Do not loose this COLLAR that continue to use.

2.1.3 The spindle replacement (2/3)



TS2B0201.ai

2.1.3 The spindle replacement (3/3)

11. Insert a new spindle from the bottom side.
Place the COLLAR D75T5 which is removed at step 9. on the upper side of the spindle bearing.
[NOTE] Align the bearing to insert.
12. Put a collar attached to a new spindle on the spindle bearing.
Attach the bearing stopper. At the time, check the O ring is inserted into the bearing stopper. Position the bearing stopper with pins. Then, secure screws (6 pcs.) on the diagonal line in turn.
13. Return the DP cam.
14. Return the air piping tube and coolant piping tube as it was.
15. Turn on the <POWER> switch.
16. Press the **[ATC]** key to perform the z axis zero position return and the spindle orientation.
17. Press the **[-Z]** key to lower the spindle head until the side hole of the spindle head appears.
18. Turn the spindle manually until the side of the key at the end of the spindle becomes parallel to the Y axis.
19. Tighten the screw on the coupling through the side hole of the spindle head.
Tightening torque for M8 screw is 29.4Nm (300 kg f.cm).
20. Every five minits speed up from 1000 min⁻¹ and through five stages(10K) / eight stages (16K) to be the maximam speed.
21. Perform the spindle orientation adjustment (See 4.1.1).
22. Adjust the spindle balance. (See 4.1.4)
23. Attach the cover for the side hole of the spindle head.
24. Attach a tool to the spindle and check with a height pre-setter that the Z axis currentposition is same as the one which was measured before the replacement.
If they are not same, set the grid shift amount for Z axis (4.3.3).

Replacement parts		Tools to be
Name	Parts code	Small test 1/100 Hexagonal wrench set Phillips screw driver(+,-) Height pre setter M8 T wrentch torque
SP ASSY 251 10K	618183001	
SP ASSY 251 16K	618184001	
SP ASSY 251 10K-C	618800001	
SP ASSY 251 16K-C	618801001	

2.1.4 Spindle motor fan (1/2)

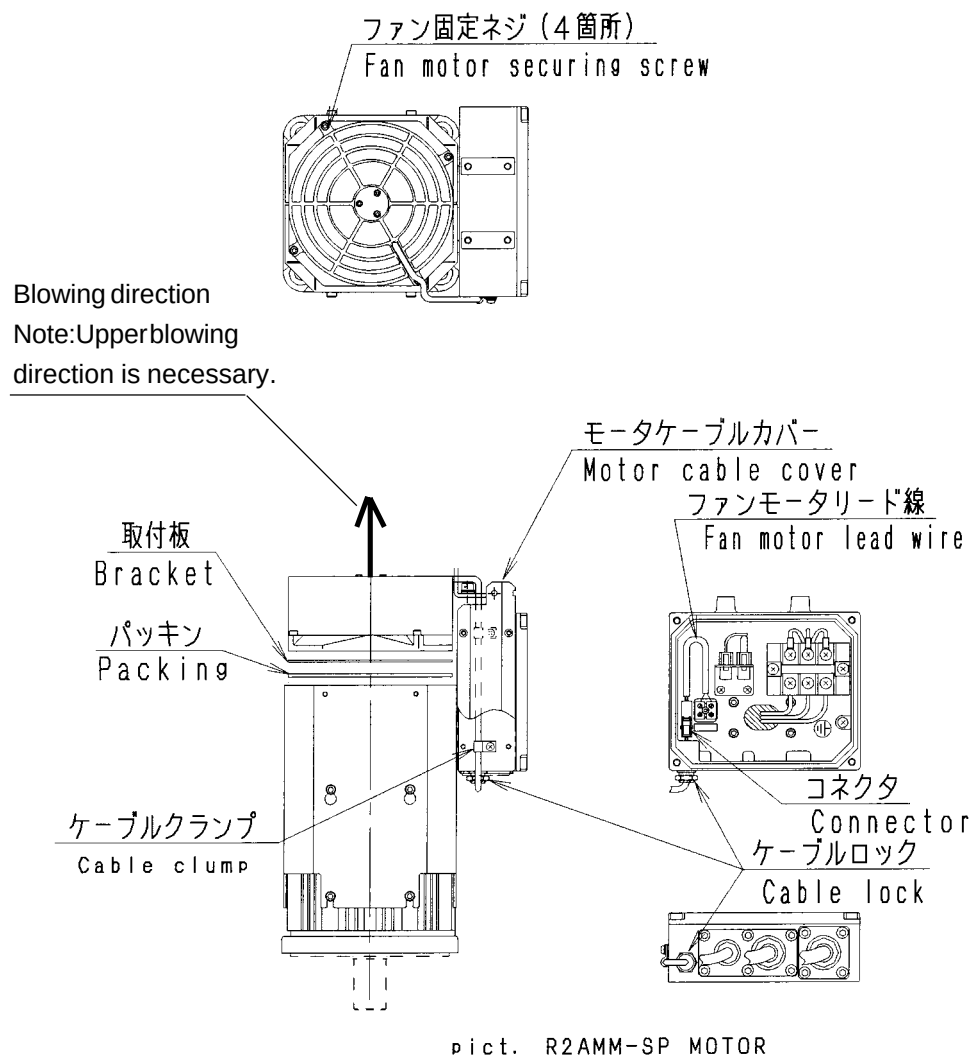
1. Turn off the <POWER> switch and then the circuit breaker.
2. Remove the motor cable cover, and remove the cable clamp of the fan lead wire.
3. Loosen the cable lock. Pull the code to pull out the connector and remove it.
4. Next, remove the fan securing screw (M4×4) the upper fan cover of the motor.
5. Connect the new fan connector. The connector pushes on to the hole.
Tighten the cable lock correctly.
6. Tighten the fan securing screw to secure the fan. Apply adhesive agent (LOCKTITE #242 or equivalent) to the fan motor securing screw and then tighten it. This is not necessary if the looseness preventive lock bolt is used.
7. Fix the cable clamp.
8. Mount the motor cable cover and the fan cover.
9. Breaker to turn on and the power switch too. Hold the emergency switch to check the blowing direction. Upper blowing direction is normal.

Note for this maintenance below.

Do not drop the fan motor or hit it with a hammer or the like.

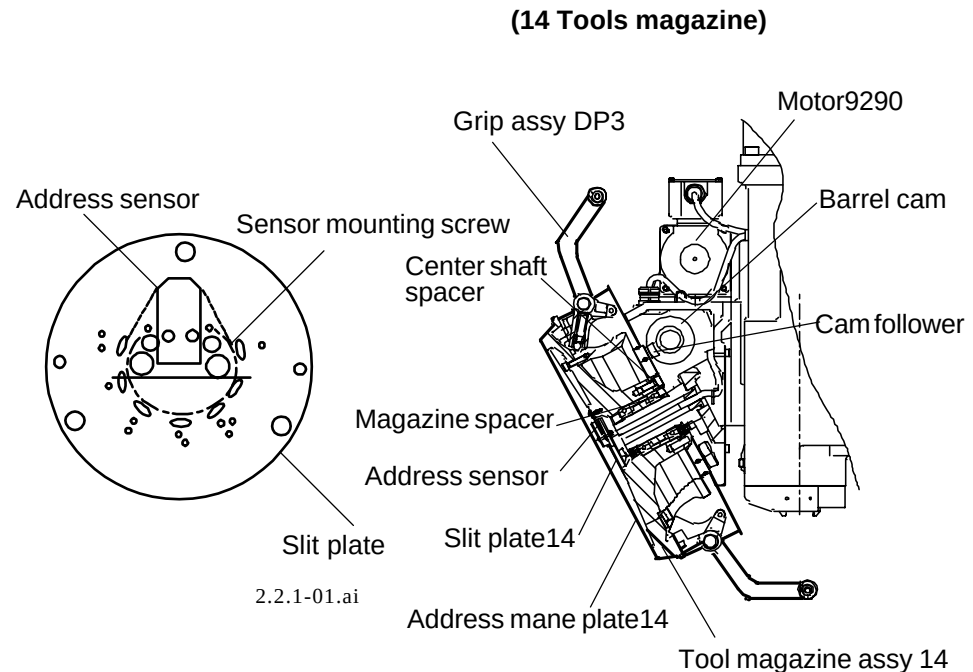
Replacement parts		Tools to be
Name	Parts code	Hazagonal Allen key Cross head screwdriver
S FAN-MOTOR R2A	654349001	

2.1.4 Spindle motor fan (2/2)



2.2 ATC

2.2.1 Magazine replacement (1/2)



2.2.1-02.ai

1. Paste a magazine No. seal on each tool in the magazine and then take off all the tools.
2. Press the **[MANU]** key.
3. Press the **[ATC]** key twice and move the spindle head to the upper limit of Z axis.
4. Turn off the <POWER> switch and turn off the circuit breaker.
5. Remove the address name plates.
6. Remove the slit plate.
7. Remove the address sensor. (The connector should be put in the shaft.)
- 8.1 Remove the grip cover. (14 tools MG)
- 8.2 Remove all of grip. (21tools MG)
9. Remove the hexagon socket head set screw for the M40 nut (14 tools MG), M60-21 nut (21 tools MG).
10. While holding the magazine with a hand, remove the M40 nut (14 tools MG), M80-21 nut (21 tools MG)
11. Remove the magazine and magazine spacer.
(Don't remove the center shaft spacer 2 (14 tools MG), the center shaft spacer 21 (21 tools MG) .)
12. Mount a new magazine while setting the cam follow in the barrel cam.
(Check if the magazine spacer is mounted.)

2.2.1 Magazine replacement (2/2)

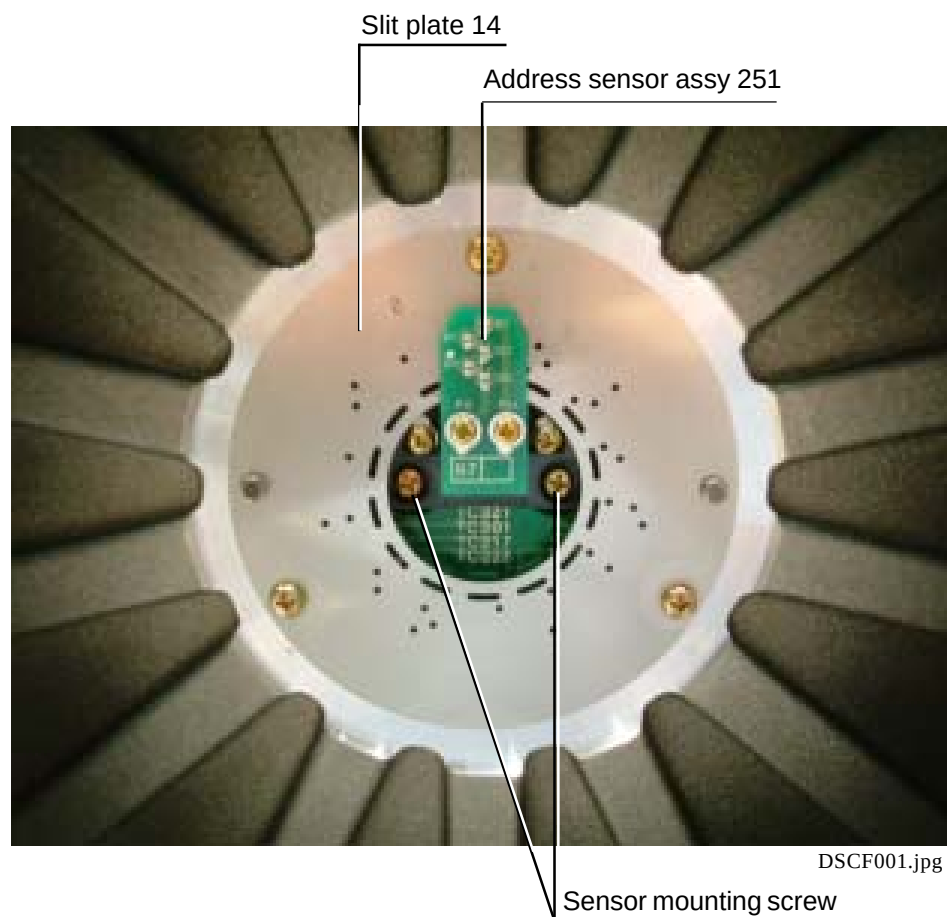
13. Tighten the M40 nut (14 tools MG), M80-21 nut (21 tools MG) to (Tightening torque for M40 nut is 350~400 Kgf·cm /36~41N·m, M80 nut is 2500~2800 Kgf·cm/ 255~286N·m.
14. Tighten the hexagon socket head set screw of the M40 nut, M80-21nut.
15. Attach the address sensor.
16. Attach the slit plate with the punched figure "2" outside.
17. Turn on the breaker and turn on the <POWER> switch.
18. Adjust the address sensor. (Refer to 4.2.2 Address sensor adjustment.)
19. Adjust the magazine. (Refer to 4.2.1 Magazine adjustment.)
20. Press the **[RELSE]** and the **[-Z]** to shift the Z axis under the zero point. Then press the **[M.Z.RT]** to perform the zero position return.
21. Select the magazine No. 2.
<CONV.>
 - 1) By pressing the **[MDI]**, **[PRGRM]** and the **[CURSOR DOWN]** keys, move the cursor to the tool.
 - 2) Press the **[2]** and the **[ENTER]** and the **[START]**.
<NC>
 - 1) Press the **[MDI]**, **[M]**, **[0]**, **[6]**, **[T]**, **[1]**, **[0]**, **[2]** and the **[START]** key.
22. Check that the punched figure "2" is on the top.
23. Attach the address name plate "2" downwards.
- 24-1. Mount the grip cover. (14 tools MG)
- 24-2. Mount the grip assy. (21 tools MG)
25. Mount tools in the magazine, matching the magazine number on seals.
26. Press the **[MANU]** key.
27. While pressing the **[ATC]** key repeatedly, check that the tool change is performed properly.

Replacement parts		Tools to be
Name	Parts code	Phillips screw driver(+,-) Hexagonal wrench set Tool alignment device set Hexagon spanner 10 M40 wrench Small test 1/100
14ATC	650062001	
TOOL MAGAZINE 14ASSY (MAGAZINE SPACER)	640128001	
21ATC	618115001	
TOOL MAGAZINE 14ASSY (MAGAZINE SPACER 21)	618127001	

2.2.2 Grip replacement

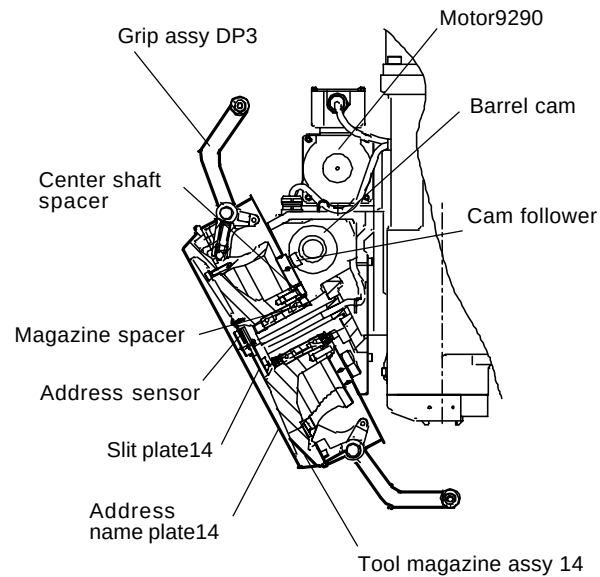
2.2.2.1 Grip replacement (14Tools MG) (1/3)

14MG



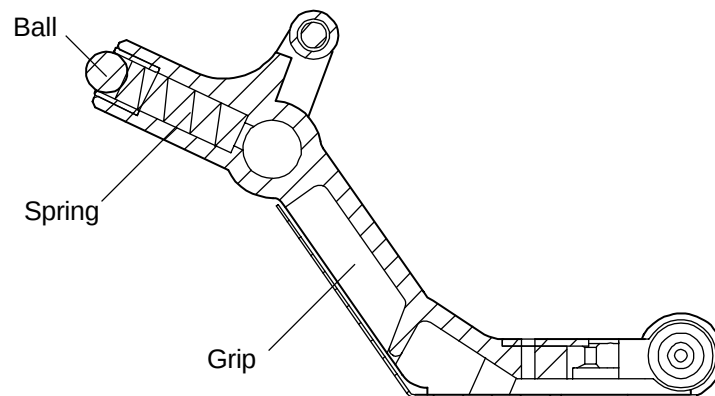
2.2.2.1 Grip replacement (14Tools MG) (2/3)

(14Tools MG)



2.2.1-02.ai

2.2.1-02.ai



S2BMT0202.ai

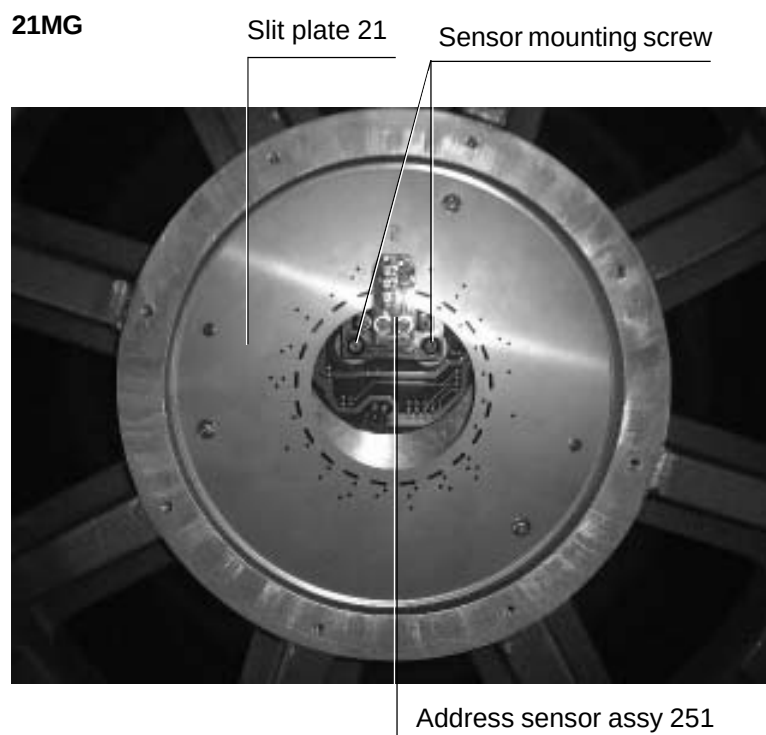
1. Press the **[MANU]** key.
2. Press the **[ATC]** key twice and move the spindle head to the upper limit of Z axis.
3. Paste a magazine No. seal on each tool in the magazine and then take off all the tools.
4. Remove the grip cover.
5. Turn off the <POWER> switch and turn off the breaker circuit.
6. Remove the address name plates.
7. Remove the slit plate.
8. Remove the address sensor. (The connector should be put in the shaft.)
9. Remove the hexagon socket head set screw of the M40 nut.
10. While holding the magazine with a hand, remove the M40 nut (SP).

2.2.2.1 Grip replacement (14Tools MG) (3/3)

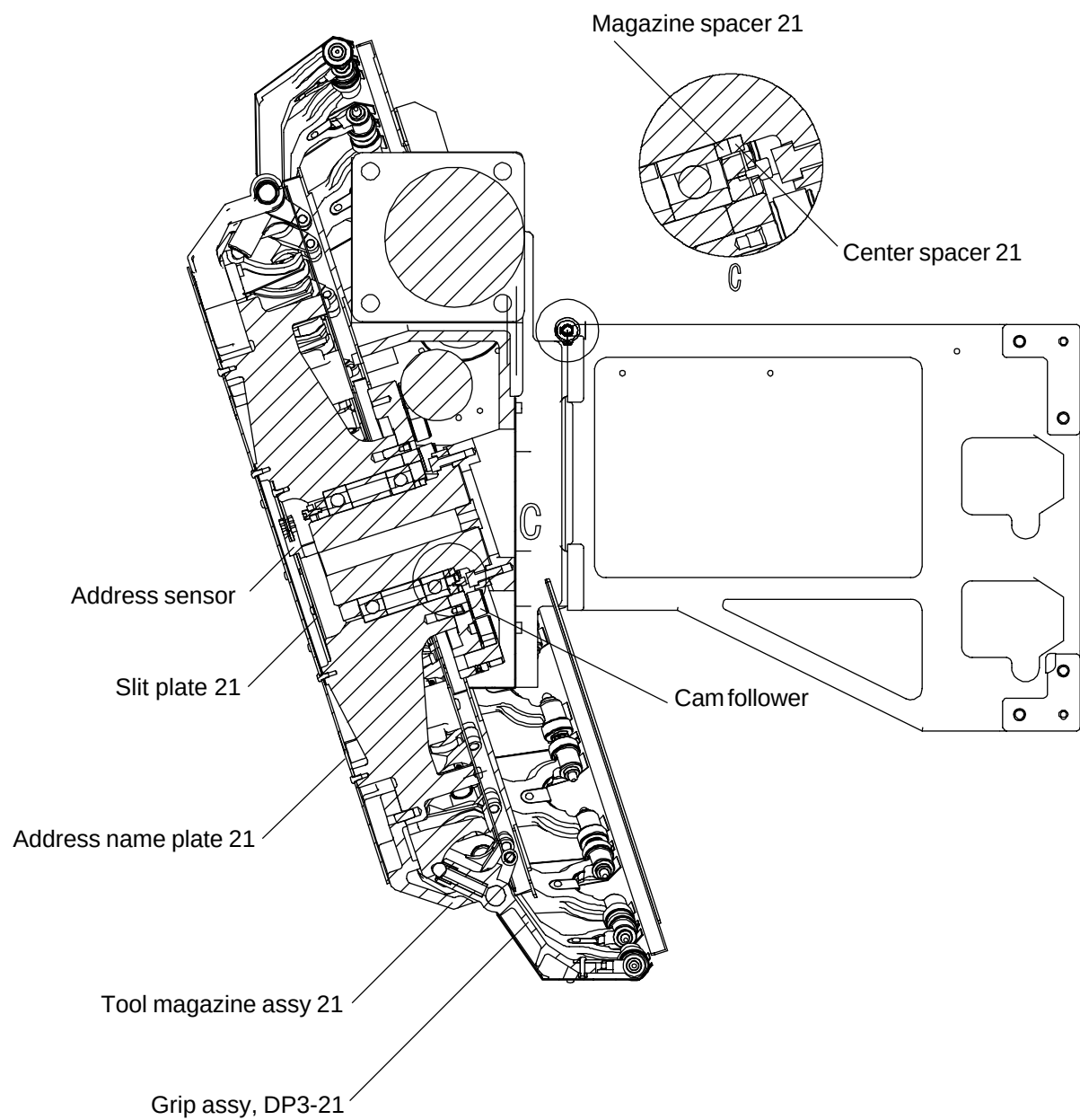
11. Remove the magazine and magazine spacer.
(Don't remove the center shaft spacer 2.)
12. Remove the broken grip.
13. Put the spring and the ball in a new grip and attach the grip to the magazine.
Fasten the bolt M6×30 by 5.88N·m (60kgf·cm).
14. Mount the magazine and magazine spacer while setting the barrel cam in the cam follower.
15. Secure M40 nut (SP) with a tightening torque.
(The torque should be between 34.3 ~ 39.2 N.m.)
16. Tighten the hexagon socket head set screw for the M40 nut.
17. Attach the address sensor.
18. Attach the slit plate with the punched figure "2" outside.
19. Turn on the <POWER> switch.
20. Adjust the address sensor (4.2.2 Address sensor adjustment).
21. Press the **[RELSE]** and then **[-Z]** to shift the Z axis under the zero point. Then press the **[M.Z.RT]** to perform the zero position return.
22. Select the magazine No. 2.
<CONV.>
By pressing **[MDI]**, **[PRGRM]** and **[CURSOR DOWN]**,
move the cursor to the tool column.
Press **[2]** and **[ENT]** key and **[START]** button .
<NC>
Press the **[MDI]**, **[M]**, **[0]**, **[6]**, **[T]**, **[1]**, **[0]**, **[2]** keys and the **[START]** button.
23. Check that the punched figure "2" is on the top.
24. Attach the address name plate "2" downwards.
25. Mount the grip cover.
26. Mount tools in the magazine, while matching the magazine No. on the seals.
27. Press the **[MANU]** key.
28. While pressing the **[ATC]** key repeatedly, check that the tool change is performed properly.

Replacement parts		Tools to be
Name	Parts code	
GRIPASSY,DP3	650065001	Phillips screw driver(+,-) Hexagon wrench Tool alignment device set Hexagon spanner 10 M40 Wrench Small test 1/100

2.2.2.2 Grip replacement (21Tools MG) (1/3)

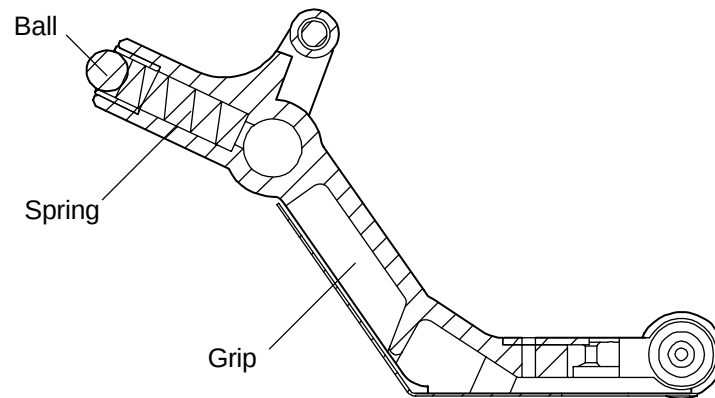


2.2.2.2 Grip replacement (21Tools MG) (2/3)



TS2BMT02-003.ai

2.2.2.2 Grip replacement (21Tools MG) (3/3)

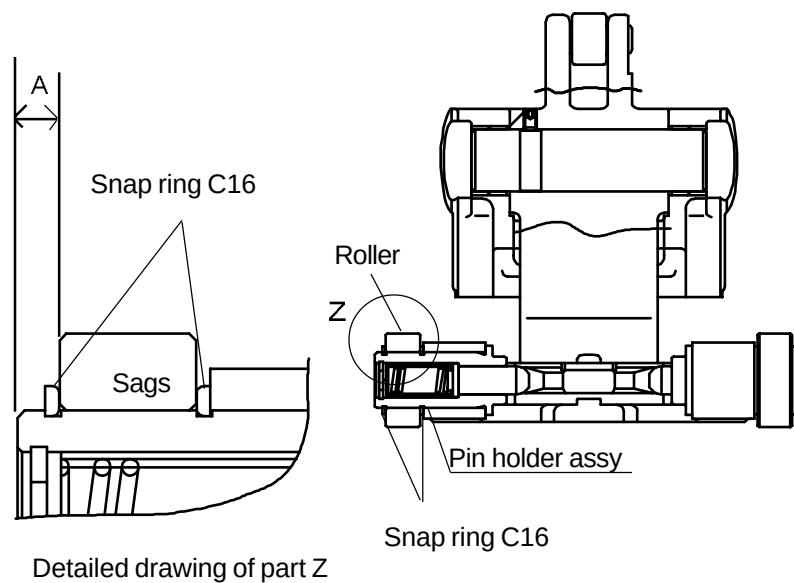


S2BMT0202.ai

1. Paste a magazine No. seal on each tool in the magazine and then take off all the tools.
2. Press the **[MANU]** key.
3. Press the **[ATC]** key twice and move the spindle head to the upper limit of Z axis.
4. Turn off the <POWER> switch and turn off the breaker circuit.
5. Remove the address name plates.
6. Remove the broken grip.
7. Put a new grip to the magazine. Fasten the bolt M6×30 by 5.88N·m (60kgf·cm).
8. Mount tools in the magazine, while matching the magazine No. on the seals.
9. Press the **[MANU]** key.
10. While pressing the **[ATC]** key repeatedly, check that the tool change is performed properly.

Replacement parts		Tools to be
Name	Parts code	
GRIPASSY,DR3-21	618136001	Phillips screw driver(+,-) Hexagon wrench Tool alignment device set Hexagon spanner 10 M40 Wrench Small test 1/100

2.2.3 Pin holder assy 2 replacement



1. Remove the snap ring C16 (1) in the following drawing).
2. Remove the roller (2) in the following drawing).
3. Remove the snap right C 16 (3) in the following drawing).
4. Pull out the pin holder assy 2 (4) in the following drawing) toward the inside of the magazine.
5. Install a new pin holder assy 2 in the reverse order from 4. to 1.
(Use the removed roller and snap rings again.)
(Never use snap rings inside out. Sags of a ring should face to the roller.)

(Note)

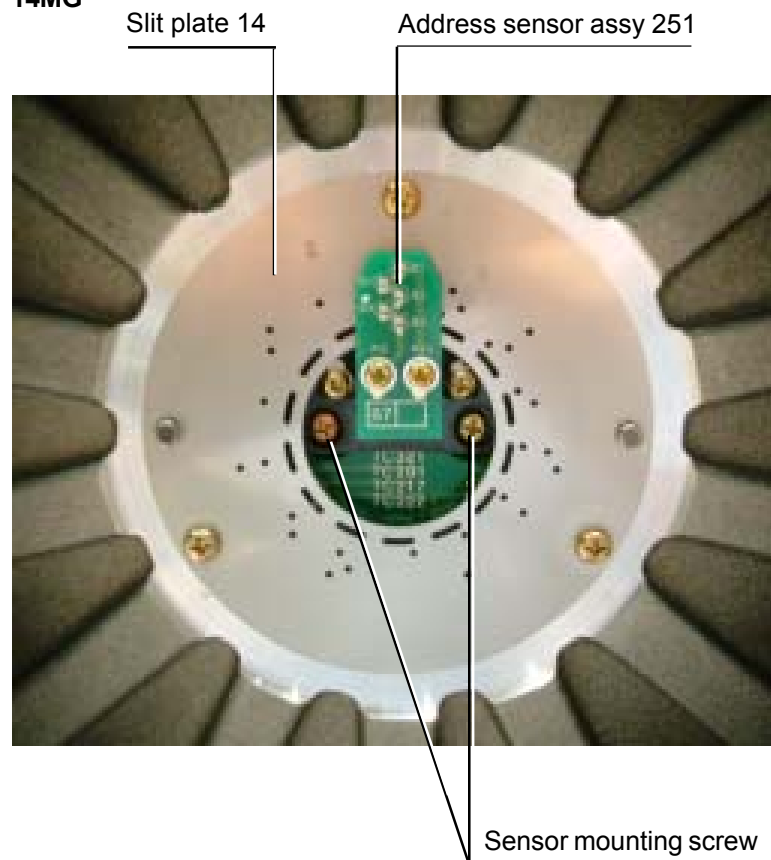
Dimension A in the illustration has to be 2 mm.

(The dimension is 5mm by the thing which they were using by the 10 magazine specifications of the old model. Interference of grip, comrade, occurs when they use this with TC-S2B.)

Replacement parts		Tools to be
Name	Parts code	Tools for a C-shaped snap ring
PINHOLDERASSY2	646108001	
EXTERNALSNAPRING	048160142	
SHAFTC16		

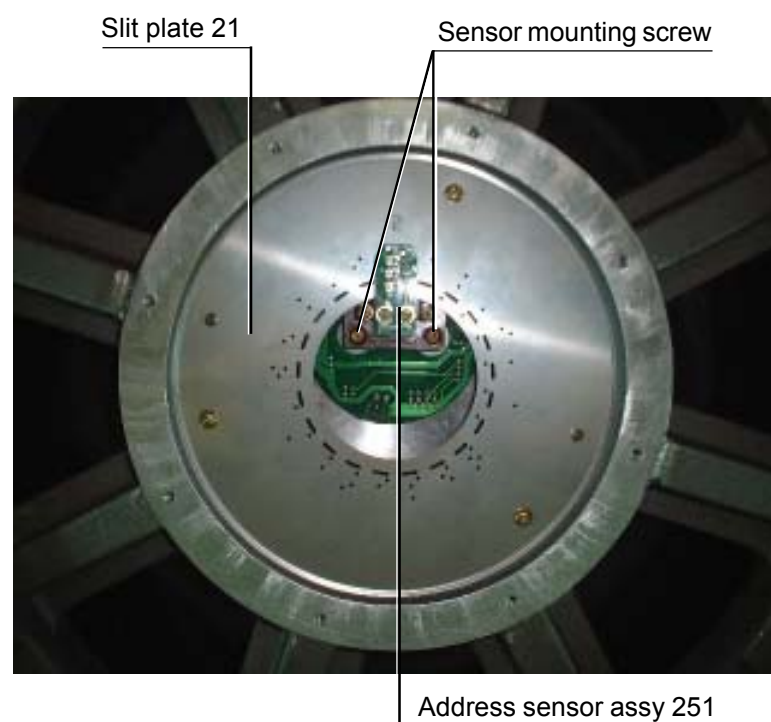
2.2.4 Address sensor replacement (1/4)

14MG



DSCF001.jpg

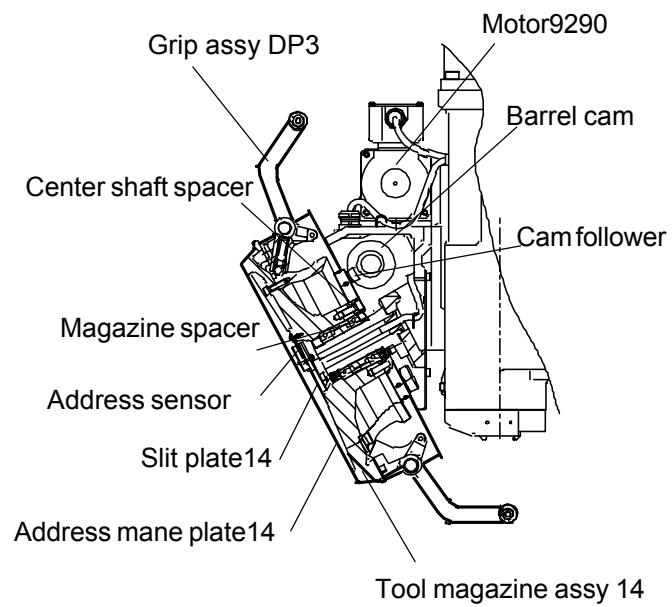
21MG



4-3.jpg

2.2.4 Address sensor replacement (2/4)

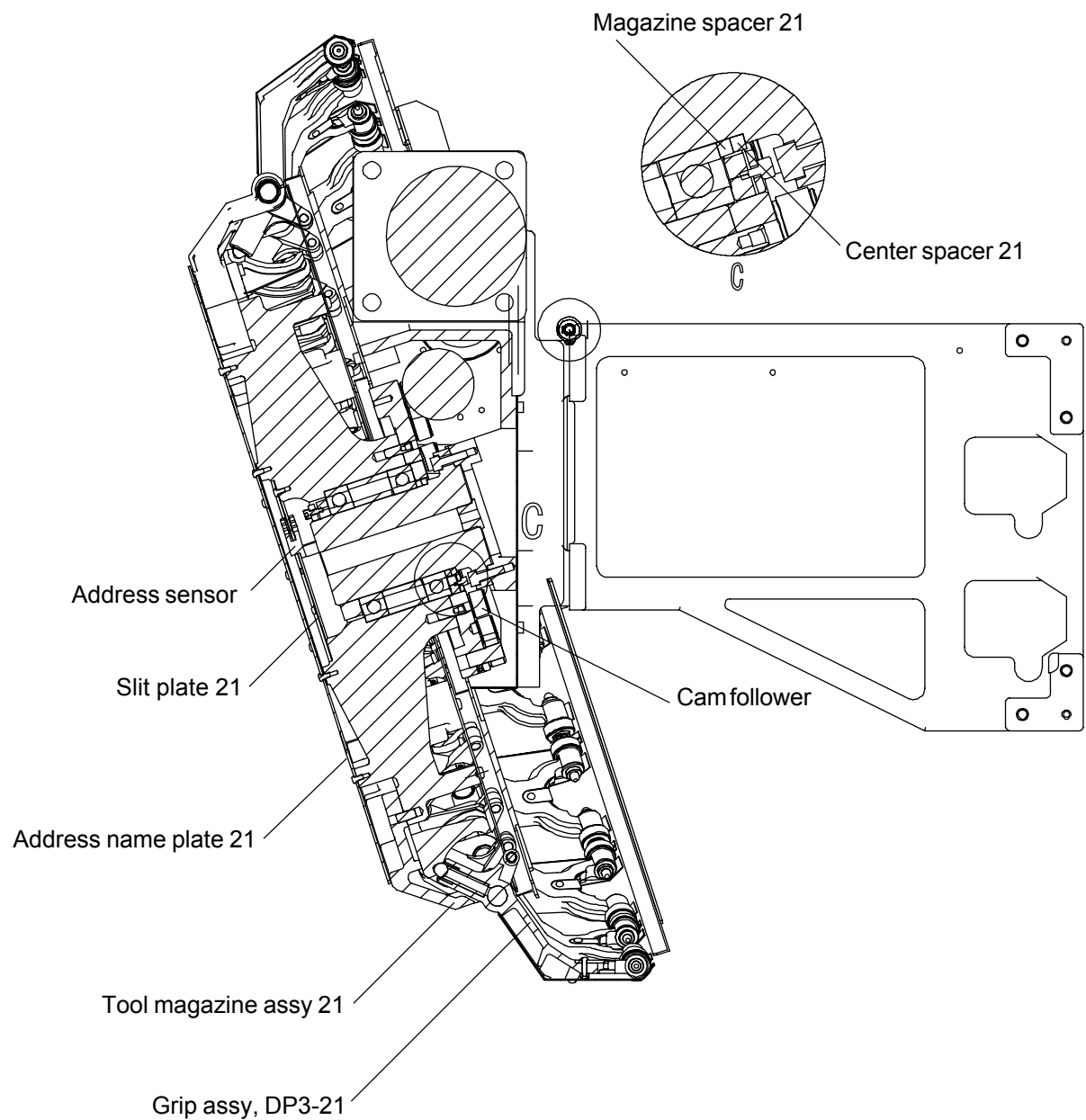
(14 Tools MG)



2.2.1-02.ai

2.2.4 Address sensor replacement (3/4)

(21 Tools MG)



TS2BMT02-003.ai

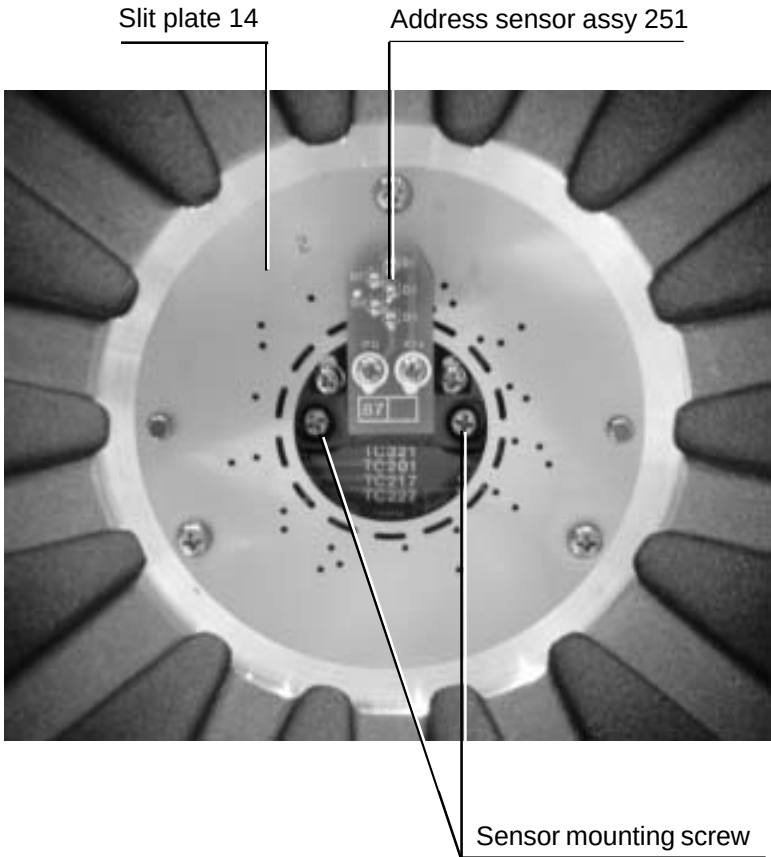
2.2.4 Address sensor replacement (4/4)

1. Turn the <POWER> switch OFF and turn off the breaker.
2. Remove the address plate.
3. Remove the slit plate.
4. Remove the address sensor.
5. Disconnect the connector from the address sensor.
6. Connect connector to a new address sensor.
7. Mount the new address sensor.
8. Attach the slit plate with the punched figure "2" outside.
9. Turn the <POWER> switch ON.
10. Press the key [ATC], so perform the zero position return, and push the key [ATC] again, and raise the Z axis to the ATC origin.
11. Adjust the address sensor. (Refer to 4.2.2 Address sensor adjustment.)
12. By pressing the [M.Z.RT] key, perform the zero position return.
13. Select the magazine No. 2.
<CONV>.
Press [MDI], [PRGRM] and the [CURSOR DOWN] keys,
move the cursor to the tool column.
Press [2] and [ENT], [START].
<NC>
Press the [MDI], [M], [0], [6], [T], [1], [0], [2] and [START] keys.
14. Check that the punched figure "2" is on the top of the slit plate.
15. Attach the address plate with the figure "2" downwards.

Replacement parts		Tools to be
Name	Parts code	Phillips screw driver (+/-)
ADDRESSSENSOR ASSY251	618649101	

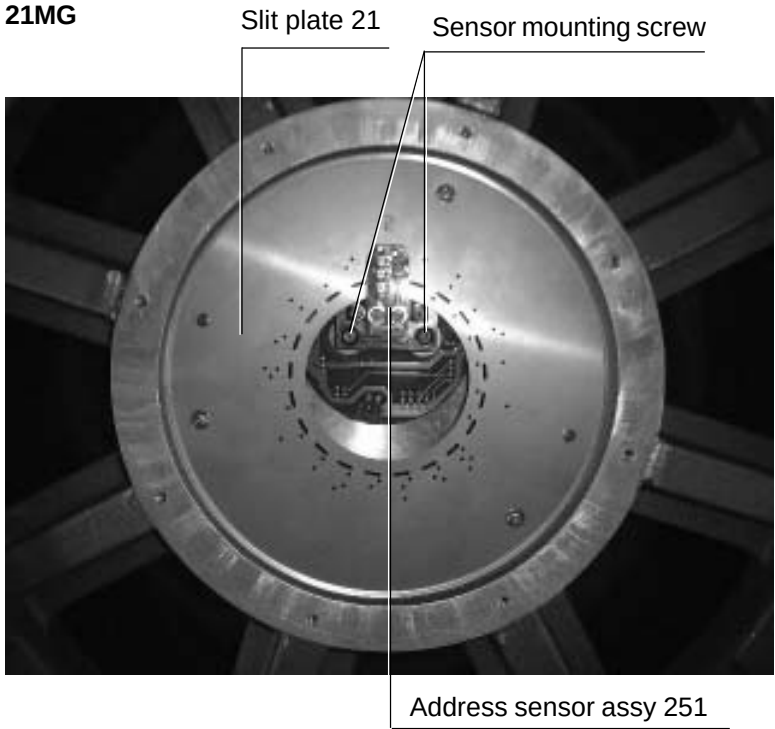
2.2.5 Barrel cam replacement (1/4)

14MG



DSCF001.jpg

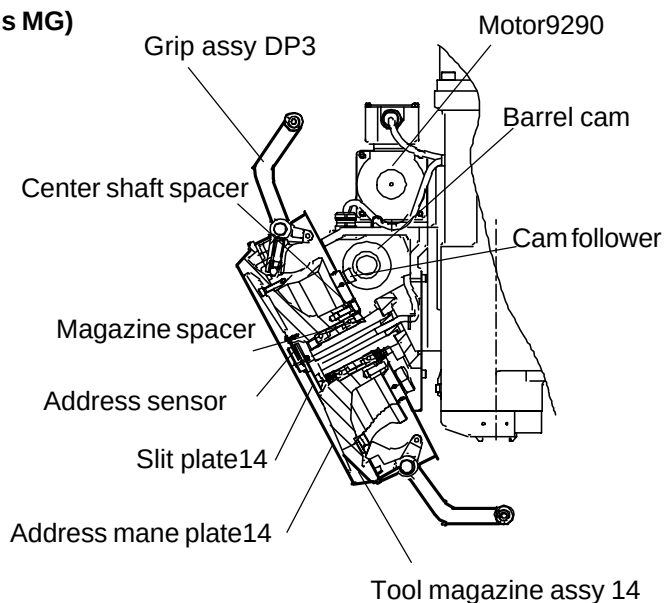
21MG



4-3.jpg

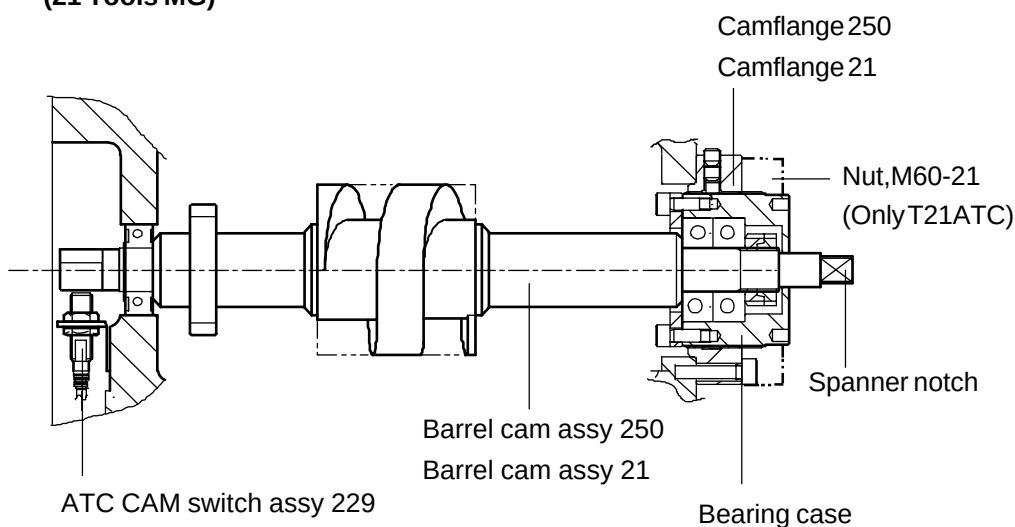
2.2.5 Barrel cam replacement (2/4)

(14 Tools MG)



2.2.1-02.ai

(21 Tools MG)

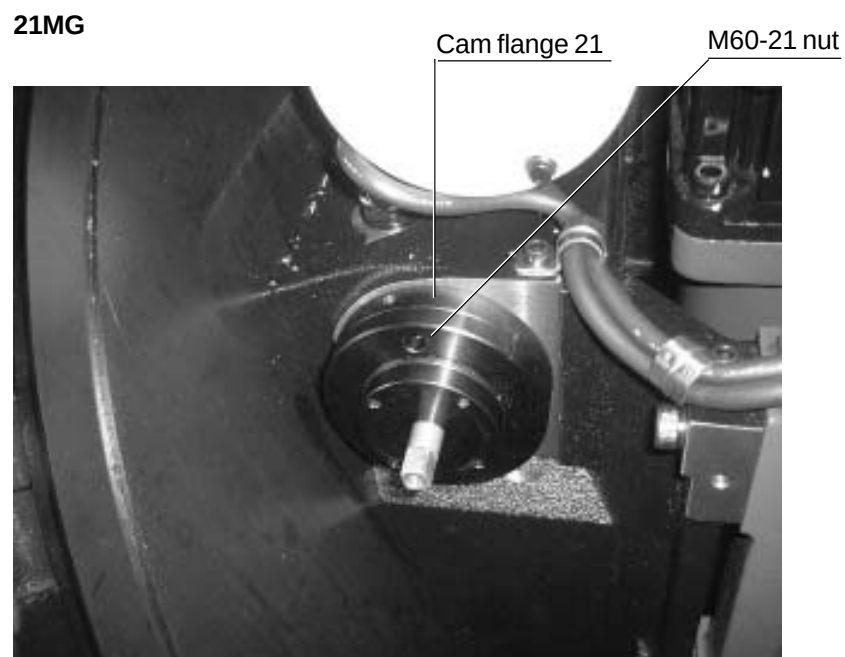
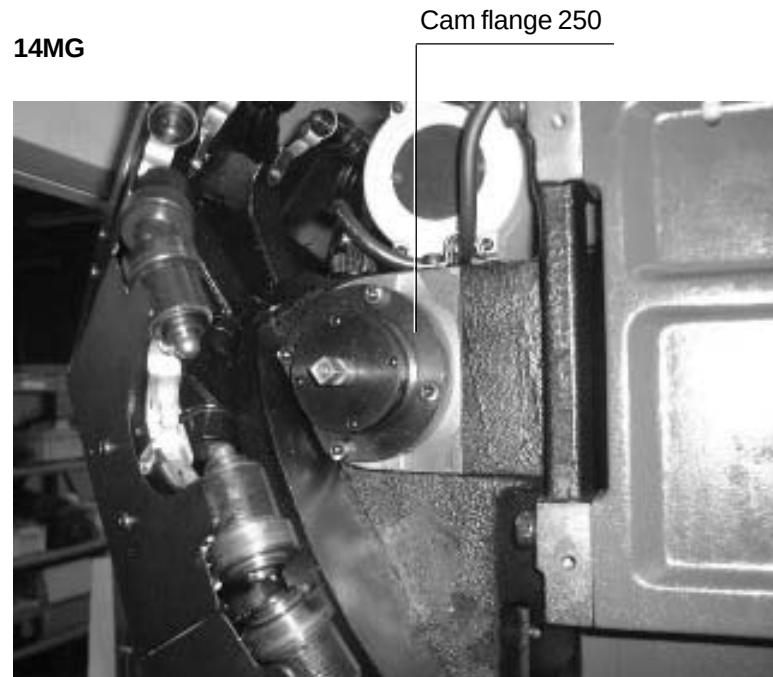


4.2.1-02.ai

1. After attaching tool number tags on the magazine, remove all tools.
2. Press the **[MANU]** key.
3. Press the **[ATC]** key twice to move the spindle head up to the upper limit of Z axis.
4. Turn the POWER switch OFF. Then turn off the breaker.
5. Remove the address plate.
6. Remove the slit plate.
7. Remove the address sensor. (Put the connector in the shaft.)
- 8-1 Remove the grip cover. (14 tools MG)
- 8-2 Remove all of the grip. (21 tools MG)
9. Remove the hexagon socket head set screw of the M40 nut (14 tools MG) and M80-21 nut (21 tools MG).

2.2.5 Barrel cam replacement (3/4)

10. While holding the magazine with a hand, remove M40 nut (14 tools MG) and M80-21 nut (21 tools MG).
11. Remove the magazine and the magazine spacer.
12. Remove the saddle cover and the saddle front cover 21.

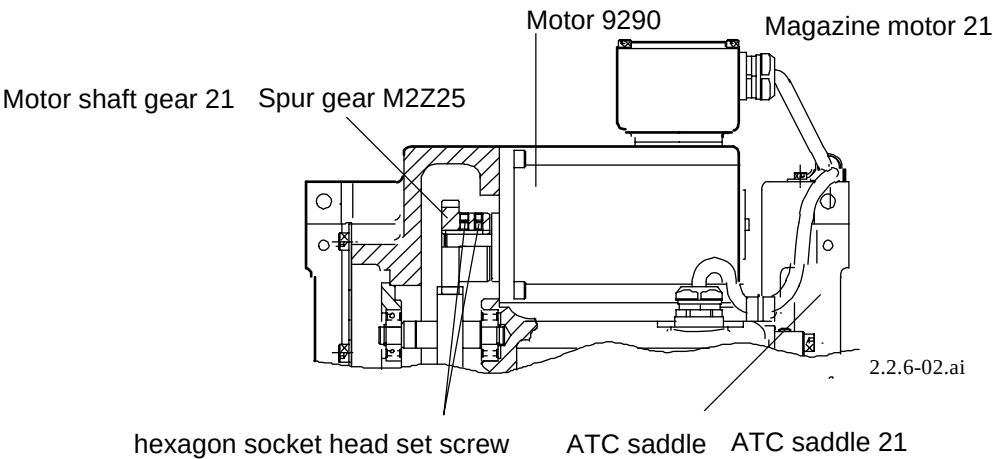


2.2.5 Barrel cam replacement (4/4)

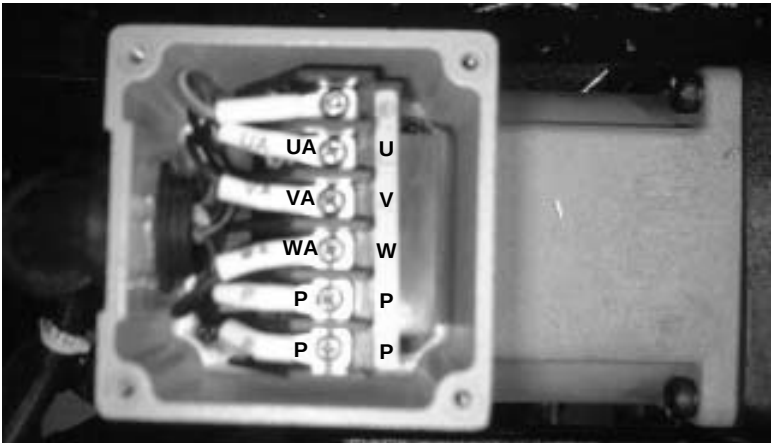
- 13-1. 14 tools MG: Remove the screw of cam flange 250 , and then barrel cam assy 250.
- 13-2. 21 tools MG: Remove the M80-21 nut, screw of cam flange 21 and barrel cam assy 21.
14. Mount a new barrel cam assy 250 (14 tools MG) and barrel cam assy 21 (21 tools MG).
15. Mount a saddle cover (14 tools MG) and a saddle front cover 21 (21 tools MG) .
16. Mount the magazine with the barrel cam in the cam follower.
17. Secure M40 nut (14 tools MG), M80-21 nut (21 tools MG) with a tightening torque. (The torque should be between 36~41N·m, 255~286N·m)
18. Tighten the hexagon socket head set screw for the M40 nut (14 tools MG), M80-21 nut (21 tools MG).
19. Mount the address sensor.
20. Mount the slit plate with the punched figure "2" outside.
21. Turn the <POWER> switch.
22. Adjust the magazine. (Refer to 4.2.1 Magazine adjustment.)
23. Adjust the address sensor. (Refer to 4.2.2 Address sensor adjustment.)
24. Press the **[RELSE]** and then the **[-Z]** to shift the Zaxis under the zero point. Then press the **[M.Z.RT]** key to perform zero point return.
25. Select the magazine No. 2.
<CONV>
 - 1) By pressing the **[MDI]**, **[PRGRM]** and the **[CURSOR DOWN]** keys, move the cursor to the tool column.
 - 2) Press the **[2]** and the **[ENTER]** key and the **[START]** keys..
<NC>
 - 1) Press **[MDI]**, **[M]**, **[0]**, **[6]**, **[T]**, **[1]**, **[0]**, **[2]** keys and the **[START]** key.
26. Check that the punched figure "2" is on the top of the slit plate.
27. Attach the address plate with the figure "2" downwards.
- 28-1. Mount the grip cover (14 tools MG).
- 28-2. Mount all of grip (21 tools MG).
29. Mount the tools, matching to the number tags on the magazine.
30. Press the **[MANU]** key.
31. By pressing the **[ATC]** key repeatedly, make sure the tool change motion has been taken place correctly.

Replacement parts		Tools to be
Name	Parts code	
14ATC BARREL CAM ASSY 250	6530520001	Phillips screw driver(+,-)
21ATC BARREL CAM ASSY 21	6181040001	Small test 1/100
		Hexagon wrentch
		Hexagon spanner 13 (2pcs.)
		Tool alignment jig set
		M40 Socket

2.2.6 ATC motor replacement (1/2)

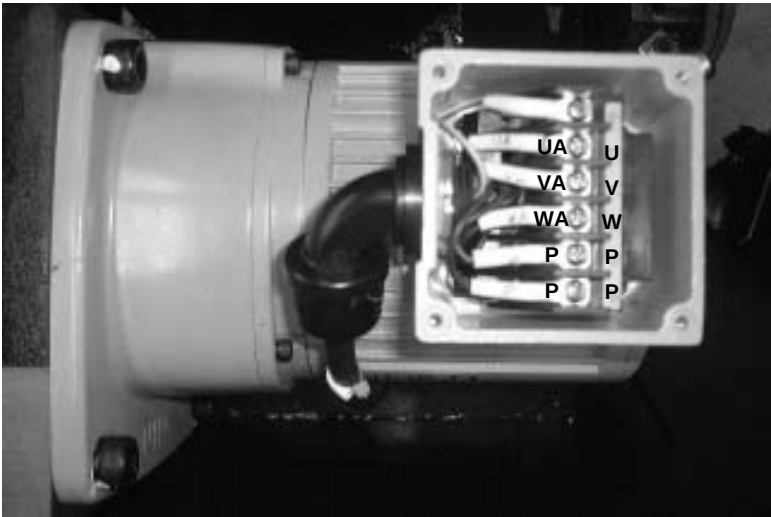


14MG



2-4.jpg

21MG



2-5.jpg

2.2.6 ATC motor replacement (2/2)

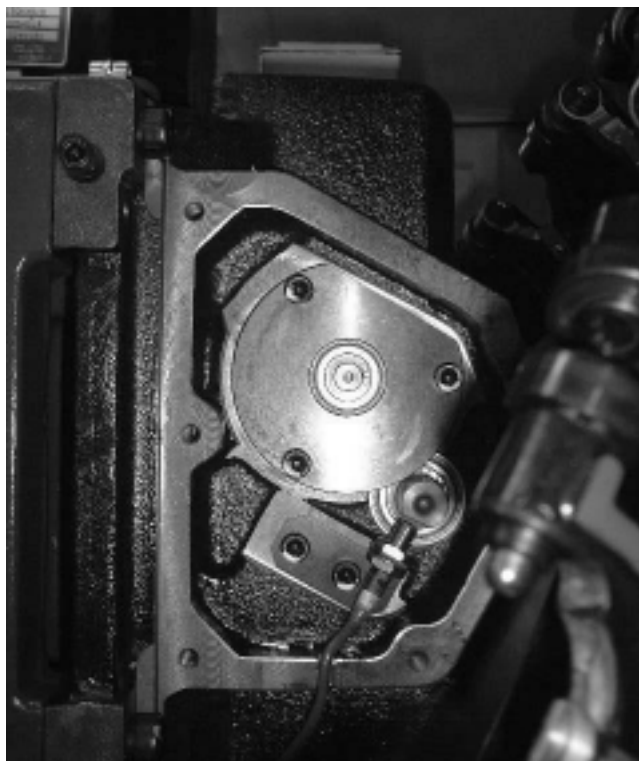
Terminal No.	Code color	Replacement
	Green/ Yellow	—
U1	Black	U1
U2	Black	U2
Z2	Black	Z2
P	Black	P
P	Black	P

1. Turn the <POWER> switch OFF and turn off the breaker.
2. Remove the magazine cover R and L.
3. Remove the cover for the terminal box in the ATC motor.
4. Disconnect the cords from the terminal block and then release the cord locks.
5. Remove the ATC motor bolts.
6. Remove the ATC motor.
7. Remove spur gear M2Z25 (14 tools MG) , Motor spindle gear 21 (21 tools MG) from the ATC motor.
(Hexagon socket set screw M5×5, 2pcs., M5×5, 1pcs.)
8. Mount spur gear M2Z25 and motor spindle gear 21 to the new ATC motor and secure the motor with hexagon socket set screw.
(Align the front end. Secure an each tap with screws (2 pcs.).)
(Tightening torque is 4.9 N.m (50kgf.cm).)
9. Mount the ATC motor to the saddle.
(Tightening torque is 11.6N.m (118kgf.cm).)
10. Attach a cord locks to the terminal box and connect the cords to the terminal block.
11. After tightening the cord locks, mount the lid on the terminal box.
12. Put back the magazine cover R and L.
13. Turn the <POWER> switch ON.
14. Press the **[MANU]** key.
15. By pressing the **[ATC]** key repeatedly, make sure the magazine rotate correctly.

Replacement parts		Tools to be
Name	Parts code	
14ATC SPUR GEAR M2AZ25	653059001	Phillips screw driver (+,-) Hexagon wrench
MAGAZINE MOTOR14 3P	618106001	
21ATC MOTOR GEAR 21	618113001	
MAGAZINE MOTOR 21	618112001	

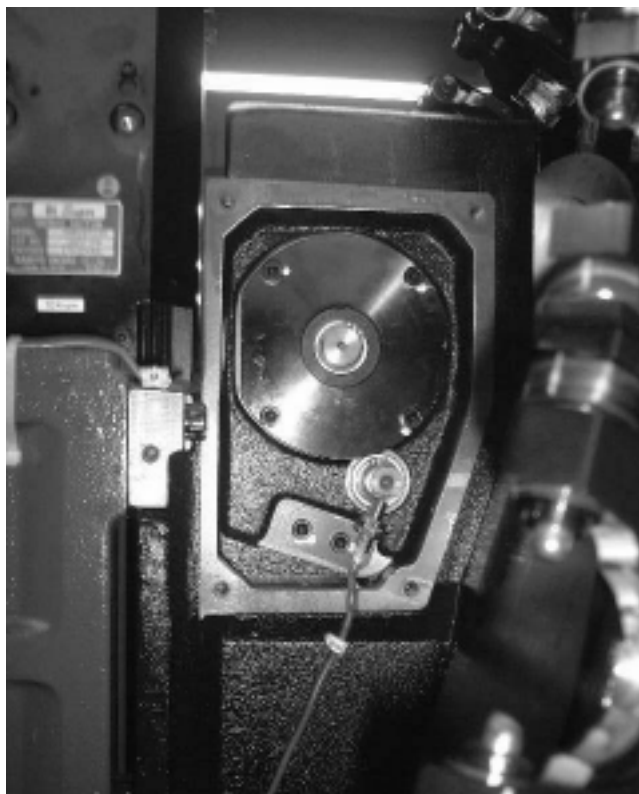
2.2.7 Middle gear replacement (1/2)

14MG



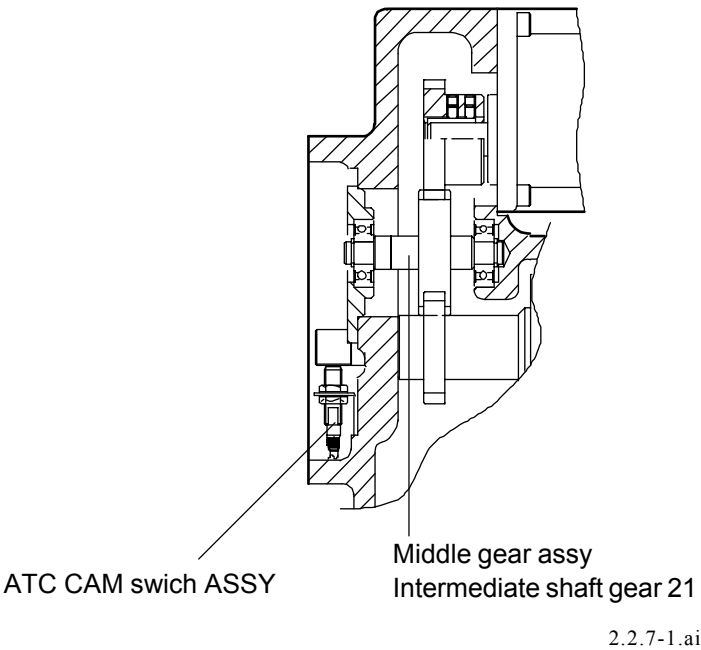
4-4.jpg

21MG



4-5.jpg

2.2.7 Middle gear replacement (2/2)

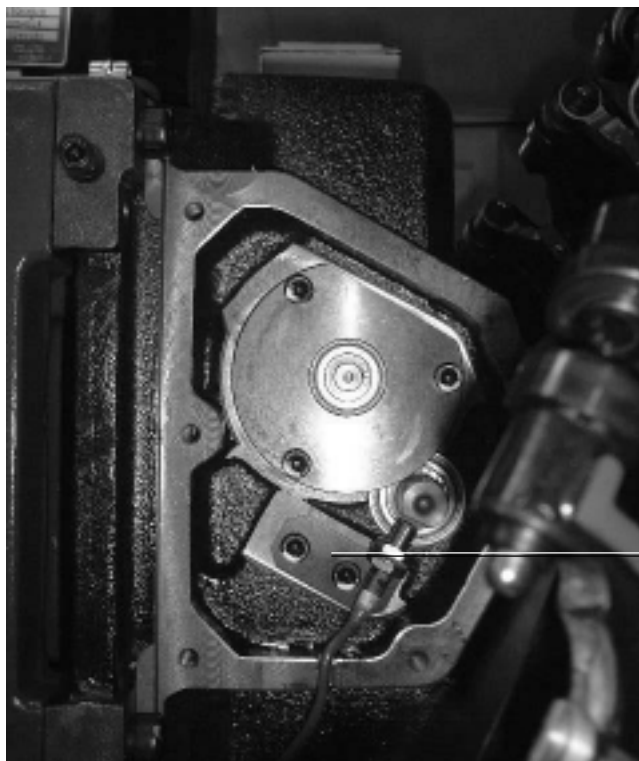


- 1. Attach the magazine number tags to the tools, and remove all tools.
- 2. Remove the magazine cover L (14 tools MG) and magazine cover 21L (21 tools MG).
- 3. Remove the ATC proximity cover 14 and the ATC proximity cover 21.
- 4. Remove the middle gear flange (M6-3 bolt, sockets) and Intermediate gear flange (M6-4 bolt, sockets).
- 5. Replace the middle gear assy and intermediate shaft gear 21.
- 6. Mount the middle gear flange and intermediate gear flange.
- 7. Mount the ATC proximity cover 14 and the ATC proximity cover 21.
- 8. Mount the magazine cover L and the magazine cover 21L .
- 9. See the magazine number tag attached to the tool. Mount the tool to the grip while matching magazine number.

Replacement parts		Tools to be used
Name	Parts code	Phillips screw driver (+,-) (Large, Middle) Hex.wrench set
MIDDLEGEARASSY	653060001	

2.2.8 Barrel CAM proximity replacement (1/2)

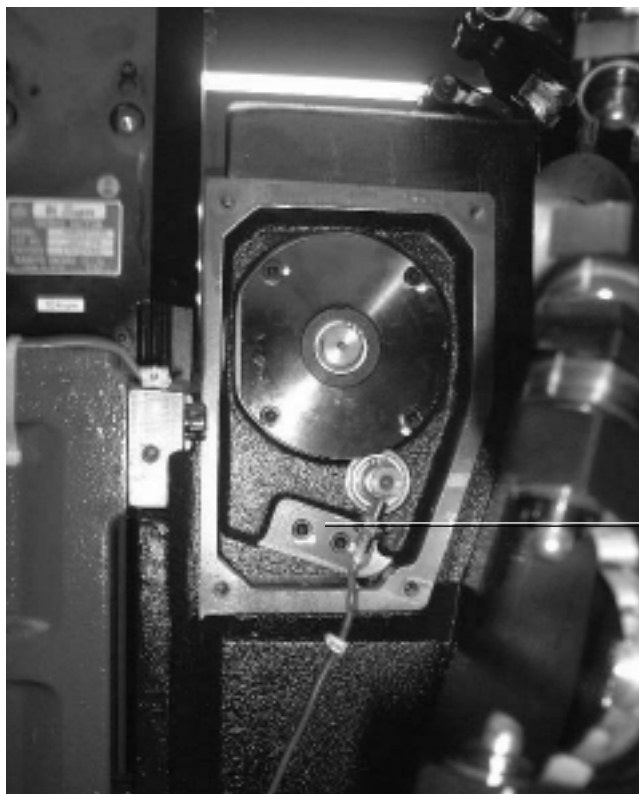
14MG



Proximity bracket 14

4-4.jpg

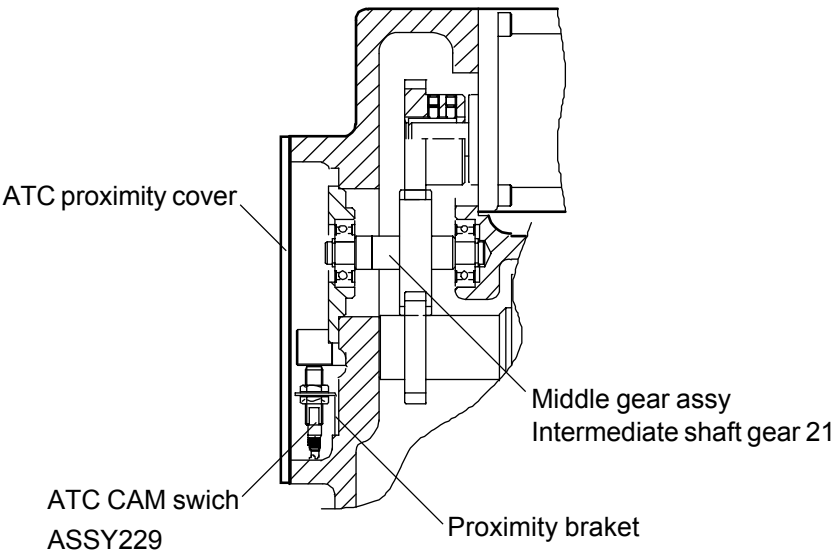
21MG



Proximity bracket 14

4-5.jpg

2.2.8 **Barrel CAM proximity replacement (1/2)**



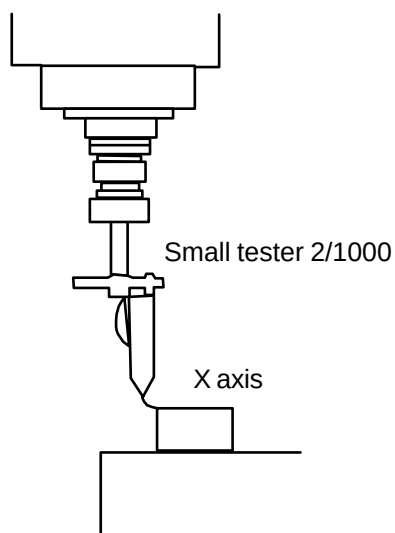
2.2.7-1.ai

1. Attach the magazine number tags to the tools, and remove all tools.
2. Remove the magazine cover L (14 tools MG) and magazine cover 21L (21 tools MG).
3. Remove the ATC proximity cover 14 and the ATC proximity cover 21.
4. Remove the proximity braket 14 (M6 3PCS.).
5. Loosen the nut of the ATC CAM switch ASSY229, remove the switch from the proximitybraket.
6. Remove the fix band that fix the code to the I/O board in the control box, then remove theATC CAM switch ASSY 229.
7. Connect the new ATC CAM switch ASSY 229 to the I/O board.
Return the code to the position before and fix it.
8. Attach the ATC CAM switch to the proximity braket.
(Not tighten the nut too much. May cause the sensor get damaged.)
9. Attach the proximity braket14.
10. Adjust the barrel cam proximity switch. (Refer to 4.2.3 Barrel cam switch adjustment.)
11. Attach the ATC proximity cover 14 and the ATC proximity cover 21.
12. Attach the magazine cover L and the magazine cover 21L .
13. See the magazine number tag attached to the tool. Mount the tool to the grip while matching magazine number.

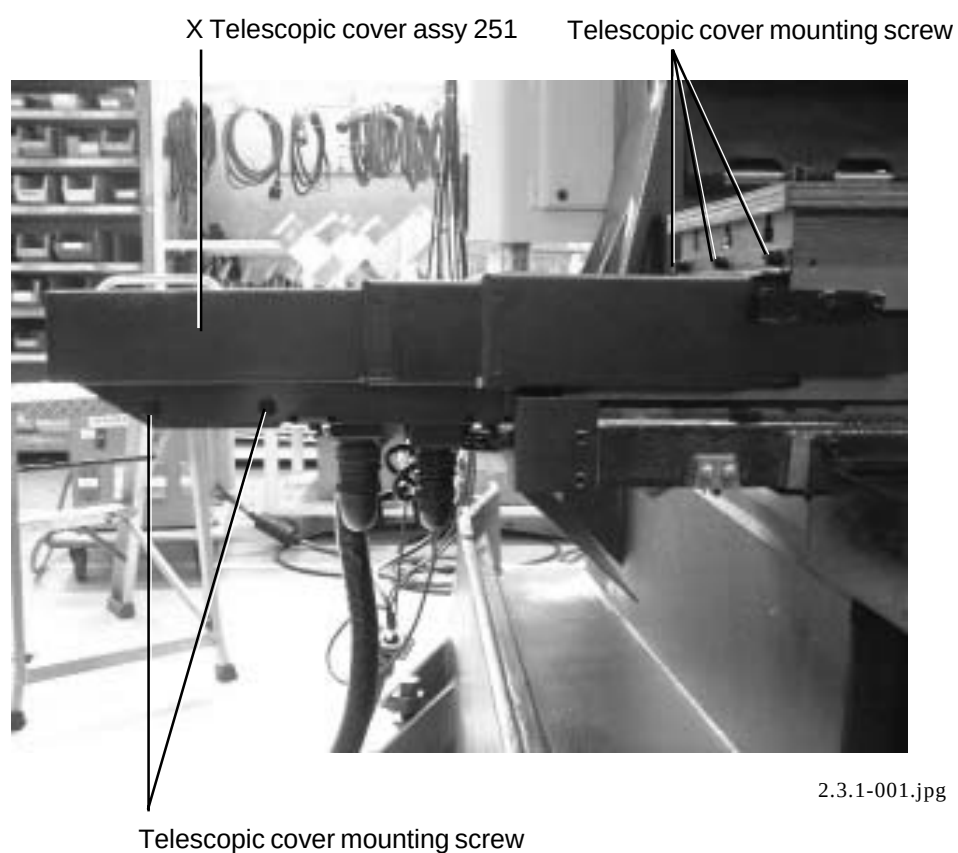
Replacement parts		Tools to be used
Name	Parts code	Phillips screw driver (+,-) (Large, Middle) Hex.wrench set
MIDDLEGEARASSY	653060001	

2.3 Feed axis

2.3.1 X axis motor Replacement (1/4)

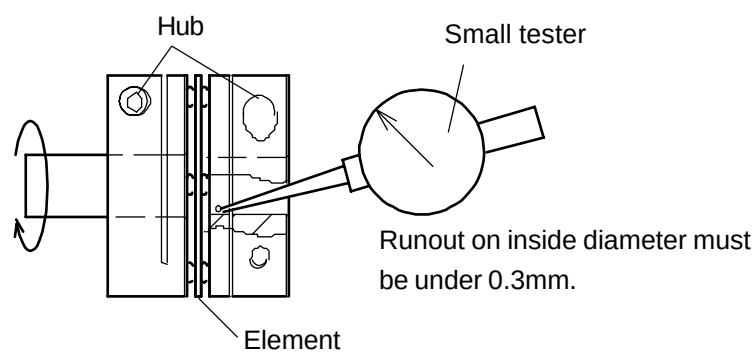


2.3.1-02.ai

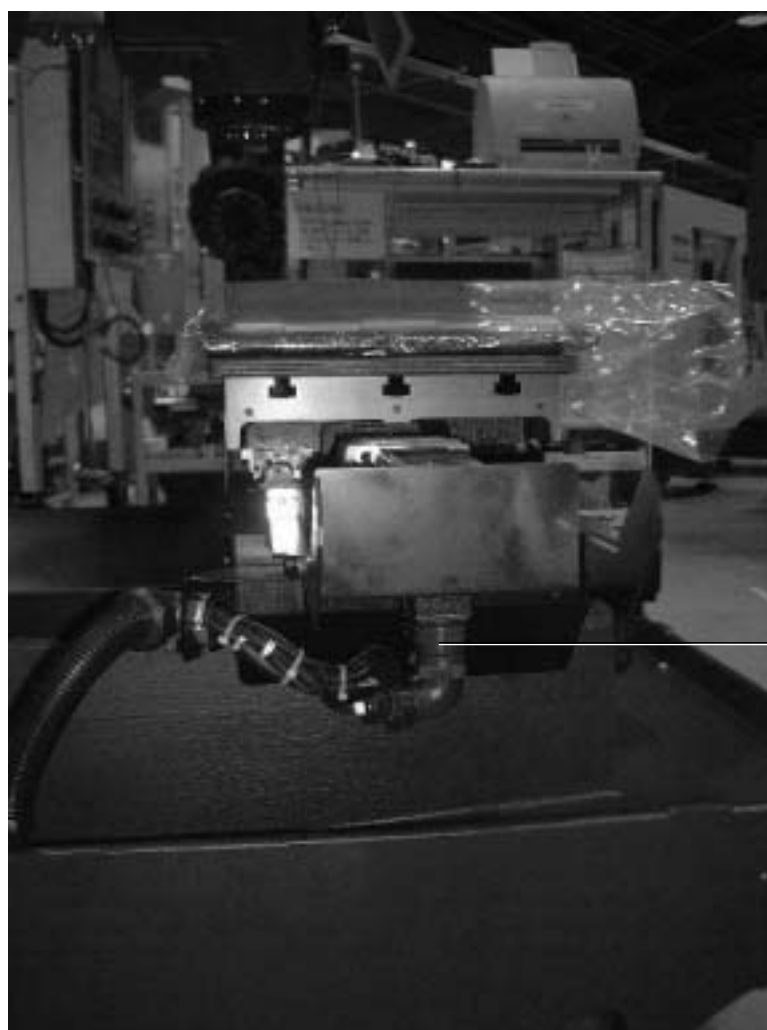


2.3.1-001.jpg

2.3.1 X axis motor Replacement (2/4)



2.3.1-04.ai



X axis motor
connector

2-6.jpg

2.3.1 X axis motor Replacement (3/4)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

1. Set a small tester at the spindle and measure the base position (Use jig etc.)
Move the column the X axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. Move the column from the X axis center position to the left.
(In case that the table doesn't move, turn the <POWER> switch OFF, remove the telescopic cover left and also BRG holder cover.
Move the table by turning the ball screw.)
5. Turn the <POWER> switch OFF and turn off the breaker.
6. Remove the table front cover and the telescopic cover right.
7. Remove the motor base cover.
8. Remove the XENC code that connected to the motor and the motor code connector.
9. Remove the X Telescopic lower cover.
10. Remove the coolant isolation cover, loosen the securing screw of the coupling on the motor side and the motor mounting screw, and remove the motor.
11. Set the new motor to lower side is a connector.

(Note)

Replace the coupling in the following conditions:

- a. When the element is deformed.
- b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
- c. When the coupling has a harmful defect.
- d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.

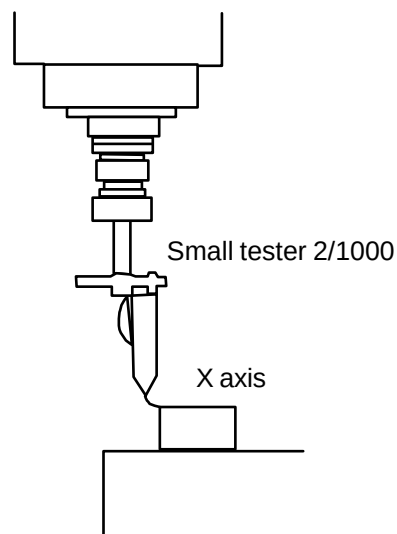
12. Set the X Telescopic lower cover.
13. Set the XENC code and the motor code connector to the new motor.
14. Tighten the coupling screw on the motor side.
15. Turn the <POWER> switch ON.
16. Press the **[MANU]** key.
17. Press the **[-X]** or the **[+X]** key and check the motor noise.

2.3.1 X axis motor Replacement (4/4)

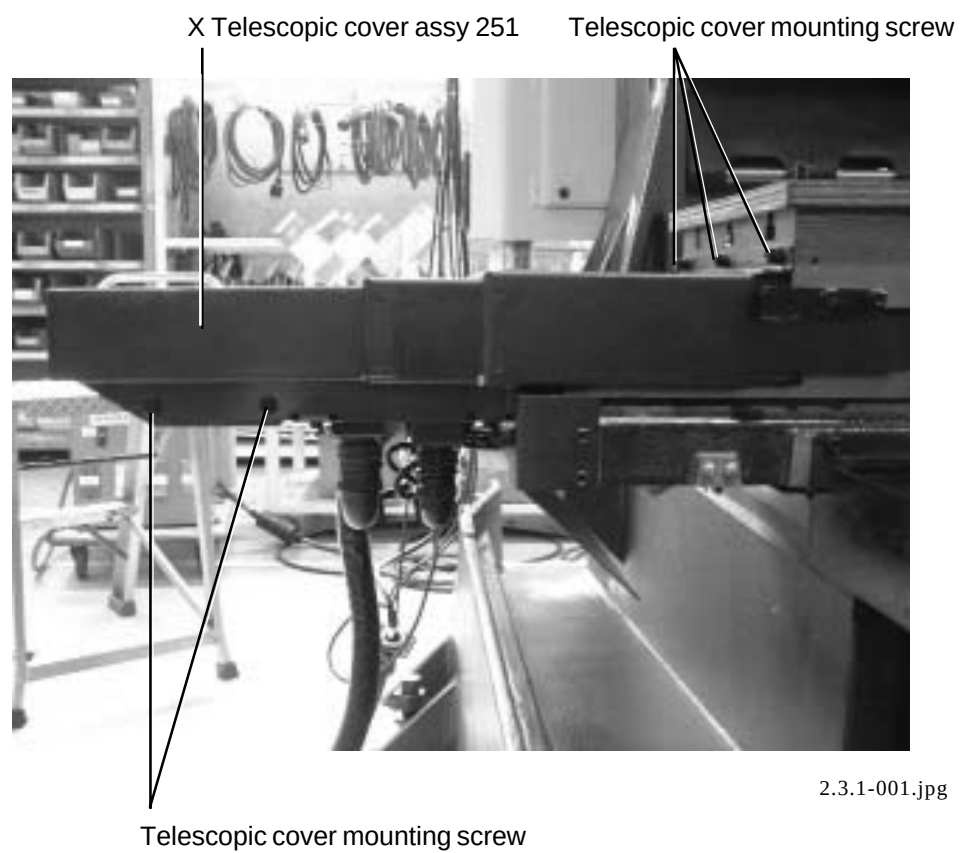
18. Set the <PROTECT ON/OFF> switch to OFF.
19. Select **[DATABANK]** -> **[MACHINEPARAMETER]** -> **[SYSTEM1]** and take note of the value set for **[GRID SHIFT VALUE X]** and **[X ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press the **[MANU]** key or the **[MDI]** key. Then, press **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Then press **[DATA BANK]** and **[6]** for conversational type (**[5]** for NC type). Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]** and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE X]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[X ORIGIN OFFSET VALUE]**. Press **[0]**, **[ENT]** and **[F0]** twice.
20. Set the <PROTECT ON/OFF> switch to ON.
21. Turn the <POWER> switch off and then on again.
22. Adjust the X axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
23. Mount the covers in the reverse order from 7. to 6.
[Note]
When mounting the X telescopic cover, move the column to the end so that the cover is contracted.
24. Set the X axis grid shift amount setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A) by using the X axis grid shift value noted in 19.
25. Set to zero in 19, change to the value noted in 22.
26. Check the over run LS movement.
(Refer to 4.3.5 X.Y axes Over run LS adjustment.)

Replacement parts		Tools to be used
Name	Parts code	Small test2/1000 Hexagonal wrench set Phillips screw driver (+) Liquid gasket
XY motor 251	618150001	

2.3.2 X axis coupling replacement (1/4)

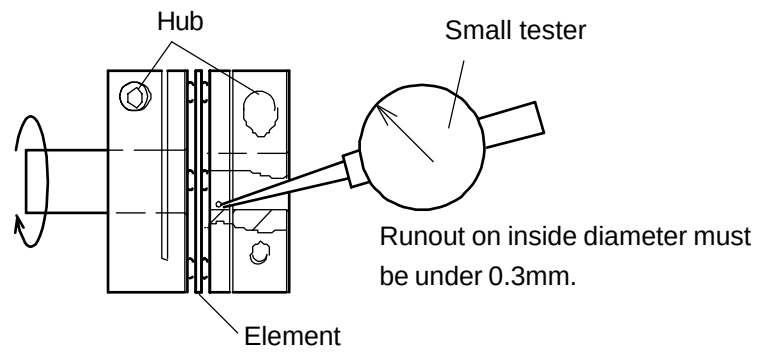


2.3.1-02.ai

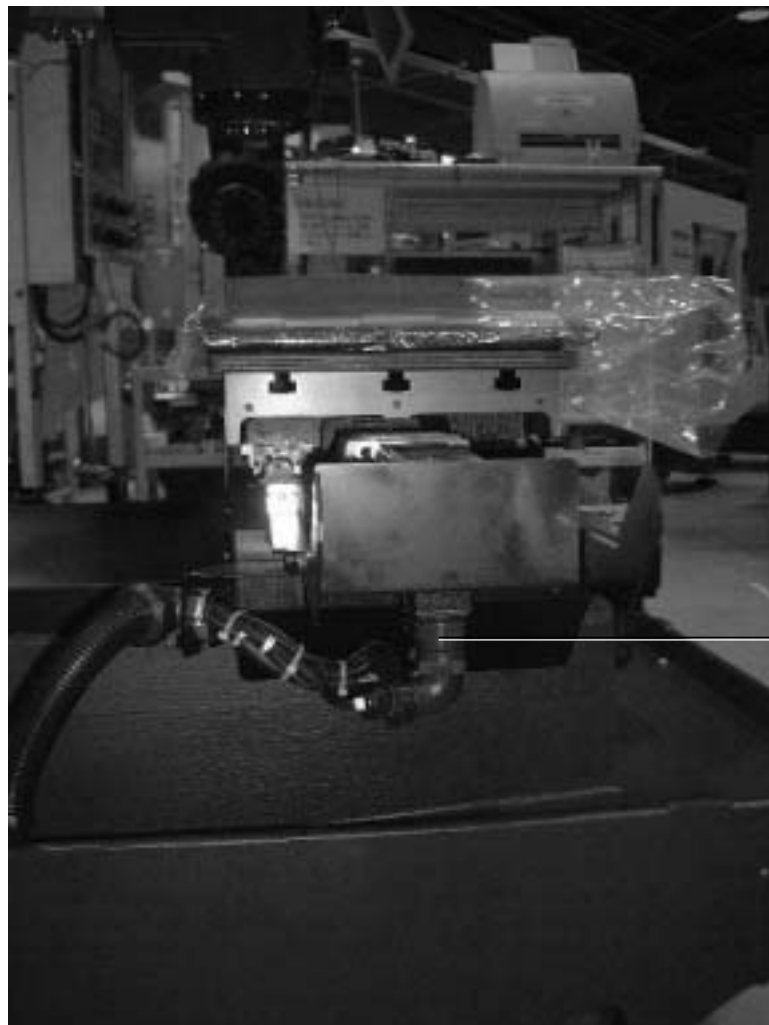


2.3.1-001.jpg

2.3.2 X axis coupling replacement (2/4)



2.3.1-04.ai



2-6.jpg

2.3.2 X axis coupling replacement (3/4)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

1. Set a small tester at the spindle and measure the base position (Use jig etc.)
Move the column the X axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. Move the column from the X axis center position to the left.
(In case that the table doesn't move, turn the <POWER> switch OFF, remove the telescopic cover left and also BRG holder cover.
Move the table by turning the ball screw.)
5. Turn the <POWER> switch OFF and turn off the breaker.
6. Remove the table front cover and the telescopic cover right.
7. Remove the motor base cover.
8. Remove the X Telescopic lower cover.
9. Loosen the securing screw of the coupling on the motor side and remove the motor.
10. Replace the coupling from the ball screw.
11. Fit a new coupling to the ball screw until a wiring fit is obtained and then tighten the fixing screw.

(Note)

Replace the coupling in the following conditions:

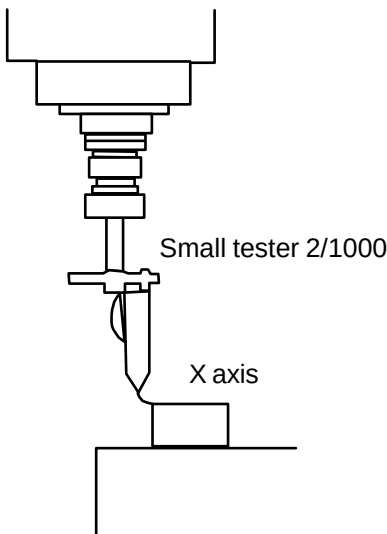
- a. When the element is deformed.
 - b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
 - c. When the coupling has a harmful defect.
 - d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.
12. Tighten the coupling fixing screw on the motor side.
 13. Set the X Telescopic lower cover.
 14. Turn the <POWER> switch ON.
 15. Press the **[MANU]** key.
 16. Press the **[-X]** or the **[+X]** key and check the noise of the motor.
 17. Set the <PROTECT ON/OFF> switch to OFF.

2.3.2 X axis coupling replacement (4/4)

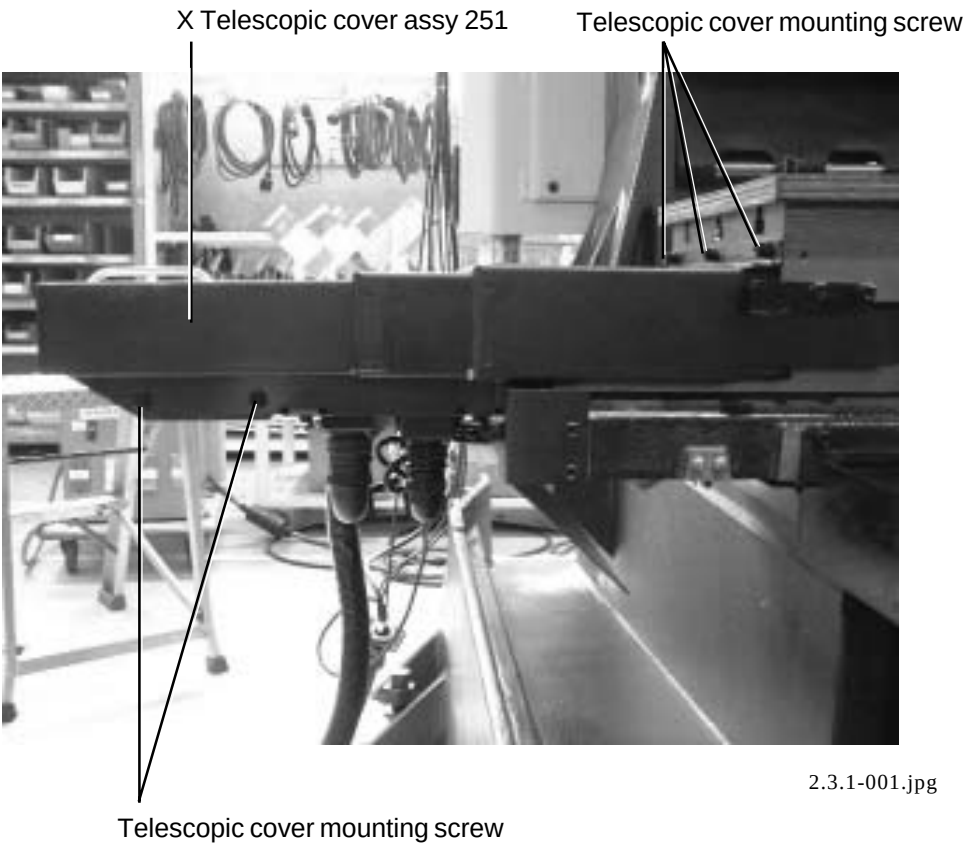
18. Select **[DATABANK]** -> **[MACHINEPARAMETER]** -> **[SYSTEM1]**, and take note of the value set for **[GRID SHIFT VALUE X]** and **[X ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press **[MANU]** or **[MDI]**. Then, press **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Then press **[DATA BANK]** and **[6]** for conversational type (**[5]** for NC type).
Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]**, and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE X]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[X ORIGIN OFFSET VALUE]** and press **[0]**, **[ENT]**, and then **[F0]** twice.
 19. Set the <PROTECT ON/OFF> switch to ON.
 20. Turn the <POWER> switch off and then on again.
 21. Adjust the X axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
 22. Mount covers in the reverse order from 7. to 6.
- [Note]**
When mounting the X telescopic cover, move the column to the end so that the cover is contracted.
23. Perform the X axis grid shift amount setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A) by using the value noted in 18.
Set to zero in 18, change to the value noted in 23.
 24. Check the over run LS movement.
(Refer to 4.3.5 X.Y axes Over run LS adjustment.)

Replacement parts		Tools to be used
Name	Parts code	Small test2/10000 Hexagonal wrench set Phillips screw driver (+)
COUPLING 16-16	653618001	

2.3.3 X axis ball screw replacement (1/5)

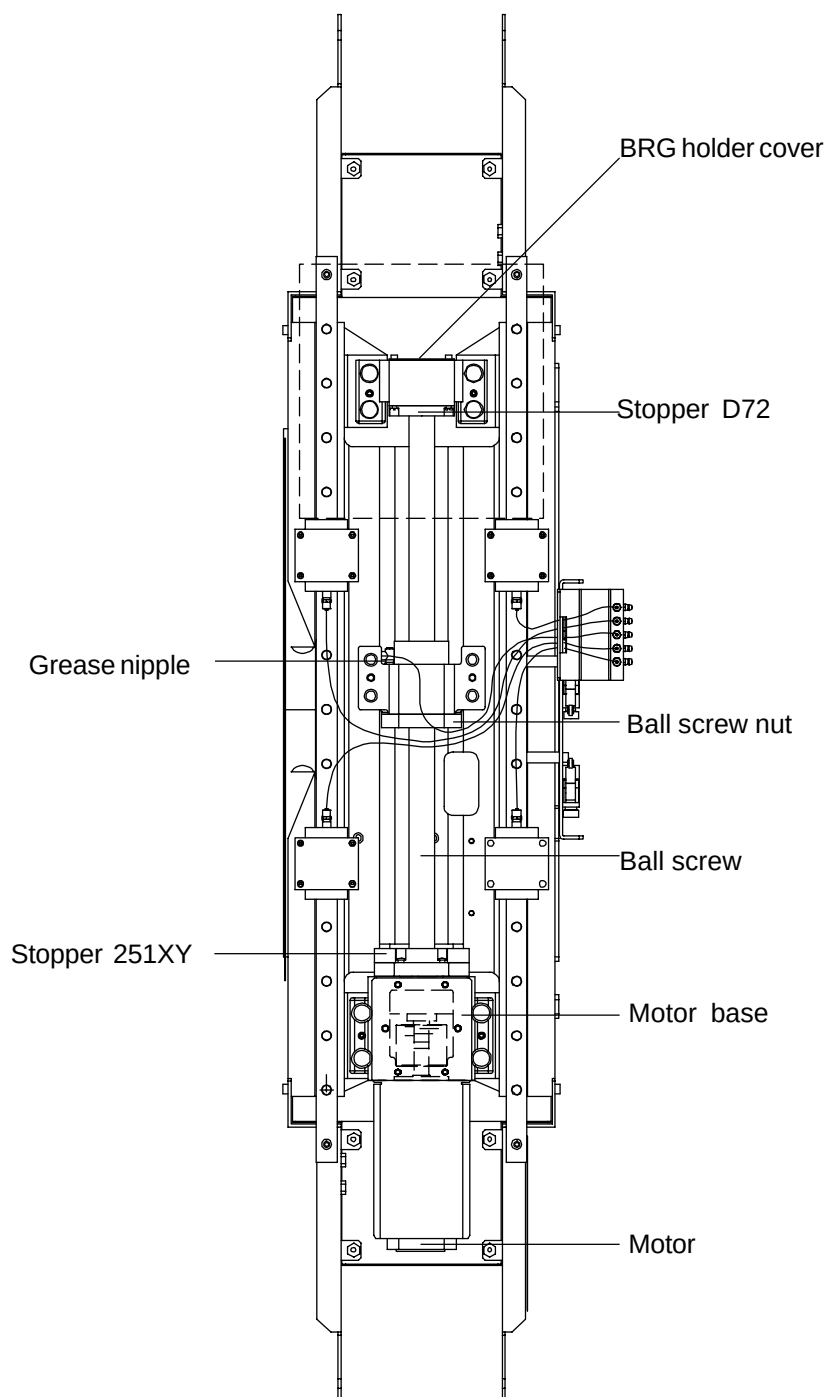


2.3.1-02.ai



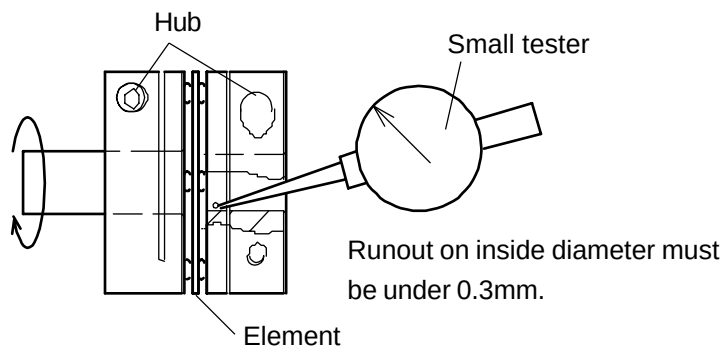
2.3.1-001.jpg

2.3.3 X axis ball screw replacement (2/5)

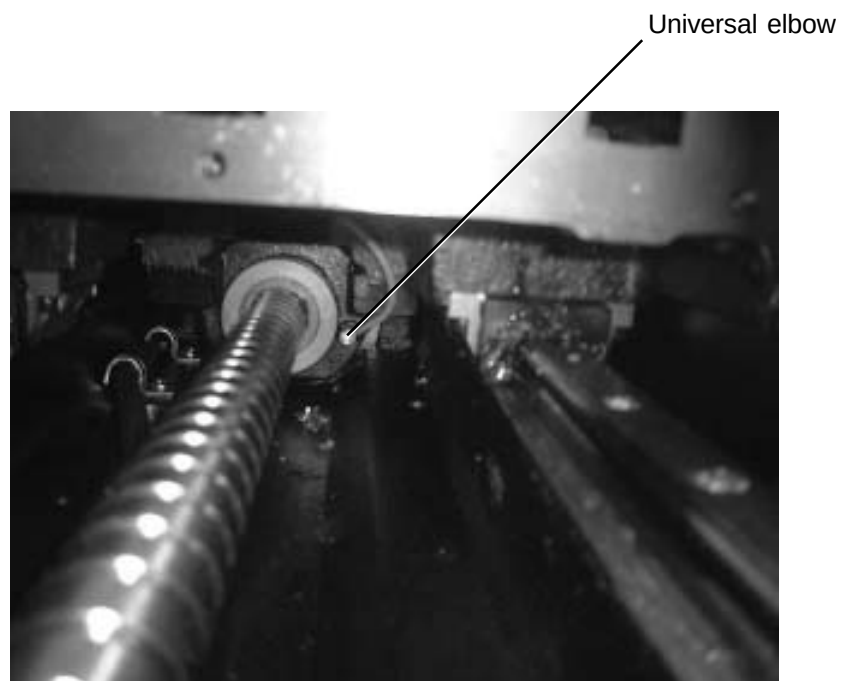


S2BMT02-004.ai

2.3.3 X axis ball screw replacement (3/5)



2.3.1-04.ai



2-7.jpg

2.3.3 X axis ball screw replacement (4/5)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load.

Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

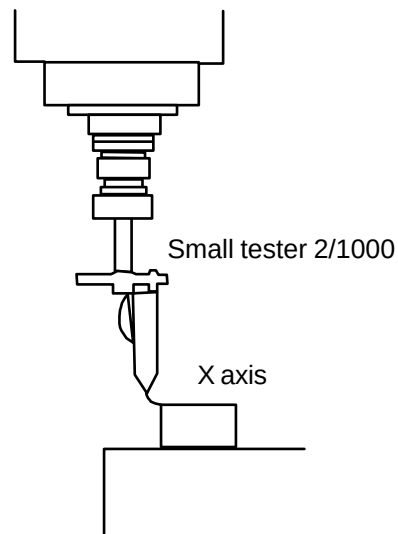
1. Set a small tester at the spindle and measure the base position (Use jigu etc.)
Move the table in the X axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. After moving the table to the left, remove the mounting screws (3pcs) for the X axis telescopic cover right and shift the X telescopic cover right to the right.
5. Remove the stopper D72.
(After removing two stepped screws, turn and pull out the stopper.
The stopper is equipped with a notch.)
6. Move the table from the X axis center position to the right. (In case that the table doesn't move, turn the POWER switch OFF, remove the X telescopic cover right, and the bearing holder cover, and move the table by turning the ball screw.)
7. Turn the POWER switch OFF and turn off the breaker.
8. Remove the table front cover, the table rear cover , the X telescopic cover left , the table cover, the motor base cover and the X telescopic lower cover.
9. Loosen the coupling securing screw on the motor side. Remove the motor, Then, remove the coupling from the ball screw.
10. Remove the stopper 251XY (2 stepped screws).
11. After removing the motor base positioning pin and the mounting screw, remove the ball screw with the motor base.
(Note) The nut holder side the table has an O ring. If remove it with the ball screw, do not lose it.
12. After mounting a new ball screw assy, attach the positioning pin and tighten the mounting screw.
(Note) If remove the O ring in 12, set with the O ring in the nut holder near the table correctly and the ball screw ASSY.
13. Tighten the ball nut mounting screw. At this time, bring the ball nut mounting screw as close to the motor base as much as possible.
14. Reattach the stopper 251XY.

2.3.3 X axis ball screw replacement (5/5)

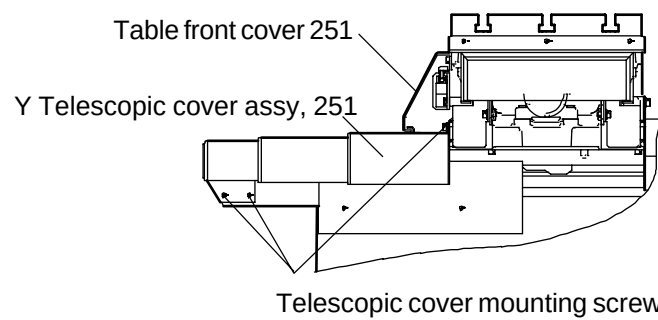
15. Attach the coupling to the ball screw and secure it with mounting screws.
(Note)
Replace the coupling in the following conditions:
 - a. When the element is deformed.
 - b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
 - c. When the coupling or hub has a harmful defect.
 - d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.
16. Mount the motor with the connector under the motor and then tighten the coupling fixing screw.
17. Attach the stopper D72.
18. After turning the <POWER> switch ON, press the [MANU] key.
19. Press the [-X] or the [+X] key and check the noise of the motor.
20. Set the <PROTECT ON/OFF> switch to OFF.
21. Select[**DATABANK**]->[**MACHINEPARAMETER**]->[**SYSTEM1**], and take note of the value set for [GRID SHIFT VALUE X] and [X ORIGIN OFFSET VALUE] and reset the value to zero (0).
Press [MANU] or [MDI]. Then, press [I/O], [1], [ENT], [PAGE UP], [1], [ENT] and [F0].
Then press [DATA BANK] and [6] for conversational type ([5] for NC type).
Press [ENT], [1], [ENT], [PAGE DOWN] and [CURSOR DOWN] to move the cursor to [GRID SHIFT VALUE X] and take note of the value.
Press [0] and [ENT]. In the same way, take note of the value set for [X ORIGIN OFFSET VALUE] and press [0], [ENT] and then [F0] twice.
22. Set the <PROTECT ON/OFF> switch to ON.
23. Turn the POWER switch OFF, and then ON again.
24. Supply grease through the grease nipple.
25. Adjust the X axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
26. Mount the cover which was removed in step 8.
(Note) **When mounting the telescopic cover, move the table to the end so that the cover is contracted.**
27. Perform the X axis grid shift amount setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A) by using the value noted in 22.
28. The X axis grid shift amount was set to "0" in 22. Now, it is to be changed to the value noted in 28.
29. Check the over run LS movement. (Refer to 4.3.5 XY axes over run LS adjustment)

Replacement parts		Tools to be used
Name	Parts code	Small test2/1000 Hexagonal wrench set Phillips screw driver (+) Grease gun Hex. wrench (1 set) Hex. wrench.4 Socket driver (7mm)
BAIISCREWXASSY-251	618155001	
BAIISCREWXASSY-251-L	618852001	
BAIISCREWXASSY-251S	6A5003001	

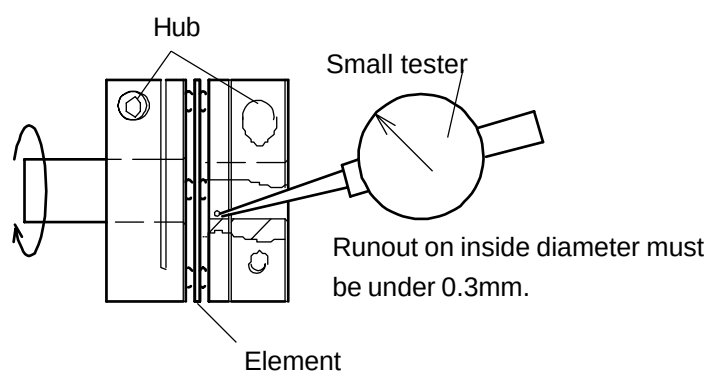
2.3.4 Y axis motor replacement (1/4)



2.3.1-02.ai



2.3.4-01.ai



2.3.1-04.ai

2.3.4 Y axis motor replacement (2/4)



Y axis motor
connector

2-8.jpg

2.3.4 Y axis motor replacement (3/4)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

1. Set a small tester at the spindle and measure the base position (Use jig etc.). Move the table in the Y axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. Move the column from the Y axis center position to the rear.
(In case that the column doesn't move, turn the <POWER> switch OFF, remove the Y apron cover, the BRG holder cover and then move the column by turning the ball screw.)
5. Turn the <POWER> switch OFF and turn off the breaker.
6. Remove the table front cover and the Y telescopic cover.
7. Remove the motor base cover.
8. Remove the connector between YENC code and motor code that connect to the motor.
9. Loosen the securing screw of the coupling on the motor side and remove the motor.
10. Connect YEN code and motor code to the new motor.
11. Mount a new motor, to be the connector lower.

(Note)

Replace the coupling in the following conditions:

- a. When the element is deformed.
- b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
- c. When the coupling has a harmful defect.
- d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.

12. Tighten the coupling fixing screw on the motor side.
13. Turn the <POWER> switch ON.
14. Press the **[MANU]** key.
15. Press the **[-Y]** or the **[+Y]** key and check the noise of the motor.
16. Set the <PROTECT ON/OFF> switch to OFF.
17. Select **[DATABANK]** -> **[MACHINE PARAMETER]** -> **[SYSTEM1]** and take

2.3.4 Y axis motor replacement (4/4)

note of the value set for [GRID SHIFT VALUE Y] and [Y ORIGIN OFFSET VALUE] and reset the value to zero (0).

Press [MANU] or [MDI]. Then, press [I/O], [1], [ENT], [PAGE UP], [1], [ENT] and [F0].

Then press [DATA BANK] and [6] for conversational type ([5] for NC type).

Press [ENT], [1], [ENT], [PAGE DOWN] and [CURSOR DOWN] to move the cursor to [GRID SHIFT VALUE Y] and take note of the value.

Press [0] and [ENT]. In the same way, take note of the value set for [Y ORIGIN OFFSET VALUE] and press [0], [ENT] and then [F0] twice.

18. Set the <PROTECT ON/OFF> switch to ON.
19. Turn the <POWER> switch off and then on again.
20. Adjust the Y axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
21. Mount covers in the reverse order from 7. to 6.

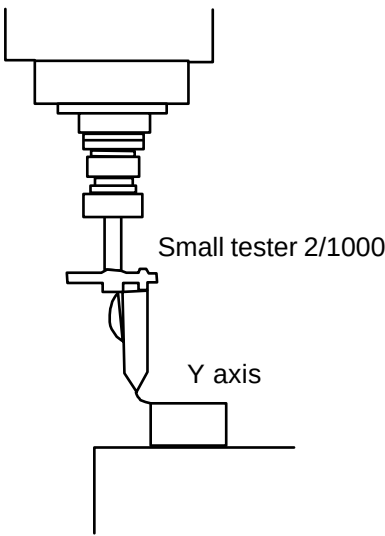
(Note)

When mounting the telescopic cover, move the column to the end so that the cover is contracted.

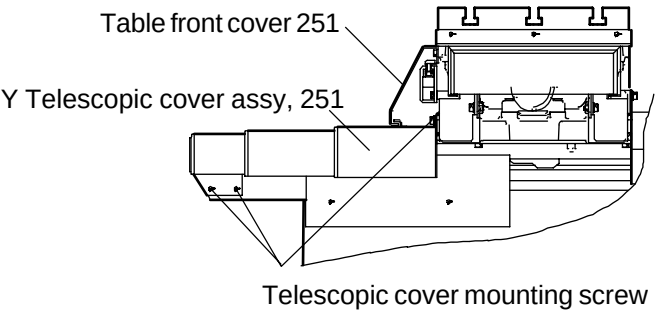
22. Perform the Y axis grid shift amount setting A (Refer to 4.3.1 Origin offset and Y axis grid shift value: Setting A) by using the value noted in 17.
Set to zero in 17, change to the value noted in 22.
23. Check the over run LS movement.
(Refer to 4.3.5 X.Y axes Over run LS adjustment.)

Replacement parts		Tools to be used
Name	Parts code	Small test2/1000 Hexagonal wrench set Phillips screw driver (+,-) Liquid gasket
MOTOR XY 251	618150001	

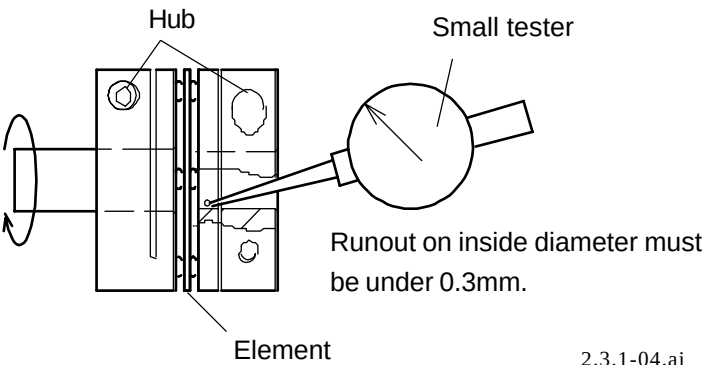
2.3.5 Y axis coupling replacement (1/4)



2.3.1-02.ai



2.3.4-01.ai



2.3.1-04.ai

2.3.5 Y axis coupling replacement (2/4)



Y axis motor
connector

2-8.jpg

2.3.5 Y axis coupling replacement (3/4)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

1. Set a small tester at the spindle and measure the base position (Use jig etc.). Move the table in the Y axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. Move the column from the Y axis center position to the rear.
(In case that the column doesn't move, turn the <POWER> switch OFF, remove the Y apron cover, the BRG holder cover and then move the column by turning the ball screw.)
5. Turn the <POWER> switch OFF and turn off the breaker.
6. Remove the table front cover and the Y telescopic cover.
7. Remove the motor base cover.
8. Loosen the coupling fixing screw on the motor side and then remove the motor.
9. Remove the coupling from the ball screw.
10. Insert the coupling until you run into the shoulder of the screw and secure it with mounting screw.

(Note)

Replace the coupling in the following conditions:

- a. When the element is deformed.
 - b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
 - c. When the coupling has a harmful defect.
 - d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.
11. Mount the motor with the terminal box on the bottom of the motor.
 12. Tighten the coupling fixing screw on the motor side.
 13. Turn the <POWER> switch ON.
 14. Press the **[MANU]** key.
 15. Press the **[-Y]** or the **[+Y]** key and check the noise of the motor.
 16. Set the <PROTECT ON/OFF> switch to OFF.
 17. Select **[DATABANK]** -> **[MACHINE PARAMETER]** -> **[SYSTEM 1]** and take

2.3.5 Y axis coupling replacement (4/4)

note of the value set for [GRID SHIFT VALUE Y] and [Y ORIGIN OFFSET VALUE] and reset the value to zero (0).

Press [MANU] or [MDI]. Then, press [I/O], [1], [ENT], [PAGE UP], [1], [ENT] and [F0].

Then press [DATA BANK] and [6] for conversational type ([5] for NC type).

Press [ENT], [1], [ENT], [PAGE DOWN] and [CURSOR DOWN] to move the cursor to [GRID SHIFT VALUE Y] and take note of the value.

Press [0] and [ENT]. In the same way, take note of the value set for [Y ORIGIN OFFSET VALUE] and press [0], [ENT] and then [F0] twice.

18. Set the <PROTECT ON/OFF> switch to ON.
19. Turn the <POWER> switch off and then on again.
20. Adjust the Y axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
21. Mount covers in the reverse order from 7. to 6.

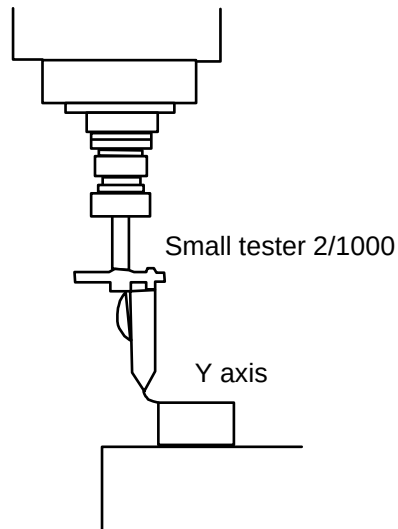
(Note)

When mounting the telescopic cover, move the column to the end so that the cover is contracted.

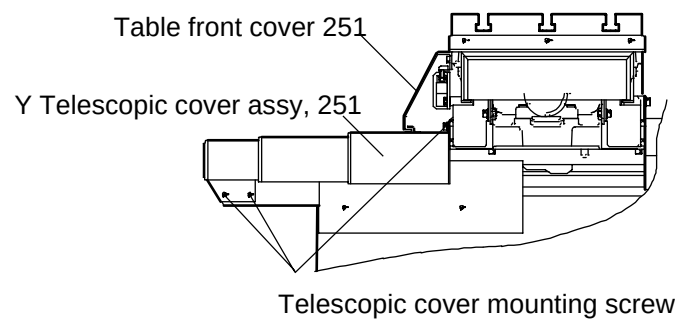
22. Perform the Y axis grid shift amount setting A (Refer to 4.3.1 Origin offset and Y axis grid shift value: Setting A) by using the value noted in 17.
Set to zero in 17, change to the value noted in 22.
23. Check the over run LS movement.
(Refer to 4.3.5 X.Y axes Over run LS adjustment.)

Replacement parts		Tools to be used
Name	Parts code	Small test2/1000 Phillips screw driver (+) Hex.wrench set
COUPLING16-16	653618001	

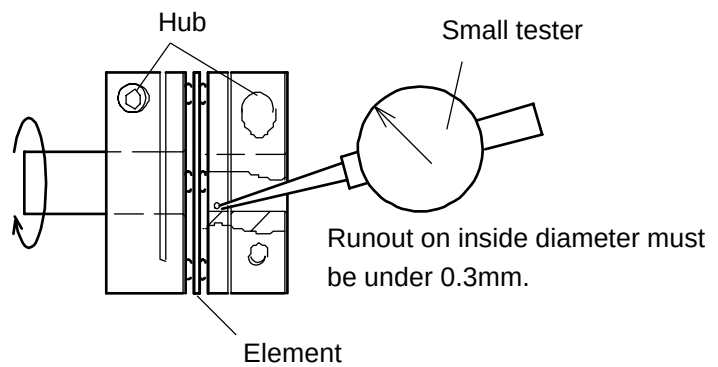
2.3.6 Y axis ball screw replacement (1/4)



2.3.1-02.ai



2.3.4-01.ai



2.3.1-04.ai

2.3.6 Y axis ball screw replacement (2/4)

CAUTION!

The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.

Accordingly, when the motor is operated with not connected to the load, be sure to set the jog feed rate is under 0.1mm. Otherwise, oscillation occurs cause of over feedrate.

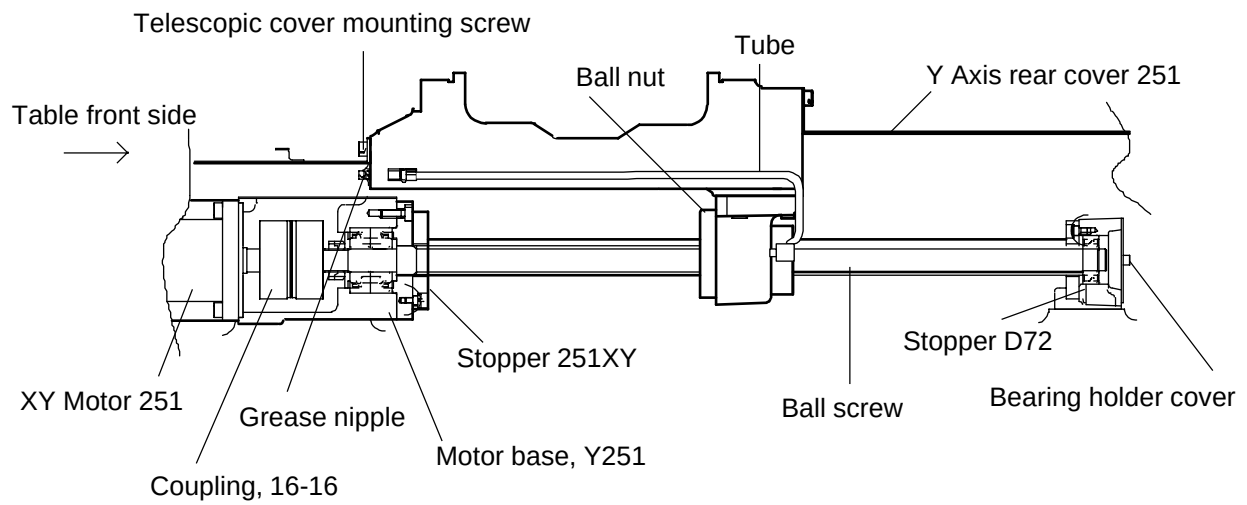
1. Set a small tester at the spindle and measure the base position (Use jig etc.)
Move the table in the Y axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
4. Remove the Y axis rear cover. (Remove the screw and move the cover.)
5. Remove the stopper D72.
(After removing two stepped screws, turn and pull out the stopper.
The stopper is equipped with a notch.)
6. Move the table from the Y axis center position to the right. (In case that the table doesn't move, turn the POWER switch OFF, remove the Y rear cover, the bearing holder cover and move the table by turning the ball screw.)
7. Turn the POWER switch OFF and turn off the breaker.
8. Remove the table front cover and the Y telescopic cover.
9. Remove the motor base cover.
10. Loosen the coupling securing screw on the motor side. Remove the motor,
Then, remove the coupling from the ball screw.
11. Remove the stopper 251XY, remove the ball nut mount screw. (2 stepped screws).
12. After removing the motor base positioning pin and the mounting screw, remove the ball screw with the motor base.
(Note) The nut holder side the table has an O ring. If remove it with the ball screw, do not lose it.
13. After mounting a new ball screw assy, attach the positioning pin and tighten the mounting screw.
(Note) If remove the O ring in 12, set with the O ring in the nut holder near the table correctly and the ball screw ASSY.
14. Tighten the ball nut mounting screw. At this time, bring the ball nut mounting screw as close to the motor base as much as possible.
15. Reattach the stopper 251XY.
16. Mount a tube for grease.

2.3.6 Y axis ball screw replacement (3/4)

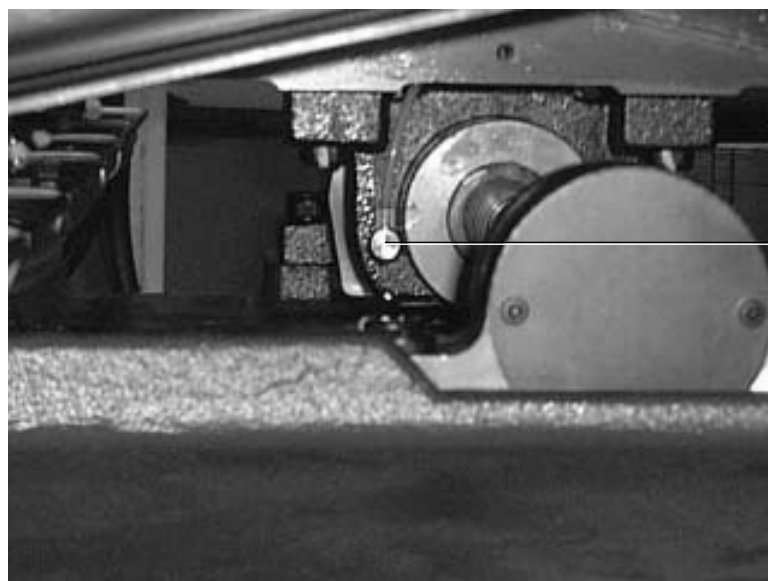
17. Attach the coupling to the ball screw and secure it with mounting screws.
(Note)
Replace the coupling in the following conditions:
 - a. When the element is deformed.
 - b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
 - c. When the coupling or hub has a harmful defect.
 - d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.
18. Mount the motor with the connector under the motor and then tighten the coupling fixing screw.
17. Attach the stopper D72.
19. After turning the < POWER > switch ON, press the [MANU] key.
20. Press the [-Y] or the [+Y] key and check the noise of the motor.
21. Set the <PROTECT ON/OFF> switch to OFF.
22. Select [DATA BANK] -> [MACHINE PARAMETER] -> [SYSTEM 1], and take note of the value set for [GRID SHIFT VALUE X] and [X ORIGIN OFFSET VALUE] and reset the value to zero (0).
Press [MANU] or [MDI]. Then, press [I/O], [1], [ENT], [PAGE UP], [1], [ENT] and [F0].
Then press [DATA BANK] and [6] for conversational type ([5] for NC type).
Press [ENT], [1], [ENT], [PAGE DOWN] and [CURSOR DOWN] to move the cursor to [GRID SHIFT VALUE X] and take note of the value.
Press [0] and [ENT]. In the same way, take note of the value set for [X ORIGIN OFFSET VALUE] and press [0], [ENT] and then [F0] twice.
23. Set the <PROTECT ON/OFF> switch to ON.
24. Turn the POWER switch OFF, and then ON again.
25. Supply grease through the grease nipple.
26. Adjust the Y axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
27. Mount the cover which was removed in step 9 to 8.
(Note) **When mounting the telescopic cover, move the table to the end so that the cover is contracted.**
28. Mount the the stopper D72 and Y axis rear cover.
29. Perform the X axis grid shift amount setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A) by using the value noted in 22.
(Set to zero in 22, change to the value noted in 29.)
30. Check the over run LS movement. (Refer to 4.3.5 XY axes over run LS adjustment)

Replacement parts		Tools to be used
Name	Parts code	
BALL SCREW ASSY, Y 251	618156001	Small test2/1000 Phillips screw driver (+) Hex.wrench set Hex.wrench 4assy Grease gun

2.3.6 Y axis ball screw replacement (4/4)



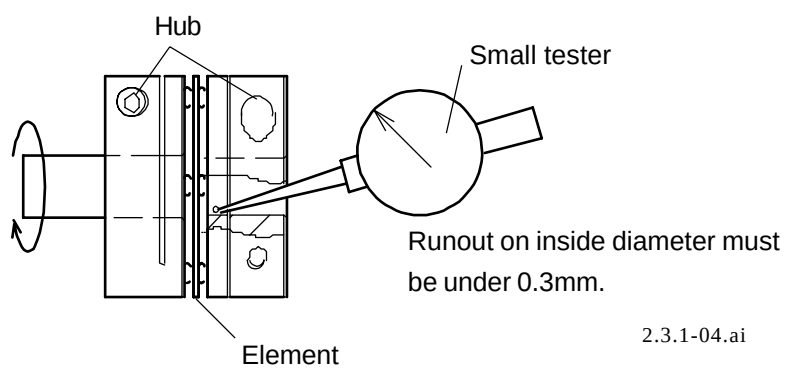
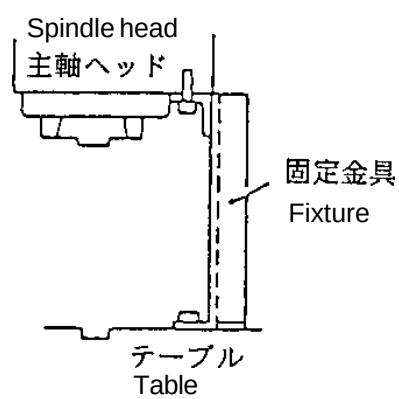
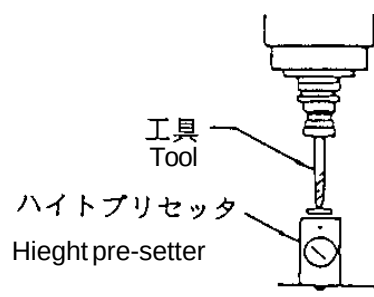
2.3.6-01.ai



Universal
elbow

2-9.jpg

2.3.7 Z axis motor replacement (1/4)



2.3.1-04.ai

2.3.7 Z axis motor replacement (2/4)

1. After mounting a tool on the spindle, move the spindle head in the Z axis direction until the height pre-setter indicates "0".
(In case that the spindle head doesn't move, use a small tester as a measuring device. Set the spindle edge 0.)
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
When a small test is used to measure the coordinate, move the small test away from the spindle by pushing **[-Z]** or **[+Z]** keys.
4. Remove the spindle head cover R, L.
5. Remove the motor base cover.
6. Bring the spindle head up and down to position the spindle where the coupling fixing bolt can be loosened through the motor base window.
7. Fix the spindle head with the fixture so that it won't fall down.
8. Turn the <POWER> switch OFF and turn off the breaker.
9. Disconnect the connectors and remove the cable boards out of the terminal box.
10. Loosen the securing screw for the coupling on the motor side.
11. Remove the motor.
12. Mount the new motor to the column side of the terminal box.

(Note)

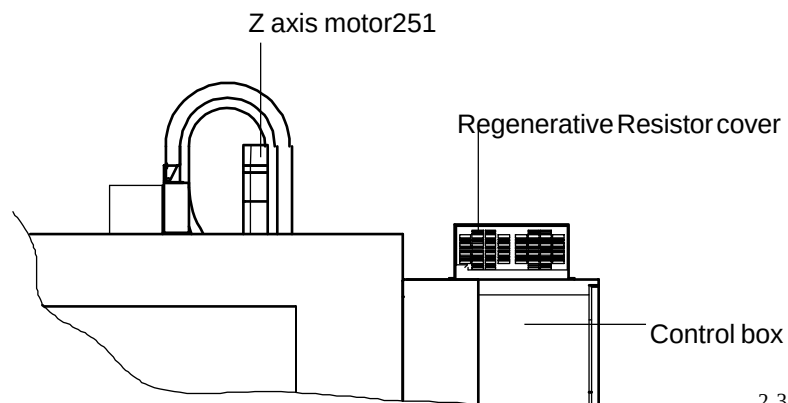
Replace the coupling in the following conditions:

- a. When the element is deformed.
- b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
- c. When the coupling has a harmful defect.
- d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.

13. Tighten the coupling fixing screw on the motor side.
14. Connect the connectors of the motor.
15. Remove the spindle head fixture.
16. Turn the <POWER >switch ON.
17. Press the **[MANU]** key.
Press the **[-Z]** or the **[+Z]** key and check the motor noise.
18. Set the <PROTECT ON/OFF> switch to OFF.
19. Select **[DATABANK]->[MACHINE PARAMETER]->[SYSTEM1]**, and take note of the value set for **[GRID SHIFT VALUE Z]** and **[Z ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press **[MANU]** or **[MDI]**. Press **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Then press **[DATA BANK]** and **[6]** for conversational type (**[5]** for NC type).
Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]**, and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE Z]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[Z ORIGIN OFFSET VALUE]** and press **[0]**, **[ENT]** and then **[F0]** twice.

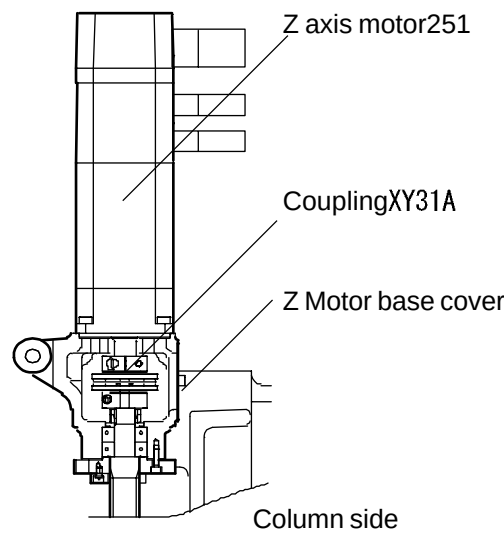
2.3.7 Z axis motor replacement (3/4)

20. Set the <PROTECT ON/OFF> switch to ON.
21. Turn the <POWER> switch OFF and then ON again.
22. Adjust the Z axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
23. Mount the motor base cover.
24. Adjust the spindle head cover R and L.
25. Perform the Z axis grid shift value setting A(Refer to 4.3.3 Settings for origin offset and Z-axis grid shift value)by using the Z axis grid shift value noted in 18. The Z axis grid shift amount was set to "0" in 18. Now, it is to be changed to the value noted in 23.
26. Check the over run LS movement . (Refer to 4.3.6 Z axis Over run LS adjustment.)



2.3.7-01.ai

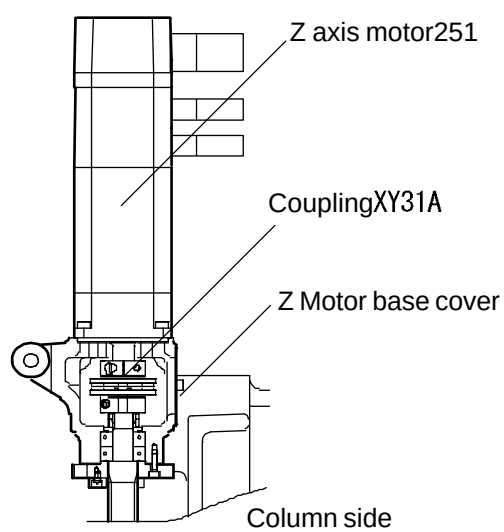
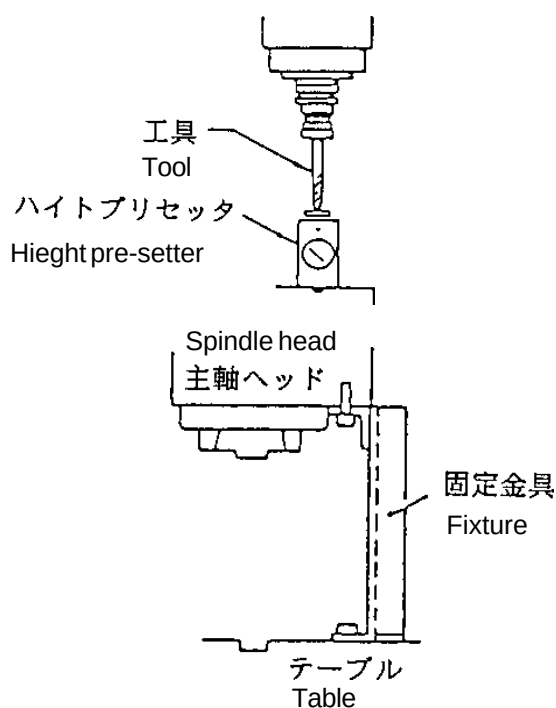
2.3.7 Z axis motor replacement (4/4)



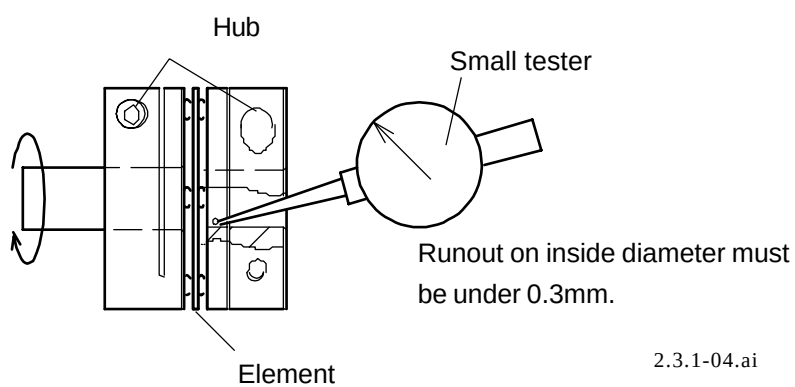
2.3.7-02.ai

Replacement parts		Tools to be used
Name	Parts code	Height pre-setter Hexagonal wrench set Phillips screw driver (+) Spindle head fixture
Z axis motor 251	618440001	

2.3.8 Z axis coupling replacement (1/3)

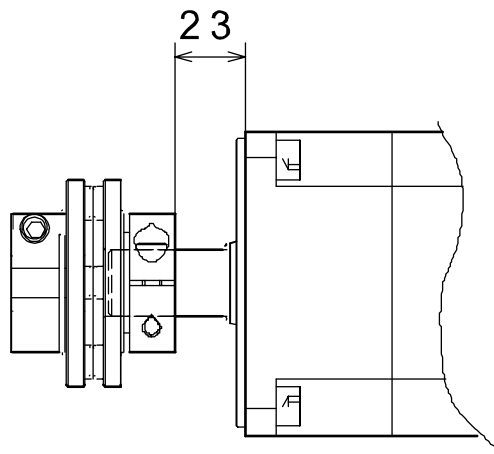


2.3.7-02.ai



2.3.1-04.ai

2.3.8 Z axis coupling replacement (2/3)



2.3.8-01ai

1. After mounting a tool on the spindle, move the spindle head in the Z axis direction until the height pre-setter indicates "0".
(In case that the spindle head doesn't move, use a small tester as a measuring device. Set the spindle edge 0.)
2. Press the **[POS]** key.
3. Take notes of the current machine coordinate position from the screen.
When a small test is used to measure the coordinate, move the small test away from the spindle by pushing **[-Z]** or **[+Z]** keys.
4. Remove the spindle head cover R, L.
5. Remove the motor base cover.
6. Bring the spindle head up and down to position the spindle where the coupling fixing bolt can be loosened through the motor base window.
7. Fix the spindle head with the fixture so that it won't fall down.
8. Turn the <POWER> switch OFF and turn off the breaker.
9. Loosen the coupling fixing screw on the ball screw side.
10. Remove the motor.
11. Remove the coupling.
12. Mount the new coupling on the motor with a clearance of 23 mm so that the hole in the coupling fixing bolt on the ball screw side is located on the motor terminal box side.
13. Mount the new motor to the column side of the terminal box.

(Note)

Replace the coupling in the following conditions:

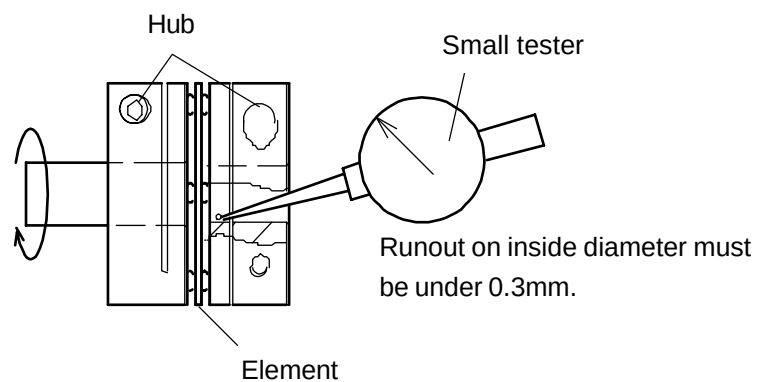
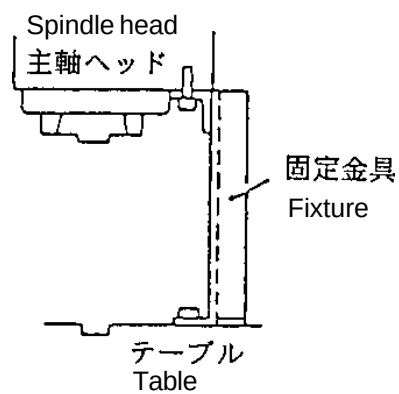
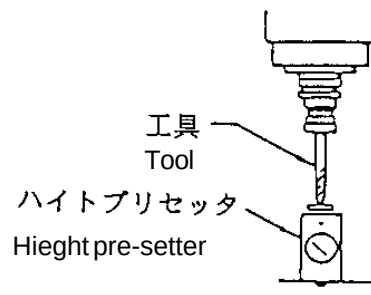
- a. When the element is deformed.
- b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
- c. When the coupling has a harmful defect.
- d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.

2.3.8 Z axis coupling replacement (3/3)

14. Tighten the coupling fixing screw on the ball screw side.
15. Remove the spindle head fixture.
16. Turn the <POWER> switch ON.
17. Press the **[MANU]** key. Press the **[-Z]** or the **[+Z]** key and check the motor noise.
18. Set the <PROTECT ON/OFF> switch to OFF.
19. Select **[DATABANK]** -> **[MACHINE PARAMETER]** -> **[SYSTEM1]** and take note of the value set for **[GRID SHIFT VALUE Z]** and **[Z ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press **[MANU]** or **[MDI]**. Press the **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Then press **[DATA BANK]** and **[6]** for conversational type (**[5]** for NC type).
Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]**, and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE Z]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[Z ORIGIN OFFSET VALUE]** and press **[0]**, **[ENT]** and then **[F0]** twice.
20. Set the <PROTECT ON/OFF> switch to ON.
21. Turn the <POWER> switch OFF and then ON again.
22. Adjust the Z axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
23. Mount the motor base cover.
24. Adjust the spindle head cover R and L.
25. Perform the Z axis grid shift value setting A(Refer to 4.3.3 Settings for origin offset and Z-axis grid shift value)by using the Z axis grid shift value noted in 19.
The Z axis grid shift amount was set to "0" in 19. Now, it is to be changed to the value noted in 19.
26. Check the over run LS movement . (Refer to 4.3.6 Z axis Over run LS adjustment.)

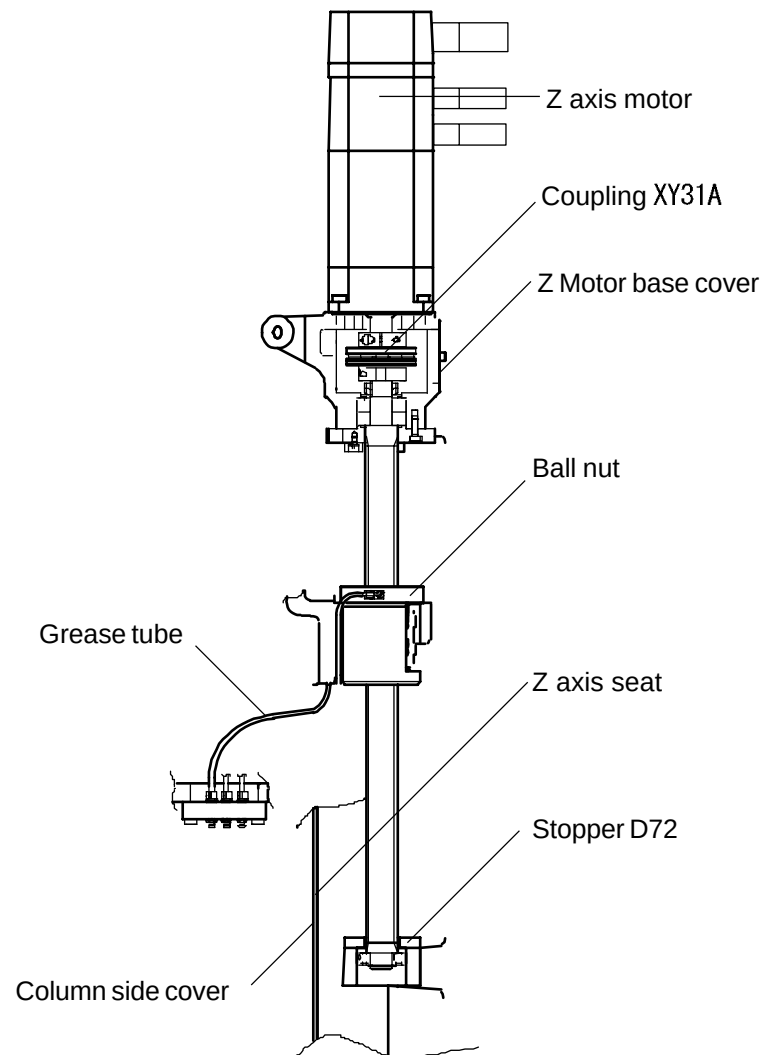
Replacement parts		Tools to be
Name	Parts code	
COUPLINGXY31A	65051XY31A	Height pre-setter Phillips screw driver(+) Hex.wrench set Spindle head fixture

2.3.9 Z axis ball screw replacement (1/4)



2.3.1-04.ai

2.3.9 Z axis ball screw replacement (2/4)



2.3.9-01ai

2.3.9 Z axis ball screw replacement (3/4)

1. After mounting a tool on the spindle, move the spindle head in the Z axis direction until the height pre-setter indicates "0".
(In case that the spindle head doesn't move, use a small tester as a measuring device. Set the spindle edge 0.)
 2. Press the **[POS]** key.
 3. Take notes of the current machine coordinate position from the screen.
When a small test is used to measure the coordinate, move the small test away from the spindle by pushing **[-X]** or **[+X]** keys.
 4. Remove the column side cover.
 5. Remove the bolt screw (M6, 3) that fix the spindle head of the Z seat.
Lower the motor base cover with care.
 6. Move the spindle head near the Z axis origin point.
 7. Remove the stopper D72 attached to the bearing holder. (The shoulder screw has the cutting edge. Pull out shoulder screws by twisting its cutting edge.)
 8. Remove the spindle head cover R, L.
 9. Lower the spindle head to remove the motor base cover.
 10. Bring the spindle head up and down to position the spindle where the coupling fixing bolt can be loosened through the motor base window.
 11. Fix the spindle head with the fixture so that it won't fall down.
 12. Turn the <POWER> switch OFF and turn off the breaker.
 13. Loosen the coupling fixing screw on the ball screw side.
 14. Remove the motor.
 15. Remove the Z axis ball nut mounting screw through the motor base hole.
Remove the grease tube.
 16. Remove the motor base mounting screw and the positioning pin.
Remove the ball screw with the motor base.
 17. Mount a new ball screw assy with the positioning pin.
Tighten the motor base mounting screw.
 18. Mount the grease tube. Tighten the ball nut mounting screw through the motor base hole.
 19. Mount the new motor with the connector is facing to the column side.
- (Note)**
Replace the coupling in the following conditions:
- a. When the element is deformed.
 - b. When any of the bolts for securing the element to the coupling has a harmful defect such as wear.
 - c. When the coupling has a harmful defect.
 - d. When the coupling, which is mounted to the motor, deviates 0.3 mm or more with respect to the inside diameter.
20. Tighten the coupling fixing screw on the ball screw side.

2.3.9 Z axis ball screw replacement (4/4)

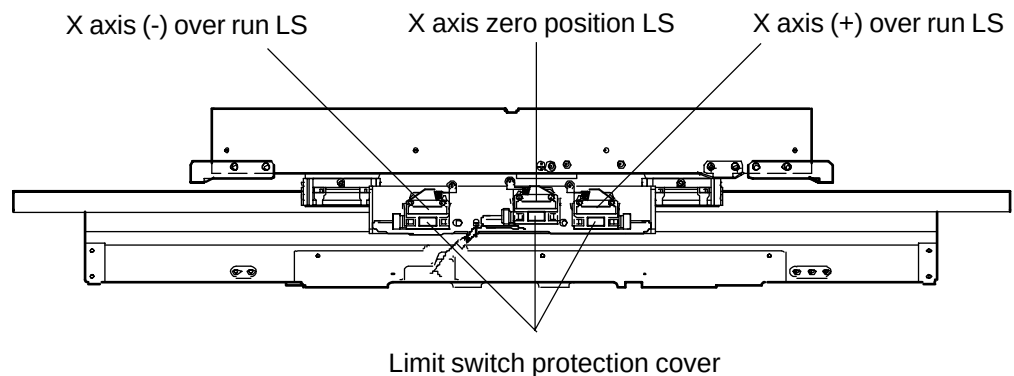
21. Remove the spindle head fixture.
22. Set the <POWER> switch to ON.
23. Press the **[MANU]** key. Press the **[-Z]** or the **[+Z]** key and check the motor noise
24. Set the <PROTECT ON/OFF> switch to OFF.
25. Select **[DATABANK]** -> **[MACHINE PARAMETER]** -> **[SYSTEM1]** and take note of the value set for **[GRID SHIFT VALUE Z]** and **[Z ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press **[MANU]** or **[MDI]**. Press the **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Then press **[DATA BANK]** and **[6]** for conversational type (**[5]** for NC type).
Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]**, and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE Z]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[Z ORIGIN OFFSET VALUE]** and press **[0]**, **[ENT]**, and then **[F0]** twice.
26. Set the <PROTECT ON/OFF> switch to ON.
27. Turn the POWER switch OFF, and then ON again.
28. Adjust the Z axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
29. Mount the stopper D72, the Z seat cover and the column side cover.
(Note) When mount the column side cover, put the Z seat cover of the seat and reinforcing board to the slit of the column side cover correctly.
30. Mount the motor base cover and spindle head cover R, L.
31. Perform the Z axis grid shift value setting A (Refer to 4.3.3 Settings for origin offset and Z-axis grid shift value) by using the Z axis grid shift value noted in 25. The Z axis grid shift amount was set to "0" in 25. Now, it is to be changed to the value noted in 25.)
32. Check the over run LS movement. (Refer to 4.3.6 Z axis Over run LS adjustment.)

Replacement parts		Tools to be used
Name	Parts code	
BALL SCREW ASSZ, 250	653045001	Height pre-setter Phillips screw driver (+) Hex.wrench set Spindle head fixture

2.4 Limit Switch

2.4.1 X axis zero position LS replacement

Switch SL1-P



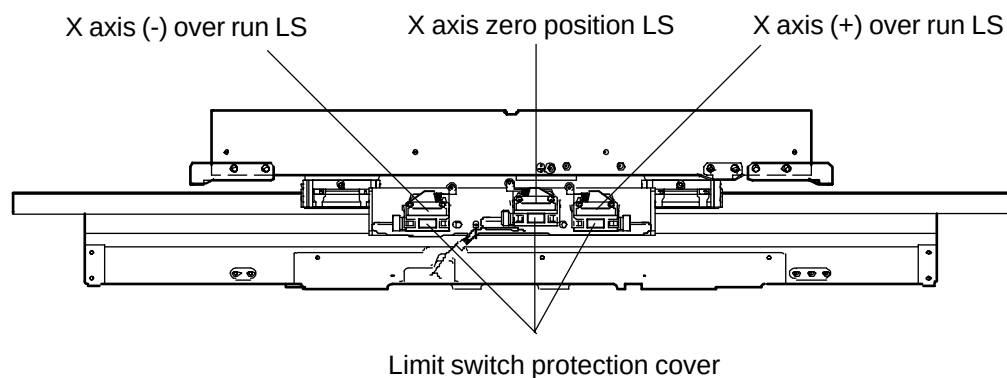
2.4.1-01.ai

1. Set a small tester at the spindle and measure the base position. (Use jigu etc.) Move the table in the X axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the X axis current machine coordinate position from the screen.
4. Turn the POWER switch OFF and turn off the breaker circuit.
5. Remove the table front cover.
6. Remove the zero position limit switch.
7. Remove the limit switch protection cover.
8. Disconnect the lead wire.
9. Connect the lead wire to a new limit switch.
10. Attach the protection cover and seal the lead wire exit with silicone.
11. Install the new limit switch.
12. Adjust the X axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
13. Perform the X axis grid shift amount setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A.).
14. Mount the table front cover.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Small test Hexagonal wrench set Silicone Phillips screw driver (+)

2.4.2 X axis overrun LS replacement

Switch SL1-P



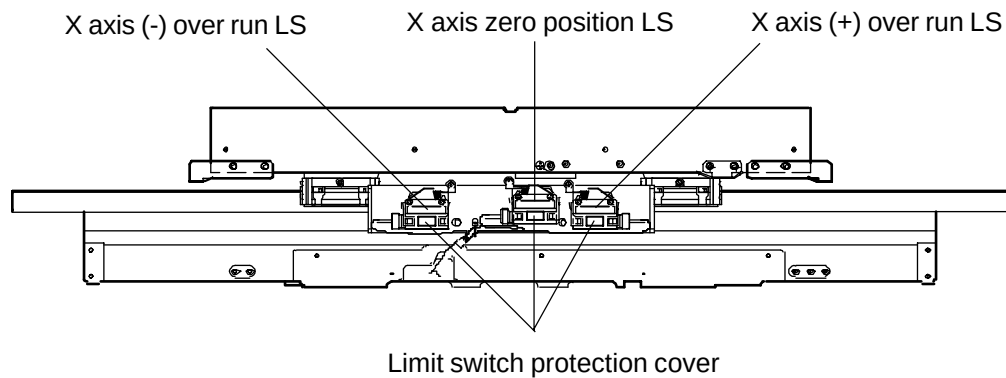
2.4.1-01.ai

1. Turn the <POWER> switch OFF and turn off the breaker circuit.
2. Remove the maintenance cover under the control box.
3. Remove the overrun limit switch.
4. Remove the limit switch protection cover.
5. Disconnect the lead wire.
6. Connect the lead wire to a new limit switch.
7. Attach the protection cover and seal the lead wire exit with silicone.
8. Install the new limit switch.
9. Adjust the X axis overrun LS (Refer to 4.3.5 X,Y axes overrun LS adjustment.).
10. Mount the maintenance cover.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Silicone Hexagonal wrench set Phillips screw driver (+)

2.4.3 Y axis zero position LS replacement

Switch SL1-P



2.4.1-01.ai

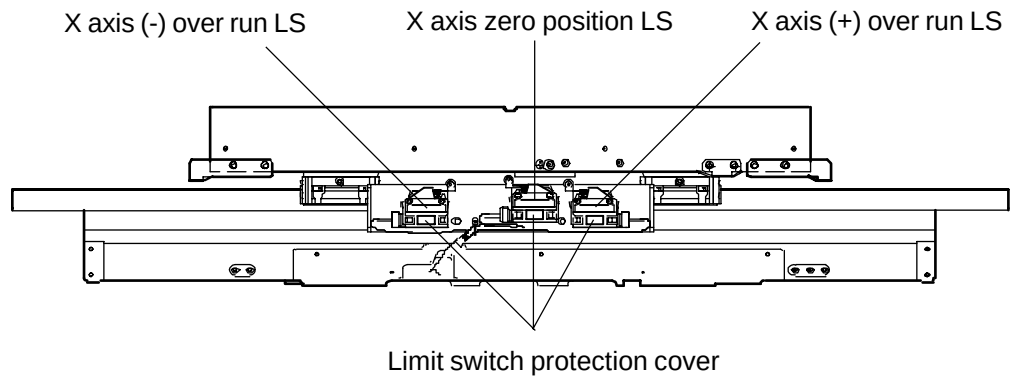
1. Set a small tester at the spindle and measure the base position (Use jig etc.)
Move the table in the Y axis direction until the small tester indicates "0" at the base position.
2. Press the **[POS]** key.
3. Take notes of the machine coordinate position from the screen.
4. Turn the <POWER> switch OFF and turn off the breaker circuit.
5. Remove the table front cover and telescopic cover Y.
6. Remove the left side carriage cover L.
7. Remove the zero position limit switch.
8. Remove the limit switch protection cover.
9. Disconnect the lead wire.
10. Connect the lead wire to a new limit switch.
11. Attach the protection cover.
12. Install the new limit switch.
13. Perform the Y axis zero position LS adjustment (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
14. Perform the Y axis grid shift value setting A (Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A).
15. Mount the YLS cover.
16. Attach the cover. in ordder to 6 to 5.

(Note) Move the table to the edge, mount the telescopic cover with it shrink.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Silicone Hexagonal wrench set Phillips screw driver (+)

2.4.4 Y axis overrun LS replacement

Switch SL1-P



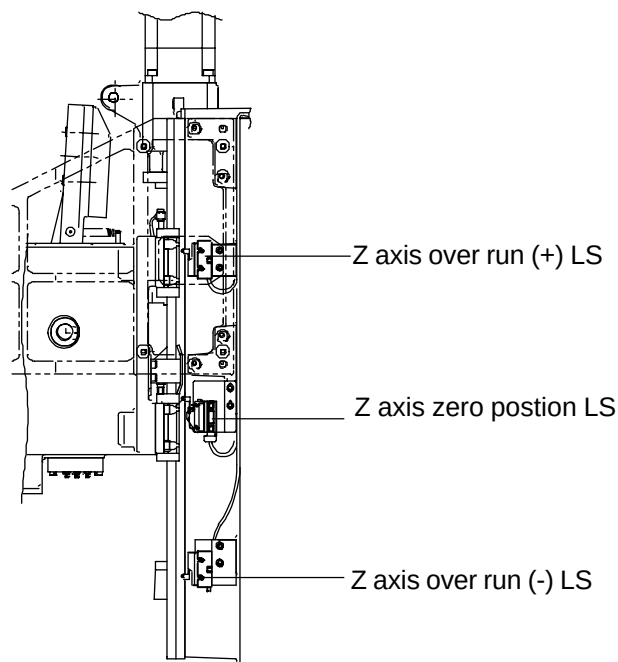
2.4.1-01.ai

1. Turn the <POWER> switch OFF and turn off the breaker.
2. Remove the table front cover and telescopic cover Y.
3. Remove the YLS cover.
4. Remove the overrun limit switch.
5. Remove the limit switch protection cover from the right side of the machine.
6. Disconnect the lead wire.
7. Connect the lead wire to a new limit switch.
8. Attach the protection cover.
9. Install the new limit switch.
10. Perform adjustment of the Y axis overrun LS (Refer to 4.3.5 X,Y axes overrun LS adjustment.).
11. Mount the YLS carriage cover.
12. Attach the cover. in ordder to3 to 2.

(Note) Move the table to the edge, mount the telescopic cover with it shrink.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Small test Hexagonal wrench set Phillips screw driver (+)

2.4.5 Z axis zero position LS replacement



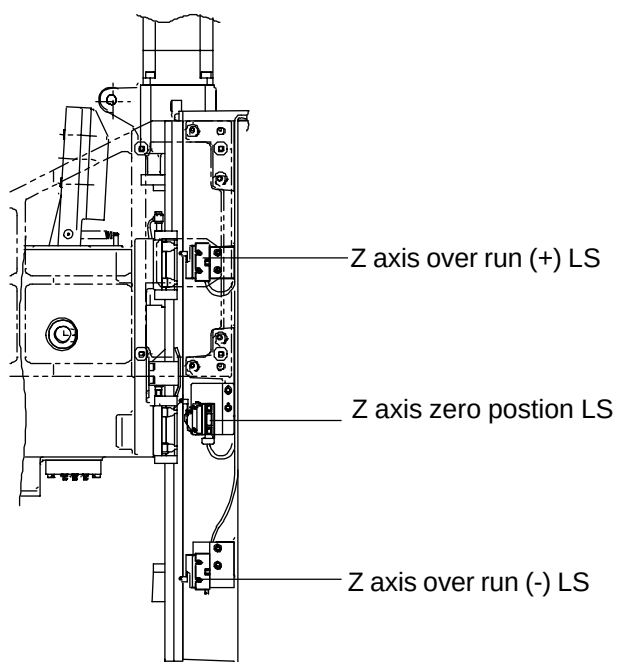
TS2BMT02-005.ai

1. After mounting a tool on the spindle, move the spindle head to the position where a height pre-setter indicates 0.
2. Press the **[POS]** key.
3. Take notes of the machine coordinate position from the screen.
4. Turn the <POWER> switch OFF and turn off the breaker.
5. Remove the column side cover in the right.
6. Remove the zero position limit switch.
7. Remove the limit switch protection cover.
8. Disconnect the lead wire.
9. Connect the lead wire to a new limit switch.
10. Attach the protection cover.
11. Install the new limit switch.
12. Perform adjustment of the Z axis zero position LS (Refer to 4.3.4 X, Y, Z axes origin limit switch A).
13. Perform the Z axis grid shift value setting (Refer to 4.3.3 Settings for origin offset and Z-axis grid shift value).
14. Mount the column side cover.

(Note) When mount the column side cover, put the Z seat cover of the seat and reinforcing board to the slit of the column side cover correctly.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Height Pre-Setter Hexagonal wrench set Phillips screw driver (+)

2.4.6 Z axis overrun LS replacement



TS2BMT02-005.ai

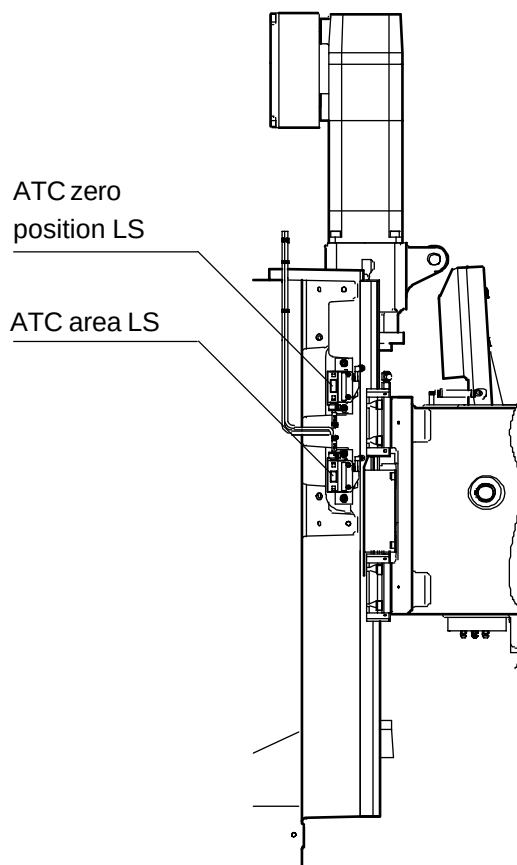
1. Turn the <POWER> switch OFF and turn off the breaker.
2. Remove the column side cover.
3. Remove the overrun limit switch.
4. Remove the limit switch protection cover.
5. Disconnect the lead wire.
6. Connect the lead wire to a new limit switch.
7. Attach the protection cover.
8. Install the new limit switch.
9. Perform adjustment of the Z axis overrun LS (Refer to 4.3.6 Zaxis overrun LS adjustment.).
10. Mount the LS column side cover.

(Note) When mount the column side cover, put the Z seat cover of the seat and reinforcing board to the slit of the column side cover correctly.

Replacement parts		Tools to be used
Name	Parts code	
SWITCHSL1-PV	653999002	Hexagonal wrench set Phillips screw driver (+)

2.4.7 Z axis ATC zero position LS replacement

ATC area LS replacement



4.2.4-01.ai

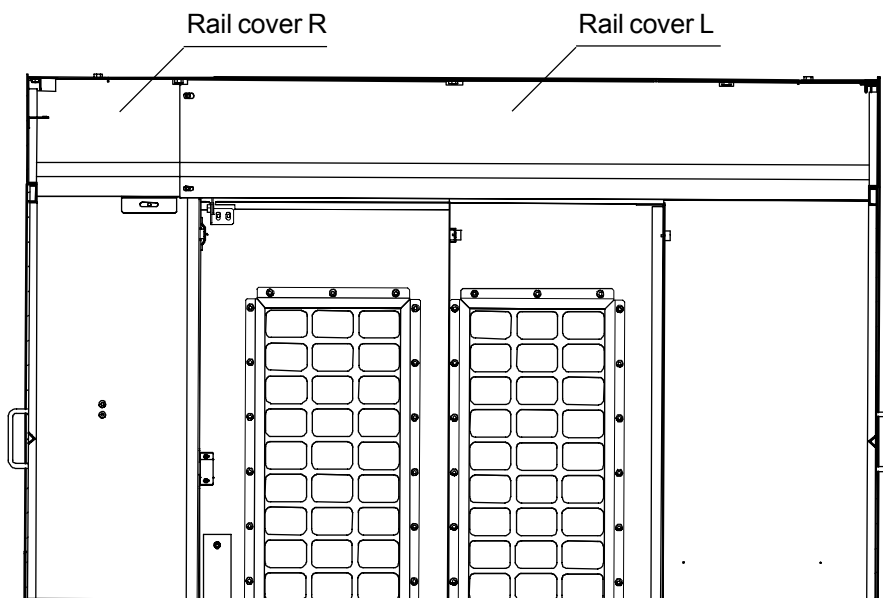
1. Turn the <POWER> switch OFF and turn off the breaker.
2. Remove the column side cover.
3. Remove the overrun limit switch.
4. Remove the limit switch protection cover.
5. Disconnect the lead wire.
6. Connect the lead wire to a new limit switch.
7. Attach the protection cover.
8. Install the new limit switch.
9. Perform adjustment of the Z axis overrun LS (Refer to 4.2.4 ATC zero position LS adjustment.).
10. Perform adjustment of the Z axis overrun LS (Refer to 4.2.5 ATC area LS adjustment.).
11. Mount the LS column side cover.

(NOTE) When mount the column side cover, put the Z seat cover to the slit of the column side cover correctly.

Replacement parts		Tools to be
Name	Parts code	
SWITCH SL1-P	653999002	Phillips screw driver (+) Hex. wrench (1 set)

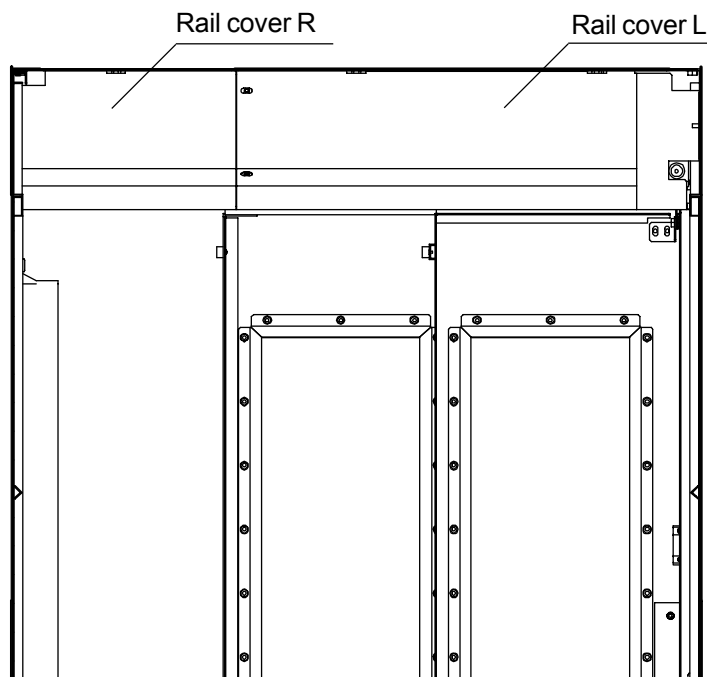
2.4.8 Door Lock LS Replacement

Standard (One door, Two doors) and long type



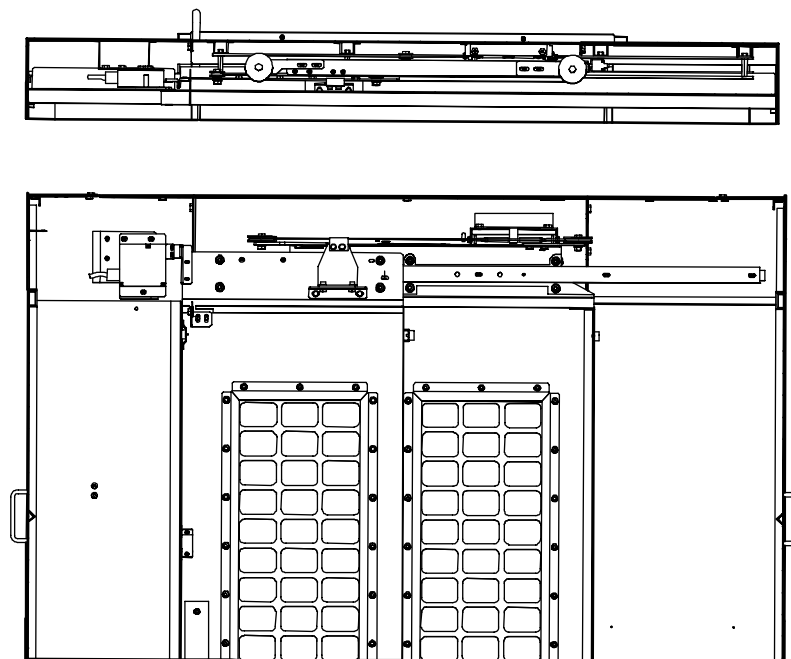
S2BMT2-006.ai

Short type



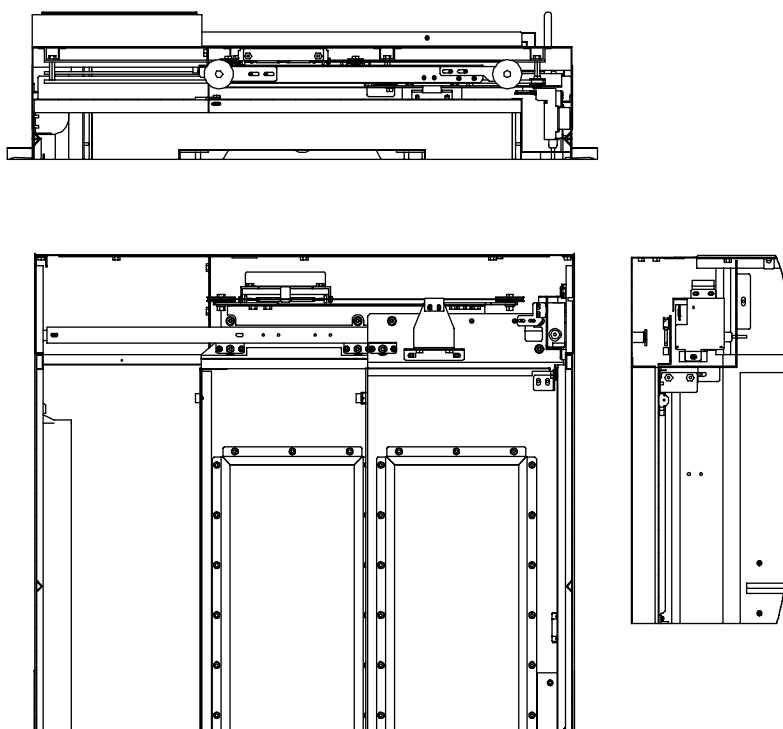
S2BMT2-009.ai

Standard (One door, Two doors) and long type



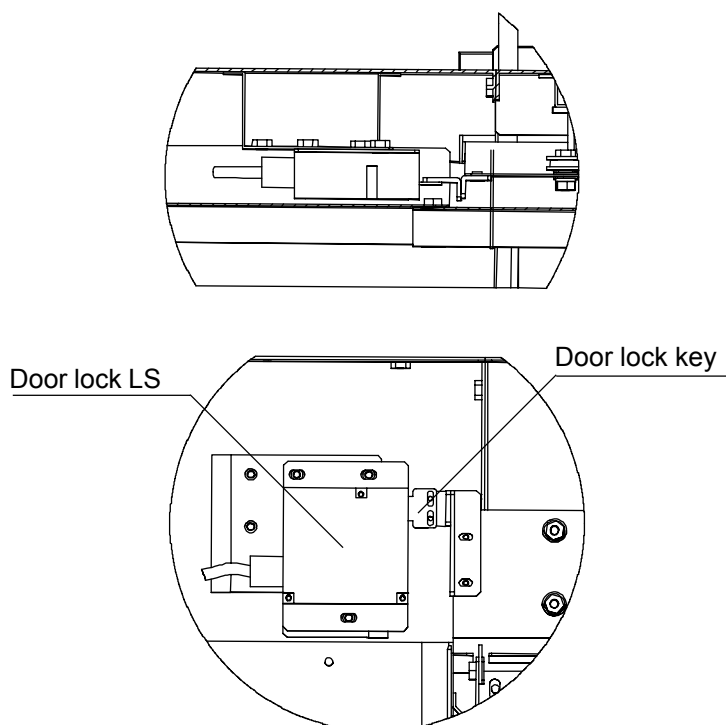
S2BMT2-007.ai

Short type



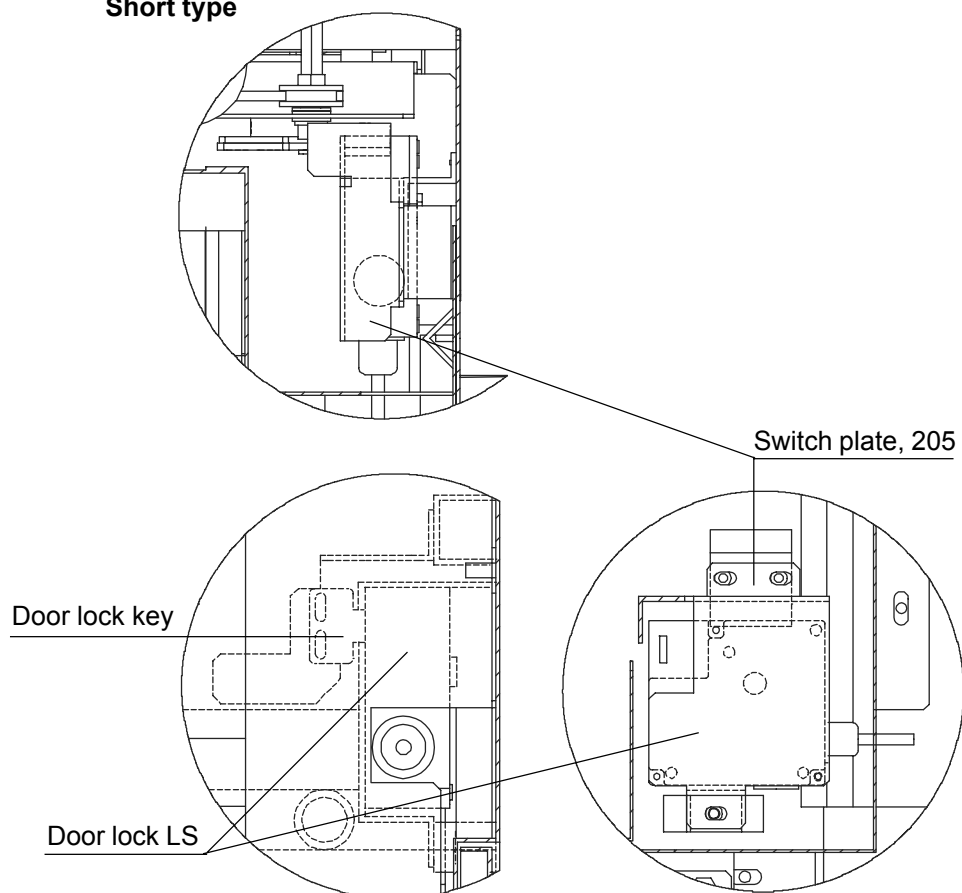
S2BMT2-010.ai

Standard (One door, Two doors) and long type



S2BMT2-008.ai

Short type



S2BMT2-011.ai

1. Remove the hexagon socket head set screw (M6 3PCS.) and nut 2PCS., remove the rail cover L.
2. Remove the hexagon socket head set screw (M6 1PCS.) and nut 3PCS., remove the rail cover R.
3. For standard, long type
Remove the hexagon socket head set screw (M6 1PCS.) then the door lock LS.

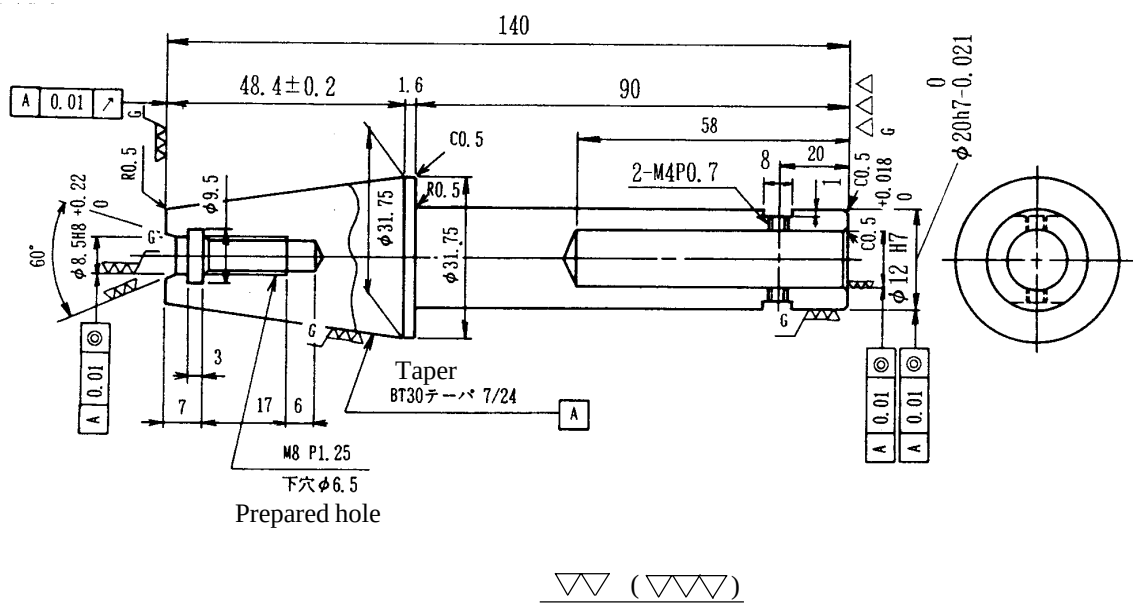
For short type
Remove the hexagon socket head set screw (M6 3PCS.), switch plate, the hexagon socket head set screw (M4 3PCS.) then the door lock LS.
4. Loosen the fix screw of door lock LS plate, then the cover.
5. Remove the code from the terminal.
6. Remove the code lock. Remove the code from it.
7. Remove the code lock from the new door lock LS, through the code it.
8. Attach the code lock to the door lock LS, connect the code to the terminal.
9. Attach the cover with fix screw to the door lock.
10. For standard, long type
Attach the door lock LS with hexagon socket head set screw (M4 3PCS.)
For short type
Attach the door lock LS to switch plate with hexagon socket head set screw (M4 3PCS.).
Attach the switch plate with hexagon socket head set screw (M6 3PCS.)
11. Attach the rail cover R with the hexagon socket head set screw (M6 1PCS.) and nut 3PCS.
12. Attach the rail cover L with the hexagon socket head set screw (M6 3PCS.) and nut 2PCS.
13. Adjust the door lock LS. (4.4.1 Door lock LS adjustment.)

2.5 The drawing of the jig (1/7)

For positioning of the magazine

Wick stock test bar

Fig.25



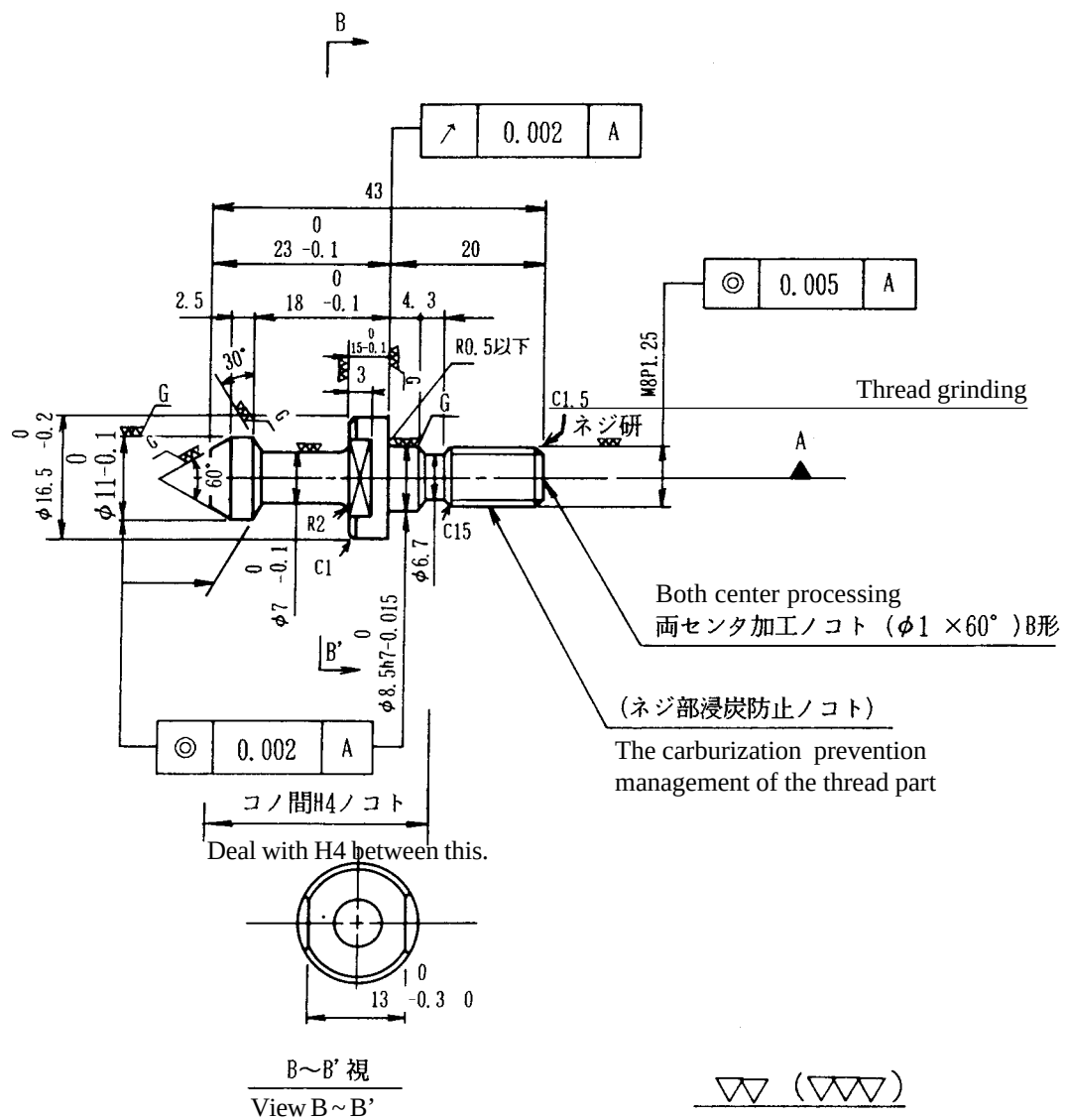
Material	S45C
Heat treatment	H2 (Induction hardening)
Hardness	HRC 50~

2.5 The drawing of the jig (2/7)

For positioning of the magazine

Pull bolt

Fig.29



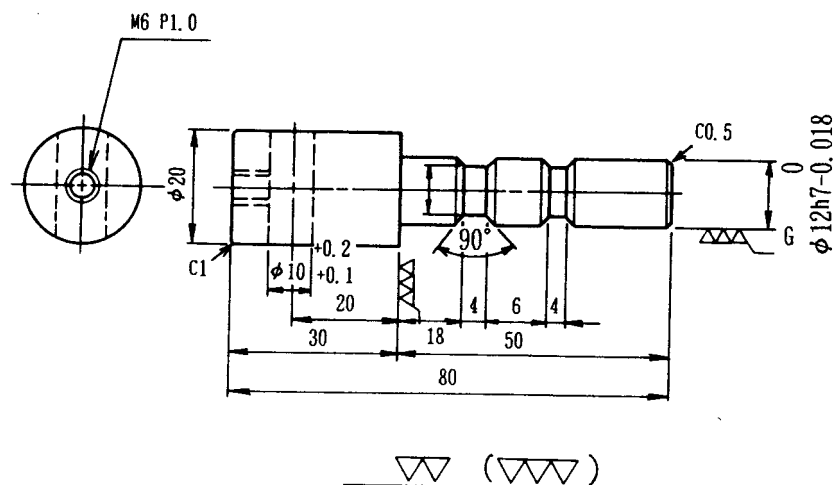
Material	SCM415
Heat treatment	H4 (carburization)
Hardness	HV 450~

2.5 The drawing of the jig (3/7)

For positioning of the magazine

Shaft

Fig.26



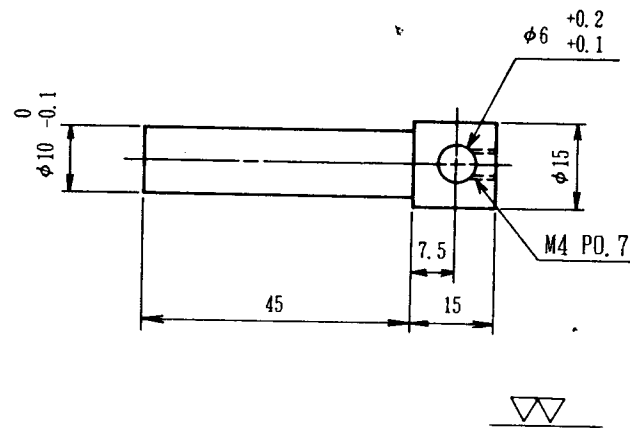
Material	S45C
Heat treatment	H2 (Induction hardening)
Hardness	HRC 50~

2.5 The drawing of the jig (4/7)

For positioning of the magazine

Dial gauge installation shaft

Fig.27



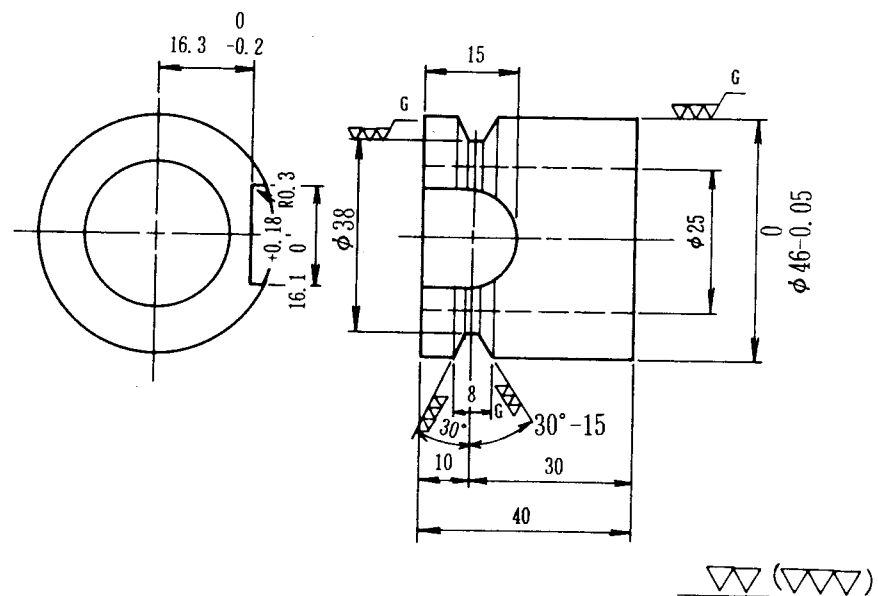
Material S45C

2.5 The drawing of the jig (5/7)

For positioning of the magazine

Dummy tool

Fig.28



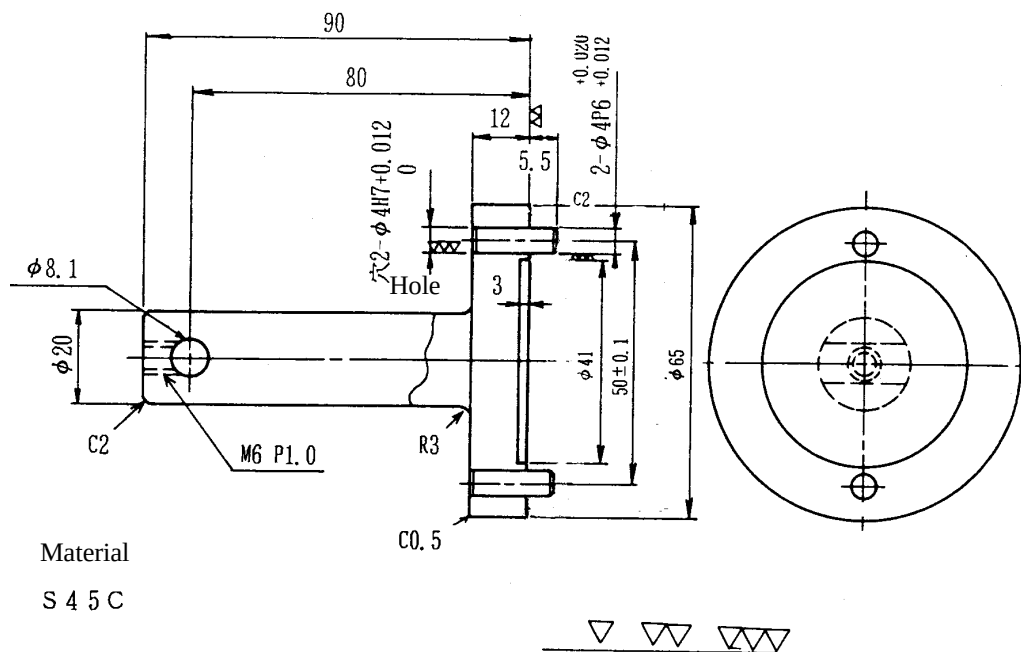
Material	S45C
Heat treatment	H2 (Induction hardening)
Hardness	HRC 50~

2.5 The drawing of the jig (6/7)

For nut loosening

Wrench for round nut

Fig.16

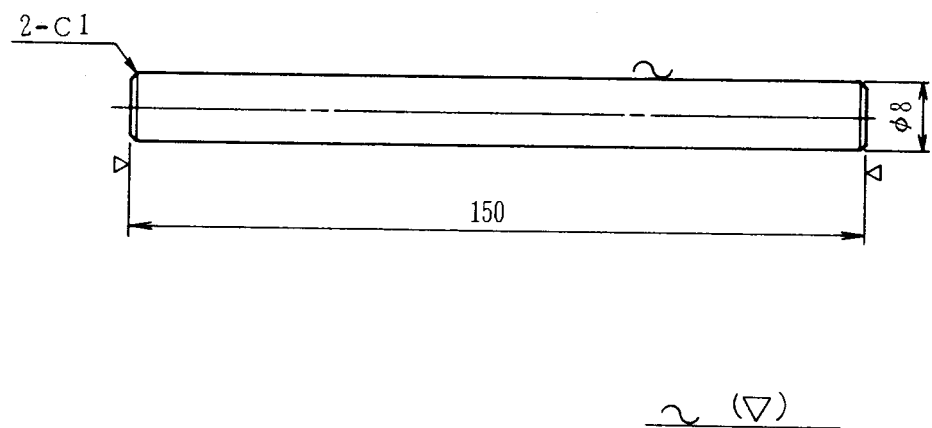


2.5 The drawing of the jig (7/7)

For nut loosening

Shaft $\varnothing 8 \times 150$

Fig.18



Material S10C-D

2.6 Consumable Parts Replacement (A copy from the installation manual chapter 9)

⚠ WARNING

When chips scatter and get into the eyes, you may damage your eyeballs and lose your eyesight.

Wear safety goggles against the chips.

Do not blow the chips by air.

⚠ WARNING

If you touch chips with bare hands, you may have your hand cut or burnt.

Do not touch chips with bare hands. Do not touch sharp edges of workpieces.

Wear a gloves and use a brush when cleaning cutting chips.

⚠ WARNING

Touching the heated sections of the motor and the like may cause you to be burned.

Do not touch such sections.

⚠ WARNING

Turn off the main power circuit breaker and then remove the maintenance covers on the right, left, and rear sides of the machine. After cleaning, be sure to attach the maintenance covers and bolt them.

Do not remove the maintenance covers except when performing cleaning and maintenance.

** WARNING**

When entering the machine, you may slip and fall down or be caught in the machine.

When entering the machine, be sure to cut the main power breaker, lock the breaker so that the breaker does not turn on, and remove any coolant and chips. Also, wear safety shoes and a helmet. Put up a signboard which says “Under maintenance” near the operation panel.

Door Roller Replacement

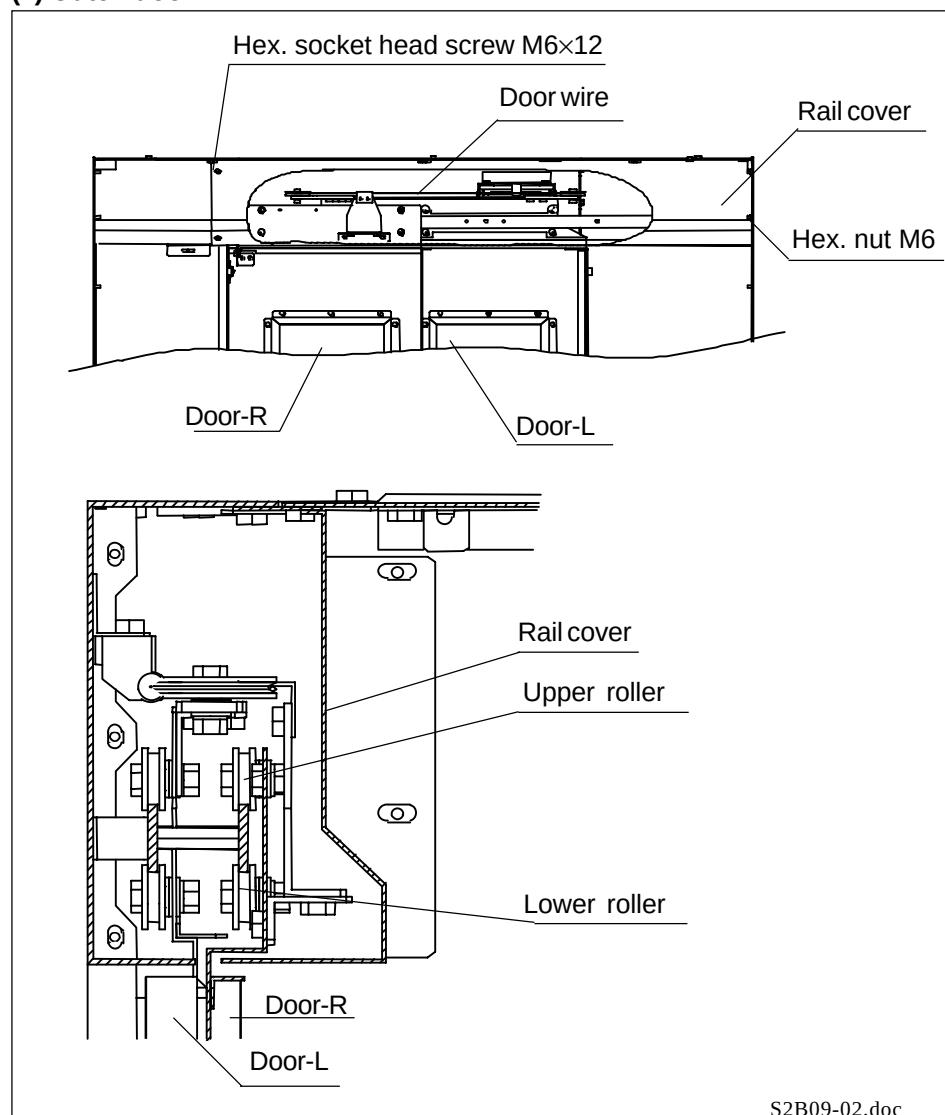
⚠ WARNING

You may be caught in the machine, resulting in serious injury.

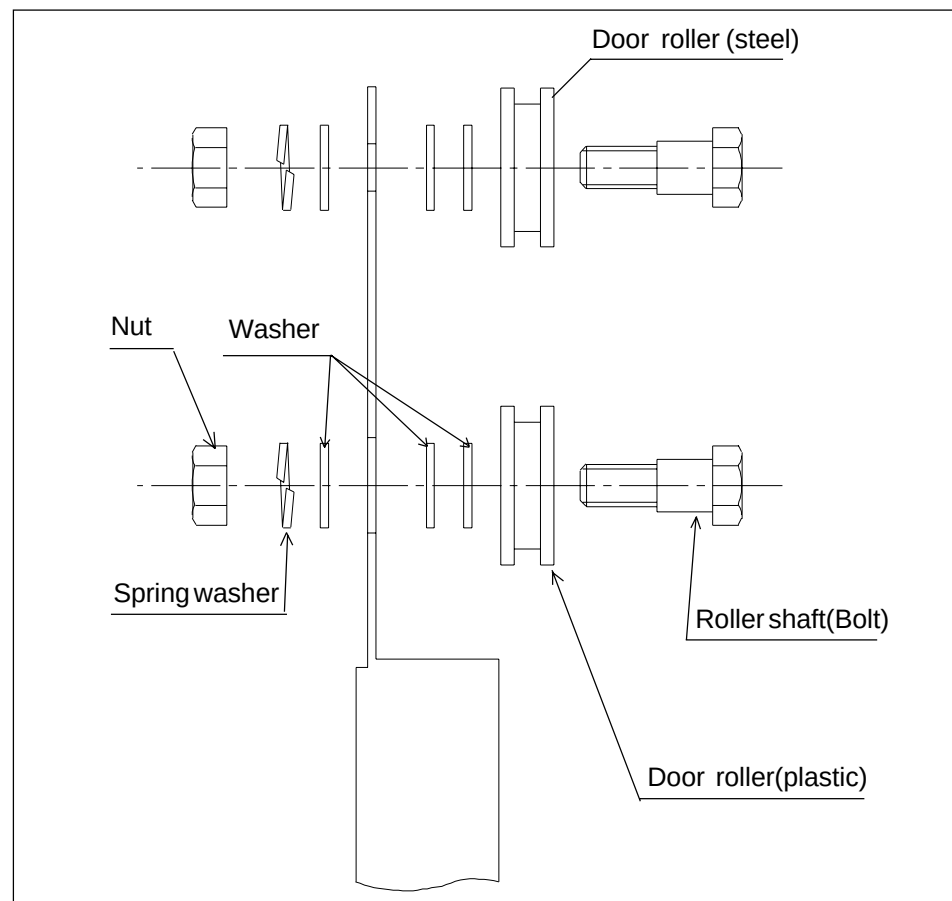
Turn off the main power breaker and padlock it before replacement. Set up a signboard with “Under Repair” on it.

After a long period of machine operation, the door rollers located on the upper section of the door may have become abraded, resulting in deteriorated machining performance. In this case, replace the door rollers, observing the steps below.

(1) Outer door



1. Turn the breaker off.
2. Remove the four socket head bolts (M6×12) and two nuts to remove the rail cover.
3. Remove the door wire referring to “9.5.1.2 Door Wire Replacement - 1) Door wire removal”.
4. Four door rollers are provided in two rows on the upper part of door-R. Loosen the roller shaft (bolt) and the nuts of two rollers of the lower row. The rollers are secured to the oblong hole, thus move the rollers to the lowest position in the hole.
5. Slightly lift door-R and remove two rollers of upper row from the rails.
6. Follow steps 4 and 5 to remove door-L from the machine. When loosening the roller shaft (bolt) and the nut of the lower row, position a wrench from the side to hold the roller shaft (bolt).
7. When doors-R and -L are removed from the machine, remove eight rollers from the roller shaft (bolt) and replace them. The rollers of the lower row need adjustment, thus tighten them temporarily.



09C11.ai

8. Mount doors-R and -L to the machine in the reverse order of the above procedure.
The lower rollers of doors-R and -L are to be secured in the oblong hole, thus lightly push the lower rollers against the rails and secure them with bolts.
Attach the door wire referring to “9.5.1.2 Door wire attachment”.
9. After mounting doors, check that the doors move smoothly.

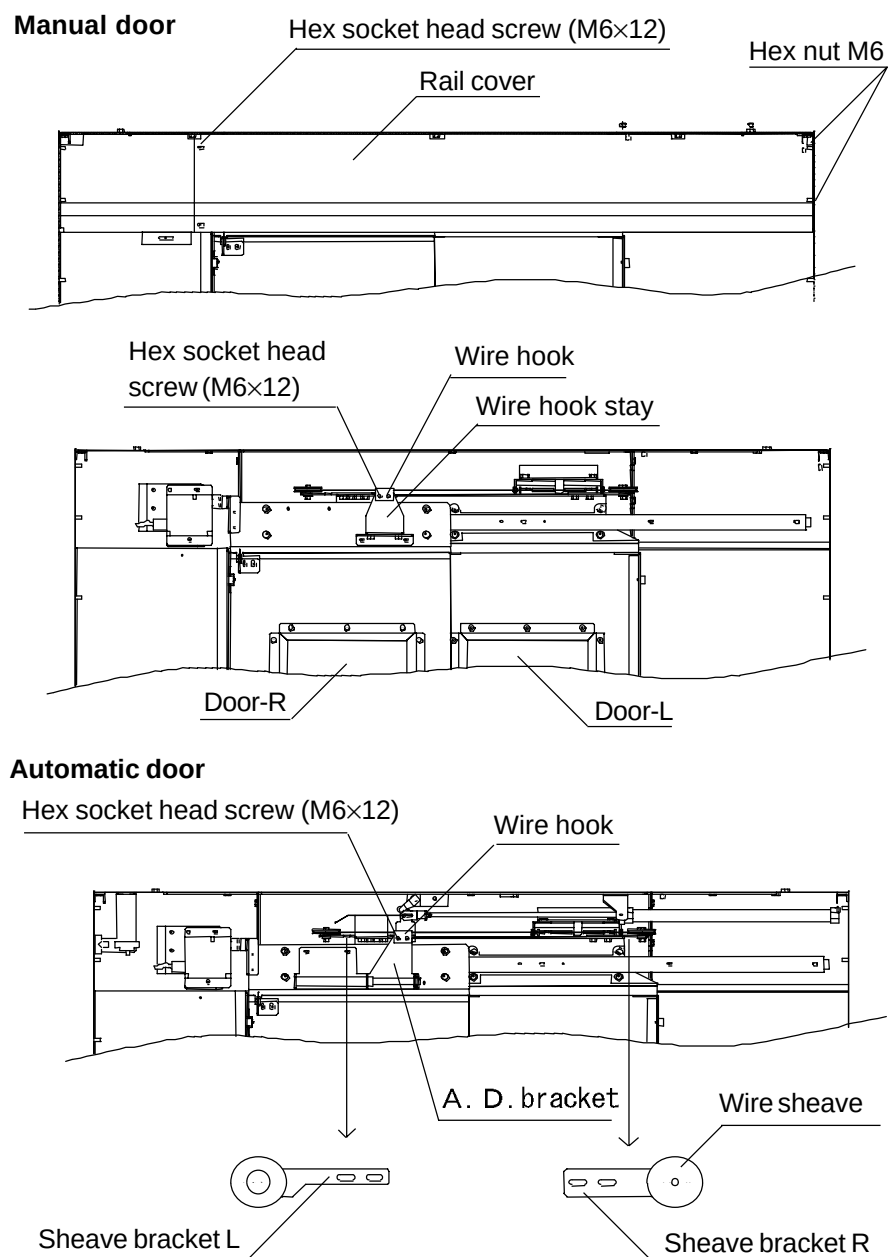
Door wire replacement

⚠ WARNING

You may be caught in the machine, resulting in serious injury.

Turn off the main power breaker and padlock it before replacement.

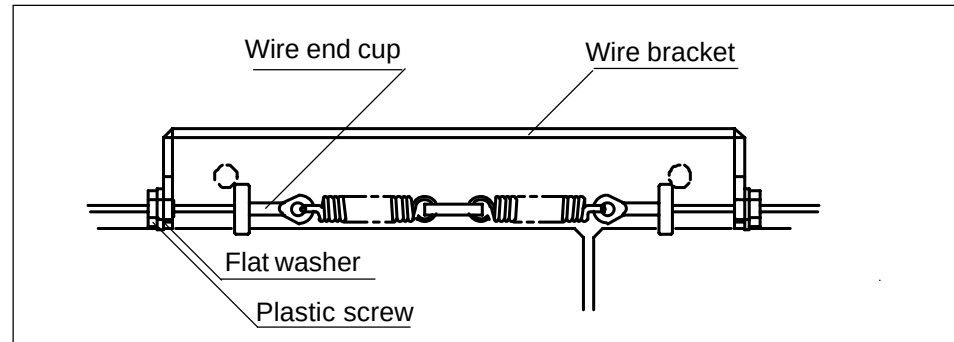
Set up a signboard with “Under Repair” on it.



1) Door wire removal

1. Remove the hex socket head screws (M6×12, 4pcs.) and two nut, then remove the rail cover.

2. Remove the hex socket head screws (M6×12, 2 pcs.) securing the wire bracket (A.D.bracket) and wire hook and separate the wire from door-R.
3. Loosen the hex socket head screws (M6×12, 4 pcs.) securing sheave bracket and move both brackets inward.



R2A00050.doc

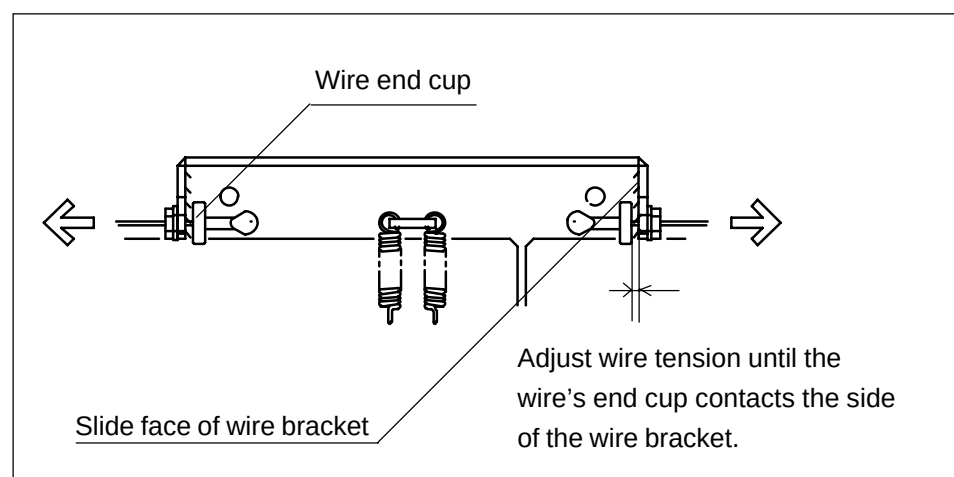
4. Remove the hook on the wire side of the spring from the wire end cup.
5. Remove the wire from the wire sheave.
6. Remove the plastic screw and then remove the wire from the bracket.

2) Door wire attachment

1. Attach the door wire in the reverse order of removal, paying attention to the following.

(Note 1)

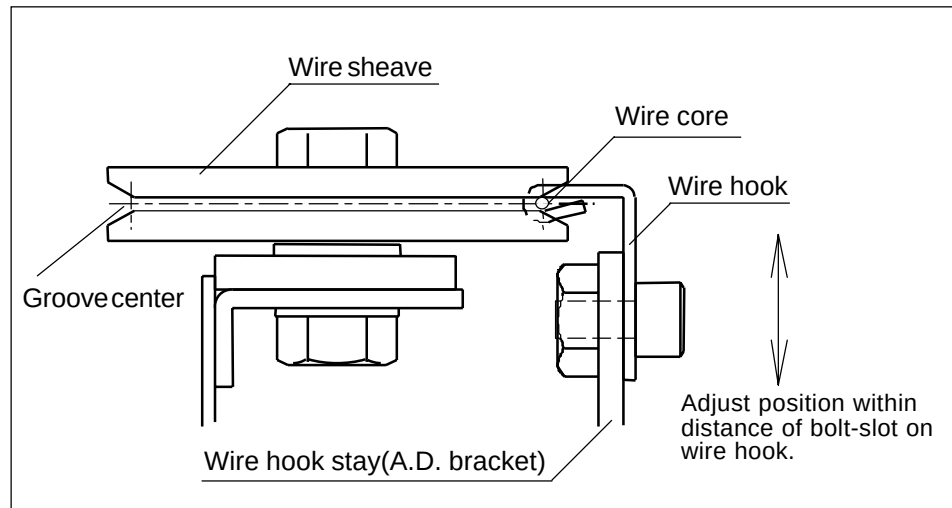
After attaching the spring, check that the distance between the wire's end cup and the end face of the wire bracket is 5 mm or less. If the distance is greater than 5 mm, see note 1 and adjust the wire tension using the bolt-slot on the wire hook.



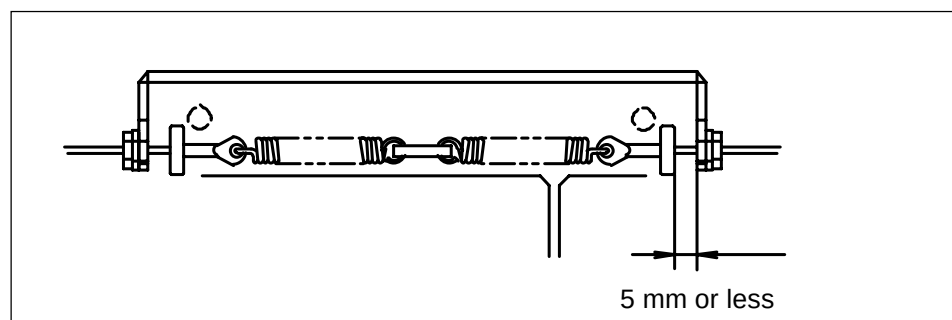
R2A00063.doc

(Note 2)

When attaching the wire hook to the wire hook stay, adjust the position of the wire hook within the distance of the bolt-slot on the wire hook so that the wire core is aligned with the wire sheave groove.

**(NOTE3)**

After attaching the spring, check that the distance between the wire's end cup and the end face of the wire bracket is 5 mm or less. If the distance is greater than 5 mm, see note 1 and adjust the wire tension using the bolt-slot on the wire hook.



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2. After attachment, check that the door moves smoothly.

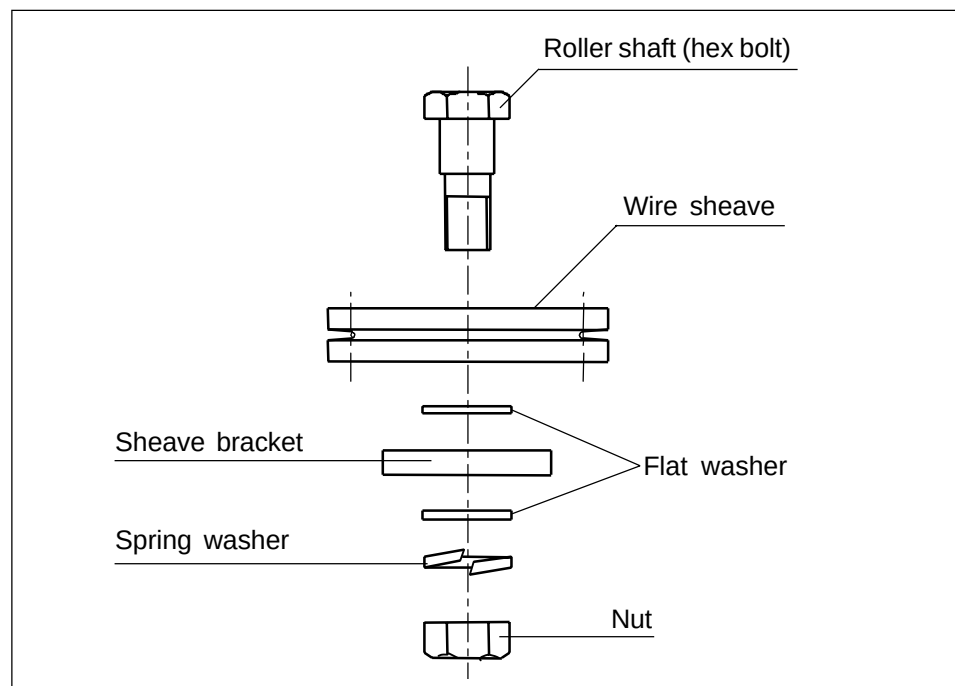
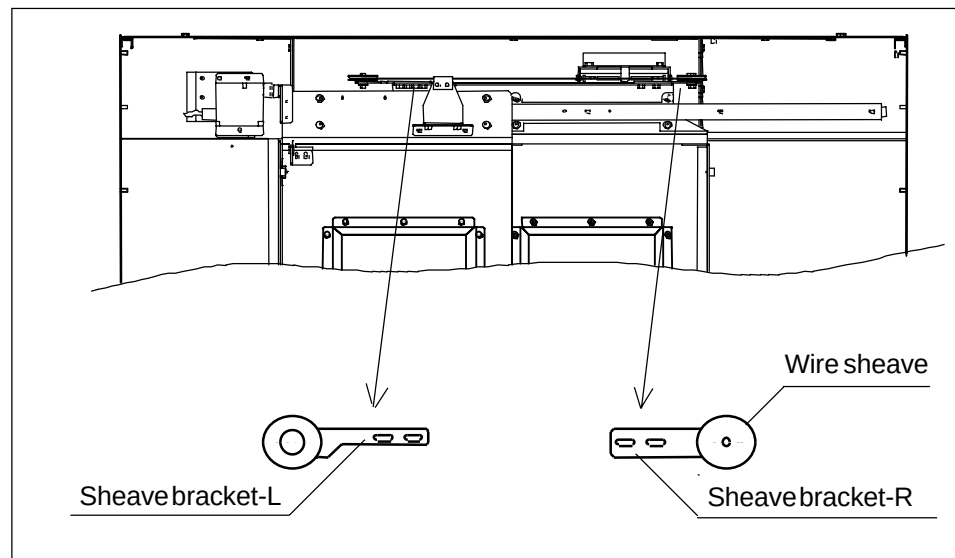
Wire sheave replacement

⚠ WARNING

You may be caught in the machine, resulting in serious injury.

Turn off the main power breaker and padlock it before replacement.

Set up a signboard with "Under Repair" on it.

1) Wire sheave removal

1. Remove the door wire referring to “9.5.1.2 Door Wire Replacement - 1) Door wire removal”.
2. Remove the hex socket head screws (M6 × 12, 4 pcs.), and then remove sheave bracket-R and sheave bracket-L.
3. Remove the sheave for each sheave bracket from the roller shaft, and replace the sheave.

2) Wire sheave attachment

1. Attach the wire sheave in the reverse order of removal.
Refer to “9.5.1.2 Door Wire Replacement - 2) Door wire attachment” for wire attachment”.
2. After attachment, check that the door moves smoothly.

Telescopic Cover Cusion Replacement

(Caution)

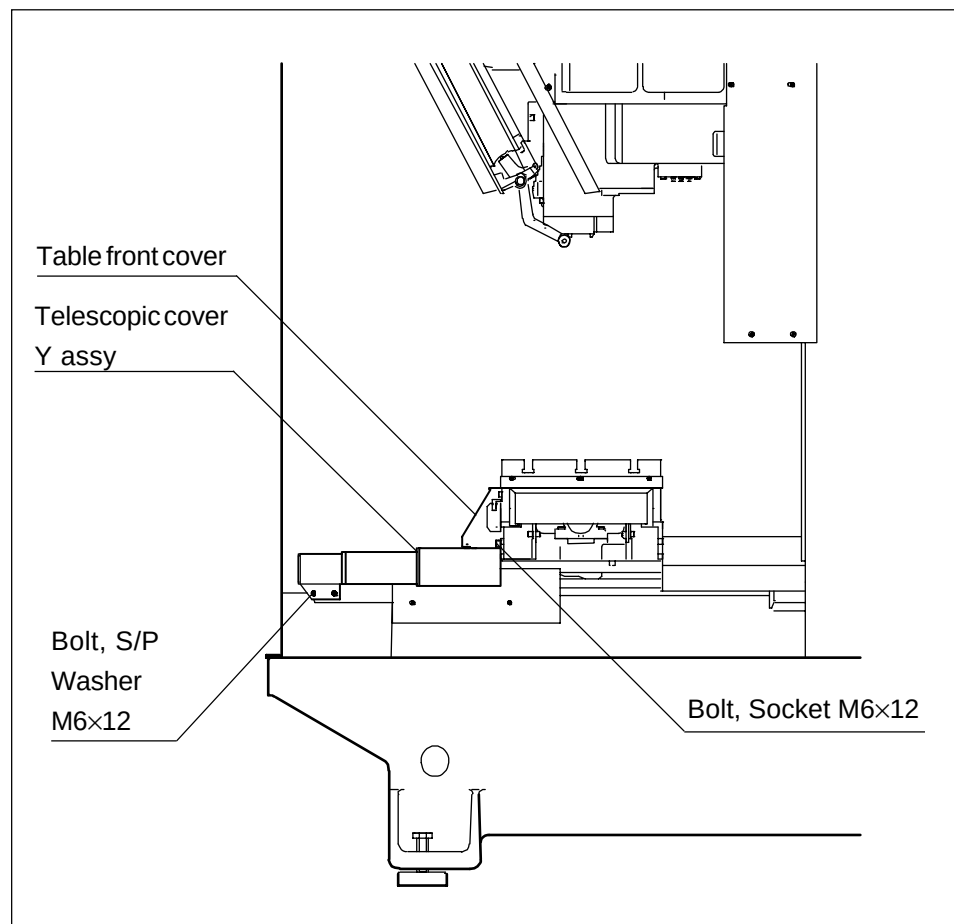
When working within the machine area, be sure to turn off the main power breaker.

When replacing the telescopic cover wiper, we recommend that you clean the table front cover (refer to Cleaning of table front cover) and telescopic cover (refer to Cleaning of driving parts).

1. Telescopic Cover Removal

1-1 Y axis telescopic cover removal

Move the XY table to the stroke end in the positive Y direction in JOG mode.

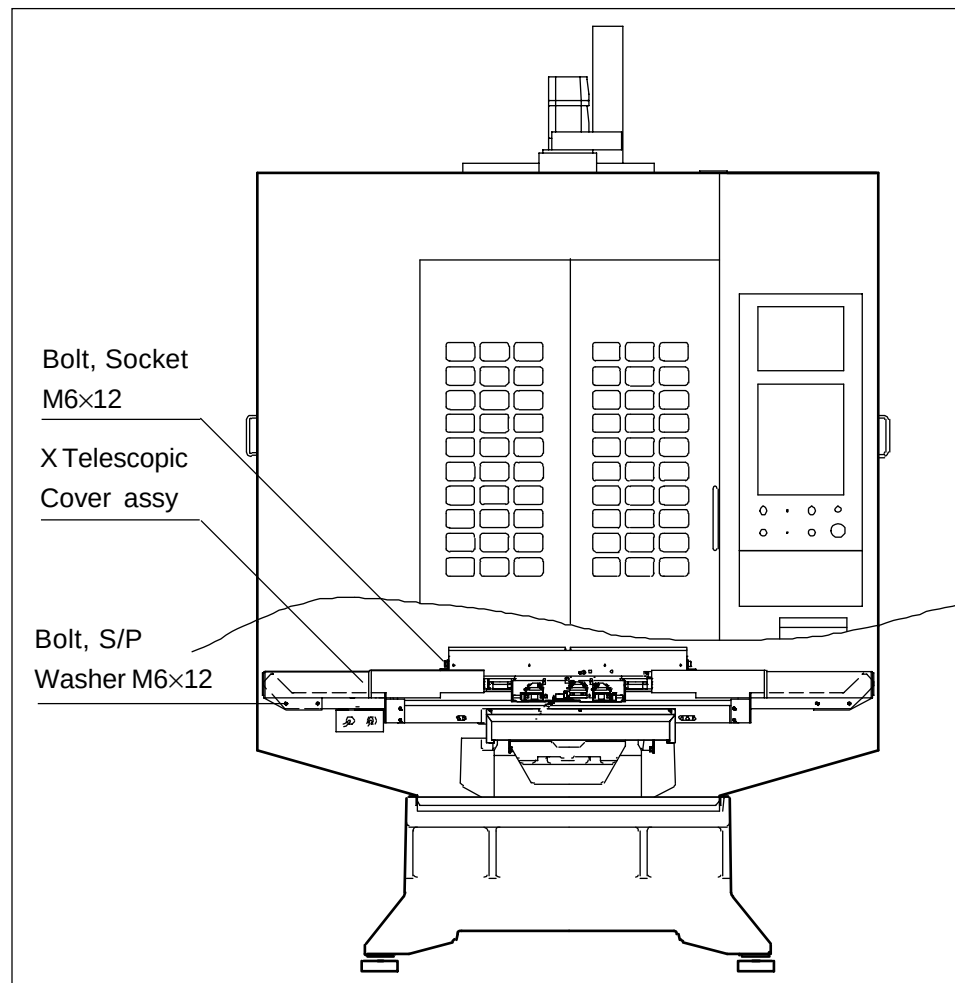


2.7-01.ai

- Turn the power off.
- Remove the table front cover.
- Clean the inside of the table front cover. (Refer to “9.4.1 Cleaning of table front cover”.)
- Remove the 'Bolt, Socket M6x12' securing the XY table side of the telescopic cover.
- Remove the 'Bolt, S/P Washer M6x12' securing the telescopic cover side.
- Lift the telescopic cover to remove.

1-2 X axis telescopic cover removal

1. Move the XY table to the stroke end in the X axis direction (It is the direction which the remove telescopic cover is extended to.).



2.7-02.ai

Turn the power off.

Remove the 'Bolt, Socket M6'12' securing the XY table side of the telescopic cover.

Remove the Bolt ,S/P WASHER M6'12 that set the telsecopic cover side.

Lift up the telescopic cover to remove.

2. Telescopic Cover Cleaning

Clean the removed telescopic cover using a cloth.

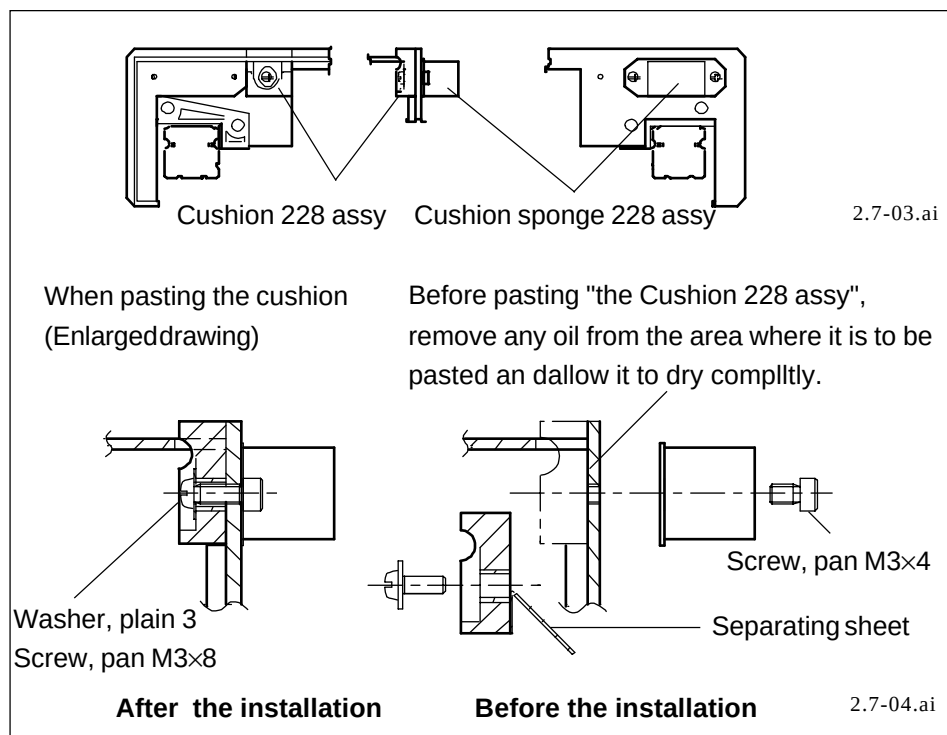
3. Old Cusion Removal

Remove the fixing screws securing the cusion to be replaced.

The CUSION 228 ASSY is secured with double sided tape. Completely remove this tape.

4. Oil Removal from cusion Area.

The CUSION 228 ASSY is secured with double sided tape. Remove any oil from the area where tape is to be stuck to the telescopic cover, using a washing agent.



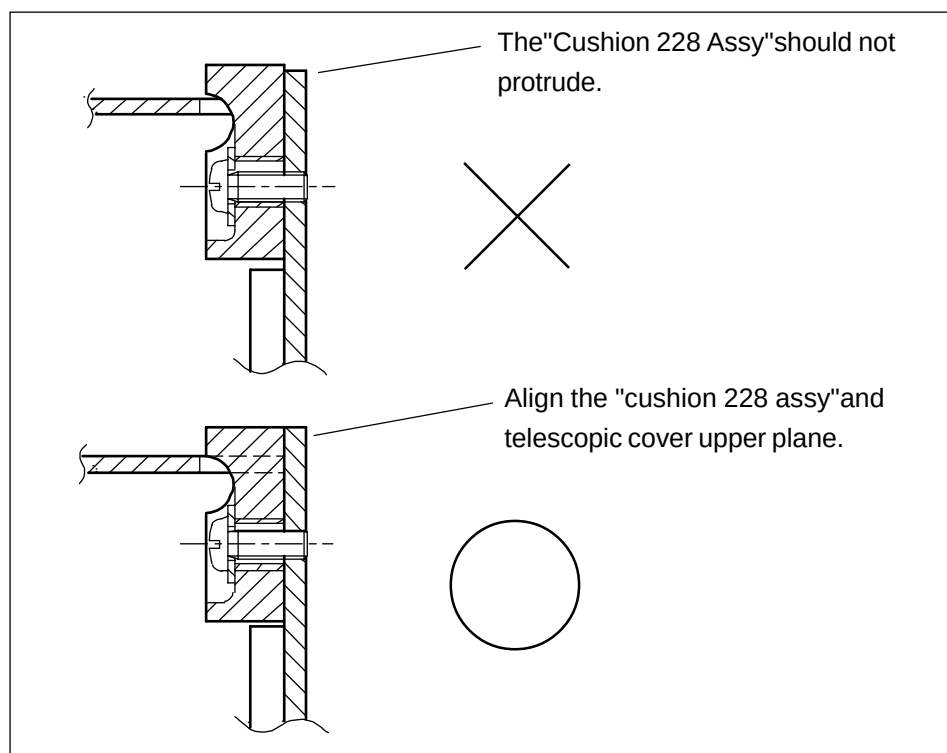
5. Cushion Installation

Install a new cushion.

After the area of the telescopic cover where the oil has been removed is completely dry, paste the "CUSHION 228 ASSY" on, and then secure it with the screws.

Once the "CUSHION 228 ASSY" has been pasted, the position cannot be changed.

Place it carefully and refer to the Fig.4-11.



2.7-05.ai

6. Telescopic Cover Installation

6-1 Y axis

Set the stay telescopic cover on the telescopic cover side with the a bolt,socket.

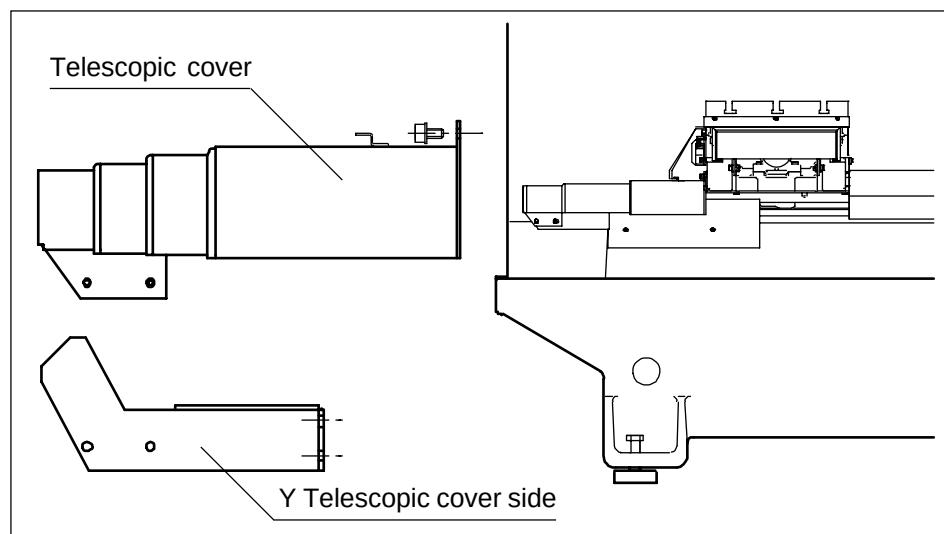
Turn the power on and move the XY table toward the operator in JOG mode so that the telescopic is contracted.

Turn the power off.

Bolt the XY table side.

('Bolt, S/D Washer M6×12' Tightening torque 11.6 Nm)

Check that the telescopic cover move.



2.7-06.ai

6-2 Xaxis

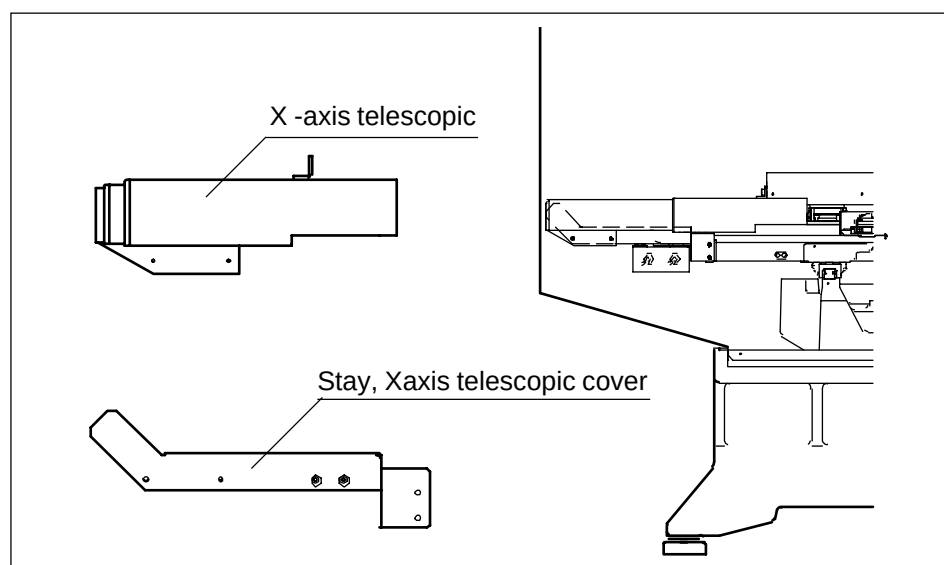
Set the stay telescopic cover on the telescopic cover side with the bolt sokets.

Turn the power on and move the XY table toward the telescopic cover side in JOG mode so that the telescopic cover is contracted.

Turn the power off.

Bolt the XY table side. ('Bolt, Socket M6×12' Tightening torque 11.6 Nm)

Check that the telescopic cover moves smoothly.



2.7-07.ai

7. After Replacement

When the telescopic cover installation is completed, check that no tools remain inside the machine area.

Stand in a safe place, turn the power on and perform zero position return.

Move the XY table vertically and horizontally in JOG mode to check the condition of the telescopic cover.

When any abnormal sound is heard, or the machine motion is not appropriate, check the cushion installation again.

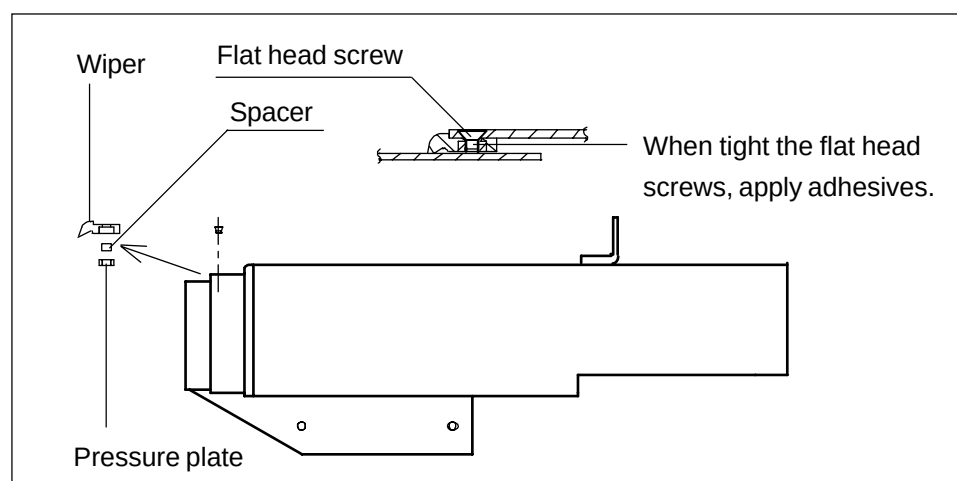
Telescopic cover wiper replacement

(Caution)

When working within the machine area, be sure to turn off the main power breaker.

If the telescopic cover wiper has fallen or be torn, replace it with a new one immediately.

1. Loosen the flat head screws, M3×4securing the wiper to be removed.
2. Numbers of the screws are different between the upper surface and the side surface.
Pull and remove the wiper.
3. Remove the pressure plate from the wiper.
4. Assemble a new pressure plate, spacer and a wiper and insert them into the telescopic cover, indexing screw positions.
5. Tighten the flat head screws M3×4 , applying adhesives to the screws.
Apply adhesives to the M3 flat head screw when tightening.
6. Lubricate Alvania Grease No.2 to the sliding surface of the wiper for fitting them.



2.7-08.ai

Replacement of Machine Light Fluorescent Bulb

⚠ WARNING

When entering the machine, you may slip and fall down or be caught in the machine.

When entering the machine, be sure to cut the main power breaker , padlock the breaker so that the breaker is not turn on, and remove any coolant and chips. Also, wear safety shoes and a helmet. Put up a signboard which says “Under maintenance” near the machine.

⚠ WARNING

Using excessive force may damage fluorescent tube or cover (transparent glass) and you may cut your hand.

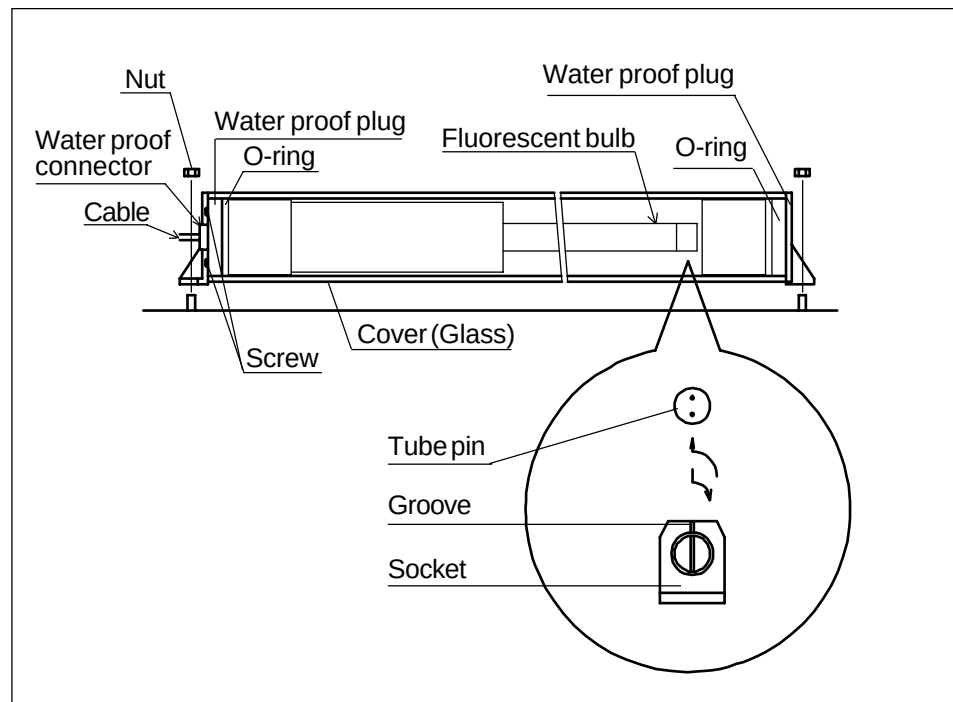
Prevent fluorescent tube or cover (transparent glass) from being hit or subjected to excessive force.

Wear gloves when replacing a broken fluorescent tube or cover.

1. Cut the cable tie securing the cable. Remove four nuts and remove the machine light from the splash guard.
2. Loosen three screws on the cable inlet side. Do not remove all screws. (Only loosen the O-ring.)
3. Loosen the waterproof connector provided at the cable inlet side.
4. Remove the waterproof plug from the cover.
5. Turn the fluorescent tube until the fluorescent tube pins are aligned with the groove, and remove the fluorescent tube.
6. Replace the fluorescent tube. Align the fluorescent tube pins with the groove and turn the light one quarter of a turn.
7. Assemble the machine light in the reverse order. Generally sold fluorescent tubes can be used as long as these are starter type straight fluorescent tubes conforming to JISC7601 or IEC81.

(Note)

Firmly connect the waterproof connector.



09C24-1.ai

Replacement of Indication lamp bulb

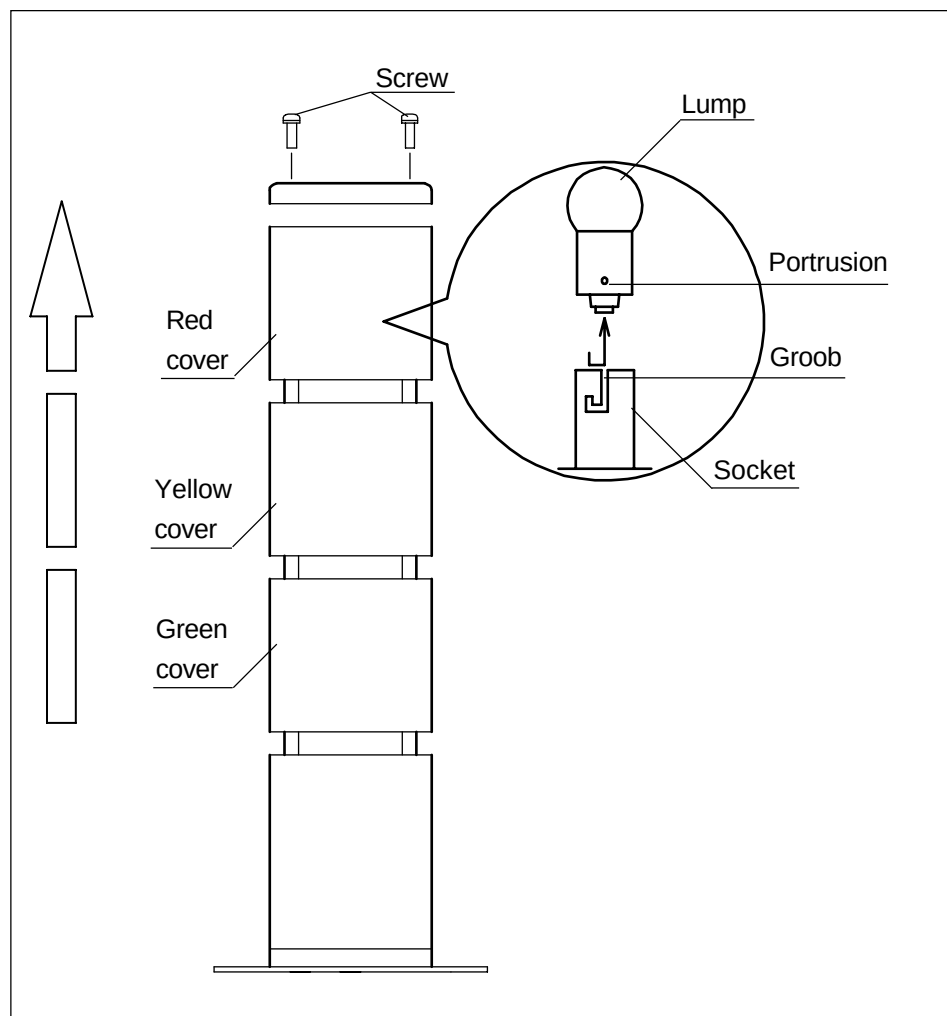
⚠ WARNING

You may get caught in the machine, be injured, or get an electric shock.

Turn off the main circuit breaker and padlock the machine before replacement.

Post 'Replacement' sign during replacement work.

- (1) Remove the screw (2 pce.) and remove the indication lamp cover orderly.
- (2) Hold the glass portion of the bulb to be replaced and lightly push the bulb down. Rotate the bulb 1/8 turn counterclockwise and remove the bulb from the socket.
- (3) Replace with a new lamp. Insert the protrusion of the lamp surface to the socket groove and rotate the lamp 1/8 turn clockwise.
- (4) Mount the covers orderly and tighten the screw (2 pce.)



09C025-1.ai

Battery fault alarm

⚠ WARNING

High voltage parts are present in the control box.

Touching such parts by mistake may result in serious injury or death.

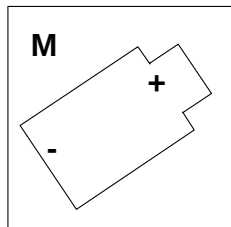
Only operators qualified for electrical work and familiar with the electrical circuits of this machine are allowed to maintain and inspect electrical components.

When entering the machine, be sure to cut the main power breaker, lock the breaker so that the breaker is not turn on.

**Put up a signboard which says “Under maintenance” .
When leaving the machine, close the box door and bolt it.**

In tapping center, the data in the memory is retained by batteries.

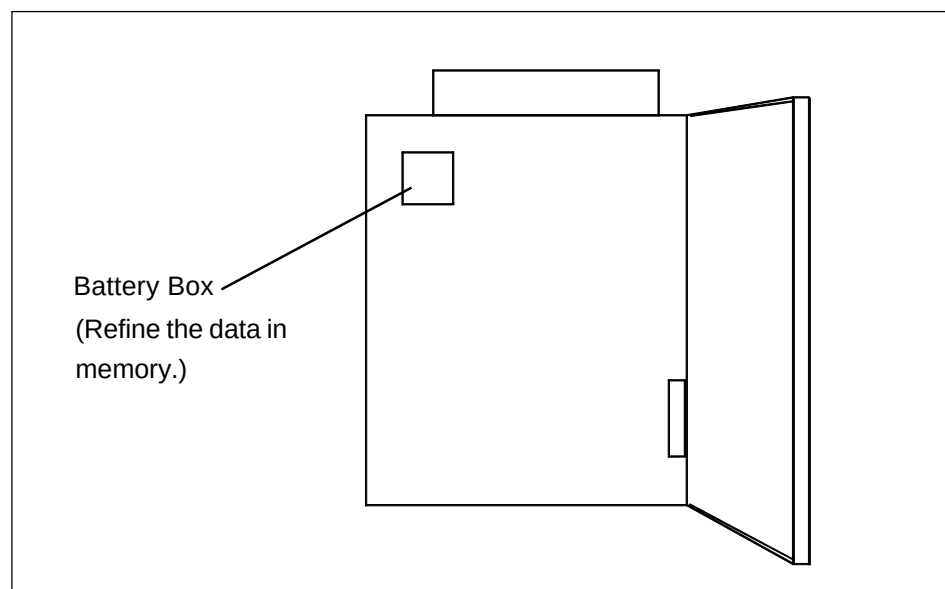
If the batteries are dead, the battery alarm mark as shown below appears on the right bottom of the screen. If this mark appears, replace the batteries. (alkaline batteries, AA1.5V×3)



(Note)

When replacing the batteries, be sure to set the batteries in the orientation indicated on the lid of the battery box, after turning off the main power breaker.

The batteries are set in the location indicated by the arrow.



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Fan filter replacement

The long hours operations without a fan filter causes defectives in the cooling sections (ex. cooling fan stops) because the coolant mist is directly getting onto the cooling section inside the machine.

Make sure to attach the fan filter before the operation.

However, a clogged filter lowers the cooling effects, affecting the service lives of electrical parts in the control box.

To maintain the machine performance at the optimum level, check the slit air output once a month.

If the amount of air decreased, clean the filter.

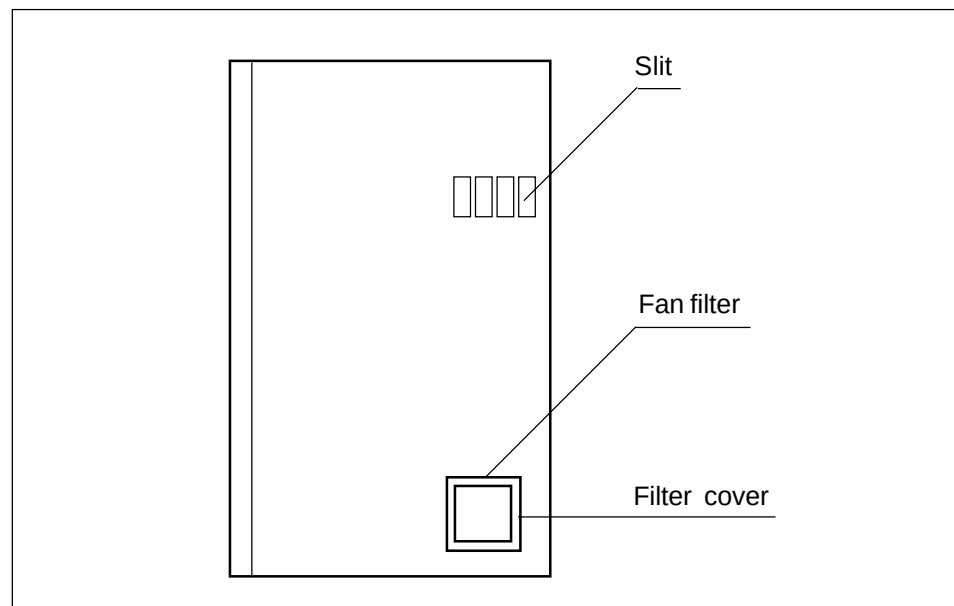
Replace the filter with a new one when the dirt stays even after cleaning it or when the filter is torn.

(Note)

The filter cover is a fitting-type. (Tools are not necessary.)

Do not remove the fan guard inside the fan filter.

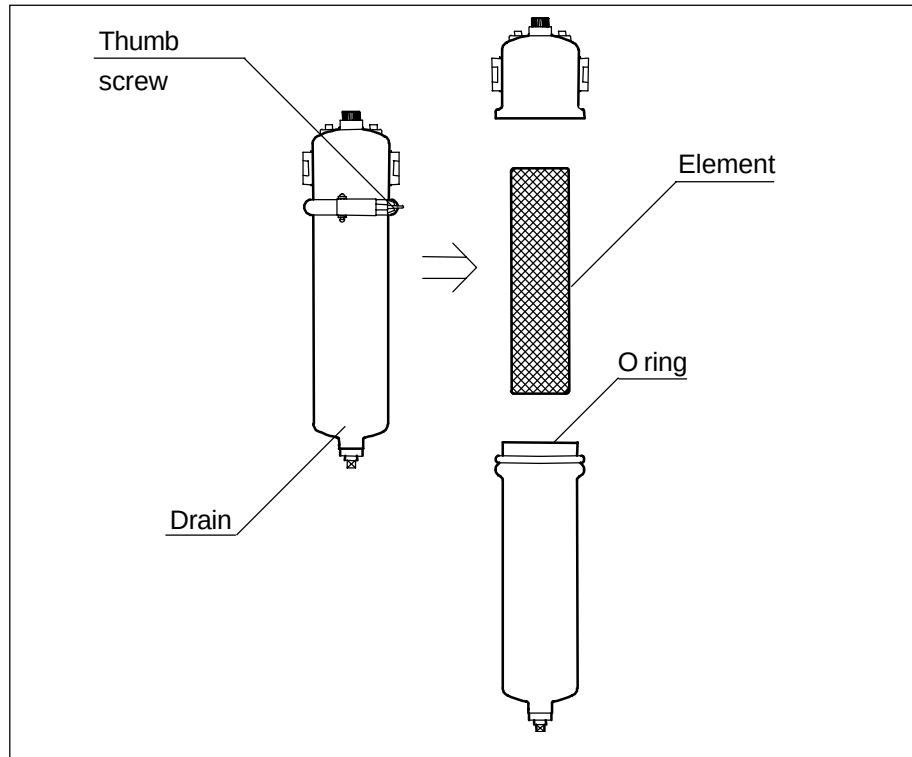
Control box right side



1. Remove the filter cover and then the fan filter.
2. Attach a new fan filter and the filter cover.

Replacement procedure for tool cleaning system filter element

1. Turn off the machine power supply.
2. Loosen the drain bolt of the line filter and drain the coolant.
3. Loosen the thumbscrew and remove the lower section of the filter.
4. Replace the element.
5. Assemble in the reverse order.



1110C05-1.doc

Replacement Parts List of Consumption

The list below contains consumable parts whose unique characteristics deteriorate depending on operating conditions and those greatly affected by misuse.

Please make an order to the dealer where you purchased the machine.

When making an order, please specify the part code and name.

Supply close terms of supply parts are 10 years after a productional close.

For parts replacement, please refer to the installation manual 9-5 Mainten anceguide Parts Replacement.

Replacement Parts List of Consumption

The list below contains consumable parts whose unique characteristics deteriorate depending on operating conditions and those greatly affected by misuse.

Please make an order to the dealer where you purchased the machine.

When making an order, please specify the part code and name.

Supply close terms of supply parts are 10 years after a productional close.

For parts replacement, please refer to the installation manual 9-5 Maintenance guide

Parts Replacement.

名称	Name	Parts code	Qty.	Remarks
ローラ 251	ROLLER 251	618539001	4	
ローラ 32Aクミ	ROLLER ASSY, 32A	655735001	4	
ワイヤフッククミ251	WAIYAHUTUKUKUMI251	618407001	1	Standard type
ワイヤフッククミ251L	WAIYAHUTUKUKUMI251L	618889001	1	Long stroke type
ワイヤフッククミ251-S	WIRE HOOK ASSY 251-S	6A5035001	1	Short stroke type
ワイヤシーブD50クミ	WIRE SHEAVE D50 ASSY	653719001	4	
ワイパー-X-259N	WIPER X-259 N	654651001	2	Standard type
ワイパー-Y-3R-22A	WIPER Y-3R-22A	652838001	2	
ワイパー-Y-3L-22A	WIPER Y-3L-22A	652841001	2	
ワイパー-X-269N	WIPER X-269 N	654652001	2	
ワイパー-Y-2R-22A	WIPER Y-2R-22A	652837001	2	
ワイパー-Y-2L-22A	WIPER Y-2L-22A	652840001	2	
ワイパー-X-259N	WIPER X-259 N	654651001	2	Long stroke type
ワイパー-Y-3R-22A	WIPER Y-3R-22A	652838001	2	Short stroke type
ワイパー-Y-3L-22A	WIPER Y-3L-22A	652841001	2	
ワイパー-X-269N	WIPER X-269 N	654652001	2	
ワイパー-Y-2R-22A	WIPER Y-2R-22A	652837001	2	
ワイパー-Y-2L-22A	WIPER Y-2L-22A	652840001	2	
ワイパー-X-225N	WIPER X-225 N	654650001	2	
ワイパー-Y-1R-22A	WIPER Y-1R-22A	652836001	2	
ワイパー-Y-1L-22A	WIPER Y-1L-22A	652839001	2	
ワイパー-Y-576	WIPER, Y-576	618190001	1	
ワイパー-Y-54RN	WIPER, Y-54R N	654656001	1	
ワイパー-Y-54LN	WIPER, Y-54L N	654657001	1	
ワイパー-Y586	WIPER, Y-586	618194001	1	
ワイパー-Y-61R N	WIPER, Y-61R N	653531001	1	
ワイパー-Y-61L N	WIPER, Y-61L N	653532001	1	
ワイパー-Y596	WIPER, Y-596	618198001	1	
ワイパー-Y-68R N	WIPER, Y-68R N	653523001	1	
ワイパー-Y-68L N	WIPER, Y-68L N	653534001	1	
蛍光灯 15W	FLUORESCENT LIGHT 15W		1~2	
電球 回転灯タイプ(KJS型)24V10W		653966001	1~2	
点滅灯タイプ(KUS型)30V60W	SPARE LAMP ASSY EP	638473001		
アルカリ電池 単3 1.5V	ALKALI CELL AA BATTERY 1.5V		3	
コウカンヨウフィルター	SPARE FILTER	654078001	1	
フィルタエレメント	FILTER ELEMENT EHM15R10AX	652860001	1	Tool cleaning system
フィルタPWUL03A	FILTER PWUL03A	618491001	1	Line filter
ギャクセンBP08100	BACK WASH BP08100	618497001	1	Back wash

09-01 list.xls

2.7 CTS Filter Replacement

2.7.1 CTS Filter Replacement Procedure

(A copy from the installation manual chapter 11)

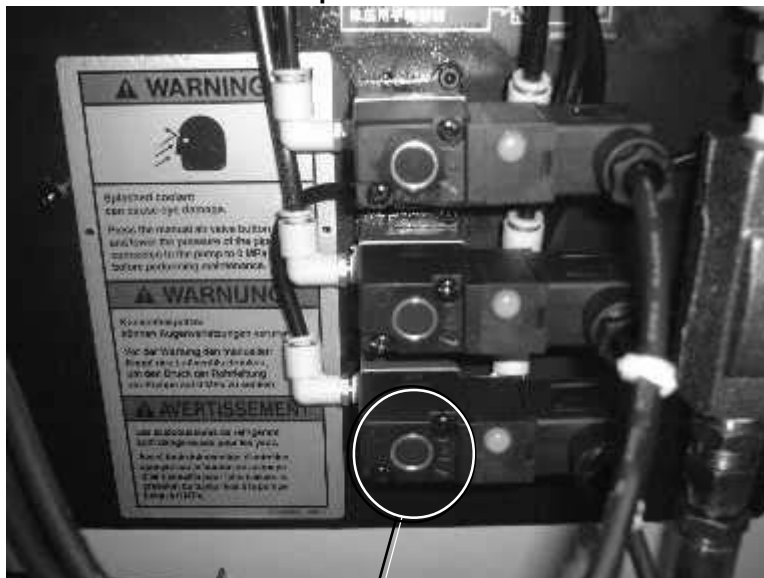
⚠ WARNING

Scattered coolant may hurt your eyes.
Be sure to remove residual pressure before filter cleaning or replacement, or other maintenance.

How to remove residual pressure

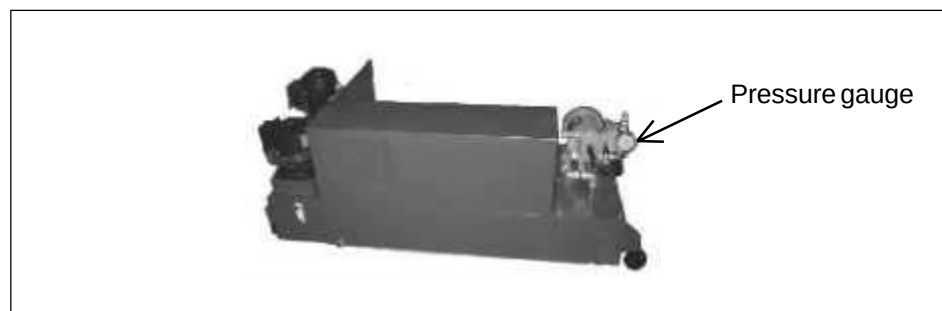
1. Be sure to remove residual pressure before filter cleaning or replacement.

How to remove residual pressure



MANfilter-5.jpg

1. Press the black buttons for the lowest valve two to three times.



MANCTStank 1.3-1-1.jpg

2. Check that the pressure gage reads 0 MPa.

b) Line filter

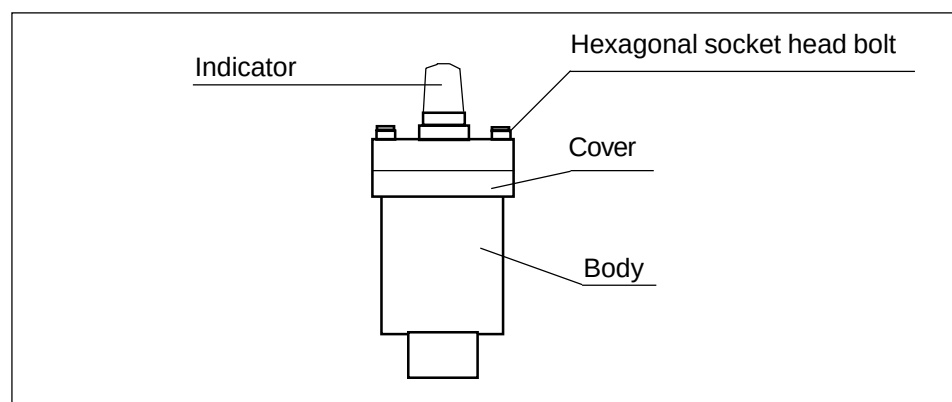
The line filter detects the differential pressure between the in and out ports of the filter. When the filter is clogged, the "LINE FILTER ERROR " alarm message is displayed . Clean the filter before it clogged as the machine sops operation.

As the line filter becomes clogged, the line filter indicator gradually becomes red.

But, a line filter is not clogged by the usual use because there is a back wash filter. Check a wrong point such as piping when this error ocures.

**Replacement steps of line filter element**

It is recommended to replace the filter when it is clogged.



1. Lower the pressure until the pressure gage reads 0 MPa before replacement.
2. Loosen the indicator screws (2 pcs.).



3. Lift the top section of the indicator straight up to remove it.



- 4 Slowly loosen the hexagon socket head bolts (4 pcs.) evenly.
It is hazardous if there is any residual pressure inside the filter, because the coolant may spray and enter your eyes. Make a slight opening between the lid and the filter unit to check that there is no residual pressure, and then open the lid.



filter-03.jpg

5. Lift the lid straight up to remove it.



filter-04.jpg

6. Pull the element downward. Coolant inside the filter may spray out when the element is pulled out. Be extremely careful.



filter-05.jpg

7. Push a new element completely into the filter as shown in the photo below (filter-04.jpg).



filter-04.jpg

8. Check that there are no chips adhered to the inside of the lid or the top surface of the filter unit, and that the O-ring is attached firmly. Then insert the lid, making sure that it is straight.
9. Tighten the hexagon socket head bolts evenly.
Be sure to use the specified torque (50 N·m).



filter-03.jpg

10. Check that the direction of the arrow indicating the coolant flow on the filter lid is as shown in the photo below. (From right to left)

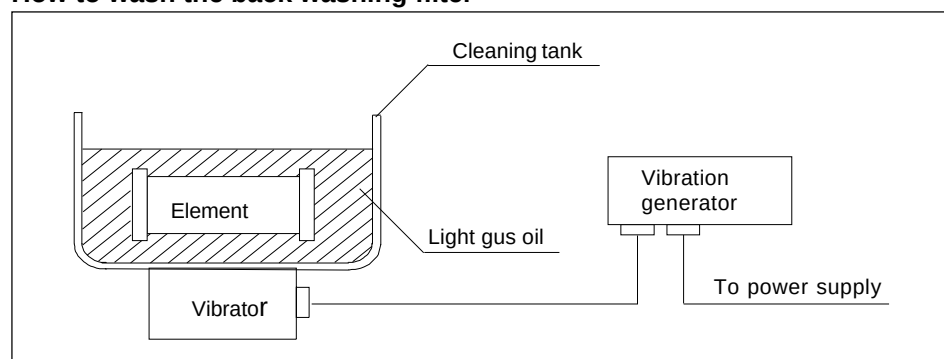


filter-06.jpg

11. Dispense CTS coolant for several seconds, and check that the coolant does not leak from the filter lid.

c) Cleaning of back wash filter

Generally, the filter will not clog to the extent that an error occurs as long as back washing is performed regularly.

How to wash the back washing filter

11-2-2.ai

See “Line Filter Replacement Procedure” for filter replacement.

2.7.2 Consumable parts

The following parts are consumable parts. Replace them regularly.

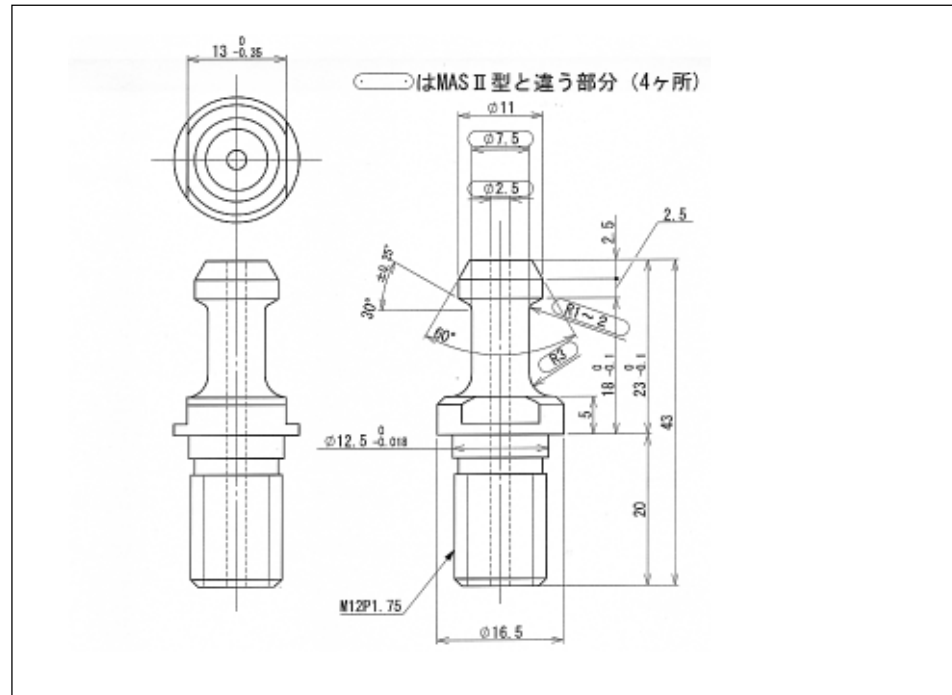
Maintenance and replacement of the parts marked by * in the following table must be done by Brother maintenance staff or people who have been given Brother maintenance education.

		Maker	Type No.	When to change	BROTHER part NO.
Line filter	Element	Taisei Kogyo	P-W-UL-03A-10U	Appropriate time	618491001
* CTS pump	Single piece of pump	Teral Kyokuto	TRP-MHG10-DBT-CLV	Appropriate time	618492001
* Rotary joint		Rix		Appropriate time	652470001

2.7.3 Pull-stud bolt sketch

Only a tool holder with a coolant through hole and conforming to BT30 can be used for the machine.

Use the pull-stud bolt such as following sketch and also with internal coolant piping.



S2BCTS-41.tif

Referece: Pull-stud bolt manufacturers conforming to Brother's specifications

Nikken	PS-130E
Yukiwa	P30TB-101
Dai showa	P30T-2H3
NT tool	S/PSB-OA-CH
	(as of February 2003)

Chapter 3 Replacement Procedures (Electrical)

3.1 NC

3.1.1 Communication maintenance when replacing PCB (1/8)

1. Operationoutline

1. Format the floppy disk on the FACIT .
(Refer to A. Format floppy disk on the FACIT)
↓
2. Output all data from the TC to the FACIT.
(Refer to B. Outputting all data from the TC to the FACIT.)
↓
3. Take note of the data of **[POWER ON TIME]** and **[RUNNING TIME]**.
(Refer to C. Take note of the power supply time and operation time.)
↓
4. Replace the PCB.
↓
5. Format the memory.
(Refer to D. Formatting memory.)
↓
6. Set the date.
(Refer to H. Setting the date.)
↓
7. Input all data from the FACIT to the TC.
(Refer to F. Inputting all data from the FACIT to the TC.)
↓
8. Check operation
(Refer to I. Special zero point return.)

3.1.1 Communication maintenance when replacing PCB (2/8)

2. Explanation of each operation

A. Format floppy disk on the FACIT.

1. Turn off the **[POWER]** switch of the machine.
2. Prepare the FACIT, and connect the communication cable to the RS-232C connector on the lower part of the operation panel.
3. Set the 3.5" floppy disk in the FACIT.
Use a 2HD floppy disk.
Set the write protect to OFF (close the notch).
4. Turn on the **[POWER]** switch of the machine.
5. Turn on the **[POWER]** switch of the FACIT. The following screen appears on the FACIT.

```
N1060 V.???
      Remote Brother
      Press Stop
      ?????? ??:??:??
```

Any data can be displayed in the
??? area.

6. Format the 3.5" floppy disk by the operation on the FACIT side.
The following are the FACIT key operation:

- 1) Press the **[STOP]** key.

```
N1060 V.???
Ready off Line
Remote Brother
??????? ??:??:??
```

Any data can be displayed in the
??? area.

- 2) Press the **[FORMAT]** key.

```
Format Disk
2DD 2HD (1.4M)
2HD (1.2M)
Press Step/ Sel.
```

- 3) Press the **[CURSOR DOWN]** key twice to move the cursor to
[2HD (1.2 M)].

```
Format Disk
2DD 2HD (1.4M)
2HD (1.2M) PG
Press Step/ Sel.
```

- 4) Press the **[ENTER]** key.

```
Insert New Disk
Press Format
```

3.1.1 Communication maintenance when replacing PCB (3/8)

- 5) Press the **[FORMAT]** key.

Formatting
.....

It takes about one minute.

Formatting
Complete

Press Stop

- 6) Press the **[STOP]** key.

N1060 V.???
Ready off Line
Remote Brother
??????? ??:?:??

Any data can be displayed
in the ??? area.

- 7) Press the **[ENTER]** key.

N1060 V.???
Remote Brother
Press Stop
??????? ??:?:??

Any data can be displayed
in the ??? area.

(Note 1) Connecting the FACIT.

1. Prepare a FACIT, and connect the communication cable to the RS232C connector on the lower part of the operation panel.
2. Check that the TC power is on, and then turn the FACIT power on.
3. Check that **[Brother Remote]** is displayed on the FACIT LCD.
4. Insert a formatted floppy disk to the FACIT floppy drive.

(Note 2) Disconnecting the FACIT

1. Remove the floppy disk from the FACIT.
2. Turn the FACIT power off.
3. Disconnect the communication cable from the operation panel.

3.1.1 Communication maintenance when replacing PCB (4/8)

B. Outputting all data from the TC to the FACIT.

1. Set the [NC LANG./CONV] switch to [NC LANG.].
2. Connect the FACIT.
3. Turn power on.
4. Set the user parameter / communication. (Refer to G. Setting parameter/communication)
5. Press the [EDIT] key.
Press the [PRGRM] key to display the <PROGRAM EDIT MENU> screen.
6. Press the [3] and [EOB/ENT] keys (NC type) or [7] and [EOB/ENT] keys (Conversation type), or move the cursor to [EXTERNAL PROGRAM I/O] and press the [EOB/ENT] key.
7. Press the [4] and [EOB/ENT] keys, or move the cursor to [MAINTENANCE] and press the [EOB/ENT] key.
- 8-1. When need to check the cause of defective board, press the [4] and [EOB/ENT] keys, or move the cursor to [OUTPUT CHECK DATA] and press the [EOB/ENT] key.
- 8-2. When not need to check the cause of defective board, press the [1] and [EOB/ENT] keys, or move the cursor to [OUTPUT ALL DATA] and press the [EOB/ENT] key.
9. Press the [E. STA] key and all data is output.
Upon completion of all data output, remove the floppy disk from the FACIT
11. and turn the FACIT power off.
12. Turn the TC power off.
13. Set the [NC LANG./CONV] switch to [CONV].
14. Repeat steps 2. to 10.
Disconnect the FACIT.

*1.Operation can be started in either NC type or conversation type.

(NOTE)

Supplementary Explanation: Up to 192 files can be output to the FACIT.

When the number of files exceeds 193, more than two floppy disks are necessary.

Operation when using two floppy disks is as follows:

1. At step 9. above, press the [3] and [EOB/ENT] keys, or move the cursor to [OUTPUT ALL DATA BANK.] and press the [EOB/ENT] key.
2. Press the [EDIT] key and all data banks are output.
3. Upon completion of all data bank output, remove the current floppy disk from the FACIT and insert a new one.
4. Press the [F0] key to display the computer menu.
5. Press the [2] and [EOB/ENT] keys, or move the cursor to [OUTPUT TO PC] and press the [EOB/ENT] key.

3.1.1 Communication maintenance when replacing PCB (5/8)

6. Press the [1] and [EOB/ENT] keys, or move the cursor to the program items and press the [ENT/EOB] key.
7. When the [1], [/] and [E. STA] keys are pressed on the <COMPUTER OUTPUT MENU> screen, files are output in order from machining program No. 1.

(NOTE)

When more than 193 machining program files exist, files are output in two stages.

Press the [1], [/], [1], [9], [2], and [E. STA] keys.

When the first output is completed, replace the floppy disk and press the [1], [9], [3], [/], and [E. STA] keys.

8. Return to step 11.above.

C. Take note of the power supply time and operation time.

1. Press the [key to display the <INPUT/OUTPUT MENU> screen.
Select[1.INPUT/OUTPUT].
2. Press the [PAGE DOWN] or [PAGE UP] key to display the version screen.
3. Take notes of the power supply time and operation time.

*1.This can be done for either NC type or conversation type.

D. Formatting memory

1. Set the [PROTECT] switch to [OFF].
2. Press the [EDIT] key.
3. Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen.
Select[1.INPUT/OUTPUT].
4. Press the [PAGE DOWN] or [PAGE UP] key to display the version screen.
5. Move the cursor to [PARAMETER CHANGE].
6. Press the [1] and [EOB/ENT] key.
7. Press the [PRGRM] key to display the <PROGRAM EDIT MENU> screen.
8. Press the [2] and [EOB/ENT] keys (NC type) or [6] and [EOB/ENT] keys (Conversation type), or move the cursor to [DIRECTORY OF MEMORY] and press the [EOB/ENT] key.
9. Press the [F4] key.
10. When instructed on the screen, press the [DEL] key.
11. Press the [F0] key on the memory format check screen.
12. After checking memory format, turn power off.
13. Set the [NC LANG./CONV] switch to the desired setting.
14. Turn power on and the selected system boots. Repeat steps 1.to 12..

(NOTE)

When [PARAMETER CHANGE] is set to [1:YES], attempting to press the [RST] key or changing mode changes the setting to [0:NO].

3.1.1 Communication maintenance when replacing PCB (6/8)

E. abbreviation

F. Inputting all data from the FACIT to the TC.

1. Set the [NC LANG./CONV] switch to [NC LANG.].
2. Set the [PROTECT] switch to [OFF].
3. Connect the FACIT.
4. Turn power on.
5. Set the user parameter / communication. (Refer to G.Use parameter / communication)
6. Press the [EDIT] key.
7. Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen. Select [1.INPUT/OUTPUT].
8. Press the [PAGE DOWN] or [PAGE UP] key to display the version screen.
9. Move the cursor to [PARAMETER CHANGE].
10. Press the [1] and [EOB/ENT] keys.
11. Press the [PRGRM] key to display the <PROGRAM EDIT MENU> screen.
12. Press the [3] and [EOB/ENT] keys (NC type) or [7] and [EOB/ENT] keys (Conversation type), or move the cursor to [EXTERNAL PROGRAM I/O] and press the [EOB/ENT] key.
13. Press the [4] and [EOB/ENT] keys, or move the cursor to [MAINTENANCE] and press the [EOB/ENT] key.
14. Press the [2] and [EOB/ENT] keys, or move the cursor to [INPUT ALL DATA] and press the [EOB/ENT] key.
15. Press the [EDIT] key and all data is input.
(The [SAME DATA BANK EXISTS. MACHINE DATA INPUT OK?] message appears. Press the [F3] key ([INPUT HERE-AFTER])).
16. Upon completion of all data input, remove the floppy disk from the FACIT and turn the FACIT power off.
17. Turn the TC power off.
18. Set the [NC LANG/CONV] switch to [CONV].
19. Repeat steps 2) to 15).
20. Disconnect the FACIT.

*1.Operation can be started in either NC type or conversation type.

(NOTE)

- 1) When [PARAMETER CHANGE] is set to [1:YES], attempting to press the [RST] key or changing mode changes the setting to [0:NO].
- 2) When using more than two floppy disks to output all data from the TC to the FACIT, replace the floppy disk when step 15) above is completed, and press the [E.STA] key.

3.1.1 Communication maintenance when replacing PCB (7/8)

G. Setting user parameter / communication

1. Press the **[DATA BANK]** key to display the <DATA BANK MENU> screen.
Press the **[4]** and **[EOB/ENT]** keys (NC type) or **[5]** and **[EOB/ENT]** keys (Conversation type), or move the cursor to the desired user parameter and press the **[EOB/ENT]** key.
2. (Conversation type), or move the cursor to the desired user parameter and press the **[EOB/ENT]** key.
3. Press the **[3]** and **[EOB/ENT]** keys, or move the cursor to **[COMMUNICATION]** and press the **[EOB/ENT]** key.
4. Set the following values:

[SELECT PORT]	0 (port A)
[CONNECTION OBJECT]	1 (computer)
[COMP COMMUNICATN PROTOCOL]	0 (format 1)
[BAUD RATE]	5(9600)
[PARITY]	0 (none)
[STOP BIT]	0 (1 bit)
[CHARACTER]	0 (7 bit)
[RESPONSE MONITORING TIME]	60
[COMMUNICATION TYPE]	0 (line)
[DR SIGNAL CHECK]	1 (YES)
[TRANS DATA CODE]	0 (ISO) (Only for NC type)
[END OF BLOCK]	0 (CR, LF) (Only for NC type)
[RECOVERY TIME]	1
5. Press the **[F0]** key twice.

H. Setting the date

1. Press the **[DATA BANK]** key to display the <DATA BANK MENU> screen.
 2. Press the **[4]** and **[EOB/ENT]** keys (NC type) or **[5]** and **[EOB/ENT]** keys (Conversation type), or move the cursor to the desired user parameter and press the **[EOB/ENT]** key.
 3. Press the **[1]** and **[EOB/ENT]** keys, or move the cursor to switch 1 and press the **[EOB/ENT]** key.
 4. Press the **[PAGE DOWN]** key several times to move the cursor to **[CURRENT DATE]** and **[CURRENT TIME]** and correct them if necessary.
 5. Press the **[F0]** key twice.
- *1. This setting can be made for either NC type or conversation type.

3.1.1 Communication maintenance when replacing PCB (8/8)

I. Special zero point return

1. Press **[MANU]** to enter the manual mode. Move the X, Y, and Z axes to their stroke centers using the jog keys.
2. Move the 4, 5, and 6 axes to the positions where the origin limit switch turns on.

Whether the 4, 5, and 6 axes are provided or not can be confirmed on the <POS> screen. The 4, 5, and 6 axes are displayed in order after the Z axis. When a coordinate value is displayed, the corresponding axis is provided.

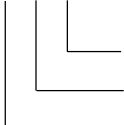
Select the axis to be moved.

Press **[F0]** (No. 4 axis), **[F1]** (No. 5 axis), or **[F2]** (No. 6 axis) on the <MANU COND> screen or the <POS> screen. The indication is highlighted when selected. Press **[+4]** or **[-4]** to move the axis to the position where the origin limit switch turns on and the axis does not get caught by any cables.

[Origin limit switch check method]

Display the <I/O> screen. Press **[1]**, **[EOB/ENT]**, and then **[NEXT PAGE]** twice. When the <ORIGIN LS STATE> screen appears, check the limit switch state. If it does not appear, press **[BEFORE PAGE]** twice to display the <MAIN1> screen and look at "Input 9" to check the limit switch state.

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Input9	-	-	*	*	*	-	-	-	-	-	-	-	-	-	-	-



0: OFF 1: ON

3. Press **[Z.RTN]** while **[RELSE]** is held down.

3.1.2 NC board replacement (1/2)

1. Send all data to the FACIT. (All data is stored in the NC PCB.)
(Refer to the section on “Outputting all data from the TC to the FACIT”.
When the machine is NC language and conversation specifications, boot the machine in respective mode to send the data.)
2. Turn off the [POWER] switch and then the main power breaker.
3. Disconnect all NC PCB and slave PCB connectors.
4. Remove the slave PCB and MEM PCB.

(NOTE) Take the utmost care to prevent your hands or conductive objects from contacting the PCB connector pins and pattern areas.

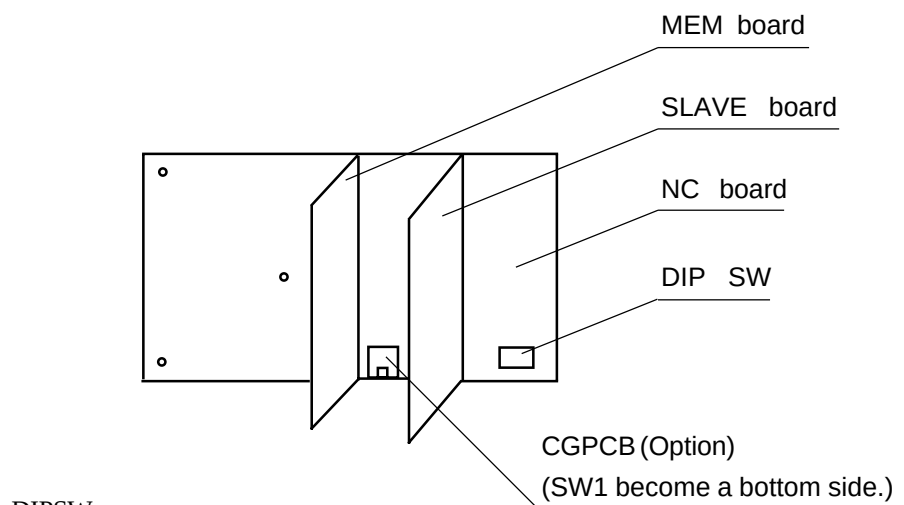
5. Remove the NC PCB.
6. Check the NC PCB dip switch settings. The settings should be the same as those before replacement.
7. Mount the NC PCB to the control box in the reverse order of steps 4 to 5.

(NOTE 1) Tighten all the screws which fix NCPCB veliably. Firmly set the PCB so as not to allow any clearance. If unavoidable, slightly move the support as far as the spring hole.

(NOTE 2) TC-S2B must use the B52J090-4 Rev.E or higer.

8. Set the [PROTECT] switch to [OFF].
9. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
10. Send all data from the FACIT.
(Refer to the section on “Inputting all data from the FACIT to the TC”.
When the machine is NC language and conversation specifications, boot the machine in respective mode to send the data.)
11. Turn off the [POWER] switch.
12. Press the [EMERGENCY STOP] switch, and turn on the [POWER] switch.
Check the key operation, display, and alarm indication.
13. Reset the [EMERGENCY STOP] switch, move the table to keep out of the tools. Operate the specific zero position return and check operation.

3.1.2 NC board replacement (2/2)



DIPSW

1 to 4 : Main

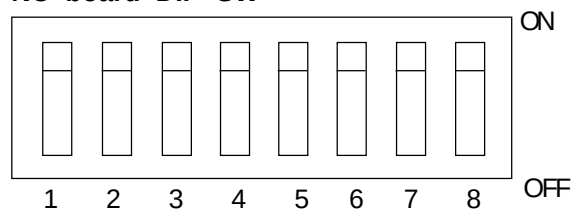
5 to 8 : Local

Bit	FUNCTION					TC-S2B
1						ON
2						ON
3						ON
4						ON
5	Bit 7 ON	Bit 6 ON	Bit5 ON	CGPCB OFF	Japanese English German French Spanish Chinese	*
6	ON	ON	OFF	OFF		*
7	ON	OFF	ON	OFF		*
	OFF	ON	OFF	OFF		
8	OFF	ON	OFF	ON		ON

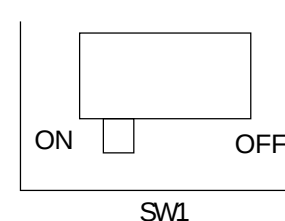
(Note)

Don't change the DIP SW except for the 5, 6 and 7 bit of NCPCB and SW1 of CGPCB.

NC board DIP SW



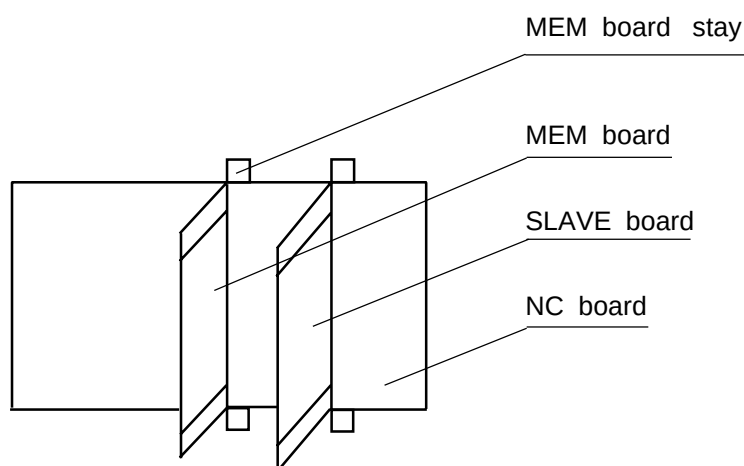
GC board DIP SW



Replacement parts		Tools to be used
Name	Parts code	
NC board assyA00# ☐	616364 - ***	Phillips screw driver FACIT
NC board assyA00# ☐ C	616365 - ***	

3.1.3 MEM board replacement

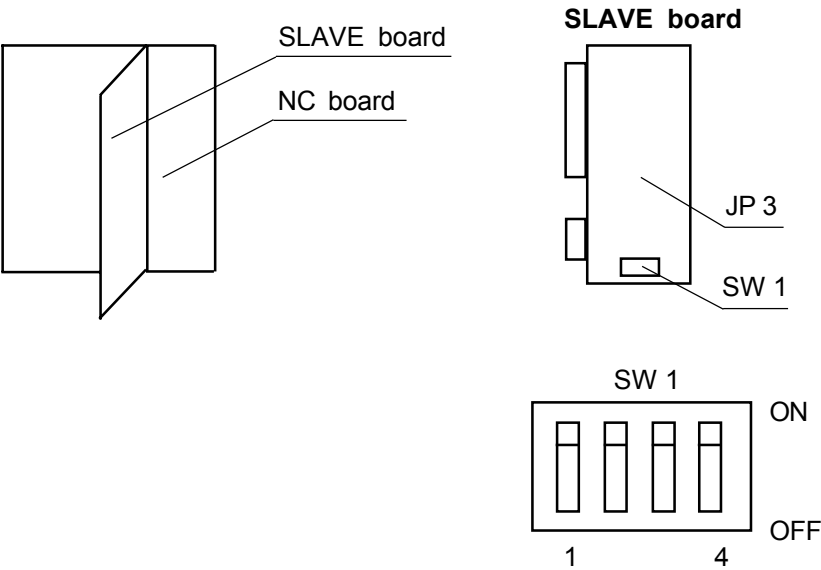
1. Send the program data to the FACIT in the case that the data may be damaged during replacement.
(Refer to the section on “Outputting all data from the TC to the FACIT”. When the machine is NC language and conversation specifications, boot the machine in respective mode to send the data.)
2. Turn off the **[POWER]** switch and then the main power breaker.
3. Loosen the screws securing the MEM board stay to the center chassis, and remove the MEM board.
4. Mount a new MEM board.
(Check that the board version is appropriate for the machine specifications.)
5. Mount the MEM board stay to the center chassis.
6. Press the **[EMERGENCY STOP]** switch, and turn on the main power breaker and then the **[POWER]** switch.
7. Check the key operation, display, and alarm indication.
If the program data is damaged, send the data from the FACIT.
(Refer to the section on “Inputting all data from the FACIT to the TC”.
When the machine is NC language and conversation specifications, boot the machine in respective mode to send the data.)
8. Reset the **[EMERGENCY STOP]** switch, move the table to keep out of the tools.
Operate the specific zero position return and check operation.



Replacement parts		Tools to be used
Name	Parts code	Phillips screw driver
MEM unit NTassy A00J MEM unit NTassy A00E Note)TC-S2B must use the MEM board version 26 or higher.	J 654846 -* 01 E 654848 -* 01 G (*=0 or higher) F S C	

3.1.4 SLAVE board replacement

- * Perform back-up of all data as it may be lost or altered during replacement.
- 1. Turn off the [POWER] switch and then the main power breaker.
- 2. Remove all connectors from the SLAVE board.
- 3. Remove all screws securing the SLAVE board stay.
Note: Be careful not to lose the screws.
- 4. Replace the SLAVE board.
Check that the dip switch (SW1) setting is same as the setting of the board used before replacement.
Check that the jumper socket is not connected to JP3.
Check that the connectors joining the NC board and the SLAVE board are fully interlocked.
- 5. Mount a new SLAVE board in the reverse order of steps 2 and 3.
- 6. Push the [Emergency stop] switch, turn on the main power breaker and then the [POWER] switch.
- 7. Check the key operation, display indication, and alarms.
- 8. Reset the [EMERGENCY STOP] switch , move the table to keep out of the tools.
Operate the specific zero position return and check operation.



Replacement parts		Tools to be used
Name	Parts code	
SLAVE board assy A00	616468 - ***	Phillips screw driver

3.1.5 IO board replacement (1/2)

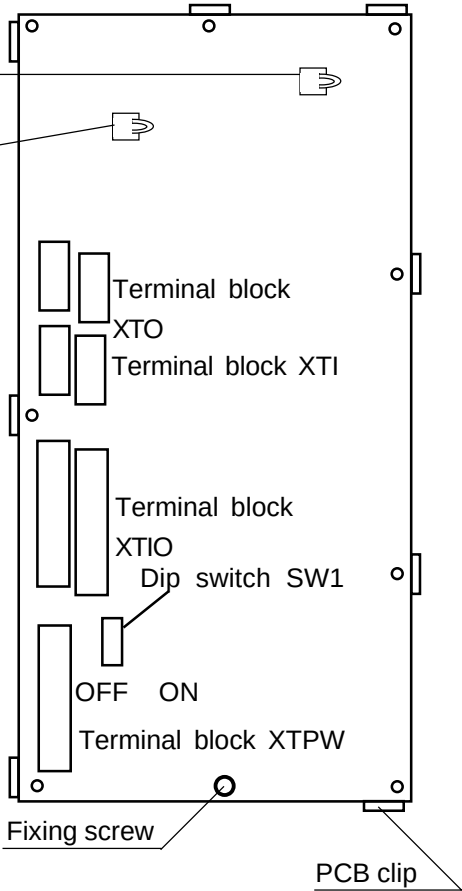
- 1. Turn off the **[POWER]** switch and the main power breaker.
- 2. After taking notes of each terminal block No., the cord mark tube No. and setting condition of dip switch, disconnect the cords.
- 3. Remove POT board of IO board. Remove all the connectors and codes.
- 4. Remove a fixing screw from the IO board.
- 5. Push the lever of eight PCB clips and remove the circuit board.
- 6. Fix the new IO board.
Mounting instruction: fit the hole of the IO board PCB to the PCB clips until having the clicking sound.
- 7. Fix a screw of IO board.
- 8. Fix the removed POT board and connect the connectors. (Remove the CNS QA2 short connector.)
- 9. short connector.)
- 10. Connect cords to the terminal block.
- 11. Check dip switch SW1 of the board, (See next page.)
- After **[EMERGENCY STOP]** switch on, turn the main power breaker and the
- 12. **[POWER]** switch on .

Check motion (the key operation, display, and alarm indication).
Remove the CNSQA2 short connector when CNSQA2 connects to the cable.

Remove the CNRNG short connector when CNRNG connects to the cable.



TC31A manual:I/O signal:05L25



Replacement parts		Tools to be used
Name	Parts code	Phillips screw driver Phillips screw driver (small) (for the terminal block)
IO board assy A00 supply	654683 - ***	

3.1.5 IO board replacement (2/2)

DIP SW Bit	Signal name	Contents	Setting when shipped
1	COL	Control of the coolant pump motor OFF:Only[CTL.P]key ON:[CTL.P] key & M08 command	OFF
2	CHP	Control of the chipflow pump motor OFF:Only[CHP.F]key ON:[CHP.F] key & M400 command	ON
3	OH1	Control (1) of the CTS valve OFF:[CLT.P] key is effective (Only M-code command control) (When this is set to OFF, bits 4 and 6 cannot be set to OFF.) ON:[CLT.P] key is invalid	ON
4	OH2	Control (2) of the oil hole pump OFF:M408 command is invalid (3 bit=ON; Only[CLT.P]key is control) (When this is set to OFF, bit 3 cannot be set to OFF.) ON:M408 command is effective (3bit ON; [CLT.P]key & M408 control)	ON
5	INT	Door interlock control of the coolant system OFF:Coolant system stops regardless of door interlock switch status. ON:Coolant system stops only when the door interlock switch is valid.	OFF
6	SPT	Control (2) of the CTS valve OFF:M-code command 494 is invalid (3 bit=ON; Only[CLT.P]key is control) (When this is set to OFF, bit 3 cannot be set to OFF.) ON:M-code command 494 is effective (3bit ON; [CLT.P] key & M-code control)	ON
7	LT	Control of the machine light OFF:LIGHT]key control ON:Stays lit when the main power breaker is on (used only for maintenance)	OFF
8	PEV	Effectiveness or invalidity the grounding voltage checking. (Voltage between R/S/T and PE of main power.) OFF:Invalidity ON:Effectiveness	ON

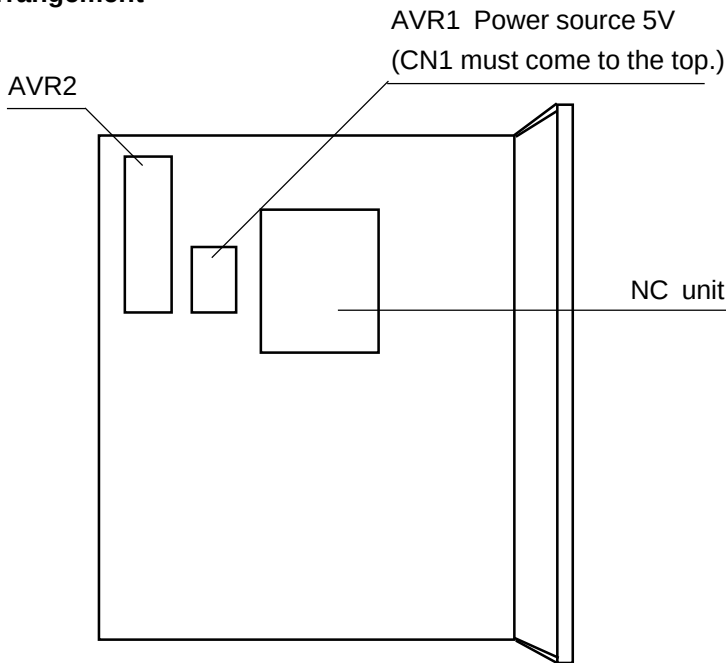
3.1.6 AVR1 replacement (1/2)

- 1. Turn off the [POWER] switch and then the main power breaker.
- 2. Open the control box door.
- 3. Remove the fixing screw (four places) of the protective cover.
- 4. Remove AVR1 connector and the metal spacer (four places).
- 5. Replace AVR1.
- 6. Secure the AVR1 metal spacer and attach the connector.
- 7. Attach the protective cover.
- 8. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 9. Check 5V of AVR1.

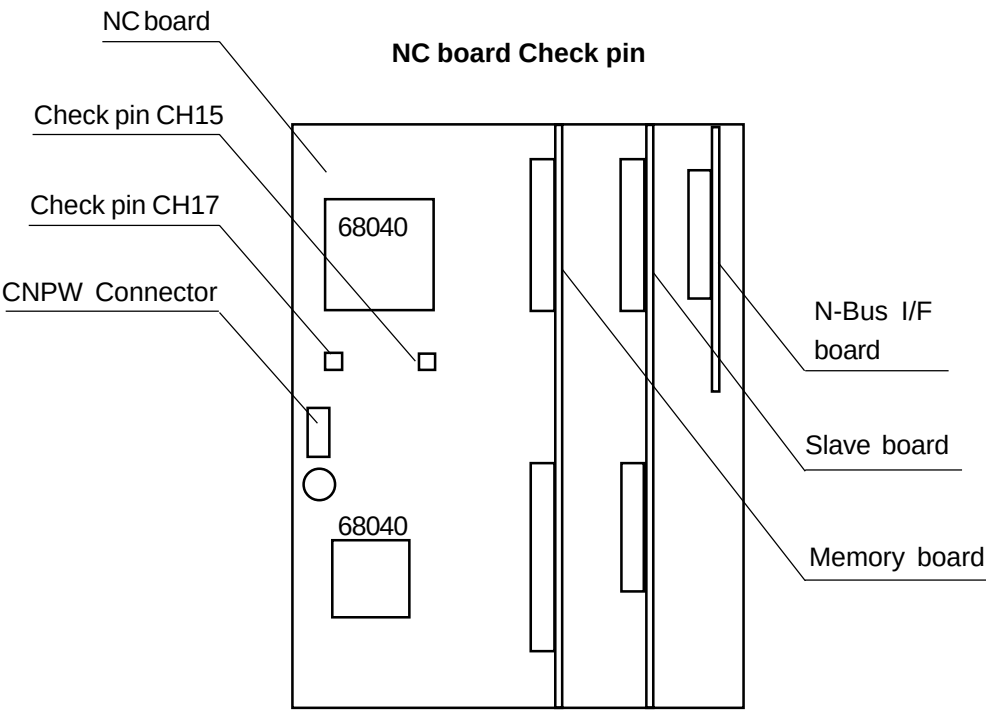
Power source	Measurement loccations	Voltage adjustment
+5V	Between the NC board CH17(5V) and CH15(LG)	4.85 to 5.15V

- 10. When the voltage is out of range, adjust AVR1. See 5.1.1)
- 11. Turn off the [POWER] switch and then the main power breaker.
- 12. Close the control box door.
- 13. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 14. Check that the LCD turns on and no error is displayed.

AVR1 Arrangement



3.1.6 AVR1 replacement (2/2)



Replacement parts		Tools to be used
Name	Parts code	
AVR LDA30F-5X	654557-001	Phillips screw driver (small) Digital tester 5.5 Box wrench or driver

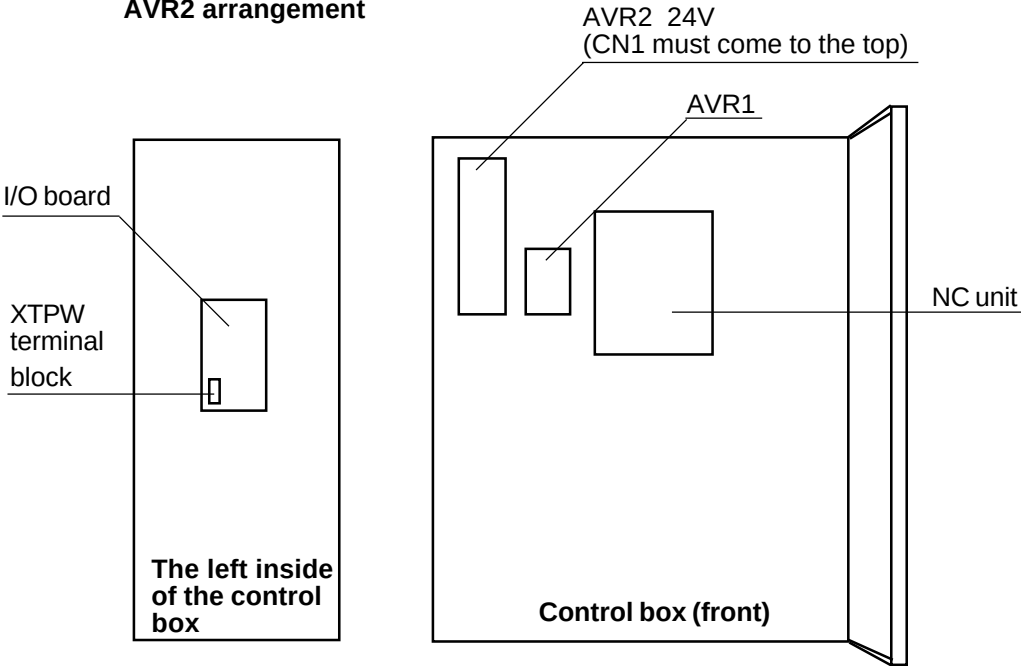
3.1.7 AVR2 replacement

- 1. Turn off the [POWER] switch and then the main power breaker.
- 2. Open the control box door.
- 3. Remove the fixing screw (four places) of the protective cover.
- 4. Remove AVR2 connector and the metal spacer (four places).
- 5. Replace AVR2.
- 6. Secure the AVR2 metal spacer and attach the connector.
- 7. Attach the protective cover.
- 8. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 9. Check 24V of AVR2.

Power source	Measurement loccations	Voltage adjustment
+24V	Between the IO board XTPW-IO24 and XTPW-IOG	22.8to 25.2V

- 10. AVR2 cannot be adjusted even when the voltage is out of range. Replace AVR2, and check the voltage again.
- 11. Turn off the [POWER] switch and then the main power breaker.
- 12. Close the control box door.
- 13. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 14. Check that the LCD turns on and no error is displayed.

AVR2 arrangement



Replacement parts		Tools to be used
Name	Parts code	Phillips screw driver (small) Digital tester 5.5 Box wrench or driver
AVR LDA100W-24X	654261-101	

3.1.8 Battery replacement (1/2)

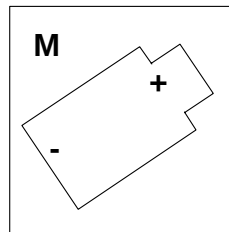
1. When the battery low power mark is indicated on the lower right on the LCD

1-1 When "M" is indicated

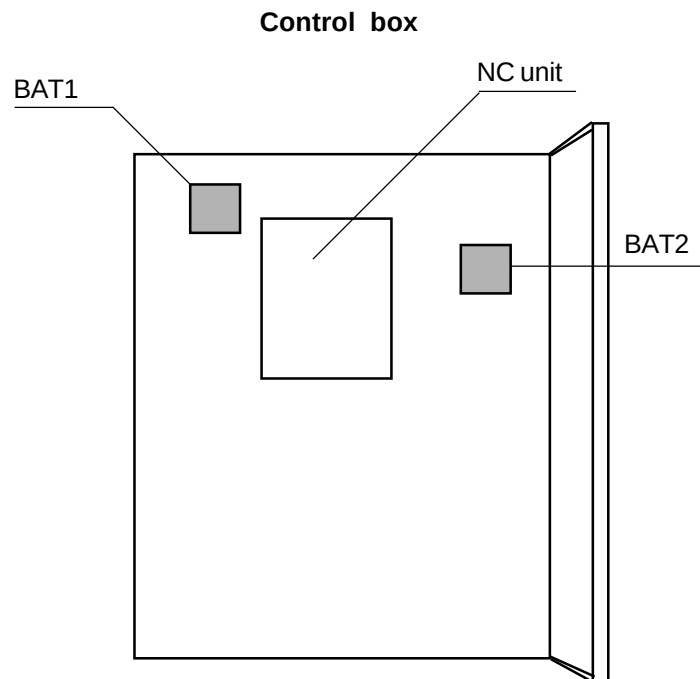
Replace BAT1 (battery for NC PCB)

1-2 When "A" is indicated

Replace BAT2 (magazine motor)



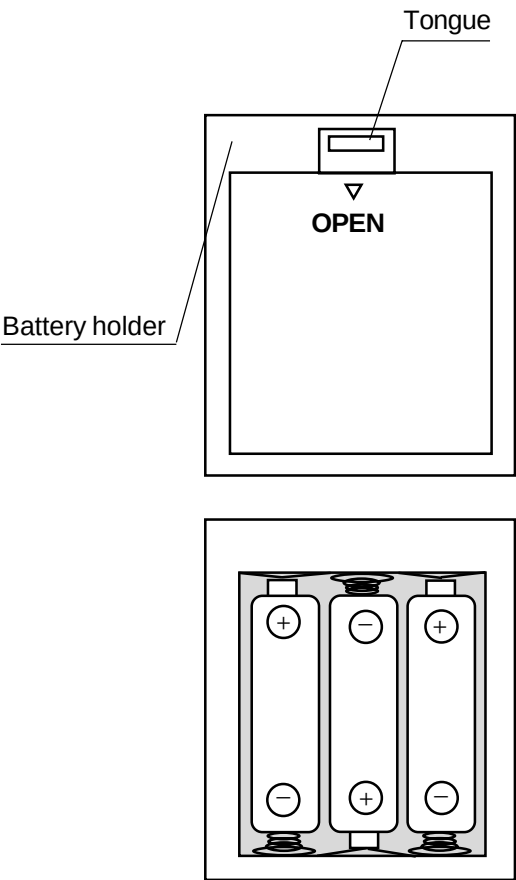
Battery arrangement



2. Turn the POWER switch and the MAIN POWER breaker OFF.
3. Holding the tongue of the battery holder, take off the lid.
4. Replace the battery immediately . Pay attention to the polarity (see the Note).
5. Attach the lid to the battery holder.
6. Turn the MAIN POWER breaker and the POWER switch ON.
7. Check that the mark indicating battery shortage doesn't display on the screen.

(NOTE) All data is lost unless the battery is connected to the MAG unit for 30 minutes or longer.

3.1.8 Battery replacement (2/2)



Replacement parts	Tools to be used
Dry battery UM-3 (Populer size AA alkali battery is sufficient for the purpose.) Note: Don't use size AA manganese dry battery.)	

3.1.9 Servo driver replacement (X, Y, Z, S, 5, 6 axes) (1/4)

1. Turn off the **[POWER]** switch and main power breaker.
2. Check that the spindle driver Charge LED is unlit.
3. Remove all connectors of the servo driver to be replaced.
4. Remove all cables (e.g. power cable, grounding cable, etc.) from the terminal block.
5. Remove two screws (Only spindle is four screws) securing the servo driver and pull the driver toward you.
6. Replace the driver. (Refer to the section on “Servo driver type” to select the correct type.)
7. Fix two screws (Only spindle is four screws).
8. Connect all cables.
9. Connect all connectors.
10. Check that the cables and connectors are connected correctly. Also check that the axis is correct.
11. Set the select switch. Refer to the section on “Select switch setting value”.
12. Turn on the main power breaker and then the **[POWER]** switch on. (Incorrect cable connection and/or select switch setting may cause runaway of the machine. Use the utmost care.)
13. Check operation in manual mode. No abnormal noise and vibration is allowed.

Replacement parts

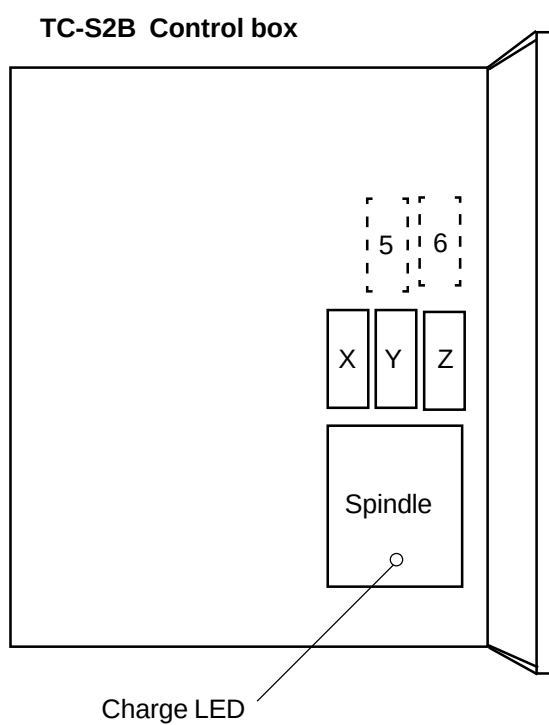
Servo	Type of the other unit	Parts code	Name	Tools to be used
X,Y,Z axes	TC-22A/31A/32A in common (XYZ axis) /TC-S2A/R2A in common (Z axis)	654678-101 or higher	Amplifer PY9A050 Rev.H or higher	Phillips screw driver Phillips screw driver (long) Phillips screw driver (small)
Spindle10K	TC-S2A(S)/31A(S(16K))/	654681-101 or higher	Amplifer PY9A150 Rev.H or higher	
Spindle16K	R2A(S) in common			

3.1.9 Servo driver replacement (X, Y, Z, S, 5, 6 axes) (2/4)

A. Set the select switch for each axis.

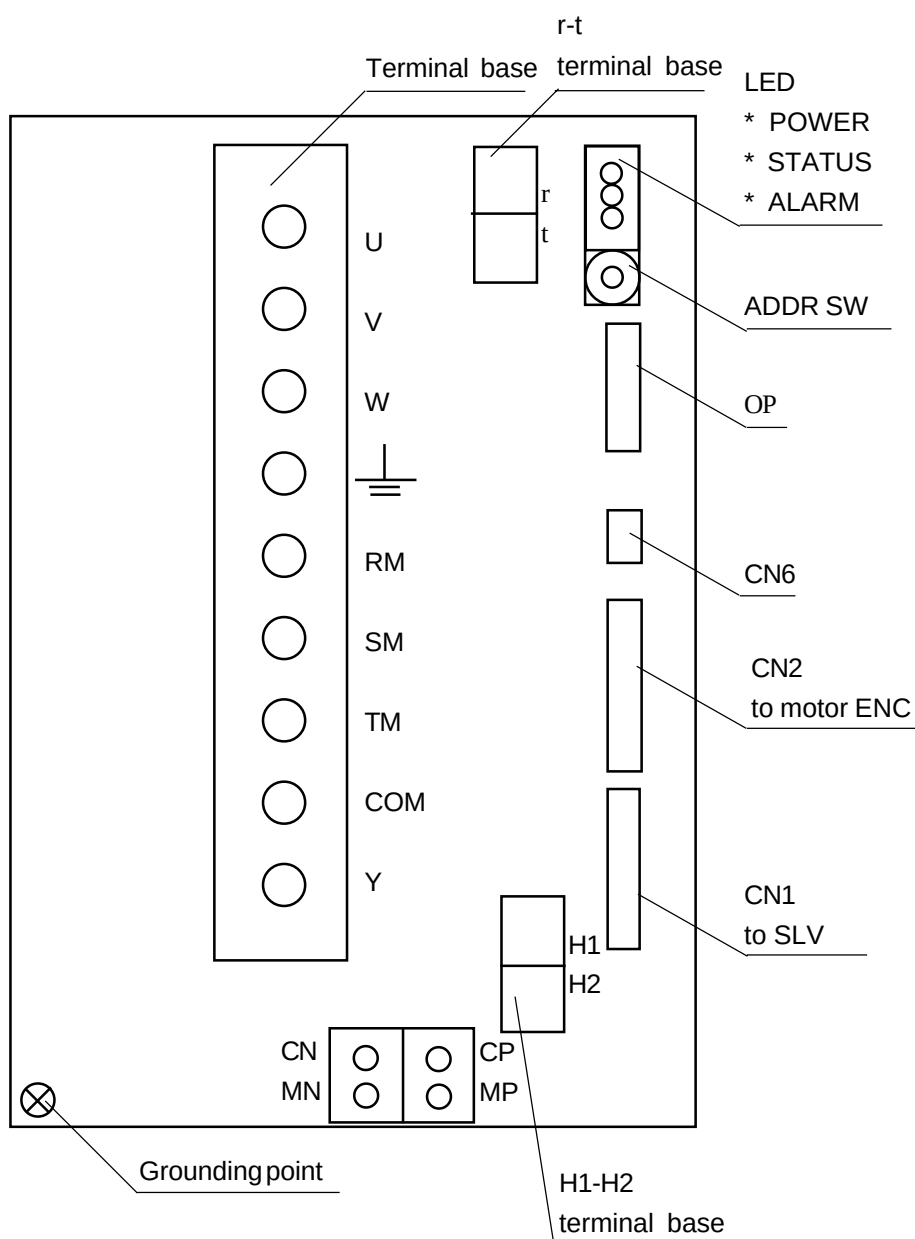
1. Select switch setting value

Driver	TC-S2B
X Axis	0
Y Axis	1
Z Axis	2
Spindle	3
5 Axis	5
6 Axis	6



3.1.9 Servo driver replacement (X, Y, Z, S, 5, 6 axes) (3/4)

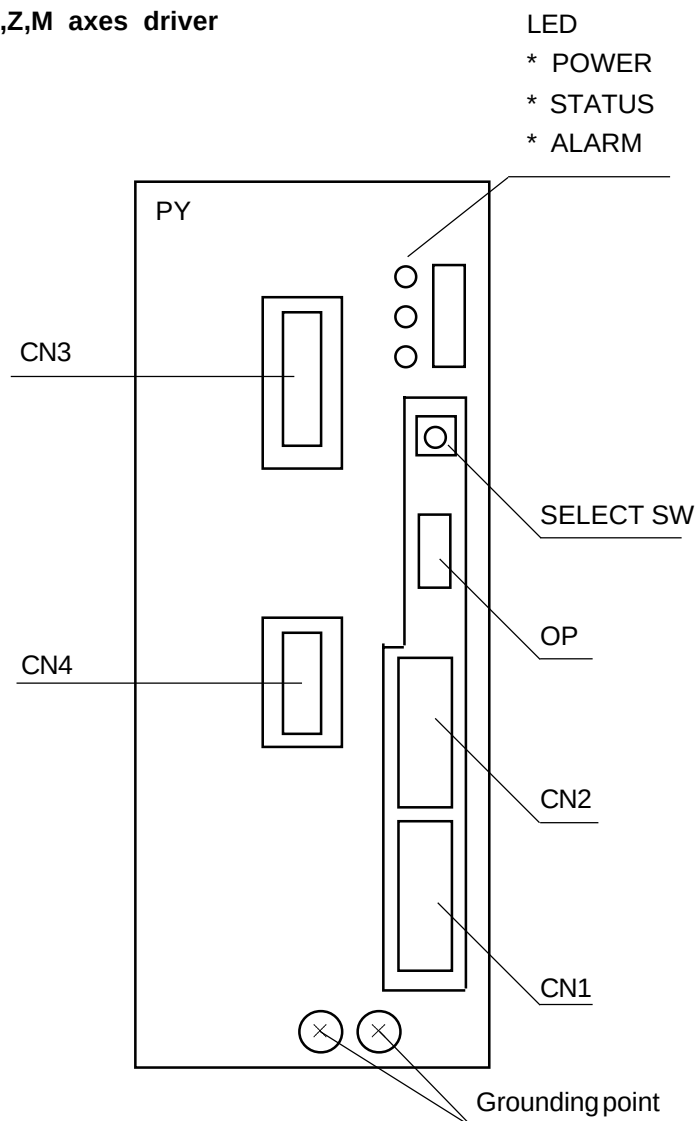
Spindle driver



Disconnect the short connector.

3.1.9 Servo driver replacement (X, Y, Z, S, 5, 6 axes) (4/4)

X,Y,Z,M axes driver

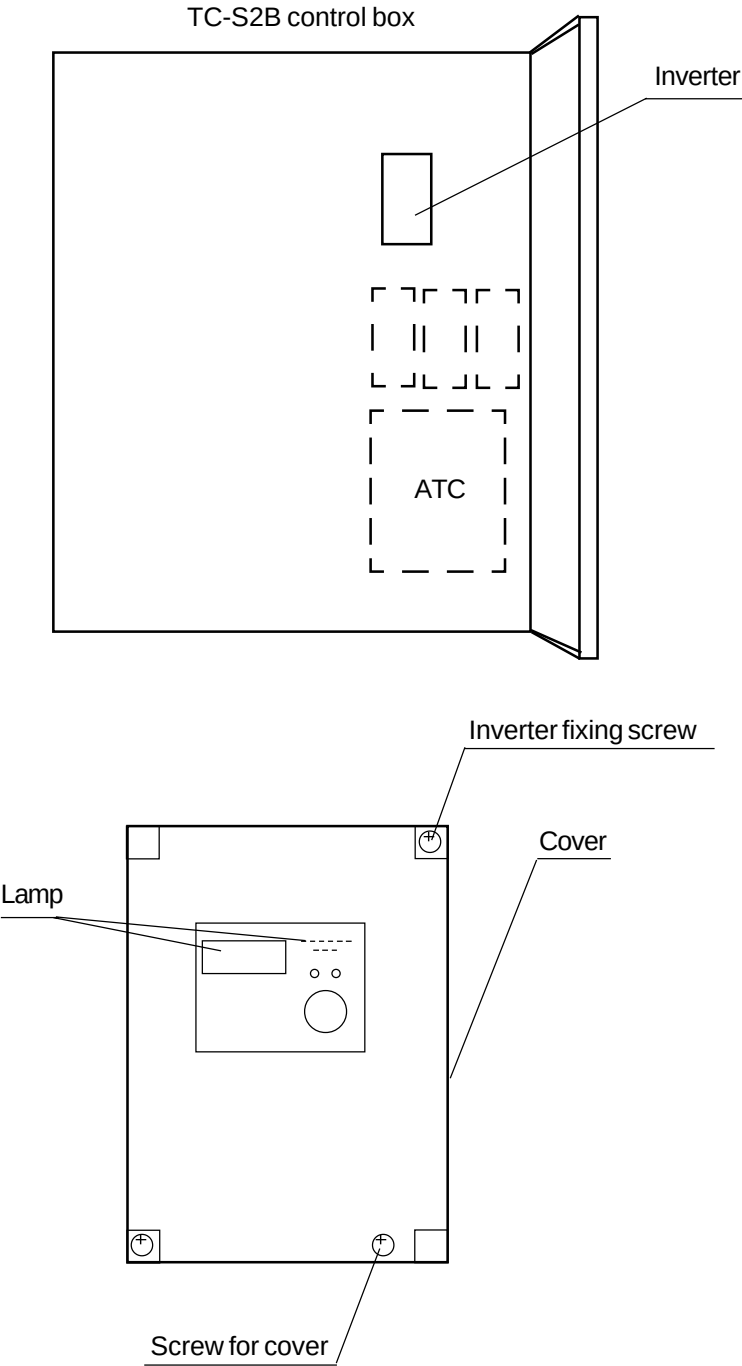


3.1.10 ATC inverter replacement (1/5)

1. Turn off the **[POWER]** switch and then the main power breaker.
2. Waiting for over one minute from inverter lamp is turns off.
3. Loosen the fixing screw of the inverter surface cover, remove the cover.
4. Remove the connectors "ARM" and "INV" around the inverter.
5. Remove motor power line and earth line from inverter terminal block.
6. Remove the securing screw.
7. Change the inverter.
8. Tighten the securing screw.
9. Connect the earth line and the motor power line from the inverter terminal block.
Connect the connectors "ARM" and "INV".
10. Check the cable and the connector are set correctly.
11. Attach the cover and fix screw it.
Turn on the breaker and turn on the **[POWER]** switch.
12. Set the parameter it needs. (Refer to ATC inverter parameter setting procedure.)
13. Check the movement of the machine, to do zero return. Push the **[ATC]** key
in manual mode.

Replacement parts		Tools to be used
Name	Parts code	
INVERTER200WASSY	618632-001	Phillips screw driver (+)

3.1.10 ATC inverter replacement (2/5)

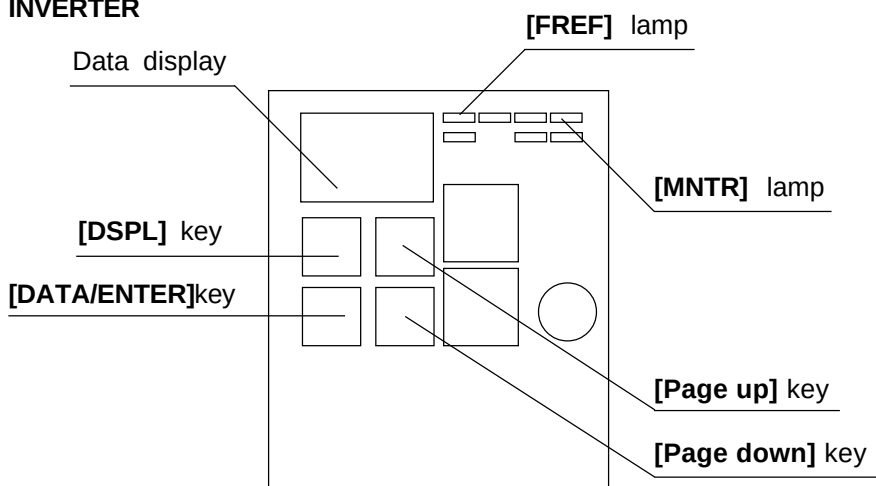


3.1.10 ATC inverter replacement (3/5)

Setting of ATC inverter parameter

1. Press the **[DSPL]** key while the inverter LED is lit (servo power on) and the **[MNTR]** lamp lights. (Each press of the **[DSPL]** key cyclically displays **[FREF]**, **[FOUT]**, **[IOUT]**, **[MNTR]**, **[F/R]**, **[LO/RE]**, **[PRGM]**, and then **[FREF]** again.
2. Press the **[PAGE UP]** and **[PAGE DOWN]** keys to display parameter's name which change to be.
3. Press the **[DATA/ENTER]** key to display the parameter's contents.
4. Press the **[PAGE UP]** and **[PAGE DOWN]** keys, adjust the numerical value to be change.
When you have confirmed the error code, press the **[DSPL]** key and the **[FREF]** lamp lights.

INVERTER



3.1.10 ATC inverter replacement (4/5)

Inverter

Constant No.	Function name	Inverter setting	S2B
n01	Password	1	←
n02	Run command selection	0	1
n03	Frequency reference selection	0	1
n04	Selecting stopping method	0	←
n05	Selecting reverse run prohibited	0	←
n06	Stop key function	0	←
n07	Selecting frequency reference in local mode	0	←
n08	Frequency reference setting method from digital operator	0	←
n09	Max. output frequency	60	400
n10	Max. voltage	200	←
n11	Max. voltage (output frequency) base frequency	60	50
n12	Mid. output frequency	1.5	3
n13	Mid. output frequency voltage	12	←
n14	Min. output frequency	1.5	3
n15	Min. output frequency voltage	12	←
n16	Acceleration time 1	10	0.2
n17	Deceleration time 1	10	0.6
n18	Acceleration time 2	10	←
n19	Deceleration time 2	10	←
n20	S-curve selection	0	←
n21	Frequency reference 1 (Master speed frequency reference)	6	60
n22	Frequency reference 2	0	←
n23	Frequency reference 3	0	35
n24	Frequency reference 4	0	←
n25	Frequency reference 5	0	←
n26	Frequency reference 6	0	←
n27	Frequency reference 7	0	←
n28	Frequency reference 8	0	←
n29	Jog frequency	6	←
n30	Frequency reference upper limit	100	←
n31	Frequency reference lower limit	0	←
n32	Motor rated current	1.1	←
n33	Electric thermal motor protection selection	0	←
n34	Electric thermal motor protection time constant setting	8	←
n35	Selecting cooling fan operation	0	←
n36	Multi-function input selection 2 (Terminal S2)	2	←
n37	Multi-function input selection 3 (Terminal S3)	5	0
n38	Multi-function input selection 4 (Terminal S4)	3	7
n39	Multi-function input selection 5 (Terminal S5)	6	3
n40	Multi-function output selection 1 (Contact output terminal MA-MB-MC)	1	0

eTS2B3.1.10-1.EXL

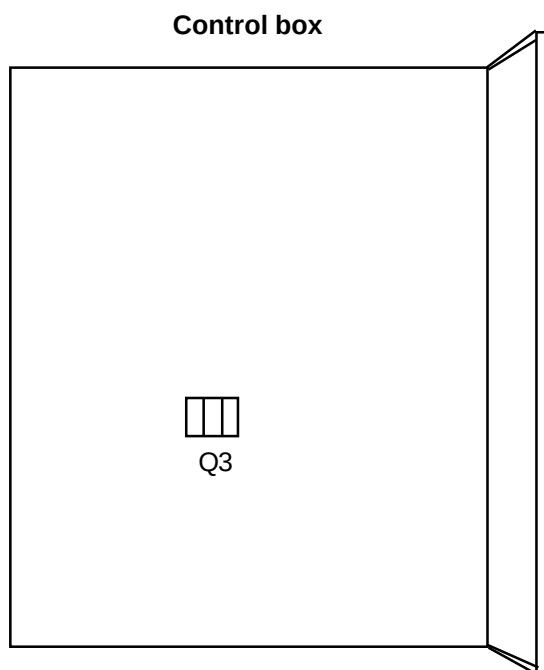
3.1.10 ATC inverter replacement (5/5)

Constant No.	Function name	Inverter setting	S2B
n 41	Analog frequency reference gain	100	←
n 42	Analog frequency reference bias	0	←
n 43	Filter time constant for analog frequency reference constant	0.1	←
n 44	Multi-function analog output (terminal AM-AC)	0	←
n 45	Analog monitor gain	1	←
n 46	Carrier frequency selection	4	2
n 47	Momentary power loss ride through method	0	2
n 48	Automatic retry attempts	0	←
n 49	Jump frequency 1	0	←
n 50	Jump frequency 2	0	←
n 51	Jump frequency range	0	←
n 52	DC injection braking current	50	100
n 53	DC injection braking time at stop	0.5	1
n 54	DC injection braking time at start	0	←
n 55	Stall prevention during deceleration	0	1
n 56	Stall prevention level during acceleration	170	200
n 57	Stall prevention level during running	160	200
n 58	Frequency detection (multi-function contact output)	0	←
n 59	Overtorque detection function selection	0	4
n 60	Overtorque detection level	160	←
n 61	Overtorque detection time	0.1	10
n 62	Hold output frequency saving selection	0	←
n 63	Torque compensation gain	1	0
n 64	Motor rated slip	2.6	←
n 65	Motor no-load current	73	←
n 66	Slip compensation gain	0	←
n 67	Slip compensation time constant	2	←
n 68	MEMOBUS time over detection	0	←
n 69	MEMOBUS frequency reference and frequency monitor unit	0	←
n 70	MEMOBUS slave address	0	←
n 71	MEMOBUS BPS selection	2	←
n 72	MEMOBUS parity selection	0	←
n 73	Transmission waiting time	10	←
n 74	RTS control	0	←
n 75	Reducing carrier frequency selection at low speed	0	←
n 76	Constant copy function selection	rdy	←
n 77	Constant read selection prohibit	0	←
n 78	Fault history	-	←
n 79	Software version No.	-	←

eTS2B3.1.10-2.EXL

3.1.11 Q3 Fuse replacement

1. Turn off the **[POWER]** switch on the operation panel.
2. Turn off the circuit breaker inside the control box, and remove two bolts to open the control box door.
3. Remove the Q3 fuse cover. Replace the blown fuse with a spare fuse, some being provided on the cover and secured with tape. Put the blown fuse in the plastic bag provided inside the control box.
Purchase fuses of the same capacities when spare fuses were used up.
(Refer to section 7.3.7 of Chapter 7 for fuse capacities.)

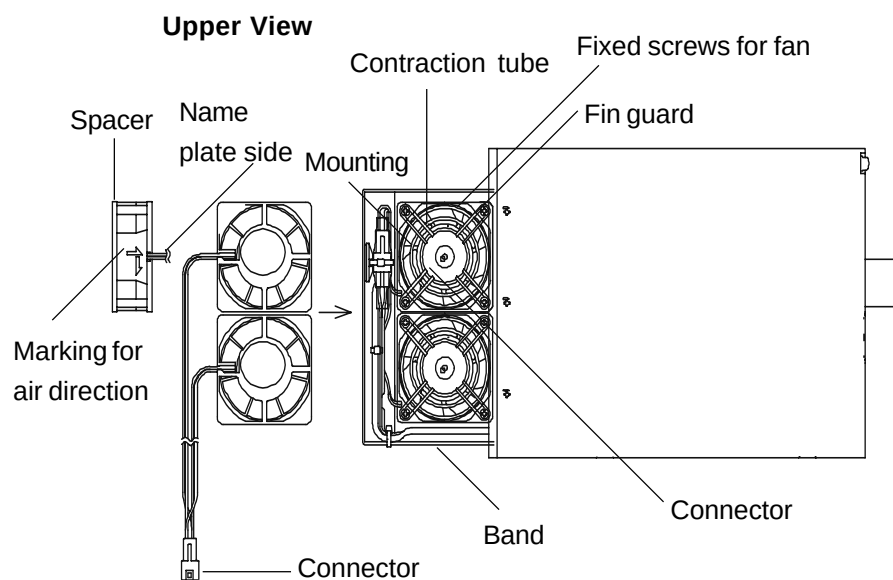


3.1.12 S-axis driver fan replacement (1/2)

1. Press the **[POWER]** button (OFF) and turn the main circuit breaker off.
2. Check that the spindle driver Charge LED is not lit.
3. Remove all connectors from the driver to be replaced.
4. Remove all cords (e.g. power cord, grounding cord) from the terminal block.
5. Remove the four screws securing the spindle driver and pull the driver toward you to remove it.
6. Replace the fan.
 1. Remove the fixed screws for fan.
 2. Cut and remove the band and the contraction tube , and remove the connection of the connector. Next, remove the fin guards and the fans. On that occasion, be careful not to give other lead wire the load.
 3. Transplant the spacers from the fans whom they removed with the process 6-2. to the new fan.
 4. Take care of the air direction, install the fans and the fin guards so that there may not be looseness by using the screws removed with the process 6-1. Install it like the air should pass the fin from the fans.
 5. Connect the relay connector (The contraction tube is unnecessary.)
 6. Fix lead wire and the relay connector with the band so that the air may not hit it directly.
7. Mount the spindle driver to the control box and secure it with four screws.
8. Connect all cords to the terminal block.
9. Connect all connectors to the driver.
10. Check that the cords and connectors are connected correctly.
11. Turn the main circuit breaker on and press the **[POWER]** button (ON).
Check that no alarm occurs.

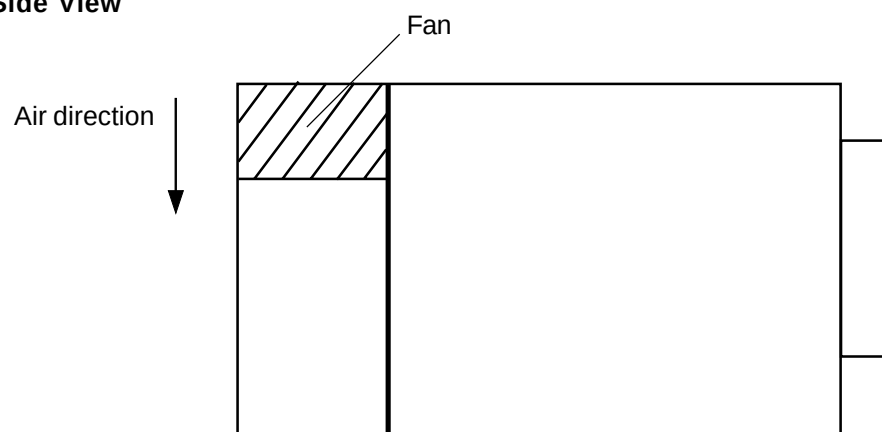
Replacement parts		Tools to be used
Name	Parts code	
PX9A150AMP FAN ASSY	654277001	Phillips screw driver Phillips screw driver (long) Phillips screw driver (small) Cable band Cutting nipper

3.1.12 S-axis driver fan replacement (2/2)



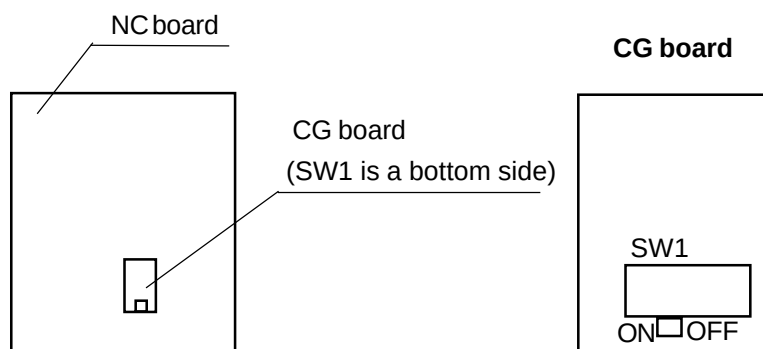
3.1.12-01.ai

Side View



3.1.13 CG board replacement

- * Perform back-up of all data as it may be lost or altered during replacement.
- 1. Turn off the **[POWER]** switch and then the main power breaker.
- 2. Remove all connectors from the SLAVE board.
- 3. Loosen the screws securing the SLAVE board and the MEM board stay to the NC board chassis, and remove the SLAVE board, the MEM board and the CG board.
- 4. Note: Be careful not to lose the screws.
Replace the CG board.
Check that the dip switch (SW1) setting is correct(See 3.1.2).
- 5. Mount a new CG board so that SW1 may become a bottom side.
Mount a new SLAVE board and a MEM board in the reverse order of steps 2 and 3.
- 6. Push the **[Emergency stop]** switch, turn on the main power breaker and then
- 7. the **[POWER]** switch.
- 8. Check the key operation, display indication, and alarms.
Release the **[Emergency stop]** button, and check operation.



Replacement parts		Tools to be used
Name	Parts code	
CG board assy A00	653477 - ***	Phillips screw driver

3.1.14 Door Lock LS replacement check points

When replacing the “Door lock LS” (650827-***), please follow out the operation bellow.

- 1. When release key is “UNLOCK” position, unable to lock the door during the machine operation. Surely check that the release key position is “LOCK” side before replacing. Please change the release key to “LOCK” side when the key position is the other side.



Release key make O mark “LOCK” side

3.1.14-01.doc

3.1.14-02.doc

- 2. After replacement, surely follow the manual to check the machine operation. Refer to the Installation manual. Door Interlock function. “ 3. Inspection of Door Interlock”.



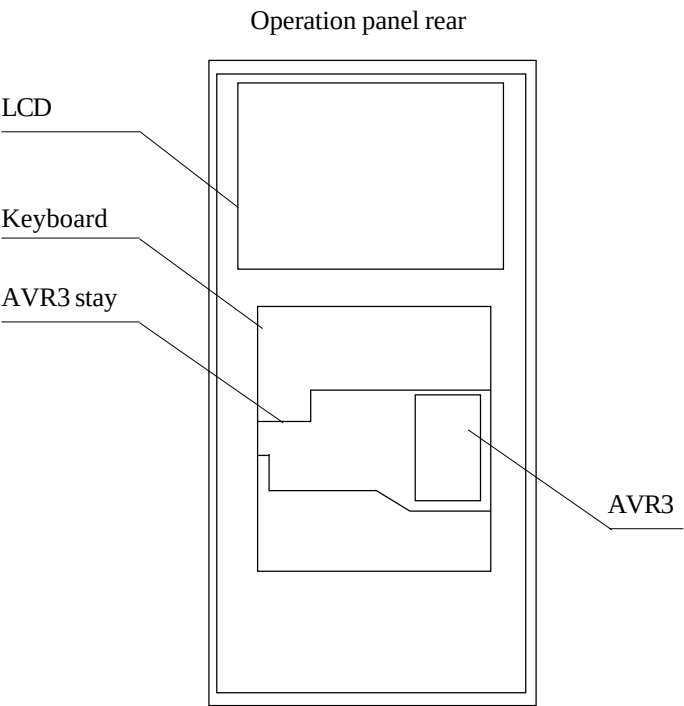
Replacement parts		Tools to be used
Name	Parts code	
Door lock LS D4DL	650827 - ***	Phillips screw driver (+)

3.2 Operation box

3.2.1 Keyboard replacement

1. Turn off the **[POWER]** switch and then the main power breaker.
2. Remove eleven M5 screws from the front operation panel. Open the panel.
3. Remove AVR3 connector.
4. Remove all keyboard connectors.
5. Remove the screws securing AVR3 stay. Remove AVR3 stay with AVR3 mounted.
6. Remove the nuts securing the keyboard.
7. Replace the keyboard.
8. Mount a new keyboard in the reverse order of steps 3 to 6.
9. Close the panel and tighten the screws.
10. Press the **[EMERGENCY STOP]** switch, and turn on the main power breaker and then the **[POWER]** switch.
11. Check the key operation.

The keyboard consists of the Key PCB and the key seat. Be sure to replace both together.



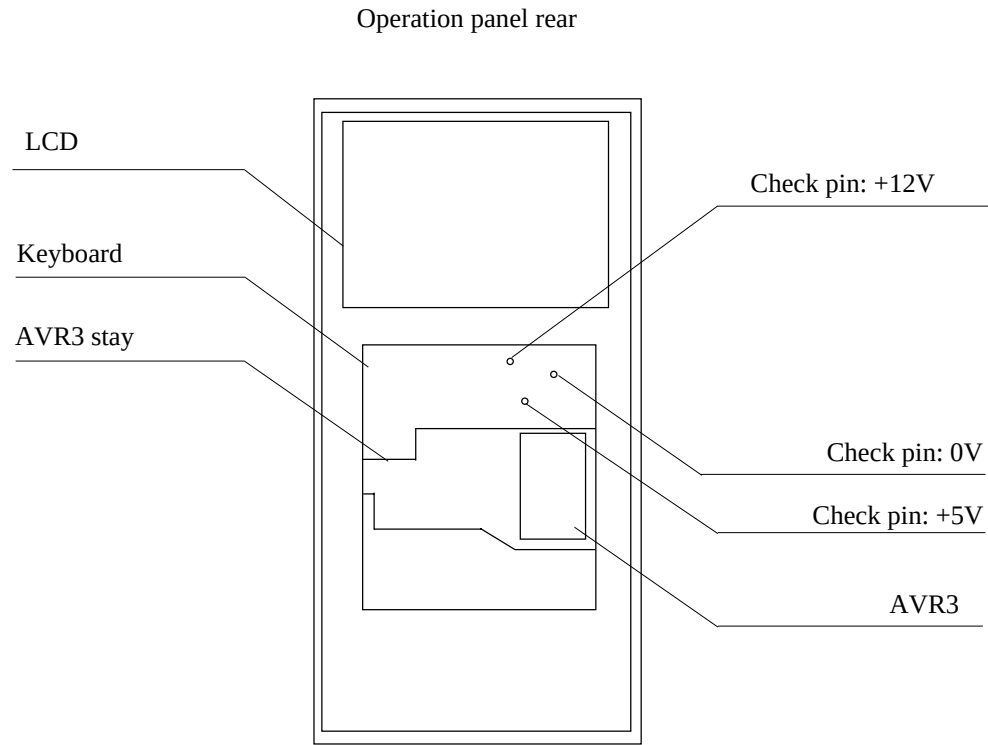
Replacement parts			Tools to be used
Name		Parts code	
Japan	Keyboard assy J	654132- 0**	Phillips screw driver M3 Nut driver
China	Keyboard assy C	654132- 4**	
Except for the above	Keyboard assy E	654132- 1**	

3.2.2 AVR3 replacement

- 1. Turn off the [POWER] switch and then main power breaker.
- 2. Remove eleven M5 screws from the front operation panel. Open the panel.
- 3. Remove AVR3 connector and securing screws.
- 4. Replace AVR3.
- 5. Secure AVR3 with screws and attach the connectors.
- 6. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 7. Check that the voltage is 5V and 12V, respectively.

Power supply	Measurement location	Voltage range
+5V	Between 0V and 5V on keyboard (check pin)	4.85 to 5.15V
+12V	Between 0V and 12V on keyboard (check pin)	11.6 to 12.4V

- 8. Turn off the [POWER] switch and then the main power breaker.
- 9. Close the panel and tighten the screws.
- 10. Press the [EMERGENCY STOP] switch, and turn on the main power breaker and then the [POWER] switch.
- 11. Check that the LCD turns on.



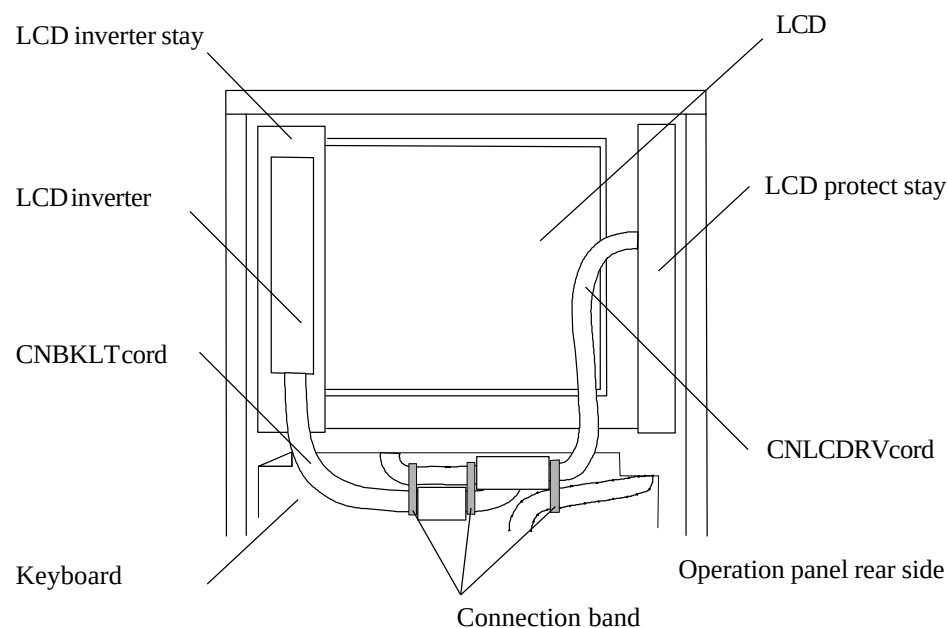
Replacement parts		Tools to be used
Name	Parts code	
Power supply LCD30F-1	638140- 001	

Phillips screw driver

3.2.3 LCD replacement

- 1. Turn on the [POWER] switch and then the main power breaker.
- 2. Remove eleven M5 screws from the front operation panel. Open the panel.
- 3. Remove the band connecting the CNLCDRV cord to the LCD protect stay. Loosen the M3 screws and remove the LCD protect stay.
- 4. Remove the screws (M3, 2 pcs.) securing the LCD inverter stay and detach the connector for the LCD inverter.
- 5. Remove the CNLCDRV connector from the keyboard, and remove three bands connecting the CNLCDRV cord.
- 6. Remove four spacers securing the LCD.
- 7. Replace the LCD with the CNLCDRV cord connected.
- 8. Secure the LCD in the reverse order of steps 2 to 5. At this time, secure the ferrite cord of the CNLCDRV cord with cable ties (3 locations).
- 9. Turn on the main power breaker and then the [POWER] switch. Check that the LCD turns on.

Note: Since the connector for the LCD and that for the cord CNLCDRV are very small, replace the LCD without disconnecting the cord CNLCDRV.



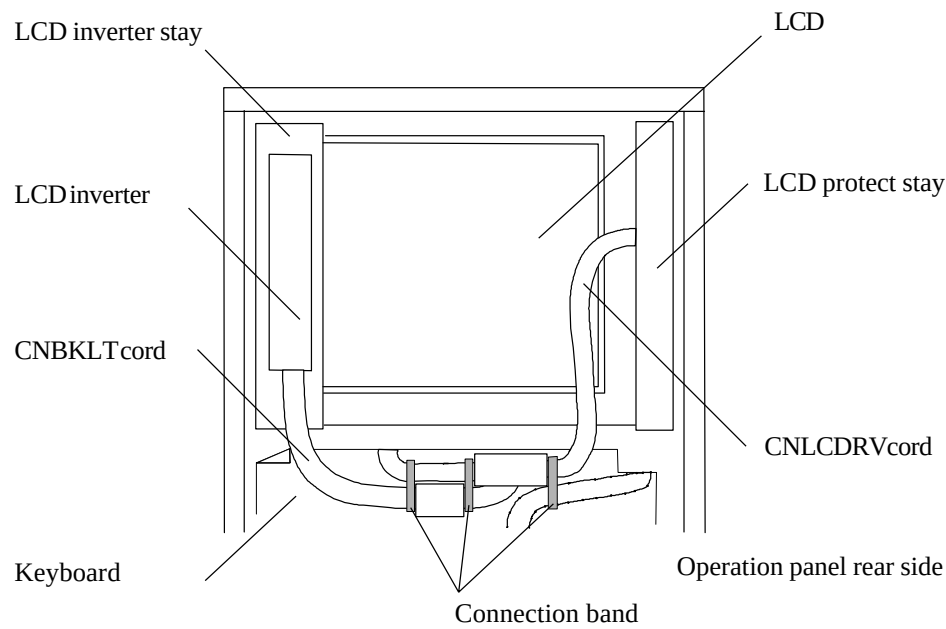
03.L2.3.ai

Replacement parts		Tools to be used
Name	Parts code	
LCD assy supply	654519-001	Phillips screw driver Nipper Band

3.2.4 LCD inverter replacement

- 1. Turn on the [POWER] switch and then the main power breaker.
- 2. Remove eleven M5 screws from the front operation panel. Open the panel.
- 3. Remove two M3 screws securing the LCD inverter stay, and disconnect the connector between the LCD inverter and the LCD.
- 4. Remove the CNBKLT connector from the keyboard, and remove two cable ties securing the CNBKLT cord.
- 5. Replace the LCD inverter with the CNBKLT cord connected.
- 6. Secure the LCD inverter in the reverse order of steps 2 to 3. At this time, secure the ferrite cord of the CNBKLT cord with cable ties (2 locations).
- 7. Turn on the main power breaker and then the [POWER] switch. Check that the LCD turns on and displays the data correctly.

Note: Since the connector for the LCD inverter and that for the cord CNBKLT are very small, replace the LCD inverter without disconnecting the cord CNBKLT.

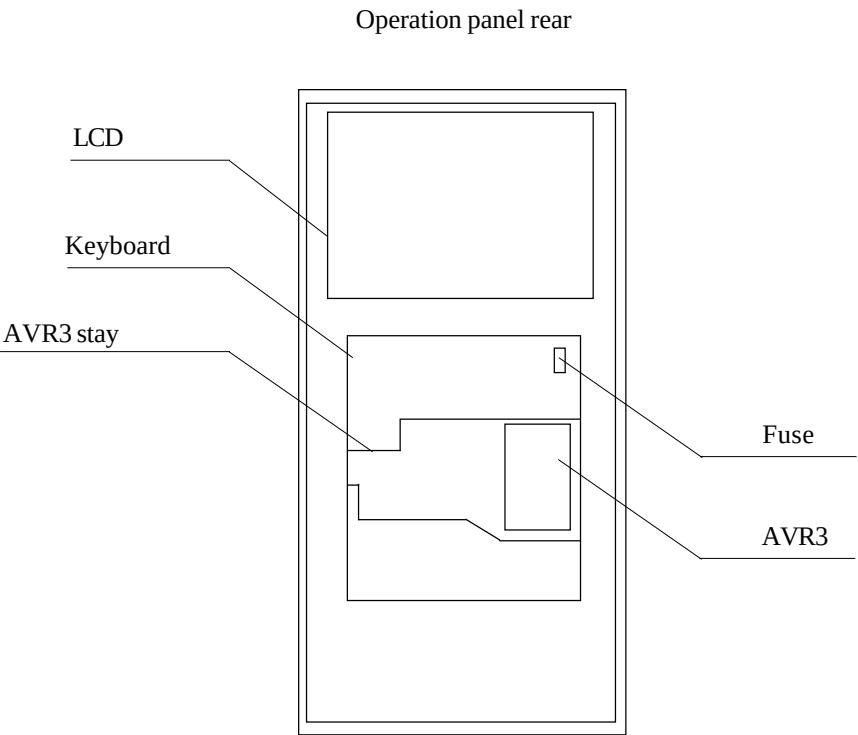


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Replacement parts		Tools to be used
Name	Parts code	
LCD inverter supply assy	654490-001	Phillips screw driver Nipper Band

3.2.5 Keyboard fuse replacement

- 1. Turn off the **[POWER]** switch and then the main power breaker.
- 2. Remove eleven (M5,11pcs.) screws from the front operation panel.
Open the panel.
- 3. Remove the fuse on the keyboard and replace the fuse.
- 4. Close the panel and tighten the screws.
- 5. Press the **[EMERGENCY STOP]** switch, and turn on the main power breaker and then the **[POWER]** switch.
- 6. Check the key operation.

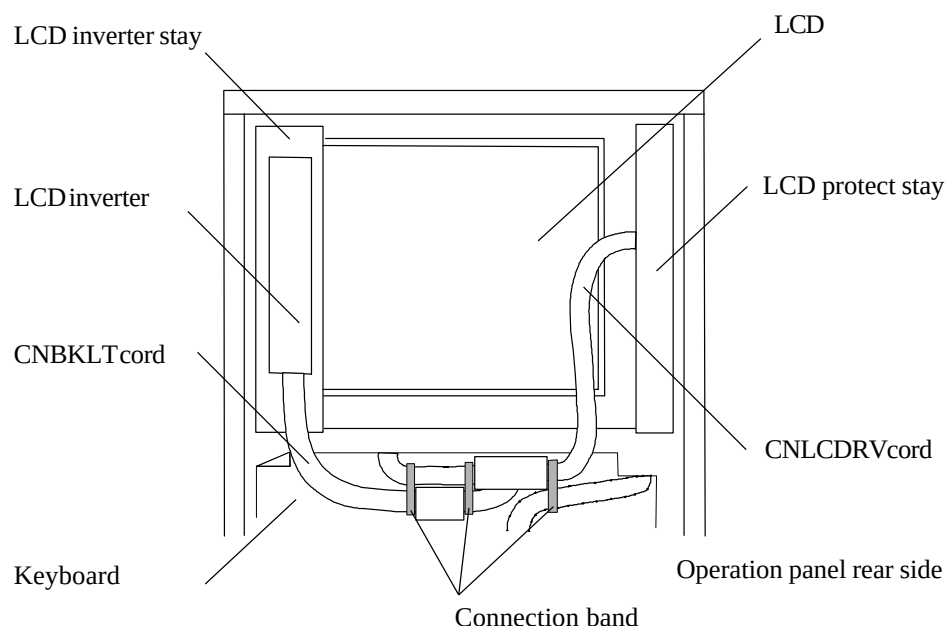


Replacement parts		Tools to be used
Name	Parts code	
G fuse S 1A		Phillips screw driver

3.2.6 LCD replacement

1. Turn on the [POWER] switch and then the main power breaker.
2. Remove eleven M5 screws from the front operation panel. Open the panel.
3. Remove the band connecting the CNLCDRV cord to the LCD protect stay. Loosen the M3 screws and remove the LCD protect stay.
4. Remove the screws (M3, 2 pcs.) securing the LCD inverter stay and detach the connector for the LCD inverter.
5. Remove the CNLCDRV connector from the keyboard, and remove three bands connecting the CNLCDRV cord.
6. Remove four spacers securing the LCD.
7. Remove the LCD with the CNLCDRV cord connected.
8. Replace the lamp. Refer to the next page "Lamp replacement" for more detail.
9. Secure the LCD in the reverse order of steps 2 to 5. At this time, secure the ferrite cord of the CNLCDRV cord with cable ties (3 locations).
10. Turn on the main power breaker and then the [POWER] switch. Check that the LCD turns on.

Note: Since the connector for the LCD and that for the cord CNLCDRV are very small, remove the LCD without disconnecting the cord CNLCDRV.



03.L2.3.ai

Replacement parts		Tools to be used
Name	Parts code	
LCD lamp supply	654872-001	Phillips screw driver Nipper Band

Lamp replacement

The lamps being used for the liquid crystal module are expendable supplies. Exchange it after you surely cut off the power supply in accordance with the hereunder process if an exchange is necessary by the life.

And, It is likely to be struck by electricity in the back light part when a lamp exchange is done with the power turned on because there is part that energized electric high voltage.

And, the lamp exchange of this liquid crystal module is done from the rear.

- (1) Remove one tapping screw to fix a BL holder.
- (2) Make to sag the hook (four places) of the P chassis.
- (3) Pull up a BL holder tab, and remove a BL holder.
- (4) Remove a lamp unit.
- (5) Include a lamp unit for the exchange into the liquid crystal module, and wired for the cable of the lamp.

(Note)

It is likely to be damaged when stress is added to the lamp.

Try not to make it dirty again so that trash and dust may not stick to the lamp.

There is danger of the breakage of the cable and catching fire when it gains a lamp cover with wiring of the cable of the lamp insufficient and coming off.

- (6) Put together four hooks with catching a tab in the P chassis.

(Note)

Be careful not to make it dirty again so that trash and dust may not appear in the frame.

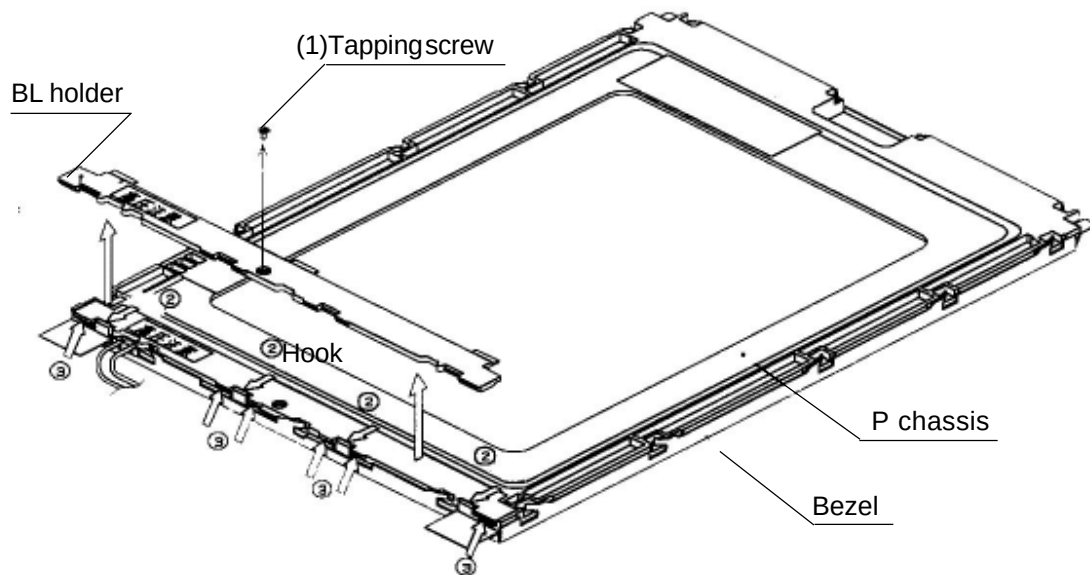
Be careful not to make it dirty again so that trash and dust may not stick to the inside of the lamp cover.

- (7) Fasten one tapping screw to fix a lamp cover in accordance with the groove of the prepared hole.

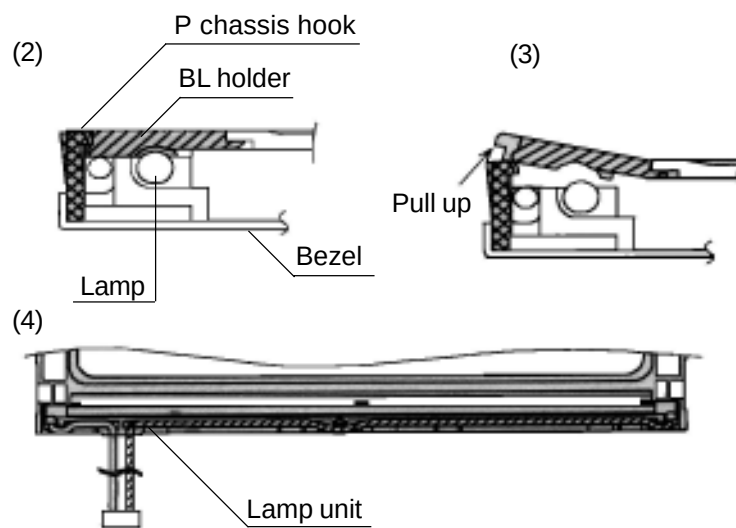
(Note)

The torque of the screw is 0.2N·m (2kgf·cm).

Be careful because it has the possibility that screw is ruined when it is fastened in more than that.

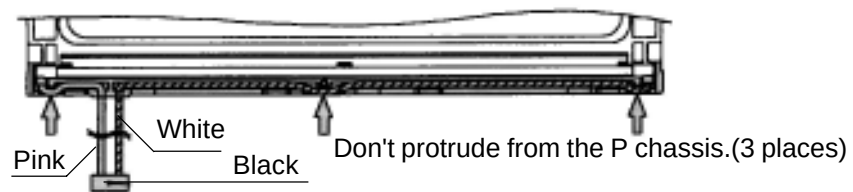


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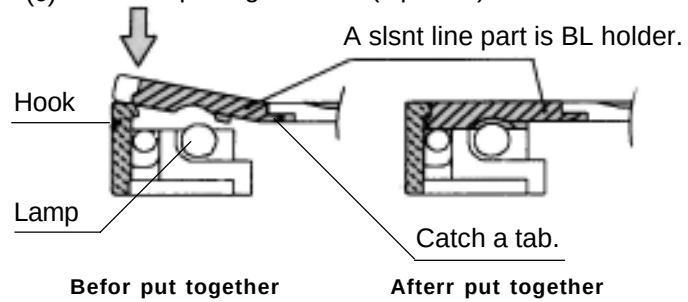


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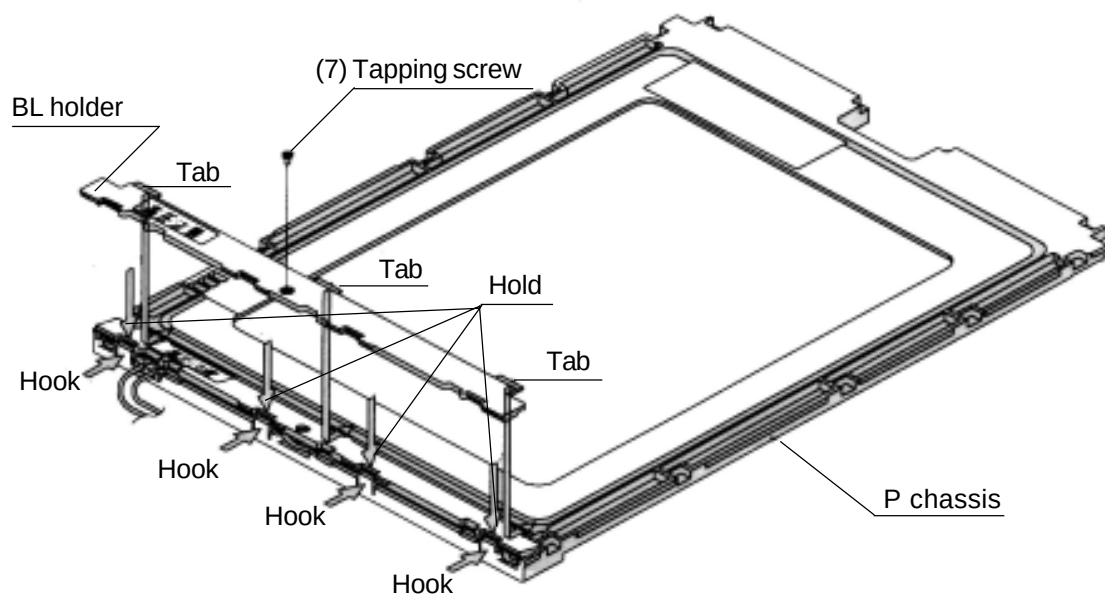
(5)



(6) Hold and put together tab.(4 places)



T20AMT004-6.doc

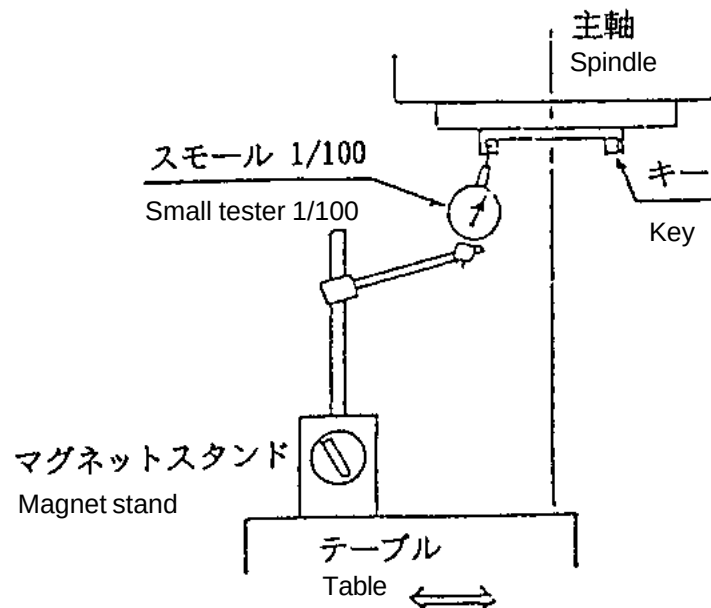


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Chapter 4 Adjustment Procedure (Mechanical)

4.1 Spindle

4.1.1 Spindle orientation adjustment (1/3)



1. Press[MANU].
2. Perform the spindle orientation by pressing the [ATC] key.
3. Fix a small tester on the table and measure the upper part of a spindle end key.
4. Move the table in the Y axis direction and measure another key on the opposite side.

*In case that the parallelism between the keys doesn't fall in 0.1 mm, perform the following adjustment.

- A. Adjustment procedure by using the coupling
 - 5A. By pressing the [-Z] key, lower the spindle head.
 - 6A. Loosen the spindle coupling fixing screw through the hole on the left side of the spindle head.
 - 7A. By pressing the [ATC] key, perform the spindle orientation.
 - 8A. By pressing the [-Z] key, lower the spindle head.
 - 9A. Turn the spindle manually to make the parallelism between the spindle keys within 0.02mm.
 - 10A. Tighten the spindle coupling.
 - 11A. By pressing the [ATC] key, perform the spindle orientation.
 - 12A. Check that the spindle key parallelism falls within 0.1mm.
 - 13A. Keep balance of the spindle. (Refer to 4.1.4 Spindle balancing)

4.1.1 Spindle orientation adjustment (2/3)

B. Adjustment procedure by using the grid shift value spindle.

5B. Press **[MANU]**.

6B. Press **[+Z]** to raise the Z-axis 2 to 3 mm from the current position to move the small test indicator off the drive key.

7B. Set the **[PROTECT ON/OFF]** switch to **[OFF]**.

8B. Press **[MANU]** or **[MDI]**. Press **[I/O]**, **[1]** and **[ENTER]**, **[PAGE UP]**, **[1]** and **[ENTER]**, **[F0]**, **[F0]**.

Press **[DATA BANK]**

For conversational type, press **[6]**, for NC type, press **[5]**, **[ENTER]**, **[1]**, and **[ENTER]**.

9B. Using the **[PAGE DOWN]** key and the cursor keys, move the cursor to **[GRIDSHIFTVALUE SPINDLE]**.

10B. Check the current grid shift value.

Calculate a new grid shift.

$$\text{New grid shift} = (\text{Current grid shift}) \times \frac{\pm \text{Key parallelism} \times 44}{2}$$

↖ :Round off to the nearest whole number.

When the key is positioned as



when viewed from above the spindle front, calculate using a positive value.

When the key is positioned as



when viewed from above the spindle front, calculate using a negative value.

11B. Enter the new grid shift value and press **[ENTER]**.

12B. Press **[F0]** twice to complete editing.

(The **[TURN OFF POWER]** message appears on the screen.)

13B. Turn the **<POWER>** switch off and on.

14B. By pressing the **[ATC]** key to operate the spindle orientation.

15B. Check that the spindle key parallelism falls within 0.1mm.

16. Correct the inspection report.

Replacement parts		Tools to be
Name	Parts code	Small test indicator 1/100 Magnetic stand Hex.wrench set

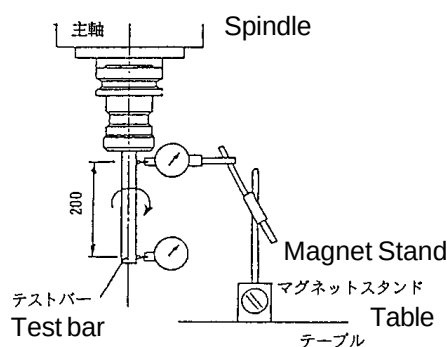
4.1.2 Static accuracy measurement

<Spindle hole deflection>

1. Install a test bar on the spindle.
2. Set a magnet stand on the table.
3. Place the small tester on the test bar at the mouth of the spindle and then at the place 200 mm away from the spindle mouth.
4. Rotate the spindle and measure the max.deflection.

	Root Position	200mm from root
Tolerance	0.01 or less	0.02 or less

(Unit:mm)



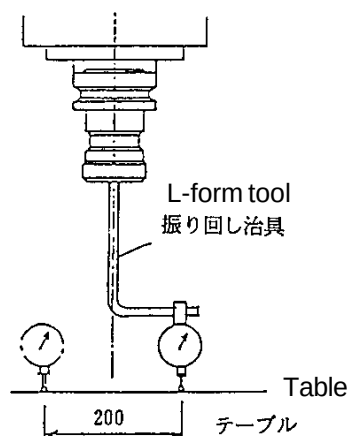
< Squareness of the spindle center line and the table surface >

1. Install a L-form tool on the spindle.
2. Make the small tester mounted on the L-form tool touched to the table surface.
(Measurement position: 100 mm from spindle center)
3. Rotate the spindle and measure the squareness.
Check the range that is within allowable.

	200mm from root
Tolerance	0.02 or less

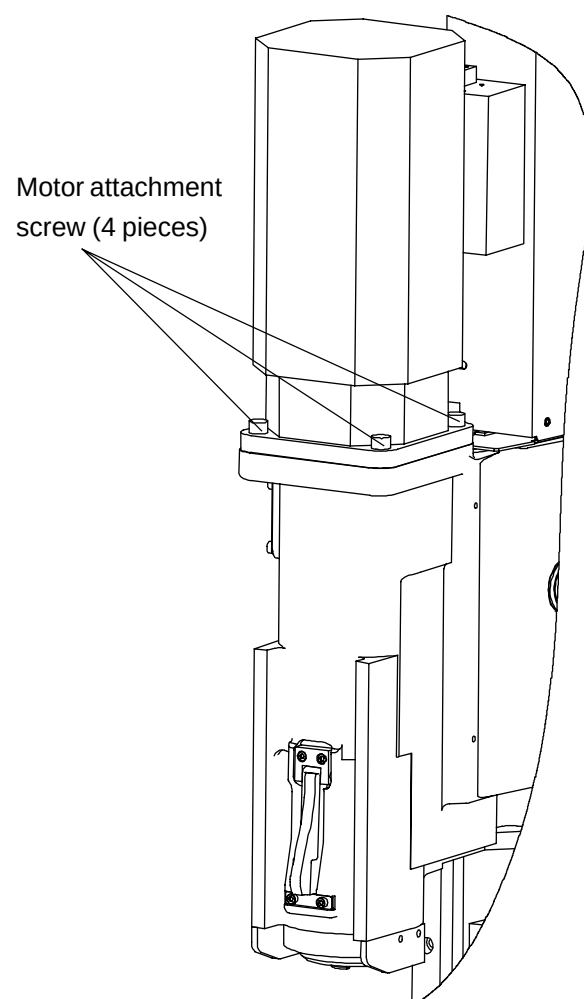
(Unit: mm)

(The table surface should not be inclined towards the operators side.)



Replacement parts		Tools to be
Name	Parts code	
		Test bar Small test indicator 2/1000 Magnetic stand L-form tool

4.1.3 Motor attachment position (1/2)

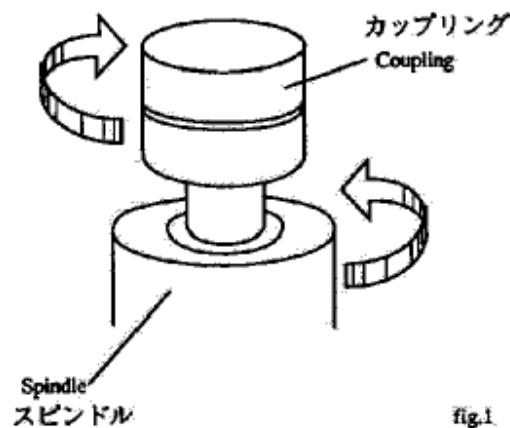


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4.1.3 Motor attachment position (2/2)

Adjust the motor mounting position only when the spindle motor is removed to replace the motor and the coupling.

1. Loosen the motor fixing screw for a half rotation.
2. Tighten the coupling screw on the spindle side. (It is not necessary to pay attention to the spindle orientation since this step is only for the adjustment.)
3. Rotate the spindle by 100 rpm, and raise it gradually, and rotate it with the manual mode by 2000 rpm.
4. Rotate the spindle for 30 to 60 seconds. Then, tighten the motor securing screw without stopping the spindle.
(The motor mounting position is adjusted automatically.)
5. Loosen the coupling screw on the spindle side.
6. Check that the spindle center is aligned with the coupling center.
(Manually rotate the coupling and the spindle in the reverse direction to check if those rotate lightly and smoothly. If they do not, try from step 1 again.)



7. Adjust the orientation.
(Refer to 4.1.1 Spindle Orientation Adjustment)
8. Adjust the balancing.
(Refer to 4.1.4 Spindle balancing)

4.1.4 Spindle balancing (1/5)

1. Remove the tool if one is attached to the spindle head.
2. Color all around the spindle, except for the section of approximately 10 mm, with a black marker.
3. Move the spindle head to the measurement position.
(Pay attention to the stroke center for the X and Y axes, and workability for the Z axis.)
4. Turn on the power of the balance monitor. Adjust the position of the speed sensor on the balance gauge so that it only reacts to the section (No.2) not colored by the black marker.
5. Attach the pick-up-sensor1,2 on the spindle head in surroundings to show in the figure.
6. Press **[MODE]** on the balance monitor to select **[2PL]**.
7. Rotate the spindle of for the type 10K specifications: 10000min^{-1} and the type 16K specifications: 16000min^{-1} . Press **[START]**.
The vibration angle and the vibration amplitude are displayed on the upper line and the lower line of balance monitors 1 and 2, respectively, for three seconds during measurement. (The displayed values disappear after three seconds, thus take note of what they are.)
8. If the vibration amplitude displayed on balance monitors 1 and 2 is $1\text{ }\mu\text{m}$ or less, balancing is not necessary. If it exceeds $1\text{ }\mu\text{m}$, perform single face balancing.

<Single face balancing procedure>

Type 16K specifications, do one face balance adjustment each of the upper sides (spindle coupling) and the bottom sides (the end face of the spindle).

Type 10K specifications, do one face balance adjustment of only the upper sides (spindle coupling).

1. Remove the cover beside the spindle head.
2. Remove all adjusting weights from the coupling and the spindle.
3. Attach pick-up 1 to where the manifold was attached.

4.1.4 Spindle balancing (2/5)

- a. Initial imbalance measurement (INT)

Turn on the power of the balance monitor and measure the initial imbalance. (You do not have to change the mode to [2PL].)

Rotate the spindle at maximum speed of the specifications and press **[START]**.

The vibration angle and the vibration amplitude are displayed on the upper line and the lower line of balance monitor 1, respectively, for three seconds during measurement. (The displayed values disappear after three seconds, thus take note of what they are.)

If the vibration amplitude is 0.5 μm or less, proceed to step “e”.

If it exceeds 0.5 μm , proceed to step “b”.
- b. Load imbalance measurement (TEST1)

Attach the testing weight to the coupling. (The testing weight should be 1.88 g. Mark the position the testing weight is attached.)

Rotate the spindle at maximum speed of the specifications and press **[START]**. After measurement has been completed, [TEST1] flashes. Enter the weight of the attached testing weight.

In the case that [TEST1] does not flash and the weight of the attached testing weight cannot be input, increase the weight of the testing weight and measure again.

Remove the testing weight after measurement.
- c. Attach the balance adjusting weights.

Press **[DIVIDED]** on the balance monitor. Select **[6P]** by pressing **[PAGE UP]** and **[PAGE DOWN]**, and press **[ENT]**.

When **[POL/DIV]** is pressed, the positions the weights are attached (#1 ~ 6) and the weight of the weights are displayed in the upper line and the lower line of balance monitors 1 and 2, respectively ([DIV] lights). Position 1 is followed by positions 2 to 6, clockwise when viewed from the top.

The testing weight is attached at position 1, and the adjusting weights are attached at the specified positions 2 to 6.
- d. Residual imbalance measurement (ADJ)

Rotate the spindle at maximum speed of the specifications and press **[START]**. The vibration angle and the vibration amplitude are displayed on the upper line and the lower line of balance monitor 1, respectively, for three seconds during measurement. (The displayed values disappear after three seconds, thus take note of what they are.)

If the vibration amplitude is 0.5 μm or less, proceed to step “e”.

If it exceeds 0.5 μm , repeat step “c” until the amplitude is below 0.5 μm .

If the vibration amplitude does not decrease, remove all the weights.

4.1.4 Spindle balancing (3/5)

Use a testing weight whose weight is close to that of the adjusting weight specified in step “c” and try measurement from the beginning again.

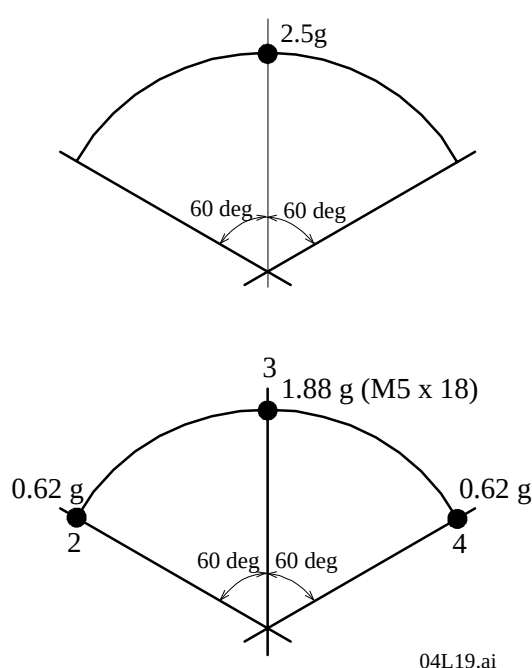
If still unsuccessful, conduct motor alignment and measure the amplitude.

If still unsuccessful, turn the coupling 90° and measure the amplitude.

If still unsuccessful, replace the coupling and measure the amplitude.

- e. Attach pick-up 1 on the spindle head lower left side in surroundings to show in figure.
- f. Bottom balancing
Perform steps “a” to “d” at the bottom of the spindle tip. At this point, attach the testing weights and adjusting weights to the bottom of the spindle tip.
(The testing weight to be attached to the bottom of the spindle tip should be 1.88 g : M5×18. To keep the same phase as that for the coupling section, the testing weight should be attached to the section corresponding to position 1 on the coupling, and position 1 is followed by positions 2 to 6, clockwise when viewed from the top.)
The weight should not protrude from the bottom of the spindle, thus the weight to be attached to the bottom of the spindle should be less than 1.88 g. (M5×18)

When the value of the weight required for the spindle exceeds the allowable weight, distribute it to the hole of both sides of the position where it is indicated , and it is possible that they put on the weight.



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Amount of unbalance = A

Balancing weight = B

$B = A - 1.88$

where 1.88 g is the weight of M5×18

e.g.

Angle (division number) = 3

Amount of unbalance = 2.5g

$2.5 - 1.88 = 0.62$

Put it on No.2 and No.4 0.62g, because it is put on No.3 only 1.88g.

4.1.4 Spindle balancing (4/5)

g. Final confirmation

Attach the pick-up-sensor1,2 on the spindle head in surroundings to show in the figure.

Turn on the power of the balance monitor and press **[MODE]** to select **[2PL]**.

Rotate the spindle at maximum speed of the specifications and press **[START]**.

The vibration angle and the vibration amplitude are displayed on the upper line and the lower line of balance monitors 1 and 2, respectively, for three seconds during measurement. (The displayed values disappear after three seconds, thus take note of what they are.)

If the vibration amplitude displayed on balance monitors 1 and 2 is 1 mm or less, measurement is completed. If it exceeds 1µm, repeat steps “a” to “f”.

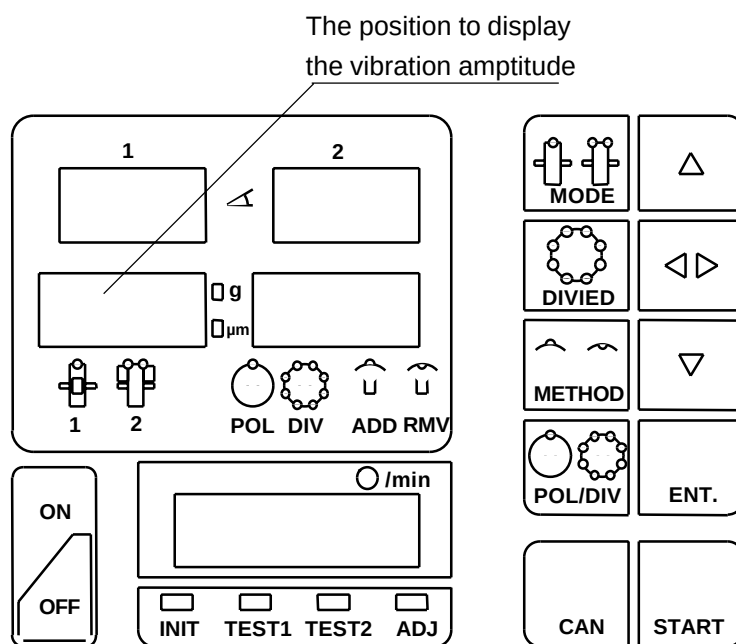
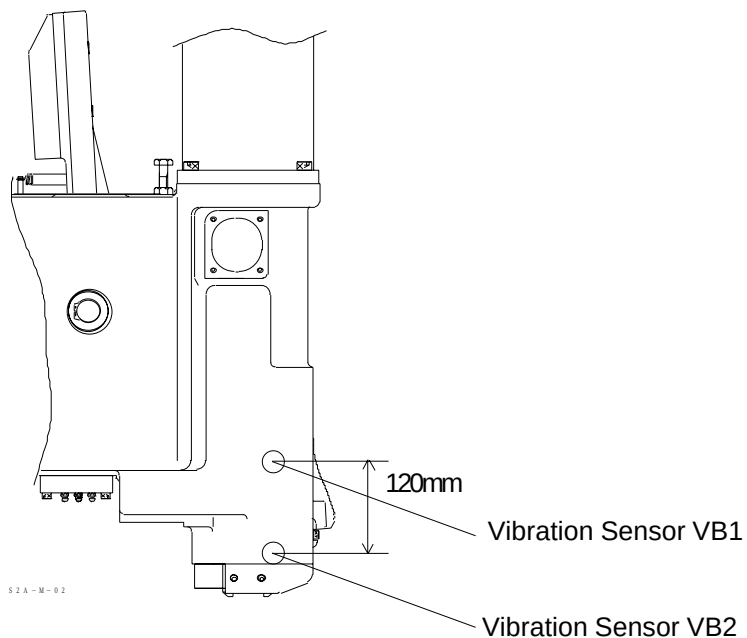
h. Finishing

Replace the adjusting weights from the spindle and coupling.

Apply the screw locking paint to the adjusting weights.

Adjust it to the spindle and coupling again.

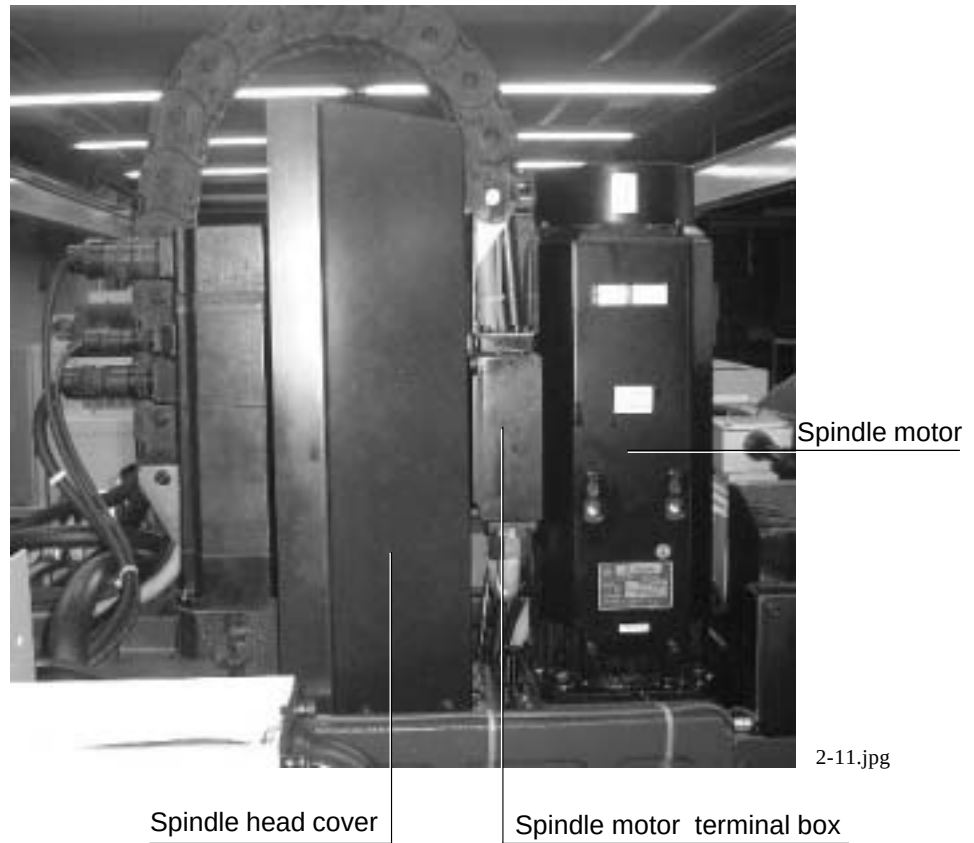
4.1.4 Spindle balancing (5/5)



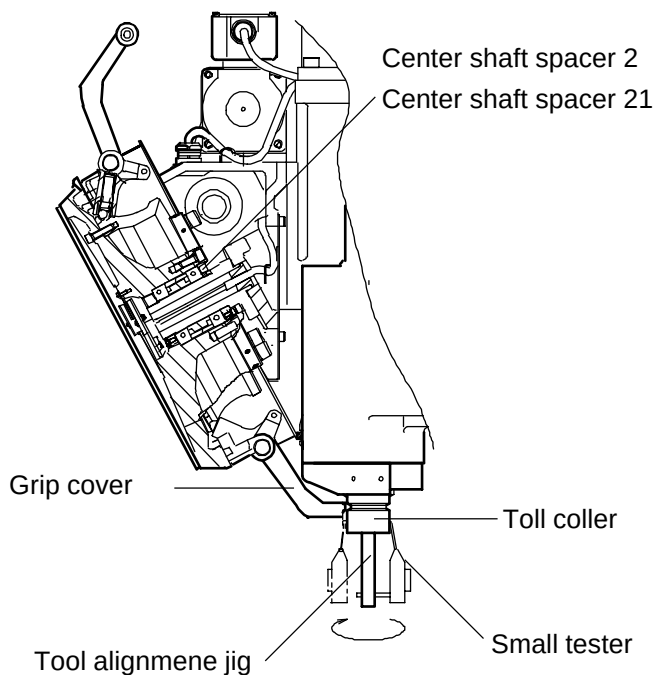
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4.2 Magazine

4.2.1 Magazine adjustment (1/4)



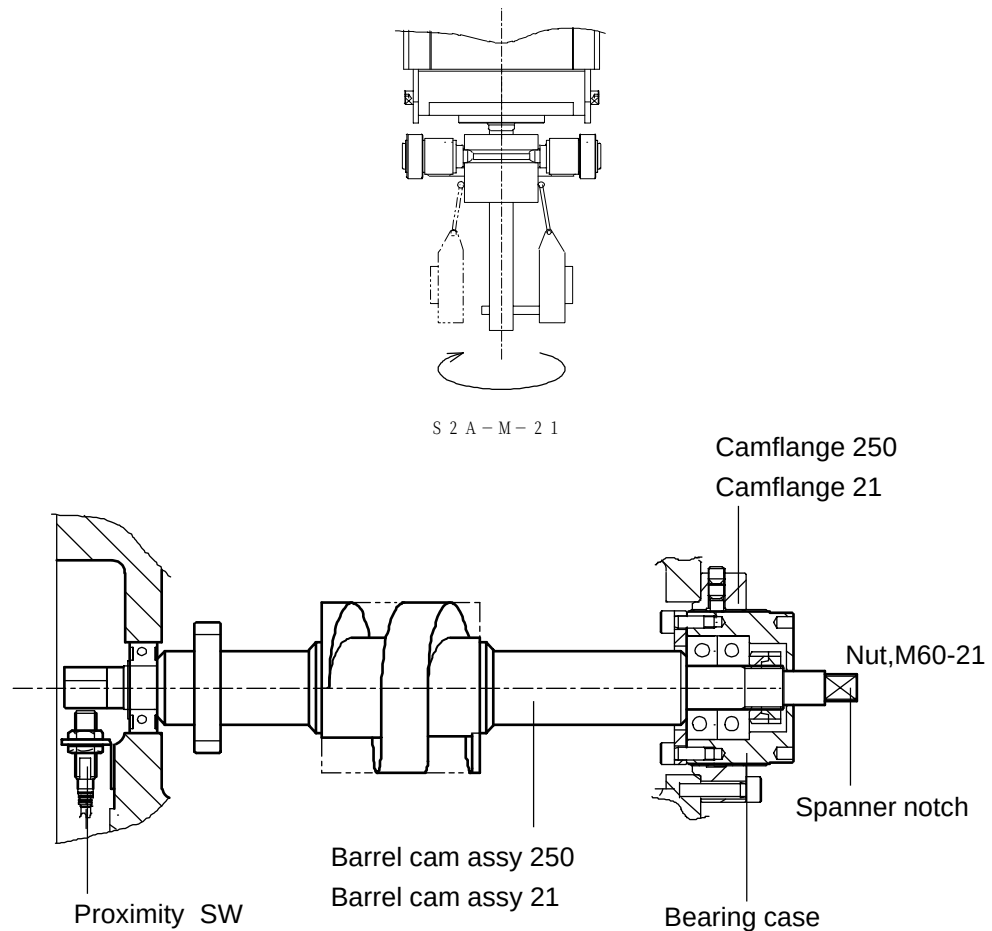
4.2.1 Magazine adjustment (2/4)



4.2.1-01.ai

1. After putting magazine No. tags on the tools, remove all the tools.
2. Remove the grip cover.
3. Remove the spindle head cover R, L.
4. Select the manual operation mode with the **[MANU]** key.
5. By pressing the **[ATC]** key, perform the spindle orientation. Make sure that the spindle orientation was completed.
6. By pressing the **[ATC]** key, raise the spindle head up to the ATC zero position.
7. Manually insert the tool align- ment jig into the spindle taper.
8. While pressing the **[RELSE]** key, press the **[-Z]** key to lower the spindle head. After mounting the tool alignment jig at the end of the spindle firmly, take off the unclamp cam out of the unclamp arm.
9. While pressing the **[RELSE]** key, press the **[+Z]** key to raise the spindle head. Then, make the grip held the tool collar.
10. While pressing the **[RELSE]** key, press the **[-Z]** key to lower the spindle head untill it comes 5mm away from the tool collar. Mount a small tester at the bottom of the tool alignment jig, which is mounted through the tool collar center hole.
11. Rotate the spindle manually and check that the indication of the tool tester at the rear side of the tool collar outer surface is within -0.3 ± 0.1 mm when the front side is set to 0. In case that the deviation between the front and the rear sides doesn't fall within -0.3 ± 0.1 mm, replace the center shaft spacer 2. 0.1 mm thicker spacer causes magazine position shifted by 0.08 mm towards the front (deviation changes by 0.16 mm). As to the replacement procedure of the spacer, refer to 2.2.1 "Replacement procedure of the ATC magazine".

4.2.1 Magazine adjustment (3/4)



4.2.1-02.ai

Thickness of the spacer:

4.6/ 4.7/4.8/4.9

5.0/5.1/5.2/5.3/5.4

12. Rotate the spindle manually and check that the deviation between the right and the left sides of the tool collar outer surface is within 0.3 mm.

(Note)

Measure it while pushing the magazine lightly to get rid of the space between the barrel cam and the cam follower. In case that the deviation is bigger than 0.3 mm, follow steps indicated below.

4.2.1 Magazine adjustment (4/4)

- 12.1 Loosen two screws (2 pcs. 2points) securing cam flange 250.
(It is not necessary to remove them.)
- 12.2 Loosen the nut M60-21. (Only 21 tools magazine)
- 12.3 By turning the bearing case, adjust the deviation within 0.3 mm.
When the bearing case is turned to the right by 36°, the barrel cam moves by 0.1 mm. Center of the grip moves by 0.4 mm under this condition.
- 12.4 Loosen the hex.hole securing socket.
7.84N·m (80kgfcm)
- 12.5 Tighten the nut M60-21. (Only 21 tools magazine) 78N·m (800kgfcm)
- 13. Remove the small tester and the tool collar.
- 14. Mount the unclamp cam.
- 15. Remove the tool alignment jig.
- 16. Mount a tool on the grip under the spindle.
- 17. While pressing the **[RELSE]** key, press the **[-Z]** key to lower the spindle head.
Check that a tool is clamped and unclamped smoothly.
- 18. Attach the spindle head cover R, L.
- 19. Attach the grip cover.

Replacement parts		Tools to be used
Name	Parts code	
CENTER SHAFT SPACER 2	640140001	Phillips screw driver (+) Tool alignment jig Hex. wrench (1 set) Tool collar M40 wrench (SP) Spanner 13 Small test 1/100 Wrench for cam Jig for magazine spacer selection

4.2.2 Address sensor adjustment (1/4)

1. After putting magazine No. tags on the tools, remove all the tools.
 2. Press the key **[ATC]**, and they raise the Z shaft in the ATC origin.
 3. Remove the magazine cover R and L.
 4. Remove the proximity sensor cover located on the left side of the saddle.
 5. Remove the address plate.
 6. Check the magazine is indexed in the right position.
(The magazine should not be moved when it is pushed by hands.)
 7. By pressing the **[I/O]** key, display <the I/O menu >on the screen..
Then, by pressing the keys **[1]** and **[ENTER]**, display the< I/O >screen.
By pressing the **[PAGE DOWN]** key, display the <Main 2> screen indicated below.
- Check that the binary number indicated by bits (*) of the Input 2
(on the screen) is the same as the indexed magazine No.
(Refer to the table below.)

The diagram illustrates the Main2 program's data flow. On the left, under the heading "Main2", are five input lines: "Input 1" (16 asterisks), "Input 2" (the string "FEDCBA9876543210" followed by 16 asterisks and a bar chart with 5 bars of heights 1, 1, 2, 3, 2), "Input 3" (16 asterisks), "Input 4" (16 asterisks), and "Input 5" (16 asterisks). On the right, under the heading "Output", are three output lines: "Output 1" (16 asterisks, preceded by a pentagon icon), "Output 2" (16 asterisks, preceded by a solid circle icon), and "Output 3" (16 asterisks, preceded by a solid circle icon).

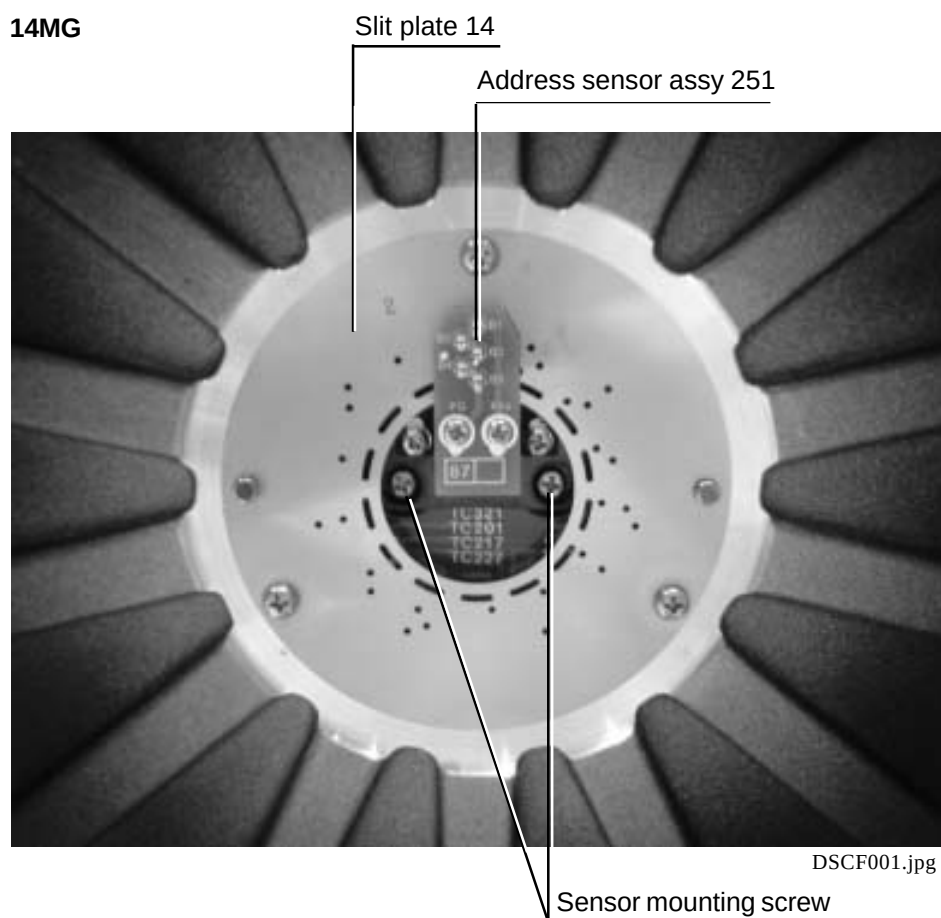
* Correspondance between the bits (*) and the magazine No. is as follows.

Bit	F	E	D	7	4
Indication of Input1	Encoder Signal 8	Encoder Signal 4	Encoder Signal 2	Encoder Signal 1	Encoder Signal 16
Input display	0	1	0	1	1
Magazine No.	$1 \times 16 + 0 \times 8 + 1 \times 4 + 0 \times 2 + 1 = 21$				

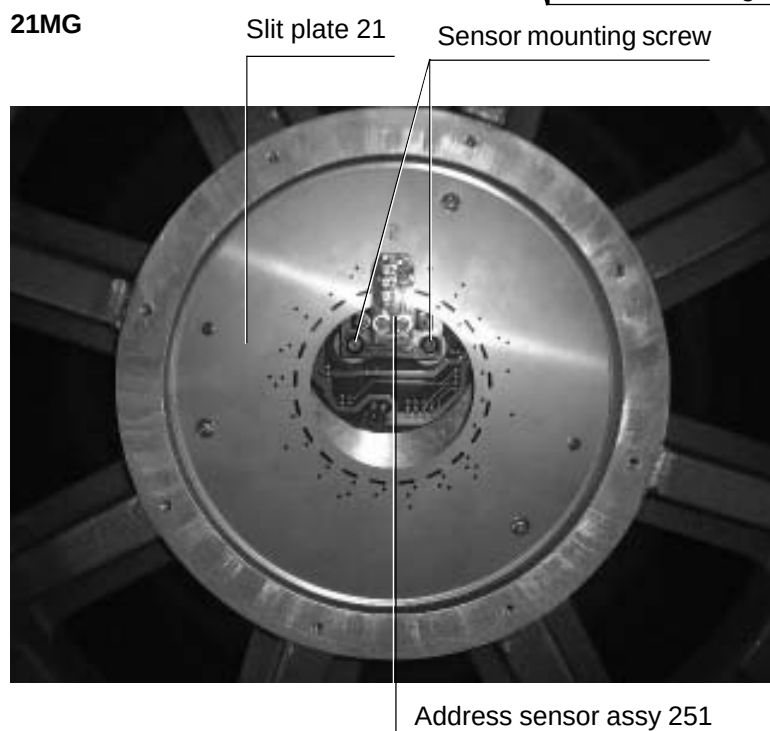
Turn the barrel cam right end to the right by using a spanner. Mark the position of an edge of the address sensor on the slit plate when a bit of Input 2 (indicating the magazine No.) changes from 1 to 0. Then, turn the barrel cam to the left and mark on the slit plate in the same way.

4.2.2 Address sensor adjustment (2/4)

14MG



21MG



4.2.2 Address sensor adjustment (3/4)

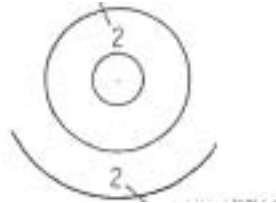
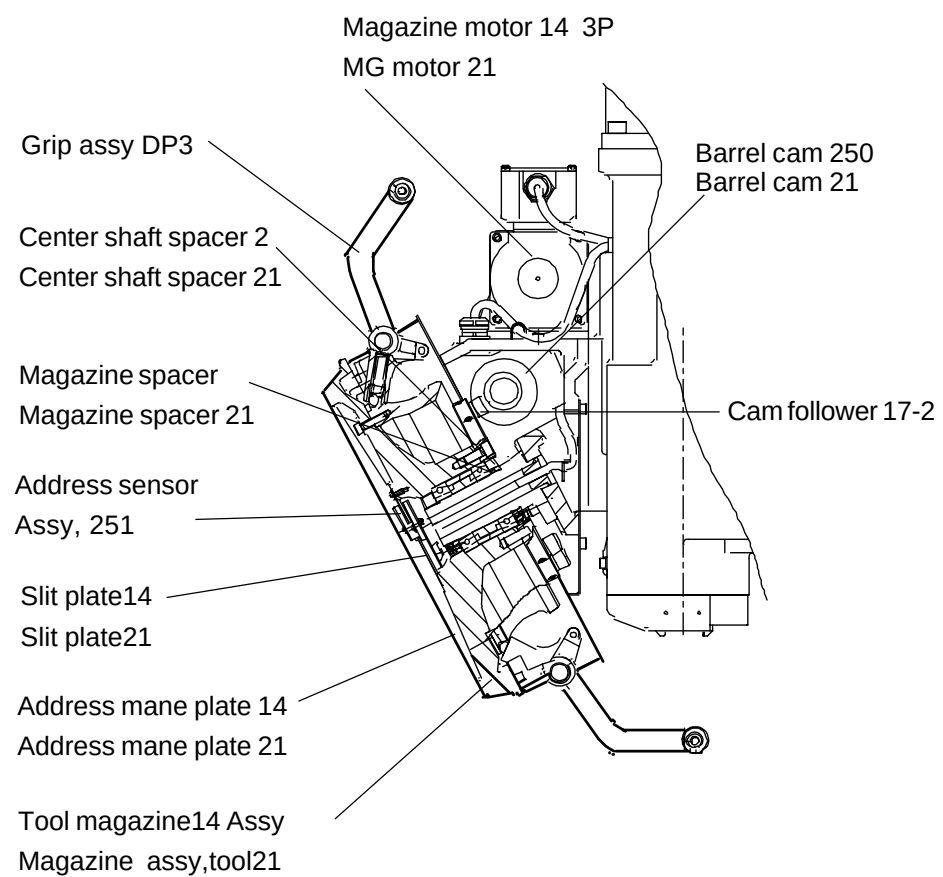


Figure "2" on the address plate



4.2.2-01.ai

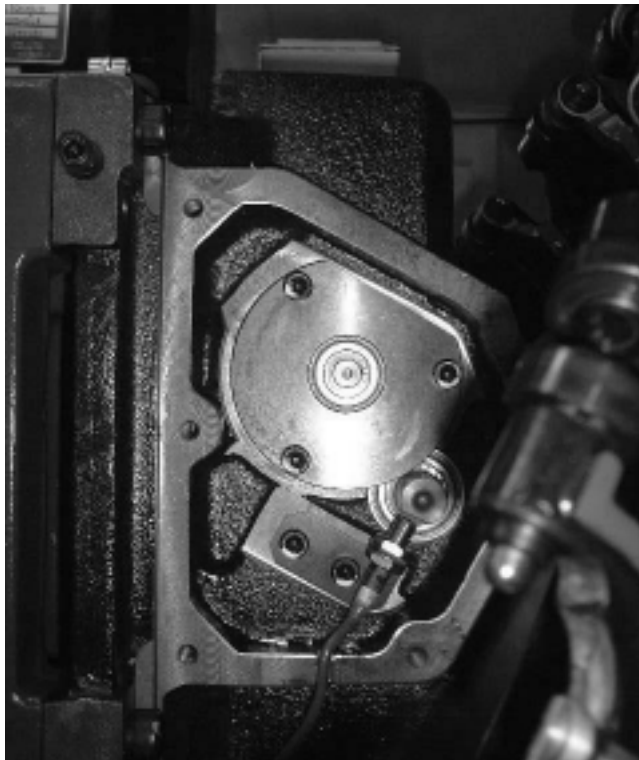
4.2.2 Address sensor adjustment (4/4)

8. Turn the right end of barrel cam until notch of the left end and the :proximity switch become parallel after you turn it until the position of the magazine is No.7.
9. Loosen the address sensor mounting screw and move the address sensor so that its edge locates at the center of the marks on the slit plate.
Tighten the mounting screw.
10. By rotating the barrel cam, index the magazine at No. 1 to 14 (21) positions. Each time, rotate the magazine manually and check that the magazine No. is properly displayed.
11. Pressing the **[MAGZ]** key repeatedly, check that the indexed magazine No. is properly displayed.
12. Select the magazine No. 2.
<CONV>
By pressing the **[MDI]**, **[PRGRM]** and **[CURSOR DOWN]** key, set the cursor to the tool column.
Press the **[2]** and **[ENTER]** key and the **[START]** button.
<NC>.
Press the **[MDI]**, **[M]**, **[0]** , **[6]** , **[T]** ,**[1]**, **[0]**, **[2]** key and the **[START]** button.
13. Attach the address plate while putting the figure "2" at the bottom.
14. Attach the magazine cover R, L.
15. Attach the grip cover.
16. Mount tools on the grips according the magazine No. tags.

Replacement parts		Tools to be
Name	Parts code	
		Phillips screw driver (+) Hex. wrench (1 set) Spanner 13

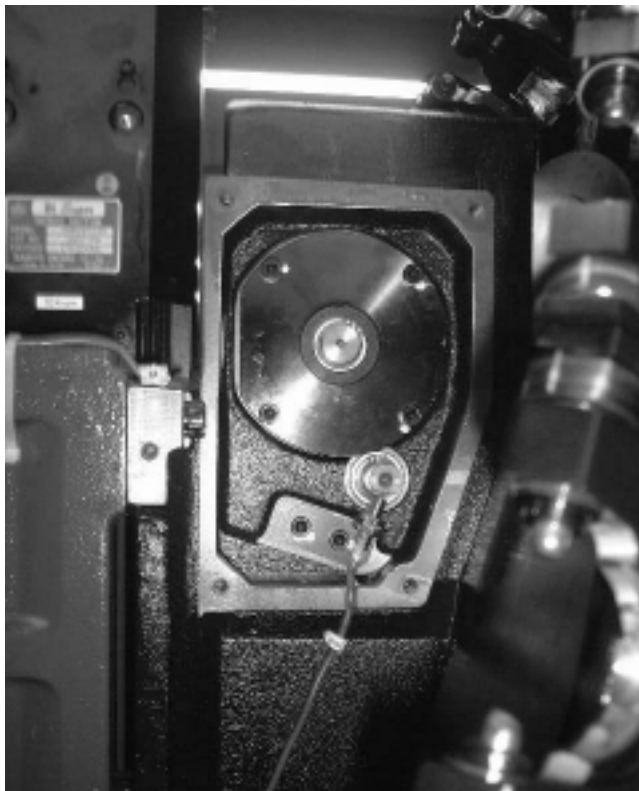
4.2.3 Barrel cam proximity adjustment (1/3)

14MG



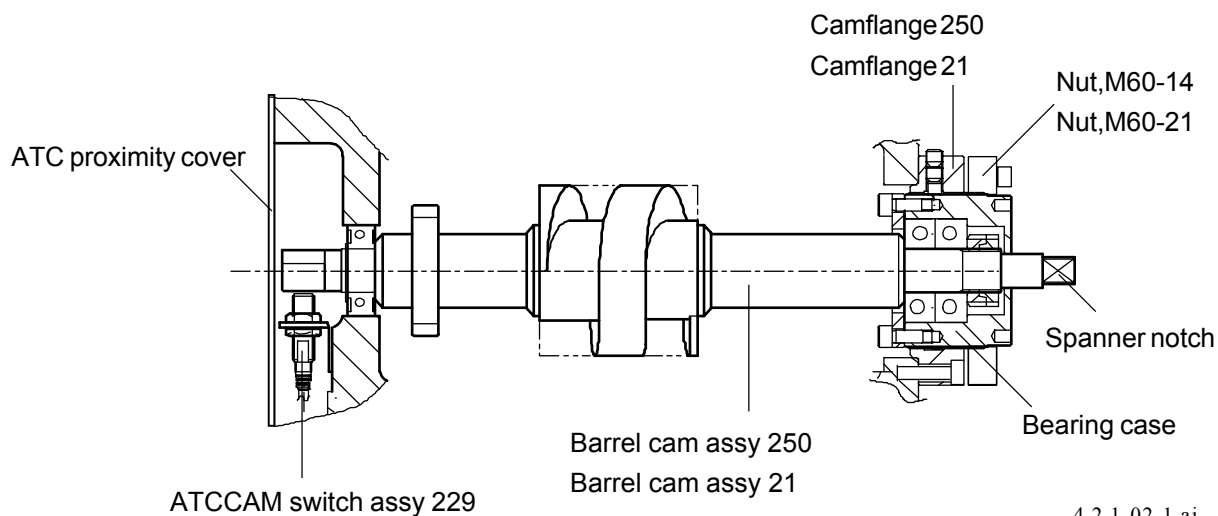
4-4.jpg

21MG



4-5.jpg

4.2.3 Barrel cam proximity adjustment (2/3)



4.2.1-02-1.ai

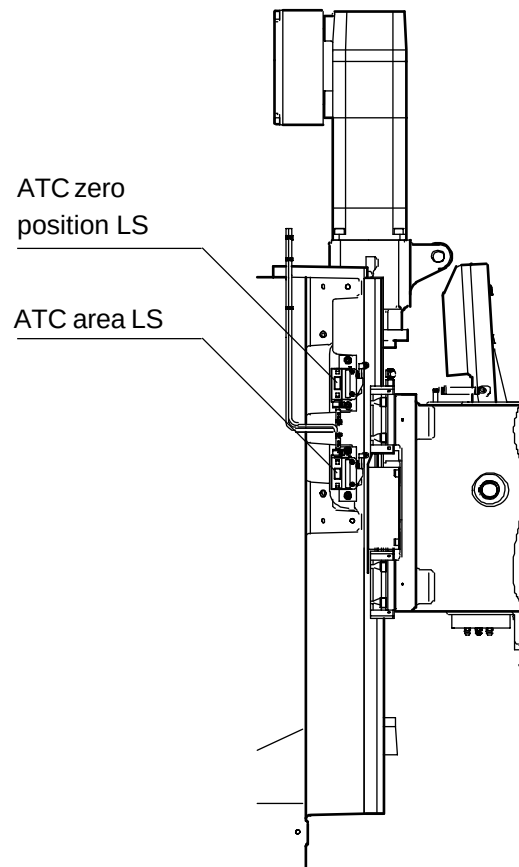
1. After putting magazine No. tags on the tools, remove all the tools.
2. Remove the magazine cover R, L.
3. By pressing the **[MANU]** key, select the manual operation mode.
4. By pressing the **[ATC]** key, move the spindle head to the Z axis zero position and perform the spindle orientation.
5. By pressing the **[ATC]** key, raise the spindle head up to the Z axis upper limit.
6. Grip the barrel cam right side end with a spanner and turn the barrel cam by 180°. (Caution: Magazine turns at the same time.)
7. Remove the proximity switch cover.
8. Loosen the proximity switch mounting nut.
9. Keeping the clearance between the barrel cam shaft outer surface and the proximity switch at 0.8 mm. Then, tighten the mounting nut.
10. Rotate the barrel cam and check that the proximity switch LED is OFF when the barrel cam comes to the zero position. Also, display the I/O screen by pressing the **[I/O]** key and check that the bit 6 of Input 2 on the < I/O (Main1) > screen is "0" under the above condition.

4.2.3 Barrel cam proximity adjustment (3/3)

11. Rotate the barrel cam and check if the proximity switch LED is ON when the barrel cam is out of the zero position. Display the <I/O>screen by pressing the **[I/O]** key. Check if the bit 6 of Input 2 on the <I/O (Main 1)> screen is "1" under this condition.
12. After making the barrel cam left side notch parallel to the proximity switch, press the **[RELSE]** key and the **[-Z]** key at the same time to lower the spindle head below the Z axis zero position.
13. Attach the proximity switch cover.
14. Attach the magazine R, L cover.
15. Attach the grip cover.
16. Mount tools on the grips by matching the magazine No. tags.

Replacement parts		Tools to be
Name	Parts code	Phillips screw driver (+) Spanner 13 Clearance gauge

4.2.4 ATC zero position LS adjustment (1/2)



4.2.4-01.ai

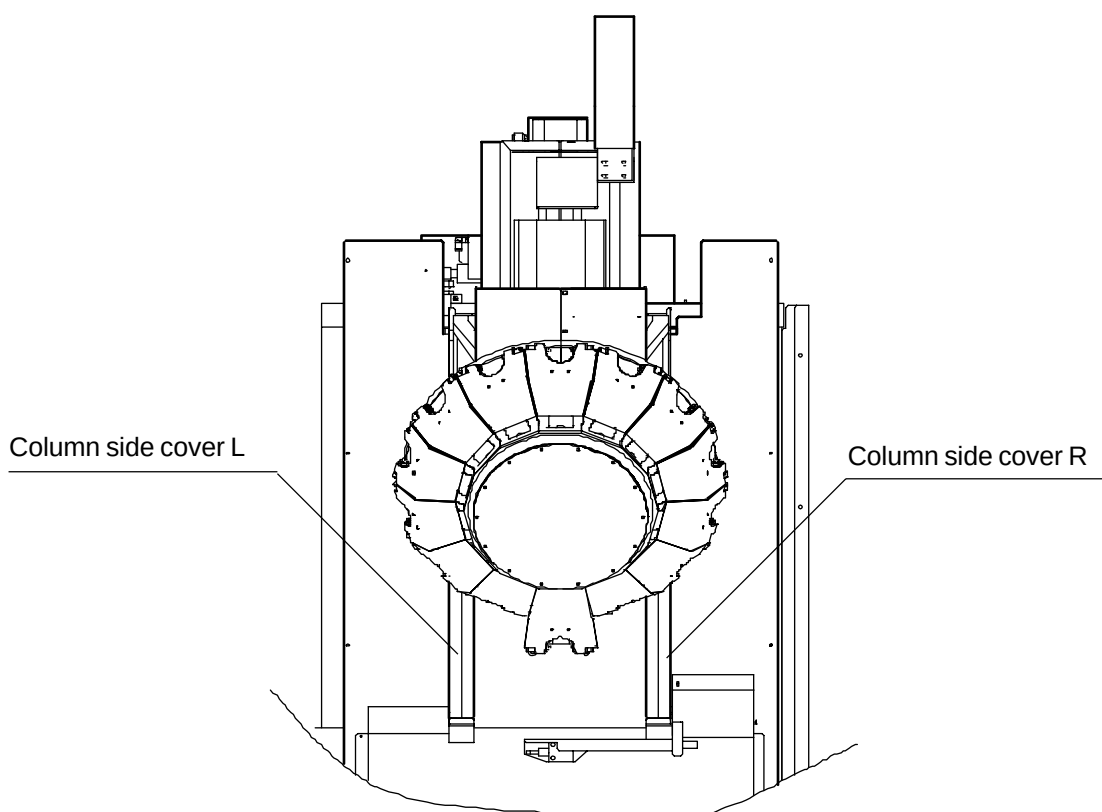
1. Select the manual operation mode by pressing the **[MANU]** key.
2. By pressing the **[CURSOR DOWN]** key, move the cursor to the step traveling amount.
3. By pressing the **[+]** key, set the step traveling amount to 0.1 mm/step.
4. By pressing the **[ATC]** key, move the spindle head to the z axis zero position and perform the spindle orientation.
5. By pressing the **[ATC]** key, raise the spindle head up to the z axis upper limit.
6. By pressing the **[I/O]** key, display the <I/O> screen (menu) on the screen. Then, press the keys **[1]**, **[ENTER]** to display the <I/O> screen (main1).
7. After pressing the **[JOG]** key, press the **[RELSE]** and the **[-Z]** keys at the same time to move the Z axis until bit E of Input 9 on the I/O screen (main 1) indicates "0".
8. After pressing the **[STEP]** key, press the **[RELSE]** and the **[+Z]** keys at the same time to move the Z axis in the step mode until bit E of Input 9 on the I/O screen (main 1) indicates "1".
9. Display the machine current coordinate screen by pressing the **[POS]** key and check the Z axis machine coordinate.

(Note) Hight colum type need add the difference in size between hight colum and the other.

4.2.4 ATC zero position LS adjustment (2/2)

Standard value	567 ± 1

10. When the Z axis machine coordinate is within the standard value, adjustment is completed. If not, proceed to the next step to adjust the limit switch position.

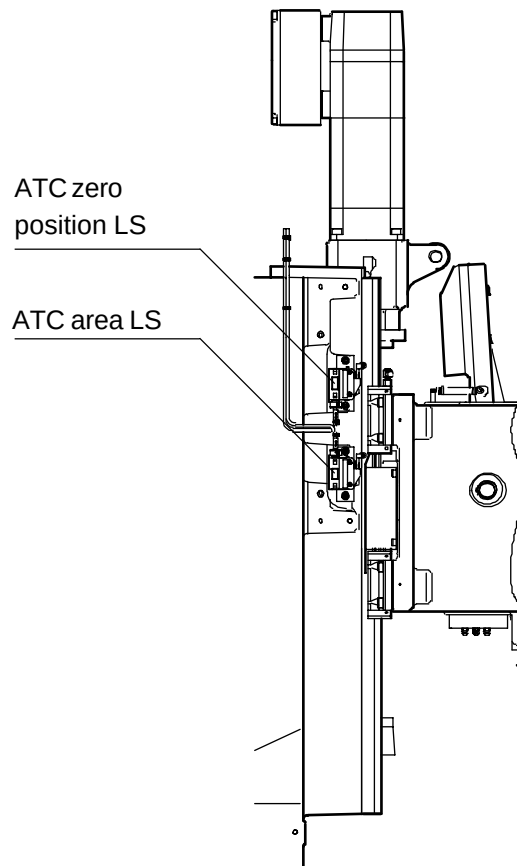


4.2.4-02.ai

- 10.1 Remove the column side cover L on the left side of the column.
 10.2 Loosen the LS mounting screw and shift the LS.
 10.3 Check the Z axis machine coordinate by the procedure from step 6. to step 9.
 10.4 Mount the column side cover L.

Replacement parts		Tools to be
Name	Parts code	
		Phillips screw driver (+) Hex. wrench (1 set)

4.2.5 ATC area LS adjustment (1/2)



4.2.4-01.ai

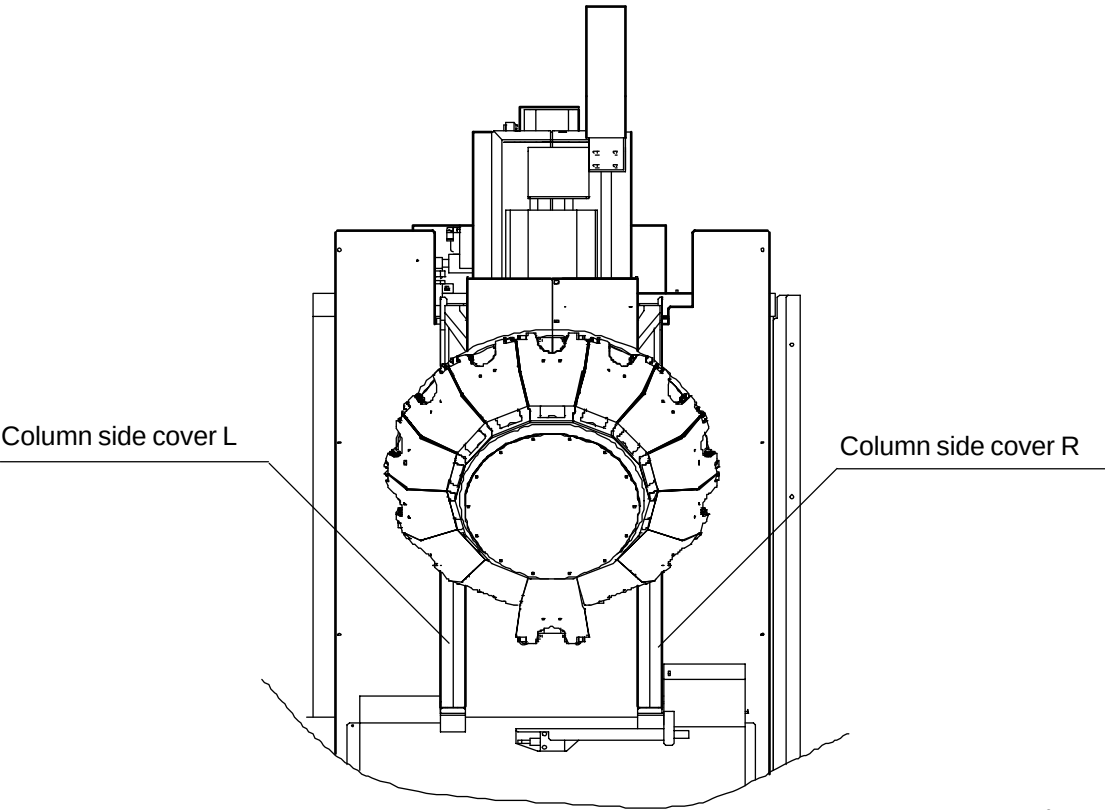
1. Select the manual operation mode with the **[MANU]** key.
2. By pressing the **[CURSOR DOWN]** key, move the cursor to the step traveling amount.
3. By pressing the **[+]** key, set the step traveling amount to 0.1 mm/step.
4. By pressing the **[ATC]** key, move the spindle head to the Z axis zero position and perform the spindle orientation.
5. By pressing the **[I/O]** key, display the <I/O> screen (menu) on the screen. Then, press the keys **[1]**, **[ENTER]** to display the <I/O> screen (main1).
6. After pressing the **[JOG]** key, press the **[RELSE]** and the **[+Z]** keys at the same time to move the Z axis until bit F of Input 9 on the <I/O> screen (main1) indicates "1".
7. After pressing the **[STEP]** key, press the **[RELSE]** and the **[-Z]** keys at the same time to move the Z axis in the step mode until bit F of Input 9 on the <I/O> screen (main 1) indicates "0".
8. Display the machine current position screen with the **[POS]** key. Check the Z axis machine coordinate.

(Note) Hight colum type need to add the diff erence in size between hight colum and the other.

Standard value	435± 3

4.2.5 ATC area LS adjustment (2/2)

- 9. When the Z axis machine coordinate is within the standard value, adjustment is completed.
 If not, proceed to the next step to adjust the limit switch position.
 (Adjustment of the limit switch position)
- 9.1 Remove the column side cover L on the left side of the column.
- 9.2 Loosen the LS mounting screw and shift the LS.
- 9.3 Check that the Z axis machine coordinate is within the standard value by repeating procedures from 5. to 8. above.
- 9.4 Attach the column side cover L.



Replacement parts		Tools to be
Name	Parts code	
		Phillips screw driver (+) Hex. wrentch (1 set)

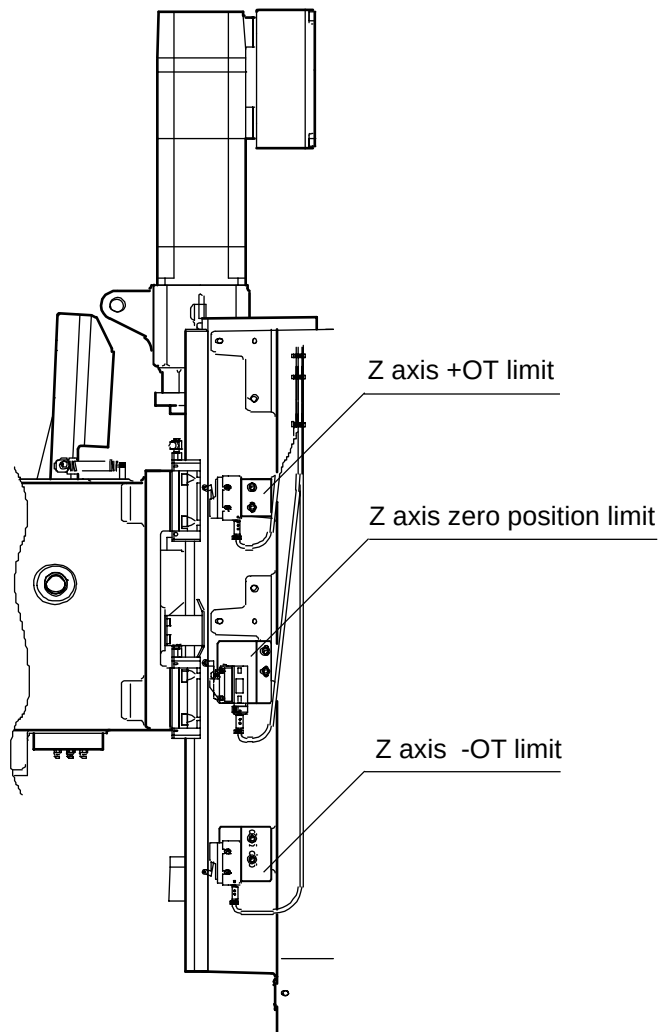
4.3 Feed Axis

4.3.1 X, Y, Z axes origin limit switch A (1/4)

(A) Origin limit switch adjustment procedure by changing shifting for XY coupling.

CAUTION!

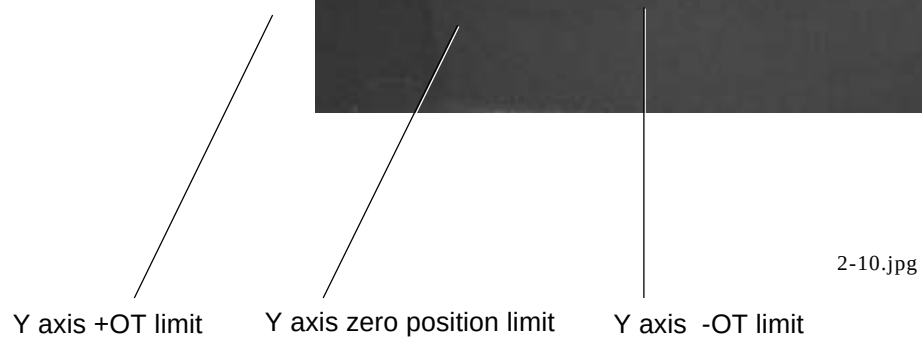
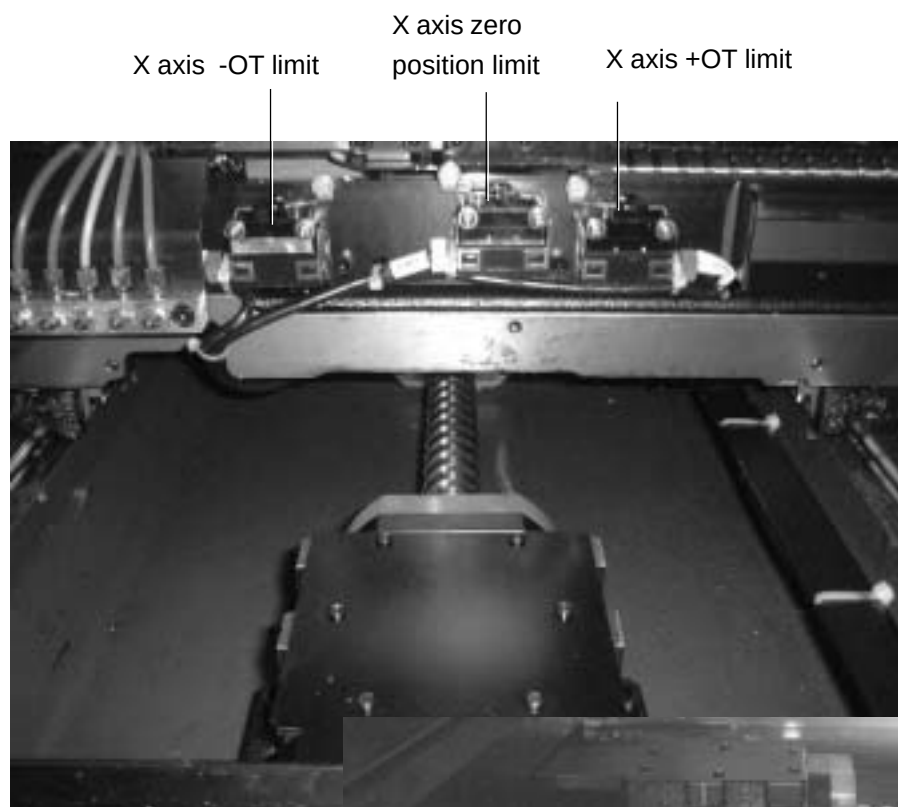
The X and Y axes of the TC-S2B performs torque observer control that compensates the amount of torque after estimating the load. Oscillation occurs when the motor is not connected to the load (e.g. when the motor is operated independently) because the actual load differs from the estimated load.



4.3.4-01.ai

4.3.1 X, Y, Z axes origin limit switch A (2/4)

(A) Origin limit switch adjustment procedure by changing shifting for XY coupling.



4.3.1 X, Y, Z axes origin limit switch A (3/4)

(A) Origin limit switch adjustment procedure by changing shifting for XY coupling.

1. Set the **[PROTECT ON/OFF]** switch to **[OFF]**.
2. Select **[DATABANK]** -> **[MACHINE PARAMETER]** -> **[SYSTEM 1]** and take note of the value set for **[GRID SHIFT VALUE X (Y, Z)]** and **[X (Y, Z) ORIGIN OFFSET VALUE]** and reset the value to zero (0).
Press **[MANU]** or **[MDI]**. Press **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]** and **[F0]**.
Press **[DATABANK]**: Conversation **[6]**
 NC **[5]**
Press **[ENT]**, **[1]**, **[ENT]**, **[PAGE DOWN]** and **[CURSOR DOWN]** to move the cursor to **[GRID SHIFT VALUE X (Y, Z)]** and take note of the value.
Press **[0]** and **[ENT]**. In the same way, take note of the value set for **[X (Y, Z) ORIGIN OFFSET VALUE]** and press **[0]**, **[ENT]** and then **[F0]**, **[F0]**.
3. Set the **[PROTECT ON/OFF]** switch to **[OFF]**.
4. Turn the <POWER> switch off and then on again.
5. Press **[MANU]** and **[Z. RTN]**.
6. Select the manual mode to move the cursor to **[STEP]**.
7. Use **[+]** to set 0.1 mm for **[STEP]**.
8. Enter **[I/O]**, **[1]** and **[ENT]**. The <INPUT/OUTPUT MENU (Main1)> screen appears.
9. Press **[JOG]**.
10. Press **[-X]**, **[-Y]** or **[-Z]** to perform jog operation until bit 8 (9,A) of Input 9 indicates "1".
11. Press **[STEP]**.
12. Press **[-X]**, **[-Y]**, or **[-Z]** to perform step operation until bit 8 (9,A) of Input 9 indicates "0". Take note of the machine coordinate.
13. Press **[POS]** to check the machine coordinate on the screen.

4.3.1 X, Y, Z axes origin limit switch A (4/4)

(A) Origin limit switch adjustment procedure by changing shifting for XY coupling.

Axis	Reference value
X	-8 ± 1
Y	-8 ± 1
Z (Standard type)	422 ± 1
Z (Long stroke type)	402 ± 1

(Note) Hight colum type need to add the diff erence in size between hight colum and the other.

14. When the machine coordinate is within the reference value in the table above, adjustment is completed. If beyond the value, take note of the machine coordinate currently displayed on the screen. When the value for XY axes is not within the reference value, shift the coupling.
15. Press **[JOG]**.
16. Press **[-X]**, **[-Y]** or **[-Z]** to perform jog operation until bit 8 (9,A) of Input 9 indicates "1" and they become 0 again.
17. Press **[STEP]**.
18. Press **[+X]**, **[+Y]** or **[+Z]** to perform step operation until bit 8 (9,A) of Input 9 indicates "1".
19. Press **[MANU]**. Use **[-X]** and **[-Y]** to move the axis to the stroke center.
- 20.1 When shifting the XY coupling, enable parameter overwriting 1.
- 20.2 Loosen the screw on the spindle motor side for the X-axis (Y-axis).
- 20.3 Press **[STEP]**.
- 20.4 Calculate the amount for shifting.
Amount for shifting = 8 mm - (Value taken note of in the step 13.)
- 20.5 Use **[+X]**, **[-X]**, **[+Y]** and **[-Y]** to move the motor for the value calculated in 20.4.
- 20.6 After shifting, secure the coupling securing screw with a torque 7N.m (70 kgf.cm).
21. When the Z axis change, shift the Z - LS.
22. Repeat steps from 4. to 14 to check the machine coordinate.
23. For XY axis, refer to step 20.1 to reset the two parameters to the factory settings (enter the factory-set values.).
24. Set for **[GRID SHIFT VALUE]**.

Replacement parts		Tools to be
Name	Parts code	
		Philips screw driver (+) Hex. wrench

4.3.2 X, Y, Z axes origin limit switch B (1/4)

(B) Origin limit switch adjustment procedure by changing setting for [ORIGIN OFFSET VALUE]

1. Set the <PROTECT ON/OFF> switch to [OFF].
2. Select [DATA BANK] -> [MACHINE PARAMETER] -> [SYSTEM 1], and note the settings for [GRID SHIFT VALUE X (Y, Z)] and [X (Y, Z) ORIGIN OFFSET VALUE] before resetting them to zero (0).
Press [MANU] or [MDI] then [I/O], [1], [ENT], [PAGE UP], [1], [ENT] and [F0].
Press [DATABANK]: Conversation [6]
 NC [5]
[ENT], [1], [ENT], [PAGE DOWN], and [CURSOR DOWN]. Note the setting for [X (Y, Z) ORIGIN OFFSET VALUE], press [0], [ENT], and then press [F0], [F0].
3. Turn the <POWER> switch OFF and then ON again. Press [Z.RTN] to perform zero point return.
4. Press [I/O], [1], and [ENT].
5. Press [PAGE DOWN], and check the offset pulse X (Y) displayed on the <SLAVE STATUS DISP1> screen.

Standard value	Offset pulse X, Y	Offset pulse Z
TC-S2B	30000 - 50000	10000 - 30000

04E.doc

When the offset pulse is within the standard range, adjustment by changing the setting for [ORIGIN OFFSET VALUE] is not necessary. If it is not within the standard range, proceed to a) or b).

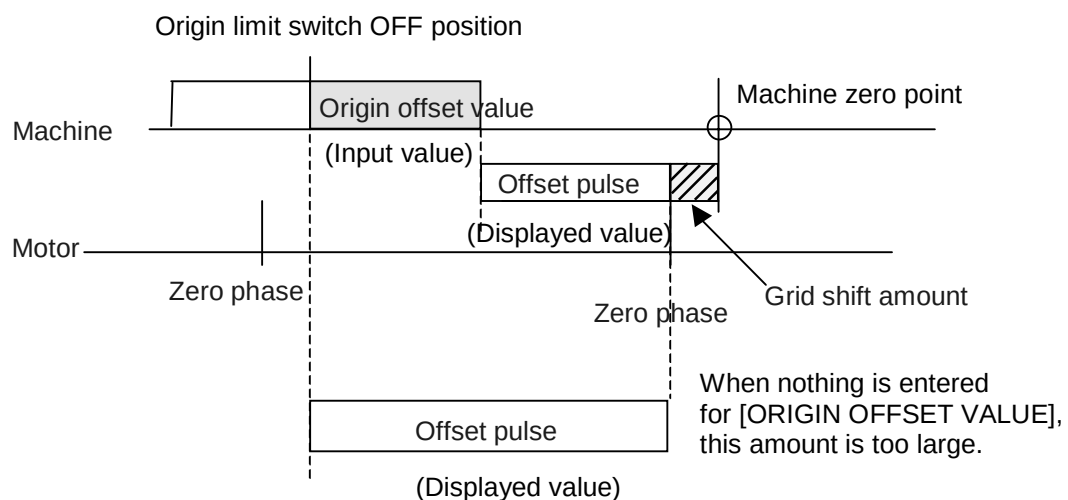
- a. When the offset pulse is larger than standard value
Select [Data bank] -> [MACHINE PARAMETER] -> [SYSTEM 1] and enter the calculated value for [X (Y, Z) ORIGIN OFFSET VALUE].
 - a1. Enable parameter overwriting; press [MANU] or [MDI], then [I/O], [1], [ENT], [PAGE UP], [1], [ENT], and [F0].
 - a2. Enter the calculated value (see the formula below) for [X (Y, Z) ORIGIN OFFSET VALUE]; press [DATABANK], [6] for conversation type ([5] for NC type), [ENT], [1], and [ENT], and then enter the calculated value and press [F0] twice.
 (X, Y) [ORIGIN OFFSET VALUE] = Current offset pulse - 40000
 (Z) [ORIGIN OFFSET VALUE] = Current offset pulse - 20000
 e.g. When the current offset pulse X is 44321
 [Origin OFFSET VALUE] = 44321 - 40000 (value in the table on the right) = 4321 pulses

4.3.2 X, Y, Z axes origin limit switch B (2/4)

(B) Origin limit switch adjustment procedure by changing setting for [ORIGIN OFFSET VALUE]

TC-S2B	Mean value of motor pulse	
	X, Y	Z
	40000	20000

04E.doc



4.3.4B-01.doc

- b. When the offset pulse is smaller than standard value
 - b1. Press **[I/O]**, **[1]**, and **[ENTER]** to display the <MAIN 1> screen.
Press **[JOG]** and **[-X]** to perform jog operation until bit 8 (9) of Input 9 indicates "1". Take note of the machine coordinate.
Loosen the screw on the coupling motor side of X or Y-axis. Calculate the value using the formula "8 mm - the value taken note of". Press **[STEP]** and **[+X]** or **[+Y]** to move the calculated distance. Tighten the coupling screw with a torque of 7N/m (70 kgf/cm).
 - b2. Repeat steps 3. to check that the value set for [X (Y) ORIGIN OFFSET VALUE] is 40000 $\pm$ 10000, [Z ORIGIN OFFSET VALUE] is 10000 $\pm$ 2500. If not, repeat b1 and b2.
 - b3. Press **[MANU]** to select the manual operation mode.
Press **[JOG]** or **[STEP]**.
 - b4. Move the cursor to **[JOG]** or **[STEP]** on the <MANUAL CONDITIONS> screen.
Press **[+]** to select the desired speed or step travel amount.
 - b5. Press **[+X]**, **[-X]**, **[+Y]**, **[-Y]**, **[+Z]**, or **[-Z]** to move the axis to the measuring position before parts replacement. And move the axis to the position where the small test indicates "0".
 - b6. Press **[POS]** and compare the current machine coordinate with that

4.3.2 X, Y, Z axes origin limit switch B (3/4)

(B) Origin limit switch adjustment procedure by changing setting for [ORIGIN OFFSET VALUE]

obtained in step 3.

- b7. Calculate the grid shift value (round off to the nearest whole number).
New grid shift value = Current grid shift value + {(Machine coordinate after parts replacement - Machine coordinate before parts replacement) / 0.0002}
(e.x.) Grid shift value = $1325 + \{(-65.533) - (-66.000)\} / 0.0002 = 3660$

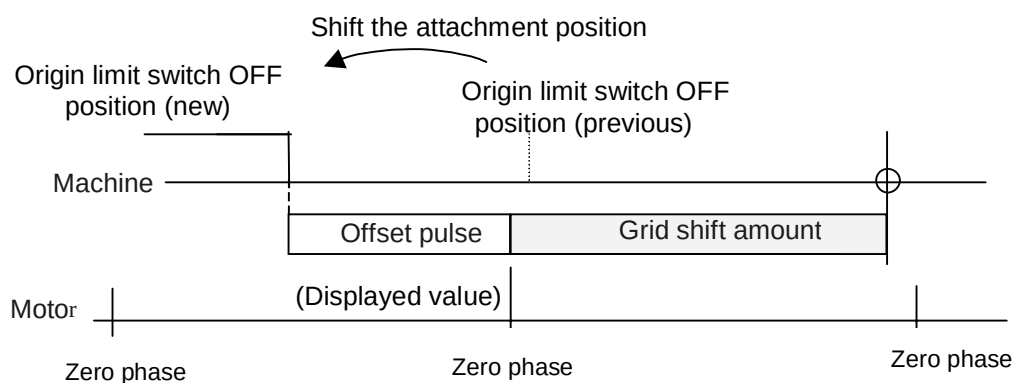
4.3.2 X, Y, Z axes origin limit switch B (4/4)

(B) Origin limit switch adjustment procedure by changing setting for [ORIGIN OFFSET VALUE]

After b2. attaching the limit switch, check the offset pulse to verify that it is within the standard range or higher. If higher than the standard range, perform step a. above until the offset pulse is within the standard.

CAUTION!

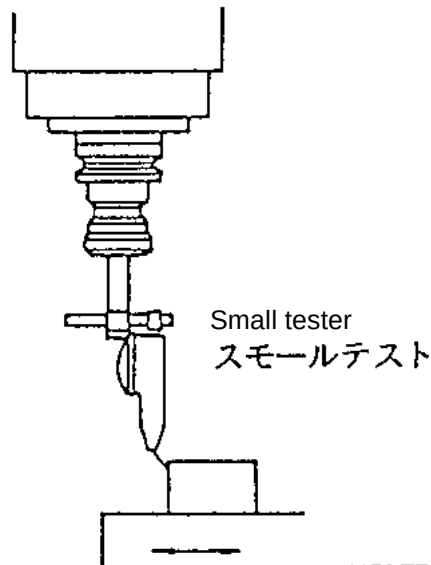
The grid shift becomes larger than the conventional value, because the motor origin index shifts one phase during adjustment of the machine zero point (setting for [GRID SHIFT VALUE]).



4.3.4B-02.doc

Replacement parts		Tools to be
Name	Parts code	Philips screw driver (+) Hex. wrench

4.3.3 Origin offset and X and Y axes grid shift value: Setting A (1/3)



1. Set a small test indicator on the spindle before parts replacement. After performing the zero point return, measure the current position at the base point on the table when the small test indicates 0.
(Use a jig to decide the base position.)
2. Press **[POS]** and the <PRESENT POS> screen appears.
3. Take note of the values set for [MACHINE POS (X, Y, Z)].
4. After replacing the parts, enter zero (0) for the [ORIGIN OFFSET VALUE] and [GRID SHIFT VALUE] parameters. (Re-adjustment is performed after resetting the factory settings or changing settings during maintenance to zero.)
 - 4.1 Enable parameter overwriting; press **[MANU]** or **[MDI]**, then **[I/O]**, **[1]**, **[ENT]**, **[PAGE UP]**, **[1]**, **[ENT]**, and **[F0]**.
 - 4.2 Enter zero (0) for the [ORIGIN OFFSET VALUE] and [GRID SHIFT VALUE] parameters;
 Press **[DATABANK]**: Conversation **[6]**
 NC type **[5]**
[ENT], **[1]** and **[ENT]**.
 Press **[PAGE UP]** and **[CURSOR DOWN]** to move the cursor to [X (Y) ORIGIN OFFSET VALUE], and press **[0]** and **[ENT]**. Similarly, move the cursor to [X (Y) GRID SHIFT VALUE] and press **[0]**, **[F0]** and **[F0]**.
5. Turn the <POWER> switch OFF and check the position of the origin limit switch. If the position of the limit switch has been changed (secured to the tap hole on the right side), re-attach the limit switch at the position shown in the drawing. (The position of the limit switch may have been changed during factory adjustment performed by changing the setting for the [ORIGIN OFFSET VALUE] parameter. If so, the position of the limit switch must be returned to the original position before position adjustment.)

4.3.3 Origin offset and X and Y axes grid shift value: Setting A (2/3)

6. Turn the <POWER> switch OFF and then ON again. Press [**Z.RTN**] to perform zero point return.
7. Press [**I/O**], [**1**], and [**ENT**].
8. Press [**PAGE DOWN**] and check the setting for [X (Y) ORIGIN OFFSETVALUE] on the <SLAVE STATUS DISP1> screen.

(Note) **The offset pulse does not usually change by a large amount. Should it not be within 40000 ± 10000 , however, see 4.3.4 X, Y, Z axes origin limit switch to adjust the offset pulse to be within the above range.**

9. Press [**MANU**] to select the manual operation mode.
Press [**JOG**] or [**STEP**].
10. Move the cursor to [**JOG**] or [**STEP**] on the <MANUAL CONDITIONS> screen.
Press [**+**] to select the desired speed or step travel amount.
11. Press [**+X**], [**-X**], [**+Y**], [**-Y**], [**+Z**], or [**-Z**] to move the axis to the measuring position before parts replacement. And move the axis to the position where the small test indicates "0".
12. Press [**POS**] and compare the current machine coordinate with that obtained in step 3.
13. Calculate the grid shift value (round off to the nearest whole number).
New grid shift value = Current grid shift value + {(Machine coordinate after parts replacement - Machine coordinate before parts replacement) / 0.0002}
(e.x.)
Grid shift value = $1325 + \{(-65.533) - (-66.000)\} / 0.0002 = 1325 + 2335 = 3660$

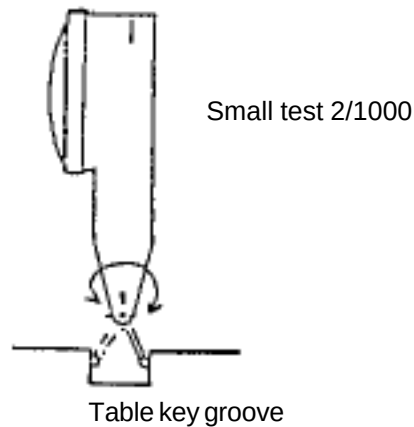
4.3.3 Origin offset and X and Y axes grid shift value: Setting A (3/3)

14. Set the **[PROTECT ON/OFF]** switch to [OFF].
15. Press the **[MANU]** or **[MDI]**. Press the **[I/O]**, **[1]**, **[ENTER]**, **[PAGE UP]**, **[1]**, **[ENTER][F0]**.
16. Press **[DATABANK]:** Conversation:**[6][ENTER]**
NC:**[5]**

Press **[1] [ENTER][PAGE UP] [CURSOR DOWN]** to move the cursor to the grid shift value X (Y) axis.
17. Use the numerical keys to enter the calculated value, and press **[ENT]** and then **[F0][F0]**.
18. Set the **[PROTECT ON/OFF]** switch to [ON].
19. Turn the <POWER> switch off and the on again.
Repeat steps 8. to 12. to check the machine coordinate.
20. Correct the inspection report.

Replacement parts		Tools to be
Name	Parts code	Small test 2/1000

4.3.4 X (Y) axis grid shift value: Setting B (1/2)



1. Set the [PROTECT ON/OFF] switch to [OFF].
2. Select [DATA BANK] -> [MACHINE PARAMETER] -> [SYSTEM 1] and take note of the value set for [GRID SHIFT VALUE X(Y)] and [X(Y) ORIGIN OFFSET VALUE] and reset the value to zero (0).

Press [MANU] or [MDI], [I/O], [1], [ENTER], [PAGE UP], [1], [ENTER] and [F0].

Press [DATA BANK]: Conversation[6]
 NC[5]

and [ENTER]. Press [PAGE DOWN] and [CURSOR DOWN] to move the cursor to [GRID SHIFT VALUE X(Y)] . Press [0] and [ENTER].

In the same way, take note of the value set for [X(Y) ORIGIN OFFSET VALUE] and press [0], [ENTER] and then [F0], [F0] .

3. Turn the <POWER> switch off and then on again.
4. Press [MANU] to enter the manual operation mode, and press [Z.RTN].
 Refer to 4.3.1 Origin offset and X and Y axes grid shift value: Setting A .
 Proceed steps from 4. to 6. to check the offset pulse value.
 If the value is not within the 10000+/10000, adjust the value by proceeding steps from 7.1 to 7.7.
5. Set a small test indicator on the spindle.
6. Select the manual mode and move the table in the X or Y-axis direction so that the spindle is at the table center.
 (Check that the table key groove deflection to the right or left is 1/100 mm or less.)
7. Press [POS] to read the machine coordinate on the screen.
8. Calculate the grid shift value (round off to the nearest whole number).
9. Set the new grid shift value.

Grid shift value = {Axis travel amount × 0.5 + Machine coordinate} / 0.0002
 (e.g.)

Grid shift value = {480 × 0.5 + (-239.623)} / 0.0002 = 1885

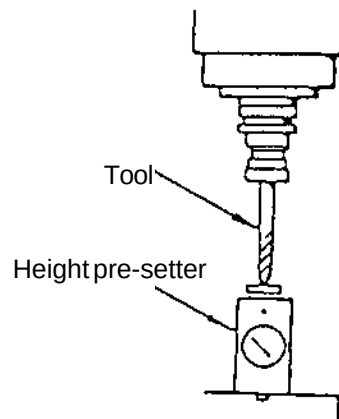
4.3.4 X (Y) axis grid shift value: Setting B (2/2)

Axis feedrate		X axis	Y axis
fullstroke	TC-S2B (Standard type)	480	360
	TC-S2B-0 (Standard type)	700	
	TC-S2B-S (Short stroke type)	300	
Feedrate/ pulse		0.0002	0.0002

10. Move the cursor to [GRID SHIFT VALUE X (Y)] of parameter .
(This is the same procedure as step 2.)
Enter the calculated value, and press **[ENT]** and then **[F0]** twice.
11. Set the <PROTECT ON/OFF> switch to [OFF].
12. Turn the <POWER> switch off and then on again.
13. Repeat steps 4 to 7 and check the machine coordinate to verify that the machine coordinate is within "axis travel amount x 0.5 +/-0.01".

Replacement parts		Tools to be
Name	Parts code	Small test 2/1000

4.3.5 Settings for origin offset and Z-axis grid shift value (1/2)



1. Before parts replacement.
Set a tool to the spindle, perform the zero point return, and measure the tool tip current position with a height pre-setter.
2. Press [**POS**] and the <PRESENT POS> screen appears.
3. Take note of the values set for [MACHINE POS (X, Y, Z)].
4. After replacing the parts, enter zero (0) for the [ORIGIN OFFSET VALUE] and [GRID SHIFT VALUE] parameters. (Re-adjustment is performed after resetting the factory settings or changing settings during maintenance to zero.)
 - 4.1 Enable parameter overwriting; press [**MANU**] or [**MDI**] then [**I/O**], [**1**], [**ENT**], [**PAGE UP**], [**1**], [**ENT**] and [**F0**].
 - 4.2 Enter zero (0) for the [ORIGIN OFFSET VALUE] and [GRID SHIFT VALUE] parameters;
Press [**DATA BANK**], Conversation:[**6**]
 NC:[**5**]

[**ENT**], [**1**] and [**ENT**].

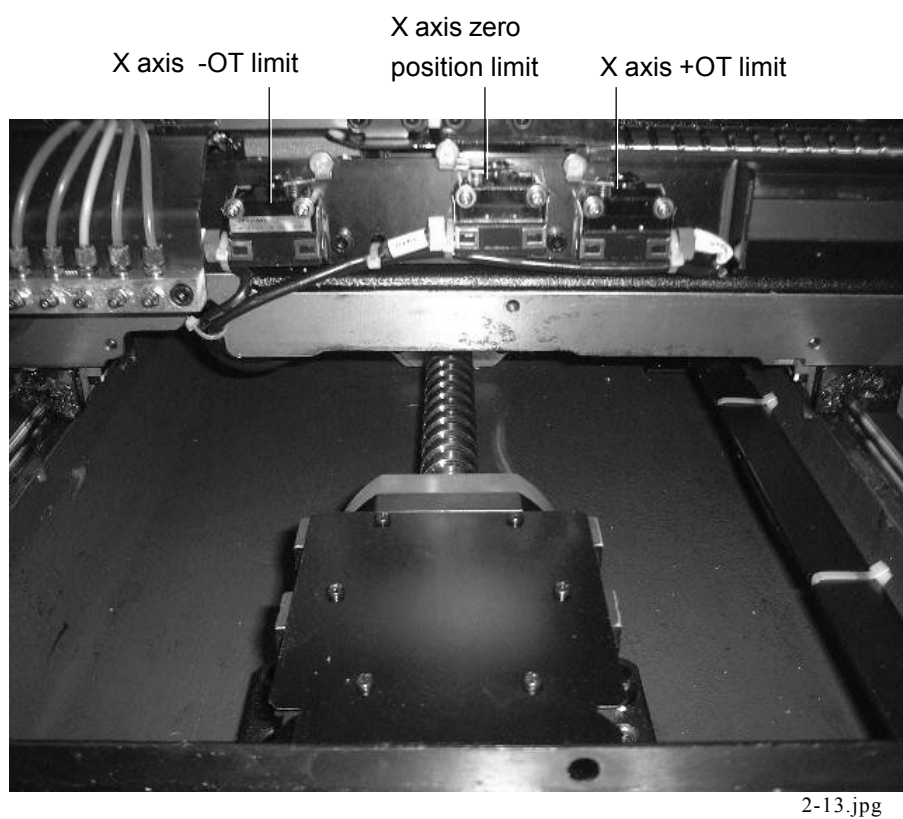
Press [**PAGE UP**] and [**CURSOR DOWN**] to move the cursor to [Z ORIGIN
OFFSET VALUE] and press [**0**] and [**ENT**]. Similarly, move the cursor to
[Z GRID SHIFT VALUE], and press [**0**], [**F0**] and [**F0**].
5. Turn the <POWER> switch OFF and check the position of the origin limit switch. If the position of the limit switch has been changed (secured to the tap hole on the right side), re-attach the limit switch at the position shown in the drawing. (The position of the limit switch may have been changed during factory adjustment performed by changing the setting for the [ORIGIN OFFSET VALUE] parameter. If so, the position of the limit switch must be returned to the original position before position adjustment.)
6. Turn the <POWER> switch OFF and then ON again. Press [**Z.RTN**] to perform zero point return.

4.3.5 Settings for origin offset and Z-axis grid shift value (2/2)

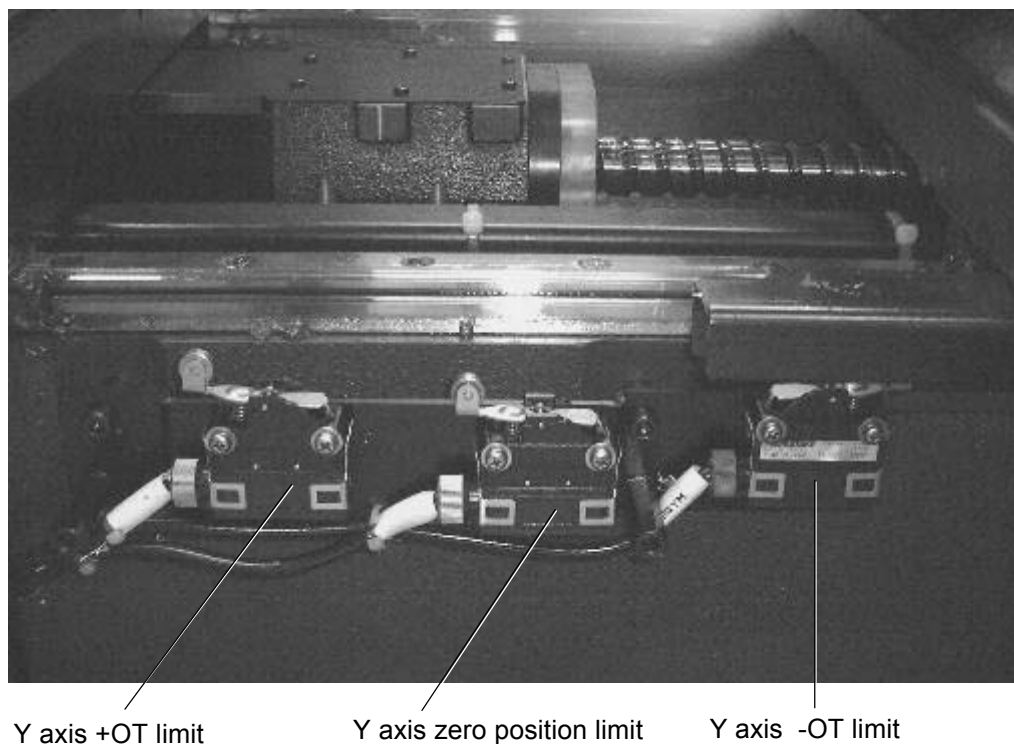
7. Press **[I/O]**, **[1]** and **[ENT]**.
8. Press **[PAGE DOWN]** and check the setting for **[Z ORIGIN OFFSET VALUE]** on the **<SLAVE STATUS DISP1>** screen.
(Note)The offset pulse does not usually change by a large amount. Should it not be within 20000 ± 5000, however, see 4.3.4 X, Y, Z axes origin limit switch to adjust the offset pulse to be within the above range.
9. Perform machine origin return. Press **[MANU]** to enter the manual operation mode and press **[JOG]** or **[STEP]**.
10. Move the cursor to **[JOG]** or **[STEP]** on the screen. Press **[+]** to select the desired speed or travel amount per step.
11. Press **[+Z]** or **[-Z]** to move the spindle head to the measurement position before parts replacement.
12. Press **[POS]** and compare the current machine coordinate with that obtained in step 3.
13. Calculate a new grid shift value (round off to the nearest whole number).
New grid shift value = Current grid shift value + (Machine coordinate after parts replacement - Machine coordinate before parts replacement) / 0.0004
(e.g.)
Grid shift value = 4375 + (245.835 - 245.000) / 0.0004 = 4375 + 2088 = 6463
14. Set the **[PROTECT ON/OFF]** switch to **[OFF]**.
15. Press the **[MANU]** or **[MDI]** . Press the **[I/O]**, **[1]**, **[ENTER]**, **[PAGE UP]**, **[1]**, **[ENTER]****[F0]**.
16. Press **[DATABANK]**: Conversation:**[6]**
 NC:**[5]**
Press **[ENTER]****[1]** **[ENTER]****[PAGE UP]** **[CURSOR UP]** to move the cursor to the grid shift value Z axis. Input the calculated value and then press **[ENT]**, **[F0]**, **[F0]** .
17. Set the **[PROTECT ON/OFF]** switch to **[ON]**.
18. Turn the **<POWER>** switch off and then on.
19. After pressing the **[ATC]** key, repeat steps 9. to 12. to check the machine coordinate.
20. Correct the inspection report.

Replacement parts		Tools to be
Name	Parts code	Height pre-setter

4.3.6 X,Y axes overrun LS adjustment (1/3)



4.3.6 X,Y axes overrun LS adjustment (2/3)



2-10.jpg

1. Select the manual operation mode with the **[MANU]** key.
 2. By pressing the **[CURSOR DOWN]** or the **[CURSOR UP]** key, move the cursor to the step traveling amount column.
 3. By pressing the **[+]** key, set the step traveling amount to 1 mm/step.
 4. Press the **[M.RTN]** key.
- *A. Adjustment procedure of the X (Y) axis + (plus) overrun LS:
- 5A. By pressing the **[POS]** key, display the current machine position screen.
 - 6A. Press the **[STEP]** key.
 - 7A. While pressing the **[RELSE]** key, press the **[+X]** (**[+Y]**) key to move the axis in the step mode until an overrun alarm is displayed on the screen. (within 7 mm)
- *B. Adjustment procedure of the X (Y) axis - (minus) overrun LS:
- 5B. By pressing the **[-X]** (**[-Y]**) key, move the X(Y) axis stroke end. Then, press the **[POS]**key.
 - 6B. Check the machine position is the following value.

	X	Y
TC-S2B (Standard type)	- 480.000	- 360.000
TC-S2B-0 (Long stroke type)	- 700.000	
TC-S2B-S (Short stroke type)	- 300.000	

4.3.6 X,Y axes overrun LS adjustment (3/3)

- 7B. Press the **[STEP]** key.
- 8B. While pressing the **[RELSE]** key, press the **[-X]([-Y])** key to move the axis in the step mode until an overrun alarm is displayed on the screen. (within 7 mm)
9. Check that the machine coordinates are within the standard values in the table below.
10. When the machine coordinates are within the standard values, adjustment is completed. Otherwise, adjust the limit switch position.
- * Adjustment of the LS position:
- 10.1 Remove the cover.
- 10.2 Loosen the limit switch mounting screw and shift the switch.
- 10.3 Check the machine coordinates again in the procedure stated as in 4. to 9.
- 10.4 Attach the cover.

Standard value

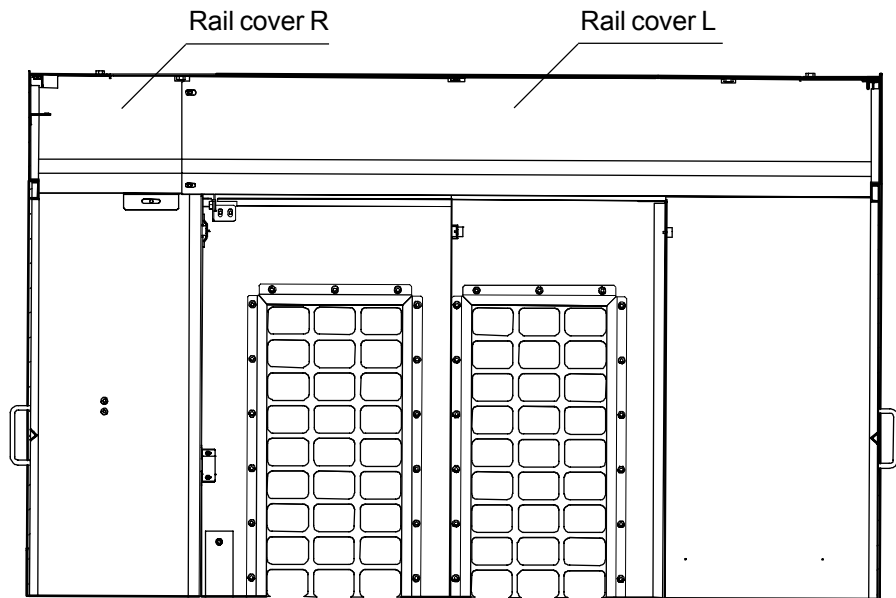
	X		Y	
	+OT	-OT	+OT	-OT
TC-S2B (Standard type)	3 ± 1	-483 ± 1	3 ± 1	-363 ± 1
TC-S2B-0 (Long stroke type)	3 ± 1	-703 ± 1		
TC-S2B-S (Short stroke type)	3 ± 1	-303 ± 1		

Replacement parts		Tools to be
Name	Parts code	
		Phillips screw driver (+) Hex. wrench (1 set)

4.4 Cover

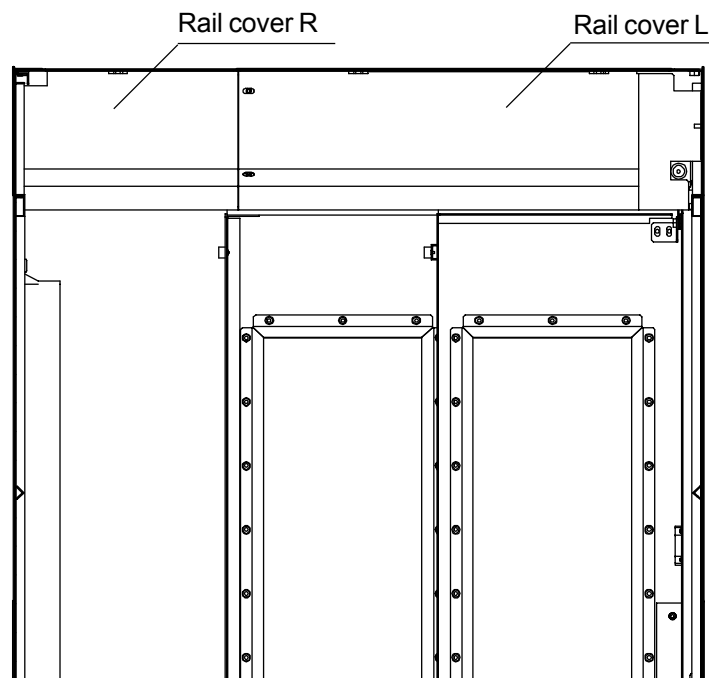
4.4.1 Door Lock LS Adjustment

Standard (One door, Two doors) and long type



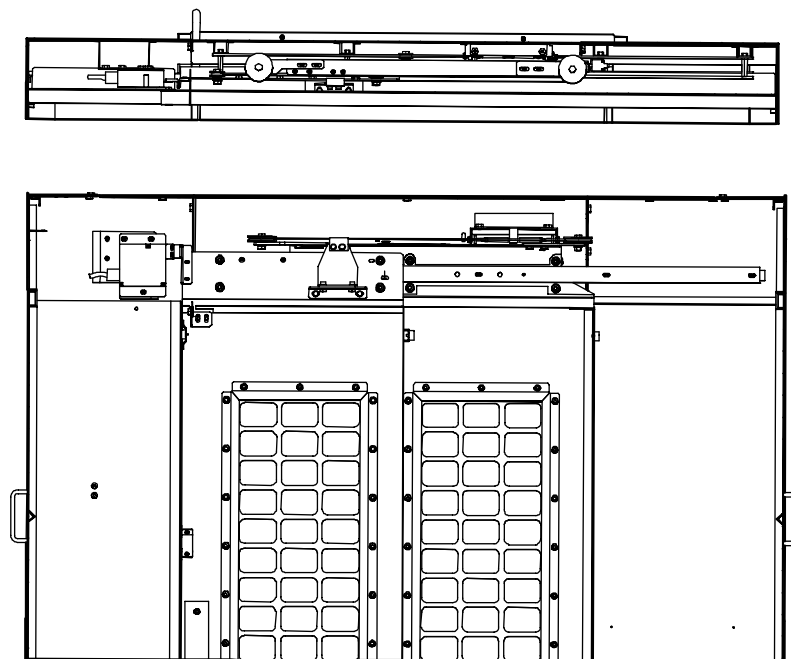
S2BMT2-006.ai

Short type



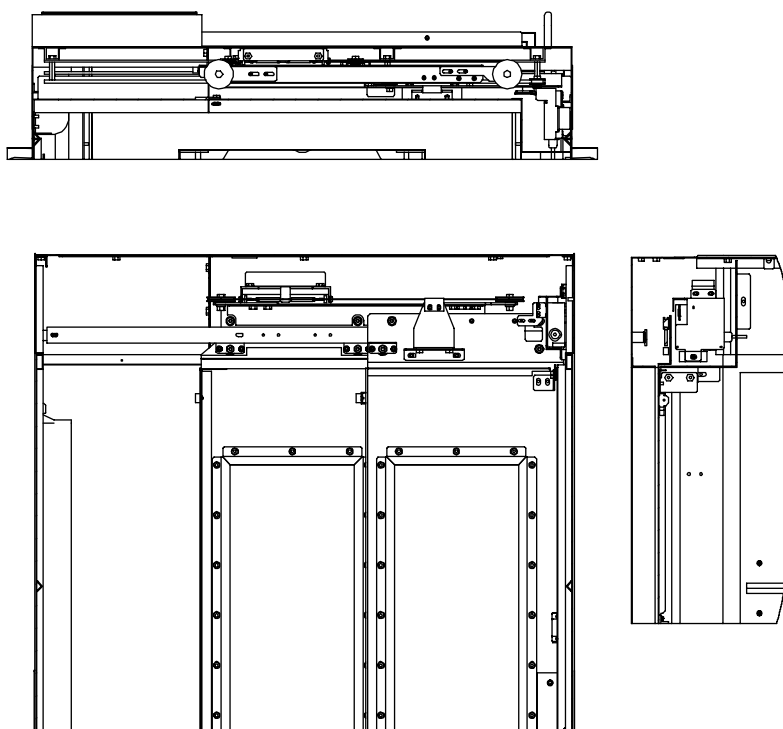
S2BMT2-009.ai

Standard (One door, Two doors) and long type

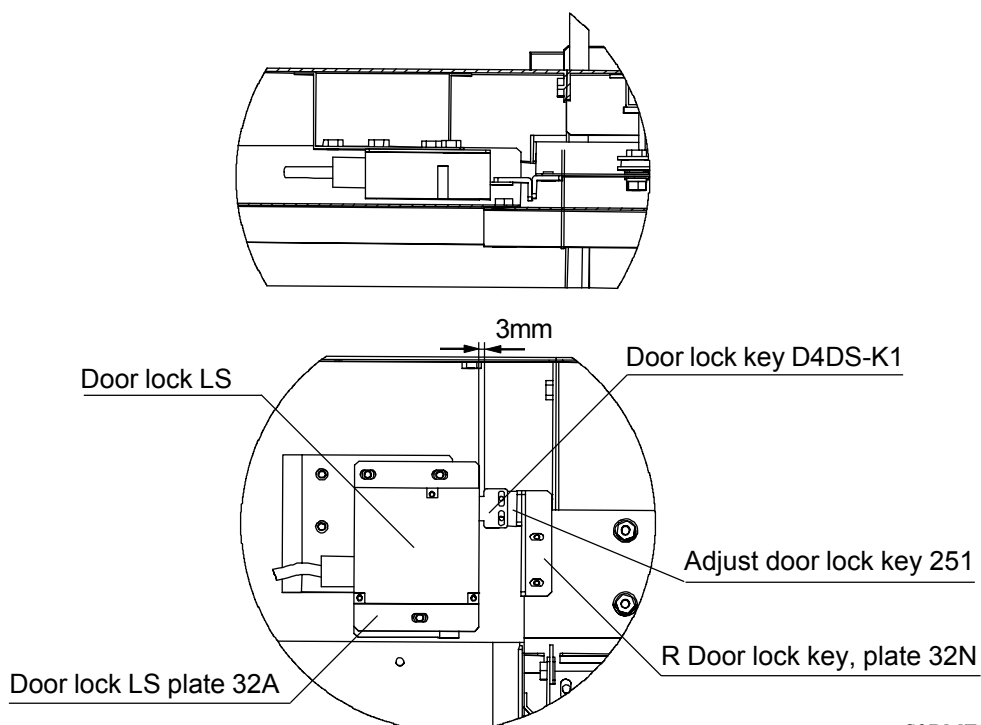


S2BMT2-007.ai

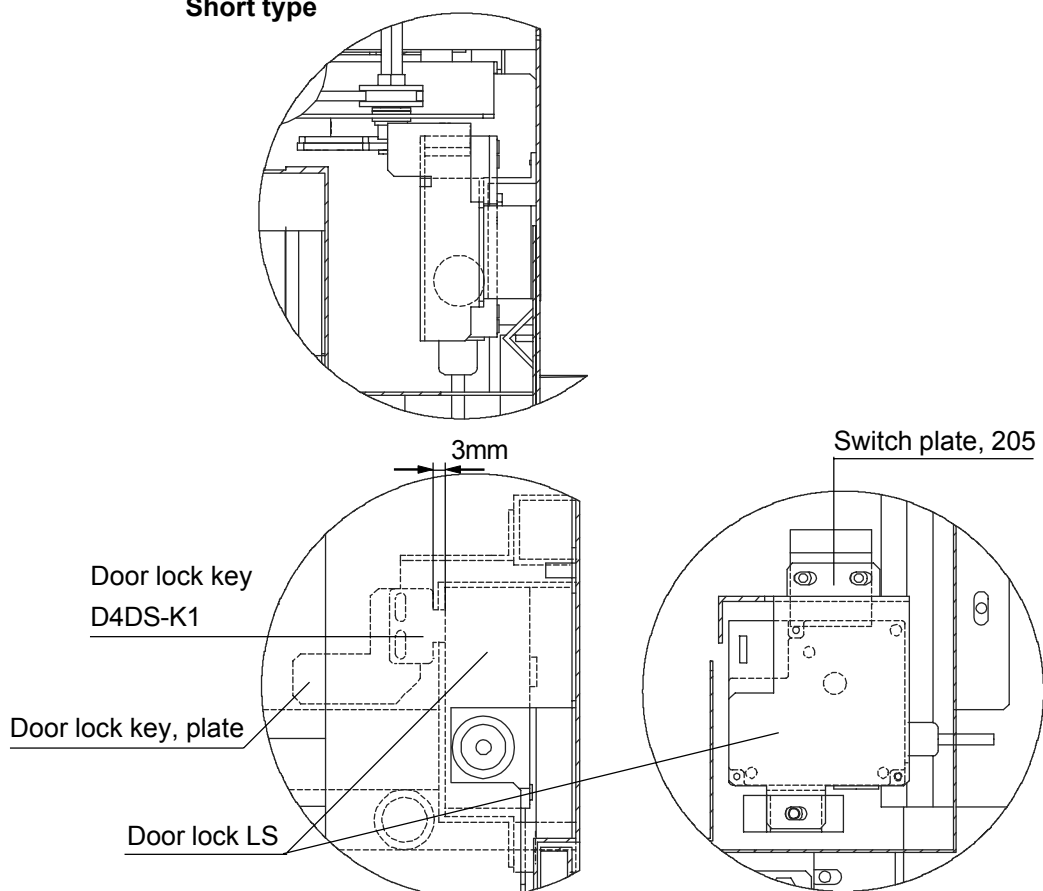
Short type



S2BMT2-010.ai

Standard (One door, Two doors) and long type

S2BMT2-008.ai

Short type

S2BMT2-011.ai

1. Remove the hexagon socket head set screw (M6 3PCS.) and nut 2PCS., remove the rail cover L.
2. Remove the hexagon socket head set screw (M6 1PCS.) and nut 3PCS., remove the rail cover R.

For standard, long type

3. Loosen the fix screw of door lock key D4DS-K1, adjust lock key plate 251 and fix screw of R lock key adjust plate 32N.
Adjust the door lock key D4DS-K1 to center of the door lock LS insert hole and fix it.
4. Loosen the fix screw of door lock LS plate 32A, adjust distance 3mm between the door lock LS and the door lock key D4DS-K1 as the figure and fix it.

For short type

3. Loosen the fix screw of the door lock key D4DS-K1 and switch plate.
Adjust the door lock key D4DS-K1 to center of the door lock LS key insert hole and fix it.
 4. Loosen the fix screw of door lock key plate 251-S, adjust distance 3mm between the door lock LS and the door lock key D4DS-K1 as the figure.
- 5-1. Close the door and door inter lock switch to [Valid].
 - 5-2. Rotate the spindle by manual mode to check the door is locked.
 - 6-1. Close the door and door inter lock switch to [Invalid].
 - 6-2. Rotate spindle by manual mode to check the spindle is stops when open the door.
 7. When error occurred steps in the 5 or 6, return to the steps 3 and 4 to readjustment.
 8. Set the rail cover L, R.

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Chapter5 Adjustment procedure (Electrical parts)

5.1 Adjustment procedure of the AVR

5.1.1 Adjustment procedure of the AVR 1 (1/2)

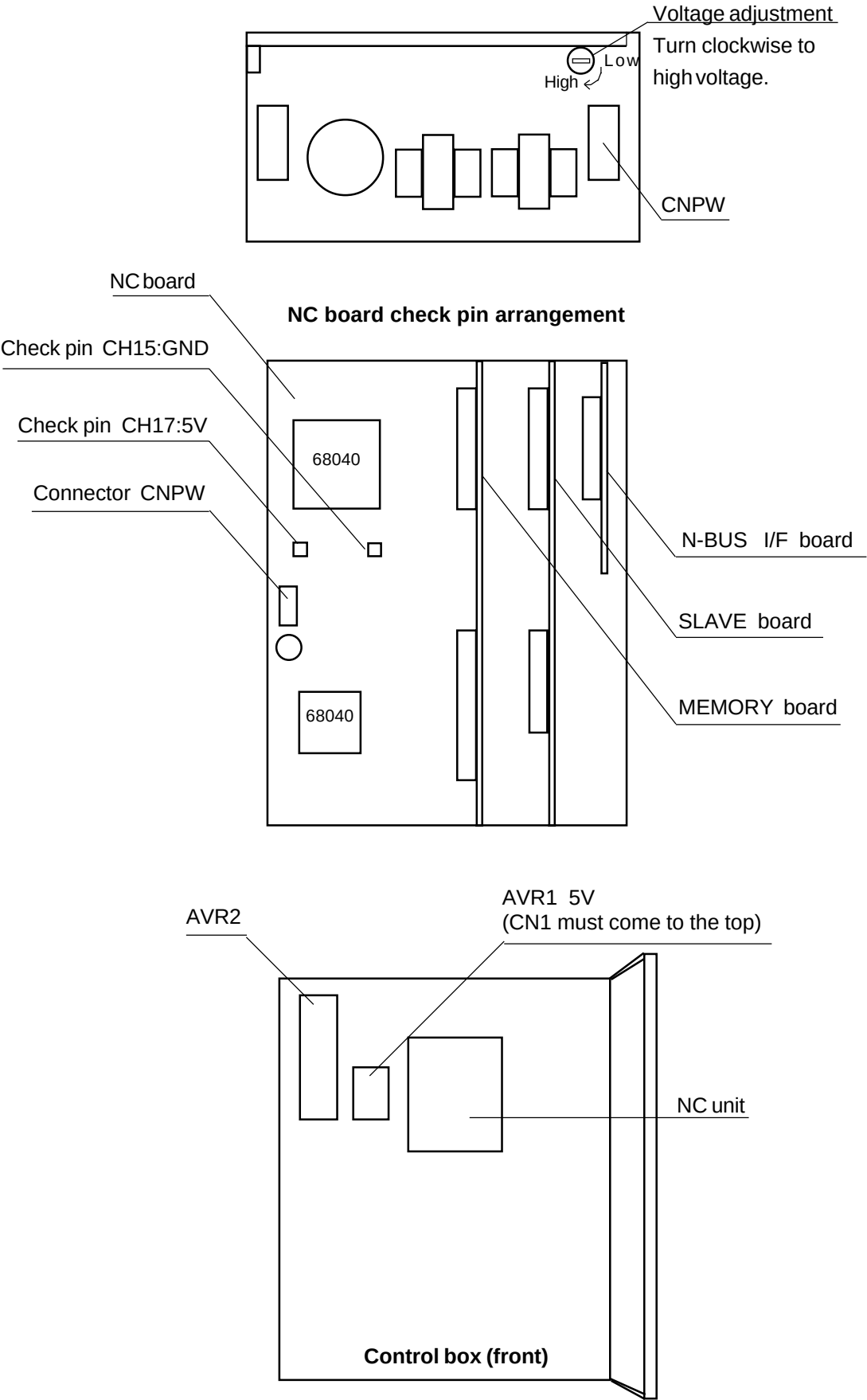
Adjust AVR when the voltage is out of range.

1. Turn the main power breaker on, then the power switch too.
2. AVR 1 adjustment.

Power source	Measurement locations	Voltage adjustment
+5V	Between the NC board CH17(5V) and CH15(LG)	4.85to5.15V Center 5.00V

(NOTE) Please do not apply paint lock.

5.1.1 Adjustment procedure of the AVR 1 (2/2)



5.2 The settlement of parameter to do the adjustment work on the condition of no-load and simple sub stance motor.

Make the current limiter effective in accordance with the following process, when you do the work on the motor condition of no-load (without the coupling) .

(NOTE) As for TC-S2B, TC-R2A, the motor oscillates when it tries to turn with the motor simple substance because the Torque observer control function is effective.
It doesn't oscillate after motor assembling was finished or the Torque observer function is invalid.

1. As following , make the editing condition that can change the parameter .
 - 1-1. Set the [PROTECT] switch on the operation panel to OFF.
 - 1-2. Select the <INPUT/OUTPUT> screen.
 - 1-3. Select [1.INPUT/OUTPUT] and the <VERSION> screen appears.
 - 1-4. Set [PARAMETER CHANGE] to [1.YES].
2. Press [DATA BANK],[MACHINE PARAMETER],[SERVO] and change the following two parameters.

Machine parameter	Shipping parameter	Only for adjustment motor simple substance
004,104	100	20
011,111	* 0 *****	* 1 *****

(NOTE) Don't change the * mark inside the table.

3. Return the parameter without forgetting it if finishing the adjustment work .

(NOTE) "X(Y) axes deviation error 1" occurs if the parameter isn't returned.

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Chapter6 Check list

6.1 Check list for NC problem

1. When a number key is pressed, NC beeps sharply.
Yes, ☐ No, ☐
2. When a mode key is pressed, LED of the mode moves.
Yes, ☐ No, ☐
3. When the [JOG] key is pressed, the relative axis moves.
Yes, ☐ No, ☐
4. When the [RESET] key is pressed, LED of the key lights up and then goes off.
Yes, ☐ No, ☐
5. 5V power at the check pin on the NC board
5V+4%,-0%(5.00to5.20V)
Yes, ☐ No, ☐
6. ROM version.

Main M
Slave S
Local L
SEQ VER

6.2 Check method of the ROM version

- 1. Turn the MAIN POWER breaker and the POWER switch ON.
- 2. By pressing the keys [I/O], [1], [ENTER] and [UP PAGE], display the I/O version screen.
- 3. Take notes of the versions.
- 4. (**) at the side of "version" indicates general version of main, local, slave.
(Response) Version 26 or higher

<Example>

VERSION		TC-S2B	INPUT/OUTPUT	
•VERSION (**)			•KEY CODE LIST	
MAIN	MA1-51-01		00000000 00000000	
SLAVE	SA1-51-01			
LOCAL	LA2-51-01			
SEQ(S)				
SEQ(U)				
•PARAMETER CHANGE		0		
(0:NO 1:YES)				
•ATC MAINT. MD		0		
•DISPLAY TEST		0	POWER ON TIME	
•MAINT.INPUT			00000:00:00	
			RUNNING TIME	
			00000:00:00	
I/O				
MENU				
			F0	F1
			F2	F3
			F4	

6.3 Check method of the servo ROM version

- 1. Turn the MAIN POWER breaker and the POWER switch ON.
- 2. Press the keys [I/O], [3] and [ENTER].
- 3. Take notes of numbers ROM TYPE, ROM VERSION.
- 4. Press [PAGE DOWN] key and take notes for each axis.

X AXIS

SERVO

•AMPLIFIER COMMAND

CONTROL DATA

CONTROL COMMAND

SPEED COMMAND

CURRENT COMMAND

SPEED LOOP PROPTNAL GAIN

SPD LOOP INTGR TM CONST

CURRENT LIMIT

•AMPLIFER RESPONSE

CONTROL DATA

STATUS

ALARM CODE

CRR COMD MONTR/CRR MONTR

ACTUAL SPEED MONITOR

ABSO POSITION DATA

FRAME ERR DETECT COUNTER

•AMPLIFER INFORMATION

ROM TYPE **/** ROM VERSION ** /**

AMP MODEL **

•OTHER

DISPLACEMENT PULSE

NO.OF PULSE CHECK RETRY

I/O

MENU

F0

F1

F2

F3

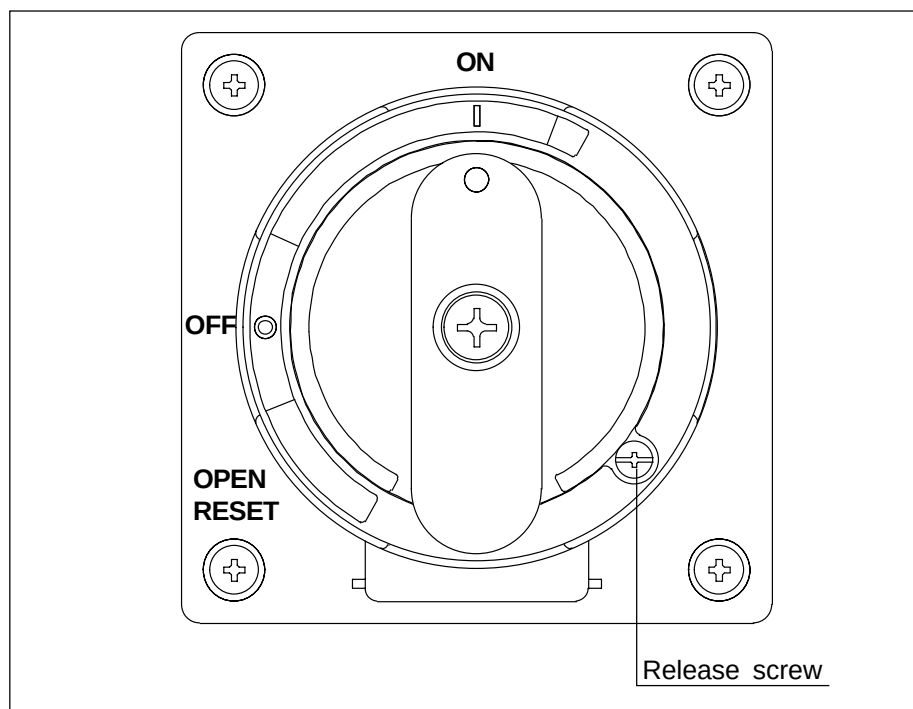
F4

6.4 Method of open the control box door without turning off the power

Be extremely careful of electrical shock.

1. Remove two screws on the rear side of control box door.
2. Put a screwdriver at the release screw of the main power breaker handle.
While turning the screw driver in the left, draw the door.

(Note) Never touch the parts in the control box.



S2B53.doc

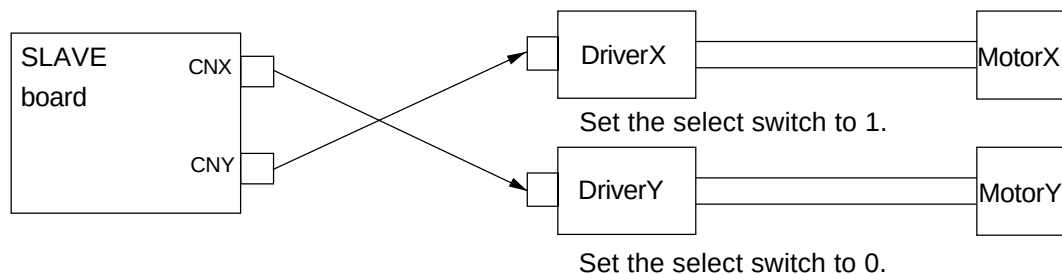
Tools to be used
Phillips screw driver

6.5 Check method of the X,Y axis trouble (1/2)

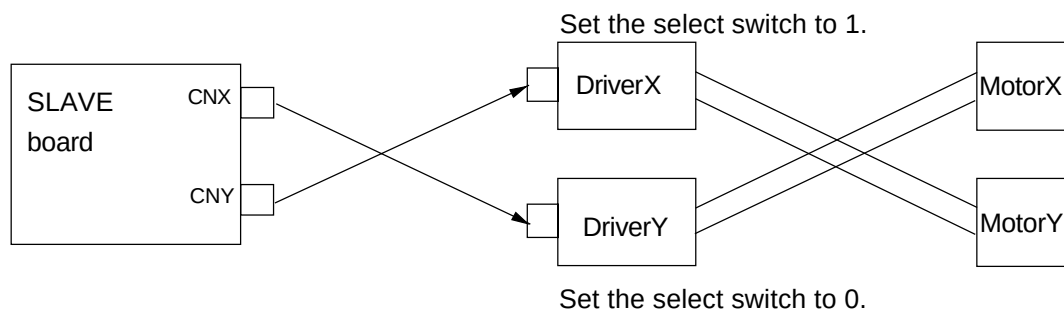
How to check the cause of the trouble of either X or Y axis;
(When no replacement parts is available.)

(Note) Do not perform the zero position return during checking.

1. Inspection of the SLAVE board internal circuit.
 - 1.Method Exchange CNX and CNY.
 - 2.Judgement When operated in the JOG mode etc, trouble occurs;
at the another axis (X, Y) .
SLAVE board trouble on the same axis.
SLAVE board OK.

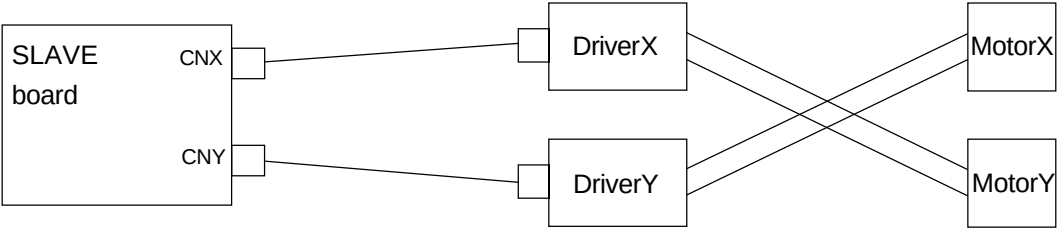


2. Inspection of the driver;
 - 1.Method Exchange the X and the Y drivers.
 - 2.Judgement When operated in the JOG mode etc, trouble occurs;
at the another axis (X,Y).
Driver trouble on the same axis.
Driver OK.



6.5 Check method of the X,Y axis trouble (2/2)

- 3. Inspection of the MOTOR;
 - 1.Method Exchange the X and the Y motor cables.
 - 2.Judgement When operated in the JOG mode etc, trouble occurs;
at the another axis (X,Y)
Motor trouble on the same axis.
Motor OK.



Tools to be used
Phillipes screw driver Phillipes screw driver (small)

6.6 Check method of the deviation

- 1. Turn the MAIN POWER breaker and the POWER switch ON.
- 2. By the pressing the keys [I/O],[1],[ENTER]and [DOWN PAGE], display the SLAVE STATUS DISPLAY1.
- 3. Take notes of numbers DEVIATION.

SLAVE STATUS DISP1		INPUT/OUTPUT	
•DEVISION		•OFFSET PULSE	
SPINDLE	*****	X AXIS	*****
X AXIS	*****	Y AXIS	*****
Y AXIS	*****	Z AXIS	*****
Z AXIS	*****	A AXIS	*****
A AXIS	*****	B AXIS	*****
B AXIS	*****	C AXIS	*****
C AXIS	*****	MAGAZINE	*****
MAGAZINE	*****		
		•MPG COUNTER	

I/O			
MENU			
F0		F1	F2
F3		F4	

6.7 Check method of the substrate version

(1) Following No. and marks are registered on each substrate (board) except the key board;

1. Brother board No.	(Ex.)	B52J067-3
2. Production serial No.		A
3. Board revision mark		9808001

1. Brother board No.

(Ex.) B52J67-1

— This figure incleases 1 to 2, 2 to 3...,when the board pattern is changed.
— No. saaigned to each board.

2. Production serial No.

(Ex.) 98 08 001

— Serial No. within the production month
— Production month
— Production year (last two places)

3. Board revision mark

(Ex.) A

— This mark changes from no mark, A to B...,when the jumper of the board is modified.
— Nomally, this mark is shown after the production serial No.

(2) Items that you need to inform the manufacturer (or the representative) when asking something;

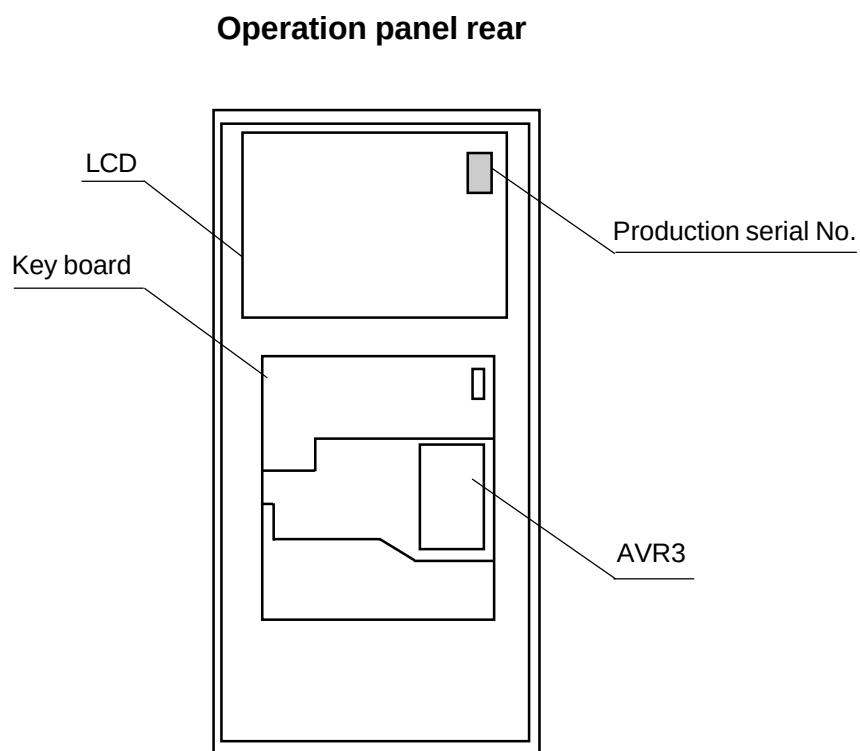
1. Model	(Ex.) TC-31A
2. Name of the board	(Ex.) NCboard
3. Brother board No.	(Ex.) B52J067-3
4. Production serial No.	(Ex.) 9808001
5. Board revision mark	(Ex.) A

(Note) Never touch the parts in the control box.

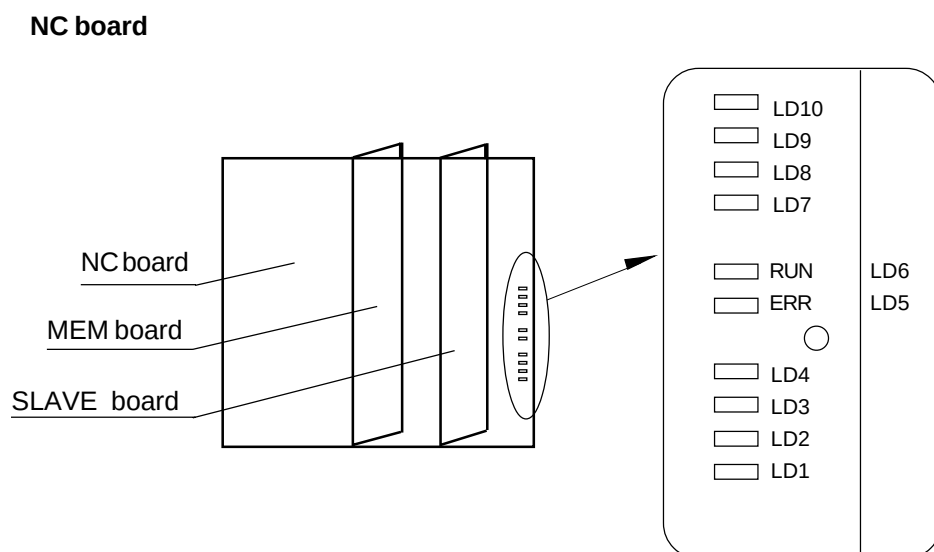
6.8 LCD version check

Machine model, LCD type, and LCD serial number are all necessary when you inquire about or order spare parts. See the examples below for how to check each.

1.	Machine model	(Ex.)TC-31A
2.	LCD type	(Ex.)LM64P30
3.	LCD serial No.	(Ex.)97C00142N

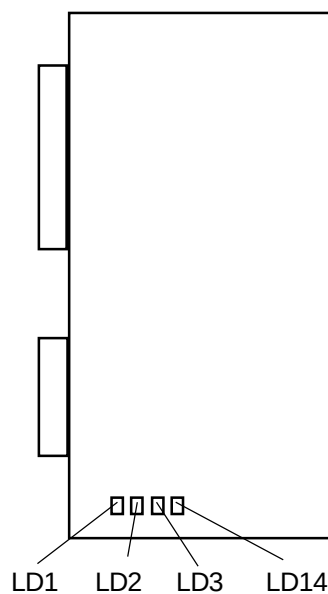


6.9 LED check (1/5)



- LED indication when operation is normal.
LD4, LD6, and LD7 are flashing constantly.
LD1 to LD3 and LD8 to LD10 are lit or are flashing.
This varies depending on the operation status.
LD5 is not lit.
- LED indication when operation is defective.
 - LD6 is not lit and LD5 is lit: Communication LSI has stopped due to an error.
→ May cause of KEY board, IO board, EXIO board, NC board or cord for connect every boards are defective.
 - Other LED display: CPU is defective.
→ May cause of NC board or MEM board are defective.

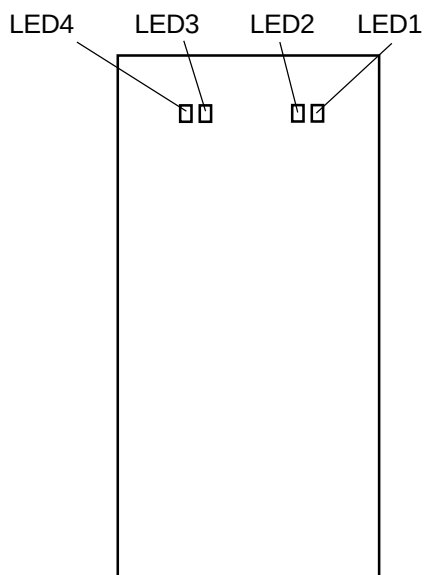
6.9 LED check (2/5)



- LED indication when operation is normal.
 - LD1 is flashing constantly.
 - LD2 to LD 4 are not lit.
- LED indication when operation is defective.
 - LD1 is not lit CPU is defective
 - LD2 stay lit CPU is defective.
 - LD3 sty lit NMI error occurred.
 - LD4 is not in use.

6.9 LED check (3/5)

I/O Board



1. LED indication when operation is normal.

When the SW power is turned off: LED1 and LED3 stay lit.
LED2 and LED4 are not lit.

When the SW power is turned on: LED1 and LED3 are not lit.
LED2 and LED4 are blink.

2. LED indication when operation is defective.

All LEDs are not lit

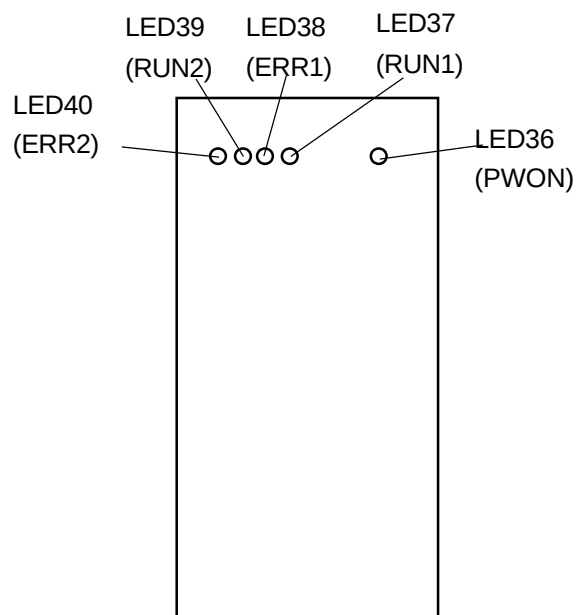
AVRN2 and IO board are defective or,
braker Q2 is tripped.

Although the SW is turned on,
LED1,3 stay lit and LED2,4 are
not lit;

Communication LSI has stopped due to an
error.

6.9 LED check (4/5)

KEYBOARD



1. LED indication when operation is normal.
LED 36 is lit and LED37 and LED 39 are blink.
LED 38 and LED 40 are not lit.
2. LED indication when operation is defective.

LED 36 is not lit:

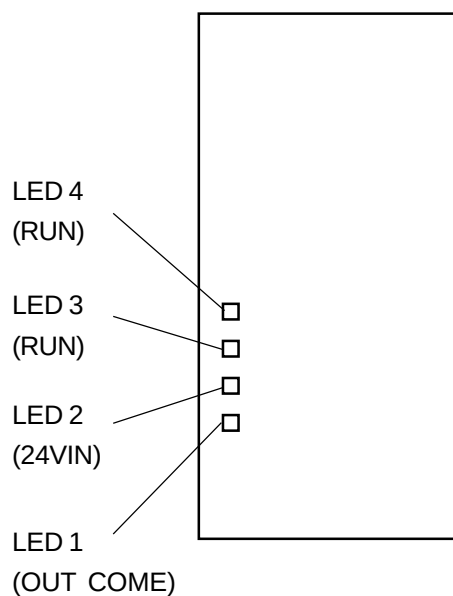
AVR3 is defective.

LED37 is not lit and LED 38 is blink
or LED 39 is not lit and LED 40 is blink:

Communication LSI has stopped due to
san error.

6.9 LED check (5/5)

EXIO



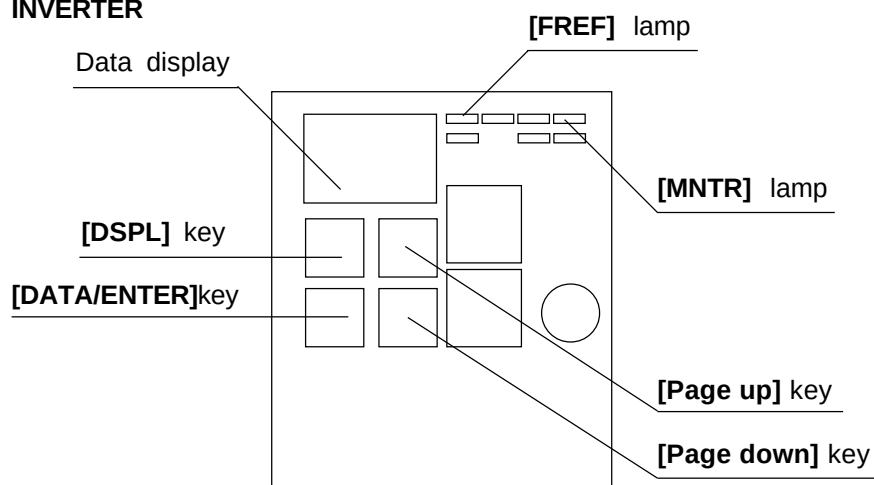
1. LED indication when operation is normal.
 LED 1 and 2 are lit.
 LED 4 is blink.
 LED 3 is not lit.
2. LED indication when operation is defective.
 LED 2 is not lit : DC24V is not supplied to CNEX24.
 LED 1 is not lit : DC24V is not supplied to OUTCOM.
 LED 4 is not lit and LED 3 is lit :
 Communication LSI has stopped due to an error.

6.10 Inverter error (ATC) content check procedure

TC-S2B Check of ATC inverter latest error log

1. Press the **[DSPL]** key while the inverter LED is lit (servo power on) and the **[MNTR]** lamp lights. (Each press of the **[DSPL]** key cyclically displays **[FREF]**, **[FOUT]**, **[IOUT]**, **[MNTR]**, **[F/R]**, **[LO/RE]**, **[PRGM]**, and then **[FREF]** again.
2. Press the **[PAGE UP]** and **[PAGE DOWN]** keys to display "U09".
3. Press the **[DATA/ENTER]** key to display the latest error code.
4. When you have confirmed the error code, press the **[DSPL]** key and the **[FREF]** lamp lights.

INVERTER



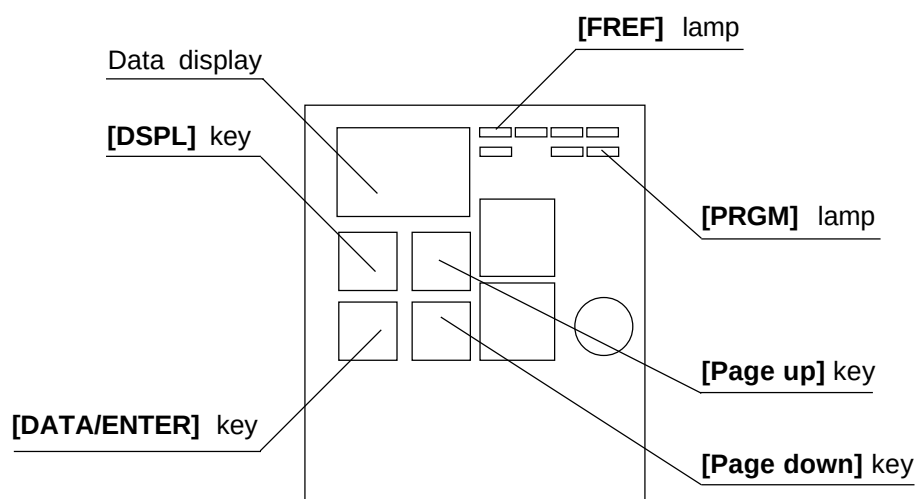
Data display	Contents
Uv(blink)	Low voltage while output is OFF
Uv1	Low voltage while output is ON
ov(blink)	Over voltage while output is OFF.
ov	Over voltage while output is ON.
oH(blink)	Overheat while output is OFF.
oH	Overheat while output is ON.
oC	Over current
oL1	Motor overload
oL2	Inverter overload
oL3	Overtorque detection
GF	Ground fault
FAN(blink)	Cooling fan fault
F00	Control circuit fault
F01	ROM fault
F04	EEPROM fault
F05	A/D converter fault

06.table-1.exl

6.11 ATC inverter version check

1. Press the **[DSPL]** key while the inverter LED is lit (servo power on) and the **[PRGM]** lamp lights. (Each press of the **[DSPL]** key cyclically displays **[FREF]**, **[FOUT]**, **[IOUT]**, **[MNTR]**, **[F/R]**, **[LO/RE]**, **[PRGM]** and then **[FREF]** again.)
2. Press the **[PAGE UP]** and **[PAGE DOWN]** keys to display "n79".
3. Press the **[DATA/ENTER]** key to display the software version for the inverter.
4. When you have confirmed the software version, press the **[DSPL]** key and the **[FREF]** lamp lights.

INVERTER



Chapter 7 Electrical System

7.1 Configuration

7.1.1 Board portability

The same main boards (NC board, Slave board, I/O board, EXIO board, KEY board) are used for the TC-31A, TC-22A, TC-S2A, TC-32A, TC-R2A, TC-20A and TC-S2B.

Thus, supply boards are common.

Though, NC PCB of TC-S2B must use the B52J090 - 4 Rev. E or higher.

The model and machine specifications can be changed among T-C31A, 22A, S2A, 32A, R2A, 20A and S2B, using "Short connector MSEL***". (As for TC-S2B, 616998001 or 616982001 is used).

Refer to 8.2 I/O (main) - Attached circuit diagram (circuit 5).

Changing contents is as described below.

MSEL0 : Quantity of tools 0: 14
(MAIN1 INPUT 8 BIT8) 1: 21

MSEL1 : ATC arm operation 0: Chuck format
(MAIN1 INPUT 8 BIT9) 1: Hook format
(This is not used in TC-S2B)

MSEL2 / MSEL3 / MSEL5: Model selection
(MAIN 1 INPUT8 BIT A, B, D)

MSEL5	MSEL3	MSEL2	Model
1	0	0	TC-22A
0	0	1	TC-31A
0	1	0	TC-S2A
0	1	1	TC-32A
1	1	0	TC-R2A
1	1	1	TC-20A
0	0	0	TC-S2B

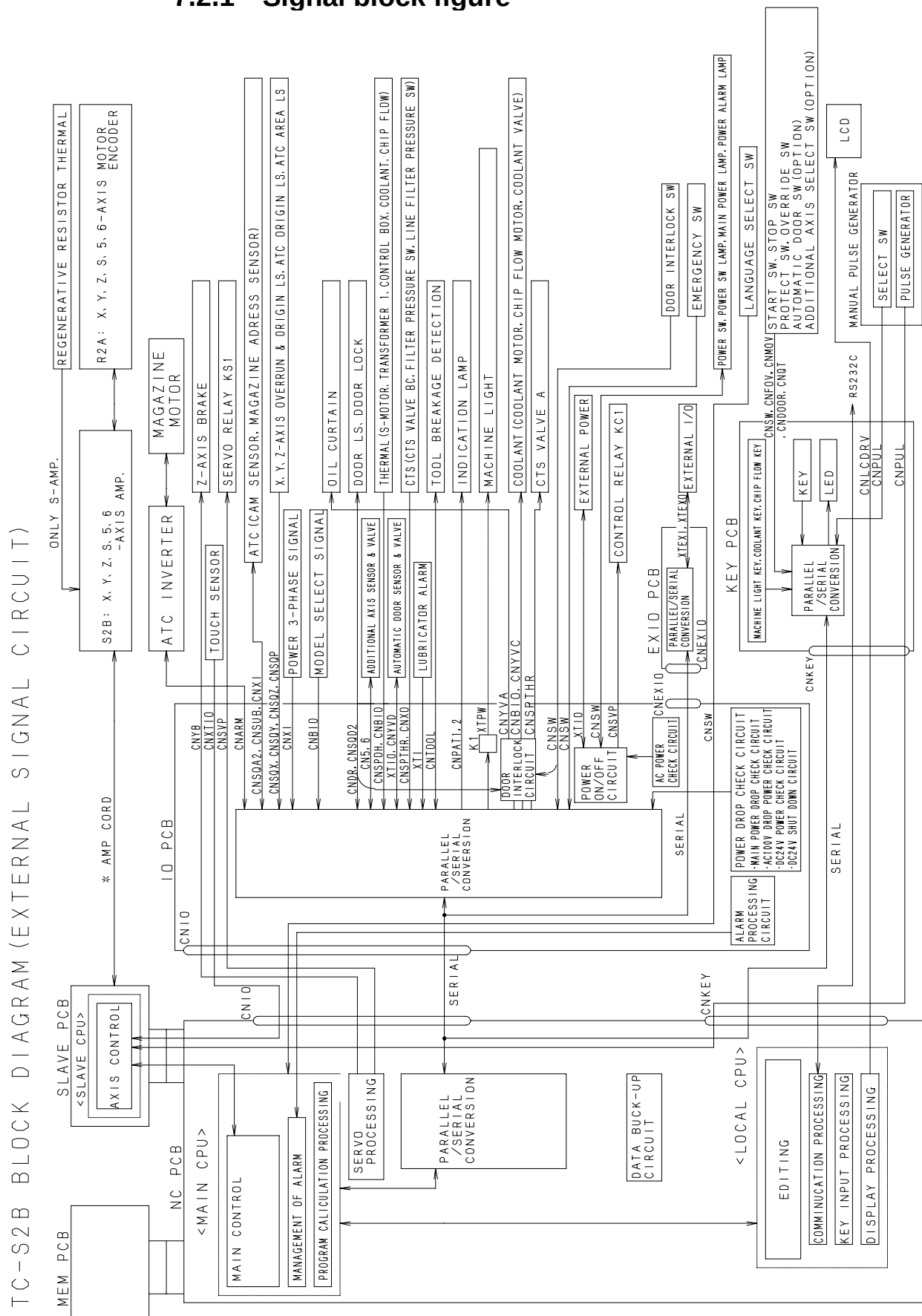
MSEL 4 : TC-32A ATC arm cover 0: Not required
(MAIN 1 INPUT 8 BIT C) 1: Equiped
(This is not used in TC-S2B)

The MEM board differs depending on whether the display language is Japanese or another language (English, German, French, Spanish or Chinese).

Selection of English, German, French, Spanish or Chinese is done using the dip switch on the NC board and CG PCB. Refer to 3.1.2 NC board replacement.

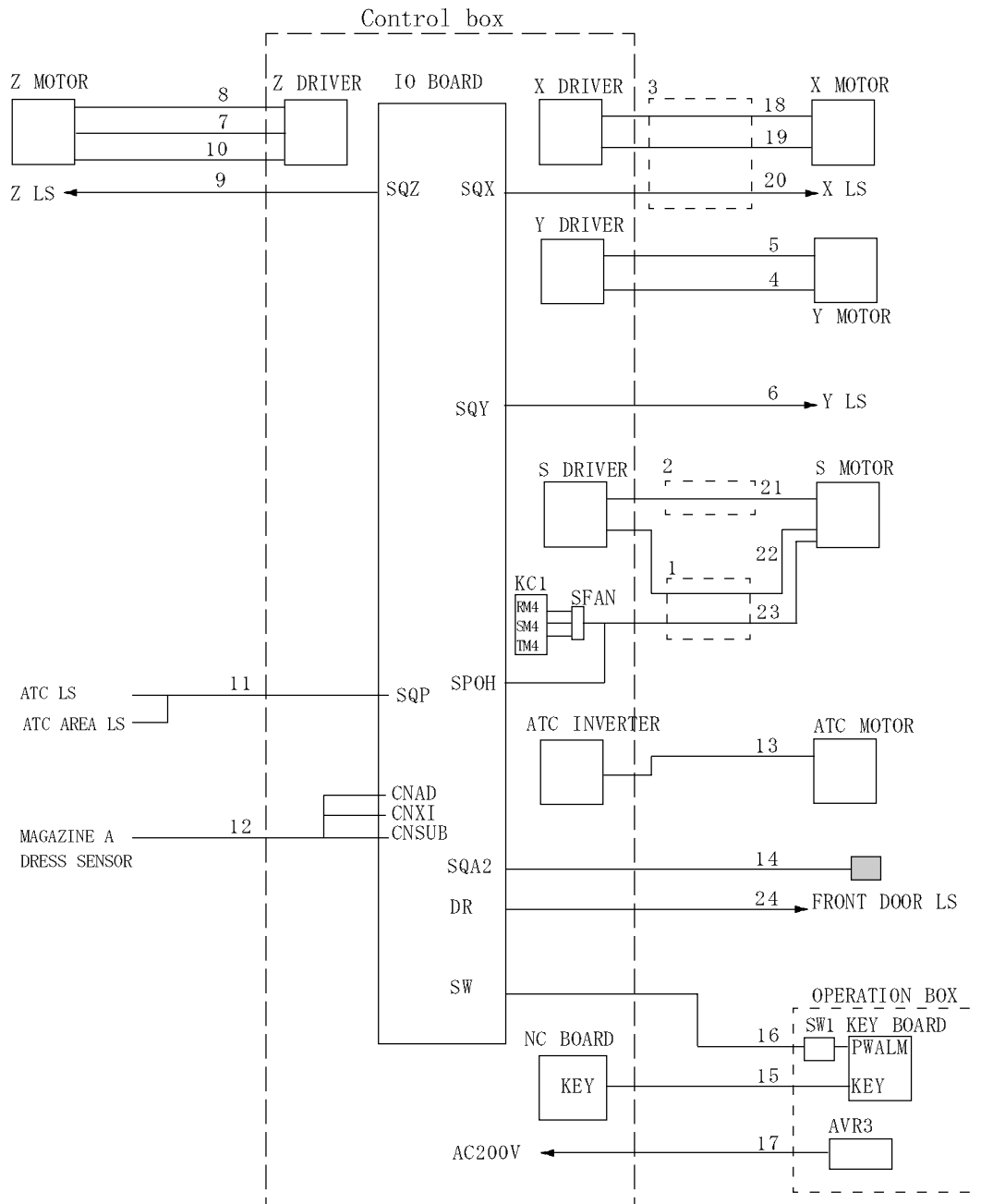
7.2 Block figure

7.2.1 Signal block figure



7.2.2 External cables

7.2.2.1 TC-S2B (1/2)

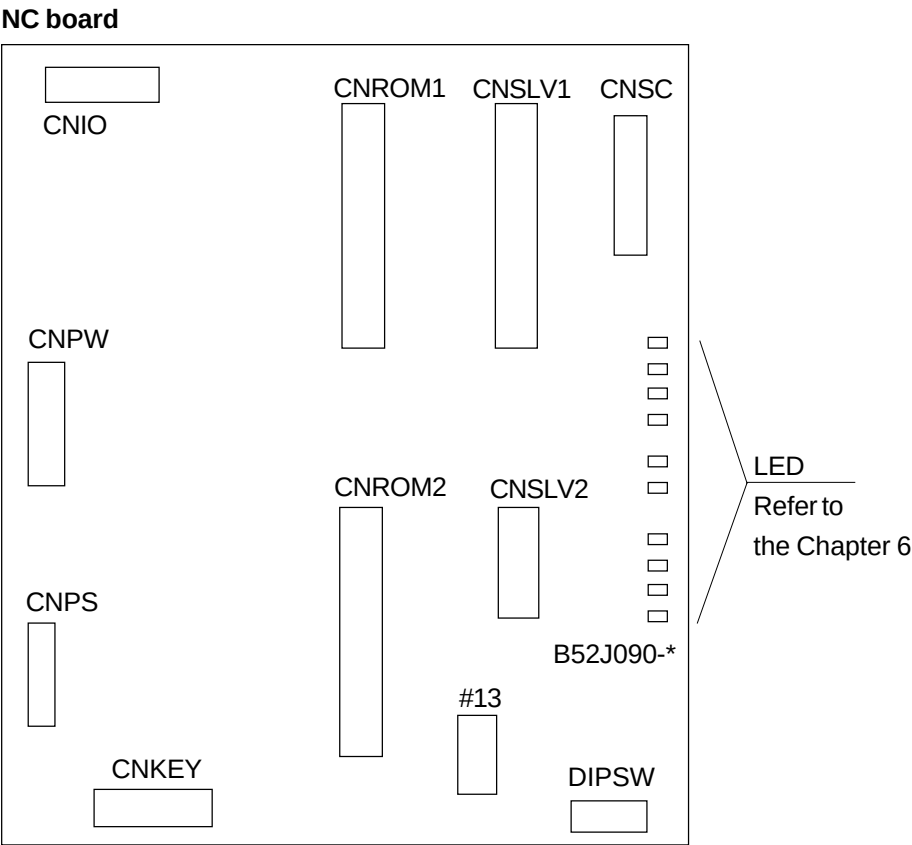


7.2.2.1 TC-S2B (2/2)

No.	PART CODE	QUANTITY	品名	PART NAME	REMARK
1	618666001	1	SENCコードクミ251	S ENCODER CORD ASSY 251	
2	618679001	1	Sモータコード251	SPINDLE MOTOR CORD 251	STD
	618719001	1	Sモータコード251 EU	SPINDLE MOTOR CORD 251 EU	EU
3	618661001	1	Xフレキシブル251	X FLEXIBLE TUBE ASSY, 251	STD
	618509001	1	Xフレキシブル251L	X FLEXIBLE TUBE ASSY, 251L	LONG
4	618664001	1	YENCコード251	Y ENCODER CORD, 251	
5	618665001	1	Yモータコード251	Y MOTOR CORD, 251	
6	618682001	1	LSYコード251	LS Y CORD, 251	
7	618747001	1	ZENCコード251	Z ENCODER CORD, 251	
8	618738001	1	Zモータコード251	Z MOTOR CORD, 251	
9	618683001	1	LSZコード251	LS Z CORD, 251	
10	618746001	1	Zブレーキコード251	Z BREAK CORD 251	
11	618684001	1	LSコードATCクミ251	LS CORD ATC ASSY, 251	
12	618685001	1	ATCENCコードクミ251	ATCENC CORD ASSY, 251	
13	618686001	1	ATCモータコード251	ATC MOTOR CORD, 251	
14	650245001	1	ATCCAMスイッチクミ229	ATCCAM SWITH ASSY, 229	
15	618743001	1	KEYコードクミS2B	KEY CORD S2B	
16	618744001	1	SWコードS2B	SW CORD S2B	
17	618745001	1	K200コードS2B	K200 CORD S2B	
18	-	1	Xモータコード251	X MOTOR CORD 251	
19	-	1	XENCコード251	X ENCODER CORD 251	
20	-	1	LSXコード251	LS X CORD 251	
21	-	1	Sモータコード251	S MOTOR CORD 251	
22	-	1	SENCコード251	S ENCODER CORD 251	
23	-	1	SFANコード251	SFAN CORD 251	
24	618478001	1	ドアロックLSクミS2B	DOOR LOCK LS ASSY S2B	

7.3 Control Unit

7.3.1 NC board (1/2)



NC PCB of TC- S2B must use the B52J090-4 Rev.E or higher.

7.3.1 NC board (2/2)

Connector on the NC board

Connector	Number	Remarks	Connection
CNIO	26	IO board control signal	IO board
CNPW	5	Power Input 5V	AVR1
CNRS	8	B port for RS-232C	None
CNKEY	36	LCD Display, Keyboard signal	Keyboard
CNROM1	96	For MEM board Interface	MEM board
CNROM2	96	For MEM board Interface	MEM board
CNSLV1	96	For SLAVE board Interface	SLAVE board
CNSLV2	48	For SLAVE board Interface	SLAVE board
CNSC	48	For NBUS board Interface	NBUS board
# 13	32	CG Interface	CG board or CG ROM

Function of NC board

1. Local CPU (Man-Machine interface)

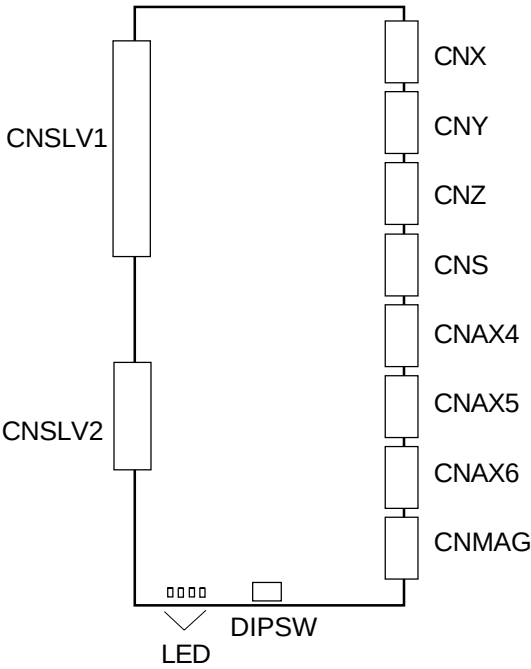
- 1.Editing
- 2.Keyboard input (RS-232C)
- 3.Display

2. Main CPU (Operation command)

- 1.Operation command
- 2.Allocation calculation of tool
- 3.Calculation of tool diameter compensation
- 4.Calculation of intersection
- 5.Management of alarm
- 6.External I/O signal

7.3.2 SLAVE board

Slave board



Connector of the SLAVE board.

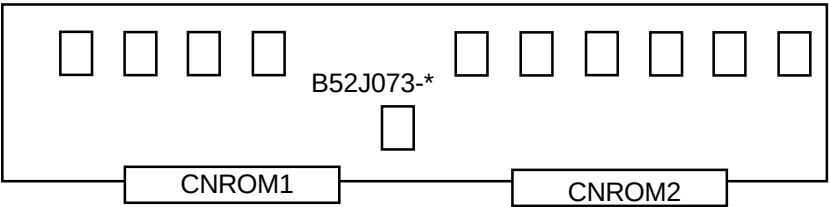
Connector	Number	Remarks	Connection
CNSLV1	96	NC board interface	NC board
CNSLV2	48	NC board interface	NC board
CNX	20	Servo driver interface	X axis driver
CNY	20	Servo driver interface	Y axis driver
CNZ	20	Servo driver interface	Z axis driver
CNS	20	Servo driver interface	S axis driver
CNAX4	20	Servo driver interface	4th axis driver
CNAX5	20	Servo driver interface	5th axis driver
CNAX6	20	Servo driver interface	6th axis driver
CNMAG	20	Servo driver interface	MAG axis driver

Function of SLAVE board.

- 1. Axis control (8 axes).
- 2. Pluse count from pluse generator.

7.3.3 MEM board

MEM board



Conector on the MEM board.

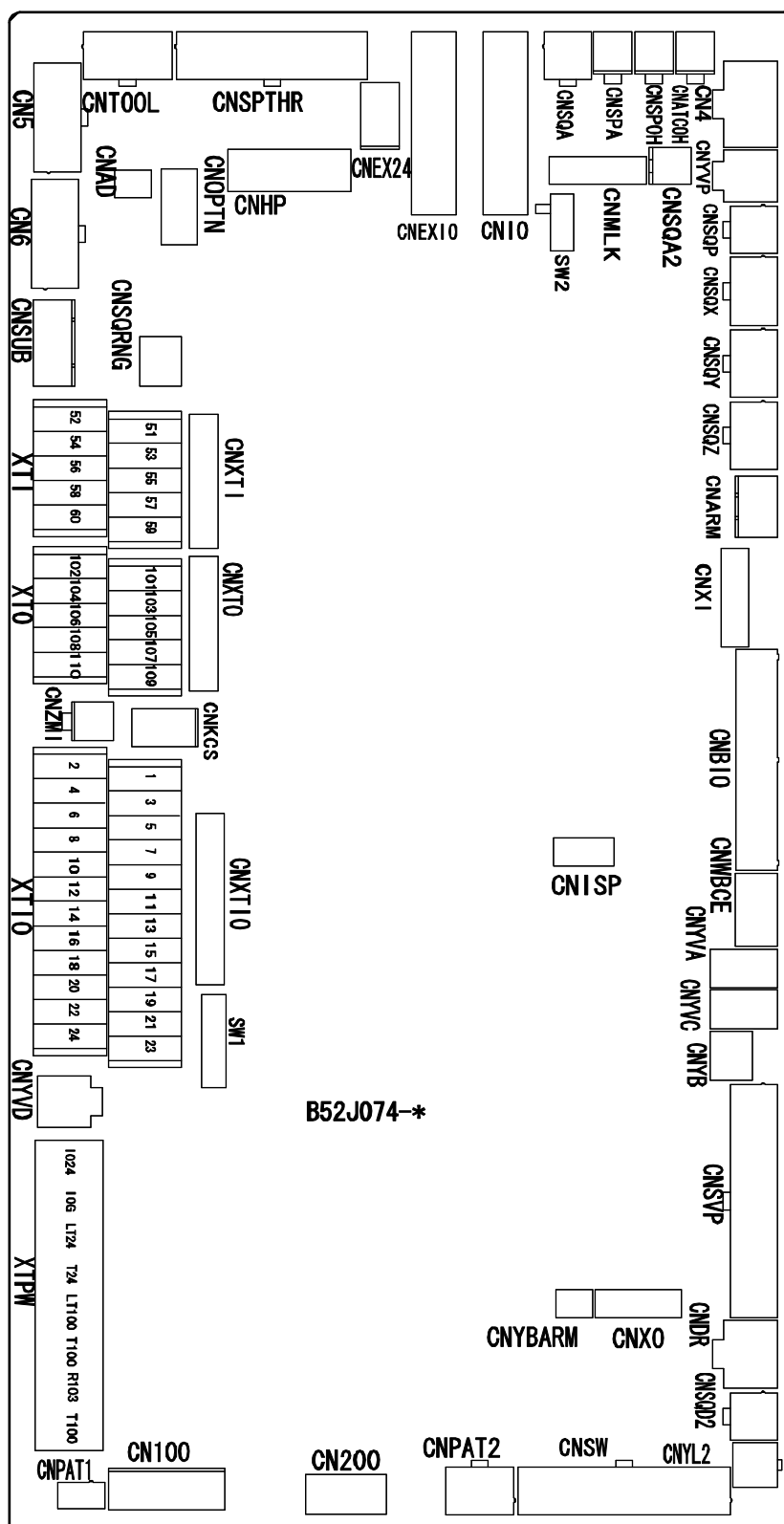
Conector	Number	Remarks	Conection
CNROM1	96	For NC board interface.	NC board
CNROM2	96	For NC board interface.	NC board

Function of the MEM board.

The MEM board is equipped with a Flash memory storing the system program for NC board and SLAVE board operations.

TC-S2B : A00-WJ(E)26 or higher.

7.3.4 IO board (1/2)



7.3.4-1.ai

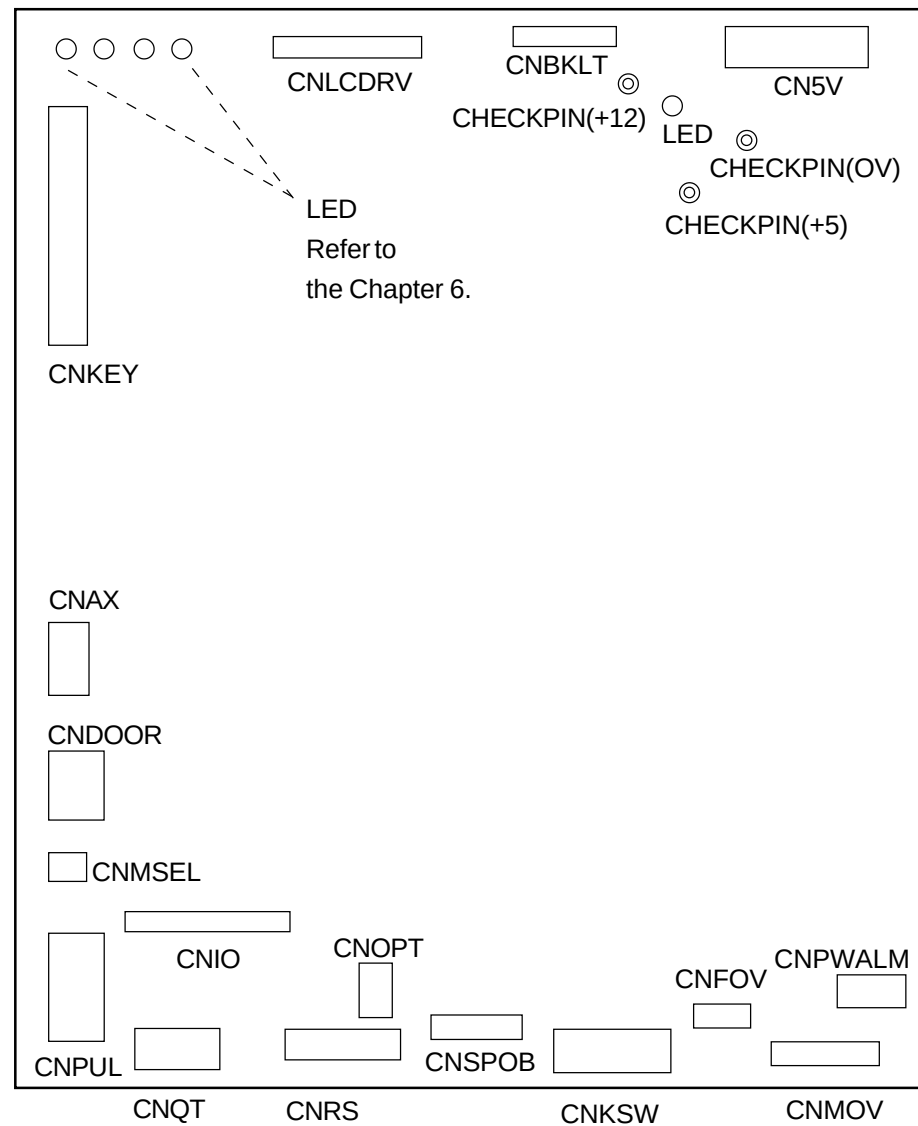
7.3.4 IO board (2/2)

Connector	Number	Remarks	Connection
CNIO	26	IO board control signal	NC board
CNEXIO	26	EXIO board control signal	EXIO board
CNSQA2	4	ATC original sensor input	ATC origin sensor
CNSQA	4	Not used	-
CNSPA	2	Air down input	Air regulator
CNSPOH	2	Spindle motor thermal input	Spindle motor
CNATCOH	2	Cam motor thermal input	Cam motor
CN4	8	C axis sensor input	C axis sensor
CNYVP	4	Pot valve output	Pot valve
CNSQP	4	Pot sensor input	Pot sensor
CNSQX	6	X axis LS input	X axis LS
CNSQY	6	Y axis LS input	Y axis LS
CNSQZ	6	Z axis LS input	Z axis LS
CNARM	8	Inverter control signal input&output	Inverer
CNBIO	30	Control singal in control box(MSEL, coolant protect)	-
CNWBCE	10	Index control signal	KS3 KS4
CNYVA	2	Air blast valve output	Air blust valve
CNYVC	2	Coolant valve output	Coolant vavle
CNYB	2	Z axis brake output	Z axis motor
CNSVP	22	Servo control signal	-
CNDR	6	Front door LS input	Front door LS
CNSQD2	4	Not used	-
CNYL2	2	Side door lock output(Magazine side)	Side door LS
CNSW	10	Operation Panel SW input	Operation panel
CNPAT1	2	Indication lamp input power	Indication lamp
CNPAT2	6	Indication lamp control signal output	Indication lamp
CN100	6	AC100V	-
CN200	3	AC200V	-
CNYVD	4	Automatic door valve output	Automatic door valve
CNKCS	2	Pallet start LED of the front SW box	Front SW BOX
CNZMI	2	Z axis meaurement unit cover valve output	Z axis measurement unit
CNSUB	12	Magazine shutter , ATC area LS, side door LS, Lock (panel side) input & output	Magazine shutter LS, valve, ATC area LS, side door LS
CN6	10	6 axis control signal & output	6axis index
CN5	10	5 axis control signal input& output	5 axis index
CNTOOL	8	tool breakage unit control signal	Tool breakage unit
CNSPTHR	18	High pressure coolant control signal	High pressure coolant unit.
CNAD	2	Not used	-
CNHP2	18	Not used	-
CNMLK	7	Not used	-
CNOPTN	5	Automatic thermal displacement compensation signal	OPSEL board
CNSQRNG	6	Not used	-
CNYBARM	2	Not used	-
CNX1	7	Not used	-
CNX0	4	Not used	-

e7.3.4-1-1.exl

7.3.5 Key board (1/2)

Key external view

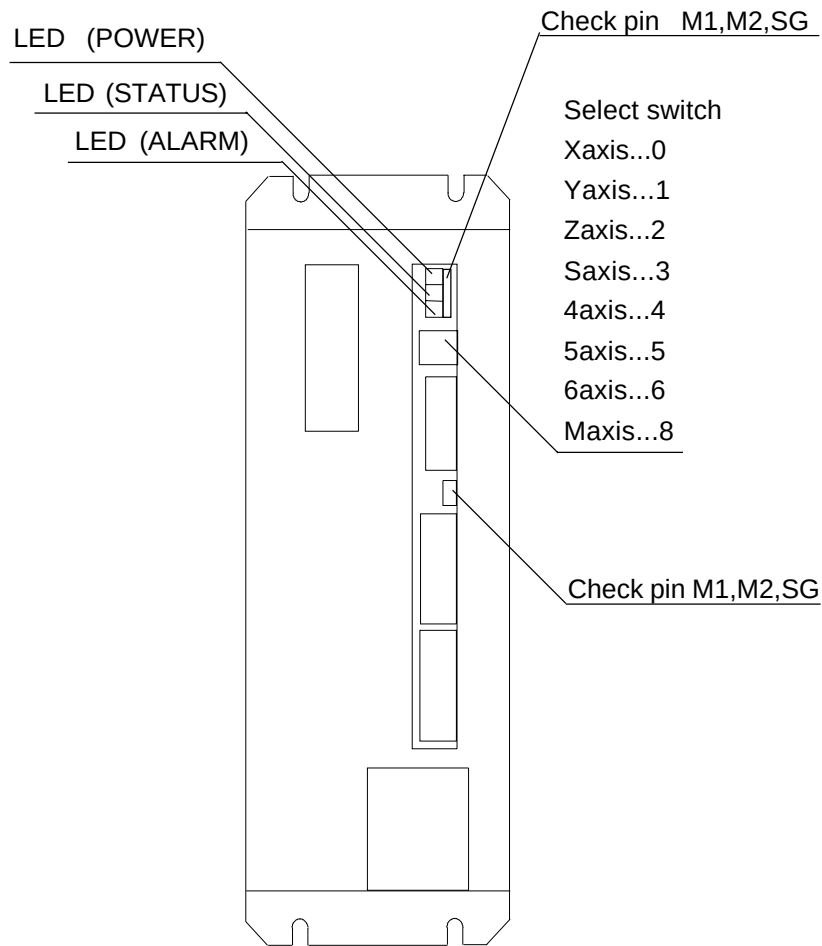


7.3.5 Key board (2/2)

Connector	Number	Remarks	Connecton
CNKEY	40	keyboard control signal	NC board
CNCDRV	15	LCD control signal	LCD
CNBKLT	5	LCD backlight control signal	LCD back light
CN5V	5	DC5 DC12	AVR3
CNPWALM	3	Power error LED	IO board
CNMOV	8	Feedrate override SW input	Feedrate override SW
CNFOV	4	Traverse override SW input	Traverse over ride SW
CNКСW	10	Start, Stop, Edit SW input	Start Stop Edit SW
CNSPOV	6	Spindle override SW input	Spindle override SW
CNOPT	6	Spare input	-
CNRS	10	RS-232C	RS-232C connect
CNOT	8	Pallet start SW, pallet select SW	Pallet start, Pallet select SW
CNIO	20	FA interface board control signal	FA interface board
CNPUL	12	Handy pulser input	Handy pulser
CNMSEL	2	Machine select SW input	-
CNDOOR	6	Automatic door SW input	Automatic door SW
CNAX	4	Axis select SW input	-

7.3.5-1table.exl

7.3.6 Servo driver



07L02.ai

7.3.6.1 Servo parameter (1/11)

These are parameters related to the servo driver of each axis.

1. Below are the parameter check methods.

<Conversation type>

- (1) Press [DATA BANK], [6], and [ENT].
- (2) Press [5] and [ENT]. (Machine parameter 5 (servo driver))
- (3) Scroll the screen using [PAGE DOWN] or [PAGE UP].

<NC type>

- (1) Press [DATA BANK], [5], and [ENT].
- (2) Press [5] and [ENT]. (Machine parameter 5 (servo driver))
- (3) Scroll the screen using [PAGE DOWN] or [PAGE UP].

7.3.6.1 Servo parameter (2/11)

Machine Parameter 5 (Servo)

NO.	Parameter name	Description
001(X) 101(Y) 201(Z) 301(S) 401(4) 501(5) 601(6) 701(7) 801(M)	Velocity loop delay time.	Set the velocity loop delay time. Setting unit : 1micron second Effective range: 1 to 1023 micron second
002(X) 102(Y) 202(Z) 302(S) 402(4) 502(5) 602(6) 702(7) 802(M)	Velocity loop proportional gain.	Set the default of the velocity loop proportional gain. Setting unit : 1Hz/LSB Effective range: 10 to 3000 Hz
003(X) 103(Y) 203(Z) 303(S) 403(4) 503(5) 603(6) 703(7) 803(M)	Velocity loop integrated time constant.	Set the default of the velocity loop integrated time constant. Setting unit : 1 ms/LSB Effective range: 1 to 1000 ms
004(X) 104(Y) 204(Z) 304(S) 404(4) 504(5) 604(6) 704(7) 804(M)	Currentlimiter.	Set the default of the current limiter. Setting unit : 1 %/LSB Effective range: 30 to 400 %
005(X) 105(Y) 205(Z) 305(S) 405(4) 505(5) 605(6) 705(7) 805(M)	Time retaining Htvi after detection of velocity command "0".	Set the time that retains Htvi after the velocity command "0" has been detected. Setting unit : 1 msec/LSB Effective range: 1 to 255 msec

7.3.6.1 Servo parameter (3/11)

NO.	Parameter name	Description
006(X) 106(Y) 206(Z) 306(S) 406(4) 506(5) 606(6) 706(7) 806(M)	Detection range of velocity command.	Set the detection range of the velocity command "0". Setting unit : 1.0 rpm/LSB Effective range: 0 to 127 rpm
007(X) 107(Y) 207(Z) 307(S) 407(4) 507(5) 607(6) 707(7) 807(M)	Velocity loop integrated time constant used for changing quadrant.	Set the velocity loop integrated time constant used when changing quadrant. Setting unit : 1 ms Effective range: 1 to 255 ms
008(X) 108(Y) 208(Z) 308(S) 408(4) 508(5) 608(6) 708(7) 808(M)	Velocity command LPF.	Set the cut off frequency of the primary low pass filter in respect to the velocity command. Setting unit : 1 Hz Effective range: 1 to 990 Hz
009(X) 109(Y) 209(Z) 309(S) 409(4) 509(5) 609(6) 709(7) 809(M)	Current command LPF cut off frequency.	Set the cut off frequency of the current command low pass filter. Setting unit : 1 Hz / LSB Effective range: 1 to 990 Hz
010(X) 110(Y) 210(Z) 310(S) 410(4) 510(5) 610(6) 710(7) 810(M)	Current command BEF1 center frequency.	Set the center frequency of the current command band pass filter. Setting unit : 10 Hz / LSB (e.g. Input value = 50 to 500Hz) Effective range: 20 to 99 (200 to 990 Hz)

7.3.6.1 Servo parameter (4/11)

NO.	Parameter name	Description
011(X) 111(Y) 211(Z) 311(S) 411(4) 511(5) 611(6) 711(7) 811(M)	Velocity command direction. Current command BEF. Velocity command LPF. CH1 polarity. CH2 polarity. Feed back phase order. Current monitor. +/- N8 N7 N6 N5 N4 N3 N2 N1 N1: Velocity command direction. N2: Current command BEF. N3: Velocity command LPF. N4: CH1 polarity. N5: CH2 polarity. N6: Feed back phase order. N7: Current limiter. N8: Current monitor.	[Velocity command direction:N1] Set the velocity command direction. '0': + input to CCW Other than '0': + input to CW [Current command BEF:N2] Set whether or not to set the band pass filter to the current command. '0': OFF Other than '0': ON [Velocity command LPF:N3] Set ON or OFF of the speed command LPF. '0': OFF Other than '0': ON [CH1polarity:N4] [CH2polarity:N5] Set the polarity of CH1 and CH2 monitors. '0': Increase CCW Other than '0': Increase CW [Feed back phase order:N6] Set the feedback phase order. '0': Phase A Other than '0': Phase B [Current limiter:N7] Set whether or not use a current limiter. '0': OFF Other than '0': ON [Current monitor:N8] Set the type of response to Control +Velocity command. '0': Current command (Icmd) Other than '0': Current monitor (Imo)
012(X) 112(Y) 212(Z) 312(S) 412(4) 512(5) 612(6) 712(7) 812(M)	CH1 monitor CH2 monitor. +/- * * * * * * N2 N1 N1 CH1 monitor. N2 CH2 monitor.	[CH1 monitor:N1] [CH2 monitor:N2] Of the following four information types; current monitor, current command, velocity monitor, and velocity command, two can be analog-output. Use this parameter to select the information output to CH1 and CH2. 0: Current monitor (1V:IR) 1: Current command (1V:IR) 2: Velocity monitor (0.5V:1000rpm) 3: Velocity command (0.5V:1000rpm) 4: Velocity monitor (0.5V:4000rpm) Other than 0 to 4: Velocity command (0.5V:4000rpm)

7.3.6.1 Servo parameter (5/11)

NO.	Parameter name	Description																		
013(X) 113(Y) 213(Z) 313(S) 413(4) 513(5) 613(6) 713(7) 813(M)	Motor type.	Set the motor type. *The follwing value may be possibly changed. 46 : 15A Driver × P50B07030D 67 : 30A Driver ×65ZBM040H 71 : 30A Driver × P50B08050D 72 : 30A Driver × P50B08075H 240 : 30A Driver × P50B8075H (Only for C axis, motor is decelerate with the time constant when turn off the servo.) 106 : 50A Driver × P10B10120H (OS:4200min⁻¹) 105 : 50A Driver × P10B10120H 164 : 150A Driver × 64BM180K 165 : 150A Driver × 64BM090W 193 : 300A Driver × 64BM100T 194 : 300A Driver × 64BM180L 195 : 300A Driver × 64BM090W																		
014(X) 114(Y) 214(Z) 314(S) 414(4) 514(5) 614(6) 714(7) 814(M)	Encoder resolution.	Set the encoder resolution. <table> <tr> <td>0: 512</td><td>1:1000</td><td>2:1024</td></tr> <tr> <td>3:1500</td><td>4:2000</td><td>5:2048</td></tr> <tr> <td>6:2500</td><td>7:3000</td><td>8:4000</td></tr> <tr> <td>9:4096</td><td>10:5000</td><td>11:6000</td></tr> <tr> <td>12:8192</td><td>13:10000</td><td>14: 16000</td></tr> <tr> <td>15: 20000</td><td>255:10000</td><td></td></tr> </table> Other than the above, 255 applies.	0: 512	1:1000	2:1024	3:1500	4:2000	5:2048	6:2500	7:3000	8:4000	9:4096	10:5000	11:6000	12:8192	13:10000	14: 16000	15: 20000	255:10000	
0: 512	1:1000	2:1024																		
3:1500	4:2000	5:2048																		
6:2500	7:3000	8:4000																		
9:4096	10:5000	11:6000																		
12:8192	13:10000	14: 16000																		
15: 20000	255:10000																			
015(X) 115(Y) 215(Z) 315(S) 415(4) 515(5) 615(6) 715(7) 815(M)	Encoder type.	Set the type of encoder. 0: Reduced wire incremental encoder. 1: Absolute encoder.																		

7.3.6.1 Servo parameter (6/11)

NO.	Parameter name	Description
016(X) 116(Y) 216(Z) 316(S) 416(4) 516(5) 616(6) 716(7) 816(M)	Deadweight dropping prevention. +/- N8 * * * * N3 N2 N1 N1: Deadweight dropping prevention. N2: Switch PI or I-P control. N3: Switch P,PI control. N8: External regenerative resistor.	[Deadweight dropping prevention:N1] Set whenever or not to enable the deadweight dropping prevention control. '0': Enable. Other than '0': Disable. [Switch PI or IP control :N2] Set the method of PI control or I-P control. '0' : PI control Other than '0' : I-P control [Switch P,PI control : N3] Set whenever or not to enable the switching P control and PI control. '0': Disable. (Adopt the PI control by all the speed range) Other than '0': Enable. (Adopt PI control in more than the set up speed in less than the speed P control.) [External regenerative resistor:N8] Set the presence of an outside regenerative resistor. '0': Not equipped. Other than '0': Equipped.
017(X) 117(Y) 217(Z) 317(S) 417(4) 517(5) 617(6) 717(7) 817(M)	Timing of deadweight dropping prevention.	Set the timing of preventing dropping due to dead weight when the servo driver is off. Setting unit : 8 ms / LSB (e.g. Input value = 50 to 400 ms) Effective range : 1 to 255 (8 to 2040 ms)
018(X) 118(Y) 218(Z) 318(S) 418(4) 518(5) 618(6) 718(7) 818(M)	Current limiter with deadweight dropping prevention control enabled.	Set the current limitation when the deadweight dropping prevention control is enabled. (Motor type of the parameter value is other than 240.) Setting unit : 1% / LSB Effective range : 30 to 400 (30 to 400%) The value of *13 (Motor type) is 240; Set the deacceleration time constant when servo is turned OFF. Setting Unit : 4ms/LSB (per 1000min⁻¹) Effective range : 1to 400 (4 to 1600ms)

7.3.6.1 Servo parameter (7/11)

NO.	Parameter name	Description
019(X) 119(Y) 219(Z) 319(S) 419(4) 519(5) 619(6) 719(7) 819(M)	Speed when P control is switched to PI control	Set the change speed when switching from P control to PI control is enabled. Setting unit : 1.0 rpm / LSB Effective range : 0 to 255 rpm (Although the setting range for the amplifier is 1 ~ 255, 0 can be set to enable numerical control common for conventional models.)
020(X) 120(Y) 220(Z) 320(S) 420(4) 520(5) 620(6) 720(7) 820(M)	Blind section control amount	Set the blind section control amount for I-P control. Effective range : 0 to 2047 (Although the setting range for the amplifier is 1 ~ 2047, 0 can be set to enable numerical control common for conventional models.)
021(X) 121(Y) 221(Z) 321(S) 421(4) 521(5) 621(6) 721(7) 821(M)	Torque ripple control gain	Set the default of the torque ripple control gain. Effective range : 0 to 32767
022(X) 122(Y) 222(Z) 322(S) 422(4) 522(5) 622(6) 722(7) 822(M)	Torque ripple control phase	Set the torque ripple control phase. Setting unit : 1 deg / LSB Effective range : - 180 ° to 180 °
023(X) 123(Y) 223(Z) 323(S) 423(4) 523(5) 623(6) 723(7) 823(M)	Torque observer frequency	Set the observer frequency. Setting unit : 1 Hz / LSB Effective range : 1 to 204 Hz

7.3.6.1 Servo parameter (8/11)

NO.	Parameter name	Description
024(X) 124(Y) 224(Z) 324(S) 424(4) 524(5) 624(6) 724(7) 824(M)	Load inertia	Set the load inertia for torque observer model. Setting unit : 1 % LSB Effective range : 0 to 3000 %
025(X) 125(Y) 225(Z) 325(S) 425(4) 525(5) 625(6) 725(7) 825(M)	Torque observer control gain	Set the amount of compensation for the estimated torque relative to the specified torque. No compensation is applied when 0% is set. Setting unit : 1 % LSB Effective range : 0 to 3000 %
026(X) 126(Y) 226(Z) 326(S) 426(4) 526(5) 626(6) 726(7) 826(M)	Torque observer input LPF	Set the torque observer input LPF. 1000Hz is automatically set when 0 Hz or a value larger than 1000 Hz is entered. Setting unit : 1 Hz / LSB Effective range : 0 to 1000 (1 to 1000Hz)
027(X) 127(Y) 227(Z) 327(S) 427(4) 527(5) 627(6) 727(7) 827(M)	Current limiter 2	Set the numerical value of the Current limiter 2 with TC-32A, TC-20A, TC-22A and TC31-A magazine pot lower position. Setting unit : 1 % LSB Effective range : 0 to 400 %
028(X) 128(Y) 228(Z) 328(S) 428(4) 528(5) 628(6) 728(7) 828(M)	In-position Check Pause	Set the waiting time after the magazine of the TC-31A or 22A has turned and in-position mode is entered until the current limit is applied. Setting unit : msec Effective range: 0 ~ 9999 msec

7.3.6.1 Servo parameter (9/11)

NO.	Parameter name	Description
029(X) 129(Y) 229(Z) 329(S) 429(4) 529(5) 629(6) 729(7) 829(M)	Current command BEF2 center frequency.	Set the center frequency of the current command band pass filter. Setting unit : 10 Hz / LSB (e.g. Input value = 50 to 500Hz) Effective range: 20 to 99 (200 to 990 Hz)
030(X) 130(Y) 230(Z) 330(S) 430(4) 530(5) 630(6) 730(7) 830(M)	Not using.	
031(X) 131(Y) 231(Z) 331(S) 431(4) 531(5) 631(6) 731(7) 831(M)	Not using.	
032(X) 132(Y) 232(Z) 332(S) 432(4) 532(5) 632(6) 732(7) 832(M)	Not using.	
033(X) 133(Y) 233(Z) 333(S) 433(4) 533(5) 633(6) 733(7) 833(M)	Not using.	

7.3.6.1 Servo parameter (10/11)

NO.	Parameter name	Description
034(X) 134(Y) 234(Z) 334(S) 434(4) 534(5) 634(6) 734(7) 834(M)	Not using.	
035(X) 135(Y) 235(Z) 335(S) 435(4) 535(5) 635(6) 735(7) 835(M)	Not using.	
036(X) 136(Y) 236(Z) 336(S) 436(4) 536(5) 636(6) 736(7) 836(M)	Not using.	
037(X) 137(Y) 237(Z) 337(S) 437(4) 537(5) 637(6) 737(7) 837(M)	Not using.	
038(X) 138(Y) 238(Z) 338(S) 438(4) 538(5) 638(6) 738(7) 838(M)	Not using.	

7.3.6.1 Servo parameter (11/11)

NO.	Parameter name	Description
039(X) 139(Y) 239(Z) 339(S) 439(4) 539(5) 639(6) 739(7) 839(M)	Not using.	
040(X) 140(Y) 240(Z) 340(S) 440(4) 540(5) 640(6) 740(7) 840(M)	Not using.	

7.3.7 Current protection element

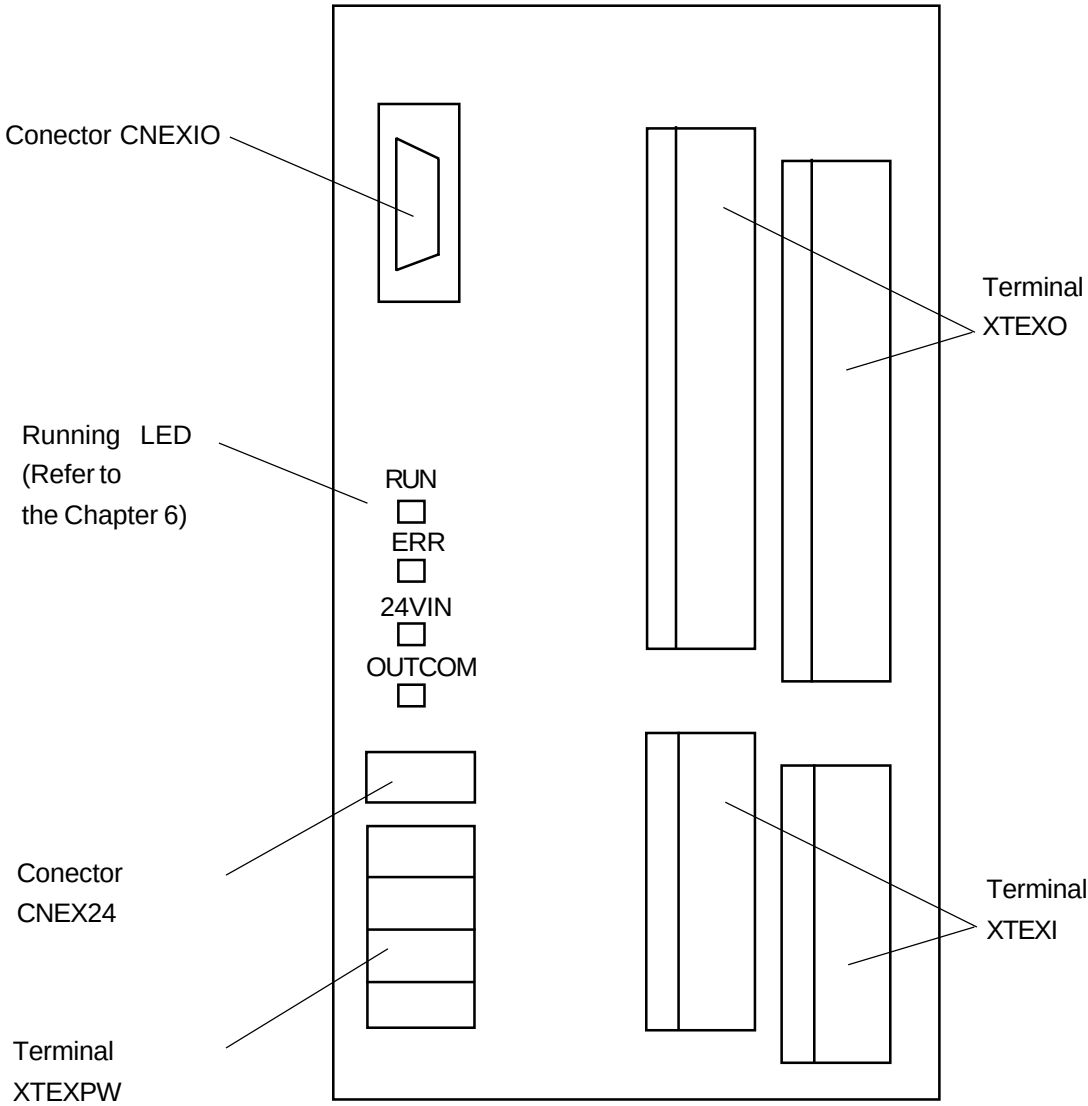
No.	Location	Name	Type/Capacity	Remarks		
1	On the T1.	Q1	Nothing.	Other than EU.	Spindle main circuit protection.	
			Breaker (3P)25A.	EU.		
2	Control box center chassis.	Q2	Breaker (2P.) 10A.	Transformer 2 primary side protection. Spindle driver		
3		Q3	G fuse (3pcs.) 8A.	Other than EU.	Coolant motor, chip flow motor, Spindle motor fan	
			Breaker (3P)7.5A.	EU.		
4	On the T2.	Q4	Circuit protector (1P)4A.	Other than EU.	AC100V protection for control.	
			Circuit protector (1P)3A.	EU.	AC200V protection for spindle and feed axis control. Spindle motor fan (EU).	
5		Q5	(1P)3A.		AC100V protection for control.	
6		Q6	(1P)3A.		AC24V protection for light.	
7		Key board.	F1	G fuse S 1A.	ForRS-232C.	
8		Side face inside the control box.	Spare fuse.	1) to 8) sets.	Other than EU. (Except8)	

No specification for EU in the TC-S2B.

7.3.8 Extension I/O board ASSY.

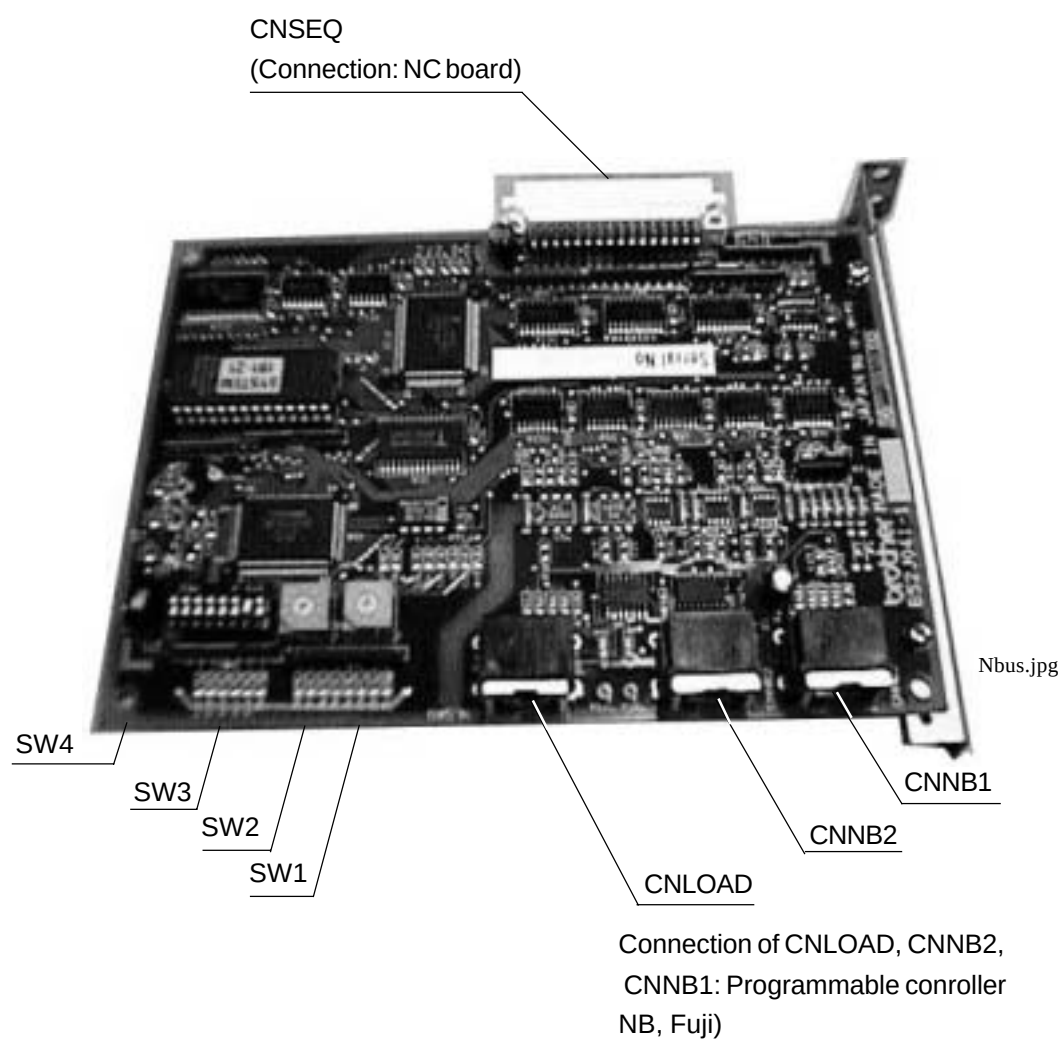
Extension IO board assy.

Fig.1



Connector Name	Number	Contents	Connection
CNEXIO	26	EXIO Control Signal	IO PCB
CNEX 24	2	DC 24V Power Supply	IO PCB

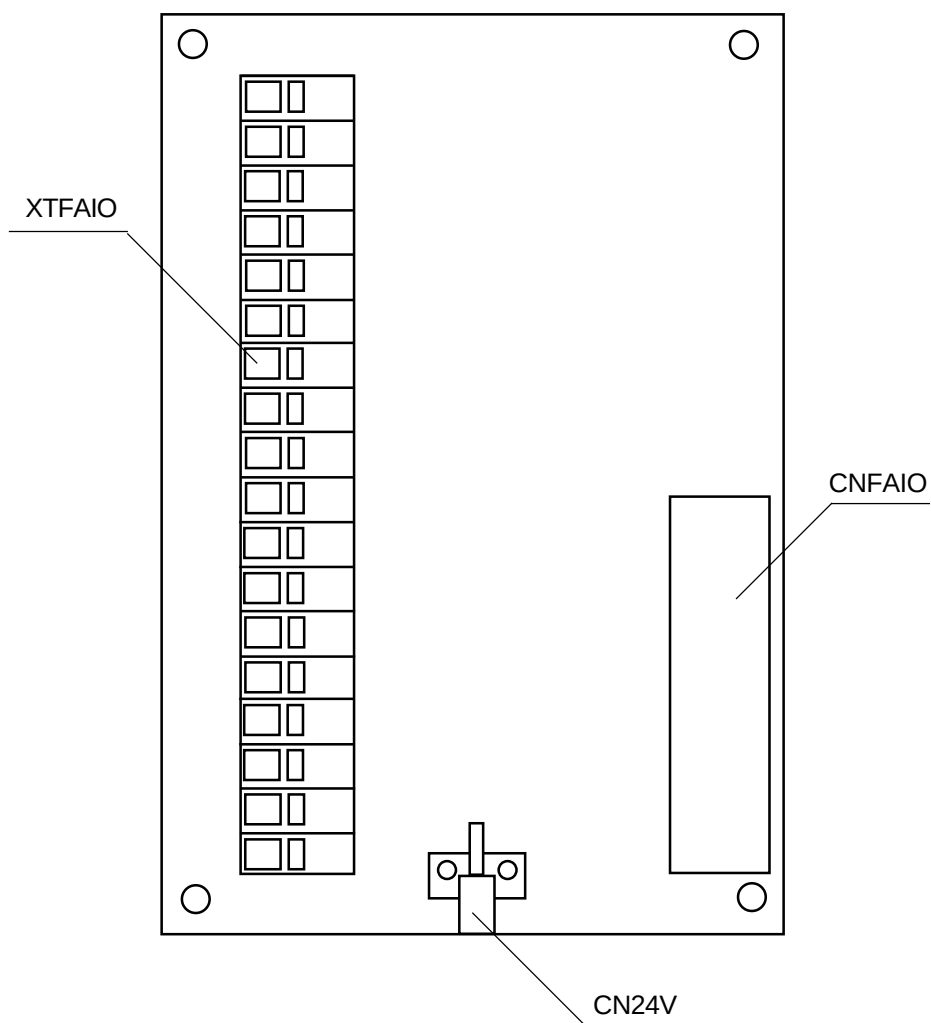
7.3.9 N bus i/ f board (B52J041-*)



SW	Contents
SW1 SW2	Setting the address of Programmable controller
SW3 SW4	Setting the model of Programmable controller

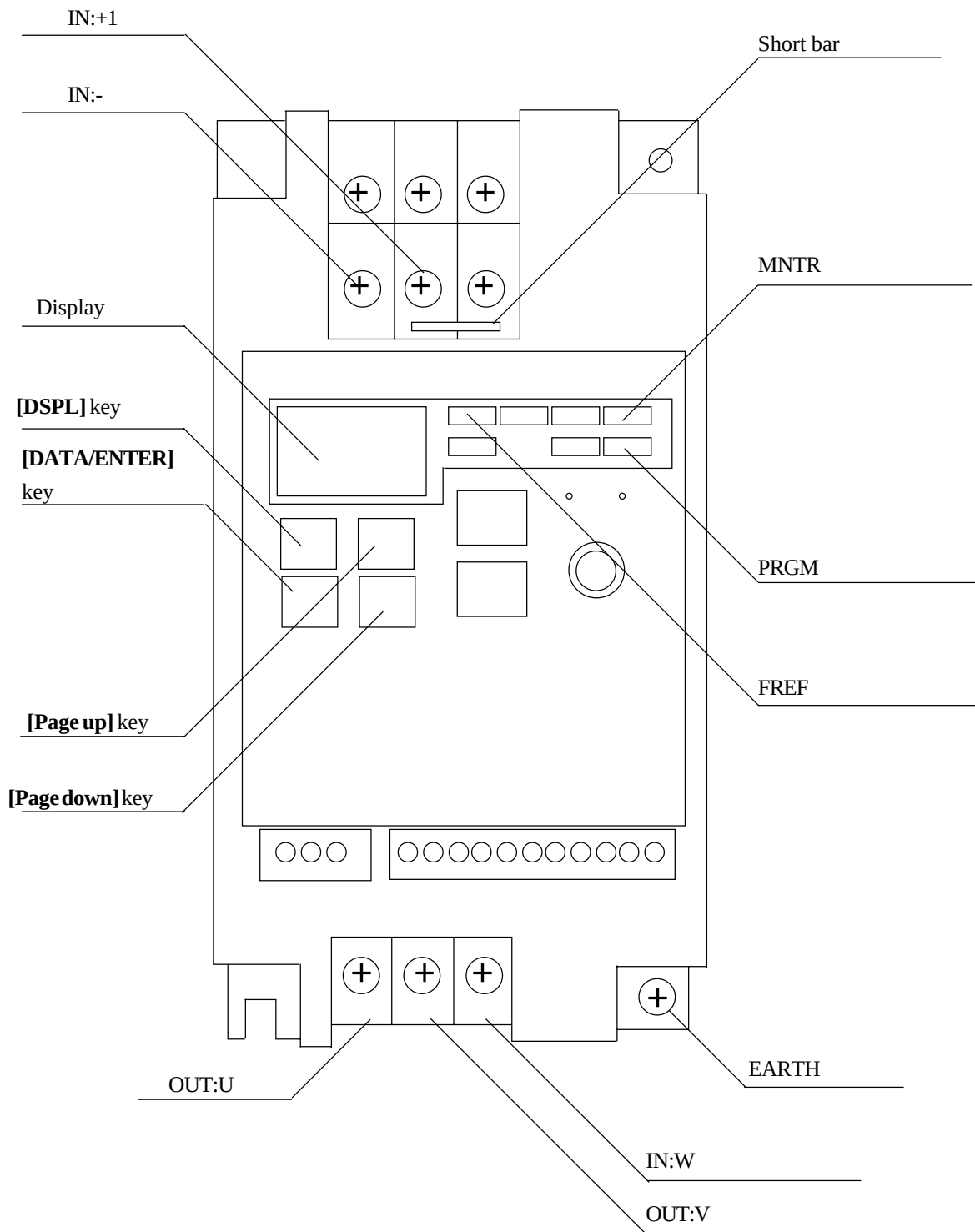
7.3.10 FA- switch interface board ASSY

Fig.1

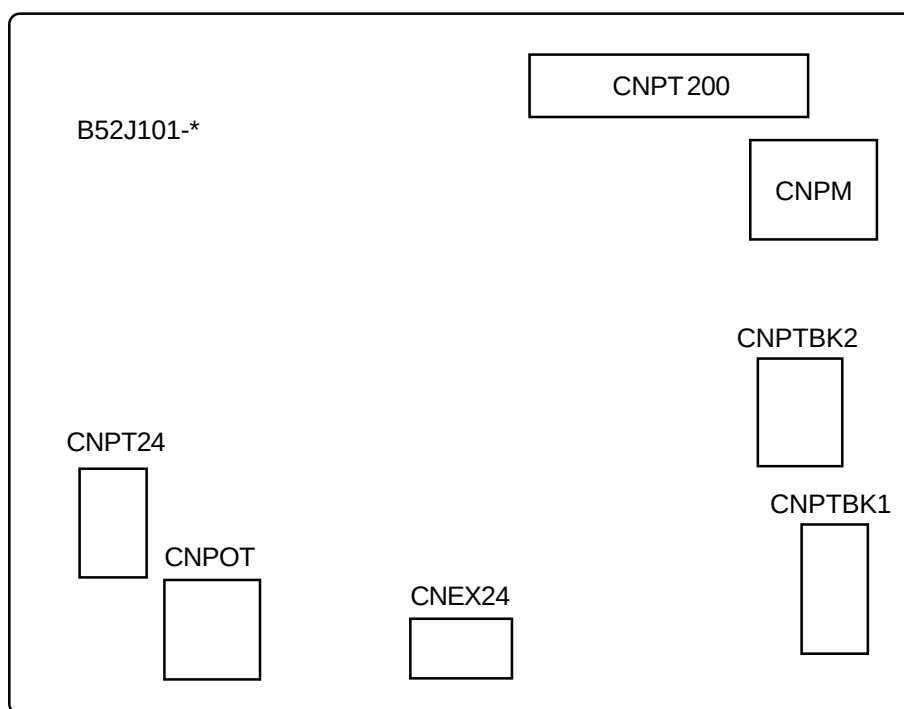


7.3.11 Inverter

J7INVERTER200W ASSY

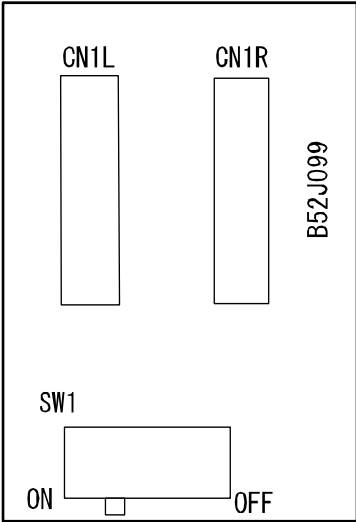


7.3.12 POT PCB



Connector name	Number	Contents	Connection
CNPT200	4	AC200V input, capacitor	KS1,CAP2
CNPM	4	MOTOR POWER	POT MOTOR
CNPTBK2	6	Brake output	POT MOTOR
CNPTBK1	3	AC100V input	XTPOW
CNEX24	2	AC24V output	EXIO board
CNPOT	4	POT control signal	IO board
CNPT24	2	DC24V input	IO board

7.3.13 CG PCB



TR2A 7.3.13.ai

Connector	A number of pole	Contents	To be connect with
CN1R	16	NC board interface	NC board
CN1L	16	NC board interface	NC board

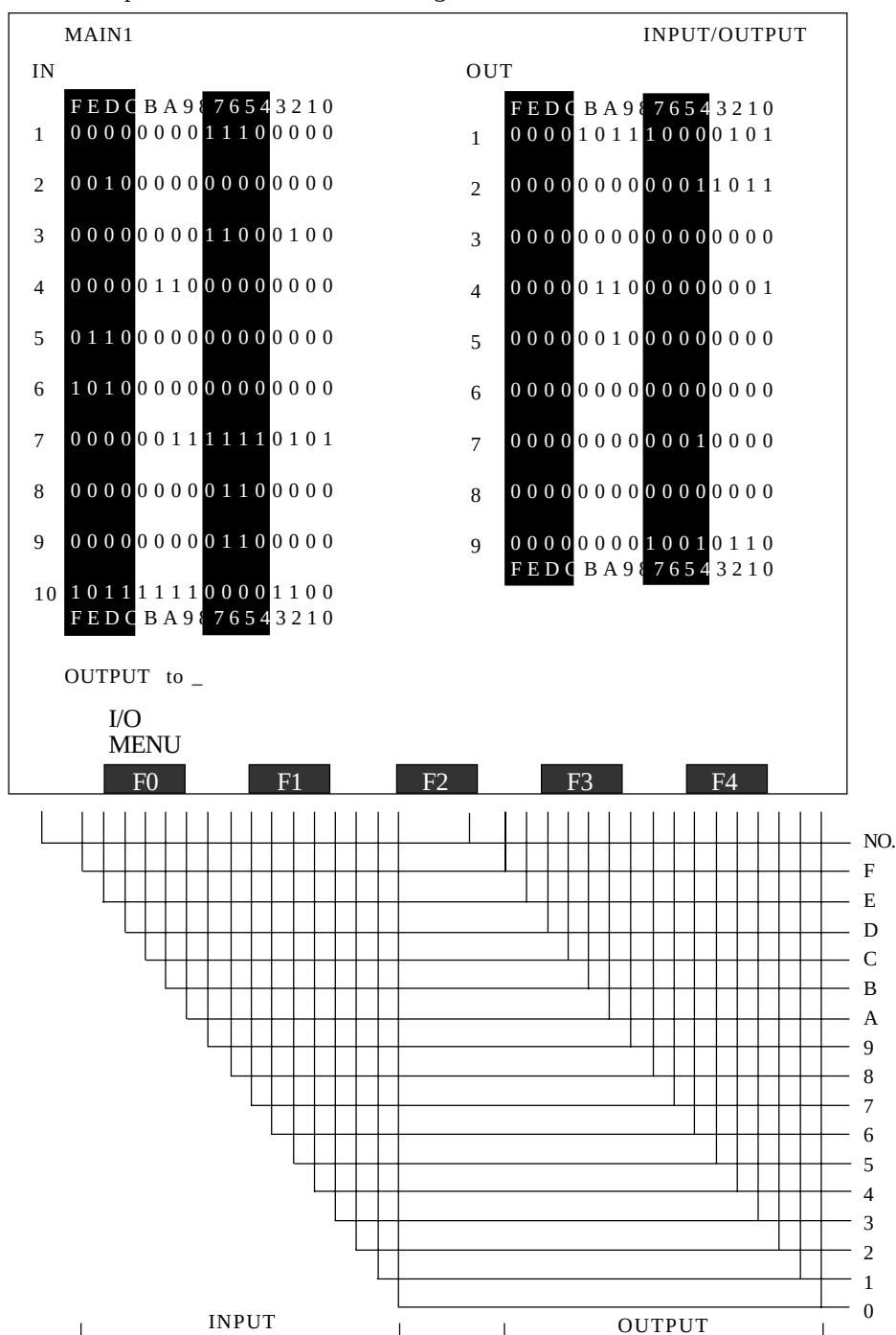
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Chapter 8 Diagnosis by NC unit

8.1 I/O Display

8.1.1 Description of <IO> screen

Input signals to the NC unit and output signals from the NC unit can be displayed by pressing the [IO] key. Consequently, you can determine the machine and NC unit operation status when servicing.



An asterisk (*) after each signal indicates that the signal is negative logic (effective when bit is "0").

"Default" indicates the state when the machine has started correctly.

"-" indicates that the status varies depending on the settings.

8.1.2 I/O list(Main) (1/6)

INPUT/OUTPUT DISPLAY

INPUT STATUS DISPLAY (MAIN 1)

Bit Input	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1			ADDITIONAL MEMORY	*EXIO (5TH STATION) provided	DIP SWITCH 3	DIP SWITCH 2	DIP SWITCH 1	DIP SWITCH 0		*ROM SELECT	MACHINE SELECTION		*BATTERY ERROR			
2									*FLASH BUSY	*ATC CAM ZERO POINT SENSOR		*ALARM INTERRUPT		CPU ERROR (LOCAL)	CPU ERROR (SLAVE)	CPU ERROR (MASTER)
3	KEY ENTRY FOR FA 7	KEY ENTRY FOR FA 6	KEY ENTRY FOR FA 5	KEY ENTRY FOR FA 4	KEY ENTRY FOR FA 3	KEY ENTRY FOR FA 2	KEY ENTRY FOR FA 1	KEY ENTRY FOR FA 0						AUTOMATIC DOOR MODE SW	AUTOMATIC DOOR CLOSE SW	AUTOMATIC DOOR OPEN SW
4	JOG KEY -4	JOG KEY +4	JOG KEY -Z	JOG KEY +Z	JOG KEY -Y	JOG KEY +Y	JOG KEY -X	JOG KEY +X		EDIT	MEMO (MEMORY OPERATION)	MDI	MANU (MANUAL)	SHIFT KEY	RST KEY	RELSE KEY
5		AXIS SELECTION SW2	AXIS SELECTION SW1		KEY MATRIX READ SIGNAL 11	KEY MATRIX READ SIGNAL 10	KEY MATRIX READ SIGNAL 9	KEY MATRIX READ SIGNAL 8	KEY MATRIX LEAD SIGNAL 7	KEY MATRIX LEAD SIGNAL 6	KEY MATRIX LEAD SIGNAL 5	KEY MATRIX LEAD SIGNAL 4	KEY MATRIX LEAD SIGNAL 3	KEY MATRIX LEAD SIGNAL 2	KEY MATRIX LEAD SIGNAL 1	KEY MATRIX LEAD SIGNAL 0
6	SPI NDL E OVER RIDE IN	SPI NDL E OVER RIDE 4	SPINDLE OVERRIDE 3	SPINDLE OVERRIDE 2	SPINDLE OVERRIDE 1	RAPID OVERRIDE IN	RAPID OVERRIDE 2	RAPID OVERRIDE 1		QT SELECT SIGNAL	PALLET SELECT 2	PALLET SELECT 1	MODE SELECT SW	PALLET START SW	STOP SW	START SW
7	INPUT RESERVE 3	INPUT RESERVE 2	INPUT RESERVE 1	INPUT RESERVE 0	MANUAL PULSE GENERATOR AXIS SELEC- TION 4	MANUAL PULSE GENERATOR AXIS SELEC- TION 3	MANUAL PULSE GENERATOR AXIS SELEC- TION 2	MANUAL PULSE GENERATOR AXIS SELEC- TION 1	MANUAL PULSE GENERATOR SCALE 2	MANUAL PULSE GENERATOR SCALE 1	CUTTING OVERRIDE IN	CUTTING OVERRIDE 5	CUTTING OVERRIDE 4	CUTTING OVERRIDE 3	CUTTING OVERRIDE 2	CUTTING OVERRIDE 1
8	CE SPECIFICA- TION	SAFETY DEVICE SW	MACHINE SELECT SIGNAL 5	MACHINE SELECT SIGNAL 4	MACHINE SELECT SIGNAL 3	MACHINE SELECT SIGNAL 2	MACHINE SELECT SIGNAL 1	MACHINE SELECT SIGNAL 0	ATC OVER HEAT	DOOR CLOSE2 (QT INNER DOOR)	DOOR CLOSE	DOOR OPEN	EXTERNAL RESET	EXTERNAL STOP	EXTERNAL OUT START	EXTERNAL START
9	ATC AREA LIMIT	ATC ZERO POINT LIMIT	ZERO POINT LIMIT 6	ZERO POINT LIMIT 5	ZERO POINT LIMIT 4	ZERO POINT LIMIT Z	ZERO POINT LIMIT Y	ZERO POINT LIMIT X	CTS PUMP THRE	OIL HOLE PUMP MOTOR OVER HEAT	CHIP FLOW PUMP MOTER OVERHEAT	COOLANT PUMP MOTOR OVERHEAT	* TRANS OVERHEAT	* SPINDLE MOTER OVERHEAT	CONTROL BOX OVERHEAT	100V POWER SUPPLY ERROR

(Main) (2/6)

OUTPUT STATUS DISPLAY(MAIN 1)

INPUT/OUTPUT DISPLAY

Bit Output	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1				*WATCH DOG CLEAR	LED OUTPUT 3	LED OUTPUT 2	LED OUTPUT 1	LED OUTPUT 0	INTERRUPT ENABLE	ATC ORIGIN SENSOR GATE	*SOFT PROTECT	SERVO RELAY ON 2	SERVO RELAY ON 1	*ALARM CLEAR	NMI GATE	WATCH DOG
2		LED MATRIX OUTPUT 9	LED MATRIX OUTPUT 8	LED MATRIX OUTPUT 7	LED MATRIX OUTPUT 6	LED MATRIX OUTPUT 5	LED MATRIX OUTPUT 4	LED MATRIX OUTPUT 3	LED MATRIX OUTPUT 2	LED MATRIX OUTPUT 1	LED MATRIX OUTPUT 0	LED SCAN OUTPUT 1	LED SCAN OUTPUT 0	KEY LED MATRIX SCAN 2	KEYLED MATRIX SCAN 1	KEY MATRIX SCAN 0
3	KEY OUTPUT FOR FA 7	KEY OUTPUT FOR FA 6	KEY OUTPUT FOR FA 5	KEY OUTPUT FOR FA 4	KEY OUTPUT FOR FA 3	KEY OUT- PUT FOR FA 2	KEY OUTPUT FOR FA 1	KEY OUTPUT FOR FA 0								
4					LED CONTRAST SIGNAL 8	LED CONTRAST SIGNAL 4	LED CONTRAST SIGNAL 2	LED CONTRAST SIGNAL 1					BUZZER	OUTSIDE START LED	STOP LED	START LED
5	AIR BLAST- ING	CTS VALVE A	OIL HOLE ON M 408	CHIP SHOWER ON M 400	COOLANT VALVE ON M18	CHIP SHOWER SW ON	COOLANT SW ON	MACHINE LIGHT	OT RELEASE	DOOR LOCK	CTS PUMP ON	MAGAZINE ADDRESS OK	MAGAZINE CCW	MAGAZINE START		
6	POWER OFF	CTS VALVE C	CTS VALVE B	OPTION CLEAR	OPTION CLOCK	*QT INDEX (Constantly 1)	DRAIN AIR VALVE ON (SP THOUGH)	3-WAY VALVE ON (SP THOUGH)	AUTOMATIC DOOR VALVE CLOSE	AUTOMATIC DOOR VALVE OPEN	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	6TH AXIS UNCLAMP OUTPUT	5TH AXIS UNCLAMP OUTPUT	4TH AXIS UNCLAMP OUTPUT
7	PROGRAMABLE OUTPUT (110)	PROGRAMABLE OUTPUT (109)	PROGRAMABLE OUTPUT (108)	PROGRAMABLE OUTPUT (107)	PROGRAMABLE OUTPUT (106)	PROGRAMABLE OUTPUT (105)	PROGRAMABLE OUTPUT (104)	PROGRAMABLE OUTPUT (103)	Z AXIS COVER OPEN	TOOL BREAKAGE START (MCODE)	SIDE DOOR LOCK	INDICA- TION LAMP BLUE	INDICA- TION LAMP YELLOW	INDICATION LAMP RED	EXTERNAL START OUTPUT	START SIGNAL OUTPUT
8	PROGRAMABLE OUTPUT (320)	PROGRAMABLE OUTPUT (319)	PROGRAMABLE OUTPUT (318)	PROGRAMABLE OUTPUT (317)	PROGRAMABLE OUTPUT (316)	PROGRAMABLE OUTPUT (315)	PROGRAMABLE OUTPUT (314)	PROGRAMABLE OUTPUT (313)	PROGRAMABLE OUTPUT (310)	PROGRAMABLE OUTPUT (309)	PROGRAMABLE OUTPUT (308)	PROGRAMABLE OUTPUT (307)	PROGRAMABLE OUTPUT (306)	PROGRAMABLE OUTPUT (305)	PROGRAMABLE OUTPUT (304)	PROGRAMABLE OUTPUT (303)
9	PROGRAMABLE OUTPUT (340)	PROGRAMABLE OUTPUT (340)	PROGRAMABLE OUTPUT (338)	PROGRAMABLE OUTPUT (337)	PROGRAMABLE OUTPUT (336)	PROGRAMABLE OUTPUT (335)	PROGRAMABLE OUTPUT (334)	PROGRAMABLE OUTPUT (333)	PROGRAMABLE OUTPUT (330)	PROGRAMABLE OUTPUT (329)	PROGRAMABLE OUTPUT (328)	PROGRAMABLE OUTPUT (327)	PROGRAMABLE OUTPUT (326)	PROGRAMABLE OUTPUT (325)	PROGRAMABLE OUTPUT (324)	PROGRAMABLE OUTPUT (323)

1*:Low active

(Main) (3/6)**INPUT STATUS DISPLAY(MAIN 2)****INPUT/OUTPUT DISPLAY**

Bit Input	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	SERVORELAY CONTACT CHECK 2	SERVORELAY CONTACT CHECK 1	INVERTER ERROR (ATC)	EMERGENCY STOP	DC 24V ERROR	POWER SW OFF	AIR POWER LOW	AC POWER OFF	*OPTION SIGNAL	ALL AXES OVER LATCH	OVER RUN -Z	OVER RUN +Z	OVER RUN -Y	OVER RUN +Y	OVER RUN -X	OVER RUN +X
2	MAGAZINE 8	MAGAZINE 4	MAGAZINE 2	SIDE DOOR OPEN	OVER RUN ADDITIONAL AXIS 2-	OVER RUN ADDITIONAL AXIS 2+	OVER RUN ADDITIONAL AXIS 1-	OVER RUN ADDITIONAL AXIS1+	INPUT RESERVE	INPUT RESERVE	6TH AXIS UNCLAMP END INPUT	MAGAZINE 16	5TH AXIS UNCLAMP END INPUT	3 PH ERROR	4TH AXIS UNCLAMP END INPUT	INPUT RESERVE 6
3	PROGRAMABLE INPUT (60)	PROGRAMABLE INPUT (59)	PROGRAMABLE INPUT (58)	PROGRAMABLE INPUT (57)	PROGRAMABLE INPUT (56)	PROGRAMABLE INPUT (55)	PROGRAMABLE INPUT (54)	PROGRAMABLE INPUT (53)	INPUT RESERVE	*CTS PRS SENSOR	CTS L FILTER	*AREA SENSOR INPUT	COVER OPEN SIGNAL	TOOL BREAKAGE DETECTION ADVANCE END LS	TOOL BREAKAGE DETECTION REACT END LS	TOOL BREAKAGE DETECTION SENSOR
4	PROGRAMABLE INPUT (220)	PROGRAMABLE INPUT (219)	PROGRAMABLE INPUT (218)	PROGRAMABLE INPUT (217)	PROGRAMABLE INPUT (216)	PROGRAMABLE INPUT (215)	PROGRAMABLE INPUT (214)	PROGRAMABLE INPUT (213)	PROGRAMABLE INPUT (210)	PROGRAMABLE INPUT (209)	PROGRAMABLE INPUT (208)	PROGRAMABLE INPUT (207)	PROGRAMABLE INPUT (206)	PROGRAMABLE INPUT (205)	PROGRAMABLE INPUT (204)	PROGRAMABLE INPUT (203)
5								NEW IO BOARD	OPTION 8	OPTION 7	OPTION 6	OPTION 5	OPTION 4	OPTION 3	OPTION 2	OPTION 1
6																
7																

1.*:Low active

OUTPUT STATUS DISPLAY(MAIN 2)									INPUT/OUTPUT DISPLAY							
Bit Output	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	SLAVE 8 PCTTOER8	SLAVE 8 CRECER8	SLAVE 7 PCTTOER7	SLAVE 7 CRECER7	SLAVE 6 PCTTOER6	SLAVE 6 CRECER6	SLAVE 5 PCTTOER5	SLAVE 5 CRECER5	SLAVE 4 PCTTOER4	SLAVE 4 CRECER4	SLAVE 3 PCTTOER3	SLAVE 3 CRECER3	SLAVE 2 PCTTOER2	SLAVE 2 CRECER2	SLAVE 1 PCTTOER1	SLAVE 1 CRECER1
2	AUX PORT INPUT PC15	AUX PORT INPUT PC14	AUX PORT INPUT PC13	AUX PORT INPUT PC9					SLVON8	SLVON7	SLVON6	SLVON5	SLVON4	SLVON3	SLVON2	SLVON1
3	COMHOLT	IRQDEN														
4																
5																

1.*:Low active

(SLAVE) (5/6)**INPUT/OUTPUT DISPLAY****INPUT STATUS DISPLAY (SLAVE)**

Bit Input	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	INPUT RESERVE	CPU ERROR MAIN	ARM AXIS SERVO ERROR	6TH SERVO ERROR	5TH SERVO ERROR	*FLASH MEM. BUSY SIG.	* SIO.2 RECEIVE READY	* SIO.1 RECEIVE READY	SERVO AIARM 2	SERVO AIARM 1	BREAKE PERMIT No 2	BREAKE PERMIT No1	DIP SW 4	DIP SW 3	DIP SW 2	DIP SW 1
2									INPUT RESERVE	INPUT RESERVE	INPUT RESERVE	INPUT RESERVE	INPUT RESERVE	INPUT RESERVE	INPUT RESERVE	INPUT RESERVE
3							C-PHASE STATUS MAG AXIS	C-PHASE STATUS ARM AXIS	C-PHASE STATUS 6-AXIS	C-PHASE STATUS 5-AXIS	C-PHASE STATUS 4-AXIS	C-PHASE STATUS MAIN AXIS	C-PHASE STATUS Z- AXIS	C-PHASE STATUS Y- AXIS	C-PHASE STATUS X- AXIS	
4																TOUCH SENSER SIGNAL

1*:Low active

OUTPUT STATUS DISPLAY (SLAVE)

Bit Output	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	OUTPUT RESERVE	SOFT PROTECT	BRAKE SELECT SIGNAL	NMI GATE	SLAVE LED 4	SLAVE LED 3	SLAVE LED 2	SLAVE LED 1	SIO 2 ADDRESS 3	SIO 2 ADDRESS 2	SIO 2 ADDRESS 1	SIO 2 ADDRESS 0	SIO 1 ADDRESS 3	SIO 1 ADDRESS 2	SIO 1 ADDRESS 1	SIO 1 ADDRESS 0
2	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	OUTPUT RESERVE	ARM AXIS ENABLE	6TH AXIS ENABLE	5TH AXIS ENABLE	ARM AXIS SERVO ON	6TH AXIS SERVO ON	5TH AXIS SERVO ON

1*:Low active

(LOCAL) (6/6)**INPUT STATUS DISPLAY (LOCAL)****INPUT/OUTPUT DISPLAY**

Bit Input	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	INPUT RESERVE 4	INPUT RESERVE 3	INPUT RESERVE 2	INPUT RESERVE 1	DIP SW INPUT LOCAL 3	DIP SW INPUT LOCAL 2	DIP SW INPUT LOCAL 1	DIP SW INPUT LOCAL 0	*DATA SET READY B	*DATA SET READY A	*LOCAL FLASH BUSY SIGNAL	*HARD PROTECT ON	MEMORY CAPACITY STANDARD	NC LANGUAGE	CPU ERROR (SLAVE)	CPU ERROR (MAIN)
2																

1*:Low active

OUTPUT STATUS DISPLAY (LOCAL)

Bit Output	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	SPARE LOCAL 1	* PORT TERMINAL READY B	* PORT TERMINAL READY A	CPU ERROR (LOCAL)	*DISPLAY TIMING CONTROL SIGNAL	*DISPLAY MASK	*NMI GATE	*SOFT PRPTCT ON (SHARE)	*LED DISPLAY LOCAL 4	*LED DISPLAY LOCAL 3	*LED DISPLAY LOCAL 2	*LED DISPLAY LOCAL 1	LIQUID CRYSTAL POWER ON SIGNAL	*SPARE OUTPUT (LOCAL 0)	*SOFT PROTECT ON (LOCAL)	INTERRRUPT PERMISSION SIGNAL (LOCAL)

1*:Low active

8.2 I/O (Main) (1/16)

MAIN 1: INPUT 1

NO.	Symbol	Name	Default	Function
00			0	
01			0	
02			0	
03	*BATER	Battery error	1	“0” when battery error occurs
04			0	
05	MSEL	Machine selection	-	Not in use
06	*ROMSEL	ROM select	1	0: Flash writing mode
07			0	
			0	
			-	
08	DIPSW0	Dip Switch input 0	-	0:ON, 1:OFF
09	DIPSW1	Dip Switch input 1	-	0:ON, 1:OFF
0A	DIPSW2	Dip Switch input 2	-	0:ON, 1:OFF
0B	DIPSW3	Dip Switch input 3	-	
0C	*EXIO1	EX IO (5th station) provided	0	Extension I/O unit presence check signal When provided: 1
0D		Additional memory	0	0: No, 1:Exist
0E			0	
0F			0	

MAIN 1: INPUT 1 08~0B bit

Bit	Function	Description
DIPSW0	Change of safety level	0: Level 2 (strict) 1: Level 1 (less strict)
DIPSW1	Change of data/command cache	0: Enable 1: Disable
DIPSW2	Not used	0
DIPSW3	Flash writing	0: Normal 1: Writing

MAIN 1: INPUT 2

NO.	Symbol	Name	Default	Function
00	CPUERM	CPU error (main)	0	CPU internal error
01	CPUERS	CPU error (slave)	0	CPU internal error
02	CPUERL	CPU error (local)	0	CPU internal error
03			0	
04	*ALMINT	Alarm interrupt	1	
05			0	
06	*ATCCAM	ATC cam zero point sensor	0	ATC cam sensor position signal 0: Zero point
07	*BYFSM	Flash busy	1	
08			0	
09			0	
0A			0	
0B			0	
0C			0	
0D			0	
0E			0	
0F			0	

8.2 I/O (Main) (2/16)

MAIN 1: INPUT 3

NO.	Symbol	Name	Default	Function
00	OPNSW	Automatic door open SW.	0	“1” when the switch is pressed.
01	CLSSW	Automatic door close SW.	0	
02	MODE	Automatic door mode SW.	-	
03			0	
04			0	
05			0	
06			1	
07			1	Input signal via FA I/F board.
08	PI0	Key entry for FA0	0	
09	PI1	Key entry for FA1	0	
0A	PI2	Key entry for FA2	0	
0B	PI3	Key entry for FA3	0	
0C	PI4	Key entry for FA4	0	
0D	PI5	Key entry for FA5	0	
0E	PI6	Key entry for FA6	0	
0F	PI7	Key entry for FA7	0	

MAIN 1: INPUT 4

NO.	Symbol	Name	Default	Function
00	RELEASE	Release key.	0	“1” when [RELEASE] key is pressed .
01	RESET	Reset key.	0	“1” when [RESET] key is pressed.
02	SHIFT	Shift key.	0	“1” when [SHIFT] key is pressed.
03	MANU	Manu (manual).	0	“1” when [MANU] key is pressed.
04	MDI	MDI.	0	“1” when [MDI] key is pressed.
05	MEMOK	Memory operation.	0	“1” when [MEMOK] key is pressed.
06	EDIT	Edit.	0	“1” when [EDIT] key is pressed.
07			0	
08	JOG+X	Jog key +X	0	“1” when [JOG] key is pressed.
09	JOG-X	Jog key -X	0	“1” when [JOG] key is pressed.
0A	JOG+Y	Jog key +Y	0	“1” when [JOG] key is pressed.
0B	JOG-Y	Jog key -Y	0	“1” when [JOG] key is pressed.
0C	JOG+Z	Jog key +Z	0	“1” when [JOG] key is pressed.
0D	JOG-Z	Jog key -Z	0	“1” when [JOG] key is pressed.
0E	JOG+4	Jog key +4	0	“1” when [JOG] key is pressed.
0F	JOG-4	Jog key -4	0	“1” when [JOG] key is pressed.

8.2 I/O (Main) (3/16)

MAIN 1: INPUT 5

NO.	Symbol	Name	Default	Function
00	R0	Key matrix lead signal0	0	Key matrix lead signal.on the board.
01	R1	Key matrix lead signal1	0	
02	R2	Key matrix lead signal2	0	
03	R3	Key matrix lead signal3	0	
04	R4	Key matrix lead signal4	0	
05	R5	Key matrix lead signal5	0	
06	R6	Key matrix lead signal6	0	
07	R7	Key matrix lead signal7	0	
08	R8	Key matrix lead signal8	0	
09	R9	Key matrix lead signal9	0	
0A	R10	Key matrix lead signal10	0	
0B	R11	Key matrix lead signal11	0	
0C			0	
0D	AX1	Axis selection SW1	0	Refer to the other table.
0E	AX2	Axis selection SW2	0	Refer to the other table.
0F			0	

MAIN 1: INPUT 6

NO.	Symbol	Name	Default	Function
00	STA	Start SW.	0	“1” when [START SW] key is pressed.
01	STOP	Stop SW.	0	“1” when [STOP SW] key is pressed.
02	OSTA	Pallet start SW.	0	“1” when [PALLET START SW] key is pressed .
03	KEYPRT	Mode select SW.	0	Mode select can not be operated.
04	QT1	Pallet select1	-	Refer to the other table.
05	QT2	Pallet select2	-	Refer to the other table.
06	QT4	QT select signal.	-	When QT is provided:0
07			-	
08	FOV1	Rapid override1	0	Refer to the other table.
09	FOV2	Rapid override2	0	Refer to the other table.
0A	FOVIN	Rapid override IN	0	Refer to the other table.
0B	SPOV1	Spindle override 1	0	Refer to the other table.
0C	SPOV2	Spindle override 2	0	Refer to the other table.
0D	SPOV3	Spindle override 3	0	Refer to the other table.
0E	SPOV4	Spindle override 4	0	Refer to the other table.
0F	SPOVIN	Spindle override IN	0	Refer to the other table.

8.2 I/O (Main) (4/16)

Main1:Input 6 0B~0F bit

SPOVIN	SPOV4	SPOV3	SPOV2	SPOV1	Description
1	0	1	1	1	120%
1	1	0	0	0	110%
1	1	0	0	1	100%
1	1	0	1	0	90%
1	1	0	1	1	80%
1	1	1	0	0	70%
1	1	1	0	1	60%
1	1	1	1	0	50%
1	1	1	1	1	Alarm

Main1:Input 6 8~0A bit

FOVIN	FOV 2	FOV 1	Description
1	0	0	100%
1	0	1	Feed speed 3
1	1	0	Feed speed 2
1	1	1	Feed speed 1

Main1:Input 6 4~6 bit

QT 2	QT 1	Description
0	0	OFF
0	1	Pallet 1
1	1	Pallet 1 $\longleftrightarrow$ 2
1	0	Pallet 2

Main1:Input 5 0D~0E bit

AX2	AX1	Description
1	0	Not connected
1	0	The 4th axis select
1	1	The 5th axis select
1	1	The 6th axis select

8.2 I/O (Main) (5/16)

MAIN 1: INPUT 7

NO.	Symbol	Name	Default	Function
00	MOV1	Cutting override 1	0	Refer to the table.
01	MOV2	Cutting override 2	0	Refer to the table.
02	MOV3	Cutting override 3	0	Refer to the table.
03	MOV4	Cutting override 4	0	Refer to the table.
04	MOV5	Cutting override 5	0	Refer to the table.
05	MOVIN	Cutting override IN	0	Refer to the table.
06	PULSC1	Manual Pulse Generator Scale 1	0	Refer to the table.
07	PULSC2	Manual Pulse Generator Scale 2	0	Refer to the table.
08	PULAX1	Manual Pulse Generator Axis Selection 1	0	Refer to the table.
09	PULAX2	Manual Pulse Generator Axis Selection 2	0	Refer to the table.
0A	PULAX3	Manual Pulse Generator Axis Selection 3	0	Refer to the table.
0B	PULAX4	Manual Pulse Generator Axis Selection 4	0	Refer to the table.
0C	OPT0	Input reserve 0	0	Input reserve 0
0D	OPT1	Input reserve 1	0	Input reserve 1
0E	OPT2	Input reserve 2	0	Input reserve 2
0F	OPT3	Input reserve 3	0	Input reserve 3

MAIN 1: INPUT 8

NO.	Symbol	Name	Default	Function
00	EXSTART	External start	0	"1" when SW is turned on.
01	EXOUTST	External out start	0	"1" when SW is turned on.
02	EXSTOP	External stop	0	"1" when SW is turned on.
03	EXRESET	External reset	0	"1" when SW is turned on.
04	DROPEN	Door open	0	"1" when automatic door is opened.
05	DRCLOSE	Door close	0	"1" when automatic door is closed.
06	DRCLS2	Door close 2 (QT inside door)	0	"1" when QT inside door is closed.
07	ATCOH	ATC overheat	0	"1" when ATC is overheat.
08	MSEL0	Machine select signal 0	-	No. of tools 0: 14 1: 21
09	MSEL1	Machine select signal 1	-	ATC arm 0: Chuck format 1: Hook format
0A	MSEL2	Machine select signal 2	-	Not used
0B	MSEL3	Machine select signal 3	-	
0C	MSEL4	Machine select signal 4	0	
0D	MSEL5	Machine select signal 5	-	
0E	SECSW	Safety Device Switch	0	
0F	CE	CE Specification	0	"1" when door interlock switch is available for CE specification.

8.2 I/O (Main) (6/16)

Main 1: Input 8 0A, 0B, 0D bit

MSEL5	MSEL3	MSEL2	MODEL
1	0	0	TC-22A
0	0	1	TC-31A
0	1	0	TC-S2A
0	1	1	TC-32A
1	1	0	TC-R2A
1	1	1	TC-20A
0	0	0	TC-S2B

Main 1: Input 7 6~7 bit

PULSC2	PULSC1	Function
0	0	X1
0	1	X10
1	0	X100
1	1	

Main 1: Input 7 8~0B bit

PULAX4	PULAX3	PULAX2	PULAX1	Function
0	0	0	0	X axis
0	0	1	0	Y axis
0	0	0	1	Z axis
0	0	1	1	palser OFF
0	0	1	1	Additional sxis
0	1	1	1	Not connected

8.2 I/O (Main) (7/16)

Main 1: Input 0~5 bit

MOVIN	MOV 5	MOV 4	MOV 3	MOV 2	MOV 1	Description
1	0	1	0	1	1	200%
1	0	1	1	0	0	190%
1	0	1	1	0	1	180%
1	0	1	1	1	0	170%
1	0	1	1	1	1	160%
1	1	0	0	0	0	150%
1	1	0	0	0	1	140%
1	1	0	0	1	0	130%
1	1	0	0	1	1	120%
1	1	0	1	0	0	110%
1	1	0	1	0	1	100%
1	1	0	1	1	0	90%
1	1	0	1	1	1	80%
1	1	1	0	0	0	70%
1	1	1	0	0	1	60%
1	1	1	0	1	0	50%
1	1	1	0	1	1	40%
1	1	1	1	0	0	30%
1	1	1	1	0	1	20%
1	1	1	1	1	0	10%
1	1	1	1	1	1	0%

8.2 I/O (Main) (8/16)

MAIN 1: INPUT 9

NO.	Symbol	Name	Default	Function
00	100VER	100 V power supply error	0	100 V error detected inside the control box.
01	BOXOH	Control box overheat	0	Control box temperature rise detection signal.
02	*SPOH	*Spindle motor overheat	1	"0" when the spindle motor is overheat.
03	*TOH	*Trans overheat	1	"0" when the trans is overheat.
04	COOLOH	Coolant pump motor overheat	0	"1" when the coolant pump motor is overheat.
05	CHPOH	Chip flow pump motor overheat	0	"1" when the chip flow pump motor is overheat.
06	OILHLOH	Oil hole pump motor overheat	0	"1" when the oil hole pump motor is overheat.
07	CTSTHRE	CTS pump thermal	0	"1" when the oil hole pump motor is overheat.
08	XLS	Zero piont limit X	0	"1" when X zero point LS is turned on.
09	YLS	Zero piont limit Y	0	"1" when Y zero point LS is turned on
0A	ZLS	Zero piont limit Z	0	"1" when Z zero point LS is turned on
0B	4LS	Zero piont limit 4	0	"1" when 4 zero point LS is turned on
0C	5LS	Zero piont limit 5	0	"1" when 5 zero point LS is turned on
0D	6LS	Zero piont limit 6	0	"1" when 6 zero point LS is turned on
0E	ATCORG	ATC zero point limit	-	"1" when ATC zero position LS is
0F	ATCIN	ATC area limit	-	turned on. "1" when ATC area LS is turned on.

8.2 I/O (Main) (9/16)

MAIN 2: INPUT 1

NO.	Symbol	Name	Default	Function
00	+X	Over run +X	0	Overrun:1
01	-X	Over run -X	0	Overrun:1
02	+Y	Over run +Y	0	Overrun:1
03	-Y	Over run -Y	0	Overrun:1
04	+Z	Over run +Z	0	Overrun:1
05	-Z	Over run -Z	0	Overrun:1
06	OTLCH	All axes over latch	0	"1" when all axes are overlatch
07	SVPWOFF	Servo Power OFF	-	"1" always (For I O board, -3~)
08	ACDWN	AC power low	0	"1" when the defective is occurred.
09	AIRDWN	Air power low	0	"1" when the defective is occurred.
0A	PWOFF	Power switch off	0	"1" when the power switch is OFF.
0B	24VER	DC24V error	0	"1" when DC24V error is occurred.
0C	EMS	Emergency stop	0	"1" when the emergency stop is ON.
0D	INVTER	ATC board error	0	The error detective signal for ATC board.
0E	RYCHK1	Servo relay contact check 1	1	"1" when KS1 is ON.
0F	RYCHK2	Servo relay contact check 2	0	Not in use.

MAIN 2: INPUT 2

NO.	Symbol	Name	Default	Function
00	P4C0	Input reserve 6	-	
01	AX4UNCLS	4th axis unclamp end input	-	"1" when C axis is clamped.
00	3PHERR	3-PHASE-ERROR	-	
03	AX5UNCLS	5th axis unclamp end input	-	"1" when LS is closed.
00	T16	Magazine 16	-	Refer to the table.
05	AX6UNCLS	6th axis unclamp end input	-	"1" when LS is closed.
06	DEC	Deceleration signal	1	ATC magazine deceleration signal
07	T1	Magazine 1	-	Refer to the table.
08	+5	Over run+ additional axis 1+	0	"1" when LS is closed.
09	-5	Over run+ additional axis 1-	0	"1" when LS is closed.
0A	+6	Over run+ additional axis 2+	0	"1" when LS is closed.
0B	-6	Over run+ additional axis 2-	0	"1" when LS is closed.
0C	DROPN3	Side door open	0	"1" when side door is open.
0D	T2	Magazine 2	-	Refer to the table.
0E	T4	Magazine 4	-	Refer to the table.
0F	T8	Magazine 8	-	Refer to the table.

8.2 I/O (Main) (10/16)

Input 2-4,7 Bit D~F

Magazine No.	T16	T8	T4	T2	T1
1	0	0	0	0	1
2	0	0	0	1	0
3	0	0	0	1	1
4	0	0	1	0	0
5	0	0	1	0	1
6	0	0	1	1	0
7	0	0	1	1	1
8	0	1	0	0	0
9	0	1	0	0	1
10	0	1	0	1	0
11	0	1	0	1	1
12	0	1	1	0	0
13	0	1	1	0	1
14	0	1	1	1	0
15	0	1	1	1	1
16	1	0	0	0	0
17	1	0	0	0	1
18	1	0	0	1	0
19	1	0	0	1	1
20	1	0	1	0	0
21	1	0	0	0	1

8.2 I/O (Main) (11/16)

MAIN 2: INPUT 3

NO.	Symbol	Name	Default	Function
00	TOOLOK	Tool breakage detection sensor	0	“0” when the sensor is not provided. “1” when the sensor is provided (retracted). “0” when the tool contacts. “1” when tool breakage detection retracts. “1” when the Z axis measurement cover is opened. “0” when beam is obstructed .
01	TLS1	Tool breakage detection retract end LS	0	
02	TLS2	Tool breakage detection advance end LS	0	
03	ZCVOLS	Cover open signal	0	
04	*ARESN	Area sensor input	1	“1” when an error occurs.
05	LFILTR	Line filter	0	
06	CTS PRS	CTS Pressure sensor	1	“1” when an error occurs(not up). “0” when an error occurs(not down).
07			1	
08	Pi53	Programable input (53)	0	I/O board, extend I/O point.
09	Pi54	Programable input (54)	0	
0A	Pi55	Programable input (55)	0	
0B	Pi56	Programable input (56)	0	
0C	Pi57	Programable input (57)	0	
0D	Pi58	Programable input (58)	0	
0E	Pi59	Programable input (59)	0	
0F	Pi60	Programable input (60)	0	

MAIN 2: INPUT 4

NO.	Symbol	Name	Default	Function
00	Pi203	Programable input (203)	0	Extend I/O board, point
01	Pi204	Programable input (204)	0	
02	Pi205	Programable input (205)	0	
03	Pi206	Programable input (206)	0	
04	Pi207	Programable input (207)	0	
05	Pi208	Programable input (208)	0	
06	Pi209	Programable input (209)	0	
07	Pi210	Programable input (210)	0	
08	Pi213	Programable input (213)	0	
09	Pi214	Programable input (214)	0	
0A	Pi215	Programable input (215)	0	
0B	Pi216	Programable input (216)	0	
0C	Pi217	Programable input (217)	0	
0D	Pi218	Programable input (218)	0	
0E	Pi219	Programable input (219)	0	
0F	Pi220	Programable input (220)	0	

8.2 I/O (Main) (12/16)

MAIN 2: OUTPUT 1

NO.	Symbol	Name	Default	Function
00	WATDOGM	Watchdog	0	NC internal self-check signal. NMI interrupt permission signal. Alarm circuit reset. Servo relay ON. System memory protect signal. Gate signal of ATC zero point signal . Interrupt permission signal.
01	NMIGATEM	NMI gate	0	
02	*ALMCLR	Alarm clear	1	
03	SVRYON1	Servo relay on 1	0	
04	SVRYON2	Servo relay on 2	0	
05	*SFTPM	Soft protect	1	
06	ATCGATE	ATC origin sensor gate	0	
07	INTOK	Interrupt enable	0	
08	LED0	LED output 0	0	
09	LED1	LED output 1	0	
0A	LED2	LED output 2	0	
0B	LED3	LED output 3	0	
0C	*WATCLR	Watch dog clear	1	
0D			0	
0E			0	
0F			0	

MAIN 2: OUTPUT 2

NO.	Symbol	Name	Default	Function
00	S0	Key LED matrix scan 0	0	Keyboard and LED output matrix drive signal.
01	S1	Key LED matrix scan 1	0	
02	S2	Key LED matrix scan 2	0	
03	SL0	LED scan output 0	0	
04	SL1	LED scan output 1	0	
05	OT0	LED matrix output 0	0	
06	OT1	LED matrix output 1	0	
07	OT2	LED matrix output 2	0	
08	OT3	LED matrix output 3	0	
09	OT4	LED matrix output 4	0	
0A	OT5	LED matrix output 5	0	
0B	OT6	LED matrix output 6	0	
0C	OT7	LED matrix output 7	0	
0D	OT8	LED matrix output 8	0	
0E	OT9	LED matrix output 9	0	
0F			0	

8.2 I/O (Main) (13/16)

MAIN 2: OUTPUT 3

NO.	Symbol	Name	Default	Function
00			0	
01			0	
02			0	
03			0	
04			0	
05			0	
06			0	
07			0	
08	PO0	Key output for FA 0	0	FA interface contact.
09	PO1	Key output for FA 1	0	
0A	PO2	Key output for FA 2	0	
0B	PO3	Key output for FA 3	0	
0C	PO4	Key output for FA 4	0	
0D	PO5	Key output for FA 5	0	
0E	PO6	Key output for FA 6	0	
0F	PO7	Key output for FA 7	0	

MAIN 2: OUTPUT 4

NO.	Symbol	Name	Default	Function
00	STALED	Start LED	0	"1" when Operation panel/start lamp is turned on.
01	STPLED	Stop LED	0	
02	OSTALED	Outside start LED	0	
03	BUZZ	Buzzer	0	"1" when Operation panel/stop lamp is turned on.
04			0	"1" when operation panel/external lamp is turend on.
05			0	"1" when Operation panel/buzzer drive is turned on.
06			0	.
07			0	
08	CONT1	LED contrast signal 1	0	Refer to the other table.
09	CONT2	LED contrast signal 2	0	Refer to the other table.
0A	CONT4	LED contrast signal 4	0	Refer to the othe table.
0B	CONT8	LED contrast signal 8	0	Refer to the other table.
0C			0	
0D				
0E				
0F				

Main 2: Output 4 08~0B bit

SHIGNAL \ CONTRAST	Dark ← Contrast → Bright															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CONT1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
CONT2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
CONT4	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
CONT8	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1

8.2 I/O (Main) (14/16)

MAIN 2: OUTPUT 5

NO.	Symbol	Name	Default	Function
00			0	
01			0	
02	MAGST	Magazine start	0	"1" is set during magazine rotation.
03	MAGCCW	Magazine CCW	0	"1" when magazine direction is CCW.
04	MAGADOK	Magazine address OK	0	
05	CTSPMP	CTS pump on	0	M494 signal output.
06	DRLK	Door lock	0	"1" when the front door is locked.
07	OTRELS	OT release	0	"1" when the release key is turned on.
08	LIGHT	Machine light	0	"1" when the machine light key is on.
09	COLSW	Coolant SW	0	"1" when the coolant key is on.
0A	CHIPSW	Chip shower SW on	0	"1" when the chip shower is on.
0B	M08	Coolant valve on M18	0	"1" when the coolant(M08) is on.
0C	M400	Chip shower on M400	0	M400 signal output.
0D	M408	Oil hole on M408	0	M408 signal output.
0E	VALVE A	CTS valve A	0	M494 signal output.
0F	AIRBLW	Air blasting	0	"1" when the spindle air valve drive is on.

MAIN 2: OUTPUT 6

NO.	Symbol	Name	Default	Function
00	AX4UNC	4 axis unclamp output.	0	4 axis unclamp output. ("1" when C axis is unclamped.)
01	AX5UNC	5 axis unclamp output.	0	5 axis unclamp output.
02	AX6UNC	6 axis unclamp output.	0	(Theory is parameter switch.) 6 axis unclamp output.
03	SPOUT1	Output reserve 1.	0	(Theory is parameter switch.) Output reserve 1.
04	SPOUT2	Output reserve 2.	0	Output reserve 2.
05	SPOUT3	Output reserve 3.	0	Output reserve 3.
06	DRVOPN	Automatic door valve open.	0	"1" when the automatic door valve opens.
07	DRVCLS	Automatic door valve close.	0	"1" when the automatic door valve closes.
08	HPVON	3 way valve on. (SP through)	0	M494 signal output.
09	DRNVON	Drain air valve on.	0	"1" when drain air valve is on.
		(SP through)		(SP through)
0A	*QTLOC	QT index. (constantly 1)	1	"0" when QT index.
0B				(always 1 for the machine QT is not provided with.)
0C				
0D	VALVE B	CTS valve B	0	
0E	VALVE C	CTS valve C	0	
0F	TMOFF	Power off	0	1: When the timer power OFF.

8.2 I/O (Main) (15/16)

MAIN2:OUTPUT7

NO.	Symbol	Name	Default	Function
00	EXSTOUT	Start signal output	0	"1" when the start switch is pressed down. "1" when the external start switch is pressed down. Indication , out put.
01	EXOUTSTOUT	External start output	0	
02	RED	Indication lamp red	0	
03	YEL	Indication lamp yellow	0	"1" when the side door is locked.. M200 output signal, tool breakage operation signal.
04	GRN	Indication lamp blue	0	
05	DRLK2	Side door lock	0	
06	M200	Tool breakage start (MCODE)	0	"1" when Z axis cover opens. IO board, IO output signal.
07	ZCVOP	Z axis cover open	0	
08	PO103	Programable output<103>	0	
09	PO104	Programable output<104>	0	
0A	PO105	Programable output<105>	0	
0B	PO106	Programable output<106>	0	
0C	PO107	Programable output<107>	0	
0D	PO108	Programable output<108>	0	
0E	PO109	Programable output<109>	0	
0F	PO110	Programable output<110>	0	

MAIN2: OUTPUT8

NO.	Symbol	Name	Default	Function
00	PO303	Programable output<303>	0	Extend IO board, IO output.
01	PO304	Programable output<304>	0	
02	PO305	Programable output<305>	0	
03	PO306	Programable output<306>	0	
04	PO307	Programable output<307>	0	
05	PO308	Programable output<308>	0	
06	PO309	Programable output<309>	0	
07	PO310	Programable output<310>	0	
08	PO313	Programable output<313>	0	
09	PO314	Programable output<314>	0	
0A	PO315	Programable output<315>	0	
0B	PO316	Programable output<316>	0	
0C	PO317	Programable output<317>	0	
0D	PO318	Programable output<318>	0	
0E	PO319	Programable output<319>	0	
0F	PO320	Programable output<320>	0	

8.2 I/O (Main) (16/16)

MAIN 2: OUTPUT 9

NO.	Symbol	Name	Default	Function
00	PO323	Programable output<323>	0	Extended IO board, IO output.
01	PO324	Programable output<324>	0	
02	PO325	Programable output<325>	0	
03	PO326	Programable output<326>	0	
04	PO327	Programable output<327>	0	
05	PO328	Programable output<328>	0	
06	PO329	Programable output<329>	0	
07	PO330	Programable output<330>	0	
08	PO333	Programable output<333>	0	
09	PO334	Programable output<334>	0	
0A	PO335	Programable output<335>	0	
0B	PO336	Programable output<336>	0	
0C	PO337	Programable output<337>	0	
0D	PO338	Programable output<338>	0	
0E	PO339	Programable output<339>	0	
0F	PO340	Programable output<340>	0	

8.3 I/O (slave) (1/2)

Slave Input 1

Bit	Symbol	Name	Nomal	Discription
0	DIPSW1	DIP switch 1	0	ON:0 OFF:1
1	DIPSW2	DIP switch 2	0	ON:0 OFF:1
2	DIPSW3	DIP switch 3	0	ON:0 OFF:1
3	DIPSW4	DIP switch 4	0	ON:0 OFF:1
4	BRKOK1	Brake permitted 1	0/1	Y/Z axis
5	BRKOK2	Brake permitted 2	0	4/5/6/ARM/MAG axis (Not used)
6	SVA1	Servo alarm 1	0	X,Y,Z,S,4,MAG axis
7	SVA2	Servo alarm 2	0	5/6/ARM axis
8	*RRDY1	*SIO1 receive ready	0/1	Receive ready:0
9	*RRDY2	*SIO2 receive ready	0/1	Receive ready:0
A	*BYFSS	*Flash memory busy	0	
B	SVAAX5	5th axis servo alarm	0	
C	SVAAX6	6th axis servo alarm	0	
D	SVAARM	ARM axis servo alarm	0	(Not used)
E	CPUERM	CPU error main	0	(Not used)
F	-	Reserved	1	

Slave Input 2

Bit	Symbol	Name	Nomal	Discription
0-7	-	Reserved	1	
8-F	-	Not used	0	

Slave Input 3

Bit	Symbol	Name	Nomal	Discription
0	-	Not used	0	
1	XPZ	X axis C phase	0	C phase ON:1
2	YPZ	Y axis C phase	0	C phase ON:1
3	ZPZ	Z axis C phase	0	C phase ON:1
4	SPZ	S axis C phase	0	C phase ON:1
5	AX4PZ	4th axis C phase	0	C phase ON:1
6	AX5PZ	5th axis C phase	0	C phase ON:1
7	AX6PZ	6rh axis C phase	0	C phase ON:1
8	ARMPZ	ARM axis C phase	0	C phase ON:1 (Not used)
9	MAGPZ	MAG axis C phase	0	C phase ON:1
A-F	-	Not used	0	

Slave Input 4

Bit	Symbol	Name	Nomal	Discription
0	TOUCH	Touch sensor	0	ON:1
1-F	-	Not used	0	

8.3 I/O (slave) (2/2)

Slave Output 1

Bit	Symbol	Name	Nomal	Discription
0	MY10	SIO1address 0	0/1	
1	MY11	SIO1address 1	0/1	
2	MY12	SIO1address 2	0/1	
3	MY13	SIO1address 3	0/1	
4	MY20	SIO2 address 0	0/1	
5	MY21	SIO2 address 1	0/1	
6	MY22	SIO2 address 2	0/1	
7	MY23	SIO2 address 3	0/1	
8	LED1S	Slave LED1	0/1	0:ON
9	LED2S	Slave LED2	0/1	0:ON
A	LED3S	Slave LED3	0/1	0:ON
B	LED4S	Slave LED4	0/1	0:ON
C	NMIGATES	NMI gate	1	
D	BRKSEL	Brake select	0	
E	PROTECTS	Soft protect	1	
F	-	Reserved	0	

Slave Output 2

Bit	Symbol	Name	Nomal	Discription
0	AX5SON	5th axis servo on	0/1	
1	AX6SON	6th axis servo on	0/1	
2	ARMSON	ARM axis servo on	0	(Not used)
3	AX5ON	5th axis enable	0/1	5th axis servo alarm enable
4	AX6ON	6th axis enable	0/1	6th axis servo alarm enable
5	ARMON	ARM axis enable	0	ARM axis servo alarm enable (Not used)
6-F	-	k	0	

8.4 I/O (Local)

Local: OUTPUT 1

Bit	Signal	Name	Normal	Contents
0	CPUERM	CPUerror(main).	0	“1” when error occurred in main CPU.
1	CPUERS	CPUerror(slave).	0	“1” when error occurred in slave CPU.
2	LANGSEL	NC language.	0/1	Language selection signal. “1” for NC type; “0” for conversation type. Not use for soft.
3		Memory capacity standard	1	0: 3 times, 1: standard
4	*HARDP	*Hard protect.	0/1	Protect ON/OFF switching signal. “0” when protect ON is selected.
5	*BYFSL	*Local flash busy signal.	1	Local flash memory busy signal.
6	*DSRA	*Data set ready A.	1	RC-232C data set ready signal. Host is ready.
7	*DSRB	*Data set ready B.	1	Spare communication port data set ready signal
8	DIPSWL0	DIPSW Input local 0.	0/1	1 bit of NC board SW1. “0” when dip switch is ON. (display language selection)
9	DIPSWL1	DIPSW Input local 1.	0/1	2bit of NC board SW1. “0” when dip switch is ON. (display language selection)
A	DIPSWL2	DIPSW Input local 2.	0	3 bit of NB board SW1. “0” when dip switch is ON.
B	DIPSWL3	DIPSW Input local 3.	0	4 bit of NB board SW1. “0” when dip switch is ON. 9 and 8 bit = 11/10/01/00 French/German/English/Japanese
C	SPIN1L	Spare input local 1.	1	
D	SPIN2L	Spare input local 2.	1	
E	SPIN3L	Spare input local 3.	1	
F	SPIN4L	Spare input local 4.	1	

Local: OUTPUT 1

Bit	Signal	Name	Normal	Contents
0	INTOKL	Interrupt permission signal (local)	1	Local CPU interrupt permission signal.
1	*SFTPWRL	*Soft protect on (local)	0	Local RAM soft protect signal.
2	*ORSV0L	*Spare output local 0.	0	
3	LEDPWON	Liquid crystal power ON signal.	1	Liquid crystal power ON/OFF signal.
4	*LED1L	*LED display local 1.	1	NC board LED1. Lights when corresponding port is “0”.
5	*LED2L	*LED display local 2.	1	NC board LED2. Lights when corresponding port is “0”.
6	*LED3L	*LED display local 3.	1	NC board LED3. Lights when corresponding port is “0”.
7	*LED4L	*LED display local 4.	0/1	NC board LED4. Lights when corresponding port is “0”. Normal toggle.
8	*SFTPL	*Soft protect on(share)	0	Common RAM soft protect signal.
9	*NMIGATEL	*NMI gate.	1	Gate signal of NMI signal.
A	*MASK	*Display mask signal.	1	Liquid crystal display indication ON/OFF signal. Screen selection timing control signal.
B	*DIMASK	* Display timing control signal.	0	
C	CPUERL	CPUerror(local).	0	Local CPU watch dog error.
D	DTRA	Port terminal ready A.	1	RS-232C terminal ready A. NC is ready.
E	DTRB	Port terminal ready B.	0	Spare communication port terminal ready B.
F	SPO1L	Spare local 1.	0	

8.5 Sequencer (1/6)

Sequence controller, Input contact

Bit Contact	7	6	5	4	3	2	1	0
0								
1								
2								
3								
99								
48	M function end MFIN	Stop STOP	Start START	In SC external error 8 SCERR	In SC manual motion SCMAN	In SC door close end SCCLS	In SC cycle SCCYCL	In SC automatic operation on going SCSTL
49	In SC outside start OUTSTA		In SC outside start LED SCRLED		In SC external error 9 ZERR		Reset EXRST	In SC external error 9 EXALM
50			Door lock EXDRLOCK	External 3rd zero point return EXORG3	External 2nd zero point return EXORG2	External zero point return EXORG	External 1st ref point return EXREF	
66	Mode change over prohibited MDLOCK	Axis operation prohibited 6LOCK	Axis operation prohibited 5LOCK	Axis operation prohibited 4LOCK	Axis operation prohibited Z LOCK	Axis operation prohibited XY LOCK	Axis operation prohibited ATC LOCK	Spindle operational prohibited SP LOCK
67	External schedule program selection PR9900	External program selection PRO64	External program selection PRO32	External program selection PRO16	External program selection PRO8	External program selection PRO4	External program selection PRO2	External program selection PRO1
68	External error EXER17	External error EXER16	External error EXER15	External error EXER14	External error EXER13	External error EXER12	External error EXER11	External error EXER10
69	Key output for FA FAOUT8	Key output for FA FAOUT7	Key output for FA FAOUT6	Key output for FA FAOUT5	Key output for FA FAOUT4	Key output for FA FAOUT3	Key output for FA FAOUT2	Key output for FA FAOUT1
70	Key operation prohibited KYLOCK	Edit prohibited ED LOCK	Program edit prohibited PRLOCK	M468	M466	M464	M462	M460

8.5 Sequencer (2/6)

Sequence controller, Output contact

Bit Contact	7	6	5	4	3	2	1	0
4								
5								
6								
7								
51	Restart RSEST	Manual operation on going MANSTL	Reset RST		Edit operation EDIT	Memory operation MEMO	MDI operation MDI	Manual operation MANU
52	Ext signal 28 M28	Ext signal 24 M24	Ext signal 22 M22	Ext signal 21 M21	Ext signal 18 M18	Ext signal 14 M14	Ext signal 12 M12	Ext signal 11 M11
53	Start switch STA	Stop STP	In SC stop requirement SCSTOP	Door interlock SAFTY	Door lock DRLOCK	Counter end CNTUP	Program end M30(/1)	Program stop M00
54	Zero point return completion ORGFIN	Tool error output TOOL	Alarm output ALM	NC operation NCOK	Memory operation enable MEMOK	Automatic operation on going STL	Automatic operation on going AUTO	M function MF
55	Dry run DRY	Release key RELS	Zero point output ZP5	Zero point output ZPSP	Zero point output ZPZ	Zero point output ZPY	Zero point output ZPX	Spindle rotation SPTURN
71	Single operation SINGL	Stop LED STPLED	Door open end DROPE	Counter end notice CNTPRE	Safety type STYPE	3rd home position return finish ORGFIN3	2nd home position return finish ORGFIN2	Door close end DRCLS
72	Zero point output ZP6	Zero point output ZP4	Estimate tool service life TOLPRE	Cutting feed override FDOR100	Spindle override SPOR100	Rapid feed override RPOR100	Alarm level 2 ALMLV2	Alarm level 1 ALMLV1
73	Operation stop error RUNSTP	M486	M484	M482	M480	M406	M404	M402

8.5 Sequencer (3/6)

Sequence controller, Output contact

Bit Contact	7	6	5	4	3	2	1	0
74	Tool broken error TLBRKE	Red lamp RED	Yellow lamp YEL	Green lamp GRN	M456	M455	M451	M450
75	Outside start LED RDYLED	Indoor close end INDRCL	Outside start output QTSTART	Pallet selection QT2	Pallet selection QT1	M30/2	Pallet index finish PFIN2	Pallet index finish PFIN1
76	Key entry for FA FAKEY8	Key entry for FA FAKEY7	Key entry for FA FAKEY6	Key entry for FA FAKEY5	Key entry for FA FAKEY4	Key entry for FA FAKEY3	Key entry for FA FAKEY2	Key entry for FA FAKEY1
77	Battery alarm BATARM	3rd ref point return finish RE6FN3	3rd ref point return finish RE5FN3	3rd ref point return finish RE4FN3	2nd ref point return finish RE6FN3	2nd ref point return finish RE5FN2	2nd ref point return finish RE4FN2	Side door close end SDDRCL
78	Manual pulse generator OFF PUL OFF	Oil Hole ON M408	Chipflow ON M400	Coolant ON M08	Ref point return finish RE6FN	Ref point return finish RE5FN	Ref point return finish RE4FN	Ref point return finish REFIN
79	6 posi signal output 6POSSW	5 posi signal output 5POSSW	4 posi signal output 4POSSW	Z posi signal output ZPOSSW	Y posi signal output YPOSSW	X posi signal output XPOSSW	Chipflow switch ON CHIPSW	Coolant switch ON COOLSW
80								
81								
82								
83								

8.5 Sequencer (4/6)

Sequence controller, Auxilliary contact1

Bit Contact	7	6	5	4	3	2	1	0
8	SEQ AUX CON M7	SEQ AUX CON M6	SEQ AUX CON M5	SEQ AUX CON M4	SEQ AUX CON M3	SEQ AUX CON M2	SEQ AUX CON M1	SEQ AUX CON M0
9	SEQ AUX CON MF	SEQ AUX CON ME	SEQ AUX CON MD	SEQ AUX CON MC	SEQ AUX CON MB	SEQ AUX CON MA	SEQ AUX CON M9	SEQ AUX CON M8
10	SEQ AUX CON M17	SEQ AUX CON M16	SEQ AUX CON M15	SEQ AUX CON M14	SEQ AUX CON M13	SEQ AUX CON M12	SEQ AUX CON M11	SEQ AUX CON M10
11	SEQ AUX CON M1F	SEQ AUX CON M1E	SEQ AUX CON M1D	SEQ AUX CON M1C	SEQ AUX CON M1B	SEQ AUX CON M1A	SEQ AUX CON M19	SEQ AUX CON M18
12	SEQ AUX CON M27	SEQ AUX CON M26	SEQ AUX CON M25	SEQ AUX CON M24	SEQ AUX CON M23	SEQ AUX CON M22	SEQ AUX CON M21	SEQ AUX CON M20
13	SEQ AUX CON M2F	SEQ AUX CON M2E	SEQ AUX CON M2D	SEQ AUX CON M2C	SEQ AUX CON M2B	SEQ AUX CON M2A	SEQ AUX CON M29	SEQ AUX CON M30
14	SEQ AUX CON M37	SEQ AUX CON M36	SEQ AUX CON M35	SEQ AUX CON M34	SEQ AUX CON M33	SEQ AUX CON M32	SEQ AUX CON M31	SEQ AUX CON M30
15	SEQ AUX CON M3F	SEQ AUX CON M3E	SEQ AUX CON M3D	SEQ AUX CON M3C	SEQ AUX CON M3B	SEQ AUX CON M3A	SEQ AUX CON M3D1	SEQ AUX CON M3D0
16	SEQ AUX CON M3D7	SEQ AUX CON M3D6	SEQ AUX CON M3D5	SEQ AUX CON M3D4	SEQ AUX CON M3D3	SEQ AUX CON M3D2	SEQ AUX CON M3D1	SEQ AUX CON M3D0
17	SEQ AUX CON M3DF	SEQ AUX CON M3DE	SEQ AUX CON M3DD	SEQ AUX CON M3DC	SEQ AUX CON M3DB	SEQ AUX CON M3DA	SEQ AUX CON M3D9	SEQ AUX CON M3D8
18	SEQ AUX CON M3E7	SEQ AUX CON M3E6	SEQ AUX CON M3E5	SEQ AUX CON M3E4	SEQ AUX CON M3E3	SEQ AUX CON M3E2	SEQ AUX CON M3E1	SEQ AUX CON M30
19	SEQ AUX CON M3EF	SEQ AUX CON M3EE	SEQ AUX CON M3ED	SEQ AUX CON M3EC	SEQ AUX CON M3EB	SEQ AUX CON M3EA	SEQ AUX CON M3E9	SEQ AUX CON M3E8
20	SEQ AUX CON M3F7	SEQ AUX CON M3F6	SEQ AUX CON M3F5	SEQ AUX CON M3F4	SEQ AUX CON M3F3	SEQ AUX CON M3F2	SEQ AUX CON M3F1	SEQ AUX CON MF0

8.5 Sequencer (5/6)

Sequence controller, Auxilliary contact 2

Contact	Discription	
21	SEQ AUX CON	M40 to M47
22	SEQ AUX CON	M48 to M4F
23	SEQ AUX CON	M50 to M57
24	SEQ AUX CON	M58 to M5F
25	SEQ AUX CON	M60 to M67
26	SEQ AUX CON	M68 to M6F
27	SEQ AUX CON	M70 to M77
28	SEQ AUX CON	M78 to M7F
29	SEQ AUX CON	M80 to M87
30	SEQ AUX CON	M88 to M8F
31	SEQ AUX CON	M90 to M9F
32	SEQ AUX CON	M98 to M9F
33	SEQ AUX CON	MA0 to MA7
34	SEQ AUX CON	MA8 to MAF
35	SEQ AUX CON	MB0 to MB7
36	SEQ AUX CON	MB8 to MBF
37	SEQ AUX CON	MC0 to MC7

8.5 Sequencer (6/6)

Sequence controller, Timer contact

Bit Contact	7	6	5	4	3	2	1	0
56	Contact for TMR7	Contact for TMR6	Contact for TMR5	Contact for TMR4	Contact for TMR3	Contact for TMR2	Contact for TMR1	Contact for TMR0
57	Contact for TMR15	Contact for TMR14	Contact for TMR13	Contact for TMR12	Contact for TMR11	Contact for TMR10	Contact for TMR9	Contact for TMR8
58	Contact for TMR23	Contact for TMR22	Contact for TMR21	Contact for TMR20	Contact for TMR19	Contact for TMR18	Contact for TMR17	Contact for TMR16
59	Contact for TMR31	Contact for TMR30	Contact for TMR29	Contact for TMR28	Contact for TMR27	Contact for TMR26	Contact for TMR25	Contact for TMR24

Sequence controller, Counter contact

Bit Contact	7	6	5	4	3	2	1	0
60	Contact for CTR7	Contact for CTR6	Contact for CTR5	Contact for CTR4	Contact for CTR3	Contact for CTR2	Contact for CTR1	Contact for CTR0
61	Contact for CTR15	Contact for CTR14	Contact for CTR13	Contact for CTR12	Contact for CTR11	Contact for CTR10	Contact for CTR9	Contact for CTR8
62	Contact for CTR23	Contact for CTR22	Contact for CTR21	Contact for CTR20	Contact for CTR19	Contact for CTR18	Contact for CTR17	Contact for CTR16
63	Contact for CTR31	Contact for CTR30	Contact for CTR29	Contact for CTR28	Contact for CTR27	Contact for CTR26	Contact for CTR25	Contact for CTR24

8.6 Servo display

Class	Items	Contents	
AMPLIFIER COMMAND	Control data	Bank set (transmission)	
	Control command Bit 7 6 5 4 3 2 1 0 0 0 0 * * * * *	Bit 0	0:OFF 1:ON
		Bit 1	1:ABS encoder reset
		Bit 2	1:Alarm clear
		Bit 3	1:Quadrant projection control ON
		Bit 4	1:Current limiter ON
	Speed command	1/65536mm ⁻¹ /LSB	
	Current command	1%/LSB	
	Speed loop proportion gain	1Hz/LSB	
	Speed loop integrated time constant	1msec/LSB	
Current limiter	1%/LSB		
AMPLIFIER RESPONSE	Control data	Bank set(reception)	
	Status Status 0 Status 1 ***** ***** Status 0 Bit 8 7 6 5 4 3 2 1 0 * * * * * Status 1 Bit 8 7 6 5 4 3 2 1 0 0 0 0 0 0 0 0 *	Status 0	
		Bit 0	1:Servo alarm
		Bit 1	1:Servo ready
		Bit 2	1:Servo active
		Bit 3	1:RST monitor
		Bit 4	1:Current limiter ON
		Bit 5	1:Encoder reset ON
		Bit 6	1:Htvi setting
		Bit 7	1:Encoder enable
		Status 1	
	Bit 0	1:Battery warning	
	Alarm code	00:Normal status 01:OC(Over Current) 03:EOH(External regenerative resistor Over Heat) 05:OV(Over Voltage) 07:CPE(Control Power Error) 08:DE1(Detector Error 1 of encoder) 09:DE2(Detector Error 2 of of Communication) 0A:OL(Over Load) 0B:OS(Over Speed) 10:MPE(Main Power Error) 11:FP(Failure of Phase) 12:RGE(Regenerative resistor over load Error) 13:DSP-E(DSP Error) 14:EEPROM-E(Memory Error) 15:PAR-E(Parameter Error) 16:ABS-E(Battery Error) 17:CS-E(Commutation Sensor Error) 18:MOC 19:Communication Error 1A:VERI-E(Verify Error) 1B:PSE (Encoder stopped receiving serial signal.) 1F: DEII(Momentary Interruption Encoder)	
		Current command monitor /Current monitor	1%/LSB
		Actual speed monitor	1mm ⁻¹ /LSB
		Effective torque monitor	1%/LSB
		Absolute position data	CW-increase
		Frame error detect counter	Transmission/Reception

Class	Items	Contents
AMPLIFIER INFORMATION	ROM type	ROM1L/ROM2L
	ROM version	ROM1H/ROM2H
	Amplifier model	00:300A type 01:150A type 02:100A type 03:50A type 04:30A type 05:15A type
OTHER	Displacement pulse	Result of C phase check
	Number of pulse check retry	Result of C phase check

Chapter 9 Measures for Errors

9.1 System error

9.1.1

Conversation type	No.0000	**WATCH DOG (MAIN)
NC type	No.5000	**WATCH DOG (MAIN)
Conversation type	No.0001	**WATCH DOG (SLAVE)
NC type	No.5001	**WATCH DOG (SLAVE)
Conversation type	No.0002	**WATCH DOG (LOCAL)
NC type	No.5002	**WATCH DOG (LOCAL)

<Meaning>

1. The CPU indicated in brackets has a trouble. The watch dog timer has not been renewed for more than the specified time.

*Watch dog supervisory time

Main		20msec
Local		20msec
Slave		73msec

<Cause>

1. Faulty NC PCB, slave PCB, or MEM PCB

<Measures>

1. Replace the PCB.

9.1.2

Conversation type	No.0003	**RAM ERROR (MAIN)
NC type	No.5003	**RAM ERROR (MAIN)
Conversation type	No.0005	**RAM ERROR (SLAVE)
NC type	No.5005	**RAM ERROR (SLAVE)
Conversation type	No.0007	**RAM ERROR (LOCAL)
NC type	No.5007	**RAM ERROR (LOCAL)
Conversation type	No.0009	**RAM ERROR (MAIN-LOC1)
NC type	No.5009	**RAM ERROR (MAIN-LOC1)
Conversation type	No.0010	**RAM ERROR (MAIN-LOC2)
NC type	No.5010	**RAM ERROR (MAIN-LOC2)
Conversation type	No.0011	**RAM ERROR (MAIN-SLV)
NC type	No.5011	**RAM ERROR (MAIN-SLV)
Conversation type	No.0055	**RAM ERROR (MAIN-LOC3)
NC type	No.5055	**RAM ERROR (MAIN-LOC3)
Conversation type	No.0106	**RAM ERROR (MAIN-LOCAL4)
NC type	No.5106	**RAM ERROR (MAIN-LOCAL4)
Conversation type	No.0107	**RAM ERROR (MAIN-LOCAL5)
NC type	No.5107	**RAM ERROR (MAIN-LOCAL5)

<Meaning>

1. When the power was turned on, the contents of the RAM indicated in brackets could not be read and written correctly.

*Main-Local RAM

MAIN-LOC1 : Common RAM other than Nos. 2 and 3

MAIN-LOC2 : Dual port RAM

MAIN-LOC3 : Software protect RAM

MAIN-LOC4 : Software protected RAM for X and Y axes thermal displacement

MAIN-LOC5 : Non protected RAM for X and Y axes thermal displacement

<Cause>

1. Faulty NC PCB or slave PCB
(SLAVE) error is faulty of slave PCB.
(MAIN-SLV) error is faulty of NC PCB or slave PCB.
The other error is faulty of NC PCB.

<Measures>

1. Replace the NC PCB or slave PCB.

9.1.3

Conversation type	No.0004	**ROM ERROR(MAIN)
NC type	No.5004	**ROM ERROR(MAIN)
Conversation type	No.0006	**ROM ERROR(SLAVE)
NC type	No.5006	**ROM ERROR(SLAVE)
Conversation type	No.0008	**ROM ERROR(LOCAL)
NC type	No.5008	**ROM ERROR(LOCAL)

<Meaning>

1. When the power was turned on, a problem was detected in the contents of the ROM indicated in brackets.

<Cause>

1. The MEM PCB is mounted incorrectly.
2. Faulty NC PCB, slave PCB, or MEM PCB.
(MAIN)(LOCAL) errors are faulty of NC PCB or MEM PCB.
(SLAVE) error is faulty of NC PCB, MEM PCB or slave PCB.

<Measures>

1. For cause 1, check that the MEM PCB is mounted correctly.
2. If the same error is still generated even in measure 1, cause 2 may be responsible. Replace the NC PCB, MEM PCB or slave PCB.

9.1.4

Conversation type	No.0012	**TIMER ERROR(SLAVE)
NC type	No.5012	**TIMER ERROR(SLAVE)

<Meaning>

1. Interruption of the slave CPU free running timer does not occur even after the specified time has elapsed, and timer overrun occurs.

<Cause>

1. Faulty slave PCB

<Measures>

1. Replace the PCB.

9.1.5

Conversation type	No.0014	**CALC ERROR(MAIN)
NC type	No.5014	**CALC ERROR(MAIN)
Conversation type	No.0015	**CALC ERROR(SLAVE)
NC type	No.5015	**CALC ERROR(SLAVE)
Conversation type	No.0016	**CALC ERROR(LOCAL)
NC type	No.5016	**CALC ERROR(LOCAL)

<Meaning>

1. The CPU indicated in brackets has had an abnormal operation.

*Examples

Division by 0

Overflow by multiplication

The result of division has exceeded the range that can be expressed within 32 bits of code.

<Cause>

1. Faulty NC PCB or slave PCB
(LOCAL) error is faulty of NC PCB.
(MAIN) (SLAVE) errors are faulty of NC PCB or slave PCB.

<Measures>

1. Replace the PCB.

9.1.6

Conversation type	No.0017	**MAIN INTIAL IMPSBLE
NC type	No.5017	**MAIN INTIAL IMPSBLE
Conversation type	No.0018	**SLV INTIAL IMPSBLE
NC type	No.5018	**SLV INTIAL IMPSBLE

<Meaning>

1. When the power was turned on, the CPU could not start properly.

<Cause>

1. The MEM PCB or slave PCB is mounted incorrectly.
2. Faulty NC PCB, slave PCB, or MEM PCB

<Measures>

1. For cause 1, check that the MEM PCB or slave PCB is mounted correctly.
2. If the same error is no longer generated in measure 1, cause 2 may be responsible. Replace the PCB.

9.1.7

Conversation type	No.0028	**POWER TURNED OFF
NC type	No.5028	**POWER TURNED OFF

<Meaning>

1. Three seconds have passed since the PWOFF signal was turned on.

*This error is not generated by a normal power-off.

<Cause>

1. Defect of power circuit in the IO PCB
2. Defect of IO PCB or alarm processing circuit

<Measures>

1. In either case, replace the IO PCB with new one.

9.1.8

Conversation type	No.0029	**POS DETECT ERR
NC type	No.5029	**POS DETECT ERR

<Meaning>

1. The difference between the absolute position data inside the magazine amplifier and relative position data inside the NC unit has exceeded the allowable range (100 pulses plus those set for [Machine Parameter] to [System 3] to [IN-POSITION WIDTH MAGAZINE]).

<Cause>

1. Faulty magazine motor or amplifier.
2. Faulty ENC cord or amplifier cord.
3. Faulty slave PCB.

<Measures>

1. Replace the magazine motor or amplifier.
2. Replace the ENC cord or amplifier cord.
3. Replace the slave PCB.

9.1.9

Conversation type	No.0030	**I/O CRC ERROR 1
NC type	No.5030	**I/O CRC ERROR 1
Conversation type	No.0032	**I/O CRC ERROR 2
NC type	No.5032	**I/O CRC ERROR 2
Conversation type	No.0034	**I/O CRC ERROR 3
NC type	No.5034	**I/O CRC ERROR 3
Conversation type	No.0036	**I/O CRC ERROR 4
NC type	No.5036	**I/O CRC ERROR 4
Conversation type	No.0038	**I/O CRC ERROR 5
NC type	No.5038	**I/O CRC ERROR 5

<Meaning>

1. CRC error has occurred because the machine received incorrect data during communication between the keyboard and the NC unit.

<Cause>

1. External noise
2. Faulty keyboard or cable connection

<Measures>

1. CRC error 1 or 2 - check the keyboard and key cable connection. Replace the PCB or cable if necessary.
2. CRC error 3 or 4 - check the IO PCB and IO cable. Replace the PCB or cable if necessary.
3. CRC error 5 - check the EXIO PCB and EXIO cable connection. Replace the PCB or cable if necessary.

9.1.10

Conversation type	No.0031	**I/O TIMEOVER 1
NC type	No.5031	**I/O TIMEOVER 1
Conversation type	No.0033	**I/O TIMEOVER 2
NC type	No.5033	**I/O TIMEOVER 2
Conversation type	No.0035	**I/O TIMEOVER 3
NC type	No.5035	**I/O TIMEOVER 3
Conversation type	No.0037	**I/O TIMEOVER 4
NC type	No.5037	**I/O TIMEOVER 4
Conversation type	No.0039	**I/O TIMEOVER 5
NC type	No.5039	**I/O TIMEOVER 5

<Meaning>

1. Framing error occurred during communication between the keyboard and the NC unit, causing an unrecoverable.

<Cause>

1. External noise
2. Faulty keyboard or cable connection

<Measures>

1. I/O timeover error 1 or 2 - check the keyboard and key cable connection.
Replace the PCB or cable if necessary.
2. I/O timeover error 3 or 4 - check the IO PCB and IO cable. Replace the PCB or cable if necessary.
3. I/O timeover error 5 - check the EXIO PCB and EXIO cable connection.
Replace the PCB or cable if necessary.

Note : CRC error 1 may occur with an I/O timeover error. This occurs because the first station's data packet. At this time, reset the I/O timeover error and check whether the same error occurs again. If it does, the keyboard of the first or second station, or its cable, is faulty.

9.1.11

Conversation type	No.0051	**ABSOLUTE CLEAR ERR
NC type	No.5051	**ABSOLUTE CLEAR ERR

<Meaning>

1. Clearing start point data was attempted but the absolute data in the magazine amplifier was not cleared within five seconds.

<Cause>

1. Faulty magazine amplifier.

<Measures>

1. Replace the magazine amplifier.

9.1.12

Conversation type	No.0052	**COMMAND ERROR
NC type	No.5052	**COMMAND ERROR

<Meaning>

1. Main CPU is not synchronized with slave CPU.

<Cause>

1. CPU overloads
2. Faulty NC PCB or slave PCB

<Measures>

1. Check bit 2 (cache switch) for dip switch on NC PCB.

(1) ON:Valid

Cause 2 can be possible, so operate the measure 2.

(2) OFF:Invalid

Check two figures from the end of the MEM PCB version seal, "A00-WJ(E)**".

(i) Later than 11.

Turn on bit 2 of the dip switch to make the cache valid.

(ii) Before 10

Change the PCB with the one "later than 11".

Turn on bit 2 for the dip switch and make the cache valid.

When the error occurs repeatedly after operating the measure above, cause 2 may be possible. Operate the measure 2.

* Refer to "9.5.5 Dip Switch" to check the dip switch.

2. Replace NC PCB or slave PCB.

9.1.13

Conversation type	No.0091	**M EXCPT INTRPT (*)
NC type	No.5091	**M EXCPT INTRPT (*)
Conversation type	No.0093	**L EXCPT INTRPT (*)
NC type	No.5093	**L EXCPT INTRPT (*)

<Meaning>

1. Main CPU or local CPU has detected incorrect interruption.

*The figure in brackets () indicates interruption no.

<Cause>

1. Faulty NC PCB or MEM PCB

<Measures>

1. Replace the PCB.

9.1.14

Conversation type	No.0501	**SYSTEM ERROR(MAIN)
NC type	No.5501	**SYSTEM ERROR(MAIN)
Conversation type	No.1150	**SYSTEMERROR(SLV)
NC type	No.6150	**SYSTEMERROR(SLV)
Conversation type	No.1280	**SYSTEM ERROR(MC)
NC type	No.6280	**SYSTEM ERROR(MC)
Conversation type	No.1281	**SYSTEM ERROR(ATC)
NC type	No.6281	**SYSTEM ERROR(ATC)

<Meaning>

1. SYSTEM ERROR (MAIN) - NMI was detected, but there was no corresponding error.
2. Other SYSTEM ERRORS - an error was detected, but there was no corresponding error.

<Cause>

1. Faulty NC PCB or slave PCB

<Measures>

1. Replace the PCB.

9.1.15

Conversation type	No.0567	*DOOR ERROR
NC type	No.5567	*DOOR ERROR
Conversation type	No.1278	*DOOR ERROR
NC type	No.6278	*DOOR ERROR

<Meaning>

1. When [AUTOMATIC DOOR] is set to [1:ON], the limit switch has turned on both at door opening and closing ends.
2. It took longer than the time set to [User Parameter] → [System 1] → [AUTOMATIC DOOR OPERATION TIME] for automatic door opening or closing.

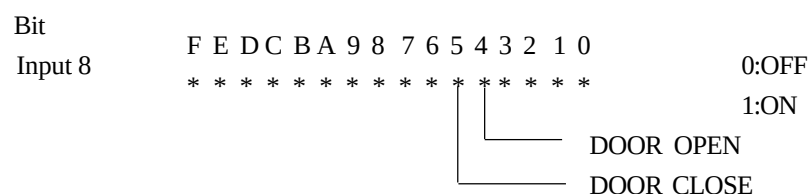
<Cause>

1. Faulty limit switch
2. Faulty setting for [User Parameter]→ [System 1] →
[AUTOMATIC DOOR OPERATION TIME].
3. Faulty cylinder movement.

<Measures>

1. For cause 1, check the limit switch input signal.

Input/output(main 1) Input 8



Unless the following conditions are met, the limit switch may be faulty.

Replace the switch.

- When the door is closed, the door opening end signal is 0 (off) and door closing end signal is 1 (on).
- When the door is open, the door opening end signal is 0 (off) or 1 (on) and the door closing end signal is 0 (off).

2. For cause 2, check the setting for [User Parameter] → [System 1] → [AUTOMATIC DOOR OPERATION TIME].

9.1.16

Conversation type	No.1051	**START POINT DATA 1 ER
NC type	No.6051	**START POINT DATA 1 ER

<Meaning>

1. When the power was turned on, start point data 1 was not the correct value (a value between zero and the machine coordinate for one magazine rotation).

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below. If not displayed, data are damaged by an external factor. Take procedure 2.
2. Adjust the magazine position in ATC maintenance mode.
 1. Enter the ATC maintenance mode. (See section 9.5.3.)
 2. Press **[MAGZ]** to index the T1 pot. (The pot number is displayed on the screen.)
When the pot is lowered, press **[E.STA]**, and then press **[U]** while **[RELSE]** is held down to raise the pot first.
 3. Press the **[EMERGENCY STOP]** switch.
 4. Insert the $\varnothing 8$ parallel pins (with M5 tap) into the $\varnothing 8$ holes in the base plate.
 5. Turn the magazine rotation coupling joint by hand so that the magazine slowly turns while pushing the pin towards the worm box side.
 6. The position where the $\varnothing 8$ pin is inserted in the $\varnothing 8$ hole in the worm box is the T1 indexing position. Once indexed, be sure to remove the pin.
Release the **[EMERGENCY STOP]** switch.
 7. Press **[E.STA]**. Then press **[D]** while **[RELSE]** is held down to lower the pot.
 8. Check that there is no clearance between the pot and the positioning block. (It is recommended that you insert a piece of paper between the pot and the positioning block to check the clearance. Check both the right and left sides.)
 9. If there is any clearance, press the emergency stop switch, and turn the coupling joint by hand until the magazine comes to the position where there is no clearance.
 10. Press **[CURSOR UP]** and **[CURSOR DOWN]** to move the cursor to **[CLEAR START P DATA]**. Press **[1]** and **[ENT]**.
 11. Quit the ATC maintenance mode. (Refer to 9.5.3.)

9.1.17

Conversation type	No.1172	*COMMAND ERROR (SP)
NC type	No.6172	*COMMAND ERROR (SP)

<Meaning>

1. Main CPU is not synchronized with slave CPU.

<Cause>

1. Faulty NC PCB or slave PCB

<Measures>

- 1 Replace the PCB.

9.1.18

Conversation type	No.1197	*COMMAND ERROR (ATC)
NC type	No.6197	*COMMAND ERROR (ATC)

<Meaning>

1. A command to ATC is abnormal.

<Cause>

1. Faulty NC PCB

<Measures>

1. Replace the PCB.

9.1.19

Conversation type	No.1293	*MAGAZN TOOL SET ERR
NC type	No.6293	*MAGAZN TOOL SET ERR

<Meaning>

1. When the power was turned on, the magazine data was damaged.
2. The magazine data was damaged when editing the data was attempted.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below. If not displayed, data are damaged by an external factor. Take procedure 2.
2. After data deletion, re-enter the data by programming or by inputting them from an external unit.

9.1.20

Conversation type	No.1300	*S OVRRD NO CONNECTED
NC type	No.6300	*S OVRRD NO CONNECTED

<Meaning>

1. When [User Parameter] → [Switch 1] → [OVERRIDE SWITCH] is set to [1: VALID], a non-connection signal was input from the I/O of the spindle override.

<Cause>

1. The spindle override connector is not connected.

<Measures>

1. Check that the following are connected to connector CNSPOV on the keyboard PCB.
 - 1) Short connector CNSPOV when spindle override is not applied.
 - 2) Spindle override connector CNSPOV when spindle override is applied.

9.1.21

Conversation type	No.2626	COMMUNICATION I/F ER
NC type	No.7626	COMMUNICATION I/F ER

<Meaning>

1. Incorrect command was given from the edit processing area to the communication processing area in the local CPU.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.
2. Faulty NC PCB or MEM PCB

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below. If not displayed, data are damaged by an external factor. Take procedure 2.
2. Select [MAINTENANCE MENU] from [EXTERNAL PROGRAM I/O], output all data, format the memory, and re-enter all data. However, when faulty data or programs cannot be output, delete them.
3. Replace NC PCB or MEM PCB.

9.1.22

Conversation type	No.2996	**KERNEL ERROR (MAIN)
NC type	No.7996	**KERNEL ERROR (MAIN)
Conversation type	No.2998	**KERNEL ERROR (LOCAL)
NC type	No.7998	**KERNEL ERROR (LOCAL)

<Meaning>

1. An error has occurred in the main CPU or local CPU operation system.

<Cause>

1. Faulty NC PCB

<Measures>

1. Replace the PCB.

9.1.23

Conversation type	No.2999	*NO ERROR NO.
NC type	No.7999	*NO ERROR NO.

<Meaning>

1. Machining data are converted to interpretive code during operation. Some interpretive code are invalid.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below.
If not displayed, data are damaged by an external factor. Take procedure 2.
2. Delete the data which generated the error. After data deletion, re-enter the data by programming or by inputting them from an external unit.

9.1.24

Conversation type	No.1327	**NO MEM (XY THRM COMP)
NC type	No.6327	**NO MEM (XY THRM COMP)

<Meaning>

1. Although the optional X and Y axes thermal displacement correction function for the OPSEL board is provided, the RAM is not attached to the NC board.

<Cause>

- 1 The NC board is defective.
- 2 The version of the NC board is obsolete (before B52J067-3 or B52J090-2).

<Measures>

1. Replace the NC board.

9.1.25

Conversation type	No.2121	*PRESS.HIGH(AUTO OIL)
NC type	No.7121	*PRESS.HIGH(AUTO OIL)

<Meaning>

The pressure sensor was on when oiling was attempted. (Oil pressure has not reduced.)

<Cause>

- 1 Machine parameter 1 (SYSTEM1) is incorrectly set.
([AUTOMATIC OILING FUNCTION] is setting [YES] or [NO ENTORY], but the machine doesn't have this option.)
- 2 [PRSNSR] signal in user parameter 4 (EXTRL IN SIGNAL) is incorrectly set.
- 3 The cord connection of [PRSNSR] signal is incorrect.
- 4 The I/O board is defective.
- 5 The KLUB relay is defective.
- 6 The cord connection to the I/O board is incorrect.
- 7 The pressure sensor of the lubricating unit is defective.

<Measures>

- 1 Set machine parameter 1 (SYSTEM1) correctly.
(Set [NO] at [AUTOMATIC OILING FUNCTION])
- 2 Set [PRSNSR] signal in user parameter 4 (EXTRL IN SIGNAL) correctly.
- 3 Check the cord connection of [PRSNSR] signal.
- 4 Replace the I/O board.
- 5 Replace the KLUB relay.
- 6 Check the cord connection to the I/O board.
- 7 Replace the lubricating unit.

9.1.26

Conversation type	No.2122	*PRESS.LOW(AUTO OIL)
NC type	No.7122	*PRESS.LOW(AUTO OIL)

<Meaning>

- 1 The pressure sensor did not turn on (oil pressure did not rise) within the monitoring time (the time set for machine parameter 1) after the oil pump was activated.

<Cause>

- 1 [PRSNSR]signal in user parameter 4 (EXTRL IN SIGNAL) is incorrectly set.
- 2 The cord connection of [PRSNSR] signal is incorrect.
- 3 Machine parameter 1 (SYSTEM1) is incorrectly set.
([AUTOMATIC OILING FUNCTION] is setting [YES] or [NO ENTORY], but the machine doesn't have this option.)
- 4 The I/O board is defective.
- 5 The KLUB relay is defective.
- 6 The cord connection to the I/O board is incorrect.
- 7 The lubricating unit is not connected to the KLUB relay correctly.
- 8 The pressure sensor of the lubricating unit is defective.

<Measures>

- 1 Set [PRSNSR]signal in user parameter 4 (EXTRL IN SIGNAL) correctly.
- 2 Check the cord connection of [PRSNSR] signal.
- 3 Set machine parameter 1 (SYSTEM1) correctly.
(Set [NO] at [AUTOMATIC OILING FUNCTION])
- 4 Replace the I/O board.
- 5 Replace the KLUB relay.
- 6 Check the cord connection to the I/O board.
- 7 Check the connection of the lubricating unit and the KLUB relay.
- 8 Replace the lubricating unit.

9.2 Axial error

9.2.1

Conversation type	No.0094	**PULSE ERROR(SPINDLE)
NC type	No.5094	**PULSE ERROR(SPINDLE)
Conversation type	No.0095	**PULSE ERROR (X AXIS)
NC type	No.5095	**PULSE ERROR (X AXIS)
Conversation type	No.0096	**PULSE ERROR (Y AXIS)
NC type	No.5096	**PULSE ERROR (Y AXIS)
Conversation type	No.0097	**PULSE ERROR (Z AXIS)
NC type	No.5097	**PULSE ERROR (Z AXIS)
Conversation type	No.0098	**PULSE ERROR (4 AXIS)
NC type	No.5098	**PULSE ERROR (4 AXIS)
Conversation type	No.0099	**PULSE ERROR (5 AXIS)
NC type	No.5099	**PULSE ERROR (5 AXIS)
Conversation type	No.0100	**PULSE ERROR (6 AXIS)
NC type	No.5100	**PULSE ERROR (6 AXIS)
Conversation type	No.0102	**PULSE ERROR (M AXIS)
NC type	No.5102	**PULSE ERROR (M AXIS)

<Meaning>

1. Pulse signal sent from the axis indicated in brackets could not be read correctly.

Note: The detected amount of shift can be checked by [DISPLACEMENT PULSE] on the <Input/output> screen.

<Cause>

1. Faulty setting for [Machine Parameter] to [System 1, 2, 3] to [? MTR PULSE CHCK ALLOWANCE]
2. Faulty motor or amplifier.
3. Faulty ENC cord or amplifier cord.
4. Faulty slave PCB.

<Measures>

1. For cause 1, check the setting for [Machine Parameter] to [System 1, 2, 3] to [? MTR PULSE CHCK ALLOWANCE].
2. Replace the motor or amplifier.
3. Replace the ENC cord or amplifier cord.
4. Replace the slave PCB.

9.2.2

Conversation type	No.0534	*SP IN-POS CHCK TMOUT
NC type	No.5534	*SP IN-POS CHCK TMOUT
Conversation type	No.0535	*X IN-POS CHCK TMOUT
NC type	No.5535	*X IN-POS CHCK TMOUT
Conversation type	No.0536	*Y IN-POS CHCK TMOUT
NC type	No.5536	*Y IN-POS CHCK TMOUT
Conversation type	No.0537	*Z IN-POS CHCK TMOUT
NC type	No.5537	*Z IN-POS CHCK TMOUT
Conversation type	No.0538	* 4 IN-POS CHCK TMOUT
NC type	No.5538	* 4 IN-POS CHCK TMOUT
Conversation type	No.0539	* 5 IN-POS CHCK TMOUT
NC type	No.5539	* 5 IN-POS CHCK TMOUT
Conversation type	No.0540	* 6 IN-POS CHCK TMOUT
NC type	No.5540	* 6 IN-POS CHCK TMOUT
Conversation type	No.0542	*M IN-POS CHCK TMOUT
NC type	No.5542	*M IN-POS CHCK TMOUT

<Meaning>

1. The amount of deviation of the axis in error did not become smaller than the value set for [Machine Parameter] to [System 1, 2, 3] to [IN-POSITION WIDTH?] even after the time set to [Machine Parameter] to [System 1, 2, 3] to [? IN-POSI CHECK TIMEOUT] has elapsed after completion of operation.

<Cause>

1. Faulty setting for [Machine Parameter] to [System 1, 2, 3] to [? IN-POSI CHECK TIMEOUT] or [IN-POSITION WIDTH?]

<Measures>

1. Check the time set to [Machine Parameter] to [System 1, 2, 3] to [? IN-POSI CHECK TIMEOUT] and [IN-POSITION WIDTH?] of the axis in error.
2. Check that there is no mechanical failure.

9.2.3

Conversation type	No.1163	*ORG POS ERROR X
NC type	No.6163	*ORG POS ERROR X
Conversation type	No.1164	*ORG POS ERROR Y
NC type	No.6164	*ORG POS ERROR Y
Conversation type	No.1165	*ORG POS ERROR Z
NC type	No.6165	*ORG POS ERROR Z
Conversation type	No.1166	*ORG POS ERROR SP
NC type	No.6166	*ORG POS ERROR SP
Conversation type	No.1167	*ORG POS ERROR 4
NC type	No.6167	*ORG POS ERROR 4
Conversation type	No.1168	*ORG POS ERROR 5
NC type	No.6168	*ORG POS ERROR 5
Conversation type	No.1169	*ORG POS ERROR 6
NC type	No.6169	*ORG POS ERROR 6

<Meaning>

1. When the zero position limit switch is turned on at the time of zero position return (dog type), the rapid traverse is normally changed to a low speed feed. However, in this case, though the speed was decelerated at the specified time constant, the zero position limit switch was turned off by passing over the zero position dog after it was once turned on.
2. When the zero position limit switch is changed from ON to OFF, zero position signal of the motor is generally confirmed at the time of zero position return (dog type), but this was not confirmed.

<Cause>

1. Defect of the zero position limit switch
2. Zero dog length does not match the machine parameter.
3. Faulty motor or amplifier.

<Measures>

1. Check if the zero position limit switch is working properly, referring to Input on the input/output screen.
In proper working condition of the zero position limit switch, the corresponding bits show "1" when the zero position limit switch is turned on, or "0" when turned off. If not, replace the zero position limit switch.
2. If the same error is no longer generated in measure 1, cause 2 may be responsible. Measure the length of the zero position limit switch through the input on the <Input/output> screen to determine whether the value matches the machine parameter using the formula below. If it does not match, set the correct value to [Machine Parameter] to [X DOG RETURN HIGH SPD TRAVEL] so that the formula below is satisfied.

L: Length of the measured zero dog (mm)

V: [Machine Parameter] to [X DOG RETURN HIGH SPD TRAVEL] (mm/min)

T: [Machine Parameter] to [X RAPID FEED TIME CONSTANT 1] (msec)

K: [Machine Parameter] to [X-AXIS POSITION LOOP GAIN] (sec-1)

F: [Machine Parameter] to [X-AXIS RAPID FEED FORWARD RATIO] (%)

$$L < \frac{V}{60} \cdot \left(0.02 + \frac{1}{2} \cdot \frac{T}{1000} + \frac{1}{K} \cdot \frac{100-F}{100} \right)$$

3. If the same error is no longer generated after measure 2 is taken, cause 3 may be responsible. Replace the motor or amplifier.

9.2.4

Conversation type	No.1323	*CZEROTRNPOSERR
NC type	No.6323	*CZEROTRNPOSERR

<Meaning>

Dog type zero position return was attempted when the C-axis machine coordinate value was set to a value other than 0.000 or -180.000.

<Cause>

<Measures>

1. Set the C-axis machine coordinate value to 0.000 or -180.000 and then conduct dog type zero position return.

9.2.5

Conversation type	No.1324-1326:	*ORIGINLSOFF(4)-(6)
NC type	No.6324-6326:	*ORIGINLSOFF(4)-(6)

<Meaning>

The zero position limit switch was on when dog type zero position return was attempted for axes No. 4 ~ 6 by pressing the **[RELSE]** and **[Z.RTN]** keys.

<Cause>

<Measures>

1. Move the axes in JOG mode until the zero position limit switch turns on, and then conduct zero position return again.

Origin LS signal check on screen

1. **[I/O]** key on.
2. **[1][EOB/ENT]** key on.
3. **[PAGE DOWN]** key on twice, and display following screen.

MAIN3		INPUT/OUTPUT	
■ ORIGINLSSTATE			
●	X AXIS	OFF	
●	Y AXIS	OFF	
●	Z AXIS	OFF	
●	C AXIS	OFF	
●	B1 AXIS	OFF	
●	B2 AXIS	OFF	
F0		F1	F2
F3		F4	

9.3 Data error

9.3.1

Conversation type	No.0025	**DATA ERR (M/C PARAM)
NC type	No.5025	**DATA ERR (M/C PARAM)
Conversation type	No.1057	**DATA ERR (USER PARAM)
NC type	No.6057	**DATA ERR (USER PARAM)
Conversation type	No.3204	*DATA ERR (TOOL)
Conversation type	No.3205	*DATA ERR (PTRN)
Conversation type	No.3206	*DATA ERR (HOLE)
Conversation type	No.3207	*DATA ERR (CUTC)
NC type	No.8206	*DATA ERR (WORK ZERO)
NC type	No.8207	*DATA ERR (TOOL DATA)
NC type	No.8208	*DATA ERR (MACRO VAR.)

<Meaning>

1. Structure of the data in brackets () currently selected is damaged.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below. If not displayed, data are damaged by an external factor. Take procedure 2.
2. Delete the data which generated the error. After data deletion, re-enter the data by programming or by inputting them from an external unit.

9.3.2

Conversation type	No.2623	DATA ERR (DATA BANK)
NC type	No.7623	DATA ERR (DATA BANK)

<Meaning>

1. Structure of the data bank not currently selected is damaged.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below.
If not displayed, data are damaged by an external factor. Take procedure 2.
2. Follow the steps below to recover the damaged data:
 - 1) Switch to program editing mode and select [DIRECTORY OF MEMORY].
 - 2) Select [DATA BANK].
 - 3) The <DIRECTORY OF MEMORY> screen for the data bank appears.
Take measure 3 if no circle (○) is displayed, regardless of METRIC or INCH.
 - 4) Delete the data indicated with a circle (○).
 - 5) After deleting the data, re-enter the data by programming or by inputting it from an external unit.
 - 6) Repeat steps 4) to 5) for all data indicated with a circle (○).
 - 7) If the above error still occurs even when no circle (○) is indicated, proceed to measure 3.

Note: Magazine data is lost when the unit system is changed.

Save the magazine data before changing the unit system in step 6.

3. Format the memory.

9.3.3

Conversation type	No.1053	**M/C PARAM ERR (SYS2)
NC type	No.6053	**M/C PARAM ERR (SYS2)

<Meaning>

1. Setting of machine parameters 2 (system 2) is faulty.

<Cause>

1. Parameter for a different model was entered.

<Measures>

1. Check the following items for machine parameters 2 (system 2).

- 4OPTION
- 5-AXISINSTALLATIONPOSITION
- 6-AXISINSTALLATIONPOSITION
- 4-AXISADDRESS
- 5-AXISADDRESS
- 6-AXISADDRESS
- 4-AXISCLAMPMECHANISM

Note: The same address cannot be used for multiple axes.

(For the TC-R2A, S2A, S2B using the same address is allowed for the 5th and 6th axes.)

9.3.4

Conversation type	No.1871	*USER PAEA ER (Z MESR)
NC type	No.6871	*USER PAEA ER (Z MESR)

<Meaning>

1. Faulty setting of user parameter 6 (Z measurement) or [AUTO THRM DISP CMP]

<Cause>

1. [THERMAL MEASUREMENT FUNCTION] of user parameter 6 (Z measurement) is set to [1: VALID] and [AUTO THRM DISP CMP] is set to [1:VALID].

<Measures>

1. Check the settings for [THERMAL MEASUREMENT FUNCTION] of user parameter 6 (Z measurement) and [AUTO THRM DISP CMP], and change either setting to [0: INVALID].

9.3.5

Conversation type	No.1153	*EDIT ERROR 1
NC type	No.6153	*EDIT ERROR 1
Conversation type	No.1154	*EDIT ERROR 2
NC type	No.6154	*EDIT ERROR 2
Conversation type	No.1155	*EDIT ERROR 3
NC type	No.6155	*EDIT ERROR 3

<Meaning>

1. During editing, data is damaged.
2. Data cannot be edited.

<Cause>

1. Content of data area is damaged.

<Measures>

1. If the error still occurs,
 - Delete the file that may be the problem source.
 - Format the memory.

9.3.6

Conversation type	No.1158	*PARITY ER (USER PARA)
NC type	No.6158	*PARITY ER (USER PARA)
Conversation type	No.1159	*PARITY ER (M/C PARAM)
NC type	No.6159	*PARITY ER (M/C PARAM)
Conversation type	No.1160	*PARITY ERR (PRGRM)
NC type	No.6160	*PARITY ERR (PRGRM)
Conversation type	No.1299	*PARITY (SOFT SWITCH)
NC type	No.6299	*PARITY (SOFT SWITCH)
Conversation type	No.3200	*PARITY ERR (TOOL)
Conversation type	No.3201	*PARITY ERR (PTRN)
Conversation type	No.3202	*PARITY ERR (HOLE)
Conversation type	No.3203	*PARITY ERR (CUTC)
NC type	No.8203	*PARITY (WORK ZERO)
NC type	No.8204	*PARITY (TOOL DATA)
NC type	No.8205	*PARITY (MACRO VARIA.)

<Meaning>

1. When the power was turned on or when the NC was reset, data in brackets () was found damaged.
2. Data in brackets () was found damaged when editing, referencing, or operating.
3. For parity error (soft switch), soft switch data was found damaged when the power was turned on.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take procedure 2 as mentioned below.
If not displayed, data are damaged by an external factor. Take procedure 2.
2. Delete the data which generated the error. After data deletion, re-enter the data by programming or by inputting them from an external unit.

*Tentative measure

Display the file which generated the error. Check the data, and correct them each time when an abnormal character is found.
(This measure does not always work to repair the data.)

9.3.7

Conversation type	No.1850	*MARK NOT FOUND
NC type	No.6850	*MARK NOT FOUND

<Meaning>

1. When starting editing or editing machining data or data bank data, data mark is lost.
2. When turning the power on or pressing the reset key, parameter mark is lost.

<Cause>

1. Tap preparatory hole data of other model are registered.
2. Parameters of other model are registered.
3. PROTECT switch is set to ON during edit processing, which results in setting an imperfect data.
4. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For causes 1 to 2, register correct data.
2. If the same error is still generated after the above, check the battery alarm at the bottom right of the screen. If the alarm is displayed, the batteries have run out. Replace the batteries with new ones, and take the procedure 3 as mentioned below. If not displayed, data are damaged by an external factor. Take the procedure 3.
3. Delete the data which generated the error. After data deletion, re-enter the data by programming or by inputting them from an external unit.

9.3.8

Conversation type No.3248 *NO REQUIRED DATA

<Meaning>

1. Data disappeared for some reason during processing.

<Cause>

1. The data were damaged by an external factor, such as depletion of back-up batteries, replacement of PCB, etc.

<Measures>

1. For cause 1, check the battery alarm at the bottom right of the screen.
If the alarm is displayed, the batteries have run out.
Replace the batteries with new ones, and take procedure 2 as mentioned below.
If not displayed, data are damaged by an external factor. Take procedure 2.
2. Delete the data which generated the error. After data deletion, re-enter the data by programming or by inputting them from an external unit.

9.3.9

Conversation type	No.4566	OPENERERROR(PROGRAM)

Conversation type	No.4567	OPEN ERROR(CUTCOND)

<Meaning>

1. During editing, data is damaged.
2. Data cannot be edited.

<Cause>

1. Content of data area is damaged.

<Measures>

1. If the error still occurs,
 - Delete the file that may be the problem source.
 - Format the memory.

9.3.10

Conversation type	No.0104	**FORMATTYPEISWRONG
NC type	No.5104	**FORMATTYPEISWRONG

<Meaning>

1. Memory format differs from the current format (conversation or NC language).

<Cause>

1. The version of the memory board is changed from WJ (E) -10 and lower to WJ (E) -11 and higher.
2. The data is damaged due to a dead backup battery or external causes, such as board replacement.
3. NC or conversation language is changed when memory capacity is three times of the standard.

<Measures>

1. Conduct special formatting. (See Hidden Operation 5.)
2. Conduct memory formatting.
3. Check the language changing switch.

9.3.11

Conversation type	No.0105	**FORMATCAPADIFFERS
NC type	No.5105	**FORMATCAPADIFFERS

<Meaning>

1. Memory format capacity differs from that set by the hardware (normal/triple).

<Cause>

1. The version of the memory board is changed from WJ (E) -10 and lower to WJ (E) -11 and higher.
2. The data is damaged due to a dead backup battery or external causes, such as board replacement.
3. The connector is not correctly connected to the NC board.

<Measures>

1. Conduct special formatting. (See Hidden Operation 5.)
2. Conduct memory formatting.
3. Check connection of the connector to the NC board.

Memory capacity check

Input/output (local) Input 1 Bit 3

Bit	FEDCBA9876543210
Input 1	*****

Memory capacity
(0:three times of standerd
1:standerd)

9.3.12

Conversation type	No.0108	**NOMEMORY FORMAT
NC type	No.5108	**NOMEMORY FORMAT

<Meaning>

1. Completion of memory formatting is not identified in the memory format check area.

<Cause>

1. The data is damaged due to a dead backup battery or external causes, such as board replacement.

<Measures>

1. Conduct memory formatting.

9.3.13

Conversation type	No.1058	**USER PARAM ERR (SW2)
NC type	No.6058	**USER PARAM ERR (SW2)

<Meaning>

1. Setting of user parameters 2 (switch 2) is faulty.

<Cause>

1. Parameter for a different model was entered.

<Measures>

1. Check the following items for user parameters 2 (switch 2).

STROKE 4

STROKE 4 (-)

STROKE 4 (+)

SOFTWARE STROKE LIMIT1 4(-)

SOFTWARE STROKE LIMIT1 4(+)

9.3.14

Conversation type	No.1059	**USER PARAM ERR (SW1)
NC type	No.6059	**USER PARAM ERR (SW1)

<Meaning>

1. Setting of user parameters 1 (switch 1) is faulty.

<Cause>

1. Parameter for a different model was entered.

<Measures>

1. Check the following items for user parameters 1 (switch 1).
TOOL BREAKAGE DETECT OPTION

9.3.15

Conversation type No.0110 **MACHINESETTINGERR
 NC type No.5110 **MACHINESETTINGERR

< Cause >

1. The machine model or type differs from the setting before shipping.

< Factor >

1. The model check signal (Main 1: Input 8-8 (MSEL0) ~ 8-d (MSEL5) is faulty.
2. Maintenance data for a different model or type was input.

< Solution >

1. Check that the model and type are correct.
 The model and type before shipping are assigned to settings “1” to “6” of soft switch 6.
 Setting “8” of soft switch 6 changes the parameter between [0: Invalid] and [1.Valid].
 Match the model check signal (Main 1: Input 8-8 (MSEL0) ~ 8-d (MSEL5) to settings “1” to “6” of soft switch 6.
 See **8.2 I/O (Main)** for details of the model check signal.

MEM PCB Ver26

Machine	Magazine	Soft switch 6							
		8	7	6	5	4	3	2	1
22A	18MG	1	0	1	0	0	0	1	0
	26MG	1	0	1	0	0	0	1	1
32A	18MG	1	0	0	0	1	1	1	0
	26MG	1	0	0	0	1	1	1	1
31A	18MG	1	0	0	0	0	1	0	0
	26MG	1	0	0	0	0	1	0	1
S2A	14MG	1	0	0	0	1	0	0	0
R2A	14MG	1	0	1	0	1	0	0	0
20A	15MG	1	0	1	0	1	1	0	0
S2B	14MG	1	0	0	0	0	0	0	0
	21MG	1	0	0	0	0	0	0	1

9.3.15-1.xel

9.4 ATC error

9.4.1

Conversation type	No.0520	*INVERTER ERR (ATC)
NC type	No.5520	*INVERTER ERR (ATC)

<Meaning>

1. [MAGAZINE M INVERTER ERROR] was input to the NC.

<Cause>

1. Overloaded ATC motor
2. Voltage error
3. Faulty ARM inverter

<Measures>

1. For cause 1, check if tool weight is within the specified range.
2. Check if the power supply voltage is within the specified range.
3. Replace the ARM inverter.

9.4.2 (1/2)

Conversation type	No.0504	*POSITION ERROR SP
NC type	No.5504	*POSITION ERROR SP

<Meaning>

1. Spindle command is ordered when Z axis was above the zero point.

<Cause>

- 1) Mistakes have been occurred during the operation.
- 2) Defect of ATC area limit switch
- 3) Defect of the board

<Measures>

- 1) For the cause 2, check if ATC area limit switch is working properly, referring to the input 5 or 6 (refer to fig.2) on the input/ output screen (slave).
If it is working properly, limit switch moves as shown in the figure 1.
If not working as shown in the fig.1, ATC area limit switch is damaged or dislocated, or the cable is disconnected.
Adjust the position or replace the part with new one as required.

9.4.2 (2/2)

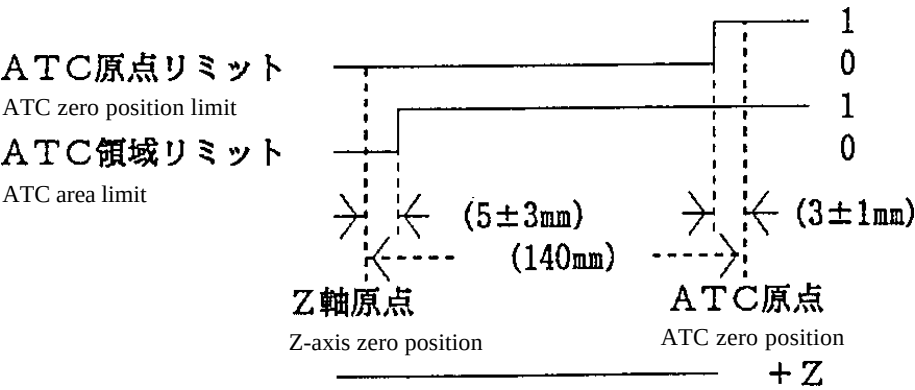


Fig.1 Normal motion

- (2) For the cause 3, check if the value of the bit F of input 9 (Refer to the fig.1) on the<I/O> screen.
If the bit is 0, the board is defective. Replace the part with the new one.

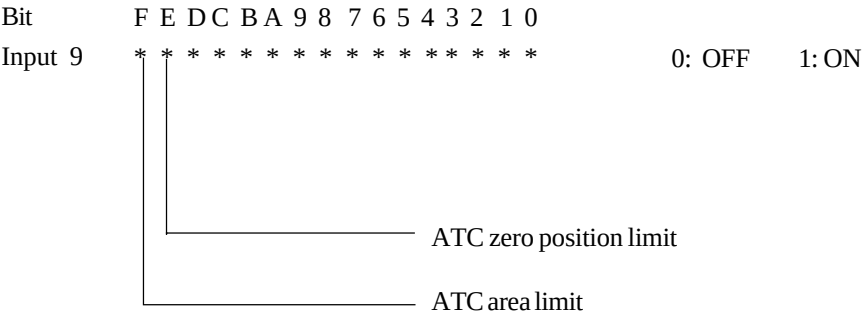


Fig.2 Input/ Output (main1) Input 9

9.4.3

Conversation type	No.1189	*POSITION ERROR SP
NC type	No.6189	*POSITION ERROR SP

<Meaning>

- 1) Spindle command is given while ATC area limit switch is being on.
- 2) With non-stop ATC, when Z axis positioning and spindle rotation are commanded after the Z axis was moved down to its zero position, the Z axis is located above the zero position, or ATC area limit switch is being on more than 3.0 sec.

<Cause>

- 1) Mistakes have been occurred during the operation.
- 2) Defect of ATC area limit switch
- 3) Defect of the board

<Measures>

- 1) For the cause 2, check if ATC area limit switch is working properly, referring to the input 5 or 6 (refer to fig.2) on the input/ output screen (slave).
If it is working properly, limit switch moves as shown in the figure 1.
If not working as shown in the fig.1, ATC area limit switch is damaged or dislocated, or the cable is disconnected.
Adjust the position or replace the part with new one as required.

9.4.3 (2/2)

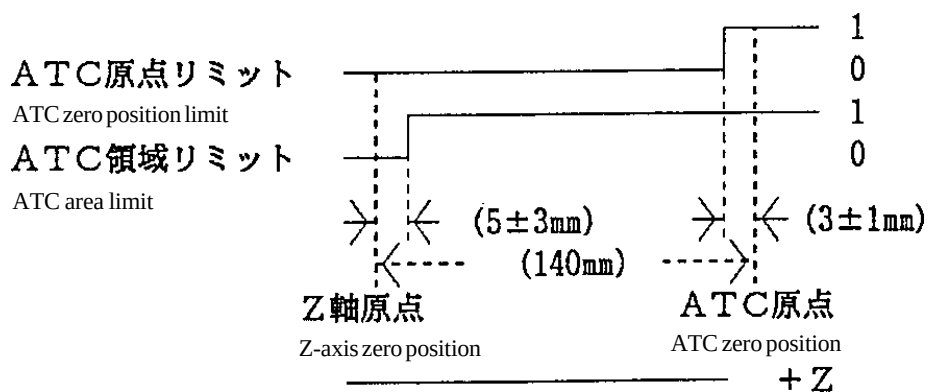


Fig.1 Normal motion

- 2) For the cause 3, check if the value of the bit F of input 9 (Refer to the fig.1) on the<I/O> screen.
If the bit is 0, the board is defective. Replace the part with the new one.

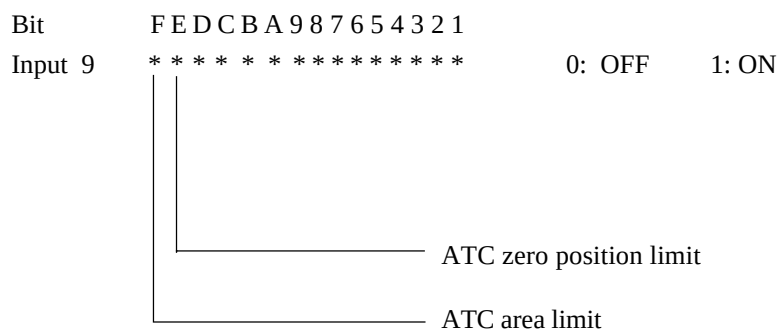


Fig.2 Input/ Output (main1) Input 9

9.4.4 (1/2)

Conversation type	No.1194	*MAGAZINE No. ERROR
NC type	No.6194	*MAGAZINE No. ERROR

<Meaning>

- (1) When the power is turned or the NC is reset, NO address sensor 1-14 (21) is not turned on.
*Operation of the **[RELSE]** + **[RST]** keys is excluded from the above.
- (2) When the magazine starts rotating, no address sensor 1-14 (21) is not turned on.
- (3) When the magazine stops after rotation, the indexed magazine number is not the one commanded.

<Cause>

- (1) Excessive tool weight.
- (2) Imbalance of tools on the magazine.
- (3) Improper location of address sensors.
- (4) TC-S2B: Connect XI2 connector for fourteenth tools type.
(16th bit is always ON.)
- (5) Defect of ATC parts (address sensor, ATC address sensor cable).
- (6) Defect of the board.
- (7) Defect of the NC board. Refer to (9.3.15.).

<Measures>

- (1) Press the **[RELSE]** key and the **[RST]** key at the same time to clear the error message, and move the magazine to a regular position by pressing **[RELSE]** and **[MAGZ]** keys.

*If the **[RELSE]** key is not pressed together, <MAGAZINE NO. ERROR> may be generated again.

- (2) For the cause 1, check the each tool and the total weight on the magazine.
- (3) For the cause 2, check the arrangement of tools on the magazine.
If it is imbalance, change the tools positions.
- (4) TC-S2B: Not connect XI2 connector for fourteenth tools type.

9.4.4 (2/2)

- (5) Cause 3 and 5, after the measure 1, check the value for 4, 7bits (D, E, F) of input 2 (Refer to the fig.1) on the input/ output screen (MAIN2) correspond to the magazine number which is currently indexed, as below. If not, move the magazine to the position corresponds. (Refer to the Maintenance Manual.)
- If the bits indicated above are not changed at all during magazine rotation, address sensor or ATC address sensor cable is damaged.
- Replace the part with new one.

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Input 2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

0:OFF 1:ON

Address Sensor

Fig.1 Input/ Output screen (Main 2) INPUT 2

Table.1 Correspondance of address sensor and number

Magazine No.	bitsF, E, D,7,4 of input 2	Magazine No.	bitsF, E, D,7,4 of input 2
1	00010	15	11110
2	00100	16	00001
3	00110	17	00011
4	01000	18	00101
5	01010	19	00111
6	01100	20	01001
7	01110	21	01011
8	10000		
9	10010		
10	10100		
11	10110		
12	11000		
13	11010		
14	11100		

- (6) Cause 6 may be occurred when measures from 1 to 5 do not work.
- Replace the board with the new one.

9.4.5 (1/2)

Conversation type	No.1195	*MAGAZINE INDEX ERROR
NC type	No.6195	*MAGAZINE INDEX ERROR

<Meaning>

- (1) When the power is turned on or when **[RST]** key is turned off, the ATC cam sensor is being off.
*Operation of **[RELSE]** + **[RST]** keys is excluded from the above.
- (2) When **[MAGZ]** or the **[ATC]** key is pressed in manual mode, ATC cam sensor is being off.
- (3) When the Z axis is moved with the ATC area limit switch being on, ATC cam sensor is being off.
- (4) After zero position return (dog type), when the Z axis is moved above the Z-axis machine zero position in manual mode (including tool changes in other mode), ATC cam sensor is being off.
- (5) When the magazine stops after rotation, ATC cam sensor is being off.

<Cause>

- (1) Excessive tool weight
- (2) Imbalance of tools on the magazine
- (3) Defect of ATC parts (ATC cam sensor, ATC cam sensor cable, Inverter cord)
- (4) Defect of the inverter.
- (5) Defect of ATC inverter parameter setting.

<MEASURES>

- (1) Press **[RELSE]** and **[RST]** keys at the same time to clear the error message, and move the magazine to a regular position by pressing **[RELSE]** and **[MAGZ]** keys.

* If **[RELSE]** key is not pressed together, <MAGAZINE NO. ERROR> or <MAGAZINE INDEX ERROR> may be generated again.

- (2) For the cause 1, check each tool weight and the total tool weight on the magazine.

9.4.5 (2/2)

- (3) For the cause 2, check the arrangement of tools on the magazine.
If imbalanced, change the tool positions.
- (4) For the cause 3, check if the value of the bit 6 of input 2 (Refer to the fig. 1.)
on the <I/O> screen changes during the rotation.
If not, ATC cam sensor or ATC cam sensor cable is damaged. Replace the
part with new one.
- (5) If the same error is still generated even after checking all the above items,
replace the board with new one.

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Input 2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

0:OFF 1:ON

ATC Cam sensor

Fig. 1 Input/output screen (MAIN 1) Input 2

9.4.6 (1/2)

Conversation type	No.1196	*MAGAZINE POSITION ERROR
NC type	No.6196	*MAGAZINE POSITION ERROR

<Meaning>

- (1) When the magazine rotation is commanded in manual mode, ATC zero position limit switch is being off.
- (2) During tool change in MDI or memory operation mode, ATC zero position limit switch is not turned on within 1.5 sec. after magazine rotation command.

<Cause>

- (1) Magazine rotation command is given without moving up the Z axis to its ATC zero position.
- (2) Grid shift amount Z or origin offset Z axis is not correct.
- (3) Defect of ATC parts
(ATC zero position limit switch, ATC zero position limit switch cable)
- (4) Defect of the board

<Measures>

- (1) Check the grid shift amount Z and origin offset Z axis.

If not correct, set it properly. (Refer to the Maintenance Manual.)

- (2) For the cause 3, check if ATC zero position limit switch is working properly, referring to the bit E of input 9 (Refer to the fig. 1.) on the <I/O> screen (MAIN 1). If not working as shown in the fig. 2, ATC zero position limit switch or cable is damaged. Replace the part with new one.

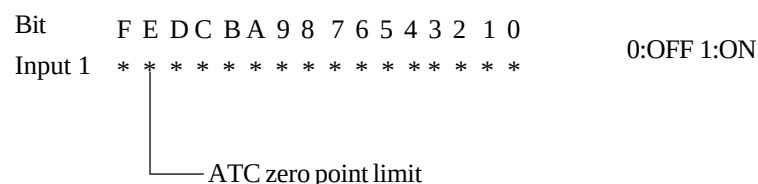


Fig.1 Input/Output screen (MAIN 1) Input 9

9.4.6 (2/2)

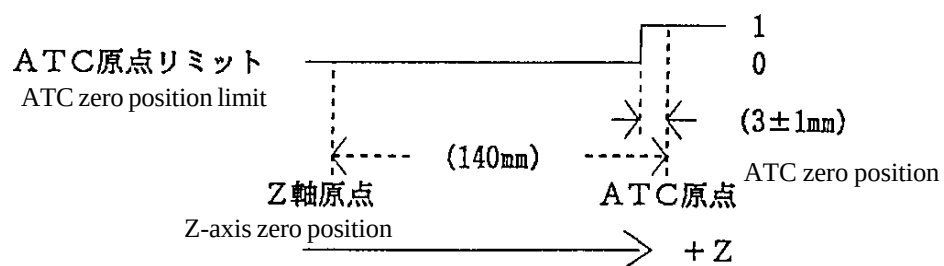


Fig. 2 Normal motion

- (3) If the same error is generated even after checking all the above items, replace the board with new one.

9.4.7 (1/3)

Conversation type	No.1199	*MAGAZINE TIME OVER
NC type	No.6199	*MAGAZINE TIME OVER

<Meaning>

- (1) Magazine rotation has not been finished within 5 sec.
 * Magazine rotation Commended on the input output screen is excluded from the above.

<Cause>

- (1) Excessive tool weight
- (2) Imbalance of tools on the magazine
- (3) Defect of ATC parts
 (address sensor. ATC deceleration sensor. ATC cam sensor. motor, Inverter cord)
- (4) Defect of inverter setting (parameter) or parts.
- (5) Defect of the board

<Measures>

1. Press **[RELSE]** and **[RST]** keys at the same time to clear the error message, and move the magazine to a regular position by pressing **[RELSE]** and **[MAGZ]** keys.
 If **[RELSE]** key is not pressed together. <MAGAZINE NO. ERROR> or <MAGAZINE INDEX ERROR> may be generated.
2. For the cause 1, check each tool weight and the total weight on the magazine. If exceeding allowable weight remove the tool(s).
3. For the cause 2, check the arrangement of tools on the magazine. If imbalanced, change the tool positions.
4. For the cause 3, check if the value of the bit 6 of input 2 (refer to the fig. 1) on the input output screen (MAIN 2) changes during magazine rotation.
 If not, ATC cam screen or ATC cam sensor cable is damaged.
 Replace the part with new one.

Bit	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
Input 2	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

0:OFF 1:ON

└──────────┘ ATC Cam sensor

Fig. 1 Input/output screen (MAIN 2) Input 2

9.4.7 (2/3)

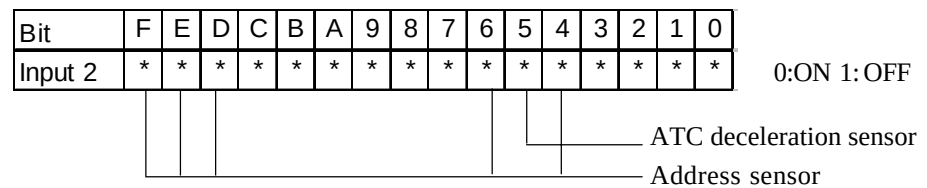


Fig.2 Input/output screen (MAIN 2) Input 2

- (5) After the measure 1, check that the values 4, 7, D, E, F bits of input 2 (Refer to the fig. 2.) on the <I/O> screen (MAIN2) correspond to the magazine number which is currently indexed, as below. If not, move the magazine for correspondence. (Refer to the Maintenance manual)
- If the values 4, 7, D, E, F bits of input 2 are not changed at all during magazine rotation, address sensor or ATC address sensor cable is damaged.
- Replace the part with new one.

Table 1 Correspondence of address sensor and number

Magazine No.	bitsF, E, D,7,4 of input 2	Magazine No.	bitsF, E, D,7,4 of input 2
1	00010	15	11110
2	00100	16	00001
3	00110	17	00011
4	01000	18	00101
5	01010	19	00111
6	01100	20	01001
7	01110	21	01011
8	10000		
9	10010		
10	10100		
11	10110		
12	11000		
13	11010		
14	11100		

9.4.7 (3/3)

- (6) For the cause 3, check if the value of the bit 6 of input 2 (Refer to the fig. 2.) on the input output screen (MAIN 2) changes during megazine rotation.
If not ATC deceleration sensor or ATC delectation sensor cable is damaged.
Replace the part with new one.
If the same error is generated even after checking dl the above items, replace the board or the motor with new one.
- (7) For the cause 4, when time over error occurred caused by slow rotated magazine, check the inverter parameter on board.
When magazine is not rotate, check the lamp is FREE on the inverter drive lamp.
Check the parameter is correct and inverter cord is.
- (8) If the same error is generated even after checking all the above items, the cause 3 or the cause 4 may be occured.
Replace the motor or board.

9.5 Reference

9.5.1 Special power-ON

1. Special power-ON 1 (when the file is damaged)
This is used when the system does not boot when power is turned on, because the desired program file (machine parameters, user parameters, etc.) is damaged. Not use for any other situation.
 - 1) Press the [POWER] switch while holding down the [EMERGENCY], [START], and [HOLD] keys.
 - 2) The system boots in manual mode with the [SPECIAL INITIAL (0001)] alarm message.
 - 3) Restore or delete the damaged file.
 - 4) Turn power off.
2. Special power-ON 2 (key check mode)
This is used to check keys. Not use for any other situation.
 - 1) Press the [POWER] switch while holding down the [EMERGENCY], [HOLD] and [RELSE] keys.
 - 2) The system boots in key check mode.
All keys are invalid after the <Key Check> screen has appeared from the <INPUT/OUTPUTMENU> screen.
 - 3) Press the [RST] key to return to normal key operation.
3. Special power-ON 3 (axis detachment)
This is used to disable a faulty axis and operate other axes when a servo error has occurred. Not use for any other situation.
 - 1) Remove the slave PCB side of the cable connecting the slave PCB of the axis with an error and the servo amplifier.
 - 2) Press the [POWER] switch while holding down the [EMERGENCY], [START] and [RELSE] keys.
 - 3) The [**SERVO CHECK OFF] and [*EMERGENCY SW ON] alarms occur.
 - 4) Release the [EMERGENCY] switch and press the [RST] key. The servo turns on. (The [**SERVO CHECK OFF] alarm is not cleared.)

Notes

- 1) **Do not allow the Z axis to drop when disabled.**
- 2) **Attempting to move the disabled axis using the jog keys may cause a deviation error or invalidate the jog keys.**
- 3) **The spindle cannot be disabled.**

4. Special power-ON 4 (clearing all memory)
This is used when the system does not boot even when special power-ON 1 (when the file is damaged) is attempted. Not use for any other situation.
 - 1) Set the [NC type/Conversation type] switch to [NC type].
 - 2) Set the [PROTECT] switch to [OFF].
 - 3) Press the [POWER] switch while holding down the [EMERGENCY], [RELSE], and [SHIFT] keys.
 - 4) Keep the [+4] key held down for at least three seconds when instructed on the screen, and all memory is cleared.
 - 5) After clearing all memory, turn power off.
 - 6) Set the [NC type/Conversation type] switch to [Conversation type].
 - 7) Repeat steps 2) to 5).
 - 8) Set the [NC type/Conversation type] switch to [NC type].
 - 9) Turn power off.
 - 10) Format the memory.
 - 11) Turn power off.
 - 12) Set the [NC type/Conversation type] switch to [Conversation type].
 - 13) Format the memory.
 - 14) Turn power off.

Notes

- 1) **Operation can be started in either NC type or conversation type.**
- 2) **When all memory is cleared, the adjusted value for the screen contrast is also cleared, thus the contrast needs to be adjusted when power is turned on next.**
Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen. Contrast can be adjusted using the [PAGE UP] or [PAGE DOWN] key.
- 3) **The steps for formatting memory are as below.**
 1. Set the [PROTECT] switch to [OFF].
 2. Press the [EDIT] key.
 3. Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen. Select [1.INPUT/OUTPUT].
 4. Press the [PAGE UP] or [PAGE DOWN] key to display the version screen.
 5. Move the cursor to [PARAMETER CHANGE].
 6. Press the [1] and [EOB/ENT] keys.
 7. Press the [PRGRM] key to display the <PROGRAM EDIT MENU> screen.
 8. Press the [2] and [EOB/ENT] keys (NC type) or [6] and [EOB/ENT] keys (Conversation type), or move the cursor to [DIRECTORY OF MEMORY] and press the [EOB/ENT] key.
 9. Press the [F4] key on the <DIRECTORY OF MEMORY MENU> screen.
 10. When instructed on the screen, press the [DEL] key.
 11. The memory format confirmation screen appears. To proceed, press the [F0] key.
 12. Confirm that formatting memory has been completed and turn power off.
- 4) **When [PARAMETER CHANGE] is set to [YES], attempting to press the [RST] key or change mode changes the setting to [NO].**

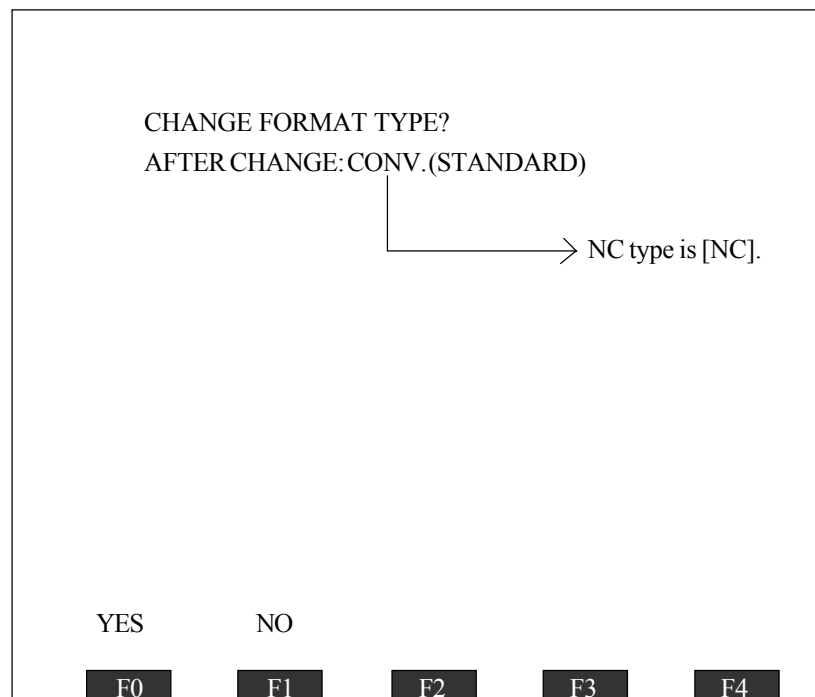
9.5.2 Hidden Operation

- 1. Hidden Operation 1 (changing the soft switch)
 - 1) Set the [PROTECT] switch to [OFF].
 - 2) Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen.
 - 3) Press the [-], [9], [9], [9], [8], and [EOB/ENT] keys.
 - 4) Set the required items.
 - 5) Press the [EOB/ENT] key.
 - 6) Press the [F0] key.

SOFT SWITCH		INPUT/OUTPUT				
•SWITCH 1	00000000					
•SWITCH 2	00000000					
•SWITCH 3	00000000					
•SWITCH 4	00000000					
•SWITCH 5	00000000					
•SWITCH 6	00000000					
•SWITCH 7	00000000					
•SWITCH 8	00000000					
•SWITCH 9	00000000					
•SWITCH 10	00000000					
SWITCH 1	→ 00000000					
I/O						
MENU						
F0	F1	F2	F3	F4		

2. Hidden Operation 2 (changing the memory format information)

- 1) Set the [PROTECT] switch to [OFF].
- 2) Press the [EDIT] mode.
- 3) Press **[6]** (conversation type) or **[2]** (NC type) and **[EOB/ENT]** key.
- 4) Press **[-]**, **[9]**, **[9]**, **[9]**, **[9]**, and **[F4]** key.
(The following screen appears.)



- 5) Press the **[F0]** key.
- 6) Turn on the power again.

9.5.3 ATC Maintenance Mode (1/3)

This parameter cannot be set for the armless ATC.

This mode is used when setting the ATC arm or adjusting the magazine position.

1. Switch from normal mode to ATC maintenance mode
 - 1) Press the **[I/O]** key to display the <INPUT/OUTPUT MENU> screen.
Select[1.INPUT/OUTPUT].
 - 2) Press the **[PAGE UP]** or **[PAGE DOWN]** key to display the version screen.
 - 3) Move the cursor to [ATC maintenance mode].
 - 4) Press the **[1]** and **[EOB/ENT]** key.
 - 5) The **[**TURN OFF POWER]** alarm occurs.
 - 6) Turn power off and then back on.
 - 7) The system boots in ATC maintenance mode.
2. Switch from ATC maintenance mode to normal mode
 - 1) Press the **[I/O]** key to display the <INPUT/OUTPUT MENU> screen.
Select[1.INPUT/OUTPUT].
 - 2) Press the **[PAGE UP]** or **[PAGE DOWN]** key to display the version screen.
 - 3) Move the cursor to [ATC maintenance mode].
 - 4) Press the **[0]** and **[EOB/ENT]** key.
 - 5) The **[**TURN OFF POWER]** alarm occurs.
 - 6) Turn power off and then back on.
 - 7) The system boots in normal mode.

9.5.3 ATC Maintenance Mode (2/3)

VERSION		TC-S2B	INPUT/OUTPUT
•VERSION(**)		•KEY CODE LIST	
MAIN	MA1-51-04	000000000000	
SLAVE	SA1-11-03	000000000000	
LOCAL	LA1-51-03	000000000000	
SEQ(S)		000000000000	
SEQ(U)		000000000000	
•PARAMETERCHANGE	0	POWERON TIME	
(0:NO 1:YES)		00236:25:08	
•ATC MAINT. MD	0	RUNNING TIME	
•DISPLAY TEST	0	00103:10:53	
•MAINT INPUT	0		
PARAMETER CHANGE → _			
I/O MENU			
F0		F1	F2
F3		F4	

ATC MAINT. MD		MANUAL CONDITIONS	
•MGZ COOD	0.000	•Z-MC C	45.000
•MAGAZINE	NO. 01	•ATC ARM ORIGIN	0
•POT OPERATION TIME			0.000 sec
•MAGAZINE COVER OPR TIME			0.000 sec
•CLEAR START P DATA			0
•START DT1			0.000
•START DT2			0
•HIGHSPEED(MAGAZINE)			10 %
•RAPID FREEDRATE (XYZ)			0 %
•JOG SPEED(MAGAZINE)			0.1 min ⁻¹
•JOG FREEDRATE (XYZ)			50 mm/min ⁻¹
•STEP AMOUNT(MAGAZINE)			0.001 °
•STEP O LENGTH (XYZ)			0.001 mm

9.5.3 ATC Maintenance Mode (3/3)

3. ATC operation

Press the **[E. STA]** key and the LED lights.

When the LED is lit, each moving section of the ATC can be operated independently. Key entry is disabled.

When the LED is unlit, key entry is enabled, but each moving section of the ATC cannot be operated independently.

[RELSE]+[X(U)] Raise the pot.

[RELSE]+[D] Lower the pot.

[RELSE]+[O(A)] Swivel ATC arm in jog mode (at low speed).

[RELSE]+[T] Swivel ATC arm in single block mode (at low speed)

[RELSE]+[S] Perform spindle orientation.

[RELSE]+[P] Magazine cover open.

[RELSE]+[Q] Magazine cover close.

Operations of the **[ATC]** and **[MAGZ]** keys are the same as those in normal mode.

4. Magazine operation

- 1) The magazine axis JOG operation is enabled by pressing the **[+4]** and **[-4]** keys.
- 2) Press the **[MAGZ]** key and the magazine swivels one pitch in the direction that the magazine number increases.
- 3) Move the cursor to **[CLEAR START P DATA]** and press the **[1]** and **[EOB/ENT]** keys. The absolute value and start point data in the amplifier are initialized.

<Supplementary explanation of clearing start point data>

An absolute encoder is used for the magazine axis. Accordingly, when adjusting the magazine axis, the absolute value for the amplifier must be initialized, and then the machine coordinates must be matched to the absolute value again.

When clearing start point data is attempted, the absolute value for the amplifier is initialized, start point data 1 (base machine coordinates) is cleared to zero, and start point data 2 (base absolute value) is set to the initialized absolute value.

9.5.4 PCB Sticker

1. Memory PCB version sticker

A00- ? ? ??

— 00 - 99 : Indicates the version (last two digits of the part code)
 — J : Japanese specifications E: Overseas specifications
 — W: Both of NC and Conversation types

(e.g.) “A00-WJ01” indicates that the PCB is version 01 and available for both conversation and NC types, and conforms to Japanese specifications.

2. Software version

		Main	Local	Slave
NC	Japan	MA1-51-??	LA1-51-??	SA1-11-??
	Overseas		LA2-51-??	
Conversation	Japan	MA1-11-??	LA1-11-??	SA1-11-??
	Overseas		LA2-11-??	

Note: The last two digits indicate the software version.

3. Example of memory PCB version sticker and software version No.

A00-WJ?? (Both, Japan)

A00-WJ01	MA1-11-01	LA1-11-01	SA1-11-01	MA1-51-01	LA1-51-01	SA1-11-01
A00-WJ02	MA1-11-02	LA1-11-02	SA1-11-02	MA1-51-02	LA1-51-02	SA1-11-02
A00-WJ03	MA1-11-03	LA1-11-02	SA1-11-02	MA1-51-03	LA1-51-02	SA1-11-02
A00-WJ04	MA1-11-04	LA1-11-03	SA1-11-03	MA1-51-04	LA1-51-03	SA1-11-03

A00-WE?? (Both, Overseas)

A00-WE01	MA1-11-01	LA2-11-01	SA1-11-01	MA1-51-01	LA2-51-01	SA1-11-01
A00-WE02	MA1-11-02	LA2-11-02	SA1-11-02	MA1-51-02	LA2-51-02	SA1-11-02
A00-WE03	MA1-11-03	LA2-11-02	SA1-11-02	MA1-51-03	LA2-51-02	SA1-11-02
A00-WE04	MA1-11-04	LA2-11-03	SA1-11-03	MA1-51-04	LA2-51-03	SA1-11-03

9.5.5 Dip Switch

Main/Local

M/L	Bit	Function	Contents
Local	5	Switch of language	Bit 7/ Bit 6 / bit 5 ON / ON / ON : Japanese ON / ON / OFF : English ON / OFF / ON : German ON / OFF / OFF : French OFF / ON / ON : Spanish (only for NC type) OFF / ON / OFF : Chinese
	6		
	7		
	8	Not available	ON

9.5.6 Software switch

Hidden Operation (changing the soft switch)

- 1) Set the [PROTECT] switch to [OFF].
- 2) Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen.
- 3) Press the [-], [9], [9], [9], [8], and [EOB/ENT] keys.
- 4) Set the required items.
- 5) Press the [F0] key.

SOFT SWITCH		INPUT/OUTPUT		
•SWITCH 1	00000000			
•SWITCH 2	00000000			
•SWITCH 3	00000000			
•SWITCH 4	00000000			
•SWITCH 5	00000000			
•SWITCH 6	00000000			
•SWITCH 7	00000000			
•SWITCH 8	00000000			
•SWITCH 9	00000000			
•SWITCH 10	00000000			
SWITCH 1	→ 00000000			
I/O				
MENU				
F0	F1	F2	F3	F4

Switch 1

Bit	Function	Contents
1	Optional thread cutting function	0: Not provided 1: Provided
2	Optional Z axis measurement function	0: Not provided 1: Provided
3	Optional zero point measurement function	0: Not provided 1: Provided
4	Optional automatic thermal displacement compensation (Note1) For version A00-??04 machines and earlier, options can be changed using the bit settings above. For version A00-??05 machines and later, options are changed using the IO PCB. Refer to the data set for [Main] on the <I/O> screen to check whether or not any option is provided or the IO PCB is applicable for option changes.	0: Not provided 1: Provided
5	Not used	0
6	Not available	0
7	Not available	0
8	Not available	0

Switch 4

Bit	Function	Contents
1	Not available	0
2	Not available	0
3	QT axis acceleration and deceleration (only TC-31A, TC-32A, TC-R2A)	0: Normal S-curve 1: Refined S-curve
4	QT axis high gain time when clamping (only TC-31A, TC-32A, TC-R2A)	0: Until in-position check is completed. 1: Until clamping is completed.
5	Spindle position deviation offset	0: Invalid 1: Valid
6	Not used	0
7	Not used	0
8	Not used	0

Switch 5

Bit	Function	Contents
1	Switch of high/ middle pressure coolant	0: high pressure coolant 1: middle pressure coolant (CTS)
2	Automatic door lock	0: Lock 1: Unlock
3	Not used	0
4	Not used	0
5	Dog type zero return XYZ axes zero point LS check	0: Not check 1: Check
6	Not used	0
7	Not used	0
8	Not available	0

Switch 6

Bit	Function	Contents
1	MSEL0	Set the MSEL signal for machine type. When bit 8 is "1", this parameter compared to machine type.
2	MSEL1	
3	MSEL2	
4	MSEL3	
5	MSEL4	
6	MSEL5	
7	Not used	0
8	Invalidating software that machine change (MSEL signal) check.	0: Valid 1: invalid

Switch 7 to 9 are not used (0).

9.5.7 Display Inspection

This function is used to check missing dots on the screen.

- 1) Press the [I/O] key to display the <INPUT/OUTPUT MENU> screen.
Select [1.INPUT/OUTPUT].
- 2) Press the **[PAGE UP]** or **[PAGE DOWN]** key to display the version screen.
- 3) Move the cursor to [DISPLAY TEST].
- 4) Press the **[1]** and **[EOB/ENT]** keys.
- 5) Testing the display is commenced.
- 6) Press any key to stop testing and the screen returns to the normal display.

Chapter 11 Alarm screen

11.1 Alarm message screen

This section describes the alarm message screen on which, in case of machine trouble or failure, the error number and its detail are displayed.

Press [**ALARM**] key to display the screen.

[illegible]

- (1) If two or more errors occur at the same time, the message of up to ten most serious errors is displayed on the screen.
- (2) If errors occur on a screen other than the alarm message screen, the message of only most serious one blinks together with its number.
- (3) Checking the error code displayed on the screen, refer to the error code list and eliminate the error according to its remedy.

There are 3 degrees of importance.

Refer to the error code list (11.3).

11.2 <Alarm Log> screen

Among critical errors that have occurred, the information of up to the latest 50 errors is retained, and able to be referred to on this screen.

11.2.1 <Log List> screen

The error list is displayed on this screen.
Press **[F0]** on the <Alarm Message> screen, and the <Log List> screen will appear.

ALARM LOG			ALARM	
NO.	MESSAGE		DATE	TIME
•1294 *	ADDRESS SETTING ERR		07/06	09:01
•1050 **	TURN OFF POWER		07/06	09:02
•1294 *	ADDRESS SETTING ERR		07/06	09:10
•1050 **	TURN OFF POWER		07/06	09:11
•1294 *	ADDRESS SETTING ERR		07/06	09:20
•1294 *	ADDRESS SETTING ERR		07/06	09:21
•1294 *	ADDRESS SETTING ERR		07/06	09:25
•1050 **	TURN OFF POWER		07/06	09:26
•1209 *	STROKE OVER (+C)		07/06	10:02
•1209 *	STROKE OVER (+C)		07/06	10:13
•1851 *	PRESS RESET KEY		07/06	13:10
•1050 **	TURN OFF POWER		07/07	09:42
•0018 **	SLV INTIAL IMP SBLE		07/07	11:20
•1851 *	PRESS RESET KEY		07/06	12:50
•1851 *	PRESS RESET KEY		07/06	14:36
DETAIL DISP. : MOVE CURSOR AND PRESS SET.				
ALARM DISPLAY				
F0		F1	F2	F3
				F4

11.2.2 <Detailed Display> screen

The detailed error information can be referred to on this screen.

Use the arrow key to select the desired error on the <Log List> screen, and press the **[ENT]** key.

DETAILED DISPLAY		ALARM LOG	
0500	*EMERGENCY SW ON	07/06	17:45
•MODE	MEM	•DISPLAY	POS
•EDIT PRGRM	0015		
•OPE PROGRAM	3100		
•MACHINING		•MOTION	
JOB NO.	---- 01	FEED	Z 23.000
TOOL NO.	---- 01		47mm/min
POS NO.	---- 001		
PIECE NO.	---- 01		
LINE NO.	---- 01		
INFEED NO.	---- 01		
•MACHINE POS			
X	-200.000		
Y	-200.000		
Z	223.616		
A	0.000		
B	0.000		
C	0.000		
MGZN	952.500		
PREVIOUS PAGE	: I/O DSP (DEVIATION)		
NEXT PAGE	: I/O DSP (MAIN 1)		
LIST			
DISP.			
F0	F1	F2	F3
			F4

11.2.3 <I/O Display> screen

The I/O status of the machine can be referred to for each alarm on this screen. This screen includes displays for Main 1, Main 2, Slave, Local, and Deviation. Press the previous and next page keys on the <Detailed Display> screen to alter the display.

MAIN1

I/O DSP (MAIN 1)										ALARM LOG									
IN					OUT														
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0			
1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0			
2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
3	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0			
4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0			
5	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
6	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0			
7	0	0	0	0	0	0	1	1	1	1	1	0	1	0	1	0			
8	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0			
9	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0			
10	1	0	1	1	1	1	1	0	0	0	0	1	1	0	0				
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0			
PREVIOUS PAGE : DETAILED DISPLAY																			
NEXT PAGE : I/O DSP (MAIN 2)																			
LIST DISP.																			
F0					F1					F2					F3				

MAIN2

I/O DSP (MAIN 2)																ALARM LOG																	
IN																OUT																	
	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0	0	0	1	0	1	
2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1
3	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0																	
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																	
	F	E	D	C	B	A <td>9</td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td> <td></td> <td>F</td> <td>E</td> <td>D</td> <td>C</td> <td>B</td> <td>A</td> <td>9</td> <td>8</td> <td>7</td> <td>6</td> <td>5</td> <td>4</td> <td>3</td> <td>2</td> <td>1</td> <td>0</td>	9	8	7	6	5	4	3	2	1	0		F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
PREVIOUS PAGE : I/O DSP (MAIN 1)																NEXT PAGE : I/O DSP (SLAVE)																	
LIST DISP.																																	
F0																F1																	
																F2																	
																F3																	
																F4																	

SLAVE

I/O DSP (SLAVE)														ALARM LOG													
IN							OUT																				
	F	E	D	C	B	A		F	E	D	C	B	A														
1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	0	0	0
4	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	F	E	D	C	B	A		F	E	D	C	B	A														
PREVIOUS PAGE : I/O DSP (MAIN 2)														NEXT PAGE : I/O DSP (LOCAL)													
LIST DISP.																											
F0														F1													
														F2													
														F3													
														F4													

LOCAL

I/O DSP (LOCAL)

IN

FEDCBA9876543210

1000000001110000

2001000000000000

FEDCBA9876543210

OUT

FEDCBA9876543210

10000101110000101

FEDCBA9876543210

ALARM LOG

PREVIOUS PAGE : I/O DSP (SLAVE)

NEXT PAGE : I/O DSP (DEVIATION)

LIST DISP.

F0F1F2F3F4

DEVIATION

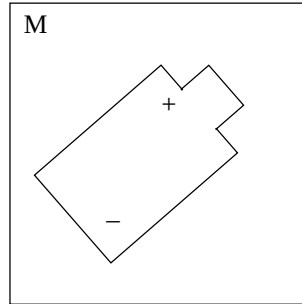
I/O DSP (DEVIATION)		ALARM LOG
DEVIATION		
SPINDLE	-1	
X AXIS	0	
Y AXIS	25	
Z AXIS	3010	
A AXIS	-210	
B AXIS	0	
C AXIS	0	
MAGAZINE	42	
PREVIOUS PAGE : I/O DSP (LOCAL)		
NEXT PAGE : DETAILED DISPLAY		
LIST DISP.		
F0	F1	F2
F3	F4	

11.3 Battery Fault alarm

In tapping center, the data in the memory is retained by batteries.

If the batteries are dead, the battery alarm mark as shown below appears on the right bottom of the screen. If this mark appears, replace the batteries.

Fig.11-1 Battery alarm



M: Battery shutoff the NC board.

A: Battery shutoff the amplifier.

S: Battery shutoff the sequence controller.

11.4 Display of alarm messages

Each message is displayed with * mark at the beginning according to the reset level.

(Ex.)

Reset level 3 = **

1000 **TURN OFF POWER

Reset level 2 = *

1040 *EMMERGENCY SW ON

Reset level 1 = No * mark

1280 MEMORY RUNNING

11.5 Alarm stop level and reset level

11.5.1 Alarm stop level

According to the stop level, the NC functions to stop as shown below.

(1) Stop level 5

The servo system stops.

(2) Stop level 4

The motion currently in execution stop instantaneously and no more motions are available afterwards.

(3) Stop level 3 (block stop)

The operation continues until the currently executed block is completed.

The blocks afterwards are not available. The START switch becomes ineffective and the NC program cannot be executed any longer.

(4) Stop level 2 (stop by M02 or M30)

The operation continues until the currently executed program is completed.

The START switch becomes ineffective and the NC program cannot be executed any longer.

When single block is ON, the stop level 3 and 2 become the same.

(5) Stop level 1

Only a warning is given but machine motions are not affected.

11.5.2 Alarm reset level

According to the reset level, reset each alarm as shown below:

(1) Reset level 3 (**)

Turn OFF the power. (An alarm cannot be reset otherwise.)

(2) Reset level 2 (*)

Press the **[RST]** key.

(3) Reset level 1 (No * mark)

Press any key.

The stop level and the reset level are independent from each other.
Therefore, they can be combined in different ways as shown below.

(Ex.) Stop level 5 and Reset level 2

Stop level 1 and Reset level 2

11.6 *Axis display

All about “ * axis “ description will be fixed, according to the machine parameter (system 2) setting in the manual , shown as below:

5-axis installation position (0: independent 1: table 1 2: table 2)

6-axis installation position (0: independent 1: table 1 2: table 2)

4-axis address (0: A 1: B 2: C)

5-axis address (0: A 1: B 2: C)

6-axis address (0: A 1: B 2: C)

		Installation position		
		0: independent	1: table 1	2: table 2
Address	0: A	A	A 1	A 2
	1: B	B	B 1	B 2
	2: C	C	C 1	C 2

11.7 Alarm message

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0000(conv) 5000(NC)	5	3	WATCH DOG (MAIN)	An error has occurred in main CPU.	Inform of circumstances when the trouble occurred.
0001(conv) 5001(NC)	5	3	WATCH DOG (SLAVE)	An error has occurred in slave CPU.	Inform of circumstances when the trouble occurred.
0002(conv) 5002(NC)	5	3	WATCH DOG (LOCAL)	An error has occurred in local CPU.	Inform of circumstances when the trouble occurred.
0003(conv) 5003(NC)	5	3	RAM ERROR (MAIN)	Reading and writing using main RAM is not possible.	Inform of circumstances when the trouble occurred.
0004(conv) 5004(NC)	5	3	ROM ERROR (MAIN)	The check sum of main ROM does not match.	Inform of circumstances when the trouble occurred.
0005(conv) 5005(NC)	5	3	RAM ERROR (SLAVE)	Reading and writing using slave RAM is not possible.	Inform of circumstances when the trouble occurred.
0006(conv) 5006(NC)	5	3	ROM ERROR (SLAVE)	The check sum of slave ROM does not match.	Inform of circumstances when the trouble occurred.
0007(conv)5 007(NC)	5	3	RAM ERROR (LOCAL)	Reading and writing using local RAM is not possible.	Inform of circumstances when the trouble occurred.
0008(conv) 5008(NC)	5	3	ROM ERROR (LOCAL)	The check sum of local ROM does not match.	Inform of circumstances when the trouble occurred.
0009(conv) 5009(NC)	5	3	RAM ERROR (MAIN- LOC1)	Reading and writing using RAM common for main-loc1 is not possible.	Inform of circumstances when the trouble occurred.
0010(conv) 5010(NC)	5	3	RAM ERROR (MAIN- LOC2)	Reading and writing using RAM common for main-loc2 is not possible.	Inform of circumstances when the trouble occurred.
0011(conv) 5011(NC)	5	3	RAM ERROR (MAIN-SLV)	Reading and writing using RAM common for main-slv is not possible.	Inform of circumstances when the trouble occurred.
0012(conv) 5012(NC)	5	3	TIMER ERROR (SLAVE)	An error has occurred in slave CPU.	Inform of circumstances when the trouble occurred.
0014(conv) 5014(NC)	5	3	CALC ERROR (MAIN)	Improper calculation is executed.	Inform of circumstances when the trouble occurred.
0015(conv) 5015(NC)	5	3	CALC ERROR (SLAVE)	Improper calculation is executed.	Inform of circumstances when the trouble occurred.
0016(conv) 5016(NC)	5	3	CALC ERROR (LOCAL)	Improper calculation is executed.	Inform of circumstances when the trouble occurred.
0017(conv)5 017(NC)	5	3	MAIN INITIAL IMPSBLE	Main CPU has not started.	Inform of circumstances when the trouble occurred.
0018(conv) 5018(NC)	5	3	SLV INITIAL IMPSBLE	Slave CPU has not started.	Inform of circumstances when the trouble occurred.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0019(conv) 5019(NC)	5	3	AC POWER SUPPLY DROP	1) AC power supply voltage dropped by more than 30%. 2) Circuit protector Q3 is moved.	1) Check the power supply voltage, change the tap of the transformer or check power supply capacity. 2) Eliminate the cause of the problem, turn ON Q3.
0020(conv) 5020(NC)	5	3	DC POWER ERROR(24V)	24 vdc supply for control has dropped.	Check if a short circuit has occurred or the power supply is overload.
0021(conv)5 021(NC)	5	3	SPECIAL INTIAL(*)	Power is turned on by special operations.	Perform required operations and turn power off and then on again.
0022(conv) 5022(NC)	5	3	THERMAL (TRANS)	The thermal relay of transformer 1 has tripped. 1) Transformer is over loaded. 2) Machining condition has exceeded capacity.	1) Check if a load more than acceptable is connected. 2) Check machining conditions and operation patterns. Eliminate the causes and turn off power for at least 30 minutes before turning it on again.
0023(conv) 5023(NC)	5	3	THERMAL (CNTL BX)	The thermal relay at the center of the control panel has tripped. 1) Temperature is too high. 2) Machining condition has exceeded capacity.	1) Check that temperature is 40 degrees or more. 2) Review the machining conditions and operation patterns.
0024(conv) 5024(NC)	5	3	AIR PRESSURE LOW	Air pressure has dropped.	1) Check air piping and pressure. 2) Check that the pressure switch is set correctly.
0025(conv) 5025(NC)	5	3	DATA ERR (M/C PARAM)	Data structure of machine parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory display in edit mode and create new data again.
0026(conv) 5026(NC)	5	3	NO M/C PARAM DATA	There is no machine parameter data.	Create the machine parameter and turn power off and then on again.
0027(conv) 5027(NC)	5	3	100V POWER SUPPLY ER	The circuit protector of the 100v power supply circuit has tripped. 1) overloaded 2) short-circuited.	Eliminate the cause and turn on the circuit protector of transformer 2.
0028(conv) 5028(NC)	5	3	POWER TURNED OFF	Power OFF activated or external power OFF signal activated.	The message, through displayed on turning off the power, is not an error. If this error occurs in a case other than the above, inform of circumstances when the trouble occurred. Refer to 9.1.7 .
0029(conv) 5029(NC)	5	3	POS DETECT ERR	The difference between the absolute position data inside the magazine amplifier and relative position data inside the NC unit has exceeded the allowable range.	Refer to 9.1.8 .

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0030(conv) 5030(NC)	5	3	I/O CRC ERROR 1	CRC error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Turn power off and then on again. If the error still occurs. 1) Eliminate the cause of external noise caused by the likes of welders. 2) The faulty keyboard or cable needs replacement. Refer to 9.1.9.
0031(conv) 5031(NC)	5	3	I/O TIMEOVER 1	Framing error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Refer to 1.5.1 and 9.1.10 .
0032(conv) 5032(NC)	5	3	I/O CRC ERROR 2	CRC error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Refer to 1.5.1 and 9.1.10 .
0033(conv)5 033(NC)	5	3	I/O TIMEOVER 2	Framing error has occurred during communication between the keyboard and NC unit. 1) External noise. 2) The faulty keyboard or cable connection.	Refer to 1.5.1 and 9.1.10 .
0034(conv) 5034 (NC)	5	3	I/O CRC ERROR 3	A CRC error has occurred during communication between I/O board and NC unit. 1) External noise 2) Faulty I/O board or cable.	Refer to 9.1.10 .
0035(conv) 5035(NC)	5	3	I/O TIMEOVER 3	Framing error has occurred during communication between the I/O board and NC unit. 1) External noise. 2) The faulty I/O board or cable connection.	Refer to 1.5.1 and 9.1.10 .
0036(conv) 5036(NC)	5	3	I/O CRC ERROR 4	A CRC error has occurred during communication between I/O board and NC unit. 1) External noise 2) Faulty I/O board or cable connection.	Refer to 9.1.10 .

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0037(conv) 5037(NC)	5	3	I/O TIMEOVER 4	A CRC error has occurred during communication between I/O board and NC unit. 1) External noise 2) Faulty I/O board or cable.	Refer to 1.5.1 and 9.1.10 .
0038(conv) 5038(NC)	5	3	I/O CRC ERROR 5	A CRC error has occurred during communication between EXIO board and NC unit. 1) External noise. 2) Faulty EXIO board or cable.	Refer to 9.1.10 .
0039(conv) 5039(NC)	5	3	I/O TIMEOVER 5	A CRC error has occurred during communication between the EXIO board and NC unit. 1) External noise. 2) The faulty EXIO board or cable connection.	Refer to 1.5.1 and 9.1.10 .
0046(conv) 5046(NC)	5	3	THERMAL (CHIP SHOWER)	The thermal relay for the chip shower protection circuit has tripped. Motor is overloaded. Motor capacity is exceeded Thermal relay setting value is incorrect. There is an open motor phase	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again Refer to 1.7.2 .
0047(conv) 5047(NC)	5	3	THERMAL (CHIP SHOWER)	The thermal relay for the chip shower protection circuit has tripped. 1) Motor is overloaded. 2) Motor capacity is exceeded 3) Thermal relay setting value is incorrect. 4) There is an open motor phase	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again. Refer to 1.7.3 .
0048(conv) 5048(NC)	5	3	THERMAL (SP MOTOR)	1) The thermal relay inside the spindle motor has tripped. 2) Motor is overloaded or locked. Machining condition has exceeded motor's capacity.	1) Manually turn the spindle to check if the spindle load is great. 2) Review the machining conditions and operation patterns. Eliminate the causes and leave the motor with power on for 30 minutes before resuming operation Refer to 1.3.3 .

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0049(conv)5 049(NC)	5	3	THERMAL (COOLANT)	The thermal relay for coolant protection circuit has tripped. 1) Motor is overloaded. 2) Motor capacity is exceeded. 3) Thermal relay setting value is incorrect. 4) There is an open motor phase.	For 1), turn off power for 15 to 20 minutes and eliminate the cause. For causes other than simply eliminate the cause and turn power off and then on again. Refer to 1.7.1 .
0050(conv) 5050(NC)	5	3	THERMAL (SP THROUGH)	An alarm has occurred in the high pressure pump. 1) Pump is overloaded. 2) Filter is clogged.	1) Eliminate the cause and turn on power again. 2) Replace the filter. Refer to 1.7.3 .
0051(conv) 5051(NC)	5	3	ABSOLUTE CLEAR ERR	Clearing start point data was attempted but the data was not cleared within the specified time.	Refer to 9.1.11.
0052(conv) 5052(NC)	5	3	COMMAND ERROR	Main CPU is not synchronized with slave CPU.	Refer to 9.1.12.
0053(conv) 5053(NC)	5	3	THERMAL (ATC MOTOR)	The thermal switch inside the ATC motor has tripped 1) Motor is overloaded and locked. 2) ATC operation condition has exceeded motor's capacity.	Refer to 1.4.1.
0054(conv) 5054(NC)	5	3	TOOL CLAMP ERROR	Tool clamp sensor turned on.	See Resetting procedure for tool clamp error.
0055(conv) 5055(NC)	5	3	RAM ERROR (MAIN-LOC3)	Reading and writing using RAM common for main-loc3 is not possible.	Refer to 1.5.1. and 9.1.2.
0056(conv) 5056(NC)	5	3	SERVO RELAY1 ERROR	The state of servo power supply relay 1 is as below. 1)The relay is already on. 2)The relay turned off midway.	Turn power off and then on again. if the error still occurs, please refer to 1.5.1.
0057(conv) 5057(NC)	5	3	SERVO RELAY2 ERROR	The state of servo power supply relay2 is as below. 1)The relay is already on. 2)The relay turned off midway.	Turn power off and then on again. if the error still occurs, please refer to 1.5.1.
0058(conv) 5058(NC)	5	3	SP SERVO (***)	A servo error has occurred for the spindle the cause differs depending on (***) Refer to the servo error list.	Refer to 1.3.1.
0059(conv) 5059(NC)	5	3	X SERVO (***)	A servo error has occurred for the X-axis. the cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0060(conv) 5060(NC)	5	3	Y SERVO (***)	A servo error has occurred for the Y-axis. the cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.
0061(conv) 5061(NC)	5	3	Z SERVO (***)	A servo error has occurred for the Z-axis. the cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.
0062(conv) 5062(NC)	5	3	* SERVO (***)	A servo error has occurred for the 4 axis. the cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.
0063(conv) 5063(NC)	5	3	* SERVO (***)	A servo error has occurred for the 5 axis. the cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.
0064(conv) 5064(NC)	5	3	* SERVO (***)	A servo error has occurred for the 6 axis. The cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.
0066(conv) 5066(NC)	5	3	M SERVO (***)	A servo error has occurred for the M axis. The cause differs depending on (***) Refer to the servo error list.	Refer to 1.2.1.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0068(conv) 5068(NC)	5	3	ROM ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0069(conv) 5069(NC)	5	3	RAM ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0070(conv) 5070(NC)	5	3	SOFT TRAP(SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0071(conv) 5071(NC)	5	3	WATCH DOG (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0072(conv) 5072(NC)	5	3	ADRS ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0073(conv) 5073(NC)	5	3	CALC ERROR (SEQ)	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0074(conv) 5074(NC)	5	3	SEQ INTIAL IMPSBLE	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0075(conv) 5075(NC)	5	3	SEQ RAM OPE ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0076(conv) 5076(NC)	5	3	COMPILE ERROR 1	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0077(conv) 5077(NC)	5	3	COMPILE ERROR 2	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0078(conv) 5078(NC)	5	3	CONVERT ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0079(conv) 5079(NC)	5	3	VERIFY ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0080(conv) 5080(NC)	5	3	STEP OVER ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0081(conv) 5081(NC)	5	3	MEMORY PROTECT ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0082(conv) 5082(NC)	5	3	DOUBLE COIL ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0083(conv) 5083(NC)	5	3	USER WDT-UP	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0084(conv) 5084(NC)	5	3	USERRAM ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0085(conv) 5085(NC)	5	3	USER PROGRAM ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0086(conv) 5086(NC)	5	3	MEMORY CASSETTE ERR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0087(conv) 5087(NC)	5	3	CALCULATION EXE ERR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0088(conv) 5088(NC)	5	3	NO EXTENSION UNIT	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0089(conv) 5089(NC)	5	3	STATION NO.SET ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0090(conv) 5090(NC)	5	3	RETAINING DATA ERROR	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0091(conv) 5091(NC)	5	3	M EXCPT INTRPT(*) L EXCPT INTRPT(*)	Main CPU has detected incorrect interruption. The figure in brackets () indicates interruption no.	Refer to 1.5.1 and 9.1.13 .
0093(conv) 5093(NC)	5	3	INTRPT(*) L EXCPT INTRPT(*)	Local CPU has detected incorrect interruption. The figure in brackets () indicates interruption no.	Refer to 1.5.1 and 9.1.13 .
0094(conv) 5094(NC)	5	3	PULSE ERROR (SPINDLE)	Pulse signal sent from the spindle motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0095(conv) 5095(NC)	5	3	PULSE ERROR (X-AXIS)	Pulse signal sent from the X-axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0096(conv) 5096 (NC)	5	3	PULSE ERROR (Y-AXIS)	Pulse signal sent from the Y-axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0097(conv) 5097(NC)	5	3	PULSE ERROR (Z-AXIS)	Pulse signal sent from the Z-axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0098(conv) 5098(NC)	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 4 axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0099(conv) 5099(NC)	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 5 axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0100(conv) 5100(NC)	5	3	PULSE ERROR (* AXIS)	Pulse signal sent from the 6 axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0102(conv) 5102(NC)	5	3	PULSE ERROR (M AXIS)	Pulse signal sent from the M axis motor could not be read correctly.	Refer to 1.2.3 and 9.2.1 .
0103(conv) 5103(NC)	5	3	ATC BOAD ERR (power)	AC power voltage increased more than 15%.	Check the power supply voltage and change the tap of the transformer. Refer to 9.4.1.
0104(conv) 5104(NC)	5	3	FORMAT TYPE IS WRONG	Memory has been formatted incorrectly for the conversation language.	Retry the formatting the memory correctly. Refer to 9.3.10.
0105(conv) 5105(NC)	5	3	FORMAT CAPA IS WRONG	The capacity of the formatted memory does not match the current machine state.	Retry the formatting the memory correctly. Refer to 9.3.11.
0106(conv) 5106(NC)	5	3	RAM ERROR (MAIN-LOC4)	Reading and writing of the RAM commonly used for main/local 4 was not possible.	Refer to 9.1.2.
0107(conv) 5107(NC)	5	3	RAM ERROR (MAIN-LOC5)	Reading and writing of the RAM commonly used for main/local 5 was not possible.	Refer to 9.1.2.
0108(conv) 5108(NC)	5	3	NO MEMORY FORMAT	The memory was not cleared at all, the data is damaged, or the memory has exceeded its capacity.	Output all data to the external device and format the memory. Refer to 9.3.12.
0109(conv) 5109(NC)	5	3	3-PHASE POWER ERROR	The three-phase power supply's phases are reversed.	Turn the primary power supply off, and then reverse the positions of the U-phase cord and the V-phase cord.
0110(conv) 5110(NC)	5	3	MACHINE SETTING ERR	The model identification signal could not be read correctly.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer. Refer to 9.3.15.
0500(conv) 5500(NC)	5	2	EMERGENCY 3 SW ON	EMERGENCY switch on signal was sent by the communication command. 1)Emergency switch is pushed. 2)External emergency stop contact is open.	Send emergency switch off signal by the communication command. 1)Remove the cause of trouble and press [RST] key. 2)Contact point of EXIO board terminal is to be closed again. Refer to 1.5.1.
0501(conv) 5501(NC)	5	2	SYSTEM ERROR (MAIN)	Error signal is detected but no relative error is found.	Press [RST] key and clear the alarm. Consult the Maker if the same trouble occurs repeatedly, refer to 1.5.1 and 9.1.14 .
0502(conv) 5502(NC)	5	2	NOT CLOSING DOOR	The door was opened while door interlock was valid.	Invalidate door interlock or close the door.
0503(conv) 5503(NC)	5	2	SERVO MOTOR STOPPED	The door was opened during operation while door interlock was valid.	Invalidate door interlock or close the door and press the [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0504(conv) 5504(NC)	5	2	POSITION ERROR SP	(For model with a double-arm ATC) The ATC arm was not at zero point during spindle rotation. (For model with an armless ATC) Z axis was attempted to be lift above the Z axis zero point, while main axis servo had been turned on. (Except the main axis orient 0 degree.)	(For model with a double-arm ATC) Press the [RST] key . Press the [ATC] key with the [RELSE] key held down in manual mode to move the ATC arm to zero position. Refer to 1.4.1. (For model with an armless ATC) Press the [RST] key to reset the error. Refer to 9.4.2.
0505(conv) 5505(NC)	5	2	OVERRUN (+X)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0506(conv) 5506(NC)	5	2	OVERRUN (-X)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0507(conv) 5507(NC)	5	2	OVERRUN (+Y)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0508(conv) 5508(NC)	5	2	OVERRUN (-Y)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0509(conv) 5509(NC)	5	2	OVERRUN (+Z)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0510(conv) 5510(NC)	5	2	OVERRUN (-Z)	The axis has overrun in the direction indicated by the alarm.	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.2.4 .
0511(conv) 5511(NC)	5	2	DEVIATION ERROR1 SP	The amount of spindle motor deviation has exceeded the value set to [maximum deviation spindle].	1)Check the value set to [maximum deviation spindle] of machine parameters system. 2)Check that machining condition is within motor's capacity press the [RST] key to reset the error. Refer to 1.3.2.
0512(conv) 5512(NC)	5	2	DEVIATION ERROR1 X	The amount of the X-axis motor deviation has exceeded the value set to [maximum deviation x].	1)Check the value set to [maximum deviation x] of machine parameters system. 2)Check that machining condition is within motor's capacity Press the [RST] key to reset the error. Refer to 1.2.2 .

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0513(conv) 5513(NC)	5	2	DEVIATION ERROR1 Y	The amount of the Y-axis motor deviation has exceeded the value set to [maximum deviation y].	Check the value set to [maximum deviation y] of machine parameters system. 1)Check that machining condition is within motor's capacity . 2)Press the [RST] key to reset the error. Refer to 1.2.2 .
0514(conv) 5514(NC)	5	2	DEVIATION ERROR1 Z	The amount of the Z-axis motor deviation has exceeded the value set to [maximum deviation z].	1)Check the value set to [maximum deviation z] of machine parameters system. 2)Check that machining condition is within motor's capacity Press the [RST] key to reset the error. Refer to 1.2.2 .
0515(conv) 5515(NC)	5	2	DEVIATION ERROR1 *	The amount of the 4 axis motor deviation has exceeded the value set to [maximum deviation 4].	1)Check the value set to [maximum deviation 4] of machine parameters system. 2)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2 .
0516(conv) 5516(NC)	5	2	DEVIATION ERROR1 *	The amount of the 5 axis motor deviation has exceeded the value set to [maximum deviation 5].	1)Check the value set to [maximum deviation 5] of machine parameters system. 2)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2 .
0517(conv) 5517(NC)	5	2	DEVIATION ERROR1 *	The amount of the 6 axis motor deviation has exceeded the value set to [maximum deviation 6].	1)Check the value set to [maximum deviation 6] of machine parameters system. 2)Check that machining condition is within motor's capacity press the [RST] key to reset the error. Refer to 1.2.2 .
0519(conv) 5519(NC)	5	2	DEVIATION ERROR1 M	The amount of the M axis motor deviation has exceeded the value set to [maximum deviation magazine].	1)Check the value set to [maximum deviation m] of machine parameters system. 2)Check that machining condition is within motor's capacity press the [RST] key to reset the error. Refer to 1.2.2 and 1.4.1 .
0520(conv) 5520(NC)	5	2	INVERTER ERR(ATC)	1) Overloaded ATC motor. 2) Voltage error.	1)Check if tool weight is within the specified range. 2)Check if the power supply voltage is within the specified range. Refer to 1.4.1 .
0521(conv) 5521(NC)	5	2	DEVIATION ERROR2 SP	The amount of spindle motor deviation has exceeded the value set to [spindle posi deviation magnif] or the on set to [minimum sp position deviation] (motor is overloaded.)	1)Check the value set to [spindle posi deviation magnif] of machine parameters(system 1). 2)Check the value set to minimum sp position deviation of machine parameters system. 3)Check that machining ondition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.3.2.
0522(conv) 5522(NC)	5	2	DEVIATION ERROR2 X	The amount of the X motor deviation has exceeded the value set to [X posi deviation magnif] or the on set to [minimum X position deviation] (motor is overloaded.)	1)Check the value set to [X posi deviationmagnif] of machine parameters(system 1). 2)Check the value set to minimum X position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0523(conv) 5523(NC)	5	2	DEVIATION ERROR2 Y	The amount of the Y motor deviation has exceeded the value set to [Y posi deviation magnif] or the on set to [minimum Y position deviation] (motor is overloaded.)	1)Check the value set to [Y posi deviation magnif] of machine parameters(system 1). 2)Check the value set to minimum Y position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0524(conv) 5524(NC)	5	2	DEVIATION ERROR2 Z	The amount of the Z motor deviation has exceeded the value set to [Z posi deviation magnif] or the on set to [minimum Z position deviation] (motor is overloaded.)	1)Check the value set to [Z posi deviation magnif] of machine parameters (system 1). 2)Check the value set to minimum Z position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0525(conv) 5525(NC)	5	2	DEVIATION ERROR2 *	The amount of the 4 motor deviation has exceeded the value set to [4 posi deviation magnif] or the on set to [minimum 4 position deviation] (motor is overloaded.)	1)Check the value set to [4 posi deviation magnif] of machine parameters (system 2). 2)Check the value set to minimum 4 position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0526(conv) 5526(NC)	5	2	DEVIATION ERROR2 *	The amount of the 5 motor deviation has exceeded the value set to [5 posi deviation magnif] or the on set to [minimum 5 position deviation] (motor is overloaded.)	1)Check the value set to [5 posi deviation magnif] of machine parameters(system 2). 2)Check the value set to minimum 5 position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0527(conv) 5527(NC)	5	2	DEVIATION ERROR2 *	The amount of the 6 motor deviation has exceeded the value set to [6 posi deviation magnif] or the on set to [minimum 6 position deviation] (motor is overloaded.)	1)Check the value set to [6 posi deviation magnif] of machine parameters(system 2). 2)Check the value set to minimum 6 position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0529(conv) 5529(NC)	5	2	DEVIATION ERROR2 M	The amount of the M motor deviation has exceeded the value set to [magazine posi deviation magnif] or the on set to [min magazine position deviation] (motor is overloaded.)	1)Check the value set to [magazine posi deviation magnif] of machine parameters(system 3). 2)Check the value set to minimum magazine position deviation of machine parameters system. 3)Check that machining condition is within motor's capacity. Press the [RST] key to reset the error. Refer to 1.2.2.
0530(conv) 5530(NC)	5	2	MASTER OFF	Emergency switch is pushed. External emergency stop contact is open. EMERGENCY switch on signal was sent by the communication command.	Remove the cause of trouble and press [RST] key. Contact point of EXIO board terminal is to be closed again. Send emergency switch off signal by the communication command.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
0531(conv) 5531(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alarm]. If the value set to [in-position width 4] is larger than the value set to [LMT pulse for position alarm], however this error occurs when the axis has shifted more than the value set to [in-position width 4]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT pulse for 4 position alarm] is not too small. When this error occurs during memory operation reduce the cutting depth.
0532(conv) 5532(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alarm]. If the value set to [in-position width 5] is larger than the value set to [LMT pulse for position alarm], however this error occurs when the axis has shifted more than the value set to [in-position width 5]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT pulse for 5 position alarm] is not too small. When this error occurs during memory operation reduce the cutting depth.
0533(conv) 5533(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT pulse for position alarm]. If the value set to [in-position width 6] is larger than the value set to [LMT pulse for position alarm], however this error occurs when the axis has shifted more than the value set to [in-position width 6]. (these parameters are set on the <machine parameter (system 2) >screen.)	1) Press the [RST] key. 2) Check the axis position on the current position screen and move the axis to the correct position. 3) Check that the value set to [LMT pulse for 6 position alarm] is not too small. When this error occurs during memory operation reduce the cutting depth.
0534(conv) 5534(NC)	5	2	SP IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width spindle even after the time set to [spindle inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width spindle] and [spindle inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
0535(conv) 5535(NC)	5	2	X IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width x even after the time set to [X inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width x] and [X inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
0536(conv) 5536(NC)	5	2	Y IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width y even after the time set to [Y inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width y] and [Y inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
0537(conv) 5537(NC)	5	2	Z IN-POS CHECK TMOUT	The amount of deviation did not become smaller than the value set to in-position width z even after the time set to [Z inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width z] and [Z inposi check timeout] of machine parameters (system 1). Press the [RST] key to reset the error.
0538(conv) 5538(NC)	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 4 even after the time set to [4 inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 4] and [4 inposi check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.
0539(conv) 5539(NC)	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 5 even after the time set to [5 inposi check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 5] and [5 inposi check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
0540(conv) 5540(NC)	5	2	* IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width 6 even after the time set to [6 inposition check timeout] had elapsed after completion of operation.	Check the values set to [in-position width 6] and [6 inposition check timeout] of machine parameters (system 2). Press the [RST] key to reset the error.
0542(conv) 5542(NC)	5	2	M IN-POS CHCK TMOUT	The amount of deviation did not become smaller than the value set to in-position width magazine even after the time set to [magazine inposition check timeout] had elapsed after completion of operation.	Check the values set to [in-position width magazine] and [magazine imposition check timeout] of machine parameters (system 3). Press the [RST] key to reset the error. Refer to 1.42.
0543(conv) 5543(NC)	5	2	MAGAZINE SERVO OFF	The servo was turned off while the magazine was swiveling or swiveling of the magazine was attempted while the servo was off.	Press the [RST] key and clear the alarm. Refer to 9.4.11.
0544(conv) 5544(NC)	5	2	EXTERNAL ERROR 1	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0545(conv) 5545(NC)	5	2	EXTERNAL ERROR 2	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
0546(conv) 5546(NC)	5	2	EXTERNAL ERROR 3	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0547(conv) 5547(NC)	5	2	EXTERNAL ERROR 4	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0548(conv) 5548(NC)	5	2	EXTERNAL ERROR 5	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0549(conv) 5549(NC)	5	2	EXTERNAL ERROR 6	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0550(conv) 5550(NC)	5	2	EXTERNAL ERROR 7	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.
0551(conv) 5551(NC)	5	2	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the EXER10 and push [RST] key.
0552(conv) 5552(NC)	5	2	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
0553(conv) 5553(NC)	5	2	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
0554(conv) 5554(NC)	5	2	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
0555(conv) 5555(NC)	5	2	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
0556(conv) 5556(NC)	5	2	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER15 and push [RST] key.
0557(conv) 5557(NC)	5	2	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.
0558(conv) 5558(NC)	5	2	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.
0559(conv) 5559(NC)	5	2	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
0560(conv) 5560(NC)	5	2	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
0561(conv) 5561(NC)	5	2	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.
0562(conv) 5562(NC)	5	2	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
0563(conv) 5563(NC)	5	2	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
0564(conv) 5564(NC)	5	2	EXTERNAL ERROR 23	EXER23 signal comes on.	Turn off the EXER23 and push [RST] key.
0565(conv) 5565(NC)	5	2	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
0566(conv) 5566(NC)	5	2	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
0567(conv) 5567(NC)	5	2	DOOR ERROR	The automatic door limit switch has turned on both at door closing and opening ends. It took x seconds (parameter value) for automatic door closing. It took x seconds (parameter value) for automatic door opening.	Eliminate the error cause and press the [RST] key to reset the error.
0577(conv) 5577(NC)	5	2	MJR FAILURE RLY ON	An error has occurred in the SEQ unit connected to NC board connector SEQ.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
0578(conv) 5578(NC)	5	2	OVERRUN	Overrun error signal was received, but the error of the corresponding axis cannot be identified.	Eliminate the error cause and press the [RST] key to reset the error.
0579(conv) 5579(NC)	5	2	OVERRUN (+*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 5)	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.24 .
0580(conv) 5580(NC)	5	2	OVERRUN (-*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 5)	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.24 .
0581(conv) 5581(NC)	5	2	OVERRUN (+*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 6)	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.24 .
0582(conv) 5582(NC)	5	2	OVERRUN (-*)	The axis has overrun in the direction indicated by the alarm. (An asterisk (*) indicates axis 6)	Switch to manual operation mode and press the [RST] key while holding down the [RELSE] key. Then move the axis in the opposite direction while holding down the [RELSE] key until the axis moves out of the overrun area. Refer to 1.24 .
0586 conv) 5586(NC)	5	2	*SERVO MOTOR OFF	When door interlock is valid , the door was opened while the axis “*” (axis 4) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.
0587 conv) 5587(NC)	5	2	*SERVO MOTOR OFF	When door interlock is valid , the door was opened while the axis “*” (axis 5) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.
0588 conv) 5588(NC)	5	2	*SERVO MOTOR OFF	When door interlock is valid, the door was opened while the axis “*” (axis 6) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.
0589 conv) 5589(NC)	5	2	C INDEX TIMEOVER	The C-axis did not contact the stopper when traveling toward the stopper at low speed, although the time set for the parameter has elapsed.	Check the setting for MACHINE PARAMETER (SYSTEM 2).
0590 conv) 5590 (NC)	5	2	C-AXIS CURRENT ERROR	The current command value when the C-axis contacts the stopper is not within the range set for the parameter.	Check the setting for MACHINE PARAMETER (SYSTEM 2).

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
0591 conv) 5591(NC)	5	2	IN-POS CHCK TMOUT	In-position check time has exceeded five seconds.	Press the [RST]key and clear the alarm.
0592 conv) 5592(NC)	5	2	MAGAZINE POS SHIFTED	The magazine position was shifted more than the value set for [LMT PULSE FOR MZ POSITION ALRM] in machine parameter3 while the magazine was stopped (when the pot was fully lowered.)	Check the machine parameter. When the error occurs repeatedly, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer. Refer to 9.4.12.
0593 conv) 5593(NC)	5	2	ORG POS ERROR SP	When the first orientation is performed after power is turned on, PHASE C signal cannot be received even after spindle motor has rotated one turn.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer. Refer to 1.2.4, 9.2.3.
0594 conv) 5594(NC)	5	2	COMMAND ERROR(SP)	Main CPU is not synchronized with slave CPU.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer. Refer to 9.1.17.
0595 conv) 5595(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 4 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 4] is larger than the value set to [LMT PULSE FOR POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 4]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 4 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth. Refer to 1.2.7.
0596 conv) 5596(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 5 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 5] is larger than the value set to [LMT PULSE FOR 5 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 5]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 5 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth. Refer to 1.2.7.
0597 conv) 5597(NC)	5	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 6 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 6] is larger than the value set to [LMT PULSE FOR 6 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 6]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 6 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth. Refer to 1.2.7.
0598 conv) 5598(NC)	4	2	END MILL TAPPING	The spindle command was ordered by intervention operate during the spindle rotation of the end mill tap is command.	Reset the alarm to press [RST] key.
0600 conv) 5600(NC)	5	2	DR OPEN MACHINE STOP	The door was opened during operation while door interlock was valid.	Invalidate door interlock or close the door and press the [RST] key.
0601 conv) 5601(NC)	5	2	SYSTEM ERROR(SLV)	Slave CPU error signal was received, but the corresponding error cannot be identified.	Press the [RST] key to reset the error. If the error still occurs, this error may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer. Refer to 1.5.3, 9.1.4.
1050(conv) 6050(NC)	4	3	TURN OFF POWER	Important parameter is modified.	Turn power OFF once and ON again.
1051(conv) 6051(NC)	4	3	START POINT DATA1 ER	When power was turned on, start point data 1 was smaller than zero or larger than machine coordinate value for one round of magazine.	Inform of circumstances when the trouble occurred. Refer to 9.1.6 and 4.21.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1053(conv) 6053(NC)	4	3	M/C PAR.AM ERR (SYS2)	Setting of machine parameters 2 (system 2) is faulty.	Check the setting of machine parameters 2 (system 2). Refer to 9.3.3.
1055(conv) 6055(NC)	4	3	ATC ARM POS ERR 2	ATC arm is not at home.	Turn off power and refer to 13.6. Resetting ATC. Refer to 1.4.1 and 1.4.3.
1056(conv) 6056(NC)	4	3	ATC OFF POSITION ERR	The ATC arm is stopped midway, and cannot be reset by key operation.	Refer to 1.4.3.
1057(conv) 6057(NC)	4	3	DATA ERR (USER PARAM)	Data structure of user parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again. Refer to 9.3.1.
1058(conv) 6058(NC)	4	3	USER PARAM ERR (SW2)	Setting of user parameters 2 (switch 2) is faulty.	Check the setting of user parameters 2 (switch 2).
1059(conv) 6059(NC)	4	3	USER PARAM ERR (SW1)	Setting of user parameters 1 (switch 1) is faulty.	Check the setting of user parameters 1 (switch 1).
1150(conv) 6150(NC)	4	2	SYSTEM ERROR(SLV)	Slave CPU error signal was received, but the corresponding error cannot be identified.	Press the [RST] key to reset the error. If the error still occurs, please contact us. Refer to 1.5.3 and 9.1.14.
1151(conv) 6151(NC)	4	2	NO MEMORY FORMAT	Memory never cleared or data destroyed.	Refer to 9.5.1. (Note that internal data is completely cleared when formatting of memory is attempted.)
1152(conv) 6152(NC)	4	2	EDITING	The same data are to be edited at the same time.	Check that communication mark has disappeared. Press the [RST] key to reset the error.
1153(conv) 6153(NC)	4	2	EDIT ERROR 1	During editing, data is destroyed.	Refer to 9.3.5.
1154(conv) 6154(NC)	4	2	EDIT ERROR 2	During editing, data is destroyed.	Refer to 9.3.5.
1155(conv) 6155(NC)	4	2	EDIT ERROR 3	During editing, data is destroyed.	Refer to 9.3.5.
1156(conv) 6156(NC)	4	2	LONG RTRN DISTANCE	Recovery distance when turning on the servo is too long. (Door interlock is effective.)	Press the [RST] key.
1157(conv) 6157(NC)	4	2	NO USER PARAM DATA	There is no user parameter data.	Create the user parameter and turn power off and then on again.
1158(conv) 6158(NC)	4	2	PARITY ER (USER PARA)	Data structure of user parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again. Refer to 9.3.6.
1159(conv) 6159(NC)	4	2	PARITY ER (M/C PARAM)	Data structure of machine parameter is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again. Refer to 9.3.6.
1160(conv) 6160(NC)	4	2	PARITY ERR (PRGRM)	Program is structure is destroyed.	Press [RST] key, and delete the destroyed data by memory screen in edit mode and create new data again. Refer to 9.3.6.
1161(conv) 6161(NC)	4	2	Check the magazine pos	When the power is on, the servo motor is on, or while the magazine is swiveling, the difference between START POINT DATA 2 and the absolute position data in the magazine amplifier has exceeded the value for one revolution of the magazine.	Check the pot number displayed on the present position screen and the pot number actually indexed. If these differ, switch to ATC maintenance mode and adjust the magazine position. Refer to 4.2.1 and 9.5.3.
1162(conv) 6162(NC)	4	2	MAGAZINE POS SHIFTED	The magazine position was shifted more than the value set for [MAGAZINE ALLOWANCE] in machine parameter3 while the magazine was stopped (when the pot was fully lowered.)	Check the machine parameter. Refer to 9.4.12.
1163(conv) 6163(NC)	4	2	ORG POS ERROR X	Zero dog signal was not confirmed while dog zero return was being performed.	Refer to 1.2.4 and 9.2.3.
1164(conv) 6164(NC)	4	2	ORG POS ERROR Y	Zero dog signal was not confirmed while dog zero return was being performed.	Refer to 1.2.4 and 9.2.3.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1165(conv) 6165(NC)	4	2	ORG POS ERROR Z	Zero dog signal was not confirmed while dog zero return was being performed.	Refer to 1.2.4 and 9.2.3 .
1166(conv) 6166(NC)	4	2	ORG POS ERROR SP	When the first orientation is performed after power is turned on, PHASE C signal cannot be received even after spindle motor has rotated one turn.	Refer to 1.2.4 and 9.2.3 .
1167(conv) 6167(NC)	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed.(the asterisk (*) indicates axis 4.)	Refer to 1.2.4 and 9.2.3 .
1168(conv) 6168(NC)	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed.(the asterisk (*) indicates axis 5.)	Refer to 1.2.4 and 9.2.3 .
1169(conv) 6169(NC)	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed.(the asterisk (*) indicates axis 6.)	Refer to 1.2.4 and 9.2.3 .
1170(conv) 6170(NC)	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed.(the asterisk (*) indicates axis 7.)	Refer to 1.2.4 and 9.2.3 .
1171(conv) 6171(NC)	4	2	ORG POS ERROR *	Zero dog signal was not confirmed while dog zero return was being performed.(the asterisk (*) indicates axis 8.)	Refer to 1.2.4 and 9.2.3 .
1172(conv) 6172(NC)	4	2	COMMAND ERROR(SP)	Main CPU is not synchronized with slave CPU.	Refer to 9.1.7.
1173(conv) 6173(NC)	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 4.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter. Refer to 1.2.5 and 1.2.7.
1174(conv) 6174(NC)	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (The asterisk (*) indicates axis 4.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter. Refer to 1.2.5 and 1.2.7.
1175(conv) 6175(NC)	4	2	* CLAMP	While * axis (4 axis) is rotating,* axis is clamped.	Refer to 1.2.5 and 1.2.7.
1176(conv) 6176(NC)	4	2	* UNCLAMP	While * axis (4 axis) is holding,* axis is unclamped.	Refer to 1.2.5 and 1.2.7.
1177(conv) 6177(NC)	4	2	*-AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 4 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 4] is larger than the value set to [LMT PULSE FOR POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 4]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 4 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth. Refer to 1.2.7.
1178(conv) 6178(NC)	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 5.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
1179(conv) 6179(NC)	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (The asterisk (*) indicates axis 5.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
1180(conv) 6180(NC)	4	2	* CLAMP	While * axis (5 axis) is rotating,* axis is clamped.	Inform of circumstances when the trouble occurred.
1181(conv) 6181(NC)	4	2	* UNCLAMP	While * axis (5 axis) is holding,* axis is unclamped.	Inform of circumstances when the trouble occurred.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1182(conv) 6182(NC)	4	2	*.AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 5 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 5] is larger than the value set to [LMT PULSE FOR 5 POSITION ALRM], however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 5]. (these parameters are set on the <machine parameter (system 2) >screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 5 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
1183(conv) 6183(NC)	4	2	CAN NOT CLAMP *	Clamping axis was attempted but failed. (the asterisk (*) indicates axis 6.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
1184(conv) 6184(NC)	4	2	CAN NOT UNCLAMP *	Unclamping axis was attempted but failed. (The asterisk (*) indicates axis 6.)	Press the [RST] key. Check if air pressure is appropriate. Check the machine parameter.
1185(conv) 6185(NC)	4	2	* CLAMP	While * axis (6 axis) is rotating. * axis is clamped.	Inform of circumstances when the trouble occurred.
1186(conv) 6186(NC)	4	2	* UNCLAMP	While * axis (6 axis) is holding. * axis is unclamped.	Inform of circumstances when the trouble occurred.
1187(conv) 6187(NC)	4	2	*.AXISPOS SHIFTED	The axis has shifted during clamping more than the value set to [LMT PULSE FOR 6 POSITION ALRM]. If the value set to [IN-POSITION WIDTH 6] is larger than the value set to [LMT PULSE FOR 6 POSITION ALRM] however this error occurs when the axis has shifted more than the value set to [IN-POSITION WIDTH 6]. (these parameters are set on the [machine parameter (system 2)]screen.)	Press the [RST] key. Check the axis position on the current position screen and move the axis to the correct position. Check that the value set to [LMT PULSE FOR 6 POSITION ALRM] is not too small. When this error occurs during memory operation reduce the cutting depth.
1188(conv) 6188(NC)	4	2	POSITION ERROR Z	(For model with a double-arm ATC) Z-axis was commanded when the Z-axis was above the ATC zero point. (For model with an armless ATC) Z-axis was commanded above the Z axis zero point. (While ATC area servo has been turned on)	Press the [RST] key. Move the Z-axis until it is below the Z-axis zero point while holding down the [RELSE]key.
1189(conv) 6189(NC)	4	2	POSITION ERROR SP	(For model with a double-arm ATC) Spindle was commanded while the ATC arm was not at zero position. (For model with an armless ATC) Spindle was commanded above the Z axis zero point. (While ATC area servo has been turned on)	(For model with a double-arm ATC) Refer to 1.4.1 and 9.4.3. (For model with an armless ATC) Press the [RST] key. Move the Z axis until it is below the Z axis zero point while holding down the [RELSE] key. Refer to 9.4.3.
1191(conv) 6191(NC)	4	2	COMMAND ERROR(SPEED)	The commanded speed is zero or larger than the maximum speed.	Inform of circumstances when the trouble occurred.
1192(conv) 6192(NC)	4	2	ARC SPEED ERROR	For arc cutting when the last point is not on the arc, the speed of the single axis is larger than the maximum speed.	Check start point and end point of program as well as circular arc center point.
1193(conv) 6193(NC)	4	2	ATC TIMEOVER ERROR	ATC arm swivel is not completed with in the specified time.	Refer to 1.4.1, 1.4.3 and 9.4.4.
1194(conv) 6194(NC)	4	2	MAGAZINE NO.ERROR	(For model with a double-arm ATC) The [emergency stop] key was pressed while the magazine was swiveling and the magazine stopped midway. (For model with an armless ATC) After the Magazine rotation, a tool was not indexed. Encoder signal is 0. Or, the number of tool were exceeded than those of magazine.	(For model with a double-arm ATC) Press the [RST] key with the [RELSE] key held down in manual mode. After the alarm indication has disappeared, press the [MAGZ] key with the [RELSE] key held down. Refer to 1.4.2. (For model with an armless ATC) Press the [RST] key with the [RELSE] key held down in manual mode. After the alarm indication has disappeared, press the [MAGZ] key with the [RELSE] key held down. Refer to 9.4.4.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1195(conv) 6195(NC)	4	2	MAGAZINE INDEX ERROR	A tool was not indexed correctly, but magazine was attempted to be rotated. Or Z axis was commanded.	Press the [RST] key with the [RELSE] key held down in manual mode. After the alarm indication has disappeared, press the [MAGZ] key with the [RELSE] key held down.
1196(conv) 6196(NC)	4	2	MAGAZINE POS. ERROR	Magazine was attempted to be rotated when the Z axis was not on the ATC zero point.	Press the [RST] key to cancel the alarm. Refer to 9.4.6
1197(conv) 6197(NC)	4	2	COMMAND ERROR(ATC)	A number exceeding the number of tools set in the magazine was required by ATC command.	Refer to 9.1.8.
1198(conv) 6198(NC)	4	2	POT POSITION ERROR	Pot position is incorrect.	Switch to manual operation mode press the [RST] key with the [RELSE] key held down. Then, press the[MAGZ] key with the [RELSE] key held down to move the magazine pot to the correct position. Refer to 1.4.2. and 9.4.6
1199(conv) 6199(NC)	4	2	MAGAZINE TIME OVER	Magazine has not been indexed within 5 sec per 1pitch.	Refer to 9.4.7.

When alarm No. 1324(6324) ~ 1326 (6326)“ORIGIN LS OFF (*)” occurs

This alarm occurs when the **[RELSE]** and **[Z.RTN]** keys are pressed when the zero position limit switch is not on. Thus, follow the steps below to move the axis using jog operation to the position where the zero position limit switch turns on.

1. Press the **[RST]** key to reset the alarm.
2. Select the desired additional axis on the <MANU COND> screen or the <POS> screen.
axis No. 4: **[F0]** key
axis No. 5: **[F1]** key
axis No. 6: **[F2]** key
3. Press the **[I/O]** key and the <I/O> screen appears.
Select **[1]** and press the **[ENT]** key.
4. Press the **[PAGE DOWN]** key to display the screen below.

MAIN3		INPUT/OUTPUT	
●	ORIGIN LS STATE		
■	X AXIS	OFF	
■	Y AXIS	OFF	
■	Z AXIS	OFF	
■	C AXIS	OFF	
■	B1 AXIS	OFF	
■	B2 AXIS	OFF	
I/O			
MENU			
F0		F1	F2
F3		F4	

5. While observing the screen, move the additional axis by pressing the **[+4]** or **[-4]** key to move in the direction that the cables connected to the additional axis are not entangled. When the manual pulse generator is provided, use it.
6. Release your finger from the key when the zero position limit switch of the additional axis being operated turns on.
When the axis has stopped at its stroke end, you can move the axis to a position out beyond the stroke limit by pressing the **[+4]** or **[-4]** key while holding down the **[RELSE]** key.
7. Press the **[RELSE]** and **[Z.RTN]** keys.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1200(conv.) 6200(NC)	4	2	POT TIME OVER	Raising and lowering of the pot was not completed within the specified time.	Turn off power and eliminate the cause.. Refer to 9.4.7
1201(conv.) 6201(NC)	4	2	POTSENSOR ERROR	Pot sensor is faulty.	Refer to 9.4.8.
1202(conv.) 6202(NC)	4	2	ATC ARM POS ERR 1	ATC arm is not at home.	Press the [RST] key with the [RELSE] key held down in manual mode. See 13.6 Resetting ATC.
1203(conv.) 6203(NC)	4	2	STROKE OVER (+X)	The X-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1204(conv.) 6204(NC)	4	2	STROKE OVER (-X)	The X-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1205(conv.) 6205(NC)	4	2	STROKE OVER (+Y)	The Y-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1206(conv.) 6206(NC)	4	2	STROKE OVER (-Y)	The Y-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1207(conv.) 6207(NC)	4	2	STROKE OVER (+Z)	The Z-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1208(conv.) 6208(NC)	4	2	STROKE OVER (-Z)	The Z-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1209(conv.) 6209(NC)	4	2	STROKE OVER (+*)	The 4 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1210(conv.) 6210(NC)	4	2	STROKE OVER (-*)	The 4 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1211(conv.) 6211(NC)	4	2	STROKE OVER (+*)	The 5 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1212(conv.) 6212(NC)	4	2	STROKE OVER (-*)	The 5 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1213(conv.) 6213(NC)	4	2	STROKE OVER (+*)	The 6 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1214(conv.) 6214(NC)	4	2	STROKE OVER (-*)	The 6 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1215(conv.) 6215(NC)	4	2	LIMIT OVER (+X)	The X-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1216(conv.) 6216(NC)	4	2	LIMIT OVER (-X)	The X-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1217(conv.) 6217(NC)	4	2	LIMIT OVER (+Y)	The Y-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1218(conv.) 6218(NC)	4	2	LIMIT OVER(-Y)	The Y-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1219(conv.) 6219(NC)	4	2	LIMIT OVER(+Z)	The Z-axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1220(conv.) 6220(NC)	4	2	LIMIT OVER(-Z)	The Z-axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1221(conv.) 6221(NC)	4	2	LIMIT OVER(+*)	The 4 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1222(conv.) 6222(NC)	4	2	LIMIT OVER(-*)	The 4 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1223(conv.) 6223(NC)	4	2	LIMIT OVER(+*)	The 5 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1224(conv.) 6224(NC)	4	2	LIMIT OVER(-*)	The 5 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1225(conv.) 6225(NC)	4	2	LIMIT OVER(+*)	The 6 axis was attempted to be moved past its stroke limit in the positive direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1226(conv.) 6226(NC)	4	2	LIMIT OVER(-*)	The 6 axis was attempted to be moved past its stroke limit in the negative direction.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1227(conv.) 6227(NC)	4	2	STROKE OVER 2	The axis was attempted to be moved into the prohibited stroke zone.	Press the [RST] key and correct the program. (check the machine parameters (system 1).)
1228(conv.) 6228(NC)	4	2	LIMIT OVER 2	The axis was attempted to be moved into the prohibited stroke limit zone.	Press the [RST] key and correct the program. (check the machine parameters (switch 2).)
1232(conv.) 6232(NC)	4	2	COUNTER1 END	Each workpiece counter has attained the preset value.	
1233(conv.) 6233(NC)	4	2	COUNTER2 END	Each workpiece counter has attained the preset value.	
1234(conv.) 6234(NC)	4	2	COUNTER3 END	Each workpiece counter has attained the preset value.	
1235(conv.) 6235(NC)	4	2	COUNTER4 END	Each workpiece counter has attained the preset value.	
1236(conv.) 6236(NC)	4	2	SENSOR SIGNAL OFF	Detection signal was not turned on during measurement.	Press the [RST] key and check the measurement position.
1237(conv.) 6237(NC)	4	2	SENSOR SIGNAL ON	Detection signal was not turned off during measurement.	Press the [RST] key and check the measurement position.
1238(conv.) 6238(NC)	4	2	THRED CUT FEED ERR	The Z axis feedrate is not obtained from the X/Y axis feedrate during the thread cutting.	Press the [RST] key and check the end point, center point and feedrate in the thread cutting.
1239(conv.) 6239(NC)	4	2	NO THREAD CUTTING	There is no optimal thread cutting function.	Purchase a thread cutting option.
1240(conv.) 6240(NC)	4	2	SIGNAL TIME OVER	After external signal is given, completion signal can not be detected even when external signal reading limit time is over. M46* signals are not detected even after the time preset to MAXIMUM TIME OF EXIT SIGNAL has passed after motions of signal output functions 46* have been completed.	Press [RST] key and set external reading completion signal within the limit time, or change parameter value.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1241(conv.) 6241(NC)	4	2	CALCULATION ERROR	<Conversation> 1.Feed rate of the additional axis could not be calculated. 2.Working path could not be calculated. 3.Tool data for tool assignment could not be calculated.. <NC> The graphic calculation is not available any longer.	Press the [RST] key , and For 1 and 2,check the program and enter the correct value. For 3, check the tool list and enter the correct value.
1242(conv.) 624(NC)	4	2	TOOL BROKEN ERROR	A signal was output from the tool detection sensor.	Check the service life of the broken tool on the <magazine tool> screen, and then press the [RST] key. If a suitable spare tool is registered, operation can be resumed. If no suitable spare tool is registered, replace the tool, set the tool length and tool life, and then resume operation. Note: when the [RST] key is pressed, the tool life indication value is automatically cleared. Note: if the tool is not broken, the tool breakage detection device needs adjustment. Refer to option - tool breakage detection device -> 4.adjustment.
1243(conv.) 6243(NC)	4	2	TOOL LIFE END (*)	The tool life of the tool in use or the one to be used has reached zero. The figure in brackets () indicates the tool number.	Replace tools and set tool life according after pressing [RST] key.
1244(conv.) 6244(NC)	4	2	MEASD VAL ERR LRG(1)	The result of zero point measurement has exceeded the tolerance set by the user parameter (zero point measurement).	Press the [RST] key and check the measurement position in the program.
1245(conv.) 6245(NC)	4	2	NO MEASURING DATA	Positioning to the measuring point was attempted (G120) although measuring data does not exist.	Press the [RST] key and check the program.
1246(conv.) 6246(NC)	4	2	TRM DISPMT AMT OVR	Displacement measured in Z-axis thermal displacement offset mode exceeded parameter Z-AXIS MACHINING ACCURACY.	See "parameter setting and change Z- axis thermal displacement offset witching motion to appropriate conditions.
1247(conv.) 6247(NC)	4	2	THRM COMP POS ERR	Thermal is placement compensation was attempted for areas other than Z- axis machine zero position.	Do not move the axis in manual mode.
1248(conv.) 6248(NC)	4	2	THRM COMP AMT OVER	Offset at stroke end exceeded THRM OFFSET AMT LIMIT VALUE in Z- axis thermal displacement offset mode.	Check if parameter measuring device installation position Z and tool length menu are correct. Check the measuring section of the tool length measuring device for chip adhesion.
1249(conv.) 6249(NC)	4	2	COVER DOESN'T OPEN	When COVER OPEN CHCKING is executed, cover opening cannot be confirmed within 10 seconds.	Check tool length measuring device cover.
1250 (conv.) 6250(NC)	4	2	NO Z-AX MEASUREMENT	Tool breakage detection command or thermal measurement command was attempted to be executed for machines without optional Z-axis measurement system.	Change program.
1252(conv.) 6252(NC)	4	2	PROGRAM PROTECT	An attempt is made to modify the data while the PROTECT SW is ON.	Set the PROTECT switch to OFF, and modify the data.
1253(conv.) 6253(NC)	4	2	NO SEQ CONTROLLER	A signal output 8XX is executed without sequence controller (option).	Change the signal output into a signal output XX.
1254(conv.) 6254(NC)	4	2	NO EXT ERROR CODE	An error signal was received from the external PLC. At this time, no bit of internal auxiliary contact 20 signal (8-bit data) is on.	Check the conditions when the external PLC alarm occurs, eliminate the cause, and press the [RST] key.
1255(conv.) 6255(NC)	4	2	EXTERNAL ERROR 1	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause and press the [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1256(conv.) 6256(NC)	4	2	EXTERNAL ERROR 2	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1257(conv.) 6257(NC)	4	2	EXTERNAL ERROR 3	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1258(conv.) 6258(NC)	4	2	EXTERNAL ERROR 4	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1259(conv.) 6259(NC)	4	2	EXTERNAL ERROR 5	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1260(conv.) 6260(NC)	4	2	EXTERNAL ERROR 6	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1261(conv.) 6261(NC)	4	2	EXTERNAL ERROR 7	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occurs eliminate the cause and press the [RST] key.
1262(conv.) 6262(NC)	4	2	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the EXER10 and push [RST] key.
1263(conv.) 6263(NC)	4	2	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
1264(conv.) 6264(NC)	4	2	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
1265(conv.) 6265(NC)	4	2	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
1266(conv.) 6266(NC)	4	2	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
1267(conv.) 6267(NC)	4	2	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER15 and push [RST] key.
1268(conv.) 6268(NC)	4	2	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.
1269(conv.) 6269(NC)	4	2	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.
1270(conv.) 6270(NC)	4	2	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
1271(conv.) 6271(NC)	4	2	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
1272(conv.) 6272(NC)	4	2	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.
1273(conv.) 6273(NC)	4	2	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
1274(conv.) 6274(NC)	4	2	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
1275(conv.) 6275(NC)	4	2	EXTERNAL ERROR 23	EXER23 signal comes on.	Turn off the EXER23 and push [RST] key.
1276(conv.) 6276(NC)	4	2	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
1277(conv.) 6277(NC)	4	2	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.
1278(conv.) 6278(NC)	4	2	DOOR ERROR	The automatic door limit switch has turned on both at door closing and opening ends. It took x seconds (parameter value) for automatic door closing. It took x seconds (parameter value) for automatic door opening.	Eliminate the error cause and press the [RST] key to reset the error.
1279(conv.) 6279(NC)	4	2	NO TOOL IN MAGAZINE	Tool required for operation is not set in the magazine.	Press the [RST] key, and set the tool on the <magazine tool> screen correctly.
1280(conv.) 6280(NC)	4	2	SYSTEM ERROR (MC)	An error was received but the corresponding error cannot be identified.	Press the [RST] key and clear the alarm. If the same trouble occurs repeatedly, this error may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1281(conv.) 6281(NC)	4	2	SYSTEM ERROR (ATC)	An error was received but the corresponding error cannot be identified.	Press the [RST] key and clear the alarm. Refer to 9.1.14.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1282(conv.) 6282(NC)	4	2	PROHIBITED POT	The tool was attempted to be replaced with a prohibited pot.	
1283(conv.) 6283 (NC)	4	2	CAPPED	The tool was attempted to be replaced with a pot with the cap specified.	
1284(conv.) 6284(NC)	4	2	NO OPTION (A)	An "a" axis program was attempted to be executed although an optional "a" axis is not provided.	Purchase an optional "a" axis. When already provided, set [a option] to [1. Yes].
1285(conv.) 6285(NC)	4	2	NO OPTION (B)	A "b" axis program was attempted to be executed although an optional "b" axis is not provided.	Purchase an optional "b" axis. When already provided, set [b option] to [1. Yes].
1286(conv.) 6286(NC)	4	2	NO OPTION (C)	A "c" axis program was attempted to be executed although an optional "c" axis is not provided.	Purchase an optional "c" axis. When already provided, set [c option] to [1. Yes].
1287(conv.) 6287(NC)	4	2	SHORT POTMOTION TIM	Raising or lowering of the pot has been completed earlier than the specified time.	Turn off power and eliminate the cause. Refer to 9.4.10.
1288(conv.) 6288(NC)	4	2	NO EMPTY POT	No pot was available when changing from standard to large tool or vice versa.	Prepare an empty pot.
1289(conv.) 6289(NC)	4	2	CAN'T SET TOOL LEN	The [protect] switch was turned on as soon as [tool length set] was executed in automatic tool length measurement mode or [tool length set] could not be executed for some reason.	Multiple errors have occurred concurrently. Check the causes on the <alarm> screen and eliminate them.
1291(conv.) 6291(NC)	4	2	NO MEASURING DEVICE	The Z-axis measurement system was attempted to be operated using the pallet without a measurement device.	Operate the system using the pallet with a measurement device.
1292(conv.) 6292(NC)	4	2	PALLET POS ERROR	The Z-axis measurement system was attempted to be operated although the pallet was not indexed.	Index the pallet and operate the system.
1293(conv.) 6293(NC)	4	2	MAGAZN TOOL SET ERR	Tools are not set in the magazine correctly.	Set the tools in the magazine correctly.
1294(conv.) 6294(NC)	4	2	ADDRESS SETTING ERR	The address of the additional axis is not set correctly.	Set the address correctly.
1295(conv.) 6295(NC)	4	2	OUT PLT NOT COMMDED	The additional axis of the pallet opposite the pallet in operation was attempted to be moved.	Press the [RST] key and check the program.
1296(conv.) 6296(NC)	4	2	NO ZERO MEASUREMENT	Zero position measurement was attempted although zero position measurement option is not provided.	Purchase this option or change the program.
1297(conv.) 6297(NC)	4	2	TOOL BRK SNSOR ERR	Tool breakage detecting sensor input is illegal.	When a tool breakage detection option is not provided, set [tool breakage detect option] to [0: no]. When provided, check to see if chips are stuck to the detection arm. if so, remove them. If the same error occurs., this error may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1298(conv.) 6298(NC)	4	2	TOOL BRK TIME OVER	Tool breakage detecting motion (extend or fold the detevting arm) time exceeds 5 sec.	Push [RST] key and check the air pressure (3-5kg/cm2). If the air is OK, inform us.
1299(conv.) 6299(NC)	4	2	PARITY (SOFT SWITCH)	Software switch data was damaged.	Refer to 9.3.6.
1300(conv.) 6300(NC)	4	2	S OVRD NO CONNECTED	The spindle override connector is not connected.	Refer to 9.1.20.
1304(conv.) 6304(NC)	4	2	NO AUTO THRM COMP(Z)	Although Z axis automatic thermal displacement compensation is not provided, Z axis automatic thermal displacement compensation was attempted.	Purchase this option.
1305(conv.) 6305(NC)	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis "*" (axis 4) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1306(conv.) 6306(NC)	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis “*” (axis 5) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.
1307(conv.) 6307(NC)	4	2	* SERVO MOTOR OFF	When door interlock is valid for machines conforming to CE specifications, the door was opened while the axis “*” (axis 6) was in motion. Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Press the [RST] key.
1308(conv.) 6308(NC)	4	2	COOLANT BLOWING ON	The spindle was attempted to be rotated while the coolant blowing function was ON.	Turn the coolant blowing function OFF and then rotate the spindle.
1309(conv.) 6309(NC)	4	2	SPINDLE ROTATING	The coolant blowing function was attempted to be turned ON while the spindle was rotating.	Stop the spindle and then turn the coolant blowing function ON.
1310(conv.) 6310(NC)	4	2	NOT CLOSING DOOR	The door was open when swiveling the ATC arm was attempted.	Close the door and press the [RST] key.
1311(conv.) 6311(NC)	4	2	H PRE COOLANT ERR 1	Either the high pressure or filter pump is overloaded.	Eliminate the cause of the overload.
1312(conv.) 6312(NC)	4	2	H PRE COOLANT ERR 3	The line filter is clogged.	Check that the element in the line filter and pipe are not damaged, and clean the element.
1317(conv.) 6317(NC)	4	2	MGZN COVER TIMEOVER	The cover did not complete opening and closing within five seconds after opening and closing operation was commenced.	Press [RST] key. Refer to 9.4.13.
1318(conv.) 6318(NC)	4	2	MGZN COVER NOT OPEN	The magazine cover was not fully open when the arm started swiveling.	Press [RST] key. Refer to 9.4.14.
1319(conv.) 6319(NC)	4	2	MGZN CVR SENSOR ERR	The sensors to detect the magazine cover opening and closing ends were on when the power was turned on and the [RST] key pressed.	Press [RST] key. Refer to 9.4.15.
1320(conv.) 6320(NC)	4	2	POSITION ERROR XY	The X and Y axes were beyond their stroke limits when the [ATC] key was pressed.	Press [RST] key to reset the alarm and return the X axis to within their stroke limits.
1321(conv.) 6321(NC)	4	2	POSITION ERROR X	The machine was attempted to be operated when the X axis was within the ATC operation range or the ATC operation limit switch was on, or the ATC operation limit switch was turned off before the ATC arm was attempted to be swiveled.	Press [RST] key to reset the alarm and return the X axis to within their stroke limits. Refer to 9.4.16.
1323(conv.) 6323(NC)	4	2	C ZERO RTRN POS ERR	Zero position return was attempted when the C-axis (pallet) had not been indexed.	Press the [RST] key to reset the alarm. Index the C axis to 0 degrees or -180 degrees and then conduct zero position return. Refer to 9.2.4.
1324(conv.) 6324(NC)	4	2	ORIGIN LS OFF (*)	The zero point limit switch for axis No. 4 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 4 to the position where the zero position limit switch for the axis No. 4 turns on, and press the [RELSE] and [Z.RTN] keys. See the attached sheet. Refer to 9.2.5.
1325(conv.) 6325(NC)	4	2	ORIGIN LS OFF (*)	The zero point limit switch for axis No. 5 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 5 to the position where the zero position limit switch for the axis No. 5 turns on, and press the [RELSE] and [Z.RTN] keys. See the attached sheet. Refer to 9.2.5.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1326(conv.) 6326(NC)	4	2	ORIGIN LS OFF (*)	The zero point limit switch for axis No. 6 was not on when zero position return was attempted by pressing the [RELSE] and [Z.RTN] keys.	Press the [RST] key to reset the alarm. Move the axis No. 6 to the position where the zero position limit switch for the axis No. 6 turns on, and press the [RELSE] and [Z.RTN] keys. See the attached sheet. Refer to 9.2.5.
1327(conv.) 6327(NC)	4	2	NO MEM (XY THERM COMP)	There is no memory area for automatic X and Y axes thermal displacement compensation data.	Refer to 9.1.24.
1328(conv.) 6328(NC)	4	2	NO AUTO THERM COMP (X)	Although X axis automatic thermal displacement compensation is not provided, X axis automatic thermal displacement compensation was attempted.	Edit the program.
1329(conv.) 6329(NC)	4	2	NO AUTO THERM COMP (Y)	Although Y axis automatic thermal displacement compensation is not provided, Yaxis automatic thermal displacement compensation was attempted.	Edit the program.
1330(conv.) 6330(NC)	4	2	DIAMETER CORRECTING	The diameter is being corrected during XZ and YZ circular interpolation.	Edit the program.
1331(conv.) 6331(NC)	4	2	COORDINATE ROTATION	The coordinates are being rotated during XZ and YZ circular interpolation.	Edit the program.
1332(conv.) 6332(NC)	4	2	MEASD VAL ERR LRG(2)	The difference between the current zero measurement result and the previous zero measurement result has exceeded measurement tolerance 2 of USER PARM (ZERO MEASUREMENT).	Press the [RST] key and check the measurement position in the program.
1333(conv.) 6333(NC)	4	2	*MAGAZINE COVER OPEN	Turning the quick table was attempted while the magazine cover was open.	Press the [RST] key.
1334(conv.) 6334(NC)	4	2	TOOL LENGTH ERROR	Tool length setting for [TOOL BREAKAGE DETECT OPTION (TYPE 3)] is incorrect. This error occurs when the length of the tool subject to breakage detection corresponds to any of the following: 1.(Tool length - Tool breakage detector return position) < 60 mm 2.(Tool length - Tool breakage detector return position) > (Tool breakage detection motor stroke + 60 mm)	Check the settings for [TOOL BREAKAGE DETECT OPTION] and [TOOL BRK DETECT RETURN POS] (user parameters), and [TOOL LENGTH] on the tool list screen.
1335(conv.) 6335(NC)	4	2	TOOL BREAKAGE POS.ER1	IO board, TB board, or tool breakage detector is faulty.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1336(conv.) 6336(NC)	4	2	TOOL BREAKAGE POS.ER2	Tool breakage detection motor did not move to the specified position.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1337(conv.) 6337(NC)	4	2	T.BRK POS.DRIVER ER	The tool breakage detector is faulty.	Press the [RST] key to reset the error. If the error still occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1338(conv.) 6338(NC)	4	2	CTS ON	M496 command is used while CTS is on.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
1339(conv.) 6339(NC)	4	2	THERM ERR (CTS PUMP)	The CTS pump thermal signal was input.	Press the [RST] key and clear the alarm. This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1340(conv.) 6340(NC)	4	2	CTS ERROR	There is a problem in the CTS pump. 1) Coolant level low 2) Coolant leakage 3) Valve damage 4) Pump damage 5) Sensor failure	This error occurs if the CTS command is used during back washing. Change the program. For other cases, 1)Check that there is no problem in the pipe. 2) When the error occurs while coolant is being discharged, check the level of coolant in the tank and replenish if necessary. If the level is correct, check the user parameter (switch 1) [M494 COOLANT BLOWING TIME]. 3)When the error occurs while coolant is not being discharged, check the valve for any damage. 4)If the error still occurs, causes 4) and 5) may be the reason. Contact your nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1850(conv) 6850(NC)	3	2	MARK NOT FOUND	Delimiter of data in program is lost.	Delete the program and reedit it after pressing [RST] key.
1851(conv) 6851(NC)	3	2	PRESS RESET KEY	Important parameter is modified.	Press [RST] key.
1852(conv) 6852(NC)	3	2	EXTERNAL ERROR 10	Exer 10 signal comes on.	Turn off the exer 10 and push [RST] key.
1853(conv) 6853(NC)	3	2	EXTERNAL ERROR 11	Exer 11 signal comes on.	Turn off the exer 11 and push [RST] key.
1854(conv) 6854(NC)	3	2	EXTERNAL ERROR 12	Exer 12 signal comes on.	Turn off the exer 12 and push [RST] key.
1855(conv) 6855(NC)	3	2	EXTERNAL ERROR 13	Exer 13 signal comes on.	Turn off the exer 13 and push [RST] key.
1856(conv) 6856(NC)	3	2	EXTERNAL ERROR 14	Exer 14 signal comes on.	Turn off the exer 14 and push [RST] key.
1857(conv) 6857(NC)	3	2	EXTERNAL ERROR 15	Exer 15 signal comes on.	Turn off the exer 15 and push [RST] key.
1858(conv) 6858(NC)	3	2	EXTERNAL ERROR 16	Exer 16 signal comes on.	Turn off the exer 16 and push [RST] key.
1859(conv) 6859(NC)	3	2	EXTERNAL ERROR 17	Exer 17 signal comes on.	Turn off the exer 17 and push [RST] key.
1860(conv) 6860(NC)	3	2	EXTERNAL ERROR 18	Exer 18 signal comes on.	Turn off the exer 18 and push [RST] key.
1861(conv) 6861(NC)	3	2	EXTERNAL ERROR 19	Exer 19 signal comes on.	Turn off the exer 19 and push [RST] key.
1862(conv) 6862(NC)	3	2	EXTERNAL ERROR 20	Exer 20 signal comes on.	Turn off the exer 20 and push [RST] key.
1863(conv) 6863(NC)	3	2	EXTERNAL ERROR 21	Exer 21 signal comes on.	Turn off the exer 21 and push [RST] key.
1864(conv) 6864(NC)	3	2	EXTERNAL ERROR 22	Exer 22 signal comes on.	Turn off the exer 22 and push [RST] key.
1865(conv) 6865(NC)	3	2	EXTERNAL ERROR 23	Exer 23 signal comes on.	Turn off the exer 23 and push [RST] key.
1866(conv) 6866(NC)	3	2	EXTERNAL ERROR 24	Exer 24 signal comes on.	Turn off the exer 24 and push [RST] key.
1867(conv) 6867(NC)	3	2	EXTERNAL ERROR 25	Exer 25 signal comes on.	Turn off the exer 25 and push [RST] key.
1868(conv) 6868(NC)	3	2	CHG TOOL DG WK	Data on used tools are modified during operation.	Press [RST] key and restart operation.
1869(conv) 6869 (NC)	3	2	CHECK MAGAZINE TOOL.	Resetting ATC arm was attempted by pressing the [RELSE] and [ATC] keys.	Check the magazine tool and press the [RST] key.
1870(conv) 6870(NC)	3	2	SPINDLE RPM ERROR	The S command is not given during the spindle rotation, or the commanded value exceeds the allowable range.	Press the [RST] key and check the program.
1871(conv) 6871(NC)	3	2	USER PARA ER (Z MESR)	Setting of user parameters 6 (Z measurement) is faulty.	Check the setting of user parameters 6(Z measurement).
1872(conv) 6872(NC)	3	2	H PRE COOLANT ERR 2	Cause 1) The filter is clogged. The coolant in the clean tank has fallen below the minimum required level.	Replace the filter. Check the coolant level of the 200 L tank and replenish coolant if necessary.
1873(conv) 6873(NC)	3	2	LOADED MASS SET ERR	For table movement type, the mass loaded on the table exceeds [TABLE LOADED MASS] + mass error tolerance. For column movement type, the current value of the C-axis (quick table) command exceeds the tolerance.	Check that the mass loaded on the table is the same as the setting for [TABLE LOADED MASS] (user parameter).
1874(conv) 6874(NC)	3	2	FILTER ERR	Tool washing filter is clogged.	Press the [RST] key to reset the error. When the machine is the armless ATC type and the Z-axis position is above the machine zero point, press the [RST] key with the [RELSE] key held down. Then lower the axis below the machine zero point in manual mode. If the error occurs repeatedly, contact your nearest BROTHER approved service dealer.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
1875(conv) 6875(NC)	3	2	LINE FILTER ERROR	1)The line filter's coolant through spindle differential pressure switch turned on while CTS is on. 2) The back washing filter is clogged while CTS is on.	Press the [RST] key to reset the error. Use M496 to perform back washing. If the error occurs repeatedly, contact your nearest BROTHER approved service dealer.
2104(conv) 7104(NC)	2	2	EXTERNAL ERROR 10	Exer 10 signal comes on.	Turn off the exer 10 and push [RST] key.
2105(conv) 7105(NC)	2	2	EXTERNAL ERROR 11	Exer 11 signal comes on.	Turn off the exer 11 and push [RST] key.
2106(conv) 7106(NC)	2	2	EXTERNAL ERROR 12	Exer 12 signal comes on.	Turn off the exer 12 and push [RST] key.
2107(conv) 7107(NC)	2	2	EXTERNAL ERROR 13	Exer 13 signal comes on.	Turn off the exer 13 and push [RST] key.
2108(conv) 7108(NC)	2	2	EXTERNAL ERROR 14	Exer 14 signal comes on.	Turn off the exer 14 and push [RST] key.
2109(conv) 7109(NC)	2	2	EXTERNAL ERROR 15	Exer 15 signal comes on.	Turn off the exer 15 and push [RST] key.
2110(conv) 7110(NC)	2	2	EXTERNAL ERROR 16	Exer 16 signal comes on.	Turn off the exer 16 and push [RST] key.
2111(conv) 7111(NC)	2	2	EXTERNAL ERROR 17	Exer 17 signal comes on.	Turn off the exer 17 and push [RST] key.
2112(conv) 7112(NC)	2	2	EXTERNAL ERROR 18	Exer 18 signal comes on.	Turn off the exer 18 and push [RST] key.
2113(conv) 7113(NC)	2	2	EXTERNAL ERROR 19	Exer 19 signal comes on.	Turn off the exer 19 and push [RST] key.
2114(conv) 7114(NC)	2	2	EXTERNAL ERROR 20	Exer 20 signal comes on.	Turn off the exer 20 and push [RST] key.
2115(conv) 7115(NC)	2	2	EXTERNAL ERROR 21	Exer 21 signal comes on.	Turn off the exer 21 and push [RST] key.
2116(conv) 7116(NC)	2	2	EXTERNAL ERROR 22	Exer 22 signal comes on.	Turn off the exer 22 and push [RST] key.
2117(conv) 7117(NC)	2	2	EXTERNAL ERROR 23	Exer 23 signal comes on.	Turn off the exer 23 and push [RST] key.
2118(conv) 7118(NC)	2	2	EXTERNAL ERROR 24	Exer 24 signal comes on.	Turn off the exer 24 and push [RST] key.
2119(conv) 7119(NC)	2	2	EXTERNAL ERROR 25	Exer 25 signal comes on.	Turn off the exer 25 and push [RST] key.
2120(conv) 7120(NC)	2	2	MNR FAILURE RLY ON	An error has occurred in the SEQ unit connected to NC board connector seq.	Refer to the instruction manual of the connected SEQ unit eliminate the cause and turn on power again.
2121(conv) 7121(NC)	2	2	PRESS. HIGH (AUTO OIL)	The pressure sensor was not off when oil supply was attempted.	Press the [RST]key. Refer to 9.1.25.
2122(conv) 7122(NC)	2	2	PRESS. LOW (AUTO OIL)	The pressure sensor did not turn on within the time set for [AUTOMATIC OILING MONITORING TIME] in the machine parameter (system1) after the oiling pump was turned on.	Press the [RST]key. Refer to 9.1.26.
2123(conv) 7123(NC)	2	2	LEVEL DROP (AUTO OIL)	Insufficient oil input signal was turned on.	Supply oil.
2400(conv) 7400(NC)	1	2	MEMORY OVER FLOW	Areas for directories and data are insufficient.	If you are editing, reduce the current program capacity before storing it or delete other programs to create greater free memory area and edit the program again.
2401(conv) 7401(NC)	1	2	M/C PARA NOT DELETED	When formatting or deleting all data banks, [PARAMETER CHANGE] was set to [NO].	When deleting machine parameters, set [PARAMETER CHANGE] to [YES] on the [I/O] screen.
2402(conv) 7402(NC)	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (4 axis) servomotor power was turned off.) Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Turn off power and see 13.6 Resetting ATC.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2403(conv) 7403(NC)	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (5 axis) servomotor power was turned off.) Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Turn off power and see 13.6 Resetting ATC.
2404(conv) 7404(NC)	1	2	* SERVO MOTOR OFF	The outer door was opened while the door interlock was valid for the CE specification machine. (*-axis (6 axis) servomotor power was turned off.) Conformance to CE specifications is standard for the TC-32A, R2A, 20A and S2B.	Turn off power and see 13.6 Resetting ATC.
2500(conv) 7500(NC)	1	1	MEMORY RUNNING	An attempt is made to start the MDI operation during the halt of memory operation. The magazine tool data was attempted to be set during memory operation. Copying, detection, formatting, or changing data number was attempted on the <MEMORY> screen during memory operation. Editing data bank was attempted during memory operation.	Execute the MDI operation after the memory operation is finished. Complete memory operation and then set the data. Complete memory operation and then perform the desired operation.
2501(conv) 7501(NC)	1	1	IN MDI OPERATION	Mode is changed during MDI operation. The magazine tool data was attempted to be set during MDI operation. Editing data bank was attempted during MDI operation.	Execute mode change after the MDI operation is finished. Complete MDI operation and then set the data. Complete MDI operation and then edit the data bank.
2502(conv) 7502(NC)	1	1	HANDLE MODE	Manual mode operation is performed during manual pulse generator mode.	Set to OFF axis selector switch of manual pulse generator.
2503(conv) 7503(NC)	1	1	COUNTER1 END NOTICE	The workpiece counter has attained the end notice number.	
2504(conv) 7504(NC)	1	1	COUNTER2 END NOTICE	The workpiece counter has attained the end notice number.	
2505(conv) 7505(NC)	1	1	COUNTER3 END NOTICE	The workpiece counter has attained the end notice number.	
2506(conv) 7506(NC)	1	1	COUNTER4 END NOTICE	The workpiece counter has attained the end notice number.	
2507(conv) 7507(NC)	1	1	NOT CLOSING DOOR	Attempt of running the machine while the door is open and the interlock unit is ON.	Close the door or set the interlock unit to OFF.
2508(conv) 7508(NC)	1	1	IN AUTO ALIGNMENT	The mode is changed during center alignment.	Finish the center alignment operation.
2509(conv) 7509(NC)	1	1	RELEASE MACHINE LOCK	An attempt is made to execute the center alignment in the machine lock.	Turn OFF the respective lock status before executing the center alignment.
2510(conv) 7510(NC)	1	1	ZERO RTN COMMAND ERR	An attempt is made to return to M.Z. point during the machine lock.	Release the machine lock before executing the zero point return.
2511(conv) 7511(NC)	1	1	DR OPEN SPNDL STOP	The door was opened during spindle rotation (the door interlock is effective).	Close the door and restart the operation. The spindle starts rotating from the position when the operation was stopped.
2512(conv) 7512(NC)	1	1	TOO SMALL TM CONST	Tap time constant set by M code was smaller than the minimum tap time constant operable for tap rotation.	Set the time constant by M code appropriately for tap rotation.
2513(conv) 7513(NC)	1	1	PALLET POS ERROR	A memory operation is commanded while the pallet is not indexed.	Change to the manual mode and index pallet with [C INDEX] key.
2514(conv) 7514(NC)	1	1	INNER DOOR OPEN	The inner door is opened in the operation.	Close the inner door and push [CAN] key.
2515(conv) 7515(NC)	1	1	OUTER DOOR OPEN	The C axis is going to rotate while the safety switch is ON and the outer door is open. Or machine is going to be operated while the pallet is not indexed.	Close the outer door, or turn off the safety switch.
2516(conv) 7516(NC)	1	1	PRESS PALLET START	The inner pallet is going to carry out before take off the outer pallet work.	Take off the outer pallet work and press [PALLET START] key.
2517(conv) 7517(NC)	1	1	DIFFER FROM PLT PRG	The program different from the one set to user parameter (quick table) was selected in memory operation mode.	Check the pallet program number set to user parameter (quick table).

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2518(conv) 7518(NC)	1	1	STROKE OVER (C)	When the pallet beyond its stroke, the [z. rtn] or [p. idx] key was pressed.	Press the [+c] or [-c] key to move the C-axis between -180.000 degrees and 0.000 degrees, and retry operation.
2519(conv) 7519(NC)	1	1	SPARE TOOL USING	Life of tool used in machining is over.	
2520(conv) 7520(NC)	1	1	MEASUREMENT ON	Switching the mode was attempted during zero position measurement.	Complete zero position measurement.
2521(conv) 7521(NC)	1	1	M406 IS ON	M406 signal was on when memory operation was executed.	Output m407 signal in MDI operation mode (block operation) to turn m406 signal off.
2522(conv) 7522(NC)	1	1	TL LF EXPIRING(*)	Tool life has reached the preset value. The figure in brackets () indicates the tool number.	
2523(conv) 7523(NC)	1	1	INPUT DATA ERROR	Data beyond the specified range is set.	Set the data within the specified range.
2524(conv) 7524(NC)	1	1	ZERO RTN NOT DONE	An attempt is made to start operation or automatic setting without executing M.Z. return.	Execute the zero point return.
2525(conv) 7525(NC)	1	1	PROGRAM NO. ERROR	An attempt is made to set the program No. which is not allowed.	Set the program No. correctly.
2526(conv) 7526(NC)	1	1	NO COPY SOURCE DATA	The program or data bank to be copied does not exist.	Check the program no. or data bank no.
2527(conv) 7527(NC)	1	1	DST DATA ALRDY EXST	A program or data bank with an identical no. to those to be copied already exists.	Copy to a different no. or delete the existing program or the data bank.
2528(conv) 7528(NC)	1	1	PROGRAM PROTECT	An attempt is made to modify the data while the PROTECT SW is ON.	Set the PROTECT switch to OFF, and modify the data.
2529(conv) 7529(NC)	1	1	CHARACTER NO. OVER	Number of characters exceeds 128.	Reduce a number of characters.
2530(conv) 7530(NC)	1	1	PRGRM IN EXECUTION	An attempt is made to edit or delete the file concerning the program in operation.	Execute it after finishing the operation.
2531(conv) 7531(NC)	1	1	SELECT AXIS	The additional axis select switch was not set after power was turned on.	Set the switch correctly.
2532(conv) 7532(NC)	1	1	COMMUNICATING	When the program or data is to be modified, the same data is in communication.	Execute it after finishing the communication.
2533(conv) 7533(NC)	1	1	REQD DATA NOT FOUND	There is no specified program or data.	Check the program No. or data No.
2534(conv) 7534(NC)	1	1	OPERATING COMMU DATA	The data desired for communication is currently being used.	Stop operation and start communication.
2535(conv) 7535(NC)	1	1	EDITING COMMUNI DATA	The data desired for communication is currently being edited.	Complete editing and start communication.
2536(conv) 7536(NC)	1	1	COMMUNI PARAM ERROR	[7 bit] is set to [character] and era is set to [trans data code] for communication parameter.	Check the parameter.
2537(conv) 7537(NC)	1	1	DR SIGNAL OFF	DR signal was turned off during communication. (Only when DR SIGNAL CHECK in parameter 4 is effective.)	Check the parameter.
2538(conv) 7538(NC)	1	1	CS SIGNAL OFF	CS signal was off during output of DC1 and DC3 codes.	Check the parameter.
2539(conv) 7539(NC)	1	1	RC BUFFER OVERFLOW	Receiving buffer has over flown. (256 bytes).	Check the parameter.
2540(conv) 7540(NC)	1	1	PARITY ERROR(COM)	PARITY error has occurred during data entry.	Check the parameter.
2541(conv) 7541(NC)	1	1	OVERRUN ERROR(COM)	Overrun error (data skip) has occurred during data entry.	Check the parameter.
2542(conv) 7542(NC)	1	1	FRAMING ERROR(COM)	Framing error (stop bit was not detected) occurred during data entry.	Check the parameter.
2543(conv) 7543(NC)	1	1	TIMEOVER (COM)	Data could not be received or transmitted during the time preset to RESPONSE MONITORING TIME of the parameter.	Check the parameter.
2544(conv) 7544(NC)	1	1	FORMAT ERROR(COM)	The header, data portion, or footer cannot be recognized.	Check the communication parameter or data.
2545(conv) 7545(NC)	1	1	LOAD HEADER ERROR	The format of the received header is not correct.	Check the format.
2546(conv) 7546(NC)	1	1	LOAD DATA NAME ERROR	The data name of the received header is not correct.	Check the data name.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2547(conv) 7547(NC)	1	1	RCV RSPONCE HEAD ERR	The received response header is not correct for the command requested through communication.	Check the response header.
2548(conv) 7548(NC)	1	1	LOAD RESPNCE ERR END	The response of error end was received for the command that has been sent.	Check any cause originating in the connected communication equipment.
2549(conv) 7549(NC)	1	1	CHECK ERROR	The contents of the machine data differ from those of input data.	
2550(conv) 7550(NC)	1	1	IGNORE LOAD (SYMBOL)	Invalid symbol was detected in the received data, thus the corresponding record was ignored.	Check the symbol in the data.
2551(conv) 7551(NC)	1	1	IGNORE LOAD (ASCEND)	The symbol in the received data is not in chronological order, thus the corresponding record was ignored.	Check the order of symbols in the data.
2552(conv) 7552(NC)	1	1	CONV. LOAD (ITEM QTY)	The number of items in one record of the received data is not correct. Excessive items are ignored. Nothing is set for missing items.	Check the record format.
2553(conv) 7553(NC)	1	1	CONV. LOAD (ITM RANGE)	The range of the item of the received data is not correct, thus changed. Nothing is set for the changed portion.	Check the value of each item.
2554(conv) 7554(NC)	1	1	COMMUNI DATA EDIT ER	Edit error has occurred during processing of communication data.	
2555(conv) 7555(NC)	1	1	SAVE DATA ERROR	The saved data format is not correct.	Edit the corresponding data again.
2556(conv) 7556(NC)	1	1	EXCESSIVE LOAD DIR.	The number of loaded directories has exceeded 256.	The number of directories to be loaded should be up to a maximum of 256.
2557(conv) 7557(NC)	1	1	COMMUNI TV CHECK ERR	The number of data in one block is incorrect.	Check the communication protocol.
2558(conv) 7558(NC)	1	1	RECEIVD DATA INVALID	The data that cannot be converted was received.	Check the communication protocol.
2560(conv) 7560(NC)	1	1	OVERWRITE PROTECT	Overwriting is prohibited for communication with slave station.	Check the communication parameter.
2561(conv) 7561(NC)	1	1	SEND(*)	The program indicated in brackets () was sent to an external device.	
2562(conv) 7562(NC)	1	1	SEND(*)	The data indicated in brackets () was sent to an external device.	
2564(conv) 7564(NC)	1	1	RECV(*)	The program indicated in brackets () was received from an external device.	
2565(conv) 7565(NC)	1	1	RECV(*)	The data indicated in brackets () was received from an external device.	
2566(conv) 7566(NC)	1	1	COMMUNI CHECKSUM ERR	The checksum of receiving response is not correct.	Set the checksum value correctly or set the checksum of user parameter (Communication) to [0:INVALID].
2567(conv) 7567(NC)	1	1	EXTERNAL ERROR 8	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause.
2568(conv) 7568(NC)	1	1	EXTERNAL ERROR 9	Error signal was input from the external PLC.	Check the conditions that external PLC alarm occur eliminate the cause.
2569(conv) 7569(NC)	1	1	EXTERNAL ERROR 10	EXER10 signal comes on.	Turn off the exer 10 and push [RST] key.
2570(conv) 7570(NC)	1	1	EXTERNAL ERROR 11	EXER11 signal comes on.	Turn off the EXER11 and push [RST] key.
2571(conv) 7571(NC)	1	1	EXTERNAL ERROR 12	EXER12 signal comes on.	Turn off the EXER12 and push [RST] key.
2572(conv) 7572(NC)	1	1	EXTERNAL ERROR 13	EXER13 signal comes on.	Turn off the EXER13 and push [RST] key.
2573(conv) 7573(NC)	1	1	EXTERNAL ERROR 14	EXER14 signal comes on.	Turn off the EXER14 and push [RST] key.
2574(conv) 7574(NC)	1	1	EXTERNAL ERROR 15	EXER15 signal comes on.	Turn off the EXER15 and push [RST] key.
2575(conv) 7575(NC)	1	1	EXTERNAL ERROR 16	EXER16 signal comes on.	Turn off the EXER16 and push [RST] key.
2576(conv) 7576(NC)	1	1	EXTERNAL ERROR 17	EXER17 signal comes on.	Turn off the EXER17 and push [RST] key.
2577(conv) 7577(NC)	1	1	EXTERNAL ERROR 18	EXER18 signal comes on.	Turn off the EXER18 and push [RST] key.
2578(conv) 7578(NC)	1	1	EXTERNAL ERROR 19	EXER19 signal comes on.	Turn off the EXER19 and push [RST] key.
2579(conv) 7579(NC)	1	1	EXTERNAL ERROR 20	EXER20 signal comes on.	Turn off the EXER20 and push [RST] key.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2580(conv) 7580(NC)	1	1	EXTERNAL ERROR 21	EXER21 signal comes on.	Turn off the EXER21 and push [RST] key.
2581(conv) 7581(NC)	1	1	EXTERNAL ERROR 22	EXER22 signal comes on.	Turn off the EXER22 and push [RST] key.
2582(conv) 7582(NC)	1	1	EXTERNAL ERROR 23	EXER23 signal comes on.	Turn off the EXER23 and push [RST] key.
2583(conv) 7583(NC)	1	1	EXTERNAL ERROR 24	EXER24 signal comes on.	Turn off the EXER24 and push [RST] key.
2584(conv) 7584(NC)	1	1	EXTERNAL ERROR 25	EXER25 signal comes on.	Turn off the EXER25 and push [RST] key.
2586(conv) 7586(NC)	1	1	EDITING AREA OVER	Editing contents have exceeded the editing capacity (64 Kbytes).	The memory area cannot be increased during editing, thus divide the program. When this error occurs when starting editing, this means the program is too large to edit.
2587(conv) 7587(NC)	1	1	SP LOCK SIGNAL ON	The spindle lock signal is on.	Turn it off.
2588(conv) 7588(NC)	1	1	ATC LOCK SIGNAL ON	The ATC lock signal is on.	Turn it off.
2589(conv) 7589(NC)	1	1	XY LOCK SIGNAL ON	The XY-axis lock signal is on.	Turn it off.
2590(conv) 7590(NC)	1	1	Z LOCK SIGNAL ON	The Z-axis lock signal is on.	Turn it off.
2591(conv) 7591(NC)	1	1	* LOCK SIGNAL ON	The axis 4 lock signal is on.	Turn it off.
2592(conv) 7592(NC)	1	1	* LOCK SIGNAL ON	The axis 5 lock signal is on.	Turn it off.
2593(conv) 7593(NC)	1	1	* LOCK SIGNAL ON	The axis 6 lock signal is on.	Turn it off.
2594(conv) 7594(NC)	1	1	SPINDLE OVERRIDE ON	The spindle override is set to the value other than 100%.	Set the spindle override to 100%.
2595(conv) 7595(NC)	1	1	CUT FEED OVERRIDE ON	Cutting feed override is set to a value other than 100%.	Set the cutting feed override to 100%.
2596(conv) 7596(NC)	1	1	RPD TRVS OVERRIDE ON	Rapid feed override is set to a value other than 100%.	Set the rapid feed override to 100%.
2597(conv) 7597(NC)	1	1	MODE CHANGE PROHIBIT	Mode changeover prohibition signal is on.	Turn the signal off.
2598(conv) 7598(NC)	1	1	DOOR LOCKED	The door OPEN/CLOSE switch was pressed while the door was locked.	
2599(conv) 7599(NC)	1	1	AREA SNSR OBSTRUCTED	The beam of the area sensor was obstructed while the door was opening or closing.	
2600(conv) 7600(NC)	1	1	TOOL ALRDY REGISTRD	The tool attempted to be set to [magazine tool] is already set for another pot.	Delete the current tool and set a new one.
2601(conv) 7601(NC)	1	1	NO TOOL IN MAGAZINE	The tool necessary for operation is not set in the magazine.	Set the correct tool on the <magazine tool> screen.
2602(conv) 7602(NC)	1	1	EDITING	Deleting and copying the data bank or changing the data bank number was attempted on the <directory of memory> screen during data bank editing.	Complete the data bank currently being edited.
2603(conv) 7603(NC)	1	1	INCORRECT TOOL TYPE	Replacement with a tool of incorrect type was attempted in manual operation mode.	
2604(conv) 7604(NC)	1	1	PROHIBITED POT	1) Setting other than "attachment of cap" was attempted for a prohibited pot on the <magazine tool> screen. 2) The tool was attempted to be changed with a prohibited pot.	1) Only "attachment of cap" can be set for a prohibited pot.
2605(conv) 7605(NC)	1	1	CAPPED	The tool was attempted to be replaced with a pot with the cap specified.	
2606(conv) 7606(NC)	1	1	EXCESSIVE TOOLS	Setting more than 30 tools per tool group was attempted.	Up to 30 tools can be set for one group.
2607(conv) 7607(NC)	1	1	TOOL SET TONEXT POT	Although a tool is set in the adjacent pot, a large tool was attempted to be set.	Delete the tool set to the adjacent pot or set the large tool in another location.
2608(conv) 7608(NC)	1	1	DELETE POS ERROR	Deletion was attempted at an incorrect position.	Move the cursor to the correct position.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2609(conv) 7609(NC)	1	1	NO MEASURING DATA	Automatic setting (parameter) was attempted although the measurement data does not exist.	Perform measurement using automatic centering function.
2611(conv) 7997(NC)	1	1	TOOL LEN SETTING ON	1) Changing mode was attempted during automatic tool length measurement. 2) The [m. lck] key was pressed.	Complete automatic tool length measurement.
2612(conv) 7612(NC)	1	1	OPERATING MANUALLY	Start data was attempted to be set during jog movement in ATC maintenance mode.	Stop jog movement and set the data.
2615(conv) 7615(NC)	1	1	NO OPTION (4)	Although an optional axis 4 is not provided, axis 4 operation was attempted to be performed.	Purchase an optional axis 4. When already provided, set [4 option] to [1: yes].
2616(conv) 7616(NC)	1	1	NO OPTION (5)	Although an optional axis 5 is not provided, axis 5 operation was attempted to be performed.	Purchase an optional axis 5. When already provided, set [5 option] to [1: yes].
2617(conv) 7617(NC)	1	1	NO OPTION (6)	Although an optional axis 6 is not provided, axis 6 operation was attempted to be performed.	Purchase an optional axis 6. When already provided, set [6 option] to [1: yes].
2618(conv) 7618(NC)	1	1	KEY OPE PROHIBITED	Key entry cannot be accepted because key operation prohibition signal is on.	Turn the signal off and then perform key entry.
2619(conv) 7619(NC)	1	1	PRGM EDIT PROHIBITED	Changing data was attempted while the program edit signal was on.	Turn the signal off and then change the data.
2620(conv) 7620(NC)	1	1	EDIT PROHIBITED	Changing data was attempted while the edit prohibition signal was on.	Turn the signal off and then change the data.
2621(conv) 7621(NC)	1	1	USER PARAM ERR (COM)	Setting of user parameter 3 (communication) is incorrect.	Check the setting.
2622(conv) 7622(NC)	1	1	SIDE DOOR OPEN	The machine was attempted to be operated while the side door was open.	Close the door and then operate the machine.
2623(conv) 7623(NC)	1	1	DATA ERR (DATA BANK)	Data structure of the non-selected data banks is damaged.	Delete the damaged data on the <directory of memory> screen in edit mode, and create new data.
2624(conv) 7624(NC)	1	1	SET POS ERROR	Setting data was attempted for a location where data cannot be set.	Set the data in other locations.
2625(conv) 7625(NC)	1	1	RCV COM ER END(***)	The command received communication with the TC slave resulted in an error.	Check the cause and send the command again.
2626(conv) 7626(NC)	1	1	COMMUNICATION I/F ER	An error occurred in the interface with communication device.	Refer to 9.1.21.
2627(conv) 7627(NC)	1	1	COMMUNI VER . CHECK ER	The version of the data attempted to be transmitted differs from that of system data version.	Edit the data again.
2628(conv) 7628(NC)	1	1	COMMU COMD END(***)	Communication command indicated in brackets()was ended.	
2629(conv) 7629(NC)	1	1	DELETE(***)	The data indicated in brackets ()was deleted during communication.	
2630(conv) 7630(NC)	1	1	DELETE(***)	The data indicated in brackets ()was deleted during communication.	
2634(conv) 7634(NC)	1	1	M PARAM CHNG DISABLE	Although input of machine parameter was attempted through communication, [parameter change] was set to [no].	When inputting the machining parameter, select [1. input/output] on the <I/O> screen, and set [parameter change] to [yes].
2635(conv) 7635(NC)	1	1	POT NOT FULLY RAISED	The pot is not at the upper end.	Press the [ATC] key to move the pot to the upper end.
2636(conv) 7636(NC)	1	1	DURING ATC	Changing to another mode was attempted during tool change.	The mode can not be changed during tool change.
2637(conv) 7637(NC)	1.	1	NO A/T THRM DISP COM	The compensation data screen was attempted to be opened although the automatic thermal displacement compensation function is not provided.	
2638(conv) 7638(NC)	1	1	MACHINE OPERATING	The C-axis is operating when the C-axis start point data is cleared.	Clear the data after the C-axis has stopped.
2639(conv) 7639(NC)	1	1	CNTRL BOX DOOR OPEN	The door of the control box is open.	Close the door of the control box.
2996(conv) 7996(NC)	5	3	KERNEL ERROR (MAIN)	An error has occurred in the main CPU operating system.	Refer to 9.1.22.
2998(conv) 7998(NC)	5	3	KERNEL ERROR (LOCAL)	An error has occurred in the local CPU operating system.	Refer to 9.1.22

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
2999(conv) 7999(NC)	5	2	NO ERROR NO.		Refer to 9.1.23.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
3200(conv)	4	2	PARITY ERR (TOOL)	Each data is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3201(conv)	4	2	PARITY ERR (PTRN)	Each data is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3202(conv)	4	2	PARITY ERR (HOLE)	Each data is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3203(conv)	4	2	PARITY ERR (CUTC)	Each data is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3204(conv)	4	2	DATA ERR (TOOL)	Each data structure is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3205(conv)	4	2	DATA ERR (PTRN)	Each data structure is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3206(conv)	4	2	DATA ERR (HOLE)	Each data structure is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3207(conv)	4	2	DATA ERR (CUTC)	Each data structure is destroyed.	Press [RST] key, an delete the destroyed data by memory display in edit mode and create new data again.
3208(conv)	4	2	IMPROPER DATA TYPE	Program of different type is to be started.	Check program.
3209(conv)	4	2	POS CALCUL IMP SBL	Improper command code is generated.	Check program.
3210(conv)	4	2	NO TOOL IN SPINDLE	Tool break checking (signal output m120) was executed with no tool set on spindle.	Check program.
3211(conv)	4	2	NO TOOL IN MENU	The tool to be used for machining is not included in the tool list.	Press the [RST] key and include the tool in the list.
3212(conv)	4	2	IMPROPER TOOL	The tool is not appropriate for machining or the tool list has been changed after the tool was assigned.	Press the [RST] key and assign the tool again.
3213(conv)	4	2	TOOL LENGTH NOT SET	Tool length is set to 0, or not set.	Set tool length after pressing [RST] key.
3214(conv)	4	2	N. D. NOT SPECIFIED	Number of pattern divisions is specified as 0.	Set no. of divisions after pressing [RST] key.
3215(conv)	4	2	N. M. NOT SPECIFIED	Machining number of patterns is specified as 0.	Set machining number after pressing [RST] key.
3216(conv)	4	2	TOO MANY N. M.	Machining number of patterns is specified beyond the range (999).	Set machining number again after pressing [RST] key.
3217(conv)	4	2	RPM NOT SPECIFIED	There is no peripheral speed set in cutting condition in memory operation, or it is set too small.	Set cutting conditions correctly after pressing [RST] key.
3218(conv)	4	2	FDRATE NOT SPECFD	There is no feed rate set in cutting condition in memory operation, or it is set too small.	Set cutting conditions correctly after pressing [RST] key.
3219(conv)	4	2	NO PECK DATA	Step data is set to 0 or no data in cutting condition in memory operation.	Set cutting conditions correctly after pressing [RST] key.
3220(conv)	4	2	DRILL DIA NOT SET	Od of drill or small dia. of drill to be used is not set or set to 0.	After pressing [RST] key, set od of drill in tool menu.
3221(conv)	4	2	NO PITCH DATA	Pitch data in tool menu is set to 0 or not set at all for tapping.	After pressing [RST] key, set pitch data.
3222(conv)	4	2	TAP SIZE ERROR	Denominator of inch screw thread size is 0.	After pressing [RST] key, set the nominal size of tap correctly.
3223(conv)	4	2	R OR L HAND ?	Data on torsion direction is not set in tool menu for tapping.	After pressing [RST] key, set torsion direction.
3224(conv)	4	2	R. COMP ERROR	Motion of tool dia. offset start-up cancel is in circular arc command.	Set linear command for motion of start-up /cancel after pressing [RST] key.
3225(conv)	4	2	TOO MANY LINES	Number of lines is set beyond the range (99). (cutting width is 0 or too small. or tool dia. is too small)	Press [RST] key, and set cutting width and tool dia. correctly

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
3226(conv)	4	2	TOO MANY INFEEDES	Depth of cut is too small	Press [RST] key and set depth of cut correctly.
3227(conv)	4	2	CORNER CALC IMPSBL	Calculation of corner r and c is not available in contouring or chamfering.	Modify corner r or c where error occurred after pressing [RST] key.
3228(conv)	4	2	POCKET IMPOSSIBLE	Too dia. is larger in pocket machining as shown below: circle : dia. Square : shorter one of X or Y track : width or tool radius is larger than corner r of square pattern. (excl. corner r or 0)	Press [RST] key and select a tool with dia. Smaller than pocket.
3229(conv)	4	2	CHAMFERING IMPSBL	Chamfer milling function comes first in pocketing.	Press [RST] key and assign tools again so that chamfer milling function comes after milling function.
3230(conv)	4	2	ATC IMPOSSIBLE	Before/after cutting, there is a tool change code in auxiliary function or tool or auxiliary function of motion call process.	Press [RST] key, and deleted tool change code.
3231(conv)	4	2	RPM OVER	Rotation commanded by MDI results in higher spindle speed than specified by machine parameter 1.	Press [RST] key and set the correct data.
3232(conv)	4	2	FEEDRATE OVER	Cutting commanded by MDI results in higher feedrate than max. cutting speed or max. rapid feedrate specified by machine parameter 1.	Press [RST] key and set the correct data.
3233(conv)	4	2	TOO LARGE R. COMP	During inner arc cutting in tool dia. Offset, programmed radius is smaller than dia. offset amount.	Press [RST] key, and set programmed radius larger than tool dia. offset amount.
3234(conv)	4	2	NO ENTRY M.CODE	Unregistered m code is to be executed.	Press [RST] key, and changed m code afterwards.
3235(conv)	4	2	ILLEGAL APPROACH	Cutter radius compensation is done on the center of line in rectangular or circular approach.	Press [RST] key, and modify approaching method afterwards.
3236(conv)	4	2	ILLEGAL RELIEF	Cutter radius compensation is done on the center of line in rectangular or circular release.	Press [RST] key, and modify release method afterwards.
3237(conv)	4	2	NO CUTTING LENGTH	Cutting length of the line of approach or release is not sufficient.	Press [RST] key, and modify the program afterwards.
3238(conv)	4	2	AXIS NOT DESIGNTD	No axis is designated in the program	Check the program.
3239(conv)	4	2	ILLEGAL AXIS	Axis is improperly designated in the program.	Check the program.
3240(conv)	4	2	R NOT DESIGNATED A	The A-axis radius is not specified in the program.	Check the program.
3241(conv)	4	2	R NOT DESIGNATED B	The B-axis radius is not specified in the program.	Check the program.
3242(conv)	4	2	A OUT OF COMMAND	During operation, A-axis operation has exceeded the range of 0~359.999.	Check the program.
3243(conv)	4	2	B OUT OF COMMAND	During operation, B-axis operation has exceeded the range of 0~359.999.	Check the program.
3244(conv)	4	2	NO NXT TOOL IN MGZ	Next tool is not set in the magazine.	Set next tool.
3245(conv)	4	2	NO ATC RTN HEIGHT	Return height for tool change is not set.	Set a return height.
3247(conv)	4	2	COORD. ROT. IMPOSS	X and Y positions cannot be calculated after coordinate rotation because the machining coordinate position of the X or Y-axis is not selected.	Correct the program and retry operation again. (set both the X and Y positions for XY movement within the first operation calling process.)
3248(conv)	4	2	NO REQUIRED DATA	Data disappeared for some reason during processing.	Refer to 9.3.8.
3253(conv)	4	2	CAN'T SET TOOL LEN	Protect switch was turned on as soon as tool length set was executed in automatic tool length measurement mode, or tool length set could not be executed for some reason.	More than one causative errors occur at the same time. Identify causes on alarm screen and remove.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
3257(conv)	4	2	NO PROGRAM (A)	A-axis motion command is executed in a program without A-axis.	Change the program.
3258(conv)	4	2	NO PROGRAM (B)	B-axis motion command is executed in a program without B-axis.	Change the program.
3259(conv)	4	2	NOT MEASURED IN INC	Zero measurement was attempted in incremental mode.	Switch to absolute mode and perform zero measurement.
3260(conv)	4	2	NOT MEASURED IN COOD	Zero measurement was attempted in coordinate rotation mode.	Cancel coordinate rotation and perform zero measurement.
3261(conv)	4	2	NOT MEASURED IN COMP	Zero measurement was attempted in diameter offset mode.	Cancel diameter offset and perform zero measurement.
3262(conv)	4	2	EXTRNL PROGRM NO. ERR	The selected external program no. of the scheduled program is 5 digits or more.	Numbers that can be used for scheduled program are up to 4 digits.
3263(conv)	4	2	TL BRK DET POS ERR	The detecting motion is going to execute in the position lower than the return position.	Push [RST] key and check the user parameter1 'return position of tool breakage detection' or make lower the 'inprocess return ' or 'intercoordinate return ' value in the program.
3264(conv)	4	2	RELEASE MACHINE LOCK	Tool replacement with the pot number (M701~749)specified was attempted in memory operation with the machine locked.	Release machine lock.(The tool cannot be replaced with pot specified while machine is locked.)
3700(conv)	3	2	PROGRAM ERROR	Program directory is destroyed.	Delete the program and reedit it after pressing [RST] key.
4450(conv)	1	1	RPM NOT SPECIFED	RPM is not specified even after speed command is given in MDI operation.	Specify speed and give speed command.
4451(conv)	1	1	AXIS NOT DSGNTD	Axis data is not specified even after motion command is given in MDI operation.	specify-axis data and give motion command.
4452(conv)	1	1	ILLEGAL AXIS	Simultaneous cutting using 3 axes other than x, y, and z was attempted in MDI mode or simultaneous cutting using 4 axes or more was attempted.	Simultaneous cutting using 3 axes is impossible if any optional axis is included.
4453(conv)	1	1	XYAB DSGNTD IN TAP	Tapping command is given with X, Y,A or B axes data set in MDI operation.	X, Y,A or B axes data can not be specified in tapping command.
4454(conv)	1	1	Z NOT DSGN IN TAP	Tapping command is given with no z-axis data set in MDI operation.	Specify z-axis data.
4455(conv)	1	1	FDRATE NOT SPECIFD	Cutting command is given with no feed rate set in MDI operation	Specify speed rate and give cutting command.
4456(conv)	1	1	FEED NOT SPECIFIED	Kind of feed is not specified in MDI operation.	Specify kind of feed.
4457(conv)	1	1	NO SCHEDULE PROGRAM	There is no schedule program available for operation.	Check schedule program number.
4458(conv)	1	1	NO SUBPROGRAM	Subprogram is not set in the program required for operation.	Set subprogram or deleted subprogram call process.
4459(conv)	1	1	NO. OF WKPCS ERROR	Workpiece number is not set.	Set workpiece number.
4460(conv)	1	1	TOOL ASGN NOT DONE	Tool assignment is not finished.	Assign tools.
4461(conv)	1	1	? CALC NOT DONE	Calculation of the unknown is not finished.	Check if line data is correctly set. assign tools afterwards.
4462(conv)	1	1	MACHINING ORD ERROR	Machining order other than 1-5 is set, or not set at all.	Set the machining order correctly.
4463(conv)	1	1	NO DIRECTION DATA	Operation is to be started without measuring direction set in automatic alignment.	Set measuring direction.
4464(conv)	1	1	DATA IMCOMPLETE	Data other than numerical values are set for the coordinate such as measuring start point, etc. when automatic aligning is started.	Set the data correctly again.
4465(conv)	1	1	ILLEGAL START SET	Operation is to be started by setting a start point in the coordinate setting process.	Check start point.
4466(conv)	1	1	NO TOOL IN SPINDLE	Spindle has no tool.	Set a proper tool in the spindle.
4467(conv)	1	1	R NOT DESIGNATED A	Radius is not designed in A-axis cutting.	Set radius.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
4468(conv)	1	1	R NOT DESIGNATED B	Radius is not designed in B-axis cutting.	Set radius.
4469(conv)	1	1	A OUT OF COMMAND	A-axis angle is improperly specified.	Check the program.
4470(conv)	1	1	B OUT OF COMMAND	B-axis angle is improperly specified.	Check the program.
4472(conv)	1	1	NO PROGRAM	There is no program available for operation.	Check program number.
4473(conv)	1	1	TOO MANY DIGITS	Data of more than allow able digits are set.	Set the data within the range.
4474(conv)	1	1	MINUS SIGN ASSIGNED	Minus data is set while minus input is not allowed.	Set plus data.
4475(conv)	1	1	JOB IN POS ERROR	Copy is to be taken where it is not allowed.	Shift the cursor to the position where copy can be taken in. (position of process)
4476(conv)	1	1	PROG NO. NOT SPECFD	Program number is not specified.	Specify program number.
4477(conv)	1	1	NO SEARCH DATA	There is no data to be searched.	Check if there is the data to be searched.
4478(conv)	1	1	TOO MANY NO. OF JOBS	The one hundredth process is to be created.	Number of processes should not exceed 99.
4479(conv)	1	1	SUBPRG ALRDY DSGNTD	Attempt of preparing a subprogram already prepared.	Use another number or deleted the existing subprogram number.
4480(conv)	1	1	ALTER POSITION ERR	Data in unchangeable position is to be modified.	Shift the cursor to changeable position and modify the data.
4481(conv)	1	1	DELETE IMPOSSIBLE	Deletion is to be done during insertion.	Press [INS] key again and stop insertion, or deleted after insertion.
4482(conv)	1	1	INSRT POSITION ERR	Insertion is to be done where it is not possible.	Shift the cursor to the proper position for insertion.
4484(conv)	1	1	CURSOR MOVE IMPSBL	Cursor is to be shifted to order data than on insertion during insertion.	Shift the cursor to the proper position after insertion of all the data.
4485(conv)	1	1	JOB OUT POS ERROR	Copy is to be inserted where it is not possible.	Shift the cursor to the proper position for inserting copy.
4486(conv)	1	1	TOO MANY MOTIONS	The one hundredth motion is to be made in motion program editing.	Number of motions should be within 99.
4487(conv)	1	1	TOO MANY LINES	The one hundredth line is to be made in editing of contouring or chamfering process.	Number of lines should be within 99.
4488(conv)	1	1	WK ZERO SET POS ERR	Working zero position is to be set where it is not possible.	Move the cursor to x of working zero position and set zero position.
4490(conv)	1	1	SEARCH IMPOSSIBLE	Search is to be performed during insertion.	Press [INS] key again and stop insertion, or perform search after insertion.
4492(conv)	1	1	TOO MANY SCHDL PRG	Number of schedule programs is to be set beyond 99.	Number of programs should be within 99.
4493(conv)	1	1	JOB IN NOT DONE	Copy is to be taken in but it is not possible.	Take in the data to be copied.
4494(conv)	1	1	TOO MANY NO. OF WKPC	Number of workpieces to be inserted is over 99.	Number of workpieces should be within 99.
4495(conv)	1	1	NO TOOL IN MENU	Tool not registered in tool menu is set in the magazine.	Register the required tool in the magazine.
4496(conv)	1	1	TOO MANY NO. POINTS	Number of machining holes (point random system) to be inserted is over 12.	Number of machining holes should be within 12.
4497(conv)	1	1	ASSIGN TOOL	Data on assignment is modified upon completion of tool assignment.	Assign tools again.
4498(conv)	1	1	CALCULATION ?	Data on calculation is modified upon completion of items with? mark.	Assign tools again.
4499(conv)	1	1	ATC RT. DATA DELETED	Machining order or assigned tool is modified.	
4500(conv)	1	1	SET MACHINING ORDER	Data on return height for tool change is to be edited without setting machining order.	
4501(conv)	1	1	NO ATC RTN DATA	Unavailable data on return height for tool change is to be used.	
4502(conv)	1	1	DATA ERR (PRGRM)	Unmatched unit program is set in edit.	Set matching unit program.
4503(conv)	1	1	WRONG TOOL LENGTH	The tool length set by the [tool offset] key becomes 0 or less.	Check user parameter (switch1) 'tool length compensation amount'.

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
4504(conv)	1	1	NO TOOL MENU DATA	There is no data on tool menu.	Set tool menu.
4505(conv)	1	1	NO PATTERN DATA	There is no data on tool pattern.	Set tool pattern.
4506(conv)	1	1	NO HOLE DATA	There is no data on drill hole dia. for tapping.	Set drill hole dia. for tapping.
4507(conv)	1	1	NO CUT COND DATA	There is no data on cutting conditions.	Set cutting conditions.
4508(conv)	1	1	MATERIAL NOT DESIGN	Workpiece material is cutting conditions.	Set workpiece material.
4509(conv)	1	1	REQD TOOL NOT FOUND	There is no tool for required machining function in tool assignment.	Check contents, etc. of machining data, tool pattern, drill hole dia. for tapping, cutting tools, cutting conditions and tool menu, and modify as required.
4510(conv)	1	1	TOO MANY TOOLS ASGD	The number of assigned tools has exceeded the maximum storage capacity .	Assign the tools appropriately with the program.
4511(conv)	1	1	NO JOB	There is no process in program.	Check machining data.
4512(conv)	1	1	NO DATA IN MENU	There is no data on specified tool in tool menu.	Set the data to the specified number in tool menu.
4513(conv)	1	1	INADEQUATE TOOL	Specified tools is not proper for machining.	Set proper tool for machining.
4514(conv)	1	1	TAP SIZE ERROR	Denominator of inch thread size is 0.	Set the correct tapping designation.
4515(conv)	1	1	JOB WITHOUT TOOL	Tools are not set in tool pattern in some process during assignment.	Set the tools in tool pattern before assignment.
4516(conv)	1	1	ILLEGAL TOOL PTRN	No tools is set in tool pattern for the required machining function in the process during assignment.	Check the tool pattern and modify as required.
4517(conv)	1	1	CALC OF ? IMPSBL	Calculation of the unknown is not available.	Modify machining data.
4518(conv)	1	1	DEPTH SHALLOW	When the tool stops at the hole bottom during center hole drilling or chamfering, the tip touches the bottom.	Check the contents of machining data and tool menu, and modify as required.
4519(conv)	1	1	SHALLOW COUNTERBORE	Tool touches counterbore surface in chamfering.	Check the contents of machining data and tool menu, and modify as required.
4520(conv)	1	1	WORK HEIGHT IMPRPR	Max. depth of cut calculated from workpiece height comes below table surface.	
4521(conv)	1	1	S. DIA TOO SMALL	Smaller dia. of tool is too small for machining data.	
4522(conv)	1	1	TL LNGT NOT SPECFD	Tool length is set to 0 or not set at all.	
4523(conv)	1	1	TL LIFE NOT SPECFD	Tool life is set to 0 or not set at all.	Check the contents of machining data and tool menu, and modify as required.
4524(conv)	1	1	TOOL TOO LONG	Tool is too long.	
4525(conv)	1	1	S. DIA TOO LARGE	Smaller dia. is too large.	
4526(conv)	1	1	IMPROPER S. DIA L	Smaller dia. is not proper.	
4527(conv)	1	1	S. DIA L TOO LONG	Smaller dia portion is too long.	
4528(conv)	1	1	IMPROPER S. DIA L	Smaller dia portion is not proper.	
4529(conv)	1	1	S.DIA L TOO SHORT	Smaller dia portion is too small.	
4530(conv)	1	1	TOOL TOO SHORT	Tool does not reach the bottom of cut.	
4531(conv)	1	1	TOOL DIA TOO SMALL	Tool od is too small.	
4532(conv)	1	1	IMPROPER TOOL DIA	Tool od is not proper.	
4533(conv)	1	1	IMPROPER CENTER ANG	Center angle is not proper.	
4534(conv)	1	1	IMPROPER CHAMF ANG	Chamfer angle is not proper.	
4535(conv)	1	1	FLUTE TOO SHORT	Flute is too short.	
4536(conv)	1	1	TORSION IMPROPER	Torsion direction of tap is not proper.	
4537(conv)	1	1	THREAD IMPROPER	Kind of tap is not proper.	
4538(conv)	1	1	THREAD DIA IMPROPER	Dia. of thread is not proper.	
4539(conv)	1	1	PITCH IMPROPER	Pitch or number of threads of tap is not proper.	

NO.	STOP LEVEL	RESET LEVEL	ERRORMESSAGE	CAUSE	SOLUTION
4540(conv)	1	1	PRIMARY DEPTH INSUF	Primary depth is not sufficient.	Check the contents of machining data and tool menu, and modify as required.
4541(conv)	1	1	NO TOOL NUMBER	Tool check is to be performed where tool number is not set.	Set tool number, or perform tool check where tool number is set.
4542(conv)	1	1	TOOL DIA TOO LARGE	Tool od is too large.	Check contents of machining data, tool menu, tool pattern, cutting conditions, etc. and modify as required.
4543(conv)	1	1	POCKET NOT DONE	Chamfering is to be done before pocketing. (chamfer milling function comes first.)	Check program.
4544(conv)	1	1	MIN. DISTANCE (SIDE)	There is interference at the side in chamfering.	
4545(conv)	1	1	MIN. DISTANCE (BTM)	There is interference at the bottom in chamfering.	
4546(conv)	1	1	B. H. NOT THROUGH	Tool which can not be used for blind hole is set.	
4547(conv)	1	1	DIFRNT TL FROM CUTC	Tool not set in cutting conditions is to be used.	
4548(conv)	1	1	TOO LARGE CONER R	Corner r is longer than the half of X or Y whichever is shorter in a square pocket in the pocketing operation.	
4549(conv)	1	1	APPROACH RAD SMALL	Approach radius (in program) in chamfering process is smaller than tool radius.	
4564(conv)	1	1	TOOL MENU EDITING	[start] key was pressed in automatic tool length measurement mode during tool menu editing.	Complete editing tool menu.
4565(conv)	1	1	LARGE OPE PROGRAM	Machining data size is larger than buffer capacity.	Divide the machining data. using the scheduled program function, divided machining data can be used for continuous operation.
4566(conv)	1	1	OPEN ERROR (PROGRAM)	The operation program cannot be analyzed.	Refer to 9.3.9.
4567(conv)	1	1	OPEN ERROR (CUT COND)	Cutting conditions cannot be referred to.	Refer to 9.3.9.
4568(conv)	1	1	WRONG M/C UNIT SYS	When selected memory operation mode, the dimention unit of set program is not same with the dimention unit of machine.	Reset the program to which having the same dimension unit with the machine.
4569(conv)	1	1	NO ZERO MEASUREMENT	Zero measurement was attempted although zero measurement option is not provided.	Please purchase the option.
4570(conv)	1	1	NO THREAD CUTTING	Helical screw cutting was attempted although screw cutting option is not provided.	Please purchase the option.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
8200(NC)	4	2	NO WORK ZERO DATA	There is no data of working zero position.	Create the data on working zero position in the data setting mode or input it externally.
8201(NC)	4	2	NO TOOL DATA	There is no tool data.	Create the tool data in the data setting mode, or input it externally.
8202(NC)	4	2	NO MACRO VARIA. DATA	There is no macro parameter data.	Create a macro parameter data or input it externally.
8203(NC)	4	2	PARITY (WORK ZERO)	Working coordinate zero position data was damaged.	Press [RST] key, and data by memory screen new data again.
8204(NC)	4	2	PARITY (TOOL DATA)	Tool data was damaged.	Press [RST] key, and data by memory screen new data again.
8205(NC)	4	2	PARIT (MACRO VARIA)	Macro parameter data was damaged.	Press [RST] key, and data by memory screen new data again.
8206(NC)	4	2	DATA ERR (WORK ZERO)	The structure of the working coordinate zero position data was damaged.	Press [RST] key, and data by memory screen new data again.
8207(NC)	4	2	DATA ERR (TOOL DATA)	The structure of the tool data was damaged.	Press [RST] key, and data by memory screen new data again.
8208(NC)	4	2	DATA ERR (MACRO VAR.)	The structure of the macro parameter data was damaged.	Press [RST] key, and data by memory screen new data again.
8209(NC)	4	2	R. COMP ERROR	1) The tool dia offset start-up or cancel motions are by the circular arc command. 2) X or Y axis and rotating axis (A, B, or C) simultaneous cutting feed command was given in tool offset mode.	Press the [RST] key and change this motions according to the linear command. Check the program.
8210(NC)	4	2	TOO LARGE R. COMP	The programmed radius is smaller than the dia offset amount during the inner circular arc cutting.	Press the [RST] key and change the program- med radius to be more
8211(NC)	4	2	NO R/Z COMMAND	The R or Z point is not commanded in the canned cycle.	Press the [RST] key and command the R and Z points.
8212(NC)	4	2	NO PITCH DATA	The tapping pitch is set to 0 or not set.	Press the [RST] key and set the pitch data.
8213(NC)	4	2	RESTART ERROR	The specified sequence No. is not found.	Press the [RST] key and check the specified sequence No.
8214(NC)	4	2	TOO MANY TOOLS ASGD	The number of tools used for the program is larger than the number of tool pots.	Press the [RST] key and check the program.
8215(NC)	4	2	FIXED CYCLE ADRS ERR	Necessary address is not found in canned cycle, or unnecessary address was specified.	Press the [RST] key and check the program.
8216(NC)	4	2	ZERO MESR ADRS ERR	Necessary address is not found in zero position measurement command or unnecessary address was specified.	Press the [RST] key and check the program.
8217(NC)	4	2	Z MESRMENT COMD ER	Thermal measurement command or tool breakage detection command format is incorrect.	Press the [RST] key and check the program.
8218(NC)	4	2	MACRO COMMAND ERROR	The format specified by the macro command is incorrect.	Press the [RST] key and check the program.
8219(NC)	4	2	THRM COMP IMPOSSIBLE ”	Thermal compensation was attempted although thermal measurement was not performed.	Refer to the reference program for thermal measurement.
8220(NC)	4	2	T-CODE RANGE ERROR	The “T” command is out of the specified range.	Check the program.
8221(NC)	4	2	LARGE OPE PROGRAM	Program size is larger than buffer capacity	Press the [RST] key and correct the program.
8700(NC)	3	2	COMMAND INVALID (G)	3-digit G code which is not available is specified.	Press the [RST] key and check the program.
8701(NC)	3	2	INVALID COMMAND	The G and M codes are commanded in the same block, though it is not allowable.	Press the [RST] key and check the program.
8702(NC)	3	2	COMMAND INVALID (M)	3-digit M code which is not available is specified.	Press the [RST] key and check the program.
8703(NC)	3	2	INVALID CH COMMAND	Characters not accepted are commanded.	Press the [RST] key and check the program.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
8704(NC)	3	2	SAME CODE INVALID	More than one M code is commanded in a block.	Press the [RST] key and check the program.
8705(NC)	3	2	INVALID VALUE DATA	The command format is not correct.	Press the [RST] key and check the program.
8706(NC)	3	2	DATA RANGE ERROR	Commanded value exceeds address range.	Press the [RST] key and check the program.
8707(NC)	3	2	CH/BLOCK OVER	No. of characters in one block exceeds 128.	Press the [RST] key and check the program.
8708(NC)	3	2	COMMAND INVALID G, M	The G and M codes which cannot be intervened mutually in the MDI mode are commanded in the memory operation.	Press the [RST] key and check the program.
8709(NC)	3	2	NO PROG END CODE	There is no M02 or M30 command.	Press the [RST] key and check the program.
8710(NC)	3	2	ARC COMMAND ERROR	Wrong command is given in the circular arc command.	Press the [RST] key and check the program.
8711(NC)	3	2	SUB PROG CALL ERROR	The subprogram nesting exceeds 8 loops.	Press the [RST] key and check the program.
8712(NC)	3	2	SUB PROG NO. ERROR	The subprogram which can not be called is called.	Press the [RST] key and check the program.
8713(NC)	3	2	MODAL SUBPRG RTN ERR	G66 was commanded in mode other than macro modal call mode or tool dia offset was not canceled when returning from the sub program.	Press the [RST] key and check the program.
8714(NC)	3	2	FEEDRATE ERROR	The F command is not given during the cutting feed, or the commanded value exceeds the limit.	Press the [RST] key and check the program.
8716(NC)	3	2	NO INTERSECTION	The cross point is not obtained during the inner cutting of tool dia offset.	Press the [RST] key and check the program.
8717(NC)	3	2	WORK CAL ADDRESS ERR	Necessary address is not found when the coordinate calculation is commanded, or the value exceeding the allowable range is commanded.	Press the [RST] key and check the program.
8718(NC)	3	2	IN ARC MODE	The coordinate calculation is commanded in the circular arc mode.	Press the [RST] key and check the program.
8719(NC)	3	2	COMMENT ERROR	The control OUT/IN codes are not in the same block.	Press the [RST] key and check the program.
8720(NC)	3	2	NO T—CODE COMMAND	The T command is not given while G100 or M06 is in execution.	Press the [RST] key and check the program.
8721(NC)	3	2	SUB PROGM RETURN ERR	The return number was specified by the program return command while the number of repeats was specified for sub program call.	Press the [RST] key and check the program.
8722(NC)	3	2	MACRO PROGM CALL ERR	The macro program call nesting exceeds 4 loops.	Press the [RST] key and check the program.
8723(NC)	3	2	NO APPLICABLE SEQ	The sequence No. specified by the sub program return command or that specified by the macro command (GOTO) was not found.	Press the [RST] key and check the program.
9450(NC)	1	1	NO PROGRAM (✱)	Specified program is not found. Figures in () indicate the program No.	Check the program No.
9451(NC)	1	1	NO SUBPROGRAM (✱)	Specified subprogram is not found. Figures in () indicate the subprogram No.	Set the subprogram, or delete the subprogram call cycle.
9452(NC)	1	1	NO APPLICABLE SEQ	Specified sequence No. is not found.	Check the specified sequence No.
9453(NC)	1	1	SEQ NO. ERROR	The sequence No. in the program is not correct.	Check the sequence No. in the program.
9454(NC)	1	1	SUB PROG NO. ERROR	The subprogram No. in the program is not correct.	Check the subprogram No. in the program.
9455(NC)	1	1	NO DIRECTION DATA	Measuring direction is not set.	Set measuring direction.
9456(NC)	1	1	DATA IMCOMPLETE	The data other than numerical values are set to [CENTER ALIGNMENT] or [AUTOMATIC TOOL LENGTH MEASUREMENT].	Set the data correctly.
9457(NC)	1	1	TOOL NO. IS NOT SET.	The group number was attempted to be set although the tool number was not set to [Magazine Tool].	Set the tool number and then group number.

NO.	STOP LEVEL	RESET LEVEL	ERROR MESSAGE	CAUSE	SOLUTION
9458(NC)	1	1	IN COORD. ROTTN. MODE	MDI operation was attempted to be executed during memory operation.	Cancel the coordinate rotation and execute MDI operation.
9459(NC)	1	1	PALLET SELECT SW OFF	Restart or sequence search was attempted while the pallet select switch is on.	Turn off the pallet select switch and retry.
9460(NC)	1	1	CORNER C/R IS ON	The MDI was operated while memory operation of the corner C/R was operating.	Start the MDI operation when the corner C/R operation was finished.
9461(NC)	1	1	BLOCK NUMBER OVER	The number of blocks to be loaded or deleted is too large.	Delete the number of such blocks.
9462(NC)	1	1	NO DATA FOUND	The character string to be searched for or replaced was not found.	Change the character string to be searched for or replaced.
9463(NC)	1	1	IN OPERATION	Deleting or copying the data bank was attempted during memory operation.	Complete the memory operation first and then delete or copy the data bank.
9464(NC)	1	1	RESTARTING	Changing the data or executing MDI operation was attempted while restarting.	Execute it after finishing the restart motions.
9466(NC)	1	1	MEMORY OVER FLOW	If you are editing, reduce the current program capacity before storing it or delete other programs to create greater free memory area, and edit the program again.	Reduce the program capacity and store it during editing. Or delete other programs to make a free area and edit it again.
9467(NC)	1	1	NO REGISTERED TOOL	A tool is not set to the group that was attempted to be set to [Magazine Tool].	Check the tool group setting.

11.8 Servo error message

DISPLAY	No	CAUSE	SOLUTION
OC	1	Overcurrent.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
AOH	2	Register DB in the amplifier is overheating.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
EOH	3	The external regenerative.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
OV	4	Overvoltage.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
CPE	6	Controller power supply has decreased.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
DE1	7	Encoder signal line is broken.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DE2	8	Serial broken wire.	Main power supply voltage drop.
OL	9	Overloaded.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer
OS	10	Overspeed.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
MPE	11	Main power error.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
FP	12	Main circuit open phase.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RGE	13	Regenerative register is overloaded.	Turn off the power supply. After 15 to 20 minutes, check the condition. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DSPE	14	DSP error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
ROME	15	Memory error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
PARE	16	Servo parameter error.	Check the following servo parameter settings. Motor type (*13) Limit of current while preventing drop due to dead load (*18)
BATT DROP	17	Battery voltage drop.	Replace alkaline battery for absolute encoder backup.
CSE	18	Encoder error in initial state.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
MOC	19	Motor overcurrent.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DTO	20	Command monitor timer has expired. (No command has been received from the amplifier within 4 msec)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
STO	21	Response monitor timer has expired. (No command has been received from the amplifier within 4 msec)	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SYS1	22	Servo error signal was input but alarm number was not notified.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SYS2	23	Servo error signal was input but undefined alarm number was issued.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
INI	24	Communication between the NC and amplifier was impossible when the power was turned on.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SS	25	Already transmitting when the data was attempted to be transferred to the amplifier.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SR	26	Already receiving when the data was attempted to be transferred to the amplifier.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
CRCE	27	CRC error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
FRME	28	Framming error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

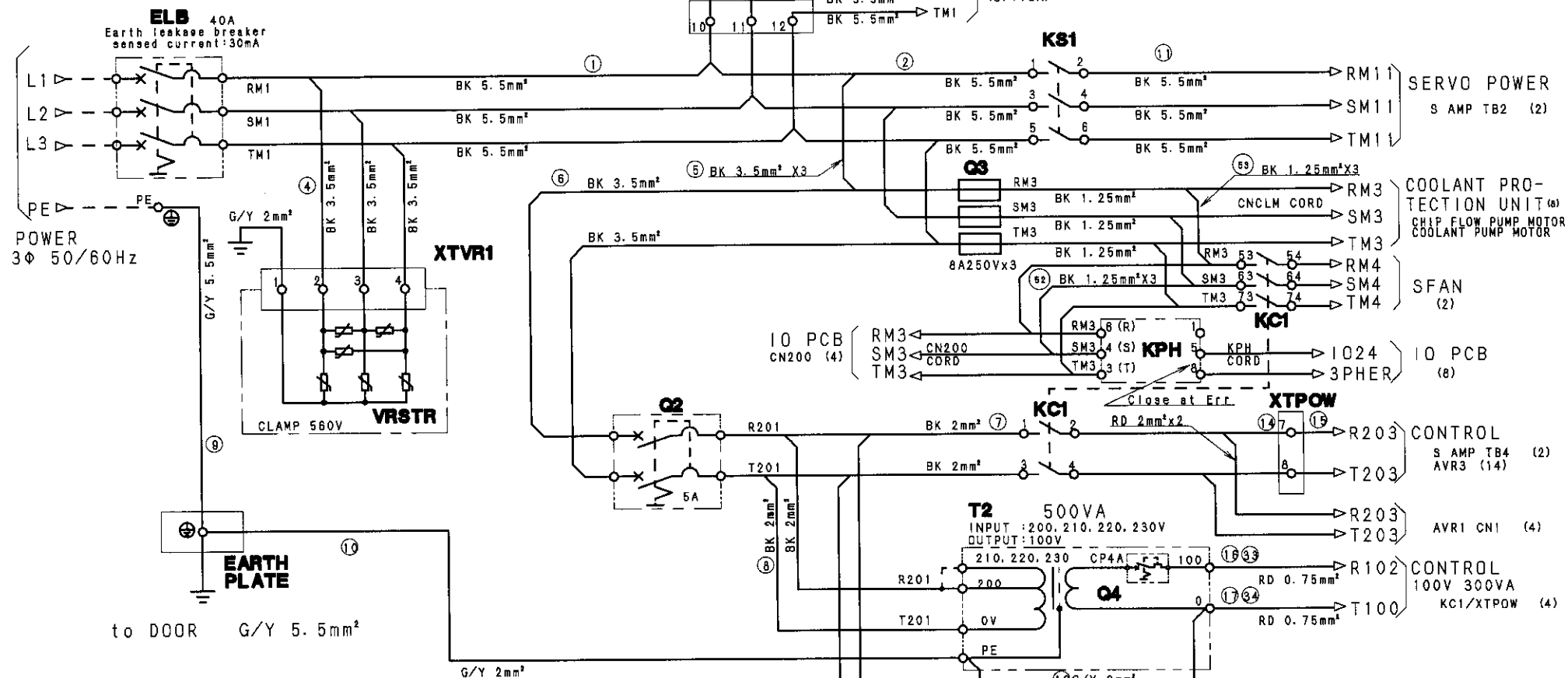
DISPLAY	No	CAUSE	SOLUTION
VERE 1	29	Output data to the amplifier was incorrect. (Data bank of servo amplifier 3,4,5)	This error occurs when power is turned on for the first time after replacing the servo amplifier. Turn the power off and then on again. If the error still occurs, check the following servo parameter settings: If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
ATO	30	Amplifier timeout error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RSTM	31	Amplifier RST input has decreased during servo on.	Check power supply voltage, capacity, momentary service interruption, and correct them as necessary. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
SCE	32	CRC error for synchronized frame.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
RECD	33	Encoder signal reading impossible error.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
VERI	34	The motor type, encoder pulse, and encoder type previously set do not coincide with those set this time. This error will occur only to the PV amplifier..	Set the following servo parameters correctly, and turn the power off and then on again. Upon this operation, the [SERVO (VERI)] message will appear again. Just turn the power off and then on again. Motor type (*13) Encoder pulse (*14) Encoder type (*15)
SRE	35	Serial receiving error	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
PSE	36	Encoder stopped receiving serial signal.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
VERE2	37	Output data to the amplifier was incorrect. (Data bank of servo amplifier 6,7)	Check the servo parameter settings. If the error still occurs, it may be due to machine failure and the like. Contact the nearest BROTHER approved service dealer.
DE11	38	The encoder signal was recovered while the DE1 alarm is current.	This error may occur due to machine failure and the like. Contact the nearest BROTHER approved service dealer.

Chapter12 Electrical circuit

部品コード PARTS CODE	品名 PARTS NAME	分割 SHEET	備考 REMARK
677501001	TCS2B カイロス 1 TCS2B CIRCUIT 1	1/3	200V POWER INPUT
		2/3	400V POWER INPUT (EXCEPT EU)
		3/3	400V POWER INPUT (EU)
677502001	TCS2B カイロス 2 TCS2B CIRCUIT 2		主軸回路 SPINDLE CIRCUIT
677503001	TCS2B カイロス 3 TCS2B CIRCUIT 3	1/2	送り軸回路 (EU以外) FEED AXIS CIRCUIT (EXCEPT EU)
		2/2	送り軸回路 (EU) FEED AXIS CIRCUIT (EU)
677504001	TCS2B カイロス 4 TCS2B CIRCUIT 4		IO PCB 1
677505001	TCS2B カイロス 5 TCS2B CIRCUIT 5		IO PCB 2
677506001	TCS2B カイロス 6 TCS2B CIRCUIT 6		IO PCB 3
677507001	TCS2B カイロス 7 TCS2B CIRCUIT 7		IO PCB 4
677508001	TCS2B カイロス 8 TCSB2 CIRCUIT 8		マガジン&ATC回路 MAGAZINE & ATC CIRCUIT
677509001	TCS2B カイロス 9 TCS2B CIRCUIT 9		C保護ユニット COOLANT PROTECTION UNIT
677510001	TCS2B カイロス 10 TCS2B CIRCUIT 10		中圧クーラント装置 (オプション) MIDDLE PRESSURE COOLANT EQUIPMENT (OPTION)
677511001	TCS2B カイロス 11 TCS2B CIRCUIT 11		基板間接続フック図 BLOCK DIAGRAM OF CONNECTION BETWEEN PCB
677512001	TCS2B カイロス 12 TCS2B CIRCUIT 12		サーボ信号線 SERVO SIGNAL CIRCUIT
677513001	TCS2B カイロス 13 TCS2B CIRCUIT 13		IO PCB 5
677514001	TCS2B カイロス 14 TCS2B CIRCUIT 14		操作ホックス 1 OPERATION BOX 1
677515001	TCS2B カイロス 15 TCS2B CIRCUIT 15		操作ホックス 2 OPERATION BOX 2
677516001	TCS2B カイロス 16 TCS2B CIRCUIT 16		手動パルス発生器 MANUAL PULSE GENERATOR
677517001	TCS2B カイロス 17 TCS2B CIRCUIT 17		EXIO PCB (OPTION)
677518001	TCS2B カイロス 18 TCS2B CIRCUIT 18		自動給油装置コントローラ (オプション) LUBRICATOR CONTROLLER (OPTION)
677519001	TCS2B カイロス 19 TCS2B CIRCUIT 19		INTERLOCK CIRCUIT
677520001	TCS2B カイロス 20 TCS2B CIRCUIT 20	1/3	200V POWER CIRCUIT
		2/3	400V POWER CIRCUIT (EXCEPT EU)
		3/3	400V POWER CIRCUIT (EU)

TC-S2B カイロス
TC-S2B CIRCUIT
677500001

200V POWER INPUT

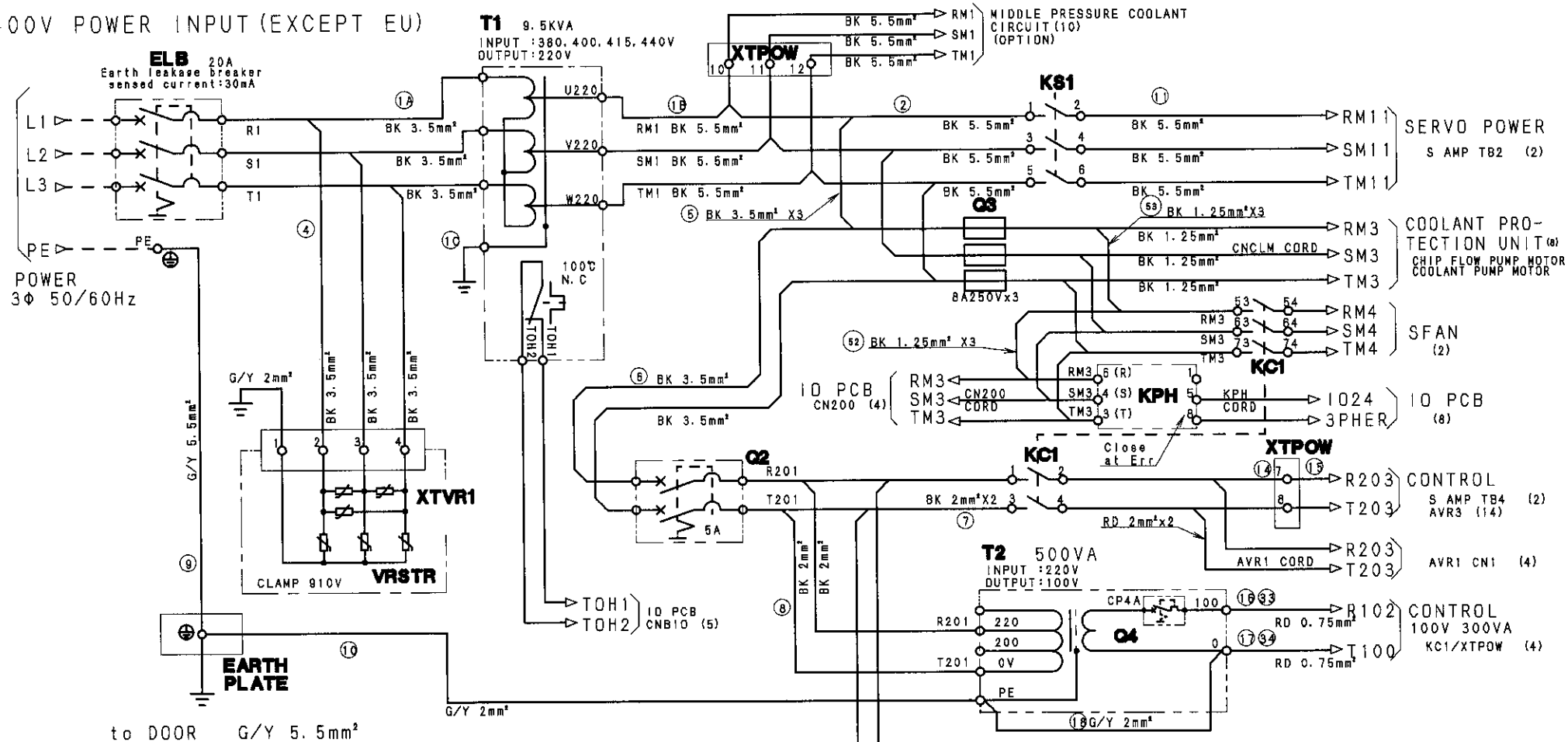


使用電線一覧表 Table of used electric wires	
22mm² (AWG4)	適用電流 65Amax (UL1283相当)
14mm² (AWG8)	適用電流 46Amax (UL1283相当)
8.0mm² (AWG8)	適用電流 34Amax (UL1283相当)
5.5mm² (AWG10)	適用電流 24Amax (UL1015相当)
3.5mm² (AWG12)	適用電流 18Amax (UL1015相当)
2.0mm² (AWG14)	適用電流 12Amax (UL1015相当)
1.25mm² (AWG16)	適用電流 9Amax (UL1015相当)
0.75mm² (AWG18)	適用電流 6Amax (UL1015相当)
0.5mm² (AWG20)	適用電流 4Amax (UL1015相当)

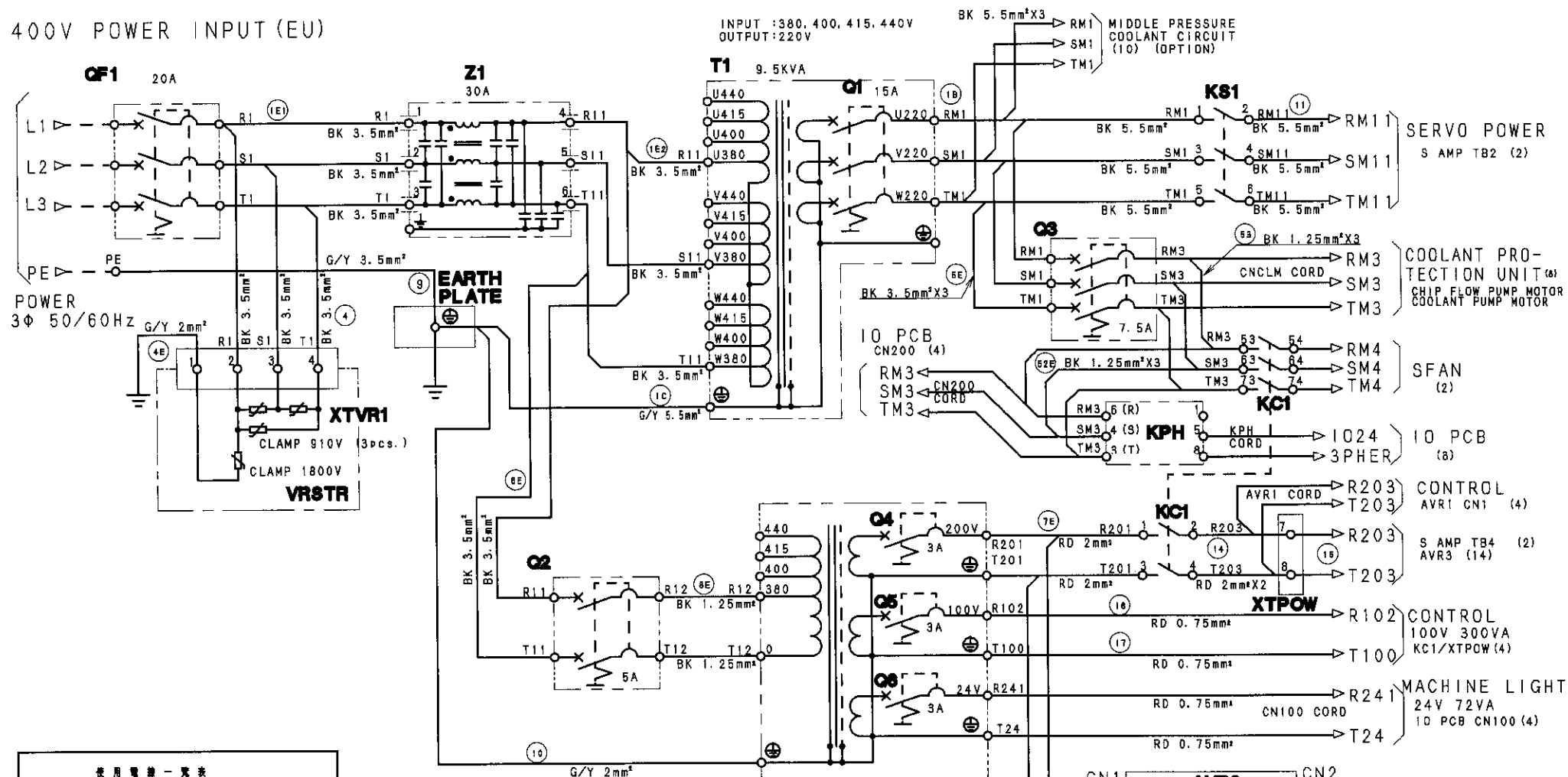
トランスタップ設定 (T2)
Transformer Tap setting

	T2 出荷時接続先 at delivery
日本 Japan	200
韓国, 台湾, ノルウェー Korea, Taiwan, Norway	210
アメリカ USA	230

400V POWER INPUT (EXCEPT EU)



400V POWER INPUT (EU)



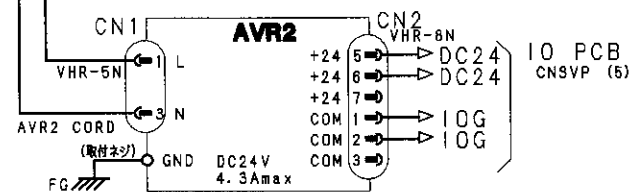
使用電線一覽表
Table of used selectric wires

2.2mm ² (AWG4)	適用電流	6.5Amax (UL1283相当)
1.4mm ² (AWG6)	適用電流	4.5Amax (UL1283相当)
0.8mm ² (AWG8)	適用電流	3.4Amax (UL1283相当)
0.5mm ² (AWG10)	適用電流	2.4Amax (UL1015相当)
0.3mm ² (AWG12)	適用電流	1.8Amax (UL1015相当)
0.2mm ² (AWG14)	適用電流	1.2Amax (UL1015相当)
0.125mm ² (AWG16)	適用電流	0.9Amax (UL1015相当)
0.075mm ² (AWG18)	適用電流	0.8Amax (UL1015相当)
0.05mm ² (AWG20)	適用電流	0.4Amax (UL1015相当)

トランスタップ° 設定 (T1, T2)
Transformer Tap setting

トランスタップ* 設定 (T1, T2) Transformer Tap setting		出荷時接続先 at delivery
英国以外の欧州	Except England	380
		400
英国	England	415
		440

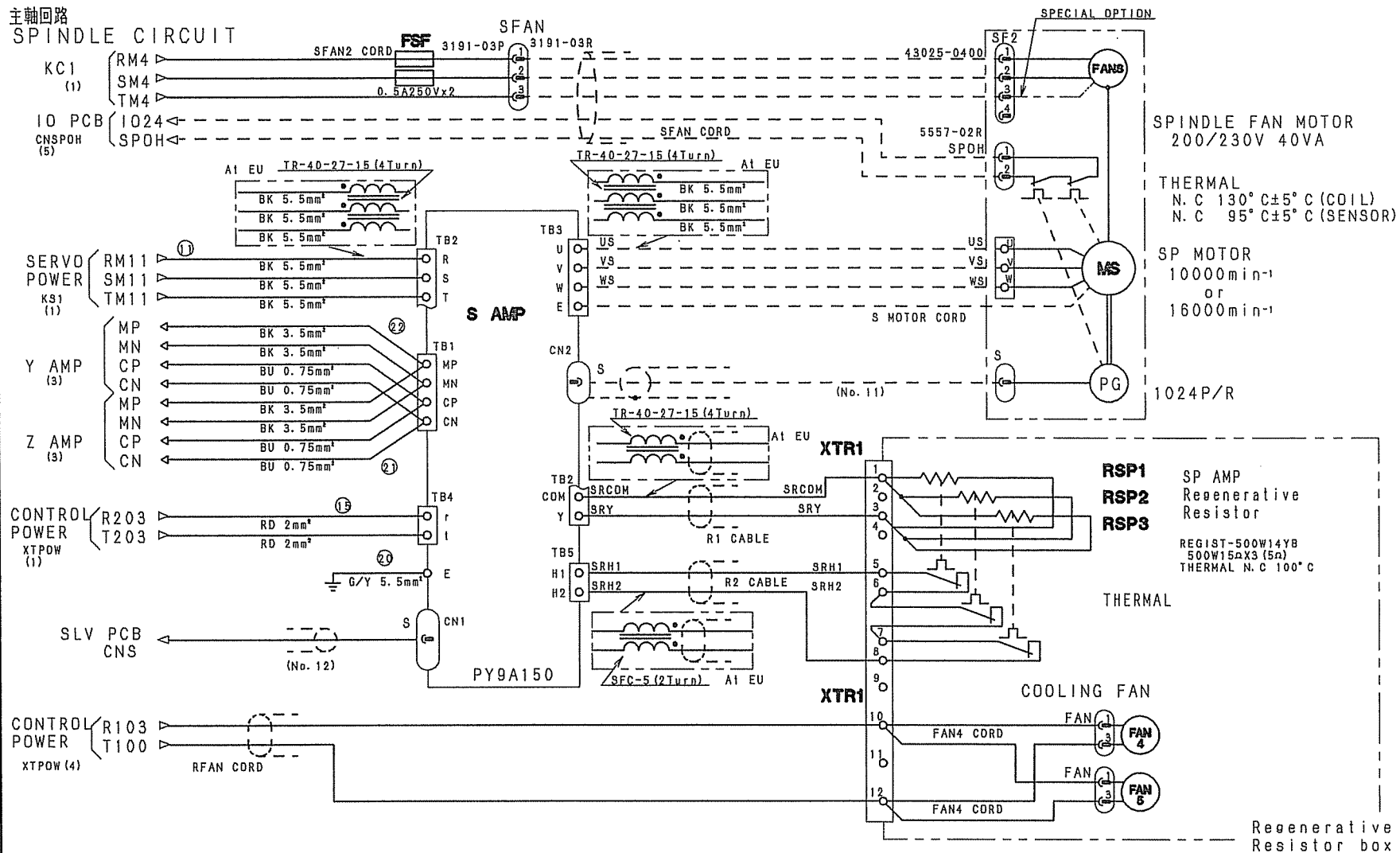
T2 972VA
INPUT : 380, 400, 415, 440V
OUTPUT: 200V, 100V, 24V



TC-S2B カイロズ 1
TC-S2B CIRCUIT 1
677501001 3/3

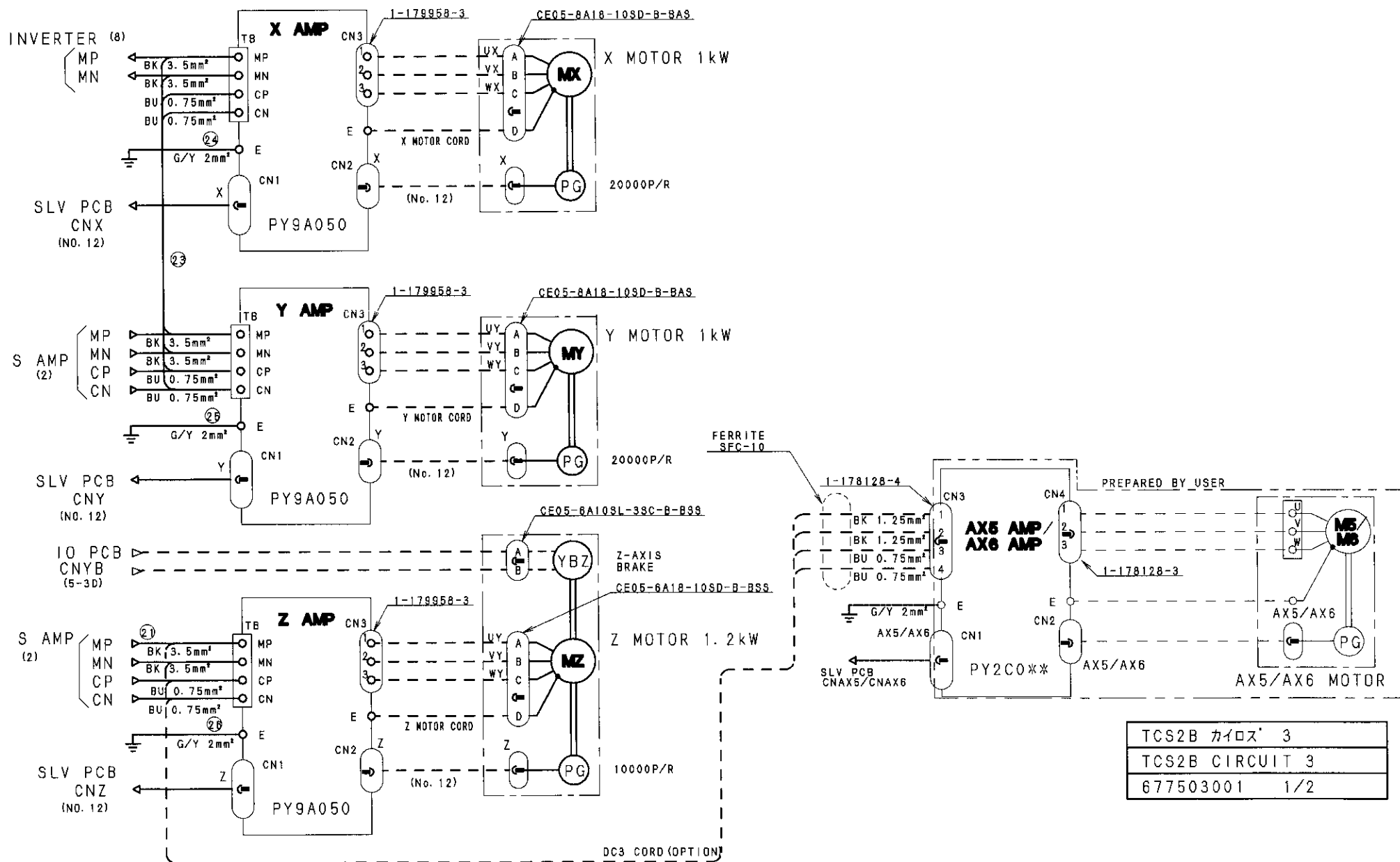
主軸回路

SPINDLE CIRCUIT



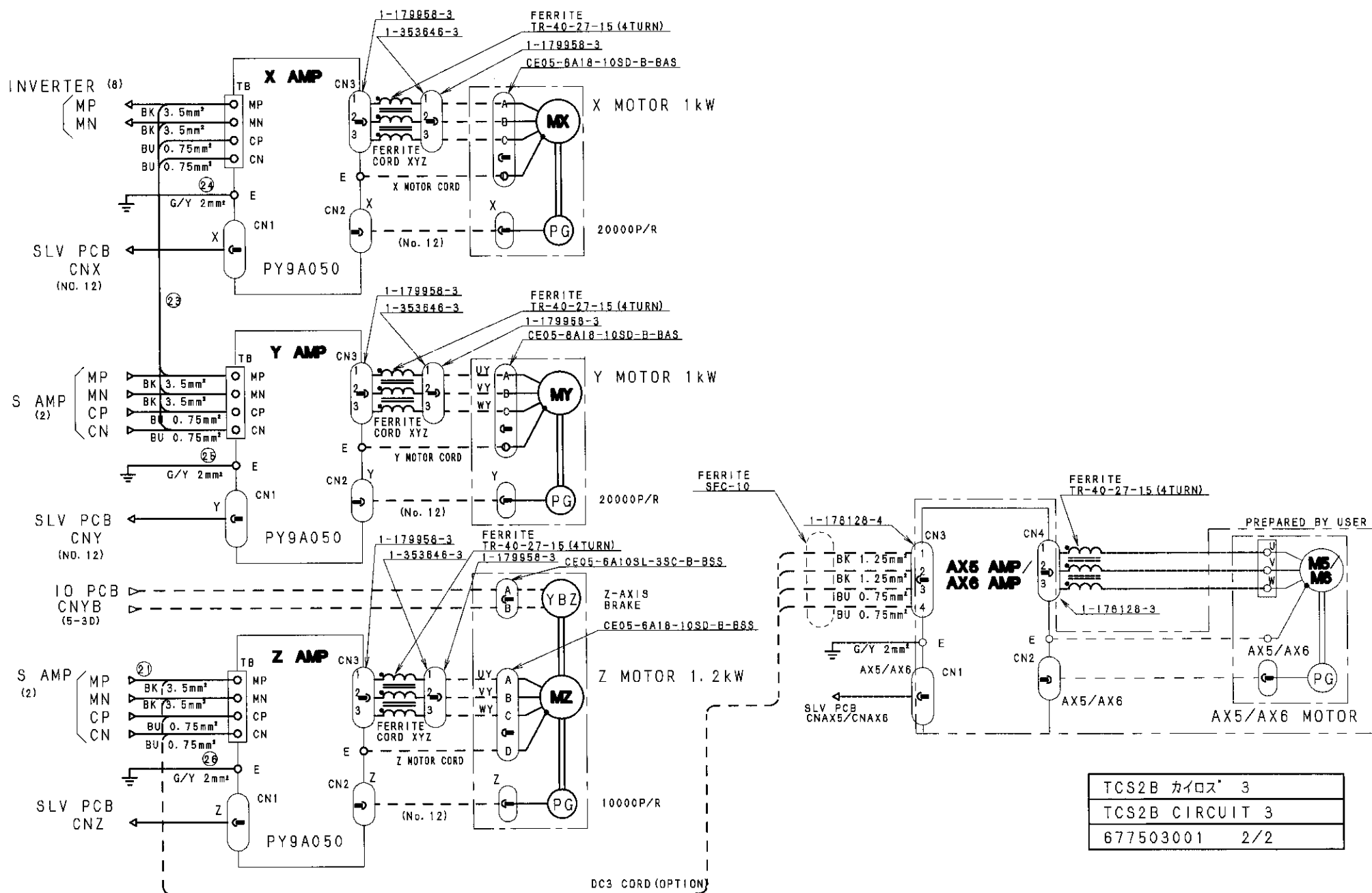
TCS2Bカイロス 2
TCS2B CIRCUIT 2
677502-001

送り軸回路 (ヨーロツハ° 以外)
FEED AXIS CIRCUIT (EXCEPT EU)



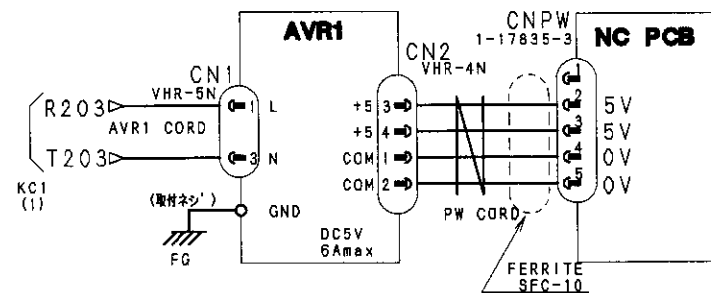
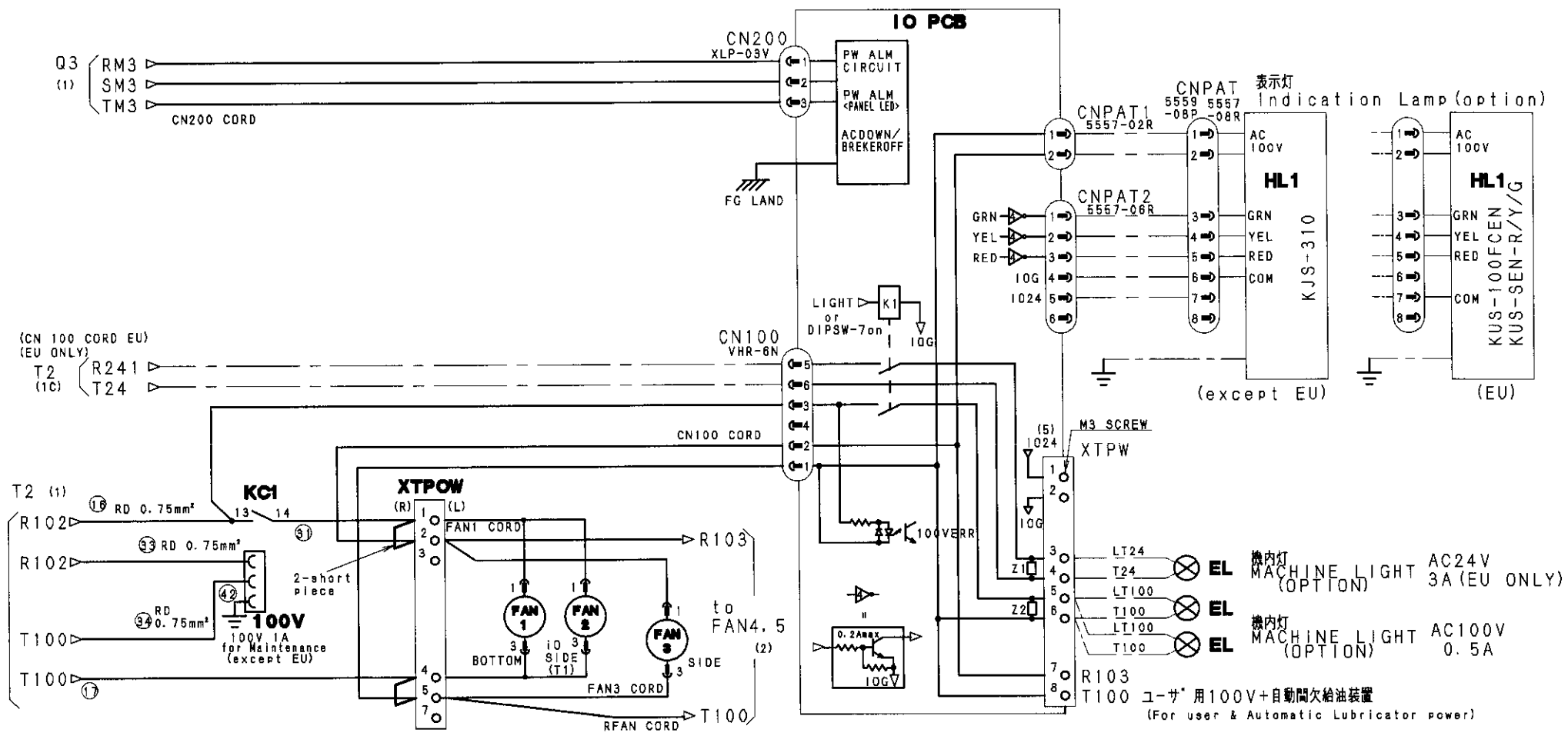
TCS2B カイロス	3
TCS2B CIRCUIT 3	
677503001	1/2

送り軸回路 (ヨーロツハ°)
FEED AXIS CIRCUIT (EU)



TCS2B カイロス*	3
TCS2B CIRCUIT	3
677503001	2/2

IO PCB 1



TCS2B カイロス	4
TCS2B CIRCUIT	4
677504001	

IO PCB

AVR2 DC24 5557-22R
DC24
IOG
IOG
SVP CORD
KCON 7
A2 A1+ 22 21
KS1+
BU 1.25mm²
KS1
RYCHK1
RYCHK1 (13)
RYCHK1
ATCOH
DR30PN
EMGO (7, 9, 10, 14)
COLPW
COLPW2
DC5
CE
YLS
-Y
DRCLS
DRLOCK
DRCLS2
BRK (7)
DRLOCK2
NYL2 51067-0200
V IOG

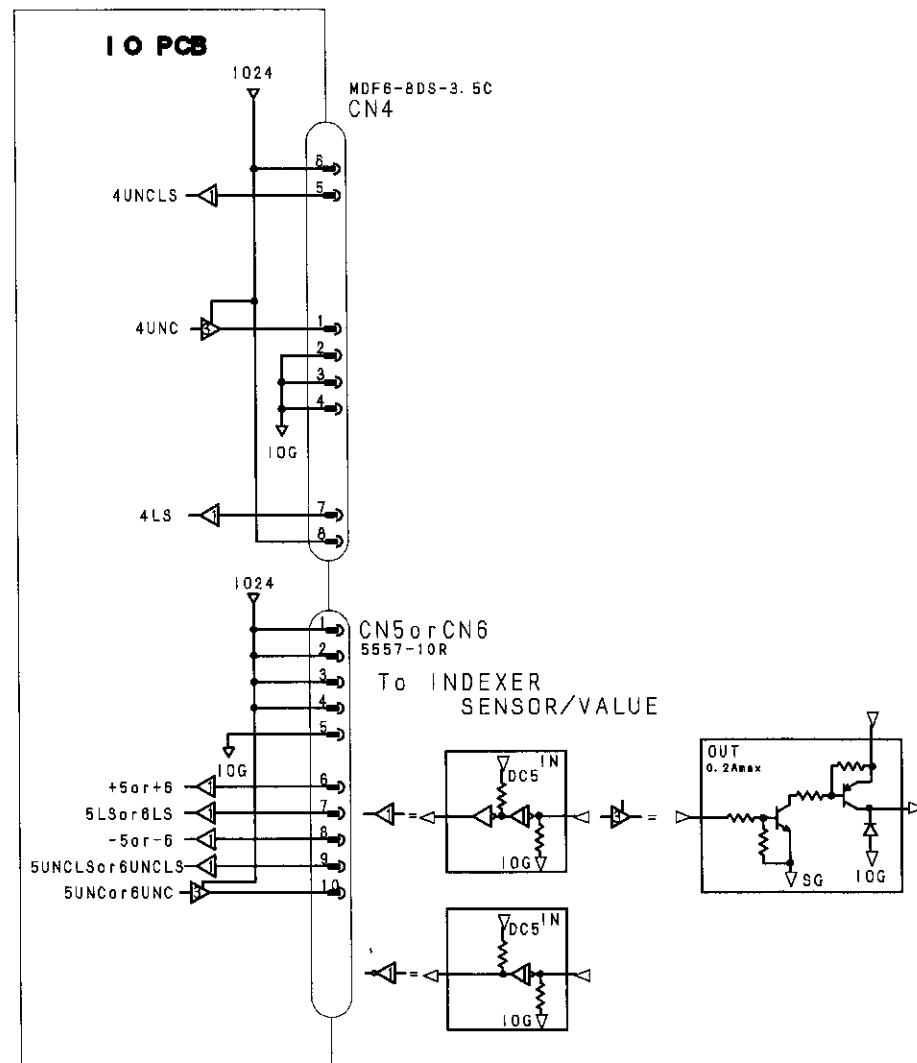
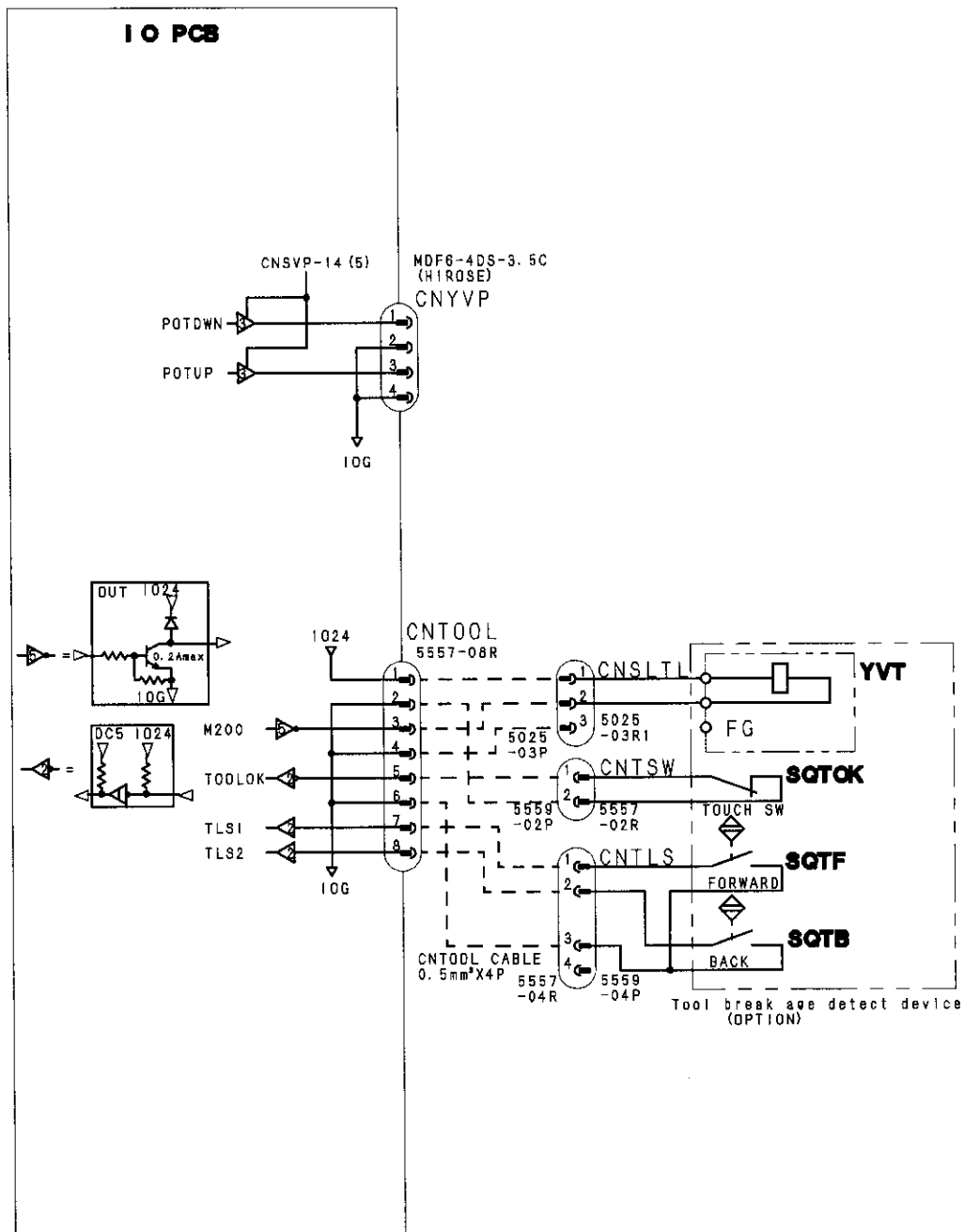
IO PCB

IO24ON
IO24
SPOH
CNSPOH VHR-2N
IO24 SPINDLE MOTOR
SPOH THERMAL SW (2)
CNSPA VHR-2N
SHORT CONNECTOR CNSPA
CNATCOH VHR-2N
IO24 ARM MOTOR
ATCOH THERMAL SW (8)
CNSQX 5557-06R
SQXP
SQXO
SQXM
CNSQY 5557-06R
SQYP
SQYO
SQYM
CNSQZ 5557-06R
SQZP
SQZO
SQZM
LSX CORD
LSY CORD
LSZ CORD
CNYB NVR-02
Z-AXIS BRAKE (3)
V IOG

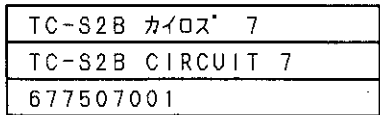
IO PCB

AXW1301421A CNMSEL machine type select signal
CNBIO 5559-14P 5557-14R
HSEL0
HSEL1
HSEL2
HSEL3
HSEL4
HSEL5
IO24
BOH
TOH
MOB
AIRBLW
COLPW (5)
XLP-02V
FG
YVC (OPTION) COOLANT VALVE
YVA SPINDLE TAPER AIR BLAST VALVE
COLPW20N = (DRCLS2 & OTLOC + DRCLS1) & DROPN3 & COLPW

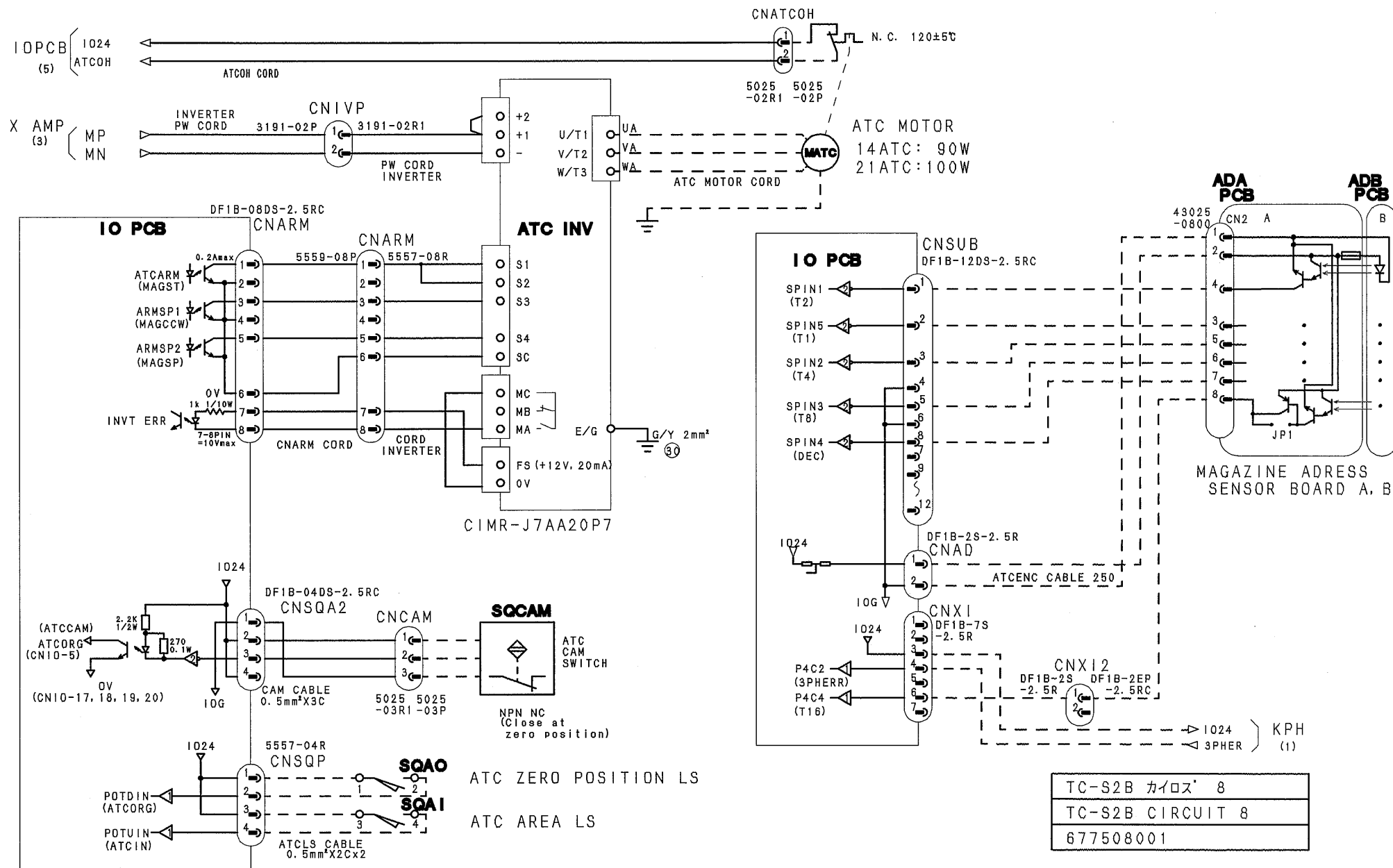
TC S2B カイロス 5
TC-S2B CIRCUIT 5
677505-001



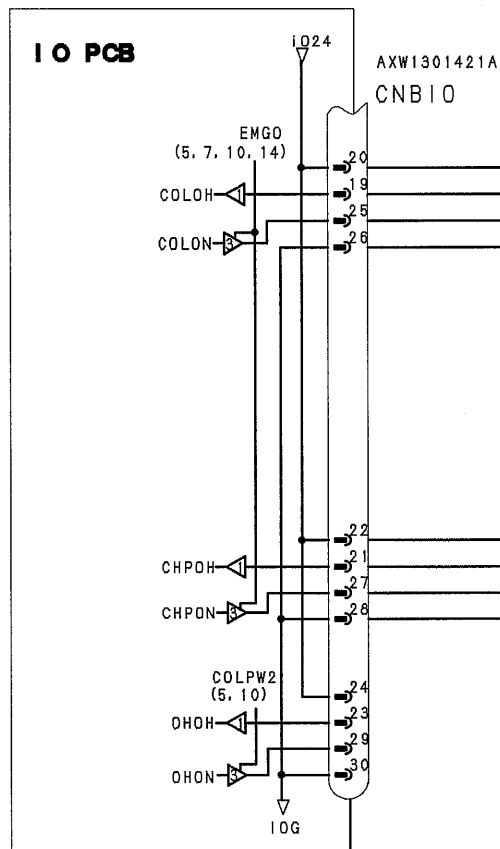
TC-S2B カイロス 6
TC-S2B CIRCUIT 6
677506001



マガジン回路
MAGAZINE CIRCUIT



C保護ユニット
COOLANT PROTECTION UNIT



(1) RM3
SM3
TM3
CNCLM CORD

BOX10 CORD

IOPCB DIPSW1 SETTING

BIT1 (COL)	COOLANT PUMP CONTROL
• OFF	COOLANT SW ONLY
ON	COOLANT SW & M08

BIT2 (CHP)	CHIP FLOW PUMP CNTRL
OFF	CHIP FLOW SW ONLY
• ON	CHIP FLOW SW & M400

サーマルリレー KP1, KP2 設定値
THERMAL RELAY KP1, KP2 SET VALUES

		with T1	without T1		
			200V INPUT	220V INPUT	230V INPUT
MOTOR	FREQUENCY	SETTING	SETTING	SETTING	SETTING
180W KP1	50Hz	0.9A	0.85A	0.9A	0.9A
	60Hz	1.0A	1.0A	1.0A	1.0A
250W KP1, KP2	50Hz	1.2A	1.2A	1.2A	1.3A
	60Hz	1.5A	1.5A	1.5A	1.6A
400W KP2	50Hz	2.6A	2.4A	2.6A	INHIBIT
	60Hz	2.4A	2.5A	2.4A	2.4A

仕向地の入力電圧に合わせて、サーマルを設定すること。
adjust the thermal value

クーラント保護ユニット
COOLANT PROTECTION UNIT (OPTION)

CNKP1
5559-04P

CNKP

CNCLM

5025
-04P

CNKP2
5559-04P

CNKP

CNCLM

5025
-04P

BIT3 (OH1) / BIT4 (OH2)	OIL HOLE PUMP CONTROL
OFF / OFF	INHIBIT
ON / OFF	COOLANT SW ONLY
OFF / ON	M408 ONLY
• ON / ON	COOLANT SW & M408

BIT5 (INT)	DOOR INTERLOCKING OF COOLANT
• OFF	ALWAYS CHECKING
ON	ONLY DOOR INTERLOCK SW IS ON

クーラントポンプモータ
COOLANT
PUMP MOTOR
180W/250W
(OPTION)

COOLANT M CABLE
0.75mm²X4C

チップシャワポンプモータ
CHIP FLOW
PUMP MOTOR
250W/400W
(OPTION)

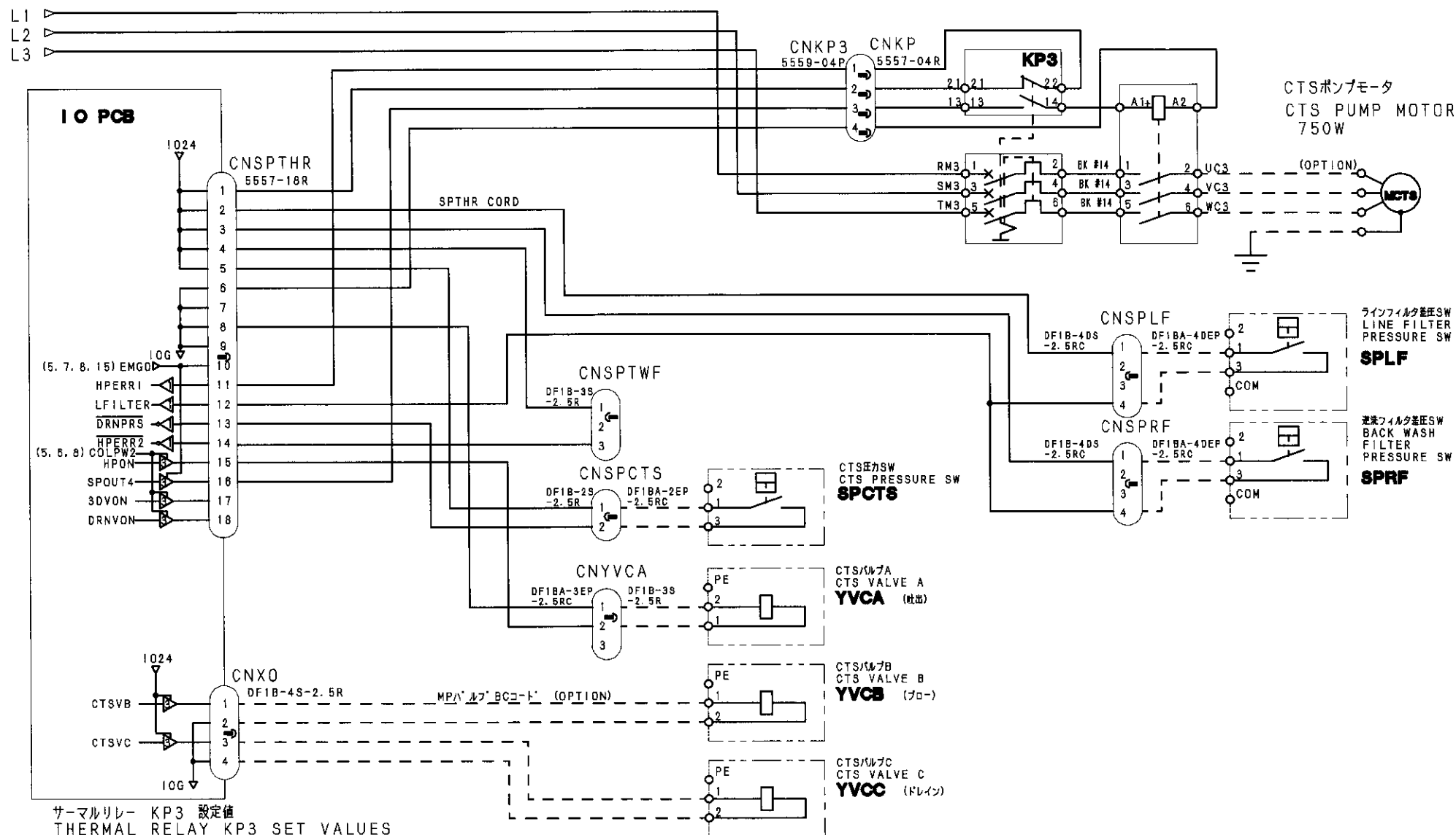
CHIPFLOW M CABLE
0.75mm²X4C

TC-S2B カイロス 9

TC-S2B CIRCUIT 9

677509001

Center Through Spindle System (OPTION)
CTS装置 (オプション)



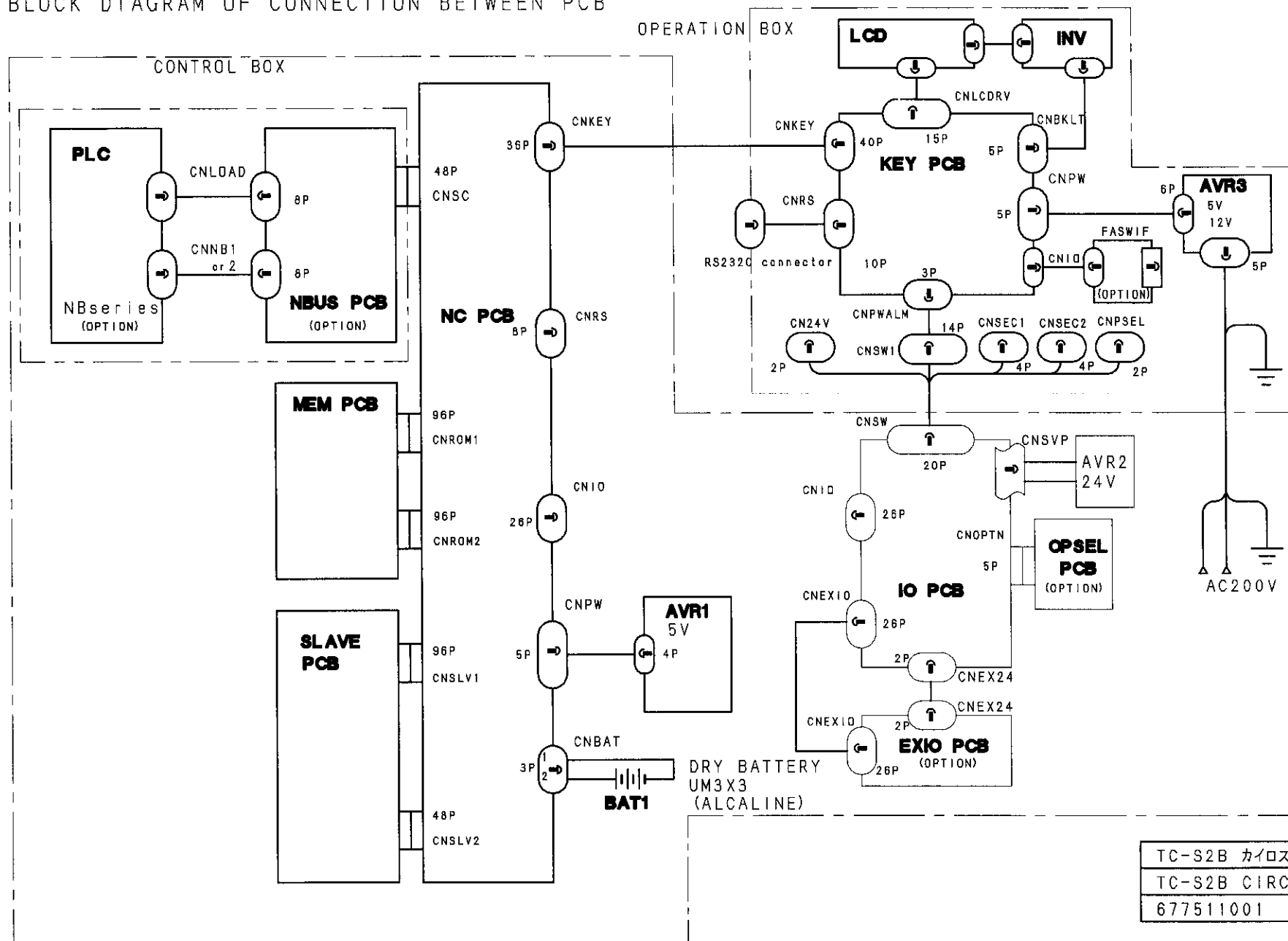
Thermal	FREQUENCY	With Trans Box (T1-2 Voltage is 220VAC.)	Without Trans. Box		
			200V INPUT	220V INPUT	230V INPUT
750W KP3	Except USA	50Hz	3.4A	3.4A	3.4A
		60Hz	3.0A	3.2A	3.0A
	USA	50Hz			
		60Hz		3.1A	3.1A

adjust the thermal value
仕向地の入力電圧に合わせて、サーマルを設定すること。

TC-S2B カイロス	10
TC-S2B CIRCUIT	10
677510001	

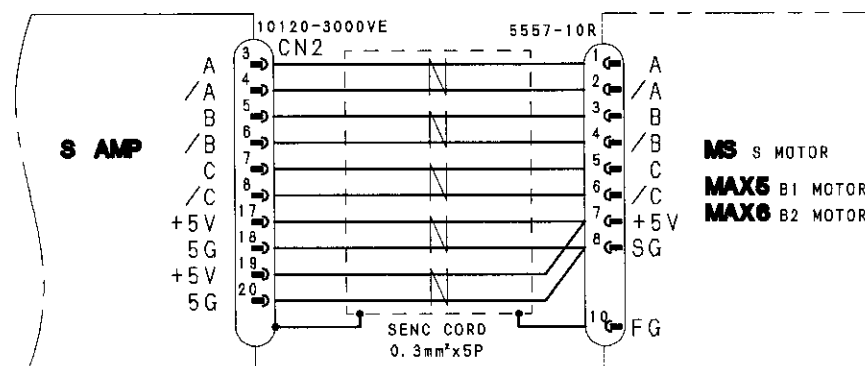
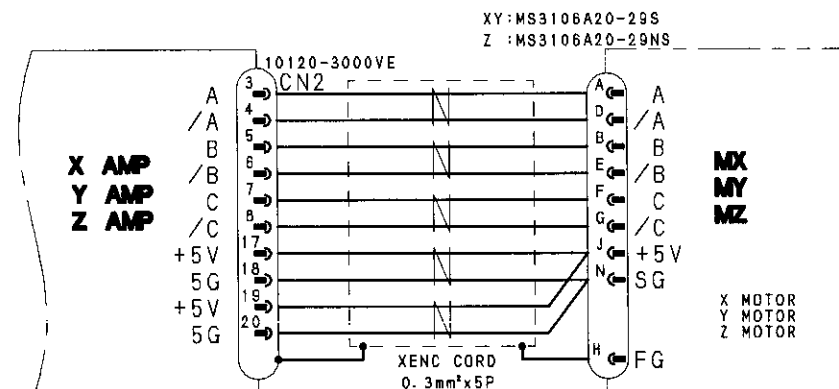
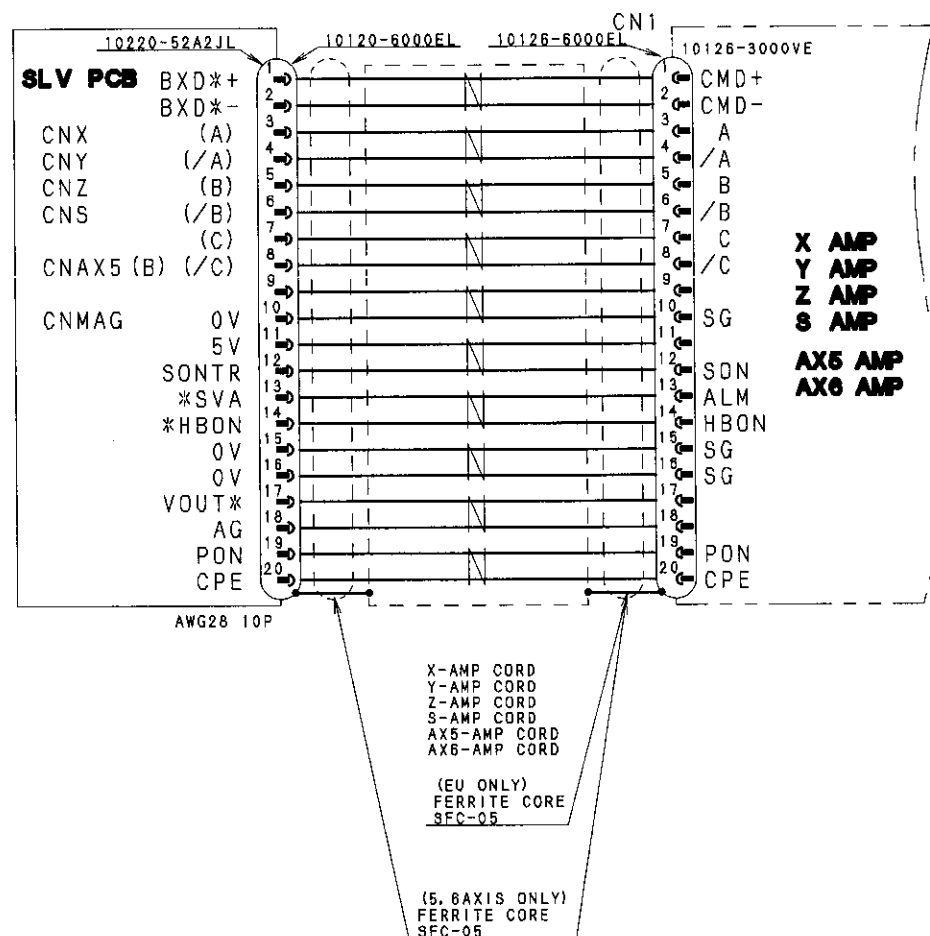
基板間接続ブロック図

BLOCK DIAGRAM OF CONNECTION BETWEEN PCB



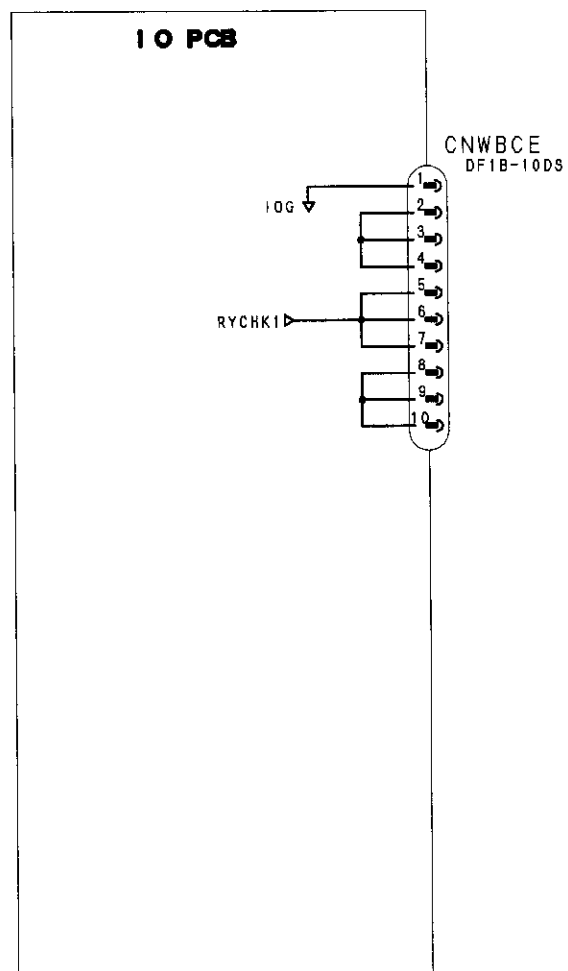
TC-S2B カイロス' 11
TC-S2B CIRCUIT 11
677511001

サーボ信号線
SERVO SIGNAL CIRCUIT



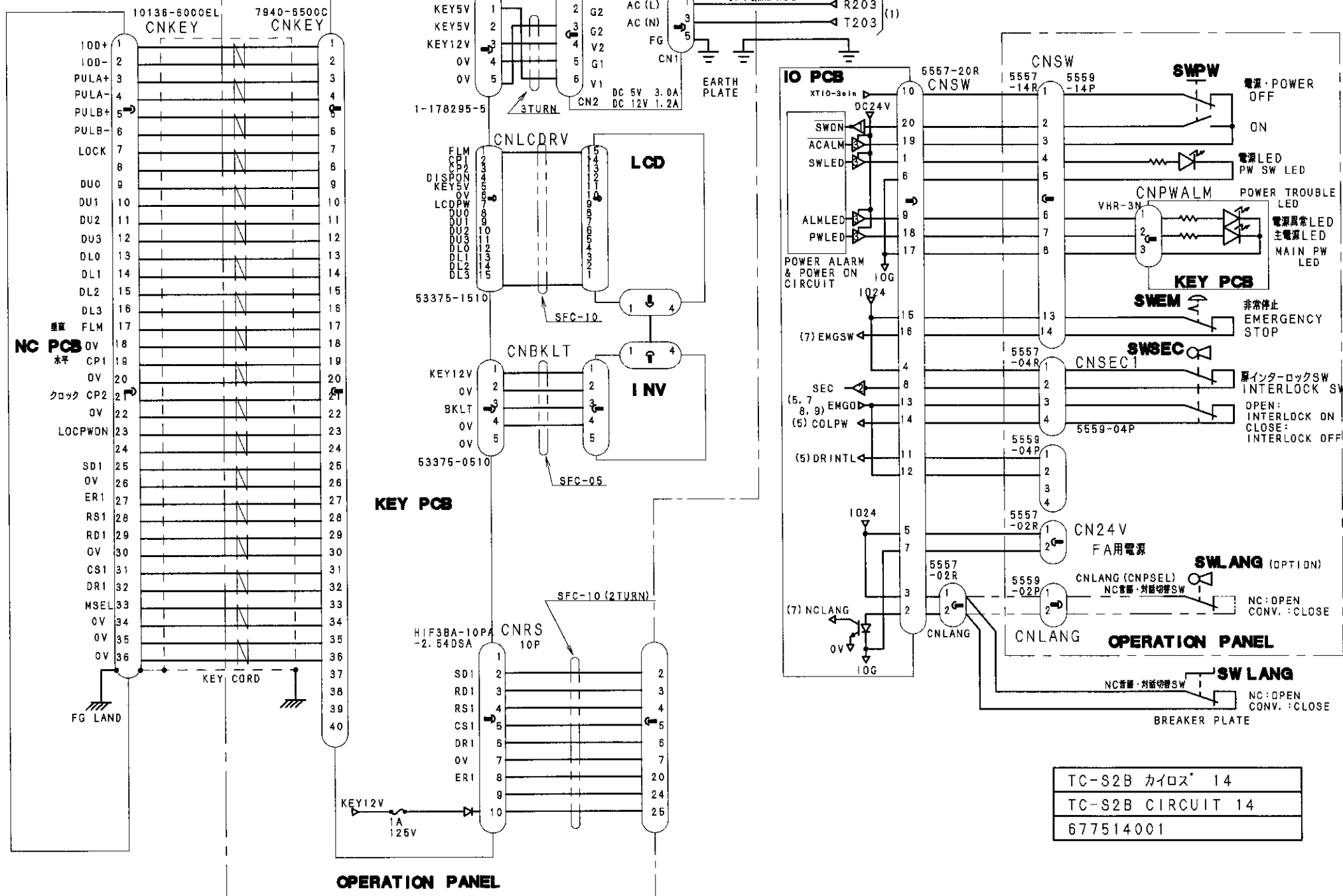
TC-S2B カイロス 12
TC-S2B CIRCUIT 12
677512001

IO PCB 5

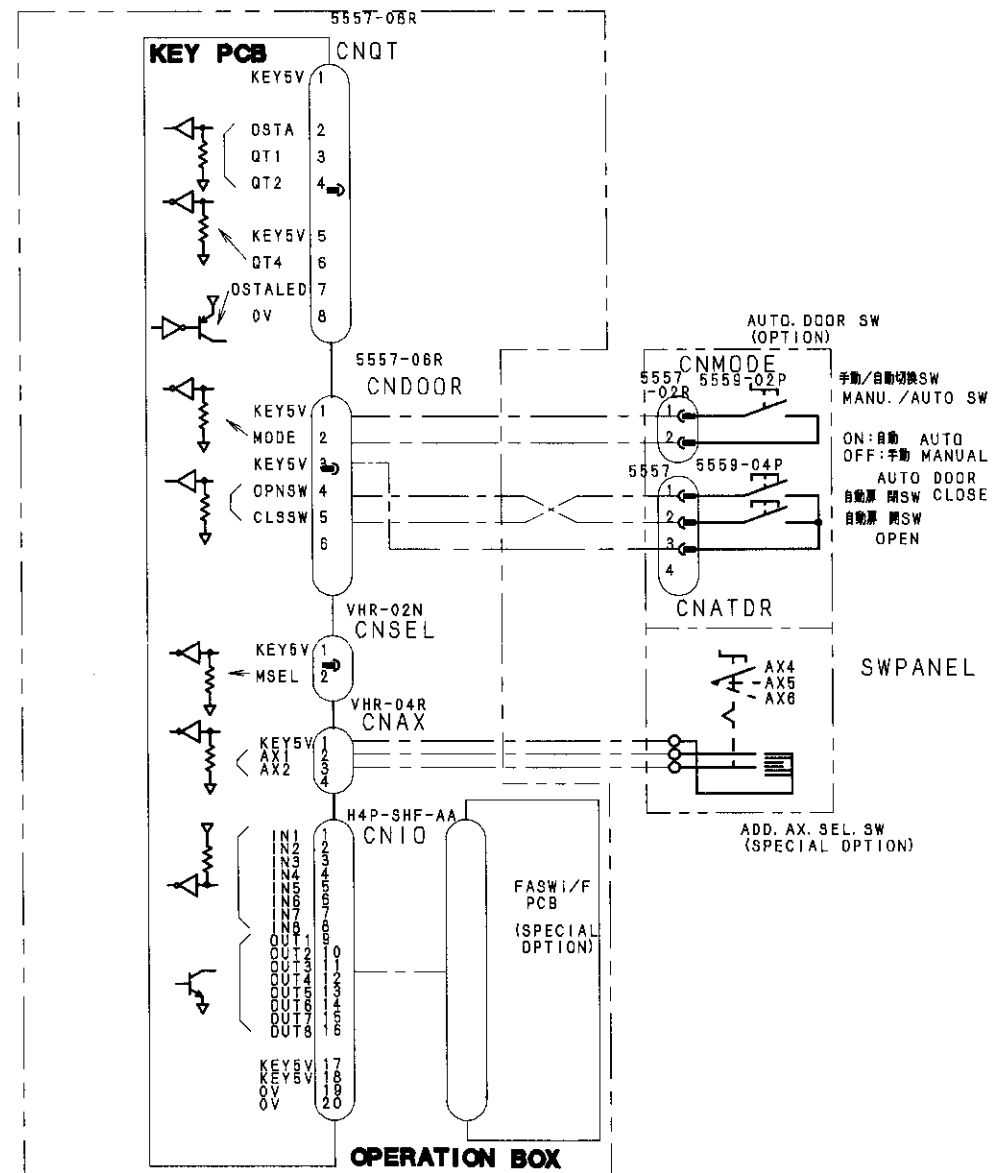
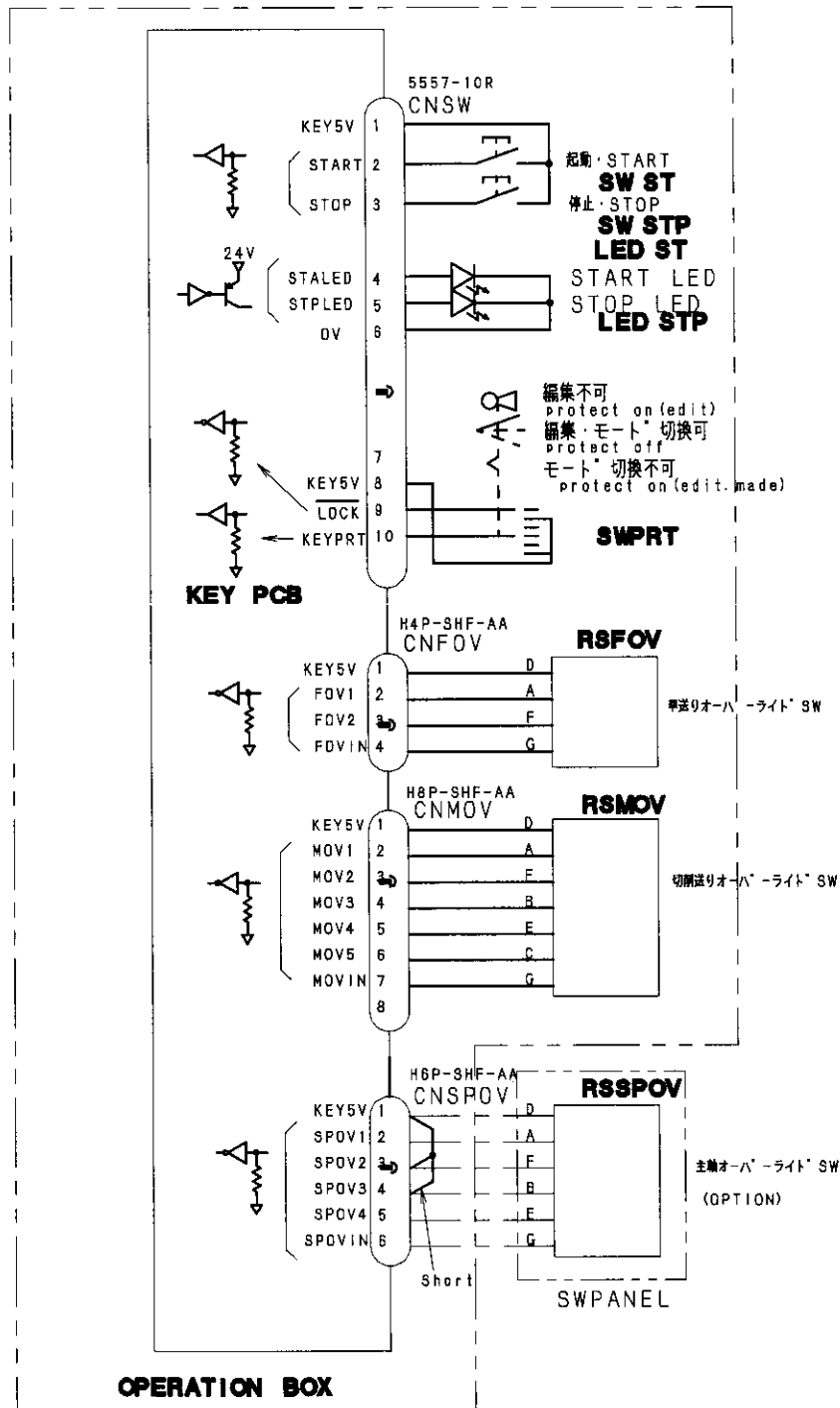


TC-S2B カイロス 13
TC-S2B CIRCUIT 13
677513001

操作ボックス
OPERATION BOX

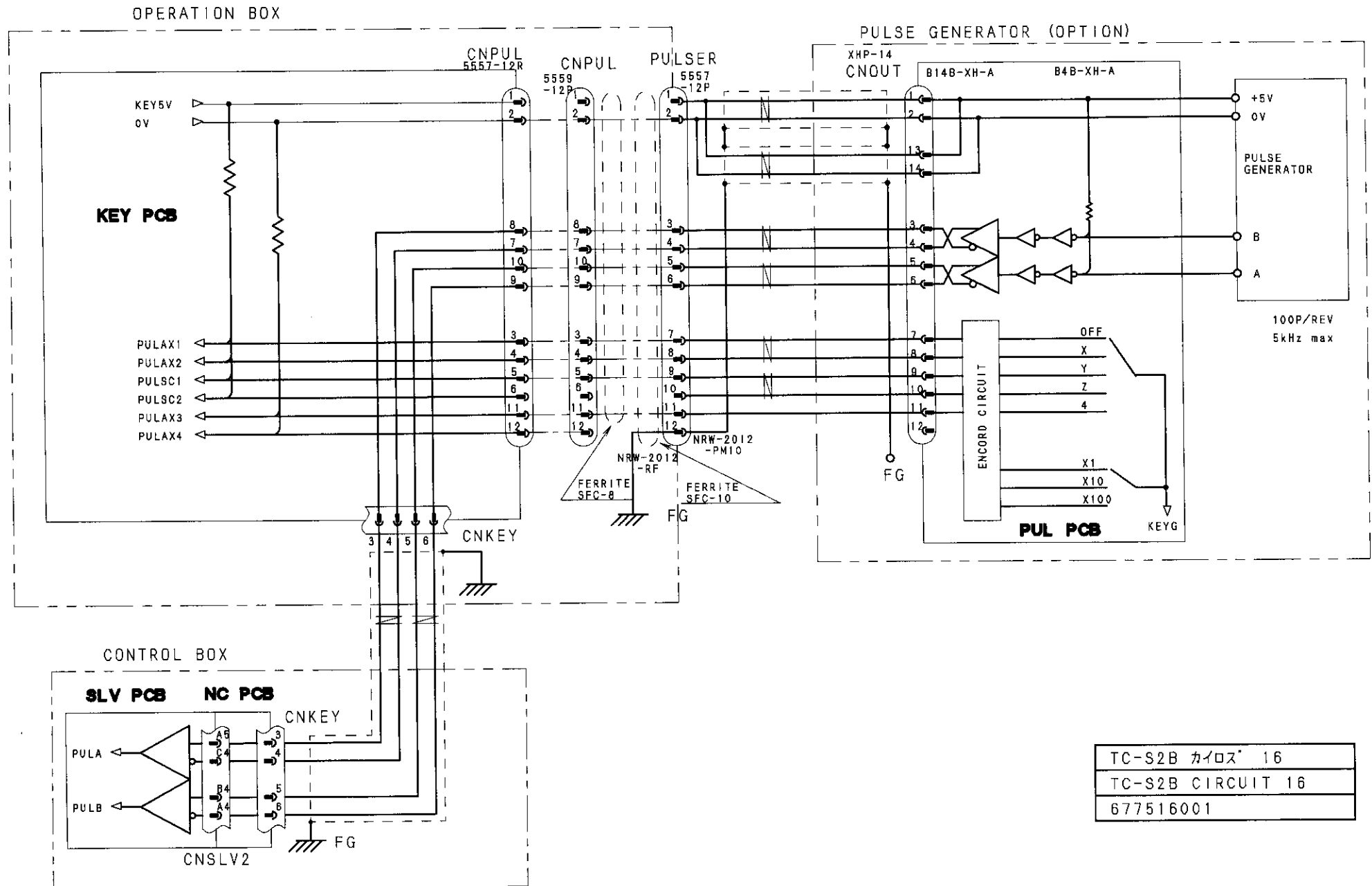


操作ボックス OPERATION BOX



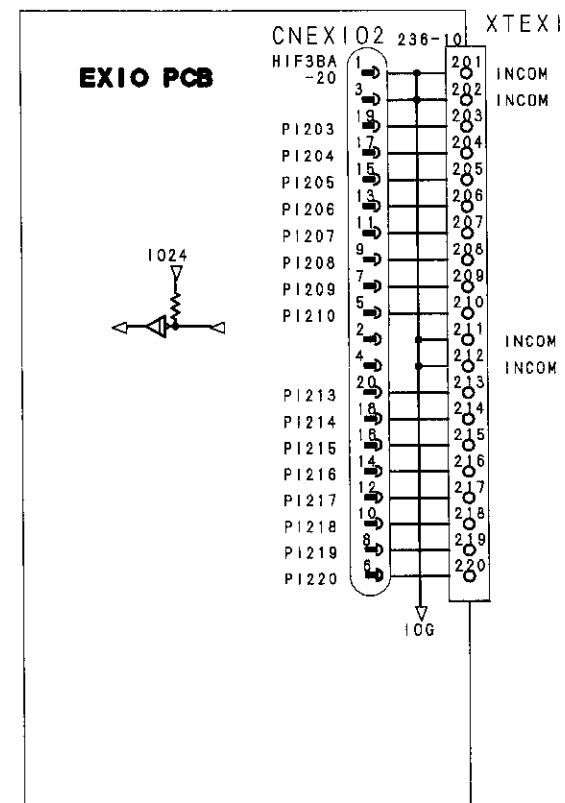
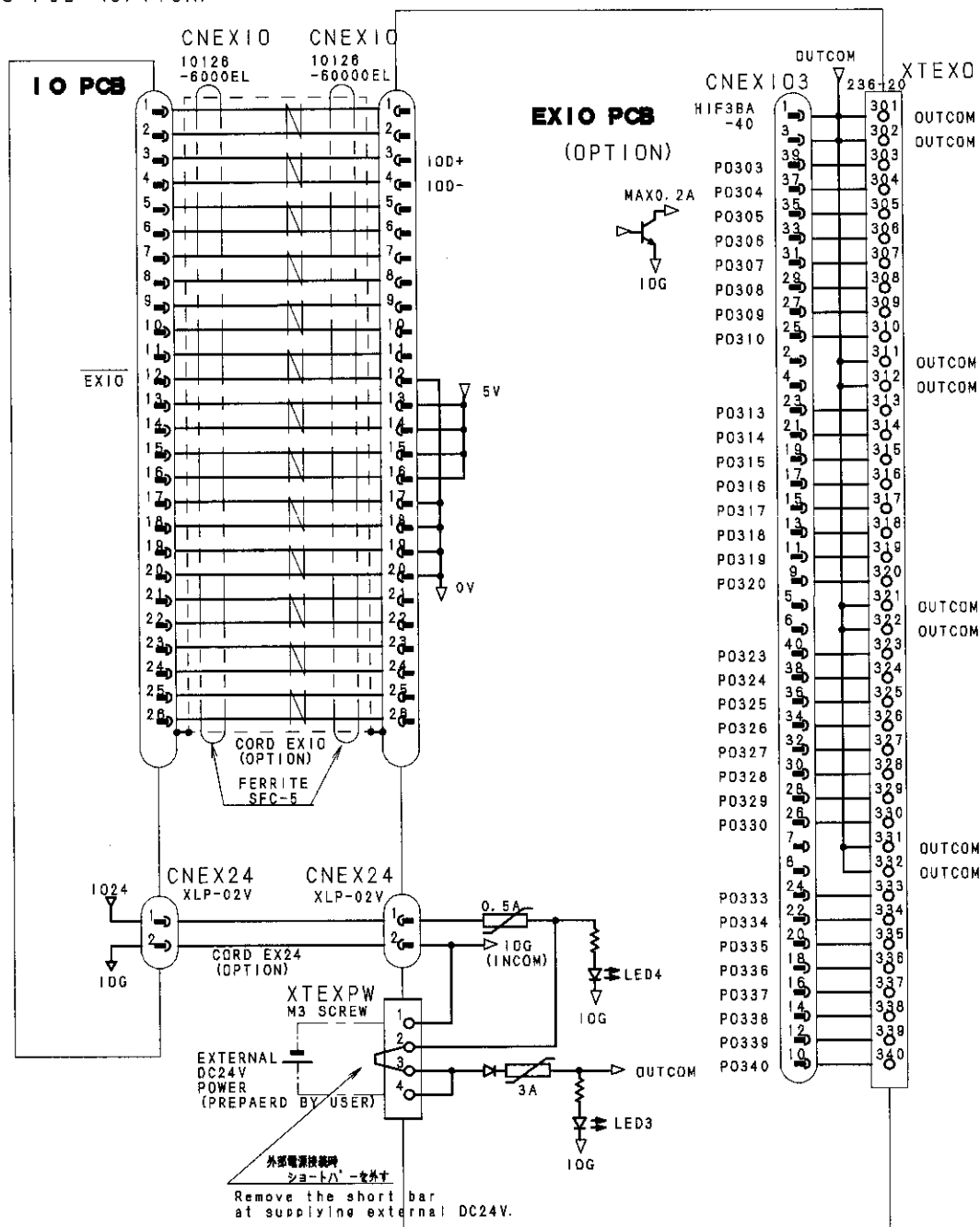
TC-S2B カイロス 15
TC-S2B CIRCUIT 15
677515001

手動パルス発生器
MANUAL PULSE GENERATOR



TC-S2B カイロス 16
TC-S2B CIRCUIT 16
677516001

EX10 PCB (OPTION)

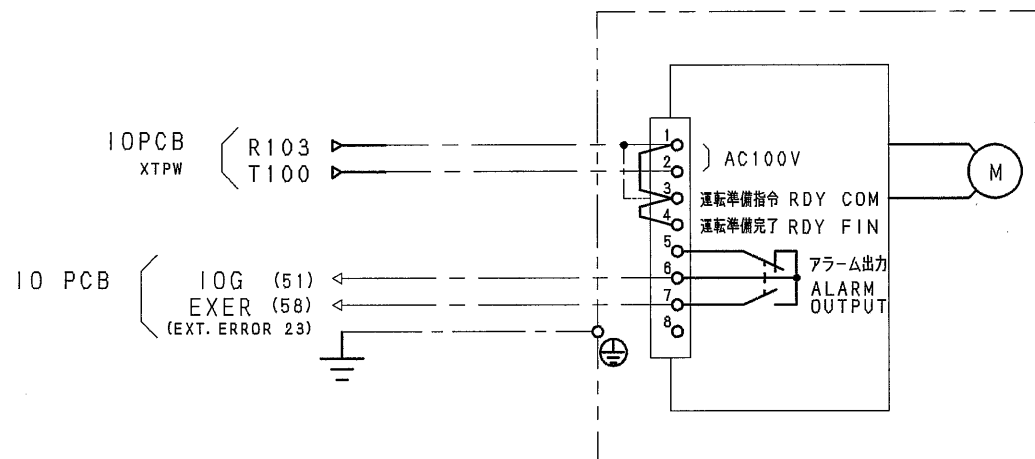


TC-S2B カイロス 17

TC-S2B CIRCUIT 17

677517001

自動給油装置ユニット (オプション)
LUBRICATOR UNIT (OPTION)



給油装置コントローラ
LUBRICATOR CONTROLLER

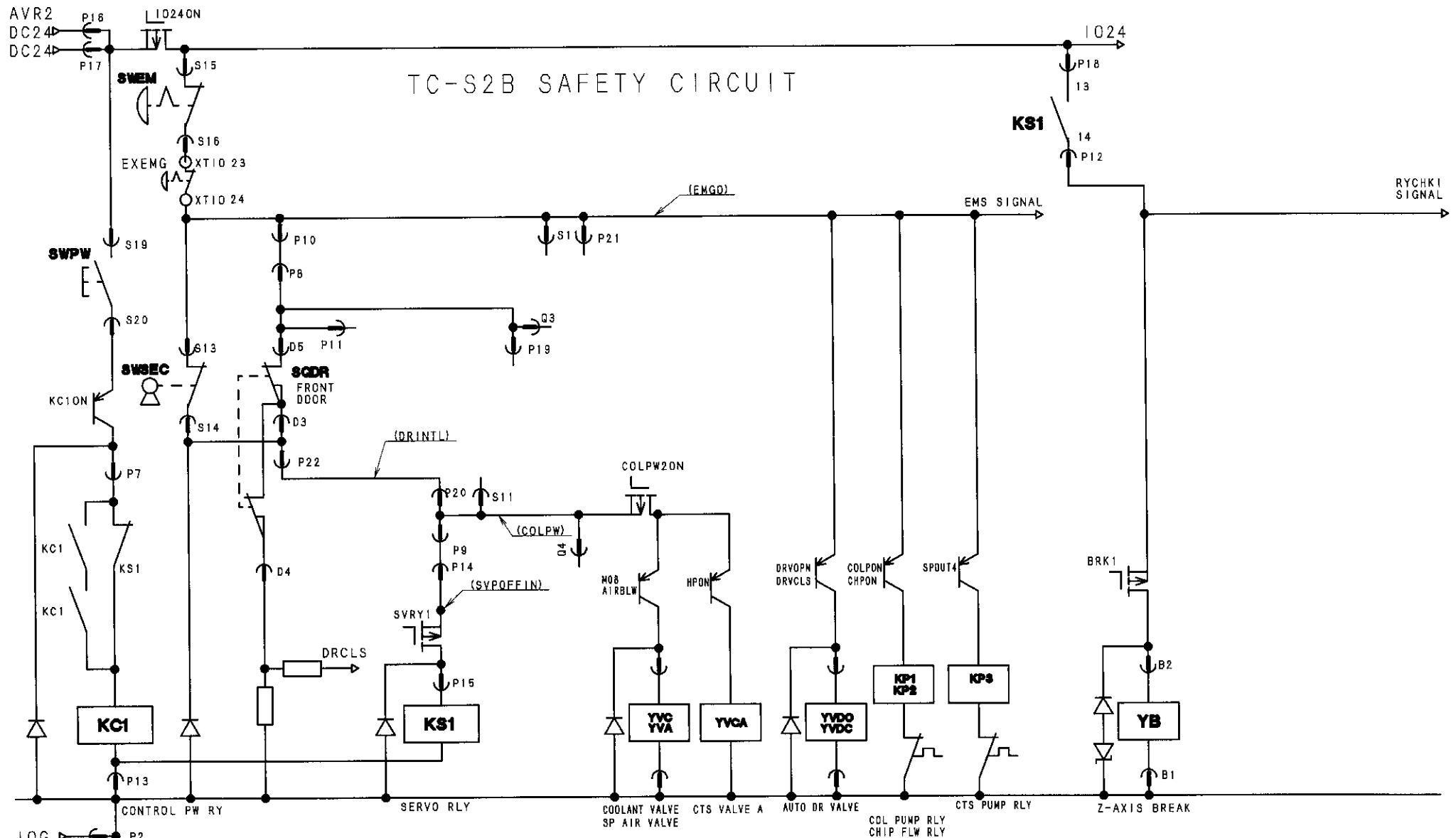
型式
TYPE
MKU2-BW3-*

定格電流
RATED CURRENT
50HZ 1.11A
60HZ 1.42A

定格回転数
RATED ROTATION SPEED
50HZ 2600rpm
60HZ 3100rpm

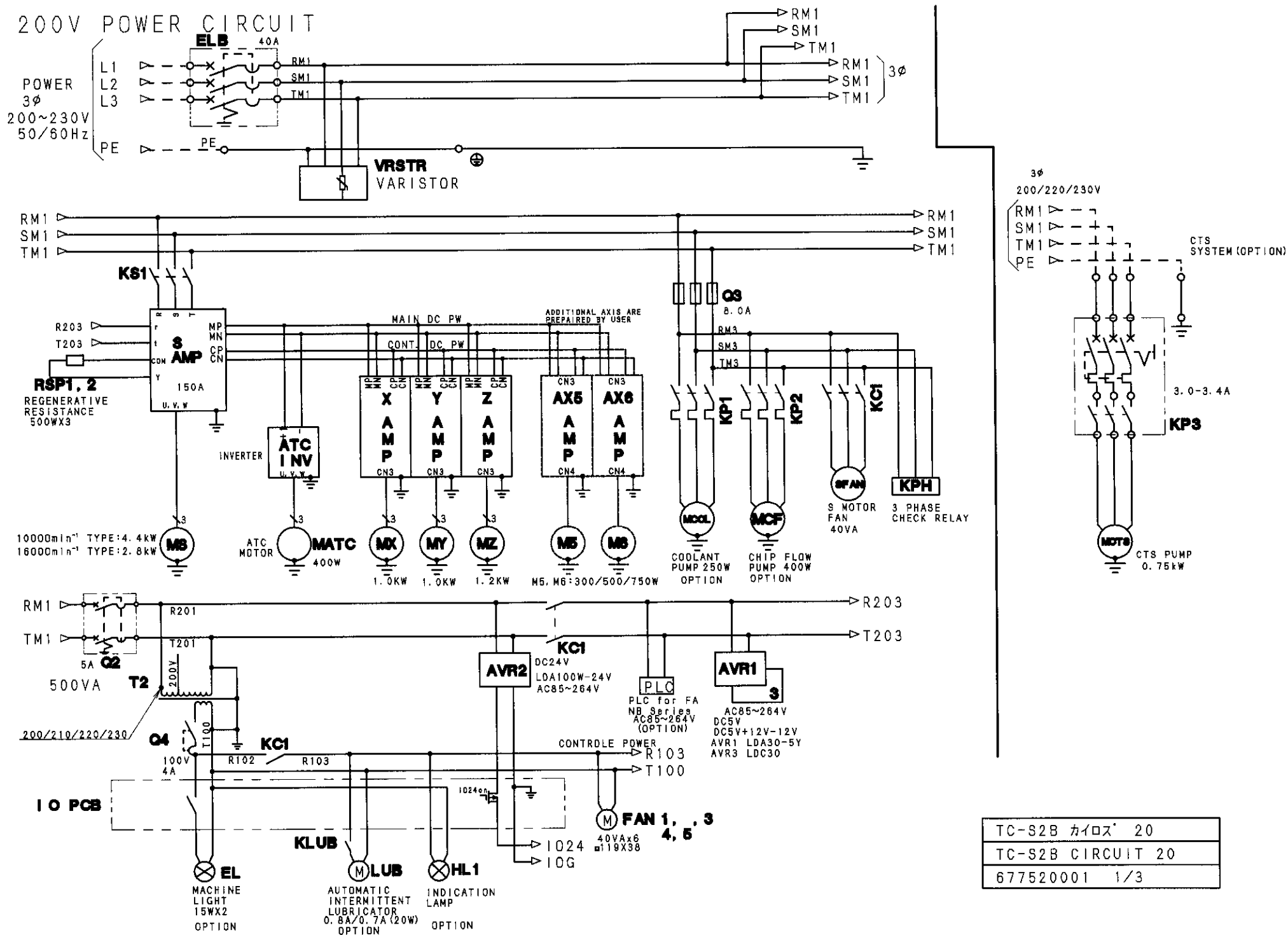
吐出量
DISPENSION CAPACITY
0.2l/min

TC-S2B カイロス	18
TC-S2B CIRCUIT	18
677518001	



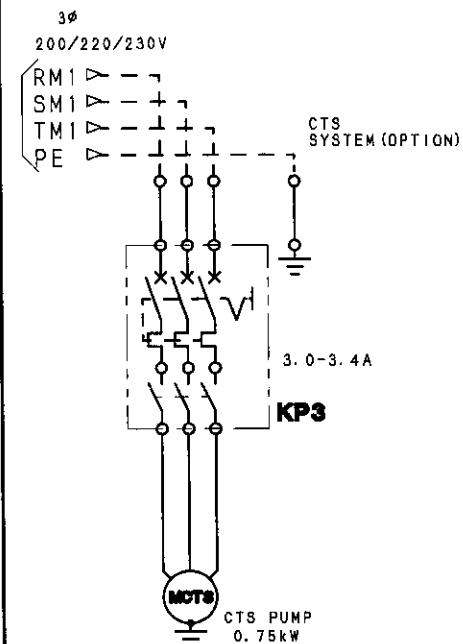
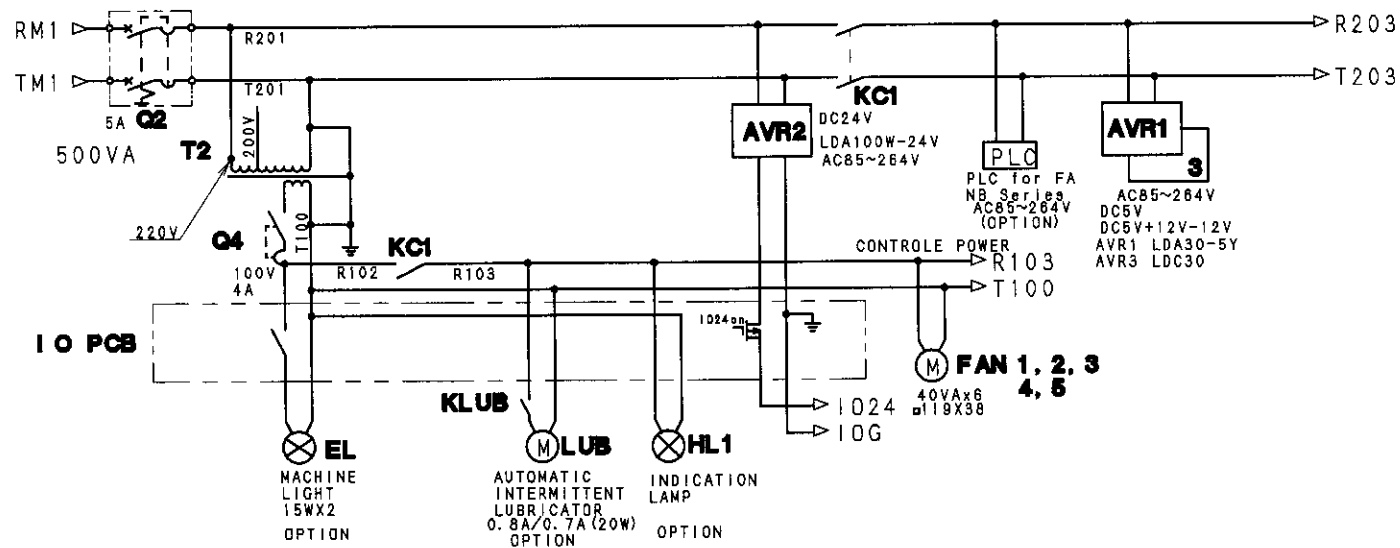
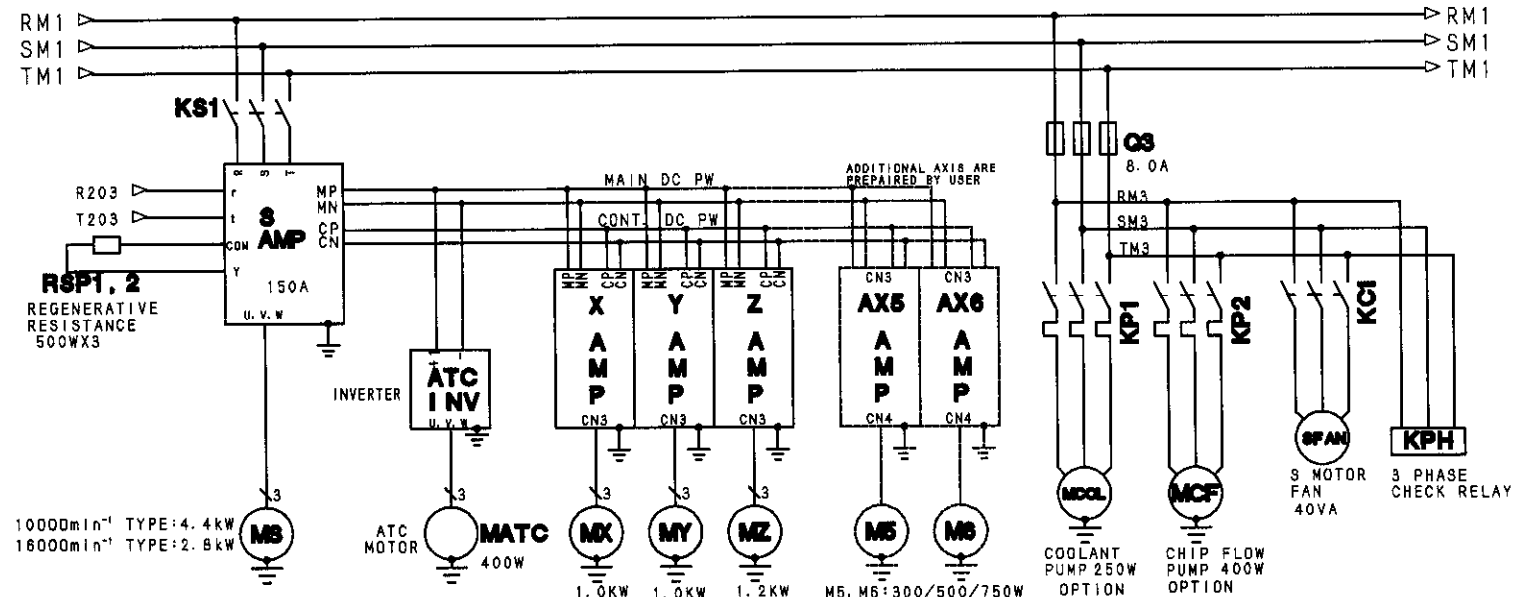
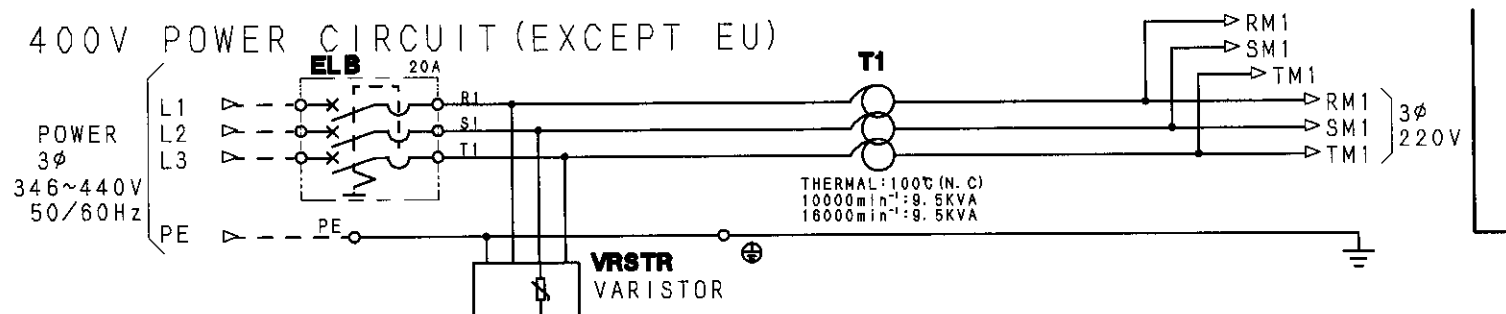
TC-S2B カイロス' 19
TC-S2B CIRCUIT 19
677519001

200V POWER CIRCUIT



TC-S2B カイロス 20
TC-S2B CIRCUIT 20
677520001 1/3

400V POWER CIRCUIT (EXCEPT EU)



TC-S2B カイロス' 20
TC-S2B CIRCUIT 20
677520001 2/3

CE POWER CIRCUIT

POWER
3 ϕ
50Hz

PE

Q1 20A

R1
S1
T1

Z1
LINE FILTER
30A

R11
S11
T11

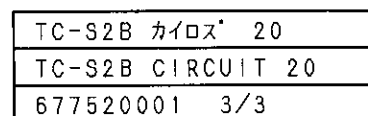
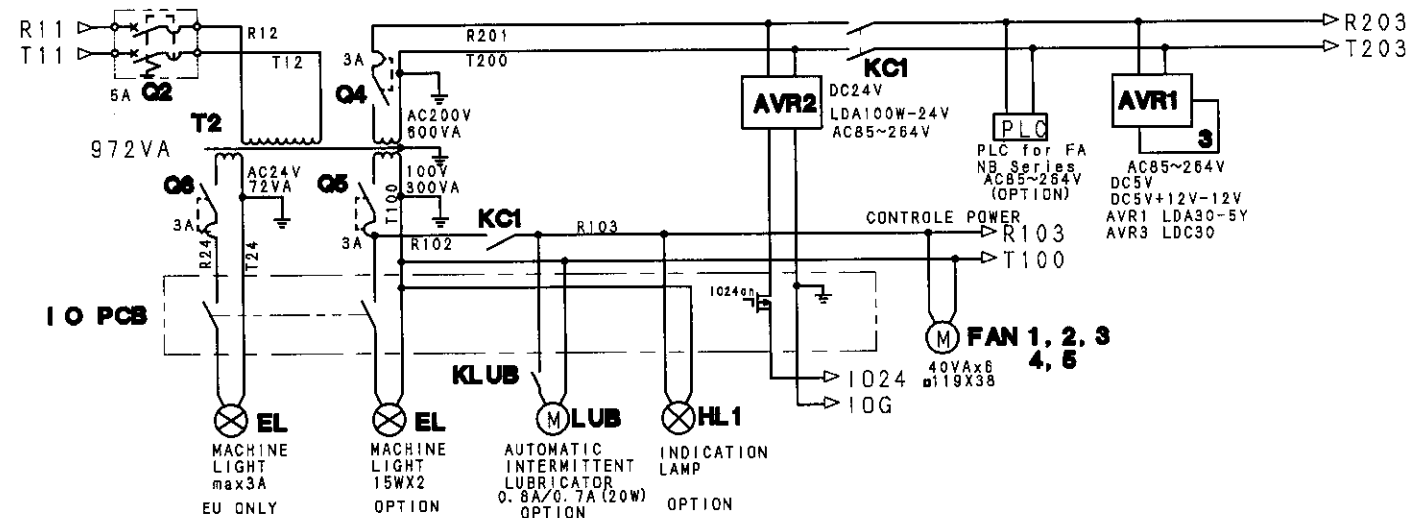
T1

Q1 9.5KVA+Q1 (25A)

VRSTR
VARISTOR

RM1
SM1
TM1

3 ϕ
220V



677520001 3/3

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Chapter13 Parts List

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CNC TAPPING CENTER

TC-S2B

**パーツリスト
PARTS LIST**

ブラザー工業株式会社
マシナリー・アンド・ソリューション カンパニー

BROTHER INDUSTRIES, LTD.
MACHINERY&SOLUTIONCOMPANY

brother

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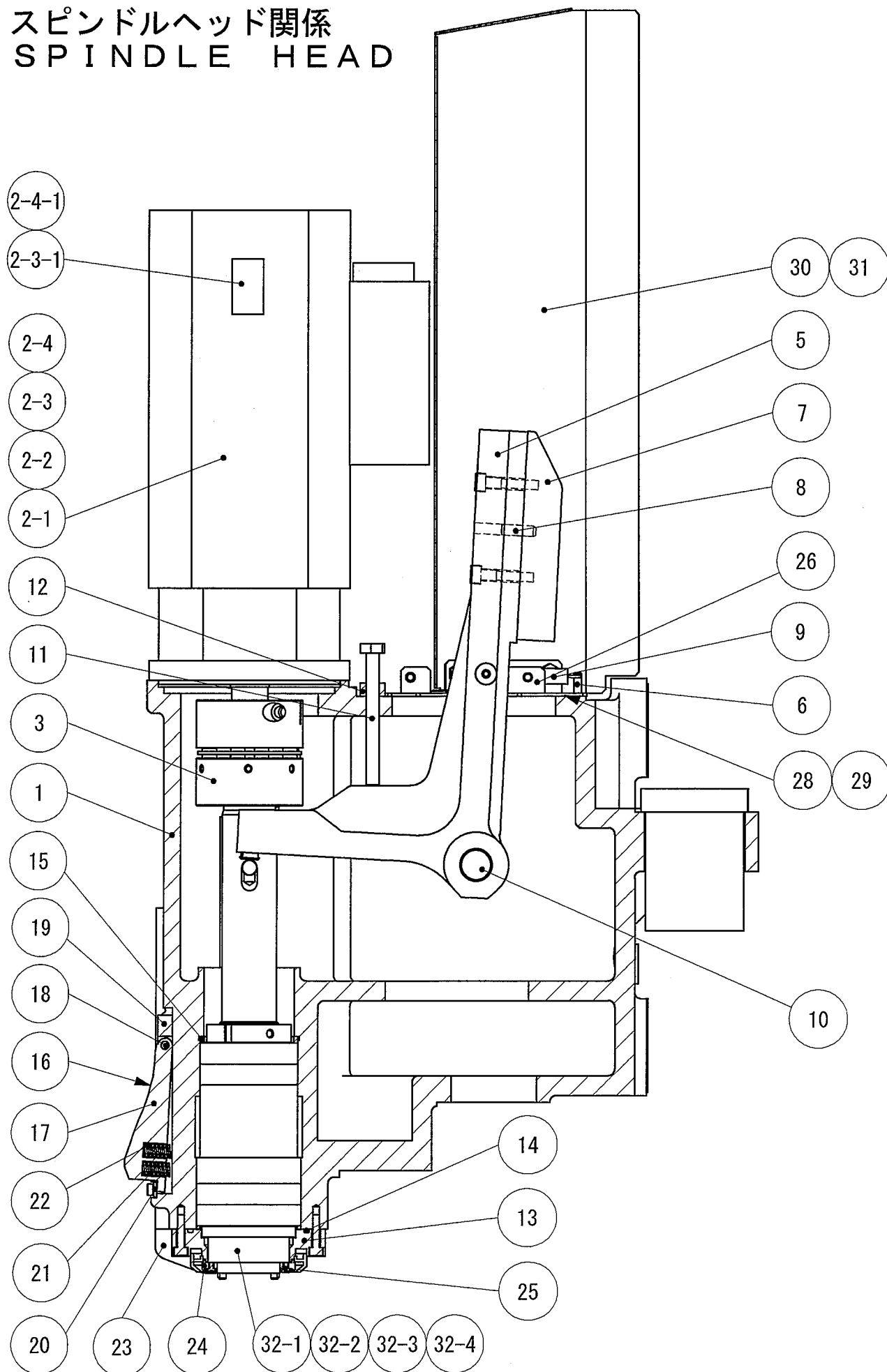
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2.2	ATC サドル 21 関係 ATC SADDLE 21
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3.1.2	グリップ 21 関係 GRIP 21
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10	Z 軸リミットスイッチ関係 Z AXIS LIMIT SWITCH
11	ATC リミットスイッチ関係 ATC LIMIT SWITCH
12	Z シートカバー関係 Z SEET COVER
13.1	X テレスコカバー関係 (標準仕様) TERESCOPIC COVER X (Standard)
13.2	X テレスコカバー関係 (ロング仕様) TERESCOPIC COVER X (Long)
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DOOR (Standard 1 door)
- 16.2 扉関係 (標準 2 枚扉)
DOOR (Standard 2 doors)
- 16.3 扉関係 (ロング 2 枚扉)
DOOR (Long 2 doors)
- 16.4 扉関係 (ショート 2 枚扉)
DOOR (Short 2 doors)
- 17.1 カバー関係 (標準 1 枚扉)
COVER (Standard 1 door)
- 17.2 カバー関係 (標準 2 枚扉)
COVER (Standard 2 doors)
- 17.3 カバー関係 (ロング 2 枚扉)
COVER (Long 2 doors)
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COVER (Short 2 doors)
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- 22 ツール洗浄関係
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- 23 クーラントタンク 50L 関係
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COOLANT TANK 100L
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COOLANT TANK 150L
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COOLANT TANK 150L (CTS) (Standard, Long)
- 26.2 クーラントタンク 150L (CTS) 関係 (ショート)
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- 27 工具折れ検出装置関係
TOOL BREAKAGE DETECTION UNIT

- 28 自動扉関係
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AUTOMATIC DOOR (Standard 1 doors)
- 28.2 自動扉関係（標準 2 枚扉）
AUTOMATIC DOOR (Standard 2 doors)
- 28.3 自動扉関係（ロング 2 枚扉）
AUTOMATIC DOOR (Long 2 doors)
- 28.4 自動扉関係（ショート 2 枚扉）
AUTOMATIC DOOR (Short 2 doors)
- 29 機内灯、表示灯、手動パルス発生器関係
MACHINE LIGHT, INDICATION LAMP, PULSE GENERATOR
- 30 間欠給油装置関係
INTERMITTENT LUBRICATING UNIT
- 40 制御箱関係
CONTROL BOX
- 41 操作箱関係
OPERATION BOX
- 42 ケーブル関係
CABLE

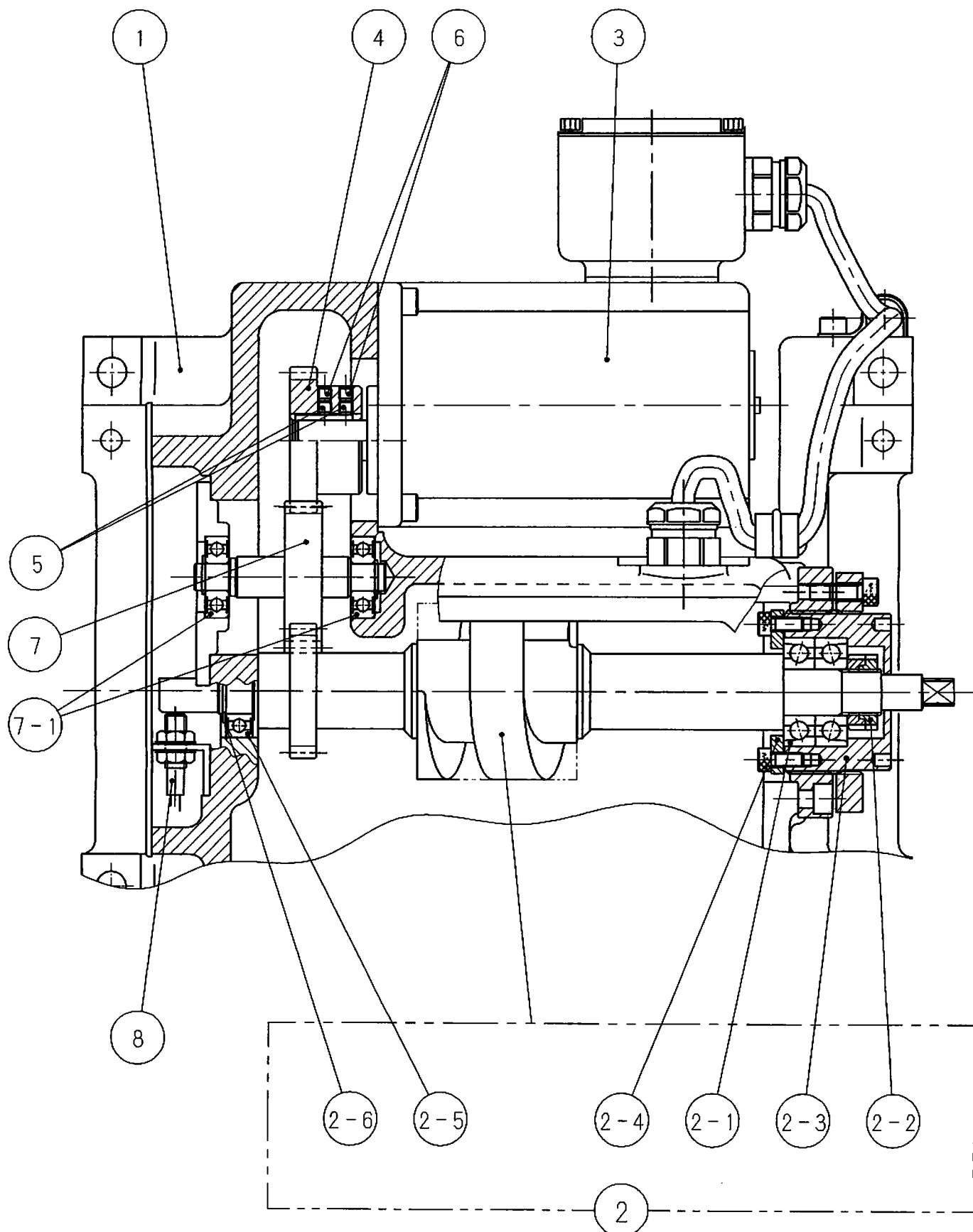
1. スピンドルヘッド関係 SPINDLE HEAD



1.スピンドル関係
SPINDLE

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618221001	1	スピンドルヘッド 251	SPINDLE HEAD, 251
2-1	618180001	1	SPモータ251 10K	SP MOTOR 251 10K
2-2	6A0093001	1	Sモータ31B16K	SPINDLE MOTOR, 31B 16K
2-3	618181001	1	SPモータ251 10KC	SP MOTOR 251 10KC
2-3-1	652428001	1	HPホースエルボ3/8	HP HOSE ELBOW, 3/8
2-4	618182001	1	SPモータ251 16KC	SP MOTOR 251 16KC
2-4-1	652428001	1	HPホースエルボ3/8	HP HOSE ELBOW, 3/8
3	653036001	1	カツプリング 250	COUPLING 250
4	653037001	1	アンクランプアームクミ250	UNCLAMP ARM ASSY 250
5	645124001	2	アンクランプアームストツパ	UNCLAMP ARM STOPPER
6	620136001	2	ピンLC-BX-6X30	PIN LC-BX-6X30
7	622085001	1	アンクランプカム 228	UNCLAMP CAM 228
8	620067002	1	ストレートピン8X26XM5	STRAIGHT PIN 8X26XM5
9	622071001	1	アンクランプバネ228	UNCLAMP SPRING 228
10	626175000	1	ジク 25X216	SHAFT 25X216
11	626177001	1	ボルト 10X100トク	BOLT 10X100
12	021100102	1	1シュナツト10	NUT, 1 M10
13	618436001	1	BRGオサエ251Sクミ	BEARING RETAINER, ASSY, 251
14	081085770	1	リングG85	O RING, G85
15	652100001	1	スペーサカラー75	SPACER COLLAR, 75
16	653040001	1	シフトカム 250クミ	SHIFT CAM ASSY, 250
17	653041001	1	シフトカムDP 250	SHIFY CAM DP 250
18	155914001	1	ジク6X31.8	STUD 6X31.8
19	645126001	1	シフトカムDP2ブラケット	SHIFT CAM DP 2 BRACKET
20	653042001	1	オサエイタDP2 250	DP PLATE
21	640137000	1	コイルバネSWM10X25	COIL SPRING DM10X25
22	641405000	1	コイルバネSWH10-25	COIL SPRING SWH10-25
23	618444001	2	DPカム2 251	DP CAM 2, 251
24	618443001	1	タンメンカバー-251	SPINDLE EDGE COVER, 251
25	018401031	4	アナボルト 4X10	BOLT, SOCKET M4X10
26	618300001	1	UCLカバー-R	_UCLKABA-R
27	618301001	1	UCLカバー-L	_UCLKABA-L
28	618302001	1	SPヘッドフタR	_SPHETUDOHUTAR
29	618303001	1	SPヘッドフタL	_SPHETUDOHUTAL
30	618304001	1	SPヘッドカバー-R	_SPHETUDOKABA-R
31	618305001	1	SPヘッドカバー-L	_SPHETUDOKABA-L
32-1	618183001	1	SPクミ251 10K	SP ASSY, 251 10K
32-2	618184001	1	SPクミ251 16K	SP ASSY, 251 16K
32-3	618800001	1	SPクミ251 10K-C	SP ASSY, 251 10K-C
32-4	618801001	1	SPクミ251 16K-C	SP ASSY, 251 16K-C

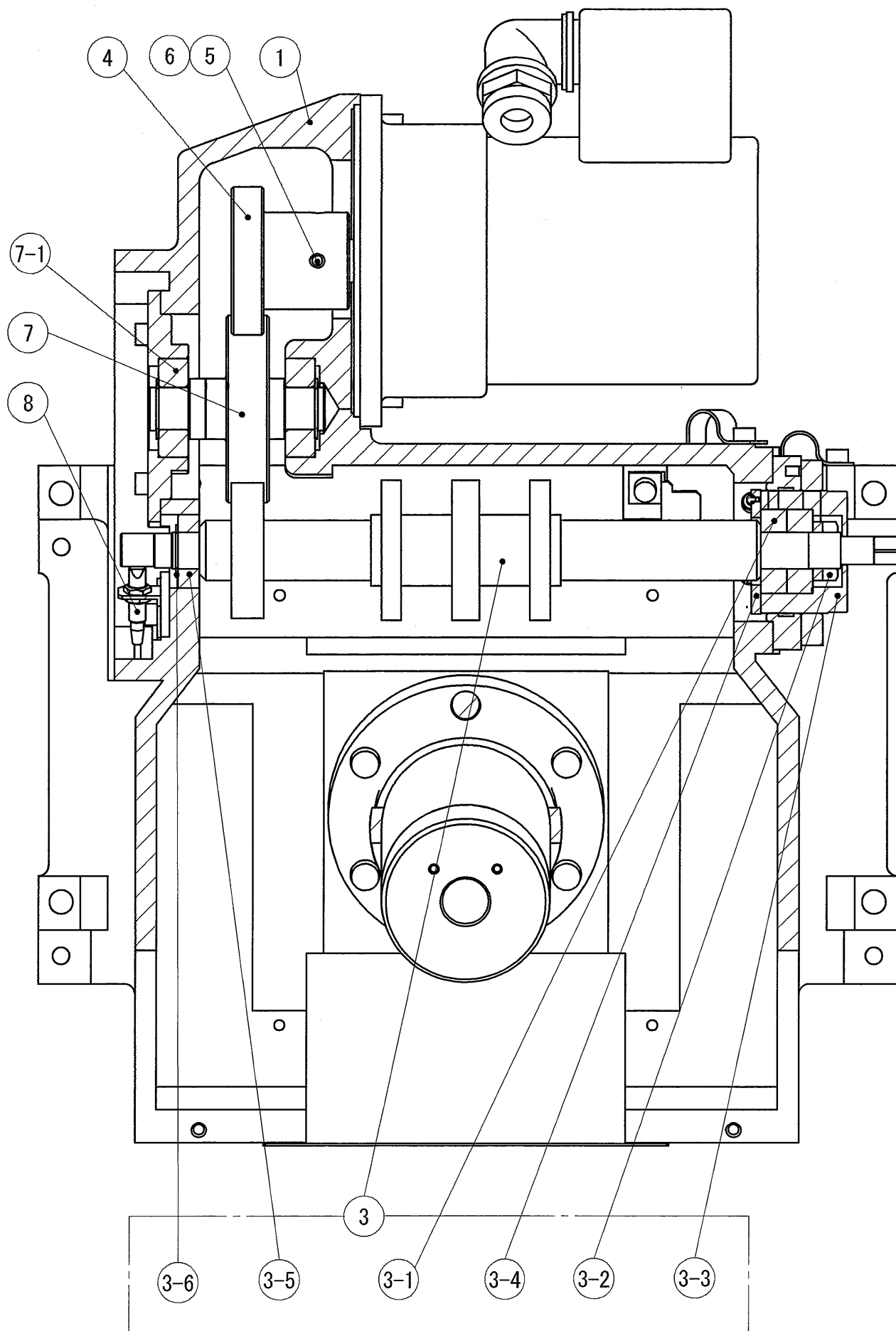
2-1. ATCサドル 14関係 ATC SADDLE 14



2-1.ATCサドル 14関係
ATC SADDLE 14

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	650028001	1	ATCサドル14	ATC SADDLE 14
2	653052001	1	バレルカムクミ 250	BARREL CAM ASSY 250
2-1	650058001	1	タマジクウケ7203BDB	BALL BEARRING RADIAL7203BDB
2-2	622018001	1	ジクウケナットHLB-17	BEARING NUT HLB-17
2-3	653054001	1	ベアリングケースクミ250	BEARING CASE ASSY 250
2-4	653057001	1	オサエイタ 250	RETAINER 250
2-5	076003809	1	タマジクウケ6003ZZ	BALL BEARING, 6003ZZ
2-6	048170142	1	トメワジクヨウC17	RETAINING RING, EXTERNAL C17
3	618106001	1	マガジンモータ14 3P	MAGAZINE MOTOR 14 3P
4	653059001	1	ヒラハグルマ M2Z25	SPUR GEAR M2Z25
5	653058001	2	アテガネ 250	_ATEGANE 250
6	608782001	4	アナトメネジ6 クボミトク	SET SCREW, SOCKET 6 SPE.
7	653060001	1	チュウカンハグルマクミ	GEAR ASSY
7-1	076200800	2	タマジクウケ6200ZZ	BALL BEARING, 6200ZZ
8	650245001	1	ATCCAMスイッチクミ229	ATC CAM SWITCH ASSY 229

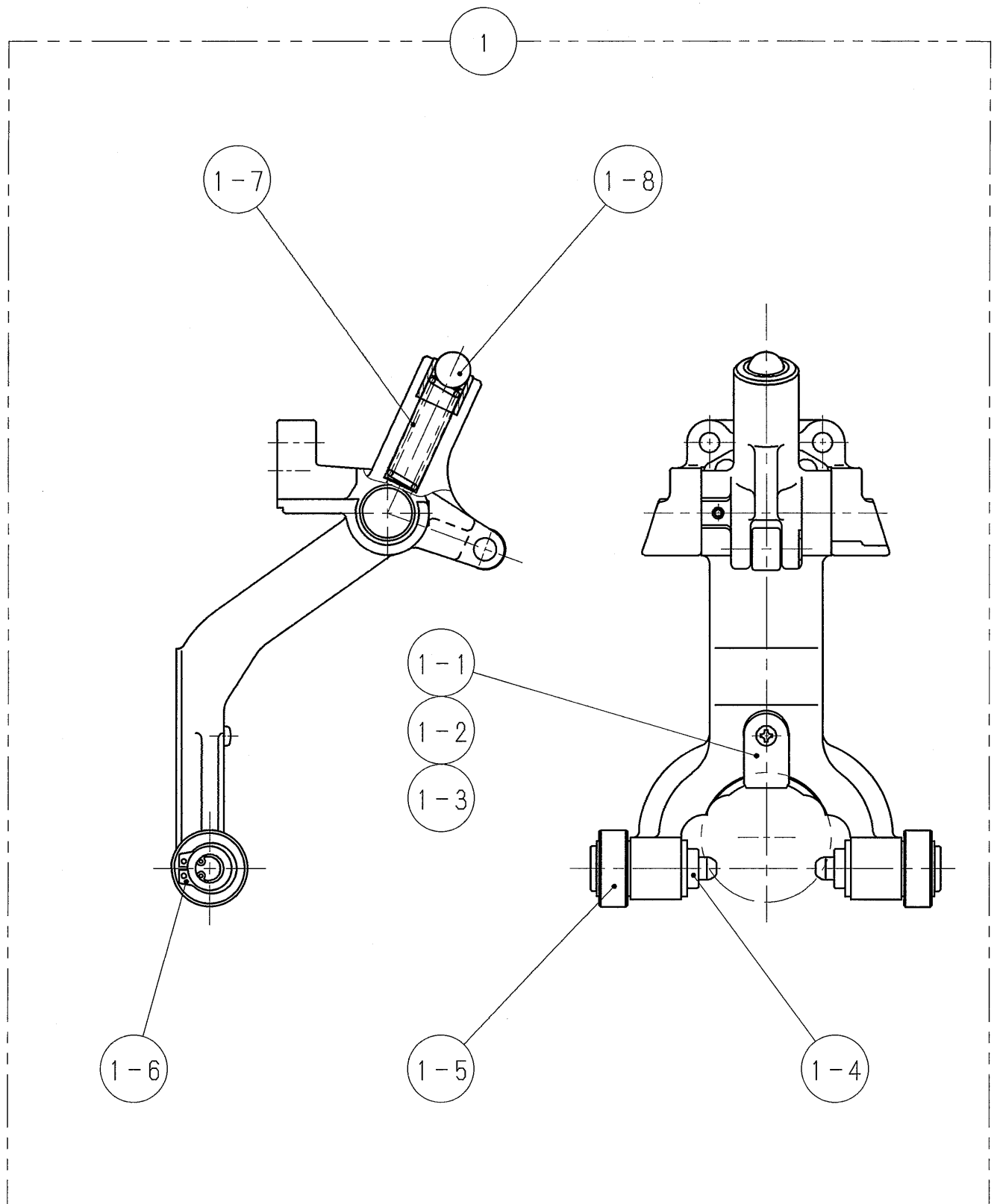
2-2. ATCサドル 21関係
ATC SADDLE 21



2-2.ATCサドル 21関係
ATC SADDLE 21

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618007001	1	ATCサドル21	ATC SADDLE 21
2	618104001	1	バレルカムクミ 21	BARREL CAM ASSY 21
2-1	650058001	1	タマジクウケ7203BDB	BALL BEARING RADIAL7203BDB
2-2	622018001	1	ジクウケナットHLB-17	BEARING NUT HLB-17
2-3	618145001	1	ベアリングケースクミ21	BEARING CASE ASSY 21
2-4	653057001	1	オサエイタ 250	RETAINER 250
2-5	076003809	1	タマジクウケ6003ZZ	BALL BEARING, 6003ZZ
2-6	048170142	1	トメワジクヨウC17	RETAINING RING, EXTERNAL C17
3	618112001	1	MGモータ21	MAGAZINE MOTOR, 21
4	618113001	1	モータジグギア21	MOTOR SHAFT GEAR 21
5	653058001	2	アテガネ 250	ATEGANE 250
6	608782001	4	アナトメネジ6 クボミトク	SET SCREW, SOCKET 6 SPE.
7	618135001	1	チュウカンジグギヤクミ21	INTERMEDIATE SHAFT GEAR 21
7-1	076204602	2	タマジクウケ6204VVC2	BALL BEARING, 6204VVC
8	650245001	1	ATCCAMスイッチクミ229	ATC CAM SWITCH ASSY 229

3-1-1. クリップ 14
GRIP 14

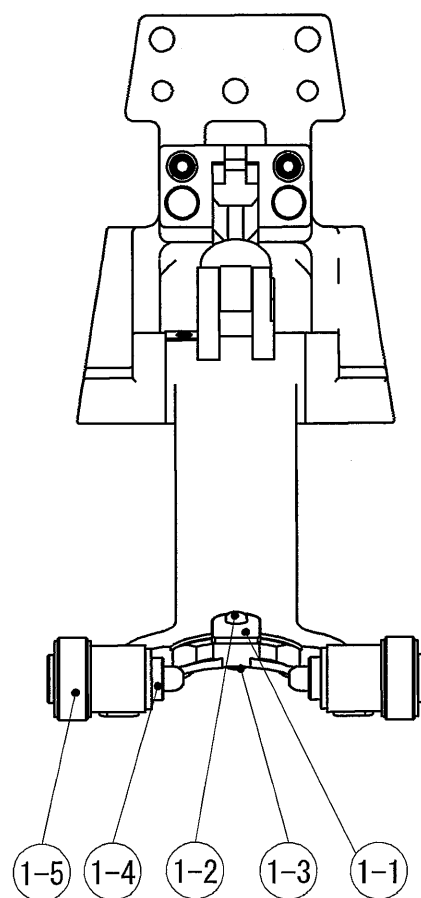
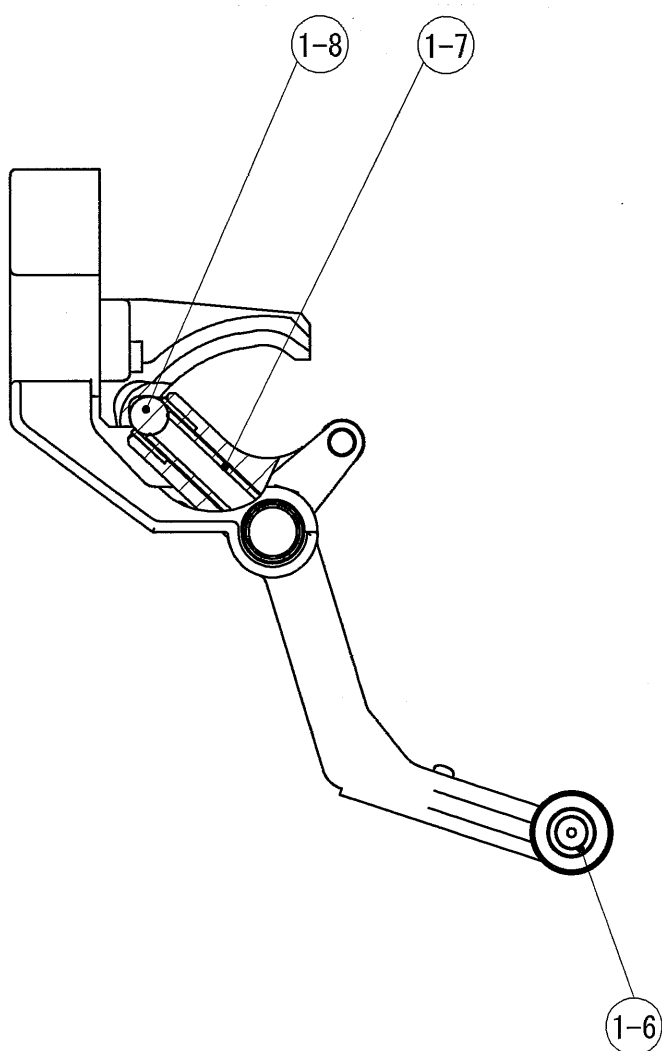


3-1-1グリップ 14関係
GRIP 14

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	650065001	14	グリップクミDP3	GRIP ASSY DP3
1-1	640150001	14	キーDP2	KEY DP2
1-2	002401605	14	+ナベコ4X16	SCREW, PAN (S/P WASHER) M4X16
1-3	640115000	14	UナットM4X0.7	U NUT M4X0.7
1-4	646108001	28	ピンホルダクミ 2	PIN HOLDER ASSY
1-5	650097001	28	ローラ27.2-2	ROLLER 27.2-2
1-6	048160142	56	トメワジクヨウC16	RETAINING RING, EXTERNAL C16
1-7	628133001	14	コイルバネ 12X50.5	COIL SPRING 12X50.5
1-8	071127050	14	コウキュウ 1/2	BEARING BALL, 1/2

3-1-2. グリップ 21
GRIP 21

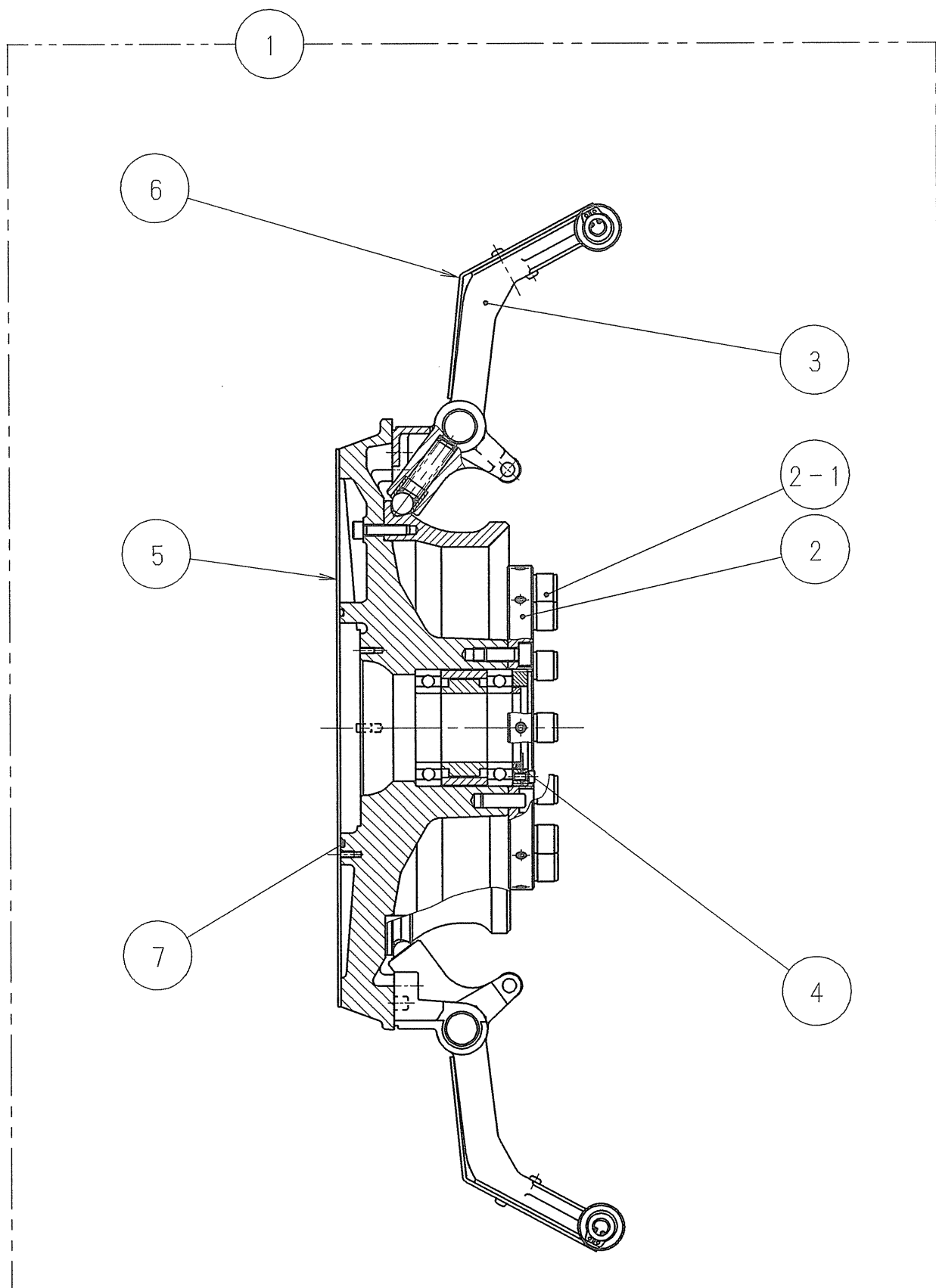
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3-1-2.グリップ 21関係
GRIP 21

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618136001	21	グリップクミDP3-21	GRIP ASSY, DP3-21
1-1	640150001	21	キ-DP2	KEY DP2
1-2	002401605	21	+ナベコ4X16	SCREW, PAN (S/P WASHER) M4X16
1-3	640115000	21	UナットM4X0.7	U NUT M4X0.7
1-4	646108001	42	ピンホルダクミ 2	PIN HOLDER ASSY
1-5	650097001	42	ローラ27.2-2	ROLLER 27.2-2
1-6	048160142	84	トメワジクヨウC16	RETAINING RING, EXTERNAL C16
1-7	628133001	21	コイルバネ 12X50.5	COIL SPRING 12X50.5
1-8	071127050	21	コウキユウ 1/2	BEARING BALL, 1/2

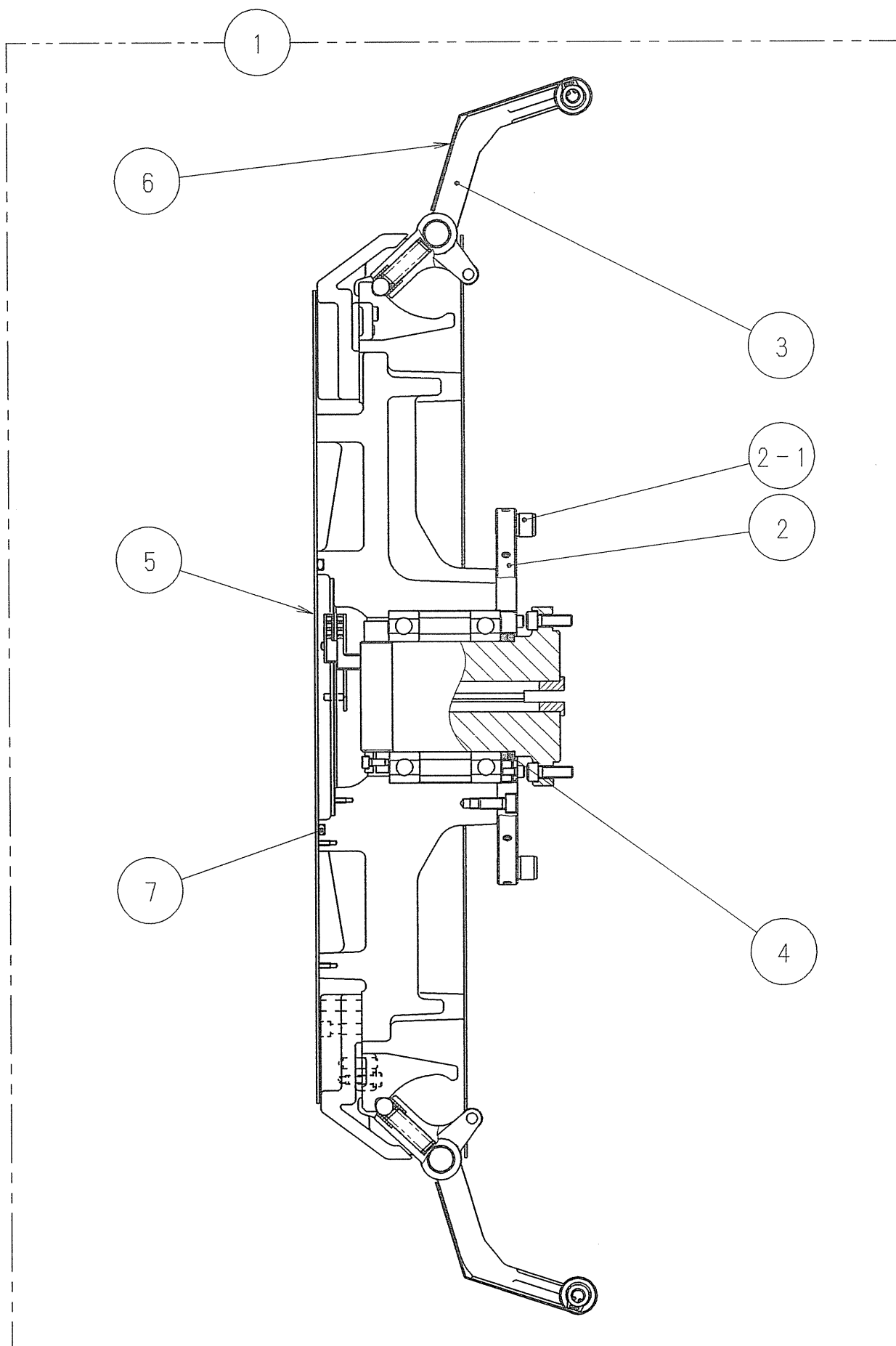
3-2-1. ATCマガジン 14
ATC MAGAZINE 14



3-2-1.ATCマガジン 14関係
ATC MAGAZINE 14

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	650062001	1	ツールマガジン14クミ	TOOL MAGAZINE 14 ASSY
2	650049001	1	センターフランジ14クミ	CENTER FLANGE ASSY, 14
2-1	628343001	14	カムフォロア17-2	CAM FOLLOWER 17-2
3	650065001	14	グリップクミDP3	GRIP ASSY DP3
4	640128001	1	マガジンスペーサ	MAGAZINE SPACER
5	618577001	1	アドレスメイバン250-2	ADDRESS NAME PLATE 250-2
6	650053001	14	グリップカバー14	GRIP COVER 14
7	6A7694001	1	OリングG130 4D	O RING G130 4D

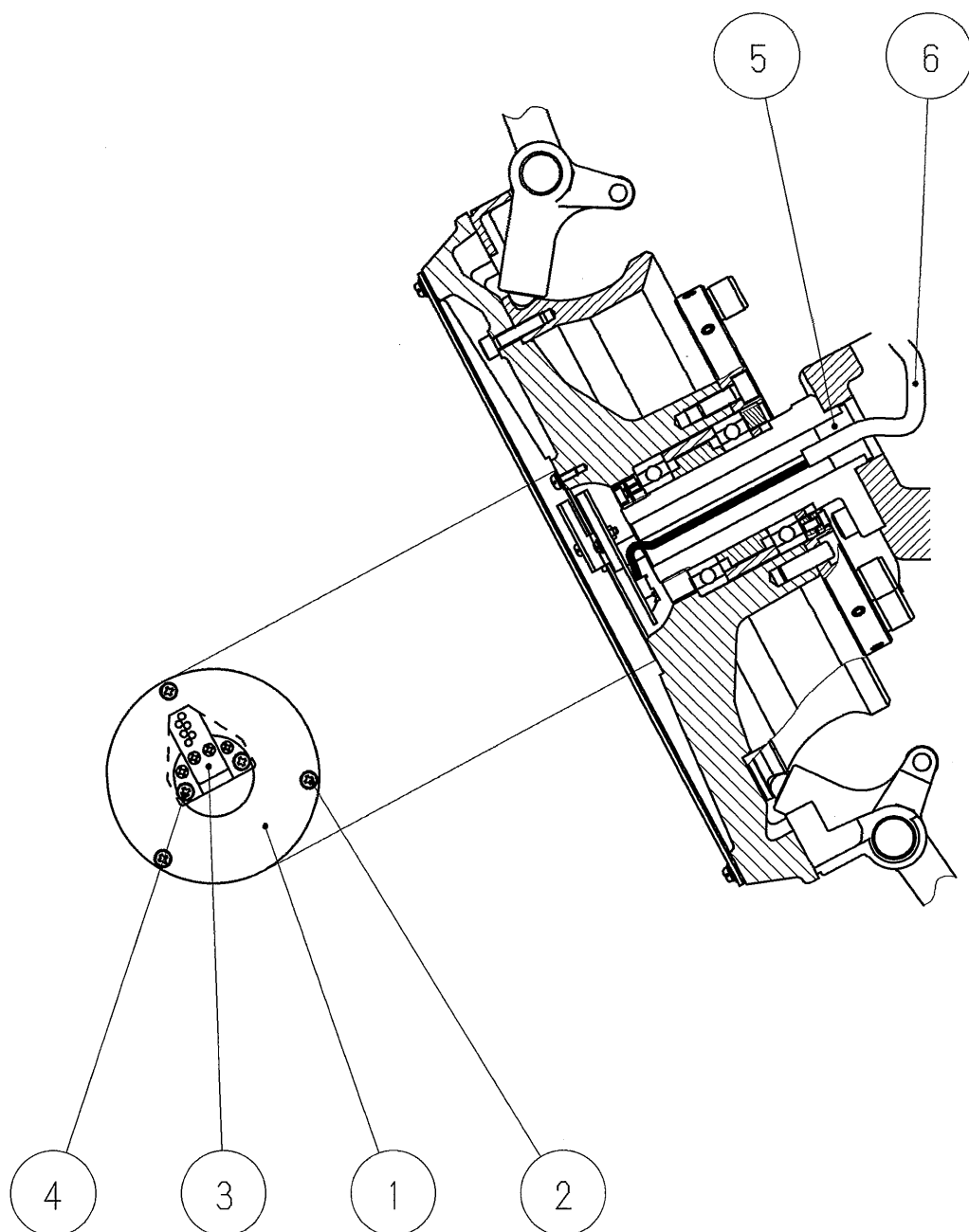
3-2-2. ATCマガジン 21
ATC MAGAZINE 21



3-2-2.ATCマガジン関係
ATC MAGAZINE 21

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618115001	1	ツールマガジン21クミ	MAGAZINE ASSY, TOOL 21
2	618122001	1	センターフランジ21クミ	CENTER FLANGE ASSY, 21
2-1	618133001	21	カムフオロア13-24	CAM FOLLOWER, 13-24
3	618136001	21	グリップクミDP3-21	GRIP ASSY, DP3-21
4	618127001	1	マガジンスペーサ21	MAGAZINE SPACER 21
5	618128001	1	アドレスメイバン21	ADDRESS NAME PLATE 21
6	618130001	21	グリップカバー-21	GRIP COVER 21
7	6A7695001	1	OリングG185 4D	O RING G185 4D

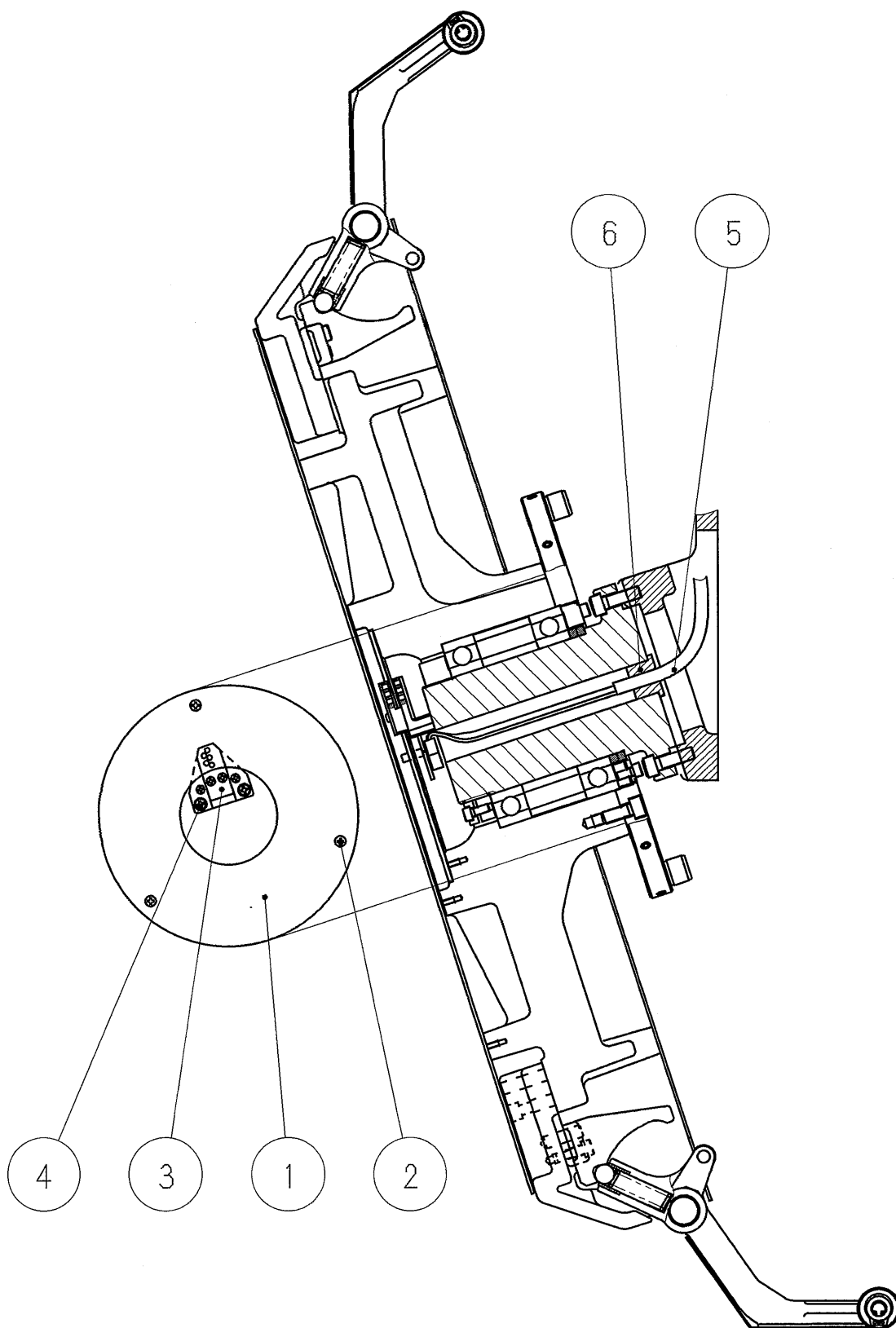
4-1. アドレスセンサ 14
ADDRESS SENSOR 14



4-1.アドレスセンサ関係
ADDRESS SENSOR 14

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	650056001	1	スリットイタ14	SLIT PLATE 14
2	602372001	3	+ナベネジ4X8Wツキ	+PAN-HEAD SCREW 4X8W
3	618649101	1	アドレスセンサクミ 251	ADDRESS SENSOR ASSY, 251
4	002402005	2	+ナベコ4X20	SCREW
5	618685001	1	ATCENCコードクミ251	ATC ENCODER CABLE ASSY, 251
6	638173001	1	コードブツシユ229	CORD BUSH 229

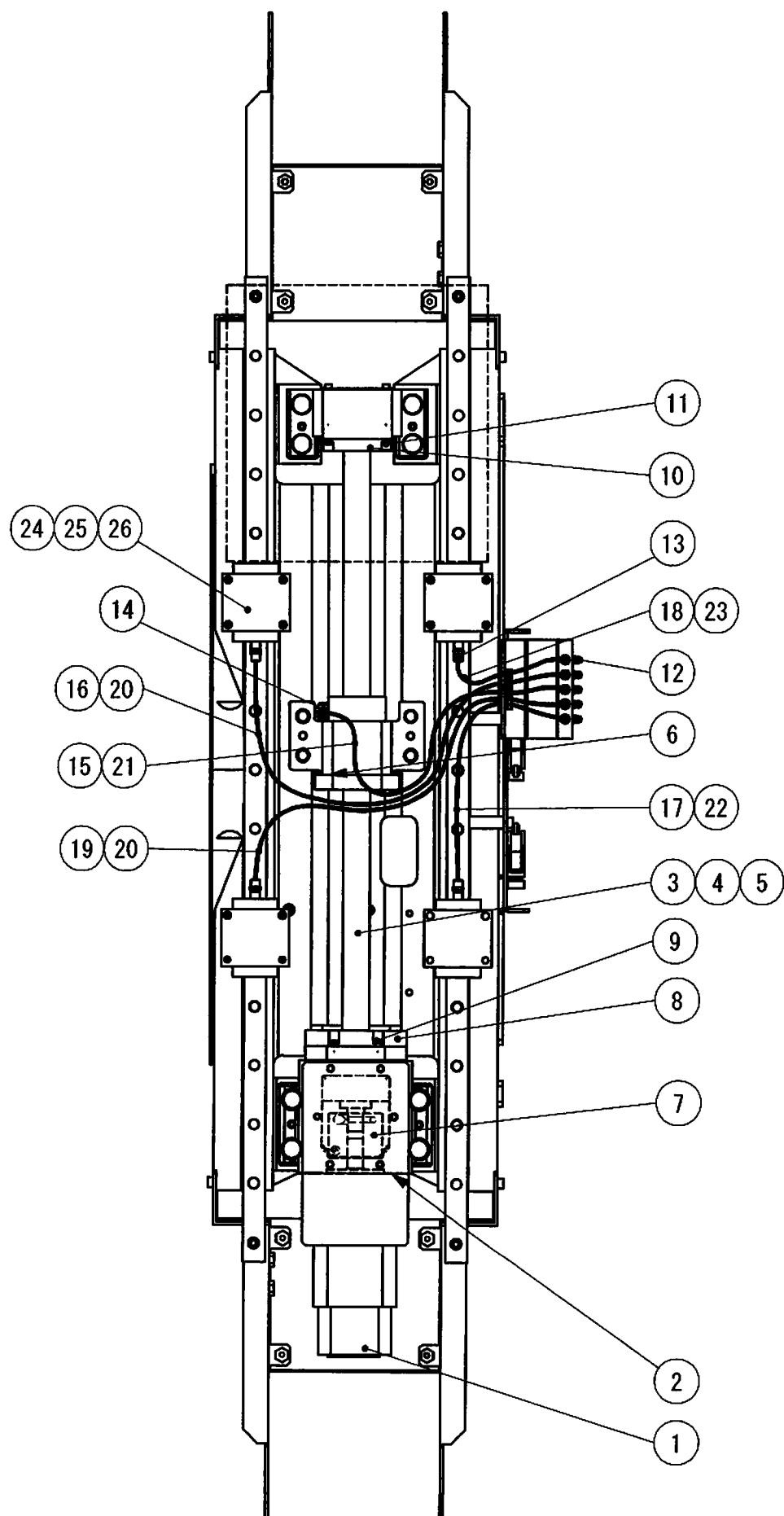
4-2. アドレスセンサ 21
ADDRESS SENSOR 21



4-2.アドレスセンサ 21関係
ADDRESS SENSOR 21

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618132001	1	スリットイタ21	SLIT PLATE 21
2	602372001	3	+ナベネジ4X8Wツキ	+PAN-HEAD SCREW 4X8W
3	618649101	1	アドレスセンサクミ 251	ADDRESS SENSOR ASSY, 251
4	002402005	2	+ナベコ4X20	SCREW
5	618685001	1	ATCENCコードクミ251	ATC ENCODER CABLE ASSY, 251
6	638173001	1	コードブツシユ229	CORD BUSH 229

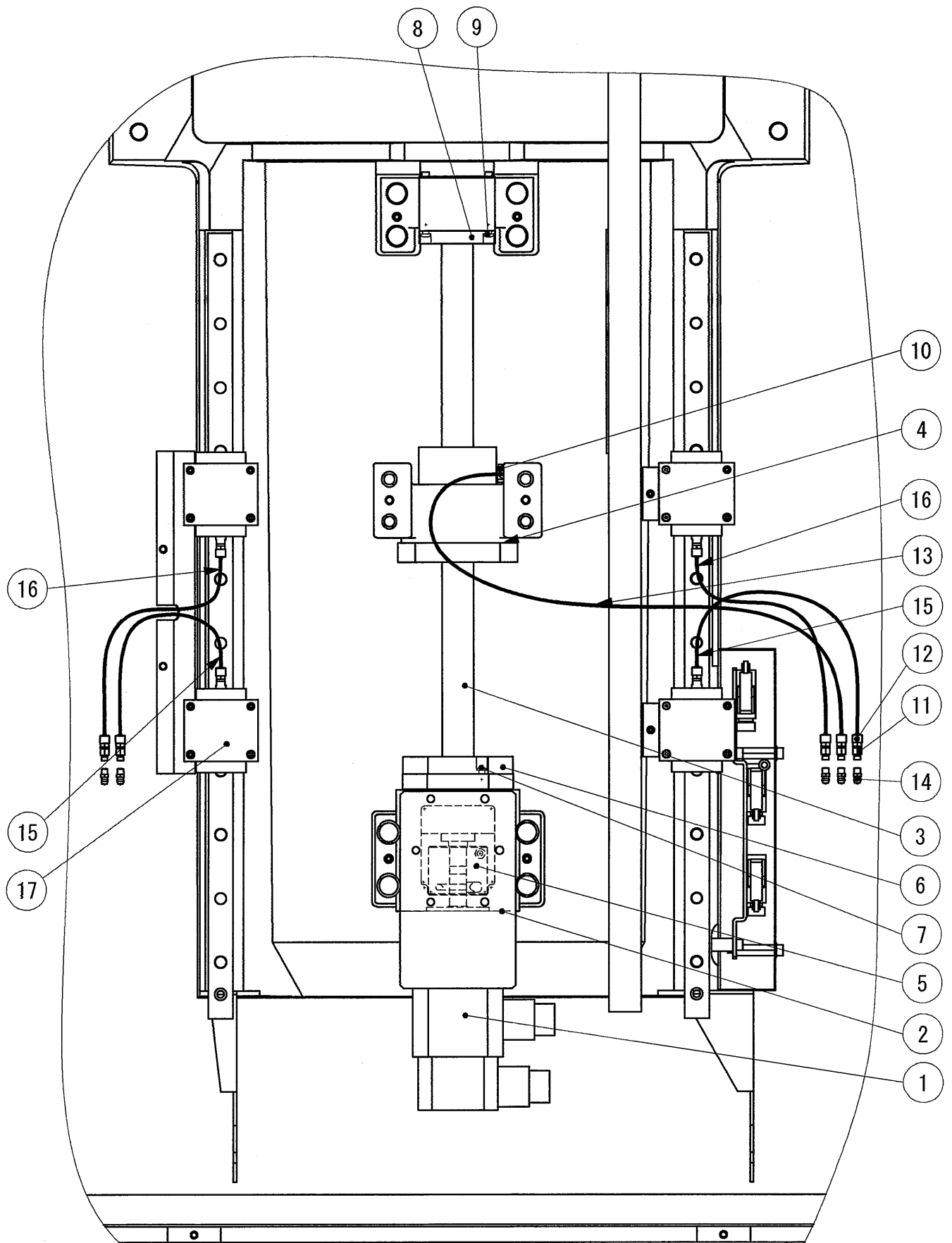
5. X軸関係 X AXIS



5.X軸関係
X AXIS

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark	
1	618150001	1	XYモータ 251	XY MOTOR 251	
2	618213001	1	モータスペーサ	MOTOR SPACER	
3	618155001	1	ボールネジXクミ251	BALL SCREW ASSY, X-AXIS 251	
4	618852001	1	ボールネジXクミ251-L	BALL SCREW L ASSY, X-AXIS 251	
5	6A5003001	1	ボールネジXクミ251S	BALL SCREW ASSY X 251S	
6	081006070	1	OリングP6	RUBBER RING P6	
7	653618001	1	カツプリング16-16	COUPLING 16-16	
8	618154001	1	ストツパ251XY	STOPPER XY, 251	
9	533676001	2	ダンネジ	SHOULDER SCREW	
10	637550001	1	ストツパD72	STOPPER D72	
11	533676001	2	ダンネジ	SHOULDER SCREW	
12	606871000	5	グリースニツプル6	GREESE NIPPLE 6	
13	641346000	9	ストレート BF4N	STRAIGHT BF4N 321	
14	641347000	1	ユニバサルエルボUEF4N	UNIVERSAL ELBOW UEF4N	
15	641342000	1	レイロンチューブ550	TUBE 550	
16	641343000	1	レイロンチューブ600	TUBE 600	
17	641338000	1	レイロンチューブ360	TUBE 360	
18	641336000	1	レイロンチューブ240	TUBE 240	
19	644770001	1	レイロンチューブ650	TUBE, LYLON 650	
20	641341000	2	レイロンチューブ4X500	TUBE 500	
21	641339000	1	レイロンチューブ400	TUBE 400	
22	644769001	1	レイロンチューブ270	TUBE, LYLON 270	
23	636168001	1	レイロンチューブ4X200	TUBE, LYLON 4X200	
24	653001001	1	ガイド Xクミ 250	GUIDE ASSY,X 250	
25	653332001	1	ガイド Xクミ 250L	X GUIDE ASSY 250L	
26	6A5002001	1	ガイド Xクミ 250S	GUIDE ASSY X 251S	

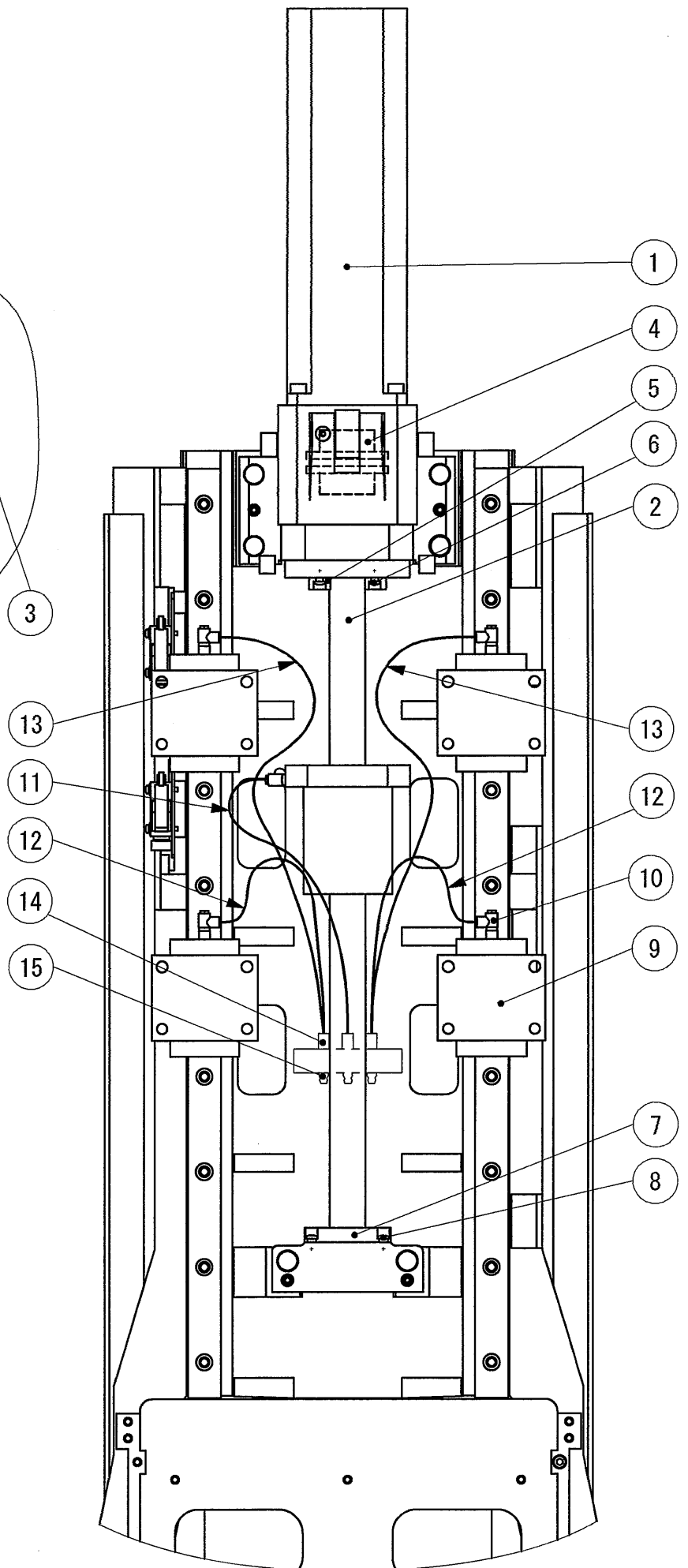
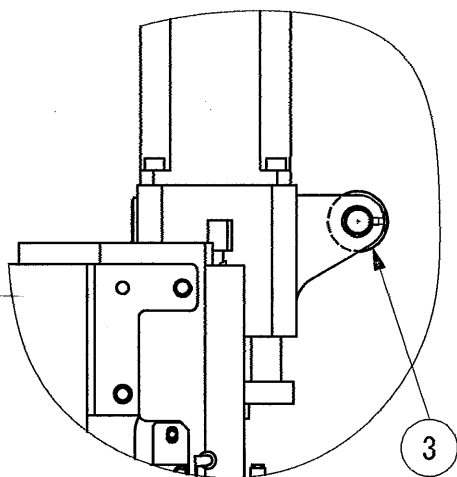
6. Y軸関係 Y AXIS



6.Y軸関係
Y AXIS

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618150001	1	XYモータ 251	XY MOTOR 251
2	618213001	1	モータスペーサ	MOTOR SPACER
3	618156001	1	ボールネジYクミ251	BALL SCREW ASSY, Y-AXIS 251
4	081006070	1	OリングP6	RUBBER RING P6
5	653618001	1	カップリング16-16	COUPLING 16-16
6	618154001	1	ストツバ251XY	STOPPER XY, 251
7	533676001	2	ダンネジ	SHOULDER SCREW
8	637550001	1	ストツバD72	STOPPER D72
9	533676001	2	ダンネジ	SHOULDER SCREW
10	641347000	2	ユニバサルエルボUEF4N	UNIVERSAL ELBOW UEF4N
11	628163000	5	ボールネジツギテ	BALL SCREW JOINT
12	641346000	9	ストレート BF4N	STRAIGHT BF4N 321
13	641342000	1	レイロンチューブ550	TUBE 550
14	606871000	4	グリースニツプル6	GREASE NIPPLE 6
15	656241001	2	レイロンチューブ4X250	TUBE, LYLON 4X250
16	641337000	2	レイロンチューブ4X300	TUBE 300
17	653002001	1	ガイド Yクミ 250	GUIDE ASSY,Y 250

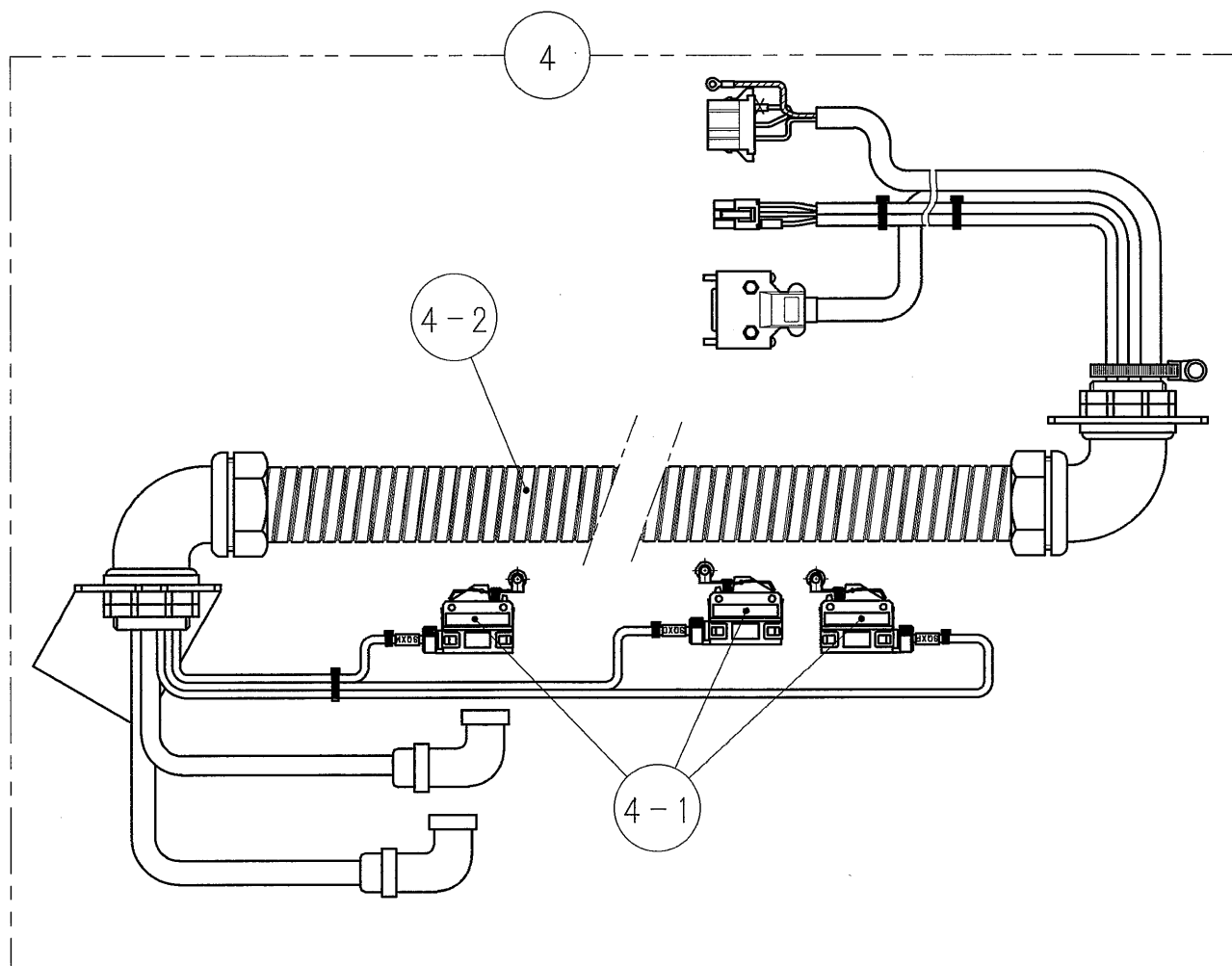
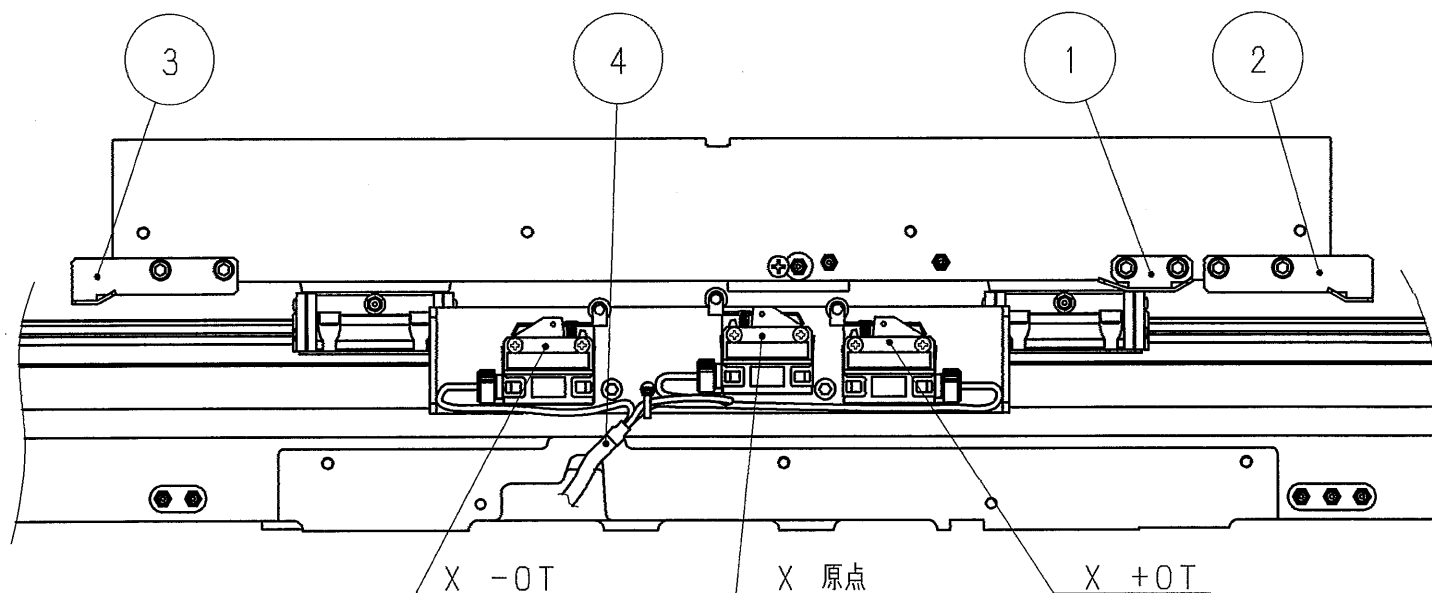
7. Z軸関係 Z AXIS



7.Z軸関係
Z AXIS

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618440001	1	Zジクモータ251	Z AXIS MOTOR,251
2	653045001	1	ボールネジ Zクミ 250	BALL SCREW ASSY Z 250
3	645162000	1	ローラ NART17UUR	ROLLER NART17UUR
4	650514001	1	カップリングXY 31A	COUPLING XY 31A
5	646237000	2	ストツパZ 311	STOPPER Z 311
6	533676001	4	ダンネジ	SHOULDER SCREW
7	637550001	1	ストツパD72	STOPPER D72
8	533676001	4	ダンネジ	SHOULDER SCREW
9	653029001	1	ガイド Zクミ 250	GUIDE ASSY Z 250
10	641347000	5	ユニバサルエルボUEF4N	UNIVERSAL ELBOW UEF4N
11	641339000	1	レイロンチューブ400	TUBE 400
12	644769001	2	レイロンチューブ270	TUBE, LYLON 270
13	641341000	2	レイロンチューブ4X500	TUBE 500
14	641346000	5	ストレート BF4N	STRAIGHT BF4N 321
15	606871000	5	グリースニツプル6	GREASE NIPPLE 6

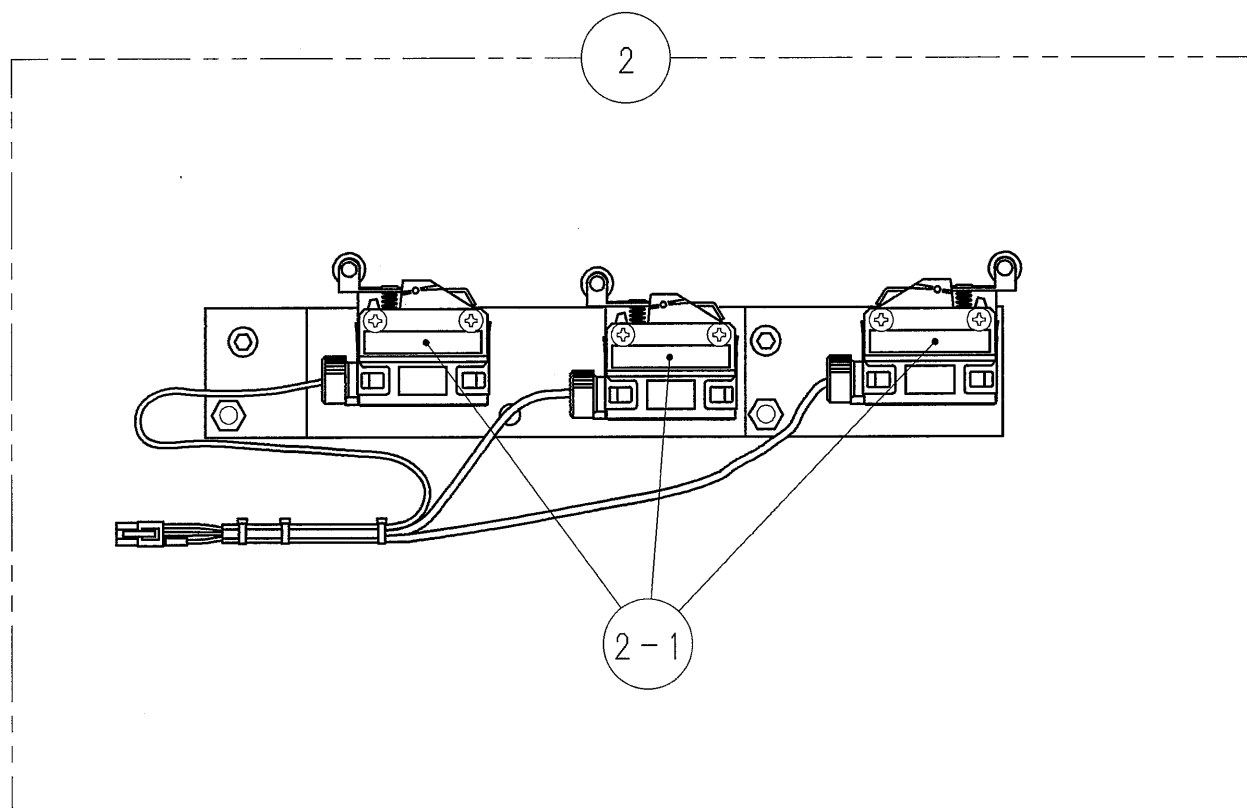
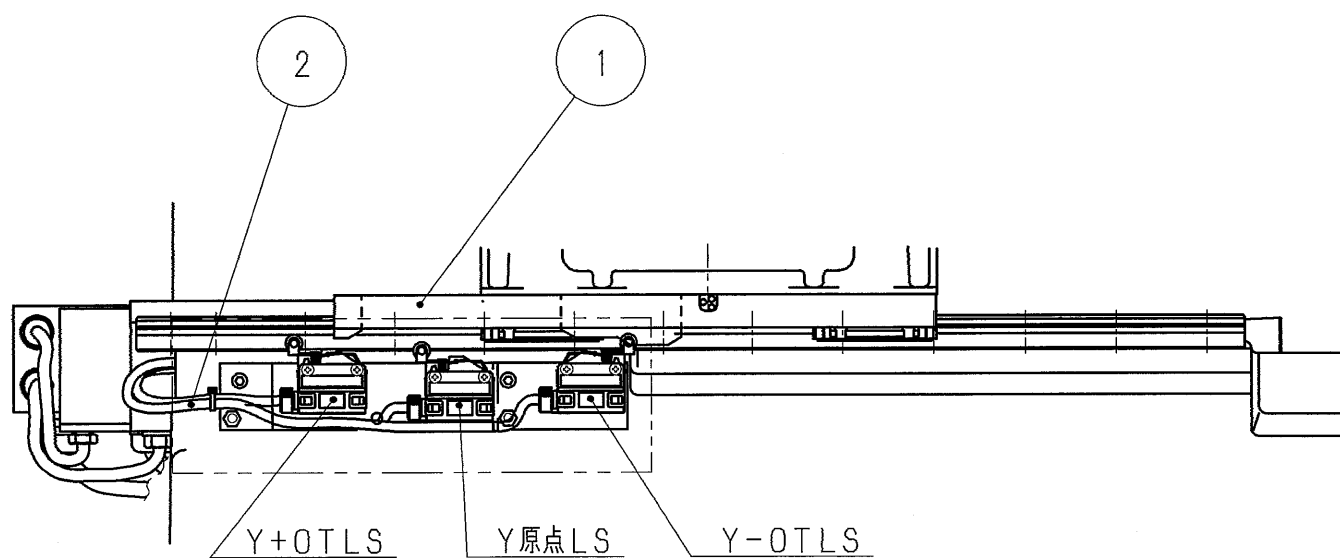
8. X軸リミットスイッチ関係 X-AXIS LIMIT SWITCH



8.X軸リミットスイッチ関係
X-AXIS LIMIT SWITCH

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618157001	1	ゲンテンドグX251	ORIGINAL POINT DOG, X251
2	650185001	1	ドグX+OT229N	DOG, X+OT229N
3	650186001	1	ドグX-OT229N	DOG, X-OT229N
4	618661001	1	Xフレキクミ251	X FLEXIBLE TUBE ASSY 251
4-1	653999002	3	スイッチ SL1-PV	SWITCH SL1-PV
4-2	618681001	1	Xフレキ251	X FLEXIBLE TUBE 251

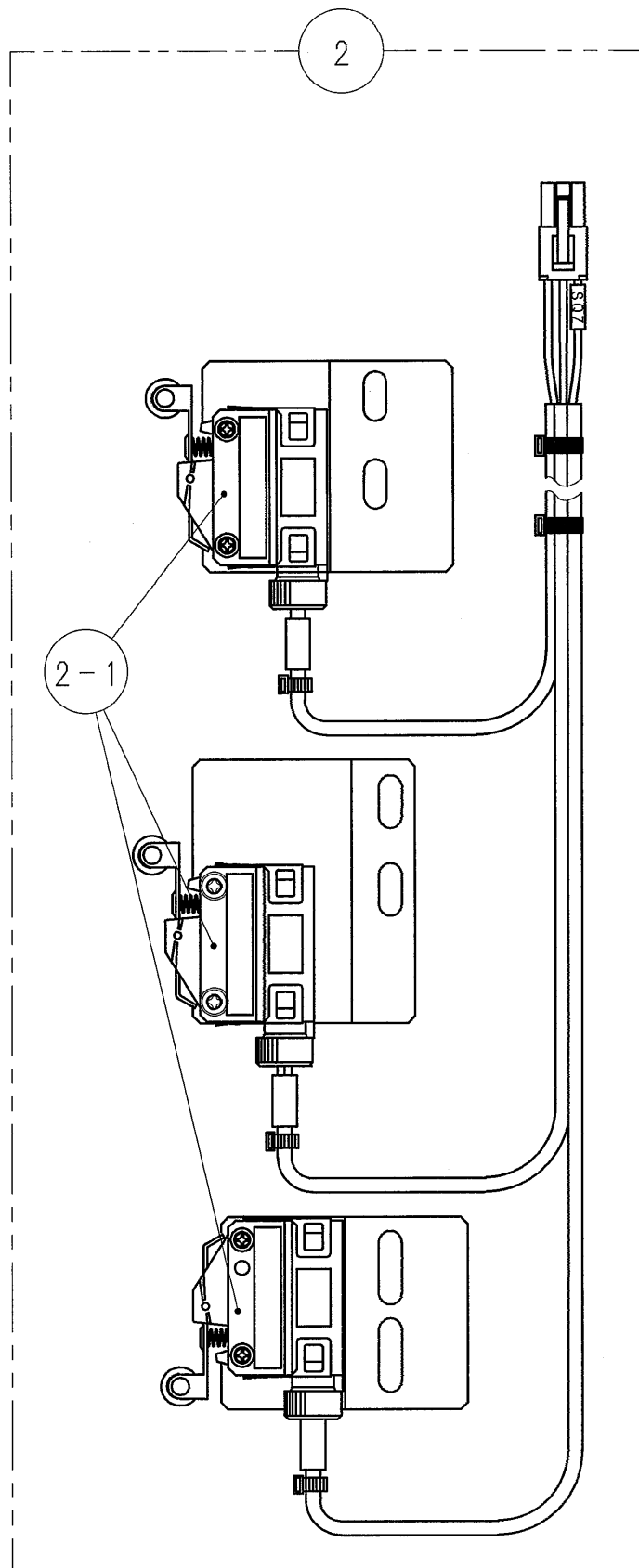
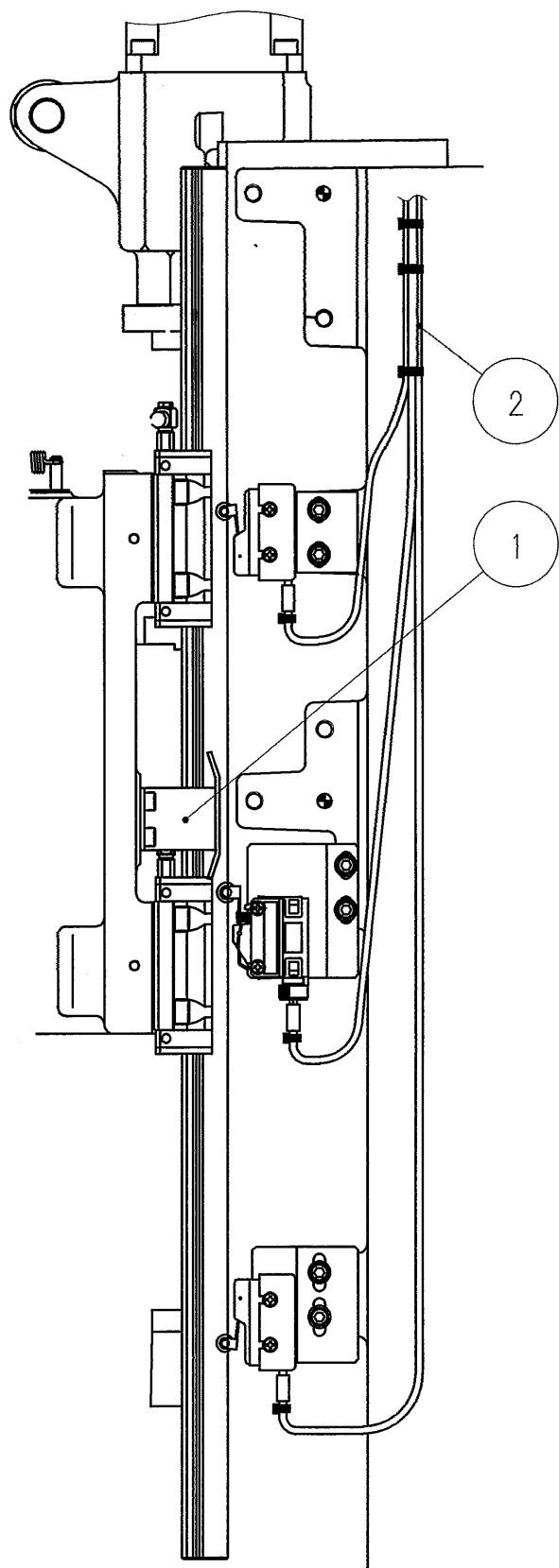
9. Y軸リミットスイッチ関係 Y-AXIS LIMIT SWITCH



9.Y軸リミット関係
Y-AXIS LIMIT SWITCH

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618158001	1	ドグ Y 251	DOG, Y 251
2	618682001	1	LSYコード 251	LS Y CORD 251
2-1	653999002	3	スイッチ SL1-PV	SWITCH SL1-PV

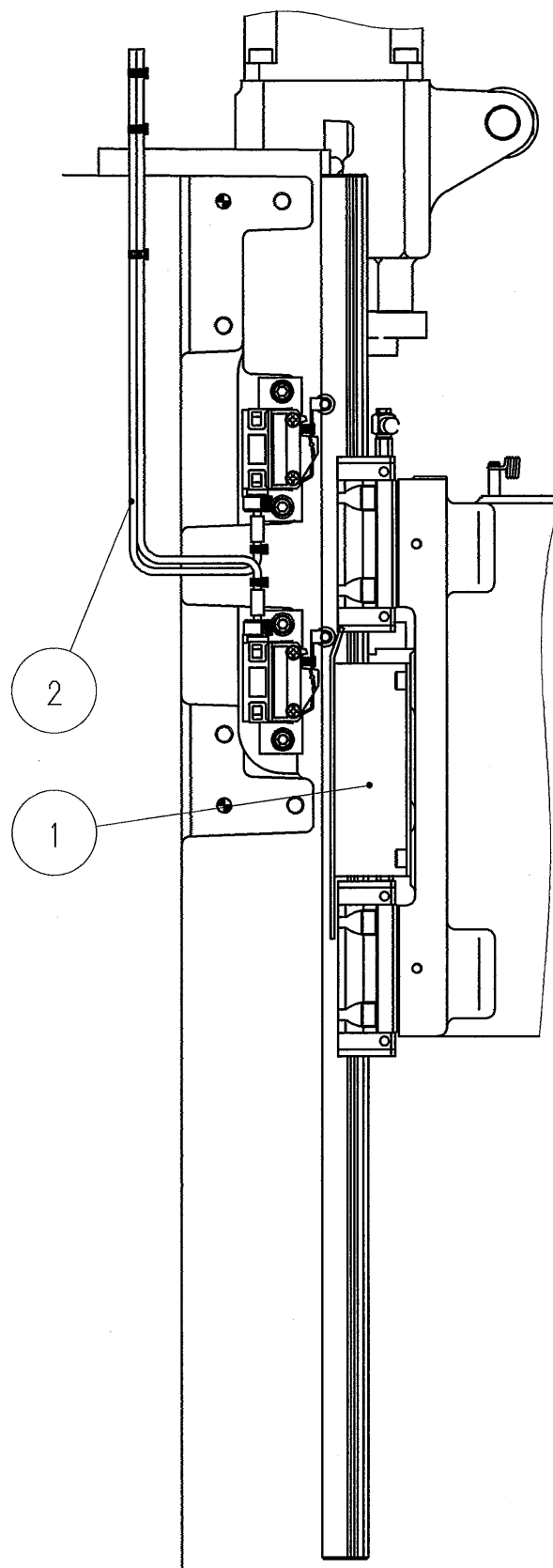
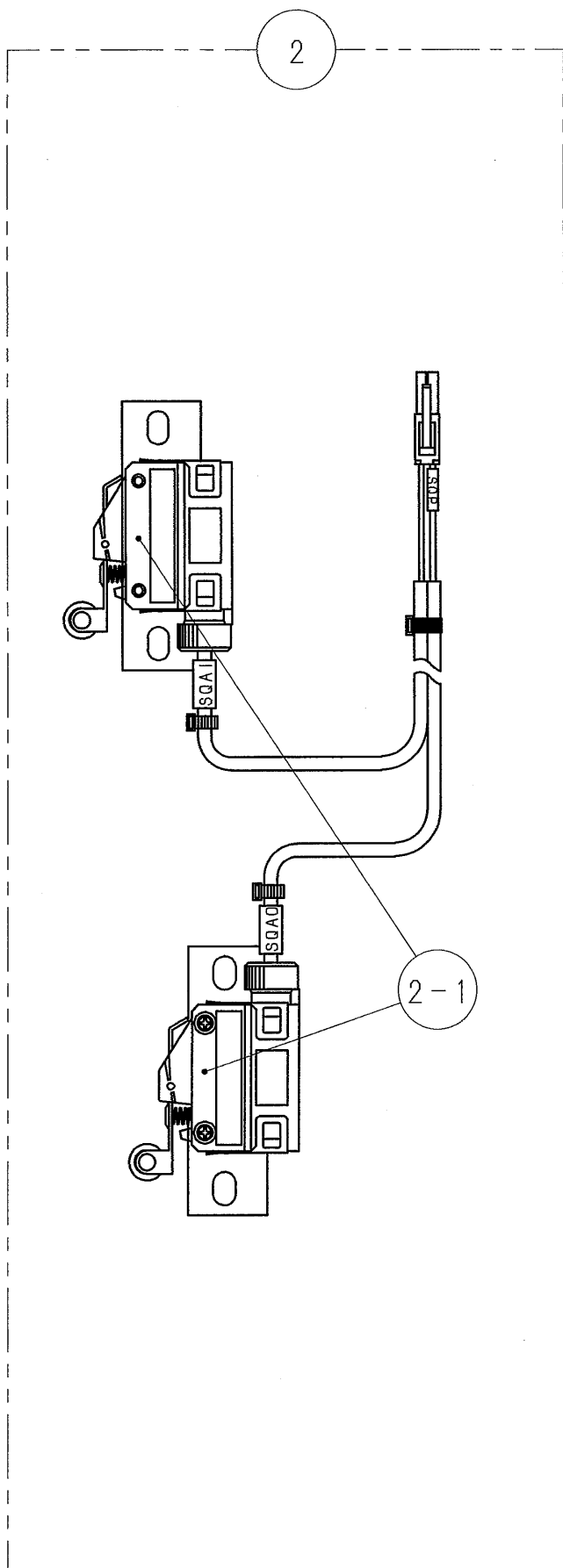
10. Z軸リミットスイッチ関係 Z-AXIS LIMIT SWITCH



10.Z軸リミットスイッチ関係
Z-AXIS LIMIT SWITCH

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618224001	1	ドグ Z251	DOG, Z 251
2	618683001	1	LSZコード251	LS Z CORD 251
2-1	653999002	3	スイッチ SL1-PV	SWITCH SL1-PV

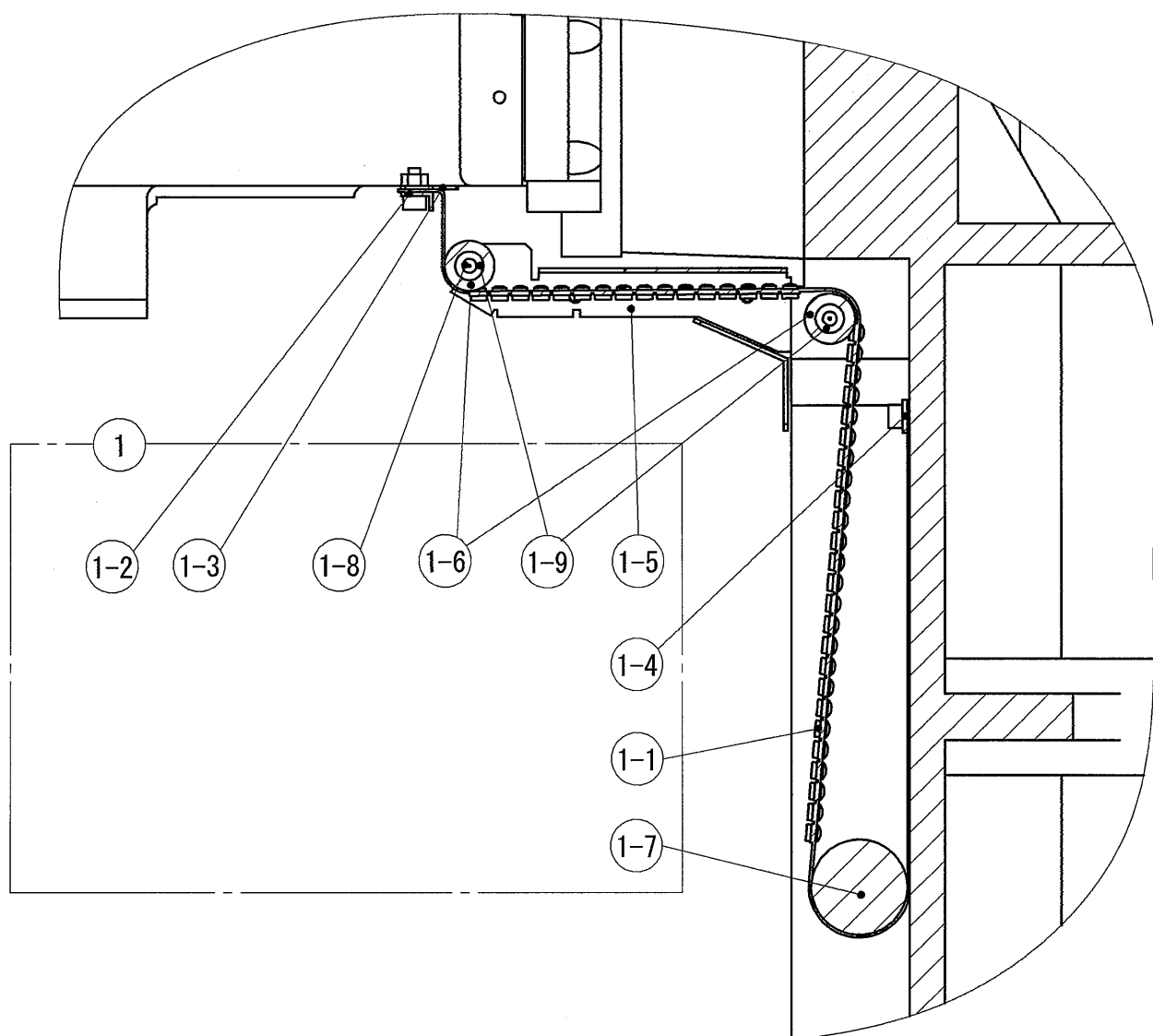
11. ATCリミットスイッチ関係 ATC LIMIT SWITCH



11.ATCリミット関係
ATC LIMIT SWITCH

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	622034001	1	ATCドグ228	DOG, ATC 228
2	618684001	1	LSコードATCクミ251	LS CORD ATC ASSY 251
2-1	653999002	2	スイッチ SL1-PV	SWITCH SL1-PV

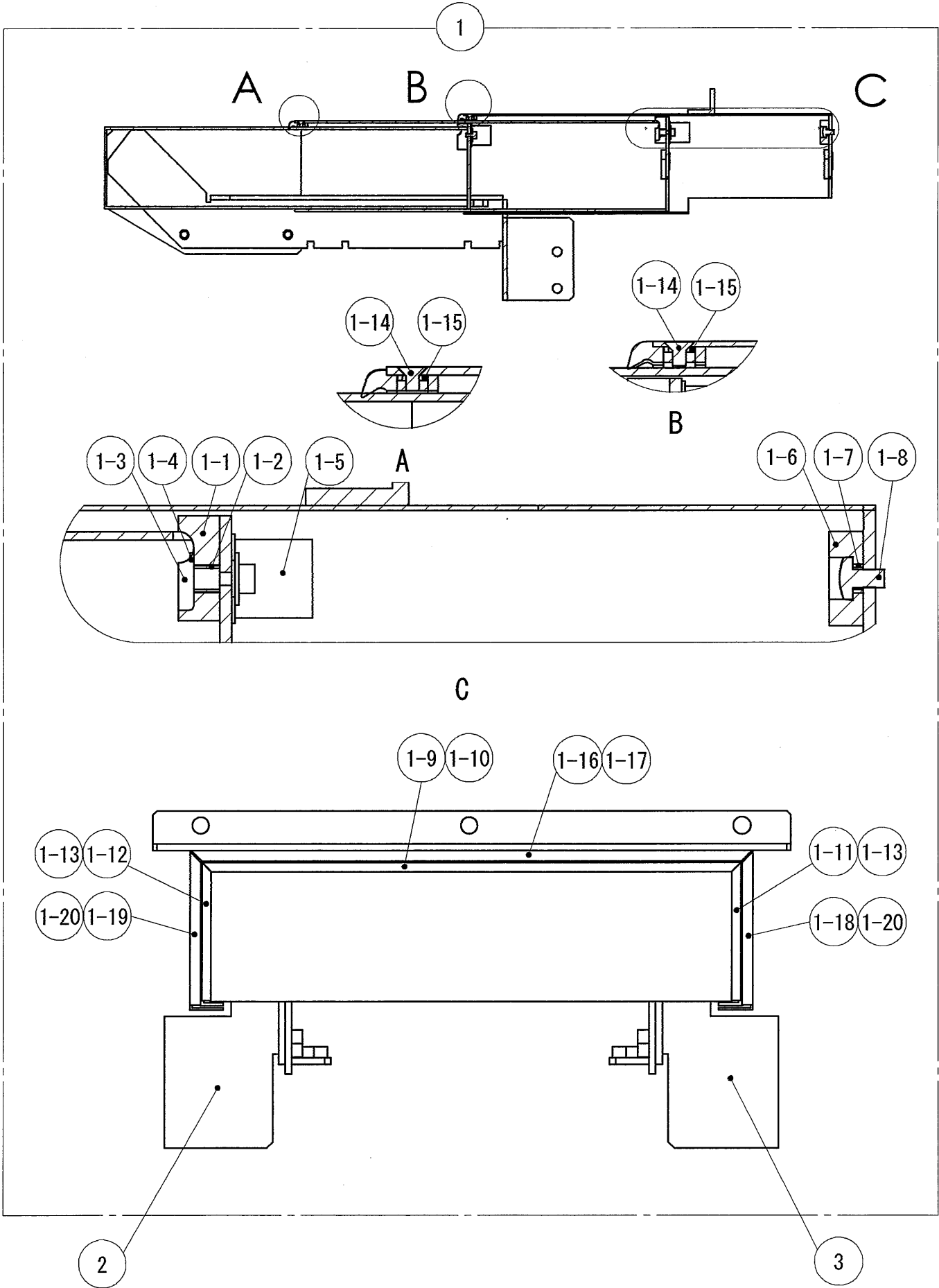
12. Zシートカバー関係 Z SHEET COVER



12.Zシートカバー関係
Z SHEET COVER

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618160001	1	Zシートカバークミ 251	Z SHEET COVER ASSY, 251
1-1	618162001	1	Zシート251	Z SHEET, 251
1-2	618163001	1	Zシートカナグ251-1	Z SHEET BRACKET 251-1
1-3	618164001	1	Zシートカナグ251-2	Z SHEET BRACKET 251-2
1-4	626102001	1	シートトリツケカナグ2-2	SEAT FITTINGS 2-2
1-5	618072001	1	ローラササエ251	TITUPUSIYAWAKABA-L251
1-6	618165001	2	Zシートローラ 251	Z SHEET ROLLER 251
1-7	618166001	1	Zシートオモリ251	Z SHEET WEIGHT 251
1-8	016083031	2	アナトガリ8X30	SET SCREW, SOCKET (CN) M8X30
1-9	620154001	4	センターウケベアリング	BEARING

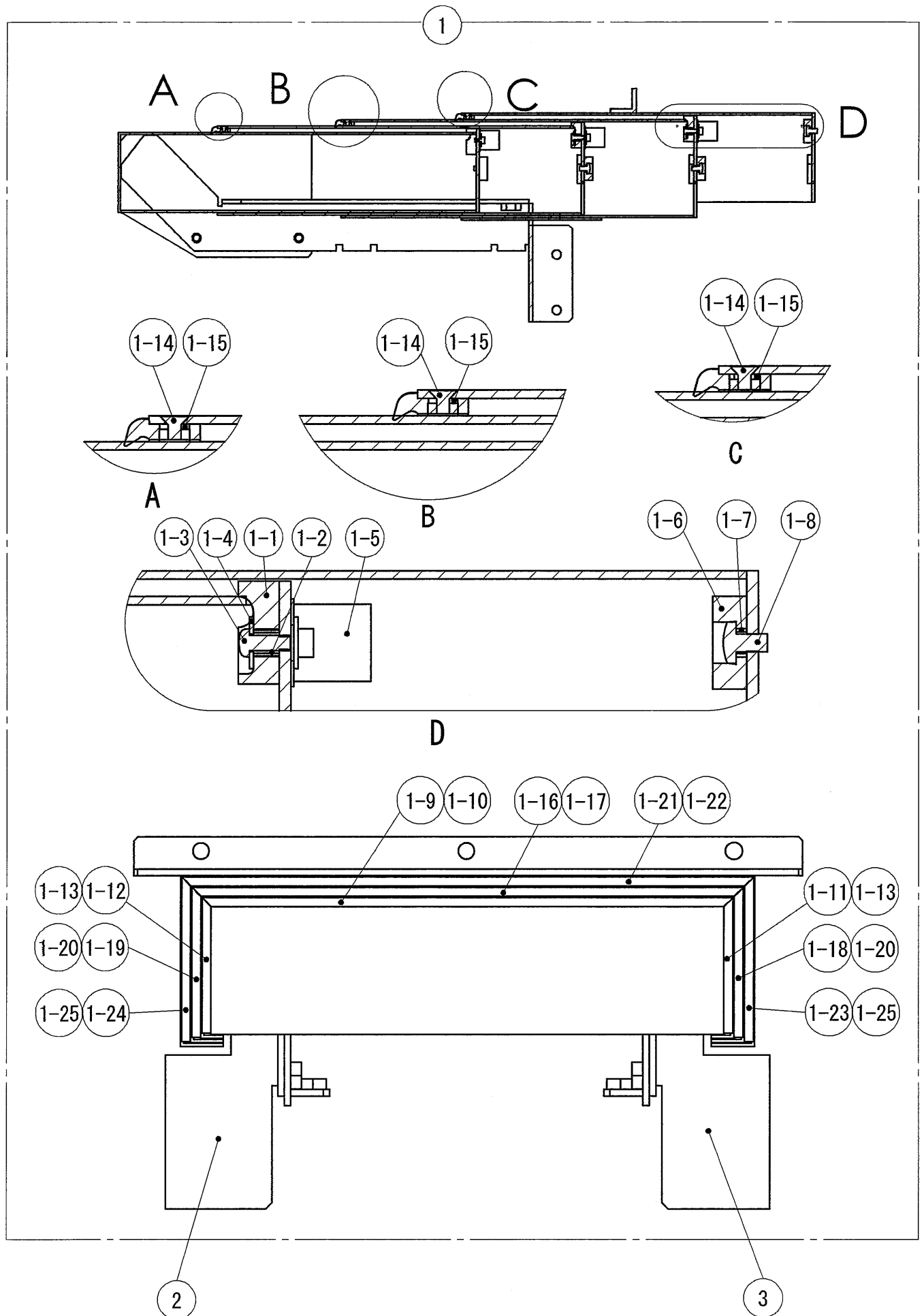
1 3 - 1. Xテレスコカバー関係 (標準仕様)
TERESCOPIC COVER X (Standard)



13-1.Xテレスコカバー関係(標準仕様)
TERESCOPI COVER X(Standard)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618250001	2	テレスコカバー-Xクミ 251	X TELESCOPIC COVER, ASSY, 251
1-1	622189001	12	クツシヨンゴム228クミ	CUSHION RUBBER 228 ASSY
1-2	622179001	12	スペーサ4X5	SPACER 4X5
1-3	062300806	12	ナベコ3X8	SCREW, PAN M3X8
1-4	025030335	12	ヒラザガネダイ3	WASHER, PLAIN L 3
1-5	622274001	12	クツシヨンスポンジクミ	CUSHION SPONGE ASSY
1-6	639646001	12	ストツパ731	STOPPER 732
1-7	639647001	12	スペーサ4X2	SPACER 4X2
1-8	000400605	12	+バインド4X6	SCREW, BIND M4X6
1-9	654651001	2	ワイパ-X-259N	WIPER X-259 N
1-10	645045000	2	ワイパ-オサエイタ6X253	WIPER FIXING BASE 6X253
1-11	652838001	2	ワイパ-Y-3R-22A	WIPER Y-3R-22A
1-12	652841001	2	ワイパ-Y-3L-22A	WIPER Y-3L-22A
1-13	652848001	4	オサエイタY-3S-22A	PRESSURE PLATE, Y-3S-22A
1-14	653440001	32	サラコネジM3X4.5	MACHINE SCREW M3X4.5
1-15	655977001	32	カラ-6-4-1	COLLAR 6-4-1
1-16	654652001	2	ワイパ-X-269N	WIPER X-269 N
1-17	645052000	2	ワイパ-オサエイタ6X263	WIPER PRESSURE PLATE6X263
1-18	652837001	2	ワイパ-Y-2R-22A	WIPER Y-2R-22A
1-19	652840001	2	ワイパ-Y-2L-22A	WIPER Y-2L-22A
1-20	652825001	4	オサエイタX-3S-22A	PRESSURE PLATE, X-3S-22A
2	618080001	2	テレスコサポートX-L251	TELESCOPIC SUPPORT X-L 251
3	618081001	2	テレスコサポートX-R251	TELESCOPIC SUPPORT X-R 251

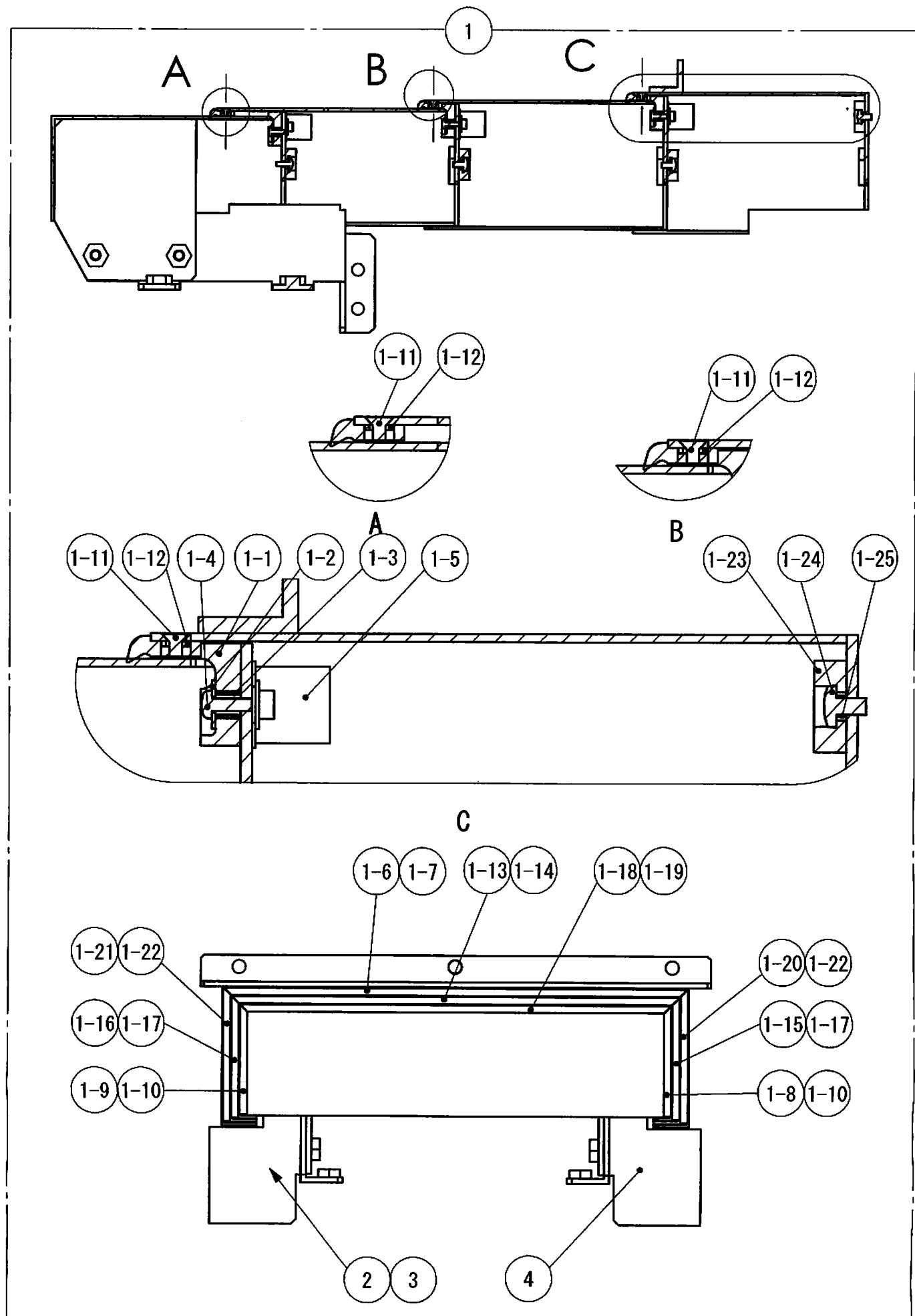
13-2. Xテレスコカバー関係 (ロング仕様)
 TERESCOPIC COVER X (Long)



13-2.Xテレスコカバー関係(ロング仕様)
TERESCOPIC COVER X(Long)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618854001	2	テレスコカバー-Xクミ251L	X TELESCOPIC COVER L,ASSY,251
1-1	622189001	8	クツシヨンゴム228クミ	CUSHION RUBBER 228 ASSY
1-2	622179001	8	スペーサ4X5	SPACER 4X5
1-3	062300806	8	ナベコ3X8	SCREW, PAN M3X8
1-4	025030335	24	ヒラザガネダイ3	WASHER, PLAIN L 3
1-5	622274001	8	クツシヨンスポンジクミ	CUSHION SPONGE ASSY
1-6	639646001	16	ストツパ732	STOPPER 732
1-7	639647001	16	スペーサ4X2	SPACER 4X2
1-8	000400605	16	+バインド4X6	SCREW, BIND M4X6
1-9	654651001	2	ワイパ-X-259N	WIPER X-259 N
1-10	645045000	2	ワイパ-オサエイタ6X253	WIPER FIXING BASE 6X253
1-11	652838001	2	ワイパ-Y-3R-22A	WIPER Y-3R-22A
1-12	652841001	2	ワイパ-Y-3L-22A	WIPER Y-3L-22A
1-13	652848001	4	オサエイタY-3S-22A	PRESSURE PLATE, Y-3S-22A
1-14	653440001	48	サラコネジM3X4.5	MACHINE SCREW M3X4.5
1-15	655977001	48	カラ-6-4-1	COLLAR 6-4-1
1-16	654652001	2	ワイパ-X-269N	WIPER X-269 N
1-17	645052000	2	ワイパ-オサエイタ6X263	WIPER PRESSURE PLATE6X263
1-18	652837001	2	ワイパ-Y-2R-22A	WIPER Y-2R-22A
1-19	652840001	2	ワイパ-Y-2L-22A	WIPER Y-2L-22A
1-20	652825001	4	オサエイタX-3S-22A	PRESSURE PLATE, X-3S-22A
1-21	654650001	2	ワイパ-X-225N	WIPER X-225 N
1-22	628880000	2	ワイパオサエX1-A225L	WIPPER STOPPER X1-A225L
1-23	652836001	2	ワイパ-Y-1R-22A	WIPER Y-1R-22A
1-24	652839001	2	ワイパ-Y-1L-22A	WIPER Y-1L-22A
1-25	652824001	4	オサエイタX-2S-22A	PRESSURE PLATE, X-2S-22A
2	618864001	2	テレスコサポートXL251L	_TERESUKOSAPO-TOXL251L
3	618863001	2	テレスコサポートXR251L	_TERESUKOSAPO-TOXR251L

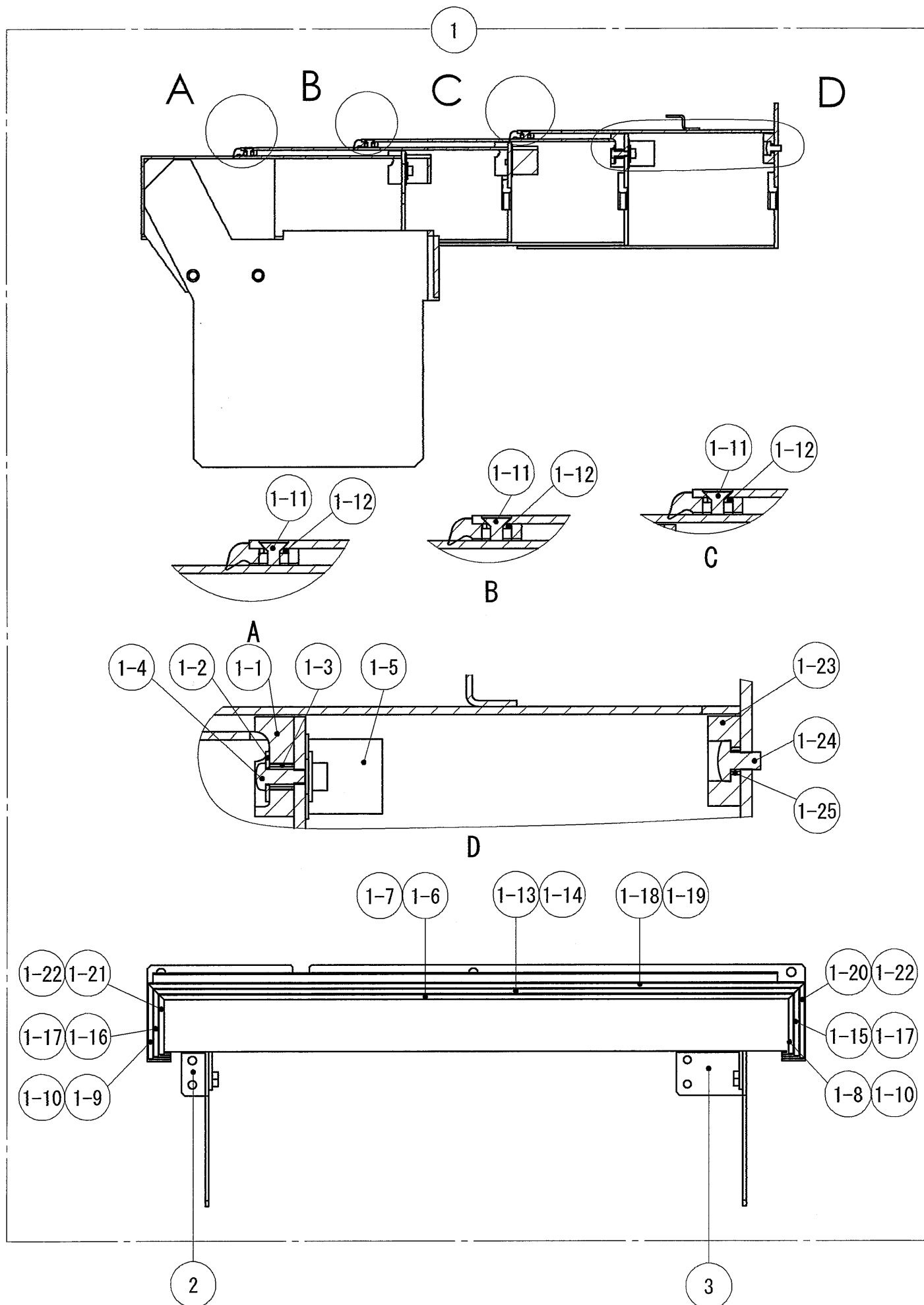
13-3. Xテレスコカバー関係 (ショート仕様)
 TERESCOPIC COVER X (Short)



13-3.Xテレスコカバー関係(ショート仕様)
TERESCOPIIC COVER X(Short)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	6A5005001	2	テレスコカバー-Xクミ251S	X TELESCOPIC COVER ASSY 251S
1-1	622189001	12	クツシヨンゴム228クミ	CUSHION RUBBER 228 ASSY
1-2	622179001	12	スペーサ4X5	SPACER 4X5
1-3	062300806	12	ナベコ3X8	SCREW, PAN M3X8
1-4	025030335	8	ヒラザガネダイ3	WASHER, PLAIN L 3
1-5	622274001	12	クツシヨンスポンジクミ	CUSHION SPONGE ASSY
1-6	639646001	16	ストツパ732	STOPPER 732
1-7	639647001	16	スペーサ4X2	SPACER 4X2
1-8	000400605	16	+バインド4X6	SCREW, BIND M4X6
1-9	654651001	2	ワイパ-X-259N	WIPER X-259 N
1-10	645045000	2	ワイパ-オサエイタ6X253	WIPER FIXING BASE 6X253
1-11	652838001	2	ワイパ-Y-3R-22A	WIPER Y-3R-22A
1-12	652841001	2	ワイパ-Y-3L-22A	WIPER Y-3L-22A
1-13	652848001	4	オサエイタY-3S-22A	PRESSURE PLATE, Y-3S-22A
1-14	653440001	48	サラコネジM3X4.5	MACHINE SCREW M3X4.5
1-15	655977001	48	カラ-6-4-1	COLLAR 6-4-1
1-16	654652001	2	ワイパ-X-269N	WIPER X-269 N
1-17	645052000	2	ワイパ-オサエイタ6X263	WIPER PRESSURE PLATE6X263
1-18	652837001	2	ワイパ-Y-2R-22A	WIPER Y-2R-22A
1-19	652840001	2	ワイパ-Y-2L-22A	WIPER Y-2L-22A
1-20	652825001	4	オサエイタX-3S-22A	PRESSURE PLATE, X-3S-22A
1-21	654650001	2	ワイパ-X-225N	WIPER X-225 N
1-22	628880000	2	ワイパオサエX1-A225L	WIPPER STOPPER X1-A225L
1-23	652836001	2	ワイパ-Y-1R-22A	WIPER Y-1R-22A
1-24	652839001	2	ワイパ-Y-1L-22A	WIPER Y-1L-22A
1-25	652824001	4	オサエイタX-2S-22A	PRESSURE PLATE, X-2S-22A
2	6A5015001	1	テレスコサポートX1L251S	TELESCOPIC SUPPORT X1L 251S
3	6A5016001	1	テレスコサポートX2L251S	TELESCOPIC SUPPORT X2L 251S
4	6A5014001	2	テレスコサポートXR251S	TELESCOPIC SUPPORT XR 251S

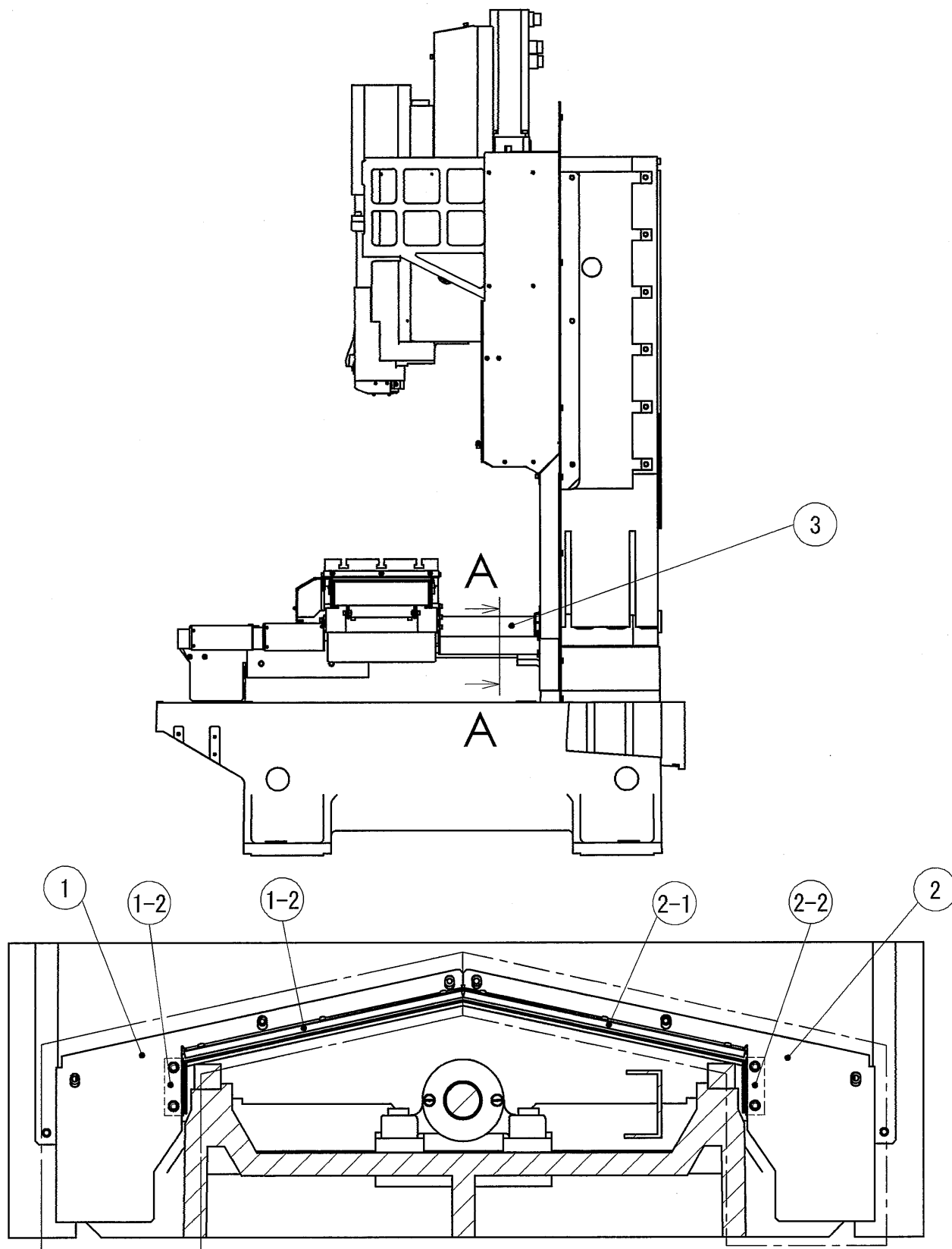
14. Yテレスコカバー関係 TERECOPIC COVER Y



14.Yテレスコカバー関係
TERESCOPIIC COVER Y

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618185001	1	テレスコカバーYクミ 251	Y TELESCOPIIC COVER, ASSY, 251
1-1	622189001	4	クッションゴム228クミ	CUSHION RUBBER 228 ASSY
1-2	622179001	8	スペーサ4X5	SPACER 4X5
1-3	062300806	6	ナベコ3X8	SCREW, PAN M3X8
1-4	025030335	18	ヒラザガネダイ3	WASHER, PLAIN L 3
1-5	622274001	8	クッションスポンジクミ	CUSHION SPONGE ASSY
1-6	618190001	1	ワイパーY-576	WIPER, Y-576
1-7	618191001	1	ワイパーオサエイト6X570	WIPER RETAINER, 6X570
1-8	654656001	1	ワイパーY-54RN	WIPER, Y-54R N
1-9	654657001	1	ワイパーY-54LN	WIPER, Y-54L N
1-10	645067000	2	ワイパーオサエイト6X48	WIPER FIXING BASE 6X48
1-11	653440001	33	サラコネジM3X4.5	MACHINE SCREW M3X4.5
1-12	655977001	33	カラ6-4-1	COLLAR 6-4-1
1-13	618194001	1	ワイパーY586	WIPER, Y-586
1-14	618195001	1	ワイパーオサエイト6X580	WIPER RETAINER, 6X580
1-15	653531001	1	ワイパーY-61R N	WIPER, Y-61R N
1-16	653532001	1	ワイパーY-61L N	WIPER, Y-61L N
1-17	645048000	2	ワイパーオサエイト6X55	WIPER FIXING BASE 6X55
1-18	618198001	1	ワイパーY596	WIPER, Y-596
1-19	618199001	1	ワイパーオサエイト6X590	WIPER RETAINER, 6X590
1-20	653523001	1	ワイパーY-68R N	WIPER, Y-68R N
1-21	653534001	1	ワイパーY-68L N	WIPER, Y-68L N
1-22	645055000	2	ワイパーオサエイト6X62	WIPER FIXING BASE 6X62
1-23	639646001	2	ストツパ732	STOPPER 732
1-24	639647001	2	スペーサ4X2	SPACER 4X2
1-25	000400605	2	+バインド4X6	SCREW, BIND M4X6
2	618082001	1	テレスコサポートY-L251	TELESCOPIIC SUPPORT Y-L 251
3	618083001	1	テレスコサポートY-R251	TELESCOPIIC SUPPORT Y-R 251

15. Y軸カバー Y-AXIS COVER

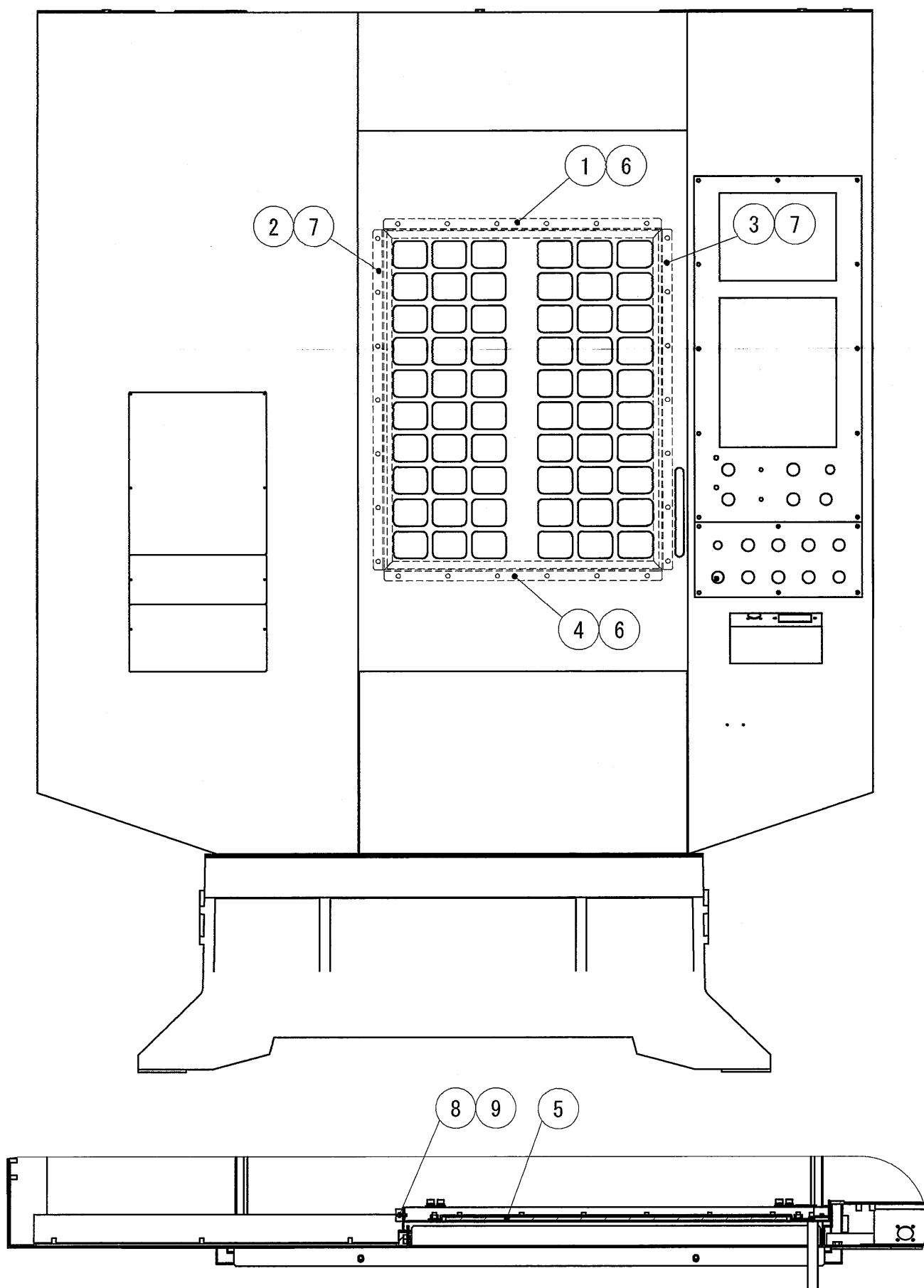


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15.Y軸カバー関係
Y-AXIS COVER

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618168001	1	YウシロワイパL251クミ	Y REAR WIPER ASSY, L 251
1-1	618169001	1	Yウシロステイル251	Y REAR STAY L 251
1-2	618170001	1	Yウシロワイパ251	Y REAR WIPER 251
2	618174001	1	YウシロワイパR251クミ	Y REAR WIPER ASSY, R 251
2-1	618175001	1	Yウシロステイル251	Y REAR STAY R 251
2-2	618170001	1	Yウシロワイパ251	Y REAR WIPER 251
3	618159001	1	Yジクアトカバー-251	Y-AXIS REAR COVER 251

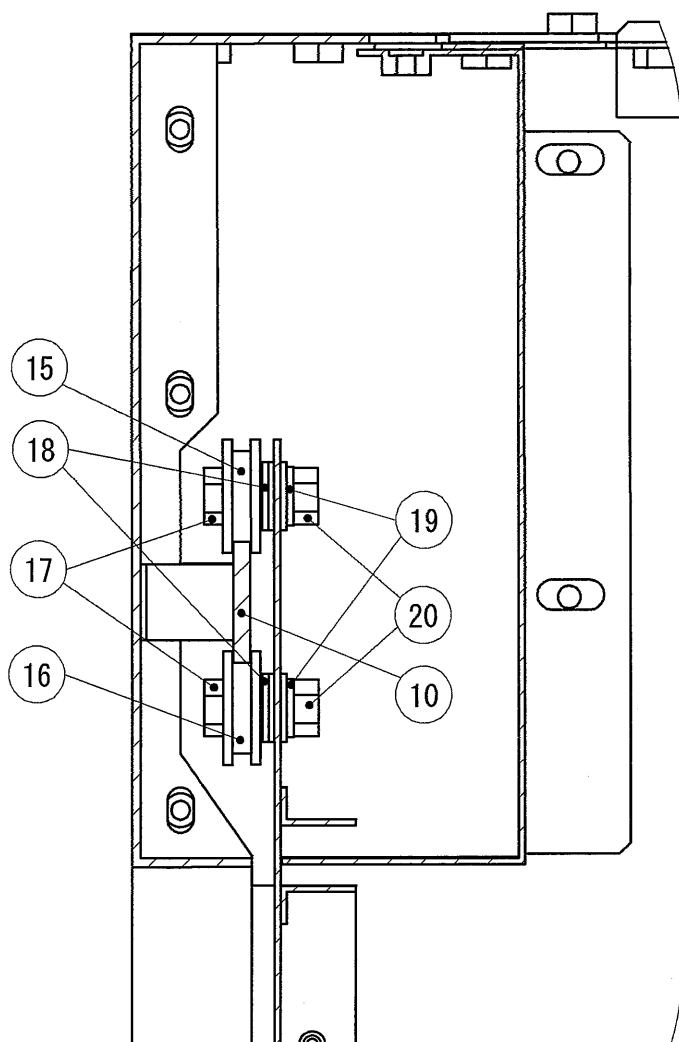
16-1. 扉関係 (標準1枚扉) (1/2)
DOOR (Standard 1Door)



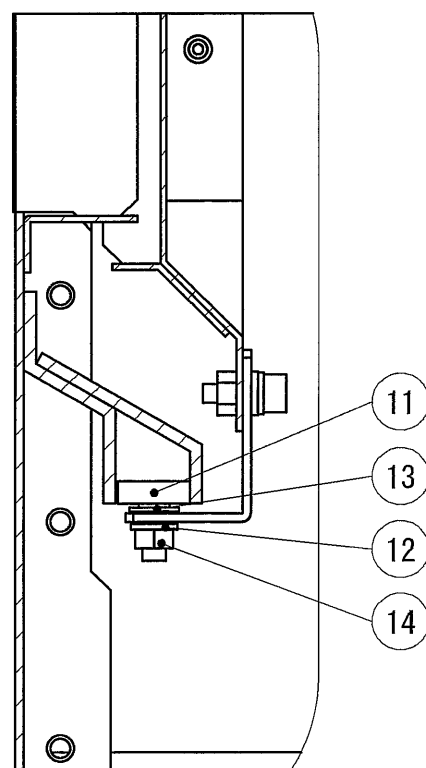
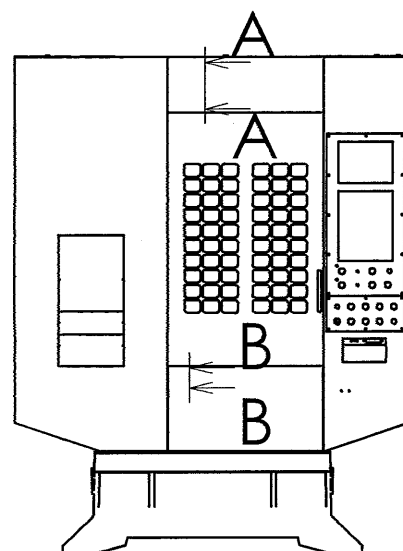
16-1.扉関係(標準1枚扉) (1/2)
DOOR (Standard 1Door)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618043001	2	マドパツキン251-1	WINDOW PACKING 251-1
2	653409001	2	マドパツキン2	WINDOW PACKING 2
3	653410001	2	マドパツキン3	WINDOW PACKING 3
4	618044001	2	マドパツキン251-4	WINDOW PACKING 251-4
5	618025001	1	トビラマド251	DOOR WINDOW 251
6	618026001	2	マドオサエ251-1	HOLDER 251-1
7	618085001	2	マドオサエ251-2	HOLDER 251-2
8	646237000	8	ストツパZ 311	STOPPER Z 311
9	533676001	8	ダンネジ	SHOULDER SCREW

16-1. 扉関係 (標準1枚扉) (2/2)
DOOR (Standard 1Door)



A-A

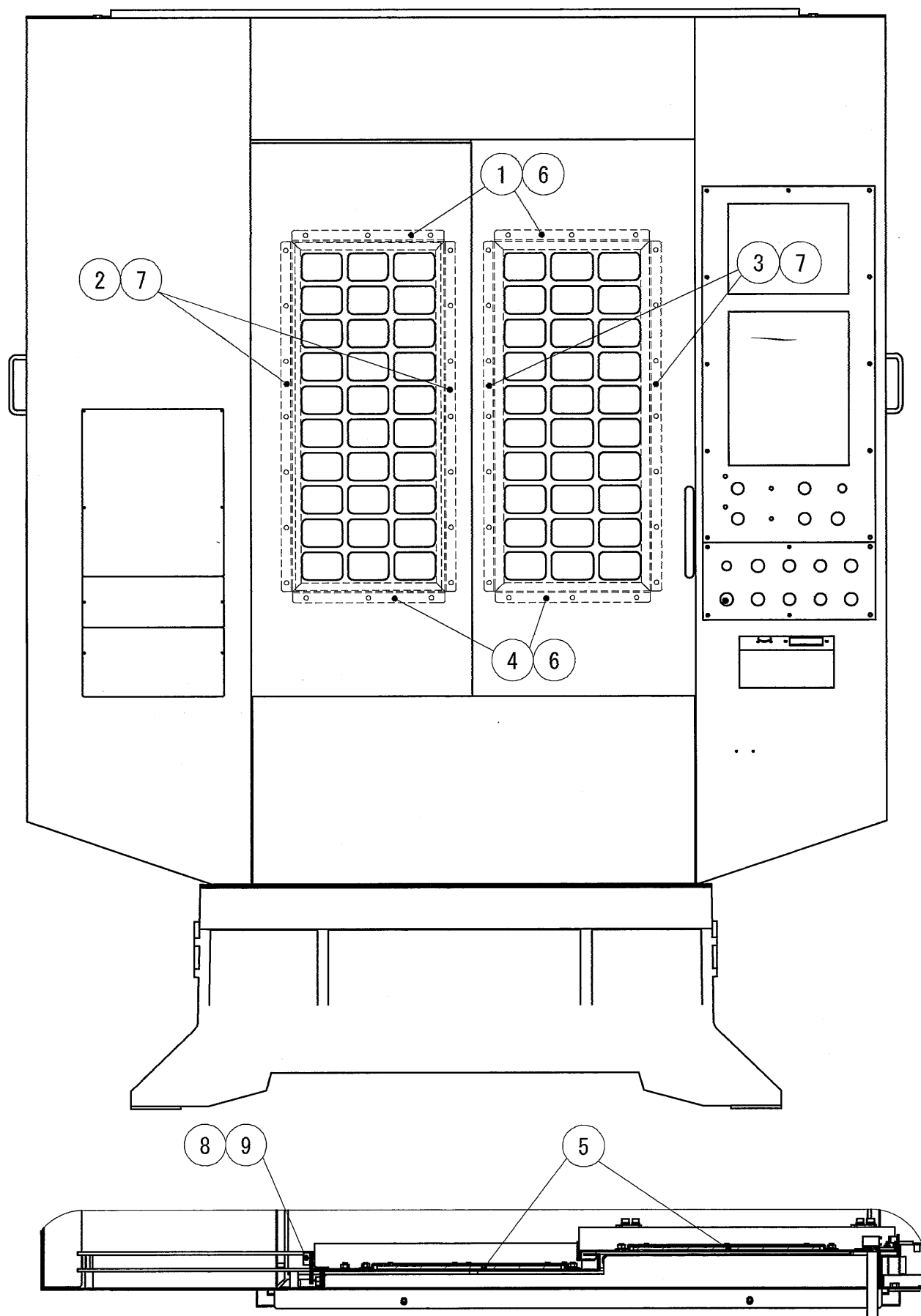


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16-1.扉関係(標準1枚扉) (2/2)
DOOR (Standard 1Door)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
10	652231001	1	ドアレール	DOOR RAIL
11	645027000	2	ジクウケDR19B1-14	BEARING DR19B1-14
12	025060232	4	ヒラザガネチュウ6	WASHER, PLAIN M 6
13	028060242	2	バネザガネ2-6	WASHER, SPRING 2-6
14	021060102	2	1シユナツト6	NUT, 1 M6
15	655394001	1	ローラ 32A	ROLLER 32A
16	618539001	2	ローラ 251	ROLLER 251
17	628194001	4	ローラジク 30	ROLLER SHAFT 30
18	025080232	12	ヒラザガネチュウ8	WASHER, PLAIN M 8
19	028080242	4	バネザガネ2-8	WASHER, SPRING 2-8
20	021080102	4	1シユナツト8	NUT, 1 M8

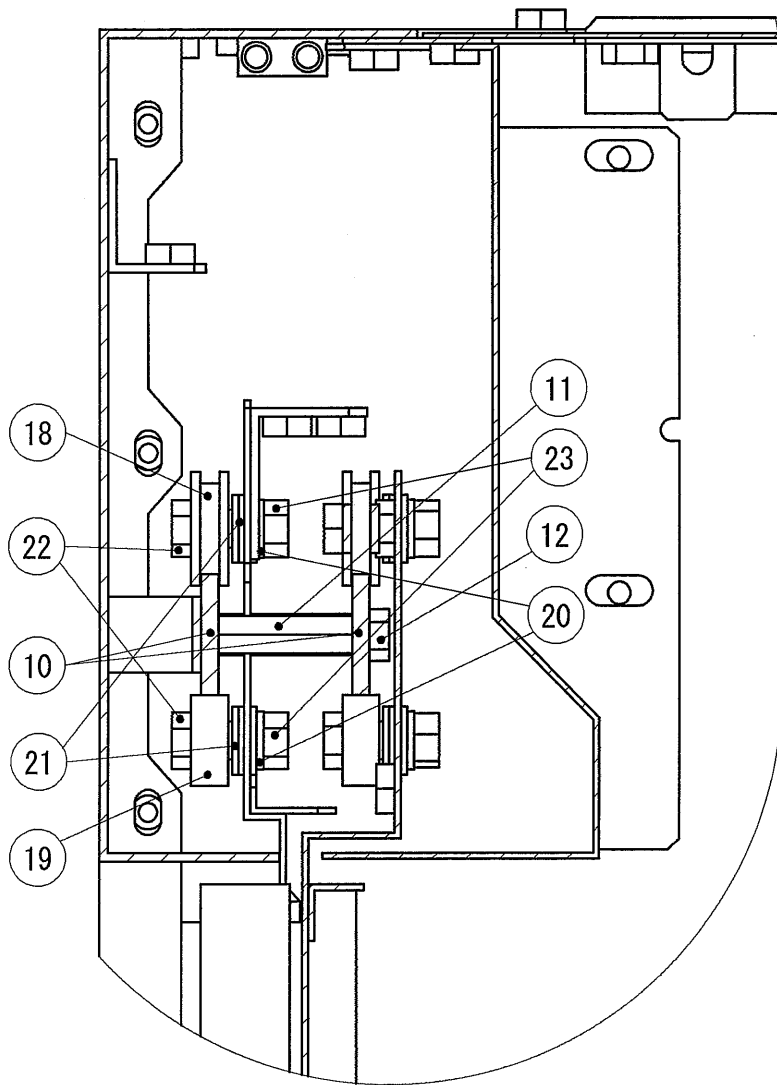
16-2. 扉関係 (標準2枚扉) (1/2)
DOOR (Standard 2 Doors)



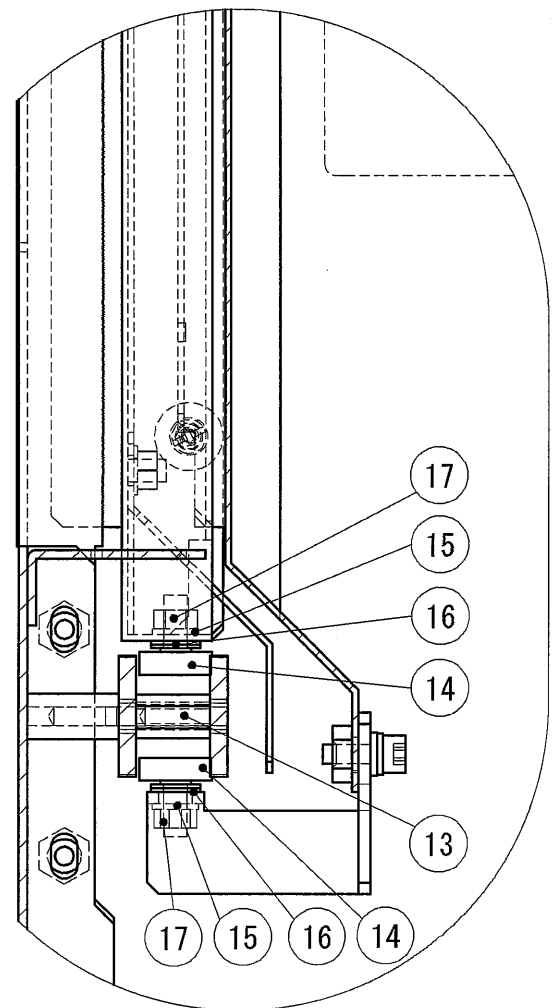
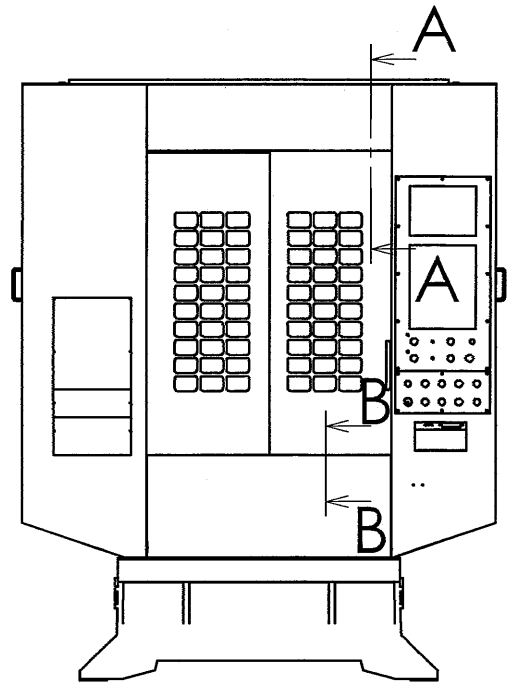
16-2.扉関係(標準2枚扉) (1/2)
DOOR (Standard 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653408001	4	マドパツキン1	WINDOW PACKING 1
2	653409001	4	マドパツキン2	WINDOW PACKING 2
3	653410001	4	マドパツキン3	WINDOW PACKING 3
4	653411001	4	マドパツキン4	WINDOW PACKING 4
5	618067001	2	トビラマド251-2	DOOR WINDOW 251
6	618306001	4	マドオサエ1 251	_MADOOSAE1 251
7	618085001	4	マドオサエ251-2	HOLDER 251-2
8	646237000	6	ストツパZ 311	STOPPER Z 311
9	533676001	6	ダンネジ	SHOULDER SCREW

16-2. 扉関係 (標準2枚扉) (2/2)
DOOR (Standard 2 Doors)



A-A

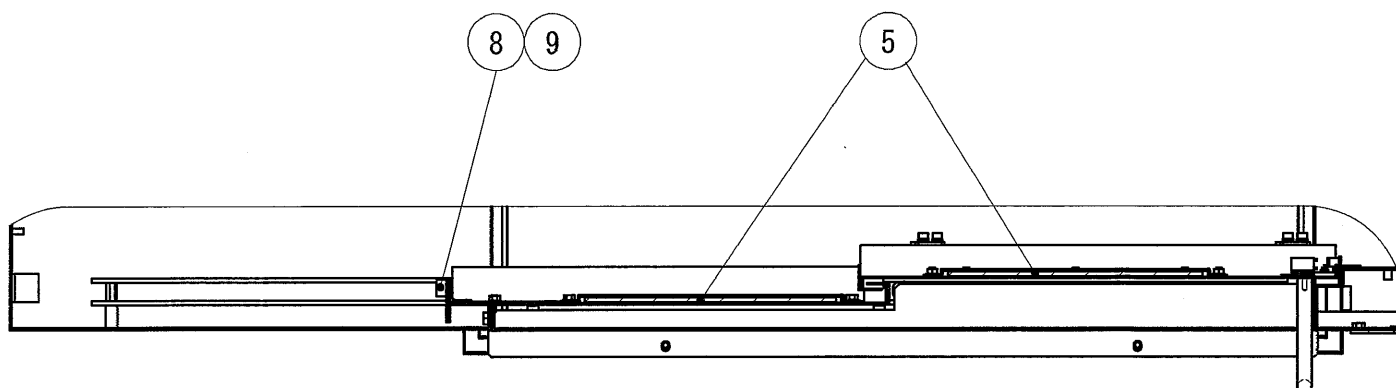
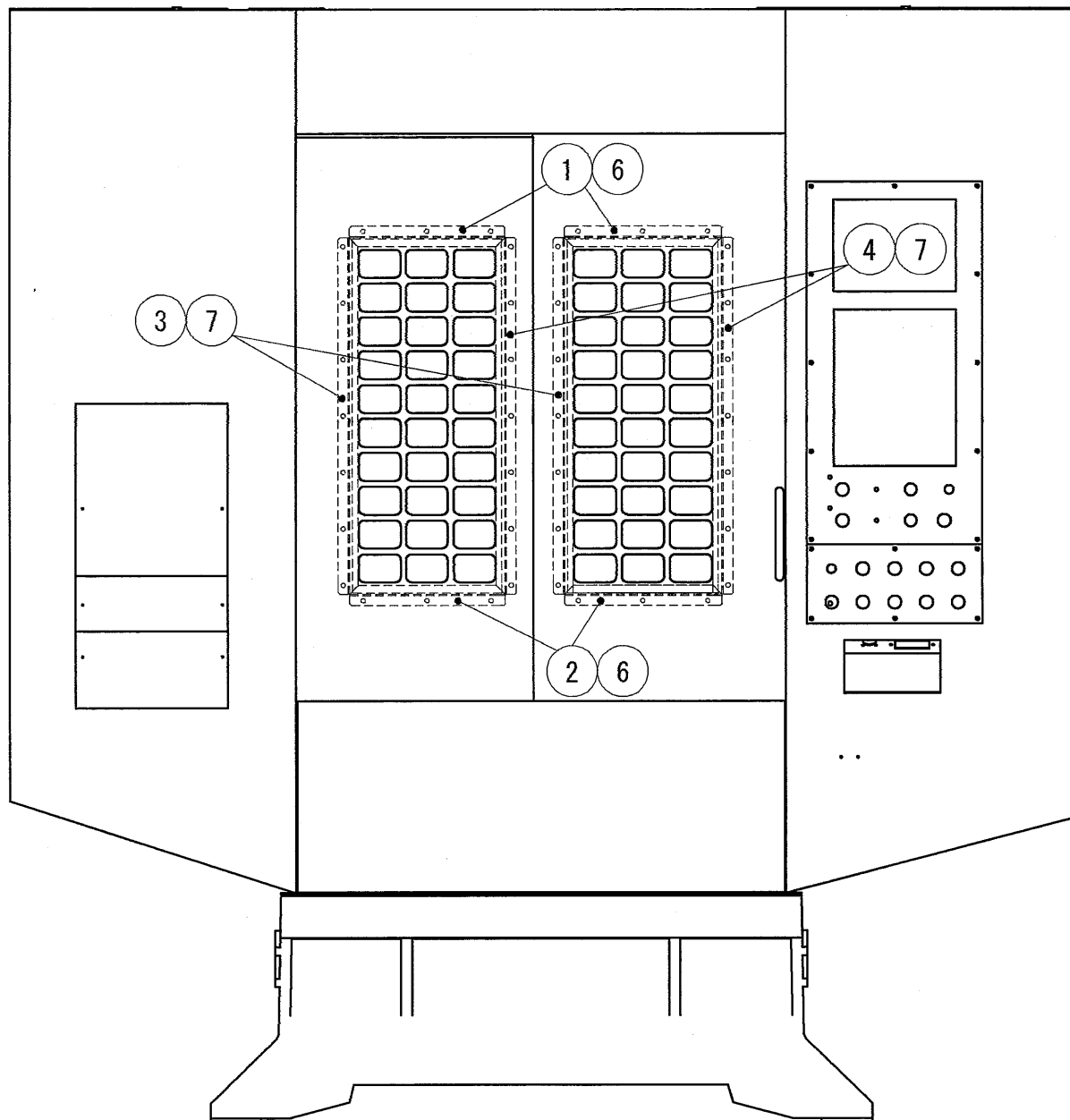


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16-2.扉関係(標準2枚扉) (2/2)
DOOR (Standard 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
10	652231001	4	ドアレール	DOOR RAIL
11	645117001	3	スペーサ 36	SPACER 36
12	017061202	13	ボルト6X12	BOLT, M6X12
13	646410001	5	スペーサ 19.5	SPACER 19.5
14	645027000	4	ジクウケDR19B1-14	BEARING DR19B1-14
15	028060242	4	バネザガネ2-6	WASHER, SPRING 2-6
16	025060232	8	ヒラザガネチュウ6	WASHER, PLAIN M 6
17	021060102	4	ナット1シユ6	NUT, 1 M6
18	655394001	4	ローラ 32A	ROLLER 32A
19	618539001	4	ローラ 251	ROLLER 251
20	028080242	8	バネザガネ2-8	WASHER, SPRING 2-8
21	025080232	16	ヒラザガネチュウ8	WASHER, PLAIN M 8
22	628194001	8	ローラジク 30	ROLLER SHAFT 30
23	021080102	4	1シユナット8	NUT, 1 M8

16-3. 扉関係 (ロング 2枚扉) (1/2)
DOOR (Long 2 Doors)

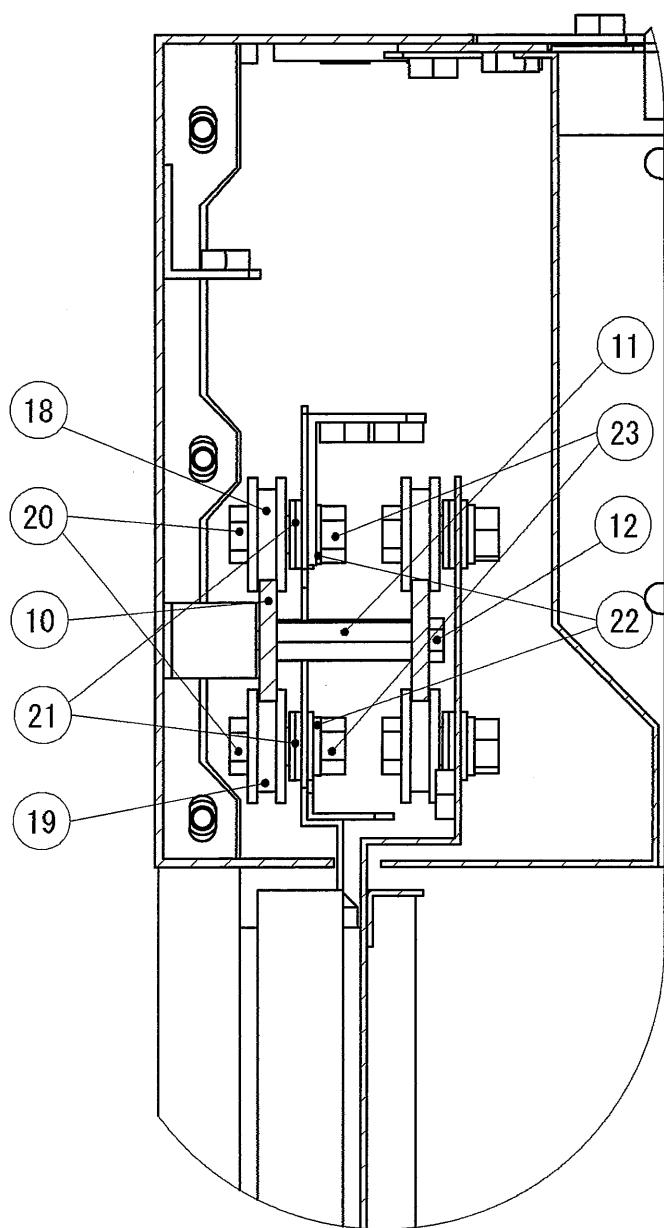
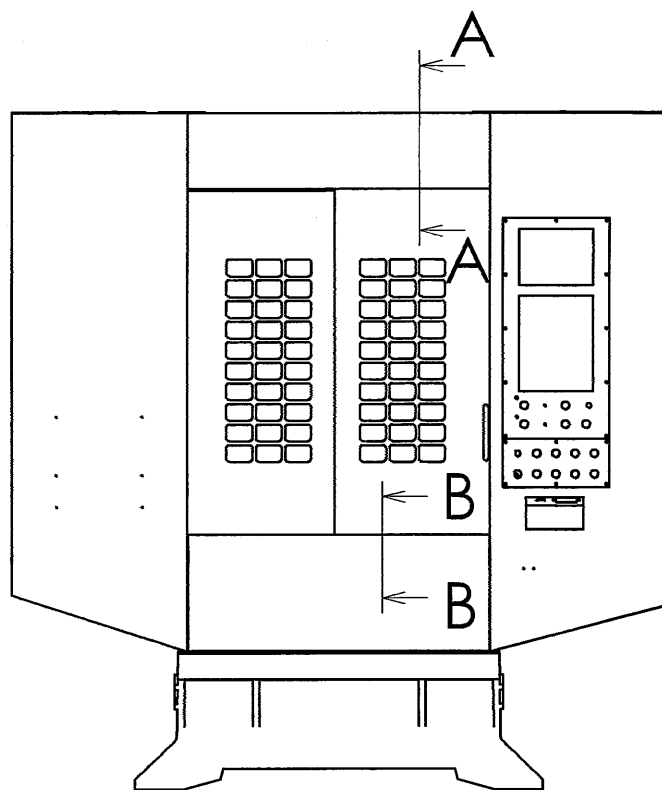


16-3.扉関係(ロング2枚扉) (1/2)
DOOR (Long 2Doors)

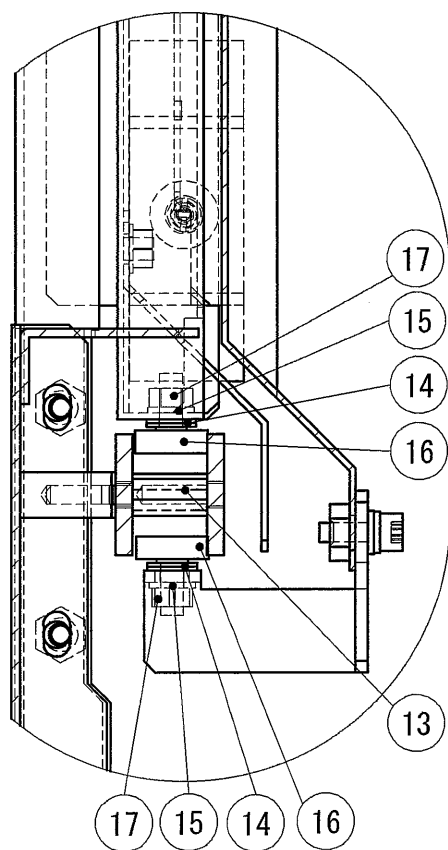
参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653408001	2	マドパツキン1	WINDOW PACKING 1
2	653409001	2	マドパツキン2	WINDOW PACKING 2
3	653410001	2	マドパツキン3	WINDOW PACKING 3
4	653411001	2	マドパツキン4	WINDOW PACKING 4
5	618067001	1	トビラマド251-2	DOOR WINDOW 251
6	618306001	2	マドオサエ1 251	_MADOOSAE1 251
7	618085001	2	マドオサエ251-2	HOLDER 251-2
8	646237000	4	ストツパZ 311	STOPPER Z 311
9	533676001	4	ダンネジ	SHOULDER SCREW

16-3. 扉関係 (ロング 2枚扉)
DOOR (Long 2 Doors)

(2/2)



A-A



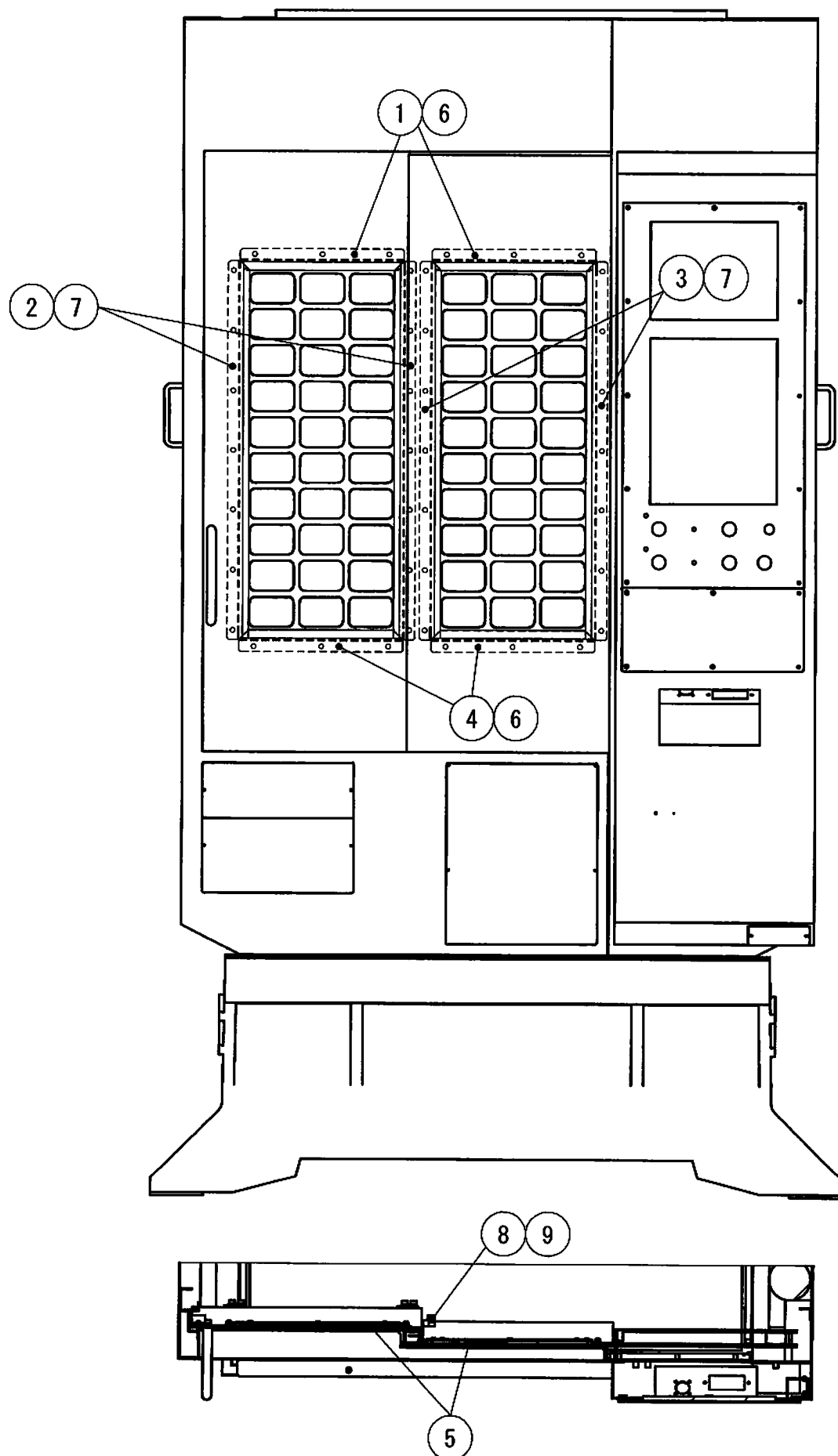
B-B

16-3.扉関係(ロング2枚扉) (2/2)
DOOR (Long 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
10	653351001	4	ドアレール250L	DOOR RAIL 250L
11	645117001	3	スペーサ 36	SPACER 36
12	017061202	13	ボルト6X12	BOLT, M6X12
13	646410001	5	スペーサ 19.5	SPACER 19.5
14	025060232	8	ヒラザガネチユウ6	WASHER, PLAIN M 6
15	028060242	4	バネザガネ2-6	WASHER, SPRING 2-6
16	645027000	4	ジクウケDR19B1-14	BEARING DR19B1-14
17	021060102	4	1シユナツト6	NUT, 1 M6
18	655394001	4	ローラ 32A	ROLLER 32A
19	618539001	4	ローラ 251	ROLLER 251
20	628194001	8	ローラジク 30	ROLLER SHAFT 30
21	025080232	16	ヒラザガネチユウ8	WASHER, PLAIN M 8
22	028080242	8	バネザガネ2-8	WASHER, SPRING 2-8
23	021080102	8	1シユナツト8	NUT, 1 M8

16-4. 扉関係 (ショート 2枚扉)
DOOR (Short 2 Doors)

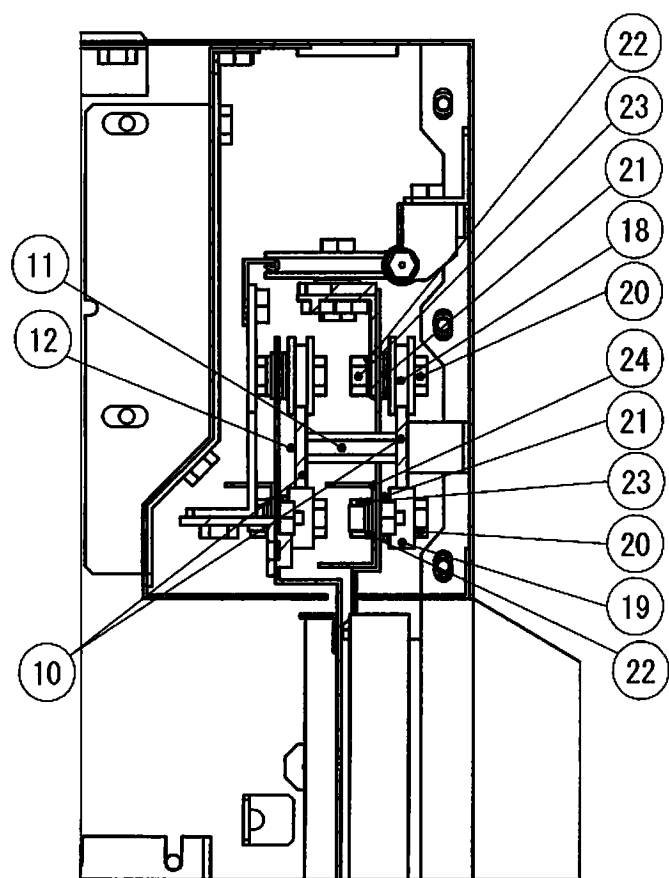
(1/2)



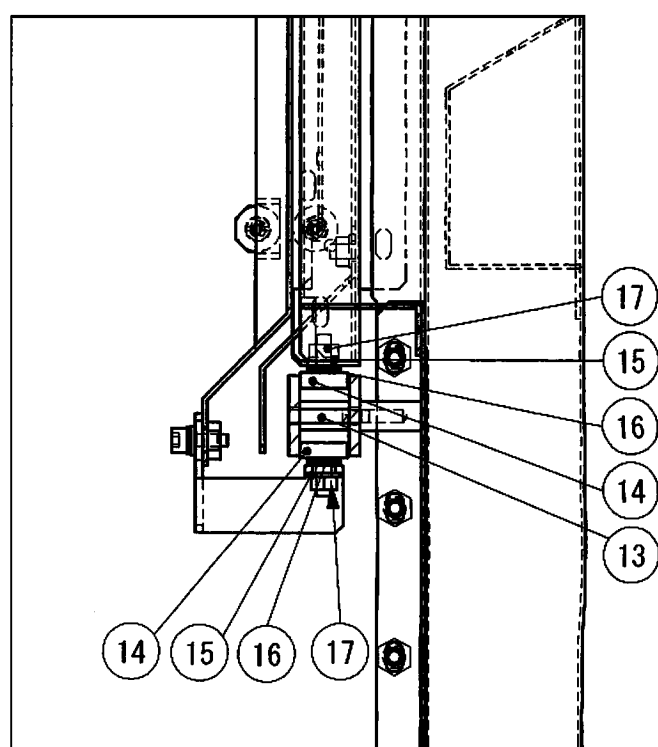
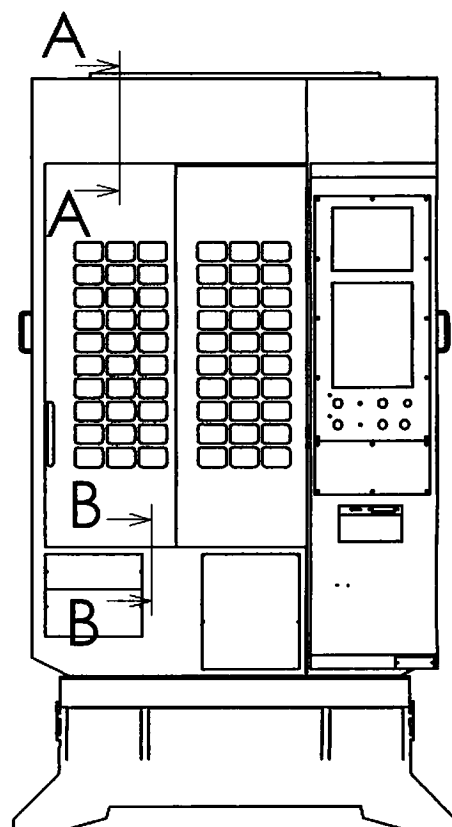
16-4.扉関係(ショート2枚扉) (1/2)
DOOR (Short 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653408001	2	マドパツキン1	WINDOW PACKING 1
2	653409001	2	マドパツキン2	WINDOW PACKING 2
3	653410001	2	マドパツキン3	WINDOW PACKING 3
4	653411001	2	マドパツキン4	WINDOW PACKING 4
5	618067001	1	トビラマド251-2	DOOR WINDOW 251
6	618306001	2	マドオサエ1 251	_MADOOSAE1 251
7	618085001	2	マドオサエ251-2	HOLDER 251-2
8	646237000	4	ストツパZ 311	STOPPER Z 311
9	533676001	4	ダンネジ	SHOULDER SCREW

16-4. 扉関係 (ショート 2枚扉) (2/2)
DOOR (Short 2 Doors)



A-A

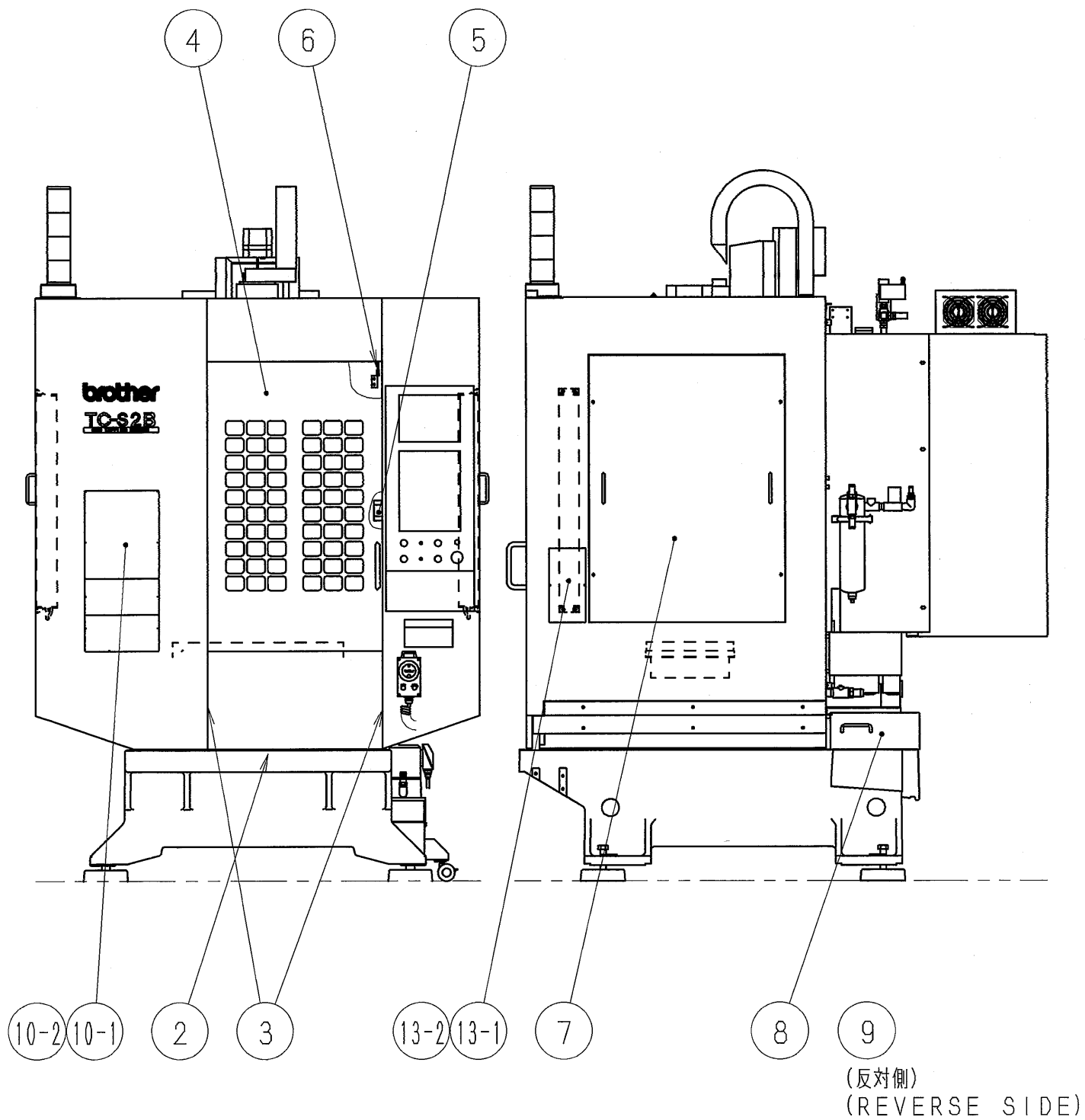


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16-4.扉関係(ショート2枚扉) (2/2)
DOOR (Short 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
10	6A5031001	4	ドアレール251-S	DOOR RAIL 251-S
11	645117001	3	スペーサ 36	SPACER 36
12	017061202	13	ボルト6X12	BOLT, M6X12
13	646410001	5	スペーサ 19.5	SPACER 19.5
14	645027000	4	ジクウケDR19B1-14	BEARING DR19B1-14
15	028060242	4	バネザガネ2-6	WASHER, SPRING 2-6
16	025060232	8	ヒラザガネチュウ6	WASHER, PLAIN M 6
17	021060102	4	ナット1シユ6	NUT, 1 M6
18	655394001	2	ローラ 32A	ROLLER 32A
19	618539001	2	ローラ 251	ROLLER 251
20	628194001	4	ローラジク 30	ROLLER SHAFT 30
21	025080232	3	ヒラザガネチュウ8	WASHER, PLAIN M 8
22	028080242	1	バネザガネ2-8	WASHER, SPRING 2-8
23	021080102	1	1シユナット8	NUT, 1 M8

17-1. カバー関係 (標準 1枚扉) (1/2)
COVER (Standard 1 Door)



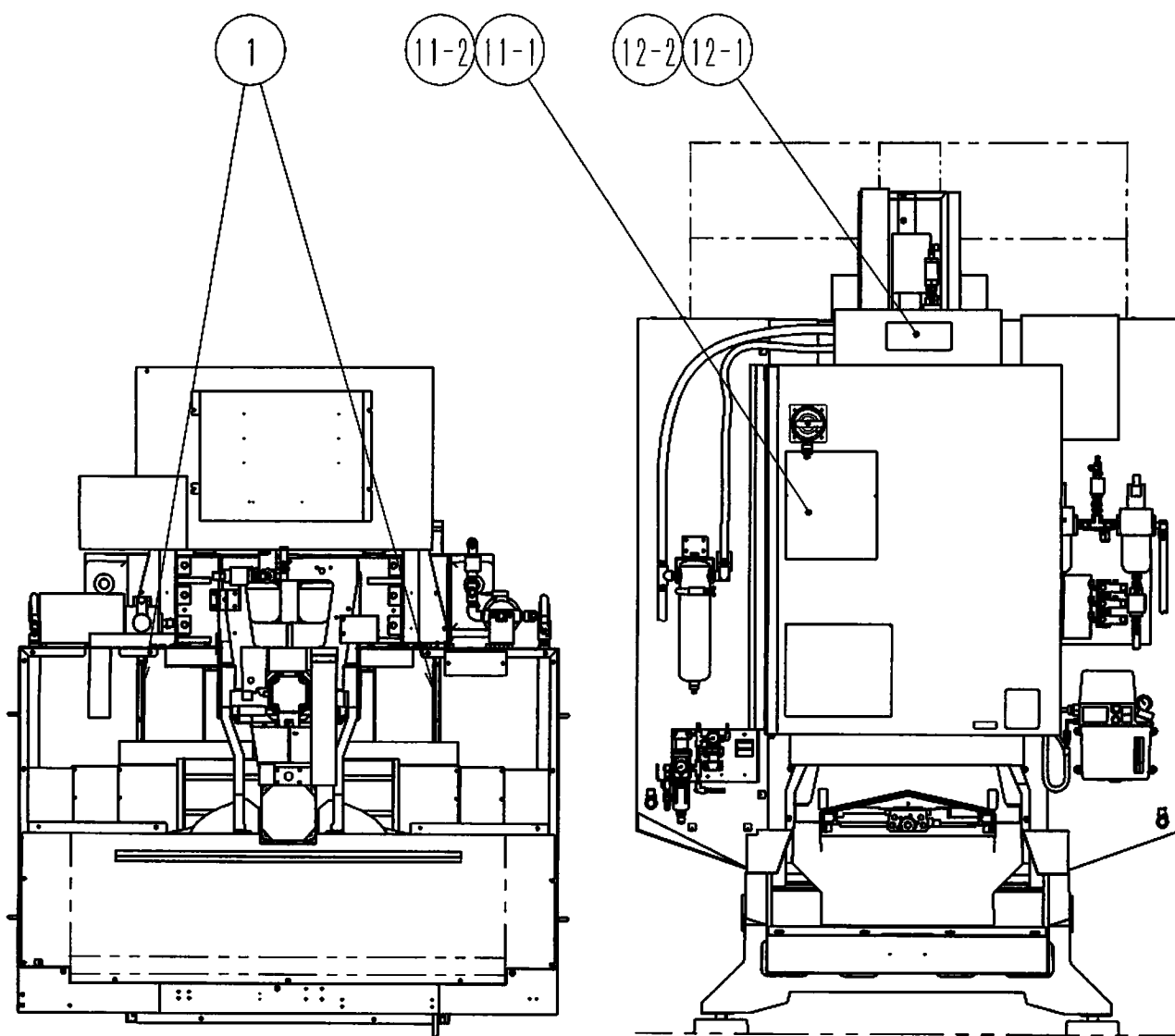
17-1.カバー関係(標準1枚扉) (1/2)
COVER (Standard 1Door)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
2	618040001	1	SパッキンF251	S PACKING F 251
3	635937001	2	パッキン 15X15X200	PACKING, 15X15X200
4	618023001	1	Fトビラ251クミ	FRONT DOOR ASSY, 251
5	640313000	1	キャッチ C-100-B-2	CATCH C-100-B-2
6	618390001	1	トビラワイパ251	_TOBIRAWAIPA251
7	650990001	2	サイドカバークミ31A	SIDE COVER ASSY 31A
8	618234001	1	ベースカバー-R251クミ	BASE COVER R, ASSY, 251
9	618235001	1	ベースカバー-L251クミ	BASE COVER L, ASSY, 251
10-1	690723001	1	TCマEPSラベルJCE	_TCMAEPSRABERUJCE
10-2	691042001	1	TCマEPSラベルEGF	_TCMAEPSRABERUEGF
13-1	690731001	2	TCメンテマドラベルJCE	TC INSTALLATION MANUAL J250
13-2	690732001	2	TCメンテマドラベルEGF	TC MEINTENANCE LABELEGF

17-1. カバー関係 (標準 1枚扉)

(2/2)

COVER (Standard 1 Door)



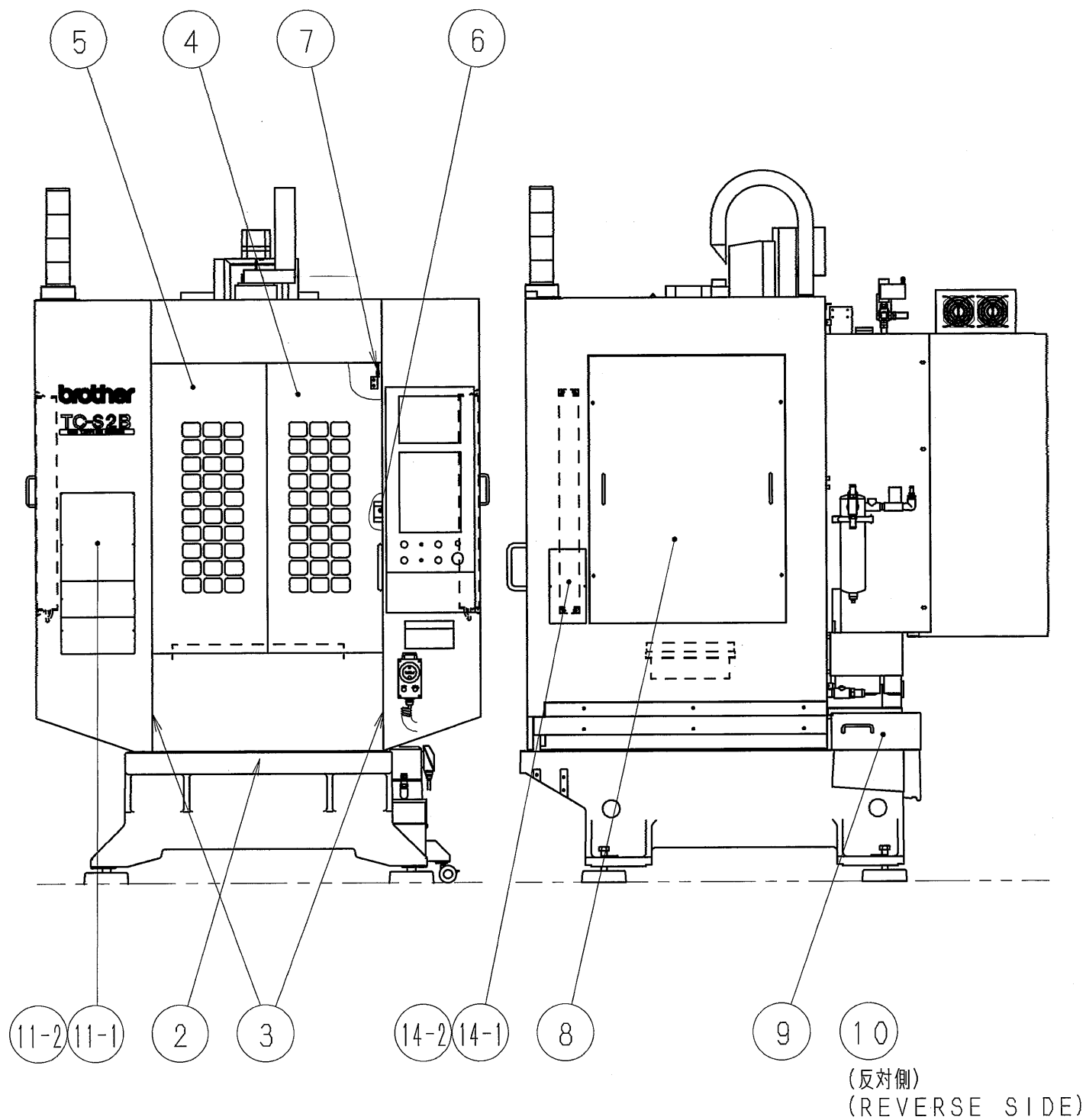
17-1.カバー関係(標準1枚扉) (2/2)
COVER (Standard 1Door)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618035001	2	SパツキンS251	S PACKING S 251
11-1	690730001	1	TCウシロPSラベルJCE	_TCUSIROPSRABERUJCE
11-2	691045001	1	TCウシロPSラベルEGF	PS LABEL,TC REAR EGF
12-1	690729001	1	TCカイセイRラベルJCE	_TOKAISEIRRABERUJCE
12-2	691058001	1	TCカイセイRラベルEGF	_TOKAISEIRRABERUEGF

17-2. カバー関係 (標準 2枚扉)

(1/2)

COVER (Standard 2 Doors)



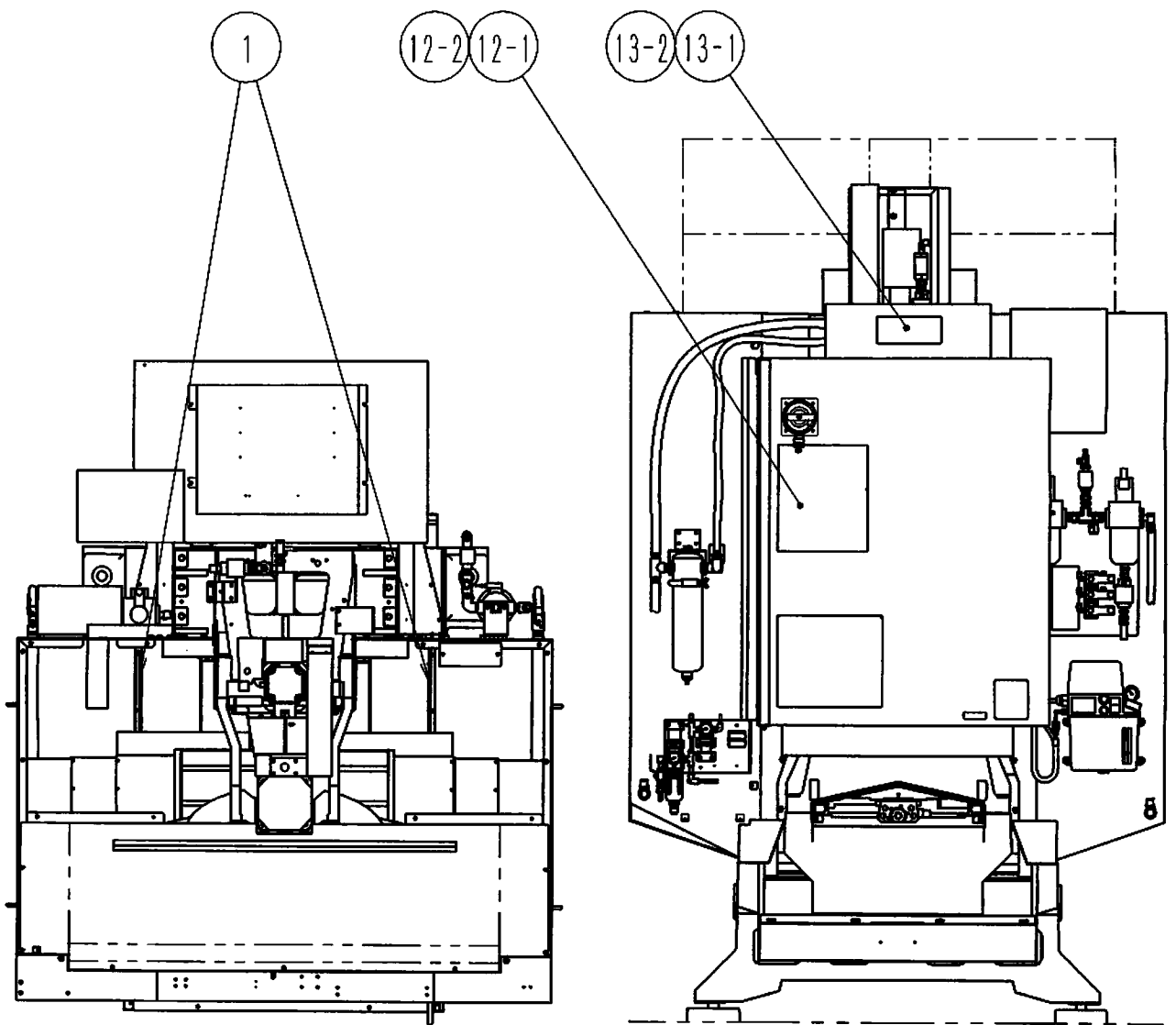
17-2.カバー関係(標準2枚扉) (1/2)
COVER (Standard 2Doors)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
2	618040001	1	SパツキンF251	S PACKING F 251
3	635937001	2	パツキン 15X15X200	PACKING, 15X15X200
4	618893001	1	ドアRクミ 251L	DOOR R ASSY 251L
5	618895001	1	ドアLクミ 251L	DOOR L ASSY 251L
6	640313000	1	キャッチ C-100-B-2	CATCH C-100-B-2
7	618390001	1	トビラワイパ251	_TOBIRAWAIPA251
8	650990001	2	サイドカバークミ31A	SIDE COVER ASSY 31A
9	618234001	1	ベースカバー-R251クミ	BASE COVER R, ASSY, 251
10	618235001	1	ベースカバー-L251クミ	BASE COVER L, ASSY, 251
11-1	690723001	1	TCマEPSラベルJCE	_TCMAEPSRABERUJCE
11-2	691042001	1	TCマEPSラベルEGF	_TCMAEPSRABERUEGF
14-1	690731001	2	TCメンテマドラベルJCE	TC INSTALLATION MANUAL J250
14-2	690732001	2	TCメンテマドラベルEGF	TC MEINTENANCE LABELEGF

17-2. カバー関係 (標準 2枚扉)

(2/2)

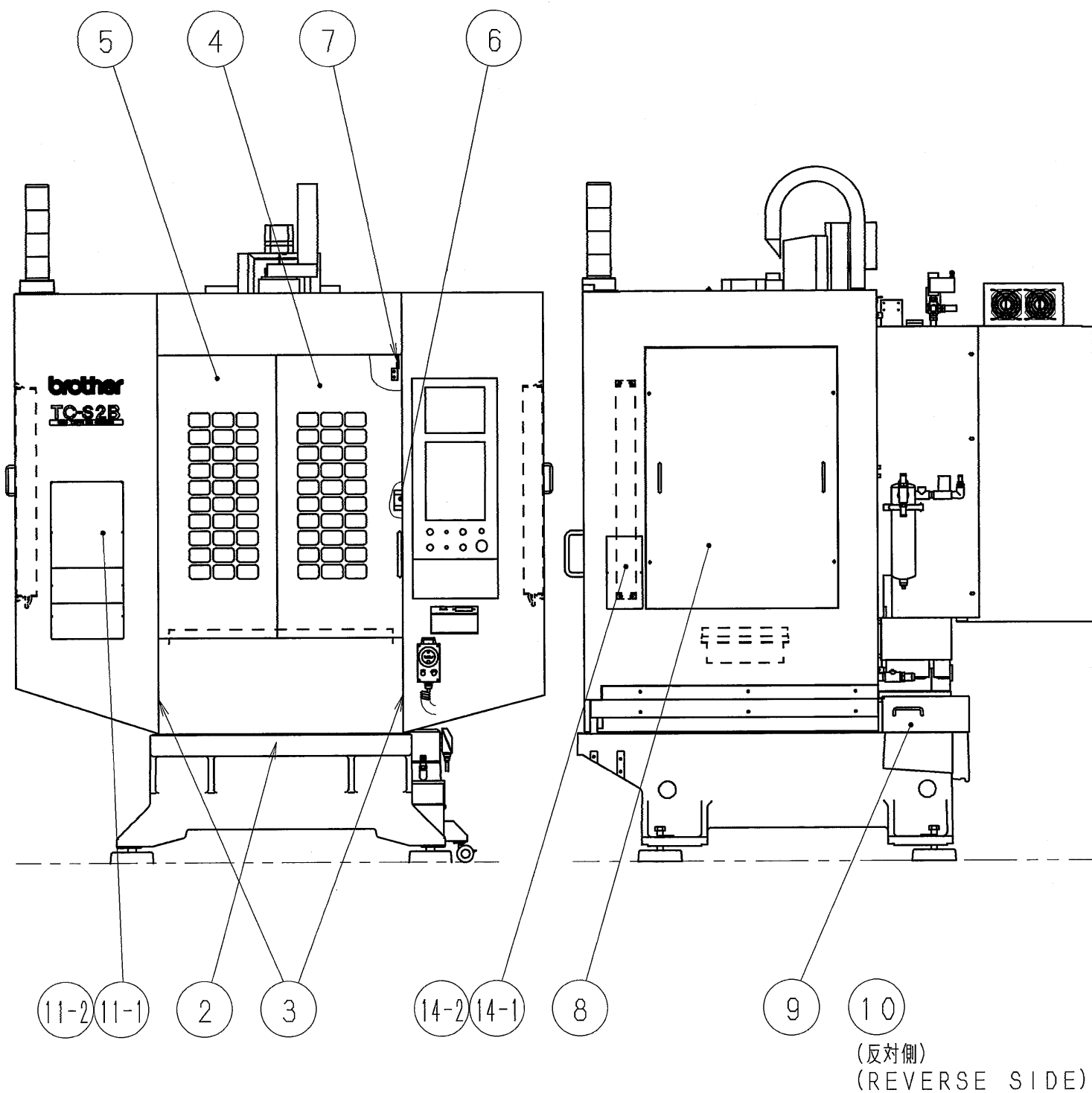
COVER (Standard 2 Doors)



17-2.カバー関係(標準2枚扉) (2/2)
COVER (Standard 2Doors)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618035001	2	SパツキンS251	S PACKING S 251
12-1	690730001	1	TCウシロPSラベルJCE	_TCUSIROPSRABERUJCE
12-2	691045001	1	TCウシロPSラベルEGF	PS LABEL,TC REAR EGF
13-1	690729001	1	TCカイセイRラベルJCE	_TOKAISEIRRABERUJCE
13-2	691058001	1	TCカイセイRラベルEGF	_TOKAISEIRRABERUEGF

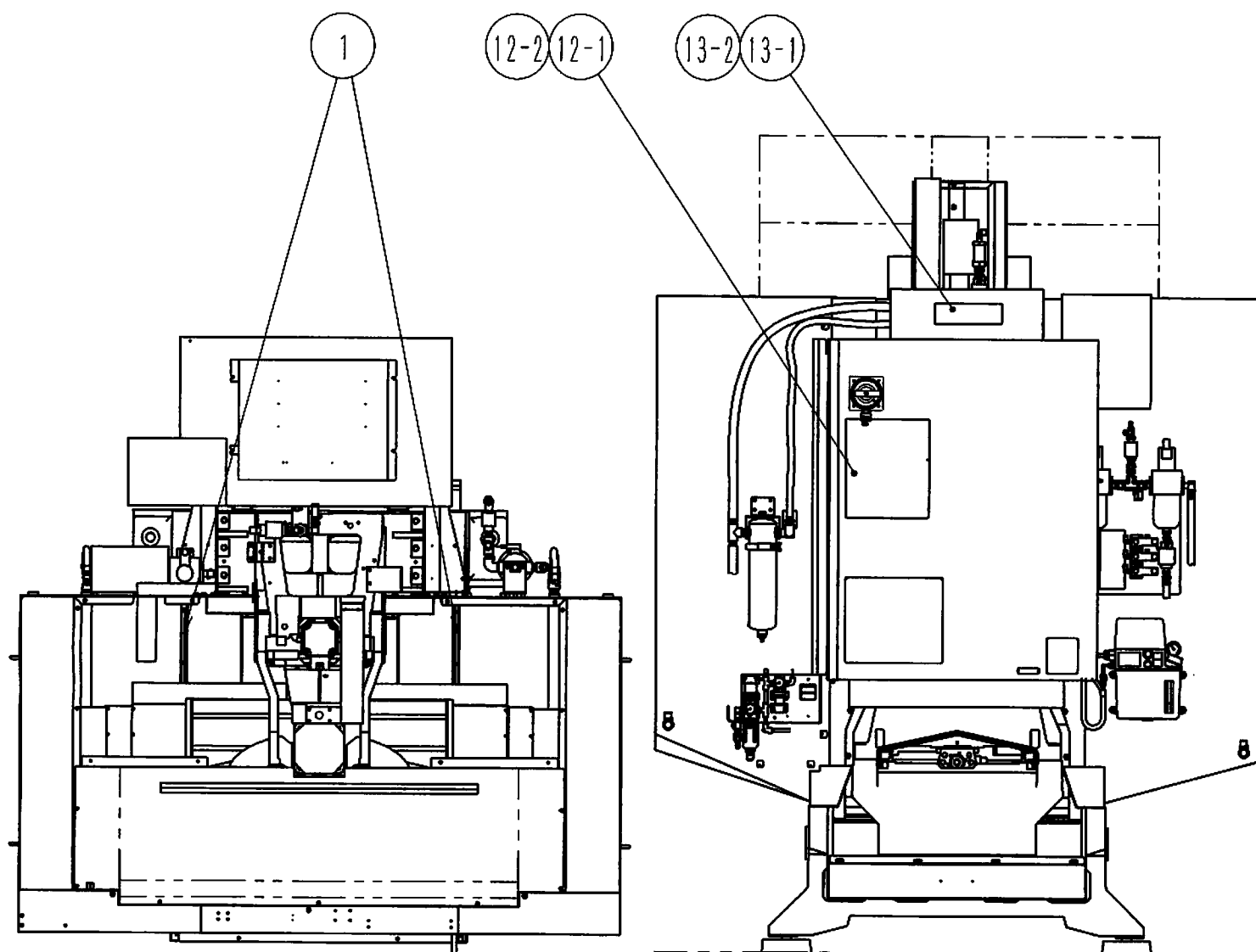
17-3. カバー関係 (ロング 2 枚扉) (1/2)
COVER (Long 2 Doors)



17-3.カバー関係(ロング2枚扉) (1/2)
COVER (Long 2Doors)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
2	618040001	1	SパツキンF251	S PACKING F 251
3	635937001	2	パツキン 15X15X200	PACKING, 15X15X200
4	618893001	1	ドアRクミ 251L	DOOR R ASSY 251L
5	618895001	1	ドアLクミ 251L	DOOR L ASSY 251L
6	640313000	1	キャッチ C-100-B-2	CATCH C-100-B-2
7	618390001	1	トビラワイパ251	_TOBIRAWAIPA251
8	650990001	2	サイドカバークミ31A	SIDE COVER ASSY 31A
9	618234001	1	ベースカバー-R251クミ	BASE COVER R, ASSY, 251
10	618235001	1	ベースカバー-L251クミ	BASE COVER L, ASSY, 251
11-1	690723001	1	TCマエPSラベルJCE	_TCMAEPSRABERUJCE
11-2	691042001	1	TCマエPSラベルEGF	_TCMAEPSRABERUEGF
14-1	690731001	2	TCメンテマドラベルJCE	TC INSTALLATION MANUAL J250
14-2	690732001	2	TCメンテマドラベルEGF	TC MEINTENANCE LABELEGF

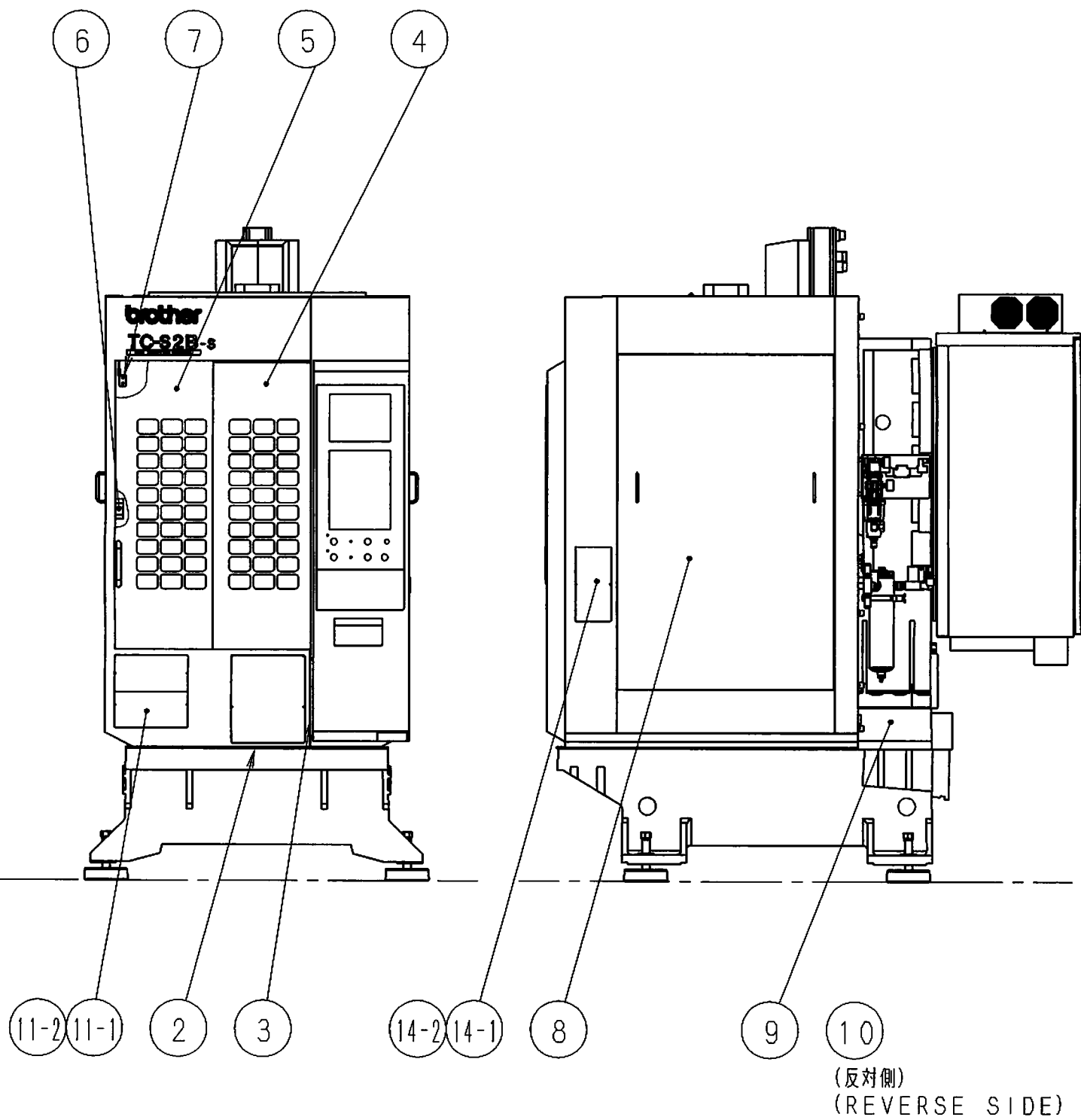
17-3. カバー関係 (ロング 2 枚扉) (2/2)
COVER (LONG 2 DOORS)



17-3.カバー関係(ロング2枚扉) (2/2)
COVER (Long 2Doors)

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618035001	2	SパツキンS251	S PACKING S 251
12-1	690730001	1	TCウシロPSラベルJCE	_TCUSIROPSRABERUJCE
12-2	691045001	1	TCウシロPSラベルEGF	PS LABEL,TC REAR EGF
13-1	690729001	1	TCカイセイRラベルJCE	_TCKAISEIRRABERUJCE
13-2	691058001	1	TCカイセイRラベルEGF	_TCKAISEIRRABERUEGF

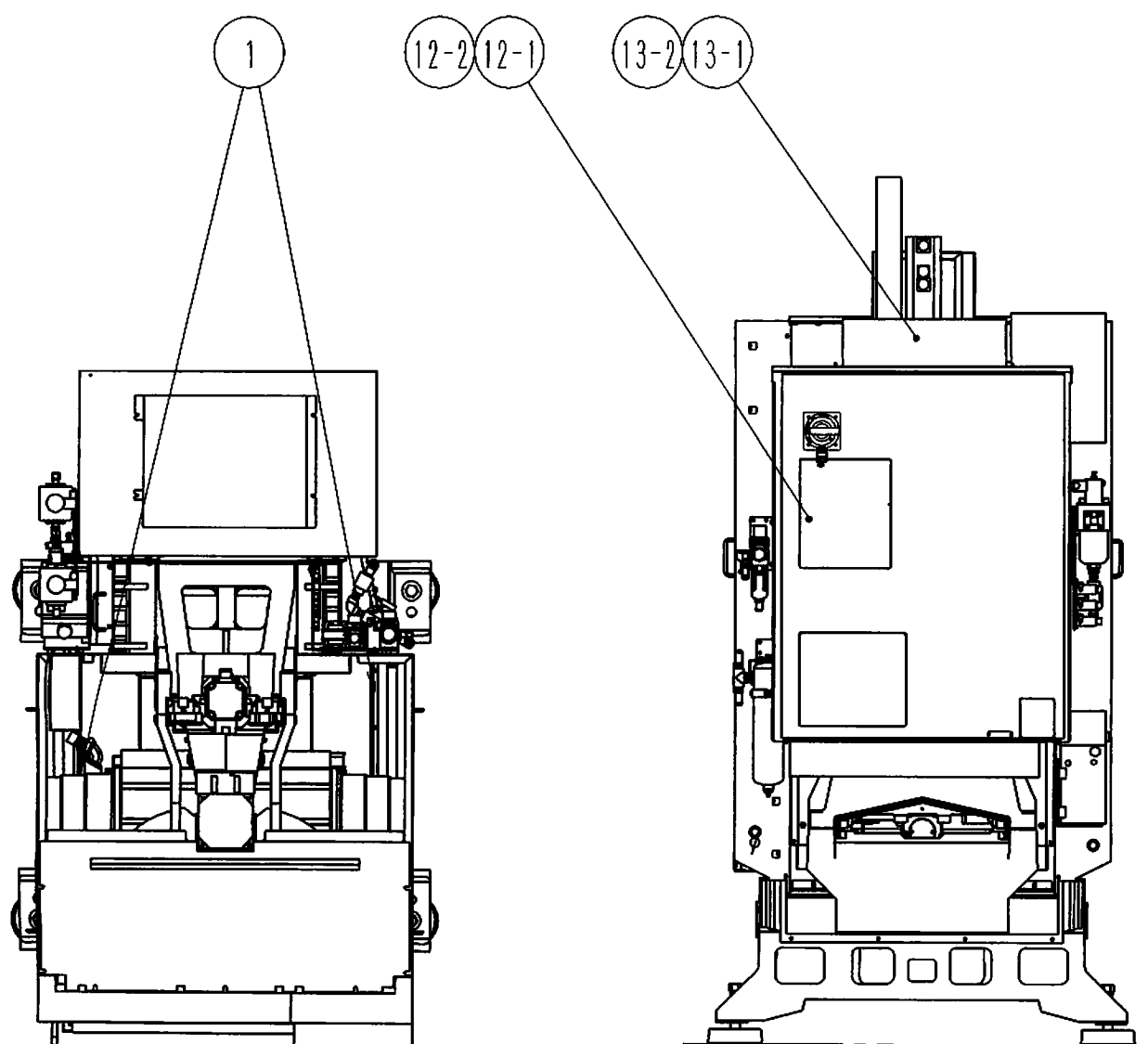
17-4. カバー関係 (ショート 2 枚扉) (1/2)
COVER (Short 2 Doors)



17-4.カバー関係(ショート2枚扉) (1/2)
COVER (Short 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
2	618040001	1	SパツキンF251	S PACKING F 251
3	635937001	2	パツキン 15X15X200	PACKING, 15X15X200
4	6A5027001	1	ドアRクミ 251-S	DOOR R ASSY 251-S
5	6A5029001	1	ドアLクミ 251-S	DOOR L ASSY 251-S
6	640313000	1	キャッチ C-100-B-2	CATCH C-100-B-2
7	618390001	1	トビラワイパ251	_TOBIRAWAIPA251
8	6A5051001	2	サイドカバークミ 251-S	SIDE COVER ASSY 251-S
9	618234001	1	ベースカバー-R251クミ	BASE COVER R, ASSY, 251
10	618235001	1	ベースカバー-L251クミ	BASE COVER L, ASSY, 251
11-1	690723001	1	TCマエPSラベルJCE	_TCMAEPSRABERUJCE
11-2	691042001	1	TCマエPSラベルEGF	_TCMAEPSRABERUEGF
14-1	690731001	2	TCメンテマドラベルJCE	TC INSTALLATION MANUAL J250
14-2	690732001	2	TCメンテマドラベルEGF	TC MEINTENANCE LABELEGF

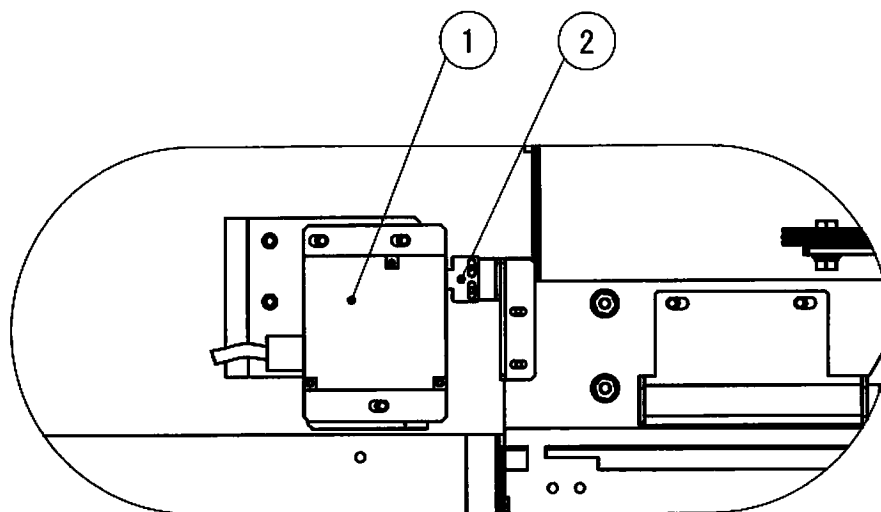
17-4. カバー関係 (ショート 2 枚扉) (2/2)
COVER (Short 2 DOORS)



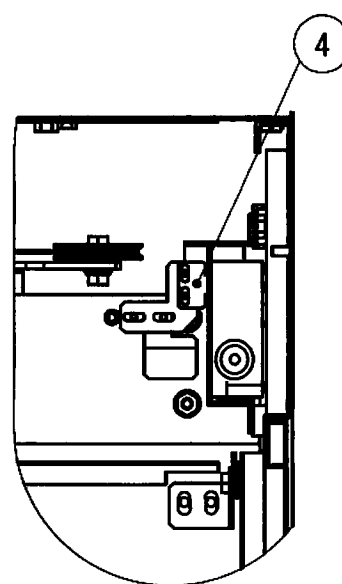
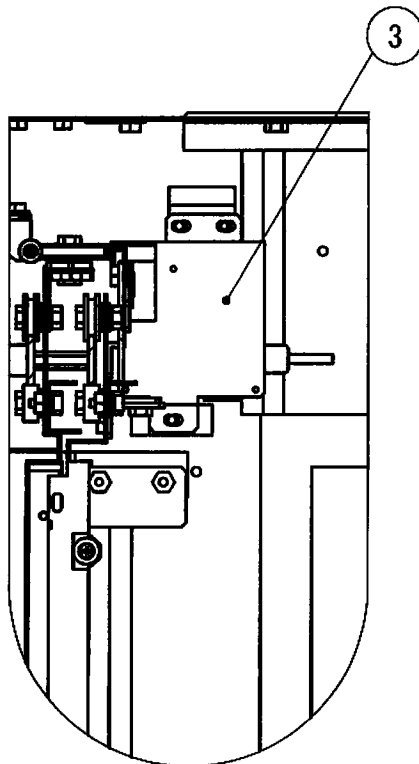
17-4.カバー関係(ショート2枚扉) (2/2)
COVER (Short 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618035001	2	SパツキンS251 S PACKING S 251	
12-1	690730001	1	TCウシロPSラベルJCE _TCUSIROPSRABERUJCE	
12-2	691045001	1	TCウシロPSラベルEGF PS LABEL,TC REAR EGF	
13-1	690729001	1	TCカイセイRラベルJCE _TCKAISEIRRABERUJCE	
13-2	691058001	1	TCカイセイRラベルEGF _TCKAISEIRRABERUEGF	

18. ドアインタロック関係 DOOR INTERLOCK



STD、LONG

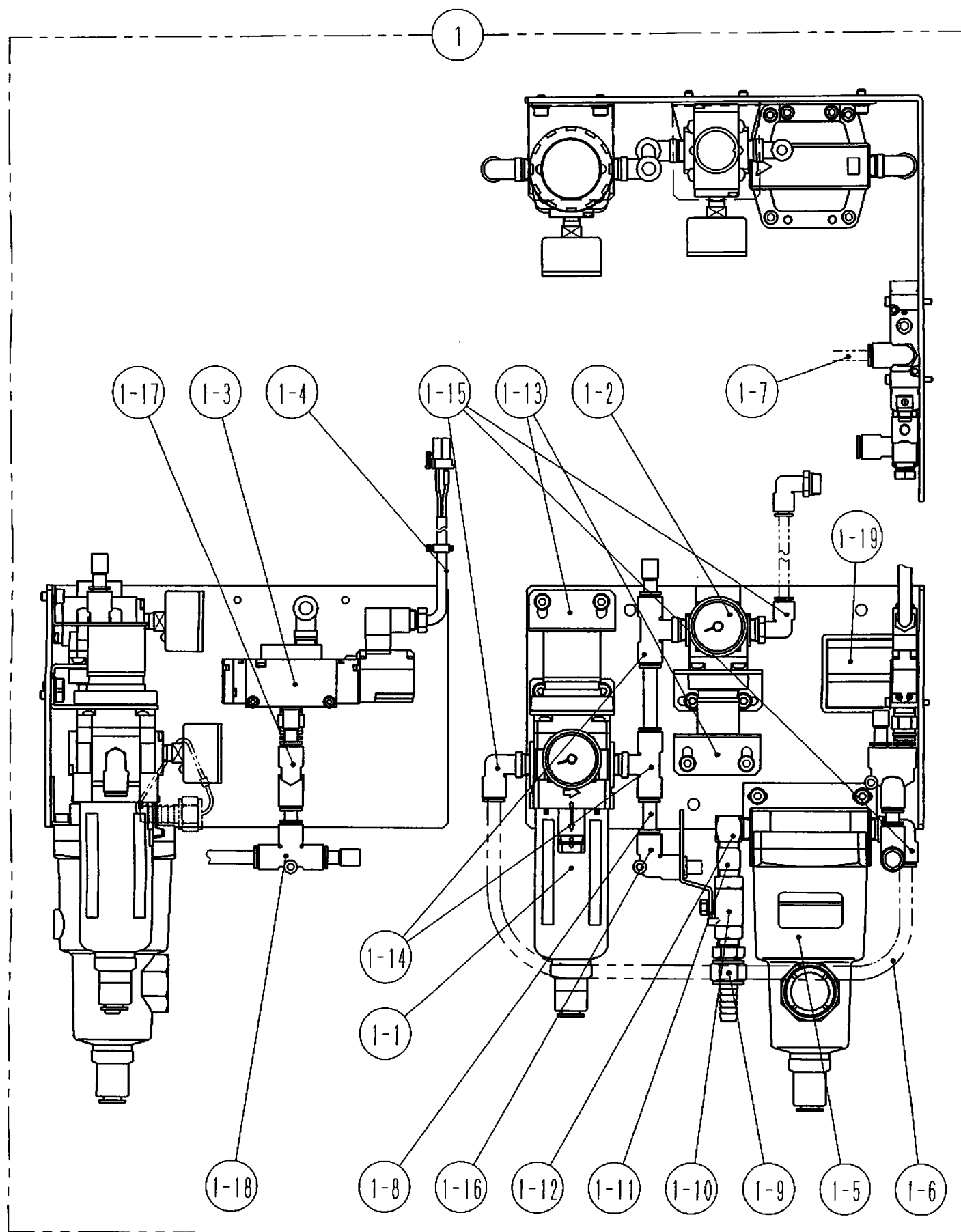


SHORT

18.ドアインタロック関係
DOOR INTERLOCK

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618478001	1	ドアロックLSクミS2B	STD, LONG
2	650826001	1	ドアロックキ-D4DS-K1	
3	618478001	1	ドアロックLSクミS2B	SHORT
4	650826001	1	ドアロックキ-D4DS-K1	

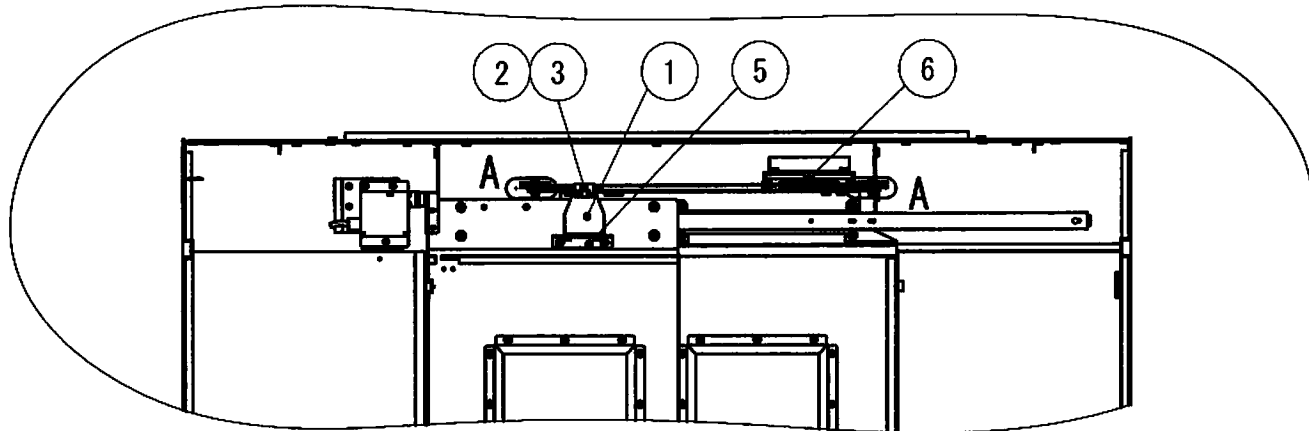
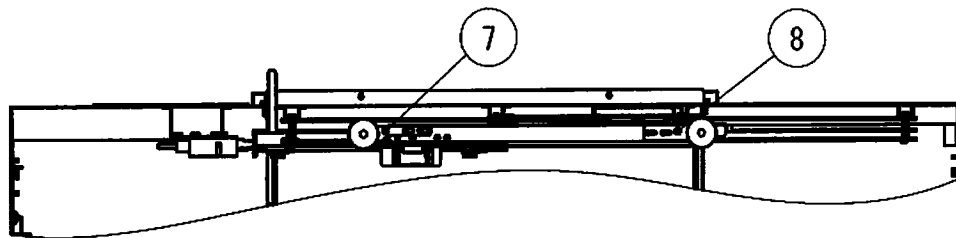
19. エアユニット関係 AIR UNIT



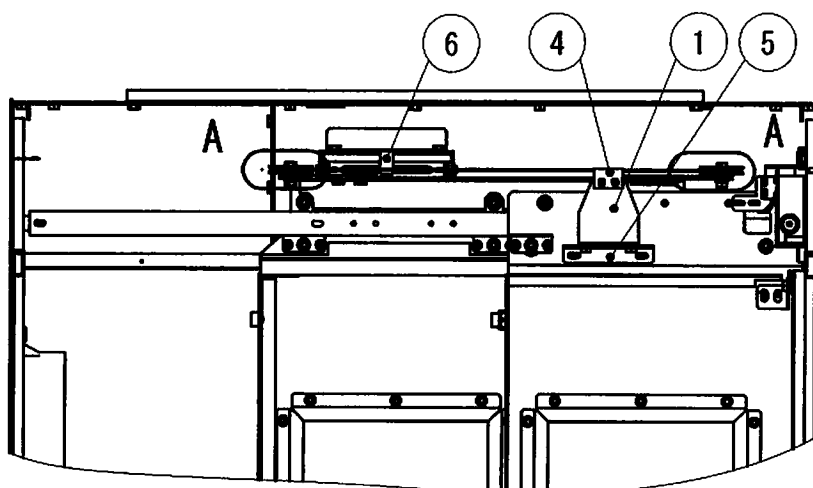
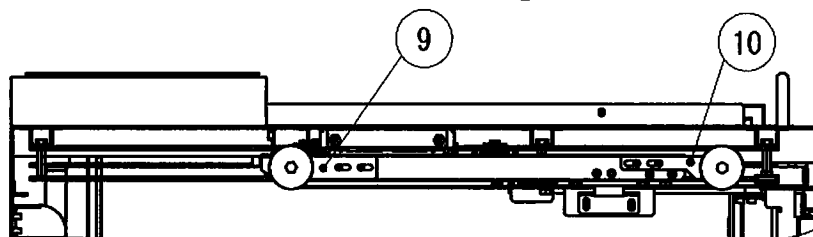
19.エアユニット関係
AIR UNIT

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	618053001	1	エアユニットクミ251B	AIR UNIT ASSY, 251B
1-1	635921001	1	FRユニットAW30	FR UNIT AW30
1-2	635922001	1	レギュレータAR20	REGULATOR
1-3	618482001	1	Tセンジョウバルブクミ	TOOL CLEANING VALVE ASSY
1-4	654718001	1	エアブラストコード205	AIR BLAST CODE 205
1-5	618377001	1	エアミズトリクミ251	EAMIZUTORIKUMI251
1-6	645381001	1	チューブ8X550	TUBE, 8X550
1-7	652305001	1	ナイロンチューブ6X740	NYLON TUBE 6X740
1-8	638908000	1	チューブ6X50	TUBE, 6X50
1-9	616912001	1	ホースジョイント1/4クミ2	HOSE JOINT 1/4 ASSY 2
1-10	610012001	1	ボールバルブTKT 1/4	BALL VALVE TKT 1/4
1-11	632754000	1	ニツプル 1/4	NIPPLE, 1/4
1-12	610013001	1	ニツプルDAV02-02	NIPPLE DAV02-02
1-13	622808001	1	FRロックカナゲ	FR LOCK PLATE
1-14	610011001	2	チーズユニオンKQ2T08	TEE UNION KQ2T08-02S
1-15	610007001	1	エルボKQ2L08-02S	ELBOW KQ2L08-02
1-16	610009001	1	エルボ KQ2L08-00	ELBOW KQ2L08-00
1-17	610010001	1	ユニオンY KQ2U08-00	Y UNION KQ2U08-00
1-18	610008001	1	チーズKQ2T08-00	TEE KQ2T08-00
1-19	690687001	1	エアパージラベル0.3	EAPA-ZIRABERU0.3

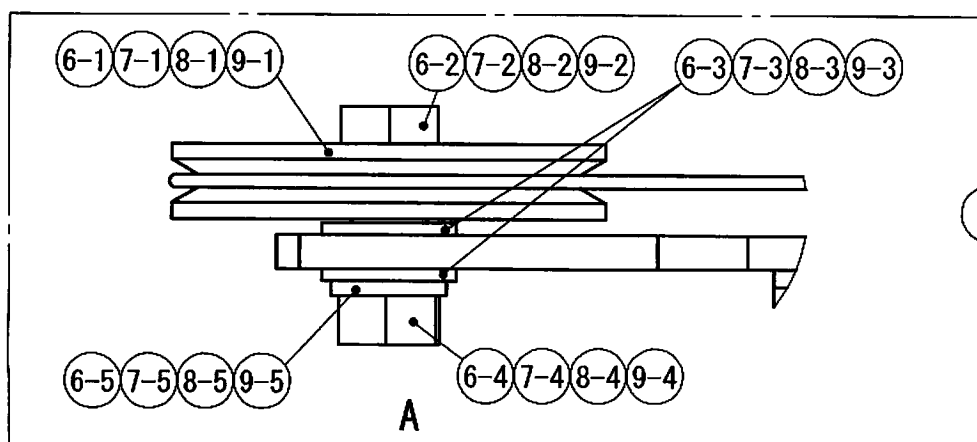
20. 扉連動關係 DOOR WIRE



Standard, Long



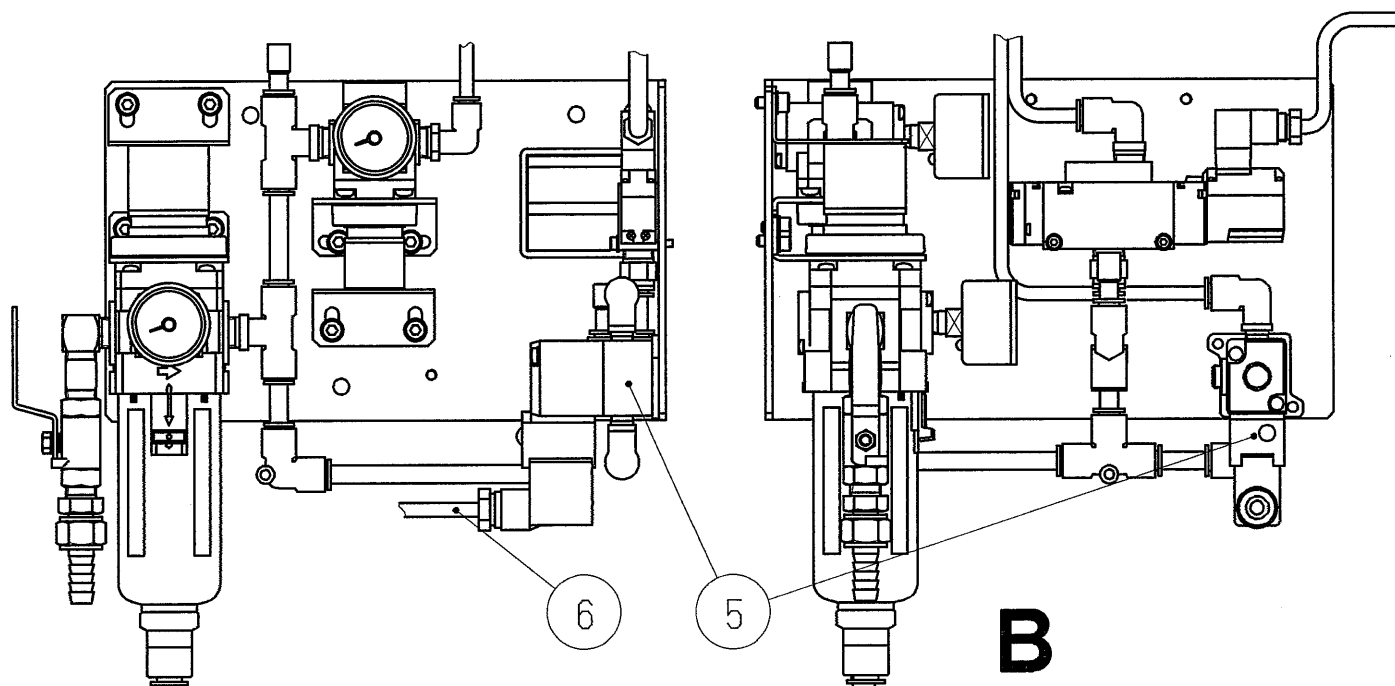
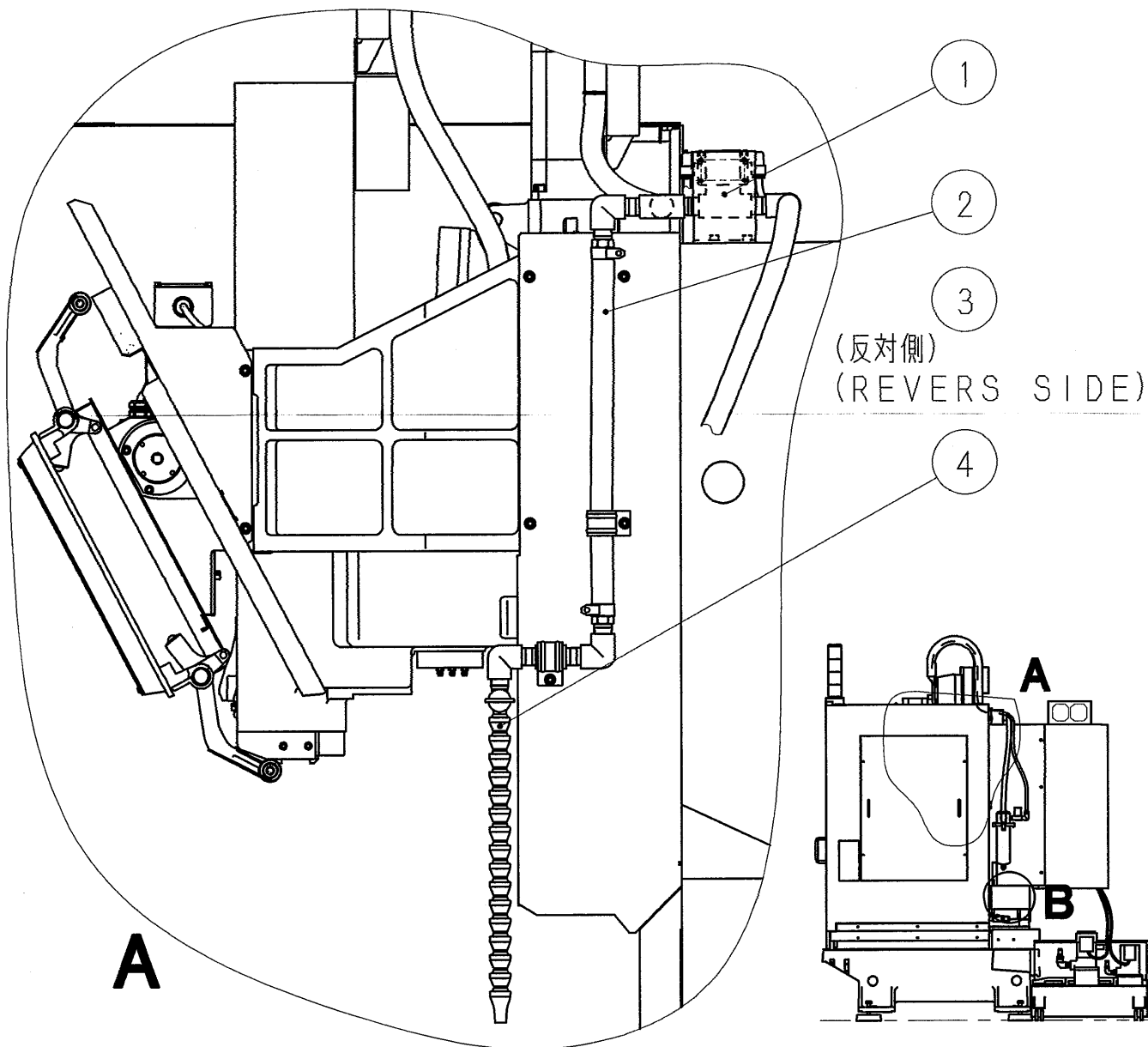
Short



20.扉連動関係
DOOR WIRE

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark	
1	618411001	1	ワイヤコティフツクスステイ25	WAIYAKOTEIHUTUKUSUTEI251	Standard Long Short
2	618407001	1	ワイヤフツククミ251	_WAIYAHUTUKUKUMI251	
3	618889001	1	ワイヤフツククミ251L	_WAIYAHUTUKUKUMI251L	
4	6A5035001	1	ワイヤフッククミ251-S	WIRE HOOK ASSY 251-S	
5	618410001	1	フツクスステイトリツケBKT	_HUTUKUSUTEITORITUKEBKT	
6	653713001	1	ワイヤコティブラケット	WIRE BRACKET	Standard,Long
7	618405001	1	シーブBKT251Rクミ	_SI-BUBKT251RKUMI	
7-1	653719001	1	ワイヤーシーブD50クミ	WIRE SHEAVE D50 ASSY	
7-2	628194001	1	ローラジク 30	ROLLER SHAFT 30	
7-3	025080232	2	ヒラザガネチュウ8	WASHER, PLAIN M 8	
7-4	028080242	1	バネザガネ2-8	WASHER, SPRING 2-8	Standard,Long
7-5	021080102	1	ナツト1シユ 8	NUT, 1 M8	
8	618408001	1	シーブBKT251Lクミ	_SI-BUBKT251LKUMI	
8-1	653719001	1	ワイヤーシーブD50クミ	WIRE SHEAVE D50 ASSY	
8-2	628194001	1	ローラジク 30	ROLLER SHAFT 30	
8-3	025080232	2	ヒラザガネチュウ8	WASHER, PLAIN M 8	Short
8-4	028080242	1	バネザガネ2-8	WASHER, SPRING 2-8	
8-5	021080102	1	ナツト1シユ 8	NUT, 1 M8	
9	618404001	1	シーブBKT251Rクミ	_SI-BUBKT251RKUMI	
9-1	653719001	1	ワイヤーシーブD50クミ	WIRE SHEAVE D50 ASSY	
9-2	628194001	1	ローラジク 30	ROLLER SHAFT 30	Short
9-3	025080232	2	ヒラザガネチュウ8	WASHER, PLAIN M 8	
9-4	028080242	1	バネザガネ2-8	WASHER, SPRING 2-8	
9-5	021080102	1	1シユナツト8	NUT, 1 M8	
10	618408001	1	シーブBKT251Lクミ	_SI-BUBKT251LKUMI	
10-1	653719001	1	ワイヤーシーブD50クミ	WIRE SHEAVE D50 ASSY	Short
10-2	628194001	1	ローラジク 30	ROLLER SHAFT 30	
10-3	025080232	2	ヒラザガネチュウ8	WASHER, PLAIN M 8	
10-4	028080242	1	バネザガネ2-8	WASHER, SPRING 2-8	
10-5	021080102	1	1シユナツト8	NUT, 1 M8	

21. クーラント配管関係 COOLANT PIPING

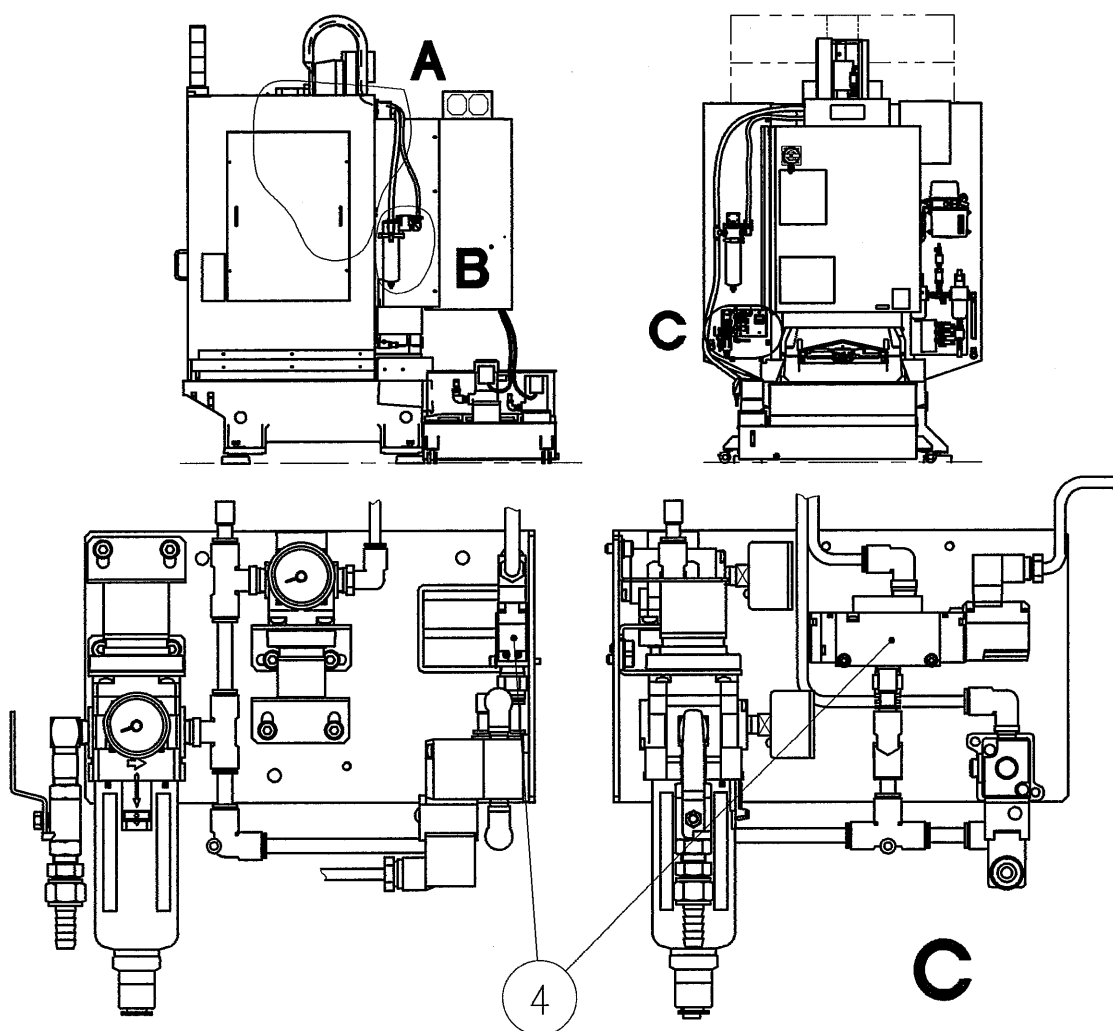
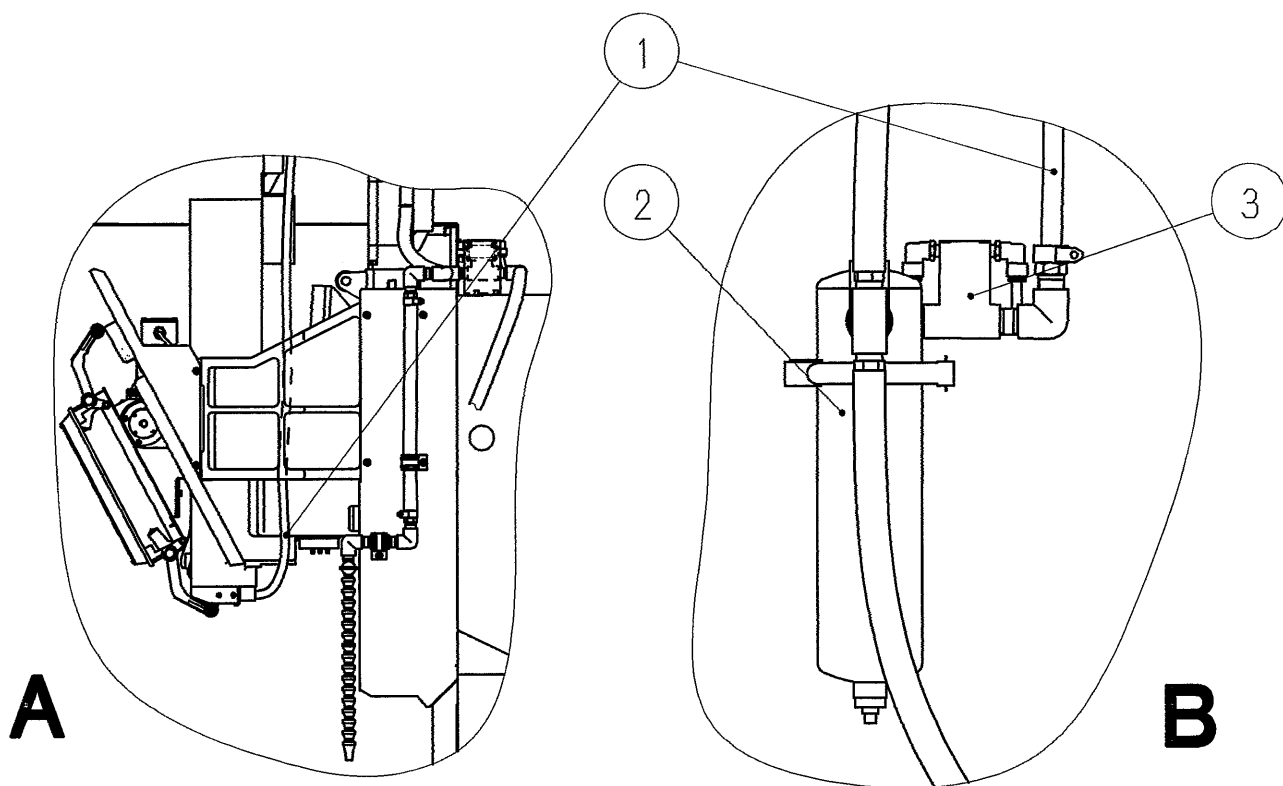


21.クーラント配管関係
COOLANT PIPING

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	652268001	1	バルブVNC201B-クミ	VALVE VNC201B ASSY
2	618280001	1	ゴムホース19X480	RUBBER HOSE, 19X480
3	618281001	1	ゴムホース19X960	RUBBER HOSE, 19X960
4	653149001	2	ノズル1/2-15	VALVE 1/2-15
5	618236001	1	クーラントバルブクミ251	_KU-RANTOBARUBUKUMI251
6	654552001	1	クーラントVコード22A	COOLANT VALVE CABLE,22A

22. ツール洗浄関係
TOOL CLEANING

(1/2)

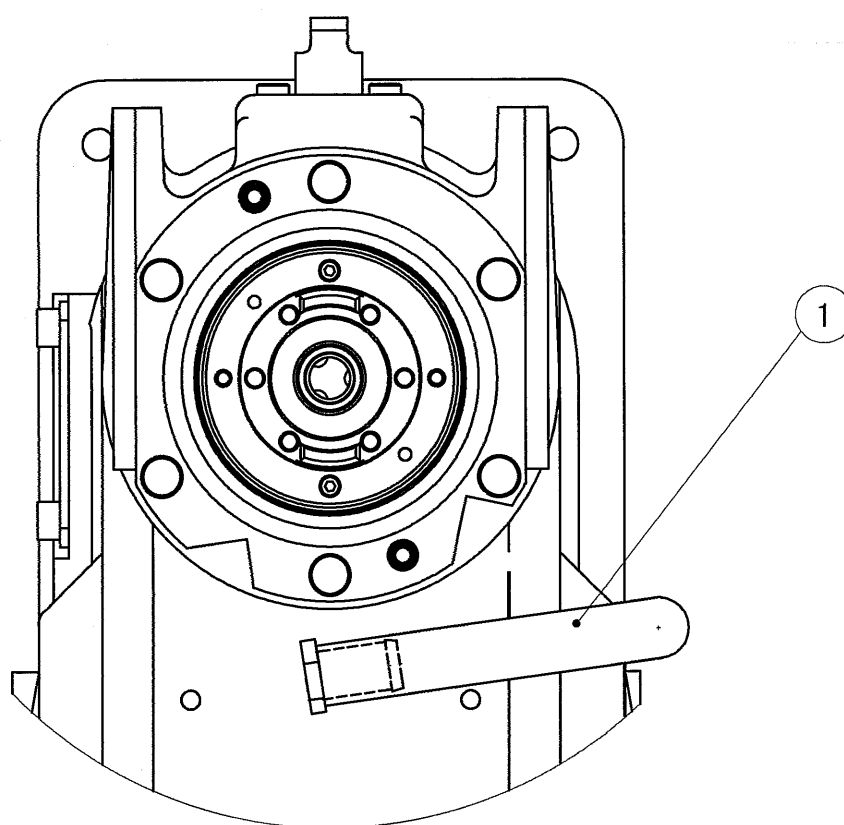


22. ツール洗浄関係
TOOL CLEANING

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618447001	1	ゴムホース12X3200	RUBBER HOSE, 12X3200
2	618421001	1	フィルタFQ-NEWクミ	FILTER FQ-NEW, ASSY
3	652268001	1	バルブVNC201B-クミ	VALVE VNC201B ASSY
4	618482001	1	Tセンジョウバルブクミ	TOOL CLEANING VALVE ASSY

22. ツール洗浄関係
TOOL CLEANING

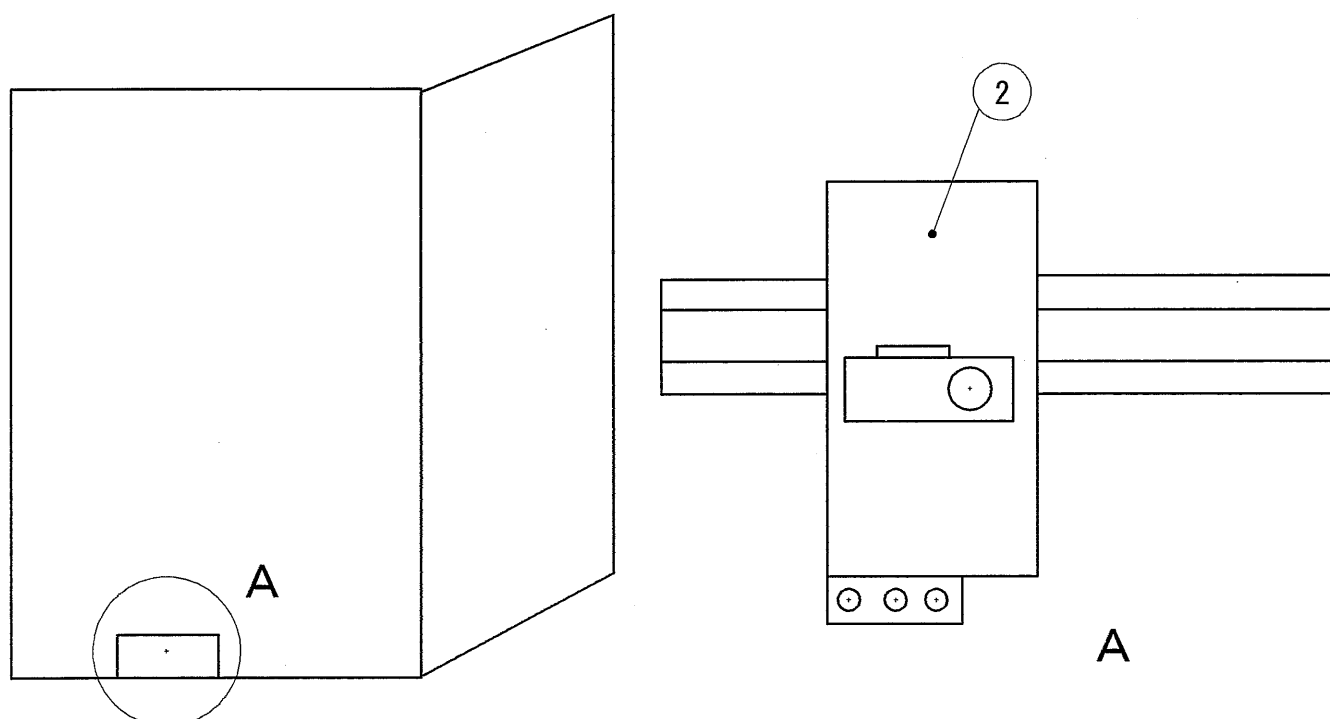
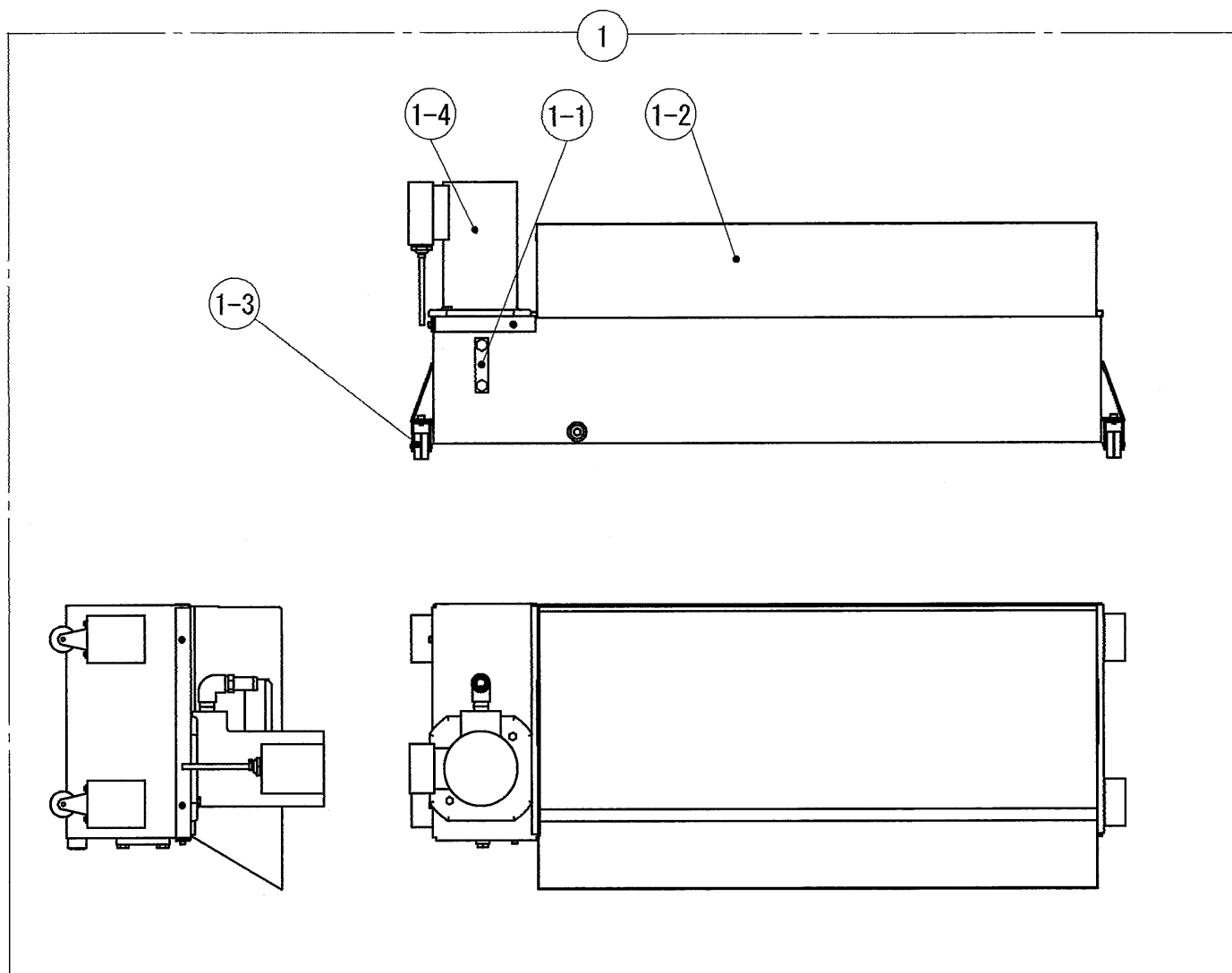
(2/2)



22.ツール洗浄関係
TOOL CLEANING

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618447001	1	ゴムホース12X3200	RUBBER HOSE, 12X3200
2	618421001	1	フィルタFQ-NEWクミ	FILTER FQ-NEW, ASSY
3	652268001	1	バルブVNC201B-クミ	VALVE VNC201B ASSY
4	618482001	1	Tセンジョウバルブクミ	TOOL CLEANING VALVE ASSY

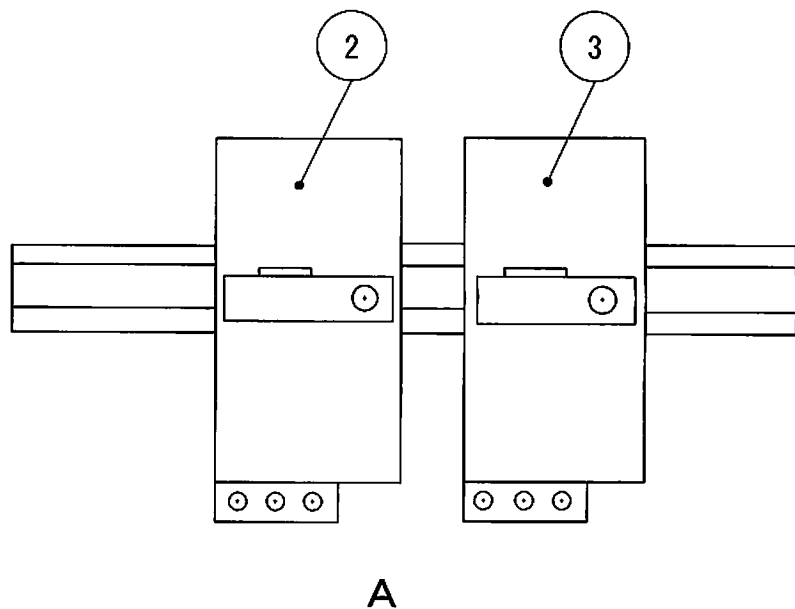
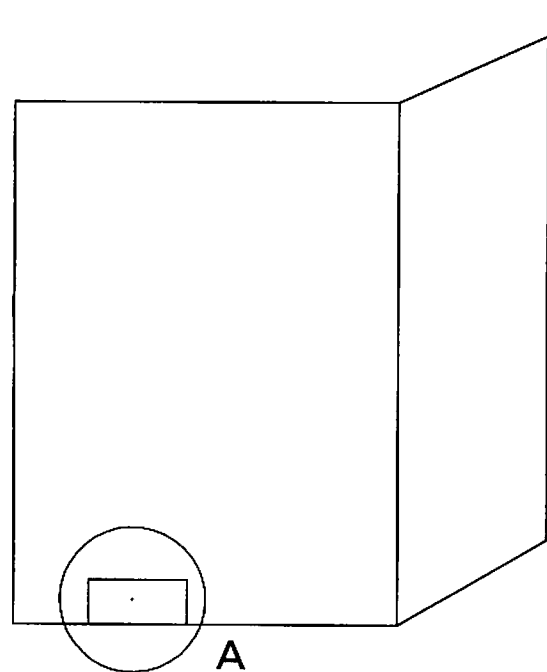
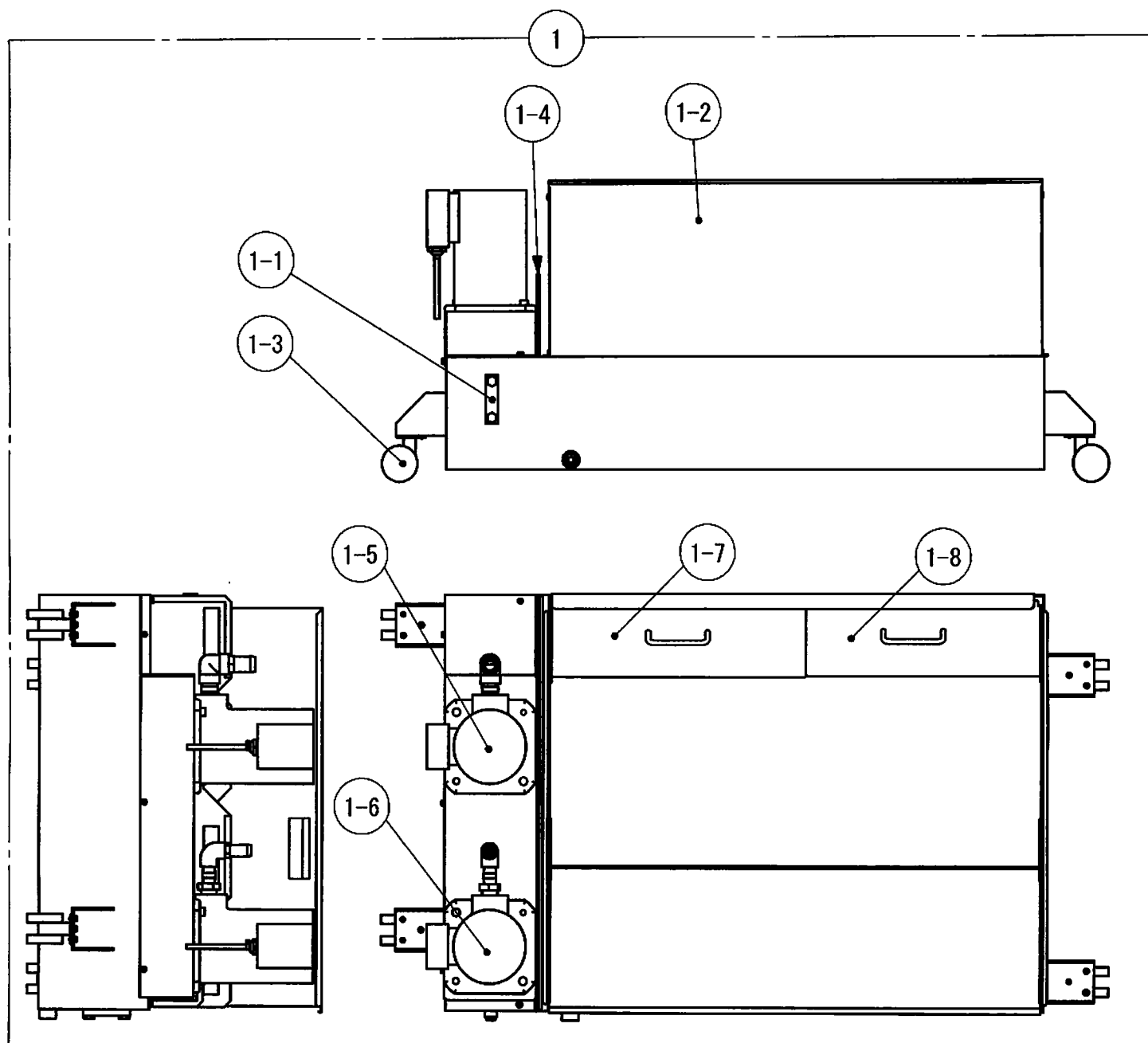
23. クーラントタンク 50L関係 COOLANT TANK 50L



23.クーラントタンク 50L関係
COOLANT TANK 50L

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618498001	1	Cタンク50L251クミ	COOLANT TANK 50L 251 ASSY
1-1	626422000	1	オイルポットAP-0160	OIL POT AP-0160
1-2	645433002	1	キリコウケ30#2	CHIP BUCKET 30#2
1-3	622123001	4	キヤスタ- 57YSB	CASTER 57YSB
1-4	651042001	1	クーラントポンプ180W	COOLANT PUMP 180W
2	653930001	1	Cホゴ180Wクミ A	C PROTECTION 180W ASSY, A

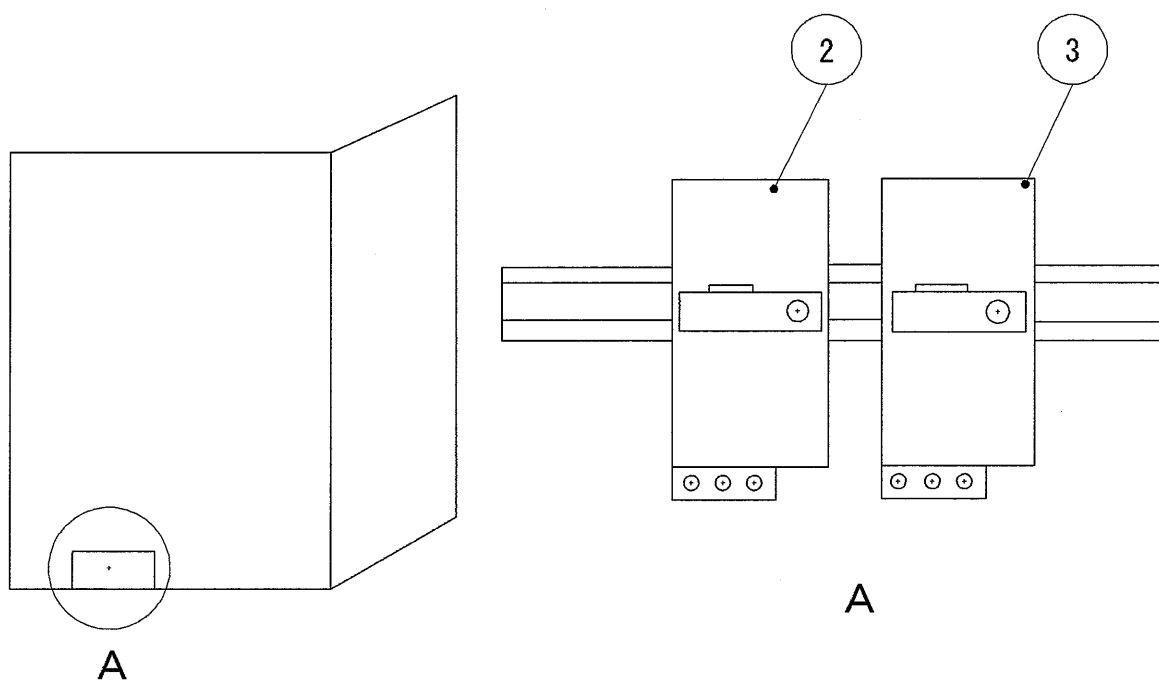
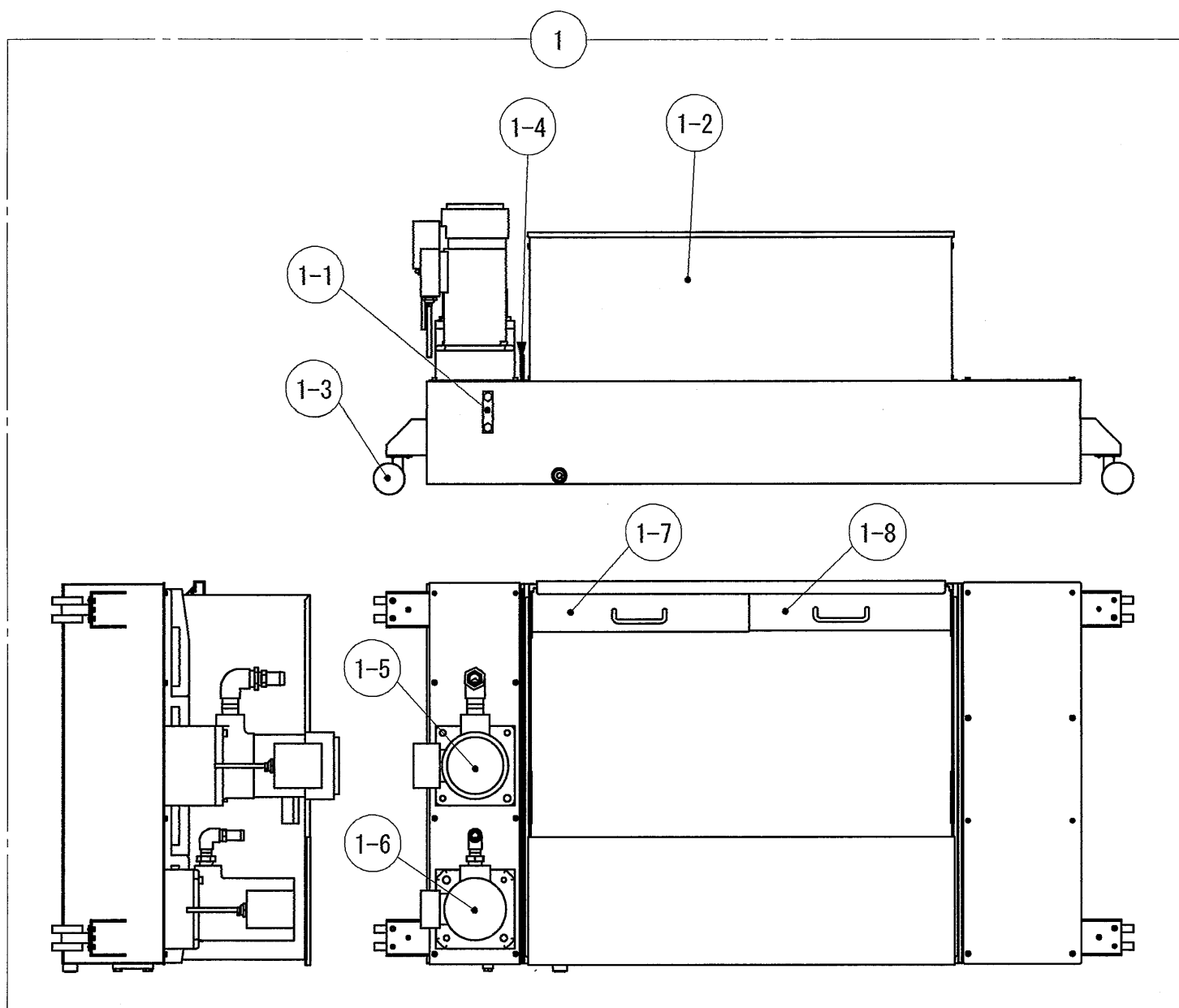
24. クーラントタンク 100L関係 COOLANT TANK 100L



24.クーラントタンク 100L関係
COOLANT TANK 100L

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	618242001	1	Cタンク100L251クミ	COOLANT CHIP SHOWER
1-1	626422000	1	オイルポットAP-0160	
1-2	618438001	1	キリコウケ100L 251クミ	
1-3	622123001	4	キャスター 57YSB	
1-4	618282001	2	タンクフィルター 100LN	
1-5	651043001	1	クーラントポンプ250W	
1-6	651043001	1	クーラントポンプ250W	
1-7	618387001	1	ベース エキキリ 251R	
1-8	618388001	1	ベース エキキリ 251L	
2	653931001	2	Cホゴ250Wクミ A	COOLANT CHIP SHOWER
3	653931001	2	Cホゴ250Wクミ A	

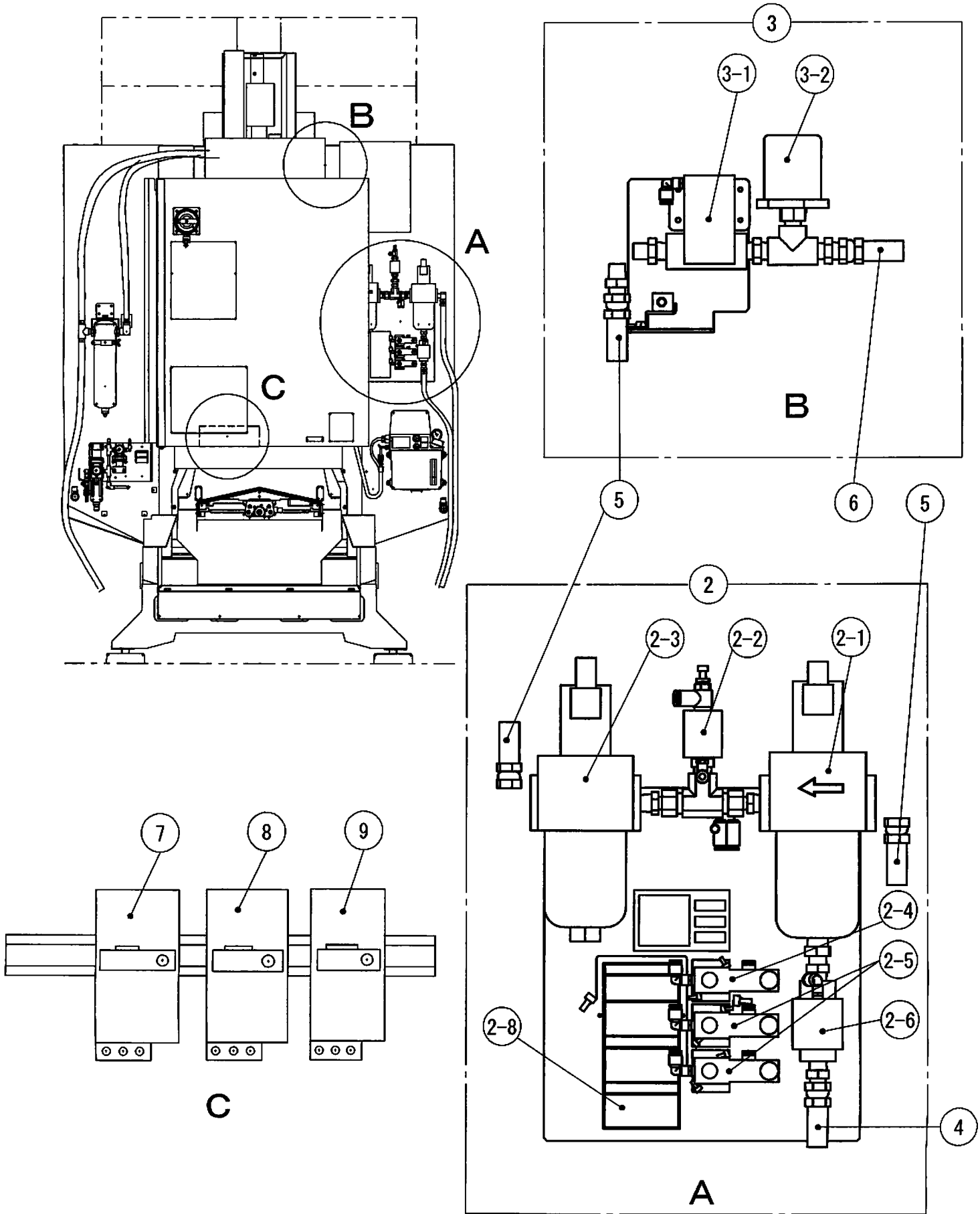
25. クーラントタンク 150L関係 COOLANT TANK 150L



25.クーラントタンク 150L 関係
COOLANT TANK 150L

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	651259001	1	タンクホンタイ 150LクミN	TANK 150L ASSY N
1-1	626422000	1	オイルポットAP-0160	OIL POT AP-0160
1-2	618376001	1	キリコウケ150L 251クミ	_KIRIKOUKE150L 251KUMI
1-3	622123001	4	キャスタ- 57YSB	CASTER 57YSB
1-4	651363001	2	タンクフィルター- 150LN	TANK FILTER, 150LN
1-5	651043001	1	クーラントポンプ250W	COOLANT PUMP 250W
1-6	651044001	1	クーラントポンプ400W	COOLANT PUMP 400W
1-7	618387001	1	ベース エキキリ 251R	_BE-SU EKIKIRI 251R
1-8	618388001	1	ベース エキキリ 251L	_BE-SU EKIKIRI 251L
2	653931001	1	Cホゴ250Wクミ A	C PROTECTION 250W ASSY, A
3	653932001	1	Cホゴ400Wクミ A	C PROTECTION 400W ASSY, A

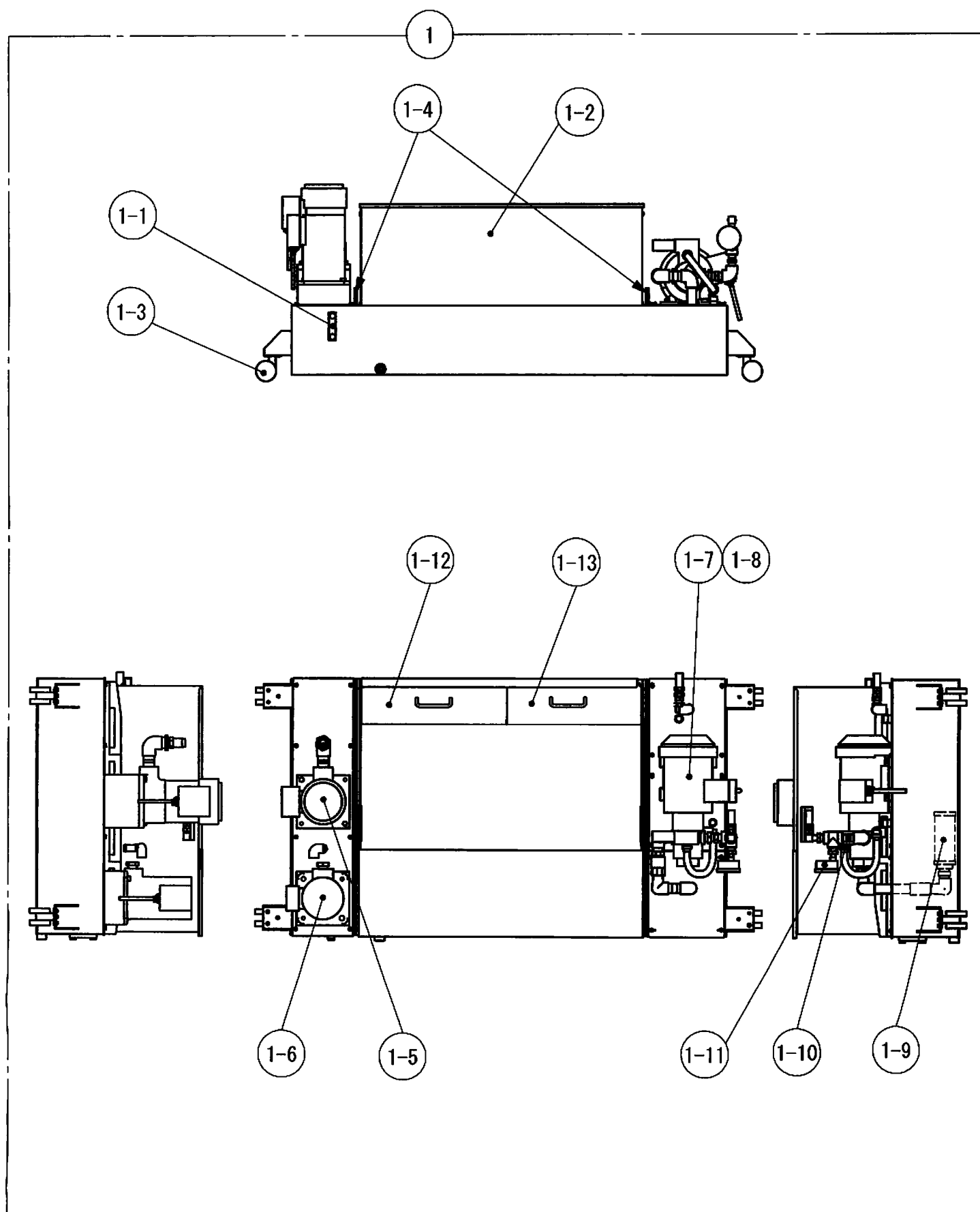
26. CTS配管関係
CTS UNIT



26.CTS配管関係
CTS UN1Y

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
2	618368001	1	F/Vトリツケイタ クミ	COOLANT CHIP SHOWER CTS
2-1	618294001	1	ギヤクセンフィルタクミ	
2-2	618422001	1	チエツクバルブ3/8	
2-3	618308001	1	ラインフィルタクミMP	
2-4	618314001	1	MPバルブAクミ	
2-5	618315001	1	MPバルブBCクミ	
2-6	618313001	1	クーラントバルブMP	
2-7	693001001	1	CTS ラベル 1 JCE	
2-8	693002001	1	CTS ラベル 1 EGF	
3-1	618313001	1	クーラントバルブMP	
3-2	618423001	1	アツリヨクスイッチクミ	
4	618312001	1	MPホースL800	
5	618310001	2	MPホースL1250	
6	618311001	1	MPホースL2000	
7	653931001	1	Cホゴ250Wクミ A	
8	653932001	1	Cホゴ400Wクミ A	
9	618728001	1	MPホゴ750Wクミ	

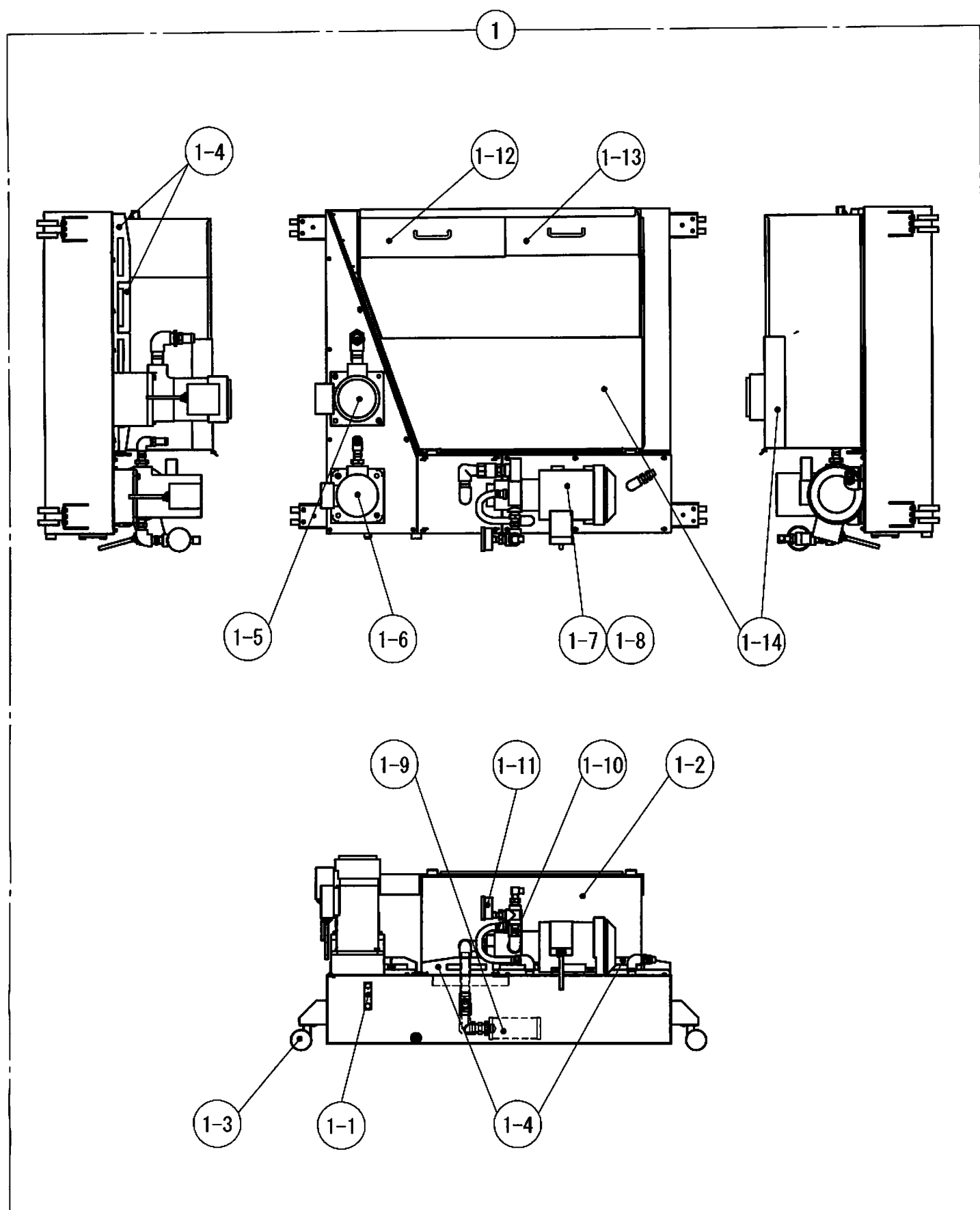
26. 1 クーラントタンク 150L CST関係(標準、ロング)
 COOLANT TANK 150L CTS (Standard, Long)



26.1クーラントタンク 150L CTS関係(標準、ロング)
COOLANT TANK 150L CTS(Standard、Long)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	651259001	1	タンクホンタイ 150LクミN	COOLANT CHIP SHOWER CTS CTS(CE)
1-1	626422000	1	オイルポットAP-0160	
1-2	618376001	1	キリコウケ150L 251クミ	
1-3	622123001	4	キャスター 57YSB	
1-4	651363001	2	タンクフィルター 150LN	
1-5	651043001	1	クーラントポンプ250W	
1-6	651044001	1	クーラントポンプ400W	
1-7	618318001	1	チュウアツポンプ	
1-8	618420001	1	チュウアツポンプEP	
1-9	622133001	2	サクシヨンフィルター-SFN06	
1-10	618426001	1	チエツクバルブ1/2	
1-11	622135001	1	アツリヨクケイ0-25	
1-12	618387001	1	ベ-ス エキキリ 251R	
1-13	618388001	1	ベ-ス エキキリ 251L	

26. 2 クーラントタンク 150L CST関係 (ショート)
COOLANT TANK 150L CTS (Short)

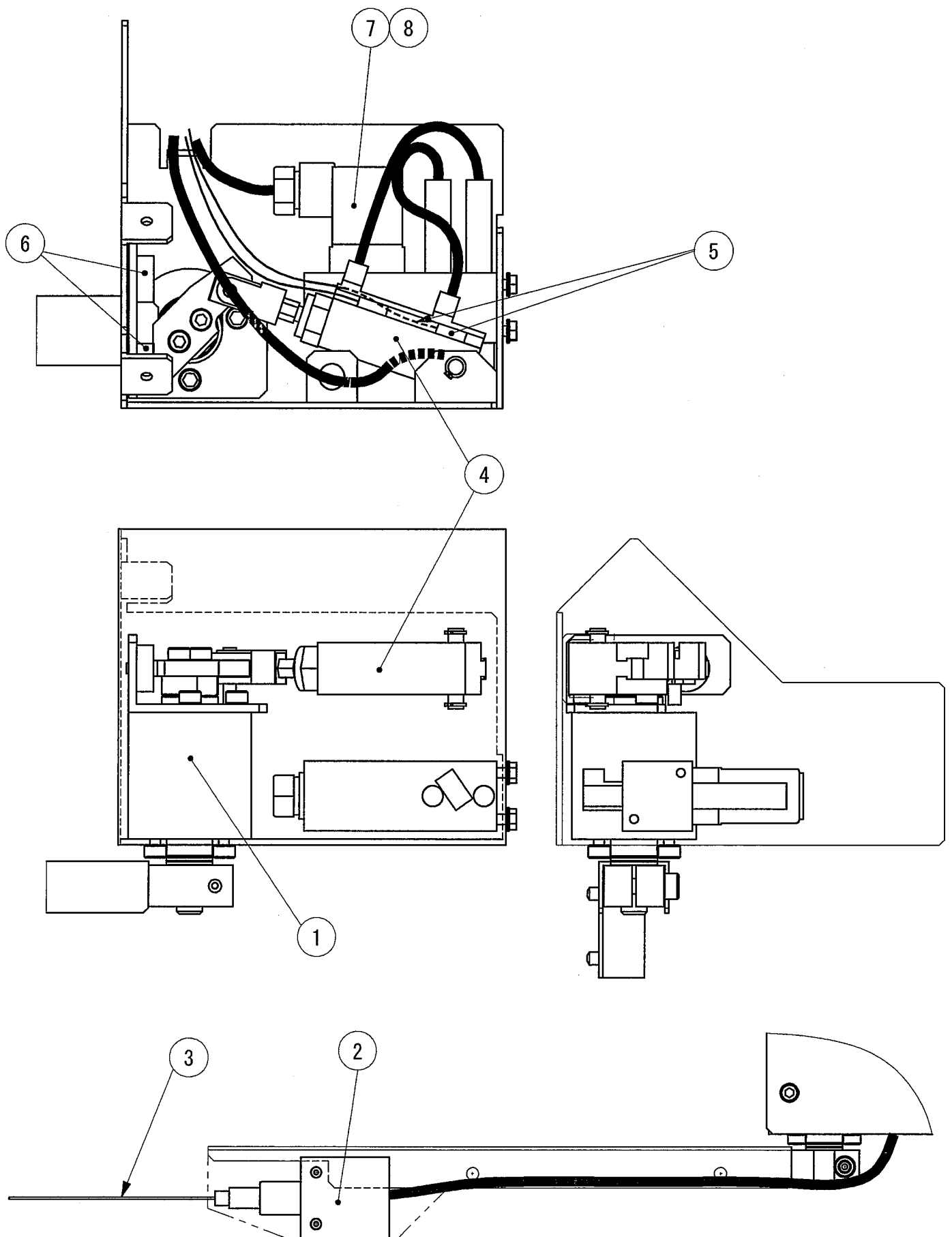


26.2クーラントタンク 150L CTS関係(ショート)
COOLANT TANK 150L CTS(SHORT)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	6A5085001	1	タンクホンタイ150LクミNS	TANK 150L ASSY N-S
1-1	626422000	1	オイルポットAP-0160	OIL POT AP-0160
1-2	6A5086001	1	キリコウケ150L251クミS	CHIP PAN150L 251KUMI-S
1-3	622123001	4	キャスタ- 57YSB	CASTER 57YSB
1-4	651363001	2	タンクフィルター 150LN	TANK FILTER, 150LN
1-5	651043001	1	クーラントポンプ250W	COOLANT PUMP 250W
1-6	651044001	1	クーラントポンプ400W	COOLANT PUMP 400W
1-7	618318001	1	チュウアツポンプ	MP PUMP
1-8	618420001	1	チュウアツポンプEP	MP PUMP EP
1-9	622133001	2	サクシヨンフィルター-SFN06	SUCTION FILTER SFN06
1-10	618426001	1	チエツクバルブ1/2	CHECK VALVE, 1/2
1-11	622135001	1	アツリヨクケイ0-25	PRESSURE GAUGE 0-25
1-12	618387001	1	ベ-ス エキキリ 251R	_BE-SU EKIKIRI 251R
1-13	618388001	1	ベ-ス エキキリ 251L	_BE-SU EKIKIRI 251L
1-14	6A5083001	1	キリコウケカバー-S	CHIP PAN COVER S

27. 工具折れ検出装置関係

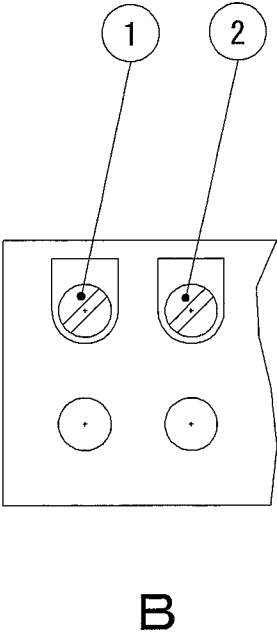
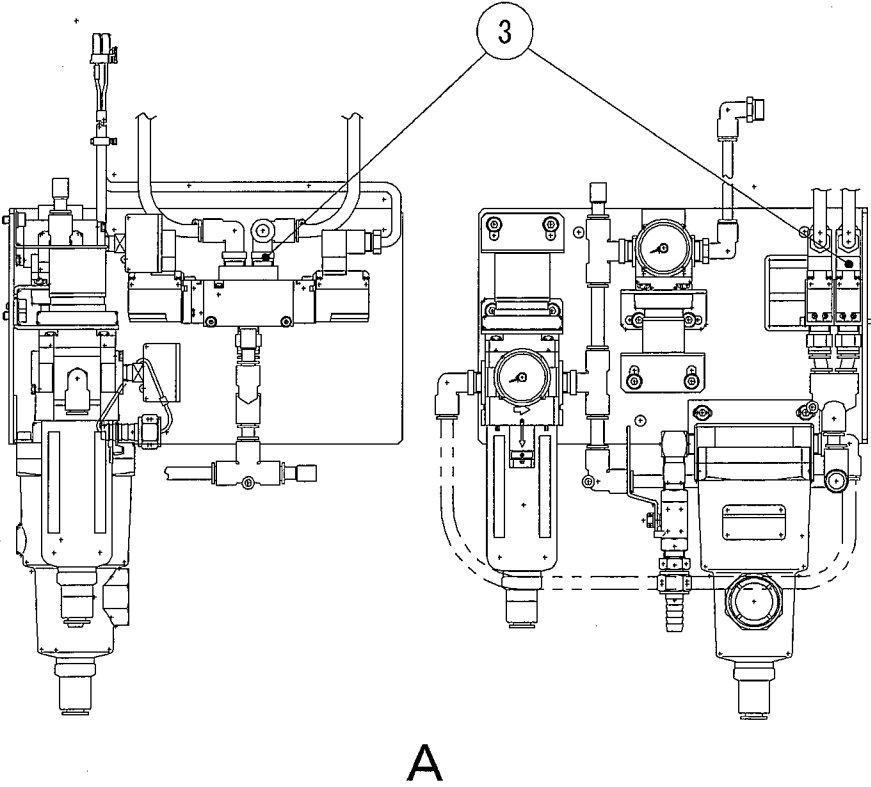
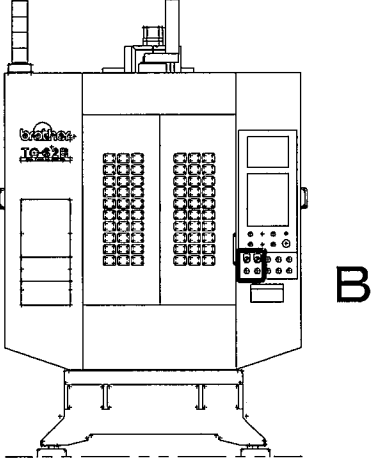
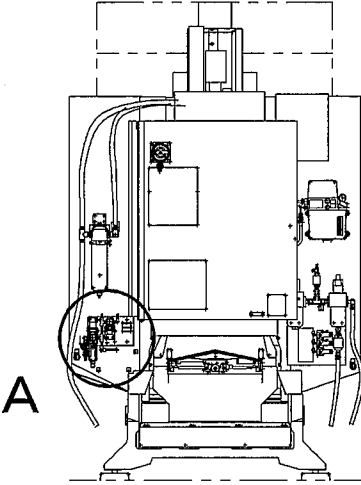
TOOL BREAKAGE DETECTION UNIT



27.工具折れ検出装置関係
TOOL BREAKAGE DETECTION

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	655763001	1	カイテンジククミ32A	ROTATINOL SHAFT, TOOL 32A
2	652643001	1	オレケンセンサクミ22A	TOOL BREAKAGE SENSOR ASSY 22A
3	650328001	1	シヨクシン	NEEDLE
4	618395001	1	オレケンシリンダ251クミ	CYLINDER, TOOL DETECTOR 251
5	618396001	1	シリンダセンサクミ251	CYLINDER SENSOR ASSY 251
6	639646001	2	ストツパ732	STOPPER 732
7	618397001	1	オレケンバルブクミ251	TBD VALVE, ASSY, 251
8	622700001	1	バルブ050-4E1	VALVE 050-4E1

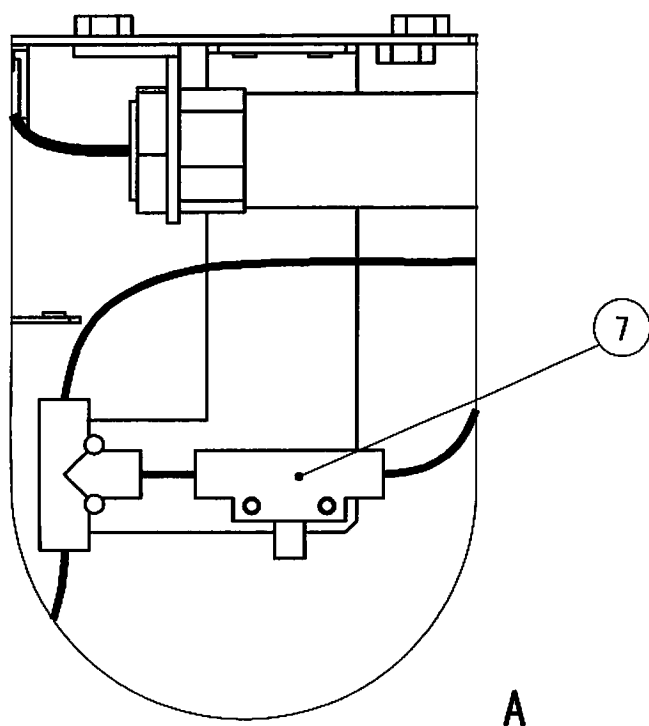
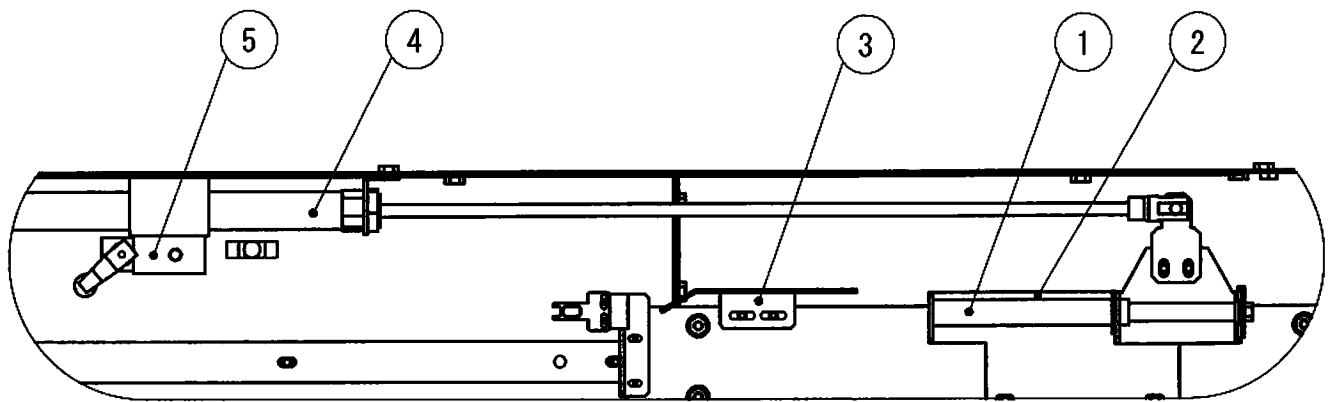
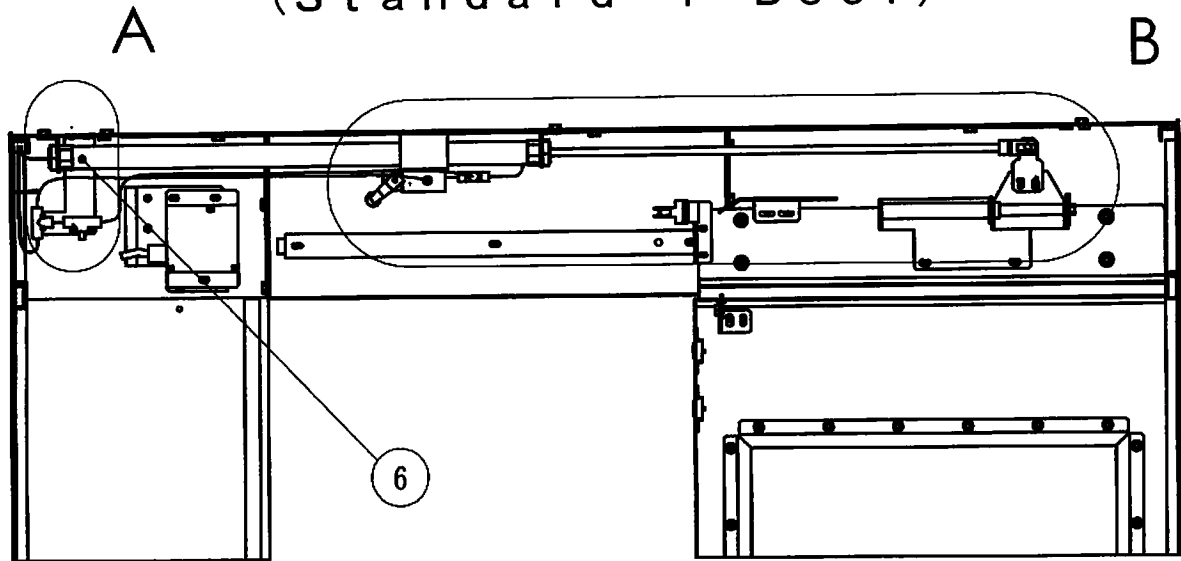
28. 自動扉関係
AUTOMATIC DOOR



28.自動扉関係
AUTOMATIC DOOR

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	643636001	1	スイッチ オートドア クミ	SWITCH AUTODOOR ASSY
2	643738001	1	スイッチ モードセレクトクミ	SWITCH MODE SELECT ASSY
3	618237001	1	ADバルブクミ251	ADBARUBUKUMI251

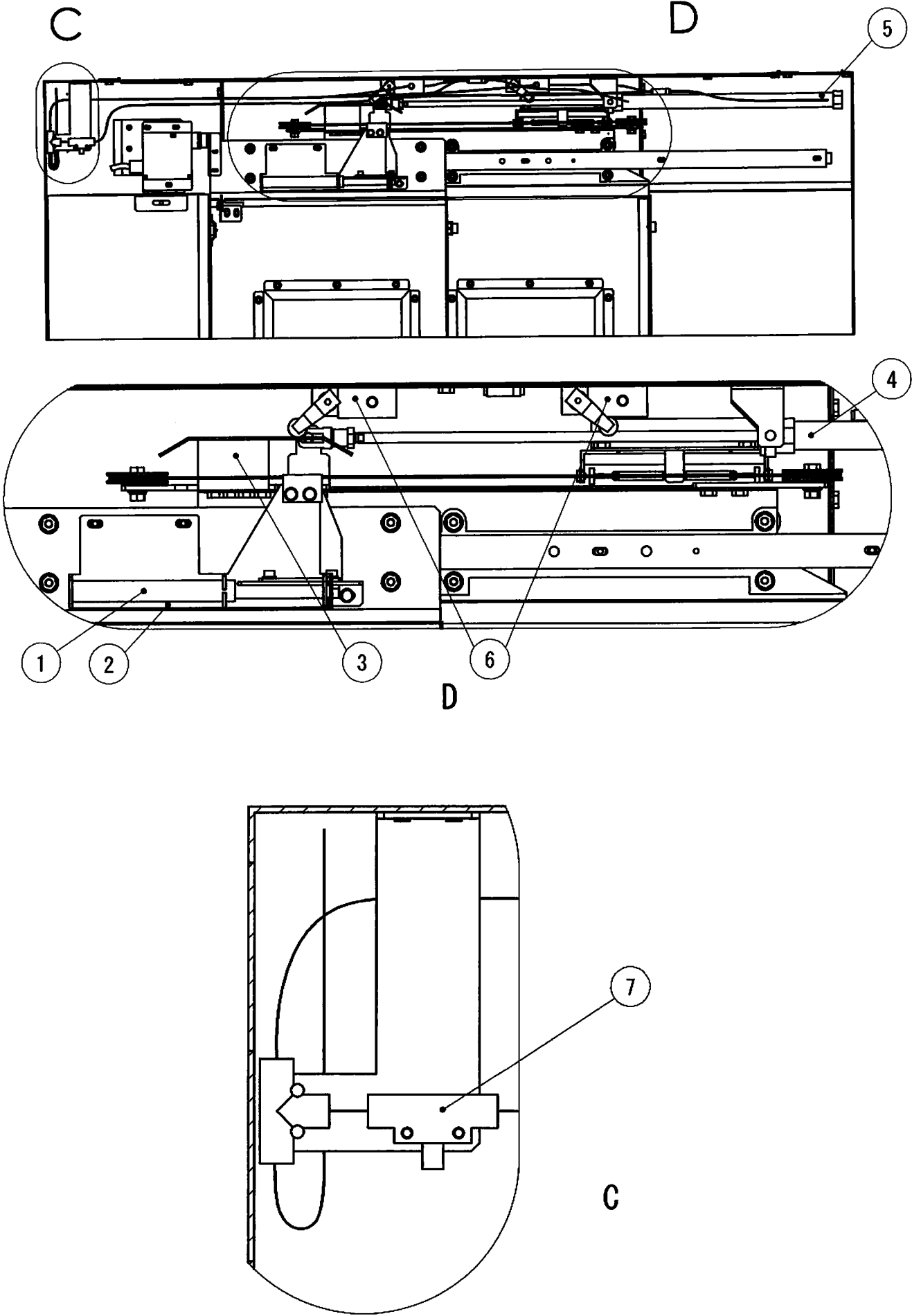
28-1. 自動扉関係 (標準 1枚扉)
 AUTOMATIC DOOR
 (Standard 1 Door)



28-1.自動扉関係(標準 1枚扉)
AUTOMATIC DOOR(Standard 1Door)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653165001	1	スプリングシャフト	SPRING SHAFT
2	651075001	1	スプリング 2.3X32	SPRING 2.3X32
3	618027001	1	ADゲンソクドグ251	AD DECELERATOR DOG 251
4	618033001	1	ADシリンダ251	AD CYLINDER, 251
5	635900001	1	シリンダスイッチ 205	CYLINDER SWITCH 205
6	635903001	1	ADゲンソクバルブ	AD DECELERATOR VALVE
7	638907001	1	スピコン SSU6	SPEED CONTROLLER SSU6

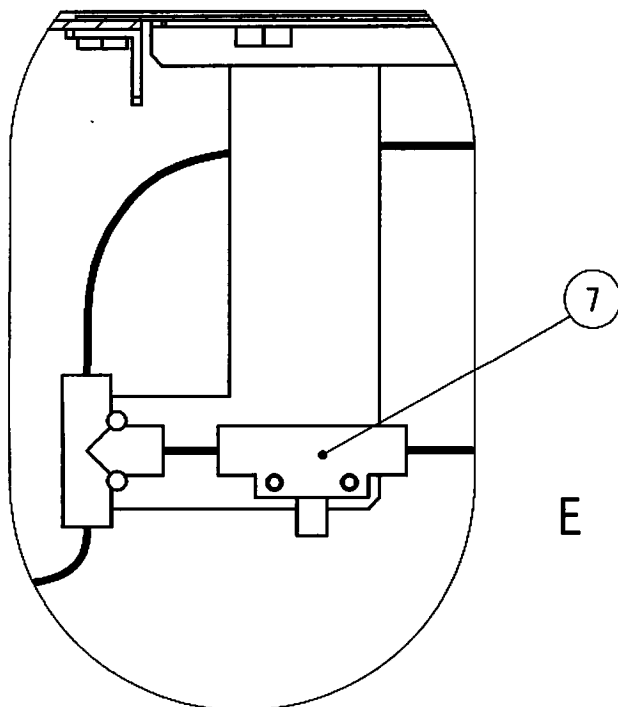
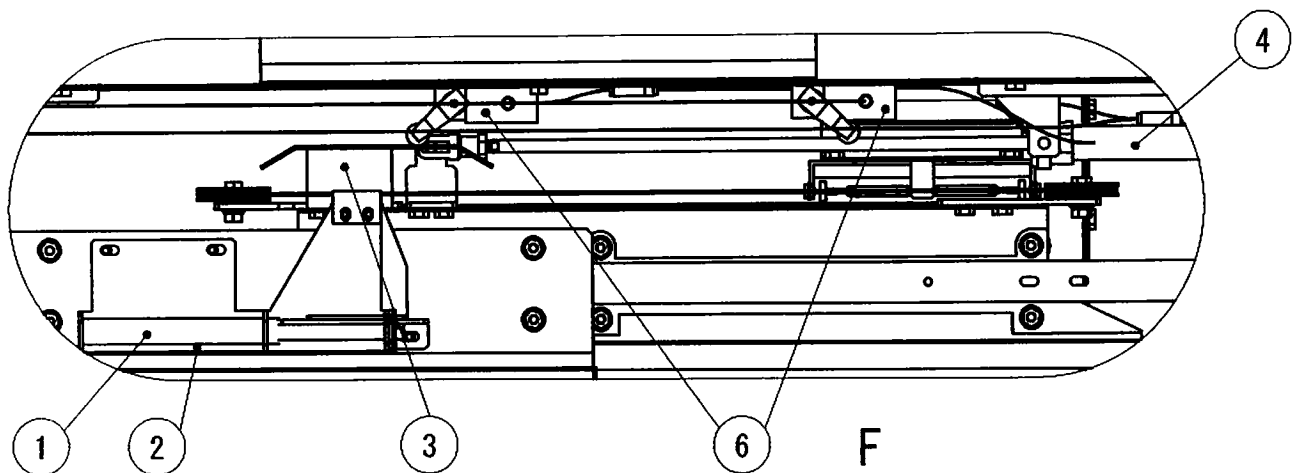
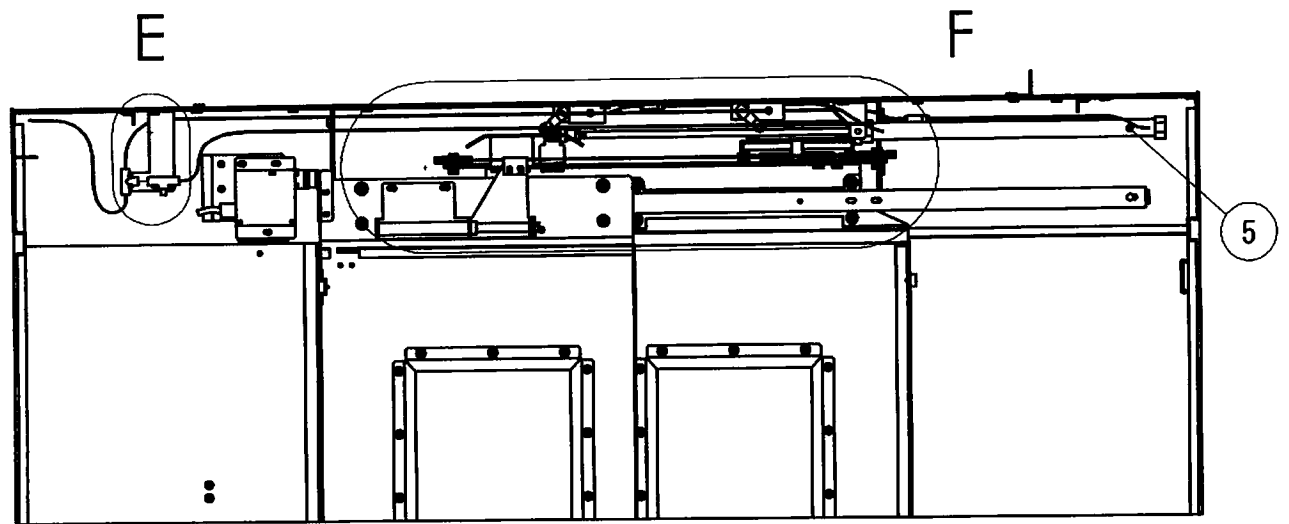
28-2. 自動扉関係 (標準 2枚扉)
AUTOMATIC DOOR
(Standard 2 Doors)



28-2.自動扉関係(標準 2枚扉)
AUTOMATIC DOOR(Standard 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653165001	1	スプリングシャフト	SPRING SHAFT
2	651075001	1	スプリング 2.3X32	SPRING 2.3X32
3	618415001	1	ADドグ2 251	AD DOG2 251
4	618356001	1	ADシリンダ251-2	_ADSIRINDA251-2
5	635900001	1	シリンダスイッチ 205	CYLINDER SWITCH 205
6	635903001	2	ADゲンソクバルブ	AD DECELERATOR VALVE
7	638907001	2	スピコン SSU6	SPEED CONTROLLER SSU6

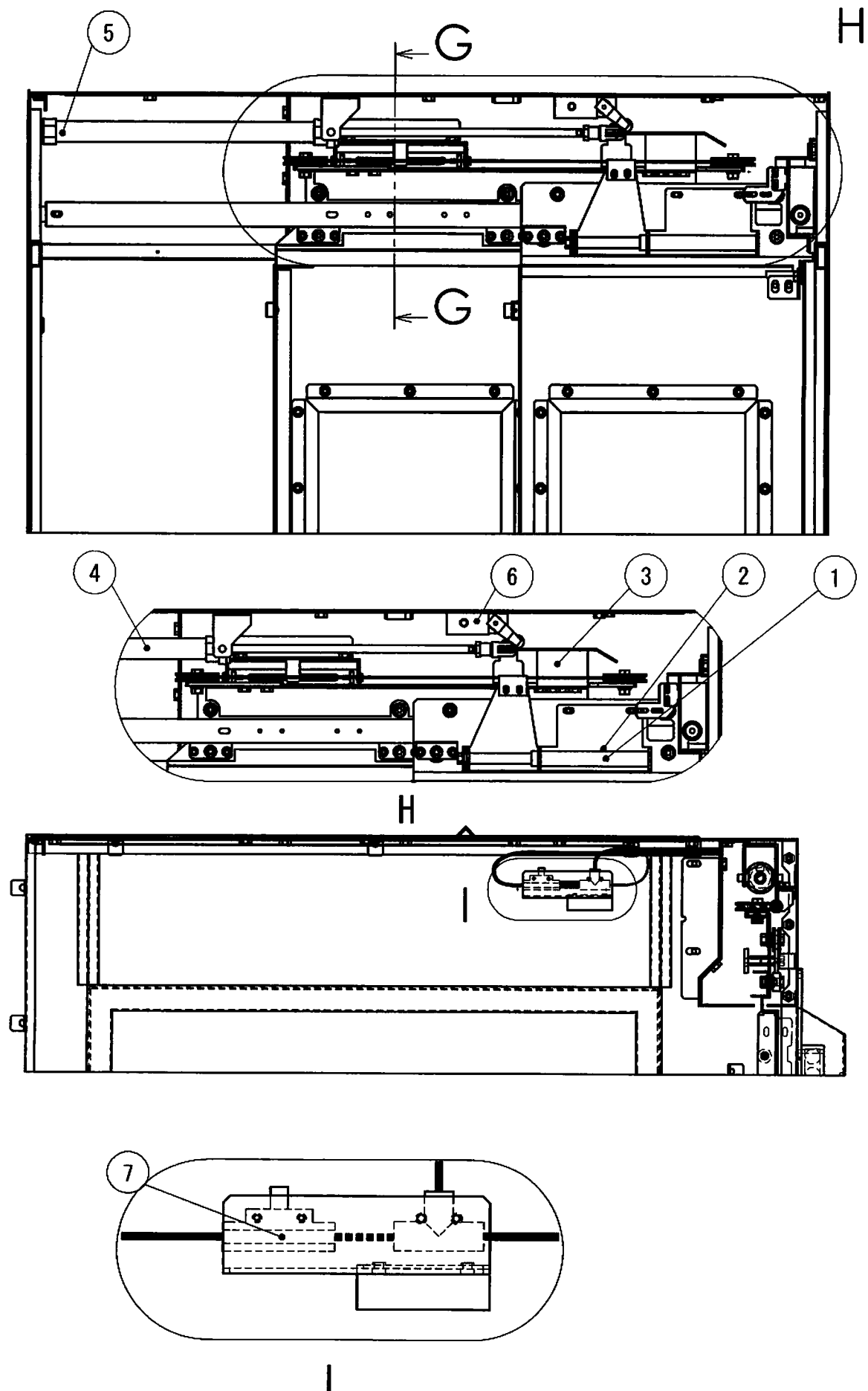
28-3. 自動扉関係 (ロング 2枚扉)
 AUTOMATIC DOOR
 (Long 2 Doors)



28-3.自動扉関係(ロング 2枚扉)
AUTOMATIC DOOR(Long 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653165001	1	スプリングシャフト	SPRING SHAFT
2	651075001	1	スプリング 2.3X32	SPRING 2.3X32
3	618415001	1	ADドグ2 251	AD DOG2 251
4	618910001	1	ADシリンダ251-L2	_ADSIRINDA251-L2
5	635900001	1	シリンダスイッチ 205	CYLINDER SWITCH 205
6	635903001	2	ADゲンソクバルブ	AD DECELERATOR VALVE
7	638907001	2	スピコン SSU6	SPEED CONTROLLER SSU6

28-4. 自動扉関係 (ショート 2枚扉)
 AUTOMATIC DOOR
 (Short 2 Doors)

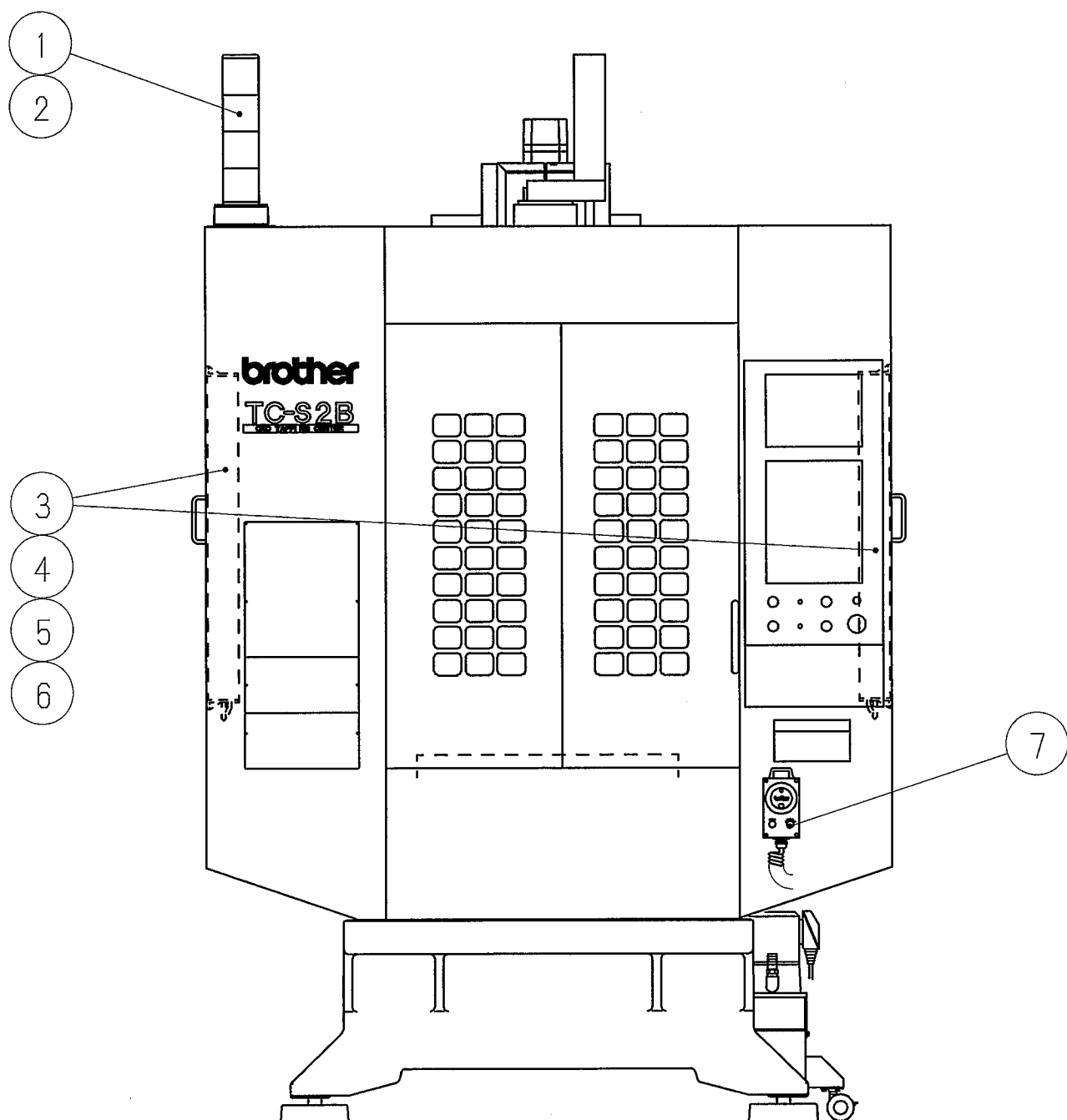


28-4.自動扉関係(ショート 2枚扉)
AUTOMATIC DOOR(Short 2Doors)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	653165001	1	スプリングシャフト	SPRING SHAFT
2	651075001	1	スプリング 2.3X32	SPRING 2.3X32
3	6A5046001	1	ADドグ 251-S	AD DOG 251-S
4	6A5047001	1	ADシリンダ 251-S	AD CYLINDER 251-S
5	635900001	1	シリンダスイッチ 205	CYLINDER SWITCH 205
6	635903001	1	ADゲンソクバルブ	AD DECELERATOR VALVE
7	638907001	1	スピコン SSU6	SPEED CONTROLLER SSU6

29. 機内灯、表示灯、手動パルス発生器関係

MACHINE LIGHT, INDICATION LAMP,
MANUAL PULSE GENERATOR



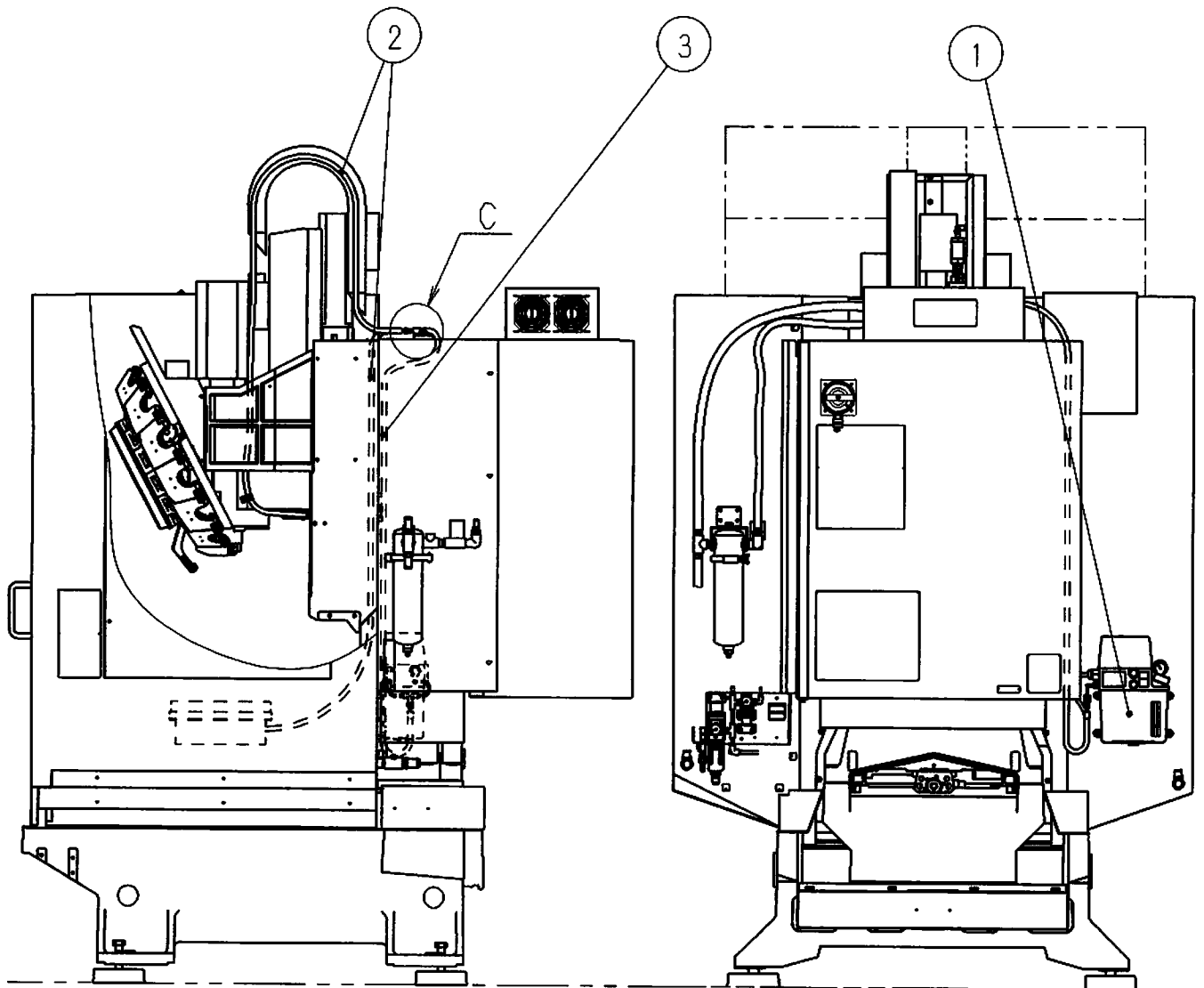
29.機内灯、表示灯、手動パルス発生器関係
MACHINE LIGHT, INDICATIONLAMP,
MANUAL PULSE GENERATOR

参照No Ref.No	部品コード Part Code	個数 Q'ty	品名 Part Name	備考 Remark
1	650878002	1	キナイトウ 1クミ60HZ	WORK LIGHT 1 60HZ
2	650621002	1	キナイトウ 1クミ 50HZ	WORK LIGHT 1 50HZ
3	638260001	1	ヒヨウジトウ1トウクミ229	INDICATOR LIGHT 1 ASSY 229
4	638261001	1	ヒヨウジトウ2トウクミ229	INDICATOR LIGHT 2 ASSY 229
5	638461001	1	ヒヨウジトウ1クミ229EP	INDICATOR LIGHT 1 ASSY 229EP
6	638462001	1	ヒヨウジトウ2クミ229EP	INDICATOR LIGHT 2 ASSY 229EP
7	646577403	1	パルサHP-102DクミF	PULSER HP-102D ASSY F

30. 間欠給油装置関係

(1/4)

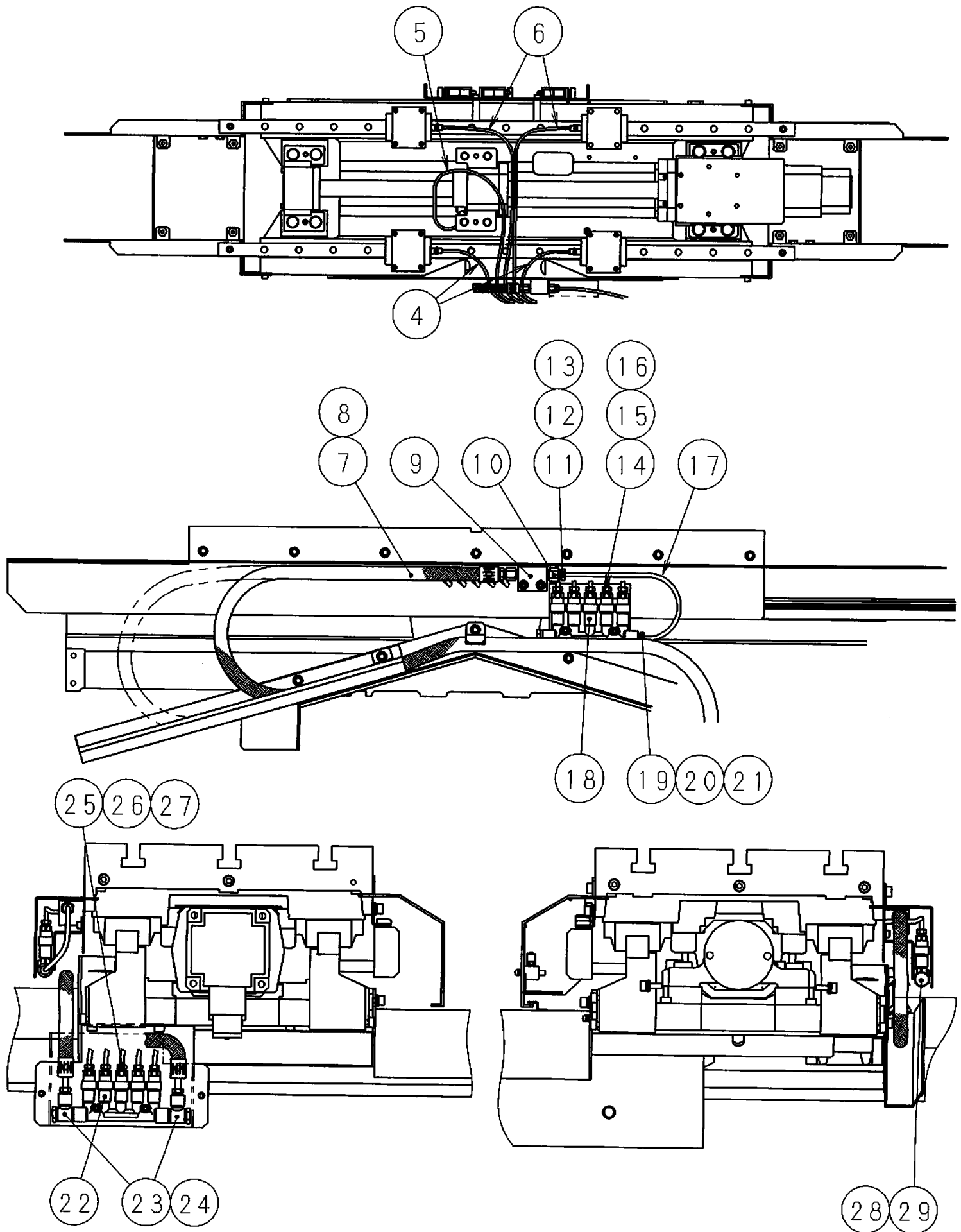
INTERMITTENT
LUBRICATING UNIT



30.間欠給油装置関係(1/4)
INTERMITTERENT LUBRICATING UNIT(1/4)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
1	637400001	1	Pユニットクミ731	PUMP UNIT ASSY, 731
2	6A0382001	3	コウアツフレキL2500	HIGH PRESSURE FLEX TUBE L2500
3	618504001	1	コウアツフレキL1300	HIGH PRESSURE FLEX TUBE L1300

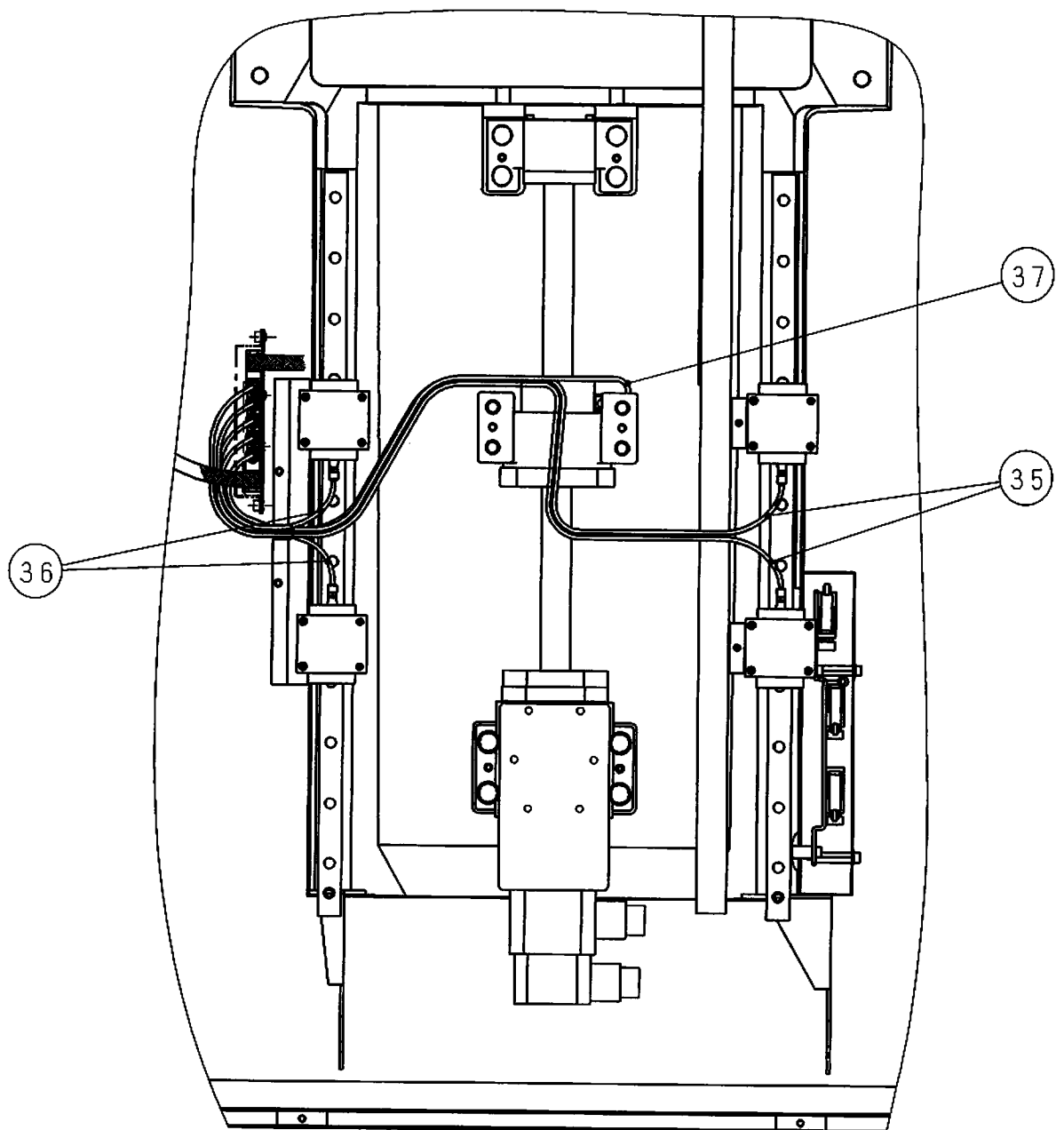
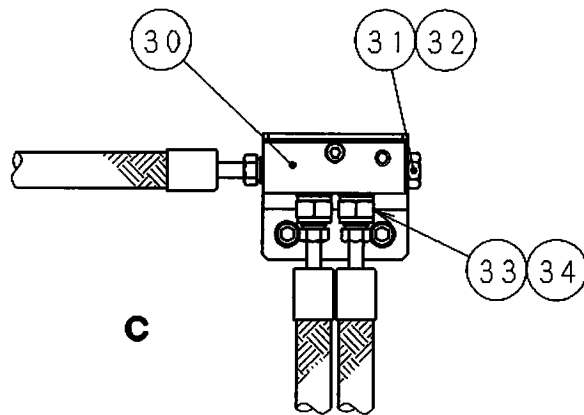
INTERMITTENT
LUBRICATING UNIT



30.間欠給油装置関係(2/4)
INTERMITTERENT LUBRICATING UNIT(2/4)

参照No	部品コード	個数	品名	備考
Ref.No	Part Code	Qty	Part Name	Remark
4	641337000	2	レイロンチューブ4X300	SHORT STD, LONG
5	641342000	2	レイロンチューブ550	
6	641340000	1	レイロンチューブ470	
7	6A0381001	1	HIGH PRESSURE FLEX TUBE L1200	
8	618504001	1	HIGH PRESSURE FLEX TUBE L1300	
9	622207001	1	キユウユマニホールド	
10	622225001	2	オスメスジョイント	
11	622222001	2	オサエナツト 6	
12	622223001	2	スリーブ 6	
13	622224001	2	インレット 6	
14	622219001	5	オサエナツト 4	
15	622220001	5	スリーブ 4	
16	622221001	5	インレット 4	
17	622218001	1	ホース6X270	
18	622213001	1	ブンバイキ	
19	622222001	2	オサエナツト 6	
20	622223001	2	スリーブ 6	
21	622224001	2	インレット 6	
22	622213001	1	ブンバイキ	
23	622212001	1	ジザイジョイント	
24	653952001	1	シールパツキンM10	
25	622219001	5	オサエナツト 4	
26	622220001	5	スリーブ 4	
27	622221001	5	インレット 4	
28	653953001	1	ザツキプラグM10	
29	653952001	1	シールパツキンM10	

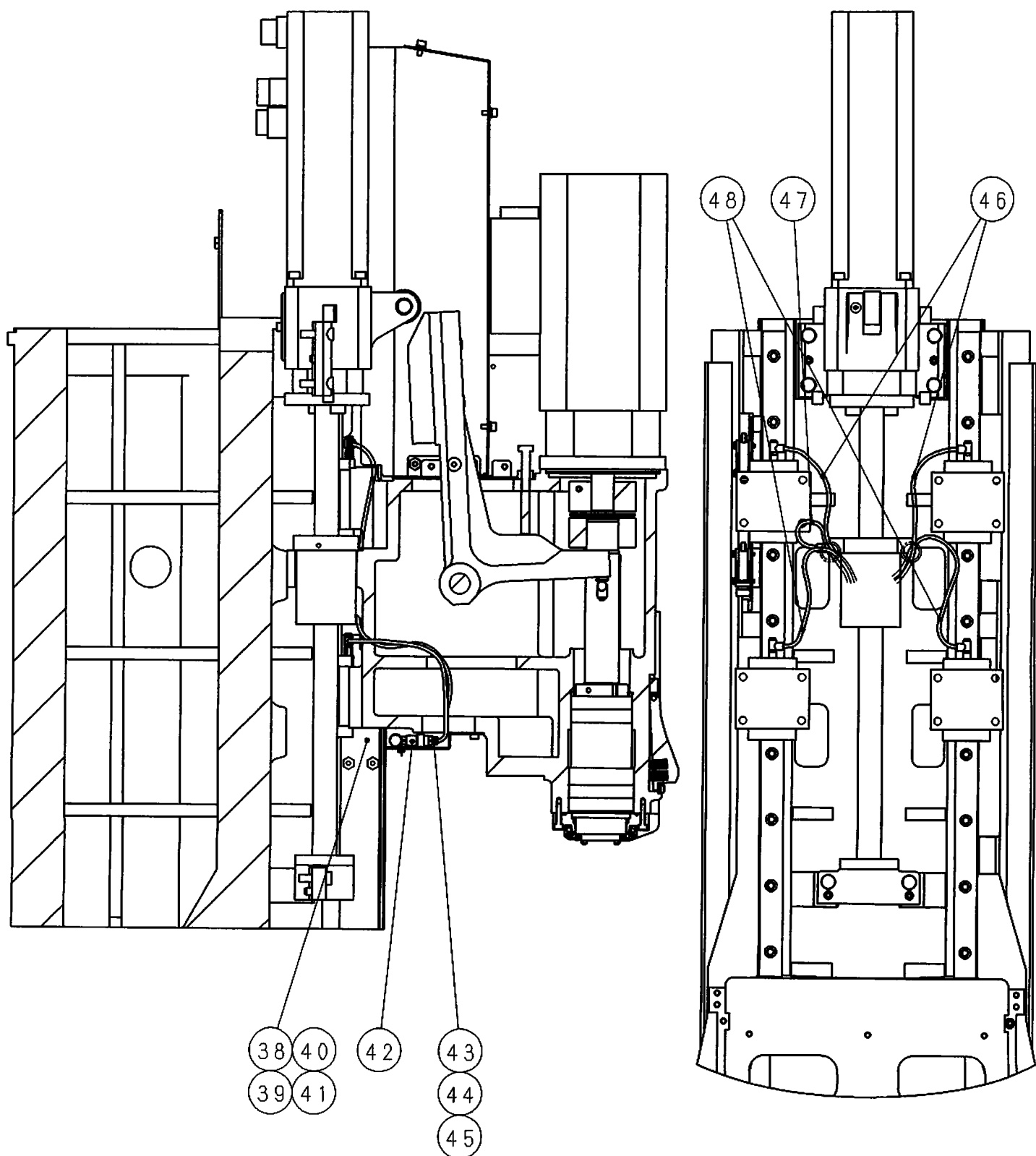
INTERMITTENT
LUBRICATING UNIT



30.間欠給油装置関係(3/4)
INTERMITTERENT LUBRICATING UNIT(3/4)

参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
30	637433001	1	ブンバイマニホールド	MANIFOLD
31	653953001	1	ザツキプラグM10	PLUG M10
32	653952001	1	シールパツキンM10	SEAL PACKING M10
33	637431001	2	オスメスジョイントM10	JOINT, M10
34	653952001	2	シールパツキンM10	SEAL PACKING M10
35	641345000	2	レイロンチューブ900	TUBE,LYLON 900
36	641337000	2	レイロンチューブ4X300	TUBE 300
37	641345000	1	レイロンチューブ650	TUBE, LYLON 650

INTERMITTENT
LUBRICATING UNIT

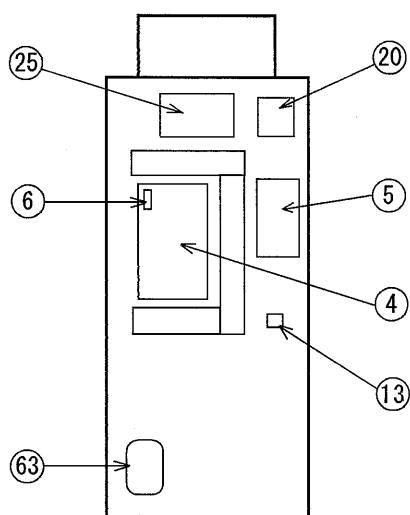
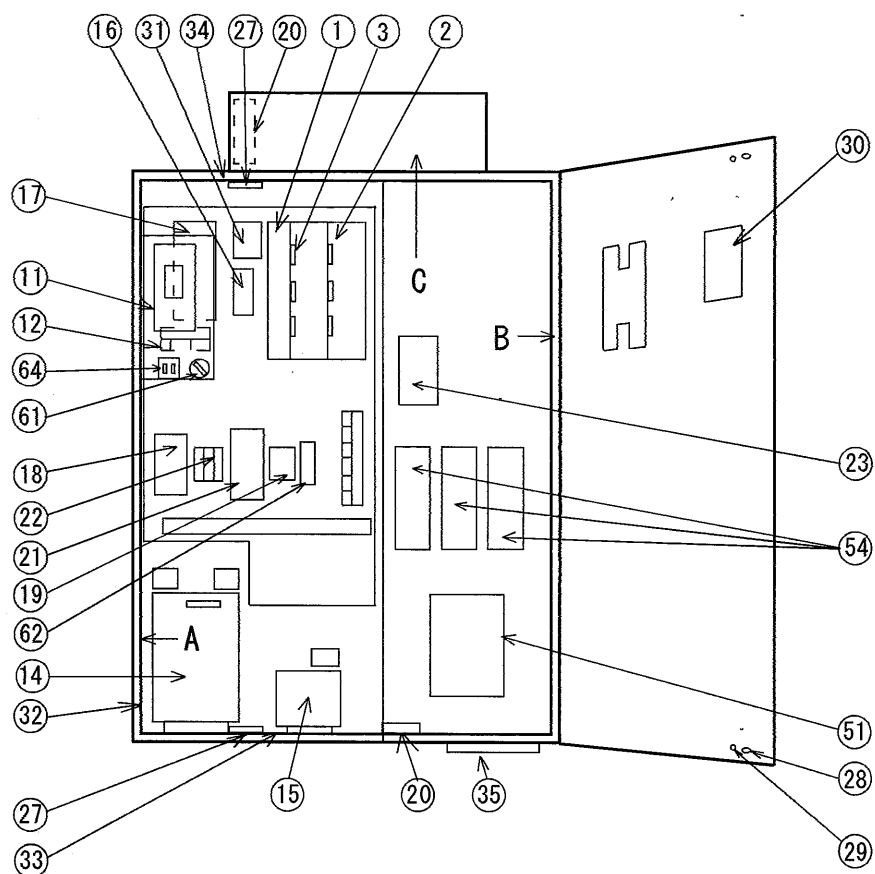


30.間欠給油装置関係(4/4)
INTERMITTERENT LUBRICATING UNIT(4/4)

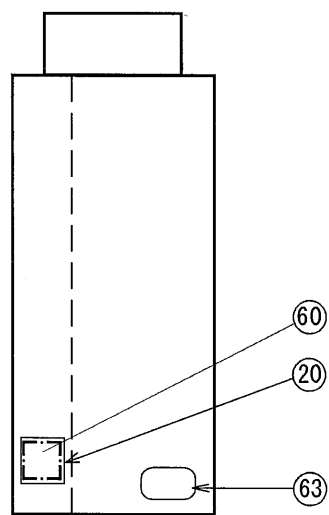
参照No Ref.No	部品コード Part Code	個数 Qty	品名 Part Name	備考 Remark
38	637433001	1	ブンバイマニホールド	MANIFOLD
39	653952001	1	シールパツキンM10	SEAL PACKING M10
40	622212001	1	ジザイジヨイント	FREE JOINT
41	653952001	1	シールパツキンM10	SEAL PACKING M10
42	622213001	1	ブンバイキ	DISTRIBUTOR
43	622219001	5	オサエナツト 4	PRESSURE NUT 4
44	622220001	5	スリーブ 4	SLEEVE 4
45	622221001	5	インレット 4	INLET 4
46	641342000	2	レイロンチューブ550	TUBE 550
47	641340000	1	レイロンチューブ470	TUBE 470
48	641337000	1	レイロンチューブ4X300	TUBE 300

40. 制御箱関係

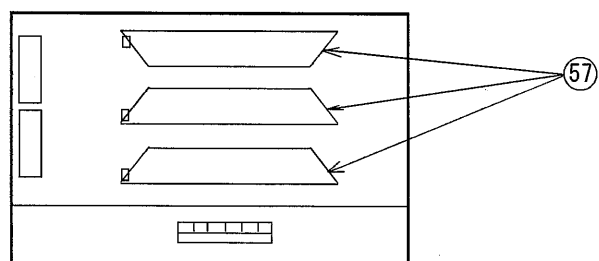
CONTROL BOX



A VIEW



B VIEW



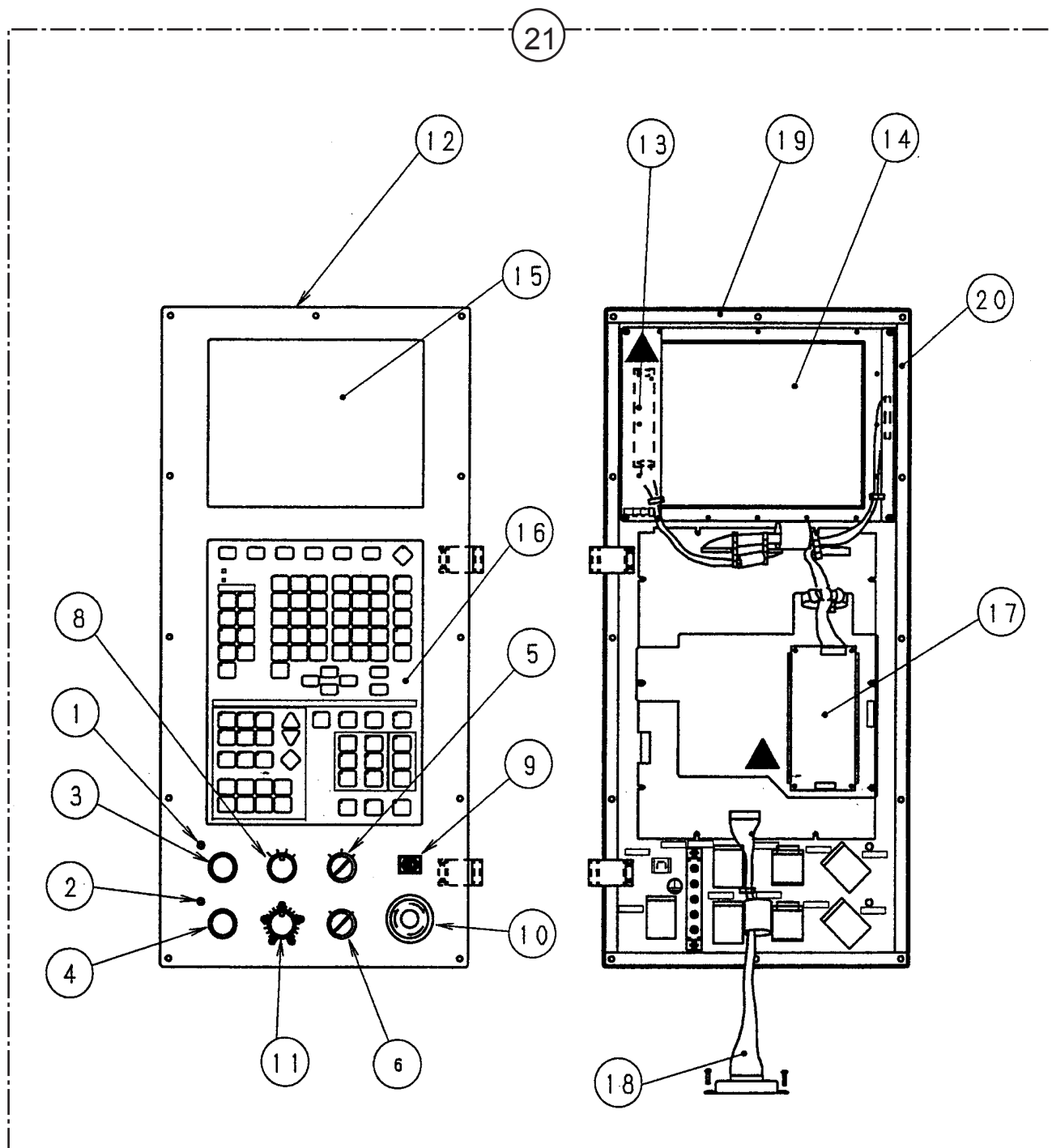
C VIEW

40.制御箱関係
CONTROL BOX

参照No	部品コード	個数	品名	パーツ番号	備考
Ref.No	Part Code	Q'ty	Part Name	Part Symbol	Remark
1	616365***	1	NCキバンクミ A10#□C	NC PCB ASSY A10#□C	NC PCB
					B52J090-4以降 (□=4以降) CG PCB付
					After B52J090-4 (□=4 or higher) on CG PCB
2	616468***	1	スレ-ブキバンクミA00	SLAVE P.C.B. ASSY A00	SLAVE PCB
3	654846***	1	MEMユニットNTクミA00J	MEM UNIT NT ASSY A00J	MEM PCB
	654848***	1	MEMユニットNTクミA00E	MEM UNIT NT ASSY A00E	//
					日本語 日本以外
4	654541***	1	IOキバンクミA00キ17	IO BOARD ASSY A00 SUPPLY	IO PCB
5	654529***	1	EXIOキバンクミ A00	EXIO BOARD ASSY A00	EXIO PCB
6	6545310**	1	OPSELキバンクミ **	OPSEL BOARD ASSY **	OPSEL PCB
11	637052001	1	ブレ-カEG53B/40E	BREAKER EG53B/40E	ELB
	638321001	1	ブレ-カEG33B/20 E	BREAKER EG33B/20 E	//
	654275001	1	ブレ-カSA33B/20 T	BREAKER SA33B/20 T	NFB
12	655629001	1	バリスタ 200V クミ	VARISTOR 200V ASSY	VRSTR
	655630001	1	バリスタ 400V クミ	VARISTER 400V ASSY	//
	655631001	1	バリスタ 400V クミEP	VARISTOR 200V ASSY EP	//
13	622464001	1	サ-モセンサOP-62 75	SENSOR OP-62 75	BOH
14	651206001	1	トランス1 9.5K 400V	TRANSFORMER 1 9.5K 400V	T1
	651207001	1	トランス1 9.5K EU	TRANSFORMER 1 9.5K EU	//
15	653245001	1	トランス2 0.5K 200V	TRANSFORMER 2 0.5K 200V	T2
	654273001	1	トランス2 1.0K EU	TRANSFORMER 2 1.0K EU	//
16	654557001	1	デンゲンLDA30F-5X	AVR, LDA30F-5X	AVR1
17	654261101	1	AVR LDA100W-24X	AVR LDA100W-24X	AVR2
18	618630001	1	リレ-LC1 32A 24V	RELAY LC1 32A 24V	KS1
19	618648001	1	リレ-LP1-K06	RELAY LP1-K06	KC1
	618670001	1	ヘッドオンLP-4P	HEAD ON LP-4P	KC1 ADD-ON
20	622484001	4	ファン4715PS10TB30	FAN 4715PS10TB30	FAN1,2,4,5
21	618674001	1	ブレ-カEA32	BREAKER EA32	Q2
22	616075001	3	Gヒューズ 8A	G FUSE 8A	Q3
	638294075	1	ブレ-カBAB3175211	BREAKER BAB3175211	//
23	618632101	1	インバ-タ200Wクミ	INVERTER ASSY 200W	ATCINV
25	618644001	1	フィルタ デンゲン 30A	FILTER POWER 30A	Z1
					EUのみ
					EU ONLY
27	653838001	2	スイッチAM50024C5	SWITCH AM50024C5	SQBOXU,BOXD
28	653840006	2	クリツピンY-K1106	CLIP PIN Y-K1106	
	653841025	2	コテイリングY-2511	FIX RING Y-2511	
29	653837001	2	ボルトGUTB6-8-20	BOLT GUTB6-8-20	
30	638376001	1	ハンドルBZ-V20C	HANDLE, BZ-V20C	
	626986000	1	ナンキンジョウ1000-30	PADLOCK 1000-30	
31	654082001	1	デンチホルダクミ31A	BATTERY HOLDER ASSY 31A	BAT1
32	654376100	2	トリムシ-ル4100B316C	TRIMSEAL 4100B316C	
33	654377080	1	トリムシ-ル4100B332C	TRIMSEAL 4100B332C	
34	654376080	1	トリムシ-ル4100B316C	TRIMSEAL 4100B316C	
35	652553001	1	フカジクPLパツキン22A	OP-AXIS PL PACKING 22A	
51	618517001	1	アンプPY9A150	AMPLIFIER PY9A150	S AMP
54	654678101	3	アンプPY9A050	AMPLIFIER PY9A050	X,Y,Z AMP
57	618740001	3	テイコウ500W15YB	REGIST 500W15YB	RSP1,2,3
60	654078001	1	コウカンヨウフィルタ-	FILTER	FAN3
61	654830001	1	スイッチLANGクミB	SWITCH LANG ASSY B	SWLANG
62	618713001	1	リレ-QE-20N	RELAY QE-20N	KPH
63	654222001	2	パツキンサイド31A	PACKING SIDE 31A	
64	654379001	1	コンセント2P	OUTLET 2P	100V
65	610308001	1	ヨビヒューズSFAN	SPARE FUSE SET SFAN	

4 1. 操作箱関係

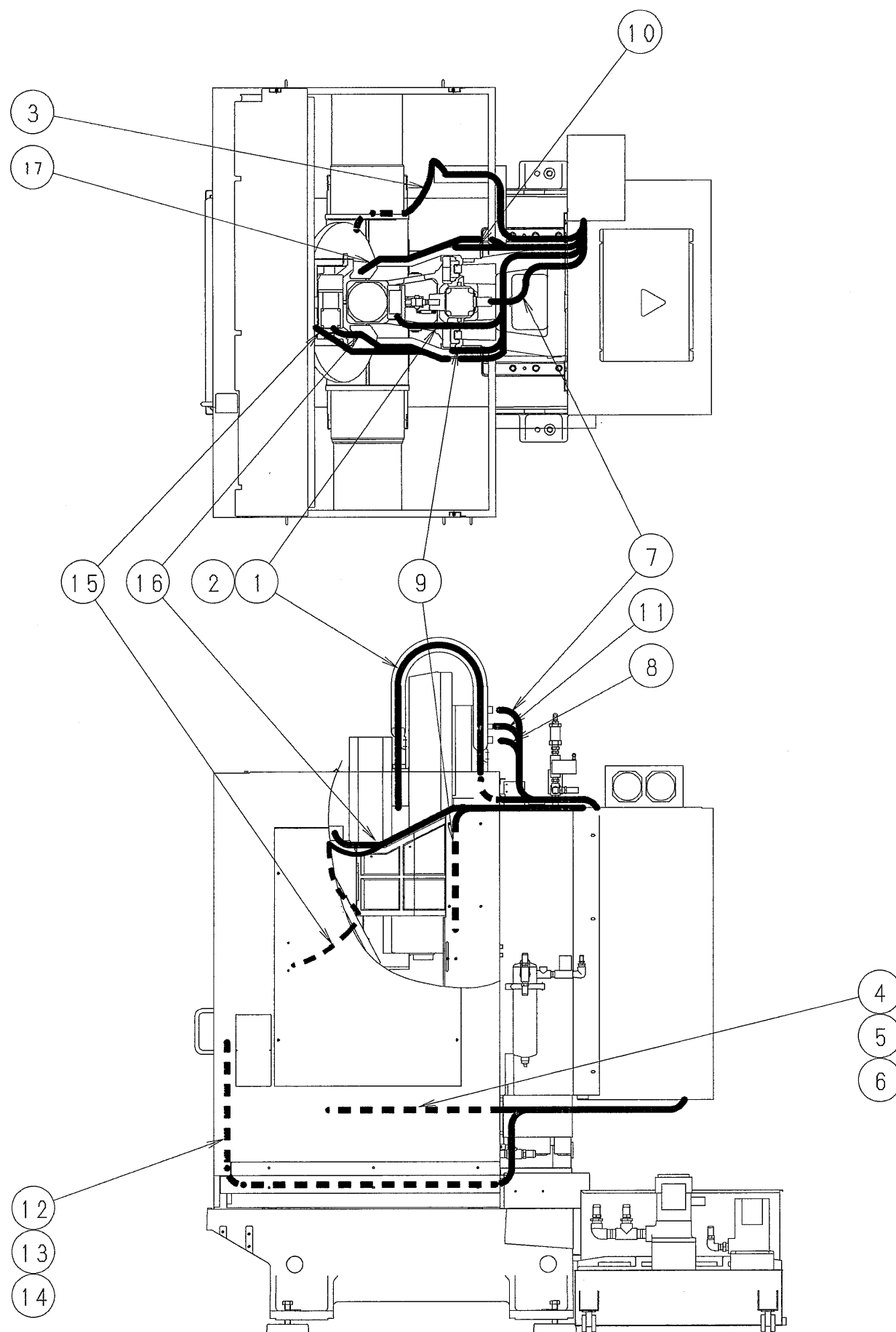
OPERATION BOX



4 1 . 操作箱関係 OPERATION BOX

参照No	部品コード	個数	品名	パ-ツシンボル	備考
Ref.No	Part Code	Q'ty	Part Name	Part Symbol	Remark
1	643690000	1	LED DB00-68B G	LED ST	
2	643691000	1	LED DB00-68B R	LED STP	
3	654102001	1	SW AR22FOR-10G	SW ST	
4	654104001	1	SW AR22FOR-10R	SW STP	
5	654444001	1	SWAR22JCR3B174A	SW PRT	
6	652629001	1	スイッチSECクミ22A	SW SEC	
8	654313001	1	スイッチFOVクミ	RSFOB	
	636844001	2	ツマミ B30	NIPPLE B30	
9	654567001	1	SW デンゲン1A1B	SW PW	
10	654631001	1	SW ヒジヨウ1B	SW EM	
11	654314001	1	スイッチMOVクミ	RSMOV	
	636844001	2	ツマミ B30	NIPPLE B30	
12	616095001	1	ソウサハコパネル22A J	OPERATION BOX PANEL, 22A J	日本語 JAPANESE
	616096001	1	ソウサハコパネル22A E	OPERATION BOX PANEL, 22A E	英語 ENGLISH
13	654497001	1	LCDインバ-タクミ	LCD INVERTER ASSY	
14	654496001	1	LCDクミ	LCD ASSY	
15	654121001	1	LCDフィルタ	LCD FILTER	
16	616174001	1	キ-ボ-ドクミJ	KEYBOARD ASSY J	日本語 JAPANESE
		1	キ-ボ-ドクミE	KEYBOARD ASSY E	英語 ENGLISH
17		1	デンゲンLDC30F-XT	AVR LDC30F-XT	
18		1	ケ-ブルCNRS 31A	CABLE CNRS 31A	
19		2	パツキン3X12X305	PACKING, 3X12X305	
20	654477001	2	パツキン3X12X614	PACKING, 3X12X614	

42. ケーブル関係 CABLE



4 2 . ケーブル関係 C A B L E

参照No	部品コード	個数	品名	パ-ツンギ-ル	備考	
Ref.No	Part Code	Q'ty	Part Name	Part Symbol	Remark	
1	618666001	1	SENCコ-ド クミ251	S ENCODER CORD ASSY, 251	E U以外 EU 標準 ロング	EXCEPT EU EU STD LONG
2	618679001	1	Sモ-タコ-ド251	SPINDLE MOTOR CORD 251		
	618719001	1	Sモ-タコ-ド251 EU	SPINDLE MOTOR CORD 251 EU		
3	618661001	1	Xフレキクミ251	X FLEXIBLE TUBE ASSY 251		
	618509001	1	Xフレキクミ251L	X FLEXIBLE TUBE ASSY 251L		
4	618664001	1	YENCコ-ド251	Y ENCODER CORD 251		
5	618665001	1	Yモ-タコ-ド 251	Y MOTOR CORD 251		
6	618682001	1	LSYコ-ド251	LS Y CORD 251		
7	618747001	1	ZENCコ-ド251	Z ENC CORD 251		
8	618738001	1	Zモ-タコ-ド251	Z MOTOR CABLE 251		
9	618683001	1	LSZコ-ド251	LS Z CORD 251		
10	618684001	1	LSコ-ドATCクミ251	LS CORD ATC ASSY 251		
11	618746001	1	Zブレ-キコ-ド251	Z BREAK CORD 251		
12	618743001	1	KEYコ-ドS2B	KEY CORD S2B		
13	618744001	1	SWコ-ドS2B	SW CORD S2B		
14	618745001	1	K200コ-ドS2B	K200 CORD S2B		
15	618685001	1	ATCENCコ-ドクミ251	ATC ENCODER CABLE ASSY, 251		
16	618686001	1	ATCモ-タコ-ド251	ATC MOTOR CABLE 251		
17	650245001	1	ATCCAMスイッチクミ229	ATC CAM SWITCH ASSY 229		

