

SONY®

USB CONTROL DEVICE

PWSK-4403

SERVICE MANUAL

1st Edition

警告

このマニュアルは、サービス専用です。
お客様が、このマニュアルに記載された設置や保守、点検、修理などを行うと感電や火災、人身事故につながる可能性があります。
危険をさけるため、サービストレーニングを受けた技術者のみご使用ください。

WARNING

This manual is intended for qualified service personnel only.
To reduce the risk of electric shock, fire or injury, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.
Alle Wartungsarbeiten dürfen nur von qualifiziertem Fachpersonal ausgeführt werden. Um die Gefahr eines elektrischen Schlages, Feuergefahr und Verletzungen zu vermeiden, sind bei Wartungsarbeiten strikt die Angaben in der Anleitung zu befolgen. Andere als die angegeben Wartungsarbeiten dürfen nur von Personen ausgeführt werden, die eine spezielle Befähigung dazu besitzen.

AVERTISSEMENT

Ce manuel est destiné uniquement aux personnes compétentes en charge de l'entretien. Afin de réduire les risques de décharge électrique, d'incendie ou de blessure n'effectuer que les réparations indiquées dans le mode d'emploi à moins d'être qualifié pour en effectuer d'autres. Pour toute réparation faire appel à une personne compétente uniquement.

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Manual Structure

Purpose of this manual

This manual describes the information items that premise the service based on the block-level such as service overview, replacement of main parts, and etc. assuming use of system and service engineers.

Related manuals

The following manual is provided for this unit in addition to this “Service Manual”.

- Operation Guide (Supplied with this unit)
This manual contains information required to operate and maintain the unit.
- Factory Service Manual (Available on request)
Parts list, circuit diagram, and board layouts of the unit are included to provide information required for part-level service.

Section 1

Service Overview

1-1. Installation

1-1-1. Operating Environment

Operating temperature: +5 °C to +40 °C

Operating humidity: 20 % to 90 %

Storage temperature: -20 °C to +60 °C

Weight: 1.7 kg

Prohibited installation places

- Places exposed directly to sunlight or intense light
- Dusty places
- Places subject to vibration
- Places in strong electric or magnetic field
- Places near a heat source
- Places subject to much electrical noise
- Places where electrostatic noise is likely to be generated

1-1-2. Power Supply

Power is supplied to this unit through the supplied AC adapter.

Specification of AC adapter (supplied with this unit)

Input voltage: 100 to 240 VAC (nominal)

Frequency: 50/60 Hz

Current consumption: 0.75 A to 0.4 A

Output voltage: 12 VDC

Output current: 3 ADC

Recommended power cord

The unit does not come with any power cord.

WARNING

- Use the approved Power Cord (3-core mains lead)/Appliance Connector/Plug with earthing-contacts that conforms to the safety regulations of each country if applicable.
- Use the Power Cord (3-core mains lead)/Appliance Connector/Plug conforming to the proper ratings (Voltage, Ampere).

WARNING

- Never use a damaged power cord.
- Fully insert the plug and connector of the power cord into an electric outlet and the AC inlet of the AC adapter respectively.

For customers in the U.S.A. and Canada

Power cord, 125 V 7 A (2.0 m):  1-757-562-1x

For customers in European countries

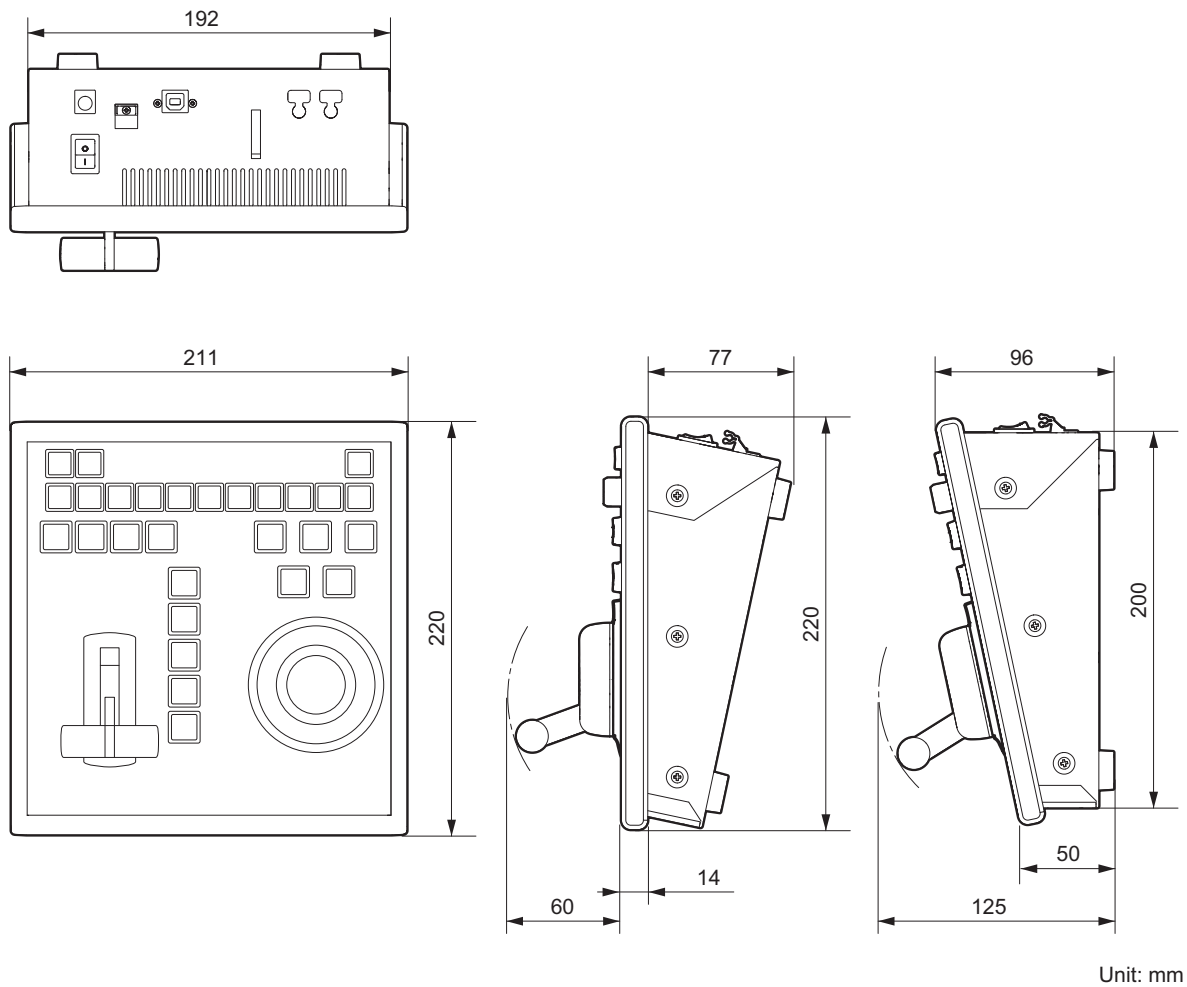
Power cord, 250 V 2.5 A (2.0 m):  1-575-131-8x

For customers in China

Power cord, 250 V 2.5 A (2.0 m):  1-782-476-1x

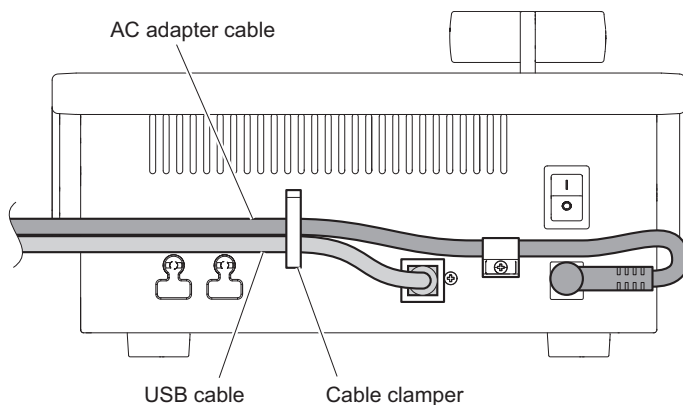
1-1-3. Installation Space

When fitting the unit into a mixing console for use, refer to the dimensions below to make a hole.



Using a Cable Clamper

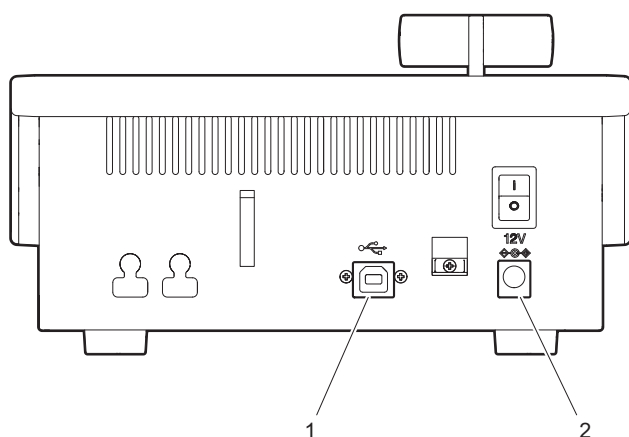
Look at the figure below to clamp the AC adapter cable and the USB cable with the cable clamper.



1-1-4. Connectors and Cables

Panel Indication	Connector Name	Applicable Connector/ Cable	Remarks
	Series "B" Receptacles	USB cable	Commercially available
	EIAJ Type4 Jack	EIAJ Type4 Plug	AC adapter (supplied with unit)

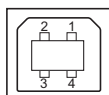
1-1-5. Connector Input/Output Signals



Input/Output Signals

1. UPSTREAM PORT: USB (Series B)

Signal standard: USB standard Ver. 1.1



- External View -

Pin No.	I/O	Signal Name
1	—	VBUS (+5 V)
2	I/O	DATA (-)
3	I/O	DATA (+)
4	—	GND

2. DC IN: EIAJ Type4 Jack

Signal standard: 12 VDC (the AC adapter supplied with the unit)

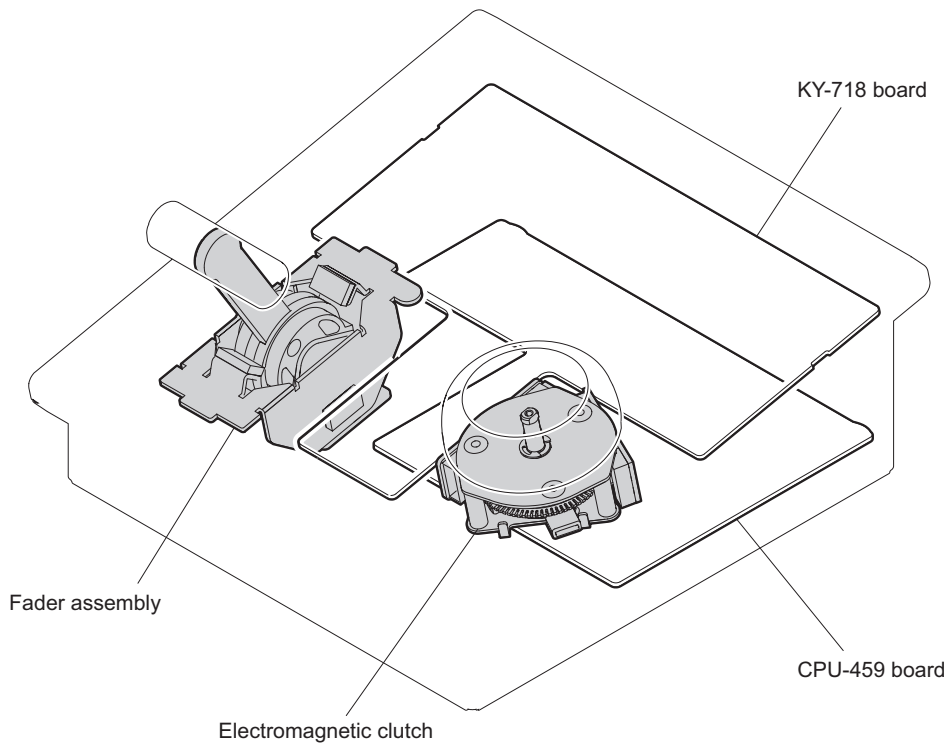
1-1-6. Connection to a Personal Computer (PC)

When connecting this unit to a PC, connect it to a PC with the production control software PWA-PRC1 installed using a USB cable.

Tip

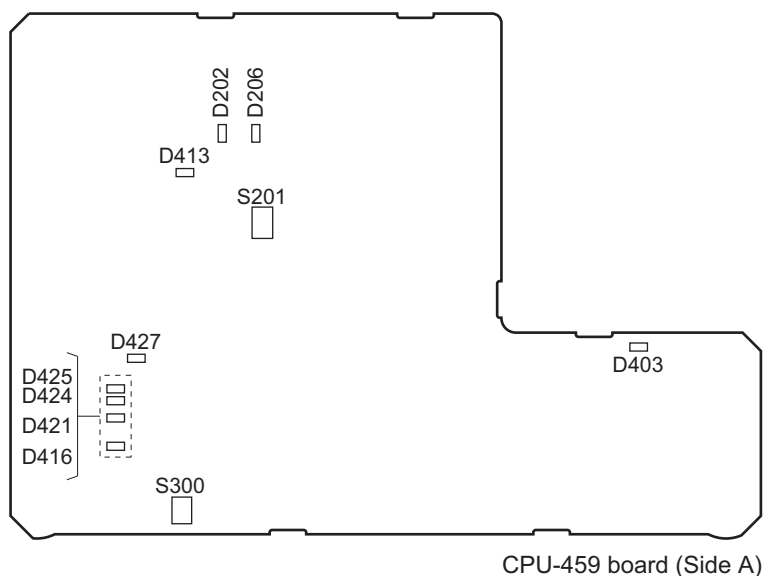
How to install the production control software PWA-PRC1 in a PC is described in the PWA-PRC1 Operation Manual.

1-2. Location of Main Parts



1-3. Functions of Onboard Switches and LEDs

1-3-1. CPU-459 Board



Switches

Note

Do not change the settings of the switches described as “Factory use”.

Ref. No.	Bit	Description	Factory Setting
S201	—	Factory use	—
S300	1	Factory use	OFF (ALL)
	2		
	3		
	4		

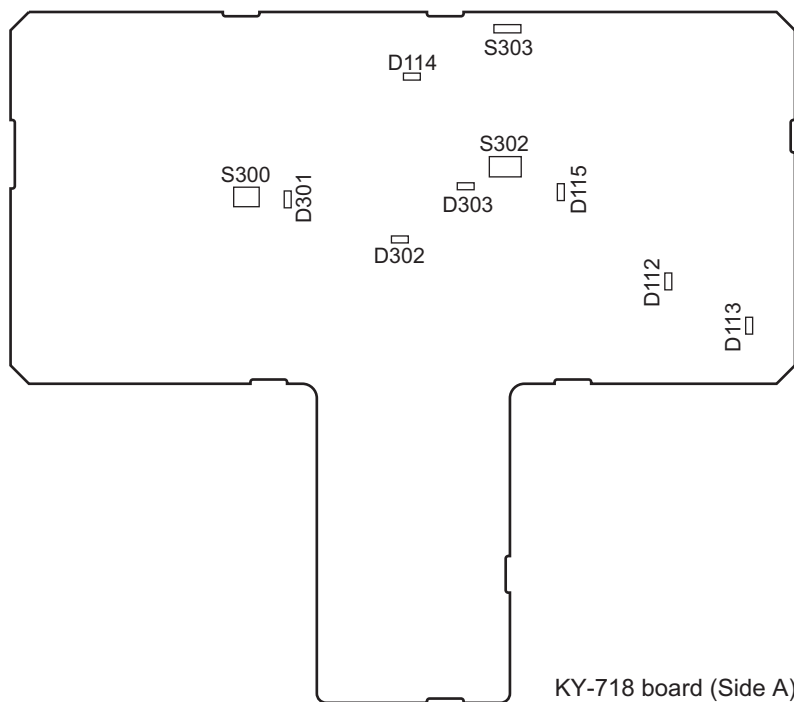
LEDs

Ref. No.	Color	Description	Normal State (Power On)
D202	Blue	Status display of CPLD (IC200)	Blinks
D206	Red	Operation status display of CPU (IC100) When resetting it, it lights.	Off
D403	Blue	Status display of +3.3 V-EVER power	On
D413	Blue	Status display of +3.3 V power	On
D416	Red	Status display of +12 V power When an abnormal voltage is cut off, it lights (Q409 turns on).	Off
D421	Red	Status display of +12 V-IN-INNER power When an abnormal voltage is detected, it lights.	Off
D424	Red	Status display of +3.3 V power When an abnormal voltage is detected, it lights.	Off
D425	Red	Status display of +3.3 V-EVER power When an abnormal voltage is detected, it lights.	Off

Continued

Ref. No.	Color	Description	Normal State (Power On)
D427	Red	Status display of ispPAC (IC400) When resetting it, it lights.	Off

1-3-2. KY-718 Board



Switches

Note

Do not change the settings of the switches described as “Factory use”.

Ref. No.	Bit	Description	Factory Setting
S300	1	Factory use	OFF (ALL)
	2	Factory use	
	3	Factory use	
	4	Factory use	
S302	—	Factory use	—
S303	1	Factory use	OFF

LEDs

Ref. No.	Color	Description	Normal State (Power On)
D112	Blue	Status display of +5 V power	On
D113	Blue	Status display of +3.3 V power	On
D114	Blue	Status display of +2.5 V power	On
D115	Blue	Status display of +1.2 V power	On

Continued

Ref. No.	Color	Description	Normal State (Power On)
D301	Red	Status display of FPGA (IC200) When resetting it, it lights.	Off
D302	Blue	Status display of FPGA (IC200)	Blinks
D303	Red	Status display of FPGA (IC200) While executing the configuration, it lights.	Off

1-4. Circuit Description

Connected to a personal computer with the production control software PWA-PRC1 installed through the USB interface, this unit provides a user interface to perform slow replay control of servers such as PWS-4400.

This unit consists of a CPU-459 board and a KY-718 board.

1-4-1. CPU-459 Board

The CPU-459 board consists of a CPU block, a CPLD block, and a power control block.

CPU block

The CPU block consists of a microcomputer (IC100) and a peripheral circuit.

This CPU contains an interface compliant with USB version 1.1 and a flash ROM.

Basic programs for CPU startup, download, etc. are installed in the built-in flash ROM and other application programs are installed in the external flash ROM IC101.

Functions can be added by modifying the content of the external flash ROM.

CPLD block

The CPLD block consists of a CPLD (IC200) and a peripheral circuit.

This block generates the CPU clock and reset signal and functions as an interface between the KY-718 board and the CPU block.

Power control block

The power control block consists of an ispPAC (IC400) and a DC/DC converter.

The ispPAC controls startup of each power voltage and performs processing such as shutdown in case an abnormality is detected.

1-4-2. KY-718 Board

The KY-718 board consists of a CPU interface block containing the main FPGA (IC200), a key scan block, a key LED display block, a fader block, and a dial block.

CPU interface block

The CPU interface block sends/receives control signals (such as key, fader, and dial information) to/from the CPU (IC100) on the CPU-459 board using the 8-bit CPU parallel bus.

Key scan block

The key scan block processes key ON/OFF information in the FPGA and transmits the key ON/OFF information to the CPU through the CPU interface block.

Key LED display block

The key LED display block controls LED ON/OFF of each key through the CPU interface block based on the information set by the CPU.

Fader block

The fader block processes the fader lever operating angle pulse information in the FPGA and transmits the operating angle pulse information to the CPU through the CPU interface block.

Dial block

The dial block processes the search dial rotation pulse information in the FPGA and transmits the rotation pulse information to the CPU through the CPU interface block, and controls clutch ON/OFF based on the information set by the CPU.

1-5. Fader Torque Adjustment

Every fader assembly for replacement is shipped with the torque adjusted. Therefore, it is not necessary to adjust the torque after replacement of the fader assembly.

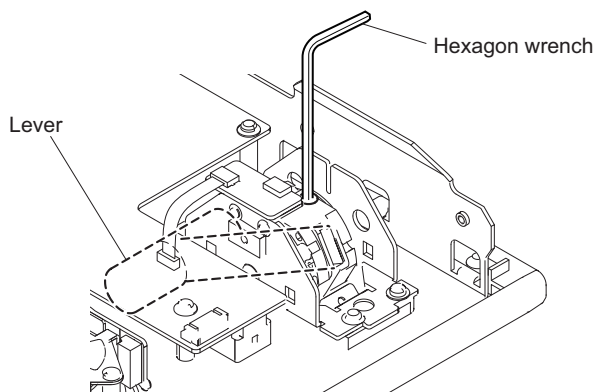
When torque adjustment is needed, perform the following procedure to adjust the torque.

Preparation

1. Remove the panel assembly. (Refer to “[2-2. Panel Assembly](#)”)

Procedure

1. Insert a hexagon wrench (size: 4 mm) into the hole and turn it to adjust the torque.



Note

- Turning the wrench clockwise: Increases the fader lever operating force.
- Turning the wrench counterclockwise: Decreases the fader lever operating force.

1-6. Circuit Protection Part List

1-6-1. Circuit Protection Element

This unit is provided with positive thermistors for power circuit.

If an overcurrent flows in a positive thermistor or it heats up to a certain degree with the increase of the ambient temperature, its internal resistance increases sharply to limit the current flowing in the circuit. When a thermistor is activated, turn off the power and check the circuit of the unit.

After the cause of the problem is removed and the device cools down, turn on the power again. The unit will work normally. It takes about one minute for the device to cool down after power-off.

Board Name	Ref. No.	Part No.	Hold Current
CPU-459	TH100	△ 1-802-108-11	1.50 A/20 °C
	TH400	△ 1-802-108-11	1.50 A/20 °C
	TH401	△ 1-802-108-11	1.50 A/20 °C
	TH402	△ 1-802-108-11	1.50 A/20 °C
KY-718	TH100	△ 1-802-263-11	1.50 A/20 °C
	TH101	△ 1-802-263-11	1.50 A/20 °C
	TH102	△ 1-802-263-11	1.50 A/20 °C

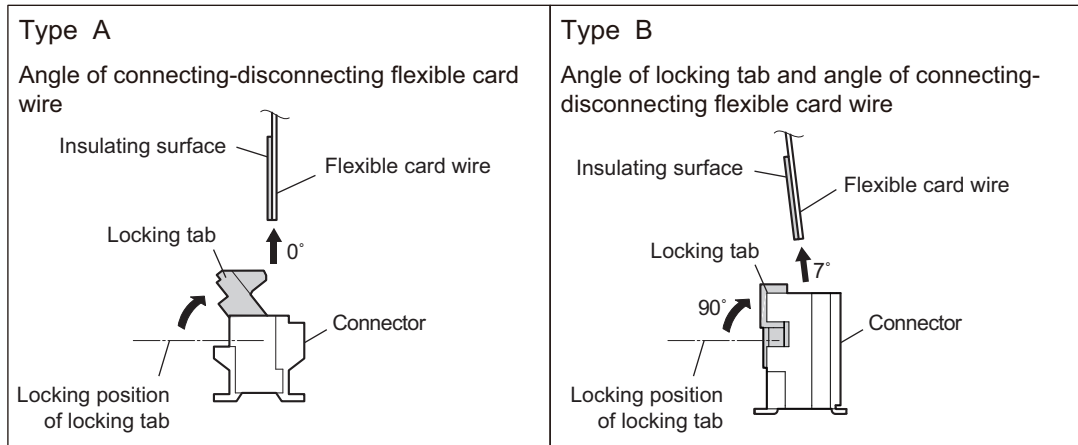
1-7. Fixtures

Part No.	Part Name	Usage
J-6325-110-A	Torque screwdriver bit (M1.4/M1.7)	Tightening screws M1.4 (+), M1.7 (+)
J-6252-540-B	Bit set for torque screwdriver (size 2, 2.5, 3 nut driver, +2 mm, +2.6 mm, +3 mm bit)	Tightening screws M2 (+), M2.6 (+), M3 (+)
J-6325-400-A	Torque screwdriver (0.3 N•m)	Tightening screws M2 (+)
J-6252-510-A	Torque screwdriver (0.6 N•m)	Tightening screws M2.6 (+)
J-6252-520-A	Torque screwdriver (1.2 N•m)	Tightening screws M3 (+)
3-179-054-01	Key-top pull-out tool	Removing key top
Commercially available	USB cable	Checking of version of each device, upgrading firmware

1-8. Disconnecting/Connecting Flexible Card Wire

Note

- Be very careful not to fold flexible card wires. Life of flexible card wire will be significantly shortened if it is folded.
- Each flexible card wire has conductive side and insulated side. If the flexible card wire is connected in the wrong orientation of the conductive side and the insulated side, the circuit will not function.
- Check that the conductive side of the flexible card wire is not contaminated.



Disconnecting

1. Turn off the power.
2. Slide or lift up the locking tab in the direction of the arrow to unlock and pull out the flexible card wire.

Connecting

1. Slide or lift up the locking tab in the direction of the arrow and securely insert the flexible card wire into the deep end of the connector.
2. Return the locking tab to its original position and lock the connector.

1-9. Lead-free Solder

All boards mounted in this unit use lead-free solder. Be sure to use lead-free solder when repairing the boards of this unit. A lead free mark (LF) indicating that the solder contains no lead is printed on each board. (Caution: Some printed circuit boards may not come printed with the lead free mark due to their particular size.)



: LEAD FREE MARK

Note

- The lead-free solder melts at a temperature about 40 °C higher than the ordinary solder, therefore, it is recommended to use the soldering iron having a temperature regulator.
- The ordinary soldering iron can be used but the iron tip has to be applied to the solder joint for a slightly longer time. The printed pattern (copper foil) may peel away if the heated tip is applied for too long, so be careful.

Section 2

Replacement of Main Parts

2-1. General Information for Parts Replacement

2-1-1. Basic Knowledge

Flexible card wire

When connecting flexible card wires, connect them firmly referring to [“1-8. Disconnecting/Connecting Flexible Card Wire”](#)

2-1-2. Tightening Torque

Torque driver and screw tightening torque

General screws are used in this unit. Be sure to use a torque driver and tighten screws to the specified tightening torque.

Tightening torque

M2: $0.30 \pm 0.02 \text{ N} \cdot \text{m}$

M3: $0.80 \pm 0.12 \text{ N} \cdot \text{m}$

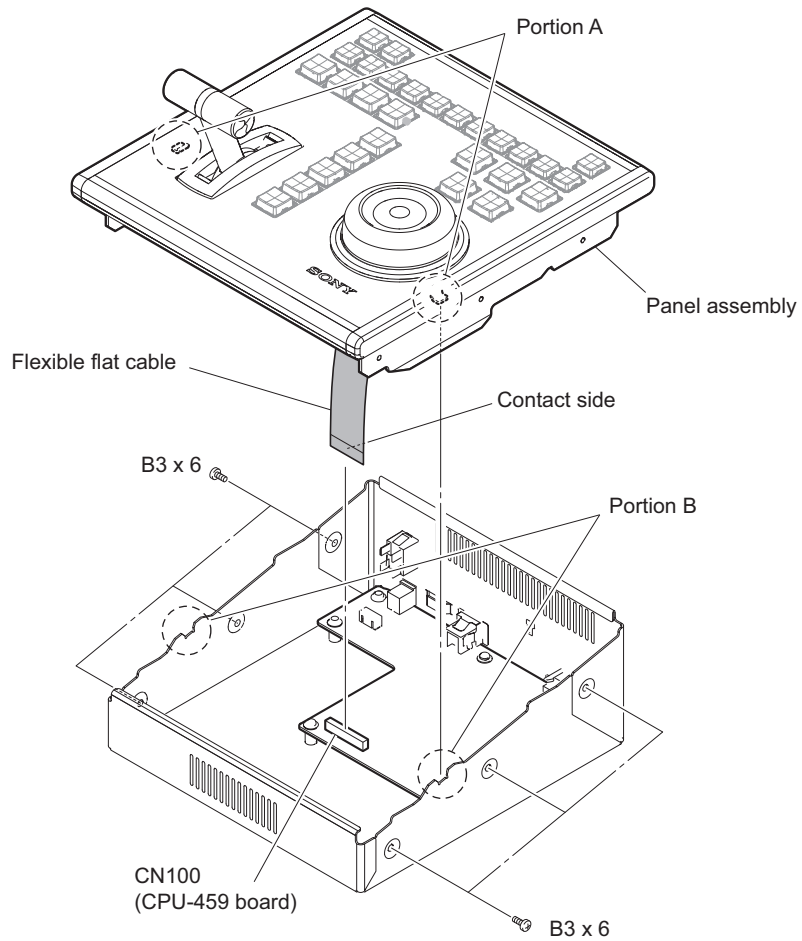
Tip

- When using the torque driver with the notation of $\text{cN} \cdot \text{m}$, interpret it as follows.
Example: $0.8 \text{ N} \cdot \text{m} = 80 \text{ cN} \cdot \text{m}$
- Since small screws are used in the unit, they may fall into the unit when they are removed and installed. To prevent screws from falling, it is recommended that the bit of each torque driver be magnetized to a degree that prevents screws from falling.

2-2. Panel Assembly

Procedure

1. Remove the six screws and lift up the panel assembly.
2. Disconnect the flexible flat cable from the connector (CN100) on the CPU-459 board and remove the panel assembly.



Note

When installing the panel assembly, fit the two portions A with the two portions B.

3. Install the removed parts by reversing the steps of removal.

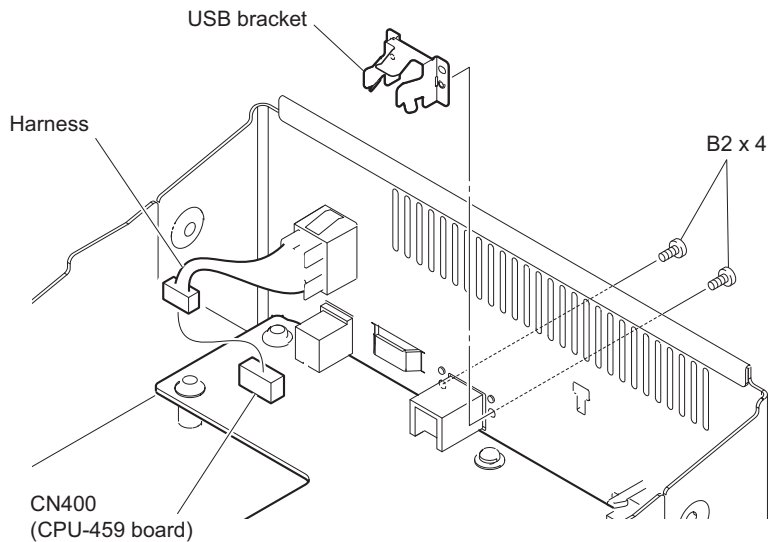
2-3. CPU-459 Board

Preparation

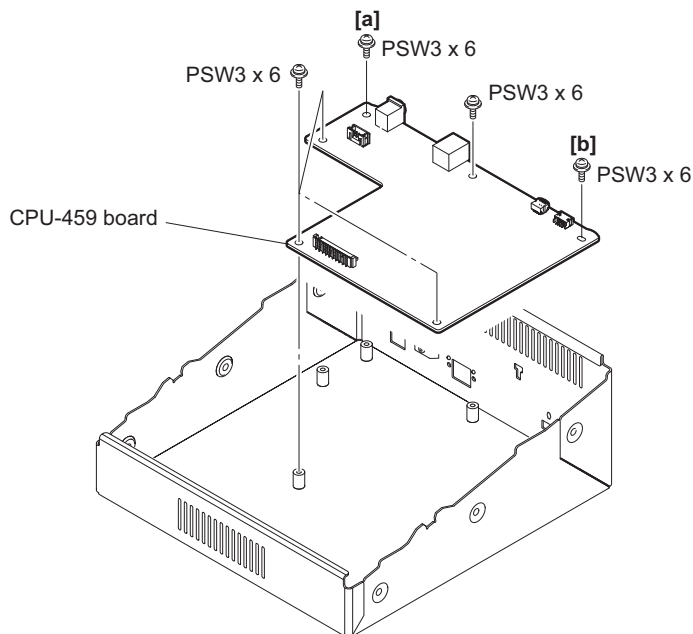
1. Remove the panel assembly. (Refer to “2-2. Panel Assembly”)

Procedure

1. Disconnect the harness from the connector (CN400) on the CPU-459 board.
2. Remove the two screws to detach the USB bracket.



3. Remove the six screws to detach the CPU-459 board.



Note

Tighten screws in the order of [a], [b], and then tighten other screws.

Tip

The holes for screws [a] and [b] are positioning holes.

4. Install the removed parts by reversing the steps of removal.

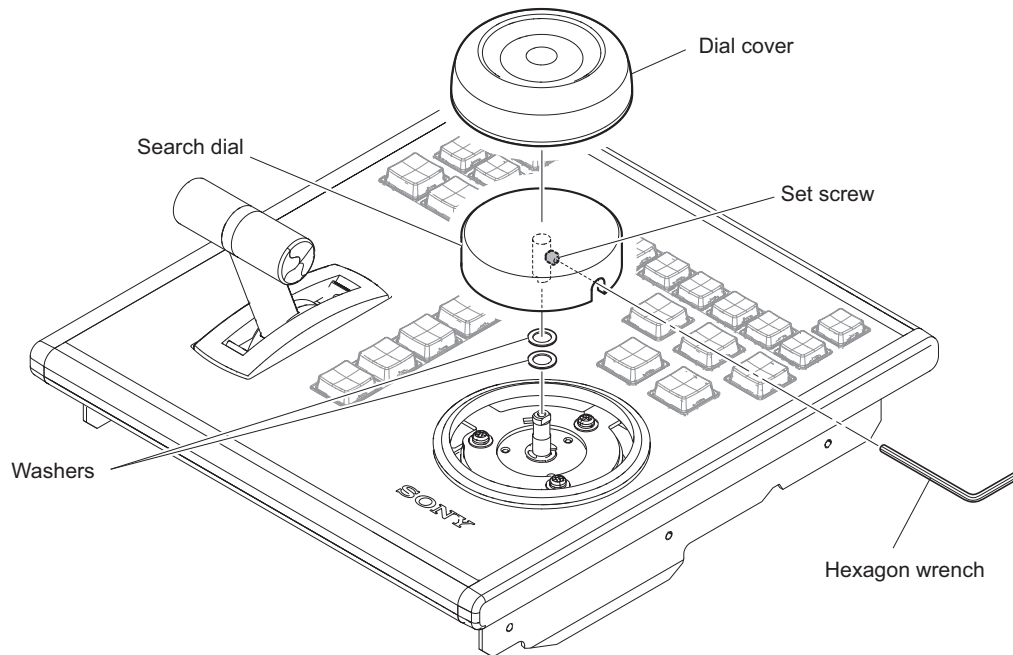
2-4. Electromagnetic Clutch

Preparation

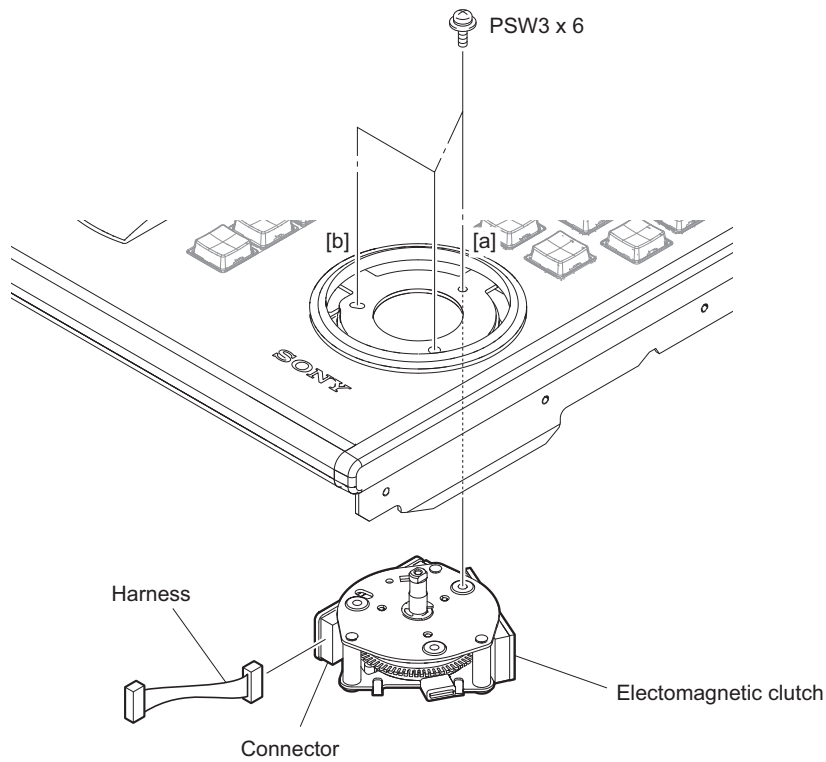
1. Remove the panel assembly. (Refer to “2-2. Panel Assembly”)

Procedure

1. Remove the dial cover.
2. Loosen the set screw by the hexagon wrench and remove the search dial.
3. Remove the two washers.



4. Remove the three screws to detach the electromagnetic clutch.



Note

Tighten screws in the order of [a], [b], and then tighten other screw.

Tip

The holes for screws [a] and [b] are positioning holes.

5. Install the removed parts by reversing the steps of removal.

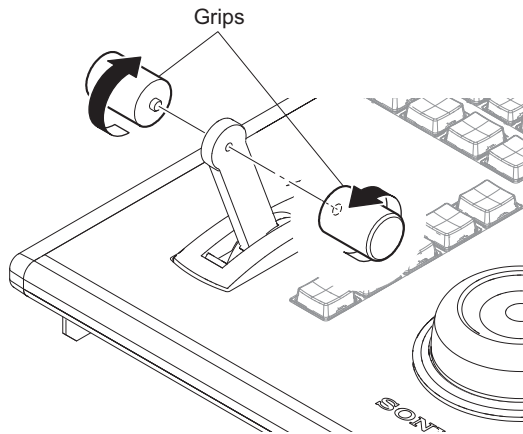
2-5. Fader Assembly

Preparation

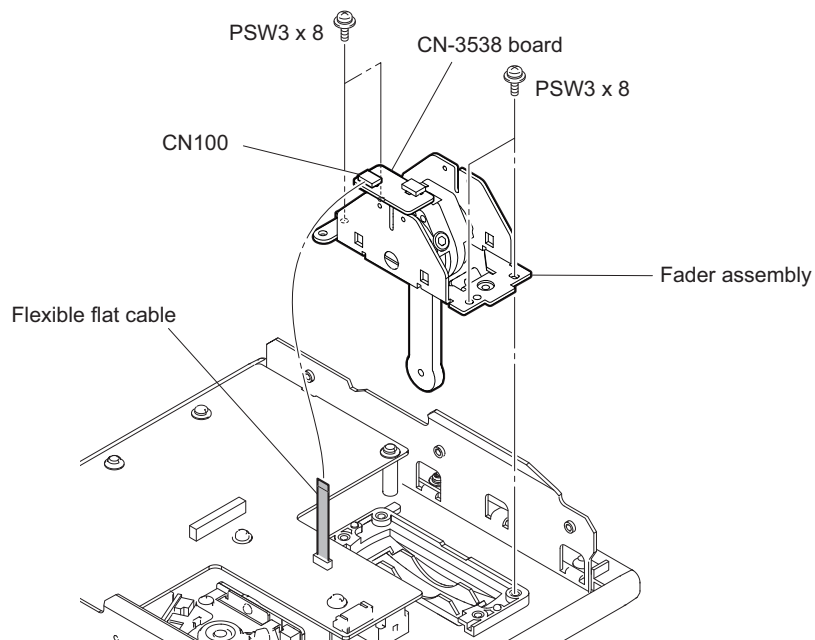
1. Remove the panel assembly. (Refer to “2-2. Panel Assembly”)

Procedure

1. Remove the two grips.



2. Disconnect the flexible flat cable from the connector (CN100) on the CN-3538 board.
3. Remove the four screws to detach the fader assembly.



4. Install the removed parts by reversing the steps of removal.

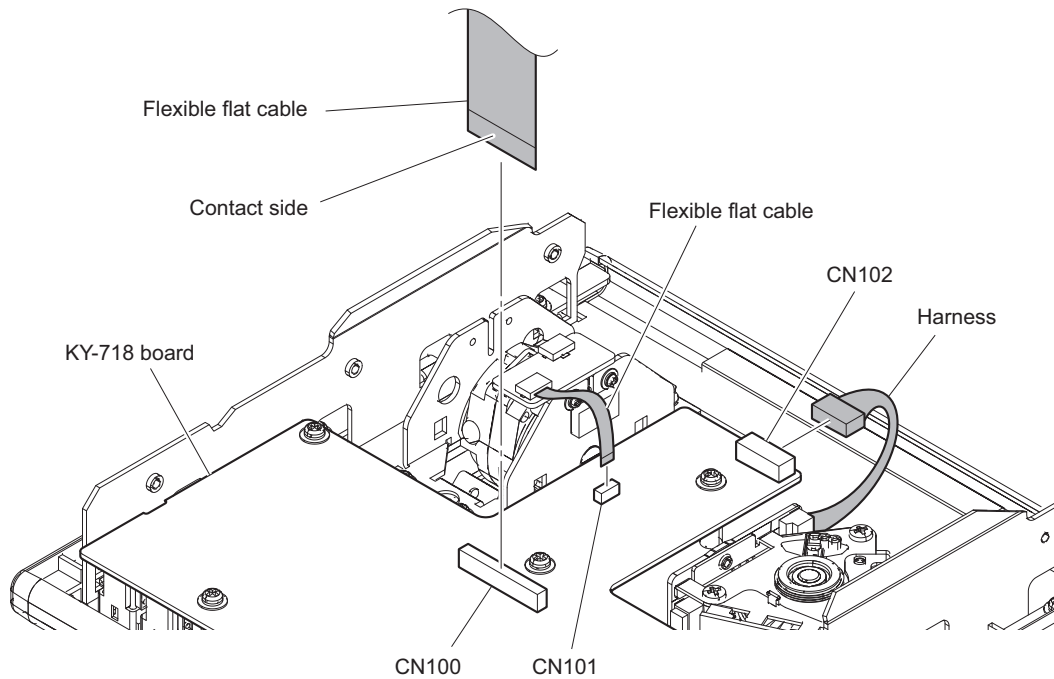
2-6. KY-718 Board

Preparation

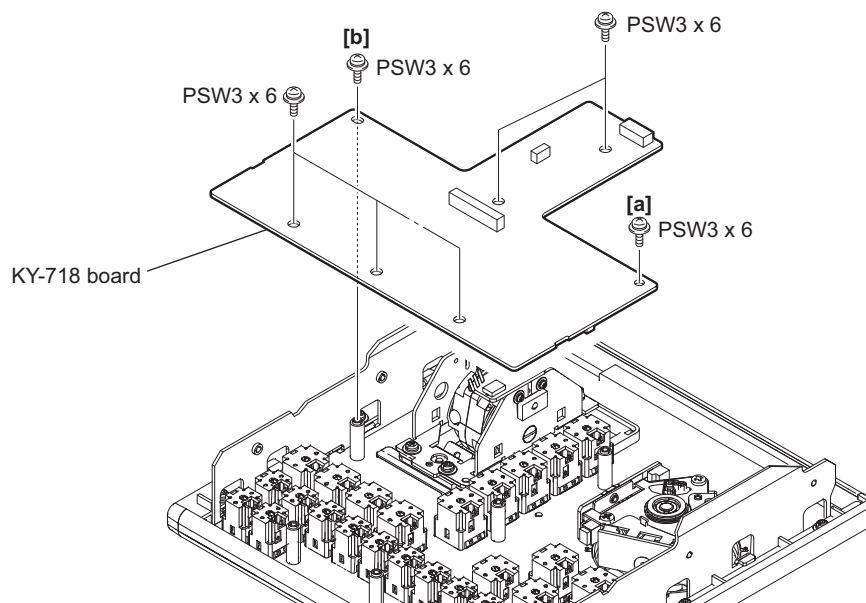
1. Remove the panel assembly. (Refer to “2-2. Panel Assembly”)

Procedure

1. Disconnect the two flexible flat cables from the two connectors (CN100, CN101) on the KY-718 board.
2. Disconnect the harness from the connector (CN102) on the KY-718 board.



3. Remove the seven screws to detach the KY-718 board.



Note

Tighten screws in the order of [a], [b], and then tighten other screws.

4. Install the removed parts by reversing the steps of removal.

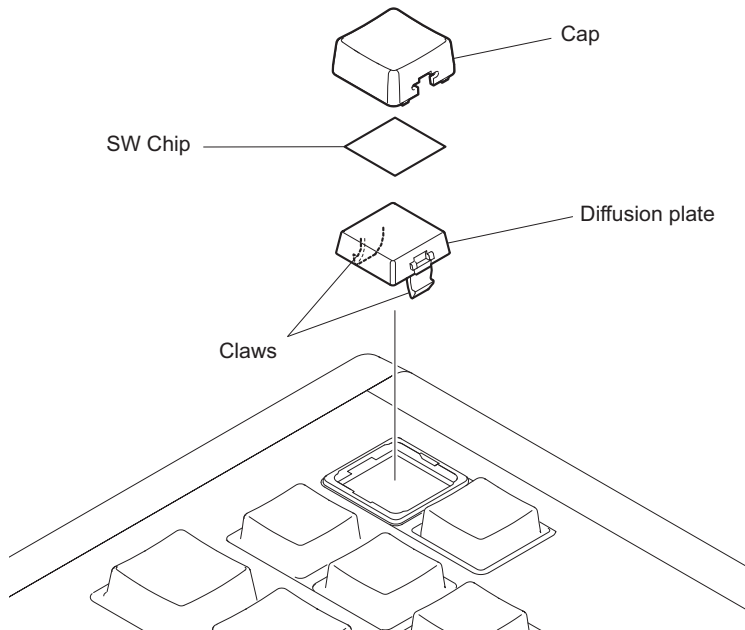
2-7. SW Chip/Switch Case Assembly

Preparation

1. Remove the panel assembly. (Refer to “2-2. Panel Assembly”)
2. Remove the KY-718 board. (Refer to “2-6. KY-718 Board”)

Procedure

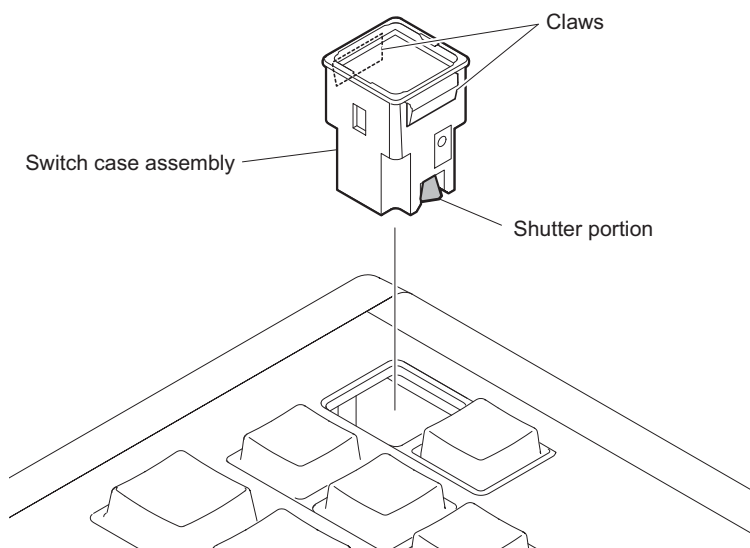
1. Release the two claws to detach the diffusion plate.
2. Remove the cap and the SW chip from the diffusion.



Note

When replacing the SW chip, refer to "Exploded Views".

3. Release the two claws to detach the switch case assembly.



Note

Install the switch case assembly so that the shutter portion comes to the right side of the unit.

4. Install the removed parts by reversing the steps of removal.

Section 3

Spare Parts

3-1. Note on Repair Parts

1. Safety Related Components Warning

WARNING

Components marked △ are critical to safe operation. Therefore, specified parts should be used in the case of replacement.

2. Standardization of Parts

Some repair parts supplied by Sony differ from those used for the unit. These are because of parts commonality and improvement.

3. Stock of Parts

Parts marked with “o” at SP (Supply Code) column of the spare parts list may not be stocked. Therefore, the delivery date will be delayed.

4. Harness

Harnesses with no part number are not registered as spare parts.

1. 安全重要部品

△警告

△印のついた部品は安全性を維持するために重要な部品です。したがって、交換する時は必ず指定の部品を使ってください。

2. 部品の共通化

ソニーから供給する補修用部品は、セットに使われているものと異なることがあります。これは部品の共通化、改良等によるものです。

3. 部品の在庫

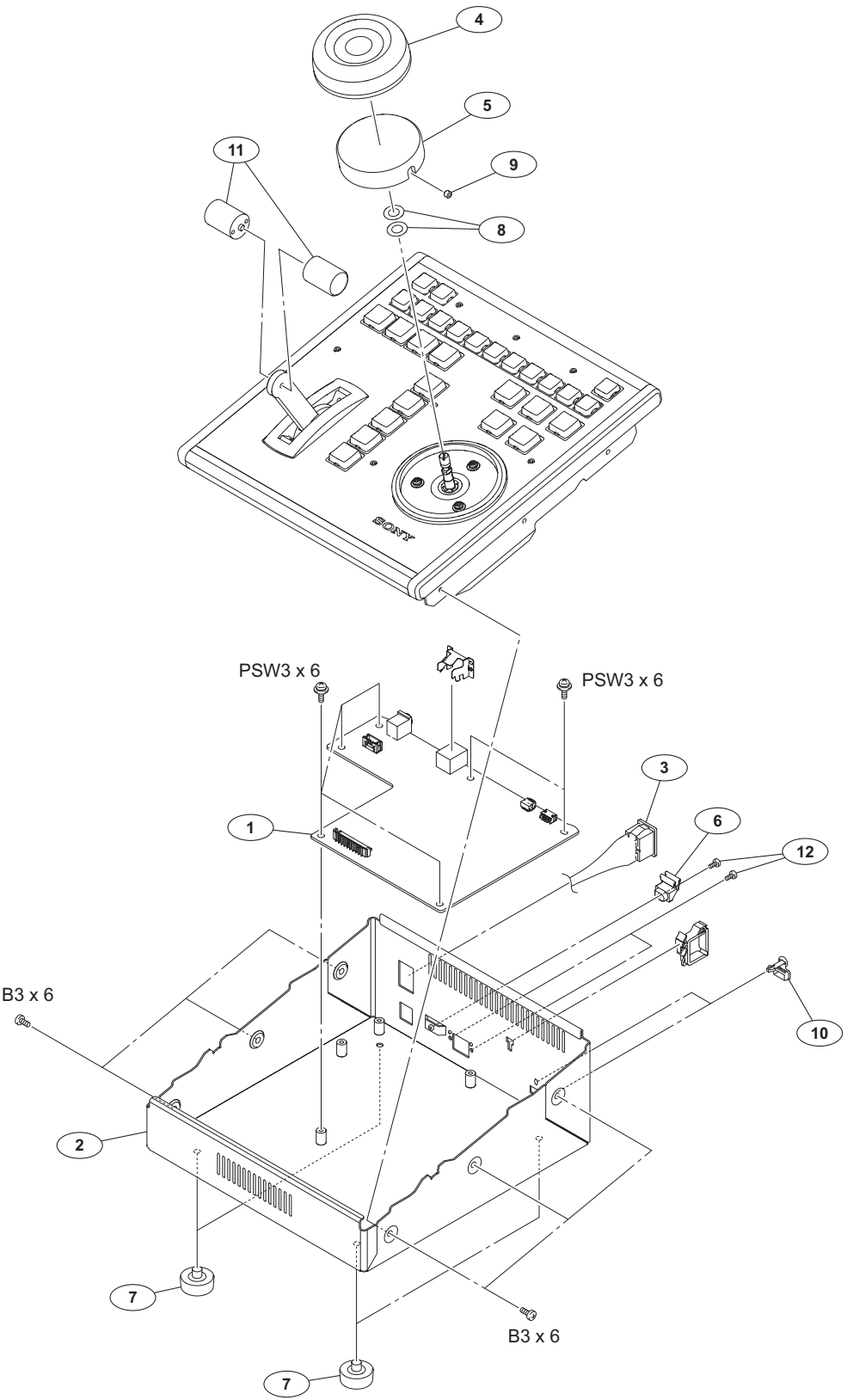
部品表の SP (Supply code) 欄に “o” で示される部品は在庫していないことがあります。納期が長くなる場合があります。

4. ハーネス

部品番号の記載されていないハーネスは、サービス部品として登録されていません。

3-2. Exploded Views

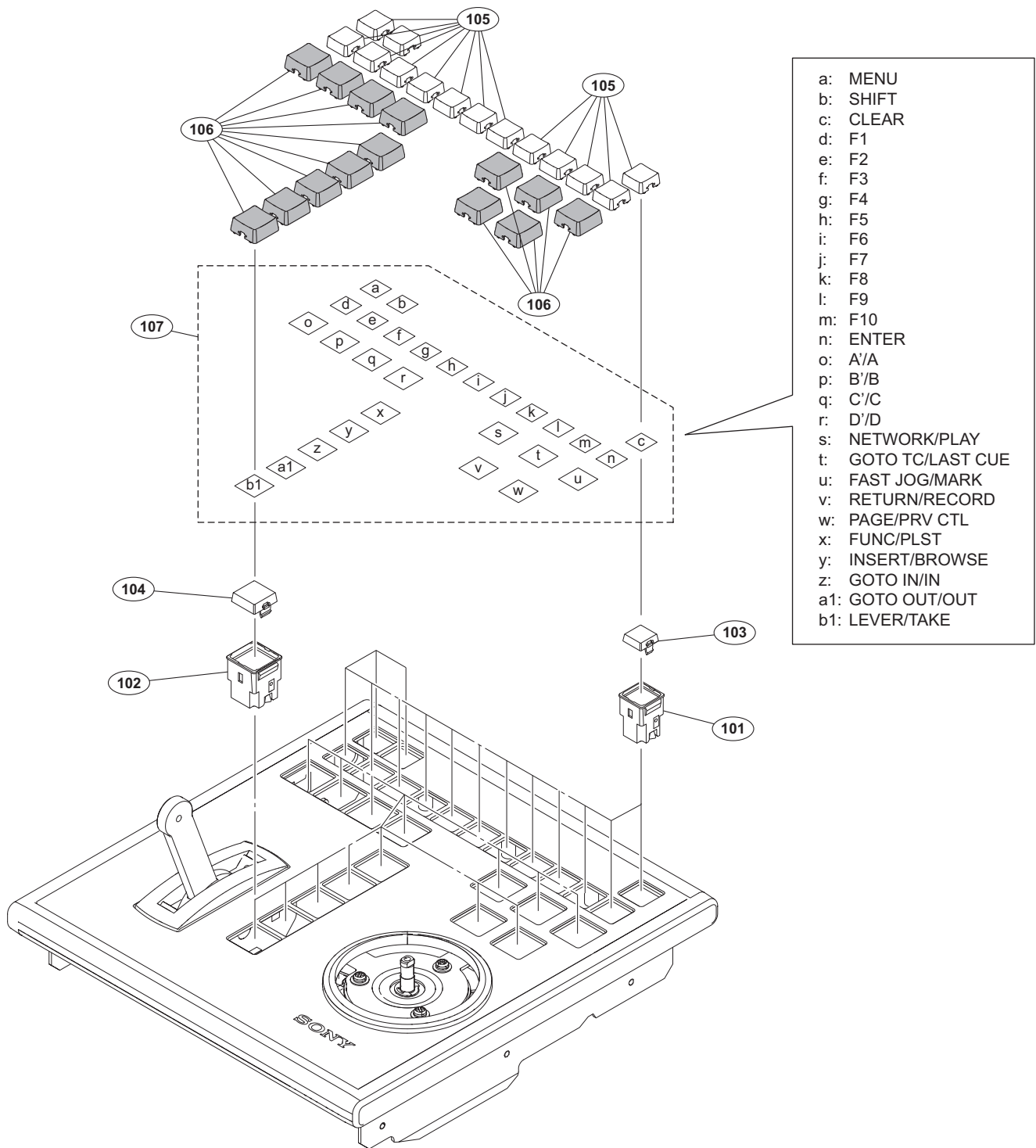
Overall



Overall

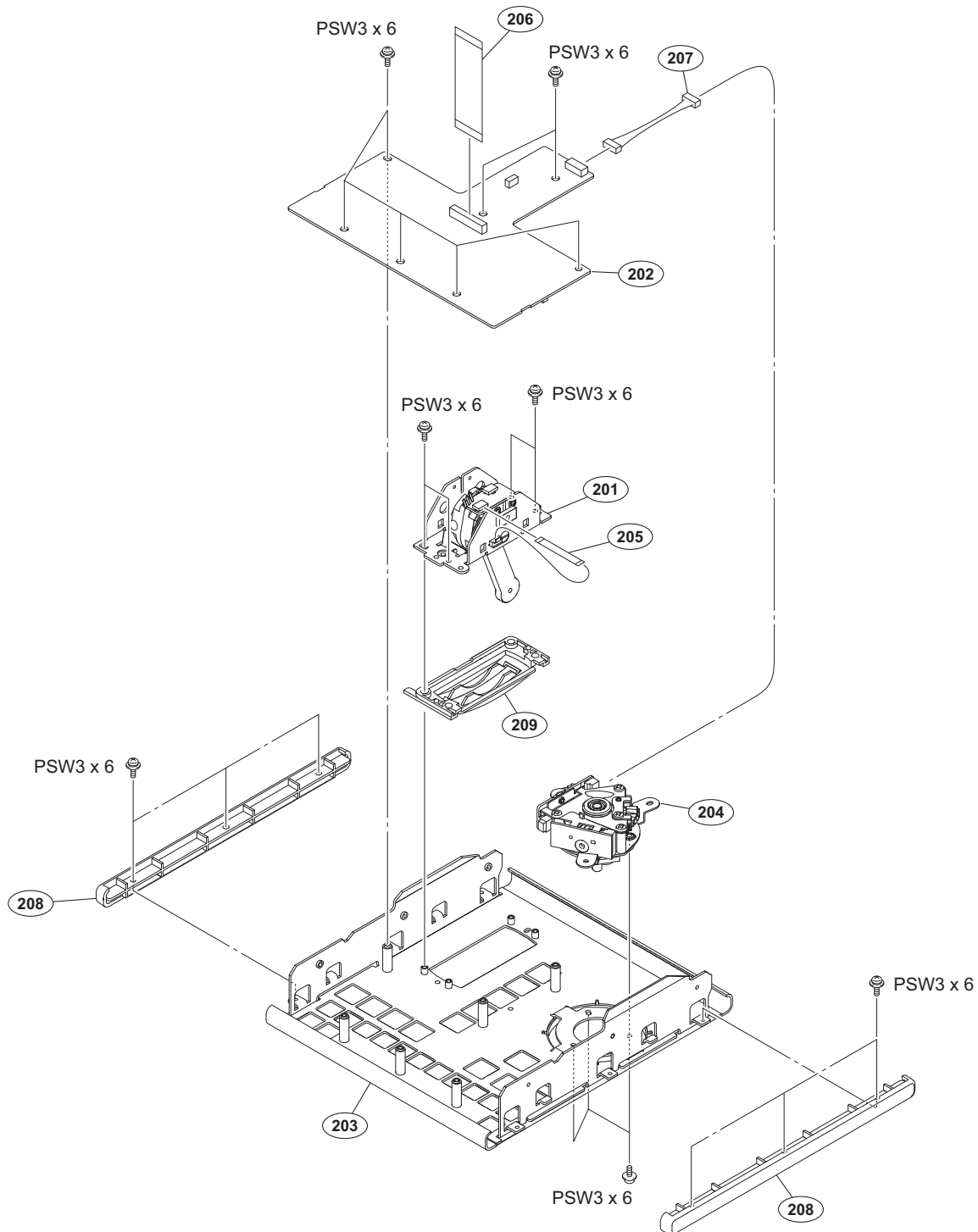
No.	Part No.	SP Description
1	A-1978-551-A	s MOUNTED CIRCUIT BOARD, CPU-459
2	X-2588-918-1	s BASE ASSY, BOTTOM
3	1-968-368-12	s HARNESS, SUB (DC POWER SW)
4	3-179-110-01	s COVER, DIAL
5	3-179-185-01	o DIAL, SEARCH
6	3-282-314-02	s WIRE CLAMPER
7	3-632-493-03	s FOOT
8	3-701-444-21	s WASHER , 6
9	3-701-510-01	s SET SCREW, DOUBLE POINT 4X4
10	3-870-105-01	s CAP, REAR
11	4-474-738-01	s GRIP (C)
12	4-644-492-72	s ACE (M2), LOCK [B2X4]
	7-682-547-09	s SCREW +B 3X6
	7-682-947-01	s SCREW +PSW 3X6

Key Block



No.	Part No.	SP Description
101	X-2587-734-1 s	CASE (C12) ASSY, SWITCH
102	X-2587-735-1 s	CASE (C15) ASSY, SWITCH
103	3-853-743-04 s	PLATE, DIFFUSION (12)
104	3-853-744-04 s	PLATE, DIFFUSION (15)
105	4-145-369-01 s	CAP (12)
106	4-145-371-01 s	CAP (15)
107	4-489-255-01 s	CHIP, SW

Key Panel



No.	Part No.	SP Description
201	A-1904-725-A s	FADER ASSY
202	A-1978-552-A s	MOUNTED CIRCUIT BOARD, KY-718
203	A-1997-455-A s	KEY PANEL SUB ASSY
204	1-455-051-11 s	CLUTCH, ELECTOMAGNETIC
205	1-846-023-11 s	CABLE, FLEXIBLE FLAT (10 CORE)
206	1-848-181-11 s	CABLE, FLEXIBLE FLAT (50 CORE)
207	1-970-088-11 s	HARNESS, SUB (DIAL)
208	3-863-678-11 s	COVER, SIDE
209	4-528-087-01 s	COVER (S), FADER

7-682-947-01 s SCREW +PSW 3X6

3-3. Supplied Accessories

Q'ty	Part No.	SP Description
1pc	△ 1-492-005-11 s	ADAPTOR, AC

Section 4

Block Diagrams

Overall

