SONY

HD COLOR CAMERA

HDC1000R
HDC1400R
HDC1450R
HDC1500R
HDC1550R
HDC1580R

Digital HDVS R SERIES

Power HAD FX

MEMORY STICK ™

MAINTENANCE MANUAL

Volume 1 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ことがあります。
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 manual 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.

Serial No. 10001 and Higher: HDC1000R (JN)
Serial No. 40001 and Higher: HDC1000R (CE)
Serial No. 10001 and Higher: HDC1400R (JN)
Serial No. 50001 and Higher: HDC1400R (E)
Serial No. 400001 and Higher: HDC1400R (CE)
Serial No. 10001 and Higher: HDC1450R (UC)
Serial No. 400001 and Higher: HDC1450R (CE)
Serial No. 10001 and Higher: HDC1500R (SY)
Serial No. 30001 and Higher: HDC1500R (JN)
Serial No. 50001 and Higher: HDC1500R (E)
Serial No. 400001 and Higher: HDC1500R (CE)
Serial No. 10001 and Higher: HDC1550R (UC)
Serial No. 400001 and Higher: HDC1550R (CE)
Serial No. 50001 and Higher: HDC1580R (CN)

注意

指定以外の電池に交換すると，破裂する危険があります。
必ず指定の電池に交換してください。
使用済みの電池は，国または地域の法令に従って
処理してください。

CAUTION

Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by the manufacturer.
When you dispose of the battery, you must obey the law in the relative area or country.

ATTENTION

Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type équivalent recommandé par le constructeur.
Lorsque vous mettez la batterie au rebut, vous devez respecter la législation en vigueur dans le pays ou la région où vous vous trouvez.

VORSICHT

Explosionsgefahr bei Verwendung falscher Batterien.
Batterien nur durch den vom Hersteller empfohlenen oder einen gleichwertigen Typ ersetzen.
Wenn Sie die Batterie entsorgen, müssen Sie die Gesetze der jeweiligen Region und des jeweiligen Landes befolgen.

FÖRSIKTIGHET!

Fara för explosion vid felaktigt placerat batteri.
Byt endast mot samma eller likvärdig typ av batteri, enligt tillverkarens rekommendationer.
När du kasserar batteriet ska du följa rådande lagar för regionen eller landet.

PAS PÅ

Fare for eksplosion, hvis batteriet ikke udskiftes korrekt.
Udskift kun med et batteri af samme eller tilsvarende type, som er anbefalet af fabrikanten.
Når du bortskaffer batteriet, skal du følge lovgivningen i det pågældende område eller land.

HUOMIO

Räjähdysvaara, jos akku vaihdetaan virheellisesti.
Vaihda vain samanlaiseen tai vastaavantyyppiseen, valmistajan suosittelemaan akkuun.
Noudata akun hävittämisessä oman maasi tai alueesi lakeja.

FORSIKTIG

Eksplosjonsfare hvis feil type batteri settes i.
Bytt ut kun med samme type eller tilsvarende anbefalt av produsenten.
Kasser batteriet i henhold til gjeldende avfallsregler.

LASER (HDC1000R, HDC1400R, HDC1500R, HDC1580R only)

Laser Diode Properties

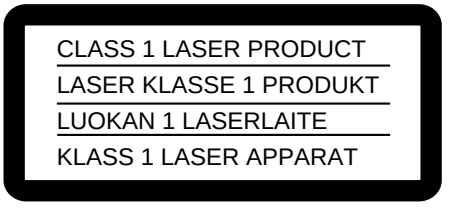
Wave length :	1310 ±40 nm
Emission duration :	Pulse Modulation
Laser output power :	141^{+37}_{-29} µW

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

CAUTION

The use of optical instruments with this product will increase eye hazard.



This HD Color Camera is classified as a CLASS 1 LASER PRODUCT.

Table of Contents

Manual Structure

1. Service Overview

2. Replacement of Main Parts

3. Electrical Alignment

4. File System

5. Setup Menu

6. Circuit Description

Manual Structure

Purpose of this manual

This manual is the maintenance manual Volume 1 for HD Color Camera HDC1000R/1400R/1450R/1500R/1550R/1580R.
This manual describes the information items that premise the service based on the components parts such as service overview, replacement of main parts, electrical alignment, file system, SERVICE menu, assuming use of system and service engineers.

Related manuals

Besides this maintenance manual Volume 1, the following manuals are available for this unit.

- **HDC1000R Operation Manual (Supplied with HDC1000R)**
  This manual is necessary for application and operation of HDC1000R.

- **HDC1500R/1400R/1550R/1450R Operation Manual (Supplied with 1500R/1400R/1550R/1450R)**
  This manual is necessary for application and operation of HDC1500R/1400R/1550R/1450R.

- **HDC1580R Operation Manual (Supplied with HDC1580R)**
  This manual is necessary for application and operation of HDC1580R.

- **Maintenance Manual Volume 2 (Available on request)**
  Describes the parts list, block diagrams, schematic diagrams and board layouts of HDC1000R/1400R/1450R/1500R/1550R/1580R.

- **“Semiconductor Pin Assignments” CD-ROM (Available on request)**
  This “Semiconductor Pin Assignments” CD-ROM allows you to search for semiconductors used in Broadcast and Professional equipment.
  Part number: 9-968-546-06

Section 1
Service Overview

1-1. Checking before Installation

1-1-1. Checking the ROM and Software Version

When connecting the peripheral equipment in the list below to HDC1000R/1400R/1450R/1500R/1550R/1580R, be sure to check that the ROM and software version on each peripheral device is corresponding to the camera to be connected.
If the ROM and software version is lower than the specified below, be sure to perform ROM replacement and updating the software.
If ROM replacement and updating the software are required, contact your local Sony Sales Office/Service Center.

ROM

Peripheral equipment	Board name	Ref No.	Rom version
MSU-700A/750	CPU-293/CPU-286	IC5, IC6/IC5, IC6	Ver. 1.30 or higher
CNU-700	AT-89 or AT-89A	IC4, IC5	Ver. 3.40 or higher
CNU-500	AT-100	IC4, IC5	Ver. 3.00 or higher
RCP-720/721	MPU-79	IC10	Ver. 3.00 or higher
RCP-730/731	MPU-79	IC10	Ver. 3.00 or higher
RCP-740/741	MPU-79	IC10	Ver. 3.00 or higher
RCP-700/701	MPU-92	IC6	Ver. 2.73 or higher
RM-B150	CPU-266	IC4	Ver. 1.00 or higher
HDCU-900	AT-141	IC105, IC106	Ver. 1.40 or higher

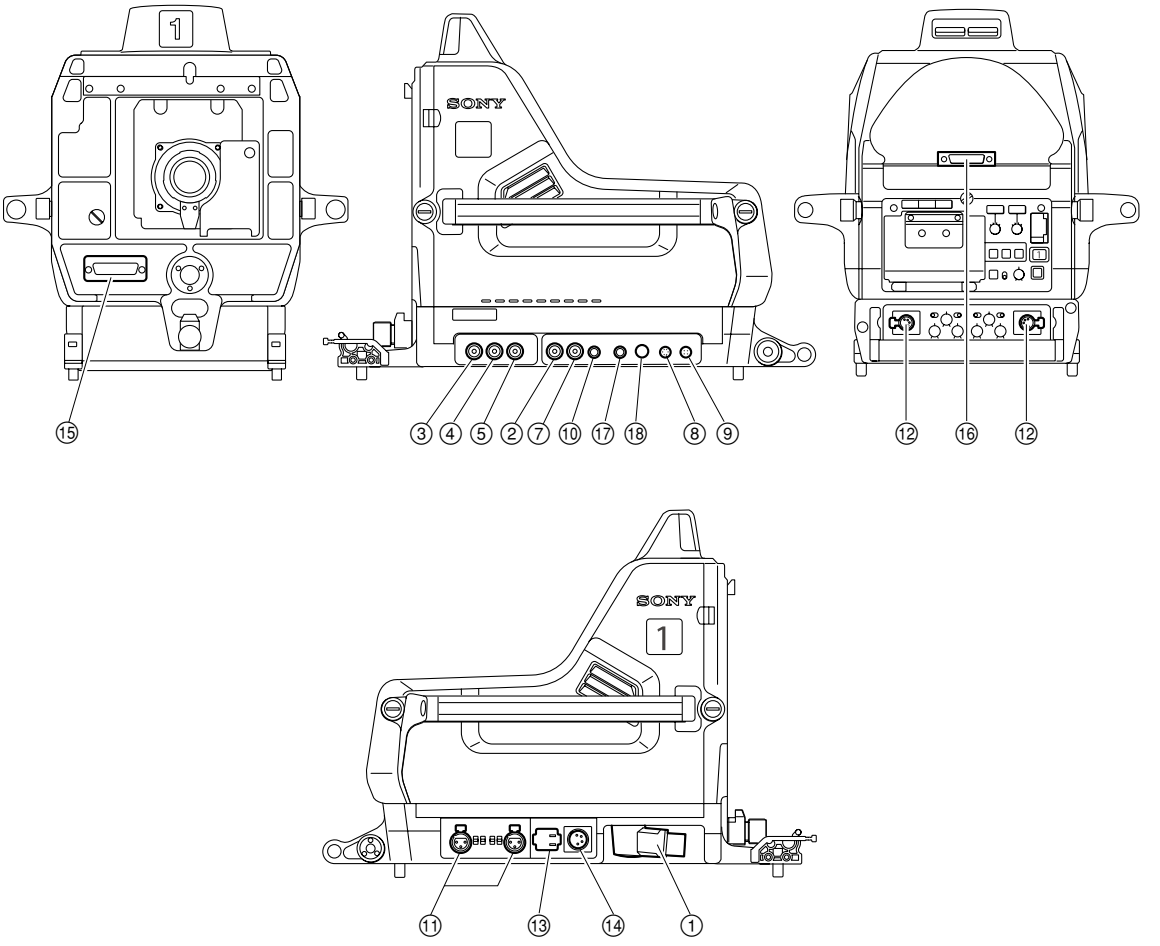
Software

Peripheral equipment	Board name	Software version
RCP-750/751	MPU-123	Ver. 1.40 or higher
RCP-920/921	MPU-143	Ver. 1.11 or higher
RM-B750	MPU-124	Ver. 1.20 or higher
HDCU-950	AT-149	Ver. 1.11 or higher
HDCU1000	AT-167	Ver. 1.21 or higher
HDCU1500	AT-167	Ver. 1.21 or higher
MSU-900/950	CPU-396	Ver. 1.21 or higher

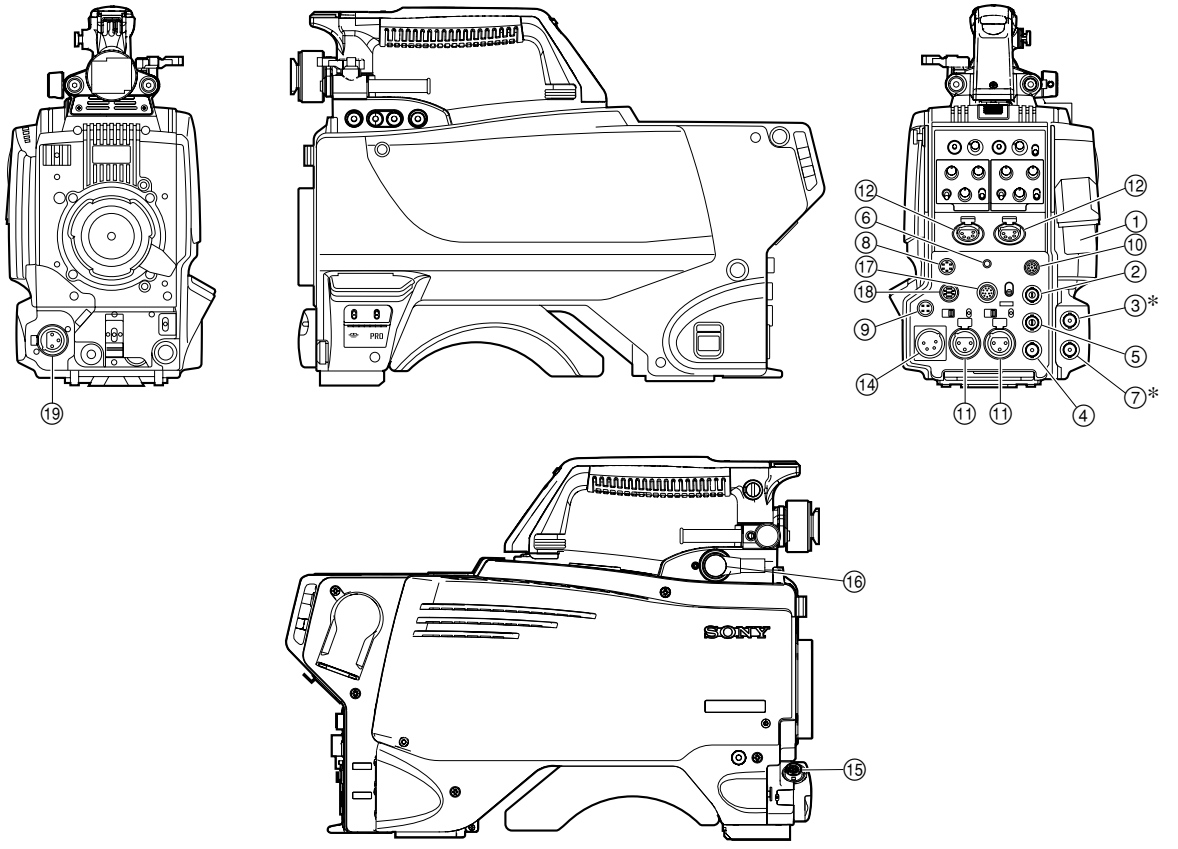
1-2. Connectors and Cables

1-2-1. Connector Input/Output Signals

HDC1000R Connector Layout



HDC1400R/1450R/1500R/1550R/1580R Connector Layout



*: HDC1500R only

Input/Output Signals

① CCU (HDC1000R/1400R/1500R/1580R)

BTA S-004A/005A/006A compliant 1.485 Gbps serial

HDCU/HDFX (HDC1450R/1550R)

UC: King Triax connector
CE: Fisher Triax connector

② GENLOCK IN/RET IN/PROMPTER (HDC1400R/1450R/1500R/1550R)

BNC type 75 Ω, 1.0 V p-p

Output Signals

② PROMPTER 1 (HDC1000R) PROMPTER (HDC1580R)

BNC type 75 Ω, 1.0 V p-p

③ SDI 1 (HDC1000R/1500R)

HD SDI signal
BTA-S004A compliant
BNC type 75 Ω, 0.8 V p-p 1.485 Gbps

④ SDI 2 (HDC1000R/1500R) SDI (HDC1400R/1450R/1550R)

HD SDI signal
BTA-S004A compliant
BNC type 75 Ω, 1.0 V p-p
or
SD SDI signal

⑤ TEST OUT

BNC type 75 Ω, 1.0 V p-p

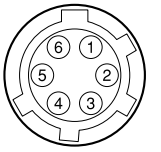
⑥ EARPHONE (HDC1400R/1450R/1500R/1550R/1580R)

EARPHONE mini jack

⑦ PROMPTER2 (HDC1000R/1500R)

BNC type 75 Ω, 1.0 V p-p

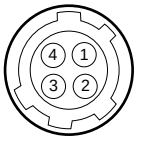
⑧ RET CTRL (6P FEMALE)



(External view)

No.	Signal	I/O	Specifications
1	INCOM 1 MIC-ON/OFF	IN	Zi ≧ 10 kΩ ON : GND OFF : OPEN
2	INCOM 2 MIC-ON/OFF	IN	Zi ≧ 10 kΩ ON : GND OFF : OPEN
3	GND	——	
4	RET 3-ON/OFF	IN	Zi ≧ 10 kΩ ON : GND OFF : OPEN
5	RET 1-ON/OFF	IN	Zi ≧ 10 kΩ ON : GND OFF : OPEN
6	RET 2-ON/OFF	IN	Zi ≧ 10 kΩ ON : GND OFF : OPEN

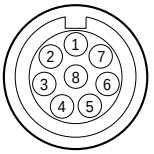
⑨ DC OUT (4P FEMALE)



(External view)

No.	Signal	I/O	Specifications
1	UNREG GND	——	GND for POWER
2	NC		No connection
3	NC		No connection
4	UNREG	OUT	+12 V dc 500 mA (max)

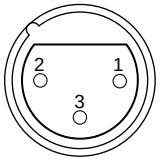
⑩ REMOTE (8P FEMALE)



(External view)

No.	Signal		I/O	Specifications
	for RCP	for TRUNK (RS422A)		(Not used: HDC1450R/ 1550R)
1	TX (X)	TX1 (+)	OUT	SERIAL DATA OUT
2	TX (Y)	TX1 (–)	OUT	/TRUNK1 DATA OUT (for RS-422A)
3	RX (X)	RX1 (+)	IN	SERIAL DATA IN
4	RX (Y)	RX1 (–)	IN	/TRUNK1 DATA IN (for RS-422A)
5	TX-GND		——	GND for TX
6	POWER (+) OUT		OUT	UNREG +10.5 V to 17 V dc, 200 mA (max)
7	POWER (–) OUT		——	GND for UNREG-OUT
8	VIDEO (X)	CHASSIS GND	OUT	75 Ω, 1.0 V p-p (SD Video) CHASSIS GND (for RS-422A)

⑪ AUDIO IN CH1/CH2 (3P FEMALE)

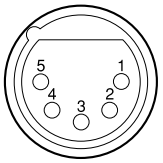


(External view)

No.	Signal	I/O	Specifications
1	AUDIO 1/2 (G)	——	–60 dBu, –50 dBu, –40 dBu,
2	AUDIO 1/2 (X)	IN	–30 dBu, –20 dBu, selectable
3	AUDIO 1/2 (Y)	IN	High impedance, Balanced

(0 dBu = 0.775 Vrms)

⑫ INTERCOM 1/2 (5P FEMALE)

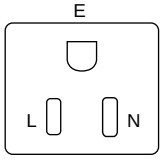


(External view)

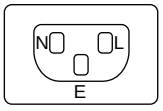
No.	Signal	I/O	Specifications
1	EXT-INCOM-T (Y)	IN	–20 dBu (CARBON MIC)
2	EXT-INCOM-T (X)	IN	–60 dBu (DYNAMIC MIC)
3	GND	——	
4	EXT-INCOM-LEFT (X)	OUT	0 dBu
5	EXT-INCOM-RIGHT (X)	OUT	0 dBu

(0 dBu = 0.775 Vrms)

⑬ AC OUT (HDC1000R) (For service only)



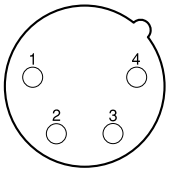
JN
(External view)



CE
(External view)

No.	Signal	I/O	Specifications
E	GND	——	CHASSIS GND
N	UTL (C)	OUT	• AC 100/120 V, 200 VA or below (UC, J)
L	UTL (H)	OUT	• AC 230 V (CE)

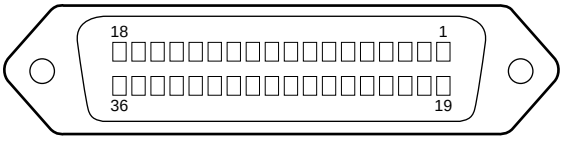
⑭ DC IN (4P MALE)



(External view)

No.	Signal	I/O	Specifications
1	EXT_DC (C)	——	GND for DC (+)
2	NC		No connection
3	NC		No connection
4	EXT_DC (H)	IN	+10.5 to 17 V dc

⑮ LENS (36P FEMALE) (HDC1000R)



(External view)

No.	Signal	I/O	Specifications
1	NC		No connection
2	NC		No connection
3	NC		No connection
4	LENS +12 V	OUT	+12 V (at 2 A)
5	GND (LENS)	——	GND for +12 V (LENS)
6	GND (SIG)	——	GND
7	NC		No connection
8	LENS-EXT-1 (SERIAL RXD)	IN	*2 (LENS SERIAL DATA)
9	LENS-EXT-2	IN	*2
10	LENS-EXT-3	IN	*2
11	LENS-SERVO	OUT	ON : GND OFF : High impedance
12	IRIS-POSI	IN	Zi ≧ 10 kΩ 2 to 7 V “3.4 ± 0.1 V (F16)” “6.2 ± 0.1 V (F2.8)”
13	ZOOM-POSI	IN	Zi ≧ 10 kΩ 2 to 7 V “2 V (WIDE), 7 V (TELE)”
14	RET 1-ON	IN	Zi ≧ 10 kΩ ON : GND OFF : High impedance
15	RET 2-ON	IN	Zi ≧ 10 kΩ ON : GND OFF : High impedance
16	FOCUS-POSI	IN	Zi ≧ 10 kΩ 2 to 7 V “2 V (MIN), 7 V (∞)”
17	IRIS-CONT	OUT	2 to 7 V “3.4 ±0.1 V (F16)” “6.2 ±0.1 V (F2.8)” Zo ≦ 1 kΩ
18	IRIS-AUTO /MANU (SERIAL TXD)	OUT	AUTO : GND MANU : High impedance Zo ≦ 1 kΩ (LENS SERIAL DATA)
19	NC		No connection
20	NC		No connection
21	LENS R TALLY	OUT	ON : GND OFF : High impedance Zo ≦ 1 kΩ
22	LENS-PUPIL-POSI	IN	Zi ≧ 10 kΩ 1 to 4 V 1 V : –7.5° 4 V : +7.5°
23	RET 3-ON	IN	Zi ≧ 10 kΩ ON : GND OFF : High impedance
24	LENS-ADR-0	IN	*1
25	LENS-ADR-1	IN	*1
26	LENS-ADR-2	IN	*1
27	LENS-ADR-3	IN	*1
28	EXT 1-ON	OUT	ON : GND OFF : High impedance
29	EXT 2-ON	OUT	ON : GND OFF : High impedance
30	F DEM (FAR)	IN	No connection
31	INCOM 1-ENG/PROD	IN	Zi ≧ 10 kΩ ENG : GND PRD : High impedance
32	INCOM 2-ENG/PROD	IN	Zi ≧ 10 kΩ ENG : GND PRD : High impedance
33	INCOM 1-MIC-ON	IN	Zi ≧ 10 kΩ ON : GND OFF : High impedance
34	INCOM 2-MIC-ON	IN	Zi ≧ 10 kΩ ON : GND OFF : High impedance
35	F-CONT-SIG	OUT	No connection
36	F-DEM (NEAR)	IN	No connection

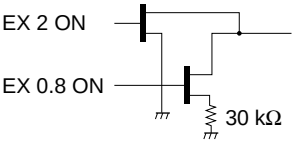
*1 Zi ≧ 10 kΩ
1 : High impedance
0 : 0 $^{+0.5}_{-0}$ V
LENS ADRS 0 (low-order bit)
LENS ADRS 3 (high-order bit)

*2 Zi ≧ 10 kΩ
1 : High impedance
0 : 0 ±0.5 V

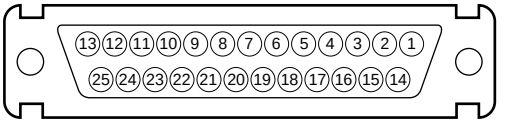
EX1	EX2	EX3	MODE
1	1	1	EXTENDER OFF
1	0	1	EXT-1 (× 1.5) ON
0	1	1	EXT-2 (× 2) ON
0	0	1	EXT-3 (× 2.5) ON

⑮ LENS (12P FEMALE) (HDC1400R/1450R/1500R/1550R/1580R)

(External view)

No.	Signal	I/O	Specifications
1	RET VIDEO ENABLE	IN	ENABLE : 0 V DISABLE : +5 V or OPEN
2	VTR CTL	IN	ENABLE : 0 V DISABLE : +5 V or OPEN
3	GND	——	GND for UNREG
4	SERVO MA/AT	OUT	AUTO : +5 V MANU : 0 V or OPEN
5	IRIS POSITION	OUT	+3.4 V (F16) to +6.2 V (F2.8)
6	UNREG	OUT	+10.5 V to +17 V
7	IRIS POSITION	IN	+3.4 V (F16) to +6.2 V (F2.8)
8	IRIS AT/MA	OUT	AUTO IRIS : 0 V MANUAL IRIS : +5 V
9	EXTENDER ON/OFF	IN	EX 2 ON : GND EX 0.8 ON : 30 kΩ to GND OFF : OPEN 
10	ZOOM POSITION	IN	WIDE : 2 V TELE : 7 V
11	FOCUS POSI (/LENS RX)	IN	∞ : 7 V min. : 2 V
12	(LENS TX)	OUT	

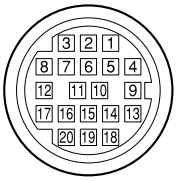
⑯ VF (25P FEMALE) (HDC1000R)



(External view)

No.	Signal	I/O	Specifications
1	VF-Y (X)	OUT	1.0 V p-p, Zo = 75 Ω
2	VF-GND (Pr)	——	GND for VF-Pr (X)
3	VF-Pr (X)	OUT	0.7 V p-p, Zo = 75 Ω
4	VF-GND (Pb)	——	GND for VF-Pb (X)
5	VF-Pb (X)	OUT	0.7 V p-p, Zo = 75 Ω
6	PEAKING LEVEL	IN	0 to 5 V dc
7	VF-UNREG	OUT	+10.5 to +20 V
8	VF-UNREG		
9	NC		No connection
10	S-DATA	IN/OUT	TTL level
11	TALLY (R)-VF	OUT	ON : +5 V OFF : 0 V
12	EFFECT	OUT	ON : +5 V OFF : 0 V
13	NC		No connection
14	VF-GND (Y)	——	GND for VF-Y (X)
15	S-CK	OUT	TTL level
16	BATT IND	OUT	ON : +5 V OFF : 0 V
17	CHASSIS GND	——	GND
18	TALLY (G)-VF	OUT	ON : +5 V OFF : 0 V
19	GND (UNREG)	——	GND for VF-UNREG
20	GND (UNREG)		
21	VF-SEL	IN	BW : 0 V COLOR : +5 V
22	H EXPAND	OUT	ON : GND OFF : +5 V
23	NC		No connection
24	NC		No connection
25	V EXPAND	OUT	ON : GND OFF : +5 V

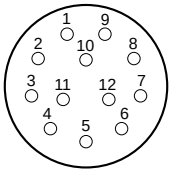
⑯ VF (20P FEMALE) (HDC1400R/1450R/1500R/1550R/1580R)



(External view)

No.	Signal	I/O	Specifications
1	S-DATA	IN/OUT	TTL level
2	NC		No connection
3	NC		No connection
4	SCK	OUT	TTL level
5	NC		No connection
6	NC		No connection
7	NC		No connection
8	G TALLY	OUT	ON : 5 V OFF : GND
9	NC		No connection
10	NC		No connection
11	NC		No connection
12	Y VIDEO	OUT	1.0 V p-p, Zo = 75 Ω
13	VIDEO GND	——	GND for VIDEO
14	Pb VIDEO	OUT	±0.35 V p-p, Zo = 75 Ω
15	Pr VIDEO	OUT	±0.35 V p-p, Zo = 75 Ω
16	NC		No connection
17	R TALLY	OUT	ON : 5 V OFF : GND
18	NC		No connection
19	UNREG GND	——	GND for UNREG
20	UNREG	OUT	+10.5 V to +17 V

⑰ CRANE (12P FEMALE)

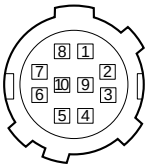


(External view)

No.	Signal		I/O	Specifications
1	Pr VIDEO (X)		OUT	±0.35 V p-p, Zo = 75 Ω
2	Pb VIDEO (X)		OUT	±0.35 V p-p, Zo = 75 Ω
3	NC			No connection
	for RS422A	for RS232C		
4	TX0 (+)	TX1	OUT	TRUNK Data out*
5	TX0 (–)	TX0	OUT	
6	RX0 (–)	RX0	IN	TRUNK Data in*
7	RX0 (+)	RX1	IN	
8	GND (VIDEO)		——	GND for VIDEO
9	Y VIDEO (X)		OUT	1.0 V p-p, Zo = 75 Ω
10	GND		——	GND for SCL/SDA
11	SCL EXT-VF		OUT	TTL level
12	SDA EXT-VF		IN/OUT	TTL level

*: Not used: HDC1450R/1550R

⑱ TRACKER (10P FEMALE)

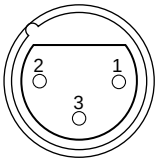


(External view)

No.	Signal	I/O	Specifications
1	TRACKER LEFT	OUT	TRACKER RECEIVE/PGM −20 dBu unbalanced
2	GND (TALK)	——	GND for TRACKER TALK
3	GND (RECEIVE/ PGM/TL)	——	GND for RECEIVE/PGM/TL
4	TRACKER RIGHT	OUT	TRACKER RECEIVE/PGM −20 dBu unbalanced
5	UNREG	OUT	+12 V (+10.5 to +17.0 V)
6	GND (UNREG)	——	GND for UNREG
7	TRACKER TALK (X)	IN	TRACKER TALK 0 dBu /−20 dBu
8	TRACKER TALK (Y)	IN	High impedance balanced
9	G TALLY	OUT	ON : GND OFF : High impedance (Open collector)
10	R TALLY	OUT	ON : GND OFF : High impedance (Open collector)

(0 dBu = 0.775 Vrms)

⑲ MIC 1 IN (3P FEMALE) (HDC1400R/1450R/ 1500R/1550R/1580R)



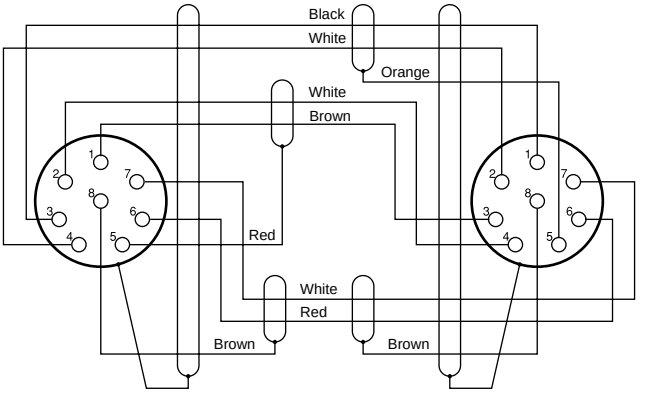
(External view)

No.	Signal	I/O	Specifications
1	MIC 1 (G)	——	−60 dBu, −50 dBu, −40 dBu,
2	MIC 1 (X)	IN	−30 dBu, −20 dBu, selectable
3	MIC 1 (Y)	IN	High impedance, Balanced

(0 dBu = 0.755 Vrms)

1-2-2. Wiring Diagrams for Cables

CCA-5 Cable



— 8P CONNECTOR (MALE) —
(WIRING SIDE)

1-2-3. Connection Connectors/Cables

Connection made with the connector panels during installation or service, should be made with the connectors/complete cable assemblies specified in the following list, or equivalent parts.

Indication	Connection connector/cable
TEST OUT PROMPTER 1 (HDC1000R) PROMPTER 2 (HDC1000R/1500R) PROMPTER (HDC1580R) SDI 1/2 (HDC1000R1500R) SDI (HDC1400R/1450R1550R) GENLOCK IN/RET IN/PROMPTER (HDC1400R/1450R/1500R/1550R) (BNC)	1-569-370-12 Plug, BNC
AUDIO IN CH1/CH2 MIC 1 IN (3P FEMALE)	1-508-084-00 XLR, 3P Male or ITT Cannon XLR-3-12C equivalent
RET CTRL (6P FEMALE)	1-560-078-00 Plug, 6P Male or HIROSE HR10-7PA-6P equivalent
DC OUT (4P FEMALE)	1-566-425-11 Plug, 4P Male or HIROSE HR10A-7P-4P equivalent
INTERCOM 1/2 (5P FEMALE)	1-508-370-11 XLR, 5P Male or ITT Cannon XLR-5-12C equivalent
DC IN (4P MALE)	1-508-362-00 XLR, 4P Female or ITT Cannon XLR-4-11C equivalent, or Cable assembly 1-551-577-00 (Supplied with AC-550/550CE)
CRANE (12P FEMALE)	1-819-261-11 Connector, Round Type 12P
REMOTE (8P FEMALE)	• 1-766-848-11 Plug, 8P Male or CCA-5 cable assembly (CCA-5-10 (10 m) /CCA-5-3 (3 m)) (option) ∗2 ∗3 • REMOTE cable 1-783-372-11 (supplied with RM-B150, 10 m) ∗1 ∗2 ∗3
TRACKER (10P FEMALE)	1-506-522-12 Connector, Round Type 10P

∗1: Use of REMOTE cable enables to monitor video signals. (The pin 8 is available for the video signal line.)
The down-converted SD signal is output.

∗2: If using a cable of length different from a standard product, contact your local Sony Sales Office/Service Center.

Note

∗3: The pin 8 of CCA-5 cable is GND (ground).
The pin 8 of REMOTE cable is not GND (ground).

1-2-4. Note in Connecting CCU Connector (HDC1000R/1400R/1500R/1580R)

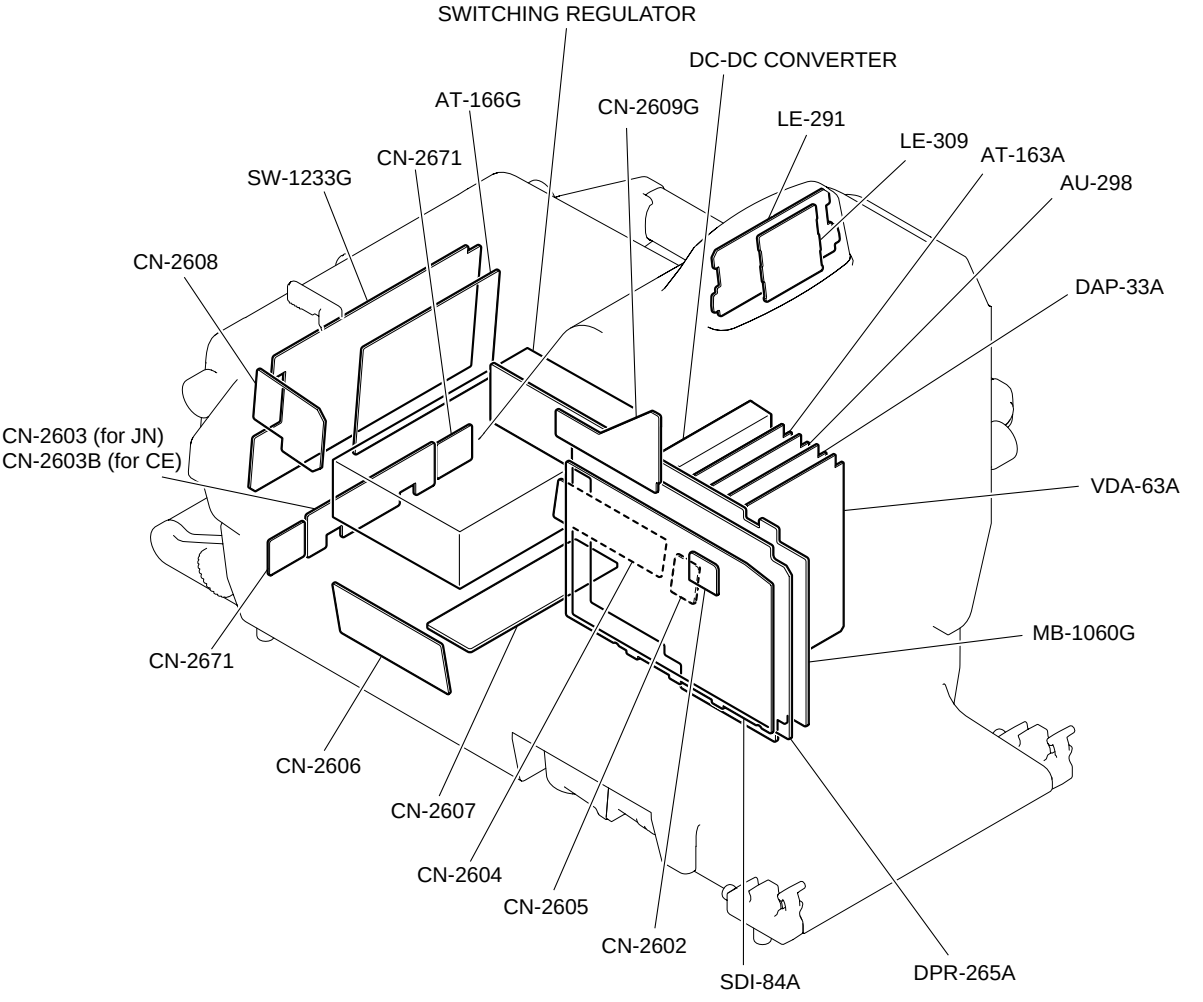
It is recommendable to clean the optical contact portions mentioned below before connecting this unit to the camera control unit.

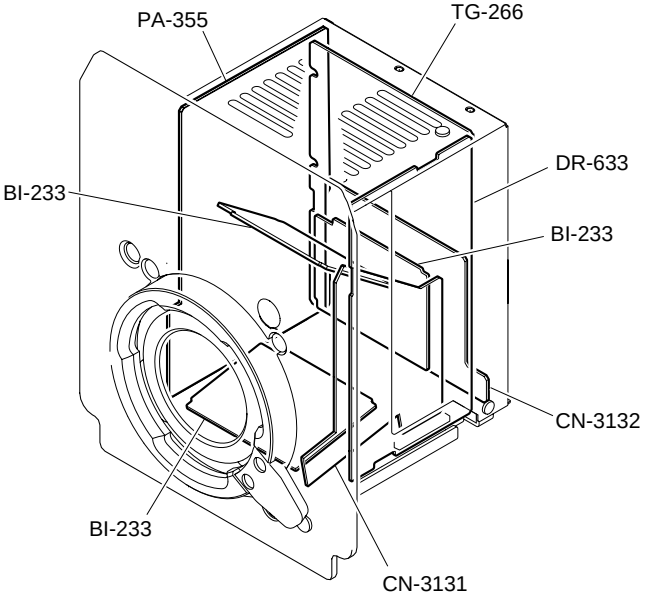
- CCU connector of this unit
- Camera connector of the camera control unit
- Optical/Electrical cable

For details on a cleaning method, refer to Section 1-7 “Cleaning of Connector/Cable”.

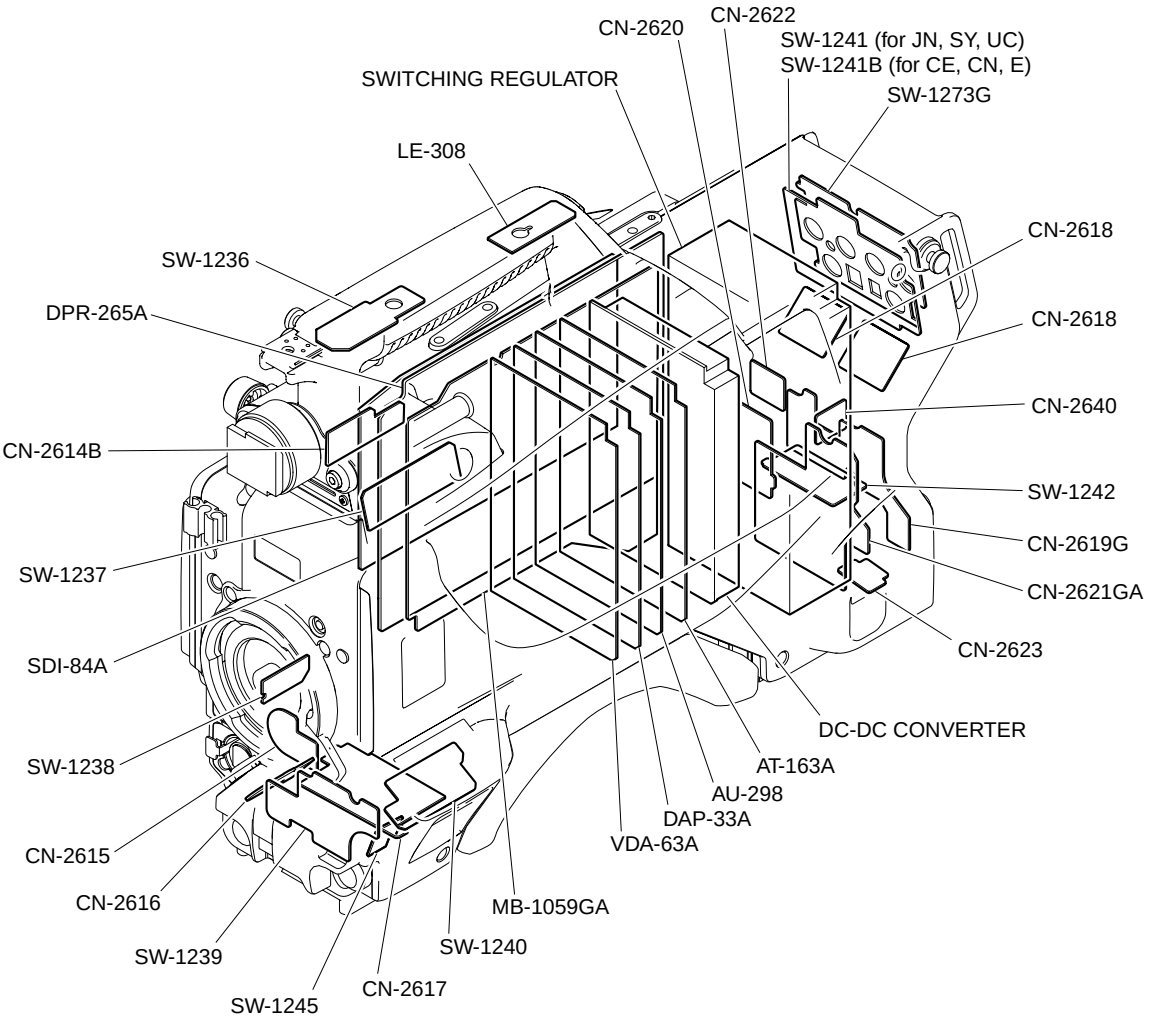
1-3. Location of Printed Circuit Boards

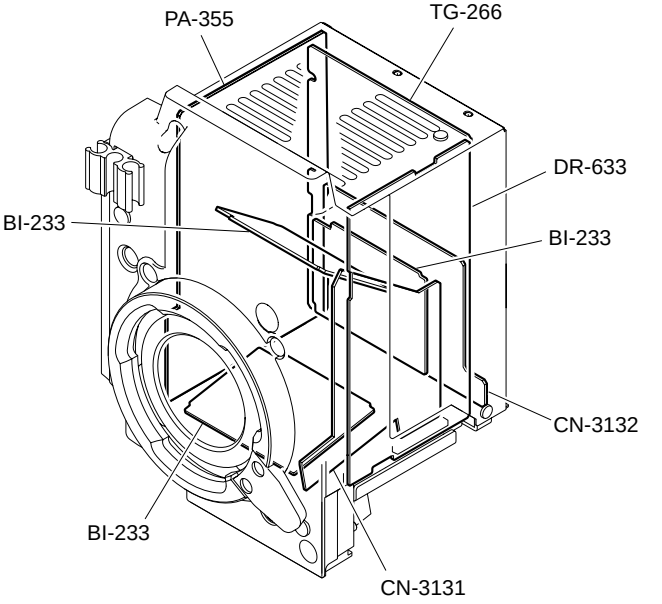
HDC1000R



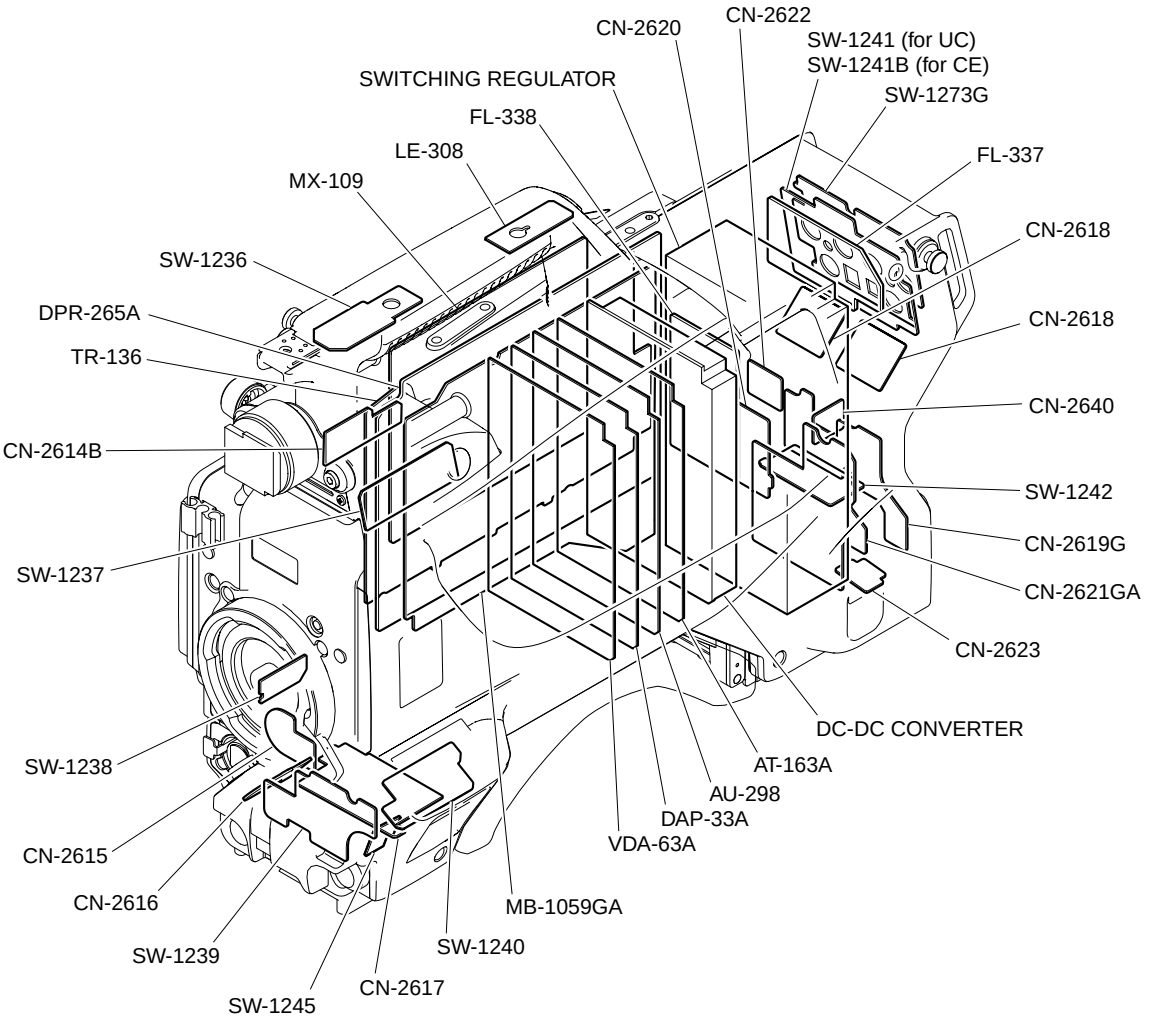


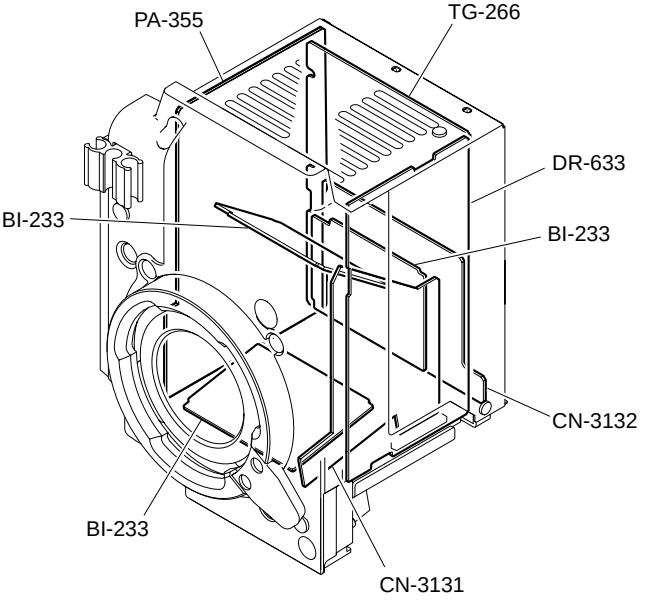
HDC1400R/1500R/1580R





HDC1450R/1550R





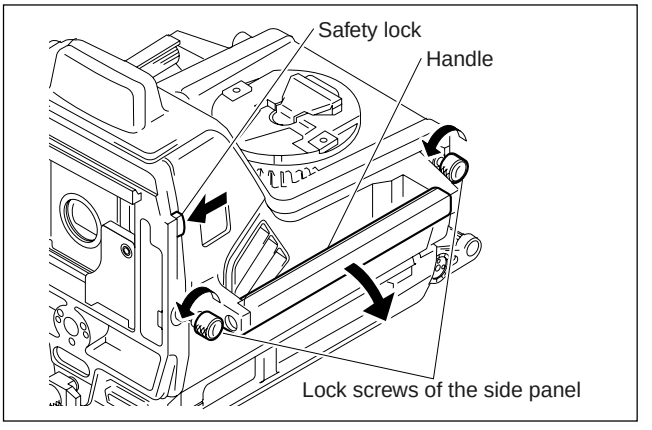
1-4. Opening/Closing the Side Panel

HDC1000R

1. Unscrew the two lock screws of the side panel.
2. While sliding the safety lock toward the lens, open the side panel by holding the handle.
3. Close the side panel and tighten securely the lock screws of the side panel.

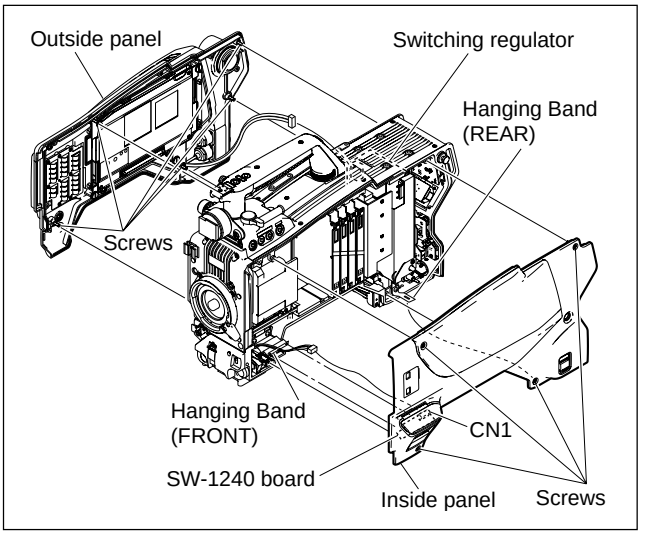
Note

Closing the side panel brings the safety lock to an automatic locking.



HDC1400R/1500R/1580R

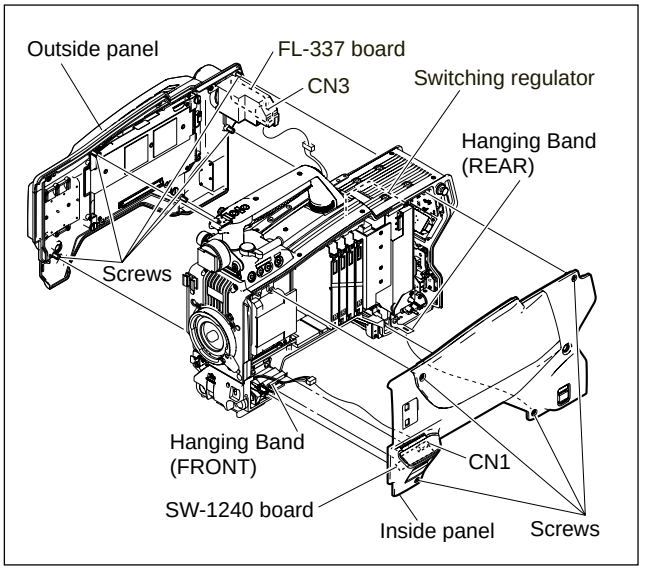
1. Unscrew the nine screws as shown in the figure, then open the inside panel and outside panel.
2. Release the hanging band (FRONT) and hanging band (REAR) from the inside panel.
3. Disconnect the harness from the connector (CN1) on the SW-1240 board, and remove the inside panel.
4. Disconnect the harness from the switching regulator connector, and remove the outside panel.



5. Reinstall the panels by reversing the steps above.

HDC1450R/1550R

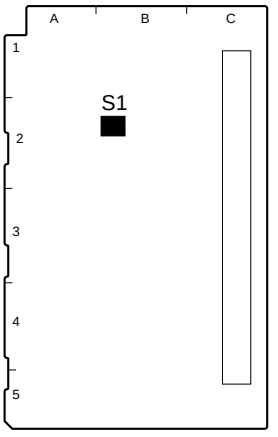
1. Unscrew the nine screws as shown in the figure, then open the inside panel and outside panel.
2. Release the hanging band (FRONT) and hanging band (REAR) from the inside panel.
3. Disconnect the harness from the connector (CN1) on the SW-1240 board, and remove the inside panel.
4. Disconnect the harness from the connector (CN3) on the FL-337 board, and remove the outside panel.



5. Reinstall the panels by reversing the steps above.

1-5. Switch Settings

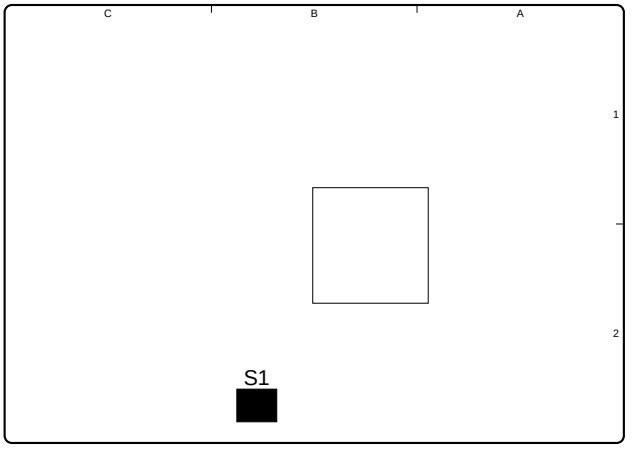
AT-163A Board



AT-163A BOARD (SIDE A)

Ref. No.	Name	Description	Factory setting
S1-1	Reserve	Not used (Fixed to OFF)	OFF
S1-2	All Preset	FRAM clear	OFF
S1-3	Reserve	Not used (Fixed to OFF)	OFF
S1-4	Firmware Load	Forcibly upgrading of firmware	OFF

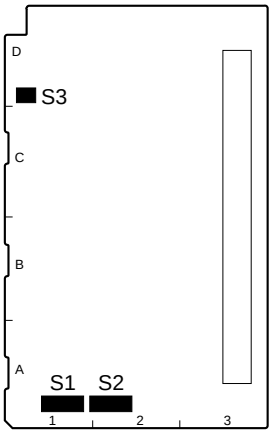
AT-166G Board (HDC1000R)



AT-166G BOARD (SIDE B)

Ref. No.	Name	Description	Factory setting
S1-1	ICE	Not used (Fixed to OFF)	OFF
S1-2	WRITER	Switch ON for software upgrading	OFF
S1-3	TEST1	Not used (Fixed to OFF)	OFF
S1-4	TEST2	Not used (Fixed to OFF)	OFF

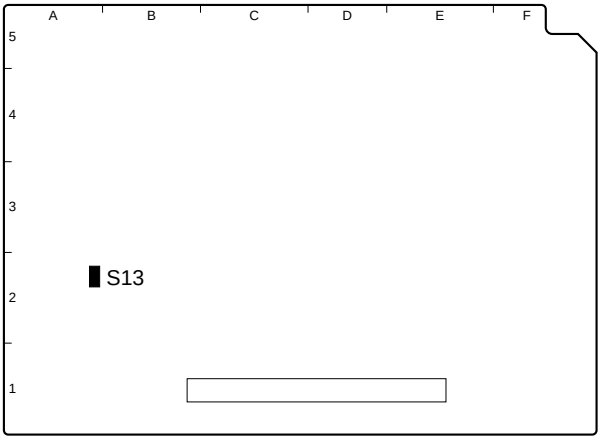
AU-298 Board



AU-298 BOARD (SIDE A)

Ref. No.	Name	Description	Factory setting
S1	Reserve	Not used (Fixed to NORM)	NORM
S2	Reserve	Not used (Fixed to NORM)	NORM
S3-1	AB POWER MIC1	Switch ON to supply +12 V for MIC POWER to the microphone connected to the AUDIO IN CH1 connector.	OFF
S3-2	AB POWER MIC2	Switch ON to supply +12 V for MIC POWER to the microphone connected to the AUDIO IN CH2 connector.	OFF

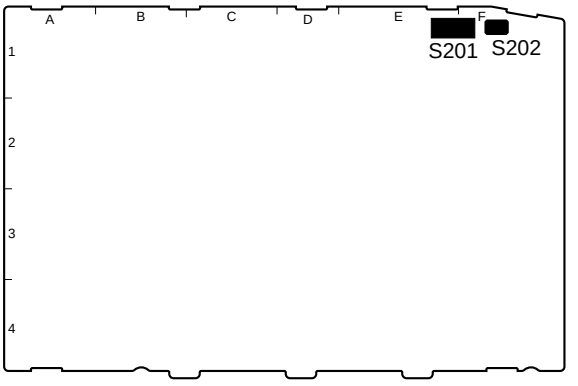
DPR-265A Board



DPR-265A BOARD (SIDE A)

Ref. No.	Name	Description	Factory setting
S13	Reserve	Not used (Fixed to OFF)	OFF

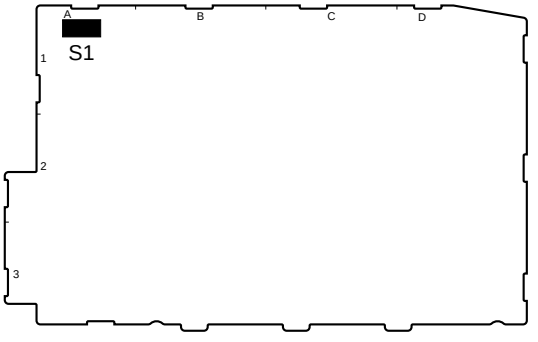
SDI-84A Board (HDC1000R/1400R/1500R/1580R)



SDI-84A BOARD (SIDE A)

Ref. No.	Name	Description	Factory setting	
			HDC1000R/1500R	HDC1400R/1580R
S201-1	TEST	Not used (Fixed to OFF)	OFF	OFF
S201-2	PROMPTER2 OUT	Switch ON for PROMPTER2	ON (active)	OFF
S201-3	VBS RET IN	Switch ON for VBS RET	OFF (non-active)	OFF
S201-4 to 8	Reserve	Not used (Fixed to OFF)	OFF	OFF
S202	LD RESET	Not used (Fixed to OFF)	OFF	OFF

TR-136 Board (HDC1450R/1550R)



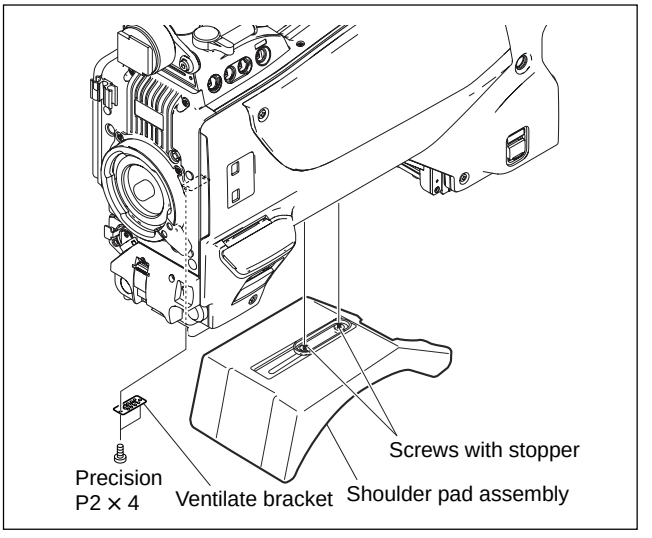
TR-136 BOARD (SIDE A)

Ref. No.	Name	Description	Factory setting
S1-1		When this switch is set to ON, the multiformat color-bar signal is output from the built-in video test signal generator.	OFF
S1-2 S1-3		Spare (not used)	OFF
S1-4		When this switch is set to ON, the 400 Hz sine wave is output from the built-in audio test signal generator.	OFF
S1-5		When this switch is set to ON, the 1 kHz sine wave is output from the built-in audio test signal generator.	OFF
S1-6 to S1-8		Spare (not used)	OFF

1-6. Cleaning the Vent Portion of the Fan (HDC1400R/1450R/1500R/ 1550R/1580R)

The ventilate bracket for preventing from dust is attached in the vent portion of the fan. Clean the ventilate bracket every two or three months. Clogging may cause the temperature increases inside the camera and result in a trouble.

1. Loosen the two screws with stopper, and remove the shoulder pad assembly.
2. Remove the two screws, and remove the ventilate bracket.
3. Remove dust on the ventilate bracket with a vacuum cleaner.



1-7. Cleaning of Connector/Cable (HDC1000R/1400R/1500R/1580R)

The photo receptive condition of the optical connector can be checked at OPTICAL CONDITION of the DPR board of the camera control unit.

When lit in green: Normal (−17 dBm or above)
When lit in yellow: Normal (−17 to −20 dBm)
When lit in red: Abnormal (Less than −20 dBm)

When lit in red, be sure to clean the optical contact portions.
When lit in yellow, cleaning is recommended.
The attenuation of the photo-receptive level may cause transmission error between the camera and HDCU. In the case of attenuation, be sure to clean optical contact portions proceeding as follows. The optical contact portions exist in the optical connector on the camera or HDCU, and in the optical/electrical cables.

1-7-1. When the Optical Connector Cleaner (Commercially Available) is Available

Tools required

- Optical connector cleaner (commercially available)
  Product name: CLETOP®
  14100402 or 14100403 (stick type) or equivalent
  14100402: 2.0 mm
  14100403: 2.0/2.5 mm double ended

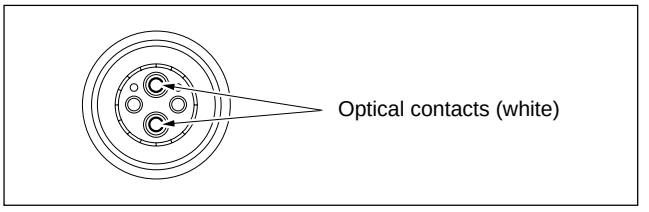
Notes

- Alcohol is not necessary during cleaning.
- Number of possible wipes is one cleaning per a piece. Do not reuse it.

Cleaning procedure

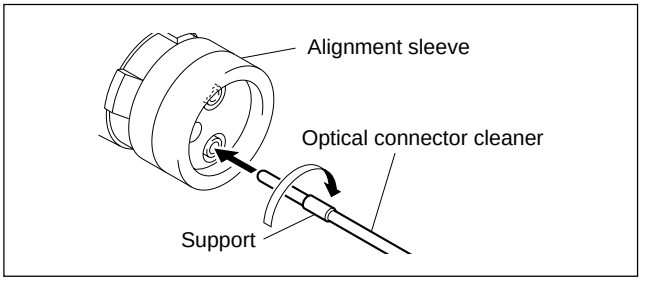
[Male connector]

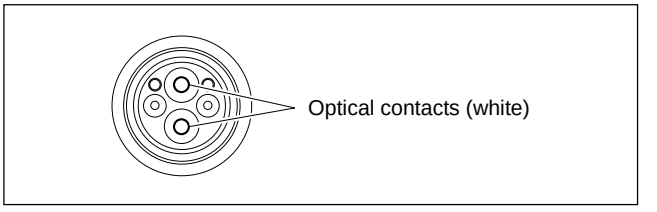
Clean the tip of the white optical contacts using the optical connector cleaner.



[Female connector]

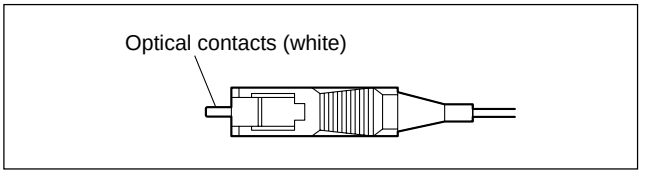
1. Insert the optical connector cleaner straight. Ensure that it is held straight when inserting.
2. Apply sufficient pressure (approximately 600 g to 700 g) to ensure that the optical contact is a little depressed.
3. While pressing the optical connector cleaner against the tip of the optical contact, rotate the optical connector cleaner by 4 to 5 turns clockwise. Holding the optical connector cleaner at around its support facilitates to apply the pressure.





[Connector]

Clean the tip of the white optical contacts using the optical connector cleaner.



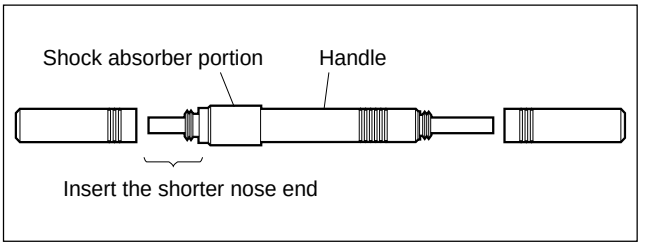
1-7-2. When the Optical Connector Cleaner (Commercially Available) is not Available

Tools required

- Alignment sleeve remover HC-001
  (for female connector)
  Sony P/N: J-6480-010-A or
  DCC.91.312.5LA or manufactured by LED, or equivalent

Note

Insert the shorter nose end when removing/installing the alignment sleeve.
Grasp not the shock absorber portion of the remover but the handle in use.



- Alcohol (commercially available)
- Cotton swabs (commercially available)

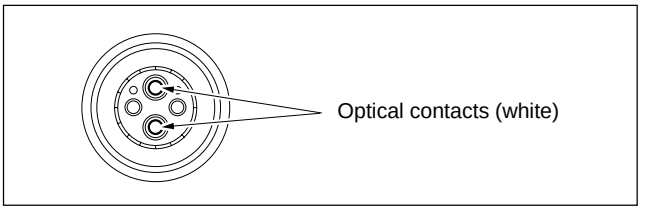
Note

Use a cotton swab whose diameter is about 4 mm.
If a cotton swab whose diameter exceeds 5 mm is used, the cotton swab cannot be inserted into the end of the connector and the tip of the optical contact cannot be cleaned.

Cleaning Procedure

[Male connector]

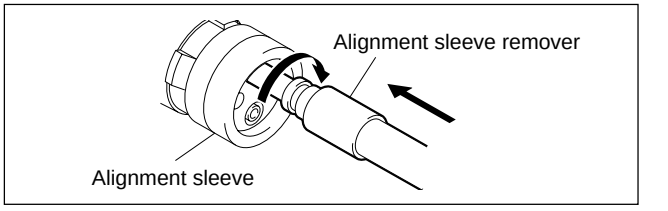
Clean the tip of the white optical contacts by a cotton swab moistened with alcohol.



[Female connector]

The optical contacts for female connector are in an unexposed state. In cleaning, it is necessary to be exposed by removing the alignment sleeve in advance. Proceed as follows.

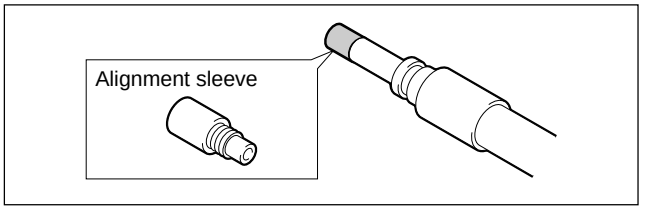
1. Insert the alignment sleeve remover into the alignment sleeve in the straight line and turn it clockwise.



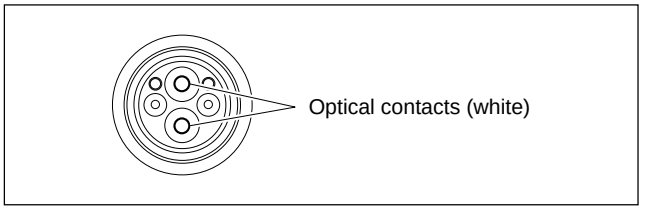
2. When the turn stops, pull out the remover in the straight line forcedly.

Note

The alignment sleeve can be removed/reinstalled with the sleeve itself attached to the tip of the remover. Great care should be taken so as not to lose or damage the alignment sleeve.
(Alignment sleeve: Sony P/N 9-980-074-01)



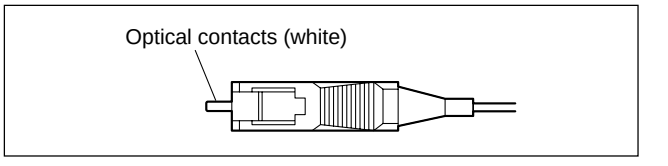
3. Clean the tip of the white optical contacts by a cotton swab moistened with alcohol.



4. Insert the remover with the alignment sleeve attached to its tip, and push it until it clicks.
5. Rotate the remover counterclockwise to install the alignment sleeve, and extract the remover.

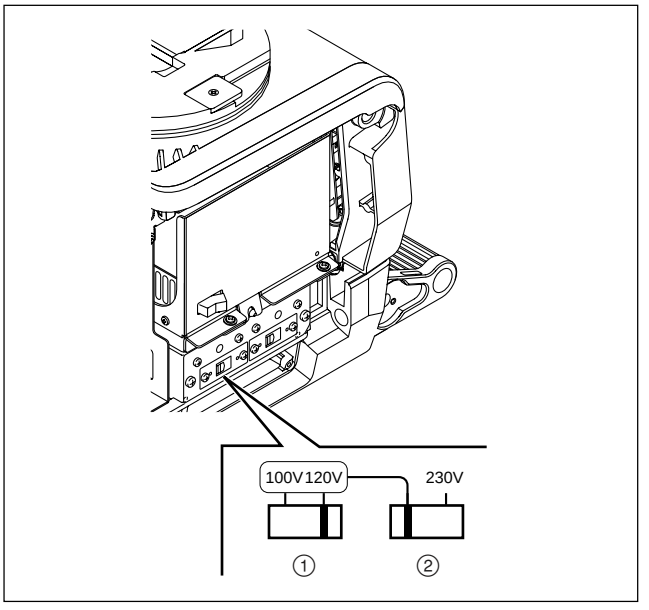
[Connector]

Clean the tip of the white optical contacts by a cotton swab moistened with alcohol.

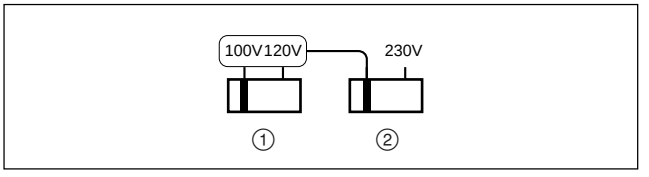


1-8. Setting the Utility Out Voltage (HDC1000R)

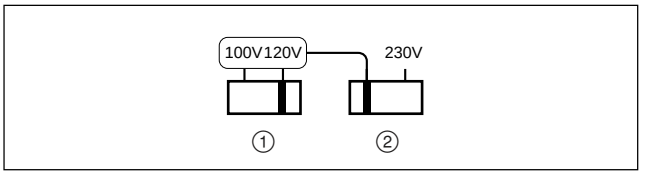
Set the utility out voltage in accordance with the voltage of peripheral devices when they are connected to the camera. The setting of the utility out voltage can be made by the combination of the switches ① and ② in the figure.



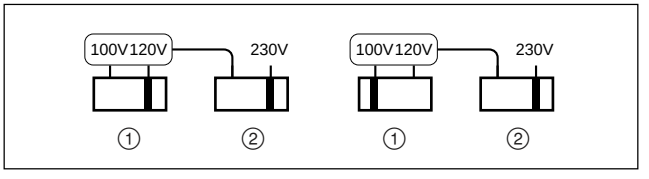
• When setting to 100 V, set as shown below.



• When setting to 120 V, set as shown below.



• When setting to 230 V, set as shown below.
Setting of the switch ① is not required.



1-9. Notes on Flexible Card Wire

1-9-1. Disconnecting/Connecting Flexible Card Wire

The flexible card wires are used between the boards of HDC1000R/1400R/1450R/1500R/1550R/1580R. Take care not to bend forcedly these flexible card wires. This shortens the wire life.

HDC1000R
- Between CN-3132 and DR-633
- Between CN-3132 and PA-355
- Between TG-266 and DR-633
- Between AT-166G and SW-1233
- Between MB-1060G and CN-2609G

HDC1400R/1450R/1500R/1550R/1580R
- Between CN-3132 and DR-633
- Between CN-3132 and PA-355
- Between TG-266 and DR-633
- Between MB-1059GA and CN-2619G
- Between MB-1059GA and CN-2621GA
- Between MB-1059GA and SW-1273G
- Between MX-109 and TR-136 (HDC1450R/1550R)

Type-A

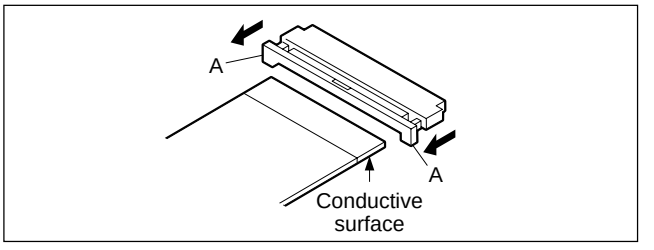
Disconnecting

Slide portions A in the direction of the arrow to unlock and pull out the flexible card wire.

Connecting

Notes
- Be careful not to insert the flexible card wire obliquely.
- Check that the conducive surface of the flexible card wire is not soiled with dust.

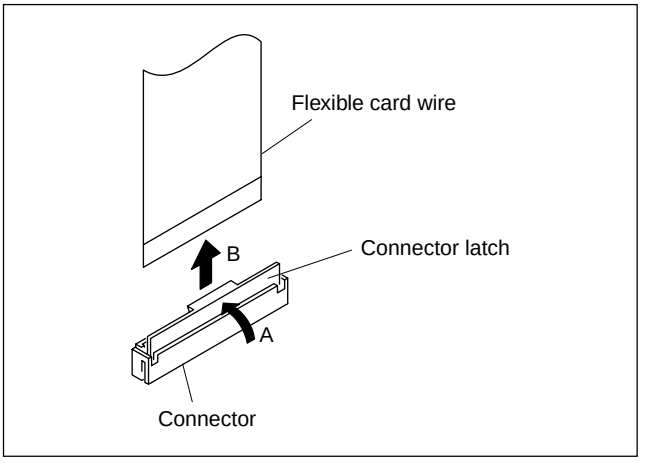
1. Slide portions A in the direction of the arrow and insert the flexible card wire with the conductive surface downward as far as it will go.
2. Slide portions A in the reverse direction to lock.



Type-B

Disconnecting

1. Open the connector latch in the direction of arrow A to release the lock.
2. Remove the flexible card wire in the direction of arrow B.

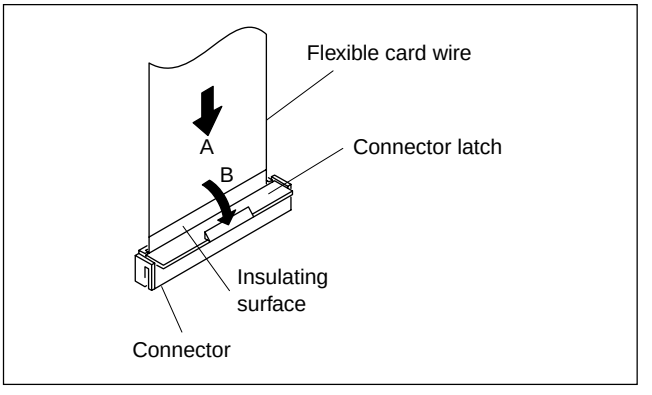


Connecting

Notes

- Be careful not to insert the flexible card wire obliquely.
- Check that the conducive surface of the flexible card wire is not soiled with dust.

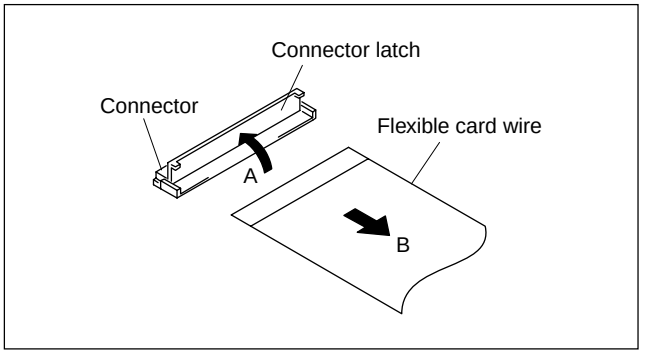
1. Hold the flexible card wire with its insulating surface facing to the front, and insert it in the direction of arrow A.
2. Close the connector latch in the direction of arrow B to lock it.



Type-C

Disconnecting

1. Open the connector latch in the direction of arrow A to release the lock.
2. Remove the flexible card wire in the direction of arrow B.

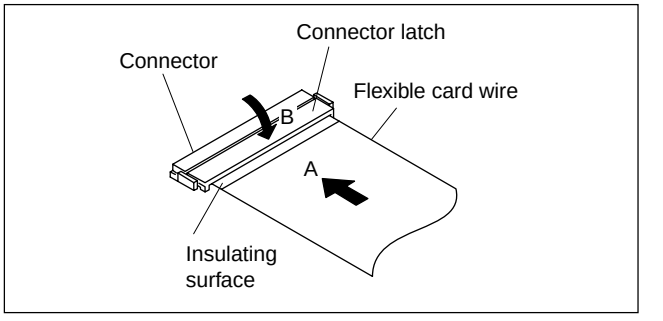


Connecting

Notes

- Be careful not to insert the flexible card wire obliquely.
- Check that the conducive surface of the flexible card wire is not soiled with dust.

1. Hold the flexible card wire with its insulating surface facing upward, and insert it in the direction of arrow A.
2. Close the connector latch in the direction of arrow B to lock it.



1-9-2. Forming of the Flexible Card Wire

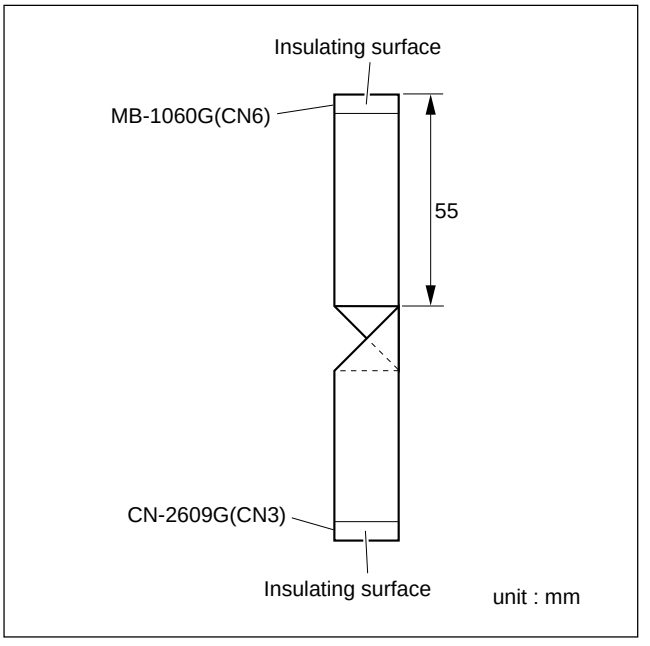
If using a new flexible card wire, be sure to fold it by hand it as shown in the figure before installation.

Note

Never fold it back after being formed once.

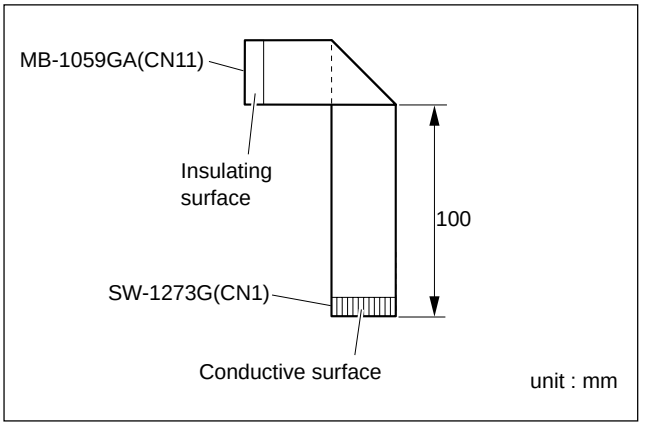
HDC1000R

• MB-1060G board CN6 ↔ CN-2609G board CN3



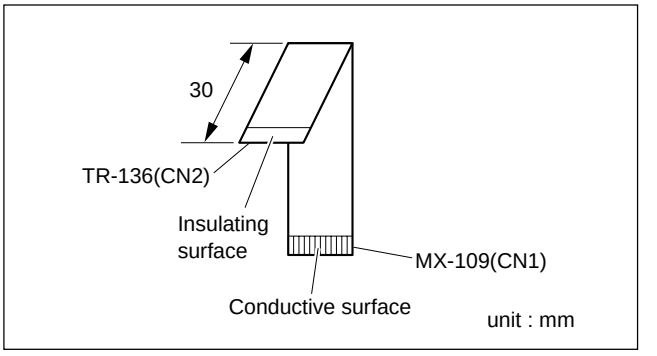
HDC1400R/1450R/1500R/1550R/1580R

• MB-1059GA board CN11 ↔ SW-1273G board CN1



HDC1450R/1550R

• MX-109 board CN1 ↔ TR-136 board CN2



1-10. Notes on Replacement of Circuit Board

1-10-1. Description on EEPROM Data

The table below gives the stored data of EEPROM (FRAM) on every printed circuit board.

Board	Ref. No.	Stored data
AT-163A	IC133	Board adjustment data (VDA, DPR), and paint data
	IC403	PLD data
TG-266	IC6	PLD data
	IC39	RPN compensation data
	IC40	CCD adjustment data
AU-298	IC11, IC12, IC13	Status of the stand by intercom
SDI-84A (HDC1000R/1400R/1500R/1580R)	IC212	PLD data
TR-136 (HDC1450R/1550R)	IC504	PLD data
VDA-63A	IC109	PLD data
DAP-33A	IC202	PLD data
DPR-265A	IC601	PLD data

Notes

- When the replacement is needed, remove the IC attached to the former board and replace it to the new board.
- The IC listed above cannot be replaced with a new one because it is the EEPROM that is the storing data inherent in the board. The part number listed in “Spare Parts” is for EEPROM which is not programmed. If replacement is needed, contact your local Sony Sales Office/Service Center.

1-10-2. Adjustment after Replacement of Board

When replacing or repairing the board, perform the electrical alignment referring to Section 3.

1-10-3. Adjustment and Setting Items when Replacing AT-163A Board

Camera settings and various files are stored in the AT-163A board. When the AT-163A board is replaced, the contents of the reference file, scene file, lens file, and operator file are lost. Store these files in a Memory Stick or other storage media beforehand, and then replace the AT-163A board.
Since the OHB file is stored in the OHB assembly, it is not lost by the replacement of the board.

Replacement

1. Store the reference file, scene file, and operator file in the memory stick. (Refer to “Section 4. File System.”)
2. Install the latest version of the firmware programs. (Refer to “Section 1-12. Upgrading the Software.”)
3. Execute ALL PRESET on the REFERENCE page of the FILE menu, and then perform “reference store.” (Refer to “Section 4-5. Reference File”)

   Note

   If ALL PRESET is not executed, the intercom panel may not work correctly.

4. For HDC1000R, set the destinations of the intercom with the SERVICE menu. (Refer to “INTERCOM” in “Section 5. Setup Menu.”)
5. Adjust the adjustment items of the VDA and DPR boards. (Refer to “Section 3. Electrical Alignment.”)
6. Install the stored reference file, scene file, and operator file at the step 1, and then perform “Level auto setup.” (Refer to “Reference File” in “Section 4. File System.”)

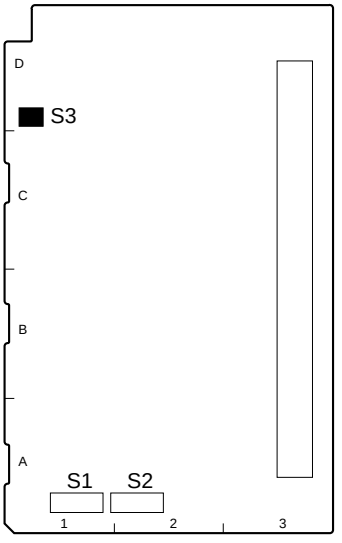
1-11. Setting Microphone Power and Intercoms

1-11-1. How to Supply a Power of +12 V

This unit can supply +12 V for MIC POWER to the microphone connected to the AUDIO IN connector.

Setting Procedure

Set the switch S3 on the AU-298 board to ON, and set on the MIC POWER switch of AUDIO IN connector referring to the Operation Manual.



AU-298 BOARD (SIDE A)

Ref. No.	Contents
S3-1	Switch ON to supply +12 V for MIC POWER to the microphone connected to the AUDIO IN CH1 connector.
S3-2	Switch ON to supply +12 V for MIC POWER to the microphone connected to the AUDIO IN CH2 connector.

1-11-2. Setting Intercoms

Since there are various types and usages of headsets for the intercoms, appropriate settings must be made for each type of headset.

Talk (microphone) setting

Check the characteristics of the microphone attached to the headset, and make the microphone setting with the camera menu. Microphone sensitivity, power supply system, balanced/unbalanced inputs can be set. Since intercom 1 and intercom 2 are independent, make settings for each intercom.

- Normal carbon microphone
  Set “INTERCOM1 MIC” and “INTERCOM2 MIC” in <HEADSET> to “CARBON.”
  Microphone sensitivity, power supply system, and balanced/unbalanced inputs are automatically set.
- Normal dynamic microphone
  Set “INTERCOM1 MIC” and “INTERCOM2 MIC” in <HEADSET> to “DYNAMIC.”
  Microphone sensitivity, power supply system, and balanced/unbalanced inputs are automatically set.
- Other types of microphone
  Set “INTERCOM1 MIC” and “INTERCOM2 MIC” in <HEADSET> to “MANUAL.”
  Set microphone sensitivity, power supply system, and balanced/unbalanced inputs according to the microphone to be used.

Receive (headphone) setting

The headphone operation varies depending on the wiring of the headset.
The following shows settings when this unit is connected to the INTERCOM connector such that the wiring from the right ear is connected to pin 5 of the INTERCOM connector and the wiring from the left ear is connected to pin 4 of the connector.

- When the headphone is binaural type and you want to hear the same sound with each ear or when the headphone is single-ear type, set “INTERCOM/PGM” in <INTERCOM> to “MIX.”
- When the headphone is binaural type and you want to hear different sound with each ear, set “INTERCOM/PGM” in <INTERCOM> to “SEPARATE.”
  You can hear INTRECOM and PGM separately with each ear.
- To set a desired channel (left/right), set “INTERCOM/PGM” in <INTERCOM> to “SEPARATE.”
  Set a channel (left/right) in <RECEIVE SEL> where INTRECOM, PGM1, PGM2 or TRACKER is audible.
- To hear your own voice, volume setting is available by “SIDE TONE” in <INTERCOM LEVEL>.

1-12. Upgrading the Software

The ROM (IC118 and IC122 on the AT-163A board) version can be upgraded using the Memory Stick.
For upgrading the software, follow the procedure shown below.

1-12-1. Upgrading the MAIN Program

HDC1000R

Tool

Memory Stick

Preparation

Copy the upgrading program to the Memory Stick in the following steps.

Note

To get the upgrading program (program files "hdc1000.rom" and "boot.rom"), contact your local Sony Sales Office/Service Center.

(1) Make the following directory on the Memory Stick.
\MSSONY\PRO\CAMERA\HDC1000

(2) Copy the program files "hdc1000.rom" and "boot.rom" to the directory made by step (1).

Procedures

1. Open the right side panel. (Refer to Section 1-4.)
2. Set the switch S1-4 on the AT-163A board to "ON".
3. Insert the Memory Stick in which the upgrading program is already saved.
4. Turn on the power.
   The upgrading status is displayed on the screen of the view finder.
5. When the version upgrade is completed, the message "Complete" will be displayed.
6. Turn off the power, and re-set the switch S1-4 on the AT-163A board to "OFF".

HDC1400R/1450R/1500R/1550R/1580R

Tool

Memory stick

Preparation

Copy the upgrading program to the Memory Stick in the following steps.

Note

To get the upgrading program (program files "hdc1000.rom" and "boot.rom"), contact your local Sony Sales Office/Service Center.

(1) Make the following directory on the Memory Stick.
\MSSONY\PRO\CAMERA\HDC1000

(2) Copy the program files "hdc1000.rom" and "boot.rom" to the directory made by step (1).

Procedures

1. Insert the Memory Stick in which the upgrading program is already saved.
2. Turn on the power while pressing the RET 2 button on the camera front and rotary encoder simultaneously.
   The upgrading status is displayed on the screen of the view finder.
3. When the version upgrade is completed, the message "Complete" will be displayed.

1-12-2. Upgrading the Boot Program

Tools

- Memory Stick
- ROM-28 board: (Sony Part No. : A-8326-017-A)
- Extension board EX-738: (Sony Part No. : A-8327-351-A)

Preparation

1. Copy the upgrading program to the Memory Stick in the following steps.

   Note

   To get the upgrading program (program files “hdc1000.rom” and “boot.rom”), contact your local Sony Sales Office/Service Center.

   (1) Make the following directory on the Memory Stick.
   \MSSONY\PRO\CAMERA\HDC1000

   (2) Copy the program files “hdc1000.rom” and “boot.rom” to the directory made by step (1).

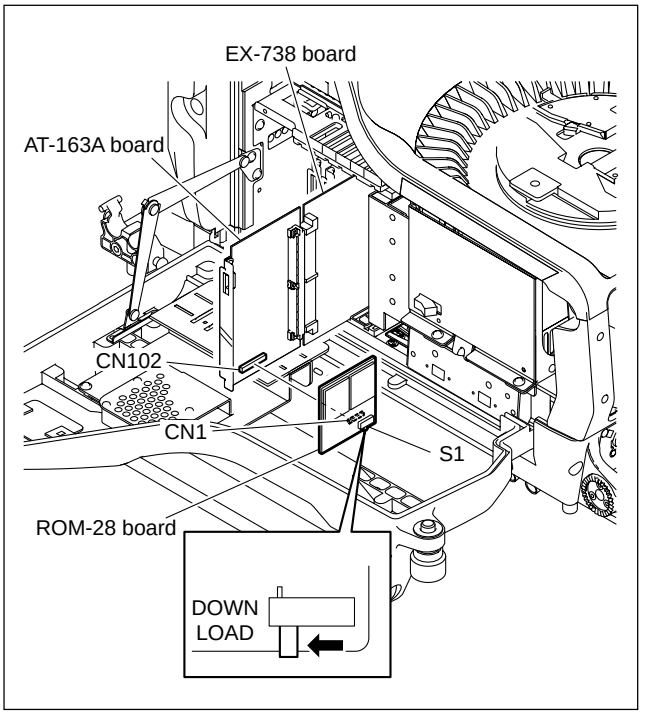
2. Save the upgrading Boot program in the ROMs H (IC2) and L (IC3) on the ROM-28 board.

   Note

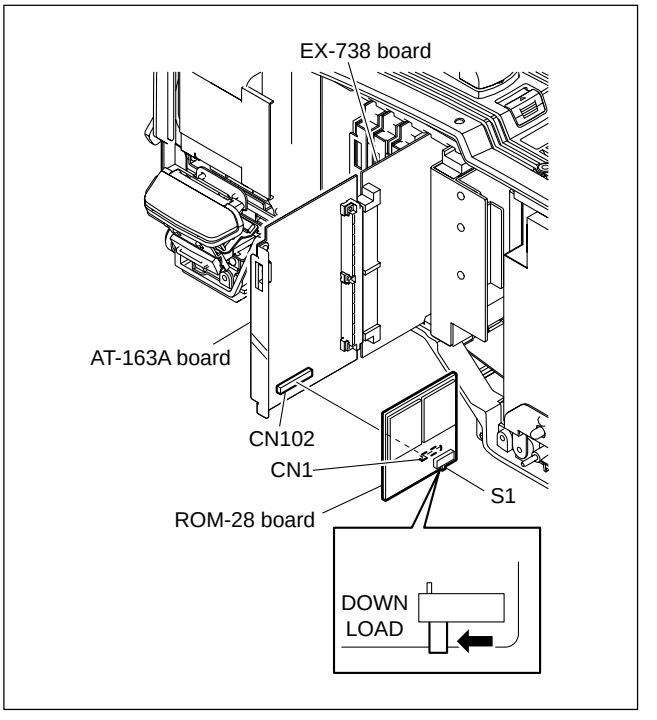
   For details of saving the upgrading program, contact your local Sony Sales Office/Service Center.

Procedures

1. Open the right side panel (HDC1000R), or inside panel (HDC1400R/1450R/1500R/1550R/1580R). (Refer to Section 1-4.)
2. Extend the AT-163A board using the EX-738 board.
3. Insert the Memory Stick in which the upgrading program is already saved.
4. Connect the connector CN1 on the ROM-28 board to the connector CN102 on the AT-163A board.
5. Set the switch S1 on the ROM-28 board to DOWN LOAD side.
6. Turn on the power.
   The upgrading status is displayed on the screen of the view finder.
7. When the version upgrade is completed, the message “Complete” will be displayed.
8. Turn off the power, and remove the ROM-28 board.
9. Put back the AT-163A board to the original position.
10. Turn on the power. The unit will start with the boot program upgraded.



HDC1000R



HDC1400R/1450R/1500R/1550R/1580R

1-13. Writing and Rewriting the PLD Internal Data

This unit uses the PLD (Programmable Logic Device) that supports the e-Production (EPR) system to write and rewrite the internal data.
If the part listed below needs to be replaced or to be upgraded, contact your local Sony Sales Office/Service Center.

Note

The part number of PLD (or ROM for PLD) in which data is not written yet, is shown in “Section 1. Spare Parts” of Maintenance Manual Volume 2.
Therefore, if part replacement is required, write the data by the following procedure.
In the case of the PLD type that runs on the program stored in external ROM, data needs not to be written only by replacing the part if the specific PLD only is defective.

e-Production system has the advantages shown below.

- To write/rewrite the PLD internal data:
  1. The standard fixture (cable) can be used.
  2. The standard software (PLD Download Tool) can be used.
- The PLD internal data is controlled in the Sony Database Server under the name of Project file (E_xxx_xxx_xx_xx).
- The printed circuit board is equipped with the standard connector (EPR connector) to write the PLD internal data. The indication “EPR” is shown on the printed circuit board.

Corresponding PLD

PLD (Ref No./board name)	EPR connector (Ref No./board name)	Project file No.
IC404/AT-163A IC403/AT-163A ∗1	CN401/AT-163A	∗8 E_000_004_49_xx
IC201/DAP-33A IC202/DAP-33A ∗2	CN2/DAP-33A	∗8 E_000_004_50_xx
IC408/SDI-84A IC212/SDI-84A ∗3 (HDC1000R/1400R/1500R/1580R)	CN202/SDI-84A	∗8 E_000_004_53_xx
IC9/TG-266 IC6/TG-266 ∗4	CN2/TG-266	∗8 E_000_004_47_xx
IC501/TR-136 IC504/TR-136 ∗5 (HDC1450R/1550R)	CN3/TR-136	∗8 E_000_003_01_xx
IC110/VDA-63A IC109/VDA-63A ∗6	CN100/VDA-63A	∗8 E_000_004_51_xx
IC604/DPR-265A IC601/DPR-265A ∗7	CN601/DPR-265A	∗8 E_000_004_52_xx

∗1: IC403/AT-163A is the ROM for IC404/AT-163A.
∗2: IC202/DAP-33A is the ROM for IC201/DAP-33A.
∗3: IC212/SDI-84A is the ROM for IC408/SDI-84A.
∗4: IC6/TG-266 is the ROM for IC9/TG-266.
∗5: IC504/TR-136 is the ROM for IC501/TR-136.
∗6: IC109/VDA-63A is the ROM for IC110/VDA-63A.
∗7: IC601/DPR-265A is the ROM for IC604/DPR-265A.
∗8: The file name changes when upgrading.

Note

For checking the SDI-84A board, refer to Section 2-14.

Equipment required

- PLD download fixture
  (Sony part number: J-7120-140-A)
  The cable to connect PC to this unit.
- PC
  A PC having parallel port.
  A PC in which the PLD Download Tool software is already installed.
  For the applicable OS and the operating environment, refer to “Download Tool Operating Instruction for Device Programming”.

Data writing procedure

Data writing procedure in the PLD (or ROM for PLD) is outlined below.
For details of data writing procedure, refer to “Download Tool Operating Instruction for Device Programming”, which is available in the same site where the PLD Download Tool software is available.

1. Prepare the Project file.
   Note
   Download the Project file from the Sony Database Server.

2. Turn off the power of this unit. Connect the PC parallel port to the EPR connector of the target board using the PLD download fixture (cable).
3. Turn on the power of this unit.
   Start the Download Tool software and read the Project file.
4. Program the PLD (or ROM for PLD) with the Download Tool software.
5. Upon completion of programming, check that error message is not displayed. Turn off the power of this unit and back on.

1-14. Note on Replacement of Lithium Battery

A lithium battery is mounted on the DAP-33A board to back up Real Time Clock (RTC).
If a battery comes to the lifetime, then RTC stops. Therefore the battery replacement is required.

DAP-33A board/CR2032 : Sony part No. (1-528-174-11)

CAUTION

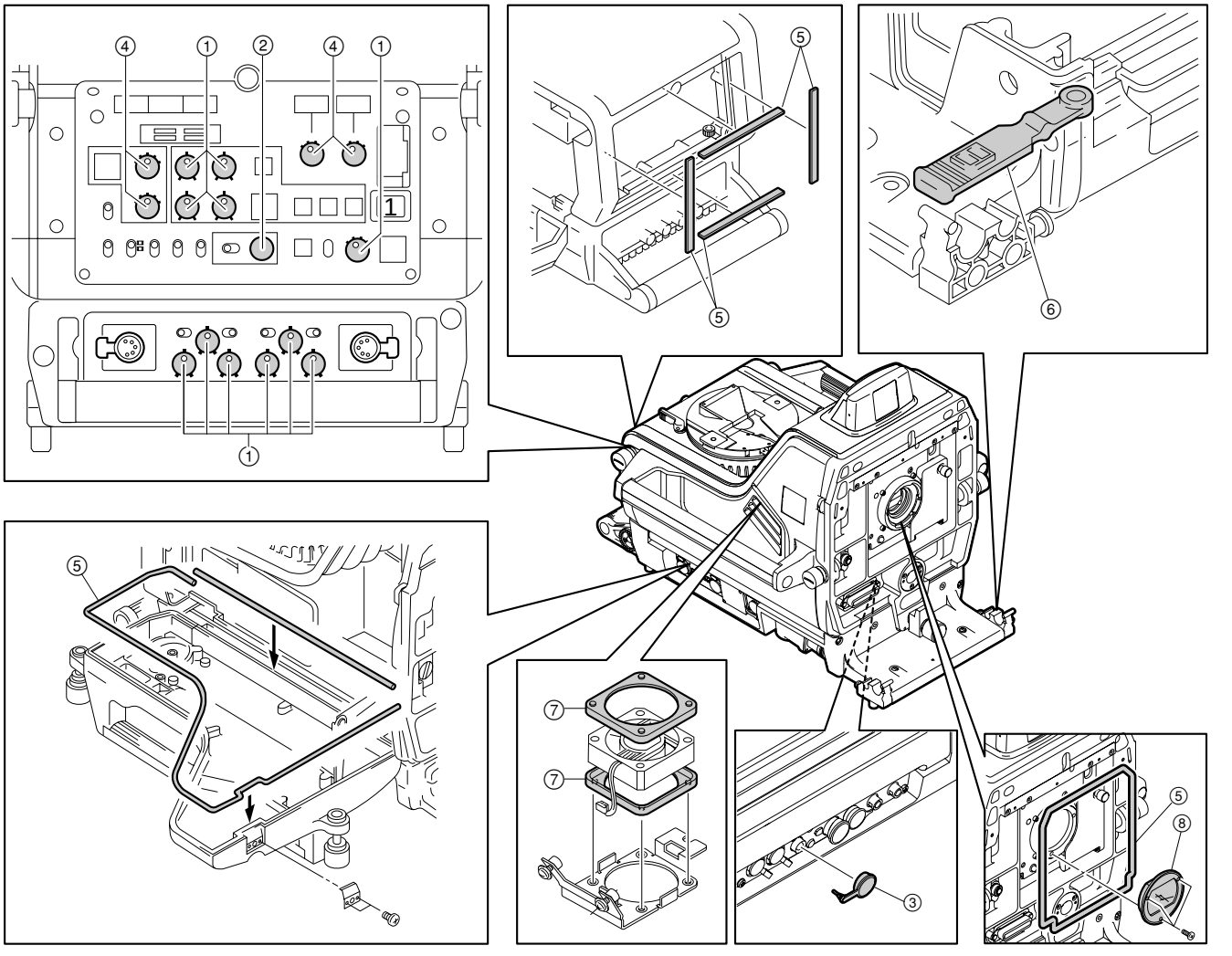
In replacing, ensure that the battery is installed with “+” and “−” poles connected to the correct terminals.
An improper connection may cause an explosion or leakage of fluid.

1-15. Recommended Replacing Parts

1-15-1. HDC1000R

Following parts are recommended replacing parts. The optical filter unit may become clouded with the lapse of time. By such a cloudy optical filter unit, the characteristics of this camera could not fully exploited, therefore replace it if necessary.
Besides, the parts made of rubber used for this camera may become cracked and split with the lapse of time, therefore also replace it if necessary.

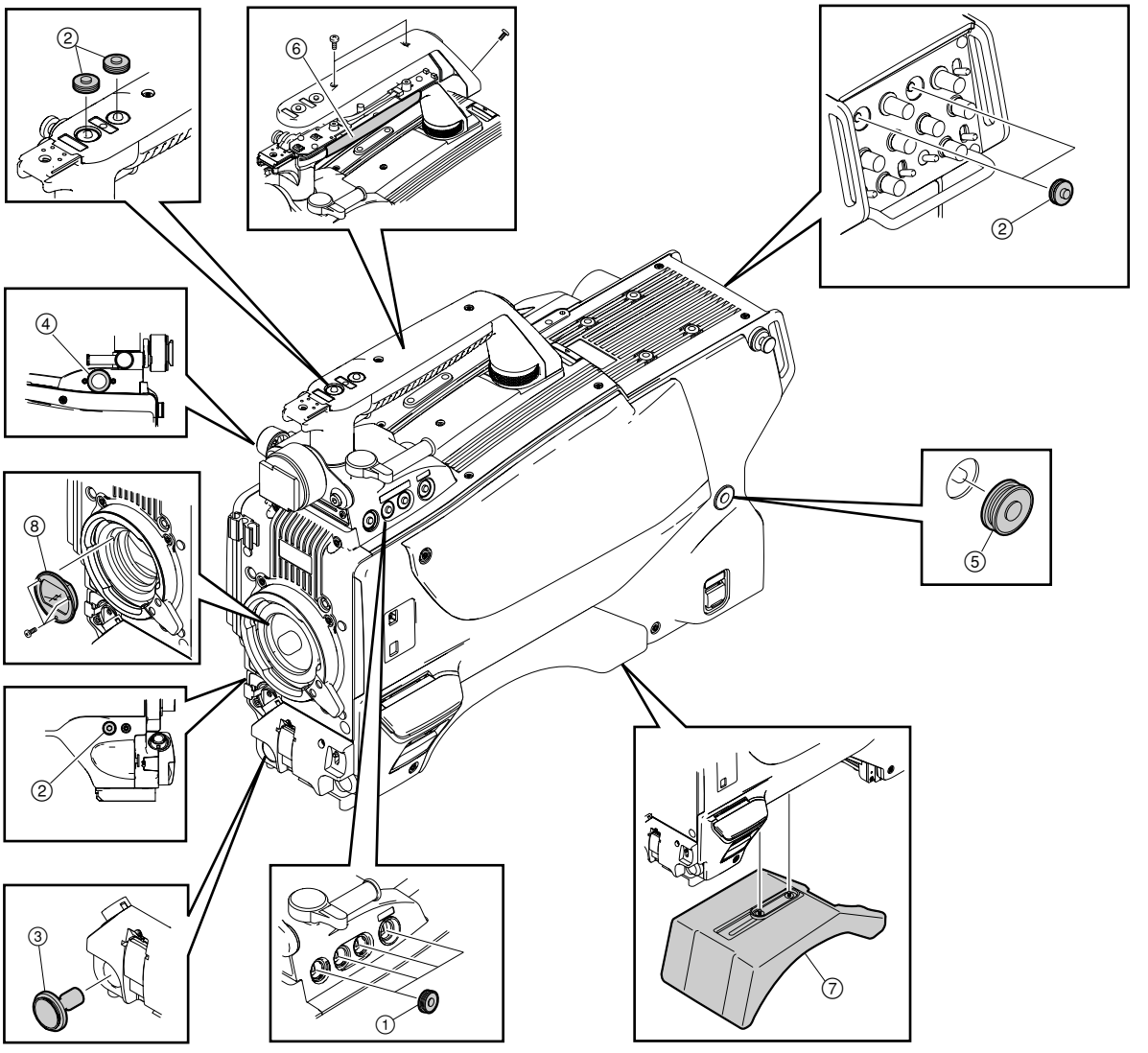
No.	Description	Sony Part No.
①	VOLUME KNOB DIA 3 ASSY	X-3167-563-X
②	KNOB, VOLUME DIA 6	3-602-483-0X
③	CAP, CONNECTOR	3-605-338-0X
④	KNOB, VOLUME DIA.6	3-872-577-0X
⑤	SHIELD CUSHION (C)	3-615-750-6X
⑥	BAND, CLAMP	3-612-712-0X
⑦	PACKING, FAN	3-627-260-0X
⑧	FILTER UNIT, OPTICAL	1-758-483-1X



1-15-2. HDC1400R/1450R/1500R/1550R/ 1580R

Following parts are recommended replacing parts. The optical filter unit may become clouded with the lapse of time. By such a cloudy optical filter unit, the characteristics of this camera could not fully exploited, therefore replace it if necessary.
Besides, the parts made of rubber used for this camera may become cracked and split with the lapse of time, therefore also replace it if necessary.

No.	Description	Sony Part No.
①	COVER, SWITCH	3-676-244-0X
②	COVER, SW	3-676-244-2X
③	BUTTON, VTR START	3-679-668-0X
④	PACKING, VF	3-710-024-0X
⑤	CALL COVER	3-857-347-0X
⑥	GRIP	4-138-676-0X
⑦	PAD ASSY, SHOULDER	A-8286-163-X
⑧	FILTER UNIT, OPTICAL	1-758-483-1X



1-15-3. Periodic Check/Replacement Parts

This table does not describe the guarantee period of part. The replacement period of each part is changed according to the environment and condition.
Refer to the “Section 2 Replacement of Main Parts” for the replacement method of part.

- HDC1000R

Description	Sony Part No.	Check/ Replacement Period
FAN, DC (60 SQUARE)	1-787-497-11	Replace every two years*

*: When used for eight hours a day.

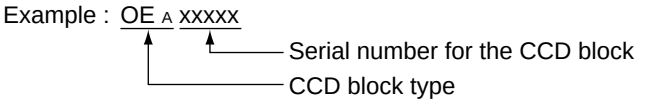
- HDC1400R/1450R/1500R/1550R/1580R

Description	Sony Part No.	Check/ Replacement Period
FAN, DC (41 SQUARE)	1-787-070-11	Replace every two years*

*: When used for eight hours a day.

1-16. Description of CCD Block Number

Every OHB assembly has its own ID number called CCD block number. It shows the CCD block type and serial number for the CCD block.
The CCD block number label is put in the OHB assembly.



Model	CCD block type
HDC1000R (CE, JN) HDC1400R (E, JN) HDC1450R (UC) HDC1500R (SY, E) HDC1550R (UC) HDC1580R (CN)	OE A
HDC1400R (CE) HDC1450R (CE) HDC1500R (CE) HDC1550R (CE)	OJ A

For replacing the OHB assembly, refer to Section 2-1.

1-17. Optional Fixtures

Name	Sony Part No.	Remarks
EX-738 Board	A-8327-351-A	For extension of plug-in boards
Extension assy, DPR-197	A-8344-327-A	For extension of DPR-265A and SDI-84A boards.
Alignment sleeve remover HC-001	J-6480-010-A	For female connector LEMO® DCC.91.312.5LA or equivalent
PLD download fixture	J-7120-140-A	PLD data download cable
OHB extension fixture	A-1547-787-A	For extension of OHB assembly

1-18. Notes 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.
Parts list has the present standardized repair parts.

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.

1-19. Lead-free Solder

Boards requiring use of lead-free solder are printed with a lead free mark (LF) indicating the solder contains no lead. (Caution: Some printed circuit boards may not come printed with the lead free mark due to their particular size.)

: LEAD FREE MARK

Notes

- Be sure to use the lead-free solder for the printed circuit board printed with the lead free mark.
- 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

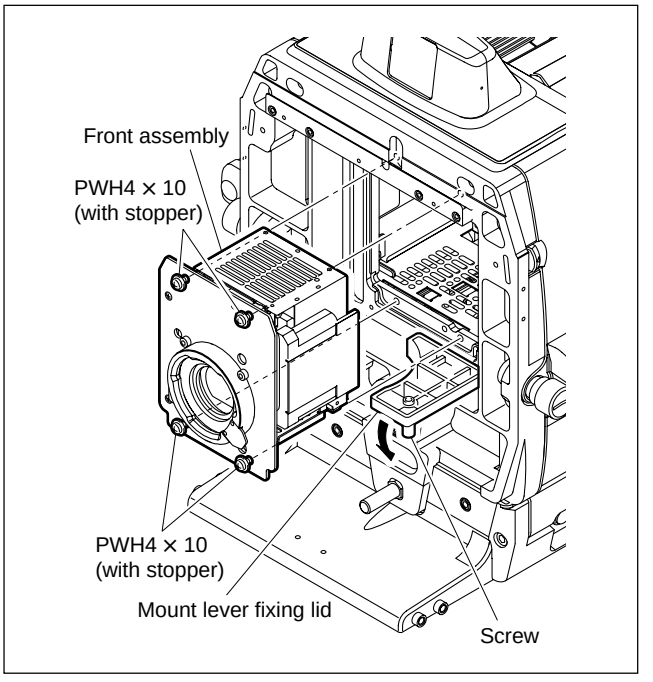
2-1. Replacing the OHB Assembly

Note

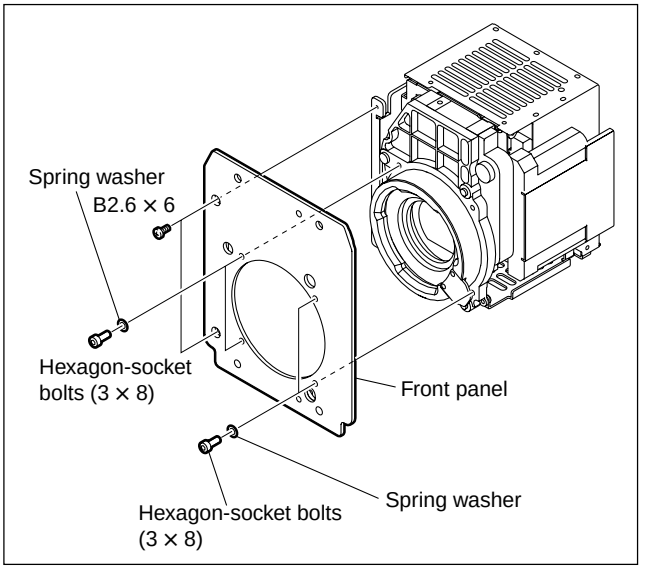
Never remove or install the OHB assembly with the power turned on. Because touching internal harness to the cabinet or other printed circuit boards during replacement causes short circuits or electric hazards.
Prior to replacement, be sure to disconnect the optical/ electrical cable or the cable connected to the DC IN connector in addition to turning off power switch.

2-1-1. HDC1000R

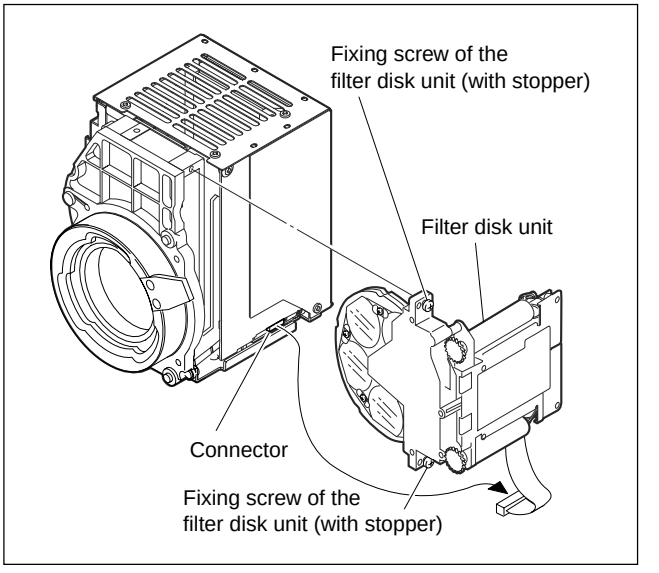
1. Loosen the screw of the mount lever fixing lid, and open the mount lever fixing lid in the arrow direction.
2. Loosen the four screws of front assembly, and remove the front assembly.



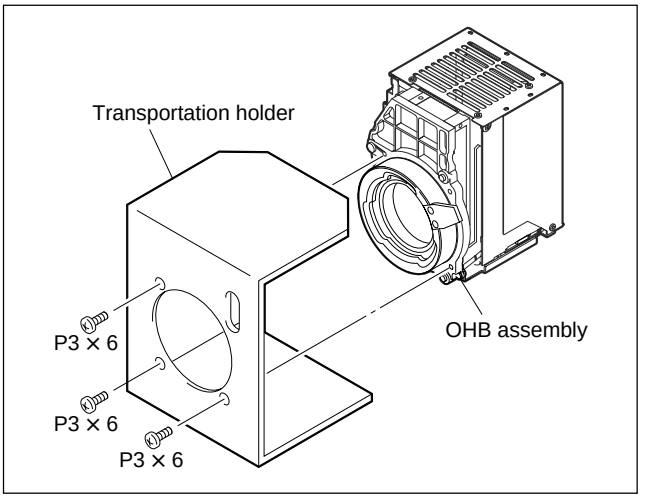
3. Remove the two screws and four hexagon-socket bolts, and remove the four spring washers, and front panel.



4. Disconnect the harness from the connector of OHB assembly, loosen the two fixing screws of the filter disk unit, and remove the filter disk unit.



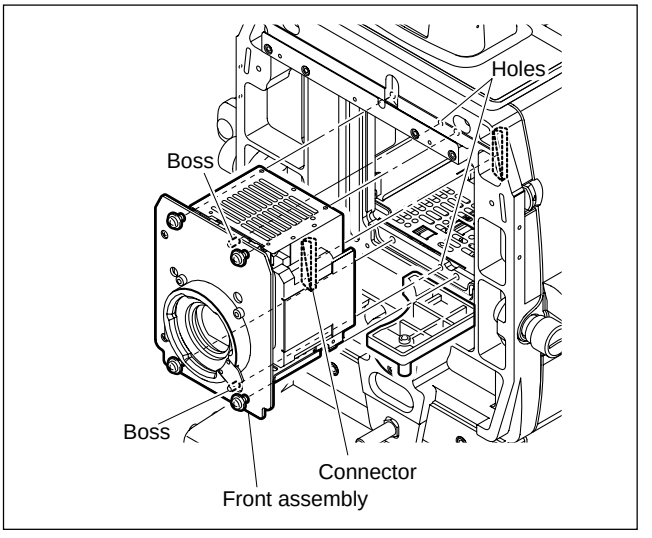
5. Remove the three screws, and remove the transportation holder from the OHB assembly for repair.



6. Install the OHB assembly by reversing the steps above.

Note

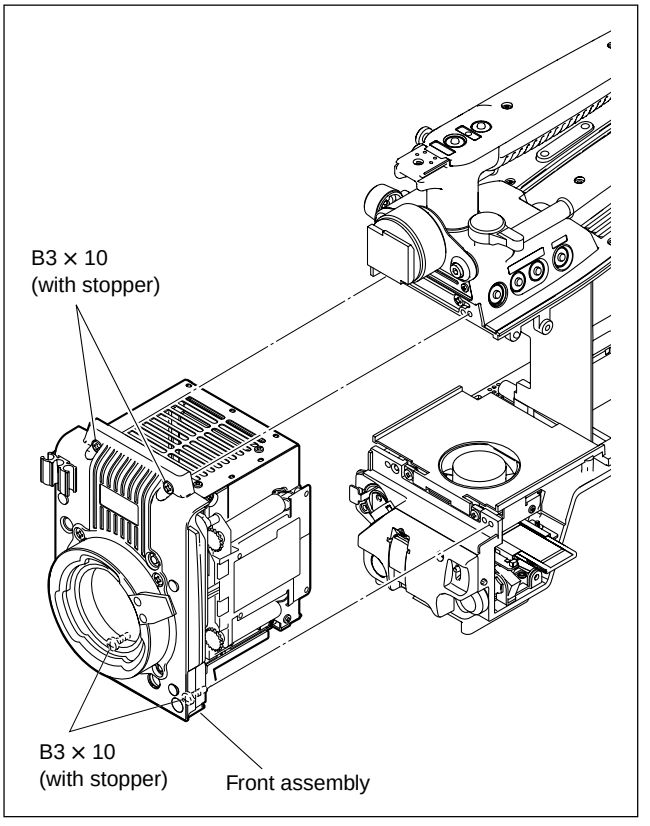
When installing the OHB assembly, adjust the boss of the front assembly to the hole on the chassis and connect the connector firmly.



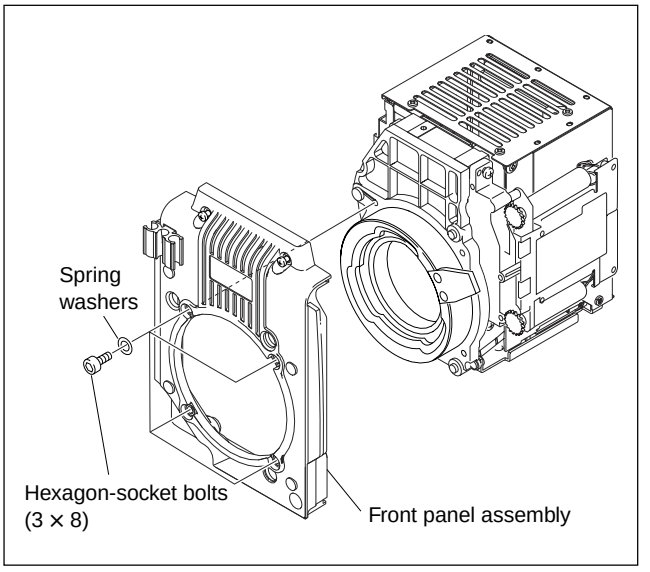
7. Set the OHB-TYPE on the service menu.
(Refer to Section 5-2.)

2-1-2. HDC1400R/1450R/1500R/1550R/1580R

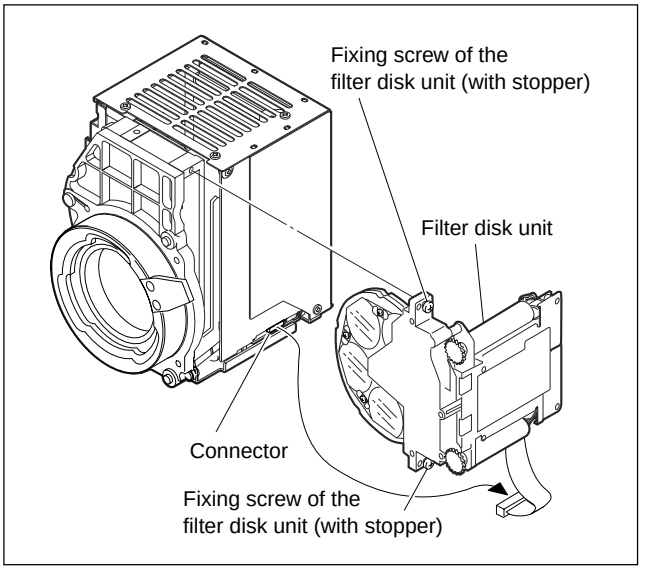
1. Loosen the four screws, and remove the front assembly.



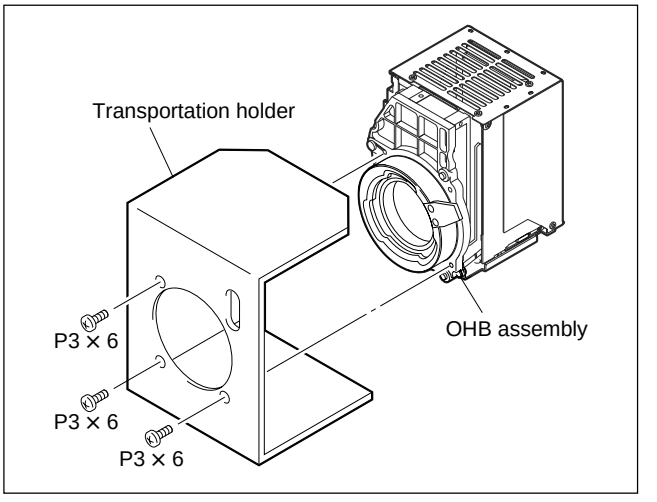
2. Remove the four hexagon-socket bolts and four spring washers, and remove the front panel assembly.



3. Disconnect the harness from the connector of OHB assembly, loosen the two fixing screws of the filter disk unit, and remove the filter disk unit.



4. Remove the three screws, and remove the transportation holder from the OHB assembly for repair.



5. Install the OHB assembly by reversing the steps above.
6. Set the OHB-TYPE on the service menu. (Refer to Section 5-2.)

2-2. Replacement of OHB Assembly Boards

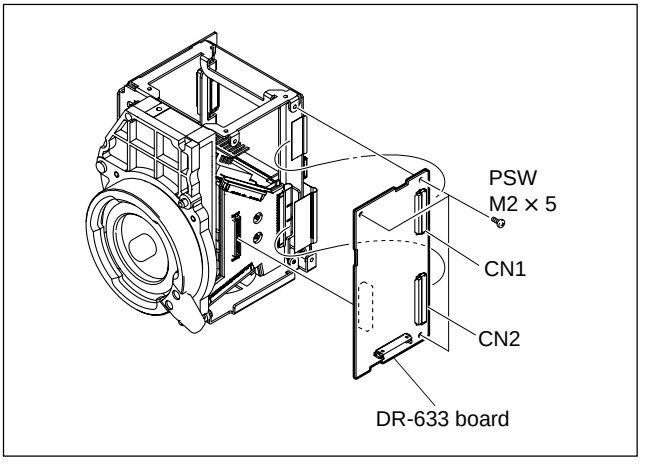
When replacing the boards in the OHB assembly, remove the OHB assembly from the main unit in advance.
For removing the OHB assembly, refer to Section 2-1.

Note

Be careful not to bend the flexible card wire. This shortens the wire life. (Refer to Section 1-9.)

2-2-1. DR-633 Board

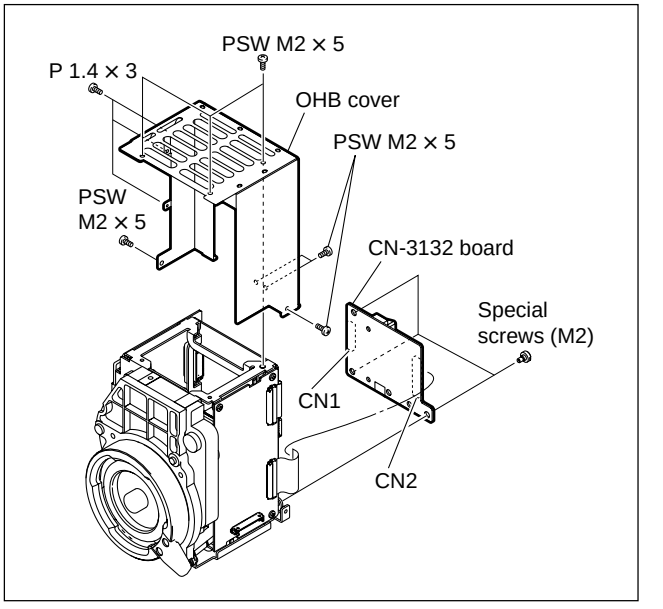
1. Remove the OHB cover.
   (Refer to Step 1 in the Section 2-2-2.)
2. Disconnect the flexible card wires from the connectors (CN1, CN2) on the DR-633 board.
3. Remove the three screws to remove the DR-633 board.



4. Install the board by reversing the steps above.

2-2-2. CN-3132 Board

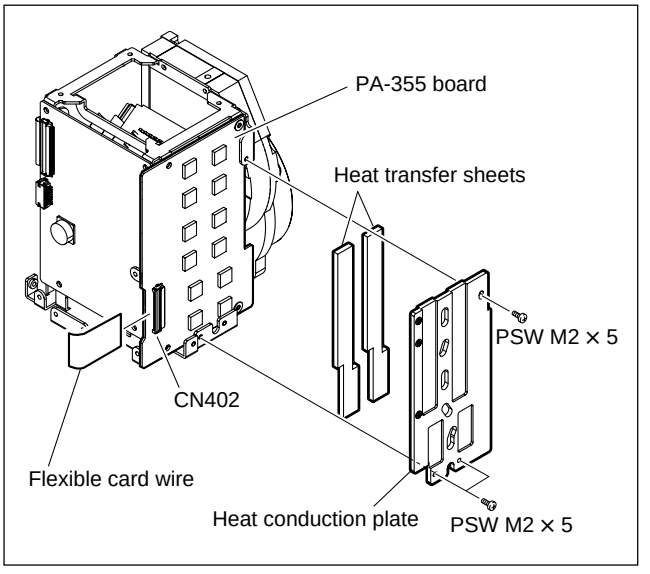
1. Remove the ten screws to detach the OHB cover.
2. Disconnect the flexible card wires from the connectors (CN1, CN2) on the CN-3132 board.
3. Remove the three special screws to remove the CN-3132 board.



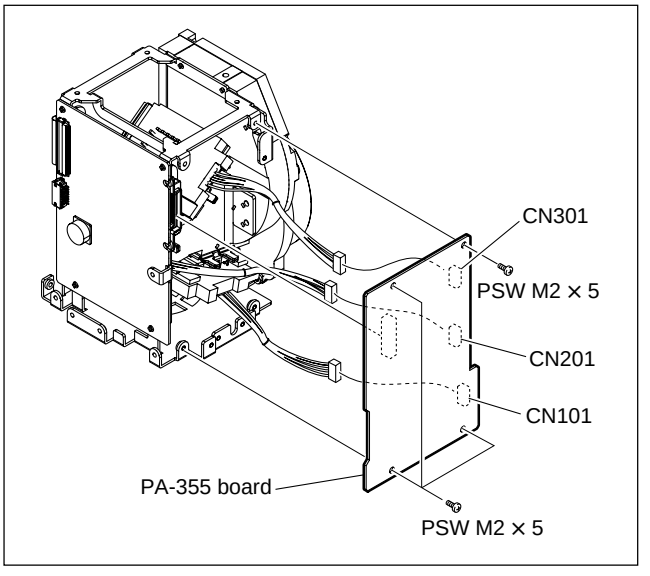
4. Install the board by reversing the steps above.

2-2-3. PA-355 Board

1. Remove the OHB cover.
   (Refer to Step 1 in the Section 2-2-2.)
2. Disconnect the flexible card wire from the connector (CN402) on the PA-355 board.
3. Remove the three screws to detach the heat conduction plate.
4. Peel the two heat transfer sheets off the PA-355 board.



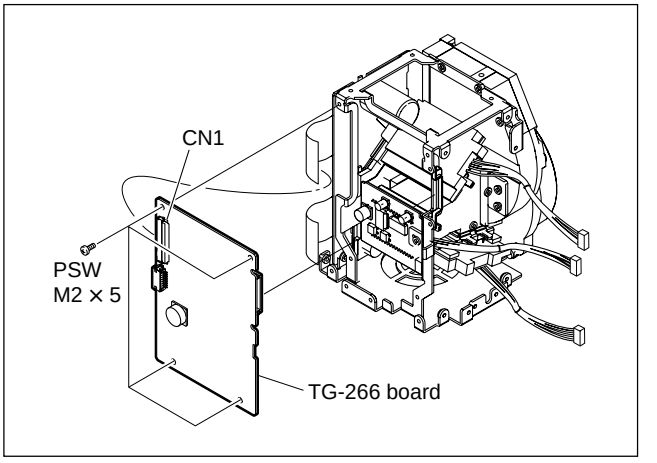
5. Remove the four screws to remove the PA-355 board.
6. Disconnect the harness from the connectors (CN101, CN201, and CN301) on the PA-355 board.



7. Install the board by reversing the steps above.

2-2-4. TG-266 Board

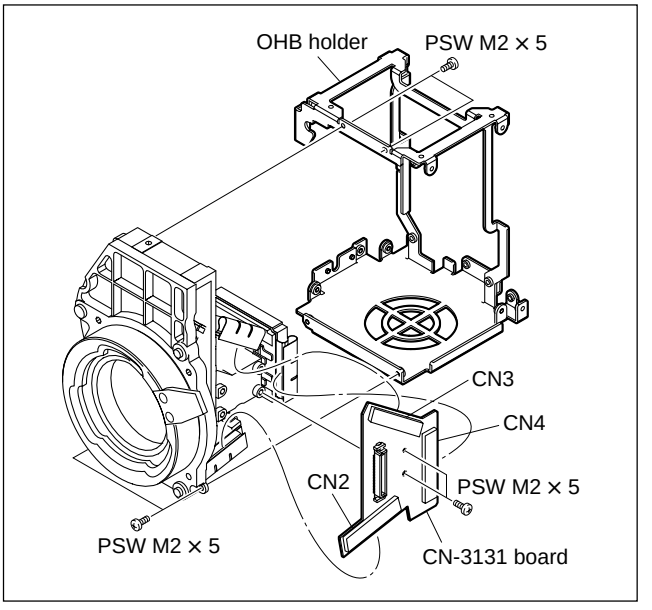
1. Remove the CN-3132 board. (Refer to Section 2-2-2.)
2. Remove the PA-355 board. (Refer to Section 2-2-3.)
3. Disconnect the flexible card wire from the connector (CN1) on the TG-266 board.
4. Remove the four screws to remove the TG-266 board.



5. Install the board by reversing the steps above.

2-2-5. CN-3131 Board

1. Remove the CN-3132 board. (Refer to Section 2-2-2.)
2. Remove the DR-633 board. (Refer to Section 2-2-1.)
3. Remove the PA-355 board. (Refer to Section 2-2-3.)
4. Remove the TG-266 board. (Refer to Section 2-2-4.)
5. Remove the four screws to detach the OHB holder.
6. Disconnect the flexible card boards from the connectors (CN2, CN3, and CN4) on the CN-3131 board.
7. Remove the two screws to remove the CN-3131 board.



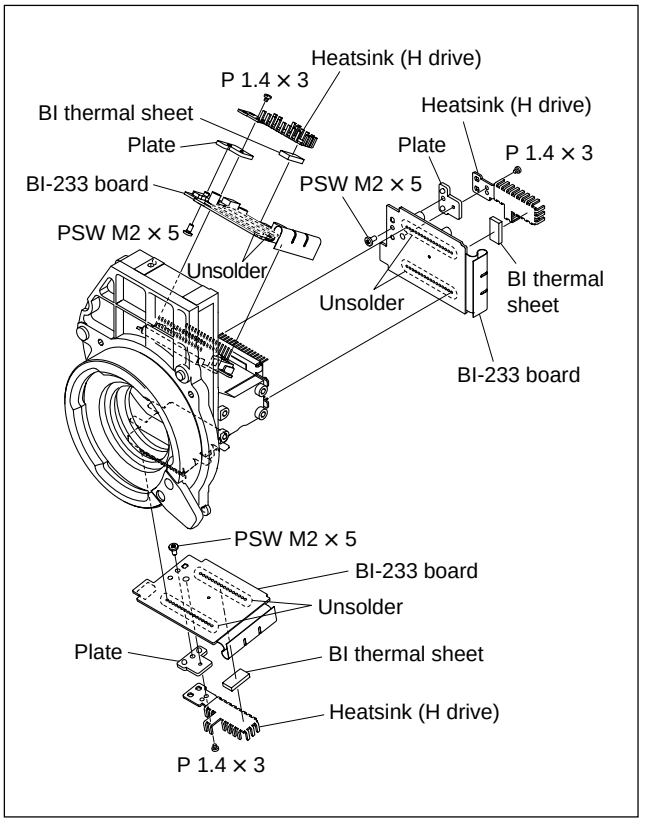
8. Install the board by reversing the steps above.

2-2-6. BI-233 Board

Note

The three BI-233 boards are installed in the OHB assembly, however the procedure is same.

1. Remove the OHB assembly. (Refer to Section 2-1-1.)
2. Remove the following boards from the OHB assembly. (Refer to Section 2-2.)
   DR/CN/PA/TG boards
3. Unsolder the BI-233 board, and remove the BI-233 board.
4. Remove the screw (P1.4 × 3) and screw (PSW M2 × 5), and remove the heatsink (D drive), BI thermal sheet and plate.

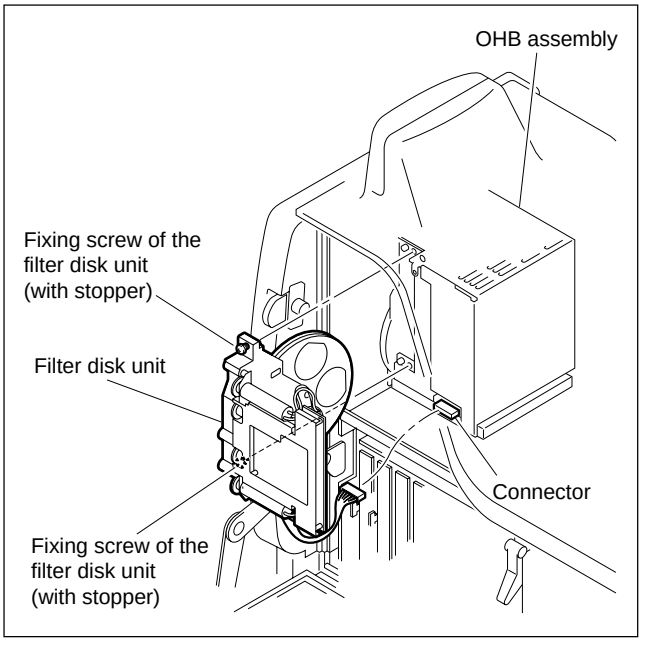


5. Install the board by reversing the steps above.

2-3. Replacing the Filter Disk Unit

2-3-1. HDC1000R

1. Open the right side panel. (Refer to Section 1-4.)
2. Disconnect the harness of the filter disk unit from the connector of the OHB assembly.
3. Loosen the two fixing screws of the filter disk unit, and remove the filter disk unit.



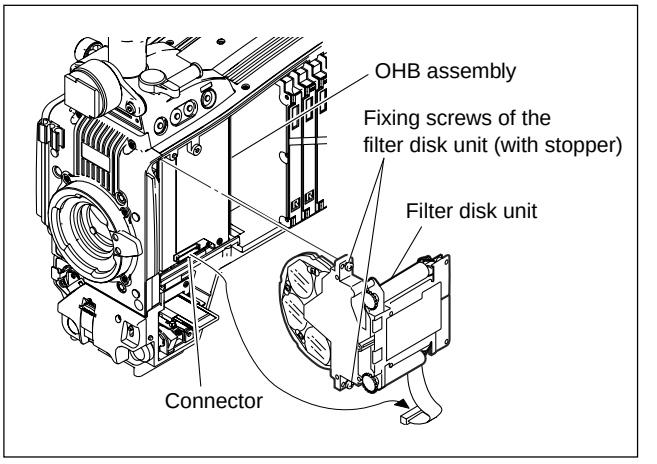
4. Install the filter disk unit by reversing the steps above.

Note

In installation, do not touch the surfaces of filters.

2-3-2. HDC1400R/1450R/1500R/1550R/1580R

1. Remove the inside panel. (Refer to Section 1-4.)
2. Disconnect the harness of the filter disk unit from the connector of the OHB assembly.
3. Loosen the two fixing screws of the filter disk unit, and remove the filter disk unit.



4. Install the filter disk unit by reversing the steps above.

Note

In installation, do not touch the surface of filters.

2-4. Replacing the Fan (HDC1000R)

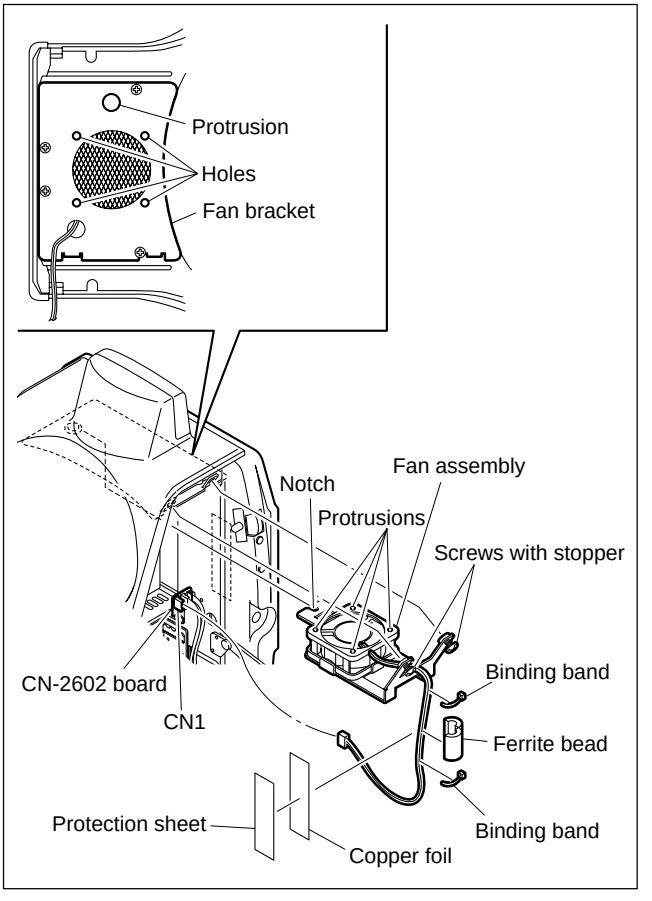
CAUTION

If the fan is out of order, the inside temperature of the unit will rise. Touching the inside in this state may cause a burn. When replacing the fan, allow a few minutes after powering off until the inside cools off.

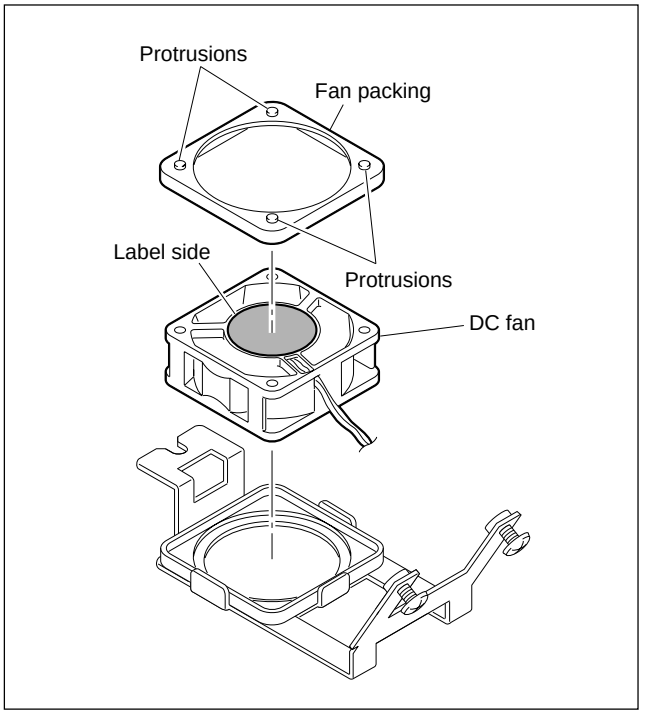
2-4-1. DC Fan (TOP)

When replacing, be sure to use the specified part.
DC Fan (TOP: 60 square): ⚠1-787-497-11

1. Open the left side panel. (Refer to Section 1-4.)
2. Remove the protection sheet and copper foil.
3. Loosen the two screws with stopper, and disconnect the harness from the connector (CN1) on the CN-2602 board.
4. Pull the notch on the fan assembly from the protrusion on the fan bracket, and remove the fan assembly.
5. Cut the two binding bands, and remove the ferrite bead.



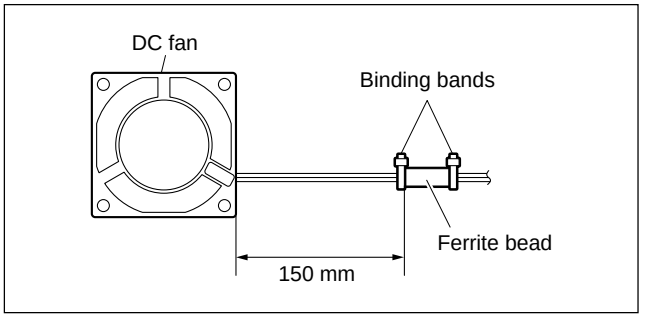
6. Detach the fan packing, and remove the DC fan.



7. Install the DC fan by reversing the steps above.

Notes

- Be careful of the orientation of the label side and the harness when installing the DC fan.
- To install the fan assembly, fit the notch on the fan assembly to the protrusion on the fan bracket, and the protrusions on the fan packing to the holes on the fan bracket.
- Attach the ferrite bead as following figure, and fix it by the two binding bands.
- The protection sheet and copper foil are nonreusable. When peeling off them, replace with new one.



2-5. Replacing the Fan (HDC1400R/ 1450R/1500R/1550R/1580R)

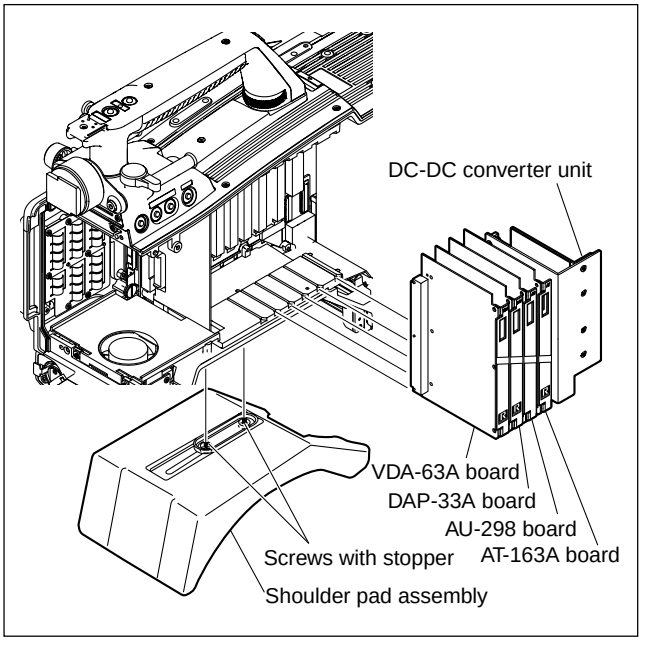
CAUTION

If any fan fails, the inside temperature of the unit will rise. Touching the inside in this state may cause a burn. Power off the unit and leave the unit until the inside cools down before replacing the fan.

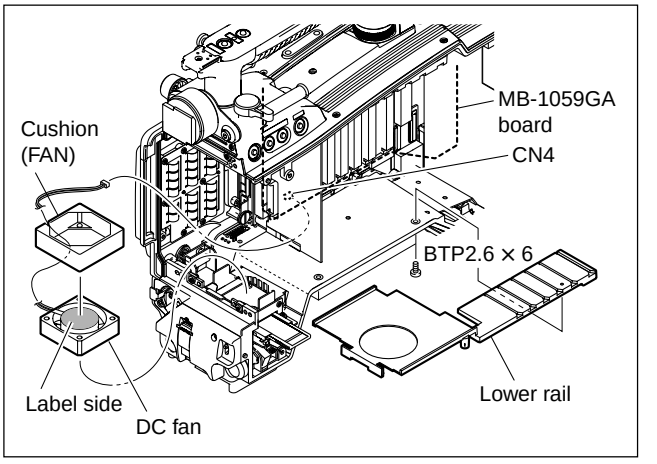
2-5-1. DC Fan (Front)

When replacing, be sure to use the specified part.
DC Fan (Front: 41 square): ⚠1-787-070-11

1. Remove the inside panel. (Refer to Section 1-4.)
2. Remove the front assembly. (Refer to Section 2-1.)
3. Loosen the two screws with stopper, and remove the shoulder pad assembly.
4. Draw all the plug-in boards and the DC/DC converter unit along the board rail grooves and remove them.



5. Remove the three screws to detach the lower rail.
6. Disconnect the fan harness from the connector (CN4) on the MB-1059GA board.
7. Remove the cushion (FAN) from the DC fan.



8. Install the front DC fan by reversing the steps above.

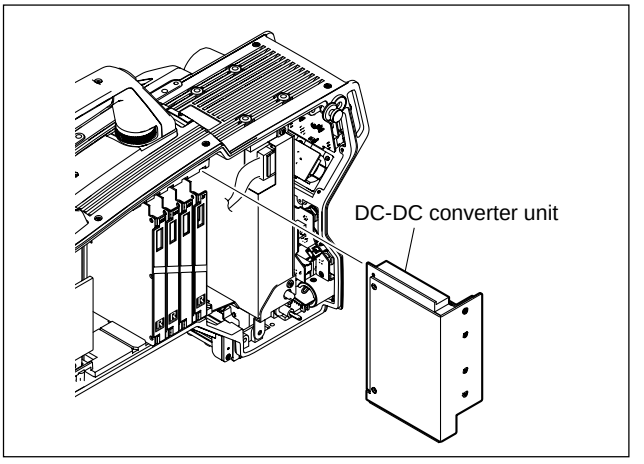
Note

Be careful of the orientation of the label side and the harness when installing the DC fan.

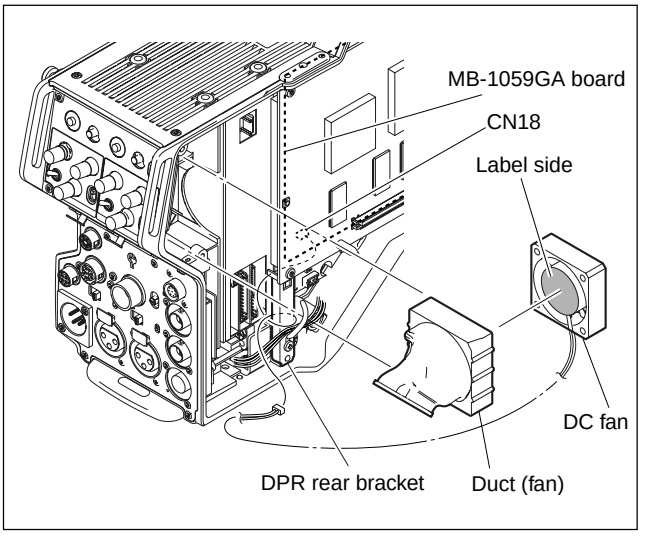
2-5-2. DC Fan (Rear)

When replacing, be sure to use the specified part.
DC Fan (Rear: 41 square): ⚠1-787-070-11

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Draw the DC/DC converter unit along the board rail grooves and remove it.



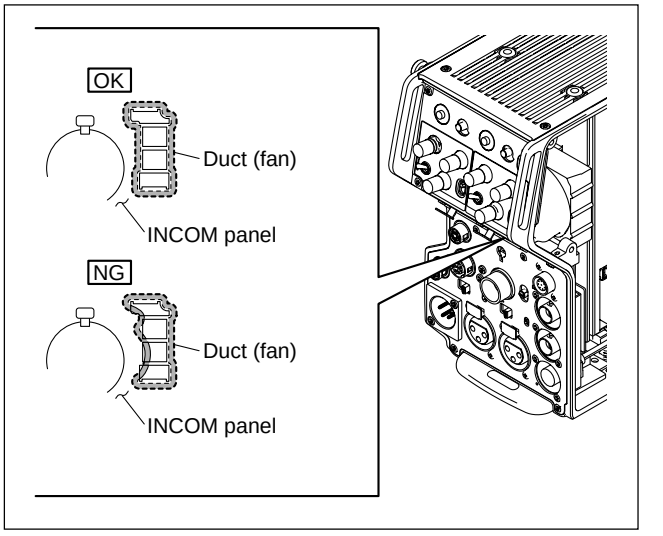
3. Disconnect the fan harness from the connector (CN18) on the MB-1059GA board.
4. Remove the fan harness from the DPR rear bracket, and remove the duct (fan).
5. Detach the DC fan from the duct (fan).



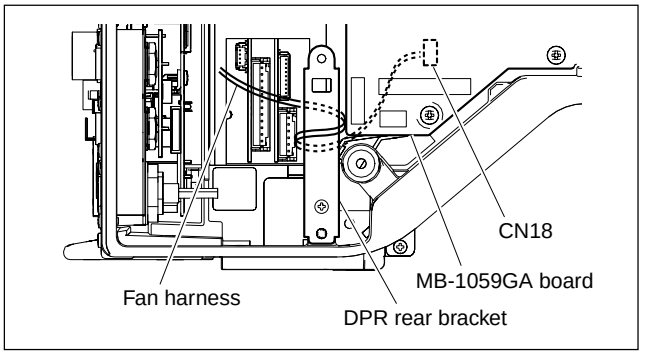
6. Install the rear DC fan by reversing the steps above.

Notes

- Be careful of the orientation of the label side and the harness when installing the DC fan.
- Attach the duct (fan) to the INCOM panel correctly so as to not block the ventilative hole.

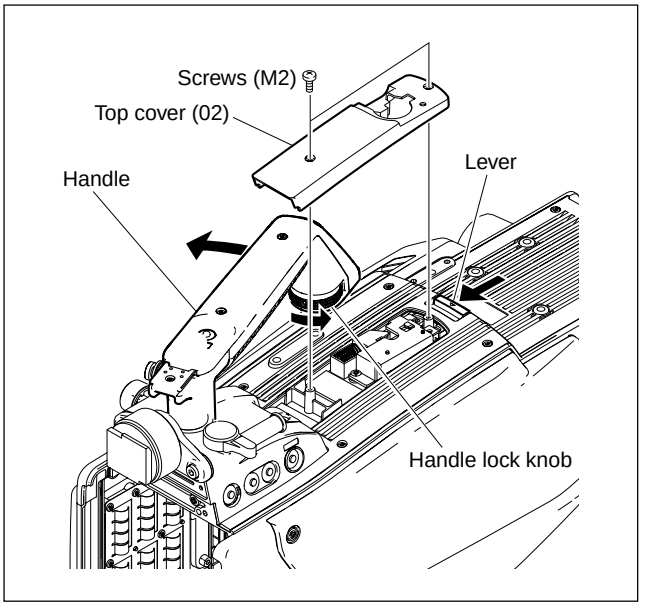


- Arrange the fan harness around the DPR rear bracket as shown below, and then connect it to the connector (CN18) on the MB-1059GA board.

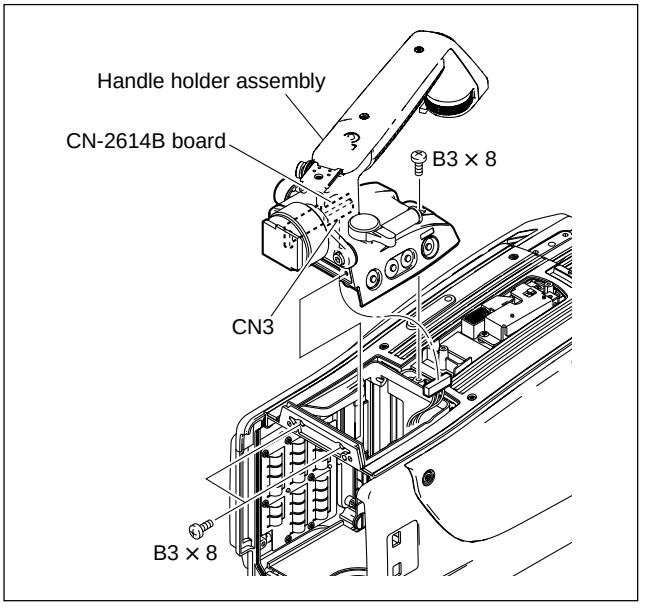


2-6. Replacing the VF DISP Switches (HDC1400R/1450R/1500R/1550R/ 1580R) (SW-1237 Board)

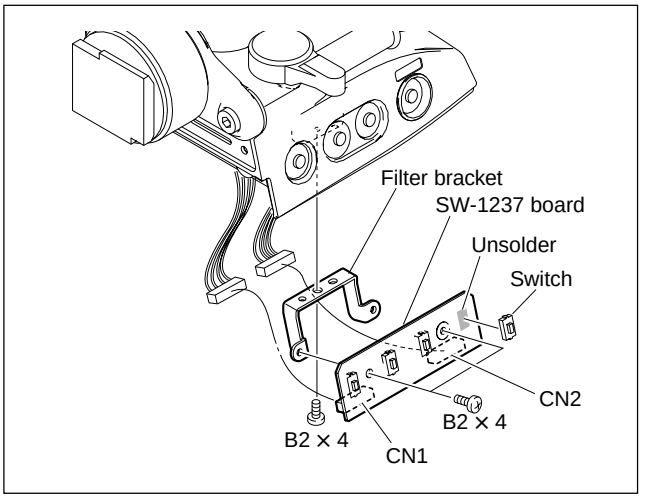
1. Remove the front assembly. (Refer to Section 2-1.)
2. Loosen the handle lock knob, and turn the handle while pressing the lever.
3. Remove the two screws, and remove the top cover (02) while pressing the lever.



4. Remove the three screws and pull out the handle holder assembly.
5. Disconnect the harness from the connector (CN3) on the CN-2614B board.



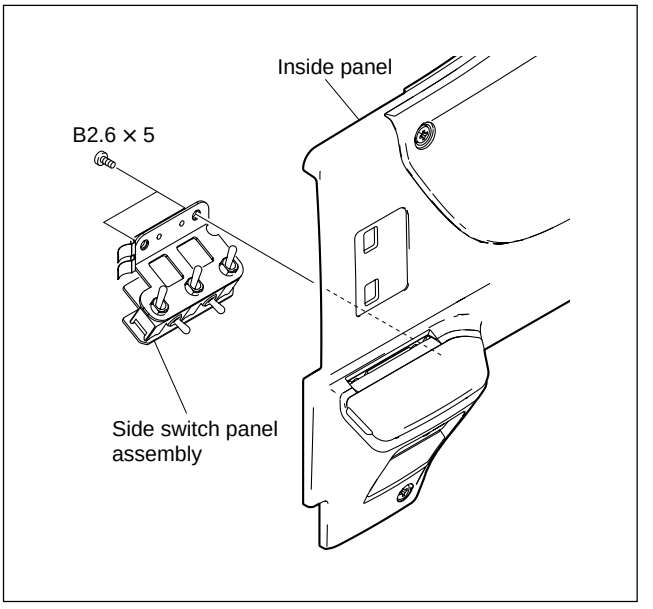
6. Disconnect the harnesses from the connectors (CN1, CN2) on the SW-1237 board.
7. Remove the screw, and remove the SW-1237 board.
8. Remove the two screws to detach the filter bracket from the SW-1237 board.
9. Unsolder the switch to be replaced from the SW-1237 board.



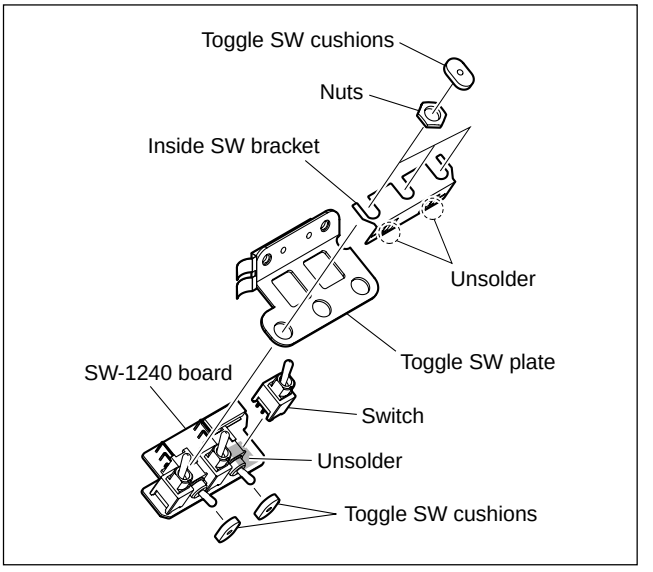
10. Install a new switch by reversing the steps above.

2-7. Replacing the Side Switch Panel Assembly (HDC1400R/1450R/1500R/1550R/1580R) (SW-1240 Board)

1. Remove the inside panel. (Refer to Section 1-4.)
2. Remove the two screws, and remove the side switch panel assembly.



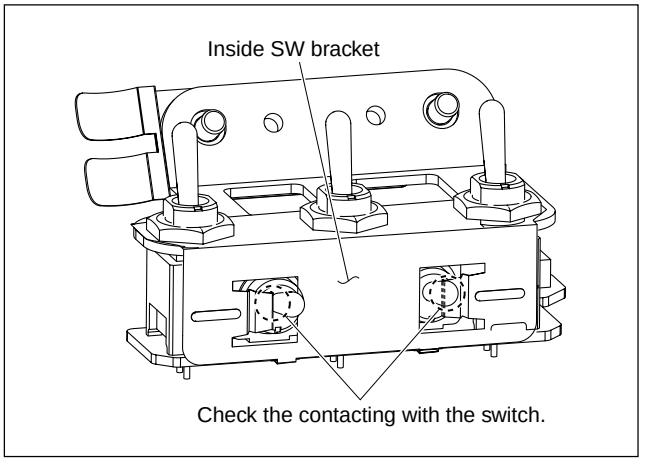
3. Remove the five toggle switch cushions from the side switch panel assembly.
4. Remove the three nuts and unsolder the inside SW bracket to detach the inside switch bracket and the toggle switch plate from the SW-1240 board.
5. Unsolder the switch to be replaced from the SW-1240 board.



6. Install a new switch by reversing the steps above.

Note

After the inside SW bracket is attached, check the inside SW bracket is in contact with the toggle SW.



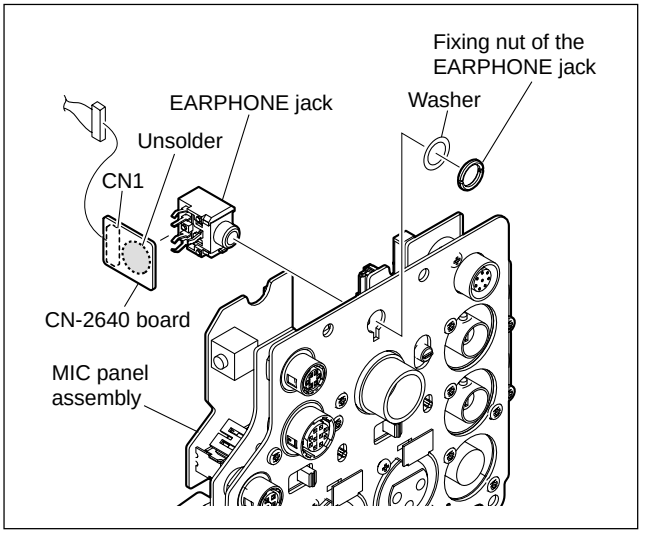
2-8. Replacing the Connectors (HDC1400R/1450R/1500R/1550R/ 1580R)

Note

Be careful not to bend the flexible card wire. This shortens the wire life. (Refer to Section 1-9.)

2-8-1. EARPHONE Jack (CN-2640 Board)

1. Remove the MIC panel assembly. (Refer to Section 2-8-2.)
2. Disconnect the harness from the connector (CN1) on the CN-2640 board.
3. Remove the fixing nut of the EARPHONE jack to detach the washer and the CN-2640 board.
4. Unsolder the EARPHONE jack from the CN-2640 board.



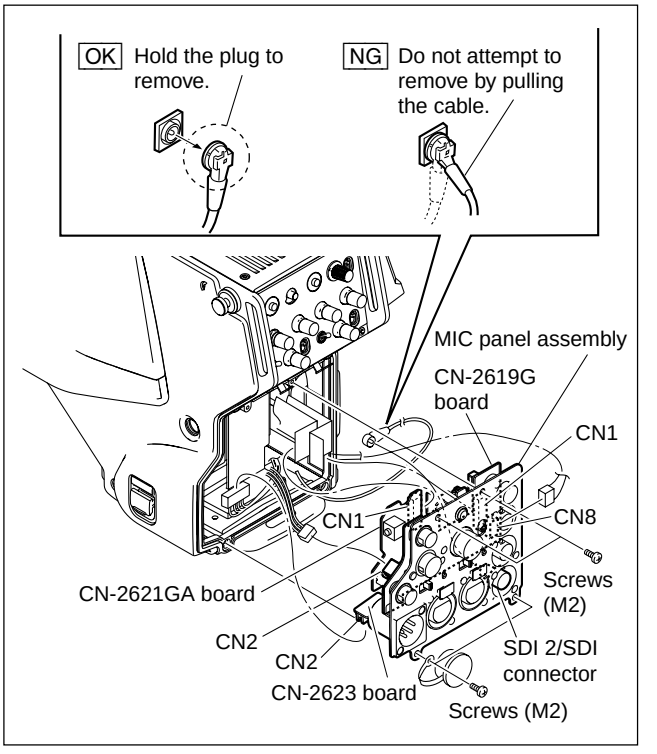
5. Install a new EARPHONE jack by reversing the steps above.

2-8-2. DC IN Connector (CN-2623 Board)

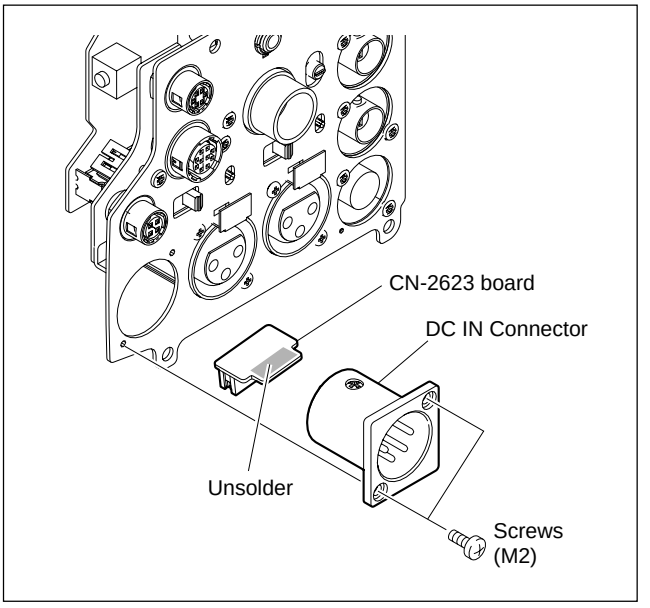
1. Remove the four screws, and pull out the MIC panel assembly.
2. Disconnect the flexible card wires from the connector (CN1) on the CN-2619G board and from the connector (CN1) on the CN-2621GA board.
3. Disconnect the harnesses from the connector (CN2) on the CN-2619G board, from the connector (CN2) on the CN-2623 board and from the connector (CN8) on the CN-2621G board.
4. Disconnect the coaxial cable from the SDI 2 connector (HDC1500R) or SDI connector (HDC1400R/1450R/ 1550R), and remove the MIC panel assembly.

   Note

   Be sure to hold the plug when disconnecting the coaxial cable. Do not pull the cable.



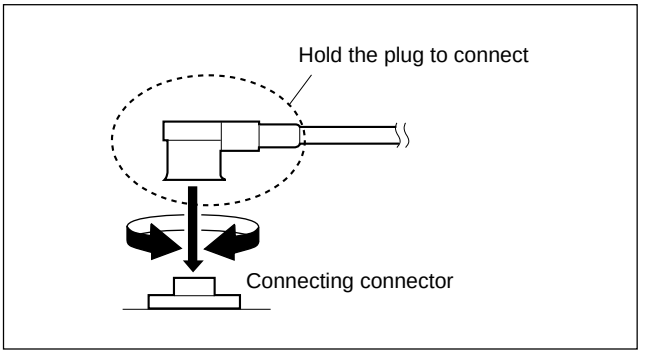
5. Remove the two screws, and remove the CN-2623 board.
6. Unsolder the DC IN connector from the CN-2623 board.



7. Install a new DC IN connector by reversing the steps above.

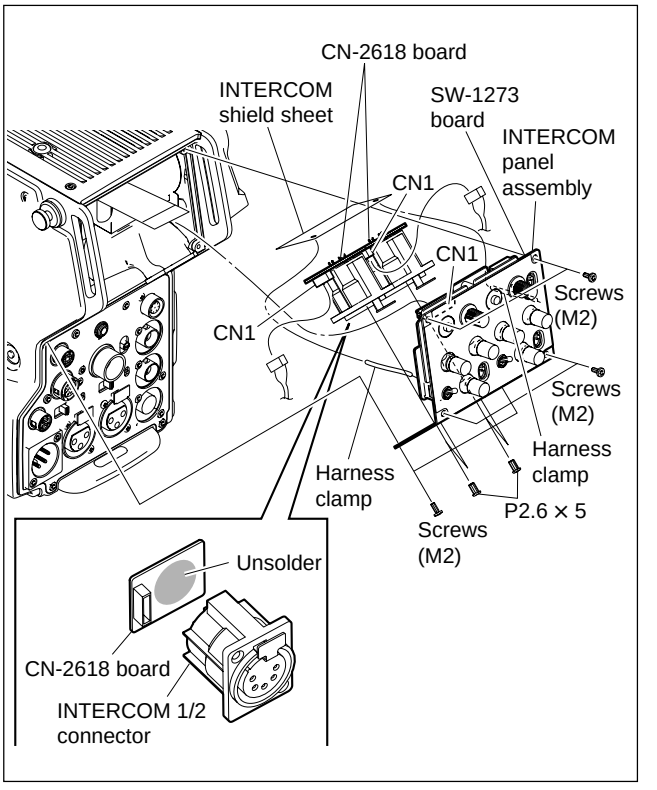
Note

Hold the plug of the coaxial cable, and connect it perpendicularly to the connector.
Push the plug into the connector while turning it clockwise and counterclockwise several times.



2-8-3. INTERCOM 1/2 Connector (CN-2618 Board)

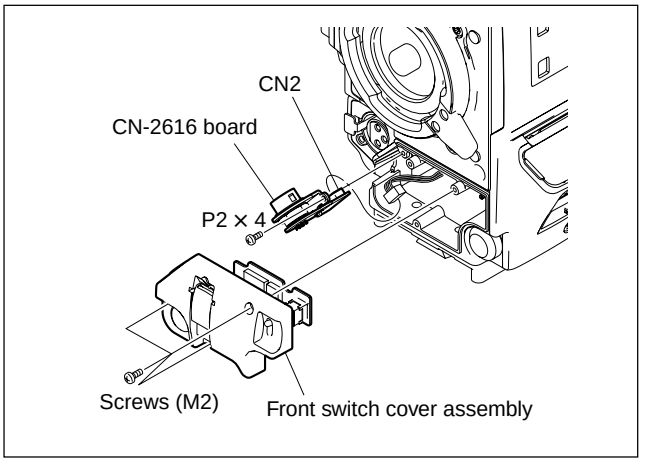
1. Remove the six screws and pull out the INTERCOM panel assembly.
2. Disconnect the flexible card wire from the connector (CN1) on the SW-1273G board.
3. Remove the two screws, and remove the CN-2618 board.
4. Release the two harness clamps, and remove the INTERCOM shield sheet.
5. Disconnect the harness from the connector (CN1) on the CN-2618 board.
6. Unsolder the INTERCOM 1 or INTERCOM 2 connector from the CN-2618 board.



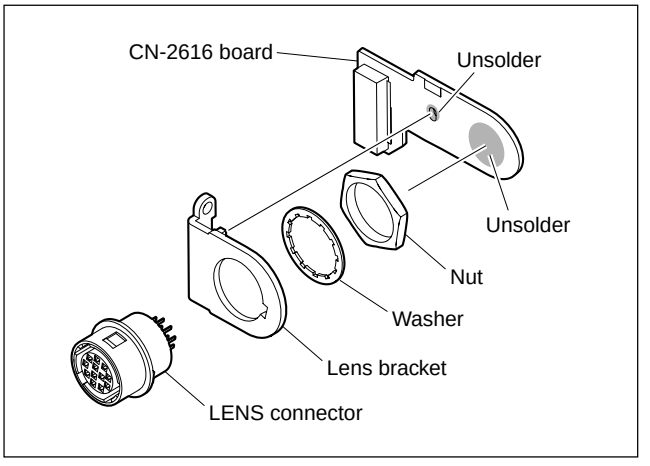
7. Install a new INTERCOM 1 or INTERCOM 2 connector by reversing the steps above.

2-8-4. LENS Connector (CN-2616 Board)

1. Remove the three screws, and pull out the front switch cover assembly.
2. Remove the screw, and pull out the CN-2616 board.
3. Disconnect the harness from the connector (CN2) on the CN-2616 board.



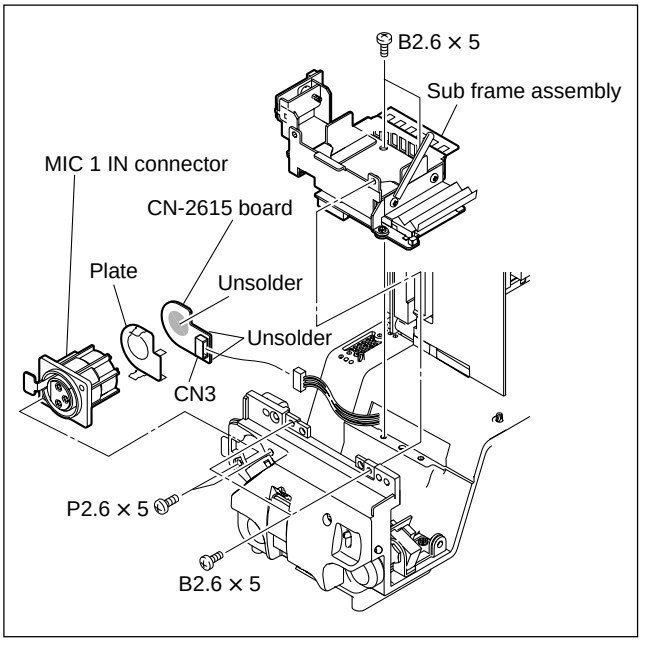
4. Unsolder the LENS connector and LENS bracket from the CN-2616 board.
5. Remove the nut to detach the washer and lens bracket from the LENS connector.



6. Install a new LENS connector by reversing the steps above.

2-8-5. MIC 1 IN Connector (CN-2615 Board)

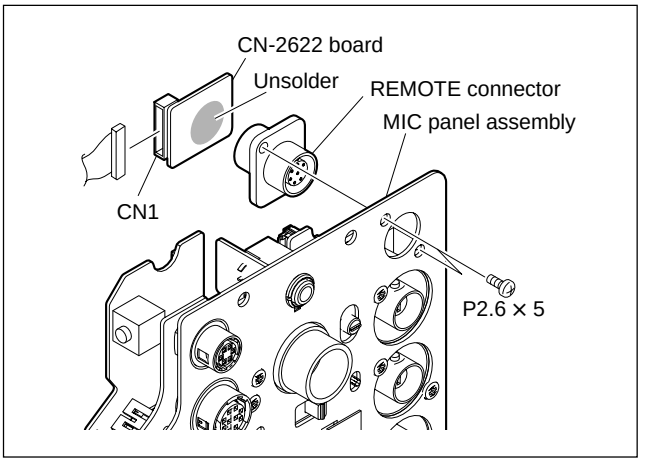
1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Remove the DC fan (front). (Refer to Section 2-5-1.)
3. Remove the four screws, and lift the sub frame assembly.
4. Remove the two screws, and remove the CN-2615 board.
5. Disconnect the harness from the connector (CN3) on the CN-2615 board.
6. Unsolder the MIC 1 IN connector from the CN-2615 board.
7. Unsolder the plate from the CN-2615 board.



8. Install a new MIC 1 IN connector by reversing the steps above.

2-8-6. REMOTE Connector (CN-2622 Board)

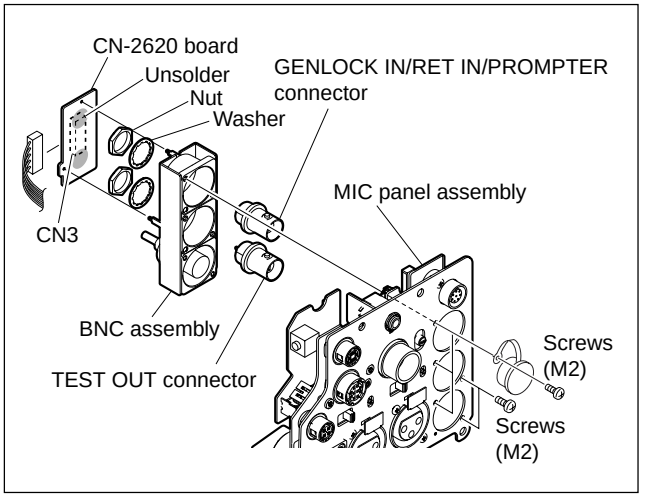
1. Remove the MIC panel assembly.
   (Refer to Section 2-8-2.)
2. Remove the two screws, and remove the CN-2622 board.
3. Disconnect the harness from the connector (CN1) on the CN-2622 board.
4. Unsolder the REMOTE connector from the CN-2622 board.



5. Install a new REMOTE connector by reversing the steps above.

2-8-7. GENLOCK IN/RET IN/PROMPTER, TEST OUT Connector (CN-2620 Board)

1. Remove the MIC panel assembly.
   (Refer to Section 2-8-2.)
2. Remove the five screws, and remove the BNC assembly.
3. Disconnect the harness from the connector (CN3) on the CN-2620 board.
4. Unsolder the GENLOCK IN/RET IN/PROMPTER, TEST OUT connector from the CN-2620 board.
5. Remove the nut to detach the GENLOCK IN/RET IN/PROMPTER, TEST OUT connector.



6. Install a new GENLOCK IN/RET IN/PROMPTER, TEST OUT connector by reversing the steps above.

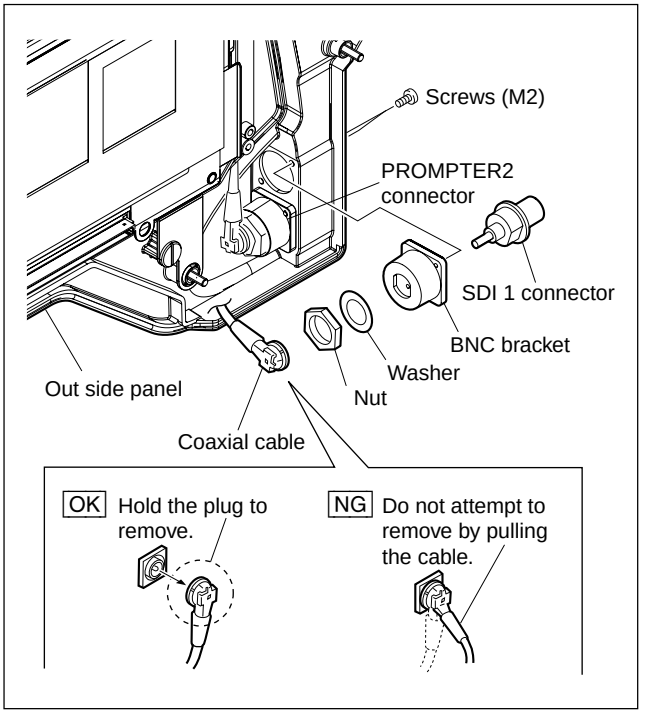
2-8-8. SDI 1, PROMPTER2 Connector (HDC1500R)

1. Remove the outside panel. (Refer to Section 1-4.)
2. Remove the two screws to detach the BNC bracket.
3. Disconnect the coaxial cable from the SDI 1, PROMPTER2 connector.

   Note

   Be sure to hold the plug when disconnecting the coaxial cable. Do not pull the cable.

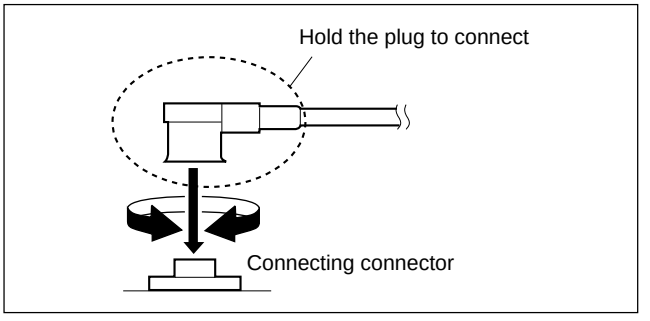
4. Remove the nut to detach the SDI 1, PROMPTER2 connector.



5. Install a new SDI 1, PROMPTER2 connector by reversing the steps above.

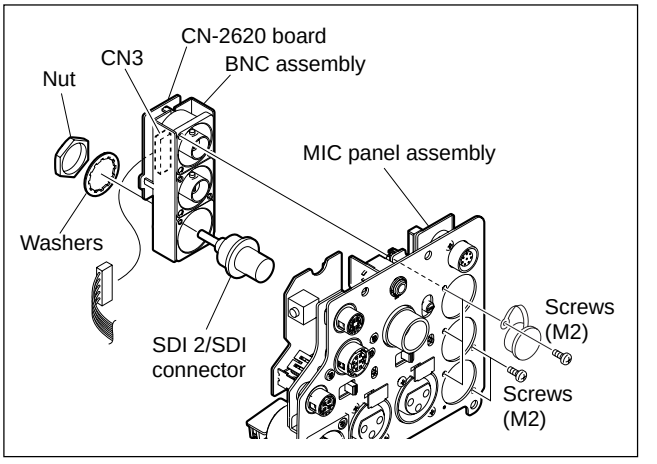
   Note

   Hold the plug of the coaxial cable, and connect it perpendicularly to the connector.
   Push the plug into the connector while turning it clockwise and counterclockwise several times.



2-8-9. SDI 2 Connector (HDC1500R)/ SDI Connector (HDC1400R/1450R/ 1550R)

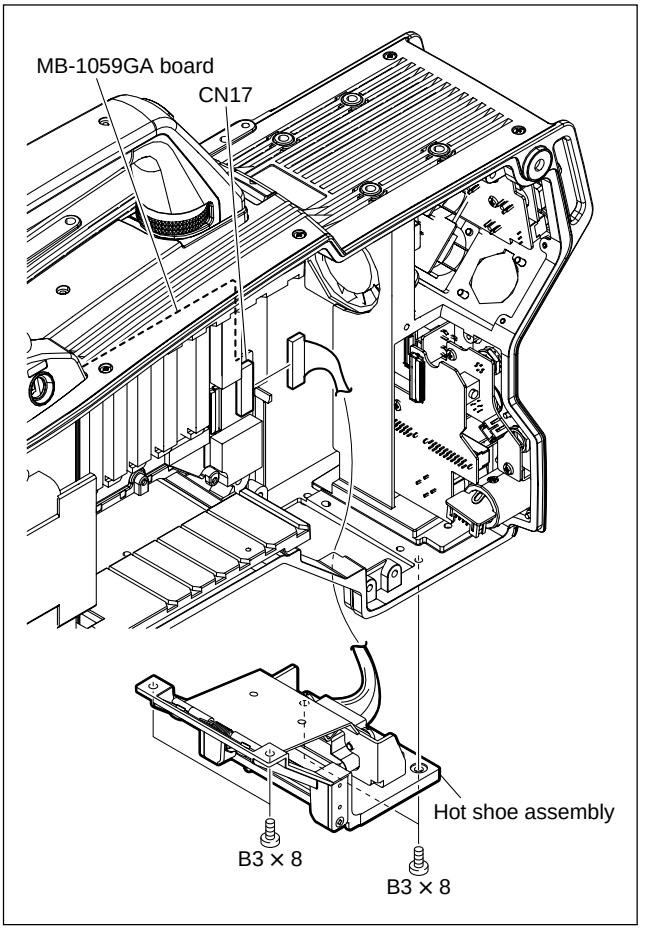
1. Remove the MIC panel assembly. (Refer to Section 2-8-2.)
2. Remove the five screws, and remove the BNC assembly.
3. Disconnect the harness from the connector (CN3) on the CN-2620 board.
4. Remove the nut to detach the SDI 2/SDI connector.



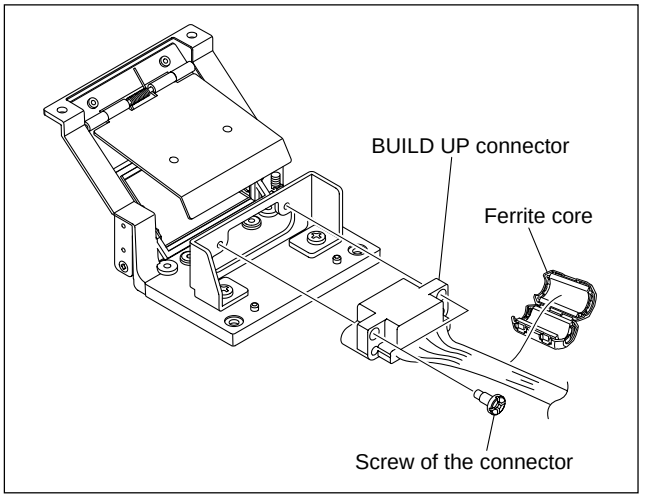
5. Install a new SDI 2/SDI connector by reversing the steps above.

2-8-10. BUILD UP Connector (Hot Shoe Assembly)

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Remove the switching regulator. (Refer to Section 2-11-2.)
3. Disconnect the harness from the connector (CN17) on the MB-1059GA board.
4. Remove the four screws, and remove the hot shoe assembly.



5. Remove the two fixing screws of the connector and remove the BUILD UP connector.
6. Remove the ferrite core.

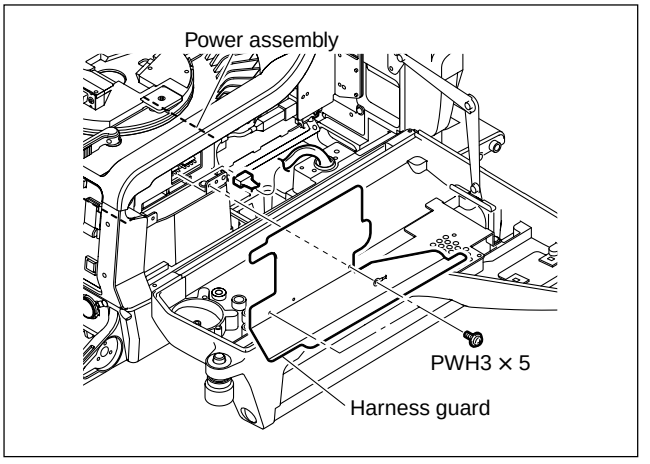


7. Install a new BUILD UP connector by reversing the steps above.

2-9. Replacing the Encapsulated Cable Assembly/TRIAX Assembly

2-9-1. HDC1000R (Encapsulated Cable Assembly)

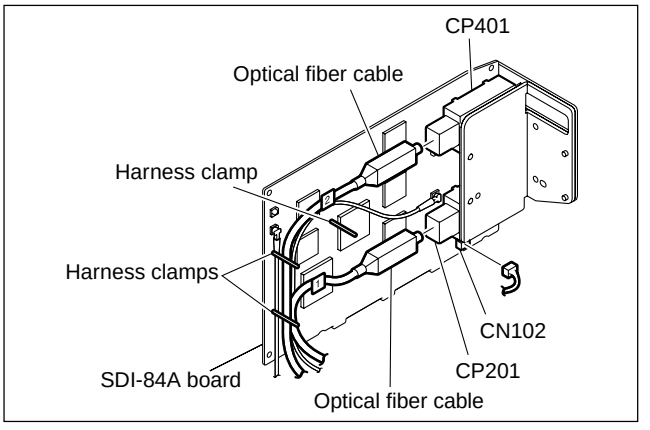
1. Open the left side panel. (Refer to Section 1-4.)
2. Remove the two screws, and remove the harness guard.
3. Disconnect the harness of the encapsulated cable assembly from the power assembly.



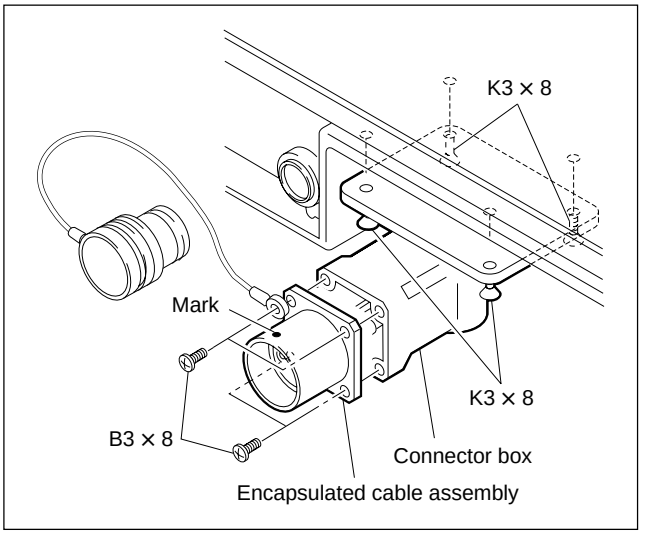
4. Release the harness and cables from the three harness clamps.
5. Disconnect the harness from the connector (CN102) on the SDI-84A board.
6. Disconnect the optical fiber cables from the E/O converter module CP201 and O/E converter module CP401 on the SDI-84A board.

Notes

- If optical fiber cable is bent or pulled strongly, it may be disconnected. Handle optical fiber cables carefully.
- Do not touch the tip of optical fiber cable connector. This may result in deterioration of signals.



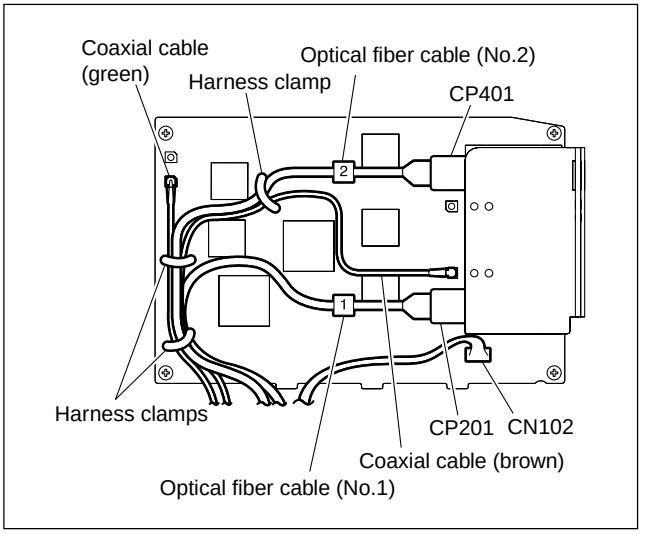
7. Remove the four screws, and remove the connector box.
8. Remove the four screws, and pull out the encapsulated cable assembly.



9. Install the encapsulated cable assembly by reversing the steps above.

Notes

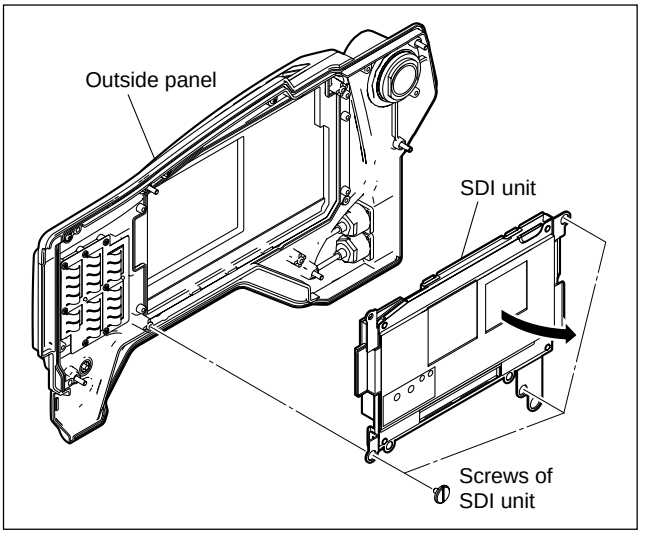
- Check cable numbers when connecting optical fiber cables, and insert the cable connector as far as it will go.
- Arrange the harness and cables as shown below, and clamp them with the three harness clamps.



- When connecting the optical fiber cables to the E/O converter module CP201 or O/E converter module CP401 on the SDI-84A board, clean the connecting connectors. (Refer to Section 1-7.)

2-9-2. HDC1400R/1500R/1580R (Encapsulated Cable Assembly)

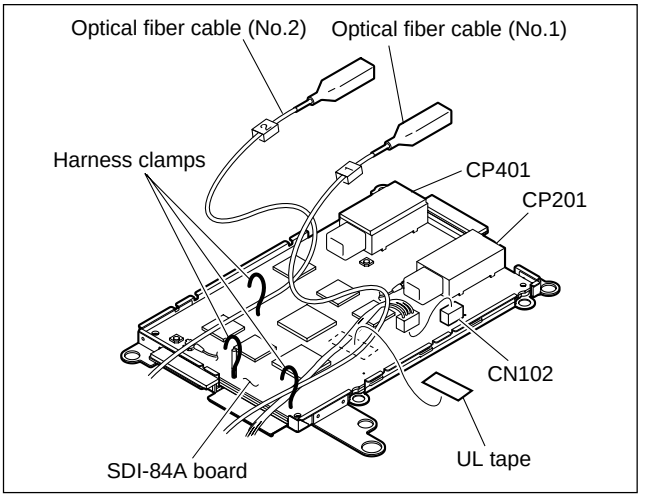
1. Remove the outside panel. (Refer to Section 1-4.)
2. Remove the three screws of the SDI unit, and open it in the arrow direction.



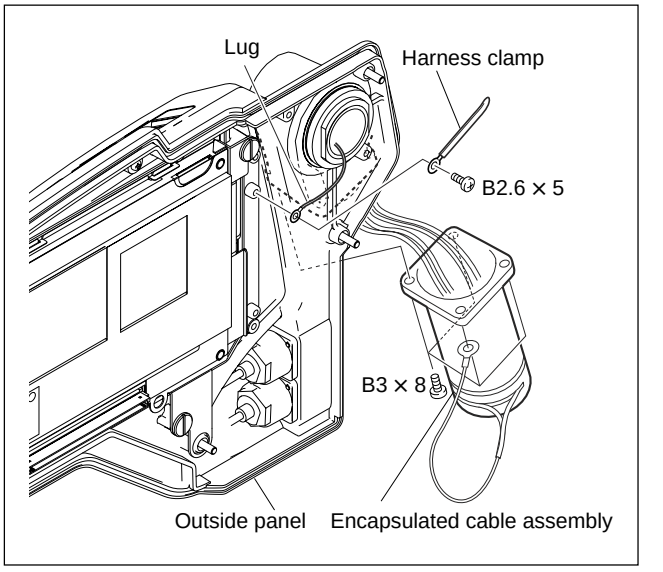
3. Remove the UL tape from the SDI-84A board.
4. Release the harness and cables from the three harness clamps.
5. Disconnect the harness from the connector (CN102) on the SDI-84A board.
6. Disconnect the optical fiber cables from the E/O converter module CP201 and O/E converter module CP401 on the SDI-84A board.

Notes

- If optical fiber cable is bent or pulled strongly, it may be disconnected. Handle optical fiber cables carefully.
- Do not touch the tip of optical fiber cable connector. This may result in deterioration of signals.



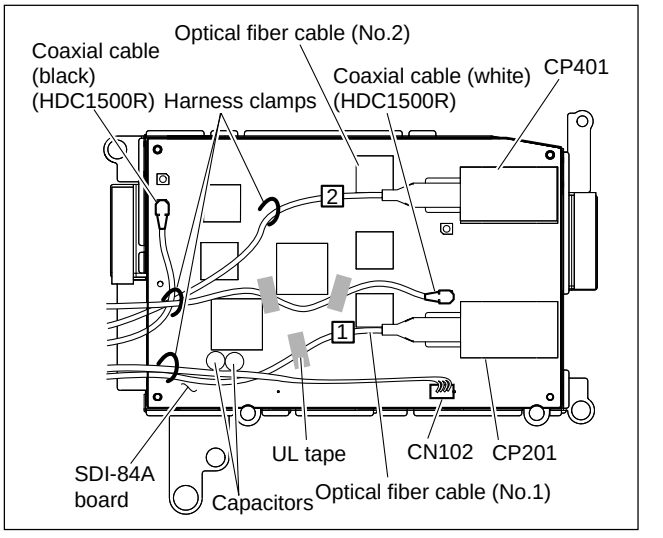
7. Remove the screw to detach the harness clamp and the lug.
8. Remove the four screws, and pull out the encapsulated cable assembly.



9. Install the encapsulated cable assembly by reversing the steps above.

Notes

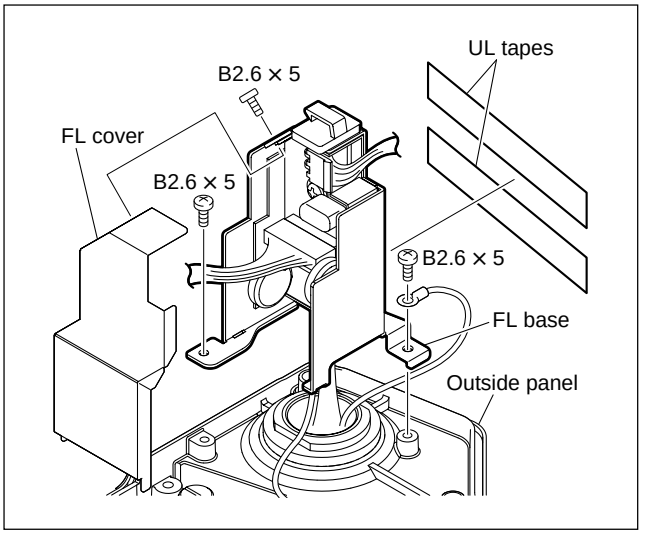
- Check cable numbers when connecting optical fiber cables, and insert the cable connector as far as it will go.
- Arrange the harness and cables as shown below, and clamp them with the three harness clamps and UL tape.



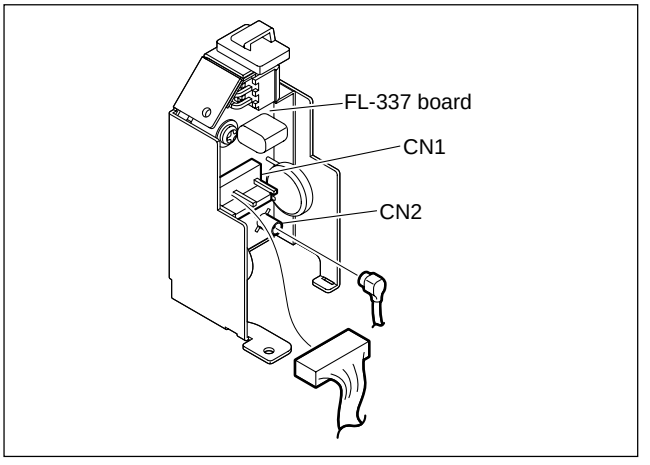
- When connecting the optical fiber cables to the E/O converter module CP201 or O/E converter module CP401 on the SDI-84A board, clean the connecting connectors. (Refer to Section 1-7.)

2-9-3. HDC1450R/1550R (TRIAX Assembly)

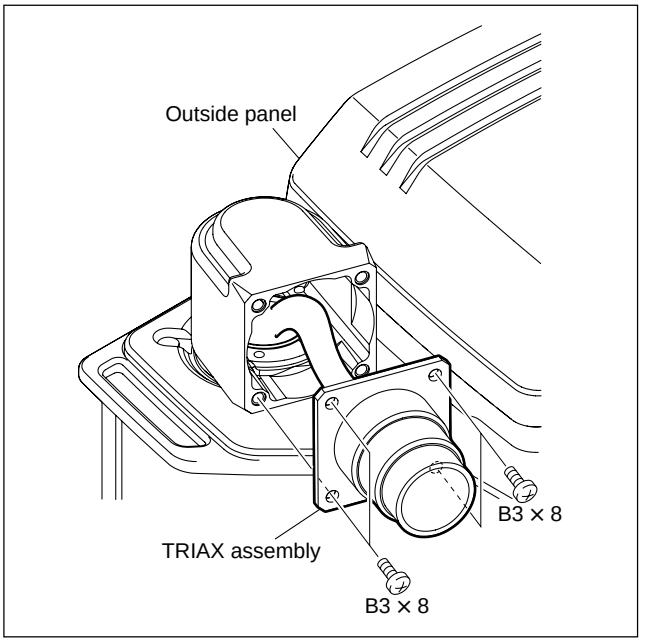
1. Remove the outside panel. (Refer to Section 1-4.)
2. Peel the two UL tapes off.
3. Remove the screw to detach the FL cover.
4. Remove the two screws, and lift the FL base up.



5. Disconnect the harness and coaxial cable from the connectors (CN1, CN2) on the FL-337 board.



6. Remove the four screws, and pull out the TRIAX assembly.



7. Install the TRIAX assembly by reversing the steps above.

Note

Replace the two UL tapes with new one.

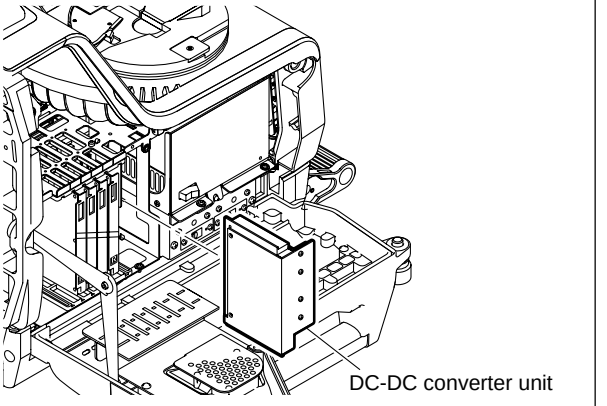
2-10. Replacing the DC-DC Converter Unit

2-10-1. HDC1000R

WARNING

The DC-DC converter unit is a critical part for safety. If it is replaced with an unspecified part, a fire or electric shock may be caused.
Be sure to use the specified DC-DC converter unit below for replacement.
CONVERTER UNIT, DC-DC: ⚠ 1-478-790-22

1. Open the right side panel. (Refer to Section 1-4.)
2. Draw the DC-DC converter unit along the board rail groove, and remove it.



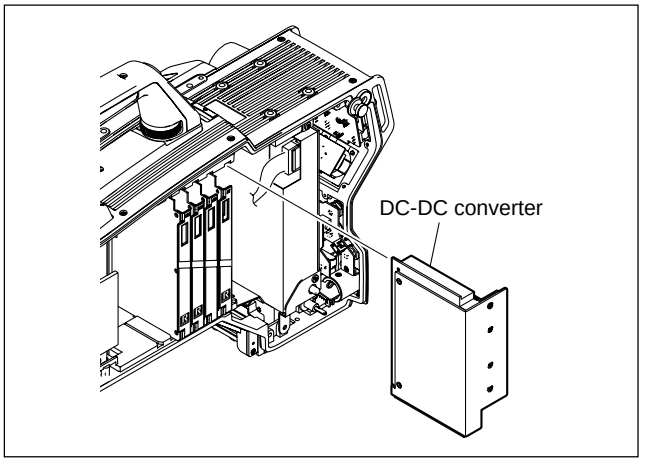
3. Install the DC-DC converter unit by reversing the steps above.

2-10-2. HDC1400R/1450R/1500R/1550R/1580R

WARNING

The DC-DC converter unit is a critical part for safety. If it is replaced with an unspecified part, a fire or electric shock may be caused.
Be sure to use the specified DC-DC converter unit below for replacement.
CONVERTER UNIT, DC-DC: ⚠ 1-478-790-22

1. Remove the inside panel. (Refer to Section 1-4.)
2. Draw the DC-DC converter unit along the board rail groove, and remove it.



3. Install the DC-DC converter unit by reversing the steps above.

2-11. Replacing the Switching Regulator

2-11-1. HDC1000R

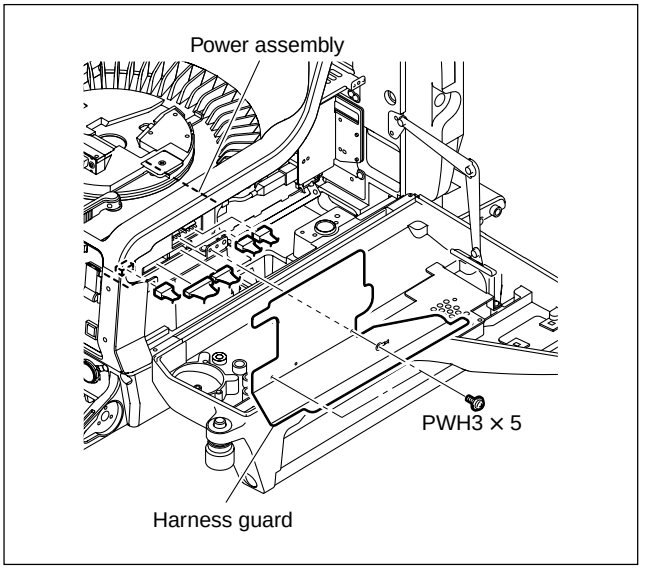
WARNING

The switching regulator is a critical part for safety. If it is replaced with an unspecified part, a fire or electric shock may be caused.
Be sure to use the specified switching regulator below for replacement.
REGULATOR, SWITCHING: ⚠ 1-468-861-13

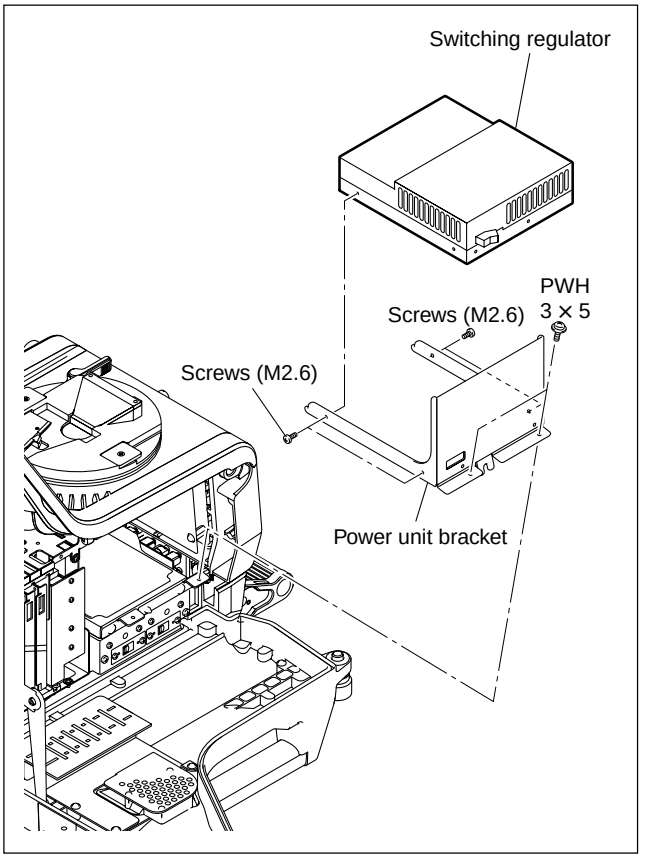
Notes

- To avoid electric hazards when disconnecting the power assembly, allow at least three minutes after powering off. To turn off the power, disconnect the optical cable or the cable connected to the DC IN connector in addition to turning off the power switch.
- The power assembly will go very hot during operation. If you touch the power assembly, there is some danger to get burned.
  When you repair power supply and peripheral equipment, allow a few minutes after powering off until the inside cools off.

1. Open the right side panel and left side panel. (Refer to Section 1-4.)
2. Remove the two screws, and remove the harness guard.
3. Disconnect the harnesses from the five connectors on the power assembly.



4. Remove the two screws, and remove the power unit bracket.
5. Remove the four screws, and remove the switching regulator from the power unit bracket.



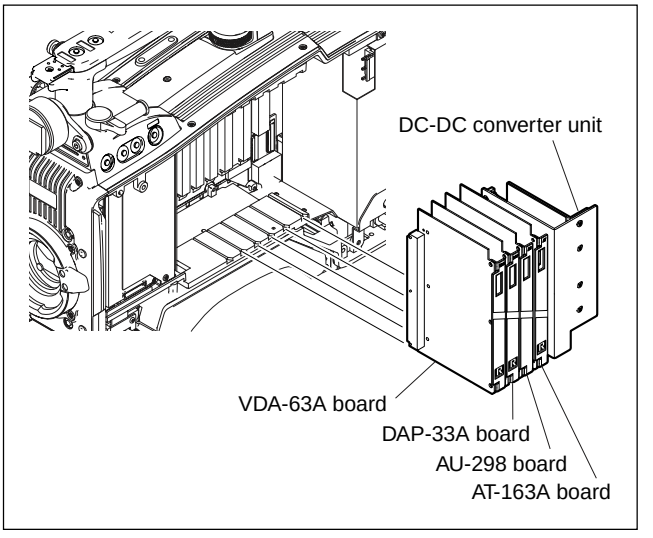
6. Install the switching regulator by reversing the steps above.

2-11-2. HDC1400R/1500R/1580R

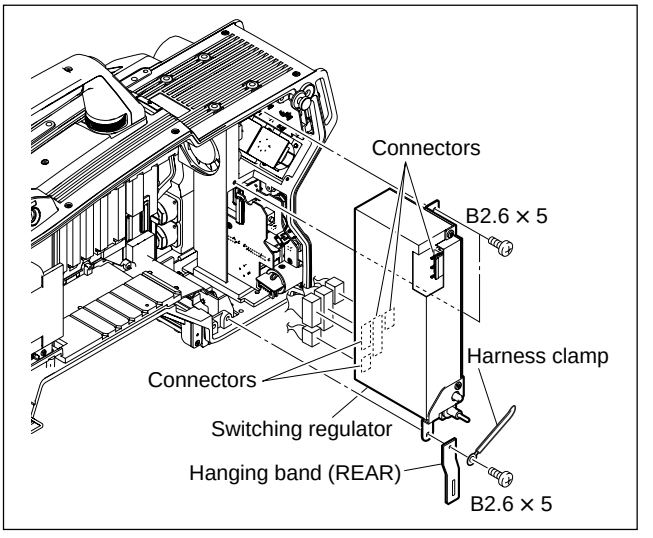
WARNING

The switching regulator is a critical part for safety. If it is replaced with an unspecified part, a fire or electric shock may be caused.
Be sure to use the specified switching regulator below for replacement.
REGULATOR, SWITCHING: ⚠1-468-862-12

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Draw all the plug-in boards and the DC-DC converter unit along the board rail grooves and remove them.



3. Disconnect the harnesses from the five connectors on the switching regulator.
4. Remove the three screws, and remove the switching regulator, hanging band (REAR), and the harness clamp.

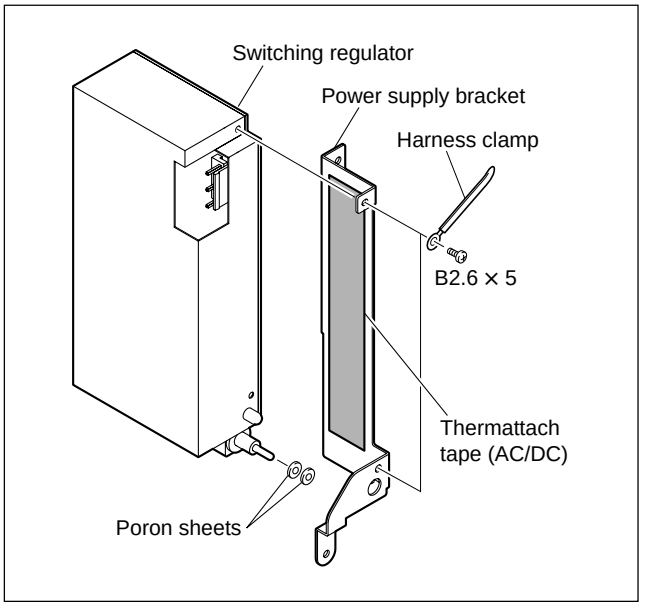


5. Remove the two screws to detach the power supply bracket and harness clamp from the switching regulator.

Notes

- There is the thermattach tape (AC/DC) between the switching regulator and power supply bracket. Detach the power supply bracket slowly and surely.
- Replace the thermattach tape (AC/DC) with new one.

6. Remove the two poron sheets from the switching regulator.



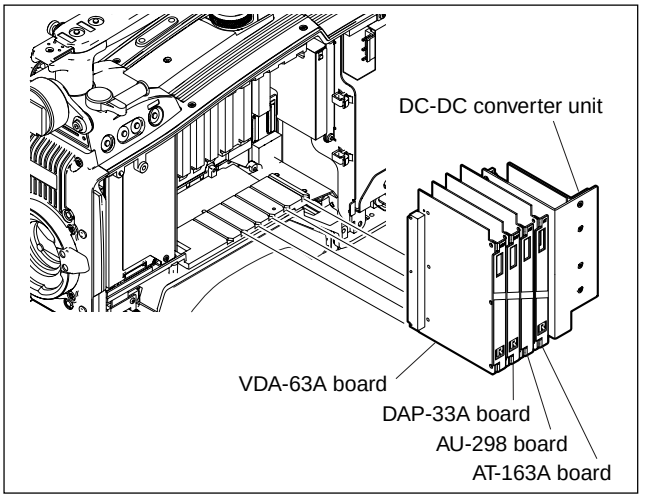
7. Install the switching regulator by reversing the steps above.

2-11-3. HDC1450R/1550R

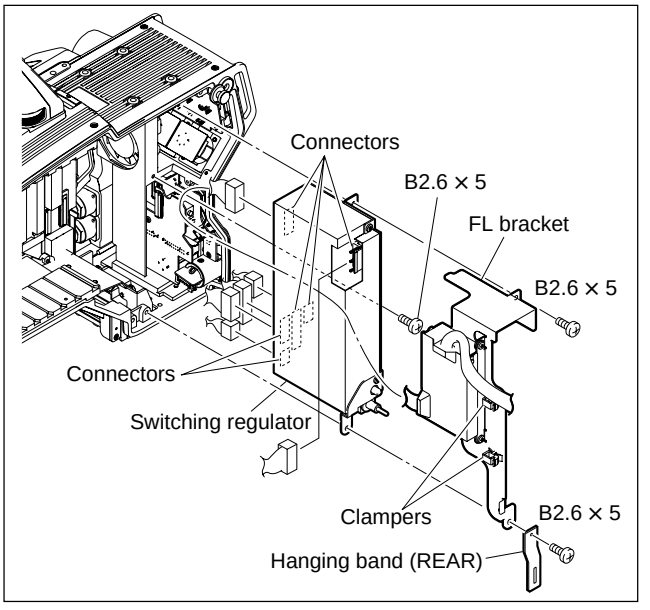
WARNING

The switching regulator is a critical part for safety. If it is replaced with an unspecified part, a fire or electric shock may be caused.
Be sure to use the specified switching regulator below for replacement.
REGULATOR, SWITCHING: ⚠ 1-468-862-12

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Draw all the plug-in boards and the DC-DC converter unit along the board rail grooves and remove them.



3. Open the two clampers and disconnect the harnesses from the six connectors on the switching regulator.
4. Remove the three screws, and remove the switching regulator, FL bracket, and hanging band (REAR).

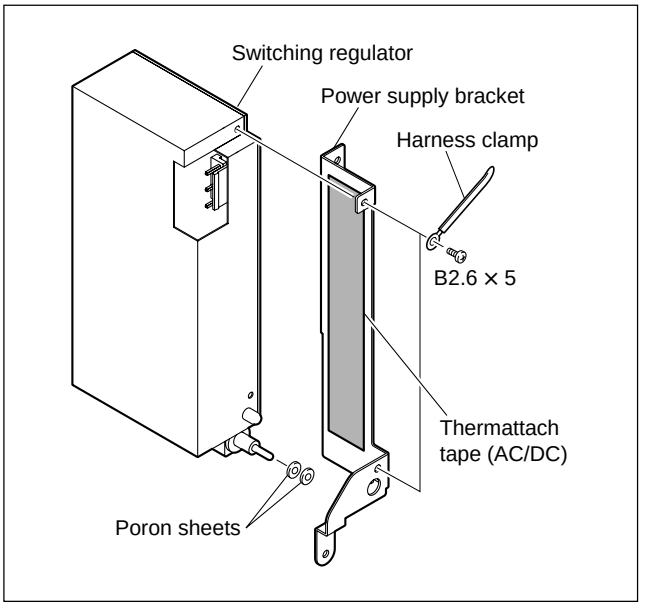


5. Remove the two screws to detach the power supply bracket and harness clamp from the switching regulator.

Notes

- There is the thermattach tape (AC/DC) between the switching regulator and power supply bracket. Detach the power supply bracket slowly and surely.
- Replace the thermattach tape (AC/DC) with new one.

6. Remove the two poron sheets from the switching regulator.

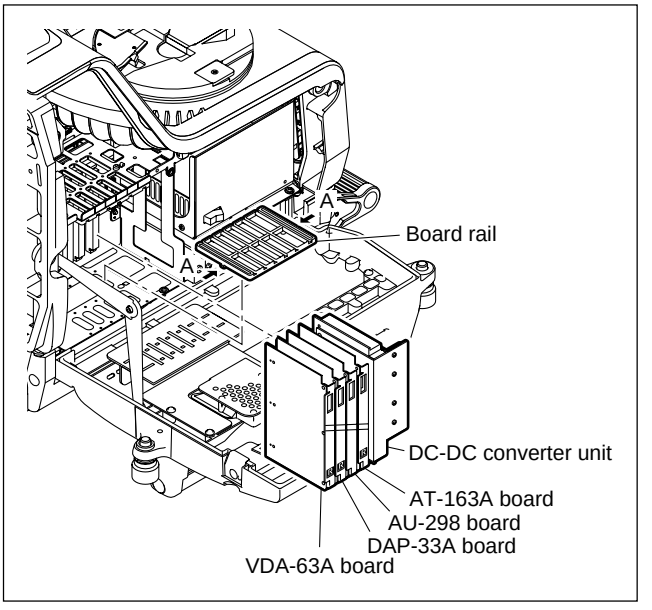


7. Install the switching regulator by reversing the steps above.

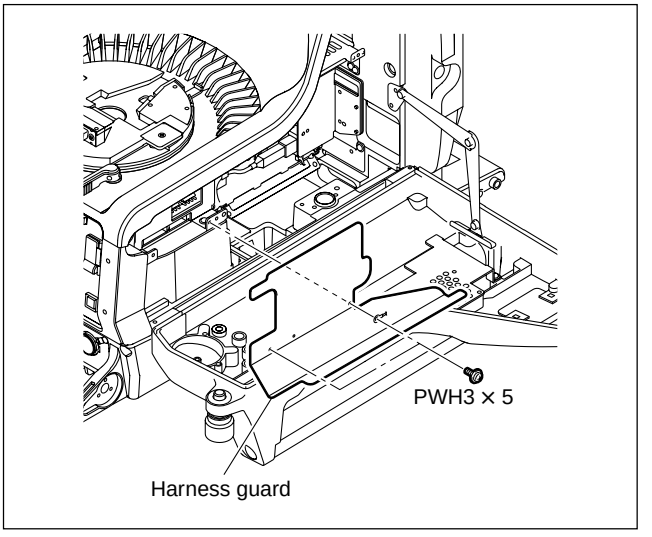
2-12. Replacing the Boards (HDC1000R)

2-12-1. MB-1060G Board

1. Open the right side panel and left side panel. (Refer to Section 1-4.)
2. Draw all the plug-in boards and the DC-DC converter unit along the board rail grooves and remove them.
3. Remove the board rail while pushing the portions A of the board rail.



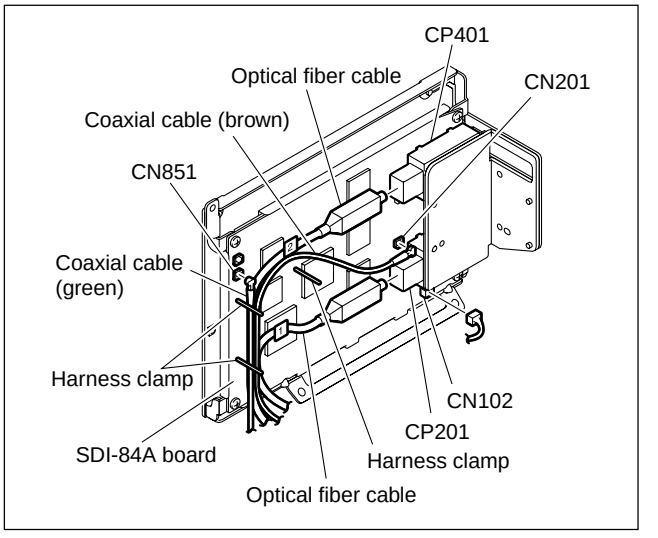
4. Remove the two screws, and remove the harness guard.



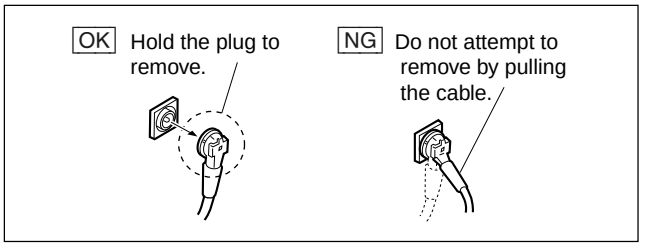
5. Release the harness and cables from the three harness clamps.
6. Disconnect the coaxial cables from the connectors (CN201, CN851) on the SDI-84A board.
7. Disconnect the harness from the connector (CN102) on the SDI-84A board.
8. Disconnect the optical fiber cables from the E/O converter module CP201 and O/E converter module CP401 on the SDI-84A board.

Notes

- If optical fiber cable is bent or pulled strongly, it may be disconnected. Handle optical fiber cables carefully.
- Do not touch the tip of optical fiber cable connector. This may result in deterioration of signals.



- Be sure to hold the plug when disconnecting the coaxial cable. Do not pull the cable.

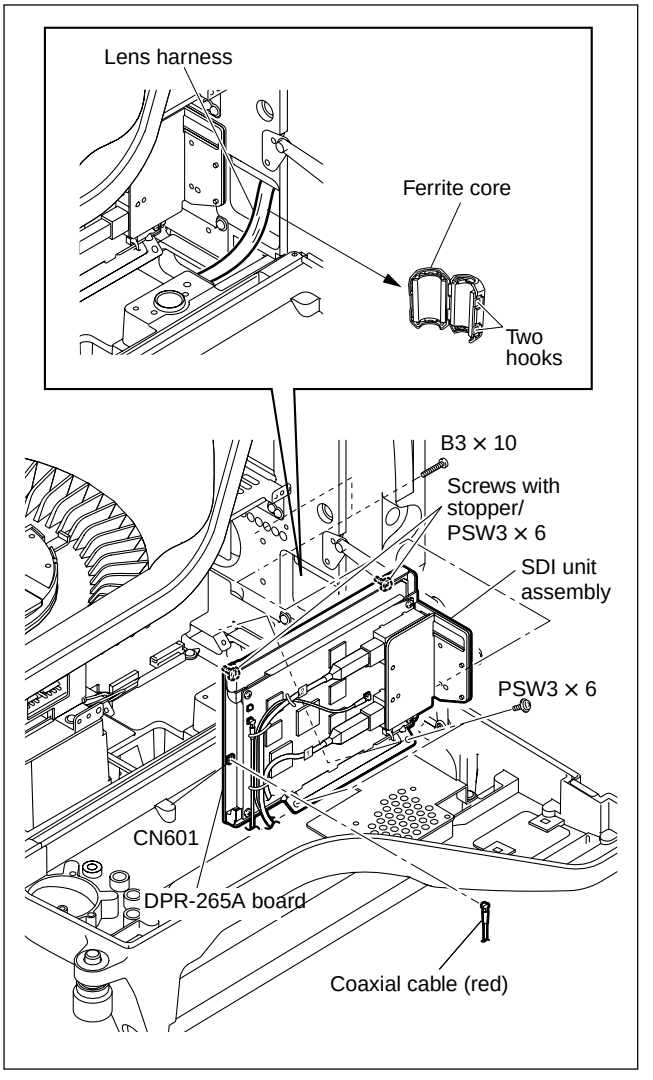


9. Loosen the two screws with stopper.

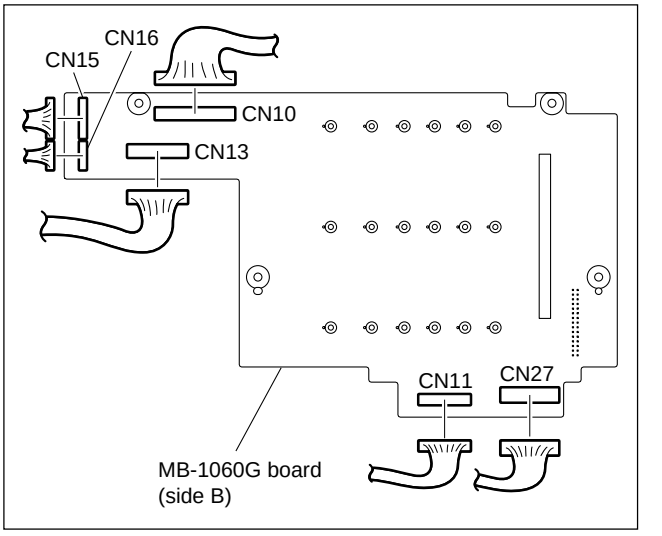
Note

There is the model for which the normal screws (PSW3 × 6) are used, too.

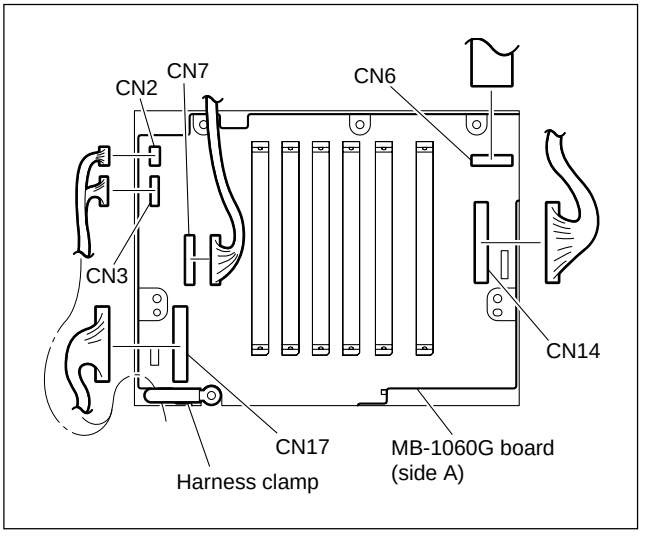
10. Remove the two hooks, and remove the ferrite core from the lens harness.
11. Remove the four screws, and remove the SDI unit assembly.
12. Disconnect the coaxial cable from the connector (CN601) on the DPR-265A board.



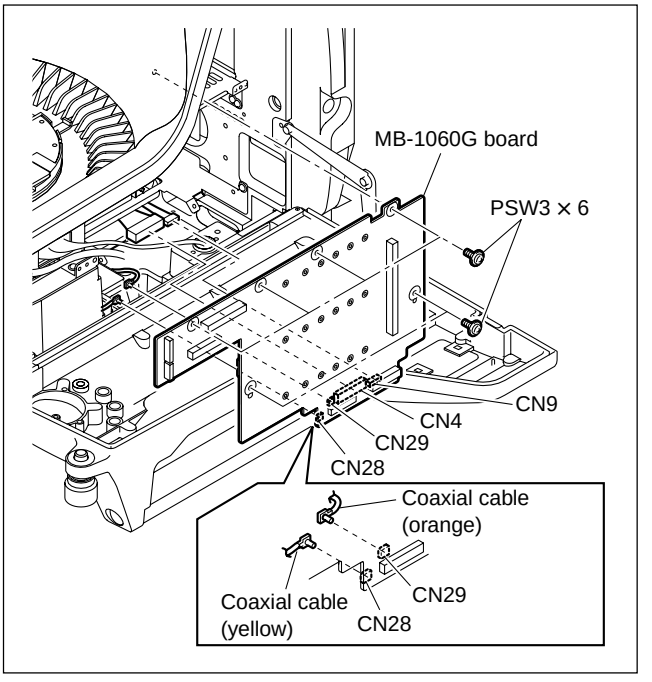
13. Disconnect the harness from the connectors (CN10, CN11, CN13, CN15, CN16, and CN27) on the MB-1060G board (side B).



14. Release the harness from the harness clamp.
15. Disconnect the harness and flexible card wire from the connectors (CN2, CN3, CN6, CN7, CN14, and CN17) on the MB-1060G board (side A).



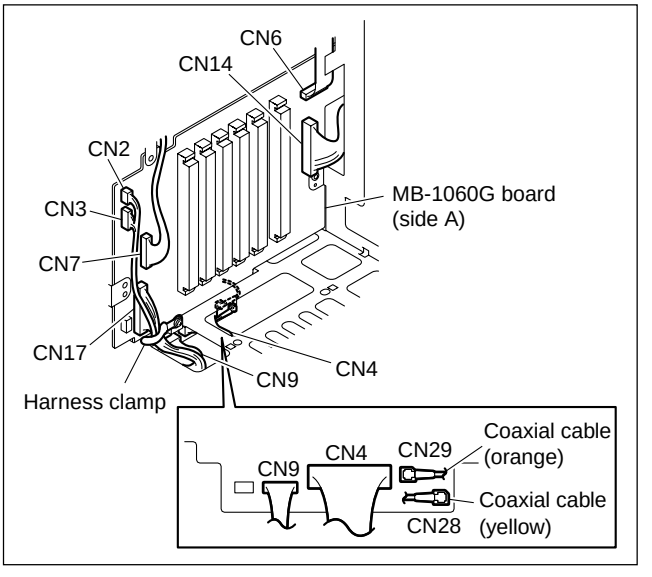
16. Remove the six screws, and remove the MB-1060G board.
17. Disconnect the harness from the connectors (CN4, CN9) on the MB-1060G board.
18. Disconnect the coaxial cables from the connectors (CN28, CN29) on the MB-1060G board.



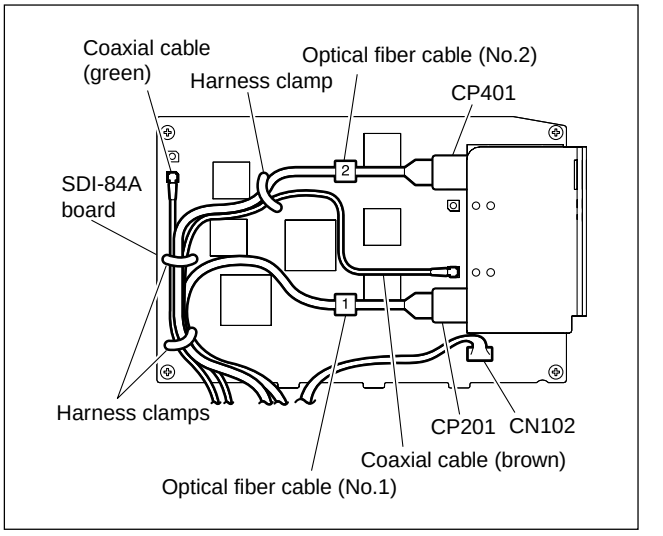
19. Install the MB-1060G board by reversing the steps above.

Notes

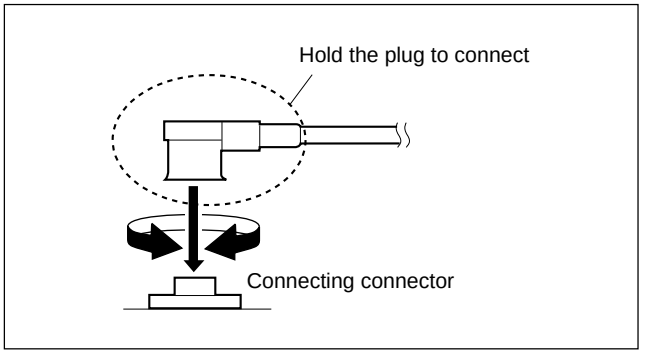
- Arrange the harness, cables and flexible card wire on the MB-1060G board (side A) as shown below, and clamp them with the harness clamp.



- Check cable numbers when connecting optical fiber cables, and insert the cable connector as far as it will go.
- Arrange the harness and cables on the SDI-84A board as shown below, and clamp them with the three harness clamps.



- Hold the plug of the coaxial cable, and connect it perpendicularly to the connector.
  Push the plug into the connector while turning it clockwise and counterclockwise several times.

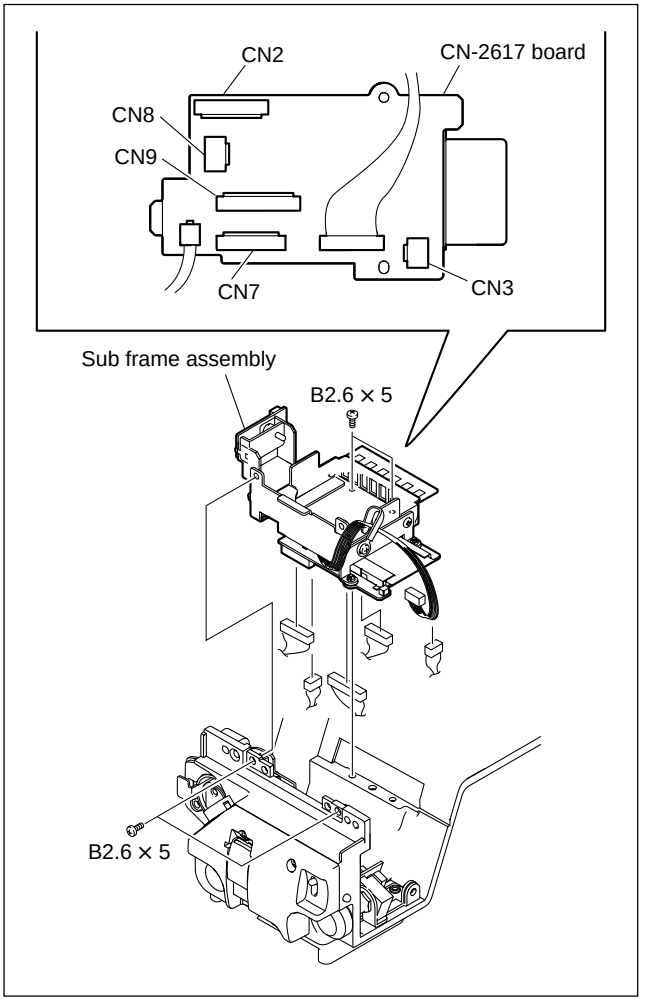


- When connecting the optical fiber cables to the E/O converter module CP201 or O/E converter module CP401 on the SDI-84A board, clean the connecting connectors. (Refer to Section 1-7.)

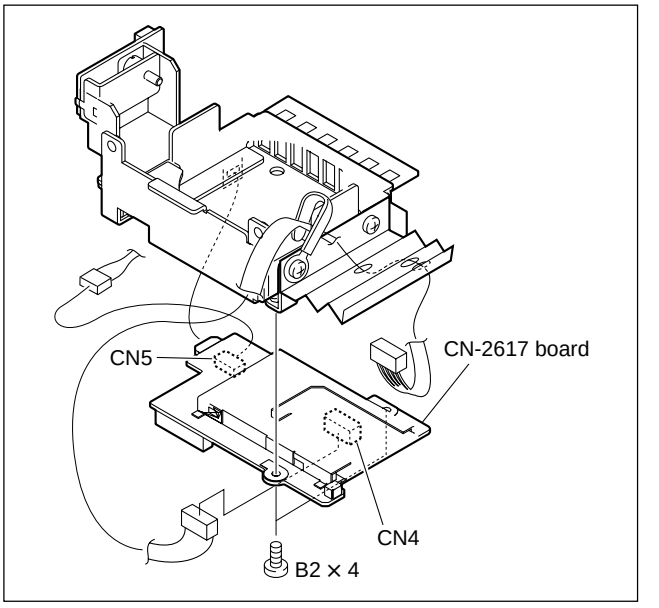
2-13. Replacing the Boards (HDC1400R/ 1450R/1500R/1550R/1580R)

2-13-1. CN-2617 Board

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Remove the DC fan (front). (Refer to Section 2-5-1.)
3. Remove the four screws, and lift the sub frame assembly.
4. Disconnect the harnesses from the connectors (CN2, CN3, CN7, CN8, and CN9) on the CN-2617 board, and remove the sub frame assembly.



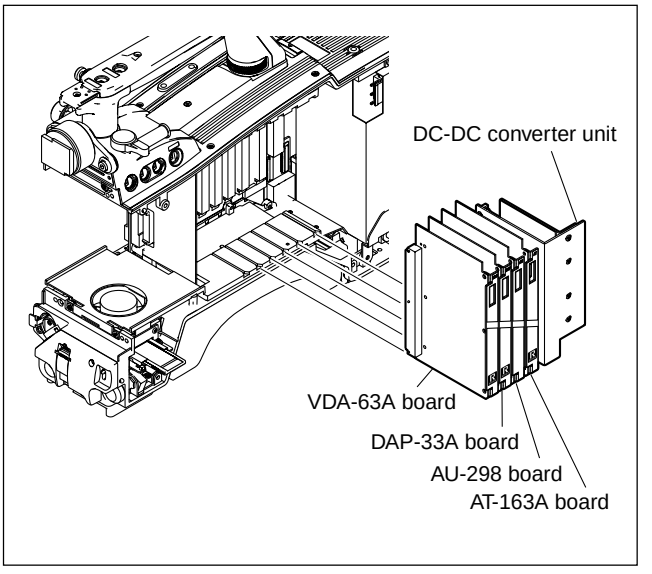
5. Disconnect the harnesses from the connectors (CN4, CN5) on the CN-2617 board.
6. Remove the two screws, and remove the CN-2617 board.



7. Install the CN-2617 board by reversing the steps above.

2-13-2. MB-1059GA Board

1. Remove the inside panel and outside panel. (Refer to Section 1-4.)
2. Remove the front assembly. (Refer to Section 2-1.)
3. Draw all the plug-in boards and the DC-DC converter unit along the board rail grooves and remove them.

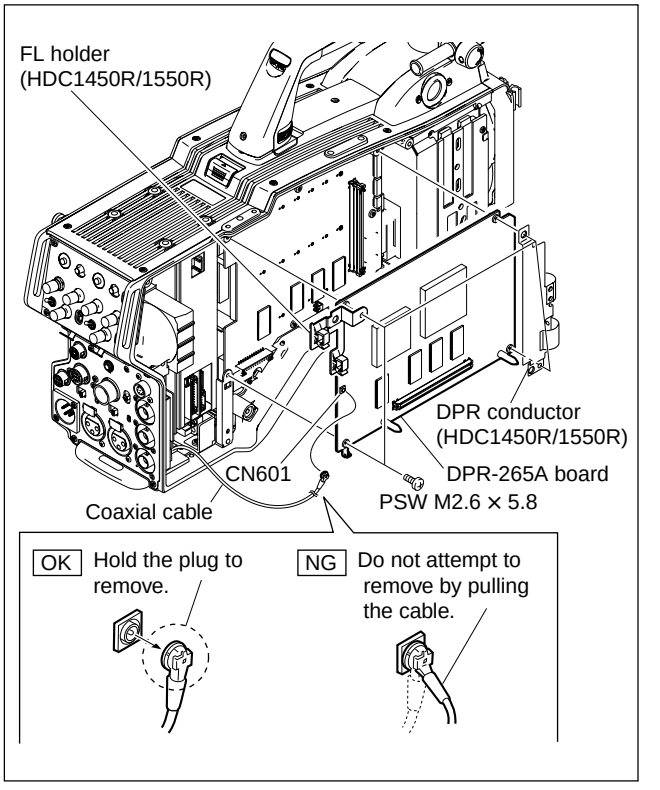


4. Disconnect the coaxial cable from the connector (CN601) on the DPR-265A board. (HDC1400R/1450R/1500R/1550R)

Note

Be sure to hold the plug when disconnecting the coaxial cable. Do not pull the cable.

5. Remove the four screws to detach the DPR-265A board, FL holder (HDC1450R/1550R) and DPR conductor (HDC1450R/1550R).

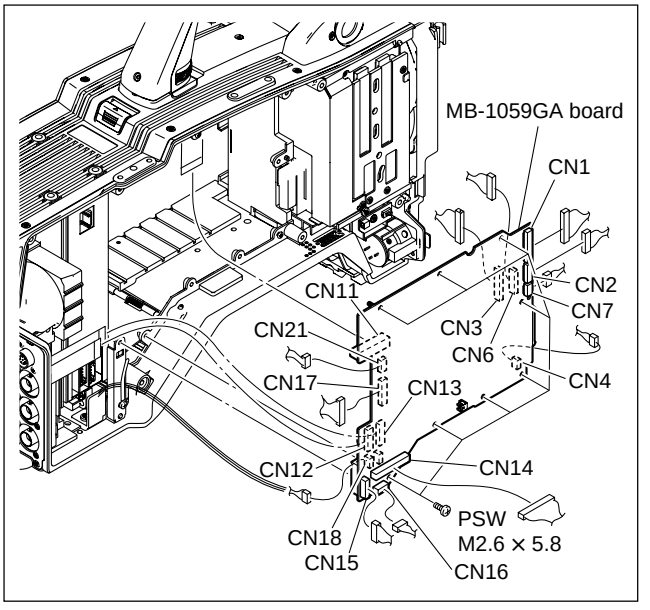


6. Disconnect the harnesses and flexible card wires from all the connectors on the MB-1059GA board.

Note

Life of flexible card wire will be significantly shortened if it is folded. Be very careful not to fold the flexible card wires. (Refer to Section 1-9.)

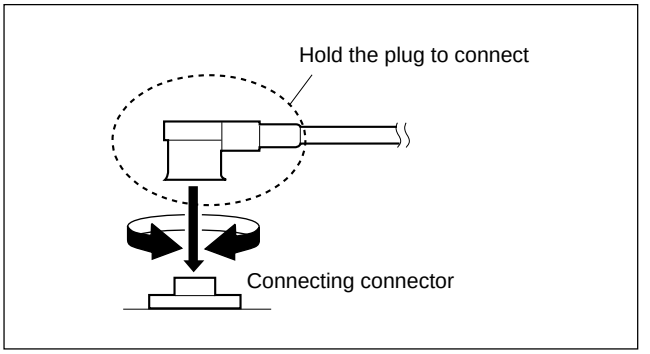
7. Remove the eight screws, and remove the MB-1059GA board.



8. Install the MB-1059GA board by reversing the steps above.

Note

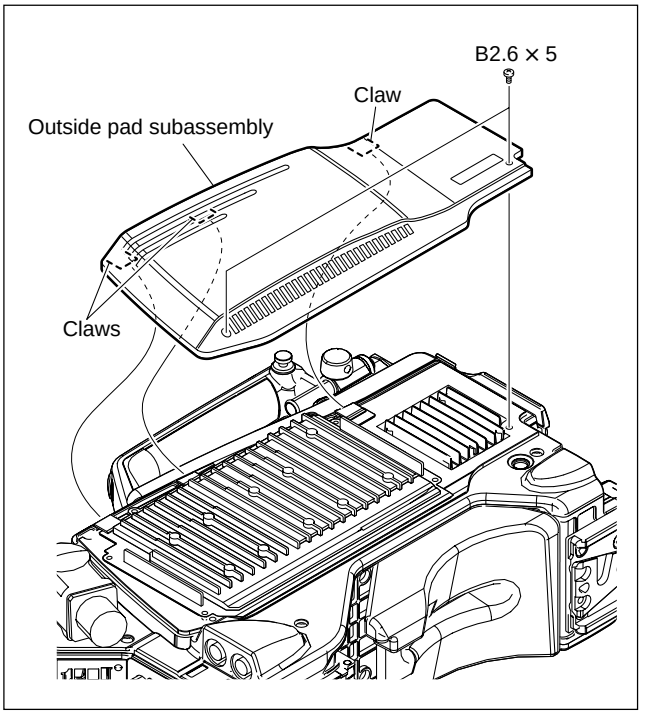
Hold the plug of the coaxial cable, and connect it perpendicularly to the connector.
Push the plug into the connector while turning it clockwise and counterclockwise several times.



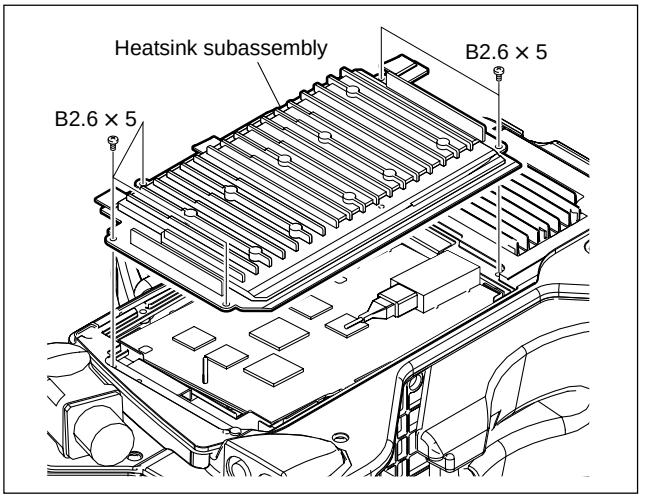
2-14. Checking SDI-84A Board (HDC1400R/1500R/1580R)

To check the operation of the SDI-84A board and to upgrade the PLD, perform preprocessing using the following procedure to ensure the service position for the SDI-84A board.

1. Remove the two screws, release the three claws on the outside pad subassembly from the holes in the heatsink subassembly, and then remove the outside pad subassembly.



2. Remove the five screws and the heatsink subassembly.
3. The SDI-84A board appears.



Section 3
Electrical Alignment

When any board of HDC1000R/1400R/1450R/1500R/1550R/1580R is repaired or replaced, perform electrical adjustments as follows.

HDC1000R/1400R/1500R/1580R

Section 3-1 to 3-5

HDC1450R/1550R

Section 3-1 to 3-9

Notes

- Perform video system level adjustment (Section 3-4) according to customer needs.
- One of master setup units MSU-900, etc. is used for electrical adjustments of the unit.
  Refer to Section 3-1-8 when using the camera setup menu for electrical adjustments without using MSU-900.

3-1. Preparations

3-1-1. Equipment Required

Measuring equipment

- HDTV serial digital waveform monitor
  Leader Electronics LV5150DA, Leader Electronics LV5152DA (multi format) or equivalent
- HD color monitor
  Sony BVM-D20F1/BVM-D14H5 or equivalent
- Oscilloscope
  Tektronix TDS460A or equivalent

Related Equipment

- HDVS camera system
  MSU-900/950
  HDVF-20A/200/C30WR/C35W (For HDC1400R/1450R/1500R/1550R)
  HDVF-700A/EL100 (For HDC1000R)
  HDCU1080 (When adjusting the HDC1580R, use this unit)
- Lens
  Canon HJ18

Tools

- Pattern box PTB-500
  Sony Part No. : J-6029-140-B
- Grayscale chart (16 : 9 transparent type)
  Sony Part No. : J-6394-080-A
- Grayscale chart (4 : 3 reflective type)
  Commercially available

3-1-2. Precautions on Adjustments

- Turn ON the main power switch (external) before adjusting, and warm up the unit for about 10 minutes.
- All measuring equipment must be calibrated.
- Periodic Maintenance must be conducted for the pattern box.
- “Section 3-1-7. Initial Settings” must be completed.
- For HDC1580R adjustment, connect the measuring waveform monitor to the SDI 1 connector of HDCU1080. Set the HDCU1080 so that the HD-SDI signal is outputted from the SDI 1 connector.

3-1-3. File Data at Adjustment

The file structure of the adjustment data of HDC1000R/1400R/1450R/1500R/1550R/1580R is as follows.

- Lens file is used for compensation of the deviation which is generated by switching the lens extender from OFF to ON and for compensation of the difference in the characteristics between lenses. This file is stored in the camera. Mount the lens actually used during the adjustment.
- The reference file stores the custom paint data adjusted by the video engineer. This file is stored in the camera and memory stick. Therefore, before performing adjustment, store this data in the memory stick first, and reset this data from the memory stick after adjustment.
- OHB file is used for adjustment of the CCD block maintenance. This file is stored in the camera.

3-1-4. Maintaining the Grayscale Chart

For the adjustment, using an 89.9 %-reflective grayscale chart is preferable.
If a reflective chart is not available, use a well-maintained pattern box and a transparent grayscale chart for adjustment.
Before beginning adjustment, set the illumination of the light source (or the luminous intensity on the chart surface) properly proceeding as follows and set the color temperature to 3200 K exactly by adjusting light.

Information on the reflective grayscale chart (16 : 9)

Recommended chart

The reflective grayscale chart (16 : 9) is commercially available.

Recommended chart: Reflective grayscale chart

Supplier: MURAKAMI COLOR RESEARCH LABORATORY

Handling precautions

- Do not touch the chart's surface.
- Do not subject the surface to dirt, scratches or prolonged exposure to sunlight.
- Protect the chart from excessive moisture and harmful gas.
- Avoid resting articles against the case.
- When the chart is not used for a long period and is stored, open the case and dry the chart for about an hour once or twice a month.

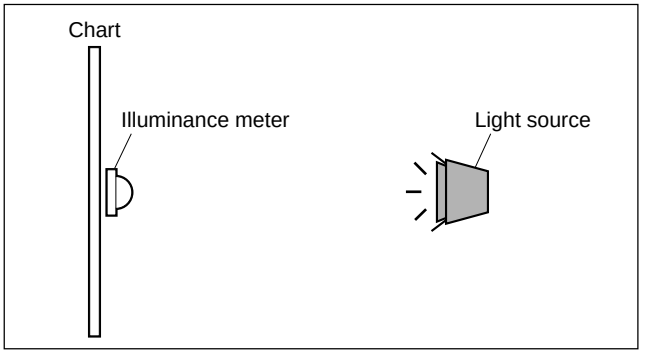
Replacement period when the chart is used as the reference

The reflective grayscale chart should be replaced every two years if it used as the reference. Because the chart deteriorates with time and proper adjustment cannot be achieved.
Replacement period varies according to storage conditions of the chart.

Setting illumination (when the reflective chart is used)

Equipment: Illuminance meter (Calibrated)

1. Turn on the light source and warm up for about 30 minutes.
2. Place the illuminance meter on the chart surface. Adjust the position and angle of the light source so that the whole surface of the chart is evenly 2000 lx.
   Note
   Light the chart from almost the same direction and height as the camera to shoot the chart.



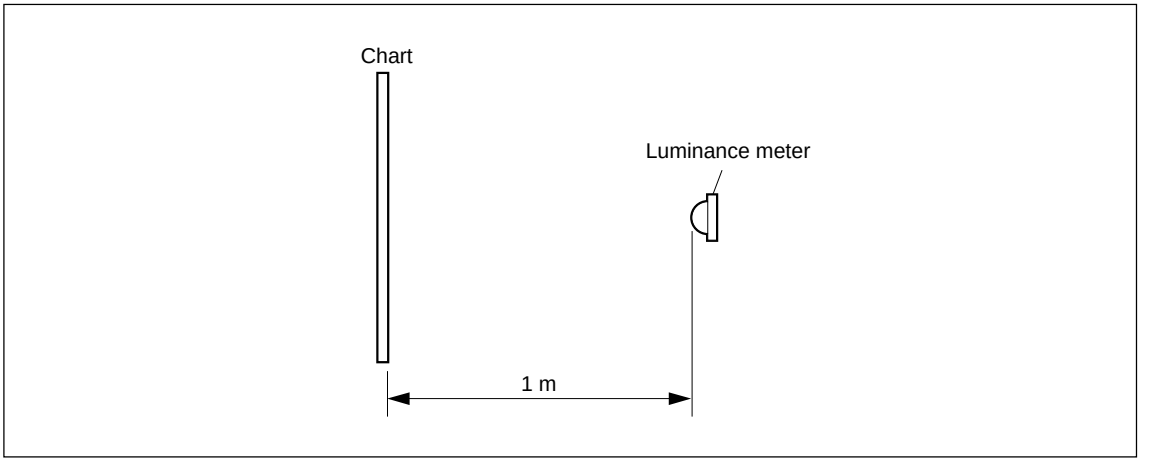
Setting luminous intensity (when the transparent chart is used)

Equipment: Luminance meter (Konica Minolta LS-110 or equivalent. Calibrated.)

1. Light the pattern box and warm up for about 30 minutes.
2. Place the pattern box where the chart is not exposed to light, such as a darkroom.
   (Or cover the pattern box with a cover whose inside is painted in black.)
3. Place the luminance meter facing straight to the chart at a distance of 1 m from it.
4. Adjust the luminance control of the pattern box so that the white portion in the center of the chart is 573 ± 6 cd/m^2.

   Note

   This corresponds to the luminous intensity on the 89.9 %-reflective chart at 2000 lx.



3-1-5. Description on Setup Menu

Some of adjustments given in this section use the setup menu. The setup menu consists of the following menus. Besides there is a TOP menu indicating the entire configuration of menu items.

- USER menu
- USER MENU CUSTOMIZE menu
- OPERATION menu
- PAINT menu
- MAINTENANCE menu
- FILE menu
- DIAGNOSIS menu
- SERVICE menu

In this section, describes the setup menu operation as follows.

For example:
When AUTO LEVEL in AUTO SETUP page of MAINTENANCE menu is performed:

MENU: MAINTENANCE
PAGE: AUTO SETUP
ITEM: AUTO LEVEL

How to display the SERVICE menu

HDC1000R

Set the DISPLAY switch to “MENU” while pressing the ASSIGNABLE switch and the MENU SELECT switch (ENTER side).

HDC1400R/1450R/1500R/1550R/1580R

Set the DISPLAY switch to “MENU” while pressing the ASSIGNABLE switch and the rotary encoder.

How to change the setting values

To enter or cancel the setting value of items, which can be changed by turning the MENU SELECT control (HDC1000R) or rotary encoder (HDC1400R/1450R/1500R/1550R/1580R), proceed as follows.

HDC1000R

To enter the setting value:

Press the MENU SELECT switch toward the “ENTER” side.

To cancel the setting value:

Before pressing the MENU SELECT switch toward the “ENTER” side, press the MENU SELECT switch toward the “CANCEL” side. The original setting is restored.

After the MENU SELECT switch is pressed toward the “ENTER” side, the setting cannot be canceled.

HDC1400R/1450R/1500R/1550R/1580R

To enter the setting value:

Press the rotary encoder.

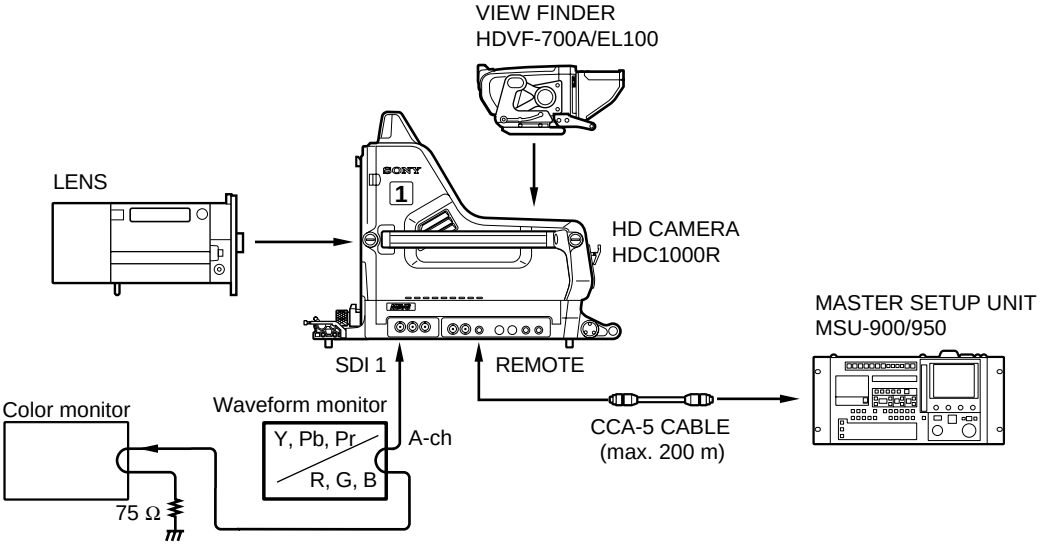
To cancel the setting value:

Before pressing the rotary encoder, press the MENU switch toward the “CANCEL” side. The original setting is restored.

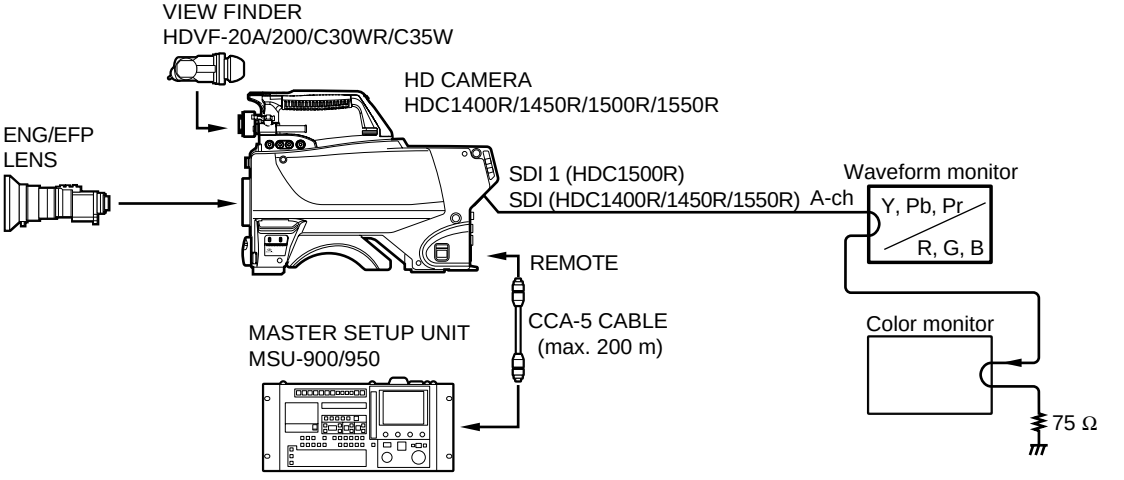
After the rotary encoder is pressed, the setting cannot be canceled.

3-1-6. Connection of Equipment

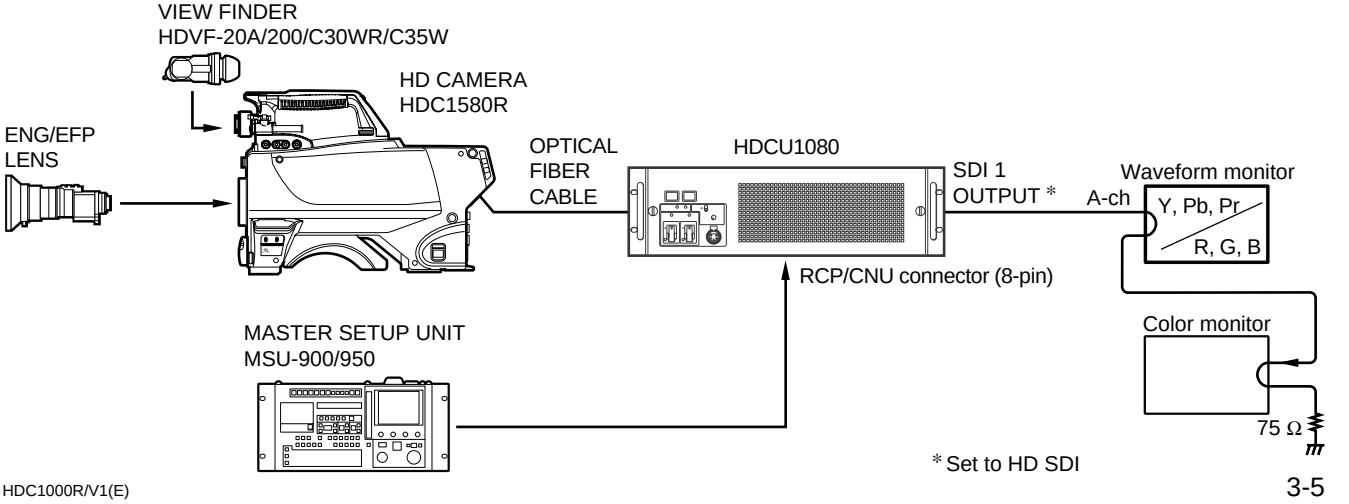
HDC1000R



HDC1400R/1450R/1500R/1550R



HDC1580R



3-1-7. Initial Settings

Note

In this section, describes the adjustment procedures using MSU-900.

MSU control panel

When MSU-900 is used

- Power supply and signal switching block
  - ALL button → OFF (dark)
  - CAM PW button → ON (lit)
  - VF PW button → ON (lit)
  - TEST 1 button → OFF (dark)
  - TEST 2 button → OFF (dark)
  - BARS button → OFF (dark)
  - CLOSE button → ON (lit)
- Camera/CCU circuit ON/OFF block
  - KNEE OFF button → OFF (lit)
  - DETAIL OFF button → OFF (lit)
  - LVL DEP OFF button → OFF (lit)
  - MATRIX OFF button → OFF (lit)
  - AUTO KNEE button → OFF (dark)
  - SKIN DETAIL button → OFF (dark)
- Others
  - GAMMA OFF button → ON (dark)
  - MASTER GAIN → 0 (0 dB)
  - FILTER(ND) button → 1 (CLEAR)
  - FILTER(CC) button → B (3200K)
  - ECS/SHUTTER ON button → OFF (dark)

When MSU-950 is used

- Power supply and signal switching block
  - ALL button → OFF (dark)
  - CAM PW button → ON (lit)
  - VF PW button → ON (lit)
  - TEST button → OFF (dark)
  - BARS button → OFF (dark)
  - CLOSE button → ON (lit)
- Camera/CCU circuit ON/OFF block
  - Knee Off* → OFF (lit in reverse)
  - Detail Off* → OFF (lit in reverse)
  - Level Dep Off* → OFF (lit in reverse)
  - Matrix Off* → OFF (lit in reverse)
  - AUTO KNEE button → OFF (dark)
  - SKIN DETAIL button → OFF (dark)
- Others
  - Gamma Off* → ON (lit normally)
  - Master Gain* → 0 (0 dB)
  - ND (1/2/3/4/5)* → 1 (CLEAR)
  - CC (A/B/C/D/E)* → B (3200K)
  - ECS/Shutter* → OFF (lit normally)

*: Push the FUNCTION button, then select the function menu display.

When adjusting using the Setup menu

- PAINT menu

Page	Setting item	Initial setting
SW STATUS	FLARE	ON
	GAMMA	ON
	BLK GAM	OFF
	KNEE	OFF
	WHT CLIP	OFF
	DETAIL	ON
	LVL DEP	ON
	SKIN DTL	OFF
	MATRIX	OFF
VIDEO LEVEL	TEST	OFF

Side panel (HDC1400R/1450R/1500R/1550R/1580R):

GAIN switch → L (0 dB)
OUTPUT/AUTO KNEE switch → CAM/OFF
WHITE BAL switch → PRST

Front panel (HDC1500R/1550R):

SHUTTER switch → OFF
FILTER LOCAL button + ND button → 1 (CLEAR)
FILTER LOCAL button + CC button → B (3200 K)

Front panel (HDC1400R/1450R/1580R):

SHUTTER switch → OFF
FILTER LOCAL button + ND button → 1 (CLEAR)

3-1-8. Adjustment Items and Setup Menu Items

Refer to the following table when using the camera setup menu for electrical adjustments without using MSU-900. The table shows camera menu items corresponding to adjustment items of MSU-900.

Maintenance menu (MAINTENANCE button/MSU-900 → ON (lit))

Menu item of the MSU-900				Menu item of the camera		
Menu	**Secondary menu**	**Sub menu**	**Adjusting item**	**MENU**	**PAGE**	**ITEM**
Adjusting	White Shading	R/G/B	H Saw	MAINTENANCE	WHITE SHADING	H SAW R/G/B
			H Para			H PARA R/G/B
			V Saw			V SAW R/G/B
			V Para			V PARA R/G/B
Auto Setup	Auto Level			MAINTENANCE	AUTO SETUP	AUTO LEVEL
Lens Adjusting	V Mod Saw		R/G/B	PAINT	VIDEO LEVEL	V MOD R/G/B
	Auto Iris		Level	MAINTENANCE	AUTO IRIS	IRIS LEVEL
			APL Ratio			APL RATIO

File control menu (FILE button/MSU-900 → ON (lit))

Menu item of the MSU-900		Menu item of the camera		
Menu	**Sub menu**	**MENU**	**PAGE**	**ITEM**
Reference	Ref Store	FILE	REFERENCE	STORE FILE
Lens File	Lens Store		LENS FILE	STORE FILE
OHB File	OHB Store		OHB FILE	STORE FILE

Paint menu page 1/3 (PAINT button/MSU-900 → ON (lit))

Menu item of the MSU-900			Menu item of the camera		
Menu	**Sub menu**	**Adjusting Item**	**MENU**	**PAGE**	**ITEM**
Black		R/G/B/Master	PAINT	VIDEO LEVEL	BLACK R/G/B/M
Flare		R/G/B			FLARE R/G/B
Detail	Detail 1	Level		DETAIL 1	LEVEL
		Limiter			LIMITER [M]
		Crispning			CLISP
		Level Dep			LVL DEP
	Detail 2	H/V Ratio			HV RATIO
	Detail 3	W.Limiter			LIMITER WHT
		B.Limiter			LIMITER BLK

Paint menu page 2/3 (PAINT button/MSU-900 → ON (lit))

Menu item of the MSU-900		Menu item of the camera		
Menu	**Adjusting item**	**MENU**	**PAGE**	**ITEM**
Gamma	R/G/B/Master	PAINT	GAMMA	LEVEL R/G/B/M
Knee Point	R/G/B/Master		KNEE	POINT R/G/B/M
Knee Slope	R/G/B/Master			SLOPE R/G/B/M
White Clip	R/G/B/Master			WHT CLP R/G/B/M

3-2. Automatic Adjustment

To execute the automatic adjustment

1. **MSU menu operation:**
   - MAINTENANCE button → ON (lit)
   - Touch panel operation
     Auto Setup → Auto Level

     Note

     When performing automatic adjustment using the menu of the camera, set the setup menu as follows.
     MENU: MAINTENANCE
     PAGE: AUTO SETUP
     ITEM: AUTO LEVEL

2. When the adjustment is completed, the message "Completed" will be displayed.

3-3. Electrical Alignment

3-3-1. Clamp Level Adjustment between Channel A and Channel B

Preparations

- Menu setting
  MENU : SERVICE
  PAGE : OHB_ADJ1

Adjustment Procedure

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: DC_ADJ_A [R1], [G1], [B1]
   DC_ADJ_B [R1], [G1], [B1]
   DC_ADJ_A [R2], [G2], [B2]
   Specification:
   For 1080_59.94i/50i/29.97PsF/25 PsF/23.58 PsF, set "DC_ADJ_A [R1], [G1], [B1]" to 68 and "DC_ADJ_B [R1], [G1], [B1]" to 60.
   For 1080_59.94P/50P, set "DC_ADJ_A [R1], [G1], [B1]" and "DC_ADJ_A [R2], [G2], [B2]" to 68. (This item is fine adjusted during the RPN adjustment described later.)
2. Execute file storing for each format.
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: STORE FILE

3-3-2. BLACK SET Adjustment

Preparation

- Setting for MSU-900
  CLOSE button → ON (lit)
  MASTER GAIN → 12

Adjustment Procedure

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: BLACK SHADING
   ITEM: BLK SET [R], [G], [B]
   Specification:
   Adjust this using WFM so that the PED level of each channel becomes equal within a range of −3 to +12 dB.
2. Execute file storing for each format.
   MENU: SERVICE
   PAGE: BLACK SHADING
   ITEM: STORE FILE

3-3-3. Sensitivity Adjustment

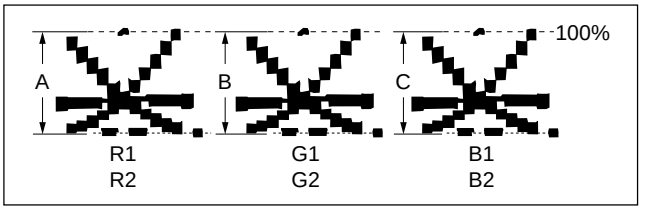
Preparation

- MSU-900 setting
  CLOSE button → OFF (dark)
  GAMMA OFF button → OFF (lit)
  MASTER GAIN → 0
  DETAIL OFF button → OFF (lit)
- Turn ON (lighting) the TEST1 button to display the TEST SAW waveform, and check that the amplitude is 700 mV using the WFM.
- If the amplitude is not 700 mV, adjust it by the following.
  MENU: SERVICE
  PAGE: WHITE SHADING
  ITEM: WHITE [R], [G], [B]
  Then turn OFF (light off) the TEST1 button.
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Lens iris: F10

* Use a lens with a transmittance equivalent to Canon HJ18.

Adjustment Procedure

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: GAIN_CONT [R1], [G1], [B1]
   GAIN_CONT [R2], [G2], [B2]
   (1080_59.94P/50P only)
   Specification:



   - For F1080_59.94i/50i/29.97PsF/25PsF/23.98PsF, probe the R1/G1/B1 signals on the tool board by the oscilloscope, and adjust “GAIN_CONT [R1], [G1], [B1]” so that the “A” level becomes 176 ±5 mV.
   - For 1080_59.94P/50P, probe the R1/G1/B1 and R2/G2/B2 signals on the tool board by the oscilloscope, and adjust “GAIN_CONT [R1], [G1], [B1], [R2], [G2], [B2]” so that the “A” level becomes 105 ±5 mV.

2. Execute file storing for each format.
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: STORE FILE

3-3-4. V-SUB Adjustment

Preparation

- Setting for MSU-900
  MASTER GAIN → 0
  SHUTTER button → OFF (dark)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: Open

Adjustment Procedure

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: OHB_ADJ3
   ITEM: V-SUB [R], [G], [B]

   - In the case of 1080_59.94i/50i
     Check that SHUTTER is set to OFF. Probe the R1, G1 and B1 by the oscilloscope and adjust the level A so that it is 1000 ±50 mV.
     Set SHUTTER to ON(1/500) and adjust the level A so that it is 555 ±20 mV.
   - In the case of 1080_59.94P/50P
     In the same procedure as above, adjust the level A so that it is 780 ±25 mV with SHUTTER set to OFF and 400 ±10 mV with SHUTTER set to ON (1/500).
   - In the case of 1080_29.97PsF/25PsF/24PsF
     In the same procedure as above, adjust the level A so that it is 710 $^{+30}_{-0}$ mV with SHUTTER set to OFF and 425 ±20 mV with SHUTTER set to ON (1/500).

2. Execute file storing for each format.
   MENU: SERVICE
   PAGE: OHB_ADJ3
   ITEM: STORE FILE

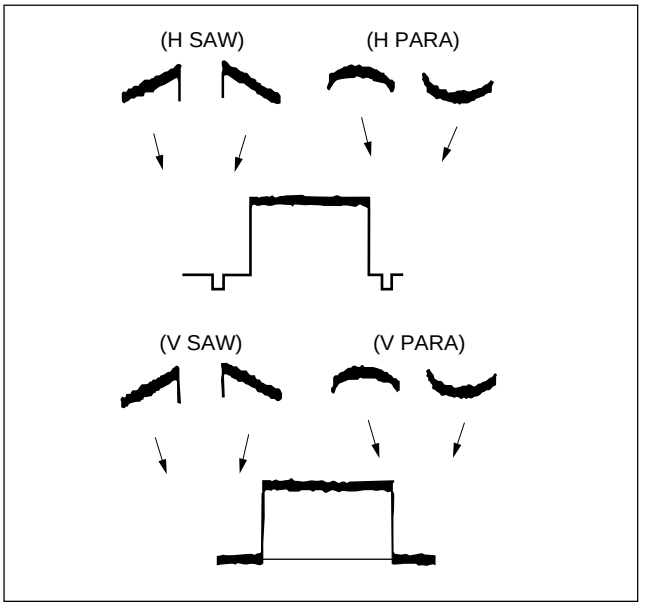
3-3-5. BLACK SHADING Adjustment

Preparation

- Setting for MSU-900
  CLOSE button → ON (lit)
  GAMMA OFF button → OFF (lit)
  MASTER GAIN → 12
  MASTER BLACK → 30

Adjustment Procedure

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: BLACK SHADING
   ITEM: H SAW, H PARA, V SAW, V PARA [R], [G], [B]
   Specification:
   Adjust so that each WFM channel becomes as flat as possible.
   (Check this in the mode of V: FIELD, H: LINE.)



2. Execute file storing for each format.
   MENU: SERVICE
   PAGE: BLACK SHADING
   ITEM: STORE FILE

3-3-6. White Shading Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Full white pattern

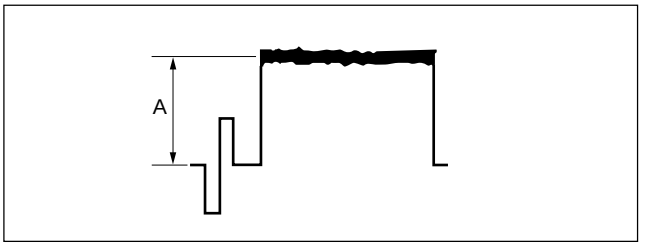
Note

When performing the white shading adjustment, make sure the following conditions are proper. If not, proper adjustment can not be obtained.

- White pattern is not uneven.
- Luminance is correctly adjusted.
- Iris and zoom control of the lens are correctly adjusted.

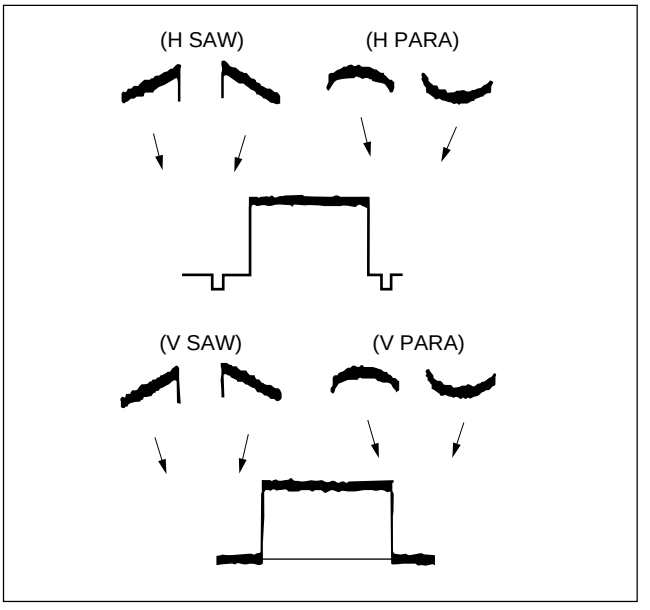
Preparations

- Setting for MSU-900
  KNEE OFF button → OFF (lit)
- Shoot the fully occupied white area of the white pattern on the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV (at F4 to F5.6)
  (If the lens aperture is greater than F5.6, adjust the light amounts with shutter.)
- Lens Focus: ∞
- Lens Extender/Shrinker: ×2, ×0.8 → OFF
- Set the setup menu as follows.
  MENU: OPERATION
  PAGE: LENS FILE
  ITEM: FILE
  (Select the file in accordance with the lens attached. If there is no appropriate file, select NO OFFSET, then change the name of lens with MSU.)



Adjustment Procedure

1. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
2. If the shading is monitored, proceed as follows.
   MSU menu operation:
   - MAINTENANCE button → ON (lit)
   - Touch panel operation
     Adjusting → White Shading → R
   - Adjustment Items: H Saw, H Para, V Saw, V Para



3. Adjust for G-ch in the same manner.
4. Adjust for B-ch in the same manner.
5. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)

OHB File Store

MSU menu operation:

- FILE button → ON (lit)
- Touch panel operation
  OHB File → OHB Store → Store

Adjustment for Lens Extender/Shrinker

When the WHITE or shading of V is out of alignment by using the lens extender or lens shrinker, perform the following adjustment (lens adjustment) after the completion of OHB file store.

6. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
7. (In the status of lens: ×1) Perform the lens file store.
   MSU menu operation:
   - FILE button → ON (lit)
   - Touch panel operation
     Lens File → Lens Store → Store
8. Lens extender (×2) → ON
   or lens shrinker (×0.8) → ON
9. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
10. **MSU menu operation:**
    - MAINTENANCE button → ON (lit)
    - Touch panel operation
      Lens Adjusting → V Mod Saw

    Adjustment Item: R, G, B
    Specification: Set the V modulation correction value as required.
11. Perform the lens file store.
    MSU menu operation:
    - FILE button → ON (lit)
    - Touch panel operation
      Lens File → Lens Store → Store

12. Lens extender (×2) → OFF
    or lens shrinker (×0.8) → OFF

3-3-7. RPN Adjustment

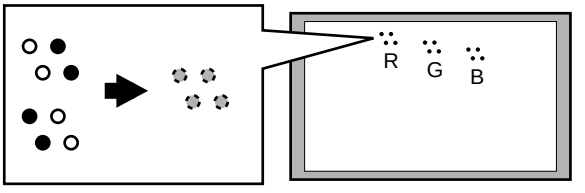
Preparation

- Adjust the color monitor manually for better display condition.
- Setting for MSU-900
  CLOSE button → ON (lit)
  DETAIL button → OFF (lit)
  MASTER GAIN → 12
- Menu setting
  MENU: SERVICE
  PAGE: OHB_ADJ2
  ITEM: CONC. TEST MODE → ON

Adjustment Procedure

• 1080_59.94i/50i/29.97PsF/25PsF/23.98PsF

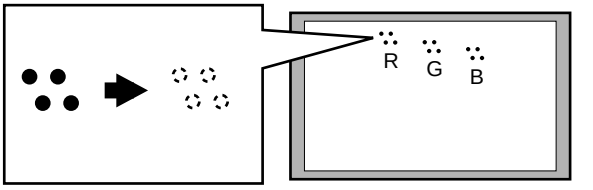
1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: DC_ADJ_B [R1], [G1], [B1]
   Specification:
   Adjust so that the dots displayed on the color monitor (R/G/B: four dots each) are of the same brightness.



Color monitor

2. Execute file storing.
   MENU: SERVICE
   PAGE: OHB_ADJ1
   ITEM: STORE FILE

3. Adjustment item
   MENU: SERVICE
   PAGE: OHB_ADJ2
   ITEM: DC_ADJ_C [R1], [G1], [B1]
   Specification:
   Adjust so that the dots displayed on the color monitor (R/G/B: four dots each) disappear.

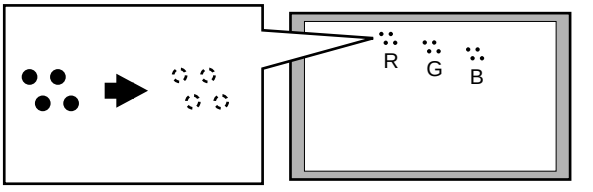


Color monitor

4. Execute file storing.
   MENU: SERVICE
   PAGE: OHB_ADJ2
   ITEM: STORE FILE

• 1080_59.94P/50P

1. **Adjustment Item:**
   MENU: SERVICE
   PAGE: OHB_ADJ2
   ITEM: SH_ADJ_A [R1], [G1], [B1]
   SH_ADJ_A [R2], [G2], [B2]
   Specification:
   Adjust so that the dots displayed on the color monitor (R/G/B: four dots each) disappear.



Color monitor

The left 2 out of 4: SH_ADJ_A [R1], [G1], [B1]
The right 2 out of 4: SH_ADJ_A [R2], [G2], [B2]

2. Execute file storing.
   MENU: SERVICE
   PAGE: OHB_ADJ2
   ITEM: STORE FILE

Note

For the details of the correction of actual RPN (Residual Point Noise), refer to Section 3-9 (RPN Compensation).

3-4. Video System Level Adjustment

Note

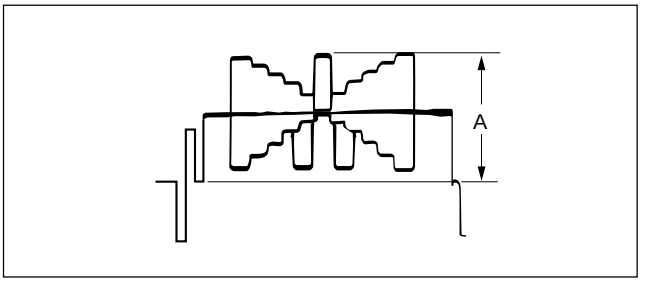
Perform the video system level adjustment at the request of the customer.

3-4-1. H/V Ratio Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

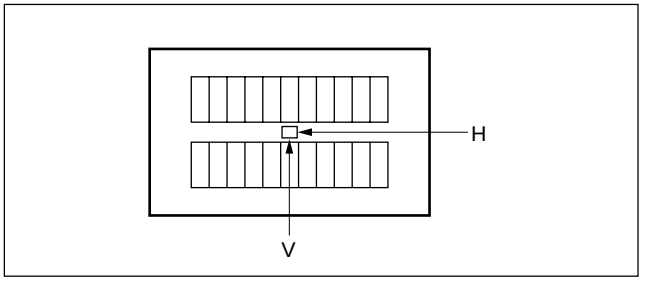
- Setting for MSU-900
  DETAIL OFF button → ON (dark)
  KNEE OFF button → OFF (lit)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV



Adjustment Procedure

1. **MSU menu operation:**
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 1/3) → Detail → Detail 1
   - Set each item as follows.
     Level → 99
     Limiter → 0
     Crispening → −25
     Level Dep → 25
2. **MSU menu operation:**
   - Touch panel operation
     Detail 2

   Adjustment Item: H/V Ratio
   Specification: A ratio between H and V detail amounts (white) to be added shall be equal. (from 20 to 40)

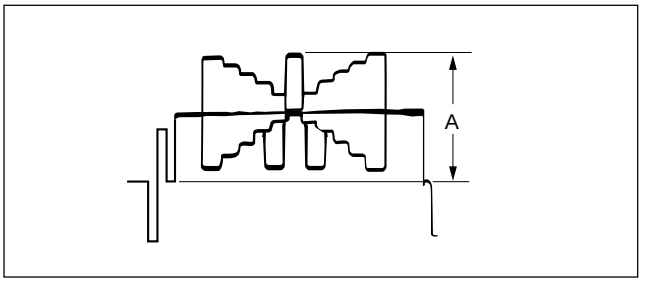


3-4-2. Detail Level Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

- Setting for MSU-900
  DETAIL OFF button → ON (dark)
  KNEE OFF button → OFF (lit)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV



Adjustment Procedure

MSU menu operation:

- PAINT button → ON (lit)
- Touch panel operation
  (Page 1/3) → Detail → Detail 1

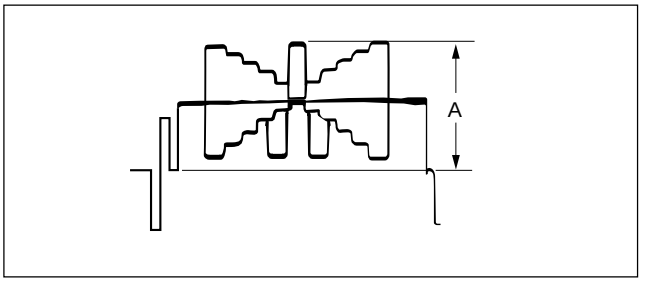
Adjustment Item: Level
Specification: Adjust the detail level to be added to each step of the grayscale for the desired level.

3-4-3. Crispening Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

- Setting for MSU-900
  DETAIL OFF button → ON (dark)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV



Adjustment Procedure

1. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
2. Adjust the crispening level.
   MSU menu operation:
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 1/3) → Detail → Detail 1

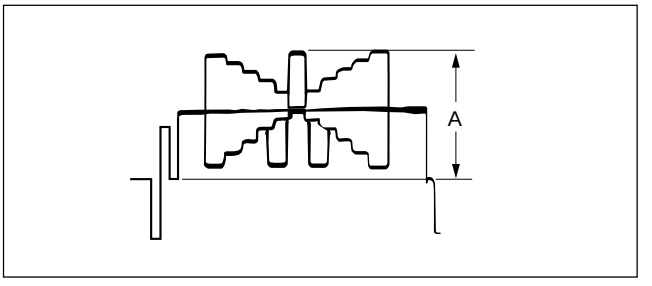
   Adjustment Item: Crispening
   Specification: Set Crispening to −99 once, and turn slowly for increment until the noise at the black level of the waveform just decreases, or until an appropriate crispening level is obtained.

3-4-4. Level Dependent Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

- Setting for MSU-900
  DETAIL OFF button → ON (dark)
  LEVEL DEP OFF button → ON (dark)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV

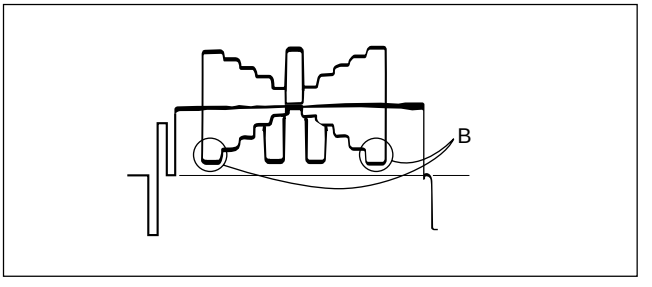


Adjustment Procedure

MSU menu operation:

- PAINT button → ON (lit)
- Touch panel operation
  (Page 1/3) → Detail → Detail 1

Adjustment Item: Level Dep
Specification: Set Level Dep to −99 once. And turn slowly for increment until spikes at portions B just decrease. Or adjust for the desired level.



Note

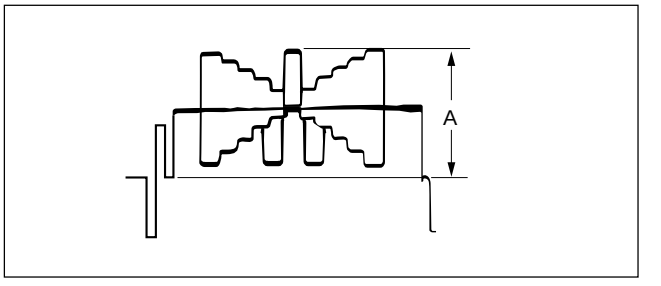
After adjustment is completed, be sure to perform Section 3-4-1 “H/V Ratio Adjustment”.

3-4-5. Detail Clip Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

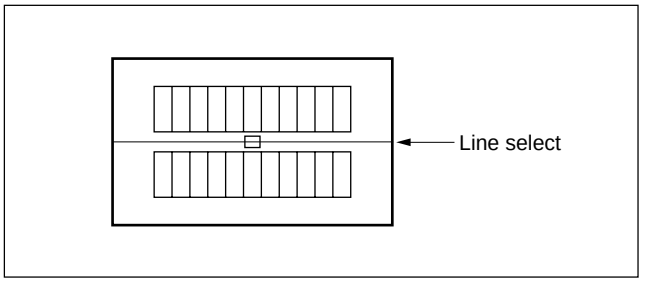
Preparations

- Setting for MSU-900
  KNEE OFF button → OFF (lit)
  DETAIL OFF button → ON (dark)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV



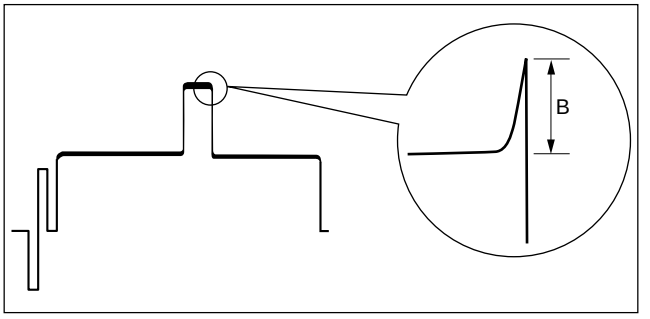
Adjustment Procedure

1. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
2. Make a line selection at the center white portion of the grayscale chart.



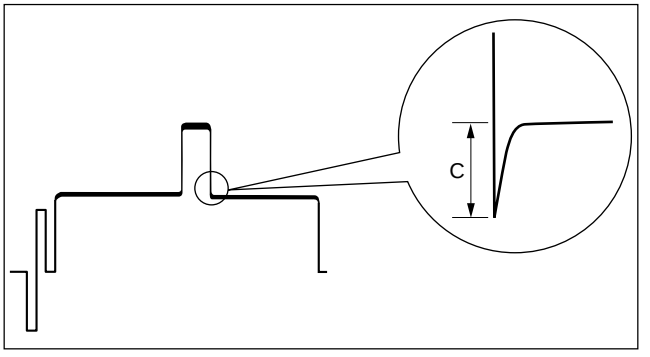
3. Adjust the white limiter.
MSU menu operation:
- PAINT button → ON (lit)
- Touch panel operation
(Page 1/3) → Detail → Detail 3

Adjustment Item: W.Limiter
Specification: Adjust the edge at portion B for the desired clip level.



4. Adjust the black limiter.
MSU menu operation:
- PAINT button → ON (lit)
- Touch panel operation
(Page 1/3) → Detail → Detail 3

Adjustment Item: B.Limiter
Specification: Adjust the edge at portion C for the desired clip level.



3-4-6. Auto-iris Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

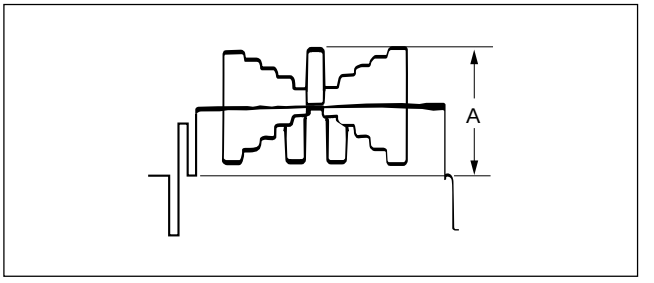
- Setting for MSU-900
AUTO button (Iris control block) → ON (lit)
KNEE OFF button → OFF (lit)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.

Adjustment Procedure

1. Adjust the white balance.
WHITE button/MSU-900 → ON (lit)
2. Adjust APL ratio.
MSU menu operation:
- MAINTENANCE button → ON (lit)
- Touch panel operation
Lens Adjusting → Auto Iris

Adjustment Item: APL Ratio
Specification: Set the auto-iris operation mode as required. (It can be set between the average and the peak value of video signal.)
99 → average
−99 → peak value

3. Adjust the auto-iris level.
MSU menu operation:
Adjustment Item: Level
Specification: A = 700 ± 7 mV



3-4-7. Pedestal Level Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)

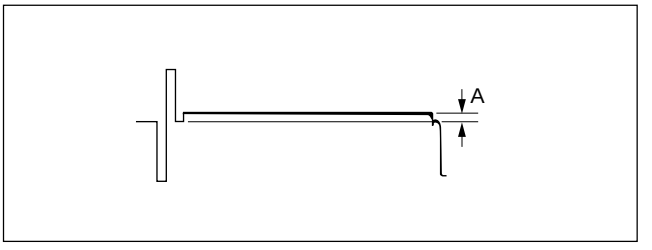
Preparations

- Settings for MSU-900
  CLOSE button → ON (lit)

Adjustment Procedure

1. **MSU menu operation:**
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 1/3) → Black

   Adjustment Item: R, G, B Master
   Specification: Adjust the levels A for preferred level for R, G and B respectively. To adjust all levels for R, G and B simultaneously, adjust them using the Master.
   (Reference value: A = 21 mV)

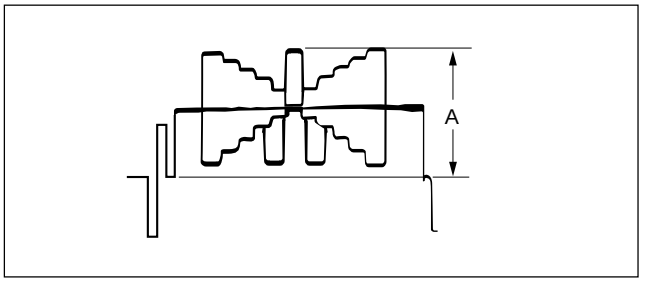


3-4-8. Flare Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

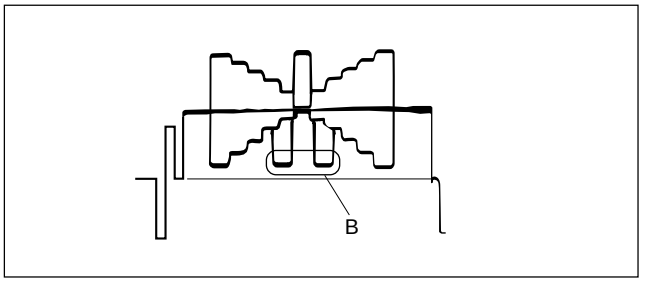
- Setting for MSU-900
  KNEE OFF button → OFF (lit)
  DETAIL OFF button → OFF (lit)
  MATRIX OFF button → OFF (lit)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 600 ±20 mV



Adjustment Procedure

1. **MSU menu operation:**
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 1/3) → Flare

   Adjustment Item: R, G, B
   Specification: Adjust the levels B for preferred level for R, G and B respectively.

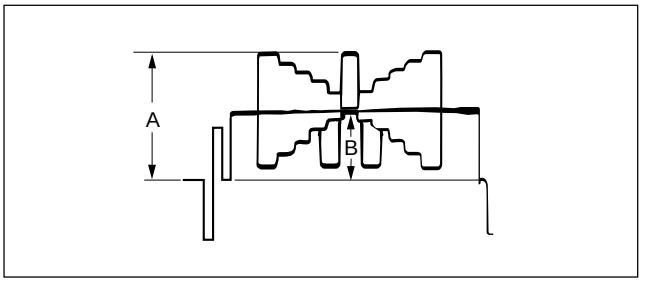


3-4-9. Gamma Correction Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

- Setting for MSU-900
  KNEE OFF button → OFF (lit)
  GAMMA OFF button → ON (dark)
- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Iris of the lens: A = 700 ±20 mV



Adjustment Procedure

1. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
2. **MSU menu operation:**
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 2/3) → Gamma

   Adjustment Item: R, G, B, Master
   Specification: Adjust the cross points B of the grayscale for preferred level for R, G and B respectively.
   To adjust all cross points for R, G and B simultaneously, adjust them using the Master.

3-4-10. Knee Point/Knee Slope Adjustment

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)

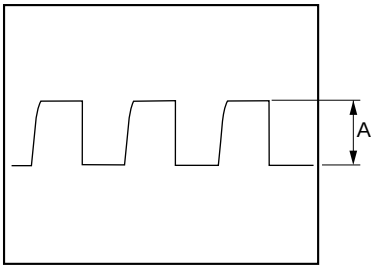
Preparations

- Setting for MSU-900
  MASTER GAIN → +6 dB
  TEST1 button → ON (lit)
  KNEE OFF button → ON (dark)

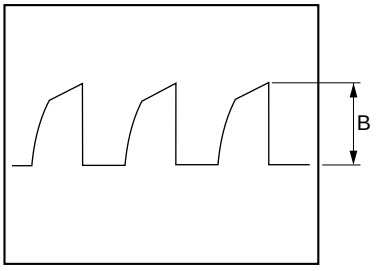
Adjustment Procedure

1. **MSU menu operation:**
   - PAINT button → ON (lit)
   - Touch panel operation
     (Page 2/3) → Knee Slope
   - Set Master to +99.
2. **MSU menu operation:**
   - Touch panel operation
     (Page 2/3) → Knee Point

   Adjustment Item: R, G, B Master
   Specification: Adjust the levels A for preferred level for R, G and B respectively.
   To adjust all levels for R, G and B simultaneously, adjust them using the Master.
   (Reference value: A = 686 mV)



3. **MSU menu operation:**
   • Touch panel operation
   (Page 2/3) → Knee Slope
   Adjustment Item: R, G, B Master
   Specification: Adjust the levels B for preferred level for R, G and B respectively. To adjust all levels for R, G and B simultaneously, adjust them using the Master.
   (Reference value: B = 735 mV)



Setting after Adjustment

• MASTER GAIN/MSU-900 → 0 dB
• KNEE OFF button/MSU-900 → OFF (lit)

3-4-11. White Clip Level Adjustment

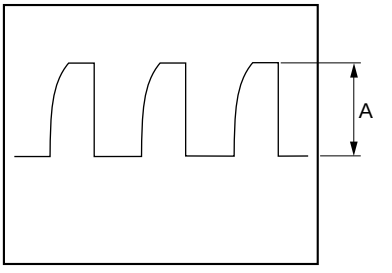
Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)

Preparations

• Setting for MSU-900
MASTER GAIN → +12 dB
TEST1 button → ON (lit)

Adjustment Procedure

1. **MSU menu operation:**
   • PAINT button → ON (lit)
   • Touch panel operation
   (Page 2/3) → White Clip
   Adjustment Item: Adjust the levels A for preferred level for R, G and B respectively. To adjust all levels for R, G and B simultaneously, adjust them using the Master.
   (Reference value: A = 756 mV)



Setting after Adjustment

• MASTER GAIN/MSU-900 → 0 dB
• TEST1 button/MSU-900 → OFF (dark)

3-4-12. File Store

After adjustments described in Section 3-4 are completed, be sure to execute the reference file store.

1. **MSU menu operation:**
   - FILE button → ON (lit)
   - Touch panel operation
     [Reference] → [Ref Store] → [Start]
2. When the store operation is completed, the message "Completed" is displayed.

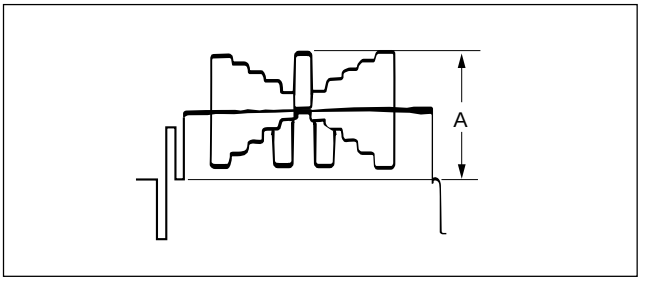
3-5. ND Offset Adjustment

When the filter disk unit is replaced alone, the correction of white balance is required. Proceed as follows.

Equipment: Waveform monitor (R, G, B)
Test Point: SDI 1 connector (HDC1000R/1500R)
SDI connector (HDC1400R/1450R/1550R)
SDI 1 connector (HDCU1080 for HDC1580R)
Object: Grayscale chart

Preparations

- Shoot the grayscale chart so that the chart frame is aligned with the underscanned monitor frame.
- Setting for MSU-900
  AUTO button (Iris control block) → ON (lit)
- Iris of the lens: A = 600 ±20 mV



Adjustment Procedure

1. FILTER CTRL button/MSU-900 → ON (lit)
2. Select the ND 1 filter.
   ND 1 button/MSU-900 → ON (lit)
3. Adjust the white balance.
   WHITE button/MSU-900 → ON (lit)
4. After the white balance adjustment is completed, switch the filter from ND2 to ND5, and adjust the white balance for each.
   Set the GAIN for each ND filter as follows.
   MASTER GAIN/MSU-900
   - ND filter 2: 0 dB
   - ND filter 3: 0 dB
   - ND filter 4: 6 dB
   - ND filter 5: 12 dB

OHB File Store

1. **MSU menu operation:**
   - FILE button → ON (lit)
   - Touch panel operation
     OHB File → OHB Store → Store
2. When the store operation is completed, the message "OHB File Stored" is displayed.

Setting after Adjustment

- MASTER GAIN/MSU-900 → 0 dB

3-6. Adjustment Preparation of HDC1450R/1550R

3-6-1. Equipment Required

Measuring equipment

- Oscilloscope: Tektronix 2465B or equivalent
- Spectrum analyzer: Advantest R3131A or equivalent
- Signal generator: Tektronix TSG130A or equivalent
- Waveform monitor: Tectronix WFM700 or equivalent

Related equipment

- HD camera control unit HDCU1500
- HD TRIAX camera adapter HDFX100
- Master setup unit MSU-900/950

Tools

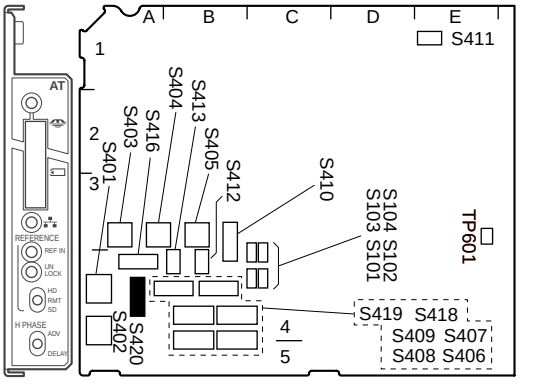
- TRIAX cable: Fujikura cable (100 m, ø: 8.5 mm) or (100 m) equivalent
- TRIAX cable: Fujikura cable (50 m, ø: 8.5 mm) or equivalent
- TRIAX cable: Fujikura cable (300 m, ø: 8.5 mm) or equivalent

Notes

- The 50 m and 300 m TRIAX cables are used for "3-8-3. Return Frequency Adjustment" only.
- Unless otherwise specified, use the 100 m TRIAX cable for adjustments.

3-6-2. Precautions on Adjustments

- Confirm that all measuring equipment and related equipment have been calibrated.
- Unless otherwise specified, use the 100 m TRIAX cable for adjustments.
- Set the switch S420 for electrical adjustments on the AT-167 board in HDCU1500 as follows, and also set the system format to 1080/59.94i.
  S420/AT-167 board: REMOTE



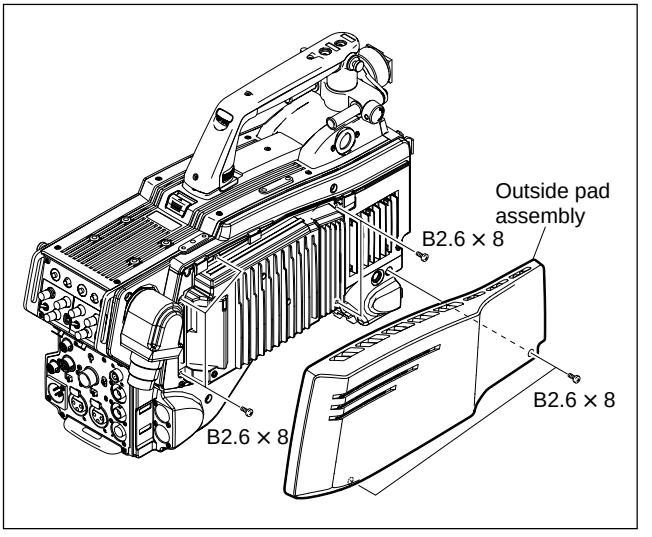
AT-167 board in HDCU1500 (Side A)

- MSU menu setting
  - CONFIG button → ON
  - Touch panel operation
    1) CCU → Multi Format → 1080 / 59.94i (UC)
       or
       1080 / 50i (CE)

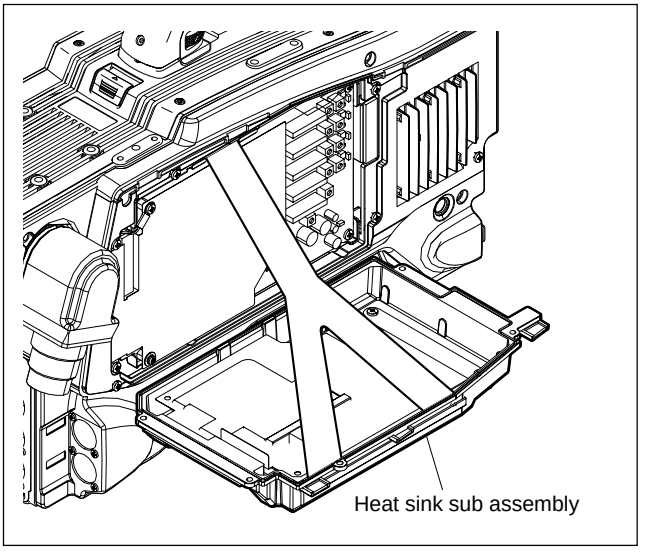
    2) CCU → Return setting → 1080 / 59.94i (UC)
       or
       1080 / 50i (CE)

3-6-3. Connection

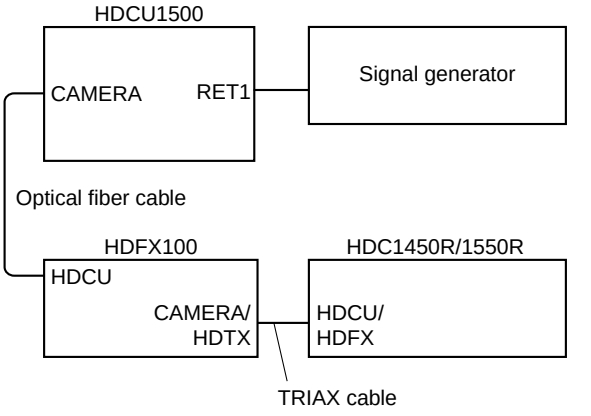
1. Remove the two screws to detach the outside pad sub assembly.
2. Remove the five screws.



3. Open the heat sink sub assembly as shown in the following figure.



4. Connect the equipments as shown in the following figure.

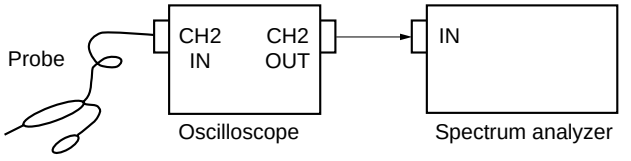


3-7. TONE Adjustment (HDC1450R/1550R)

3-7-1. CHU DATA/TONE Frequency Adjustment

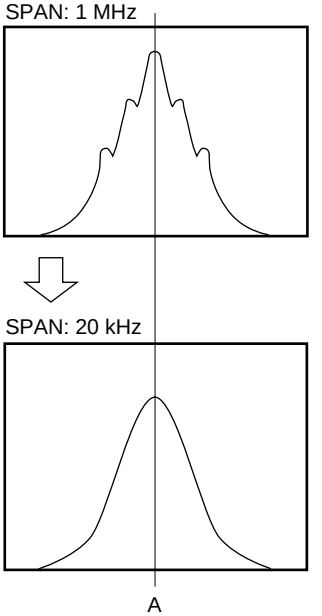
Preparation

1. Connect the oscilloscope to the spectrum analyzer as shown below.



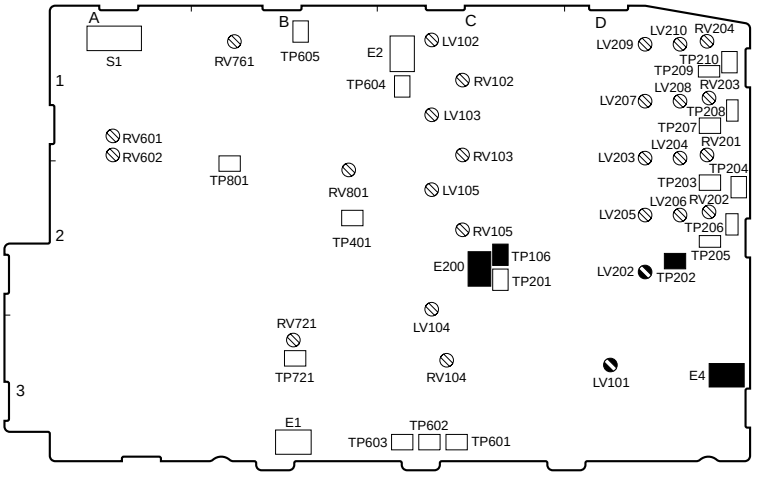
Adjustment procedure

2. Adjust the frequency at the waveform peak while changing the SPAN of the spectrum analyzer as 1 MHz → 50 kHz → 20 kHz.
   Measuring equipment: Spectrum analyzer (via oscilloscope)
   CENTER: 5.6 MHz
   SPAN: 1 MHz → 50 kHz → 20 kHz
   RBW: 300 Hz
   Test point: TP106 (GND: E200)/TR-136 board
   Adjusting point: ⊘LV101/TR-136 board
   Specification: A = 5.600 ±0.005 MHz



3-7-2. CCU DATA Demodulation Adjustment

Measuring equipment: Oscilloscope
Input mode: DC
Test point: TP202 (GND: E4)/TR-136 board
Adjusting point: ⊘LV202/TR-136 board
Specification: 0 ±40 mV



TR-136 BOARD (SIDE A)

3-8. Video System Adjustment (HDC1450R/1550R)

Note

Be sure to perform "3-7. TONE Adjustment" before adjusting the video system.

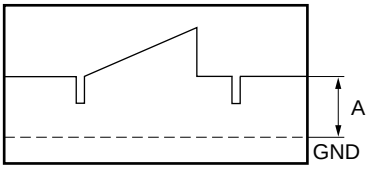
3-8-1. Demodulation Tuning Adjustment

Preparation

1. • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → NTSC or PAL
2. • Connect the signal generator to the RET 1 IN connector on HDCU1500, and input the MOD RAMP signal.
   • Set S1 on the DM-141 board in HDFX100 to "0".

Adjustment procedure

3. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP201 (GND: E1)/MX-109 board
   Adjusting point: ⊘LV201/MX-109 board
   Specification: A = 3.1 ±0.1 V dc



4. • Re-set S1 on the DM-141 board in HDFX100 to "F".
   • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → 1080 / 59.94i (UC)
   or
   1080 / 50i (CE)

5. Disconnect the signal generator from the RET 1 IN connector on HDCU1500.

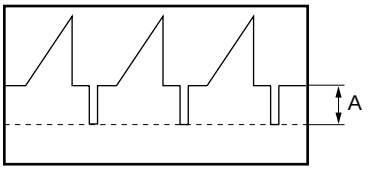
3-8-2. Return Sync Level Adjustment

Preparation

1. • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → NTSC
2. • Connect the signal generator to the RET 1 IN connector on HDCU1500, and input the MOD RAMP signal.
   • Set S1 on the DM-141 board in HDFX100 to "0".

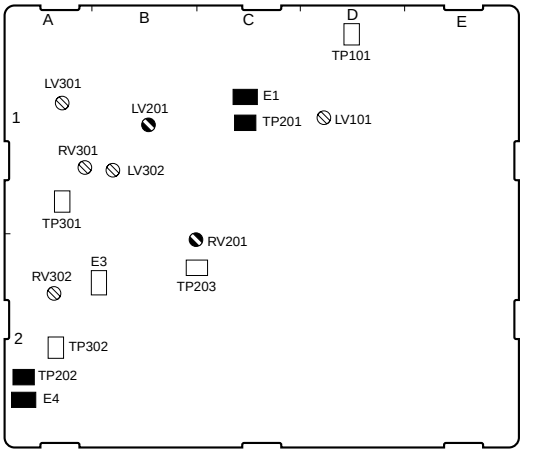
Adjustment procedure

3. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP202 (GND: E4)/MX-109 board
   Adjusting point: ⊘RV201/MX-109 board
   Specification: A = 600 mV



4. • Re-set S1 on the DM-141 board in HDFX100 to "F".
   • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → 1080 / 59.94i (UC)
   or
   1080 / 50i (CE)

5. Disconnect the signal generator from the RET 1 IN connector on HDCU1500.



MX-109 BOARD (SIDE A)

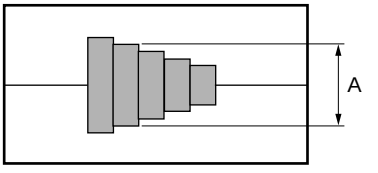
3-8-3. Return Frequency Adjustment

Preparation

1. • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → NTSC or PAL
2. • Connect the signal generator to the RET 1 IN connector on HDCU1500, and input the MULTI BURST signal.
   • Replace the TRIAX cable between HDFX100 and HDC1450R/1550R with the 300 m cable.
   • Set S1 on the DM-141 board in HDFX100 to "0".

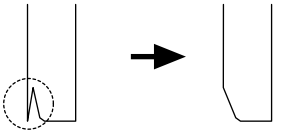
Adjustment procedure

3. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP202 (GND: E4)/MX-109 board
   Adjusting point: ◓LV101/MX-109 board
   Specification: A = minimum



4. • Replace the TRIAX cable between HDFX100 and HDC1450R/1550R with the 50 m cable.
   • Set S1 on the DM-141 board in HDFX100 to "2".

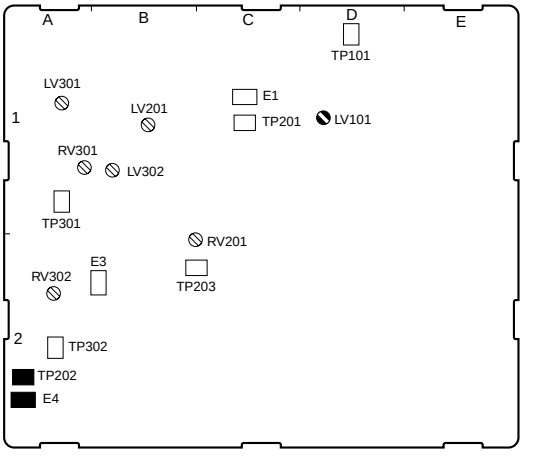
5. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP202 (GND: E4)/MX-109 board
   Adjusting point: ◓LV101/MX-109 board
   Specification: No overshoot in the sync area of the waveform.



No overshoot in the sync area of the waveform.

6. • Return the TRIAX cable to the original 100 m cable.
   • Re-set S1 on the DM-141 board in HDFX100 to "F".
7. • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → 1080 / 59.94i (UC)
   or
   1080 / 50i (CE)

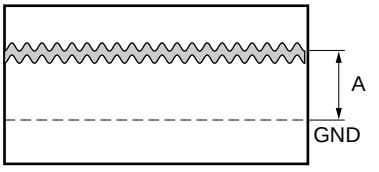
8. Disconnect the signal generator from the RET 1 IN connector on HDCU1500.



MX-109 BOARD (SIDE A)

3-8-4. 74 MHz Clock Duty Adjustment

Measuring equipment:
Oscilloscope
Input mode: DC
Test point: TP721 (GND: E1)/TR-136 board
Adjusting point: ⊘RV721/TR-136 board
Specification: A = 1.6 ±0.05 V dc



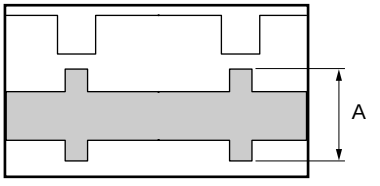
3-8-5. CHU Y Level Adjustment

Preparation

1. Close the lens iris of HDC1450R/1550R.

Adjustment procedure

2. Measuring equipment:
Oscilloscope
Test point: TP604 (GND: E2)/TR-136 board
TRIG: TP602/TR-136 board
Adjusting point: ⊘RV601/TR-136 board
Specification: A = 3.0 ±0.05 V p-p



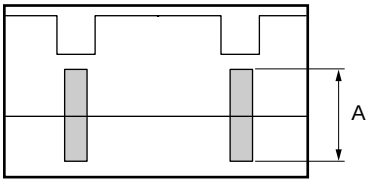
3-8-6. CHU C Level Adjustment

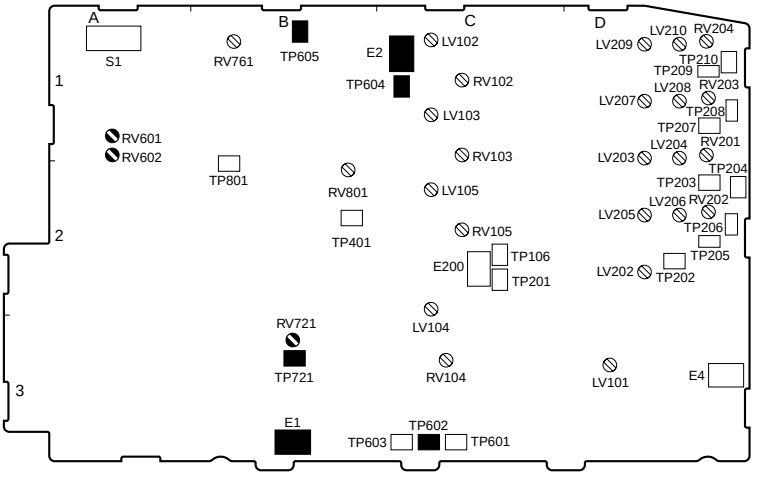
Preparation

1. Close the lens iris of HDC1450R/1550R.

Adjustment procedure

2. Measuring equipment:
Oscilloscope
Test point: TP605 (GND: E2)/TR-136 board
TRIG: TP602/TR-136 board
Adjusting point: ⊘RV602/TR-136 board
Specification: A = 2.0 ±0.05 V p-p



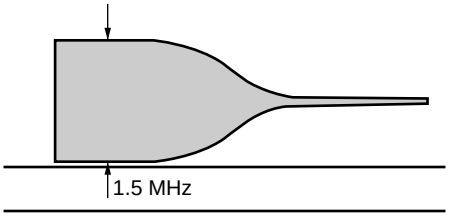


TR-136 BOARD (SIDE A)

3-8-7. MX-109 Prompter Adjustment

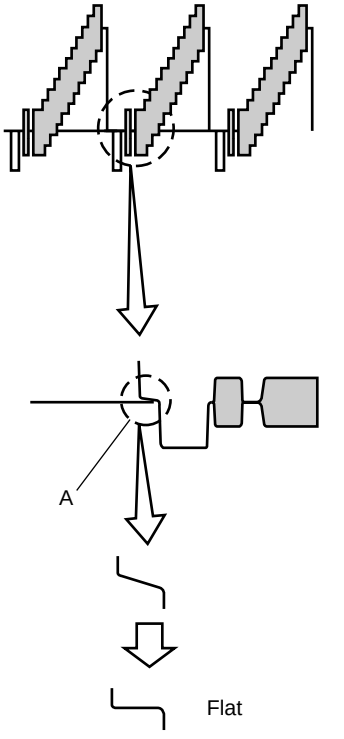
Prompter Frequency Adjustment

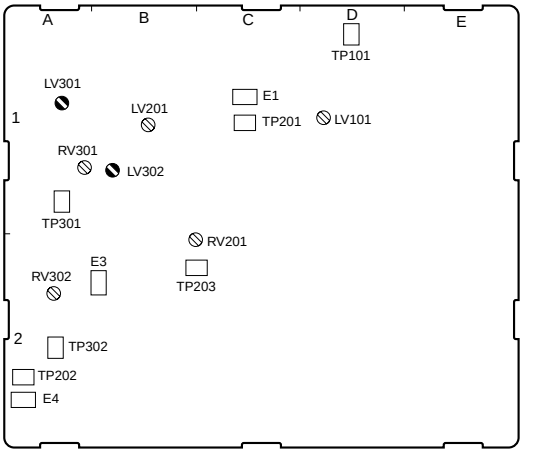
1. Measuring equipment: Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: "1"
   TRIAX cable: 400 m
   Adjusting point: ⊘LV302 (PROMPT TUNE)/ MX-109 board
   Specification: A waveform shall appear.



2. Measuring equipment: Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: "1"
   TRIAX cable: 400 m
   Adjusting point: ⊘LV301 (PROMPT FREQ)/ MX-109 board
   Specification: A waveform shall be maximized.

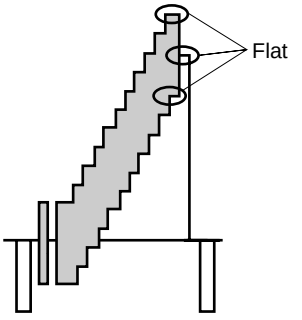
3. Measuring equipment: Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: "1"
   TRIAX cable: 400 m
   Adjusting point: ⊘LV302 (PROMPT TUNE)/ MX-109 board
   Specifications: The back porch shall be flat. If this specification is not met, perform "Prompter AGC Adjustment (See step 5)," and then perform this adjustment.





MX-109 BOARD (SIDE A)

4. Measuring equipment:
   Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: “1”
   TRIAX cable: 400 m, 100 m
   Adjusting point: —
   Specification: The portions in the waveform shown below shall be flat.

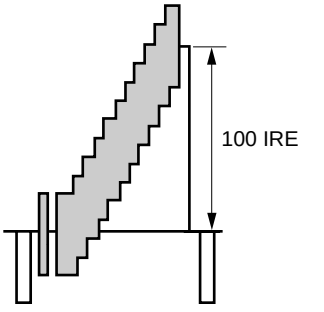


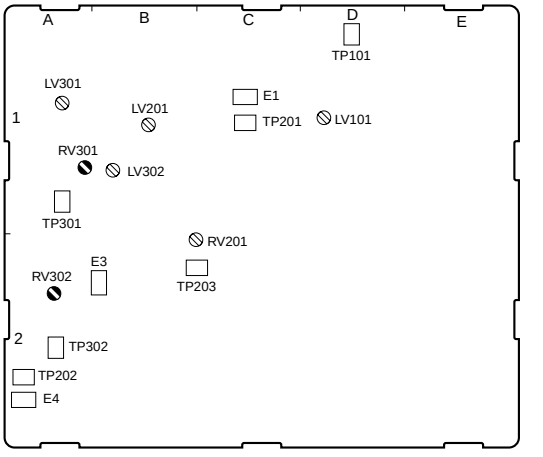
Prompter AGC Adjustment

5. Measuring equipment:
   Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: “1”
   TRIAX cable: 300 m
   Adjusting point: ⊘RV301 (RF AGC DLY)/ MX-109 board
   Specification:
   - The noise level shall be minimum.
   - The SYNC level shall be maintained.
   - The back porch shall be flat.

Prompter Level Adjustment

6. Measuring equipment:
   Waveform monitor
   Test point: HDC1450R/1550R PROMPTER connector
   HDFX setting: S1: “1”
   TRIAX cable: 200 m
   Adjusting point: ⊘RV302 (PROMPT LEV)/ MX-109 board
   Specification: 100 IRE ±3%





MX-109 BOARD (SIDE A)

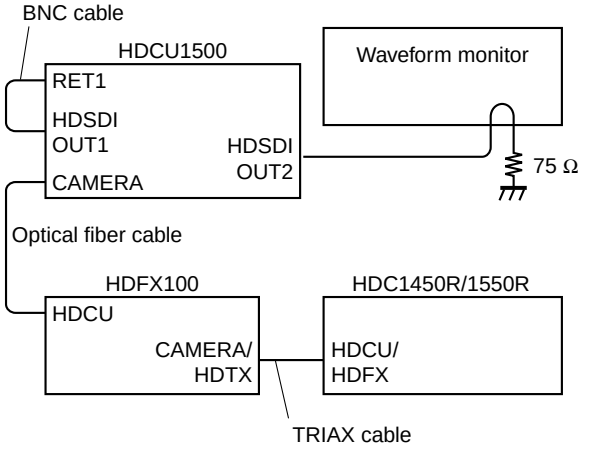
3-8-8. Return DC Level Adjustment

Preparation

1. • MSU menu setting
   • CONFIG button → ON
   • Touch panel operation
   CCU → Return setting → 1080 / 59.94i (UC)
   or
   1080 / 50i (CE)

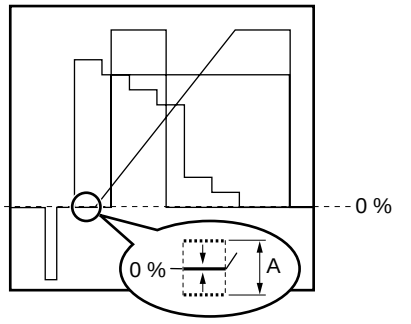
2. Set S1-1 on the TR-136 board to ON (HDC1450R/1550R).
   Note
   The multiformat color-bar signal is output from the test signal generator in HDC1450R/1550R.

3. Change the connection of the equipments as shown in the following figure.

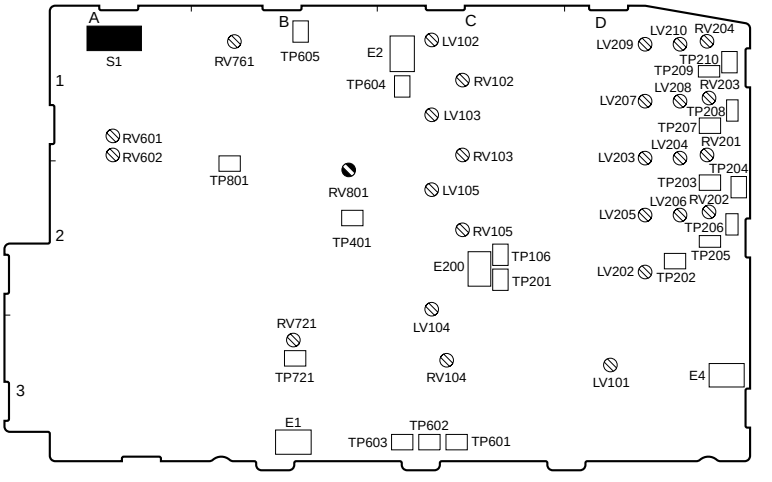


Adjustment procedure

4. Measuring equipment:
   Waveform monitor
   Test point: SDI OUT2/HDCU1500 rear panel
   Adjusting point: ◓RV801/TR-136 board
   Specification: A = 0 %
   (Flatten the RET DC level A.)



5. Reconnect the equipments as shown in Section 3-6.
6. Re-set S1-1 on the TR-136 board to OFF.



TR-136 BOARD (SIDE A)

3-9. Audio System Adjustment (HDC1450R/1550R)

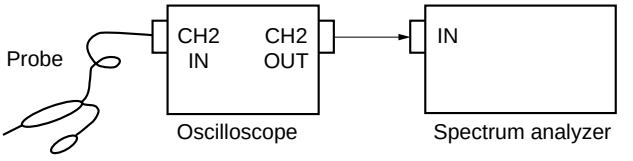
Note

Be sure to perform "3-7. TONE Adjustment" before adjusting the audio system.

3-9-1. Frequency Adjustment

Preparation

1. Connect the oscilloscope to the spectrum analyzer as shown below.



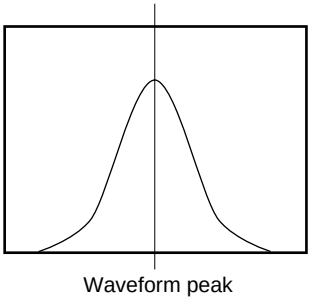
Adjustment procedure

2. Measuring equipment:
   Spectrum analyzer
   (via oscilloscope)
   CENTER: 6.7 MHz
   SPAN: 3 MHz
   RBW: 30 kHz
   Test point: TP106 (GND: E200)/TR-136 board
   Adjusting point and specification:

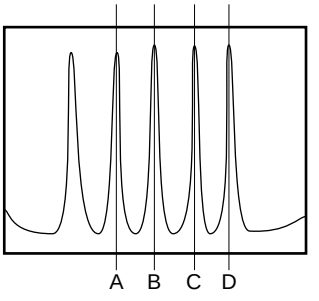
	Adjusting point	Specification
MIC 1	⊘LV102/TR-136 board	A = 6.20 ±0.01 MHz
MIC 2	⊘LV103/TR-136 board	B = 6.70 ±0.01 MHz
INCOM 1	⊘LV104/TR-136 board	C = 7.10 ±0.01 MHz
INCOM 2	⊘LV105/TR-136 board	D = 7.40 ±0.01 MHz

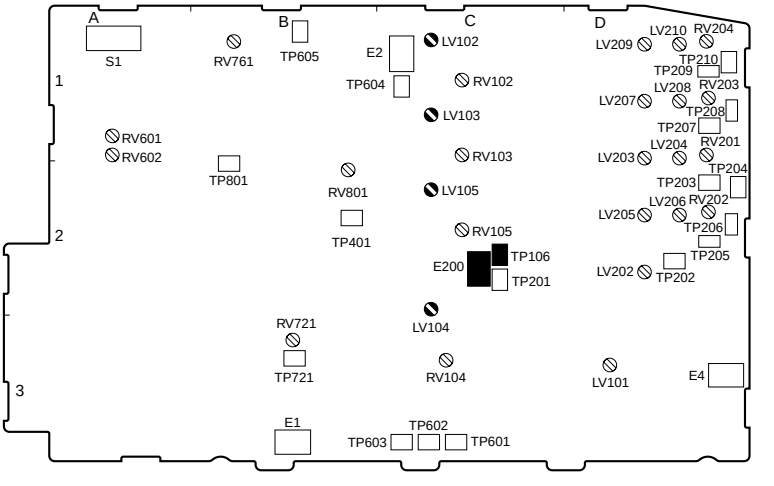
3. Change the SPAN of the spectrum analyzer to 50 KHz, and RBW to 300 Hz.
4. Adjust the frequency at each waveform peak while changing the CENTER of the spectrum analyzer.
   Measuring equipment:
   Spectrum analyzer
   (via oscilloscope)
   CENTER: 6.2 MHz (MIC 1)
   6.7 MHz (MIC 2)
   7.1 MHz (INCOM 1)
   7.4 MHz (INCOM 2)
   SPAN: 50 KHz
   RBW: 300 Hz
   Test point: TP106 (GND: E200)/TR-136 board
   Adjusting point and specification:

	Spectrum analyzer CENTER	Adjusting point/ TR-136 board	Specification
MIC 1	6.2 MHz	⊘LV102	6.200 ±0.005 MHz
MIC 2	6.7 MHz	⊘LV103	6.700 ±0.005 MHz
INCOM 1	7.1 MHz	⊘LV104	7.100 ±0.005 MHz
INCOM 2	7.4 MHz	⊘LV105	7.400 ±0.005 MHz



Waveform peak



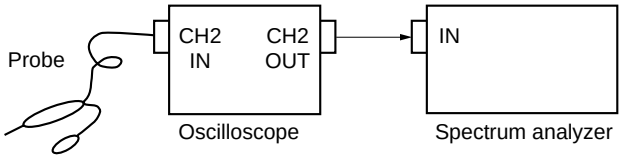


TR-136 BOARD (SIDE A)

3-9-2. Audio Modulation Adjustment

Preparation

1. Connect the oscilloscope to the spectrum analyzer as shown below.



2. Set S1-4 on the TR-136 board to ON (HDC1450R/1550R).

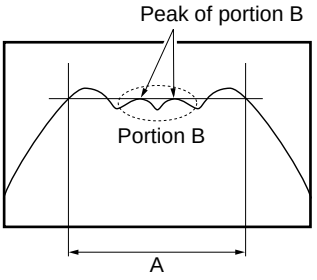
Note

A 400 Hz sine wave is output from the test signal generator in HDC1450R/1550R.

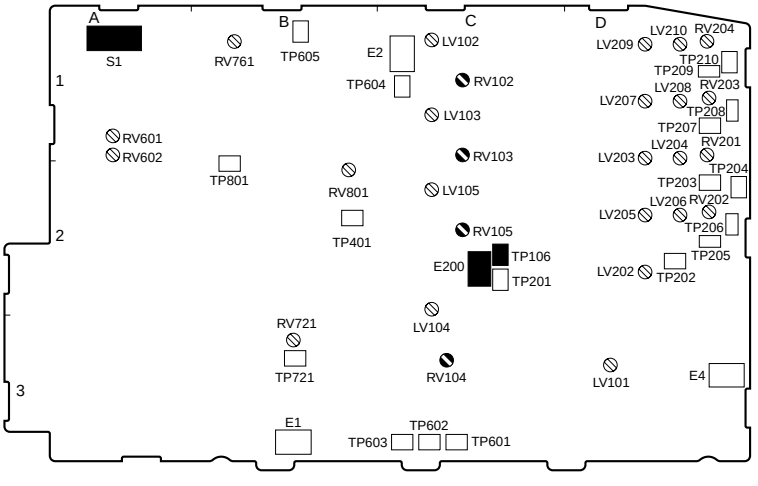
Adjustment procedure

3. Adjust width A of each waveform while changing the CENTER and SPAN of the spectrum analyzer.
   Measuring equipment:
   Spectrum analyzer
   (via oscilloscope)
   CENTER: 6.2 MHz (MIC 1)
   6.7 MHz (MIC 2)
   7.1 MHz (INCOM 1)
   7.4 MHz (INCOM 2)
   SPAN: 20 kHz (MIC 1, 2)
   25 kHz (INCOM 1, 2)
   RBW: 1 kHz
   Test point: TP106 (GND: E200)/TR-136 board
   Adjusting point and specification:

	Spectrum analyzer CENTER/ SPAN	Adjusting point/ TR-136 board	Specification
MIC 1	6.2 MHz/ 20 kHz	⊘RV102	A = 16.0 ±0.2 kHz
MIC 2	6.7 MHz/ 20 kHz	⊘RV103	A = 18.0 ±0.2 kHz
INCOM 1	7.1 MHz/ 25 kHz	⊘RV104	A = 20.0 ±0.2 kHz
INCOM 2	7.4 MHz/ 25 kHz	⊘RV105	A = 20.0 ±0.2 kHz



4. Re-set S1-4 on the TR-136 board to OFF.



TR-136 BOARD (SIDE A)

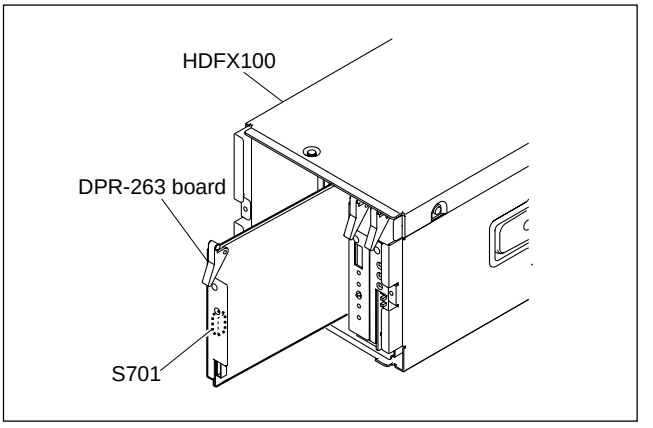
3-9-3. INCOM 1 Demodulation/Output Level Adjustments

Preparation

1. Set S701-8 to ON on the DPR-263 board in HDFX100.

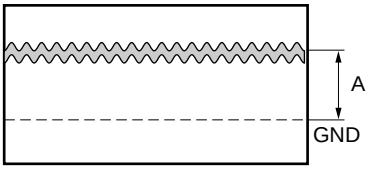
Note

A 1-kHz sine wave is output from the test signal generator in HDFX100.



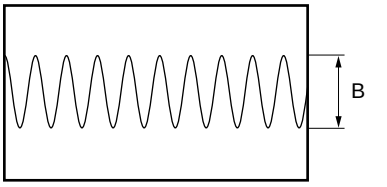
INCOM 1 Demodulation Adjustment

2. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP203 (GND: E4)/TR-136 board
   Adjusting point: ⊘LV203/TR-136 board
   Specification: A = 5.00 ±0.05 V dc



3. Change the input mode of the oscilloscope to AC.

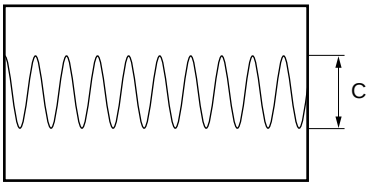
4. Measuring equipment:
   Oscilloscope
   Input mode: AC
   Test point: TP204 (GND: E4)/TR-136 board
   Adjusting point: ⊘LV204/TR-136 board
   Specification: B = minimum



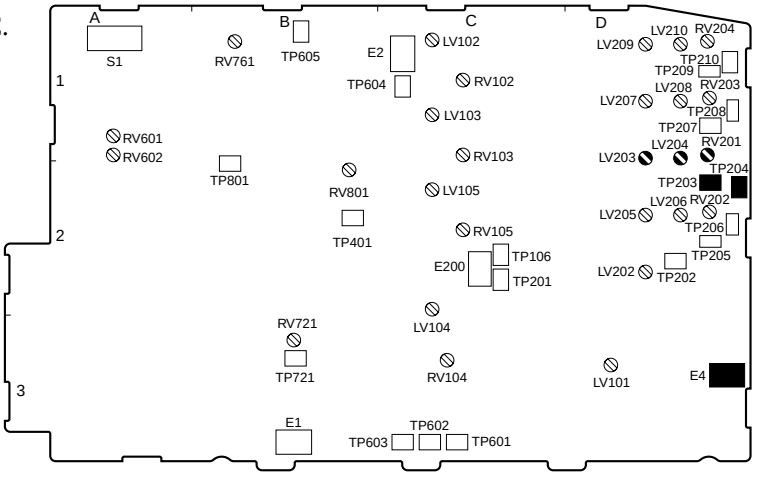
5. Repeat steps 2 to 4 to meet the specifications A and B.

INCOM 1 Output Level Adjustment

6. Measuring equipment:
   Oscilloscope
   Input mode: AC
   Test point: TP204 (GND: E4)/TR-136 board
   Adjusting point: ⊘RV201/TR-136 board
   Specification: C = 200 ±5 mV p-p



7. Re-set S701-8 to OFF on the DPR-263 board in HDFX100.



TR-136 BOARD (SIDE A)

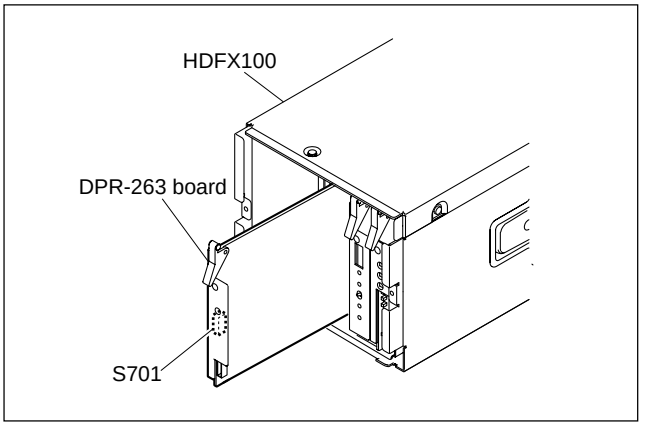
3-9-4. INCOM 2 Demodulation/Output Level Adjustments

Preparation

1. Set S701-8 to ON on the DPR-263 board in HDFX100.

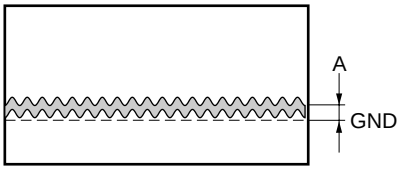
Note

A 1-kHz sine wave is output from the test signal generator in HDFX100.



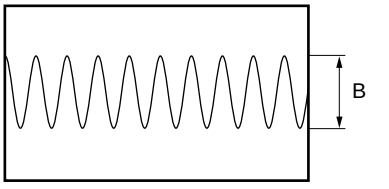
INCOM 2 Demodulation Adjustment

2. Measuring equipment: Oscilloscope
   Input mode: DC
   Test point: TP205 (GND: E4)/TR-136 board
   Adjusting point: ◓LV205/TR-136 board
   Specification: A = 0.00 ±0.05 V dc



3. Change the input mode of the oscilloscope to AC.

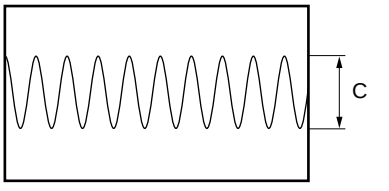
4. Measuring equipment: Oscilloscope
   Input mode: AC
   Test point: TP206 (GND: E4)/TR-136 board
   Adjusting point: ◓LV206/TR-136 board
   Specification: B = minimum



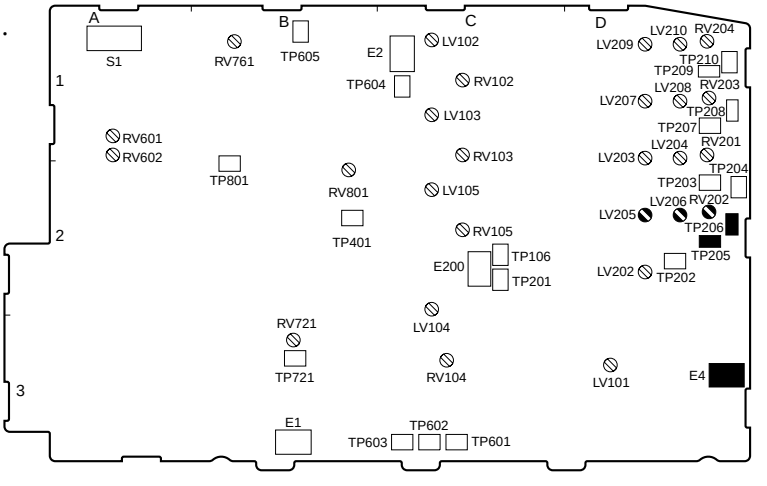
5. Repeat steps 2 to 4 to meet the specifications A and B.

INCOM 2 Output Level Adjustment

6. Measuring equipment: Oscilloscope
   Input mode: AC
   Test point: TP206 (GND: E4)/TR-136 board
   Adjusting point: ◓RV202/TR-136 board
   Specification: C = 200 ±5 mV p-p



7. Re-set S701-8 to OFF on the DPR-263 board in HDFX100.



TR-136 BOARD (SIDE A)

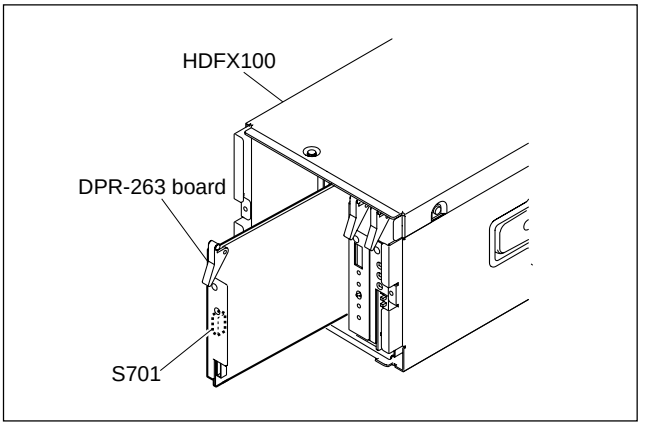
3-9-5. PGM 1 Demodulation/Output Level Adjustments

Preparation

1. Set S701-8 to ON on the DPR-263 board in HDFX100.

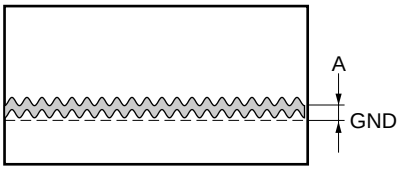
Note

A 1-kHz sine wave is output from the test signal generator in HDFX100.



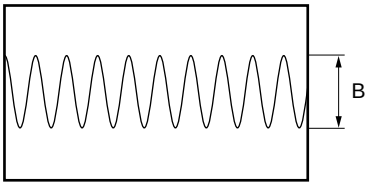
PGM 1 Demodulation Adjustment

2. Measuring equipment: Oscilloscope
   Input mode: DC
   Test point: TP207 (GND: E4)/TR-136 board
   Adjusting point: ◓LV207/TR-136 board
   Specification: A = 0.00 ±0.05 V dc



3. Change the input mode of the oscilloscope to AC.

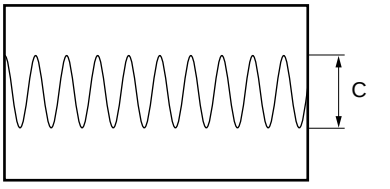
4. Measuring equipment: Oscilloscope
   Input mode: AC
   Test point: TP208 (GND: E4)/TR-136 board
   Adjusting point: ◓LV208/TR-136 board
   Specification: B = minimum



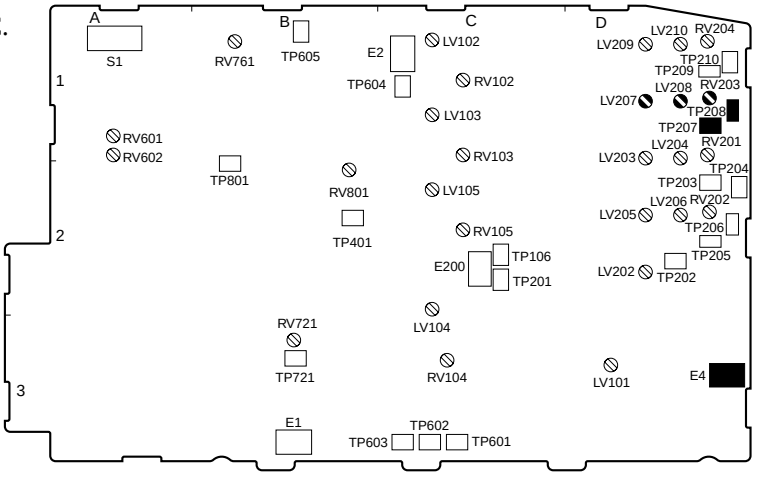
5. Repeat steps 2 to 4 to meet the specifications A and B.

PGM 1 Output Level Adjustment

6. Measuring equipment: Oscilloscope
   Input mode: AC
   Test point: TP208 (GND: E4)/TR-136 board
   Adjusting point: ◓RV203/TR-136 board
   Specification: C = 200 ±5 mV p-p



7. Re-set S701-8 to OFF on the DPR-263 board in HDFX100.



TR-136 BOARD (SIDE A)

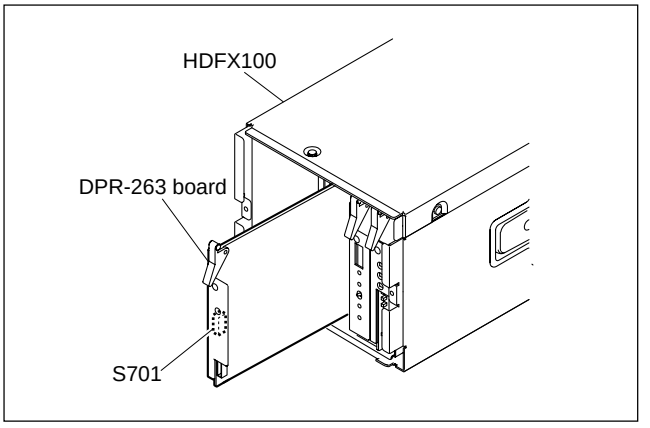
3-9-6. PGM 2 Demodulation/Output Level Adjustments

Preparation

1. Set S701-8 to ON on the DPR-263 board in HDFX100.

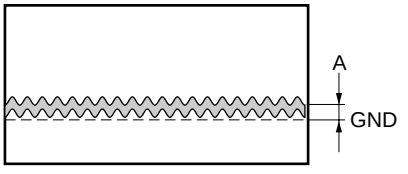
Note

A 1-kHz sine wave is output from the test signal generator in HDFX100.



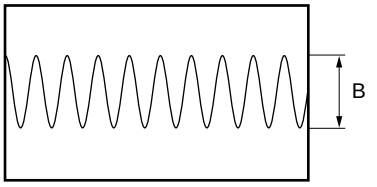
PGM 2 Demodulation Adjustment

2. Measuring equipment:
   Oscilloscope
   Input mode: DC
   Test point: TP209 (GND: E4)/TR-136 board
   Adjusting point: ◓LV209/TR-136 board
   Specification: A = 0.00 ±0.05 V dc



3. Change the input mode of the oscilloscope to AC.

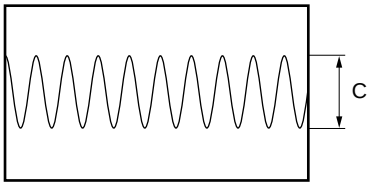
4. Measuring equipment:
   Oscilloscope
   Input mode: AC
   Test point: TP210 (GND: E4)/TR-136 board
   Adjusting point: ◓LV210/TR-136 board
   Specification: B = minimum



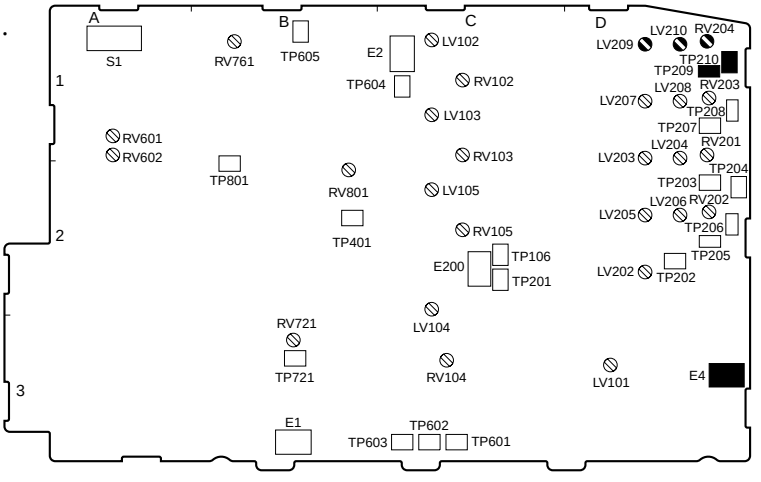
5. Repeat steps 2 to 4 to meet the specifications A and B.

PGM 2 Output Level Adjustment

6. Measuring equipment:
   Oscilloscope
   Input mode: AC
   Test point: TP210 (GND: E4)/TR-136 board
   Adjusting point: ◓RV204/TR-136 board
   Specification: C = 200 ±5 mV p-p



7. Re-set S701-8 to OFF on the DPR-263 board in HDFX100.



TR-136 BOARD (SIDE A)

3-10. RPN Compensation

Notes

- The residual point noise (RPN) of the CCD is automatically compensated with the automatic compensation (APR) function usually during the automatic black balance adjustment (ABB). If the RPN still remains after the APR is executed, perform the manual RPN compensation adjustment.
- If any RPN still remains after the RPN compensation adjustment, handle it according to the flowchart.

3-10-1. Automatic Compensation (APR)

When an RPN is detected in the screen, perform the automatic black balance adjustment (ABB) and remove the RPN with the APR function.

Notes

- RPNs of only one channel (R, G, or B) can be detected and compensated with one-time APR. To scan these three channels, be sure to perform the ABB three times.
- The log of the address data of RPNs that have been compensated is updated each time the APR is performed. RPNs that are not detected with the APR function five times in a row, they are excluded from the scope of compensation and their data is deleted.

3-10-2. Manual RPN Compensation Adjustment

The manual RPN compensation adjustment uses the SERVICE menu.
For how to display the SERVICE menu, refer to the Section 5-1.
Open the MANUAL RPN[S03] page of the SERVICE menu.

```
<MANUAL RPN>    S03   TOP

 RPN CH SELECT    :     R
 RPN CURSOR       :   OFF
 CURSOR H POS.    :  1008
 CURSOR V POS.    :   576
 CURSOR JUMP      :  CURR
 RPN WIDTH        :     1
 RECORD RPN       :  EXEC
 DELETE RPN       :  EXEC
```

Preparations

- Perform the automatic black balance adjustment.

Adjustment Procedure

Note

Points that are adjacent laterally and diagonally to already compensated RPNs cannot be compensated.

1. Select the channel (R, G, or B) that is to be compensated.
   ITEM : RPN CH SELECT → R, G, B
2. Adjust the H and V values and set the cross cursor center at the target RPN.
   When the cursor is placed accurately at the RPN position, the RPN is compensated.
   Note
   Some RPNs seem to have been compensated even if the cursor is placed off the RPNs by one line or one pixel. Before proceeding to step 3, shift the cursor by one line or one pixel and check that the compensation position is correct.
   ITEM : RPN CURSOR → ON
   ITEM : CURSOR H POS
   ITEM : CURSOR V POS
   Reference
   One turn of the rotary encoder is equivalent to one-pixel shift.
   On the other hand, the cursor moves by two clicks of the rotary encoder because the cursor has a size of two pixels.
3. Press the rotary encoder and record the RPN data (correction value).
   ITEM : RECORD RPN → EXEC
4. A message “RECORD DATA OK? YES → NO” appears. Check that the RPN has disappeared and then select YES with the rotary encoder.
5. Press the rotary encoder. A message “COMPLETE!” appears and the RPN compensation starts.
   Note
   If a compensation pixel has been wrongly recorded, delete the RPN data.
   ITEM : DELETE RPN → EXEC
6. Repeat steps 2 to 5 to compensate other RPNs.

If any RPN still remains after this manual adjustment, handle it according to the flowchart.

Setting after Adjustment

ITEM : RPN CURSOR → OFF

3-10-3. Procedures to be Taken When the RPN Compensation Fails

When the RPN compensation is not successful even after the manual RPN compensation adjustment was made, the following causes are possible.

- An adjacent wrong position was compensated.
- The compensation failed due to the influence of other RPNs.
- The RPN with a very large level has an extent over one pixel that was made in the signal generation process.

Checking Correction Points

1. Open the MANUAL RPN[S03] page of the SERVICE menu.

```
<MANUAL RPN>    S03   TOP

 RPN CH SELECT    :     R
 RPN CURSOR       :   OFF
 CURSOR H POS.    :  1008
 CURSOR V POS.    :   576
 CURSOR JUMP      :  CURR
 RPN WIDTH        :     1
 RECORD RPN       :  EXEC
 DELETE RPN       :  EXEC
```

2. Set RPN CURSOR to ON.

3. Check whether there are any compensated pixels close to the pixel to be compensated with the CURSOR JUMP function.

   Reference

   Correction points can be checked effectively by placing the cursor in advance close to the pixel to be compensated by using CURSOR H POS and CURSOR V POS.

   When the target pixel is above the cursor position,
   ITEM : CURSOR JUMP → PREV
   When the target pixel is under the cursor position,
   ITEM : CURSOR JUMP → NEXT

4. When the cursor stopped at a position near the target pixel
   (1) Delete the data because the data is recorded so as to compensate the pixel at the cursor position.
   ITEM : DELETE RPN → EXEC
   (2) A message “DELETE DATA OK? YES → NO” appears. Select YES with the rotary encoder and then press the rotary encoder.

   Note

   Appearance of an RPN next to the pixel to be compensated means that adjacent RPNs exit. If an RPN appears in the diagonal direction, the RPN cannot be compensated. In this case, the CCD or the CCD block must be replaced. For more information, contact your local Sony Sales Office/ Service Center.

   (3) If nothing has changed, change the compensation position.
   Move the cursor horizontally or vertically to check whether the RPN can be compensated.
   (4) When the RPN has been successfully compensated, record the data.
   ITEM : RECORD RPN → EXEC
   (5) A message “RECORD DATA OK? YES → NO” appears. Select YES with the rotary encoder and then press the rotary encoder.

(6) A message “COMPLETE!” appears and the data is recorded.

Note

When two RPNs are vertically adjacent to each other, record the data at the position where one RPN can be compensated.
Then shift the cursor vertically by ±1 at the same horizontal address and check whether the other RPN can be compensated.
When the other RPN has been successfully compensated, record the data of the RPN.
When two RPNs are horizontally adjacent to each other, move the cursor to the position where the left RPN can be compensated. Next, set RPN WIDTH to 2 and record the data, and then check whether these RPNs can be successfully compensated.
If the RPN compensation failed, delete the data.
Increase RPN WIDTH to 3, 4, ..., and select a value that allows the best compensation.
For an RPN that has a horizontal extent (smear), increase RPN WIDTH from 1 to 2, 3, 4, ..., and select a value that allows the best compensation.

3-10-4. Performing Automatic RPN Detection Effectively

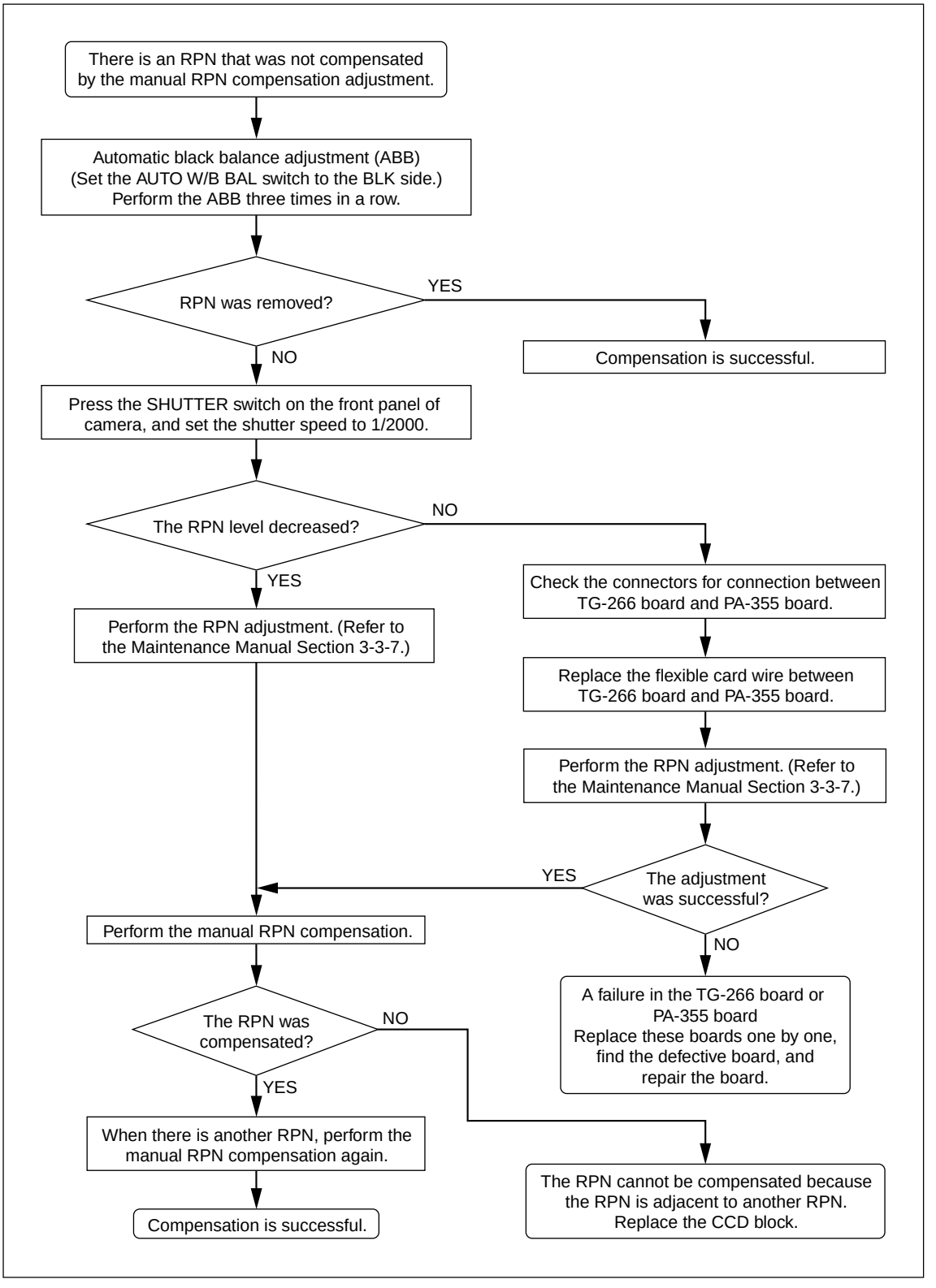
1. Open the RPN MANAGE[S05] page of the SERVICE menu.
2. Only perform the APR of RPNs.
   RPNs of three channels are automatically detected at the same time through this operation.
   ITEM : AUTO CONCEAL → EXEC

Notes

- Set IRIS at the CLOSE position.
- Set the BARS switch to OFF.
- Set the SHUTTER switch to OFF.
- If AUTO CONCEAL is executed with a wrong switch setting, delete all the recorded data. Make these settings and execute AUTO CONCEAL carefully so that the RPN compensated data is not deleted completely.
  ITEM : RPN ALL PRESET → EXEC

3-10-5. RPN Compensation Flowchart

If any RPN still remains after the manual RPN compensation adjustment, handle the RPN according to the following flowchart.



3-11. Vertical Line Compensation

Notes

- Compensate the vertical line fixed-pattern noise of the CCD using the following procedure.
- Such vertical lines cannot be well compensated even with adjustment in some cases. In that case, replace the CCD block.

Use the SERVICE menu for vertical line compensation. For how to display the SERVICE menu, refer to the Section 5-1.
Open the V.LINE [S04] page of the SERVICE menu.

```
<V.LINE>          S04   TOP

 RPN CH SELECT     :     R
 RPN CURSOR        :   OFF
 CURSOR H POS      :  1008
 CURSOR V POS      :   576
 CURSOR JUMP       :  CURR
 V.LINE LEVEL.     :   127
 RECORD V.LINE     :  EXEC
 DELETE V.LINE     :  EXEC
```

Preparation

- Perform the automatic black balance adjustment.

Adjustment procedure

Note

An area of 11 lines right and left from the compensated vertical line cannot be compensated. If you attempt to compensate a vertical line in the area, a message “ADJACENT PIXEL” appears on the screen.

1. Select a channel (R, G, or B) you want to compensate.
   ITEM : RPN CH SELECT → R, G, B
2. Adjust the vertical cursor position to move the horizontal axis of the cross cursor to the vertical line position where you want to start compensation.
   ITEM : RPN CURSOR → ON
   ITEM : CURSOR V POS
3. Then adjust the horizontal cursor position to align the vertical axis of the cross cursor with the vertical line.
   ITEM : CURSOR H POS

   Note

   One turn of the rotary encoder is equivalent to one-pixel shift. On the other hand, the cursor moves by two clicks of the rotary encoder because the cursor has a size of two pixels.

4. Place the cursor at “RECORD V.LINE” and press the rotary encoder to display “RECORD DATA OK? YES → NO.”
   ITEM : RECORD V.LINE → EXEC
5. Choose “YES” and press the rotary encoder. A message “LEVEL SETTING” appears. Place the cursor at “V.LINE LEVEL” and make fine adjustment while paying attention to avoid overcompensation (black lines) and insufficient compensation (white lines).
   ITEM : V.LINE LEVEL → 127 to 0
6. Confirm that the vertical line has already disappeared, and then place the cursor at “RECORD V.LINE” again. Then choose “YES” with the rotary encoder.
7. Press the rotary encoder. A message “COMPLETE!” appears and the compensation data is stored.

   Note

   If the data is stored at an incorrect compensation address, delete the V.LINE data.
   ITEM : DELETE V.LINE → EXEC

8. To compensate other vertical lines, repeat steps 1 to 7.

Setting after adjustment

ITEM : RPN CURSOR → OFF

Section 4
File System

The HDC1000R/1400R/1450R/1500R/1550R/1580R are equipped with various file systems for managing data.
In this section, the menu operations are described as follows.
Example: When executing WRITE (CAM → MS) at the OPERATOR FILE page of the OPERATION menu.
OPERATION → OPERATOR FILE → WRITE (CAM → MS)
As for the details on the setup menu, refer to Section 5.

4-1. File Structure

The following six types of files are available. As for the items to be stored in each file, refer to Section 4-8. " File Items".

1. **Operator File**
   Stores the items displayed on the viewfinder and switch settings for camera operator. This file can be stored in the memory stick, yet the video data (paint data) cannot be stored.
2. **Preset Operator File**
   Stores the standard settings of Operator File.
   This file can be stored in the camera, yet video data (paint data) cannot be stored.
3. **Scene File**
   Stores the temporary video setting data according to the scene. This file can be stored in the camera and memory stick.
4. **Reference File**
   Stores the custom paint data adjusted by the video engineer. This file can be stored in the camera and memory stick.
5. **Lens File**
   Used for compensation of the deviation which generates by switching the lens extender from OFF to ON and for compensation of the difference in the characteristics between lenses. This file is stored in the camera.
6. **OHB File**
   Used for adjustment of the CCD block maintenance. This file can be stored in the camera.

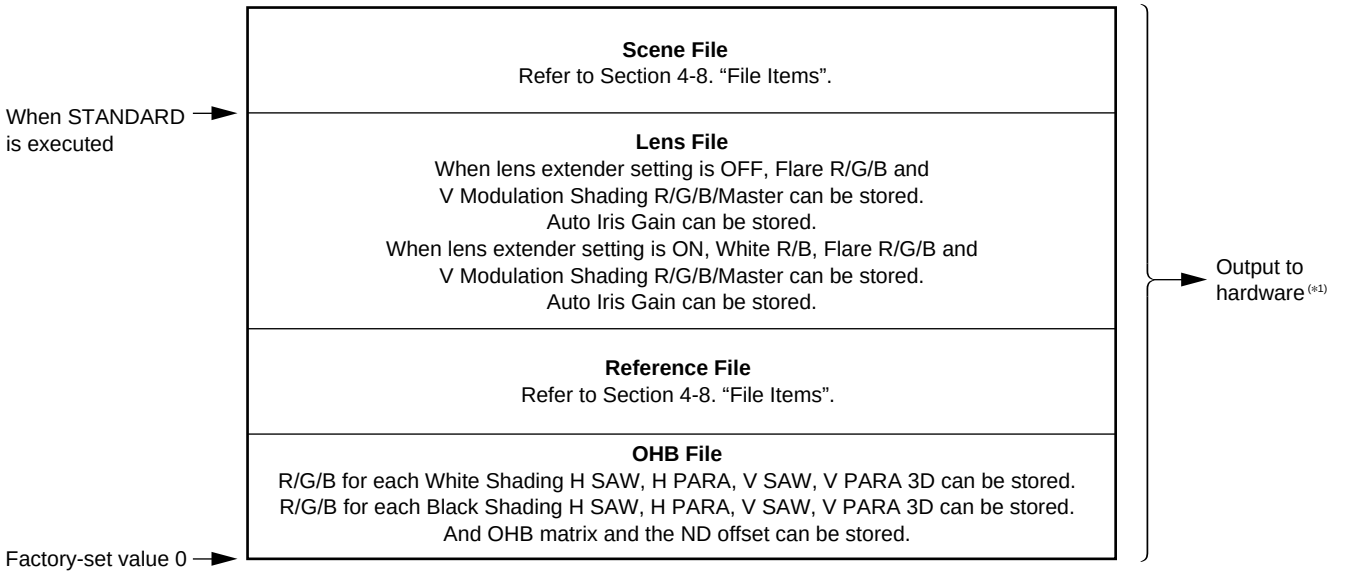


Fig. 4-1. Structure of Paint Related Files

(∗1): The additional data of each file is sent to each circuit on the unit.

4-2. Operator File

Operator File stores data in the memory stick.
Storing and reading data are implemented using the setup menu.

Notes

- Operator file data stored in the memory stick cannot be read when the power is just turned ON.
- The current operator file data is retained even when the power is turned off by the power switch.
- Before storing the data in the memory stick, make sure that the LOCK switch on the memory stick is in OFF position.

Storing (Refer to step 1 of Fig. 4-2.)

Using OPERATION Menu of This Unit

Stores the current status in the memory stick.

OPERATION → OPERATOR FILE → WRITE (CAM → MS)

Reading (Refer to step 2 of Fig. 4-2.)

Using OPERATION Menu of This Unit

OPERATION → OPERATOR FILE → READ (MS → CAM)

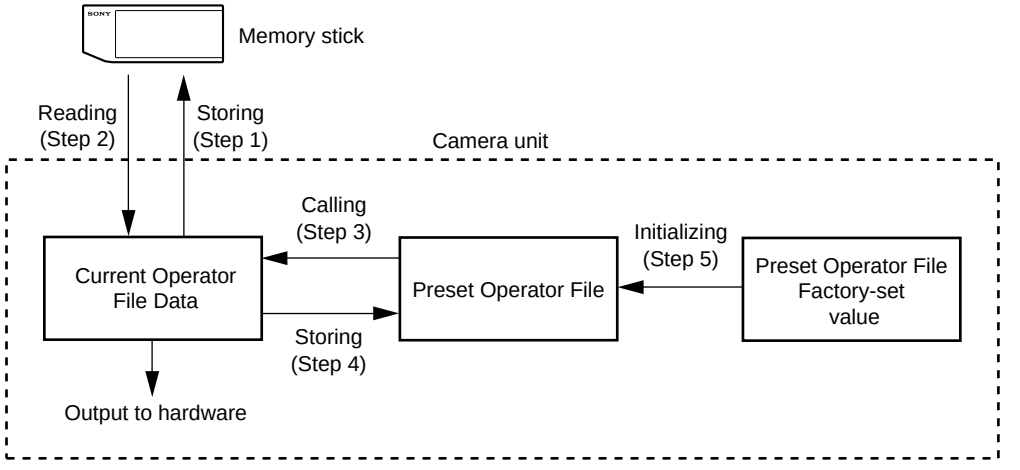


Fig. 4-2. Operating Procedure for Operator Files

4-3. Preset Operator File

Preset Operator File stores data in the camera.
Calling and Storing data are implemented using the setup menu.
Items to be stored as Preset Operator file are the same as Operator File.

Calling (Refer to step 3 of Fig. 4-2.)

Using OPERATION Menu of This Unit
OPERATION → OPERATOR FILE → PRESET

Storing (Refer to step 4 of Fig. 4-2.)

Using FILE Menu of This Unit
Use when you want to store the current settings in the Preset Operator File as the standard settings of Operator File.
FILE → OPERATOR FILE → STORE PRESET FILE

Initializing (Refer to step 5 of Fig. 4-2.)

Using FILE Menu of This Unit
Use when initializing the changed Preset Operator File data to their factory-set values.
FILE → FILE CLEAR → PRESET OPERATOR

4-4. Scene File

Scene File stores data in the camera and memory stick.
It also stores in the IC memory card if the MSU (master setup unit) is used. For the details, refer to the MSU operation manual.
Storing and calling data are implemented using the setup menu or MSU.
Scene files can be copied between cameras using the memory stick.

Notes

- Scene Files are files for storing the differences from the Reference File. Therefore when the Reference File is changed, output of the Scene File item corresponding with the item changed in the Reference File is also changed.
- Before storing the data in the memory stick, make sure that the LOCK switch on the memory stick is in OFF position.

Storing (Refer to step 1 of Fig.4-3.)

Using PAINT Menu of This Unit

(1) Change the scene file item to the desired value.
(2) PAINT → SCENE FILE → STORE
Select the scene file number to be stored.

With MSU

(1) Change the scene file item to the desired value.
(2) Press “STORE” of the scene file, and press the STORE number.

Calling and Clearing the Call (Refer to step 2 of Fig.4-3.)

Using PAINT Menu of This Unit

Select the scene file number to be called on the “SCENE FILE” page. A file currently being called is shown with its file number highlighted. Select the number again to cancel the call and resume the previous status.

With MSU

Press and light up the SCENE FILES button of the desired number when the STORE button is dark. Press the lit button again to turn it dark and resume the previous status.

Storing the Scene File to the Memory Stick (Refer to step 1 of Fig. 4-3.)

Using PAINT Menu of This Unit

Stores the scene files stored in the camera in the memory stick.

PAINT → SCENE FILE → WRITE (CAM → MS)

Reading the Scene File from the Memory Stick (Refer to step 3 of Fig. 4-3.)

Using PAINT Menu of This Unit

Reads the scene files stored in the memory stick to the camera.

PAINT → SCENE FILE → READ (MS → CAM)

Note

Scene File data stored in the memory stick cannot be read when the power is just turned on.

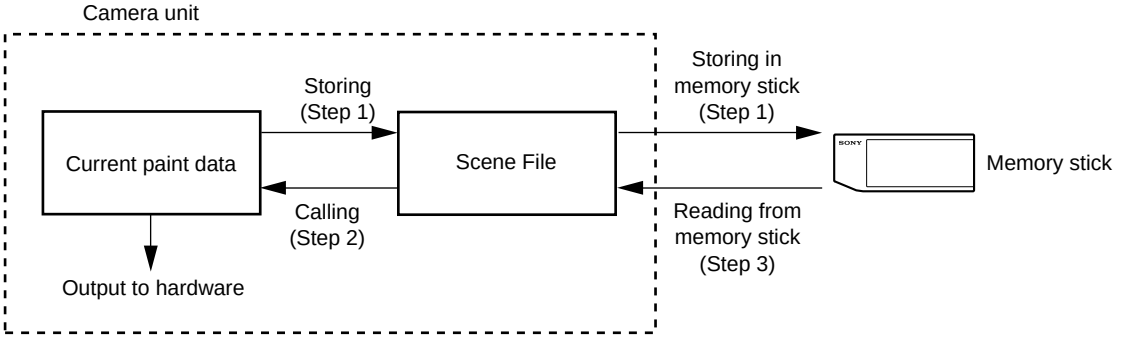


Fig. 4-3. Operating Procedure for Scene Files

4-5. Reference File

Reference File stores data in the camera and the memory stick.
It also stores in the IC memory card if the MSU (master setup unit) is used. For the details, refer to the MSU operation manual.
Storing and calling the data are implemented using the setup menu or MSU.

Reference Files stores the differential data taking the factory-setting as 0. Therefore, initializing the Reference File brings the settings to the same status at factory-setting. If Lens File or OHB File retains the data, they need to be initialized as well. To initialize data, use the setup menu. You can select whether to initialize the all file items or only the specified items.
Reference Files can be copied between cameras using the memory stick.

Note

Before storing the data in the memory stick, make sure that the LOCK switch on the memory stick is in OFF position.

Storing (Refer to step 1 of Fig.4-4.)

Using FILE Menu of This Unit

FILE → REFERENCE → STORE FILE

The data will be stored in the camera and the numerical data will be displayed as 0. (Excluding some items. Refer to Section 4-8. “File Items”.)

With MSU

Press FILE button. Then press Reference and press Ref Store. The data will be stored in the camera and the numerical data will be displayed as 0. (Excluding some items. Refer to Section 4-8. “File Items”.)

Calling (Refer to step 2 of Fig. 4-4, Fig. 4-1.)

Using PAINT Menu of This Unit

PAINT → SCENE FILE → STANDARD

The temporary paint amount and scene file amount will be cleared and the reference file will be reset to the state stored in.

With MSU

Press STANDARD button to reset the reference file item to the state stored in.

Reading the Reference File from the Memory Stick (Refer to step 3 of Fig. 4-4.)

Using FILE/MAINTENANCE Menu of This Unit

(1) Reference File data stored in the camera can be changed by reading the Reference File data stored in the memory stick.
FILE → REFERENCE → READ (MS → CAM)

(2) The Reference File data in the memory stick cannot be applied to the camera when the data are just read. For applying the data, adjust the level automatically.
MAINTENANCE → AUTO SETUP → AUTO LEVEL

Note

Reference File data stored in the memory stick cannot be read when the power is just turned on.

Storing the Reference File to the Memory Stick (Refer to step 1 of Fig. 4-4.)

Using FILE Menu of This Unit

Stores Reference File stored in the camera in the memory stick.
FILE → REFERENCE → WRITE (CAM → MS)

Initializing All File Items (Refer to step 4 of Fig. 4-4.)

Using FILE Menu of This Unit

FILE → FILE CLEAR → REFERENCE (ALL)

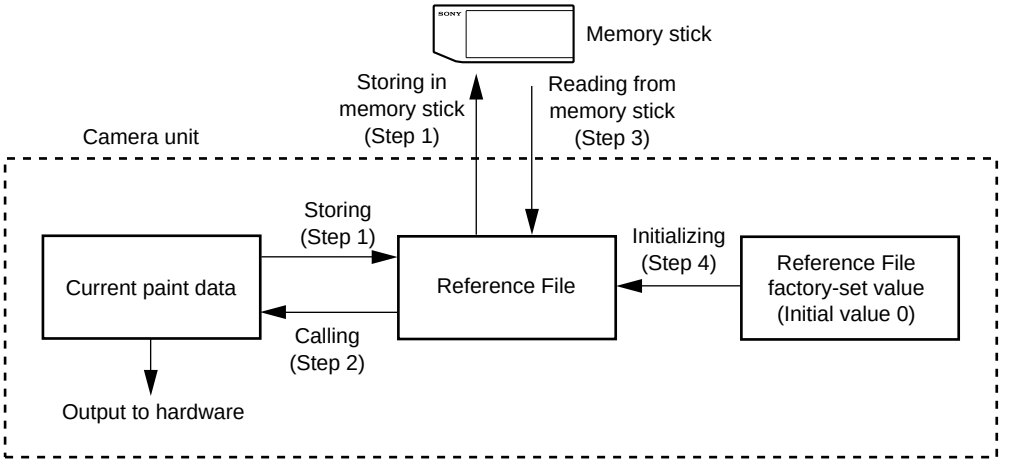


Fig. 4-4. Operating Procedure for Reference Files

4-6. Lens File

Lens File stores the data to compensate the differences of the white shading, flare balance, white balance, which occur when the lens extender is set to ON. It also stores the minimum f-stop value and name of the lens. Lens File data of up to 16 files can be stored for a lens that is not compatible with serial communication and Lens File data of up to 50 files can be stored for a lens compatible with serial communication. The adjustment data can be called by selecting the Lens File.
The Lens File stores the differential data from the Reference File.

Note

Prior to creating the Lens File, perform the necessary adjustments by using the lens normally used to create the Reference File.

Adjusting the Lens File Data

(Using a lens not compatible with serial communication)

(1) Mount the lens. Select the file with the same name as the lens mounted from the setup menu. If no file with the same name as the lens exists, select “NO OFFSET”.
FILE → LENS FILE → No. → (Select the No.)
(2) Select the name of the lens, and minimum f-stop value.
(3) Set the lens extender to OFF.
(4) Shoot the white pattern, and adjust V modulation R/G/B/Master so that the video level is around 560 mV (80 %) with the lens iris set around F4 and the zoom control in the center of the ring.
(5) Adjust the white balance and flare balance shooting the grayscale chart.
(6) Zooming the lens, and adjust the center marker to a position at which the object does not deviate.*1
(7) Store the data in the lens file.
FILE → LENS FILE → STORE FILE
(8) Set the lens extender to ON.
(9) Shoot the white pattern, and adjust V modulation R/G/B/Master so that the video level is around 560 mV (80 %) with the lens iris set around F4 and the zoom control in the center of the ring.
(10) Adjust the white balance and flare balance shooting the grayscale chart.
(11) Zooming the lens, and adjust the center marker to a position at which the object does not deviate.*1
(12) Store the Lens File.
FILE → LENS FILE → STORE FILE

∗1 : The center marker position is stored in the Lens File immediately after the position is aligned and not when executing the Lens File store.

(For lens compatible with serial communication)

(1) Check that the lens number is No. 17.
(2) Also check that the name of the lens and minimum f-stop value.
(3) Turn on the dynamic shading. *1
(4) Set the lens extender to OFF.
(5) Adjust the white balance and flare balance shooting the grayscale chart.
(6) Zooming the lens, and adjust the center marker to a position at which the subject does not move.*2
(7) Store the Lens File.
FILE → LENS FILE → STORE FILE
(8) Set the lens extender to ON.
(9) Adjust the white balance and flare balance shooting the grayscale chart.
(10) Zooming the lens, and adjust the center marker to a position at which the subject does not move.*2
(11) Store the Lens File.
FILE → LENS FILE → STORE FILE

∗1 : If using the lens compatible with serial communication with the dynamic shading turned on, you do not require the V modulation adjustment. Adjust the white shading or V modulation only when the deviation occurs. In this case, the data will not be stored in the Lens File.

∗2 : The center marker position is stored in the Lens File immediately after the position is aligned and not when executing the Lens File store.

Calling

Using OPERATION Menu of This Unit

Select the Lens File.
OPERATION → LENS FILE

4-7. OHB File

OHB File is used to store the adjustment values specific to the CCD block, and it stores the data in the camera.

2D black shading and 3D white shading adjustment

2D black shading and 3D white shading adjustments are performed during black shading or white shading automatic adjustment respectively when the 2D black shading or 3D white shading is set to ON. Compensation data is stored only in the OHB File.
If performing only adjustment without storing adjustment data, the data will be lost after the unit was powered off. Be sure to store the data in the OHB File.

Notes

- When you cannot adjust the video level for the specified value by the lens iris at the ND offset adjustment, adjust by Shutter/ECS. If adjusting by gain up, the error may occur in the white balance.
- Perform the OHB matrix adjustment only when it is necessary to unite the delicate difference in color reappearance.
- If adjusting the all items shown below, execute the OHB File Store after finishing all adjustments.
  If adjusting only the individual item, first execute STANDARD in step (1), and then perform adjustment. After finishing adjustment, execute the OHB File Store.

Adjusting and Storing

Using FILE/MAINTENANCE Menu of this unit

(1) FILE → REFERENCE → STANDARD

(2) Adjust the black shading automatically.
MAINTENANCE → BLACK SHADING → AUTO BLACK SHADING
Repeat this operation 3 times or more.
When adjustment is not completed correctly, adjust the black shading automatically again, or adjust the black shading V SAW, V PARA, H SAW, and H PARA on R/G/B respectively.
MAINTENANCE → BLACK SHADING → V SAW R/G/B, V PARA R/G/B, H SAW R/ G/B, H PARA R/G/B

(3) Adjust the black balance automatically.
MAINTENANCE → AUTO SETUP → AUTO BLACK

(4) Adjust the white shading automatically.
Shoot the white pattern so that the video level is around 80 % (560 mV).
MAINTENANCE → WHITE SHADING → AUTO WHITE SHADING
Repeat this operation 3 times or more.
When adjustment is not completed correctly, adjust the white shading automatically again, or adjust the white shading V SAW, V PARA, H SAW, and H PARA on R/G/B respectively.
MAINTENANCE → WHITE SHADING → V SAW R/G/B, V PARA R/G/B, H SAW R/G/B, H PARA R/G/B

(5) Perform the ND offset adjustment.

Note

Perform adjustments while selecting all ND filters (1 to 5), or the ND offset adjustment will not be completed.

① Select 5 by the ND filter knob, and shoot the white pattern so that the video level is 50 % (350 mV) or more.

② Select 1 by the ND filter knob, and adjust the lens iris so that the video level is 80 to 50 % (560 to 350 mV), and then adjust the white balance automatically.
MAINTENANCE → AUTO SETUP → AUTO WHITE

③ Select 2 by the ND filter knob, and adjust in the same manner as step ②.
④ Select 3 by the ND filter knob, and adjust in the same manner as step ②.
⑤ Select 4 by the ND filter knob, and adjust in the same manner as step ②.
⑥ Select 5 by the ND filter knob, and adjust in the same manner as step ②.

(6) Perform the OHB matrix adjustment.
[MAINTENANCE] → [OHB MATRIX] → [OHB MATRIX : ON]

(7) Store the OHB File.
[FILE] → [OHB FILE] → [STORE FILE]

With MSU

(1) STANDARD button → ON (lit)

(2) Adjust the black shading automatically.
FILE button → ON (lit)
[Touch panel selection]
[OHB File] → [Auto B. Shading]
Repeat this operation 3 times or more.
When adjustment is not completed correctly, adjust the black shading automatically again, or adjust the black shading V SAW, V PARA, H SAW, H PARA on R/G/B respectively.
[OHB File] → [Adjusting] → [Black shading] → [R/G/B] → [V SAW], [V PARA], [H SAW], [H PARA]

(3) Adjust the black balance automatically.
BLACK button → ON (lit), or [OHB File] → [Auto Black]

(4) Adjust the white shading automatically.
Shoot the white pattern so that the video level is around 80 % (560 mV).
[OHB File] → [Auto W. Shading]
Repeat this operation 3 times or more.
When adjustment is not completed correctly, adjust the white shading automatically again, or adjust the white shading V SAW, V PARA, H SAW, H PARA on R/G/B respectively.
[OHB File] → [Adjusting] → [White shading] → [R/G/B] → [V SAW], [V PARA], [H SAW], [H PARA]

(5) Perform the ND offset adjustment.
Note
Perform adjustments while selecting all ND filters (1 to 5), or the ND offset adjustment will not be completed.

① Select 5 by the ND filter knob, and shoot the white pattern so that the video level is 50 % (350 mV) or more.
② Select 1 by the ND filter knob, and adjust the lens iris so that the video level is 80 to 50 % (560 to 350 mV), and then adjust the white balance automatically.
WHITE button → ON (lit), or [OHB File] → [Auto White]
③ Select 2 by the ND filter knob, and adjust in the same manner as step ②.
④ Select 3 by the ND filter knob, and adjust in the same manner as step ②.
⑤ Select 4 by the ND filter knob, and adjust in the same manner as step ②.
⑥ Select 5 by the ND filter knob, and adjust in the same manner as step ②.

(6) Perform the OHB matrix adjustment.
[OHB File] → [Adjusting] → [Matrix]
Change the adjustment display by pressing the button 1, 2 of sub menu, and adjust the value of the OHB matrix.

(7) Store the OHB File.
[OHB File] → [OHB store] → [Store]

4-8. File Items

You can save each setting data set using the setup menu in files.
This section shows the destination files to which the respective setting data can be stored.
It also shows the indication mode (absolute or relative) of each setting and the default settings when the unit was shipped from the factory.

Description on symbol

○ : When executing each file store, it indicates items that can be stored in the file. (If ON or OFF is described in the list, the setting is stored as it is.)
× : Setting is not stored in the file.

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
GAIN	Master Gain Select		○	○	×	×	×	–3 dB to +12 dB
Iris		IRIS	×	×	×	×	×	
	Auto Iris on		○	○	×	×	×	
		Level	○	○	×	×	×	
		APL	○	○	×	×	×	
		Gain	○	○	○	×	×	
		over ride	×	×	×	×	×	
	Detect Pattern		○	○	○	×	×	
	Close		×	OFF	×	×	×	
Shutter	Shutter ON		○	OFF	×	×	×	
	Shutter Select		○	×	×	×	×	
ECS	ECS ON		○	OFF	×	×	×	
		ECS Frequency	○	×	×	×	×	
Black Shading		Black Shading H Saw-R	×	×	×	×	○	
		Black Shading H Saw-G	×	×	×	×	○	
		Black Shading H Saw-B	×	×	×	×	○	
		Black Shading V Saw-R	×	×	×	×	○	
		Black Shading V Saw-G	×	×	×	×	○	
		Black Shading V Saw-B	×	×	×	×	○	
		Black Shading H Para-R	×	×	×	×	○	
		Black Shading H Para-G	×	×	×	×	○	
		Black Shading H Para-B	×	×	×	×	○	
		Black Shading V Para-R	×	×	×	×	○	
		Black Shading V Para-G	×	×	×	×	○	
		Black Shading V Para-B	×	×	×	×	○	
	Auto Black Shading		×	×	×	×	×	
Black set		Black Set-R	×	×	×	×	○	
		Black Set-G	×	×	×	×	○	
		Black Set-B	×	×	×	×	○	

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
Test	Test1 on (TEST SAW)		×	×	×	×	×	
	Test2 ON		×	×	×	×	×	
	Test2 Mode 3step/ 10step		×	×	×	×	×	
Optical filter	Filter1 (ND)		○	×	×	×	×	
	Filter2 (CC)		○	×	×	×	×	Except for HDC1400R/ 1450R/1580R
	Filter Remote/Local		×	×	×	×	×	
5600k	5600K ON		○	OFF	×	×	×	
White Shading		White Shading H Saw-R	×	×	×	×	○	
		White Shading H Saw-G	×	×	×	×	○	
		White Shading H Saw-B	×	×	×	×	○	
		White Shading V Saw-R	×	×	×	×	○	
		White Shading V Saw-G	×	×	×	×	○	
		White Shading V Saw-B	×	×	×	×	○	
		White Shading H Para-R	×	×	×	×	○	
		White Shading H Para-G	×	×	×	×	○	
		White Shading H Para-B	×	×	×	×	○	
		White Shading V Para-R	×	×	×	×	○	
		White Shading V Para-G	×	×	×	×	○	
		White Shading V Para-B	×	×	×	×	○	
	Auto White Shading		×	×	×	×	×	
V Modulation	V Mod Shading OFF		×	ON	×	×	×	
		Mod Shading V Saw-R	×	×	○	×	×	
		Mod Shading V Saw-G	×	×	○	×	×	
		Mod Shading V Saw-B	×	×	○	×	×	
		Master V Mod Saw	×	×	○	×	×	
	Dynamic Shading Compensation ON		×	×	×	×	×	
White		White-R	○	○	OFFSET	×	×	
		White-G	○	○	×	×	×	
		White-B	○	○	OFFSET	×	×	
		color temp	—	—	—	—	—	
		balance	—	—	—	—	—	
		Master White Gain	×	×	×	×	×	
	Auto White Balance		×	×	×	×	×	
Flare	Flare OFF		○	ON	×	×	×	
		Flare-R	○	○	○	×	×	
		Flare-G	○	○	○	×	×	
		Flare-B	○	○	○	×	×	

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
Black		Master Black	○	○	×	×	×	
		Black-R	○	×	×	×	×	
		Black-G	○	×	×	×	×	
		Black-B	○	×	×	×	×	
	Auto Black Balance		×	×	×	×	×	
Detail	Detail Off		○	ON	×	×	×	
		Detail Level	○	○	×	×	×	
		Detail Limiter	○	○	×	×	×	
		Detail White Limiter	○	○	×	×	×	
		Detail Black Limiter	○	○	×	×	×	
		Detail Crispening	○	○	×	×	×	
		H Detail Frequency	○	○	×	×	×	
		Mix Ratio	○	○	×	×	×	
	V DTL control mode		×	○	×	×	×	
		Detail H/V Ratio	○	○	×	×	×	
	Level Dep. Off		○	○	×	×	×	
		Detail Level Depend	○	○	×	×	×	
	Knee Aparture On		○	○	×	×	×	
		Knee Aparture	○	○	×	×	×	
Skin Detail	Skin DTL On		○	○	×	×	×	
	Skin gate ON		×	×	×	×	×	
	Skin gate (CCU)		×	×	×	×	×	
	Skin Detail Auto Hue (ch1)		×	×	×	×	×	
	Skin Detail Auto Hue (ch2)		×	×	×	×	×	
	Skin Detail Auto Hue (ch3)		×	×	×	×	×	
	Skin 1 On		ON	ON	×	×	×	
	Skin 1 Gate On		×	×	×	×	×	
		Skin 1 Level	○	○	×	×	×	
		Skin 1 Phase	○	○	×	×	×	
		Skin 1 Width	○	○	×	×	×	
		Skin 1 Sat	○	○	×	×	×	
	Skin 2 On		○	○	×	×	×	
	Skin 2 Gate On		×	×	×	×	×	
		Skin 2 Level	○	○	×	×	×	
		Skin 2 Phase	○	○	×	×	×	
		Skin 2 Width	○	○	×	×	×	
		Skin 2 Sat	○	○	×	×	×	

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
Skin Detail	Skin 3 On		○	○	×	×	×	
	Skin 3 Gate On		×	×	×	×	×	
		Skin 3 Level	○	○	×	×	×	
		Skin 3 Phase	○	○	×	×	×	
		Skin 3 Width	○	○	×	×	×	
		Skin 3 Sat	○	○	×	×	×	
Matrix	Matrix Off		○	○	×	×	×	
	Preset Matrix on		○	○	×	×	×	
	Preset Matrix Sel		×	×	×	×	×	
	User Matrix on		○	○	×	×	×	
		R-G	○	○	×	×	×	
		R-B	○	○	×	×	×	
		G-R	○	○	×	×	×	
		G-B	○	○	×	×	×	
		B-R	○	○	×	×	×	
		B-G	○	○	×	×	×	
	Multi Matrix On		○	○	×	×	×	
		gate	×	×	×	×	×	
		Phase select	×	×	×	×	×	
		Hue	○	○	×	×	×	
		Saturation	○	○	×	×	×	
digital liner	saturation on		○	○	×	×	×	
saturation		saturation	○	○	×	×	×	
OHB matrix	OHB Matrix On		×	○	×	×	×	
		Phase select	×	×	×	×	×	
		Hue	×	×	×	×	○	
		Saturation	×	×	×	×	○	
Black Gamma	Black Gamma On		○	○	×	×	×	
		R Black Gamma	○	○	×	×	×	
		G Black Gamma	○	○	×	×	×	
		B Black Gamma	○	○	×	×	×	
		M Black Gamma	○	○	×	×	×	
	Black Gamma (RGB) Range		○	○	×	×	×	
Low key	Low Key Saturation ON		○	○	×	×	×	
saturation	Range		○	○	×	×	×	
		Low Key Saturation level	○	○	×	×	×	

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
Gamma	Gamma Off		○	ON	×	×	×	
	Gamma Category Select		○	○	×	×	×	
	STANDARD Gamma Table Select		○	○	×	×	×	
	HYPER Gamma Table Select		○	○	×	×	×	
	Step Gamma (0.90 to 0.35)		○	○	×	×	×	
		R Gamma	○	○ (RGB mode)	×	×	×	
		G Gamma	○	○	×	×	×	
		B Gamma	○	○ (RGB mode)	×	×	×	
		M Gamma	○	○	×	×	×	
Knee	Knee Off		○	○	×	×	×	
		R Knee point	○	○	×	×	×	
		G Knee point	○	○	×	×	×	
		B Knee point	○	○	×	×	×	
		M Knee point	○	○	×	×	×	
		R Knee Slope	○	○	×	×	×	
		G Knee Slope	○	○	×	×	×	
		B Knee Slope	○	○	×	×	×	
		M Knee Slope	○	○	×	×	×	
	Knee Max On		×	OFF	×	×	×	
	Knee Saturation on		○	○	×	×	×	
		Knee saturation	○	○	×	×	×	
	Auto Knee (DCC) on		○	○	×	×	×	
		Auto Knee Point Limit	○	○	×	×	×	
		Auto Knee Slope	○	○	×	×	×	
White Clip	White Clip Off		○	ON	×	×	×	
		R White Clip	○	○	×	×	×	
		G White Clip	○	○	×	×	×	
		B White Clip	○	○	×	×	×	
		M White Clip	○	○	×	×	×	
Noise Suppression	Noise Suppression ON		○	○	×	×	×	
	Level		○	○	×	×	×	
Mono Color	Mono Color On		○	OFF	–	–	–	
		Mono Color Saturation	○	○	–	–	–	∗1
		Mono Color Hue	○	○	–	–	–	∗1

∗1: Connected with CCU only

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
SD Detail	SD Detail Off		○	○	–	–	–	∗1
		SD Detail Level	○	○	–	–	–	∗1
		SD Detail Limiter	○	○	–	–	–	∗1
		SD Detail White Limiter	○	○	–	–	–	∗1
		SD Detail Black Limiter	○	○	–	–	–	∗1
		SD Detail Crispening	○	○	–	–	–	∗1
		SD H Detail Frequency	○	○	–	–	–	∗1
		SD Detail H/V Ratio	○	○	–	–	–	∗1
		SD Detail Level Depend	○	○	–	–	–	∗1
		SD Detail Comb	○	○	–	–	–	∗1
Cross Color	Cross Color Reduce Off		○	○	–	–	–	∗1
Reduce		Cross Color Reduce Level	○	○	–	–	–	∗1
		Cross Color Reduce Coring	○	○	–	–	–	∗1
SD Matrix	SD Matrix Off		○	○	–	–	–	∗1
	SD Preset Matrix On		○	○	–	–	–	∗1
	SD User Matrix On		○	○	–	–	–	∗1
		R-G	○	○	–	–	–	∗1
		R-B	○	○	–	–	–	∗1
		G-R	○	○	–	–	–	∗1
		G-B	○	○	–	–	–	∗1
		B-R	○	○	–	–	–	∗1
		B-G	○	○	–	–	–	∗1
	SD Multi Matrix On		○	○	–	–	–	∗1
		Phase select	×	×	–	–	–	∗1
		Hue	○	○	–	–	–	∗1
		Saturation	○	○	–	–	–	∗1
SD Gamma	SD Gamma Off		○	ON	–	–	–	∗1
		SD M Gamma	○	○	–	–	–	∗1
Level auto	level auto set up		×	×	×	×	×	
set up	White Setup Mode		×	×	×	×	×	

∗1: Connected with CCU only

(Continued)

Function	Switch item	Analog item	scene file	reference file	Lens file	operator file	OHB file	note
file	Standard		—	—	—	—	—	
	reference file store		—	—	—	—	—	
	reference store to memory stick		—	—	—	—	—	
	reference recall from memory stick		—	—	—	—	—	
	Scene file recall		—	—	—	—	—	
	Scene file store		—	—	—	—	—	
	Scene file store to memory stick		—	—	—	—	—	
	Scene file recall from memory stick		—	—	—	—	—	
	Lens file recall		—	—	—	—	—	
	Lens file store		—	—	—	—	—	
	OHB file store		—	—	—	—	—	
format	1080 59.94i		—	—	—	—	—	HDC1000R/ 1400R (UC)/ 1450R (UC)/ 1500R/1550R only
	1080 29.97PsF		—	—	—	—	—	HDC1000R/ 1500R/1550R only
	1080 23.98PsF		—	—	—	—	—	HDC1000R/ 1500R/1550R only
	1080 50i		—	—	—	—	—	HDC1000R/ 1400R (CE)/ 1450R (CE)/ 1550R/1580R only
	1080 25PsF		—	—	—	—	—	HDC1000R/ 1500R/1550R only
	1080 24PsF		—	—	—	—	—	HDC1000R/ 1500R/1550R only
	720 59.94P		—	—	—	—	—	HDC1000R/ 1500R/1550R/ 1400R (UC)/ 1450R (UC) only
	720 50P		—	—	—	—	—	HDC1000R/ 1500R/1550R/ 1400R (CE)/ 1450R (CE) only
	1080 59.94P		—	—	—	—	—	HDC1000R/1500R standalone only
	1080 50P		—	—	—	—	—	HDC1000R/1500R standalone only
digital extender	digital extender on		×	×	×	×	×	

1500R,

(Continued)

MENU	ITEM	scene file	reference file	Lens file	operator file	OHB file	note
USER MENU customize		—	—	—	○	—	
VF DISPLAY	EX	—	—	—	○	—	
	ZOOM	—	—	—	○	—	
	DISP	—	—	—	○	—	
	FOCUS	—	—	—	○	—	
	ND	—	—	—	○	—	
	CC	—	—	—	○	—	Except for HDC1400R/1450R/ 1580R
	5600K	—	—	—	○	—	
	IRIS	—	—	—	○	—	
	WHITE	—	—	—	○	—	
	D.EXT	—	—	—	○	—	
	GAIN	—	—	—	○	—	
	SHUTT	—	—	—	○	—	
	BATT	—	—	—	○	—	
	RETURN	—	—	—	○	—	
	TALK	—	—	—	○	—	
	MESSAG	—	—	—	○	—	
! IND	ND	—	—	—	○	—	
	CC	—	—	—	○	—	Except for HDC1400R/1450R/ 1580R
	WHITE	—	—	—	○	—	
	5600K	—	—	—	○	—	
	GAIN	—	—	—	○	—	
	SHUTT	—	—	—	○	—	
	FAN	—	—	—	○	—	
	EXT	—	—	—	○	—	
	FORMAT	—	—	—	○	—	
VF MARKER	MARKER	—	—	—	○	—	
	CENTER	—	—	—	○	—	
	SAFETY ZONE	—	—	—	○	—	
	EFFECT	—	—	—	○	—	
	ASPECT	—	—	—	○	—	
	MASK	—	—	—	○	—	
	SAFETY	—	—	—	○	—	

(Continued)

MENU	ITEM	scene file	reference file	Lens file	operator file	OHB file	note
VF DETAIL	VF DETAIL	—	—	—	○	—	
	LEVEL	—	—	—	○	—	
	CRISP	—	—	—	○	—	
	FREQUENCY	—	—	—	○	—	
	FAT MODE	—	—	—	○	—	
	FLICKER	—	—	—	○	—	
	AREA	—	—	—	○	—	
	ZOOM LINK	—	—	—	○	—	
	COLOR DETAIL	—	—	—	○	—	
	COLOR SEL	—	—	—	○	—	
	PEAK COLOR	—	—	—	○	—	
	CHROMA LEVEL	—	—	—	○	—	
FOCUS ASSIST	INDICATOR	—	—	—	○	—	
	MODE	—	—	—	○	—	
	LEVEL	—	—	—	○	—	
	GAIN	—	—	—	○	—	
	OFFSET	—	—	—	○	—	
	AREA MAKER	—	—	—	○	—	
	SIZE	—	—	—	○	—	
	POSITION	—	—	—	○	—	
	POSITION H	—	—	—	○	—	
	POSITION V	—	—	—	○	—	
ZEBRA	ZEBRA	—	—	—	○	—	
	ZEBRA1 LEVEL	—	—	—	○	—	
	WIDTH	—	—	—	○	—	
	ZEBRA2 LEVEL	—	—	—	○	—	
CURSOR	CURSOR	—	—	—	○	—	
	BOX/CROSS	—	—	—	○	—	
	H POSITION	—	—	—	○	—	
	V POSITION	—	—	—	○	—	
	WIDTH	—	—	—	○	—	
	HEIGHT	—	—	—	○	—	
VF OUT	VF OUT	—	—	—	○	—	
	RET MIX VF	—	—	—	○	—	
	MIX DIRECTION	—	—	—	○	—	
	MIX VF MODE	—	—	—	○	—	
	MIX VF LEVEL	—	—	—	○	—	
	VF SCAN	—	—	—	○	—	Except for HDC1000R

(Continued)

MENU	ITEM	scene file	reference file	Lens file	operator file	OHB file	note
SWITCH ASSIGN1	GAIN [L]	—	—	—	○	—	
	GAIN [M]	—	—	—	○	—	
	GAIN [H]	—	—	—	○	—	
	ASSIGNABLE	—	—	—	○	—	
	RE.ROTATION	—	—	—	○	—	
SWITCH ASSIGN2	LENS VTR S/S	—	—	—	○	—	
	FRONT RET1	—	—	—	○	—	
	FRONT RET2	—	—	—	○	—	
	HANDLE SW1	—	—	—	○	—	
	HANDLE SW2	—	—	—	○	—	
	ZOOM SPEED	—	—	—	○	—	
HEAD SET	INTERCOM1 MIC	—	—	—	○	—	
	INTERCOM1 LEVEL	—	—	—	○	—	
	INTERCOM1 POWER	—	—	—	○	—	
	INTERCOM1 UNBAL	—	—	—	○	—	
	INTERCOM2 MIC	—	—	—	○	—	
	INTERCOM2 LEVEL	—	—	—	○	—	
	INTERCOM2 POWER	—	—	—	○	—	
	INTERCOM2 UNBAL	—	—	—	○	—	
INTERCOM LEVEL	INTERCOM1 SIDE TONE	—	—	—	○	—	
	INTERCOM2 SIDE TONE	—	—	—	○	—	
RECEIVE SEL1	INTERCOM1 RECEIVE SELECT	—	—	—	○	—	
	INTERCOM	—	—	—	○	—	UC model only
	ENG	—	—	—	○	—	CE model only
	PROD	—	—	—	○	—	CE model only
	PGM1	—	—	—	○	—	
	PGM2	—	—	—	○	—	
	TRACKER	—	—	—	○	—	
RECEIVE SEL2	INTERCOM2 RECEIVE SELECT	—	—	—	○	—	
	INTERCOM	—	—	—	○	—	UC model only
	ENG	—	—	—	○	—	CE model only
	PROD	—	—	—	○	—	CE model only
	PGM1	—	—	—	○	—	
	PGM2	—	—	—	○	—	
	TRACKER	—	—	—	○	—	

(Continued)

MENU	ITEM	scene file	reference file	Lens file	operator file	OHB file	note
RECEIVE SEL3	TRACKER RECEIVE SELECT	—	—	—	○	—	
	INTERCOM	—	—	—	○	—	UC model only
	ENG	—	—	—	○	—	CE model only
	PROD	—	—	—	○	—	CE model only
	PGM1	—	—	—	○	—	
	PGM2	—	—	—	○	—	
RECEIVE SEL4	EARPHONE RECEIVE SELECT	—	—	—	○	—	
	INTERCOM	—	—	—	○	—	UC model only
	ENG	—	—	—	○	—	CE model only
	PROD	—	—	—	○	—	CE model only
	PGM1	—	—	—	○	—	
	PGM2	—	—	—	○	—	
	TRACKER	—	—	—	○	—	

Section 5
Setup Menu

5-1. Entering the SERVICE Menu

Some of adjustments given in this section use the setup menu. The setup menu consists of the following menus. Besides there is a TOP menu indicating the entire configuration of menu items.

- USER menu
- USER MENU CUSTOMIZE menu
- OPERATION menu
- PAINT menu
- MAINTENANCE menu
- FILE menu
- DIAGNOSIS menu
- SERVICE menu

In this section, describes the setup menu operation as follows.

For example:
When AUTO LEVEL in AUTO SETUP page of MAINTENANCE menu is performed:

MENU: MAINTENANCE
PAGE: AUTO SETUP
ITEM: AUTO LEVEL

How to display the SERVICE menu

HDC1000R

Set the DISPLAY switch to “MENU” while pressing the ASSIGNABLE switch and the MENU SELECT switch (ENTER side).

HDC1400R/1450R/1500R/1550R/1580R

Set the DISPLAY switch to “MENU” while pressing the ASSIGNABLE switch and the rotary encoder.

How to change the setting values

To enter or cancel the setting value of items, which can be changed by turning the MENU SELECT control (HDC1000R) or rotary encoder (HDC1400R/1450R/1500R/1550R/1580R), proceed as follows.

HDC1000R

To enter the setting value:

Press the MENU SELECT switch toward the “ENTER” side.

To cancel the setting value:

Before pressing the MENU SELECT switch toward the “ENTER” side, press the MENU SELECT switch toward the “CANCEL” side. The original setting is restored.

After the MENU SELECT switch is pressed toward the “ENTER” side, the setting cannot be canceled.

HDC1400R/1450R/1500R/1550R/1580R

To enter the setting value:

Press the rotary encoder.

To cancel the setting value:

Before pressing the rotary encoder, press the MENU switch toward the “CANCEL” side. The original setting is restored.

After the rotary encoder is pressed, the setting cannot be canceled.

5-2. Settable Special Functions

The following functions are made available by settings in the service menu. Note that they are limited functions. In addition, settings of the number of scene files, aspect ratio of the down-converter, and filter local return position are available. Refer to the description in the service menu.

When an autofocus lens is used

When an auto focus lens of Fujinon or Canon is used, a focal area marker and a focusing indicator can be displayed on the viewfinder.
When AF DISPLAY in “Setup” in the service menu is set to ON, the area marker appears according to the area marker display switch of the lens.
The area marker is a rectangular frame in which auto focus is detected.
“AF” is added to “VF DISPLAY” in the Operation menu. When this “AF” is set to ON, the indicator appears.

Focusing indicator
▲ Front focus
■ Focal point
▼ Rear focus

However, there are the following restrictions.
- When AF DISPLAY is set to ON, the EFFECT display cannot be used. Instead of the EFFECT display, you can select 100% of the SAFETY ZONE display that usually cannot be selected.
- If “Digital extender” is set to ON, the area marker is not displayed correctly.

How to Use VBS as Return for Standalone Operation (HDC1000R/1100R/1500R/1600R only)

Enabling this function causes the following restrictions:
- Prompter 2 (or SDI 1) is not available.
- The VBS return does not function in the 23.98PsF, 24PsF, or 25PsF format.
- Even if SDI 2 is set to RET, the VBS RET IN signal is not output.

1. Check that the version of the PLD on the SDI-84A board is V1.13 or higher.
2. Remove the outside pad subassembly on the left of the unit and remove the heat sink subassembly to make the SDI-84A board visible. (Refer to Section 2-14.)
3. Disconnect the cable connected to the connector CN851 “Prompter2 out” (one of the two coaxial harnesses) on the SDI-84A board (or the cable indicated as “SDI 1, CN201 LINKA”), and connect the cable to the connector CN601 “EXT VIDEO IN”.
4. Set S201-2 on the SDI-84A board to OFF and S201-3 to ON.
5. Choose <RAM FUNCTION> from the SERVICE menu, and set STANDALONE in RAM FUNC to RET SYNCHRO.
6. VBS input to the “Prompter2” connector (or SDI 1) is enabled. To change the indication, replace the label with the supplied label “VBS RET IN”.
7. Number 1 of the RET SEL knob corresponds to the RET IN input on the rear panel, and numbers 2, 3, and 4 correspond to the VBS RET IN input.
8. The <EXT RETURN> page is added to the MAINTENANCE menu, which allows the aspect ratio setting for the VBS RET input.

Descriptions of Service Menu

SETUP

```
<SET UP>          S01 TOP
SCENE FILE TYPE : 5
AF DISPLAY      : OFF
FILTER RESUME   : OFF
LENS IF MODE    : AUTO
FILTER SELECT   : SINGLE *
```

* HDC1400R/1450R/1580R only

SCENE FILE TYPE

Setting of the number of scene files that a camera can have. A number of 5 or 32 can be set. Note that, when the number of scene files is changed from 32 to 5, the data of the sixth and the following scene files are lost. The factory setting of the number of scene files is 5.

AF DISPLAY

When an autofocus lens is used, a focal area marker and a focusing indicator can be displayed on the viewfinder. Refer to “When an autofocus lens is used.”

FILTER RESUME

- HDC1400R/1450R/1500R/1550R/1580R equipped with the large lens adaptor
- HDC1000R

When the FILTER LOCAL button is set to ON and OFF in these cameras, the filter position of camera operates as follows by setting the FILTER RESUME.

ON Filter position before the FILTER LOCAL button is set to ON

OFF Filter position is not changed.

LENS INTERFACE MODE

When a lens that is able to communicate with a camera through the serial interface, the interface mode can be changed forcibly to the parallel interface. The factory setting is AUTO.

AUTO Sets an interface automatically.

PARA Selects the parallel interface forcibly.

FILTER SELECT (HDC1400R/1450R/1580R only)

FILTER SELECT is used to set the number of optical filter discs.

When HKC-D14 is installed, set FILTER SELECT to “DOUBLE”. For other cases, set to “SINGLE.”

CC FILTER

```
<CC FILTER>       S02 TOP
 A:  3200K
 B:  3200K
 C:  4300K
 D:  6300K
 E:  8000K
```

When the CC filter is replaced with a nonstandard color temperature conversion filter, change this setting. However, when the CC filter is replaced with a filter without color temperature conversion, such as CROSS FILTER, set 3200K. This setting is a reference for color temperature display and the color temperature control function. The factory settings are A: 3200K, B: 3200K, C: 4300K, D: 6300K, and E: 8000K.

These settings are not necessary for HDC1400R/1450R/1580R.

MANUAL RPN

```
<MANUAL RPN>      S03 TOP
 RPN CH SELECT   :     R
 RPN CURSOR      :   OFF
 CURSOR H POS.   :  1008
 CURSOR V POS.   :   576
 CURSOR JUMP     :  CURR
 RPN WIDTH       :     1
 RECORD RPN      :  EXEC
 DELETE RPN      :  EXEC
```

The MANUAL RPN menu is used for manual RPN compensation.

V LINE

```
<V.LINE>          S04 TOP
 RPN CH SELECT   :     R
 RPN CURSOR      :   OFF
 CURSOR H POS.   :  1008
 CURSOR V POS.   :   576
 CURSOR JUMP     :  CURR
 V.LINE LEVEL    :   127
 RECORD V.LINE   :  EXEC
 DELETE V.LINE   :  EXEC
```

RPN MANAGE

```
<RPN MANAGE>     S05 TOP

 CONC.(APR) RESET:  EXEC
 RPN ALL PRESET  :  EXEC
 AUTO CONCEAL    :  EXEC
 APR AT ABB      :    ON
```

VDA_ADJ

```
<VDA-ADJ>        S06 TOP

 Y  -GAIN   :→18
 Pb -GAIN   : 68
 Pr -GAIN   : 68
 VBS-GAIN   : 5A


 TEST OUT SELECT: HD-Y
 REF-SEL        : HD-60i
 CHANNEL-SEL    : COLOR
```

OHB_ADJ1

```
<OHB_ADJ1>       S07 TOP

 FORMAT :→1080-59.94i
           [R1][G1][B1]
 DC_ADJ_A :  68  68  68
 DC_ADJ_B :  60  60  66
 GAIN_CONT:  80  80  80
           [R2][G2][B2]
 DC_ADJ_A :  7F  7F  7F
 GAIN_CONT:  7F  7F  7F
 FILTER   :   ON
 STORE FILE  : EXEC
```

OHB_ADJ2

```
<OHB_ADJ2>       S08 TOP

 FORMAT :→1080-59.94i
           [R1][G1][B1]
 SH_ADJ_A :  7F  7F  7F
 DC_ADJ_C :  80  80  80
           [R2][G2][B2]
 SH_ADJ_A :  7F  7F  7F

 CONC.TEST MODE :  OFF

 STORE FILE  : EXEC
```

OHB_ADJ3

```
<OHB_ADJ3>       S09 TOP

 FORMAT :→1080-59.94i
            [R] [G] [B]
 V-SUB  :   80  80  80
 STORE FILE :  EXEC

 SHUTTER    :  OFF
 SHUT_SPEED :  1/500
```

The OHB-ADJ menus are used for adjustments of the CCD block.

BLACK SHADING

```
<BLACK SHADING> →S10 TOP

 FORMAT : 1080-59.94i
          [R][G][B]
V SAW  : 00  00  00
V PARA : FF  FF  FF
H SAW  : FF  01  01
H PARA : FD  FE  FE
BLK SET: 04  04  04
 OFFSET: 00  00  00
GAIN:  12dB   TEST: ---
 STORE FILE:   EXEC
```

The BLACK SHADING menu is used for adjustment of the black shading.

WHITE SHADING

```
<WHITE SHADING>  S11 TOP

           [R]  [G]  [B]
V SAW  :  →00   00   00
V PARA :   00   00   00
H SAW  :   01   00   00
H PARA :   00   FF   00
WHITE  :    0    0    0

 STORE FILE:   EXEC
 COLOR_TEMP_SEL: 3200K
```

The WHITE SHADING menu is used for adjustment of the white shading.

DAP/AU-ADJ

```
<DAP/AU-ADJ>     S12 TOP

 BOARD-TEST : OFF
 TRUNK-TEST : OFF

 INCOM1-GAIN:→60dB
 INCOM2-GAIN: 60dB
 MIC1-GAIN  : 60dB
 MIC2-GAIN  : 60dB

 2009/02/23  22:06:00
 RESET DATA : EXEC
```

The DAP/AU-ADJ menu is used for setting of the DAP board and AU board.

SDI

```
<SDI>              S13 TOP

TEST MODE     :→OFF
RX CRC ERR    :   0
CRC ERR RESET:  EXEC
STATUS        : 10110011
OPT LEVEL     : 0.00V RED
TEMP SDI      : 43°C
SDI2-VBS      : OFF
PROMPTER      : 1CH
```

The SDI menu is used to display the SDI board status.

EXT RETURN

```
<EXT RETURN>      S14 TOP
 EXT RET IN: VBS

  STATUSE : OK
  FORMAT  : NTSC

 SD ASPECT : SQ
```

The EXT RETURN menu is not used.

RAM FUNCTION

```
<RAM FUNCTION>    S15 TOP

RAM FUNC
 STANDALONE:→   DOWNCONV
 CCU        :   DOWNCONV
```

The RAM FUNCTION menu is used to change the priority of the memory functions.

DOWNCONV

The output of the down-converter is pulled down in the 23.98PsF, 24PsF, or 25PsF format.

LETTERBOX

The output of the down-converter is enabled when LETTER BOX is set. When RAM FUNC is set to LETTERBOX, SQ/ LB is selectable for ASPECT in DOWN CONVERTER of the MAINTENANCE menu.
However, in the 23.98PsF, 24PsF, or 25PsF format, even if LB is set, the output of the down-converter is not enabled with LETTER BOX set. The down-converter setting is available only for the main signals, but is not available for the return and VF signals.

RET SYNCHRO (HDC1000R/1500R only)

When the unit is operating in the standalone mode, VBS can be viewed as a return signal on the viewfinder.
To enable this function, internal connection must be changed and the board switch must be set. Refer to “How to Use VBS as Return for Standalone Operation.”
For the 23.98PsF, 24PsF, or 25PsF format, however, the VBS return does not function correctly even if STANDALONE is set to RET SYNCHRO.

INTERCOM

```
<INTERCOM>        S16 TOP




 INCOM FILE  : UCJ
  READ FILE
```

INTERCOM FILE

This menu is used for setting of intercom panel destinations.
In HDC1400R/1450R/1500R/1550R/1580R, this setting is automatically made by performing file menu → reference → ALL preset. However, in HDC1000R or when not using ALL PRESET, set INTERCOM FILE in this menu. Set CE for CE destinations and HDC1580R, or set UCJ for others.

READ FILE

Not used.

TRACKER

```
<TRACKER>          S17 TOP

  INPUT LEVEL    :    0dB
   TALK LEVEL    :    0dB

 OUTPUT LEVEL
        L-CH     :  -20dB
        R-CH     :  -20dB
```

The TRACKER menu is used to set the input/output levels of the tracker terminal.

SERIAL NO.

```
<SERIAL NO.>       S18 TOP

 MODEL: HDC1500R
 NO.  : 100001
```

The SERIAL NO. menu is used to set the model name and serial number.

OHB-TYPE

```
<OHB-TYPE>         S19 TOP
 OHB TYPE : MULTI




 STORE FILE : EXEC
```

CCD block type setting
Set to the following settings.

- HDC1400R/1450R (UC/J): DUAL 60
- HDC1400R/1450R (CE): DUAL 50
- HDC1580R: SINGLE 50
- Others: MULTI

If the setting has been changed, execute STORE FILE. Then the setting change is reflected during the power-on restart.

OPTION

```
<OPTION>           S20 TOP

GAIN EXTEND     :     OFF
720P RESPONSE   :    WIDE
ZOOM SKINDTL    : DISABLE
CHROMA FILTER   :    FULL
720 VSOP MODE   :     OFF
```

GAIN EXTEND

When GAIN EXTEND is set to ON, the master gain is extended up to +36 dB. When it is set to OFF, the master gain is extended to +12 dB.

720P RESPONSE (Except for HDC1580R)

This is used to set 720P horizontal and vertical filter characteristics.

ZOOM SKINDTL

This is the setting of the function to interlock the Skin Tone Detail level with the lens zoom position.

CHROMA FILTER

Chroma filter characteristic setting.

720 VSOP MODE (Except for HDC1580R)

It is used in the 720P mode placing emphasis on the sensitivity characteristic.

BOOT VERUP

```
<BOOT VERUP>       S21 TOP

MAIN   :V2.00
BOOT   :V2.00
```

The BOOT VERUP menu is used for upgrading the BOOT block.

Section 6
Circuit Description

6-1. HDC1000R/1400R/1450R/1500R/1550R/1580R

6-1-1. BI-233 board

The BI-233 board supplies the DC bias required for CCD. A CCD output two-channel signal is sent through an amplifier to the PA-355 board. Moreover, the BI-233 board mounts a horizontal CCD clock driver and reset gate driver.

6-1-2. PA-355 Board

After CDS (Correlative Double Sampling), the PA-355 board multiplexes the two-channel from CCD so as to produce one signal. The PA-355 board then corrects the black shading, increases the gain, and sends the resultant data to the DPR-265A board.

6-1-3. TG-266 Board

The TG-266 board establishes synchronization using the PLL-H signal input from the DPR-265A and generates a CCD drive pulse or sample-and-hold pulse. It also generates an error correction pulse or black shading correction signal. The TG-266 board mounts a test signal generator circuit. The test signal generator circuit is used for adjustment and maintenance by switching to a CCD output signal. CCD block adjustment data and error correction data are memorized in each EEPROM on this board.

6-1-4. DR-633 Board

The DR-633 board mounts a CCD drive vertical driver, shutter pulse driver, and VH driver. It also generates a Vsub voltage peculiar to CCD and supplies it to CCD.

6-1-5. AT-163A Board

The AT-163A board consists of a system control microcomputer and its peripheral circuit. A main program is written in EEPROM on the AT-163A board. The control data of a camera is saved in FRAM. The AT-163A board also mounts a lens interface circuit and auto iris control circuit.

6-1-6. AU-298 Board

The AU-298 board mounts an incom input amplifier (consisting of two circuits), microphone input amplifier (consisting of two circuits), incom receive output circuit (consisting of two circuits), PGM output circuit (consisting of two circuits), tracker input/output circuit (consisting of one circuit), and earphone output circuit.

6-1-7. DAP-33A Board

The analog two-channel incom signal and analog two-channel microphone signal input from the AU-298 board are sent through the DAP-33A board to CCU. Digital signals are converted into an analog two-channel incom signal and analog two-channel program signal and output to the AU-298 board.

6-1-8. VDA-63A Board

The digital signal from the DPR-265A board is converted into an analog signal using a D/A converter. Among the R/G/B/Y signals or RET signals (Y) of a camera, a sync signal is added to the selected signal. The added signal is output from a 75 Ω driver to a viewfinder or camera's TEST OUT connector.

6-1-9. DPR-265A Board

The R/G/B signal that is input from the PA-355 board through the CN-3132, CN-2609G (HDC1000R only), and MB-1059GA/1060G boards is passed through a pre-filter and then converted from analog to digital. Camera process treatment and enhancement processing such as knee and gamma correction are performed by Vigent-LSI. Down-conversion into an SD signal and generation of a viewfinder signal are performed in Baryon-LSI. A digital output signal is sent to the SDI-84A board and then transmitted to CCU.

6-1-10. SDI-84A Board (HDC1000R/1400R/1500R/1580R only)

A digital audio signal and command are multiplexed into the video signal in a main channel sent from the DPR-265A board. Moreover, the video signal in a main channel is converted from parallel to serial, converted from electric to optical, and sent to CCU as a serial optical signal.
The serial optical return video signal sent from CCU is converted from optical to electric and converted from serial to parallel. Next, the digital audio signal, command, and prompter video signal multiplexed into the return video signal are separated, and the return video signal, digital audio signal, and command are sent to each board.

6-1-11. TR-136 Board (HDC1450R/1550R only)

The audio digital signal, in a main channel, sent from the DPR board is converted from digital to analog and modulated to the RF signal suitable for triaxial cable transmission. The RET and audio RF signals sent from HDFX100 are demodulated and output to the DPR-265A board.

HDC1000R (JN)
HDC1000R (CE)
HDC1400R (JN)
HDC1400R (E)
HDC1400R (CE)
HDC1450R (UC)
HDC1450R (CE)
HDC1500R (SY)
HDC1500R (JN)
HDC1500R (E)
HDC1500R (CE)
HDC1550R (UC)
HDC1550R (CE)
HDC1580R (CN) E
9-968-618-01

Sony Corporation

Printed in Japan
2009. 4 22