

SONY®

HD ELECTRONIC VIEWFINDER

HDVF-20

HDVS

MAINTENANCE MANUAL

1st Edition

Serial No. 10001 and Higher

警告

このマニュアルは、サービス専用です。

お客様が、このマニュアルに記載された設置や保守、点検、修理などを行うと感電や火災、人身事故につながる可能性があります。

危険をさけるため、サービストレーニングを受けた技術者のみご使用ください。

WARNING

This manual is intended for qualified service personnel only.

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

WARNUNG

Die Anleitung ist nur für qualifiziertes Fachpersonal bestimmt.

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

AVERTISSEMENT

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

X-RAY RADIATION WARNING

Be sure that parts replacement in the high voltage block and adjustments made to the high voltage circuits are carried out precisely in accordance with the procedures given in this manual.

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Manual Structure

Purpose of this manual

This manual is the maintenance manual for HD Electronic Viewfinder HDVF-20. This manual describes the information items necessary when the unit is supplied and installed, items that premise the service based on the components parts such as alignment, schematic diagrams, board layouts and spare parts lists, assuming use of system and service engineers.

Contents

The following are summaries of the each section for understanding the manual.

Section 1. Service Overview

Describes information about board locations, connector input/output signals, cleaning and replacement of CRT.

Section 2. Electrical Alignment

Explains the general information for adjustment procedures and the electrical adjustments of this unit.

Section 3. Spare Parts

Describes parts list, exploded views and supplied accessories used in the unit.

Section 4. Semiconductor Pin Assignments

Describes function diagrams and pin names of semiconductor used in the unit.

Section 5. Block Diagram

Describes overall block diagram of this unit.

Section 6. Board Layouts

Describes board layouts for every circuit board.

Section 7. Schematic Diagrams

Describes schematic diagrams for every circuit board and frame wiring .

Relative manual

Besides this maintenance manual the following manual is available for this unit.

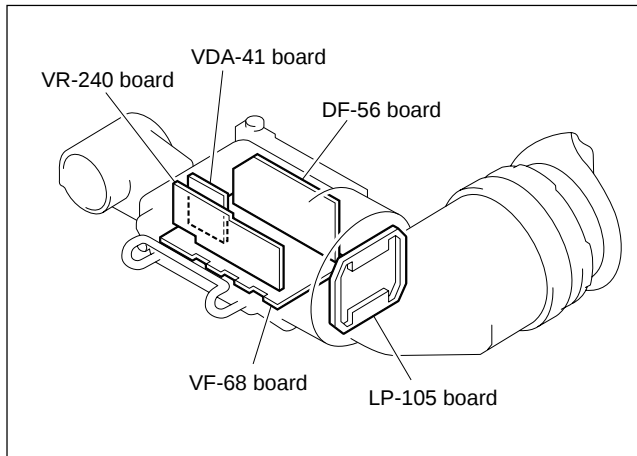
- **Operation Manual(Supplied with this unit)**

This manual is necessary for application and operation of this unit.

Section 1

Service Overview

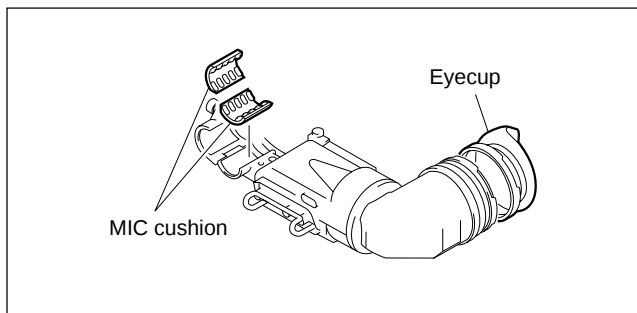
1-1. Location of Printed Circuit Boards



1-2. Recommended Replacement Parts

Parts listed below are recommended replacement parts. They are subject to cracks with the lapse of time. Check sometimes by visual, and replace as necessary.

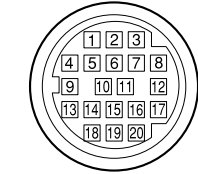
Name	Sony Part No.	Remarks
Microphone spacer (ø21)	3-179-882-0X	Supplied accessory
Microphone holder (ø19)	3-680-582-0X	Supplied accessory
MIC cushion	3-692-138-0X*	
Eyecup	3-723-079-0X	



* It is recommended that the MIC cushions are replaced in pairs. In this case, please order two pieces.

1-3. Connector Input/Output Signals

VF (20P MALE)



(EXTERNAL VIEW)

Pin No.	Signal	I/O	Specifications
1	S-DATA	IN/OUT	TTL level
2	NC		
3	POWER OFF CTL	IN	ON : OPEN OFF : GND
4	SCK	IN	TTL level
5	COLOR/BW	OUT	B/W : GND COLOR : OPEN
6	NC		
7	NC		
8	G TALLY	IN	ON : 5V OFF : GND
9	PEAKING CTL	OUT	VF to CAM ($R_o = 1\text{ k}\Omega$) 0 V to 5 V 0 V : PEAKING OFF 5 V : PEAKING MAX
10	NC		
11	NC		
12	Y VIDEO	IN	1.0 V p-p ($R_o = 75\text{ k}\Omega$)
13	VIDEO GND		
14	NC		
15	NC		
16	NC		
17	R TALLY	IN	ON : 5 V OFF : GND
18	NC		
19	UNREG GND		
20	UNREG		+10.5 V to 17 V

1-4. Cleaning

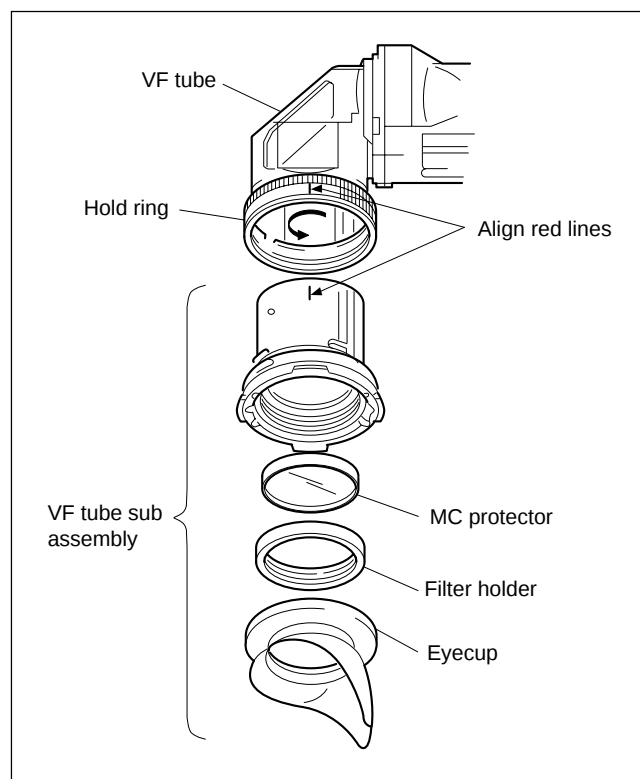
1-4-1. Cleaning of Viewfinder

By extracting VF tube sub assembly, lens and MC protector can be easily cleaned. And also dust on the CRT surface or mirror can be easily cleaned off.

1. Turn the hold ring to the left and extract the VF tube sub assembly.
2. Detach the eyecup.
3. Remove the filter holder with the MC protector installed.
4. Wipe the lens and the MC protector with a commercially available lens cleaner.
5. After the cleaning is completed, install by reversing the preceding steps. Align red lines of the VF tube and VF tube sub assembly when inserting, and turn the hold ring to the right until it locks.

Notes

- Do not use any type of solvent, such as alcohol, benzine or thinner to remove stains.
- Be sure to attach the eyecup to the viewfinder, or the MC protector may come off.
- To protect the viewfinder lens from drops, securely put the MC protector in the filter folder and attach the eyecup to the viewfinder.



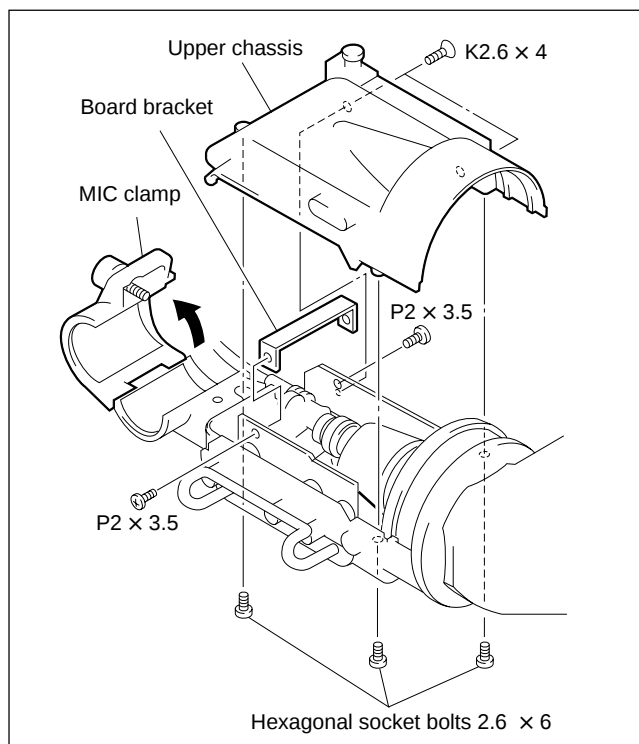
1-4-2. Cares After Using at Special Environment

It is recommended to check the following items after gathering the news at seaside, dust area or spa.

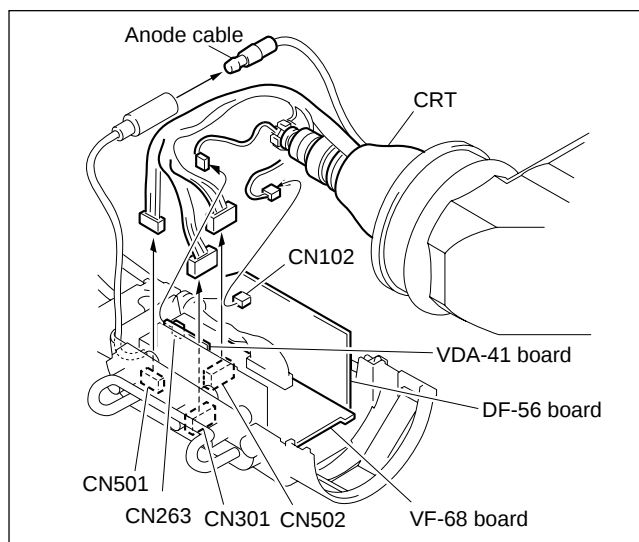
1. Clean off sand and other dust in the unit carefully.
2. Do not allow salt in seawater or sulfur in spa to contact a not-painted surface of the cabinet. They may cause to corrode. Clean with alcohol immediately if contacted.
3. Clean the connection surface of connectors.
4. Carry out the common operation check and confirm that the unit normally operates.

1-5. Replacement of CRT

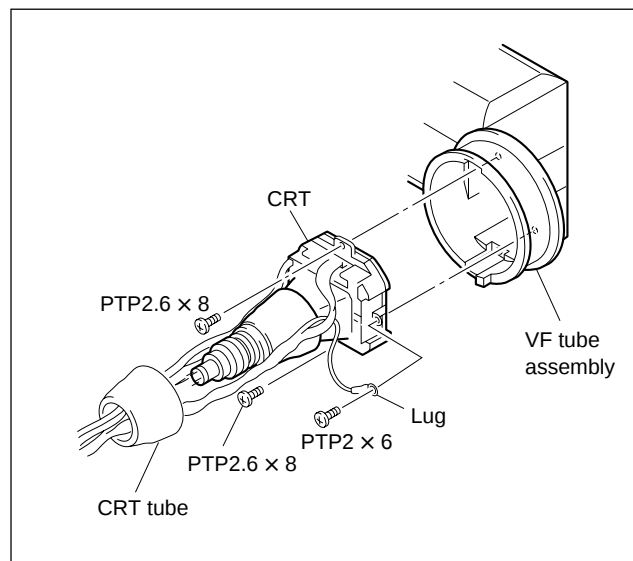
1. Loosen the screw of the MIC clamp and open the MIC clamp.
2. Remove the two screws (K2.6 × 4).
3. Remove the three hexagonal socket bolts (2.6 × 6) and remove the upper chassis.
4. Remove the two screws (P2 × 3.5) and the board bracket.



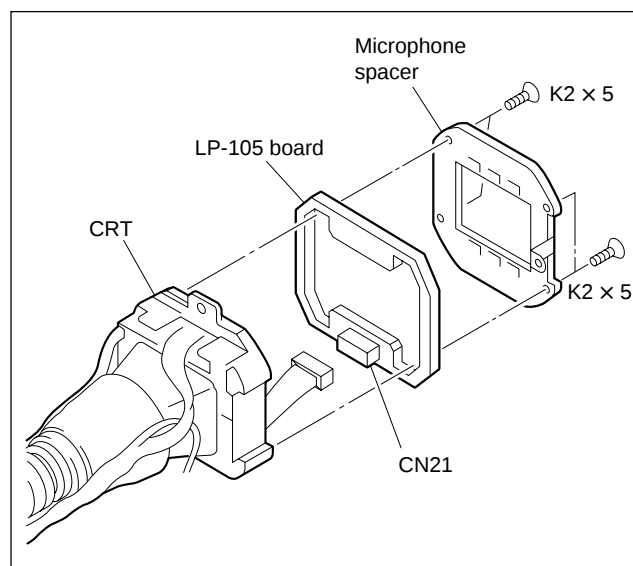
5. Disconnect the five connectors CN301, CN501 and CN502 on the VF-68 board, CN102 on the DF-56 board and CN263 on the VDA-41 board and the anode cable.



6. Remove the four screws and remove the CRT from the VF tube assembly.
7. Remove the CRT tube from the CRT.



8. Remove the four screws and remove the microphone spacer.
9. Disconnect the connector CN21 on the LP-105 board.



10. Install a new CRT in the reverse procedures of removal.

Note

When installing the upper chassis, take care not to catch the harness between upper and lower chassis.

1-6. Disconnecting/Connecting Flexible Card Wire

The flexible card wire is used between the VF-68 board and VR-240 board. Take care not to break this flexible card wire. This shorten the wire life.

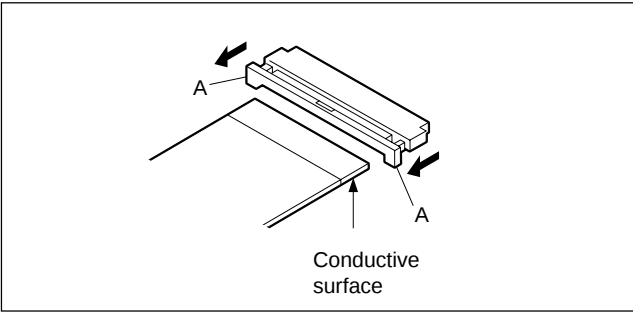
Disconnecting

1. Turn off the power.
2. 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 conductive 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 as far as it will go with the conductive surface down.
 2. Slide portions A in the reverse direction to lock.



1-7. Notes on Repair Parts

1. Safety Related Components Warning

WARNING

Components marked $\triangle$ 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. Units Representation

The following represented units are changed or omitted in writing.

Units		Representation
Capacitance	μF	uF
Inductance	μH	uH
Resistance	Ω	Abbreviation
Temperature	$^{\circ}\text{C}$	XXX-DEG-C

1-8. Circuit Description

VF-68 board

The VF-68 board consists of a power supply block, H deflection drive circuit and serial interface circuit for various controls.

A switching regulator consists of IC401 and Q401 to Q404, where +9.5 V and about +7.5 V for H driving are generated from UNREG (10.5 to 17 V) input at pin B10 of CN001. And H size adjustment is performed by controlling the reference dc voltage for IC401 with RV110 (H SIZE) on the DF-56 board.

The H deflection circuit IC501 and Q501 are also used to drive a flyback transformer. The flyback transformer outputs HV (6 kV), G2 (500 V), 60 V and heater pulse voltage. The heater pulse voltage is smoothed by C513, and is adjusted in voltage by RV501 (HEATER). The resultant is applied to the heater through IC503.

The voltage for feedback circuit is output at pin 1 of the flyback transformer and is sent to a feedback circuit consisting of IC501, IC502, Q502 and Q503 to stabilize a high-voltage portion. When the voltage goes higher than the reference, the power is turned off as pin 8 of IC502 goes high and a protection circuit operates.

IC301 and IC302 are serial interface ICs, which are used to control indicators and to grab switch data and so on.

IC304 is a timer IC. It is used to set the time period during which the zebra pattern is displayed in MOMENTARY mode, and during which the brightness increases momentarily as the internal tally signal is turned on.

DF-56 board

The DF-56 board provides an external sync circuit, V deflection drive circuit and blanking pulse generation circuit.

IC104 is a sync separator, which separates sync signals from the video signal input to the DF-56 board and outputs the HD signal from pin 7 and VD signal from pin 3. The HD signal is compared in phase with a flyback pulse at IC101 and then enters AFC circuit.

The VD signal is input to pin 21 of IC101, and is then sent to the V deflection drive circuit consisting of Q104 to Q107 as a trigger pulse.

IC106 generates a video clamp pulse, and IC108 to IC115 generate a beam blanking pulse. These pulses are output to the VF-68 board.

VR-240 board

The VR-240 board consists of a video amplifier circuit and bright control circuit.

The video signal input at pin 3 of CN201 is adjusted in level with RV201 (CONTRAST), and is sent through the peaking circuit to the VDA-41 board.

DC voltage is adjusted with RV205 and RV206 (BRIGHT) and is sent to the VF-68 board as a bright control voltage.

VDA-41 board

The video signal from the VR-240 board is shifted by a constant voltage at D261 zener diode. And then the video signal is amplified by Q261 and Q262, and is output to G1 through a drive circuit of Q263 to Q266. Q267 clamps the blanking portion to stabilize the black level.

Section 2

Electrical Alignment

2-1. General Information for Electrical Adjustment

2-1-1. Notes on Adjustment

WARNING

There is a danger of an electric shock around the CRT due to its high voltage. Great care should be taken in servicing. Never touch a live CRT by bare hands.

Before performing adjustment, read throughly the following comments.

- Calibration for all measuring equipment should be completed.
- Alignment of peripheral equipment such as camera should be completed.
- Turn off the power before extending the plug-in board of the camera using the extension board.

2-1-2. Equipment/Fixtures Required

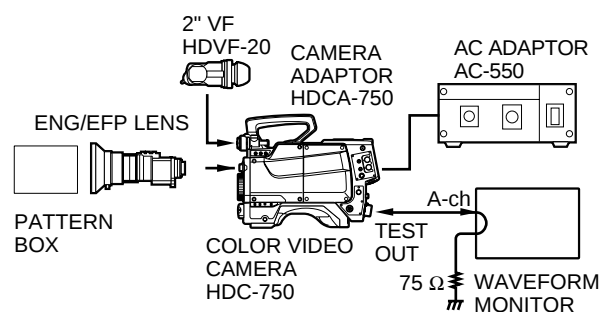
Equipment

- HDVS camera system
HDC-750, HDCA-750
- AC adaptor
AC-550/550CE or equivalent
- Oscilloscope
(Input capacitance of probe : 12 pF or below)
Tektronix 2465B or equivalent
- HDTV waveform monitor
Tektronix 1735HD/1730HD or equivalent
- HDTV B/W monitor
- Digital voltmeter
- Frequency counter

Fixtures

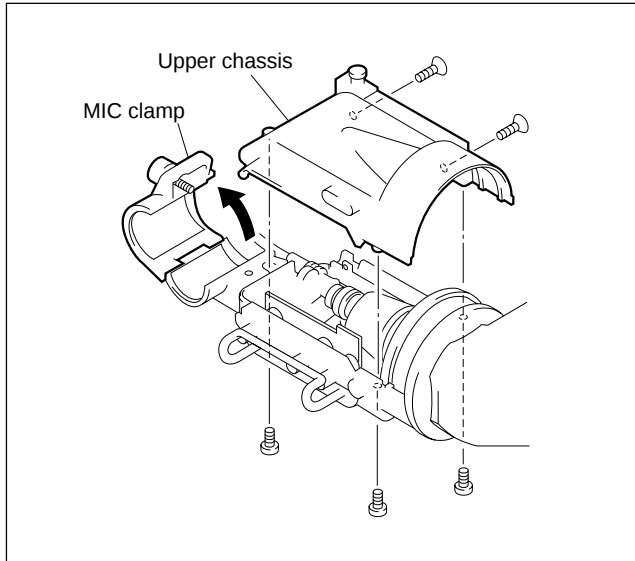
Fixtures	Sony P/N
Pattern box PTB-500	J-6029-140-B
Resolution chart (16:9)	J-6395-320-A
VF extension harness	J-6395-050-A

2-1-3. Connection



2-1-4. Extending Viewfinder

1. Turn off the power before performing adjustment.
2. Remove the viewfinder from the camera.
3. Open the MIC clamp and remove the upper chassis.
(Refer to Section 1-5 “Replacement of CRT” for details.)



4. Connect the viewfinder to the camera via the VF extension harness.
5. Turn on the power.

2-1-5. Setting of the VF SCAN Mode

1. Before adjustment, set the VF SCAN mode to 16:9 following to the camera's setup menu. (Refer to HDC-750 Maintenance Manual Vol.1 for details.)
MENU : Operation
PAGE : VF Setup
ITEM : VF Scan→16:9
2. Whenever you press DISPLAY/SCAN switch on the viewfinder to SCAN, the picture frame mode toggles between 16:9 and 4:3. Perform the adjustment in 16:9 mode unless otherwise specified.

2-2. Power Supply Voltage Adjustment

Equipment : Digital voltmeter

Adjustment Procedure

Test point : CN101-1pin/DF-56
 Adjustment point : ⚙RV401/VF-68
 Specification : 9.50 ± 0.05 V dc

2-3. Vertical Hold Adjustment

Equipment : Frequency counter

Preparation

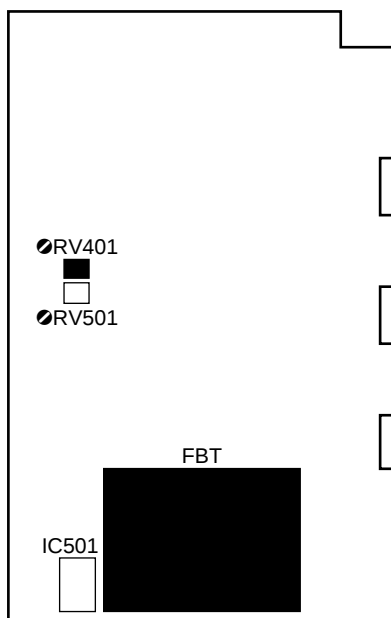
- Extract the VDA-31 board from the HDCA-750.

Adjustment Procedure

Test point : CN102-1pin/DF-56
 GND : Shielding case of FBT501/VF-68
 Adjustment point : ⚙RV105/DF-56
 Specification : 55.0 ± 0.5 Hz

Setting after Adjustment

- Return the VDA-31 board to its normal position.



VF-68 BOARD (A SIDE)

2-4. Horizontal Hold Adjustment

Equipment : Frequency counter

Preparation

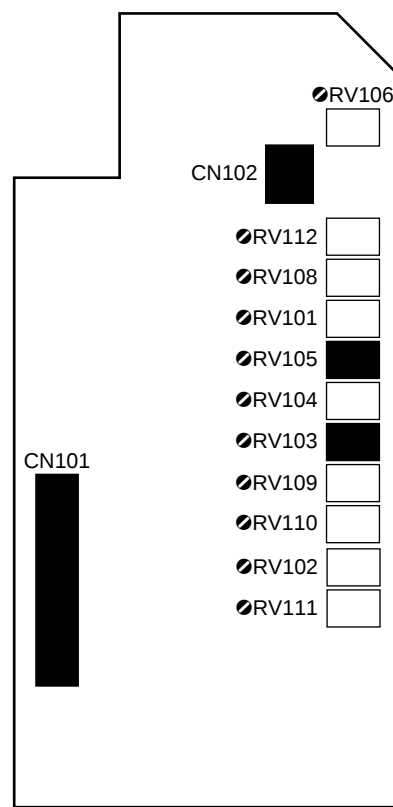
- Extract the VDA-31 board from its normal position.

Adjustment Procedure

Test point : CN101-7pin/DF-56
 GND : Shielding case of FBT501/VF-68
 Adjustment point : ⚙RV103/DF-56
 Specification : 33.75 ± 0.25 kHz

Setting after Adjustment

- Return the VDA-31 board to its normal position.



DF-56 BOARD (A SIDE)

2-5. Horizontal Duty Adjustment

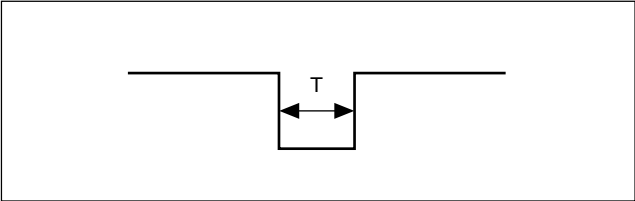
Equipment : Oscilloscope

Preparations

- Iris of the lens : CLOSE
- BRIGHT control : Fully counterclockwise ☯
- CONTRAST control : Fully counterclockwise ☯
- PEAKING control : Fully counterclockwise ☯

Adjustment Procedure

Test point : IC501-7pin/VF-68
GND : Shielding case of FBT501/VF-68
Adjustment point : ⚙RV104/DF-56
Specification : $T=2.9 \pm 0.1 \mu s$
Turn ⚙RV104 fully counter-clockwise, and slowly turn it clockwise until the specification is satisfied.



Note

If T is set to $2.5 \mu s$ or below, high-voltage protection circuit may become activated. In this case, power off once and turn ⚙RV104/DF-56 fully counterclockwise. After that power on again to perform the adjustment.

2-6. Heater Voltage Adjustment

Equipment : Digital voltmeter

Note

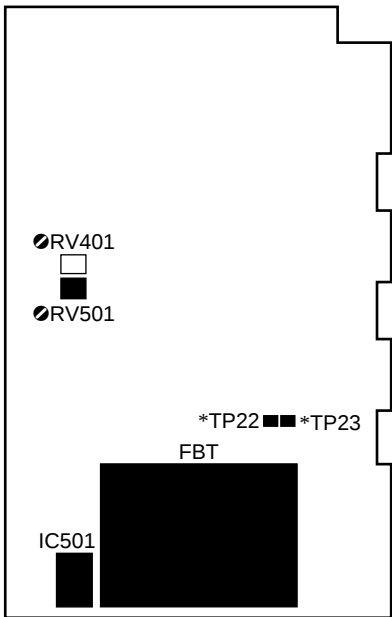
During adjustment, do not set heater voltage to 700 mV or over.

Preparations

- BRIGHT control : Mechanical center
- CONTRAST control : Mechanical center
- PEAKING control : Mechanical center

Adjustment Procedure

Test point : TP22/VF-68
GND : TP23/VF-68
Adjustment point : ⚙RV501/VF-68
Specification : $650 \pm 30 \text{ mV dc}$
Turn ⚙RV501 fully clockwise, and slowly turn it counterclockwise until the specification is satisfied.
(Do not set heater voltage to 700 mV or over.)



VF-68 BOARD (A SIDE)
(* : B SIDE)

2-7. Focus Adjustment

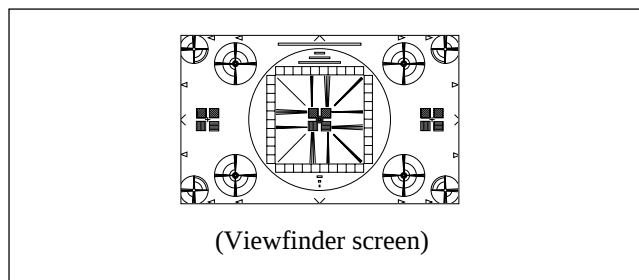
Subject : Resolution chart

Note

This focus adjustment, “2-8. Picture Frame Adjustment” and “2-9. Bright Extent Adjustment” affect each other. Therefore, repeat these adjustments until all specifications are satisfied.

Preparations

- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



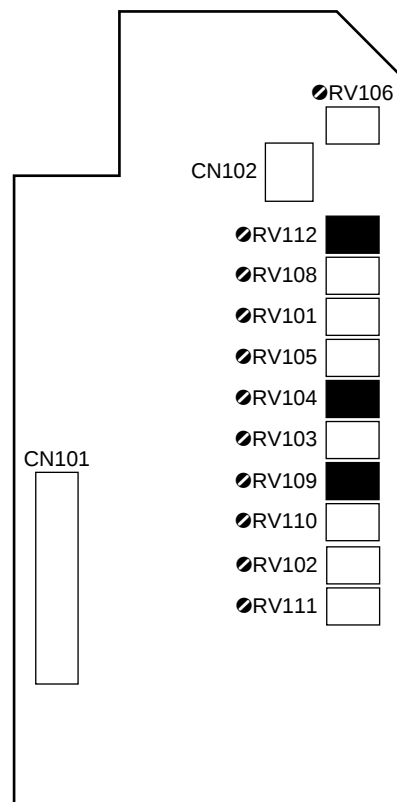
- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Mechanical center
- CONTRAST control : Mechanical center
- PEAKING control : Fully counterclockwise ⤿

Adjustment Procedures

- Adjustment point : ⚙RV109/DF-56
Specification : Turn ⚙RV109 fully counterclockwise, and slowly turn it clockwise until the optimum focus is achieved.
- After the adjustment, confirm that the focus can be achieved at all settings of BRIGHT, CONTRAST and PEAKING controls.

Notes

- If the picture frame adjustment is out of specifications, especially in horizontal size, the focus may not be achieved. In this case, turn ⚙RV112/DF-56 clockwise a little (referring to Section 2-8), and perform the focus adjustment.
- The application of too-high voltage may make the high-voltage protection circuit activated. In this case, power off once and turn ⚙RV109/DF-56 fully counterclockwise. After that power on again to perform the adjustment.



DF-56 BOARD (A SIDE)

2-8. Picture Frame Adjustment

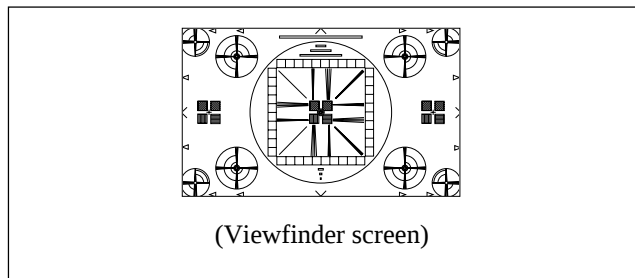
Subject : Resolution chart

Note

This picture frame adjustment, “2-7. Focus Adjustment” and “2-9. Bright Extent Adjustment” affect each other. Therefore, repeat these adjustments until all specifications are satisfied.

Preparations

- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



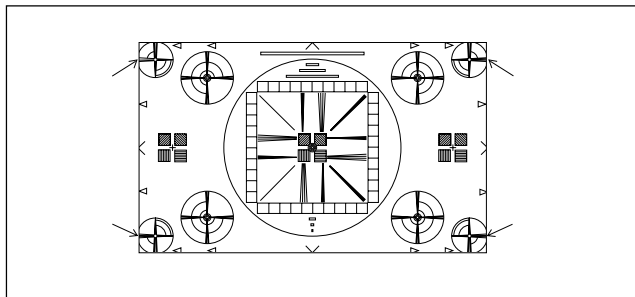
- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Mechanical center
- CONTRAST control : Mechanical center
- PEAKING control : Fully counterclockwise ☺

Adjustment Procedures

1. Vertical Linearity Adjustment

Adjustment point : ●RV108/DF-56

Specification : Minimize the distortion of the four circles at the corners of the resolution chart.

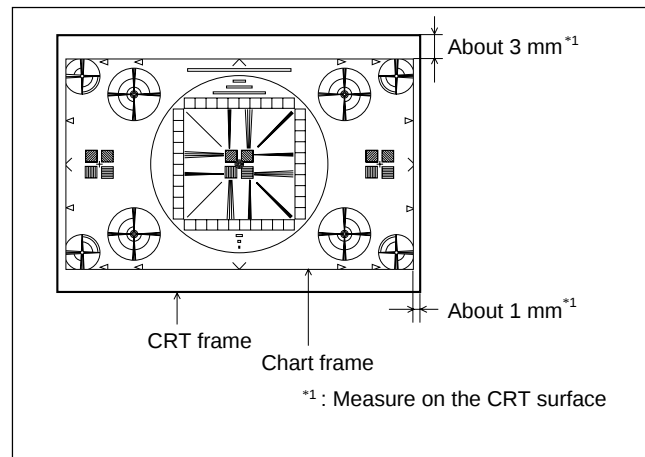


2. Adjustment points : ●RV112/DF-56

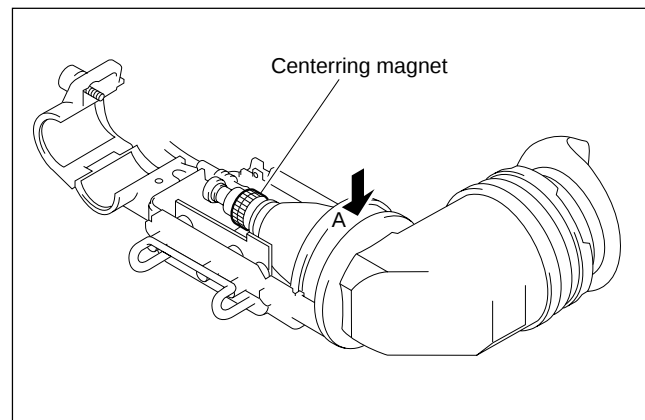
●RV106/DF-56

●Centering magnet

Specification : Adjust ●RV112 and ●RV106 so that the chart frame position within the CRT frame is as shown below. Turn the centering magnet only when centering the chart.



- Press the portion A to the lower chassis as shown below to recreate the same situation as when the upper chassis is installed to the viewfinder, and confirm that the picture is positioned in the center of the viewfinder.



2-9. Bright Extent Adjustment

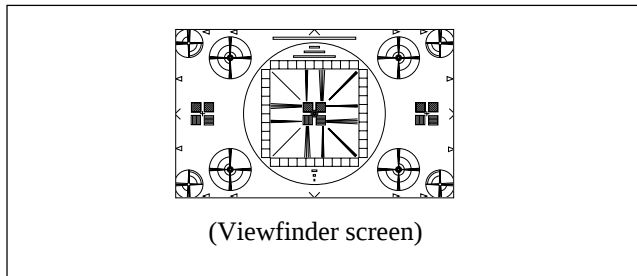
Subject : Resolution chart

Note

This bright extent adjustment, “2-7. Focus Adjustment” and “2-8. Picture Frame Adjustment” affect each other. Therefore, repeat these adjustments until all specifications are satisfied.

Preparations

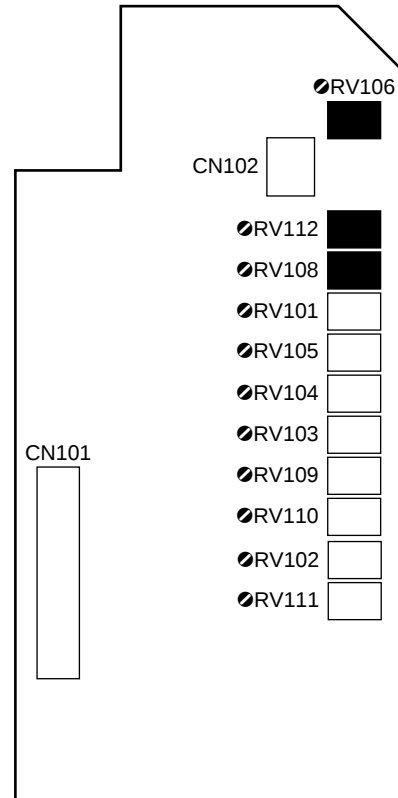
- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



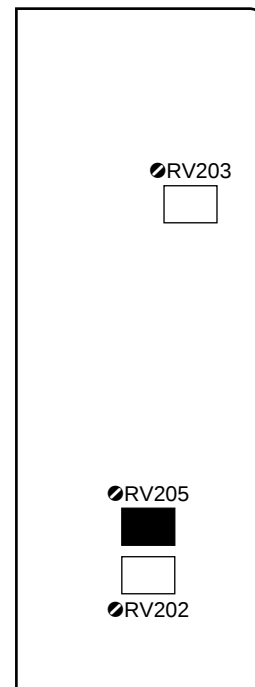
- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Fully counterclockwise ☯
- CONTRAST control : Fully counterclockwise ☯
- PEAKING control : Fully counterclockwise ☯

Adjustment Procedure

Adjustment point : ⚙RV205/VR-240
 Specification : The central circle of the resolution chart shall be barely discriminated.



DF-56 BOARD (A SIDE)



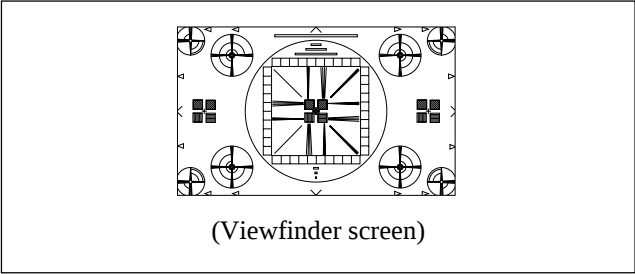
VR-240 BOARD (A SIDE)

2-10. Horizontal Picture Positioning Adjustment

Subject : Resolution chart

Preparations

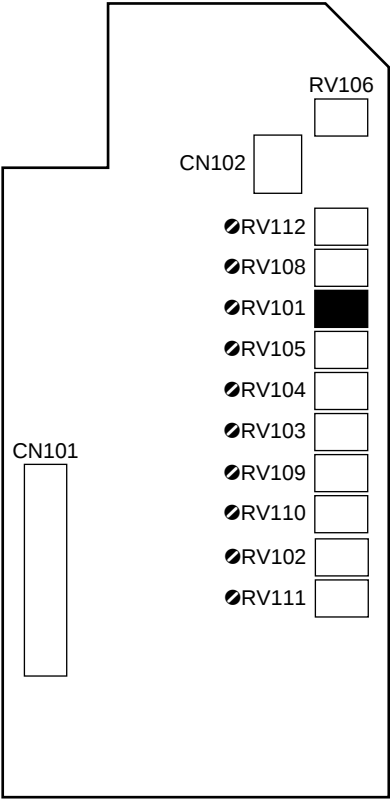
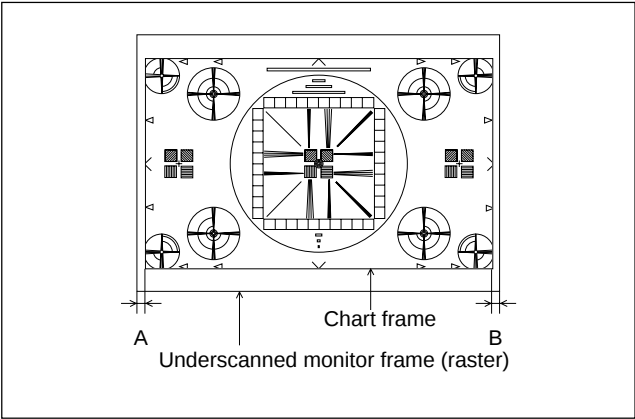
- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



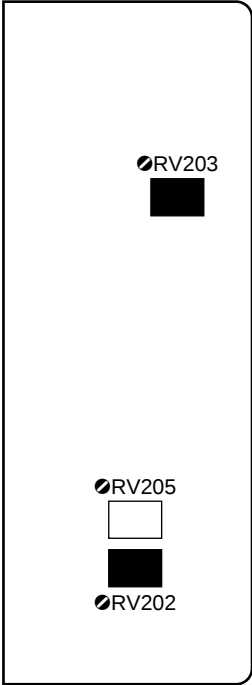
- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Fully clockwise
- CONTRAST control : Fully counterclockwise
- PEAKING control : Fully counterclockwise

Adjustment Procedure

Adjustment point : ●RV101/DF-56
Specification : Adjust the position of the resolution chart for A = B



DF-56 BOARD (A SIDE)



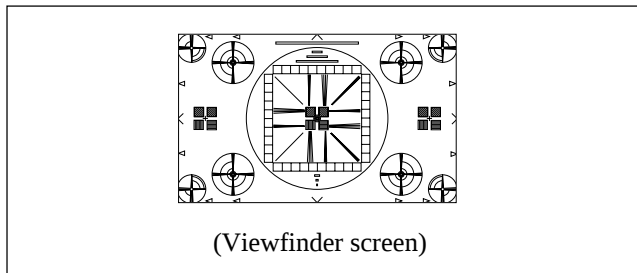
VR-240 BOARD (A SIDE)

2-11. Peaking Level Adjustment

Equipment : Oscilloscope
Subject : Resolution chart

Preparations

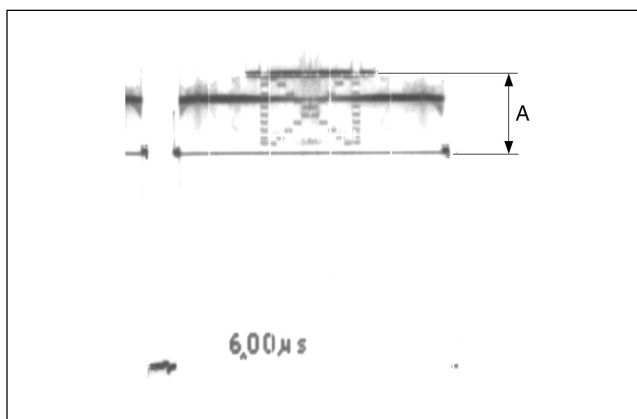
- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Mechanical center
- CONTRAST control : Mechanical center
- PEAKING control : Fully counterclockwise $\odot$

Adjustment Procedure

Test point : TP261/VDA-41
GND : Viewfinder cabinet
Adjustment point : $\odot$ RV203/VR-240
Specification : The waveform level A shall not change at all settings of PEAKING control.

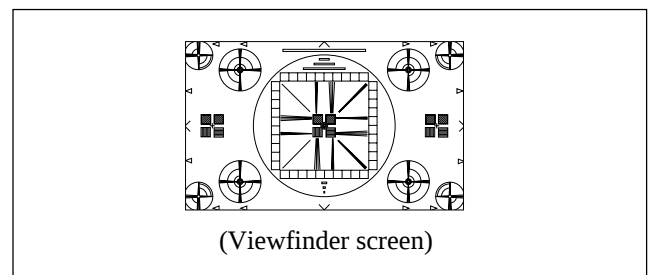


2-12. Clamping Level Adjustment

Equipment : Oscilloscope (DC mode)
(Input capacitance of probe : 12 pF or below)
Subject : Resolution chart

Preparations

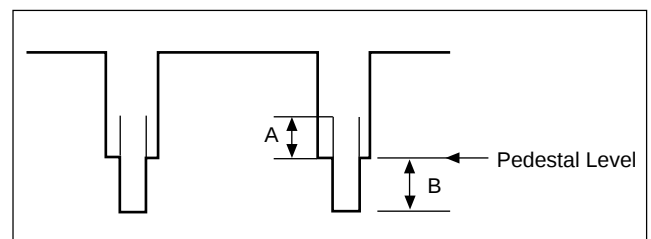
- Shoot the resolution chart so that the chart frame is aligned with the underscanned monitor frame with the zoom control.



- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 500 ± 50 mV.
- BRIGHT control : Mechanical center
- CONTRAST control : Mechanical center
- PEAKING control : Fully counterclockwise $\odot$

Adjustment Procedure

Test point : TP261/VDA-41
GND : Grounding plate/VR-240
Adjustment point : $\odot$ RV202/VR-240
Specifications : Adjust the overshoot A for 9 ± 1 V.
Check to see that blanking B is from 5 V to 20 V.



VDA-41 BOARD (B SIDE)

2-13. 4:3 Picture Frame Adjustment

Subject : Full white pattern

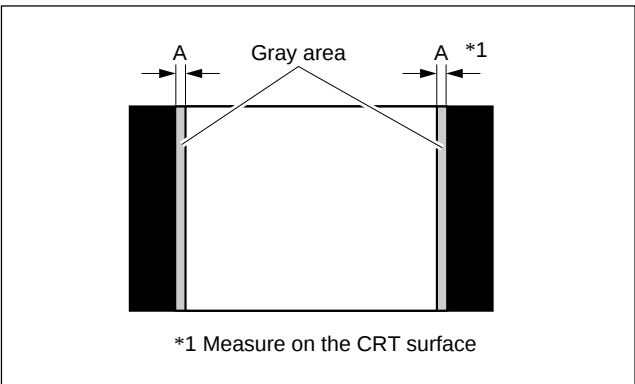
Preparations

- Shoot the fully occupied white area in the underscanned monitor frame with the zoom control.
- Adjust the iris of the lens so that the output level (Y level) at TEST OUT connector on the camera is 350 ± 35 mV.
- BRIGHT control : Fully clockwise 
- CONTRAST control : Mechanical center
- PEAKING control : Mechanical center
- Press the DISPLAY/ASPECT switch to ASPECT to enter the 4:3 mode.

Adjustment Procedure

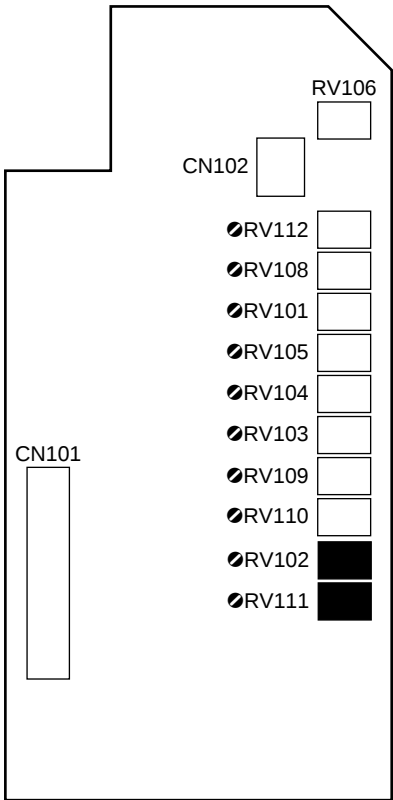
Adjustment points : RV102(4:3 PHASE)/DF-56
RV111(4:3 SIZE)/DF-56

Specifications : Adjust the 4:3 picture frame for
 $A = 2 \pm 1$ mm with RV102 and
RV111. (Adjust the gray area)



Setting after Adjustment

Press the DISPLAY/ASPECT switch to ASPECT to return the 16:9 mode.

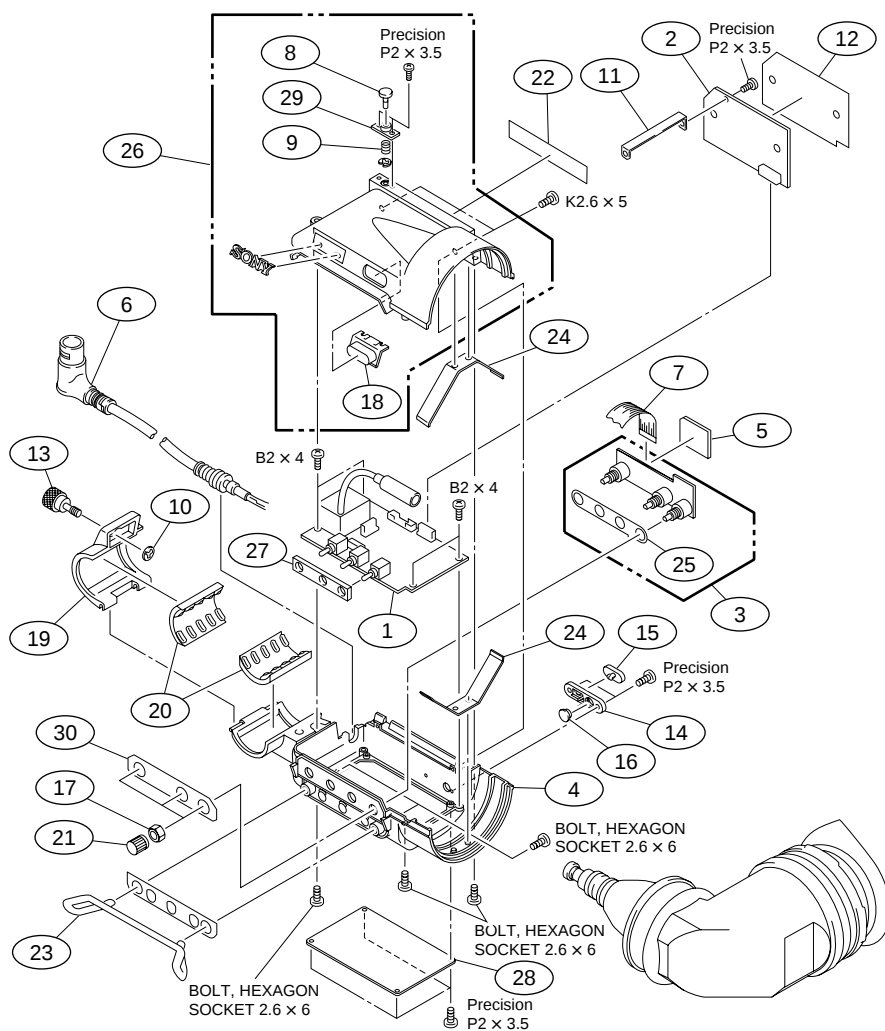


DF-56 BOARD (A SIDE)

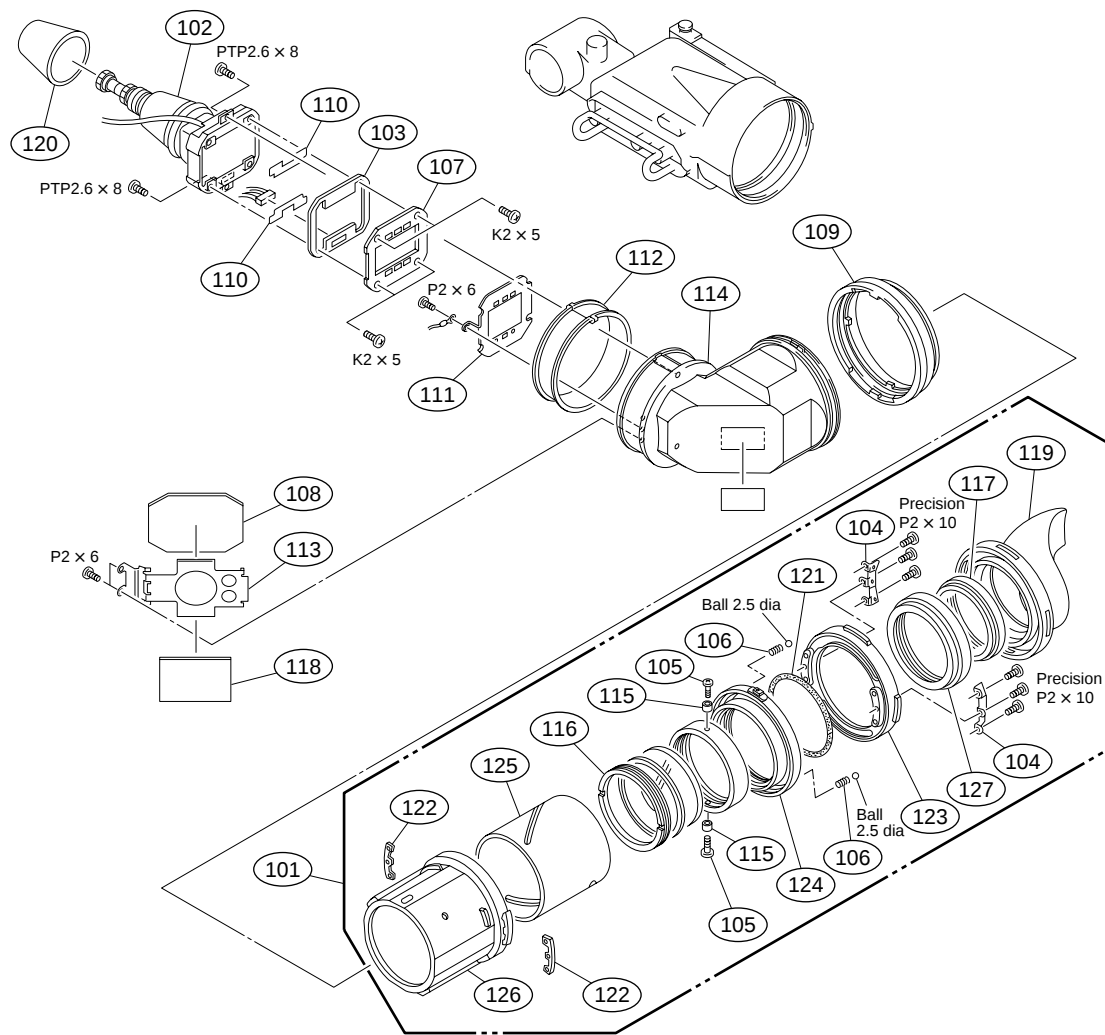
Section 3

Spare Parts

3-1. Exploded Views



No.	Part No.	SP Description	No.	Part No.	SP Description
1	A-8315-182-A	o MOUNTED CIRCUIT BOARD, VF-68	18	3-692-132-03	o COVER, TALLY
2	A-8315-183-A	o MOUNTED CIRCUIT BOARD, DF-56	19	3-692-134-01	o MIC CLAMP
3	A-8315-184-A	o MOUNTED CIRCUIT BOARD, VR-240	20	3-692-138-01	s MIC CUSHION, RUBBER
4	X-3678-575-3	o CHASSIS B ASSY, BOTTOM (LOWER)	21	X-3604-579-1	s VOLUME KNOB ASSY
5	1-665-341-11	o PRINTED CIRCUIT BOARD, VDA-41	22	3-693-978-01	o SHEET, LUBICATION
6	1-777-131-11	s CORD, CONNECTION (VF)	23	3-609-735-01	o BAR, GUARD
7	Pending	o CABLE, FLAT (12 CORE)	24	3-697-152-01	o SPRING, LEAF (2)
8	2-277-457-00	s KNOB, STOPPER	25	3-697-153-01	o PLATE, GROUND (2)
9	2-277-466-01	s SPRING, COMPRESSION	26	A-8277-112-A	o CASE ASSY, TOP
10	3-165-904-01	s WASHER, SCREW STOPPER	27	3-697-156-01	o CUSHION, DRROP PROTECCION (2)
11	3-609-582-01	o PLATE, BOARD FIX	28	3-697-161-01	o LID, COVER
12	3-609-583-01	o SHEET, INSULATING	29	3-710-008-02	s HOUSING, STOPPER
13	3-657-657-00	s SCREW (M5)	30	3-697-160-01	o LABEL, VF (C)
14	3-679-693-01	o BASE, SLIDE		7-621-772-18	s SCREW, +B 2X4
15	3-679-694-01	o COVER, SLIDE		7-627-454-38	s SCREW, PRECISION +K 2.6X5
16	3-679-695-01	o COVER, TALLY		7-627-554-18	s SCREW, PRECISION +P 2X3.5 TYPE1
17	3-685-104-01	s NUT (M6), CONTROL		7-683-412-05	s BOLT, HEXAGON SOCKET 2.6X6



No.	Part No.	SP Description
101	A-8262-798-A	s TUBE SUB ASSY, VF
102	1-251-636-11	s CRT/DY ASSY, 2" WIDE
103	1-665-342-11	o PRINTED CIRCUIT BOARD, LP-105
104	3-176-414-01	o RETAINER, RING
105	3-335-207-01	s SHAFT, MOTOR
106	3-573-150-00	o SPRING, COMPRESSION
107	3-603-499-01	o SPACER, MASK
108	3-608-806-01	o MIRROR(3)
109	3-692-136-03	o FIXED RING
110	3-692-144-01	o SPACER, LP
111	3-697-159-02	o PLATE A, DISPLAY
112	3-697-151-01	o RING, VF
113	3-697-154-01	o HOLDER, MIRROR(3)
114	3-697-167-03	o VF TUBE(4)
115	3-722-485-01	o ROLLER, SLIDE
116	3-722-492-01	o HOLDER (B), LENS
117	3-723-069-02	o PROTECTOR, MC

No.	Part No.	SP Description
118	3-723-073-01	o CUSHION, MIRROR
119	3-723-079-02	s EYECUP
120	3-725-220-02	o TUBE (A), CRT
121	3-726-904-01	o RING (MT), O
122	3-742-038-01	o NUT (2), PLATE
123	3-742-052-03	o HOLDER, EYECUP
124	3-742-053-02	o RING
125	3-742-054-01	o TUBE
126	3-742-060-01	o HOLDER, RING
127	3-742-075-01	o HOLDER, FILTER
	7-627-452-38	s SCREW, PRECISION +K 2X5
	7-627-553-78	s SCREW, PRECISION +P 2X10
	7-671-158-01	s BALL, STAINLESS (2.5 DIA)
	7-685-104-19	s SCREW +P 2X6 TYPE2 NON-SLIT
	7-685-134-19	s SCREW +PTP 2.6X8 TYPE2 NON-SLIT

3-2. Electrical Parts List

DF-56 Board

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-8315-183-A	o	MOUNTED CIRCUIT BOARD, DF-56
C101	1-115-581-11	s	TANTALUM,CHIP 100uF 20% 16
C102	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C103	1-115-581-11	s	TANTALUM,CHIP 100uF 20% 16
C105	1-164-691-11	s	CERAMIC 0.0024uF 5% 50V
C106	1-163-135-00	s	CERAMIC 560PF 5% 50V
C107	1-164-182-11	s	CERAMIC 0.0033uF 10% 50V
C108	1-135-091-00	s	TANTALUM, CHIP 1uF 20% 16V
C109	1-135-091-00	s	TANTALUM, CHIP 1uF 20% 16V
C110	1-104-551-11	s	FILM 0.01uF 5% 16V
C111	1-104-542-11	s	CHIP FILM 0.0018uF 5% 50V
C112	1-163-011-11	s	CERAMIC 0.0015uF 10% 50V
C113	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C114	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C115	1-115-581-11	s	TANTALUM,CHIP 100uF 20% 16
C116	1-135-070-00	s	TANTALUM, CHIP 0.1uF 10% 35V
C117	1-135-179-21	s	TANTAL 2.2uF 10% 16V
C118	1-135-145-11	s	TANTALUM, CHIP 0.47uF 10% 35V
C119	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C121	1-115-581-11	s	TANTALUM,CHIP 100uF 20% 16
C122	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C123	1-163-018-00	s	CERAMIC, CHIP 0.0056uF 5% 50V
C125	1-163-024-00	s	CERAMIC 0.018uF 10% 50V
C126	1-163-989-11	s	CERAMIC 0.033uF 10% 25V
C151	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C152	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C153	1-163-235-11	s	CERAMIC, CHIP 22PF 5% 50V
C155	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C156	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C158	1-163-251-11	s	CERAMIC, CHIP 100PF 5% 50V
C159	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C160	1-163-251-11	s	CERAMIC, CHIP 100PF 5% 50V
C163	1-163-235-11	s	CERAMIC, CHIP 22PF 5% 50V
C164	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C171	1-164-182-11	s	CERAMIC 0.0033uF 10% 50V
C172	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C175	1-163-235-11	s	CERAMIC, CHIP 22PF 5% 50V
C176	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C182	1-163-135-00	s	CERAMIC 560PF 5% 50V
C184	1-163-135-00	s	CERAMIC 560PF 5% 50V
C185	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C186	1-163-235-11	s	CERAMIC, CHIP 22PF 5% 50V
CN102	1-564-704-11	s	CONNecOR, 2P, MALE
D101	8-719-951-22	s	DIODE 1MN10
D103	8-719-941-23	s	DIODE DA204U
D104	8-719-056-22	s	DIODE MA2S728-(K8).S0
IC101	△ 8-759-394-25	s	IC LA7858
IC102	8-759-075-70	s	IC TA75S393F
IC103	8-759-234-08	s	IC TA78L05F
IC104	8-759-394-30	s	IC GS4981IKA
IC105	8-759-242-78	s	IC TC7W02F
IC106	8-759-180-08	s	IC TC74HC4538AFS
IC107	8-759-082-58	s	IC TC7W08FU
IC108	8-759-082-61	s	IC TC4W53FU
IC109	8-759-180-08	s	IC TC74HC4538AFS
IC110	8-759-394-32	s	IC TC4427EOA

(DF-56 Board)

Ref. No. or Q'ty	Part No.	SP	Description
IC111	8-759-082-59	s	IC TC7W32FU
IC112	8-759-180-08	s	IC TC74HC4538AFS
IC113	8-759-082-59	s	IC TC7W32FU
IC114	8-759-082-55	s	IC TC7W00FU
IC115	8-759-180-08	s	IC TC74HC4538AFS
Q101	8-729-802-80	s	TRANSISTOR 2SC3661
Q104	8-729-905-36	s	TRANSISTOR 2SC4081-S
Q105	8-729-402-84	s	TRANSISTOR XN4601
Q106	8-729-905-36	s	TRANSISTOR 2SC4081-S
Q107	8-729-905-36	s	TRANSISTOR 2SC4081-S
Q108	8-729-905-36	s	TRANSISTOR 2SC4081-S
R101	1-216-073-00	s	METAL, CHIP 10K 5% 1/10W
R102	1-216-057-00	s	METAL, CHIP 2.2K 5% 1/10W
R103	1-216-081-00	s	CHIP, METAL 22K 5% 1/10W
R104	1-216-075-00	s	CHIP, METAL 12K 5% 1/10W
R105	1-216-071-00	s	METAL, CHIP 8.2K 5% 1/10W
R106	1-216-097-00	s	CHIP, METAL 100K 5% 1/10W
R107	1-216-071-00	s	METAL, CHIP 8.2K 5% 1/10W
R108	1-216-085-00	s	CHIP, METAL 33K 5% 1/10W
R109	1-216-674-11	s	METAL, CHIP 9.1K 0.5% 1/10W
R110	1-216-049-91	s	METAL 1K 5% 1/10W
R111	1-216-686-11	s	CHIP, METAL 30K 0.50% 1/10W
R112	1-216-079-00	s	CHIP, METAL 18K 5% 1/10W
R114	1-216-634-11	s	CHIP, METAL 200 0.50% 1/10W
R115	1-216-003-11	s	METAL, CHIP 12 5% 1/10W
R116	1-216-103-00	s	METAL, CHIP 180K 5% 1/10W
R117	1-216-099-00	s	CHIP, METAL 120K 5% 1/10W
R118	1-216-051-00	s	METAL, CHIP 1.2K 5% 1/10W
R119	1-216-097-00	s	CHIP, METAL 100K 5% 1/10W
R120	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R121	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R122	1-216-033-00	s	METAL, CHIP 220 5% 1/10W
R123	1-216-308-00	s	CHIP, METAL 4.7 5% 1/10W
R124	1-216-065-00	s	METAL, CHIP 4.7K 5% 1/10W
R125	1-216-061-00	s	METAL, CHIP 3.3K 5% 1/10W
R126	1-216-308-00	s	CHIP, METAL 4.7 5% 1/10W
R127	1-216-308-00	s	CHIP, METAL 4.7 5% 1/10W
R128	1-216-037-00	s	CHIP, METAL 330 5% 1/10W
R129	1-216-009-00	s	CHIP, METAL 22 5% 1/10W
R130	1-216-308-00	s	CHIP, METAL 4.7 5% 1/10W
R131	1-216-049-91	s	METAL 1K 5% 1/10W
R132	1-216-037-00	s	CHIP, METAL 330 5% 1/10W
R133	1-216-043-91	s	METAL, CHIP 560 5% 1/10W
R134	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R135	1-216-079-00	s	CHIP, METAL 18K 5% 1/10W
R136	1-216-065-00	s	METAL, CHIP 4.7K 5% 1/10W
R137	1-216-071-00	s	METAL, CHIP 8.2K 5% 1/10W
R138	1-216-057-00	s	METAL, CHIP 2.2K 5% 1/10W
R139	1-216-692-11	s	CHIP, METAL 51K 0.50% 1/10W
R140	1-216-077-00	s	METAL, CHIP 15K 5% 1/10W
R141	1-216-073-00	s	METAL, CHIP 10K 5% 1/10W
R142	1-216-079-00	s	CHIP, METAL 18K 5% 1/10W
R143	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R151	1-216-089-91	s	METAL 47K 5% 1/10W
R152	1-216-057-00	s	METAL, CHIP 2.2K 5% 1/10W
R153	1-216-057-00	s	METAL, CHIP 2.2K 5% 1/10W
R154	1-216-073-00	s	METAL, CHIP 10K 5% 1/10W
R155	1-216-105-00	s	CHIP, METAL 220K 5% 1/10W

(DF-56 Board)

Ref. No. or Q'ty	Part No.	SP Description
R156	1-216-033-00	s METAL, CHIP 220 5% 1/10W
R157	1-216-073-00	s METAL, CHIP 10K 5% 1/10W
R158	1-216-660-11	s METAL 2.4K 0.50% 1/10W
R159	1-216-061-00	s METAL, CHIP 3.3K 5% 1/10W
R160	1-216-061-00	s METAL, CHIP 3.3K 5% 1/10W
R161	1-216-049-91	s METAL 1K 5% 1/10W
R162	1-216-079-00	s CHIP, METAL 18K 5% 1/10W
R163	1-216-634-11	s CHIP, METAL 200 0.50% 1/10W
R164	1-216-033-00	s METAL, CHIP 220 5% 1/10W
R165	1-216-009-00	s CHIP, METAL 22 5% 1/10W
R171	1-216-075-00	s CHIP, METAL 12K 5% 1/10W
R172	1-216-682-11	s METAL, CHIP 20K 0.5% 1/10W
R173	1-216-085-00	s CHIP, METAL 33K 5% 1/10W
R174	1-216-678-11	s CHIP, METAL 13K 0.50% 1/10W
R175	1-218-759-11	s CHIP, METAL 200K 0.50% 1/10W
R176	1-216-061-00	s METAL, CHIP 3.3K 5% 1/10W
R177	1-216-083-00	s METAL, CHIP 27K 5% 1/10W
R178	1-216-009-00	s CHIP, METAL 22 5% 1/10W
R179	1-216-043-91	s METAL, CHIP 560 5% 1/10W
R180	1-216-009-00	s CHIP, METAL 22 5% 1/10W
R181	1-216-634-11	s CHIP, METAL 200 0.50% 1/10W
R182	1-216-634-11	s CHIP, METAL 200 0.50% 1/10W
R183	△ 1-216-065-00	s METAL, CHIP 4.7K 5% 1/10W
R184	1-216-025-11	s CHIP, METAL 100 5% 1/10W
R185	1-216-025-11	s CHIP, METAL 100 5% 1/10W
RV101	1-241-722-11	s RES, ADJ, METAL 4.7K
RV102	1-241-722-11	s RES, ADJ, METAL 4.7K
RV103	1-241-722-11	s RES, ADJ, METAL 4.7K
RV104	1-241-722-11	s RES, ADJ, METAL 4.7K
RV105	1-241-726-11	s RES, ADJ, METAL 220K
RV106	1-241-719-11	s RES, ADJ, METAL 220K
RV107	1-241-722-11	s RES, ADJ, METAL 4.7K
RV108	1-241-722-11	s RES, ADJ, METAL 4.7K
RV109	1-241-722-11	s RES, ADJ, METAL 4.7K
RV110	1-241-722-11	s RES, ADJ, METAL 4.7K
RV111	1-241-722-11	s RES, ADJ, METAL 4.7K

LP-105 Board

Ref. No. or Q'ty	Part No.	SP Description
1pc	1-665-342-11	o PRINTED CIRCUIT BOARD, LP-105
CN21	1-565-651-11	o PIN, CONNECTOR 8P
D1	8-729-026-41	s TRANSISTOR 2SA933AS-QRT
D2	8-719-026-39	s DIODE CL-150UR-CD-T
D3	8-719-987-43	s DIODE CL-150PG-CD
D4	8-719-026-16	s DIODE CL-150D-CD-T
D5	8-719-026-39	s DIODE CL-150UR-CD-T
D6	8-719-026-16	s DIODE CL-150D-CD-T

VDA-41 Board

Ref. No. or Q'ty	Part No.	SP	Description
1pc	1-665-341-11	o	PRINTED CIRCUIT BOARD, VDA-41
C262	1-163-125-00	s	CERAMIC 220PF 5% 50V
C263	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C265	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
D261	8-719-984-56	s	DIODE HZK2ALL
D262	8-719-052-18	s	DIODE RLS245TE-11
Q261	8-729-036-39	s	TRANSISTOR 2SC4104
Q262	8-729-036-38	s	TRANSISTOR 2SC4080
Q263	8-729-036-39	s	TRANSISTOR 2SC4104
Q264	8-729-036-40	s	TRANSISTOR 2SA1580
Q265	8-729-036-39	s	TRANSISTOR 2SC4104
Q266	8-729-036-40	s	TRANSISTOR 2SA1580
Q267	8-729-036-39	s	TRANSISTOR 2SC4104
R261	1-216-644-11	s	METAL, CHIP 510 0.5% 1/10W
R262	1-216-630-11	s	METAL, CHIP 130 0.5% 1/10W
R264	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R265	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R266	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R267	1-216-834-11	s	METAL, CHIP 12K 5% 1/16W
R268	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R269	1-216-834-11	s	METAL, CHIP 12K 5% 1/16W
R270	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R271	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R274	1-218-179-11	s	RES, CHIP 10M 5% 1/10W
R275	1-216-644-11	s	METAL, CHIP 510 0.5% 1/10W
R276	1-218-769-11	s	METAL 510K 0.50% 1/10W
R277	1-216-033-00	s	METAL, CHIP 220 5% 1/10W

VF-68 Board

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-8315-182-A	o	MOUNTED CIRCUIT BOARD, VF-68
C301	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C302	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C303	1-164-001-11	s	CERAMIC 150PF 5% 50V
C304	1-164-001-11	s	CERAMIC 150PF 5% 50V
C305	1-164-001-11	s	CERAMIC 150PF 5% 50V
C306	1-135-160-21	s	CHIP, TANTALUM 15uF 10% 16V
C307	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C308	1-164-001-11	s	CERAMIC 150PF 5% 50V
C309	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C310	1-164-001-11	s	CERAMIC 150PF 5% 50V
C402	1-135-091-00	s	TANTALUM, CHIP 1uF 20% 16V
C404	1-104-919-11	s	TANTALUM, CHIP 10uF 20% 25V
C406	1-164-001-11	s	CERAMIC 150PF 5% 50V
C408	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C409	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C414	1-164-001-11	s	CERAMIC 150PF 5% 50V
C502	1-164-001-11	s	CERAMIC 150PF 5% 50V
C503	1-164-001-11	s	CERAMIC 150PF 5% 50V
C504	1-135-179-21	s	TANTALUM 2.2uF 10% 16V
C505	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C506	1-164-001-11	s	CERAMIC 150PF 5% 50V
C507	1-164-001-11	s	CERAMIC 150PF 5% 50V
C509	1-164-691-11	s	CERAMIC 0.0024uF 5% 50V
C513	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C514	1-164-001-11	s	CERAMIC 150PF 5% 50V
C515	1-164-346-11	s	CERAMIC 1uF 16V
C517	1-113-991-11	s	TANTALUM, CHIP 33uF 20% 16V
C518	1-110-497-11	s	CHIP CERAMIC 1uF 20% 100V
C519	1-110-497-11	s	CHIP CERAMIC 1uF 20% 100V
C520	1-110-497-11	s	CHIP CERAMIC 1uF 20% 100V
C521	1-163-018-00	s	CERAMIC, CHIP 0.0056uF 5% 50V
C522	1-164-001-11	s	CERAMIC 150PF 5% 50V
CN1	1-580-539-11	o	PIN, CONNECTOR (PC BOARD) 20P
CN301	1-764-080-21	s	PIN, CONNECTOR (PC BOARD) 8P
CN501	1-564-705-11	s	CONNECTOR, 3P, MALE
CN502	1-564-706-11	o	PIN HEADER, STRAIGHT 4P
CN101A	1-580-974-11	o	CONNECTOR, BOARD TO BOARD
CN201A	1-569-528-11	s	HOUSING 12P
D301	8-719-941-23	s	DIODE DA204U
D302	8-719-941-23	s	DIODE DA204U
D303	8-719-029-66	s	DIODE RD5.1UJN-T1
D304	8-719-029-66	s	DIODE RD5.1UJN-T1
D305	8-719-029-66	s	DIODE RD5.1UJN-T1
D401	8-719-989-76	s	DIODE SC802-04
D402	8-719-989-76	s	DIODE SC802-04
D501	8-719-941-23	s	DIODE DA204U
D502	8-719-941-23	s	DIODE DA204U
D503	8-719-941-23	s	DIODE DA204U
D504	8-719-941-86	s	DIODE DAN202U
D505	8-719-941-23	s	DIODE DA204U
D506	8-719-941-86	s	DIODE DAN202U
D507	8-759-394-26	s	IC LM4041EIM3-1.2
FBT1	△ 1-453-243-11	s	TRANSFORMER, FLYBACK
HLC1	△ 1-416-387-11	s	COIL, LINEARITY

(VF-68 Board)

Ref. No. or Q'ty	Part No.	SP Description
IC301	8-759-990-61	s IC PCF8574T
IC302	8-759-990-61	s IC PCF8574T
IC303	8-759-394-34	s IC BR24C02F
IC304	8-759-939-51	s IC BA225F
IC501	8-759-394-31	s IC TC4426EOA
IC502	8-759-058-50	s IC XRA10324AF
IC503	8-759-075-66	s IC TA75S01F
IC504	8-759-050-14	s IC SN74HC175APW-E05
L401	1-411-877-11	s COIL, CHOKE 56UH
L402	1-411-877-11	s COIL, CHOKE 56UH
LED301	8-719-989-53	s DIODE CL-200HR-C-TSL
Q301	8-729-036-19	s TRANSISTOR IMB2A
Q302	8-729-036-19	s TRANSISTOR IMB2A
Q303	8-729-036-48	s TRANSISTOR IMH2A
Q304	8-729-036-48	s TRANSISTOR IMH2A
Q305	8-729-036-19	s TRANSISTOR IMB2A
Q306	8-729-036-20	s TRANSISTOR IMH3A
Q401	8-729-905-36	s TRANSISTOR 2SC4081-S
Q402	8-729-040-75	s TRANSISTOR SI4953DY-T1
Q403	8-729-402-84	s TRANSISTOR XN4601
Q404	8-729-402-84	s TRANSISTOR XN4601
Q502	8-729-037-55	s TRANSISTOR 2SK1826(TE85L)
Q503	8-729-035-20	s TRANSISTOR 2SK1920
R301	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R302	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R303	1-216-638-11	s METAL 300 0.50% 1/10W
R304	1-216-638-11	s METAL 300 0.50% 1/10W
R305	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R306	1-216-013-00	s METAL, CHIP 33 5% 1/10W
R307	1-216-089-91	s METAL 47K 5% 1/10W
R308	1-216-081-00	s CHIP, METAL 22K 5% 1/10W
R309	1-216-855-11	s METAL, CHIP 680K 5% 1/16W
R310	1-216-842-11	s METAL, CHIP 56K 5% 1/16W
R312	1-216-043-91	s METAL, CHIP 560 5% 1/10W
R313	1-216-832-11	s METAL, CHIP 8.2K 5% 1/16W
R314	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R315	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R316	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R317	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R318	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R319	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R320	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R321	1-216-825-11	s METAL, CHIP 2.2K 5% 1/16W
R322	1-216-825-11	s METAL, CHIP 2.2K 5% 1/16W
R323	1-216-825-11	s METAL, CHIP 2.2K 5% 1/16W
R401	1-216-833-11	s METAL, CHIP 10K 5% 1/16W
R402	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R403	1-216-049-91	s METAL 1K 5% 1/10W
R404	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R405	1-216-793-11	s METAL 4.7 5% 1/16W
R406	1-216-037-00	s CHIP, METAL 330 5% 1/10W
R408	1-216-081-00	s CHIP, METAL 22K 5% 1/10W
R409	1-216-839-11	s METAL, CHIP 33K 5% 1/16W
R410	1-216-839-11	s METAL, CHIP 33K 5% 1/16W
R411	1-216-839-11	s METAL, CHIP 33K 5% 1/16W
R412	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R413	1-216-833-11	s METAL, CHIP 10K 5% 1/16W

(VF-68 Board)

Ref. No. or Q'ty	Part No.	SP Description
R414	1-216-834-11	s METAL, CHIP 12K 5% 1/16W
R415	1-216-832-11	s METAL, CHIP 8.2K 5% 1/16W
R416	1-216-081-00	s CHIP, METAL 22K 5% 1/10W
R417	1-216-049-91	s METAL 1K 5% 1/10W
R418	1-216-821-11	s METAL, CHIP 1K 5% 1/16W
R419	1-216-793-11	s METAL 4.7 5% 1/16W
R420	1-216-037-00	s CHIP, METAL 330 5% 1/10W
R421	1-216-690-11	s METAL 43K 0.50% 1/10W
R422	1-216-833-11	s METAL, CHIP 10K 5% 1/16W
R501	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R502	1-216-833-11	s METAL, CHIP 10K 5% 1/16W
R503	1-216-793-11	s METAL 4.7 5% 1/16W
R504	1-216-692-11	s CHIP, METAL 51K 0.50% 1/10W
R505	1-216-668-11	s METAL, CHIP 5.1K 0.5% 1/10W
R506	1-216-694-11	s CHIP, METAL 62K 0.50% 1/10W
R507	1-216-839-11	s METAL, CHIP 33K 5% 1/16W
R508	1-216-839-11	s METAL, CHIP 33K 5% 1/16W
R509	△ 1-216-684-11	s CHIP, METAL 24K 0.50% 1/10W
R510	△ 1-216-694-11	s CHIP, METAL 62K 0.50% 1/10W
R511	1-216-833-11	s METAL, CHIP 10K 5% 1/16W
R512	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R513	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R514	1-216-827-11	s METAL, CHIP 3.3K 5% 1/16W
R515	1-216-793-11	s METAL 4.7 5% 1/16W
R516	1-216-809-11	s METAL, CHIP 100 5% 1/16W
R517	1-216-833-11	s METAL, CHIP 10K 5% 1/16W
R518	1-216-083-00	s METAL, CHIP 27K 5% 1/10W
R519	1-220-350-11	s RES, CHIP 3.3M 5% 1/4W
R520	1-220-350-11	s RES, CHIP 3.3M 5% 1/4W
R521	1-220-350-11	s RES, CHIP 3.3M 5% 1/4W
R522	1-216-037-00	s CHIP, METAL 330 5% 1/10W
R526	1-216-045-00	s METAL, CHIP 680 5% 1/10W
R527	1-216-845-11	s METAL, CHIP 100K 5% 1/16W
R528	1-216-845-11	s METAL, CHIP 100K 5% 1/16W
R529	1-216-081-00	s CHIP, METAL 22K 5% 1/10W
R530	1-216-081-00	s CHIP, METAL 22K 5% 1/10W
R531	1-216-809-11	s METAL, CHIP 100 5% 1/16W
R532	1-216-809-11	s METAL, CHIP 100 5% 1/16W
R533	1-216-809-11	s METAL, CHIP 100 5% 1/16W
RV401	1-241-722-11	s RES, ADJ, METAL 4.7K
RV501	1-241-724-21	s RES, ADJ, METAL 47K
S301	1-762-019-11	s SWITCH, TOGGLE
S302	1-762-020-11	s SWITCH, TOGGLE
S303	1-762-489-11	s SWITCH, TOGGLE

VR-240 Board

Ref. No. or Q'ty	Part No.	SP	Description
1pc	A-8315-184-A	o	MOUNTED CIRCUIT BOARD, VR-240
2pcs	3-697-153-01	o	PLATE, GROUND(2)
C201	1-115-581-11	s	TANTALUM, CHIP 100uF 20% 16
C202	1-115-581-11	s	TANTALUM, CHIP 100uF 20% 16
C203	1-115-581-11	s	TANTALUM, CHIP 100uF 20% 16
C204	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C205	1-164-346-11	s	CERAMIC 1uF 16V
C206	1-104-913-11	s	TANTALUM, CHIP 10uF 20% 16V
C207	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C208	1-164-232-11	s	CERAMIC, CHIP 0.01uF 10% 50V
C209	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C211	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C212	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C213	1-163-235-11	s	CERAMIC, CHIP 22PF 5% 50V
C214	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C215	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C216	1-163-009-11	s	CERAMIC, CHIP 0.001uF 10% 50V
C217	1-107-686-11	s	CHIP, TANTALUM 4.7uF 20% 16V
C218	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C219	1-107-688-11	s	CHIP, TANTALUM 1.5uF 20% 25V
C220	1-164-691-11	s	CERAMIC 0.0024uF 5% 50V
C221	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C222	1-164-004-11	s	CERAMIC, CHIP 0.1uF 10% 25V
C224	1-110-497-11	s	CHIP CERAMIC 1uF 20% 100V
CN201B	1-569-528-11	s	HOUSING 12P
D201	8-719-941-86	s	DIODE DAN202U
D202	8-719-029-77	s	DIODE RD15UJN-T1
D203	8-719-029-66	s	DIODE RD5.1UJN-T1
DL201	1-411-876-11	s	DELAY LINE
IC201	8-759-058-50	s	IC XRA10324AF
IC202	8-759-391-22	s	IC CA3094M
IC203	8-759-394-29	s	IC AD8011AR
IC204	8-759-395-40	s	IC HFA1135IB
IC205	8-759-391-21	s	IC DG613-DY
L201	1-412-066-21	s	INDUCTOR CHIP 220UH
LED201	8-719-989-53	s	DIODE CL-200HR-C-TSL
LED202	8-719-989-53	s	DIODE CL-200HR-C-TSL
Q201	8-729-036-40	s	TRANSISTOR 2SA1580
Q202	8-729-036-39	s	TRANSISTOR 2SC4104
Q203	8-729-036-39	s	TRANSISTOR 2SC4104
Q204	8-729-927-87	s	TRANSISTOR 2SA1579RR
Q205	8-729-038-81	s	TRANSISTOR 2SC4102-T106
Q206	8-729-802-80	s	TRANSISTOR 2SC3661
R201	1-216-839-11	s	METAL, CHIP 33K 5% 1/16W
R203	1-216-023-00	s	CHIP, METAL 82 5% 1/10W
R204	1-216-031-00	s	METAL, CHIP 180 5% 1/10W
R205	1-216-692-11	s	CHIP, METAL 51K 0.50% 1/10W
R206	1-216-827-11	s	METAL, CHIP 3.3K 5% 1/16W
R207	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R209	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R210	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R211	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R212	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R213	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W

(VR-240 Board)

Ref. No. or Q'ty	Part No.	SP	Description
R214	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R215	1-216-827-11	s	METAL, CHIP 3.3K 5% 1/16W
R216	1-216-620-11	s	METAL, CHIP 51 0.5% 1/10W
R217	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R218	1-216-029-00	s	METAL, CHIP 150 5% 1/10W
R219	1-216-029-00	s	METAL, CHIP 150 5% 1/10W
R220	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R221	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R222	1-216-640-11	s	METAL, CHIP 360 0.5% 1/10W
R223	1-216-640-11	s	METAL, CHIP 360 0.5% 1/10W
R224	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R225	1-216-047-91	s	RES, CHIP 820 5% 1/10W
R226	1-216-834-11	s	METAL, CHIP 12K 5% 1/16W
R227	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R228	1-216-620-11	s	METAL, CHIP 51 0.5% 1/10W
R229	1-216-813-11	s	METAL, CHIP 220 5% 1/16W
R230	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R231	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R232	1-216-081-00	s	CHIP, METAL 22K 5% 1/10W
R234	1-216-813-11	s	METAL, CHIP 220 5% 1/16W
R235	1-216-682-11	s	METAL, CHIP 20K 0.5% 1/10W
R236	1-216-682-11	s	METAL, CHIP 20K 0.5% 1/10W
R237	1-216-095-00	s	CHIP, METAL 82K 5% 1/10W
R238	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R239	1-216-813-11	s	METAL, CHIP 220 5% 1/16W
R240	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R241	1-216-821-11	s	METAL, CHIP 1K 5% 1/16W
R242	1-216-620-11	s	METAL, CHIP 51 0.5% 1/10W
R243	1-216-089-91	s	METAL 47K 5% 1/10W
R244	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R246	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R247	1-216-833-11	s	METAL, CHIP 10K 5% 1/16W
R248	1-216-845-11	s	METAL, CHIP 100K 5% 1/16W
R249	1-216-692-11	s	CHIP, METAL 51K 0.50% 1/10W
R250	1-216-692-11	s	CHIP, METAL 51K 0.50% 1/10W
R251	1-216-668-11	s	METAL, CHIP 5.1K 0.5% 1/10W
R252	1-216-041-00	s	CHIP, METAL 470 5% 1/10W
R253	1-216-809-11	s	METAL, CHIP 100 5% 1/16W
R254	1-216-688-11	s	CHIP, METAL 36K 0.50% 1/10W
R255	1-216-089-91	s	METAL 47K 5% 1/10W
RV201	1-238-290-11	s	CARBON, VAR 1K
RV202	1-241-722-11	s	RES, ADJ, METAL 4.7K
RV203	1-241-552-11	s	RES, ADJ, METAL 470K
RV204	1-238-290-11	s	CARBON, VAR 1K
RV205	1-241-726-11	s	RES, ADJ, METAL 220K
RV206	1-238-293-11	s	CARBON, VAR 10K

Frame

Ref. No. or Q'ty	Part No.	SP Description
1pc	△ 1-251-636-11	s CRT ASSY, 2inch HD
1pc	1-777-131-11	s CORD, CONNECTION(VF)

3-3. Supplied Accessories

Ref. No. or Q'ty	Part No.	SP Description
1pc	3-179-882-01	o SPACER, MICROPHONE(21 mm dia.)
1pc	3-680-582-01	o HOLDER (B), MICROPHONE(19 mm dia.)

3-4. Tools and Fixtures

Part No.	SP Description
J-6029-140-B	o PATTERN BOX PTB-500
J-6395-050-A	o VF EXTENSION HARNESS
J-6395-320-A	o RESOLUTION CHART(16:9)

Section 4

Semiconductor Pin Assignments

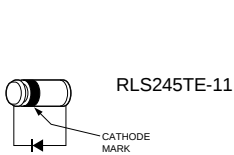
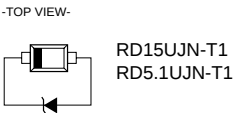
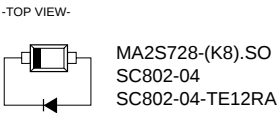
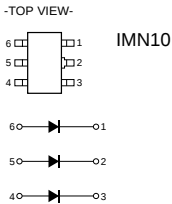
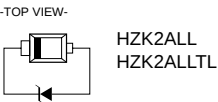
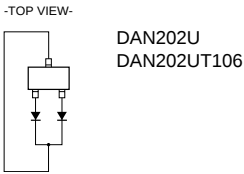
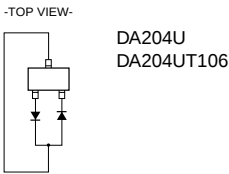
ここに記載されている半導体は、それぞれの機能を等価的に表したものです。なお、互換性のない型名を併記していることがありますので、部品を交換するときは、Spare Partsの章を参照してください。

等価回路は I C メーカーのデータブックに従いました。

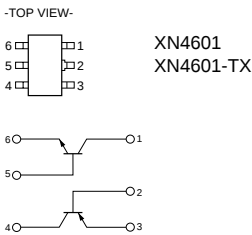
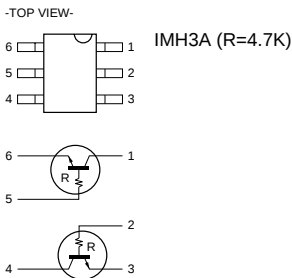
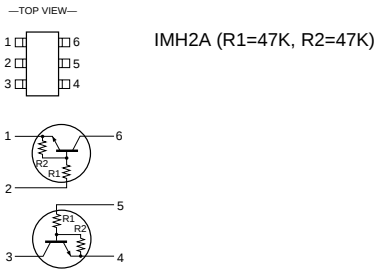
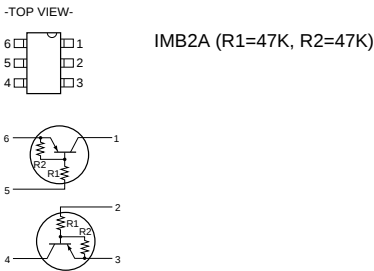
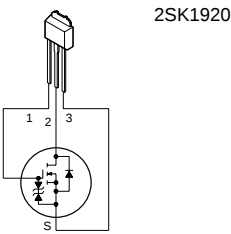
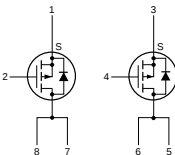
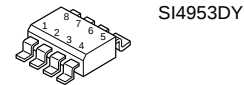
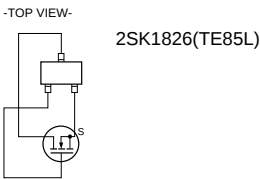
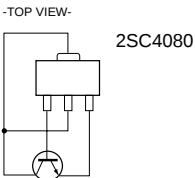
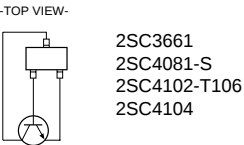
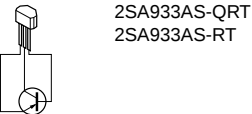
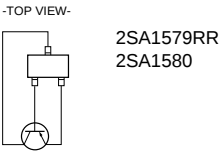
Semiconductors of which functions are equivalent are described here. For parts replacement, refer to the section of Spare Parts in this manual. The circuit diagram of each IC is obtained from the IC data book published by the manufacturer.

DIODE	Page	TRANSISTOR	Page	LED	Page	IC	Page
DA204U	4-2	2SA1579RR	4-2	CL-150D-CD	4-2	AD8011AR	4-3
DA204UT106	4-2	2SA1580	4-2	CL-150D-CD-T	4-2	BA10324AF	4-6
DAN202U	4-2	2SA933AS-QRT	4-2	CL-150PG-CD	4-2	BA225F-T1	4-3
DAN202UT106	4-2	2SA933AS-RT	4-2	CL-150PG-CD-T	4-2	BR24C02F	4-3
		2SC3661	4-2	CL-150UR-CD-T	4-2		
HZK2ALL	4-2	2SC4080	4-2	CL-200HR-C-TSL	4-2	CA3094M	4-3
HZK2ALLTL	4-2	2SC4081-S	4-2			DG613-DY	4-3
		2SC4102-T106	4-2			GS4981IKA	4-4
IMN10	4-2	2SC4104	4-2			HFA1135IB	4-3
MA2S728-(K8).SO	4-2	2SK1826(TE85L)	4-2			LA7858	4-4
		2SK1920	4-2			LM4041EIM3-1.2	4-3
RD15UJN-T1	4-2	IMB2A	4-2			PCF8574T	4-5
RD5.1UJN-T1	4-2	IMH2A	4-2			SN74HC175APW-E05	4-4
RLS245TE-11	4-2	IMH3A	4-2			TA75S01F	4-4
SC802-04	4-2	SI4953DY	4-2			TA75S393F	4-4
SC802-04-TE12RA	4-2	XN4601	4-2			TA75S393F-TE85R	4-4
		XN4601-TX	4-2			TA78L05F	4-5
						TA78L05F-TE12L	4-5
						TC4426EOA	4-5
						TC4427EOA	4-5
						TC4W53FU	4-5
						TC4W53FU(TE12R)	4-5
						TC74HC4538AFS-EL	4-6
						TC7W00FU	4-5
						TC7W00FU(TE12R)	4-5
						TC7W02F	4-6
						TC7W02FU(TE12R)	4-6
						TC7W08FU	4-6
						TC7W08FU(TE12R)	4-6
						TC7W32FU	4-6

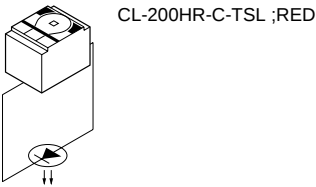
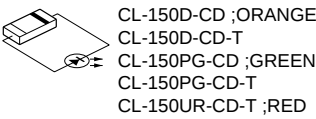
DIODE



TRANSISTOR



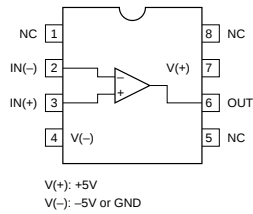
LED



IC

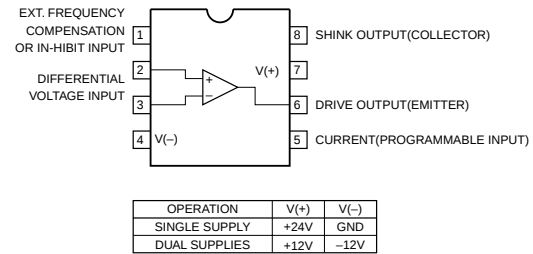
AD8011AR (AD)FLAT PACKAGE

OPERATIONAL AMPLIFIER
-TOP VIEW-



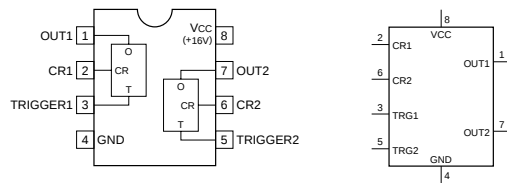
CA3094M (HARRIS)FLAT PACKAGE

PROGRAMMABLE POWER SWITCH/AMPLIFIER
- TOP VIEW -



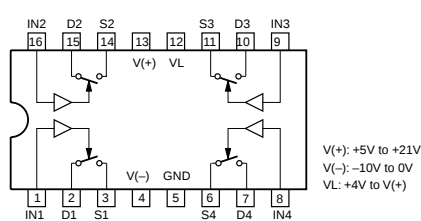
BA225F-T1 (ROHM)FLAT PACKAGE

CR TIMER
-TOP VIEW-



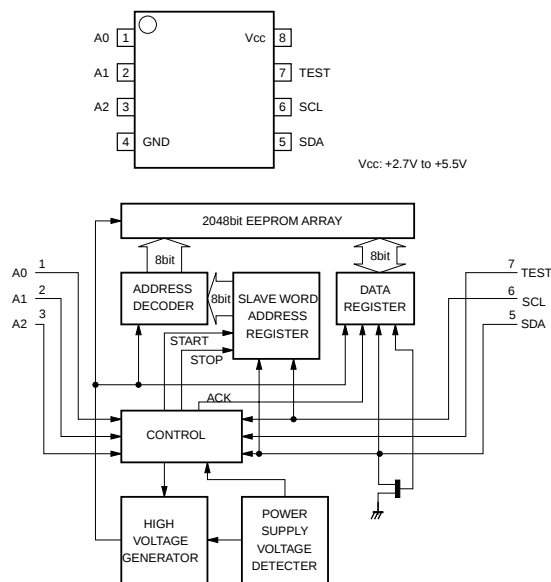
DG613-DY (SILICONIX)FLAT PACKAGE

D/CMOS QUAD ANALOG SWITCHES
- TOP VIEW -



BR24C02F (ROHM)FLAT PACKAGE

2k (256 x 8)-bit SERIAL EEPROM
-TOP VIEW-

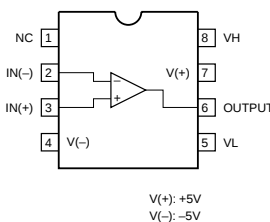


TRUTH TABLE

LOGIC	S1,S4	S2,S3	
0	OFF	ON	LOGIC "0" ≤ 1V
1	ON	OFF	LOGIC "1" ≥ 4V

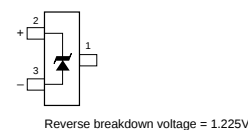
HFA1135IB (HARRIS)FLAT PACKAGE

OPERATIONAL AMPLIFIER
- TOP VIEW -



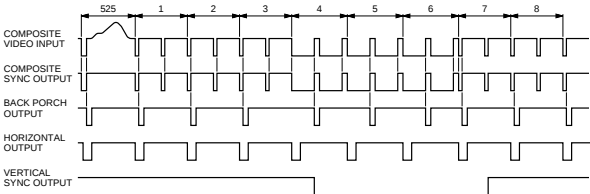
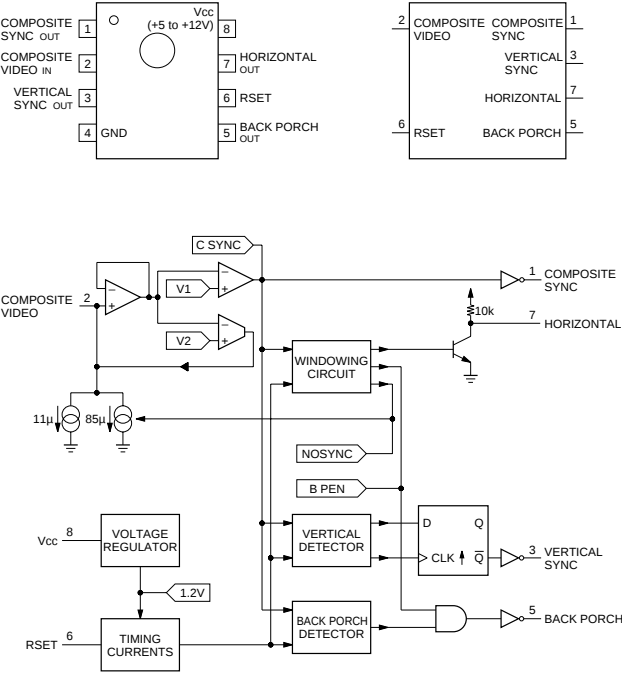
LM4041EIM3-1.2 (NS)

SHUNT VOLTAGE REFERENCE
-TOP VIEW-



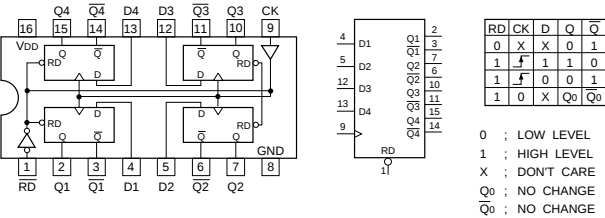
GS4981IKA (GENNUM)FLAT PACKAGE

VIDEO SYNC SEPARATOR
- TOP VIEW -



SN74HC175APW-E05 (TI)FLAT PACKAGE

C-MOS QUAD D-TYPE FLIP-FLOPS WITH RESET
-TOP VIEW-

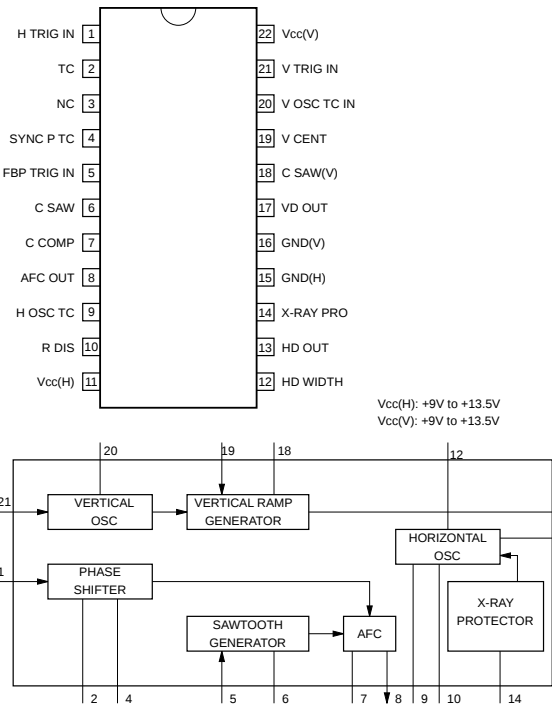


NOTE:

TYPE	VDD
AC TYPE	+2V to +5.5V
74ACT175 TYPE	+4.5V to 5.5V
OTHER TYPES	+2V to 6V

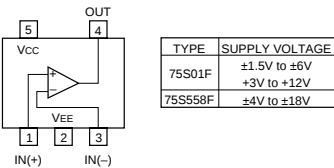
LA7858 (SANYO)

SYNCHRONIZATION/DEFLECTION CIRCUIT
- TOP VIEW -



TA75S01F (TOSHIBA)

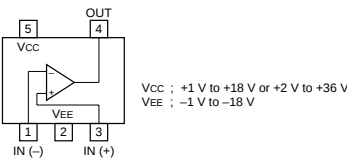
SINGLE OPERATIONAL AMPLIFIER
-TOP VIEW-



TYPE	SUPPLY VOLTAGE
75S01F	±1.5V to ±6V +3V to +12V
75S58F	±4V to ±18V

TA75S393F (TOSHIBA)
TA75S393F-TE85R

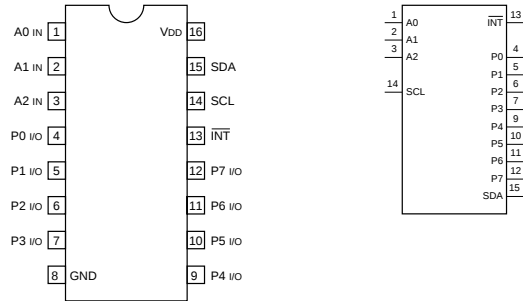
SINGLE COMPARATOR
- TOP VIEW -



Vcc ; +1 V to +18 V or +2 V to +36 V
VEE ; -1 V to -18 V

PCF8574T (PHILIPS)

C-MOS REMOTE 8-BIT I/O EXPANDER
— TOP VIEW —



INPUT

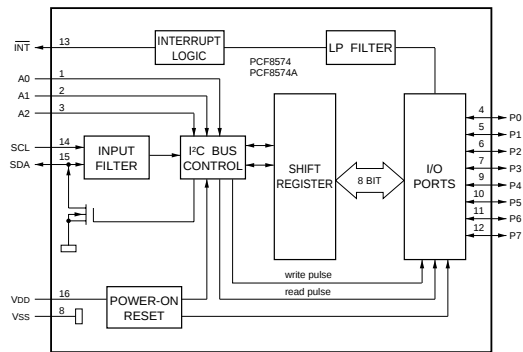
A0 - A2 : ADDRESS INPUTS
SCL : SYSTEM CLOCK LINE

OUTPUT

INT : INTERRUPT OUTPUT
SDA : SERIAL DATA LINE

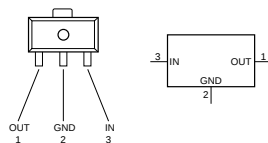
INPUT/OUTPUT

P0 - P7 : 8-BITS QUASI-BIDIRECTIONAL I/O PORT



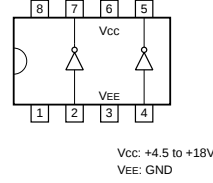
TA78L05F (TOSHIBA)+5V (100mA)
TA78L05F-TE12L

POSITIVE VOLTAGE REGULATOR
-SIDE VIEW-



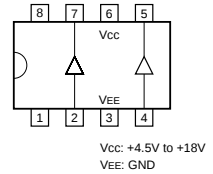
TC4426EOA (TELCOM)FLAT PACKAGE

1.5A FET DRIVERS
— TOP VIEW —



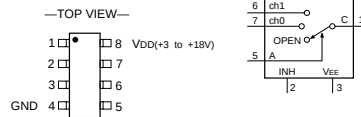
TC4427EOA (TELCOM)FLAT PACKAGE

1.5A FET DRIVERS
— TOP VIEW —



TC4W53FU (TOSHIBA)CHIP PACKAGE
TC4W53FU(TE12R)

C-MOS 2-CHANNEL MULTIPLEXER / DEMULTIPLEXER

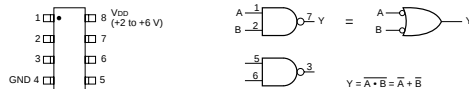


0 ; LOW LEVEL
1 ; HIGH LEVEL
X ; DON'T CARE

CONT.INPUT	ON CHANNEL
INH A	ch0
0 0	ch1
0 1	ch0
1 X	OPEN

TC7W00FU (TOSHIBA)CHIP PACKAGE
TC7W00FU(TE12R)

C-MOS DUAL 2-INPUT NAND GATE
-TOP VIEW-



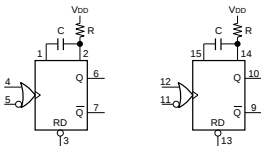
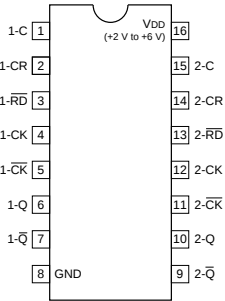
A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

0 ; LOW LEVEL
1 ; HIGH LEVEL

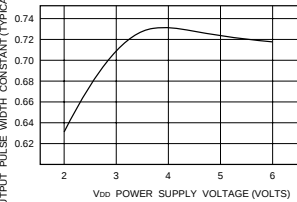
TC74HC4538AFS-EL (TOSHIBA)FLAT PACKAGE

C-MOS DUAL RETRIGGERABLE / NON-RETRIGGERABLE MONOSTABLE MULTIVIBRATOR

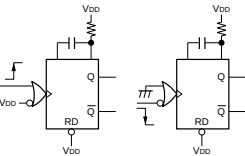
—TOP VIEW—



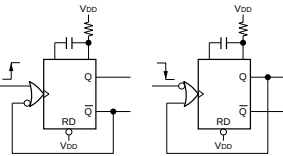
OUTPUT PULSE WIDTH = $k \cdot C \cdot R$



RETRIGGERABLE M. M. V



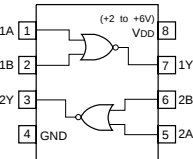
NON-RETRIGGERABLE M. M. V



TC7W02F (TOSHIBA)FLAT PACKAGE
TC7W02FU(TE12R)

C-MOS DUAL 2-INPUT NOR GATE

—TOP VIEW—



$A \text{ --- } B \text{ --- } Y = A + B$

$Y = A + B = \overline{A} \cdot \overline{B}$

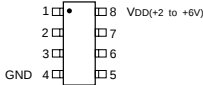
A	B	Y
0	0	1
0	1	0
1	0	0
1	1	0

0; LOW LEVEL
1; HIGH LEVEL

TC7W08FU (TOSHIBA)CHIP PACKAGE
TC7W08FU(TE12R)

C-MOS 2-INPUT AND GATE

—TOP VIEW—



$A \text{ --- } B \text{ --- } Y = A \cdot B$

$Y = A \cdot B = \overline{A + B}$

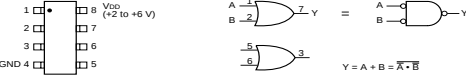
A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

TC7W32FU (TOSHIBA)CHIP PACKAGE

C-MOS DUAL 2-INPUT OR GATE

—TOP VIEW—



$A \text{ --- } B \text{ --- } Y = A + B$

$Y = A + B = \overline{A \cdot B}$

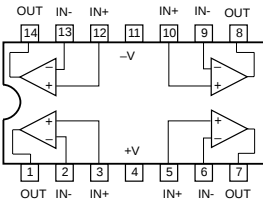
A	B	Y
0	0	0
0	1	1
1	0	1
1	1	1

0; LOW LEVEL
1; HIGH LEVEL

BA10324AF (ROHM)FLAT PACKAGE

QUAD OPERATIONAL AMPLIFIERS

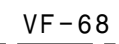
—TOP VIEW—



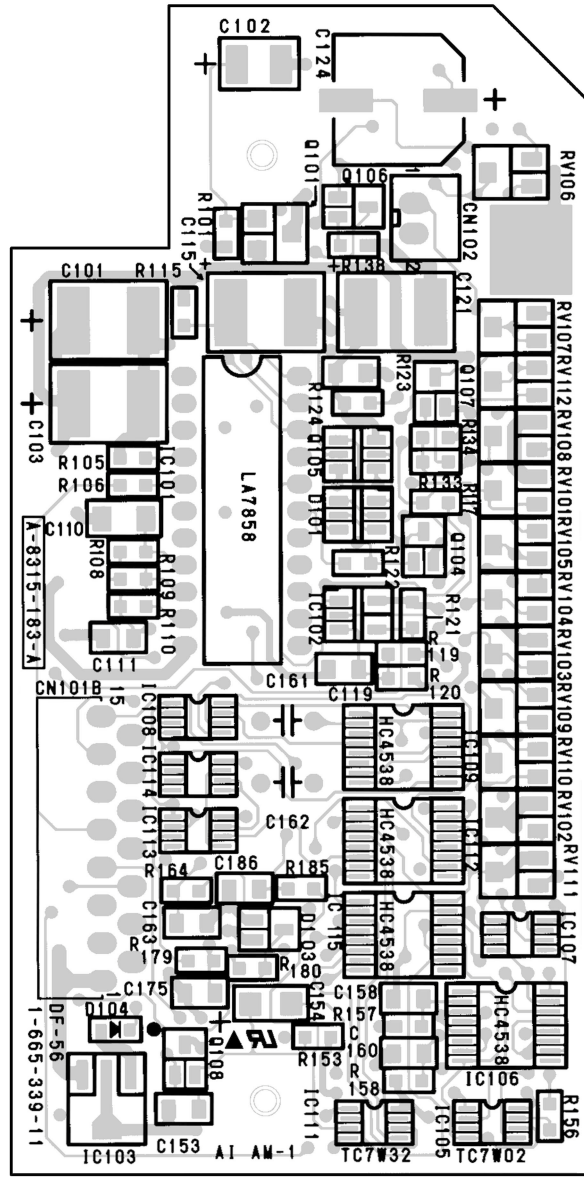
	+V	-V
SINGLE SUPPLY	+3 to +32 V	GND
DUAL SUPPLIES	+1.5 to +16 V	-1.5 to -16 V

Section 5
Block Diagram

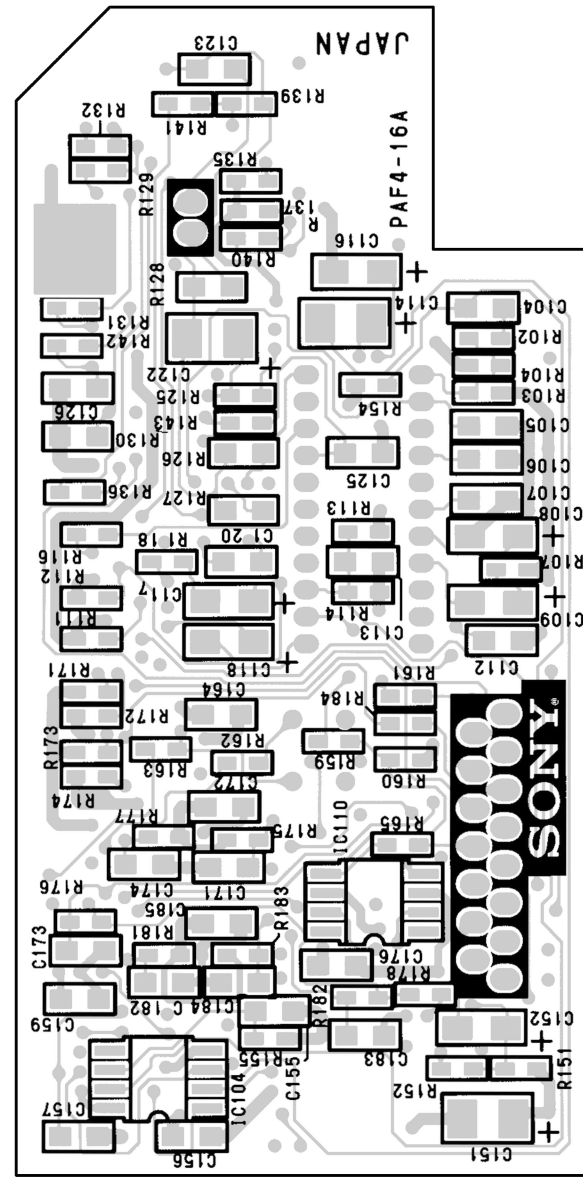
HDVF-20(UCJ):



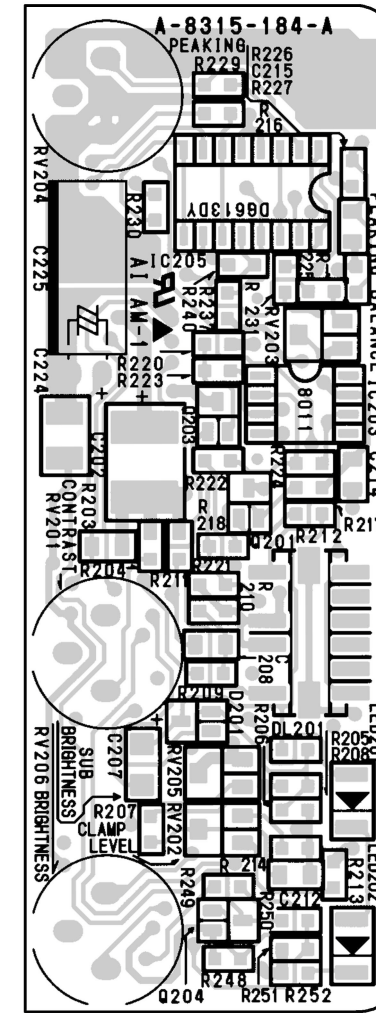




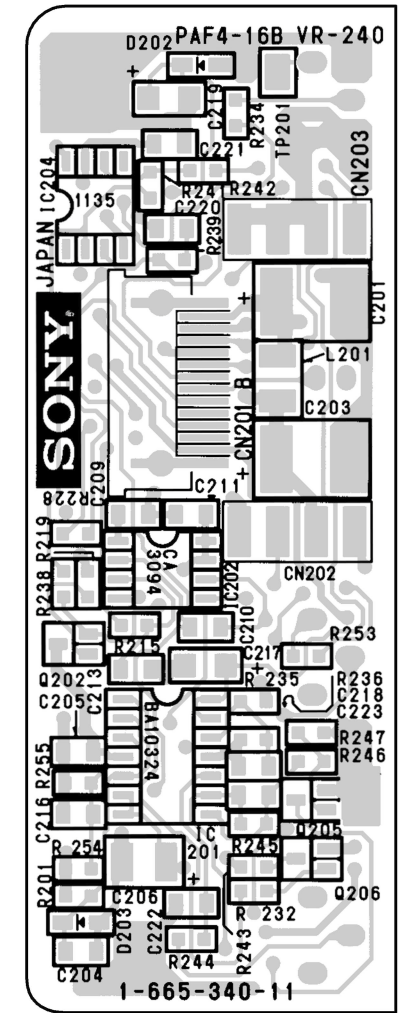
DF-56 -A SIDE-
1-665-339-11



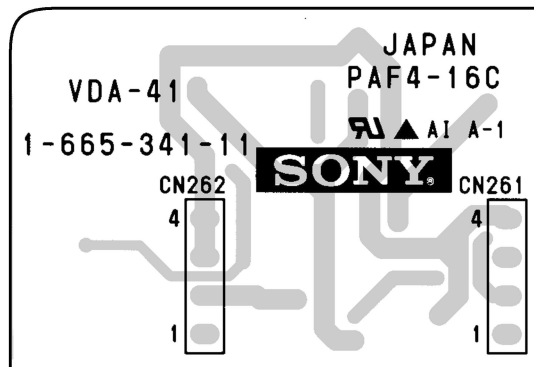
DF-56 -B SIDE-
1-665-339-11



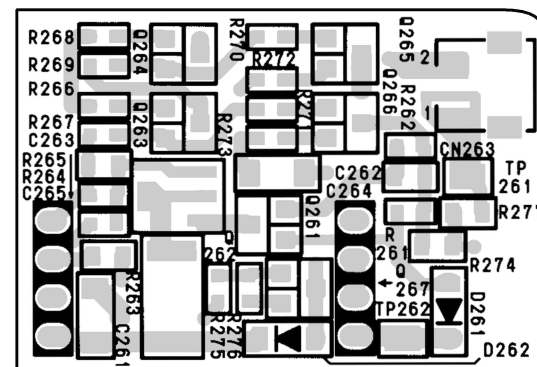
VR-240 -A SIDE-
1-665-340-11



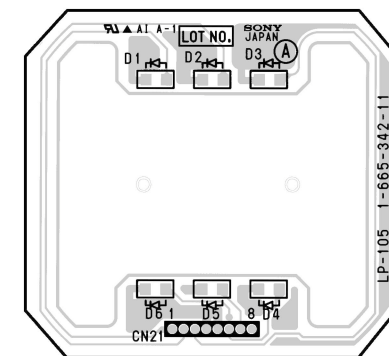
VR-240 -B SIDE-
1-665-340-11



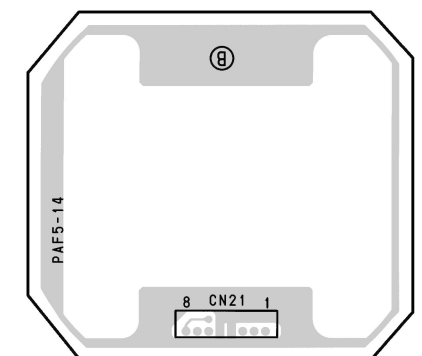
VDA-41 -A SIDE-
1-665-341-11



VDA-41 -B SIDE-
1-665-341-11



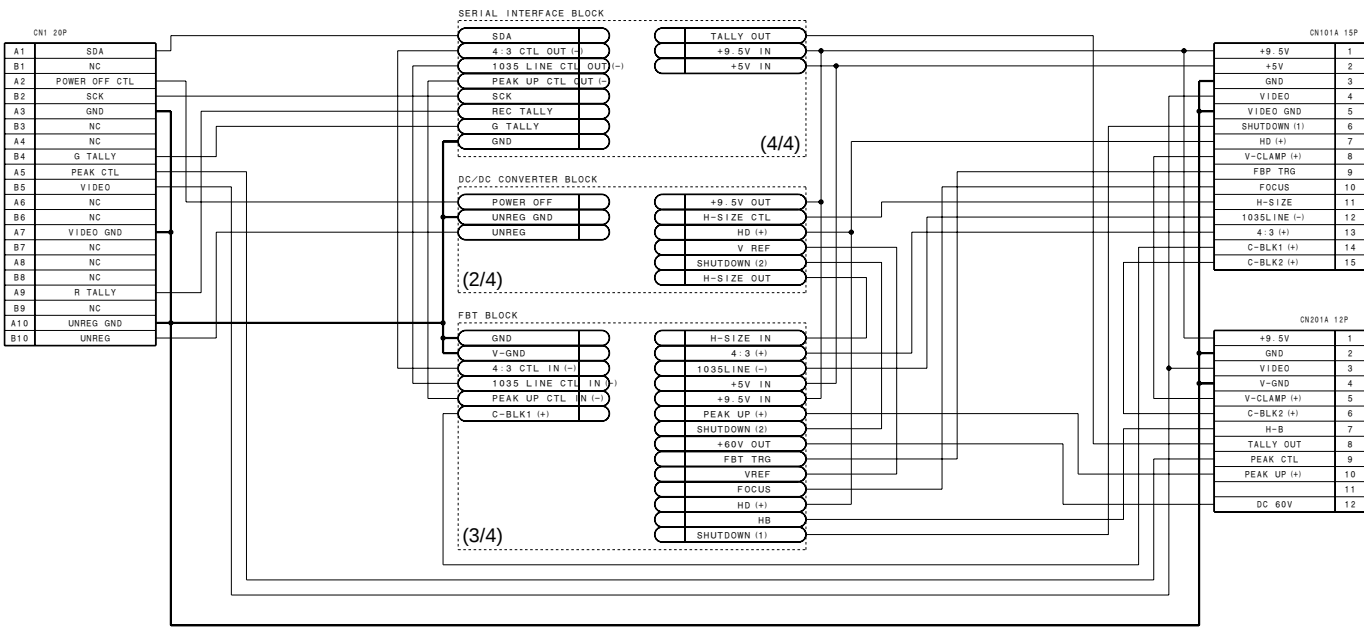
LP-105 -A SIDE-
1-665-342-11



LP-105 -B SIDE-
1-665-342-11

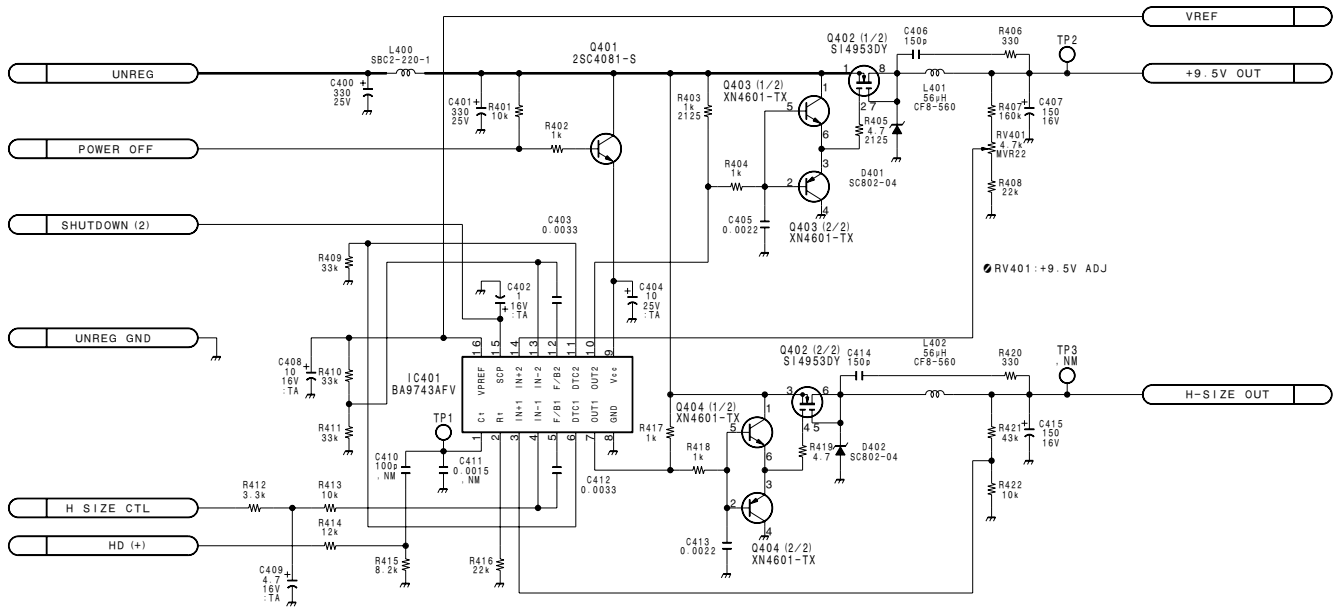
Section 7

Schematic Diagrams



VF-68 (1/4)

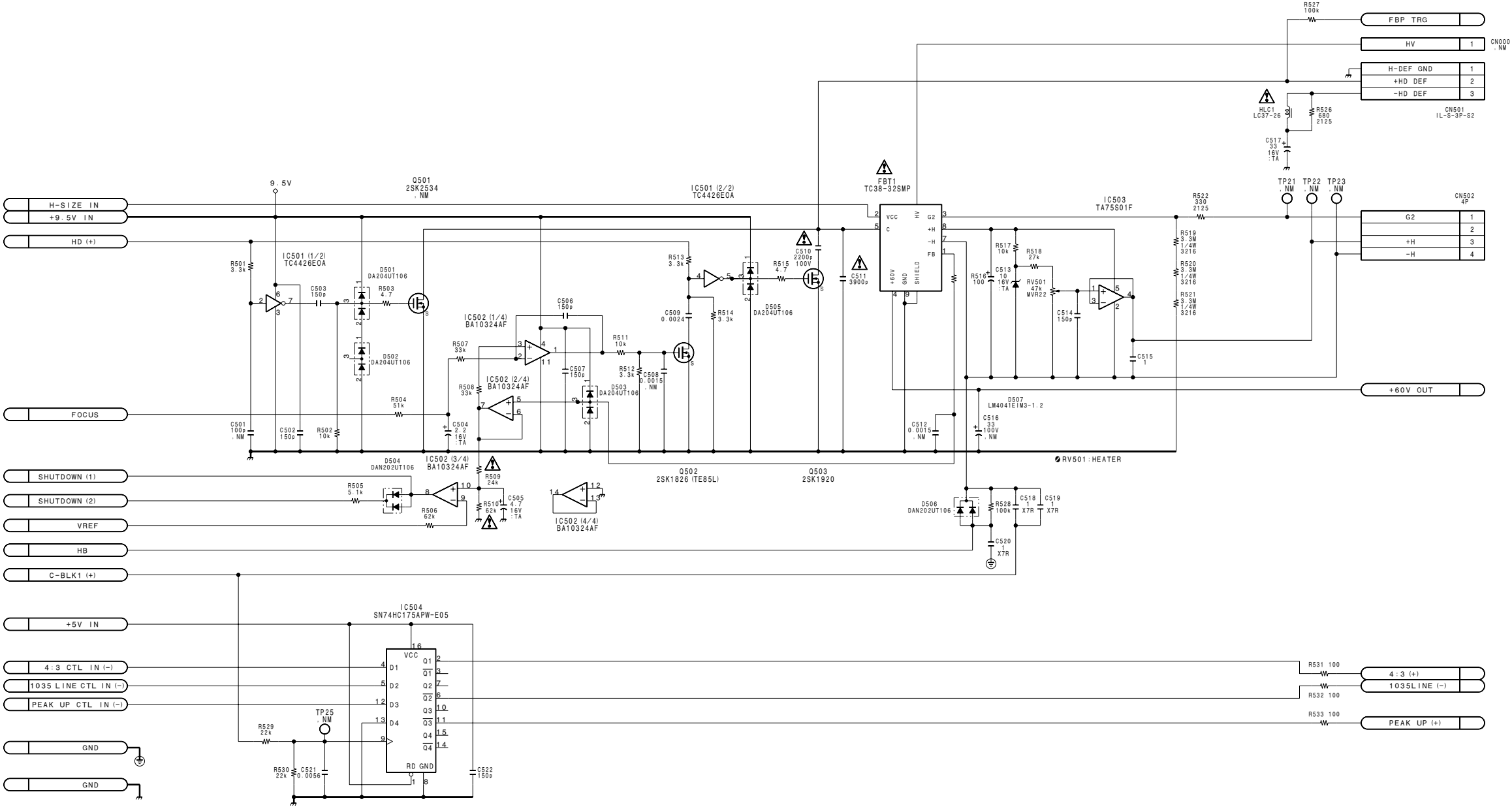
BOARD NO. 1-665-338-11
LOT NO. 703-
B-VHDFV20-VF68



VF-68 (2/4)

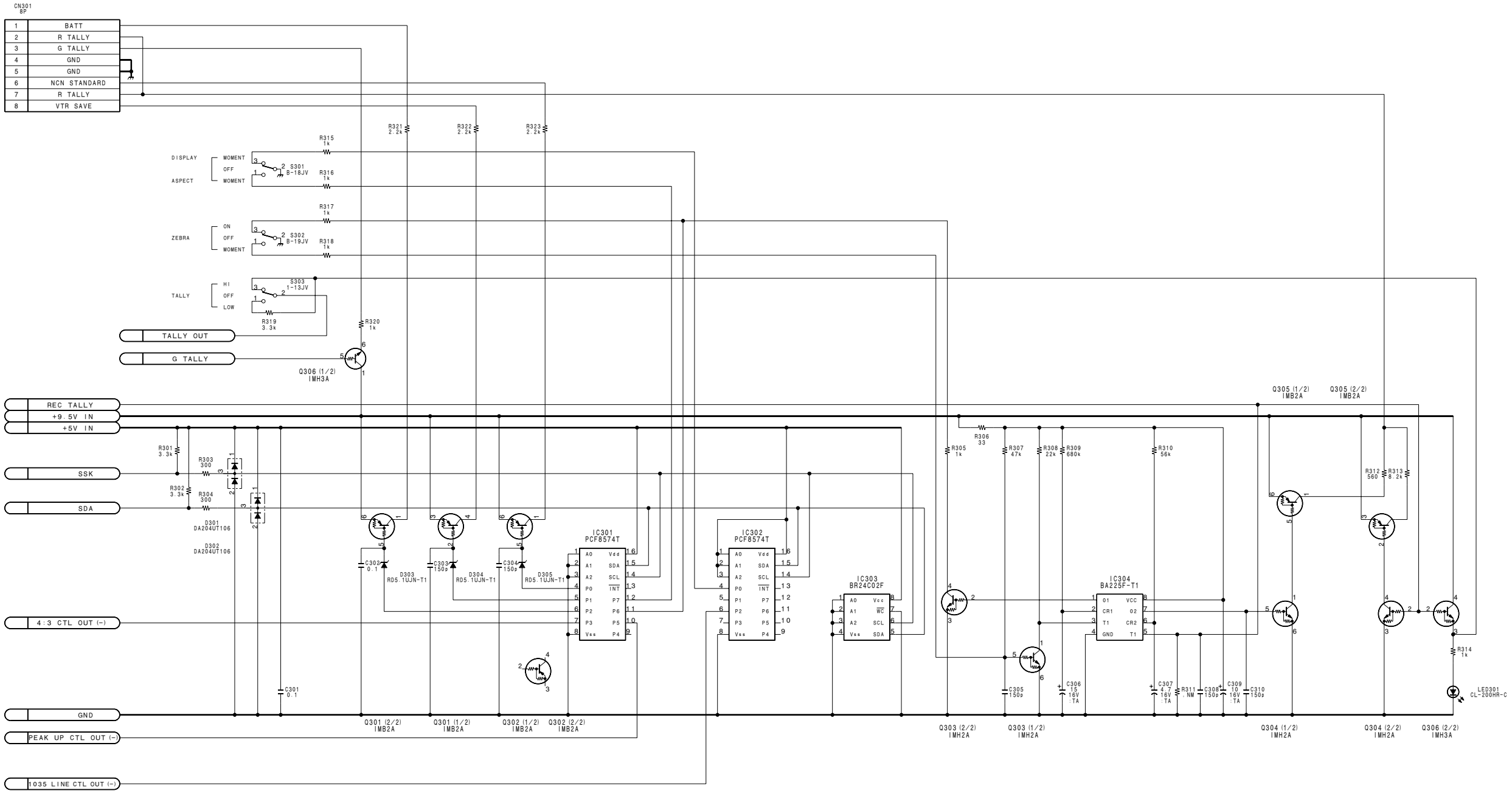
BOARD NO. 1-665-338-11
LOT NO. 703-
B-VHDFV20-VF68

HDVF-20(UCJ):



VF-68 (3/4)
BOARD NO. 1-665-338-11
LOT NO. 703-
B-WHDVF20-VF68

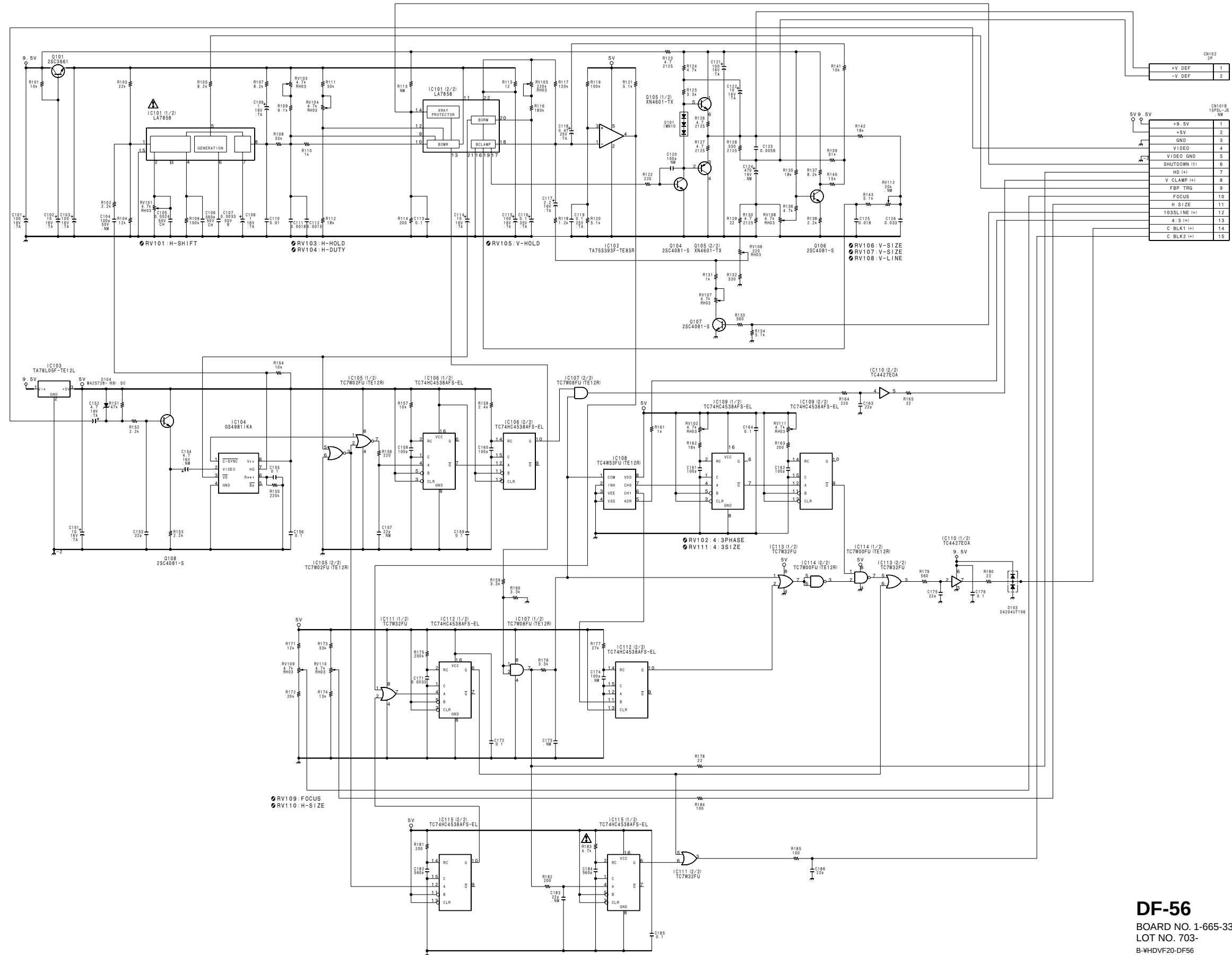
HDVF-20(UCJ):



VF-68 (4/4)

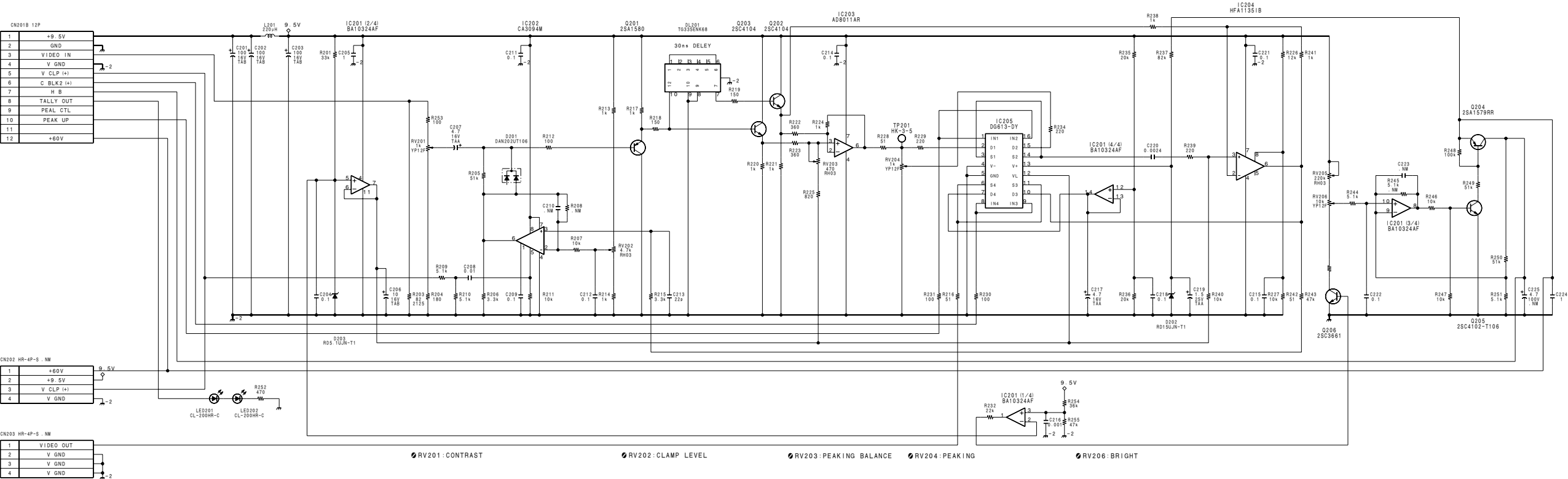
BOARD NO. 1-665-338-11
LOT NO. 703-
B-VHDF20-VF68

HDVF-20(UCJ):



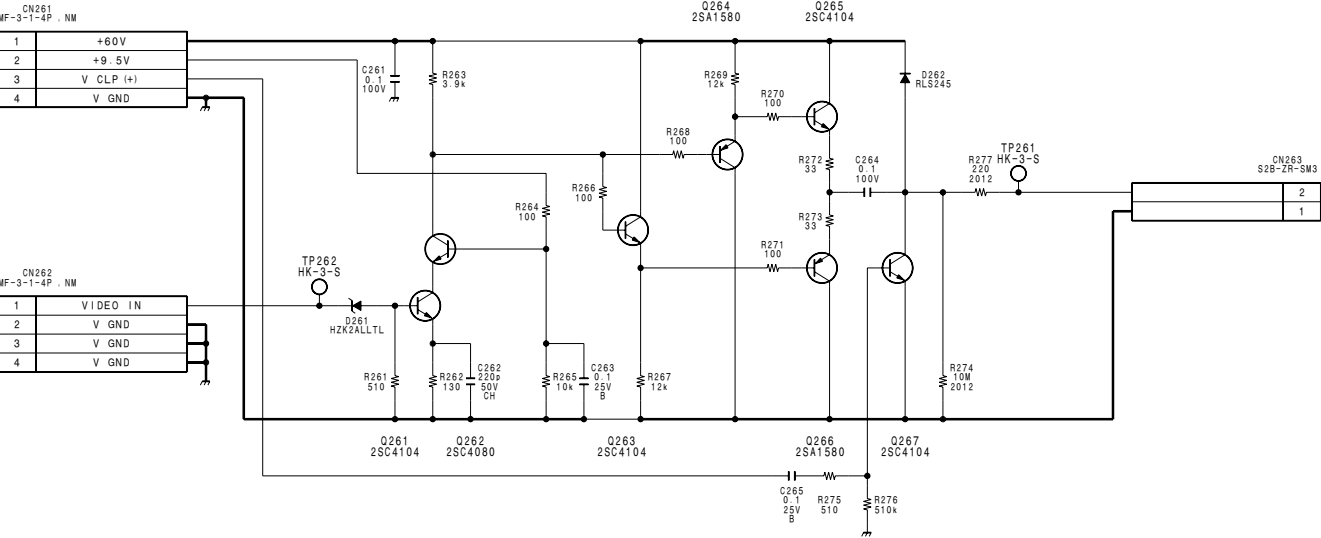
DF-56
BOARD NO. 1-665-339-11
LOT NO. 703-
B-¥HDFV20-DF56

HDVF-20(UCJ):



VR-240

BOARD NO. 1-665-340-11
LOT NO. 703-
B-WHDVF20-VR240



VDA-41

BOARD NO. 1-665-341-11
LOT NO. 703-
B-WHDVF20-VF68

HDVF-20(UCJ):

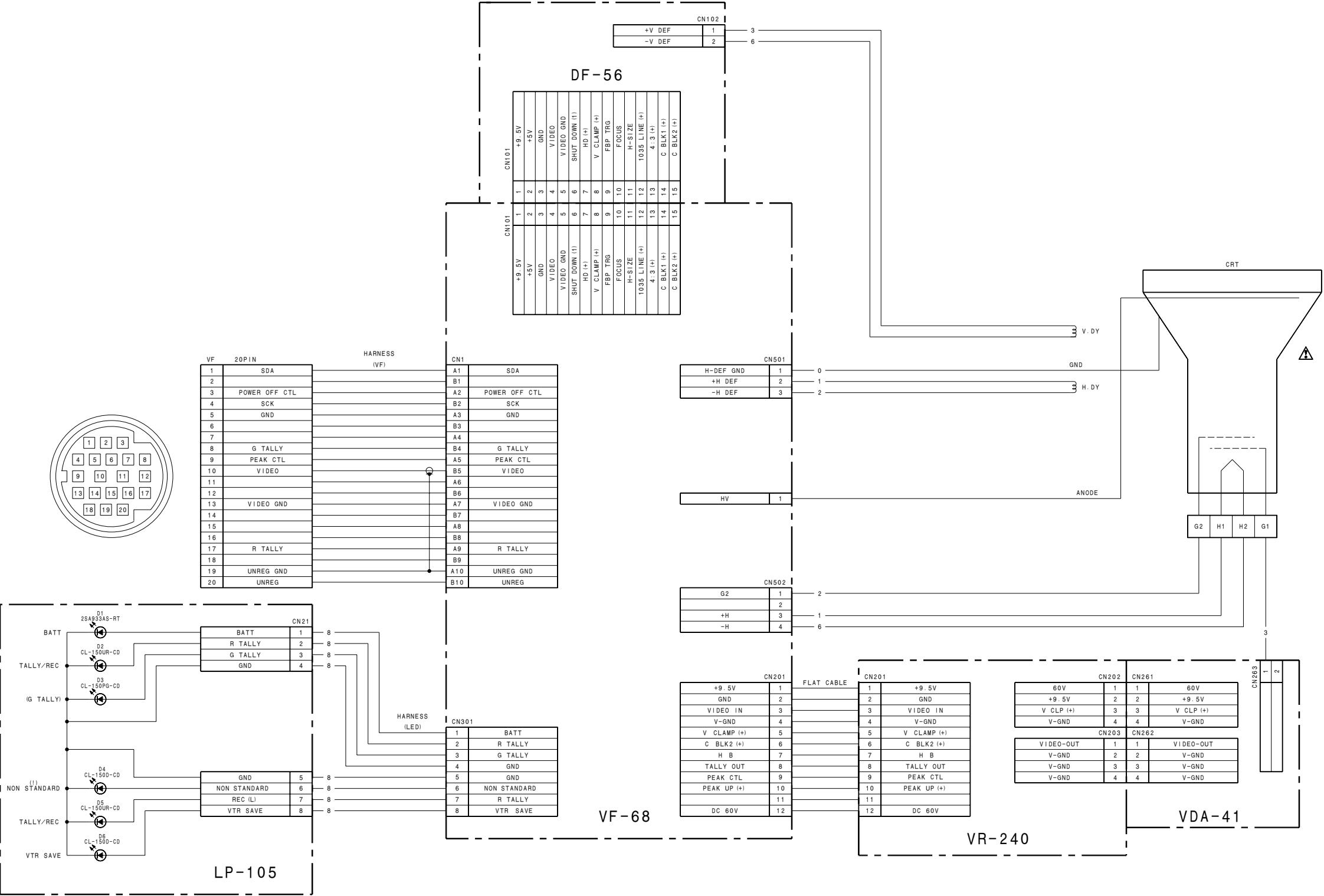
1

2

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4

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FRAME WIRING

LOT NO. 703-
B-YHDVF20-FRAME

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