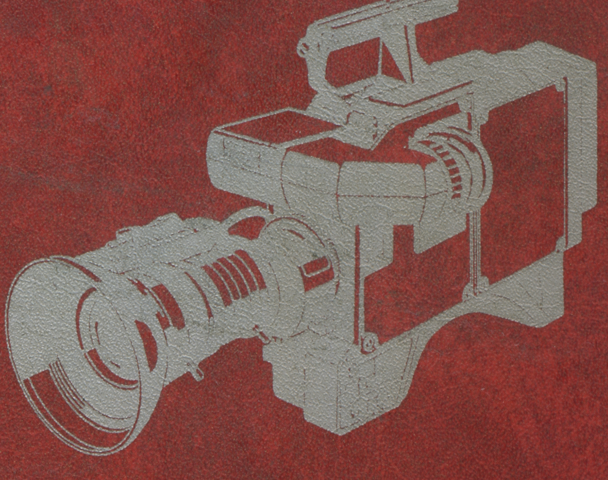
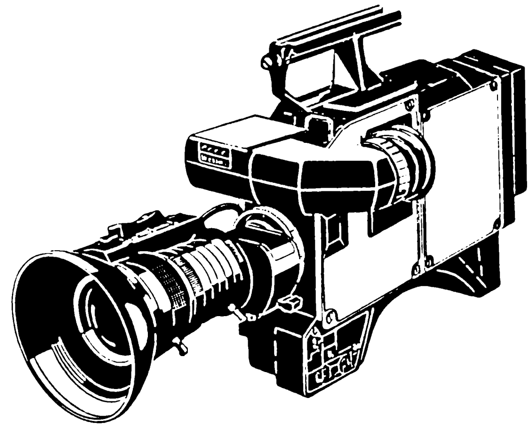


HL-95 UNICAM™

INSTRUCTION MANUAL

Ikegami



HL-95

UNICAM™

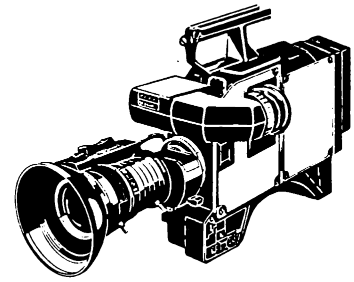
(PAL-B)

INSTRUCTION MANUAL

Ikegami

HL-95 UNICAM™ (PAL-B)

INSTRUCTION MANUAL



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SECTION 1.0 SPECIFICATIONS

SECTION 1.1 OUTLINE

Ikegami's advanced video technology has developed the world's smallest and lightest 2/3-inch, 3-tube (Sta-Mag Diode-Gun plumbicon®), VTR combined color TV camera. This camera can be fitted with VTR interface units permitting the attachments of various types of VTR units and also a host of accessories enable this camera to use as a multi-purpose camera.

Dispite its compactness, the HL-95 Unicam has greater performance than the HL-79 series has. It introduces a new generation in portable color cameras.

Features

1. Camera head is made of magnesium alloy, offering sturdily-built drip proof construction and lightweight.

2. Optical system
Utilizes high sensitivity prism with quartz filter to eliminate colorimetry errors due to polarized light.

3. S/N ratio : -58dB

4. Automatic highlight compression
Accomodates scenes with very wide contrast range. Auto knee function always offers pictures with proper contrast ratio.
Knee aperture correction compensates for aperture correction fall-off to reproduce enhanced pictures in highlight areas.

5. Viewfinder
Utilizes 1.5 inch high resolution CRT to facilitate focusing adjustment. Display functions of LED, Zebra, and character help the camera person monitor the camera status quickly and operate the camera correctly.

(1) LED Indication

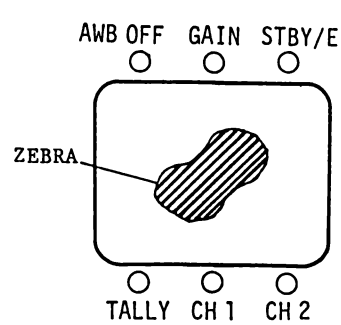
① GAIN (green)
Lights up at +12dB/ 24dB video gain up operation.

② STBY / E (yellow)
Lights up in the STAND-BY mode or when lens extender is used.

③ AWB OFF (yellow)
Lights up when the AWB switch is set to "OFF" (preset) position.

④ TALLY (red)
Lights up at ON AIR or Recording.

⑤ CH1, CH2 (yellow)
Audio level indicator.



(2) Striped Zebra Pattern

1) White balance area

2) Video level

(3) Character display

① "OK 3.3K"
Obtained white balance with a scene color temperature of 3300°K.

② "NG LEVEL OVER" / "NG LEVEL UNDER" / "NG 5.9K"
Not obtained white balance

③ "AWB OFF"
The AWB switch is depressed while the switch is set to "OFF" position.

④ "3.4K" (AWB A ch 3.4K) / "B5.4K" (AWB B ch 5.4K)
Displays the setting color temperature contained in the white balance memory for 3 seconds when the AWB switch position is changed. When the SW is only B-position, the "B" display will appear.

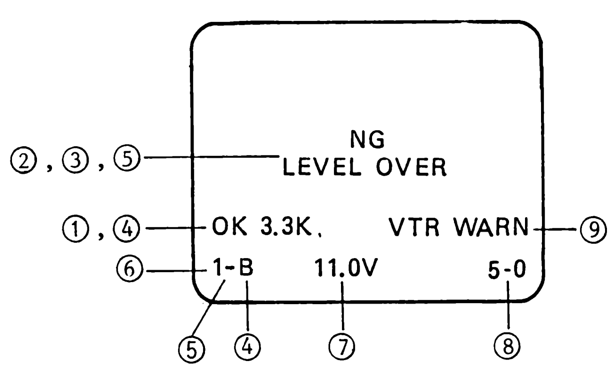
⑤ "MEMORY BREAK"
If the white balance memory becomes empty, AUTO WHITE comes back to PRESET status and this word blinks for thirty seconds after power is turned on. After thirty seconds passed, "——" mark is displayed on the next position of filter position indicator of viewfinder screen and the mark disappears if automatic white balance is obtained.
(A memory retained the correction data for 48 hours.)

⑥ Filter Position
"1" : 3000°K, "2" : 5600°K, "3" : 5600°K, + 25% ND, "4" : CAP

⑦ Battery Warning
"11.0 V" : Lights up when the battery voltage drops down to 11.0 V.
"10.8 V" : Blinks when the battery voltage is below 10.8 V.

⑧ Tape Remaining Time
"5-0" : Blinks when the tape remaining time becomes less than five minutes.

⑨ "VTR WARN"
Indicates VTR malfunction.



6. Video Gain Up Switch

The +12dB/+24dB video gain switch makes it possible to increase the sensitivity electronically enabling shooting under lighting conditions as low as 15 lux. An L.E.D. warning is visible in the viewfinder when the gain switch is actuated to prevent misoperation.

7. Selectable white balance correction

Two automatically set (memory A/B) and one manual preset (3,000°K) positions are available. To confirm proper execution of function, the value of a scene color temperature, which is contained in the memory A or B, is displayed in the viewfinder for three seconds.

8. Lens

Following Lens functions are same as HL-79E.

(1) Iris Waiting/Lens Close Functions

These functions are provided to protect the camera pick-up tubes from damage. When power is turned on, iris is automatically closed until the beam runs. When power is turned off or in the STAND-BY mode, iris is also automatically closed. Iris close function operates regardless of the position of the Mode Select switch on lens, and protect the pick-up tubes.

(2) IRIS Auto/Remote mode is automatically set to Remote mode by external AUTO IRIS OFF control. So it is not necessary to operate the switch. Usually, it is set to AUTO mode independently of Auto/Remote switch.

(3) When 2 times extender used, an LED indicator with the 1.5" viewfinder lights up (yellow).

9. Automatic Beam Control (ABC)

Automatic Beam Control circuit is provided to stabilize the beam discharge on scene highlights of about 3 lens iris stop.

10. System Connector

The HL-95 basic camera is provided with 79 pin multi-purpose connector, which can be fitted with various kind of VCR interface units and camera adapters for systems expansion.

SECTION 1.2 RATING/PERFORMANCE

Mechanical

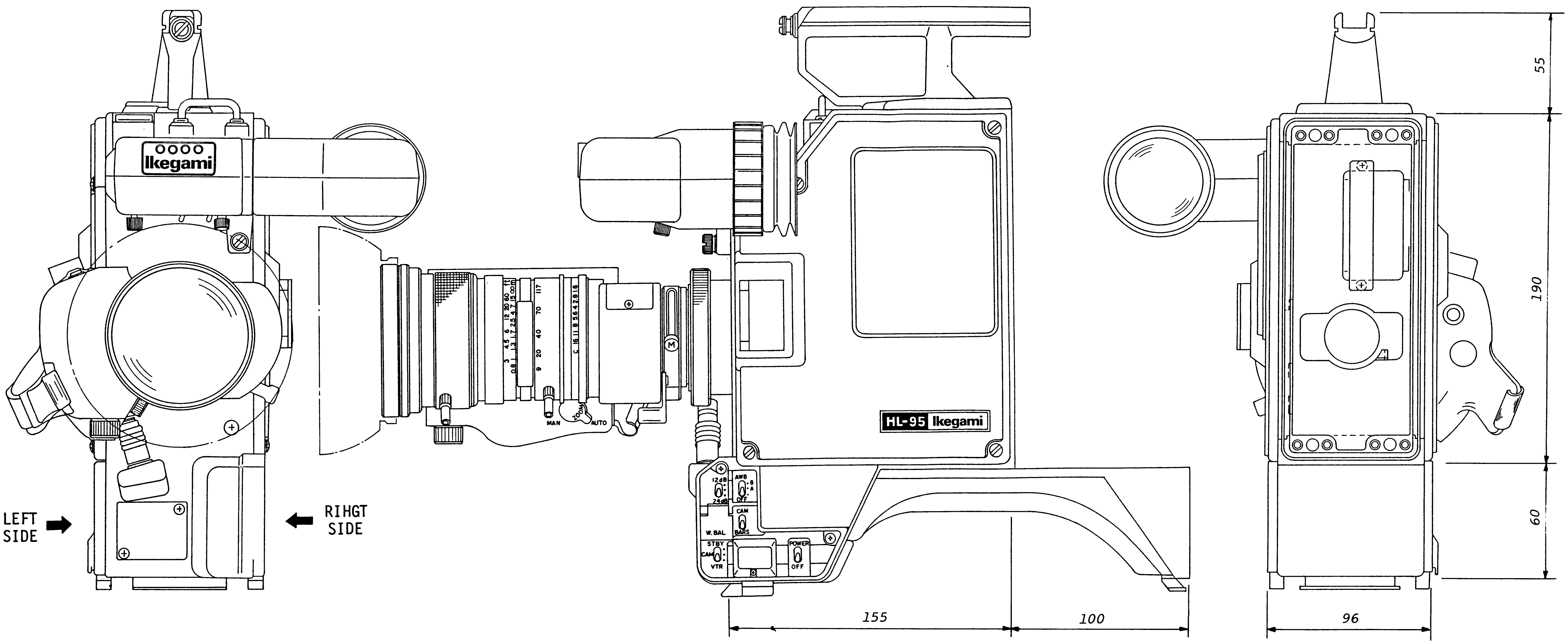
Item	Rating				Remarks
Dimensions	95(W) × 250(H) × 165(D) mm 3.7 (W) × 9.8 (H) × 6.5 (D) inches				Refer to external appearance
Weight	3.4 kgs				Including 1.5" Viewfinder
Lens Mount	Bayonet				Same as HL-79A/D, HL-79E
Optical Filter	1.	2.	3.	4.	
	3000°K	5600°K	5600°K 25%ND	CAP	

Electrical

Item	Rating/Performance	Remarks
DC input voltage	Normal: +12V Allowance: +11 ∿ 16 V	Negative Grounded
AC input voltage	100 V or 117 V ±5% 50/60Hz	AC PACK ACP-23E (USA,JPN)
	220 V or 240 V ±5% 50/60Hz	AC PACK ACP-17E(EUROPE)
Power consumption	Approx. 18W	+12 V
External sync for Genlock	VBS 1Vp-p } +3dB BBS 0.45 Vp-p } -6dB	75Ω terminated (with optional genlock in the CA-95)
Return Video	VBS or VS 1 Vp-p	75Ω terminated
Mic Input	-20dBm 600Ω balance	Using CA-95
Tally Input	Power supply or contact closure	Using CA-95
Intercom	2-wire or 4-wire type	Using CA-95 (LINE -10dB)
H. Blanking Width	12.05μS standard	Adjustable
V. Blanking Width	25H standard	
Camera Tube	2/3 inches	
Sensitivity	Approx. F4.5	GAIN 0 dB, 2000 lux 3000°K Reflectance 89.9% KNEE OFF

Item	Rating/Performance	Remarks
S/N	Type -58dB	GAMMA OFF, PEDESTAL 5% DTL OFF, CHROMA OFF MATRIX OFF KNEE APERTURE OFF Band Width 5.0MHz
Resolution	H. Center 650 TVL or better Corner 600 TVL or better V. Center 350 TVL or better	2000 lux RETMA Pattern GAMMA OFF
DTL correction	2H	with comb filtering
Phase	ENC ←→ R,G,B Approx. 0.355μS GENLOCK HOR. TIMING ±3.0μS SC phase 720° SC Frequency 4.43361875 MHz ±5 Hz	 Adjustable (Using CA-95) Adjustable (Using CA-95) -20° ∿ +50°
VIDEO output	Composite 75Ω Component out 1000Ω	System connector output(Basic camera output) 1 BNC output (CA-95 output) VTR, Remote } 1 output (CA-95 output) VTR 1 output (Component type CA-95 output)
MONITOR OUT	Composite VIDEO or R, G, B, R-G, B-G, R+G+B 75Ω 1 output	BNC, Remote } 1 output 75Ω terminated
VF VIDEO	R, G, B, R-G, B-G, R+G+B	in parallel with MON OUT
R,G,B VIDEO	0.7 Vp-p 1 output each(System connector) 75Ω 0.7 Vp-p output each (System connector)	HL-95 Basic camera output CA-95 output
Dynamic Range	Hightlight Compression 500% or more	
AUTO IRIS detection signal	NAM VIDEO	
MIC OUT	-20dBm 600Ω or through	GAIN:Adjustable (Using CA-95)
Registration	Zone 1 (Within a circle having a diameter of 80% picture height): within ±0.05% of picture height Zone 2 (Within a circle having a diameter of picture height): within ±0.1% of picture height Zone 3 (Outside zone 2): within ±0.2% of picture height	

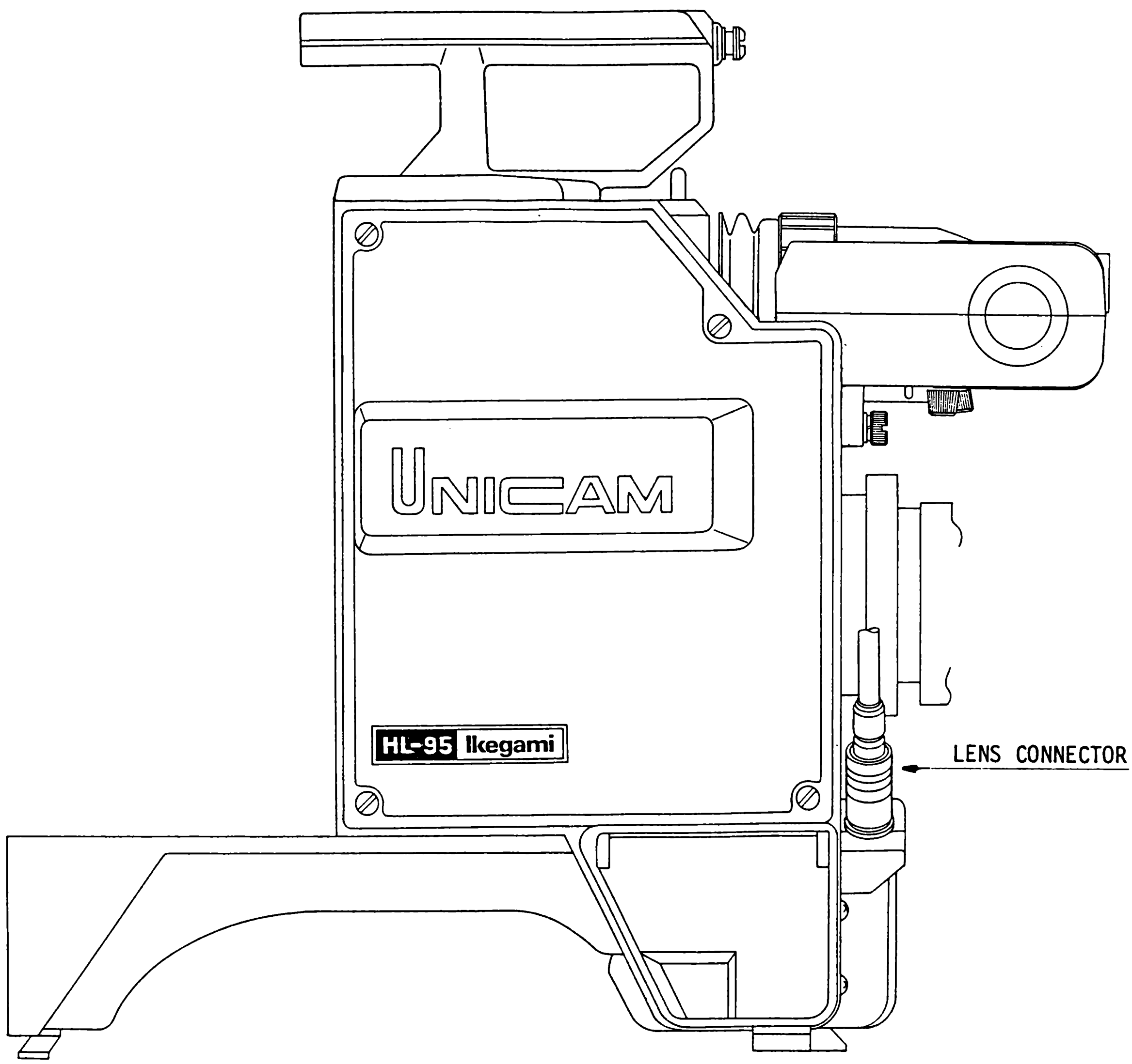
Item	Rating/performance	Remarks
Deflection distortion	within ±1.5% enter picture area	
Ambient Temperature	Specified characteristics shall be satisfied without any readjustment when temperature at setup varies +10°C in a range that it does not exceed 0°C to 40°C at an ambient temperature from 0°C to 40°C. The tolerable variation of registration shall be ±0.1% in the first zone and the tolerable variation of the video and pedestal level shall be ±2%. The preceding characteristics shall be satisfied at a temperature from -20°C to 0°C and from +40°C to +50°C by re-adjustment.	
Control function	° R B H. CENT ° R B V. CENT ° R B PEDESTAL ° MASTER PEDESTAL ° R B GAIN ° IRIS CONTROL ° BARS ON/OFF ° CAL ON/OFF ° DTL ON/OFF ° KNEE ON/OFF AUTO KNEE ON/OFF ° AUTO IRIS ON/OFF ° AUTO WHITE CONT ° AUTO WHITE OFF AUTO WHITE A ch/B ch RET CONT GAIN UP +12dB, +24dB	All control functions are applied through the system connector. ° Mark : CA-95 remote connector



FRONT VIEW RIGHT SIDE REAR VIEW

HEAD
External Appearance (1)

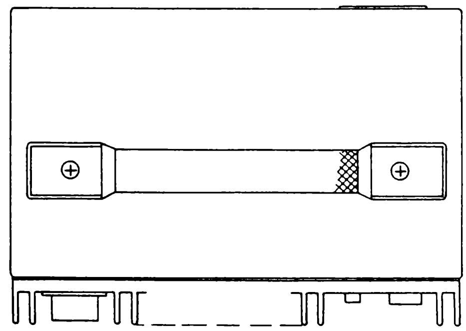
Fig. 1-2



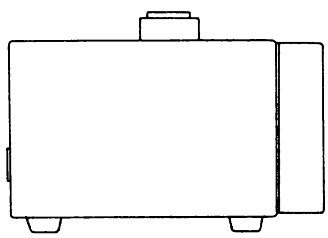
LEFT SIDE

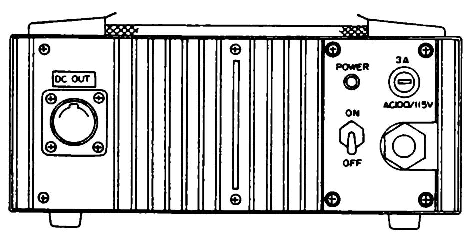
HEAD
External Appearance (2)

Fig. 1-3

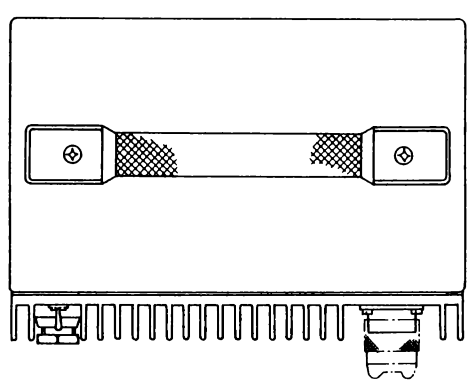


212(W) x 94(H) x 147(D) mm
8.3(W) x 3.7(H) x 5.8(D) inches

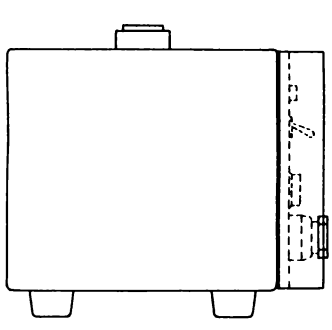


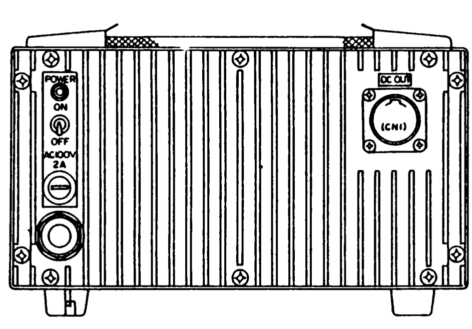


ACP-23E



212(W) x 133(H) x 147(D) mm
8.3(W) x 5.2(H) x 5.8(D) inches

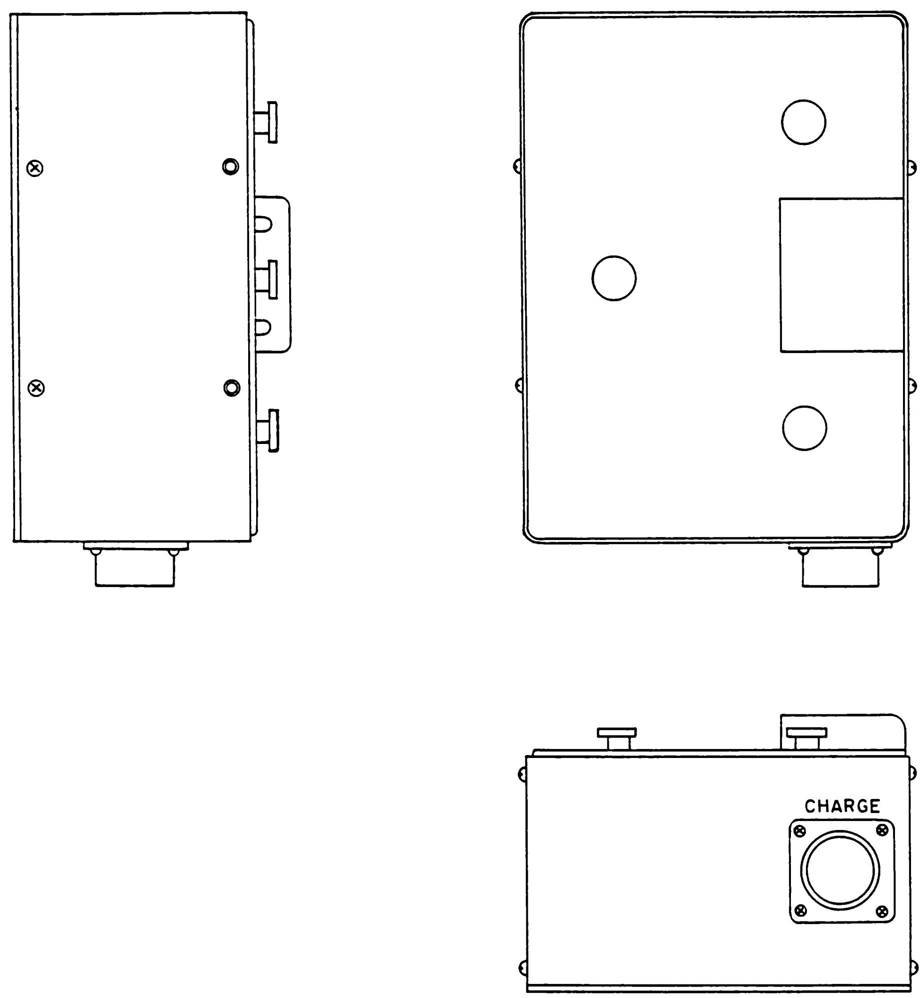




ACP-17E

AC PACK

Fig. 1-4



112(W) x 154(H) x 96(D) mm
4.4(W) x 6.0(H) x 3.8(D) inches

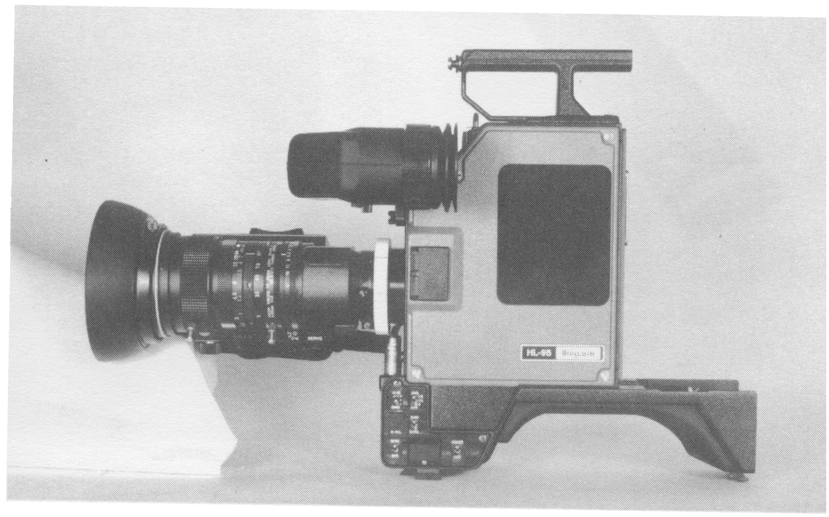
BAT-12C
BATTERY PACK

SECTION 2.0 EQUIPMENT

Section 2.1 Camera Configuration

2.1.1 Standard configuration

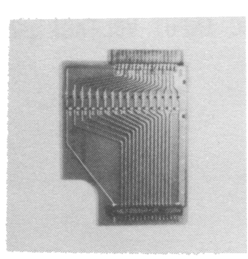
(1) HL-95 Basic Camera



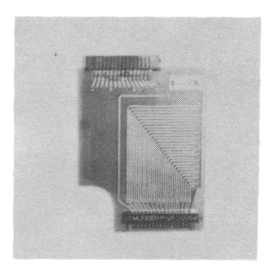
(2) 1.5" High Resolution Viewfinder

2.1.2 Standard accessories

(1) Module Extender Card

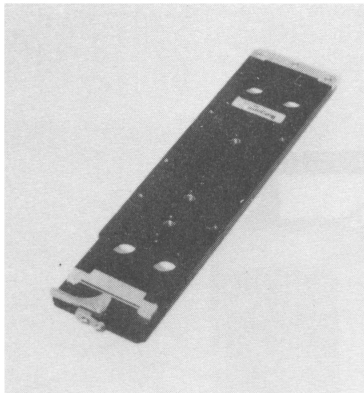


Module Extender card-1

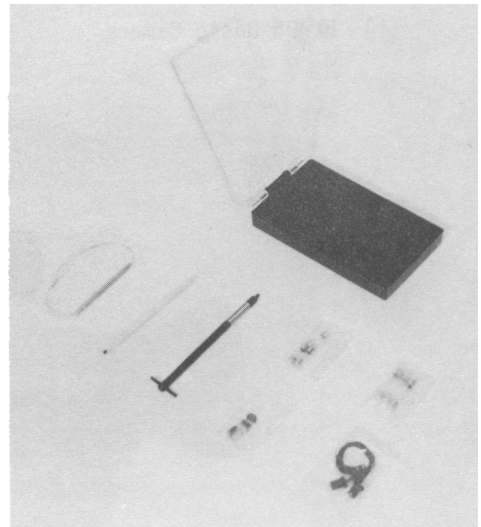


Module Extender card-2

(2) Quick Release Tripod Adapter Plate. (T-95)

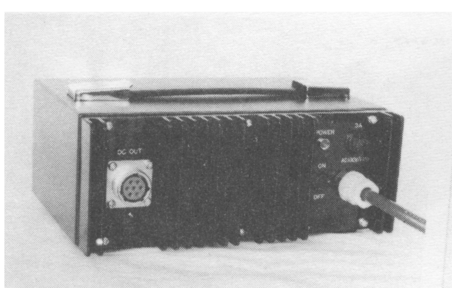


(3) Tool Kit
Module adjust bar, universal driver, spare fuse, bias light lamp.

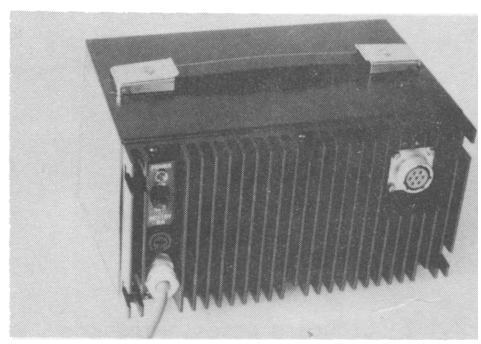


2.1.3 Optional accessories

(1) AC Power Pack with 2 m AC Cable.

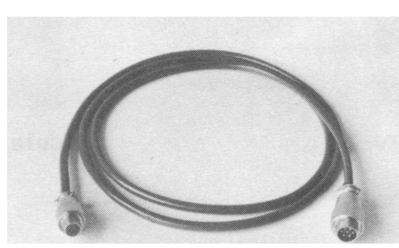


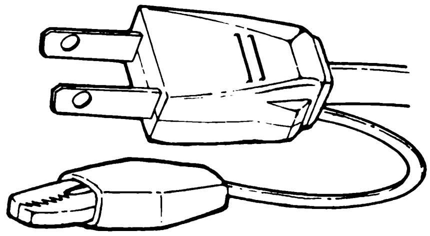
ACP-23E(U.S.A.)
(AC INPUT VOLTAGE : 100V or 117V)



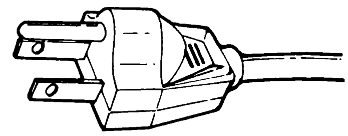
ACP-17E
(AC INPUT VOLTAGE : 220V or 240V)

(2) DC Power Cable

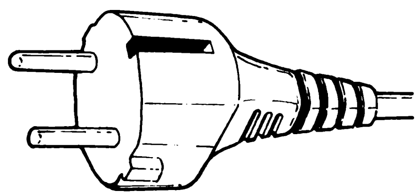




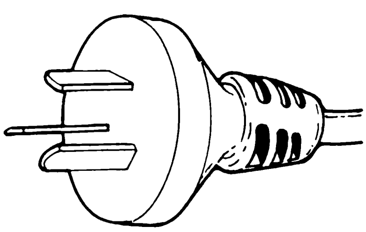
JAPAN



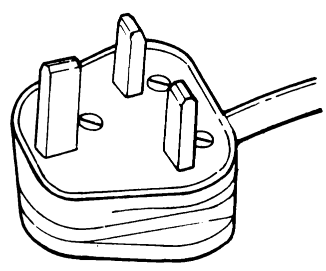
U.S.A.



EUROPE

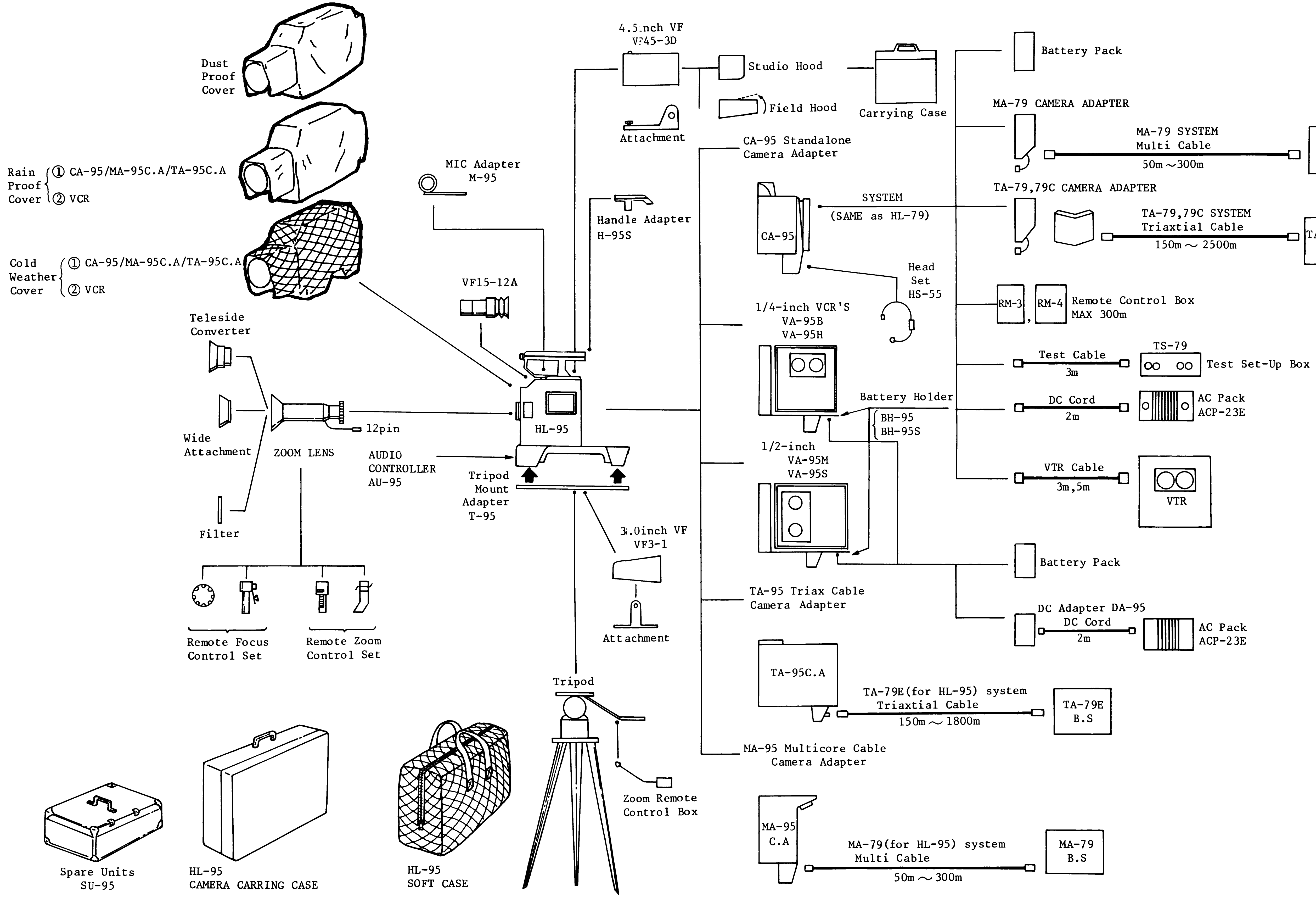


AUSTRALIA



U.K.

AC PLUG

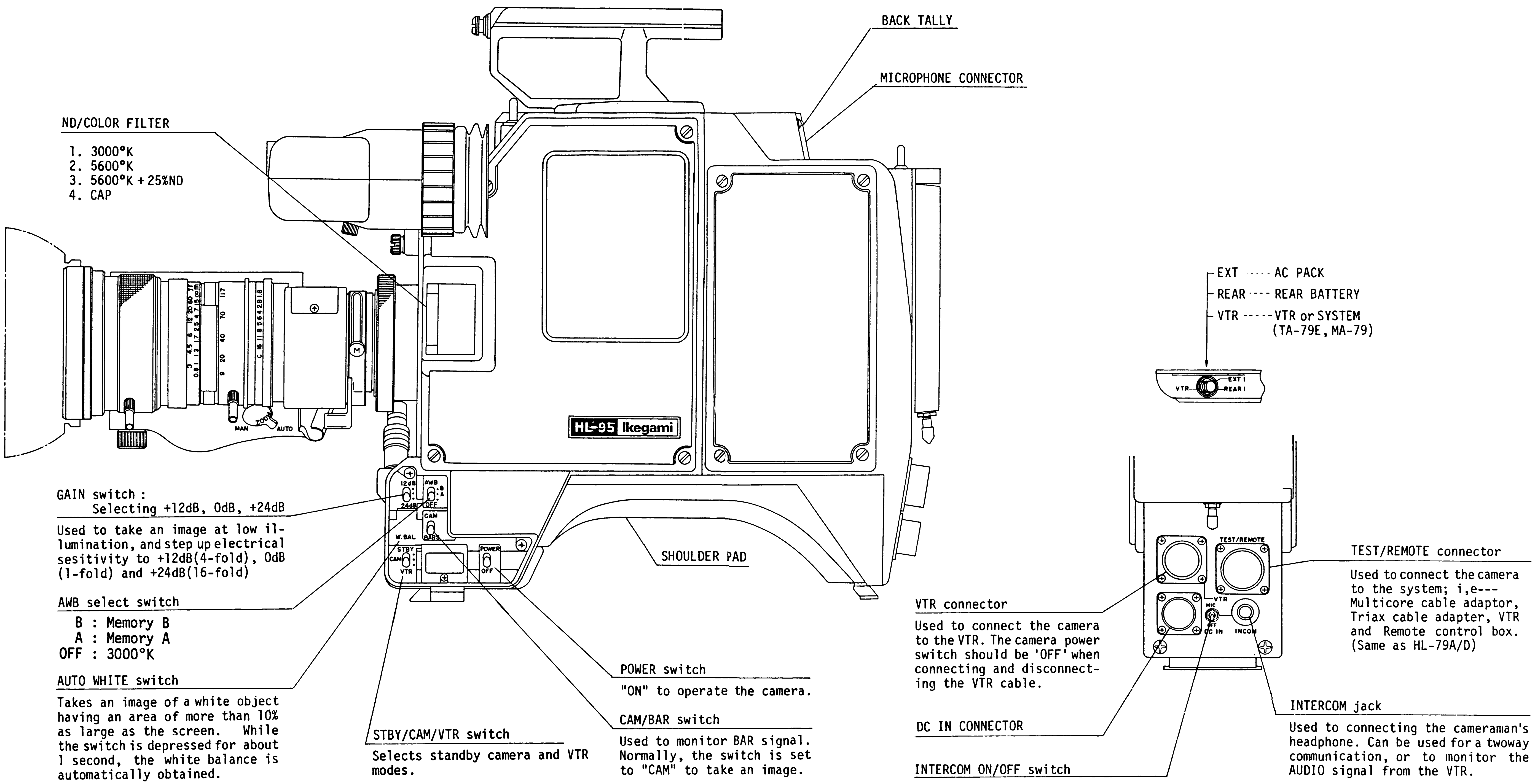


Camera Equipment Accessories and Options Installation Block Diagram

Fig. 2-2

SECTION 2.2 NOMENCLATURE AND DESCRIPTION OF EACH PART

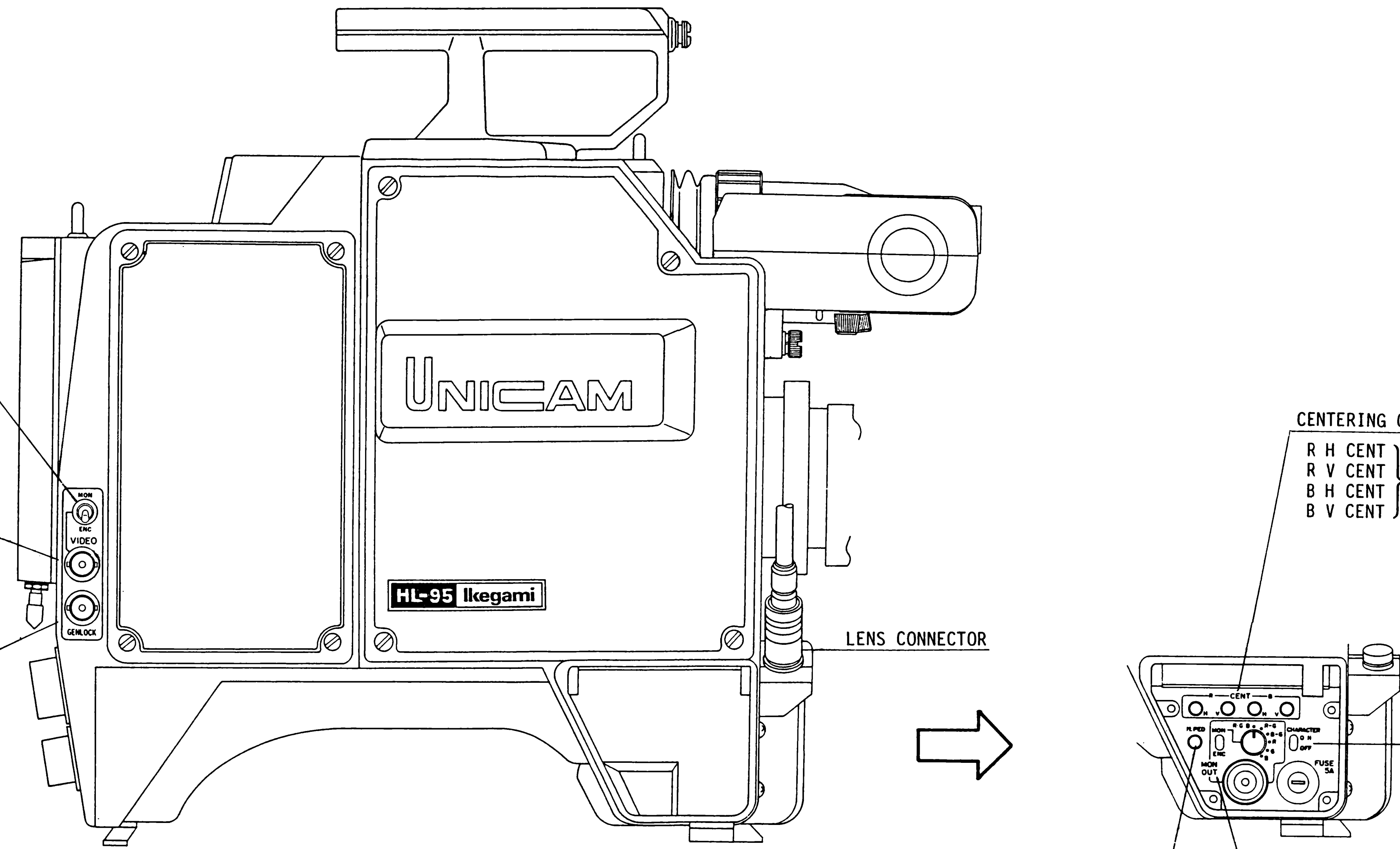
2.2.1 Camera head



Head Right Side
with CA-95

HEAD

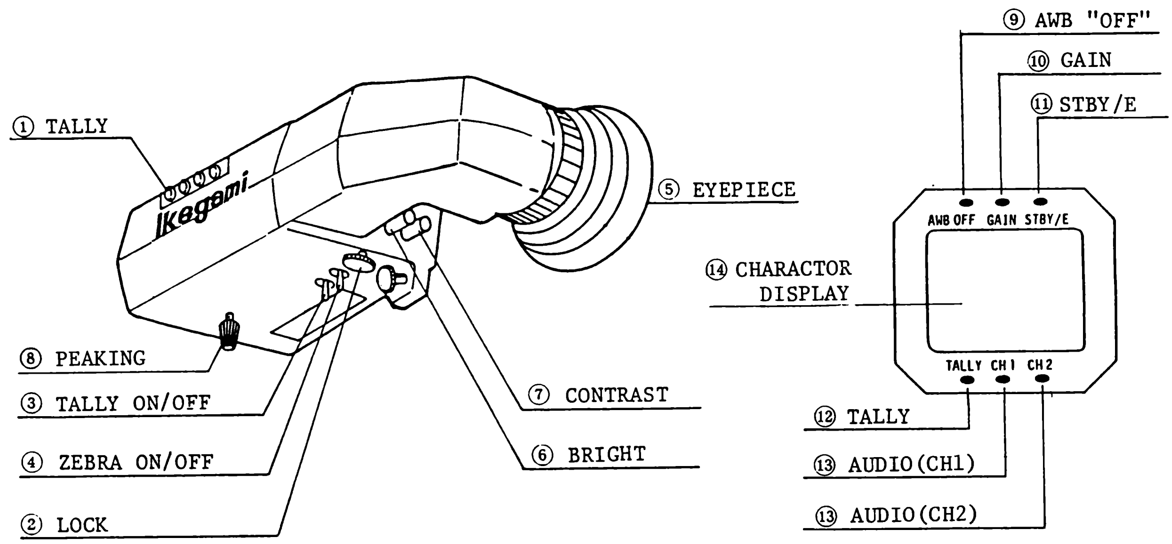
External Controls & Connectors (1)



Head Left Side
with CA-95

HEAD
External Controls & Connectors (2)

2.2.2 Viewfinder



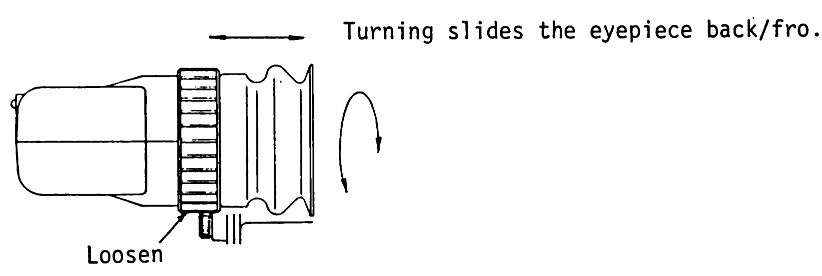
① Tally lamp
It comes on when the camera is in on-air/in record situation.

② LOCK
Used to lock the viewfinder eyepiece.

③ TALLY ON/OFF Switch
This switch can turn on and off the tally lamp (red) at the front side of the viewfinder. The switch is unrelated to the tally lamp inside the viewfinder and the rear tally.

④ ZEBRA ON/OFF Switch
This switch when turned on superimposes the ZEBRA signal on VF video where a level of 100% or more is present. The video level can be predeterminated in the AUX module.

⑤ Eyepiece
Diopter can be adjusted by turning the eyepiece.



⑥ BRIGHT

Used to adjust brightness.

⑦ CONTRAST

Used to adjust contrast.

⑧ PEAKING

Used to adjust peaking control.

⑨ AWB off Lamp

Comes on when the AWB OFF-A-B switch is set to "OFF".

⑩ GAIN

Comes on when the GAIN switch is set to +12dB or +24dB.

⑪ STBY/E Lamp

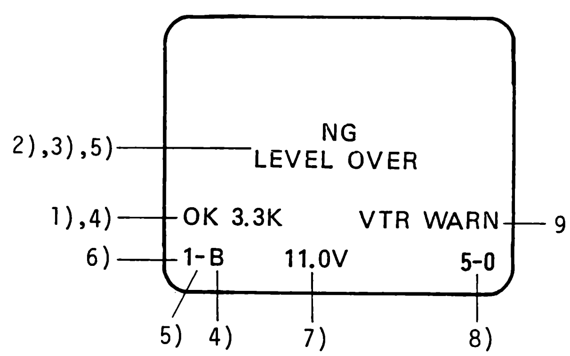
Comes on when in STBY mode or lens extender is used.

⑫ TALLY Lamp

Comes on together with the tally indicator lamp at the front of the camera.

⑬ AUDIO CH1, CH2

⑭ Character display



1) "OK 3.3K"

Obtained white balance with a scene color temperature of 3300°K.

2) "NG LEVEL OVER"/"NG LEVEL UNDER"/"NG 5.9K"

Not obtained white balance

3) "AWB OFF"

The AWB switch is depressed while the switch is set to "OFF" position.

4) "3.4K" (AWB A ch 3.4K) / "B5.4K" (AWB B ch 5.4K)

Displays the setting color temperature contained in the white balance memory for 3 seconds when the AWB switch position is changed. When the SW is only B-position, the "B" display will appear.

5) "MEMORY BREAK"

If the white balance memory becomes empty, AUTO WHITE comes back to RESET status and this word blinks for thirty seconds after power is turned on. After thirty seconds passed, " —— " mark is displayed on the next position of Filter IND. of viewfinder screen and the mark disappears if automatic white balance is obtained.(A memory retains the correction data for 48 hours.)

6) Filter Position : Display the each filter position number.

"1" : 3000°K

"2" : 5600°K

"3" : 5600°K + 25% ND

"4" : CAP

7) Battery Warning

"11.0 V" : Lights up when the battery voltage drops down to 11.0 V.

"10.8 V" : Blinks when the battery voltage is below 10.8 V.

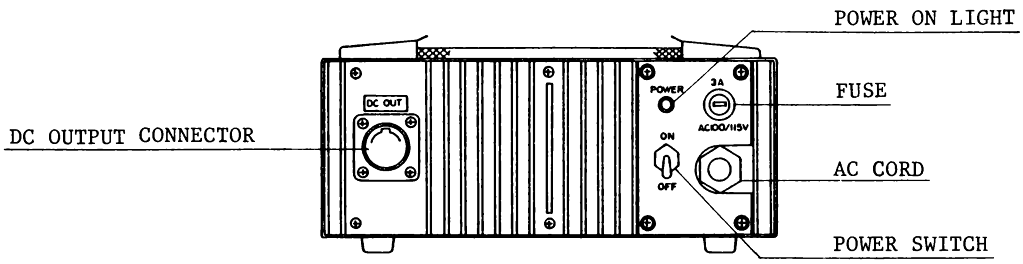
8) Tape Remaining Time

"5-0" : Blinks when the tape remaining time becomes less than five minutes.

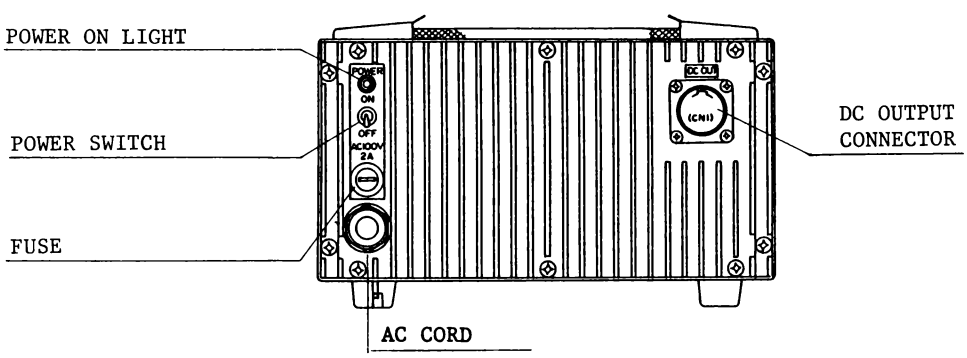
9) "VTR WARN"

Indicates VTR malfunction.

2.2.3 AC pack



ACP-23E (U.S.A. JAPAN)
AC100 or 117V

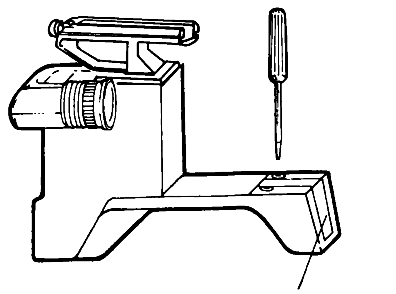


ACP-17E (EUROPE)
AC 220 or 240V

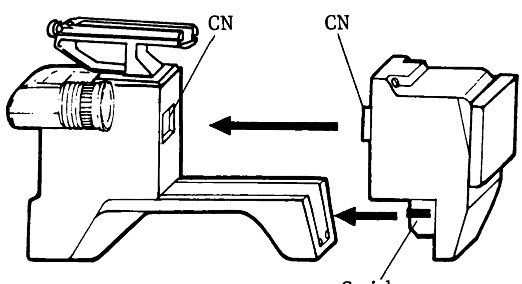
SECTION 3.0 INSTALLATION INSTRUCTIONS

SECTION 3.1 INSTALLATION

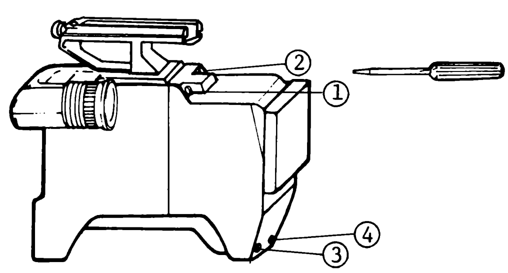
3.1.1 Mounting CA-95 camera adapter



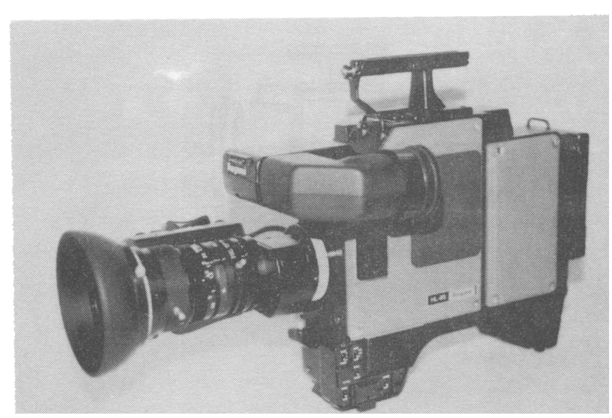
1) Remove the Blind cap at the rear of the HL-95
(Take off two screws using a screwdriver ⊕ or ⊖.)



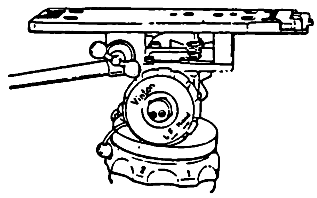
2) Set the system connector and guide to the camera body. Then push in it toward the arrows (⟵).



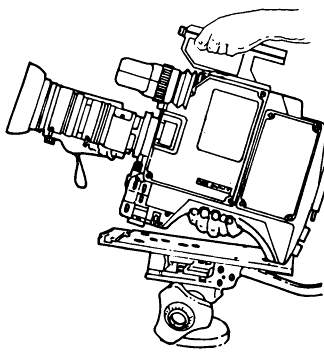
3) Tighten screws from ① to ④ using a screwdriver ⊕ or ⊖.



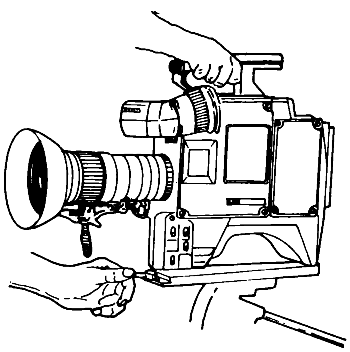
3.1.2 Mounting tripod



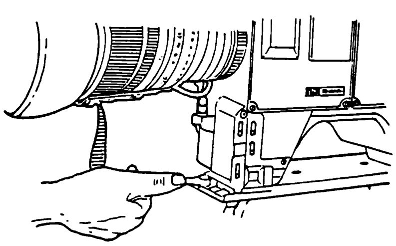
1) Secure the Tripod Adapter Plate (supplied) to the tripod with a 3/8 x 16 fixing bolt.
The camera head locking mechanism should be forward (toward the scene).



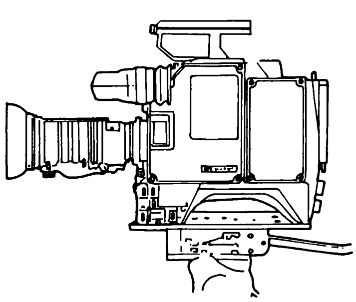
2) Mount the Camera Head on the Tripod Adapter by placing the rear of the camera in the rear slot.



3) With the front clamping lever of the Adapter Plate open, place the front of the camera in the front slot...and...



...push the clamping lever shut, and snap the safety lock in place.



4) Check that the camera is safely seated in the adapter.

SECTION 3.2 POWER SUPPLY CONNECTION

Note: Check to make sure that camera switches are set to the following positions.

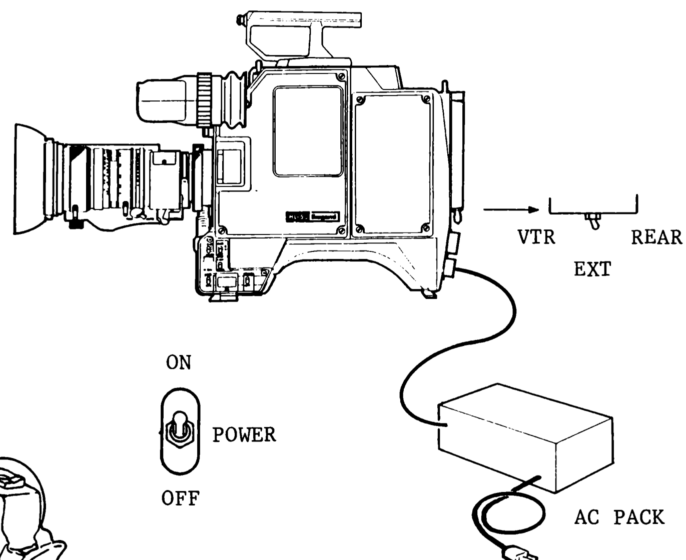
POWER	"OFF"
STBY/CAM/VTR	"CAM"
CAM/BAR	"CAM"
GAIN	"0 dB"

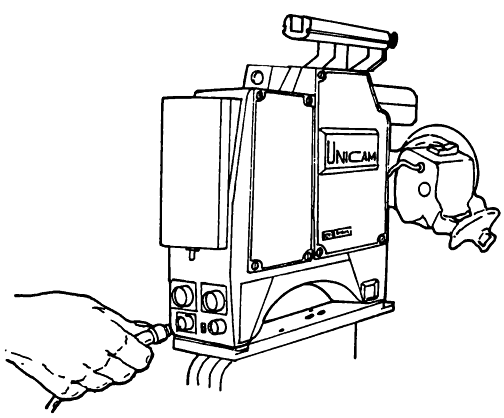
3.2.1 External power source

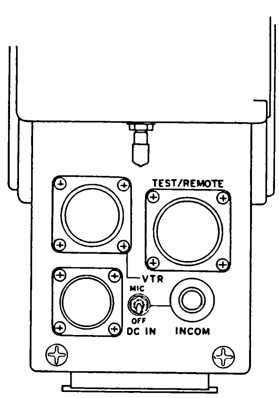
The camera accepts only DC +12 V (+110 V +16 V).

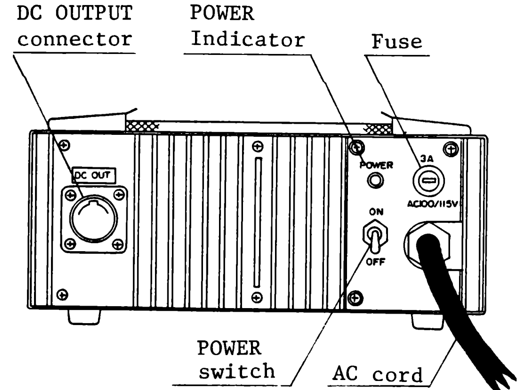
① When using an AC pack or external power sources, connect DC cable to the power connector.

② Set the VTR/EXT/REAR switch to "EXT".



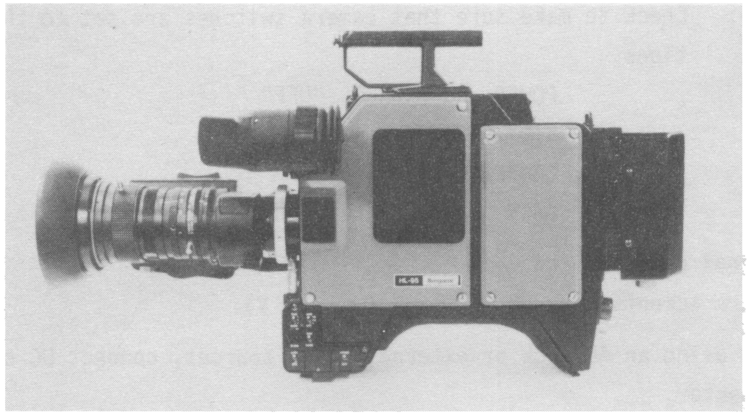






ACP-23E

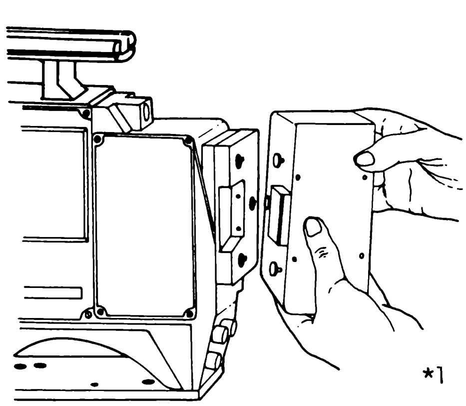
3.2.2 Mounting rear battery



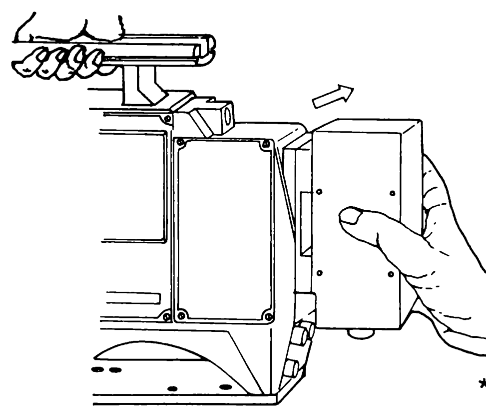
① Remove the battery bracket cover by depressing the release lever while sliding the cover to the left.

② To mount the battery, align the 3 battery tabs with the slots in the battery bracket, and slide the battery to the right. It will selflock, and no other connections required. See *1 and *2.

Note: To remove the battery, press the release lever while sliding the battery to the left.



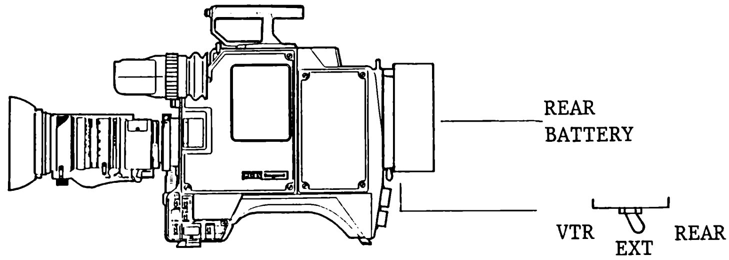
*1



*2

③ To power the camera system from the Rear Battery set camera switches as follows: See *3.

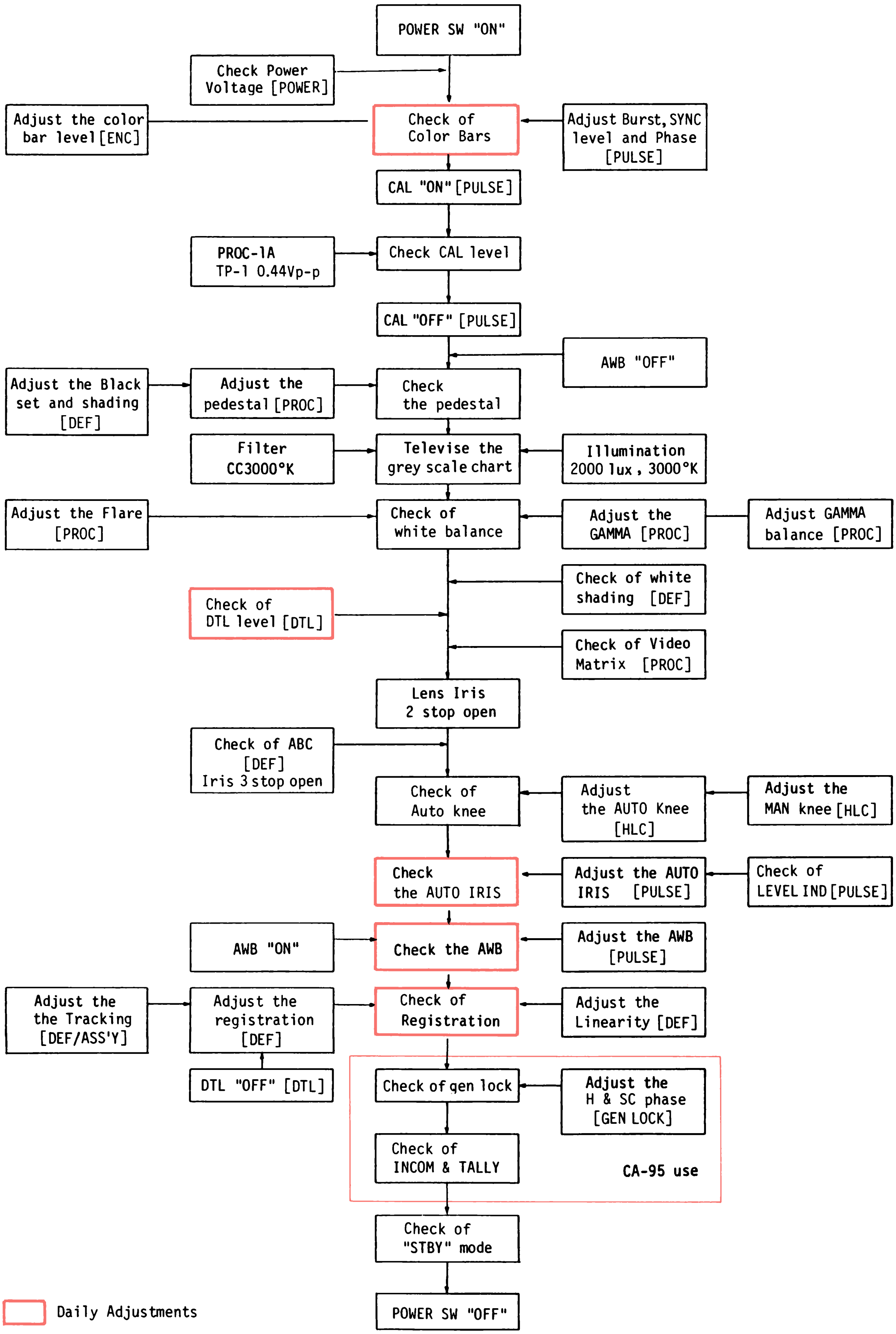
VTR/EXT/REAR switch: "REAR"



*3

SECTION 4.0 OPERATION

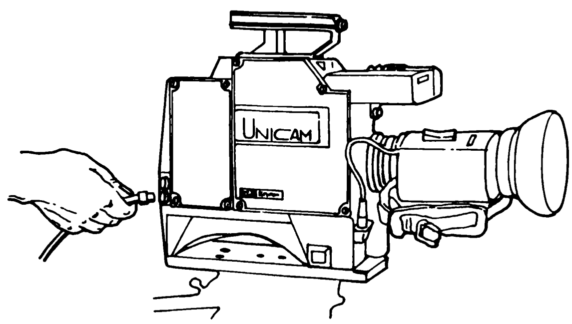
SECTION 4.1 HEAD OPERATION FLOW CHART



SECTION 4.2 OPERATING PROCEDURE

(1) Connect the cable from the color monitor to the video terminal.

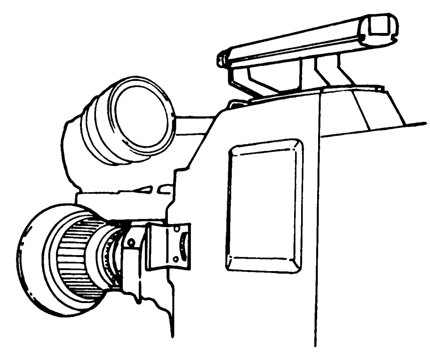
Caution: Avoid holding the camera by the viewfinder!



(2) Set the POWER switch on the camera to 'ON'. The camera will be ready within 5 seconds.

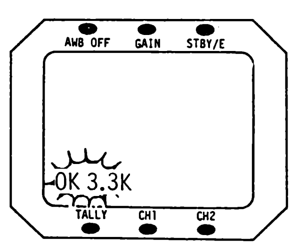
(3) Use the appropriate filter to compensate for the scene's light source.

COLOR filter	Light sources
"1" : 3000°K	Tungsten-filament lamp
"2" : 5600°K	White fluorescent lamp
"3" : 5600°K +25%ND	Normal sunlight
"4" : CAP	



(4) Auto white balance

① Depress the W BAL switch on the right side of the camera for about 1 second. Then the display "OK" & "color temperature" will come on to indicate in the viewfinder that the white balance is obtained.



<Condition for the white balance>

◦ A white field occupies an area of more than 10% as large as the screen.
◦ A white video level reaches more than 60%.
◦ The highlight of more than 100% does not exist on the screen.

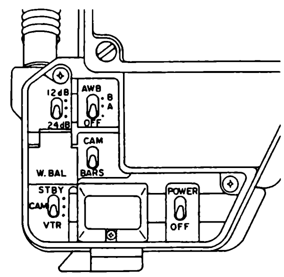
The white balance can be obtained in about 1 second.

② Three (3) modes for white balance

B - memory B

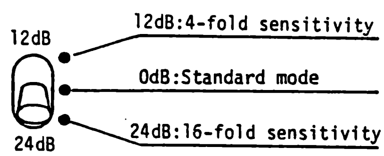
A - memory A

OFF - 3000°K

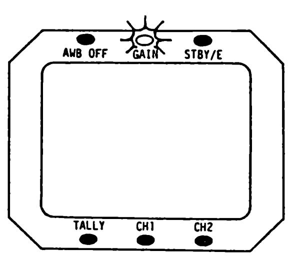


(5) Taking image at Low Illumination

The following effects can be obtained by the 12dB/24dB (GAIN UP) switch at the right side of the camera if an object is at low illumination.



When sensitivity is gained up to 12dB or 24dB, the GAIN lamp (GREEN) in the view-finder comes on.



(6) Operating of Lens

① IRIS control

Set the lens to 'AUTO IRIS'. Set the camera to BAR .... the lens will close automatically.

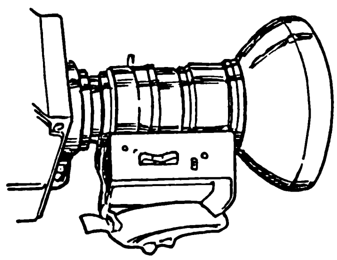
It will also close automatically to protect the image pick-up tube, when the POWER switch is set to 'OFF' or at STBY mode.

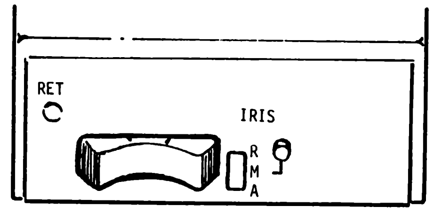
IRIS status positions:

'M': The iris ring can be turned manually; also the Auto Iris can be set when momentary pushbutton is depressed. The iris setting obtained is kept even when the pushbutton is released.

'A': The AUTO system operates and maintains a stable video level.

'R': Used to remotely control the IRIS.





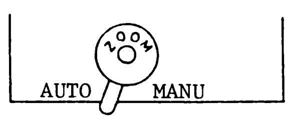
② ZOOM lens control

'MANU': The zoom ring can be turned and controlled manually.

'AUTO': The zoom ring can be controlled with the Zoom rocker switch. Increasing finger pressure on either the W (wide) or T (tele) position of the rocker switch, increases the zoom speeds.

'RET': The Return video from the VTR can be seen in the viewfinder, when this button is pressed.

'VTR': Puts the VTR in the Record mode when depressed, and the VTR is stopped when this button is released.



(7) Operate

SECTION 4.3 ADJUSTMENT OF CONTROLS (Using CA-95 Camera Adapter)

(1) Intercom Adjustment

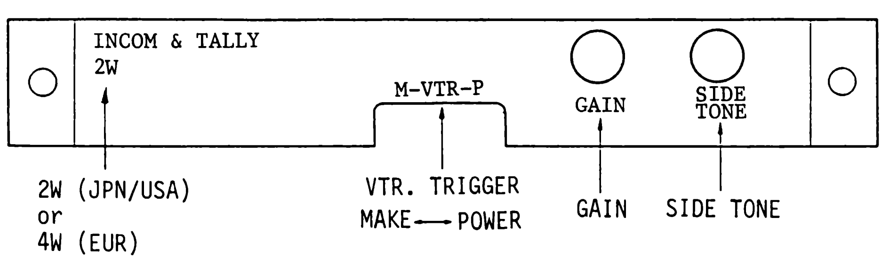
① Listening to the LINE signal via the head-phone, adjust its volume to an optimum level with the GAIN control VR2.

② Adjust the SIDE-TONE control VR1 until a signal from the Mic (headset) can be best heard via the head-phone.

(2) Tally Adjustment

① When the VTR start switch on the lens of the camera is depressed in normal condition, the tally lamp (red) at the front side of the viewfinder comes on. However, the tally lamp can be made to come on with a control from the VTR when the VTR TALLY switch S4 of the VIDEO I/F module is set to "OFF".
In that case, applying control signal to the 15 pin of VTR connector is required.
The Tally control from Remote Connector can be set by either shorting the control between the 17 and 47 or, applying control voltage (from +5 to +24V) to the 47 pin and ground of REMOTE connector.

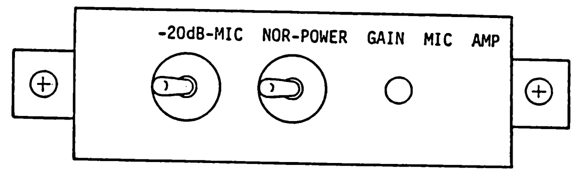
② A trigger signal can be supplied to the VTR using a control and power.
Usually, it is supplied using power. Setting the VTR switch SW2 on the INCOM & TALLY module to "P" allows sending of the signal with the power, and setting the switch to "M" allows sending with the contact.



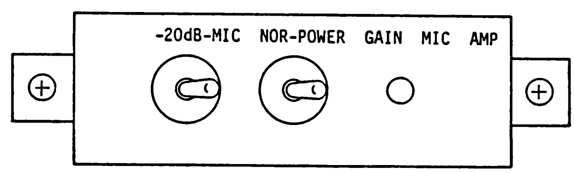
(3) Microphone Gain Adjustments

The following ways of use are permissible in accordance with the microphone used.

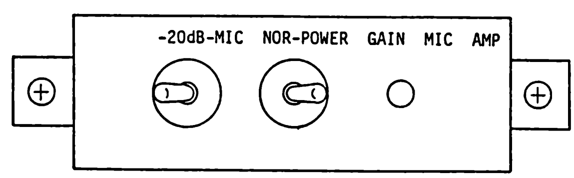
① Input of -50dB, output of -20dB



② Input-output thru, power supply (+9 to +9.6 V)



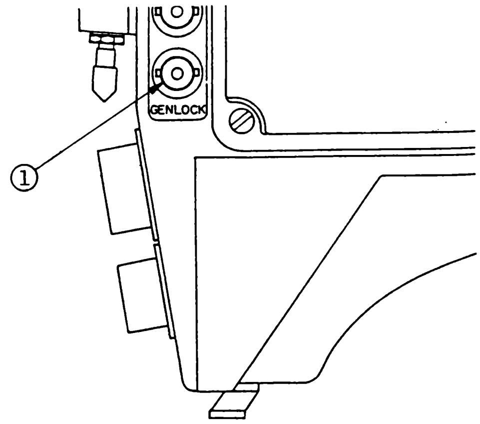
③ Input of -20dB, output of -60dB, power supply (+9 to +9.6 V) (when using the MIC amplifier as a pad of -40dB)



* Turn the GAIN control toward a minimum position to get input of -20dB. Under that condition, adjust an output level to -60dB.

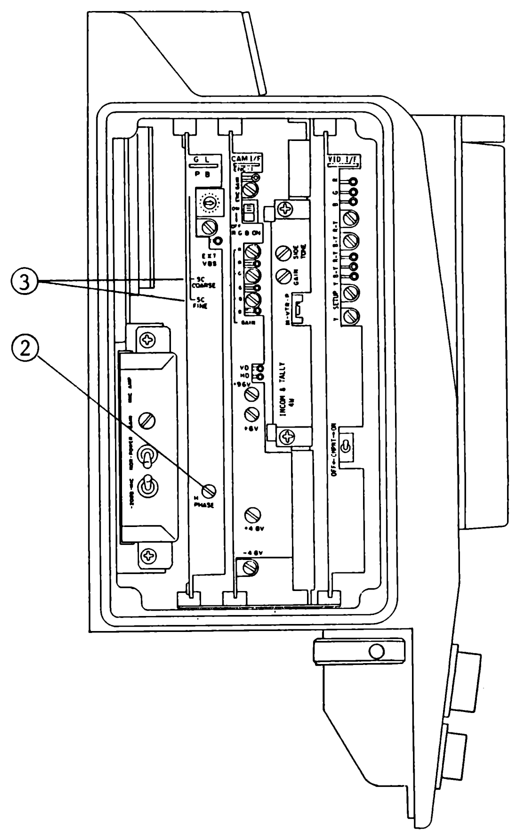
(4) GEN LOCK Adjustment

① Apply an external synchronizing signal (EXT VBS) to the GEN LOCK input terminal of the camera.



② Adjust the H PHASE control at the front of the GEN LOCK module until the sync phase of the camera matches that of the external synchronizing signal.

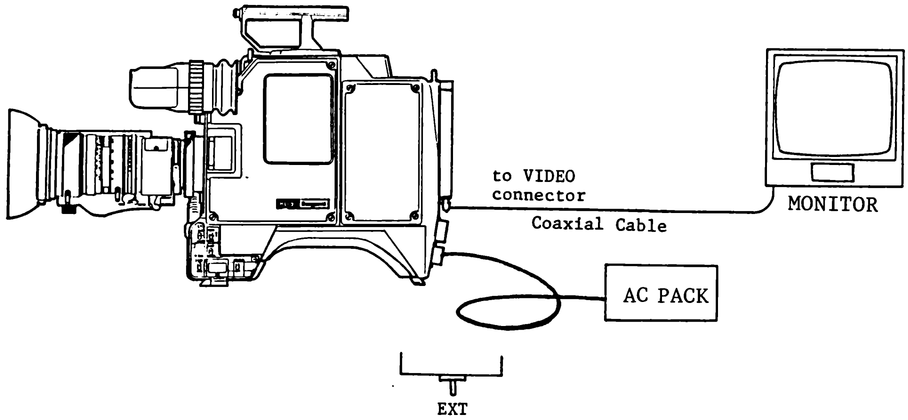
Adjusting range: ±3.0μs.



③ Adjust the SC COARSE PHASE and SC FINE PHASE controls at the front side of the GEN LOCK module until the subcarrier phase of the camera matches that of the external synchronizing signal.

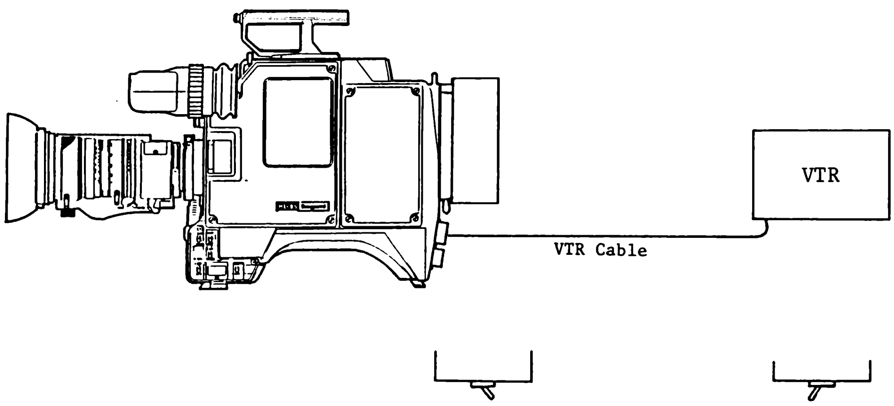
SECTION 4.4 SYSTEM CONNECTION

(1) Camera Operation Confirmation



POWER SELECT SW POSITION: CENTER (EXT)

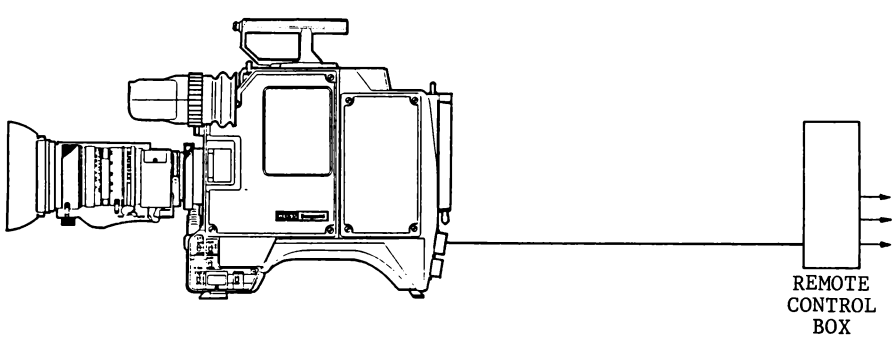
(2) VTR Operation



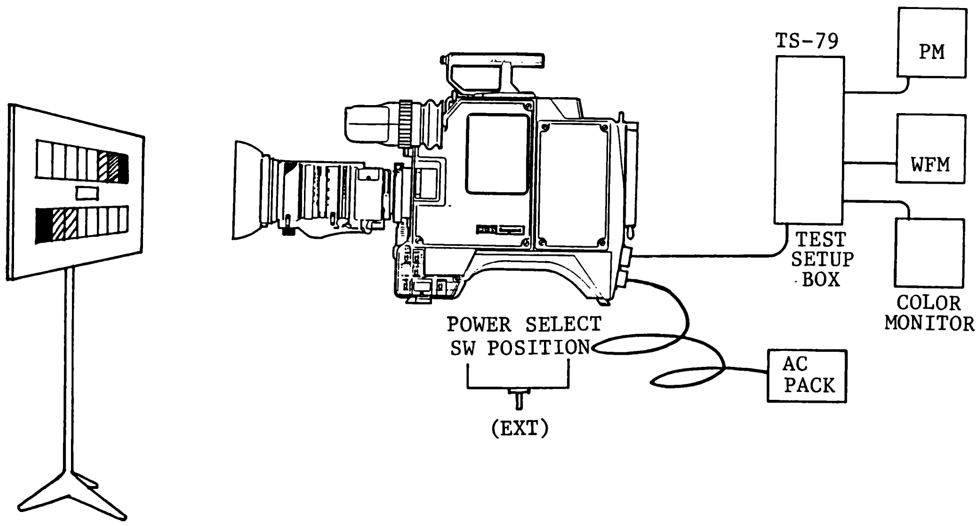
POWER SELECT SW POSITION: "REAR" when the power is supplied from Battery

"VTR" when the power is supplied from VTR

(3) Remote Control System

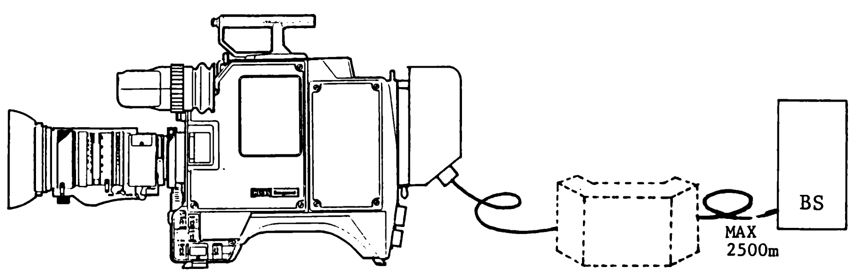


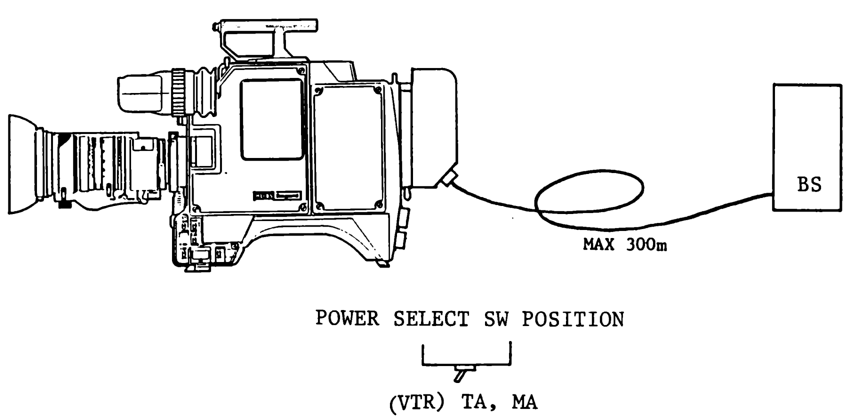
(4) Setup System



(5) System Operation

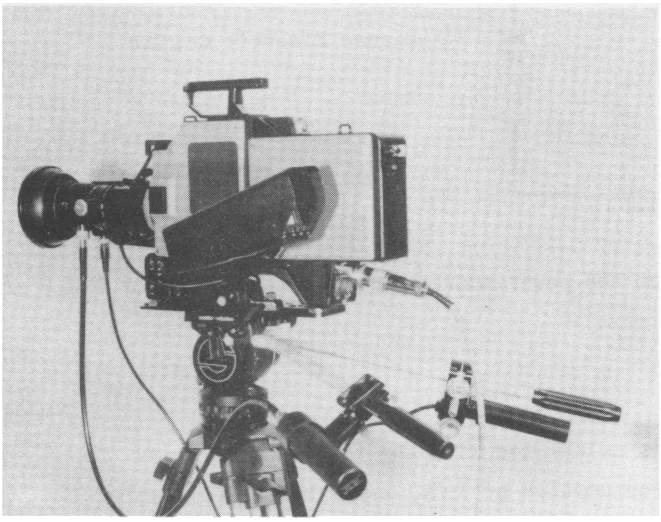
① Same as HL-79A/D System

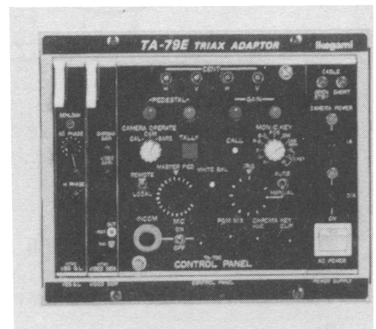




② HL-95 System

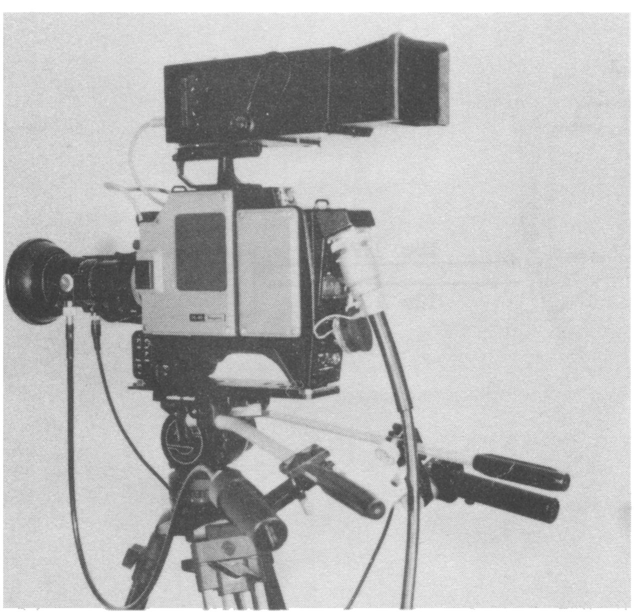
Triax Remote Control System and 3" Viewfinder

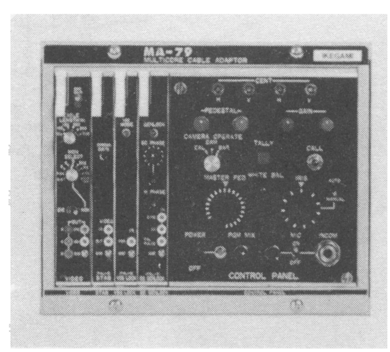




TA-79E Triax Base Station

Multicore Remote Control System and 4.5" Viewfinder

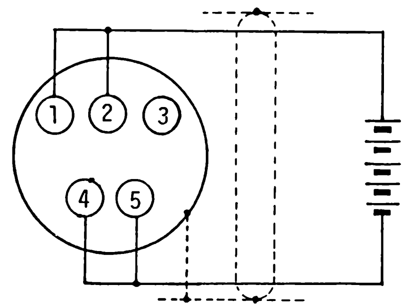




MA-79 Multicore Base Station

SECTION 4.5 DC/VTR CONNECTORS (Using CA-95 Camera Adapter)

(1) DC IN



JRC13PG-5S

Hirose Electric Co.,Ltd.

Always use adequate size from the power source to assure a minimum of 11.0 V at the camera input.

VOLTAGE DROP VALCULATION

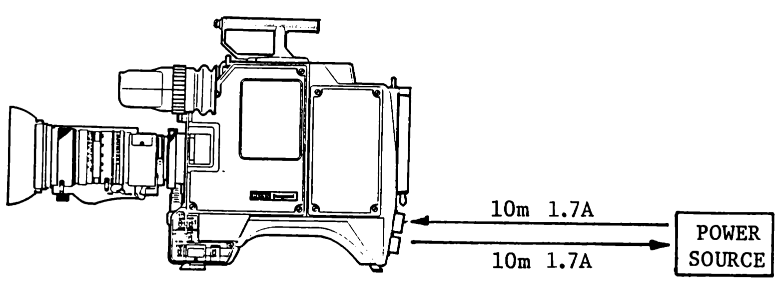
Voltage drop at the camera is calculated with the following formula.
That is based on a current consumption of 1.7A, and a 10m (30ft) cable.

Conductor resistance = 14.7 Ω/km

14.7 (Ω/km) ÷ 1000 (m) × 10 m × 2* × 1.7A = 0.4998

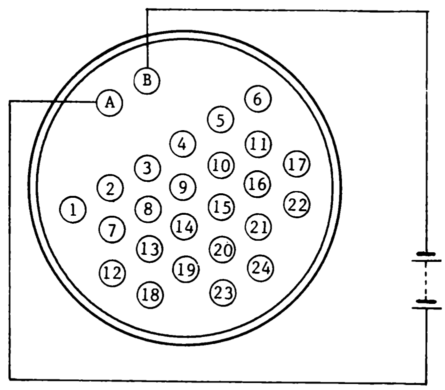
(2* = 2 wire conductor ... To & from camera)

The voltage drop is 0.4998 for the 10 m cable length. Accordingly, the camera input terminal voltage is 12.0V(output from power supply) -0.4998 V = 11.5 V at the camera input.



(2) VTR

SRCB02A21-26P

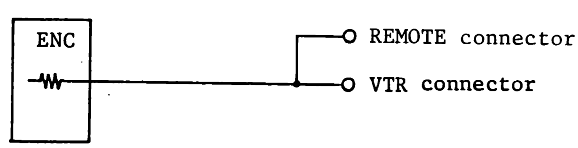


VTR

Pin	Signal
1	ENC OUT
2	ENC RET
3	Y RET
4	Y OUT
5	R-Y OUT
6	R-Y RET
7	B-Y OUT
8	B-Y RET
9	MIC OUT(HOT)
10	MIC OUT(COLD)
11	MIC OUT(SHIELD)
12	VTR TRIG OUT
13	BATT.ALM IN
14	——
15	REC TALLY IN
16	EXT VBS IN
17	CABLE SHIELD
18	RET VIDEO IN
19	RET VIDEO RET
20	P.SAVE/ADU.MONI
21	EXT VBS RET
22	COLOR FLM OUT
23	——
24	——
A	+12V IN
B	+12V RET

Note: Encoded Video

VTR and Remote connectors in parallel connection



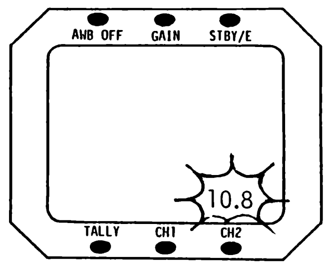
* Encoded video signal cannot be taken out from both REMOTE connector and VTR connector at the same time because of parallel connection as shown above.

SECTION 4.6 OPERATING PRECAUTIONS

(1) Battery indication (display in the viewfinder.)

11.0 V .... "11.0" display

10.8 V .... "10.8" blinking display



If "11.0" is indicated, change the battery immediately. When the input voltage is less than 10.8 V, it is likely to be impossible to taking a picture.
It takes a few minutes (from 1 to 5 minutes) to change from "11.0 V" display to "10.8" blinking display.
Discharge time of the battery (service time of the camera) depends upon charging condition and ambient temperature. In addition, battery discharge time also depends upon the ratio in working the 4.5 inch viewfinder and the zoom lenz servo system. When battery discharge voltage drops, the battery warning lits indication to warn the camera man can observe it in the viewfinder.

(2) The camera must not directly face an object such as the sun-light having an excess of quantity of light.

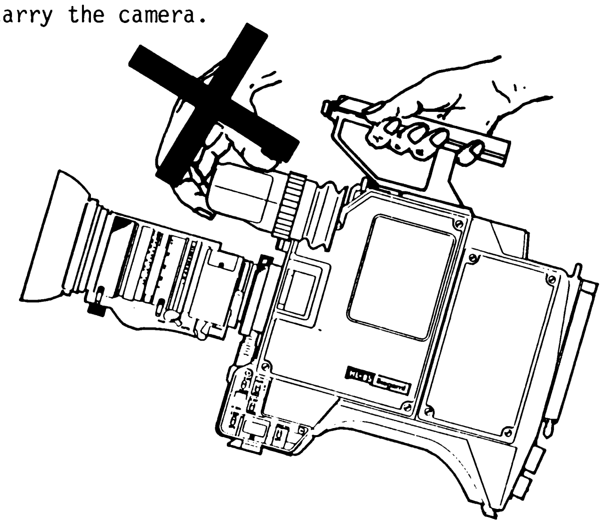
(3) Use the carrying case to carry the camera without any excessive vibration and shocks.

(4) When storing the camera, avoid the following locations.

° High temperature (30°C or less preferable in longtime services)

° High relative humidity

(5) Do not hold the viewfinder to carry the camera.
to carry the camera.

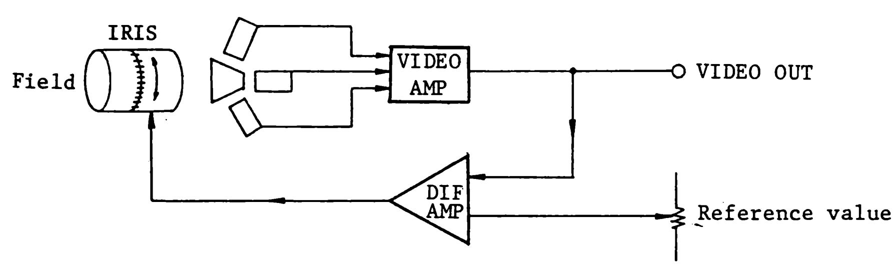


SECTION 5.0 TECHNICAL DESCRIPTION OF SYSTEM

SECTION 5.1 LENS IRIS SYSTEM

Iris

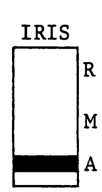
The IRIS control signal from the HL-95 camera controls the servo-motor which drives the iris ring.
The auto iris circuit is such that the lens iris operates automatically with variations of incident light so that the video level of the camera output will be held essentially constant even if an object varies in quantity of light.



The auto iris of the HL-95 operates by the NAM(non additive mix)signal of R,G and B.

Switching Iris Mode

The selector switch mounted on the right side of lens allows the following operation modes to drive the iris for the HL-95 lens.



R : Remote

Remote mode (R) is used to quicken a response with the camera remotely controlled by increasing gain of the servo-amplifier of the iris.

M : Manual

Manual mode (M) is used to permit manual operation of iris.

A : Auto

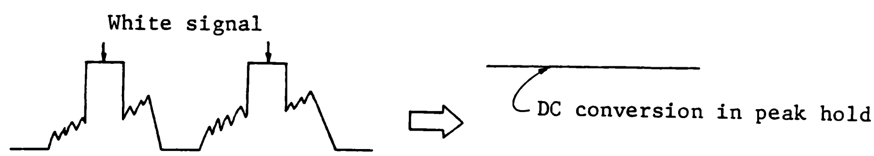
Auto mode (A) provides for operation of iris from the cameras output signal.

In the past, the switching between remote and auto modes depended upon the operation method of camera, but the HL-95 permits automatic mode-change to free the cameraman from this action.
The camera, when operated as a single unit, can be operated by the auto iris regardless of remote and auto lens settings. The remote mode is automatically switched by remotely sending an auto iris OFF control signal to the camera.
Even when AWB/ABB is activated during operation of the camera in manual mode, the auto iris is automatically adjusted for an appropriate position. When the camera is set to STBY, or turned off, the iris closes automatically to protect the image tube.

SECTION 5.2 AUTO WHITE BALANCE

The AUTO WHITE balance function, viewfinder object, always reproduces it as white. In the color camera, the R, G and B signal must have the same levels to reproduce white. The R, G and B signal levels are not always equal to each other but change with conditions of lighting. This is caused by different color temperatures of the light. The same colored object will be seen differently through man's eyes under fluorescent and incandescent lamps. This phenomenon applies to the camera. The AUTO WHITE balance function is to reproduce the white object as white under any conditions. The image tube used for the camera changes in sensitivity with change of color temperature. The R signal level will lower and the B and G signal levels will rise as the color temperature rises above 3000°K, in case of the white object.

The principle of the AUTO WHITE balance function is based televising a white object, applying the R, G and B video signals to the module and holding them at peak level to convert each to a DC signal.



This is intended to operate the detector circuit only in the white part.

The R, G and B signals, entering the PULSE module, are held at peak to detect the highest level of any one of the three signals (signal corresponding to the white part of video).

The detected R, G and B signals are sequentially computed, and the R and B GAIN control circuits in the PROC module are controlled from the PULSE module to make the levels equal. The white object is now reproduced as white.

Note: The AUTO WHITE balance function must be operated only on a white object. The AUTO WHITE balance function, when operated for a bright colored object, makes it white.

SECTION 5.3 VIDEO SYSTEM

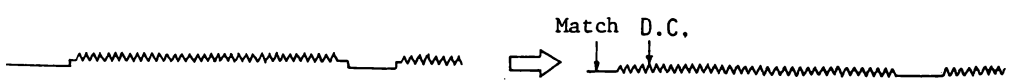
The weak video signals from the image tube is picked up by the low-input-capacity FET on the PREAMPLIFIER and amplified to 0.44Vp-p at the output of the PREAMPLIFIER module (when the signal current is 0.22μA in the G channel). The output signals of the PREAMPLIFIER module are processed by the PROCESS module, the HLC module and the DTL module, then converted to a composite signal by the ENC module and outputted from the camera.

PREAMPLIFIER Module

The PREAMPLIFIER module is a negative feedback type circuit employing a low-input-capacity FET that amplifies the weak video signal from the image tube. The output from the image tube is direct-coupled (not isolated by a capacitor) to improve black level stability and improve clamp noise.

PROCESS Module

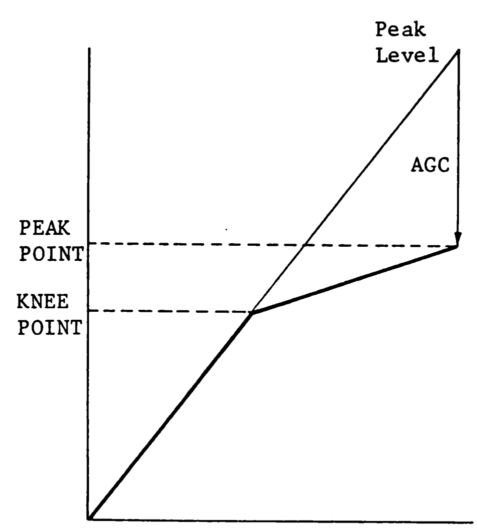
The output R, G and B signals from the PREAMPLIFIER module differ in level. Their levels are made equal to 0.56Vp-p by the first-stage amplifier. The BLACK COMP circuit is provided in the first-stage amplifier to adjust output D.C. signals to match CAM BL pulse in the video period.



The gain control amplifier has the +12/+24dB gain switching function, the remote control function by output DC and the white shading function.

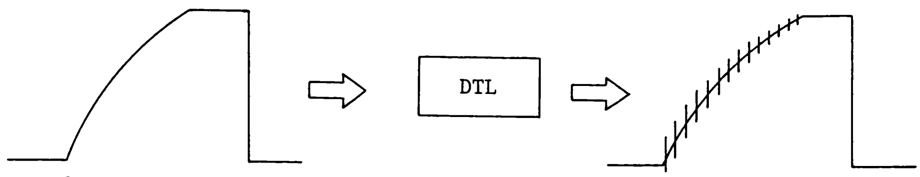
HLC Module

This module operates the highlight compression. Highlight compression operation is such that the AGC operates to compress the peak levels so that the level has the same level of the peak point when the video level is higher than a pre-determined peak point. The peak points where the AGC operates becomes the knee point. This operation always keeps the video level in the correct dynamic range even if its level varies.

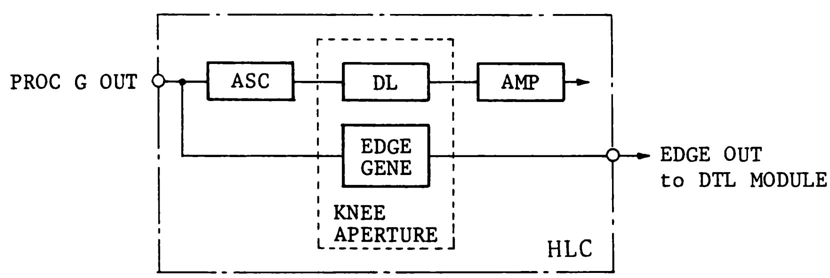


The knee aperture circuit sharpens the video being highlight compressed.

Conventional system

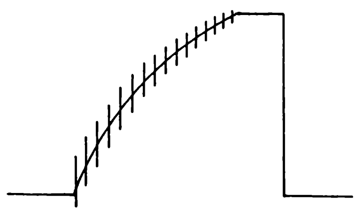


The conventional system has DTL edge signal lowered with an increase of the video signals since the DTL circuit is provided after gamma correction, this is normally not a problem since conventional cameras have less knee range than the HL-95. However, it is difficult for a camera having a wide dynamic range such as the HL-95 to produce an edge signal in the DTL circuit, for the video signal is more compressed by the highlight compression circuit.

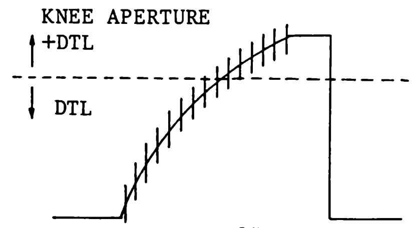


ASC:Auto Slope Control
(Auto Knee)

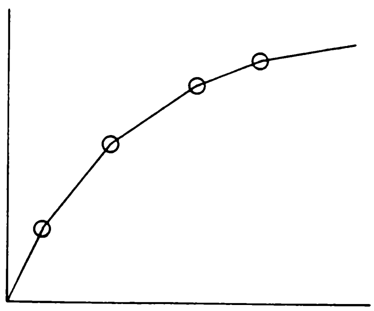
The signal from the G channel of the PROC module is applied to the highlight compression circuit and the knee aperture circuit on the HLC module.
The knee aperture circuit produces an edge signal from the wide range video signal before being compressed by the highlight compression circuit. Since the edge signal has a threshold level of 70% to 80%, lower levels receive no edge. The G-channel signal of the highlight compression circuit (signal used to perform highlight compression operation) is matched in phase with the G-ch signal of the edge circuit in knee aperture circuit by a delay line. This signal is shown next page.



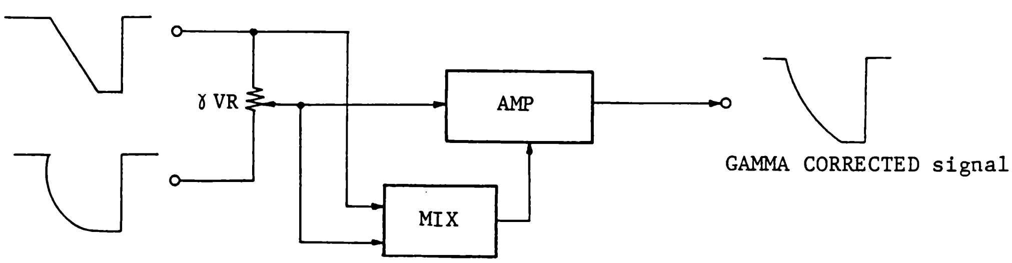
Conventional camera



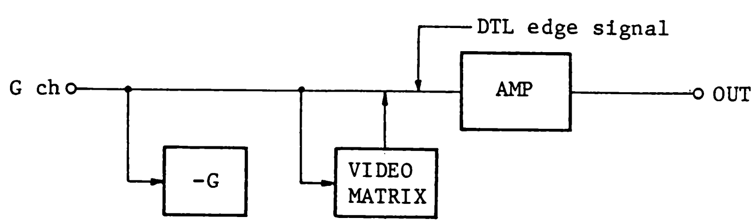
HL-95



The PROC module includes the gamma correction circuit for the signal compressed by the high-light compression circuit. The gamma correction curve is represented by four broken lines by using transistors.
And the gamma correction signal LIN signal are mixed to prepare the normal GAMMA CORRECTED signal (0.45).



The GAMMA CORRECTED signal enters the final-stage amplifier circuit.



The GAMMA CORRECTED signal is mixed with the DTL edge and MATRIX signals.
Matrix adjustment is as follows:

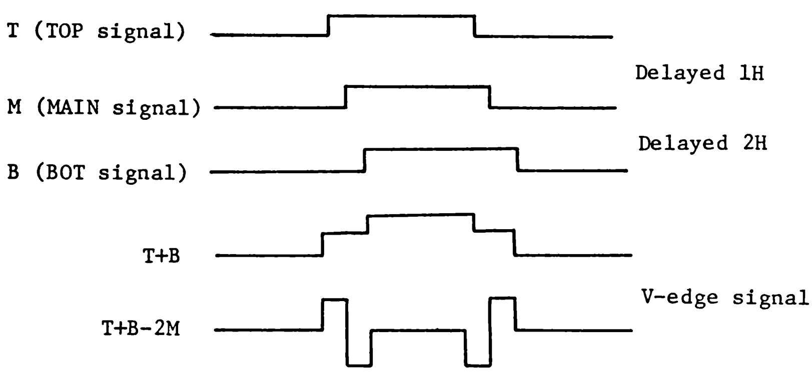
R channel : R-G
G channel : G-B
B channel : B-G

DTL Module

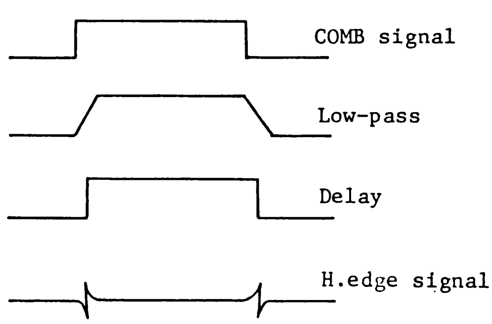
The DTL module produces an edge signal for detail correction. It inputs the gamma corrected G signal of the PROC module and mixes a white pulse (for AGC) into the signal in the first stage.

This signal is modulated by a 30MHz carrier to pass through the video delay unit. The M signal (MAIN) is delayed 1 H (64 μS) by the first video delay unit. The MAIN signal is further delayed 1 H by the second video unit, i.e., the B signal (BOT) is delayed 2 H in total.

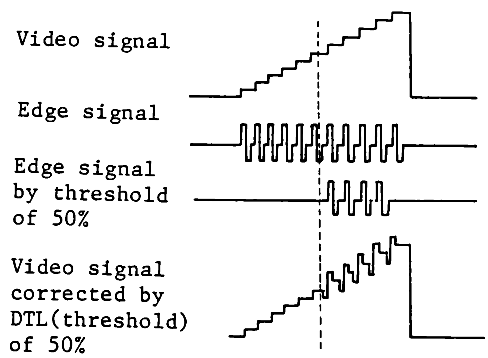
These signals, delayed 1 H and 2 H, are demodulated in the next stage. A vertical contour signal is produced by the demodulated M and B signal and the original T (TOP) signal.



A horizontal contour comb signal is generated from a composite signal of the MAIN and TOP signals. The signal is divided into two; one applied to a low-pass filter and another to a delay line to produce the contour signal in the horizontal direction.

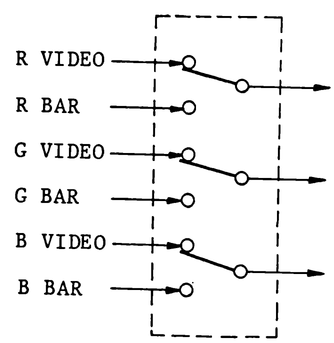


The V and H contour signals are mixed with and the dark part is cut off by the threshold circuit. Then noise is reduced by the noise slice circuit and the detail (contoured) signal sent to the PROC module.

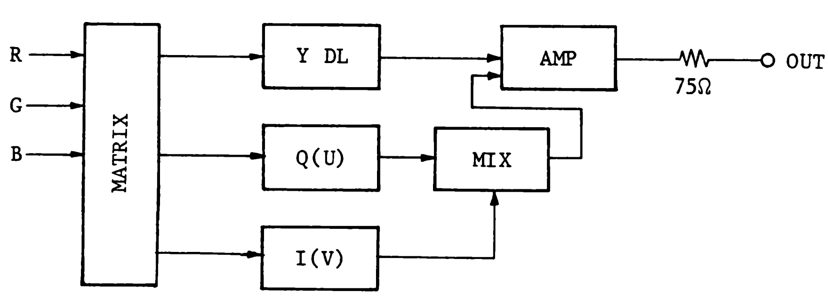


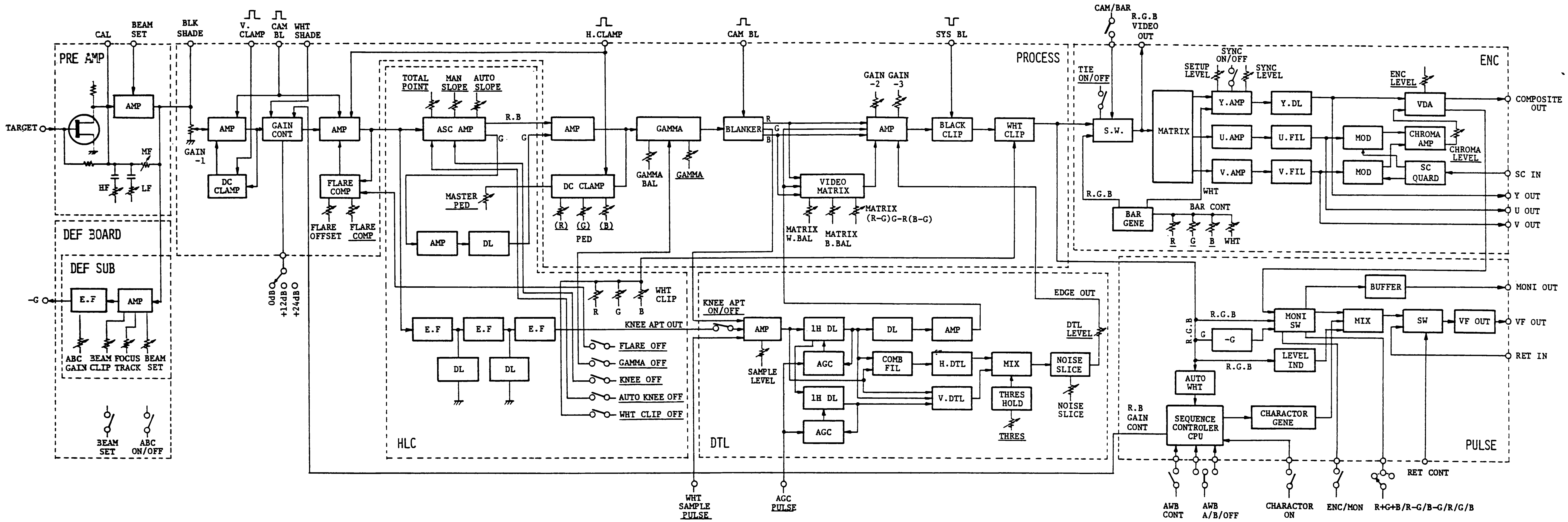
ENCODER Module

The ENCODER module produces the NTSC, PAL-B and PAL-M signal, etc. from the three video (R, G and B) signals. Each of the video signals enters an analog switch IC capable of switching it to the BAR signal. This is a means to provide the COLOR BAR signal or the camera video signal to ENC OUT. R, G and B video signals are converted via the matrix module to the Y,I and Q(Y,U and V) signals. The Y signal is mixed with the SYNC, SETUP and white BAR signals, and this composite signal is sent to the Y delay line. The Y delay line matches the signal with the CHROMA signal in phase. The I and Q (or U and V) signals are modulated and mixed to form the CHROMA signal. The Y signal is mixed with the CHROMA signal. The Y signal is mixed with the CHROMA signal and two signals are outputted as the ENC out signal (75Ω), through the output amplifier.



Analog switch





VIDEO SYSTEM (PAL-B)
Block Diagram

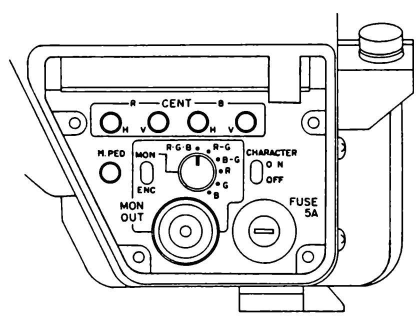
SECTION 5.4 MONITOR SYSTEM

The HL-95 has the following video output functions.

VIDEO	Input/Output Pin Location
ENCODER VIDEO-1 out	SYSTEM connector
MONITOR VIDEO out (ENC,R,G,B,R-G,B-G,R+G+B)	Camera BNC and SYSTEM connectors in parallel connection
VF VIDEO out (NAM,R,G,B,R-G,B-G,R+G+B/RET)	VF connector
R,G,B VIDEO out	SYSTEM connector
RET VIDEO in	SYSTEM connectors in parallel connection

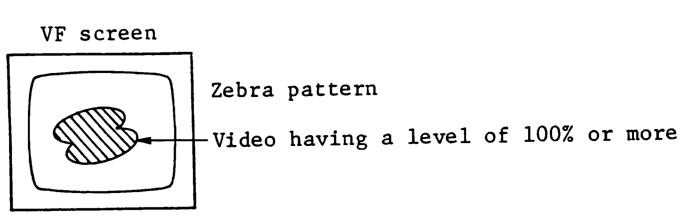
° In case that CA-95 camera Adapter is used with the HL-95, the input and output functions are same as that of the HL-79D.

° The MONITOR VIDEO OUT can select any kinds of signal using the selector switch on the camera body,but whenever operated, must be terminated with 75Ω.
The ENCODER VIDEO signal is outputted to the MONITOR VIDEO OUT (BNC connector) when operated. (Keep the ENC/MON switch to "ENC".) Therefore to select the MONITOR VIDEO OUT desired, set the ENC/MON switch to "MON" and select any of R, G, B, R-G, B-G and R+G+B with the rotary selector switch.



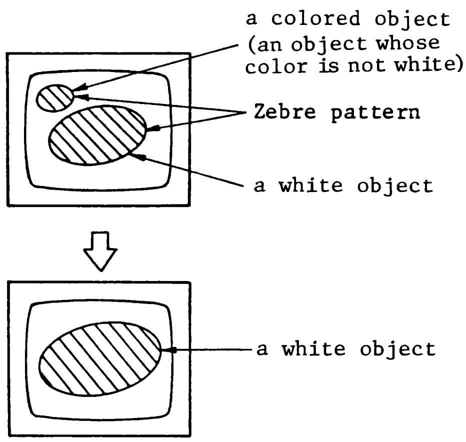
° The NAM signal is outputted to the VF VIDEO OUT when operated during setting the ENC/MON switch to "ENC". Any of R, G, B, R-G, B-G, and R+G+B signals can be outputted by changing the ENC/MON switch to "MON".

° Level Indicator
The level indicator permits the cameraman to monitor the video level on the screen by superimposing a zebra pattern on the video where its level exceeds 100%.



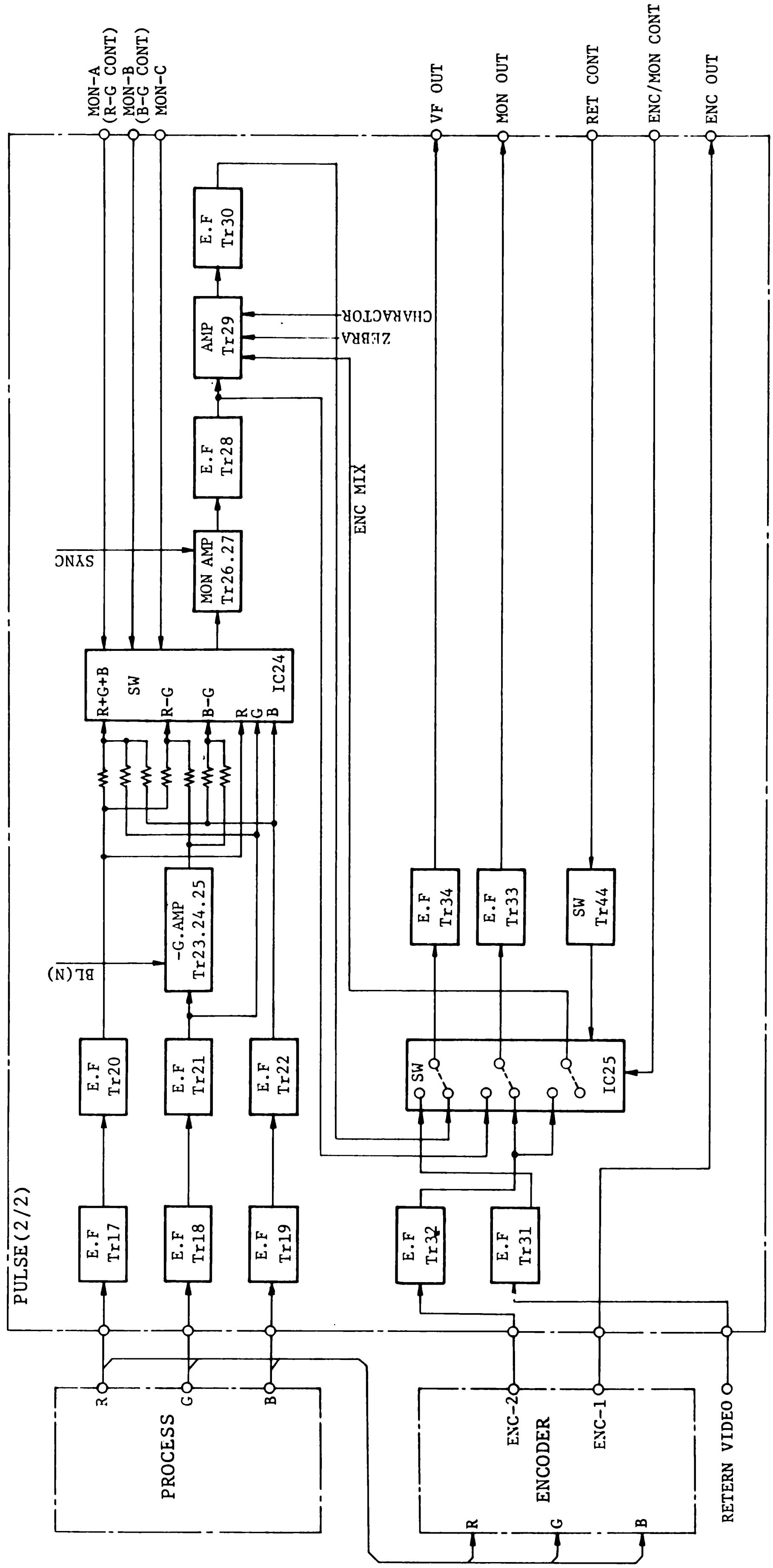
° WHITE BALANCE POSITION

This function displays the area where the AUTO WHITE BALANCE is operated. When the AUTO WHITE BALANCE is operated and the zebra pattern is superimposed on the unnecessary video area besides the specified area, it means the AWB operation should not be done in such a scene.



If the zebra pattern is superimposed even on a colored object at the AWB operation, it means the AWB cannot be obtained for a white object.
Therefore it is required to obtain the AWB again after removal of a colored object from the scene (remaining only a white object in the VF screen).

Fig. 5-2



MONITOR SYSTEM
Block Diagram

SECTION 5.5 PULSE SYSTEM (PAL-B)

The PULSE module consists of the synthesizer pulse signal generator circuits, and monitor circuit. It's major signal functions are as follows.

CAL: Used for calibration of the camera. (This pulse is common for the R, G and B signals. Therefore G-ch signal from ENC OUT is delayed by DTL module.)

SYNC: Added to the video output signals of the ENC and PULSE modules.

CAM HD: The horizontal deflection is derived from this pulse.

CAM VD: The vertical deflection is derived from this pulse.

CAM BL: Used for the beam cut off and protection of the image tube.

V CLAMP: Used in the first-stage clamp circuit of the PROC module.

H CLAMP: Used for clamp circuits

V SAMPLE: Used for the reference level in the AGC circuit on the DTL module.

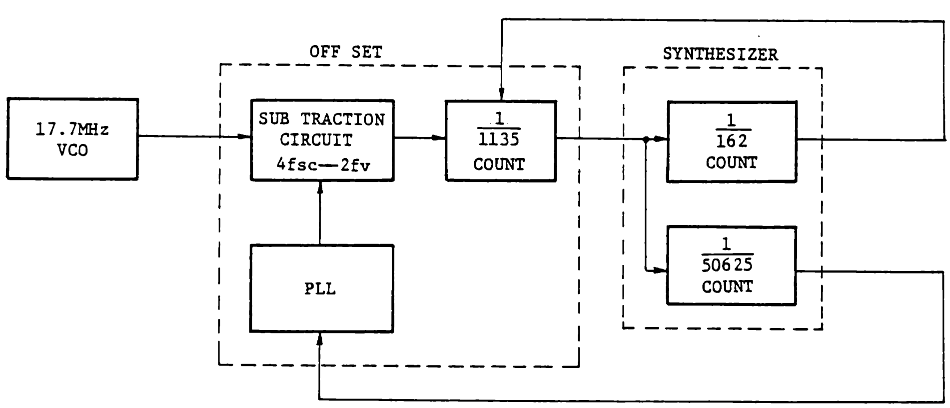
Internal Operation

In the PAL system, the subcarrier (fsc) and horizontal frequency (fh) have to satisfy the following equation (1).

$$fh = \frac{4fsc}{1135 + \frac{4}{625}} \qquad \frac{4}{625} fh = 2fv$$

$$fh = \frac{4fsc - 2fv}{1135} \quad \ldots\ldots\ldots\ldots\ldots(1)$$

In the internal operation, the subcarrier and horizontal frequency are controlled by satisfying the equation (1) with the OFF SET IC3,4 and SYNTHESIZER(IC11) since an external signal (VBS/BBS) is not available.



In the interior of the OFF SET IC3, 2fv(100Hz) sent from PLL CIRCUIT is subtracted from this 4fsc by SUBTRACTION CIRCUIT to obtain 4fsc-2fv which is divided into 1135 by combining the H. COUNTER in the SYNTHESIZER with the COUNTER in OFF SET IC3,4 to obtain fh.

Two times fv from SYNTHESIZER (IC11), 2fv (100Hz), generated in the PLL CIRCUIT and supplied to the SUBTRACTION CIRCUIT.

A variety of pulses used by the TV camera are prepared from the output of the SYNTHESIZER that is operating under such condition. Each of the pulses has the following function.

Gen lock

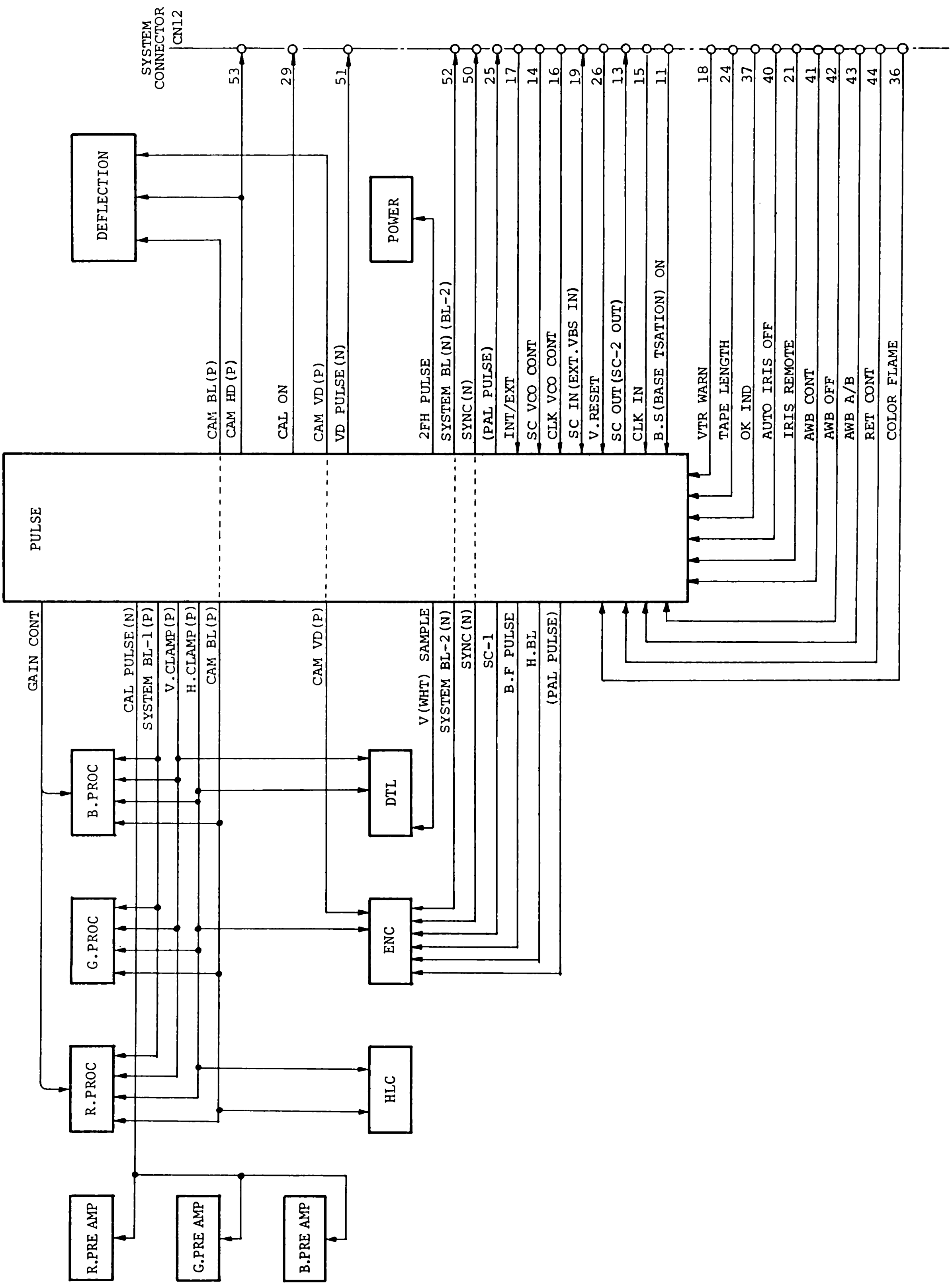
When applying external synchronization to the GEN LOCK module, VBS or BBS is used as the external synchronizing signal.

The GEN LOCK module regenerates the synchronization signal from the VBS/BBS signal using the SYNC SEP circuit. A sampling pulse is prepared from the synchronizing signal via the H SEP circuit and used in the color synchronization and horizontal synchronization circuits. The V RESET pulse is prepared by the V SEP circuit and used for vertical gen lock.

For color gen lock, a subcarrier component is picked up from the external synchronizing signal VBS/BBS via a band-pass filter and the burst flag is compared with an internal subcarrier to control the quartz crystal oscillator in the PULSE module using the error voltage.

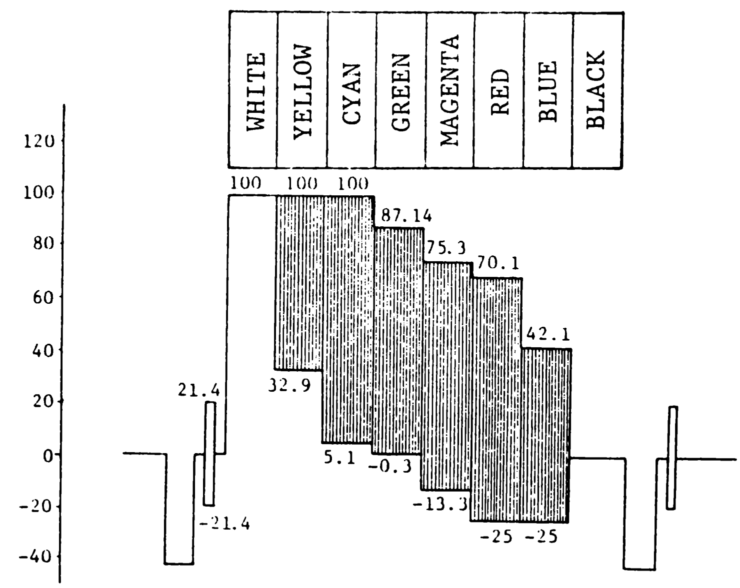
Synchronization at the base station is performed by the V RESET pulse and a frequency of 2.531250 MHz in the PULSE module.

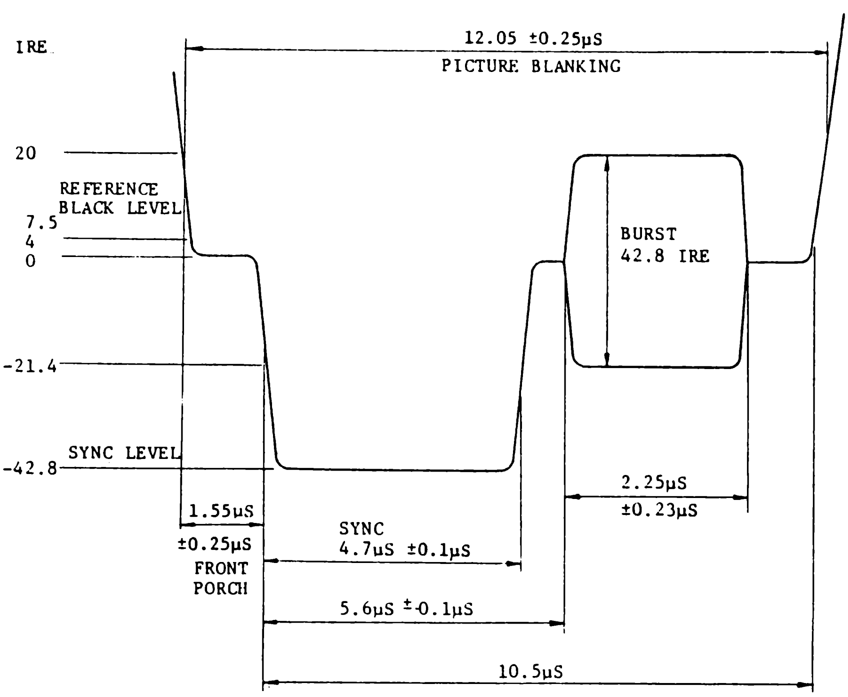
Color synchronization is achieved by applying a subcarrier (color burst signal) to the EXT VBS terminal of the PULSE module.



PULSE SYSTEM
Block Diagram

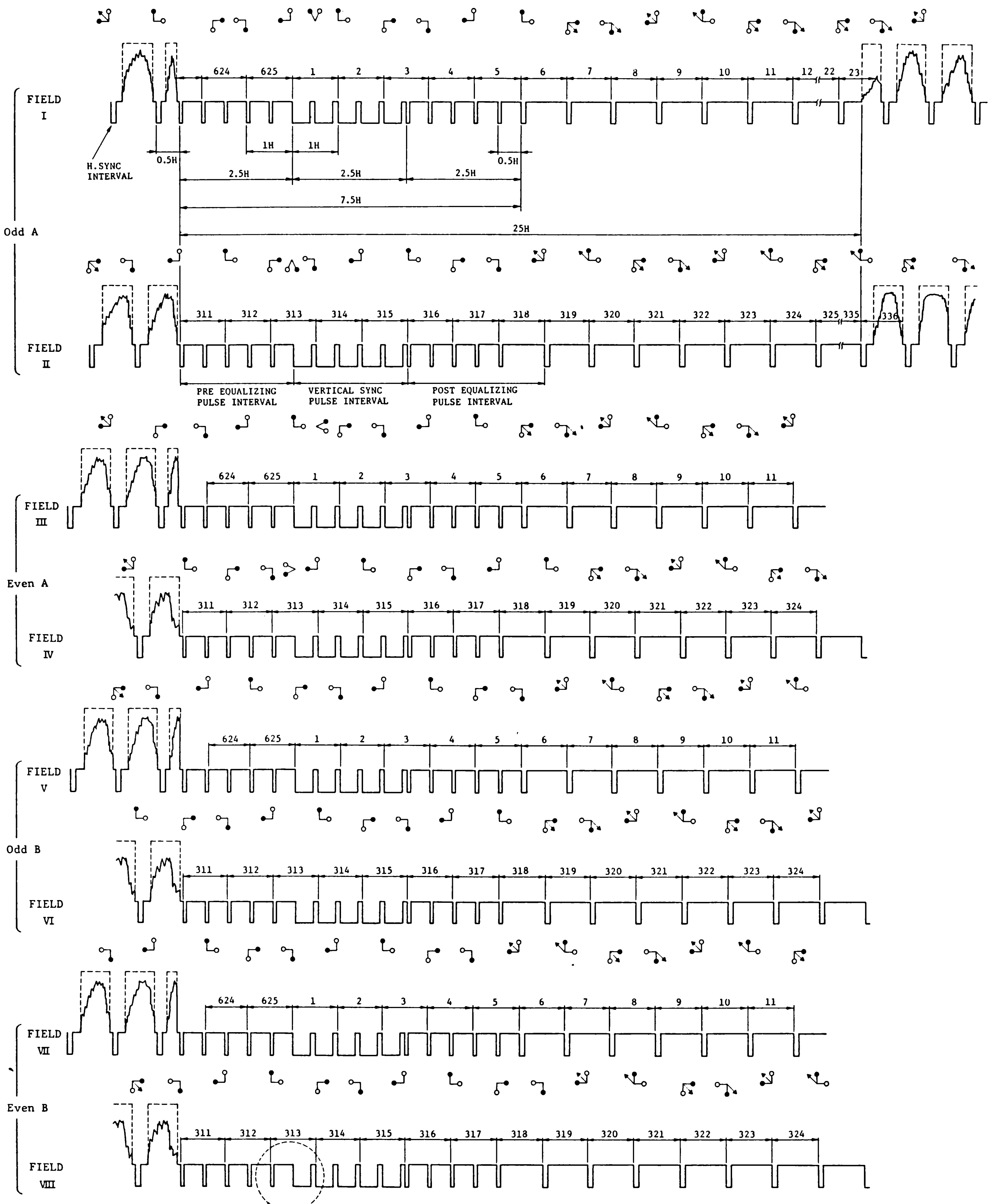
Fig. 5-4

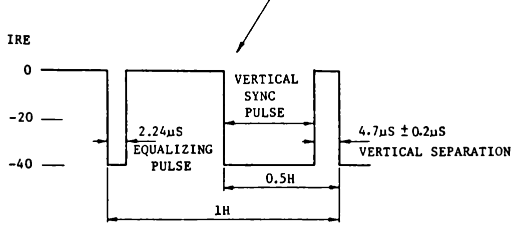




Sync Basic Waveform -1

Fig. 5-5



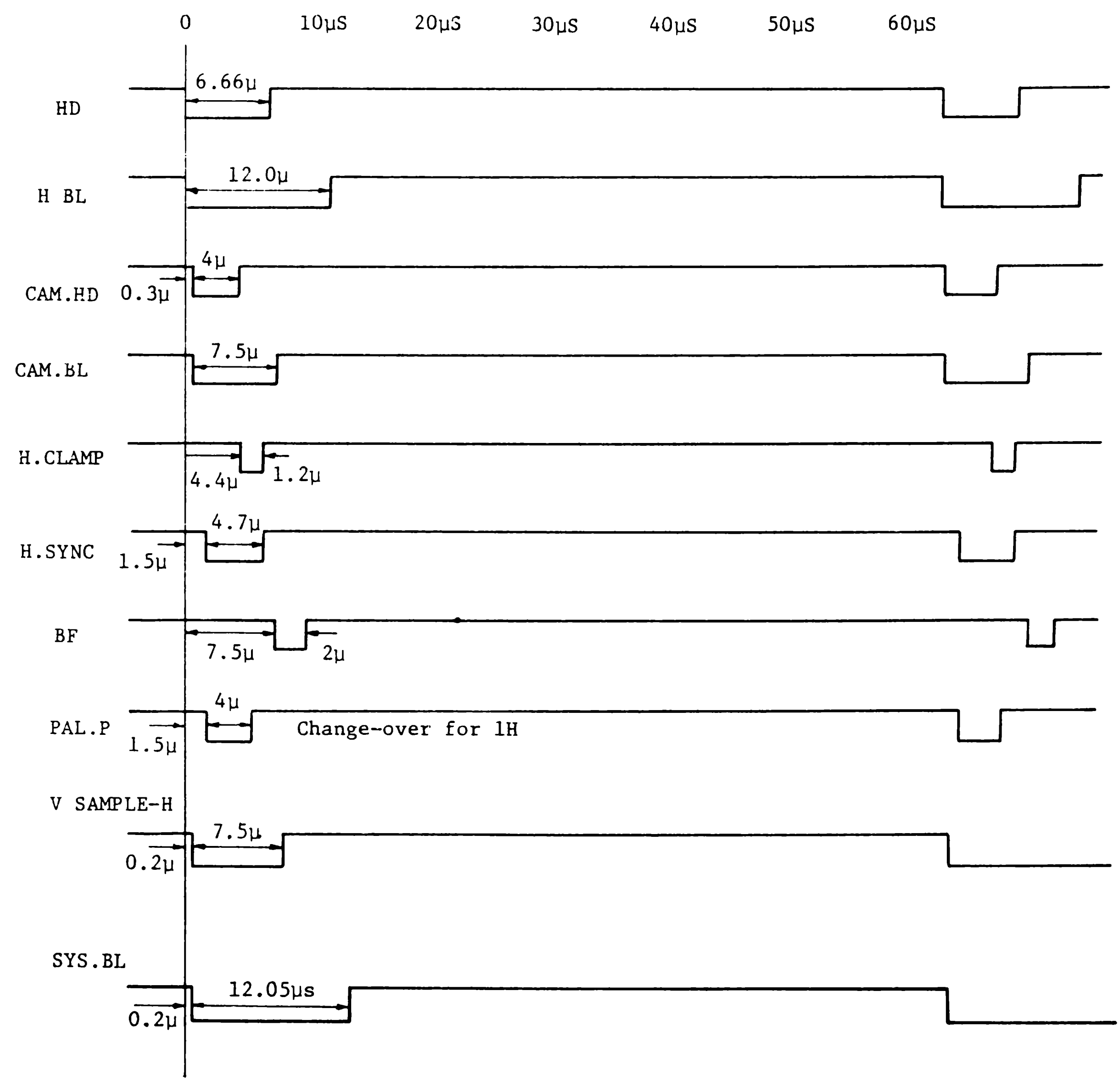


Vectrial representation of the chrominance signals:
—o non-inverted Eᵥ signal —• -Eᵤ signal ↗ burst

P: position of the PAL pulses, indicating the line where Ev is not inverted.

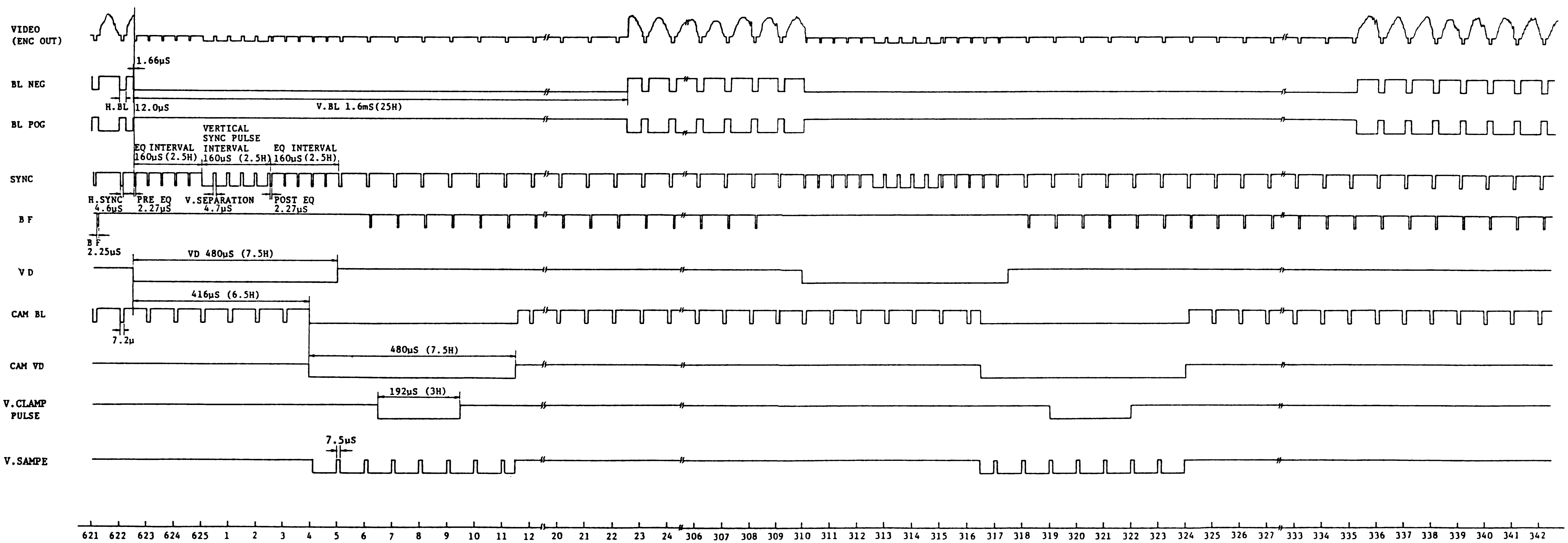
Sync Basic Waveform-2

Fig. 5-6



Timing Chart-1

Fig. 5-7



Timing Chart-2

SECTION 5.6 POWER SYSTEM

The HL-95 is operable with a battery pack, AC pack or external DC power supply. It has a signal source voltage of +12 V (11 to 16 V).

Voltages generated in the camera are as follows:

- ° +9.6 V, +4.8 V, -4.8 V for main voltages
- ° +955 V, +320 V and -55 V for the image tube
- ° -45 V made by the DEF module for the image tube

The design permits activation of preheat circuit in the image tube and the power save condition of VTR in the STBY mode, to provide the operation of the camera and VTR.

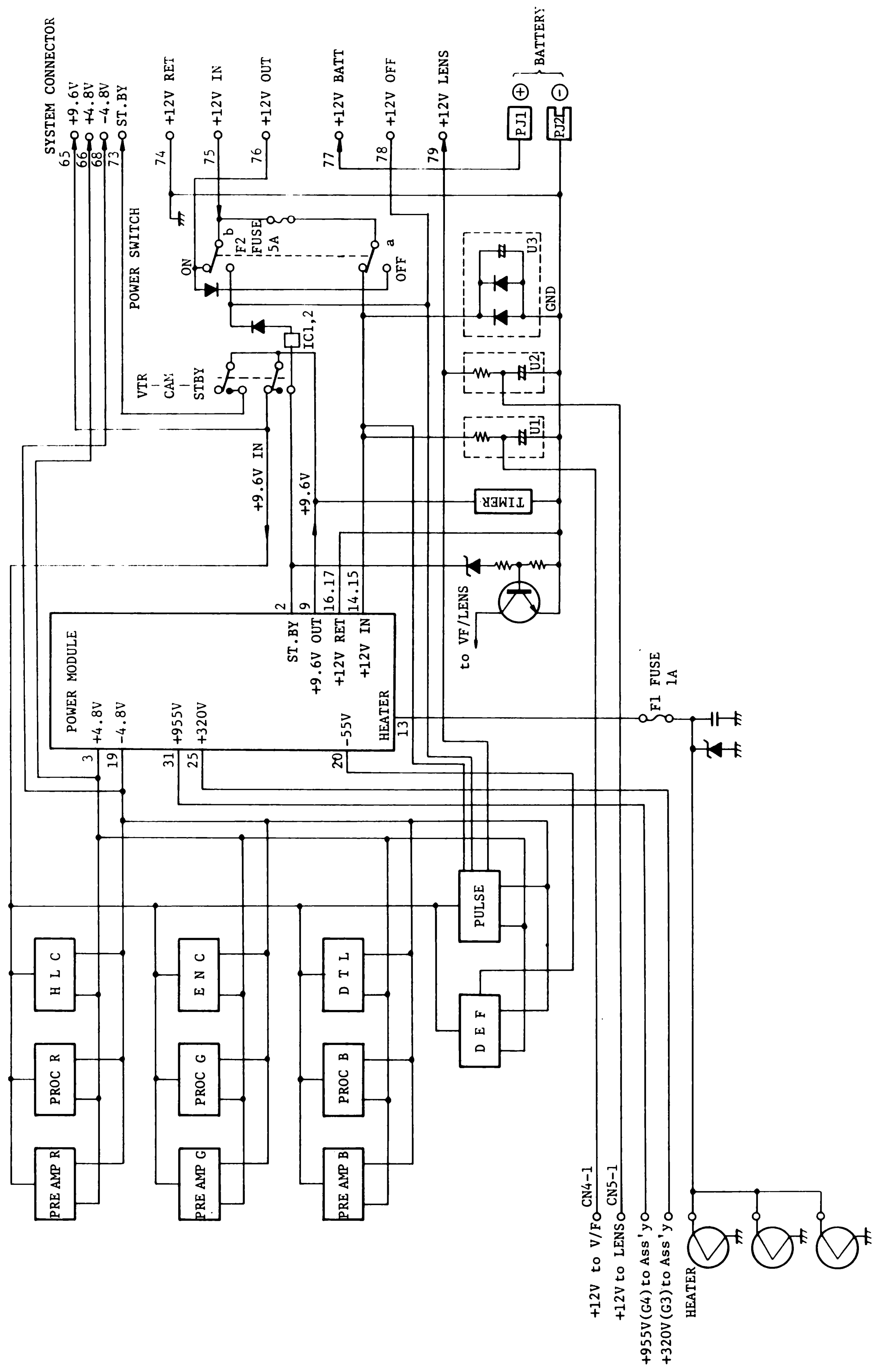
When the CAM mode is selected, camera is operating and VTR is still in power save condition, so in this case, it takes about 2∿5 seconds to record the picture after VTR SW being on.

The VTR mode permits a quick and smooth operation, when VTR SW is pushed.

Because, in this mode, the camera and VTR are in operating condition.

When using an external power supply, pay attention to the resistance value of the DC cable used and it's possible voltage drop. The input voltage to the camera must be more than 11.0 V.

Fig. 5-8



POWER SYSTEM
Block Diagram

SECTION 5.7 INTERCOM/TALLY SYSTEM (Only when using CA-95 Camera Adaptor)

The INTERCOM & TALLY system are provided. This is,

600Ω standard ..... NTSC, PAL-B (Europe), PAL-M

The tally indicator is at three locations; at the front side of the viewfinder, in the eyepiece of the viewfinder and on the Back of the camera adaptor (Back tally lamp).

For the tally indicator at the front side of the viewfinder, the ON/OFF selection is available by the switch at the bottom of the viewfinder.

The tally indication method includes a self illumination type and a non-self illumination type. These types can be selected by the switch in the VIDEO I/F module, and S1-b in the INTERCOM & TALLY will be OFF position.

CAM TALLY .... Self illumination type (comes on when the lens switches to start VTR, S4 in the VIDEO I/F will be ON position).

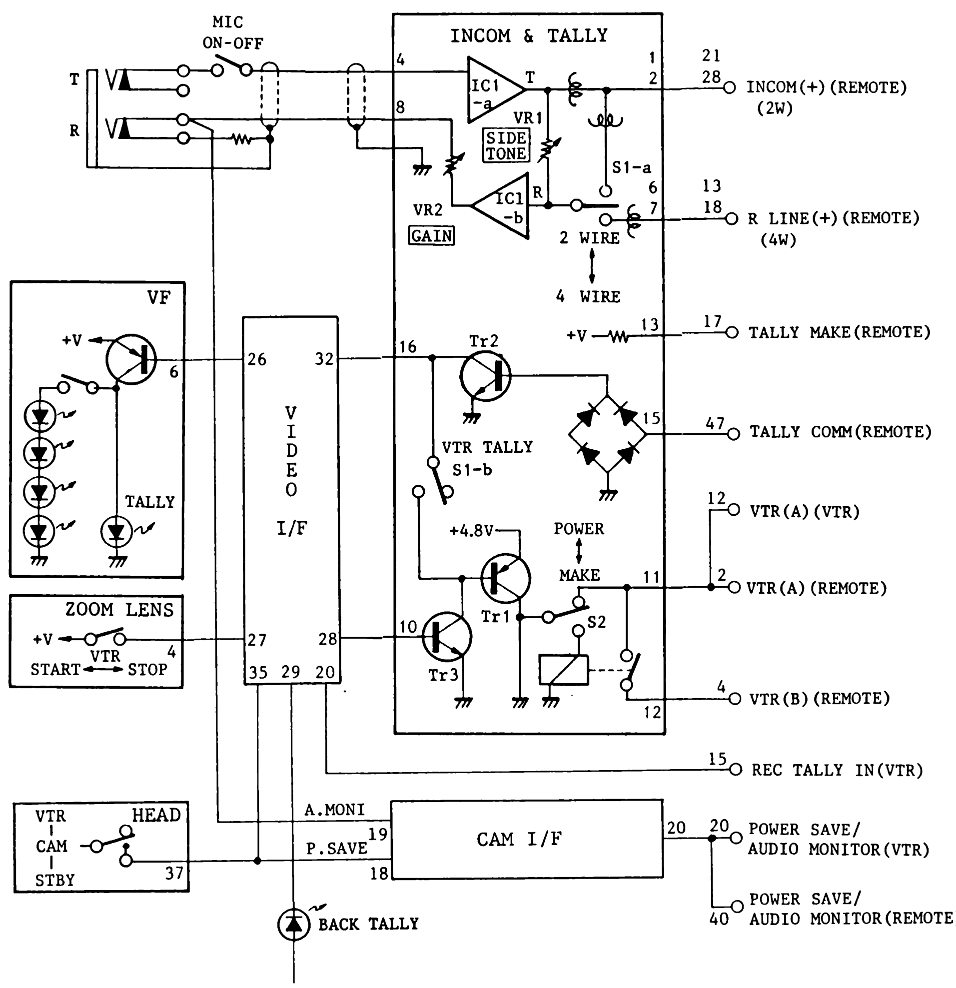
REC TALLY .... Non-self illumination type (comes on with a record indication from the VTR, S4 in the VIDEO I/F will be OFF position.)

The control to operate the tally indicator lamp in the HL-95 is either a contact type or a voltage type on the Remote Connector.

The microphone input terminal is provided in the camera body. An input signal of -50dB is amplified by the MIC AMPLIFIER module. And a signal of -20dBm, 600Ω balanced is outputted from the VTR connector and the REMOTE connector. Power to the microphone and selection of -20dBm are allowed by operating the POWER and MIC switches on the MIC AMPLIFIER module.

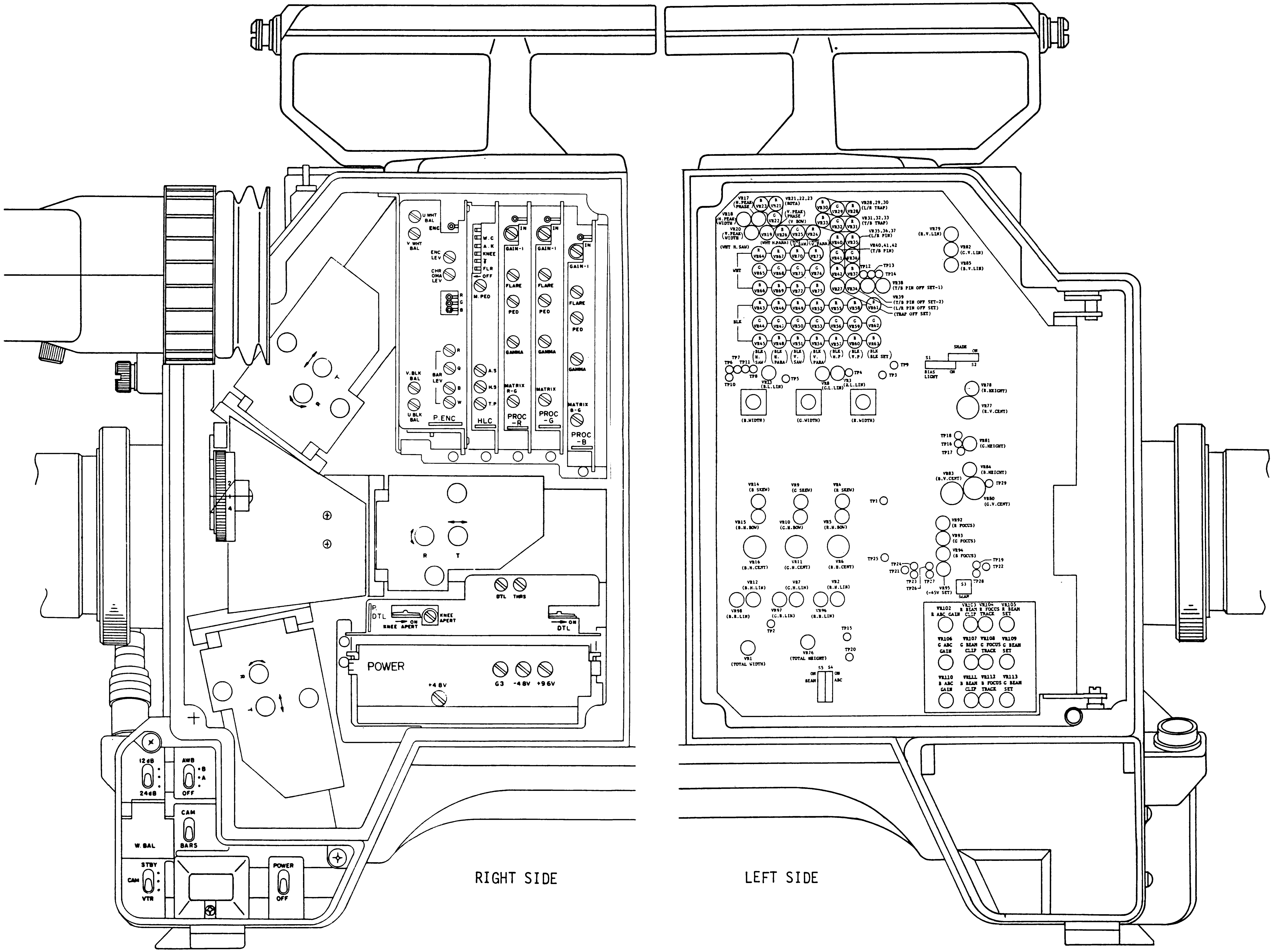
The MIC connector type is XLR-3-31.

Fig. 5-9



INTERCOM & TALLY SYSTEM
Block Diagram

Fig. 6-0



HEAD Module Layout

SECTION 6.0 CIRCUIT DESCRIPTION & ADJUSTMENT

Explanations of Parts List

1. Parts list for HL-95 will follow the below procedures.

   Example:

   (1) PULSE

(2) No.	(3) Description	(4) M.F.D
(5) Integrated Circuits		
IC 1	SN74LS76	TI
IC 2	MC74HCOON(MOS)	MOT

   Meanings of example:

   (1) PULSE .... Name of module concerned
   (2) No. .... Parts number shown on circuit diagram
   (3) Description .... Model number of part
   (4) M.F.D .... Manufacturer
   (5) Integrated Circuits .... Category of parts

2. Notice

   (a) Please pay special attention to handle the following parts.

   (MOS) .... Metal Oxide Semiconductor
   DL .... Delay Line
   X .... Crystal
   T .... Transformer

   (b) Part marked * is for adjustment, then is subject to change without notice. All parts are subject to change without notice due to the progression of technology.

MANUFACTURERS CODE

Code	Manufacturer	Country
AAH	Asahi Co., Ltd.	Japan
ABC	Allen-Bradley Co.	U.S.A.
ABI	Nippon Aviotronics Co., Ltd.	Japan
ALP	Alps Electric Co., Ltd.	Japan
AMD	Advanced Micro Devices	U.S.A.
AME	Amelco Semiconductor	U.S.A.
AMF	Amfenol-Borg Electronics Co., Ltd.	U.S.A.
AMP	AMP Inc.	Japan
ANA	Analog Devices	U.S.A.
ARA	Arai Musen Co., Ltd.	Japan
ARO	Arrow Electric Co., LTD.	Japan
ASA	Asahi Electric Mfg. Co., Ltd.	Japan
ASG	Asahi Glass	Japan
ASH	Ashida Sound Co., Ltd.	Japan
ASN	Alsan	U.S.A.
ASP	Asahi Print	Japan
ATC	Asahi Trans Co., Ltd.	Japan
AVX	AVX Co., Ltd.	Japan
BBL	Burr-Brown Research Corporation	U.S.A.
BDD	Bando Densen Co., Ltd.	Japan
BEC	Beckman Instruments Inc.	U.S.A.
BEN	Bendix Co., Ltd.	U.S.A.
BEY	Gotham Audio Co.	U.S.A.
BRG	Berg Electronics Devision Ei Dupon De Nemous & Co.	U.S.A.
CAN	Canon Inc.	Japan
CAS	Canon Seiki Co., Ltd.	Japan
CHM	Chiba Ohm	Japan
CHU	Chunichi Denshi Kogyo Co., Ltd.	Japan
CLD	Cleveland Electronics Inc.	U.S.A.
CND	Canon Electronics Co., Ltd.	Japan
CNL	Central Ab/Uscc	U.S.A.
CDD	Codix Corporation	Japan
COS	Tokyo Cosmos Electronics Co., Ltd.	Japan
CPL	Copal Electronics Co., Ltd.	Japan
CRB	Tokyo Musen Kizai Co., Ltd.	Japan
CRS	Cricson	U.S.A.
CSR	CSR Ind.	U.S.A.
C&K	C&K Components Inc.	U.S.A.
DAI	Dainichi Denshi Co., Ltd.	Japan
DAK	Daiko Electronics Co., Ltd.	Japan
DAL	Dale Electronics Ind.	U.S.A.
DDK	Daiichi Denshi Kogyo Ltd.	Japan
DET	Datel System's Inc.	U.S.A.
DGM	Daiei Gomu	Japan
DIA	Diaright	U.S.A.
DID	Daiichi Denchi Co., Ltd.	Japan
DIK	Daiichi Keiki Co., Ltd.	Japan
DIT	Daitou Tsushinki Co., Ltd.	Japan.
DKC	Denshi Kagaku Co., Ltd.	Japan
DKK	Daikin kogyo	Japan
DDK	Denki Onkyo Co., Ltd.	Japan
EDI	Electronics Devices Inc.	U.S.A.
EIE	EIE Co., Ltd.	Japan
ELC	Elco International Corp.	Japan
ELE	Electro Cube	U.S.A.
ELM	Elma Electronics A.G	Switzerland
ERI	Erie Technological Products Inc.	U.S.A.
ESA	Eisha Denshi Co., Ltd.	Japan
FCH	Fairchild Semiconductor	U.S.A.
FDK	Fuji Denki Kagaku Co., Ltd.	Japan
FER	Fernseh	Germany
FIS	Fisher	Switzerland
FJC	Fujicon Co., Ltd.	Japan
FJE	Fuji Electric Co., Ltd.	Japan
FJN	Fuji Shashin Koki Co., Ltd.	Japan
FJS	Fujisoku Electric Co., Ltd.	Japan
FJT	Fujitsu Ltd.	Japan
FKD	Fukuda S.S	Japan
FKK	Fujimoto Kinzoku Co., Ltd.	Japan
FKW	Fujikura Cable Works, Ltd.	Japan
FLT	Flat Denshi Co., Ltd.	Japan
FSO	Foster Electric Co., Ltd.	Japan
FRT	Ferten	Germany

FSO	Fuso Shoji Co., Ltd.	Japan
FUC	Fuji Ceramic Co., Ltd.	Japan
FUK	Fujiki Electric Co., Ltd.	Japan
FUS	Fukushima Futaba Electric Co., Ltd.	Japan
FTB	Futaba Denki	Japan
GES	General Semiconductor	U.S.A.
GIT	General Instrument	U.S.A.
GRY	Grayhill	U.S.A.
HAM	Hamai Electric Lamp Ind. Co., Ltd.	Japan
HAR	Harris Corpotation	U.S.A.
HAS	Hasegawa S.S	Japan
HCP	Hi-Comp Ltd.	Japan
HDK	Hokuriku Electric Ind. Co., Ltd.	Japan
HIM	Heinemann Electric Company	Germany
HIN	Hinomoto Gosei Jushi S.S	Japan
HIR	Hirose Electric Co.,Ltd.	Japan
HIT	Hitachi Ltd.	Japan
HKD	Hokuto Denshi	Japan
HON	Honda Tsushin Kogyo Co., Ltd.	Japan
HOS	Hoshiden Electronics Co., Ltd.	Japan
HOY	Hoya Glass	Japan
HOZ	Hozan Tool Ind. Co., Ltd.	Japan
HRA	Hirakawa Densen Co., Ltd.	Japan
HTO	Hakuto Co., Ltd.	Japan
HWC	Hanai Densen	Japan
IDC	Izumi Denki Corp.	Japan
IKE	Ikegami Tsushinki Co., Ltd.	Japan
IKN	Ikuno Electronic	Japan
INC	Inter Compo Inc.	U.S.A.
INS	Intersil	U.S.A.
INT	Inter Corpotation	U.S.A.
ISI	Ishizuka Electronics Corporation	Japan
ISS	Ito Seimitsu	Japan
ISK	Ishikawa Seisakushyo	Japan
IKJ	Ikejiri Denki Co., Ltd.	Japan
ITT	ITT Components Co., Ltd.	U.S.A.
IWT	Iwatsu Seimitsu Co., Ltd.	Japan
JAE	Japan Aviation Electronics Ind. Ltd.	Japan
JFC	Japan Fine Chemical Corp.	Japan
JFD	JFD Electric Corp.	Japan
JNB	Jinbo Electric Co., Ltd.	Japan
JND	Jyonan Denki Co., Ltd.	Japan
JOH	Johanson Mfg. Corp.	U.S.A.
JRC	New Japan Radio Co., Ltd.	Japan
JSR	Japan Servo Co., Ltd.	Japan
JUN	Junkosha Co., Ltd.	Japan
JMC	Japan Machnix Co., Ltd.	Japan
KAN	Kaneko Code Seizo Co.	Japan
KCK	KCK Co., Ltd.	Japan
KDK	Kawasaki Densen Co., Ltd.	Japan
KEI	Koeisha	Japan
KEL	KEL Corp.	Japan
KEN	Kenko	Japan
KGS	Kogyosha	Japan
KIG	Kings Electronics Company Inc.	U.S.A.
KIN	Kinseki Co., Ltd.	Japan
KIT	Kitagawa Gomu Kogyo Co., Ltd.	Japan
KKS	Kyoritsu Kinzoku	Japan
KMC	Kimachi Kikai Kogu	Japan
KMD	Kimura Denki Co., Ltd.	Japan
KMH	Komatsu Hofman	Japan
KMY	Kamaya Co., Ltd.	Japan
KOA	KOA Denko Co., Ltd.	Japan
KOM	KH Electronics Corp.	Japan
KON	Kondo Electric Co., Ltd.	Japan
KOZ	Kosmica	Japan
KYO	Kyoritsu Dengyo Co., Ltd.	Japan
KYC	Kyosera Co., Ltd.	Japan
LEM	Lemo	Switzerland
LEX	LEX Co., Ltd.	Japan
LTR	Litronix	Japan

J-064 P-068 N-068

LUX	LUX Corp.	Japan
MAC	MAC EIGHT Co., Ltd.	Japan
MAD	Matsushita Denko Co., Ltd.	Japan
MAR	Marcon Electronics Co., Ltd.	Japan
MAT	Matsushita Electric Ind. Co., Ltd.	Japan
MCD	Meiko Denshi	Japan
MCR	Micron Electric Co., Ltd.	Japan
MHC	Matsukyu Co., Ltd.	Japan
MID	Midori Precisions Co., Ltd.	Jqpan
MIM	Micro Metal	U.S.A.
MIN	Minmoter SA./Koshin Shoji	Switzerland
MIT	Mitsubishi Electric Corp.	Japan
MIY	Miyama Electric Co., Ltd.	Japan
MIZ	Mizutani Electric Ind. Co., Ltd.	Japan
MKS	Murakami Shikisai	Japan
MMD	Morimatsu Denshi Kogyo Co., Ltd.	Japan
MMM	Sumitomo 3M Co., Ltd.	Japan
MON	Mori Ohm	Japan
MON	Monsanto Company/General Instrument	U.S.A.
MOR	Mori Tsushinki Co., Ltd.	Japan
MOS	Mostec	U.S.A.
MOT	Motorola Semiconductor Products	U.S.A.
MRR	Moririca Electronics Co., Ltd.	Japan
MSH	Matsuzaki Vacuum Evaporation Co., Ltd.	Japan
MSS	Musashi Electric Co., Ltd.	Japan
MTK	Mitoku Electric Co., Ltd.	Japan
MTM	Mitsumi Electric Co., Ltd.	Japan
MTT	MTT Co., Ltd.	Japan
MTY	Mitsuya Denki Co., Ltd.	Japan
MUB	Murata Burns Co., Ltd.	Japan
MUR	Murata Mfg. Co., Ltd.	Japan
MYM	Miyama Electric Co., Ltd.	Japan
NAV	Nippon Aviotronics Co., Ltd.	Japan
NBA	Nihon Burndy Ltd.	Japan
NBT	Nippon Battery Co., Ltd.	Japan
NBL	Noble Musen Co., Ltd.	Japan
NBW	Nihon Blower	Japan
NCC	Matsuo Electric Co., Ltd.	Japan
NCH	Nippon Chemical Condenser Co.,	Japan
NCI	Nichicon Capacitor Ltd.	Japan
NDC	Nissei Electric Co., Ltd.	Japan
NDD	Nihon Denyow Co., Ltd.	Japan
NDP	Nihon Denpa	Japan
NEC	Nippon Electric Co., Ltd.	Japan
NEW	New Ohto Co., Ltd.	Japan
NFB	NF Circuit Design Block Co., Ltd.	Japan
NFK	Nippon Ferrite Kogyo Co., Ltd.	Japan
NIE	Nikkon Electronics Co., Ltd.	Japan
NIK	Nihon Koshuha Misawa S.S	Japan
NIN	Inter Rectifier Corp. Japan Co., Ltd.	Japan
NIP	Nippon Thermo Co., Ltd.	Japan
NIS	Nissho Electric	Japan
NJR	Nagano Japan Radio Co., Ltd.	Japan
NKA	Nihon Kaiheiki Ind. Co., Ltd.	Japan
NKK	Nikkan Kogyo	Japan
NMO	Nihon Molex	Japan
NSC	National Semiconductor Corporation	U.S.A.
NSS	Nihon Shiements	Japan
NTA	Nippon Tanshi	Japan
NTK	Nitsuko Ltd.	Japan
ODS	Ohkura Denshi Sangyo	Japan
OEL	Oshino Electric Lamp Works Ltd.	Japan
OEN	Oriental Motor Co., Ltd.	Japan
OIZ	Oizumi Mfg. Co., Ltd.	Japan
OKA	Okaya Electric Ind Co., Ltd.	Japan
OKI	Oki Electronics Co., Ltd.	Japan
OKW	Okita Works Co., Ltd.	Japan
OLM	Olympus Presision Co., Ltd.	Japan
OMD	Omori Denki Seisakusho Co., Ltd.	Japan
OMR	Tateishi Denki Co., Ltd.	Japan
ORI	Origin Electric Components	Japan
OSM	Ohshima Electric Co., Ltd.	Japan
OSS	OS Electronics Co., Ltd.	Japan
OTT	Otto Heil Ohg	Japan

OPM	Optimax Inc.	U.S.A.
PHI	Philips	Netherland
PIO	Pioneer Electronix Comp.	Japan
QQQ	Chuo Musen Co., Ltd.	Japan
RAY	Raytheon Semiconductor Division	U.S.A.
RCA	Radio Corporation of America	U.S.A.
RCL	RCL Co., Ltd.	U.S.A.
RED	Read Co., Ltd.	Japan
RIF	Aktiebolaget Rifa	Sweden
RKN	Riken Dengu Seizo Co., Ltd.	Japan
ROHM	Rohm Co., Ltd.	Japan
RYO	Ryosan Co., Ltd.	Japan
SAK	Sakae Tsushin Kogyo Co., Ltd.	Japan
SAM	Samtec	
SAN	Sanyo Electric Co.	Japan
SAT	Sato Parts Co., Ltd.	Japan
SCH	H/Schurter	Switzerland
SCS	Saito Code Seizo Co., Ltd.	Japan
SEF	Seidensha Electric Works Ltd.	Japan
SIG	Signetics Co., Ltd.	U.S.A.
SIL	Sylvania G.T & E.	U.S.A.
SIN	Shinmei Electric Co., Ltd.	Japan
SIZ	Shizuki Electric Company Inc.	Japan
SJD	Shoji Denki	Japan
SJK	Senju Kinzoku Kogyo Co., Ltd.	Japan
SKE	Sankei Engineering	Japan
SKK	Sinetsu Kagaku Kogyo Co., Ltd.	Japan
SKM	Shonan Komaku Kenkyujo	Japan
SKN	Sanken Electric Co., Ltd.	Japan
SKO	Sankosha	Japan
SLC	Siliconix Incorporated	U.S.A.
SLW	Sil Walker	U.S.A.
SMK	Showa Musen Kogyo Co., Ltd.	Japan
SNA	Sinagawa Densen	Japan
SND	Shindengen Electric Mfg. Co., Ltd.	Japan
SNE	Sanyo Electric Co., Ltd.	Japan
SNH	San Hayato Co., Ltd.	Japan
SNK	Sanko Co., Ltd.	Japan
SNS	Sanshin Denki Co., Ltd.	Japan
SNT	Shin Nittoku	Japan
SOD	Soko Denki	Japan
SOK	Soken Kogyo Co.	Japan
SONY	Sony Corp.	Japan
SOR	Soruton Co.	Germany
SOS	Soshin Electric Co., Ltd.	Japan
SPR	Sprague Products Company	U.S.A.
SRK	Schrack Electrical Sales Corp.	Germany
SRP	Sharp Co., Ltd.	Japan
SSI	Sansei Electric Co., Ltd.	Japan
SSM	Susumu Ind. Co., Ltd.	Japan
SSS	Solid State Scientific Inc.	
STA	Star Mfg. Co., Ltd.	Japan
STL	Stanley Electric Co., Ltd.	Japan
SUD	Sumida Electric Co., Ltd.	Japan
SUM	Sumitomo Electric Kogyo Co., Ltd.	Japan
SWCC	Showa Electric Wire & Cable Co., Ltd.	Japan
SYO	Tokyo Sanyo Electric Co., Ltd.	Japan
TAD	Taiko Denki Co., Ltd.	Japan
TAG	Tamagawa Denki	Japan
TAI	Tokai Denki Co., Ltd.	Japan
TAJ	Tajimi Musen Denki Co., Ltd.	Japan
TAM	Tama Electric Co., Ltd.	Japan
TCP	Toshiba Components Co., Ltd.	Japan
TDK	TDK Electric Co., Ltd.	Japan
TDD	Tokyo Denon Co., Ltd.	Japan
TEA	Teac	Japan
TEW	Tamura Electric Works Ltd.	Japan
TEX	Texas Instruments Products Inc.	U.S.A.
THK	Tohoku Metal Industries Ltd.	Japan
TKD	Tokyo Ko-on Denpa Co., Ltd.	Japan
TKO	Toko Ind.	Japan
TKR	Tokyo Takara Shokai	Japan
TLD	Teledyne	U.S.A.

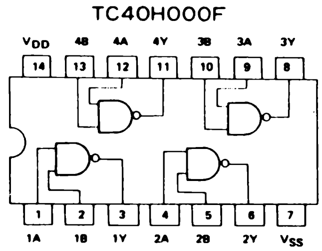
TLM	Telmo	Japan
TMR	Tamura Seisakusho Co., Ltd.	Japan
TOB	Tobishi Kosan Co., Ltd.	Japan
TOD	Tokyo Denki CO., Ltd.	Japan
TOG	Tochigiya Co., Ltd.	Japan
TOI	Toai Co., Ltd.	Japan
TOK	Tokai Communication Ind. Ltd.	Japan
TOS	Toshiba Corp.	Japan
TOW	Towa Chikudenki Co., Ltd.	Japan
TOY	Toyo Musen Co., Ltd.	Japan
TRA	Transitron Electric Co.	U.S.A.
TRW	TRW Corp.	U.S.A.
TSK	Tokyo Sokutei Kizai Ltd.	Japan
TSM	Tokyo Shimoda Kogyo Co., Ltd.	Japan
TSS	Tamura Seiko	Japan
TSU	Tsumura Denshi Sangyo Co., Ltd.	Japan
TTD	Tokyo Tokushu Densen Co., Ltd.	Japan
TTE	Totsu Electronics Co., Ltd.	Japan
TTS	Teikoku Tsushin Kogyo Co., Ltd.	Japan
TWD	Tokiwa Denki Co., Ltd.	Japan
TWE	Towa Denki Co., Ltd.	Japan
TXT	Tektoronix Inc.	U.S.A.
TYC	Taiyo Yuden Co., Ltd.	Japan
TYE	Taiyo Electronics Co., Ltd.	Japan
TYD	Tokyo Denpa Co., Ltd.	Japan
TYO	Toyo Electronics Industry Corp.	Japan
TYT	Toyo Tokei Kogyo Co., Ltd.	Japan
TYX	Toyo Communication Equipment Co., Ltd.	Japan

UEL	Uro Electronics Ind. Co., Ltd.	Japan
UCD	Uchida Engineering Co.	Japan
UNI	Unizon Corp.	Japan
USI	Usio Denki	Japan
UUU	Sanyu Kogyo Co., Ltd.	Japan

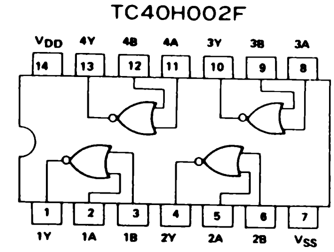
VAR	Varo Inc.	

WIM	Wima Co., Ltd.	Germany
WAK	Waka S.S	

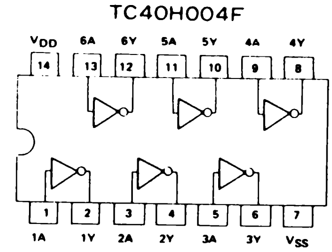
YAD	Yardney Electric Co., Ltd.	U.S.A.
YAG	Yagishita Electric Co., Ltd.	Japan
YAM	Yamaki Electric Co., Ltd.	Japan
YHL	Yamatake Honeywell Co., Ltd.	Japan
YHP	Yokogawa Hewlett-Packard Ltd.	Japan
YMD	Yamada Kogyo Co.	Japan
YMI	Yamaichi Electric Mfg. Co., Ltd.	Japan
YSD	Yasuda Denken Co., Ltd.	Japan



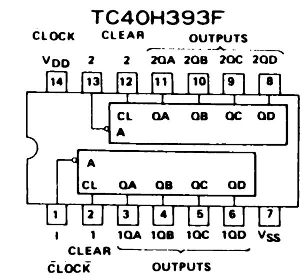
QUAD 2-INPUT NAND GATE



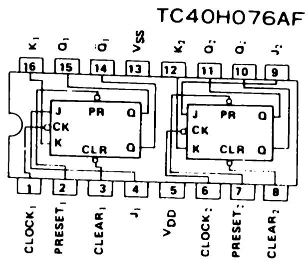
QUAD 2-INPUT NOR GATE



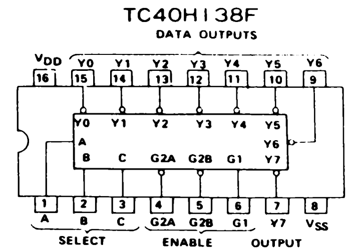
HEX INVERTER (TOS)



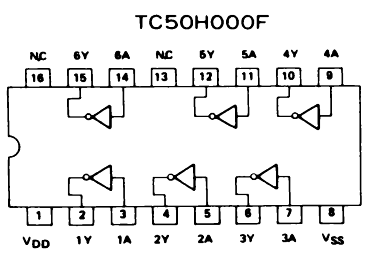
DUAL 4-BIT BINARY COUNTER



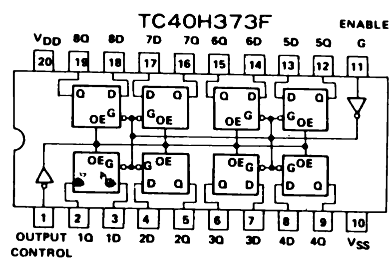
DUAL J-K FLIP FLOP
(EDGE TRIGGER)



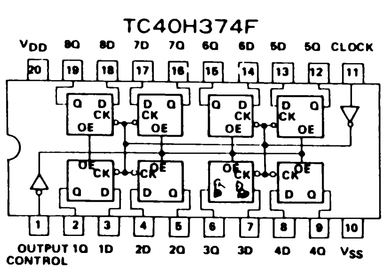
3-TO-8 LINE
DECODER/DEMULTIPLEXE



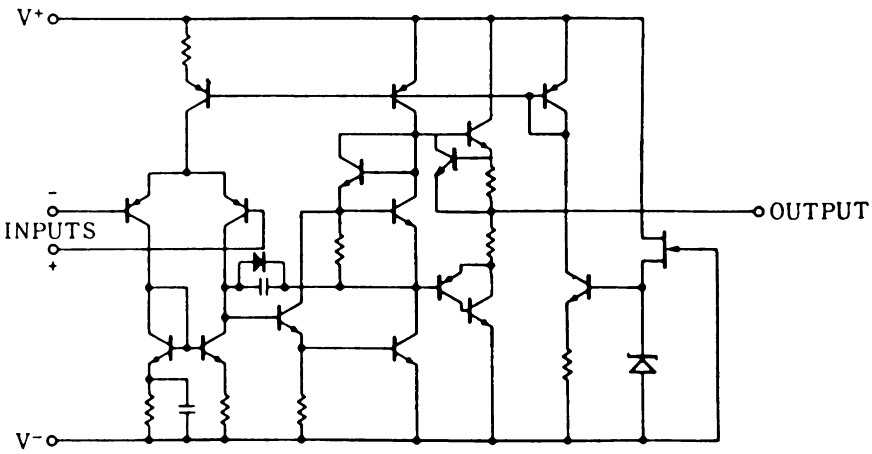
HEX BUFFER(TC4049B TYPE)



OCTAL "D" TYPE LATCH

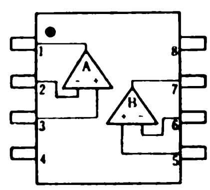


OCTAL "D" TYPE FLIP FLOP

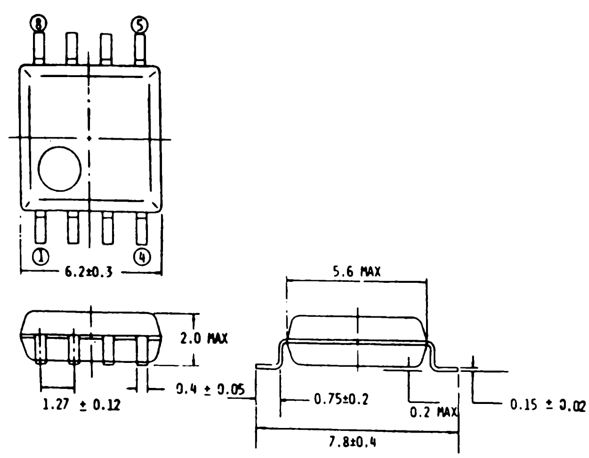


NJM4556:DUAL HIGH CURRENT OPERATIONAL
AMPLIFIER(NJM)

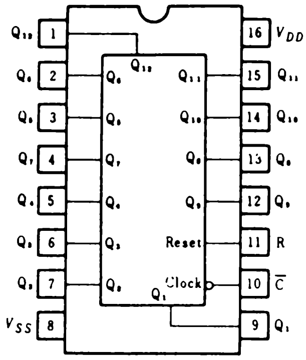
D,M TYPE
(TOP VIEW)



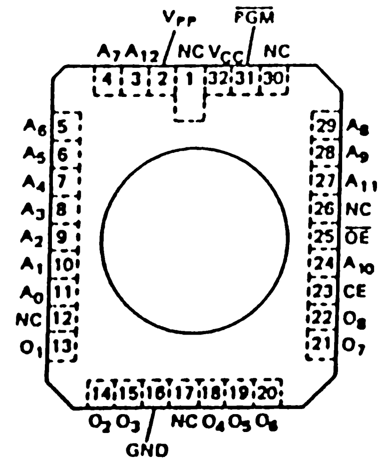
PINS LAYOUT
1. A OUTPUT
2. A−INPUT
3. A+INPUT
4. V-
5. B+INPUT
6. B−INPUT
7. B OUTPUT
8. V+



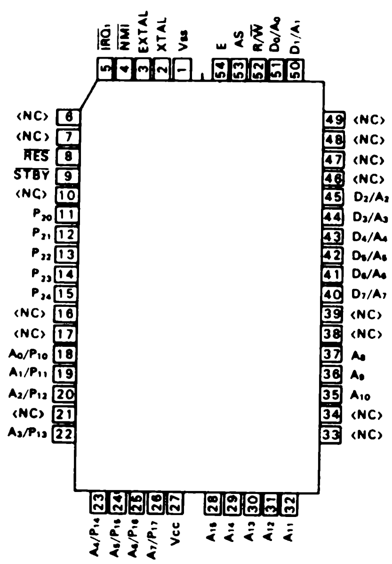
TL062CPS:BIFET OP AMP(TEX)



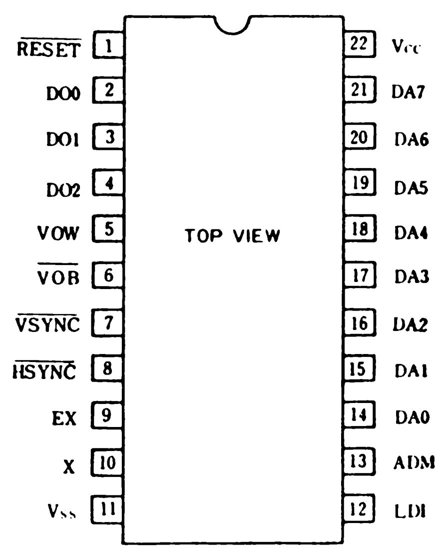
HD14040BFP(HIT)



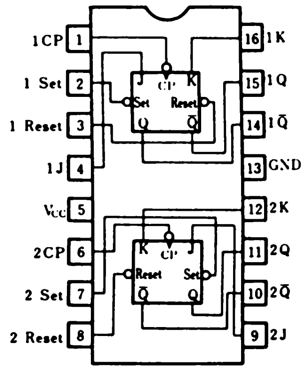
CMOS
EPROM
MBM27C64-30(FJT)



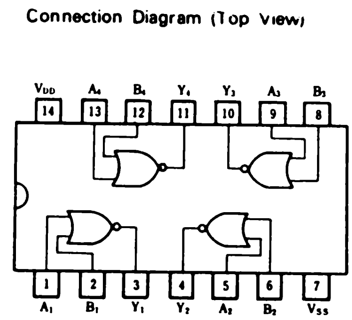
TOP VIEW
HD6303(HIT)



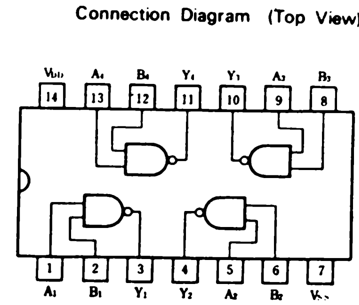
MB88303(FJT)



DN74LS76(MAT)

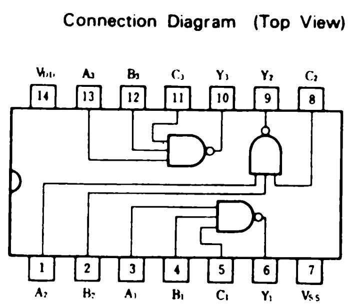


μPD4001BG:Qaud
2 Input NOR Gate

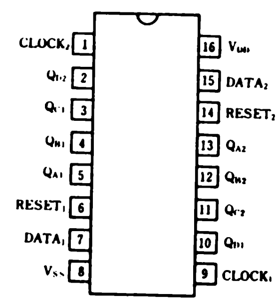


μPD4011BG:Qaund
2 Input NAND Gate

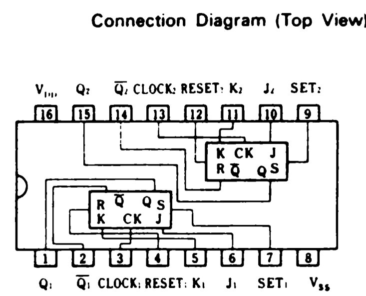
(NEC)



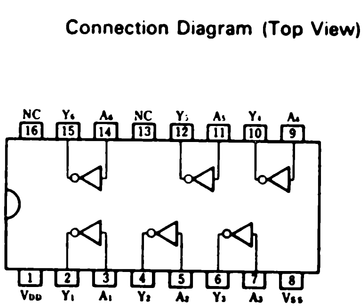
μPD4023BG:Triple
3 Input NAND Gate



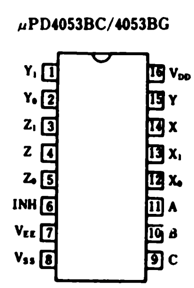
μPD4015BG:Dual 4 Stage
Static Shift Register



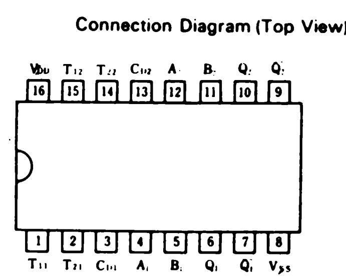
μPD4027BG:Dual JK
Flip Flop



μPD4049UBG:Hex Lnverting
Buffer Converter

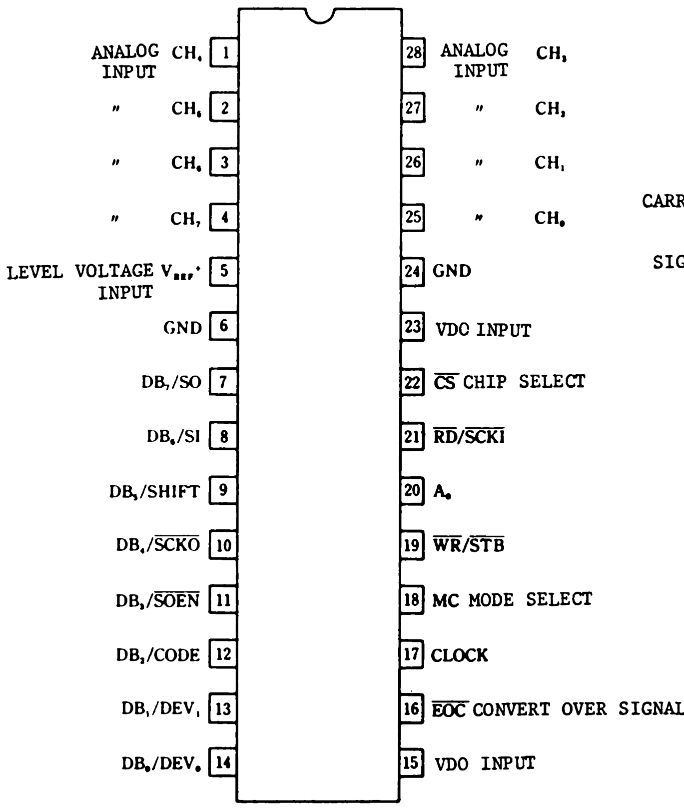


μPD4053BG:Triple 2 Ch
Analog Multiplexer
Demultiplexer

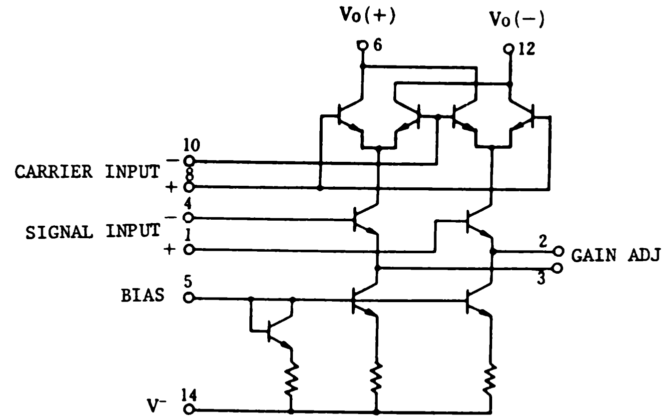


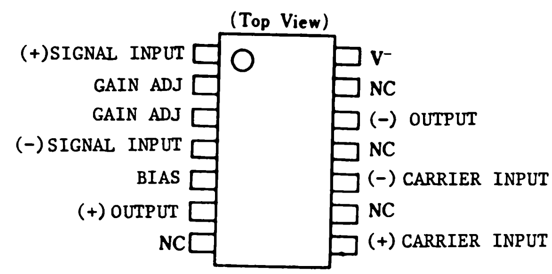
μPD4528BG
:Dual Monostable
Mulivibrator

TOP VIEW

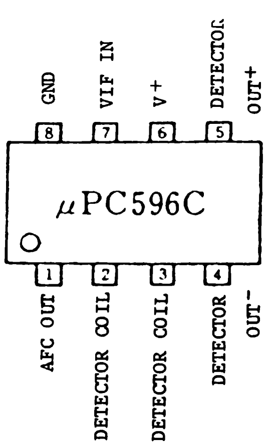


μPD7004C:CMOS A/D(NEC)

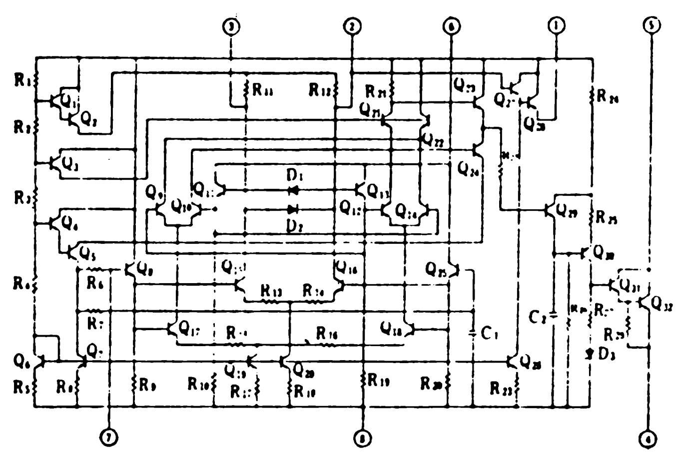


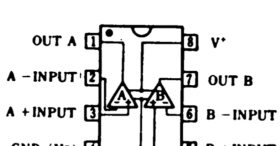


NJM1496M:DOUBLE BALANCED MODULATOR/DEMODULATOR (NJM)

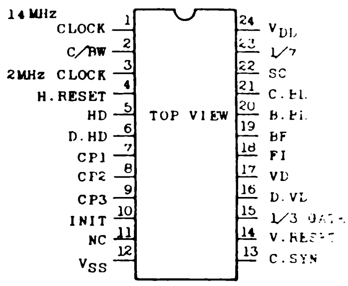


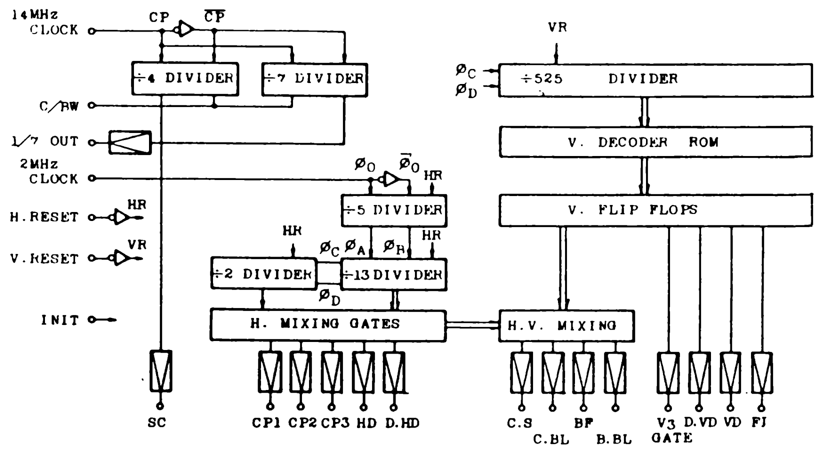
μPC596C(NEC)





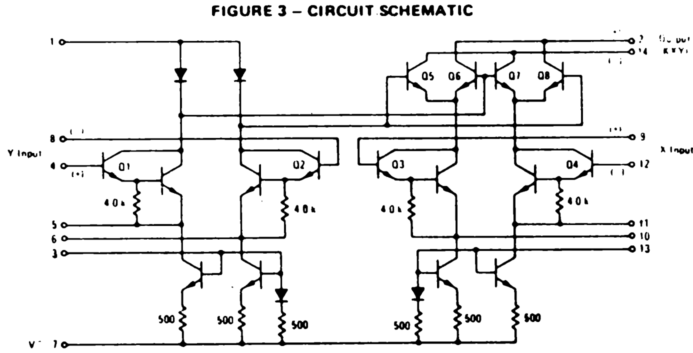
μPC339G2:Quad Comparator(NEC)

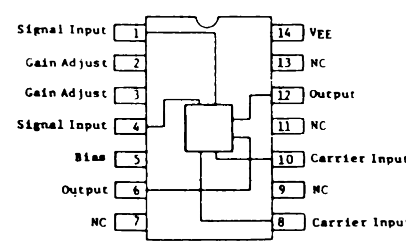




TC5003P

FIGURE 3 – CIRCUIT SCHEMATIC

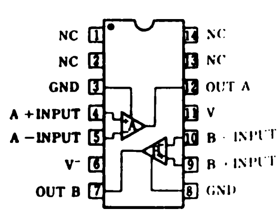


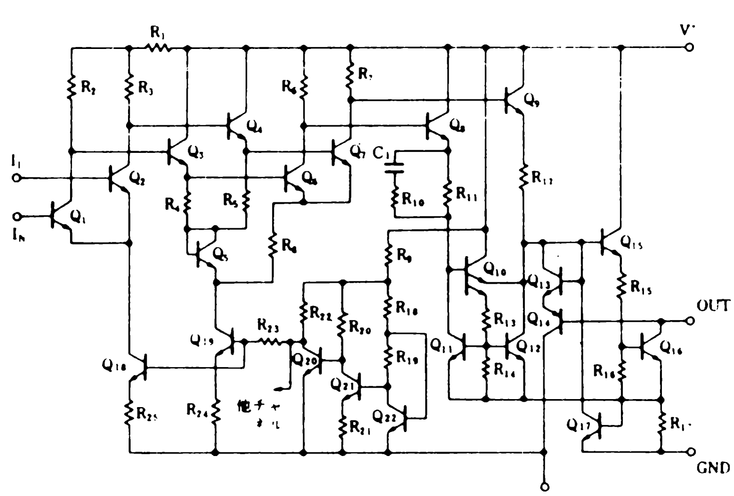


MC1595L

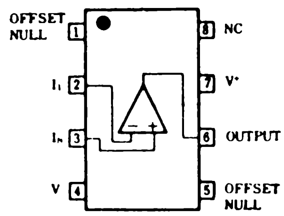
Equivalent Circuit

TOP VIEW



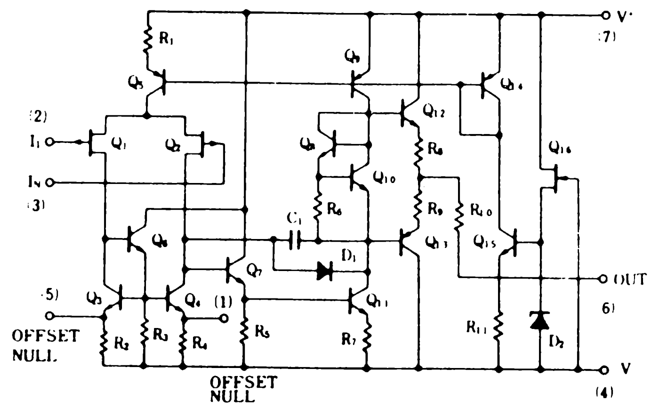


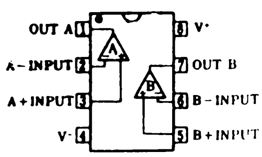
μPC319G2(NEC)



μPC4081G2 (NEC)

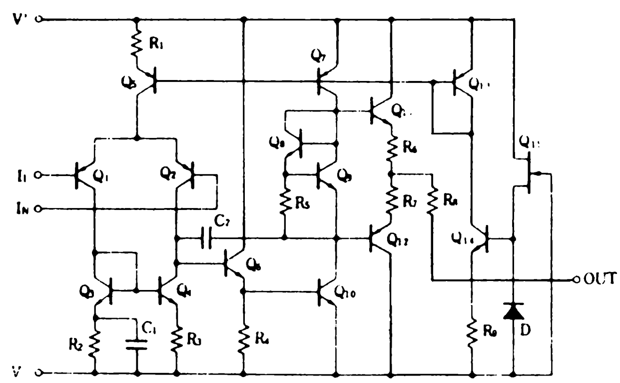
Equivalent Circuit



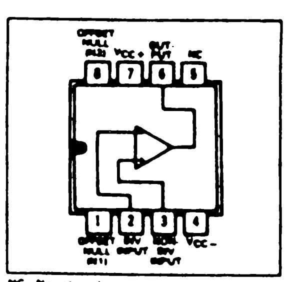


μPC4558G2 (NEC)

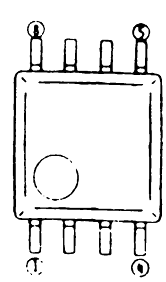
Equivalent Circuit



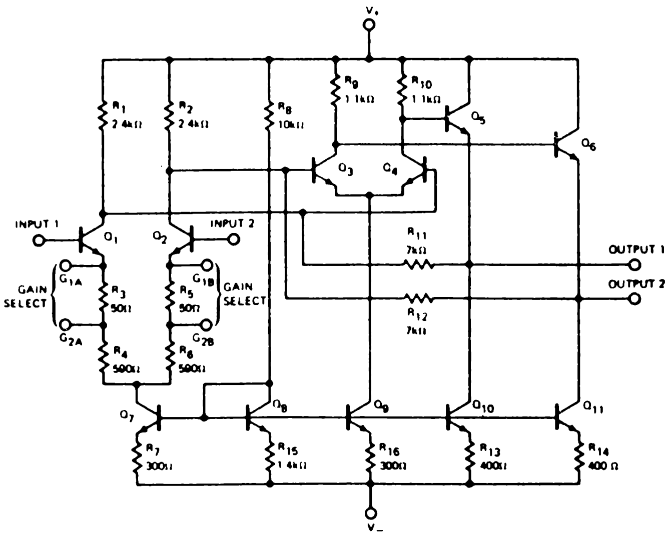
(TOP VIEW)

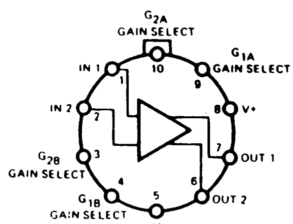


(TOP VIEW)



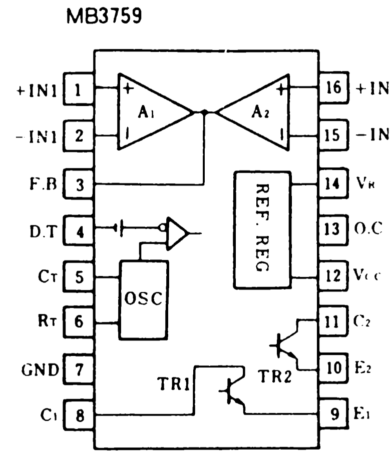
OP-07D : OP-AMP (TEX)

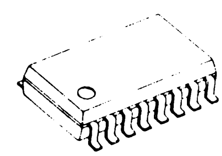




μA733HC Dellerential AMP

TOP VIEW

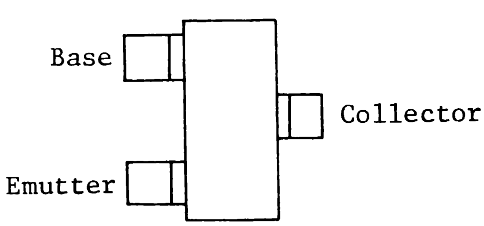




MB3759PF:Switching Regurator Control circut

TRANSISTOR

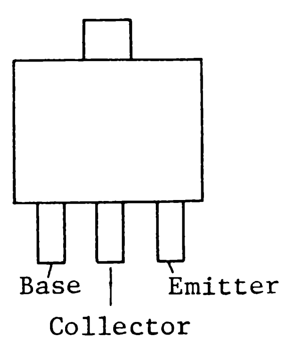
TOP VIEW



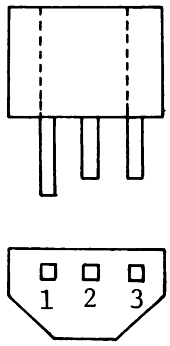
2SC3360-N16,17
2SA812-M6,7
2SA1226-E4
NTM3904-B25

2SA1330-06,7
2SC1623-L6,7
2SC2223F-14
NTM3906-Y25
(NEC)

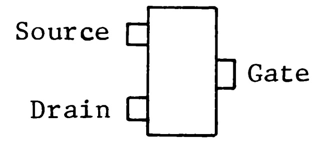
TOP VIEW



2SA1213-0(TOS)
2SC2873-0(TOS)

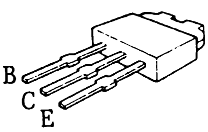


2SK372(TOS)

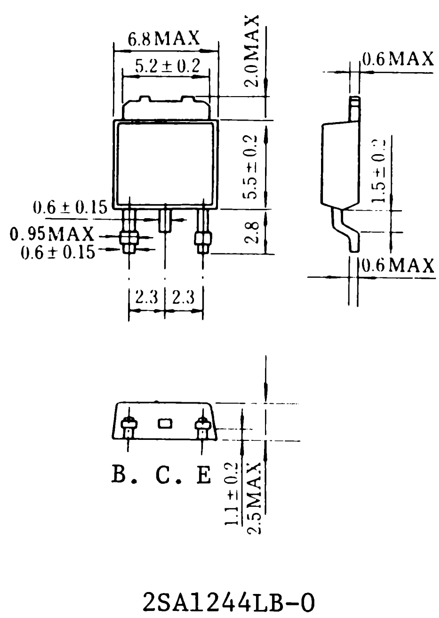


1.Drain
2.Gate
3.Source

2SK316PIK
2SK321-P
2SK94-X4

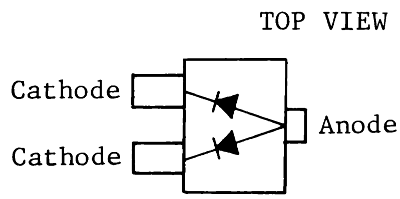


2SC3074-Y 2SD1220Y

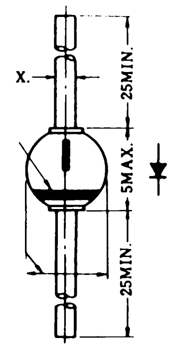


2SA1244LB-0
2SC3074LB-0
2SC2983LB-0

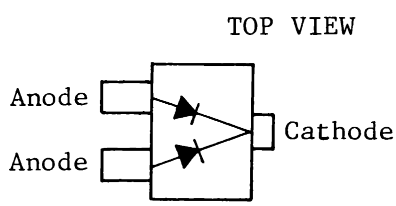
Diode



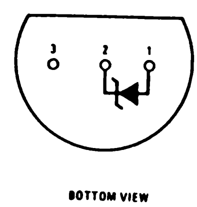
1S2836-A4(NEC`



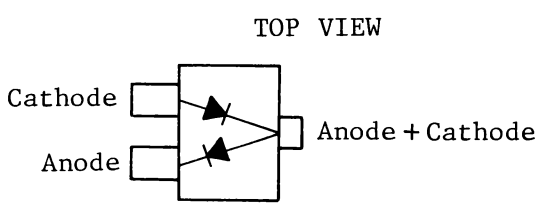
F114B～F114F(NEC)



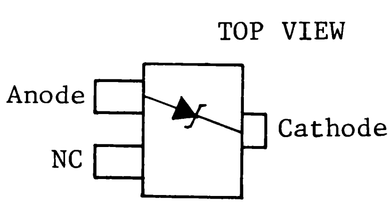
1S2838-A6(NEC)



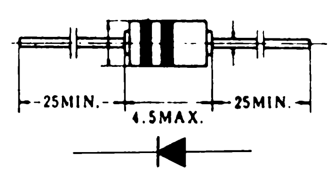
LM385Z



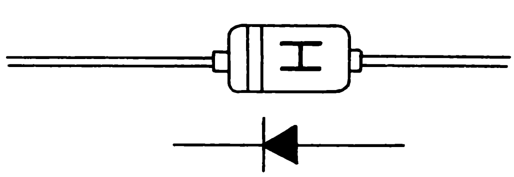
1SS123-A7(NEC)



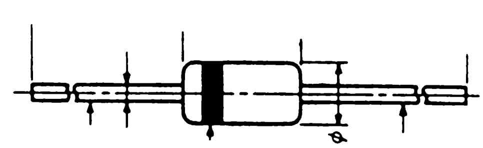
RD2.4M～RD24M (NEC)



1S953.954.955(NEC)

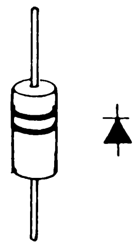


1SV68(HTT)

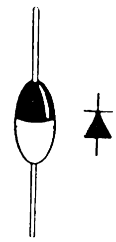


1SS97(NEC)

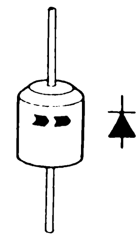
Diode



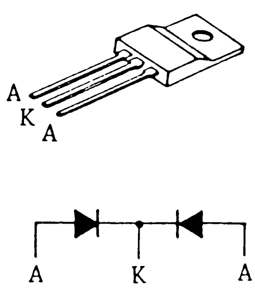
RD11FB(NEC)



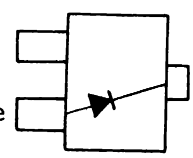
(HIT)



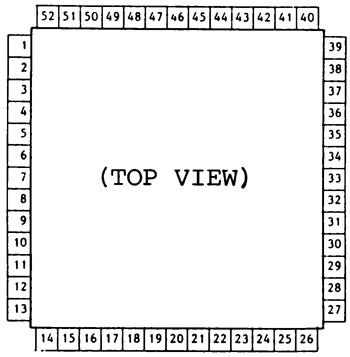
ERB81-004
WRA81-004
(FJT)



ESAC82-004(FJT)



1SS154 (TOS)



1	1135fH IN	14	N.C.	27	V.BL	40	CONT(GND)
2	162fH OUT	15	H.BL	28	BL	41	SYNC-1 OUT
3	2.53MHz IN	16	CAM H.BL	29	BF GATE	42	SYNC-2 OUT
4	TEST PIN	17	CAM H.D	30	COLOR FRAME PULSE	43	SYNC-3 OUT
5	TEST PIN	18	H.CLAMP	31	TEST Pin	44	T4(SCH DATA-d)
6	Fsc IN	19	B.F.	32	V.RESET	45	T2(SCH DATA-b)
7	GND	20	PAL PULSE	33	GND	46	T1(SCH DATA-a)
8	SCH COARSE - 1	21	TEST Pin	34	VDD(+5V)	47	MRES(SCH DATA-c)
9	SCH COARSE - 2	22	TEST Pin	35	TEST Pin	48	EXT HD IN
10	PAL-P PORARITY	23	ADVANCED VD	36	VTR WHT PULSE	49	H.LOCK OFF IN
11	2fH OUT	24	V.D	37	WHT PULSE	50	INT/EXT IN
12	fH OUT	25	CAM VD	38	TEST Pin	51	SCH OFF IN
13	fH IN	26	V.CLAMP	39	INT HD IN	52	100Hz OUT

µPD65021G-017(NEC)

Diodes

D	1	RD11FB	NEC
D	4	ESAC82-004	FDK

Resistors

R	8	SN14L3A 2R4ohm G	KOA
R	9	SN14L2H 3R0ohm F	KOA

Capacitors

C	1	FD52AX1H-104M-1	TDK
C	2	FZ0H104Z	NEC
C	3	SXE25VB-2200-12R5L	NCH
C	4	SXE25VB-220-8D	NCH
C	5	SXE25VB-1000-12R5G	NCH
C	8	FD95AX600-104M	TDK
C	9	UVS1A221MNA	NCI
C	10	FD95AX600-104M	TDK

Connectors

CN	1	PS-10SD-D4C2(w/pin)	JAE
CN	2	PS-10SD-D4C2(w/pin)	JAE
CN	3	PS-10SD-D4C2(w/pin)	JAE
CN	4	DE-9S	JAE
CN	5	HR10-10R-12S	HIR
CN	6	ST-203476	IKE
CN	7	ST-203477	IKE
CN	8	ST-203475	IKE
CN	9	IL-S-5S-S2C2-S	JAE
CN	10	PS-50SD-D4C2(w/pin)	JAE
CN	12	2DC-79P	JAE
CN	13	IL-G-6S-S3C2	JAE
CN	14	IL-G-2S-S=302	JAE

Jacks

J	1	PS-16PA-D4T1-A1	JAE
J	2	PS-16PA-D4T1-A1	JAE
J	3	PS-16PA-D4T1-A1	JAE
J	4	MLF2B31R-J1	NBA
J	5	MLF2B31R-J1	NBA
J	6	MLF2B31R-J1	NBA
J	7	MLF2B31R-J1	NBA
J	8	MLF2B31R-J1	NBA
J	9	MLF2B31R-J1	NBA
J	10	MLF2B31R-J1	NBA
J	11	SMQ-5S	HIR
J	12	LX-8P-DLT1-P1	JAE

Fuses

F	1	DM10	DIF
F	2	GMB-5	AAH

Terminales

TB	1	PR-10 WHITE	FSO
TB	2	PR-10 WHITE	FSO
TB	3	PR-10 WHITE	FSO

BNC Connector

CM	1	BNC-119R	TAJ

Optical System

OS	1	ST-203500	IKE

Fuse Holder

FH	1	DM2H	DIF
FH	2	FEF-031-1081	INC

TIMER

TM	1	TM25D9R6-5000	FUC

PIN JACKS

PJ	1	1-480350-0 (60618-5)	AMP
PJ	2	1-480350-3 (60618-5)	AMP
PJ	3	1-480349-3 (60617-5)	AMP

Integrated Circuits

IC	1	2SC3402	SNE
IC	2	2SA1348	SNE

Diodes

D	2	1S953	NEC
D	5	1S953	NEC
D	11	V03E	HIT

Switches

S	1	8J-2011	FJS
S	2	M-2020·L/S	NKK
S	3	8J-2021	FJS
S	4	8532-ZQ	C&K
S	5	8J-2021	FJS
S	6	8J-1011	FJS
S	7	8J-1011	FJS
S	8	8J-1021	FJS

VR BOARD A

Transistor

TR 1	2N3904	NEC

Diodes

D 6	RD3R0EB	NEC
D 7	1S953	NEC
D 8	1S953	NEC
D 9	1S953	NEC
D 10	1S953	NEC

Resistors

R 1	RE15YQ 1500ohm F	SSM
R 2	RE15YQ 5600ohm F	SSM
R 3	RE15YQ 2000ohm F	SSM
R 4	RE15YQ 47Kohm F	SSM
R 5	RE15YQ 2000ohm F	SSM
R 6	RE15YQ 47Kohm F	SSM
R 7	RE15YQ 5100ohm F	SSM
R 10	RE15YQ 6800ohm F	SSM
R 11	RE15YQ 6800ohm F	SSM

Variable Resistors

VR 1	λ-6B 10Kohm	CPL
VR 2	λ-6B 10Kohm	CPL
VR 3	λ-6B 10Kohm	CPL
VR 4	λ-6B 10Kohm	CPL
VR 5	λ-6B 10Kohm	CPL

Switches

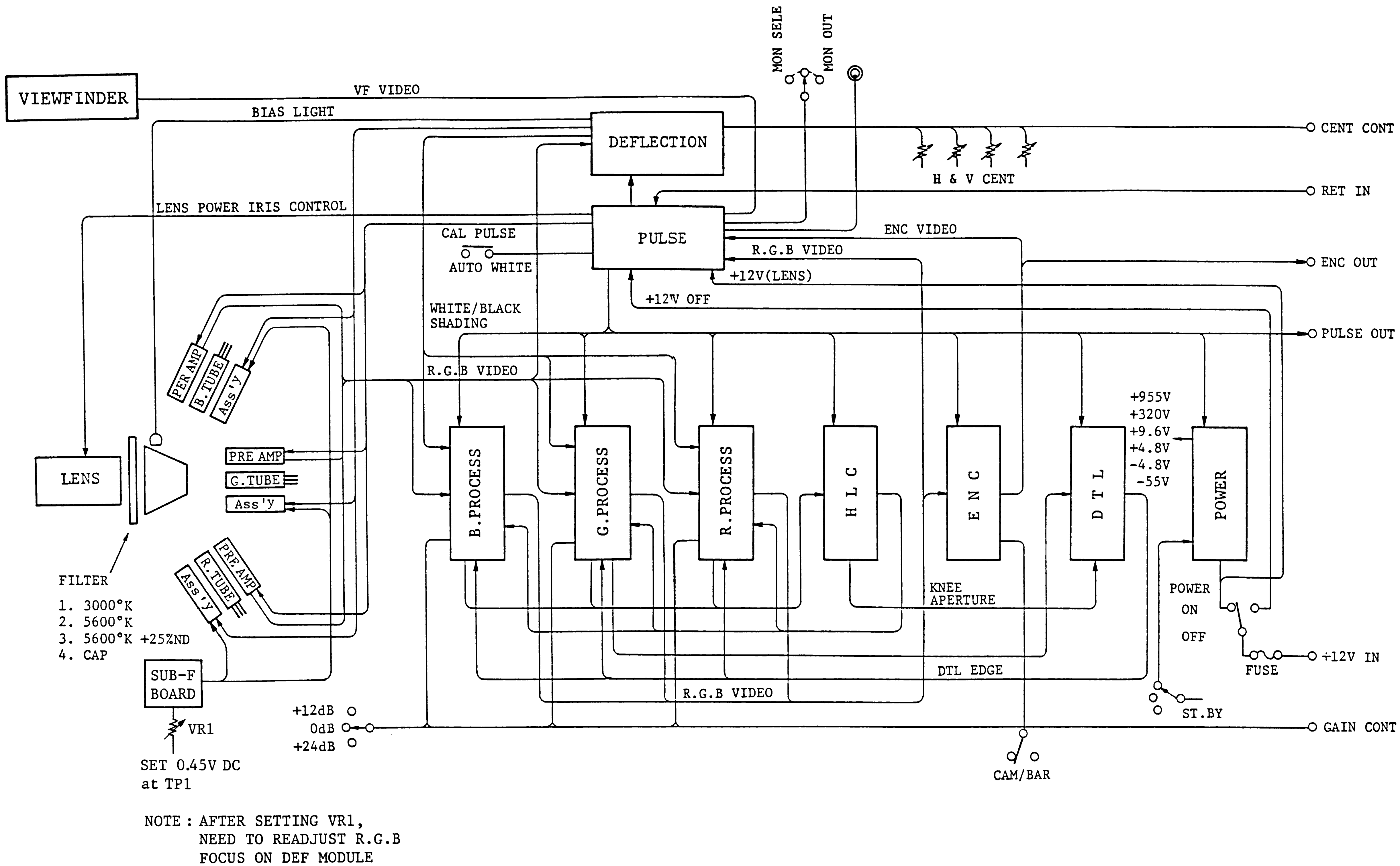
S 9	ATE1D-2M3	FJS
S 10	ATE1D-2M3	FJS
S 11	JRE 2-6-51	NEW
S 12	SU-100L	SAN

Connectors

CN	1	PS-16SD-D4C2	JAE
CN	2	PS-16SD-D4C2	JAE
CN	3	PS-16SD-D4C2	JAE
CN	4	IL-S-2S-S2C2-S	JAE
CN	5	IL-S-2S-S2C2-S	JAE
CN	6	IL-S-2S-S2C2-S	JAE

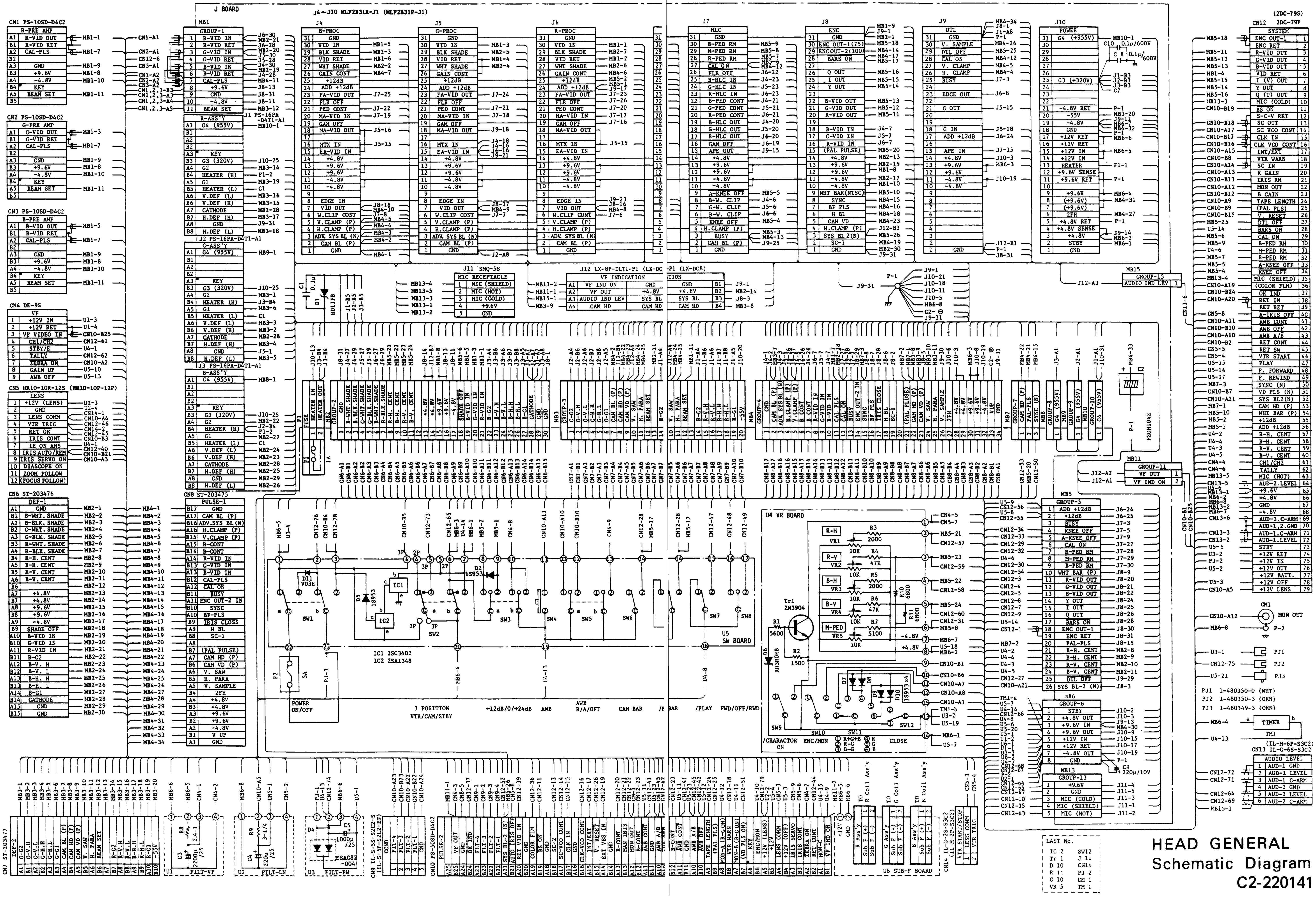
COIL Ass'y

CA	1	XQ4187 R/A	MEC
CA	2	XQ4187 G/A	MEC
CA	3	XQ4187 B/A	MEC



HEAD GENERAL
Block Diagram

Fig. 6-1-b



HEAD GENERAL
Schematic Diagram
C2-220141

Fig. 6-1-c

CONNECTING SIDE VIEW

UP

Pin	Signal	Pin	Signal	Pin	Signal
54	WHT BAR(P)	27	$\overline{\text{DTL OFF}}$	1	ENC OUT
55	+12dB	28	$\overline{\text{BARS ON}}$	2	ENC RET
56	ADD +12dB	29	$\overline{\text{CAL ON}}$	3	R-VID OUT
57	R-H CENT	30	B-PED	4	G-VID OUT
58	B-H CENT	31	M-PED	5	B-VID OUT
59	R-V CENT	32	R-PED	6	VID RET
60	B-V CENT	33	$\overline{\text{A-KNEE OFF}}$	7	I (V) OUT
61	CH1/$\overline{\text{CH2}}$	34	$\overline{\text{KNEE OFF}}$	8	Y OUT
62	$\overline{\text{VF TALLY}}$	35	MIC(SHIELD)	9	Q (U) OUT
63	MIC(HOT)	36	(COLOR FLM)	10	MIC(COLD)
64	AUD-2 LEV	37	$\overline{\text{OK IND}}$	11	$\overline{\text{BS ON}}$
65	+9.6V	38	RET IN	12	S-C-V RET
66	+4.8V	39	RET RET	13	SC OUT
67	GND	40	$\overline{\text{A-IRIS OFF}}$	14	SC VCO CONT
68	-4.8V	41	$\overline{\text{AWB CONT}}$	15	CLK IN
69	AUD-2,C-ARM	42	$\overline{\text{AWB OFF}}$	16	CLK VCO CONT
70	AUD-1,2,GND	43	AWB A/$\overline{\text{B}}$	17	INT/$\overline{\text{EXT}}$
71	AUD-1,C-ARM	44	RET CONT	18	VTR WARN
72	AUD-1,LEV	45	RET SW	19	SC IN
73	STBY	46	VTR START	20	R-GAIN
74	+12V RET	47	PLAY	21	MAN IRIS
75	+12V IN	48	F.FORWARD	22	MON OUT
76	+12V OUT	49	F.REWIND	23	B-GAIN
77	+12V BATT	50	SYNC(N)	24	TAPE LENGTH
78	+12V OFF	51	VD PLS(N)	25	(PAL PLS)
79	+12V(LENS)	52	SYS BL(N)	26	$\overline{\text{V.RESET}}$
		53	CAM HD(P)		

2DC-79P

(2DC-79S)

SYSTEM CONNECTOR 79P

Schematic Diagram

C4-217806

SUB-F BOARD

Integrated Circuits

IC	1	LM385Z1R2	NSC
IC	2	uPC358G2	NEC

Transistor

TR	1	2SA1213-O	TOS

Resistors

R	1	RMC1/10 82Kohm F	KMY
R	2	RMC1/10 1600ohm F	KMY
R	3	RMC1/10 1100ohm F	KMY
R	4	RMC1/10 560ohm F	KMY
R	5	RMC1/10 3900ohm F	KMY
R	6	RMC1/10 27ohm F	KMY

Variable Resistor

VR	1	RJ-4W 1000ohm	CPL

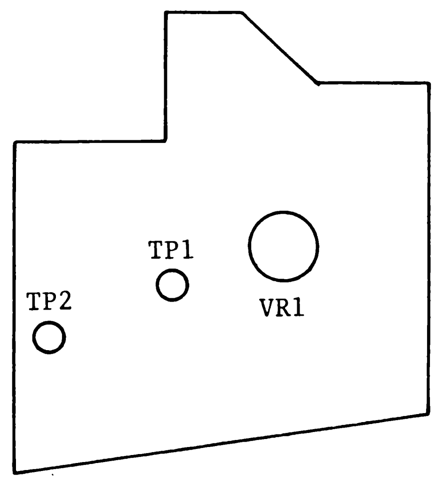
Capacitors

C	1	CM21W5R223M25VDC	KYC
C	2	CM21W5R223M25VDC	KYC
C	3	CM21W5R223M25VDC	KYC
C	4	CM32W5R104M25VDC	KYC

Connectors

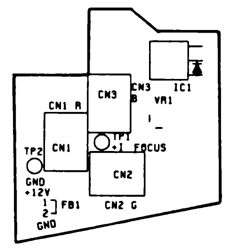
CN	1	IL-S-2P-S2L2-EF	JAE
CN	2	IL-S-2P-S2L2-EF	JAE
CN	3	IL-S-2P-S2L2-EF	JAE

Fig. 6-1-d

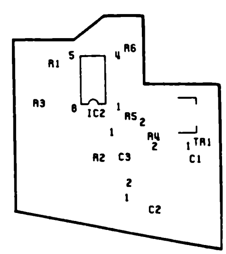


SUB-F BOARD
Controls

Fig. 6-1-e



A SIDE



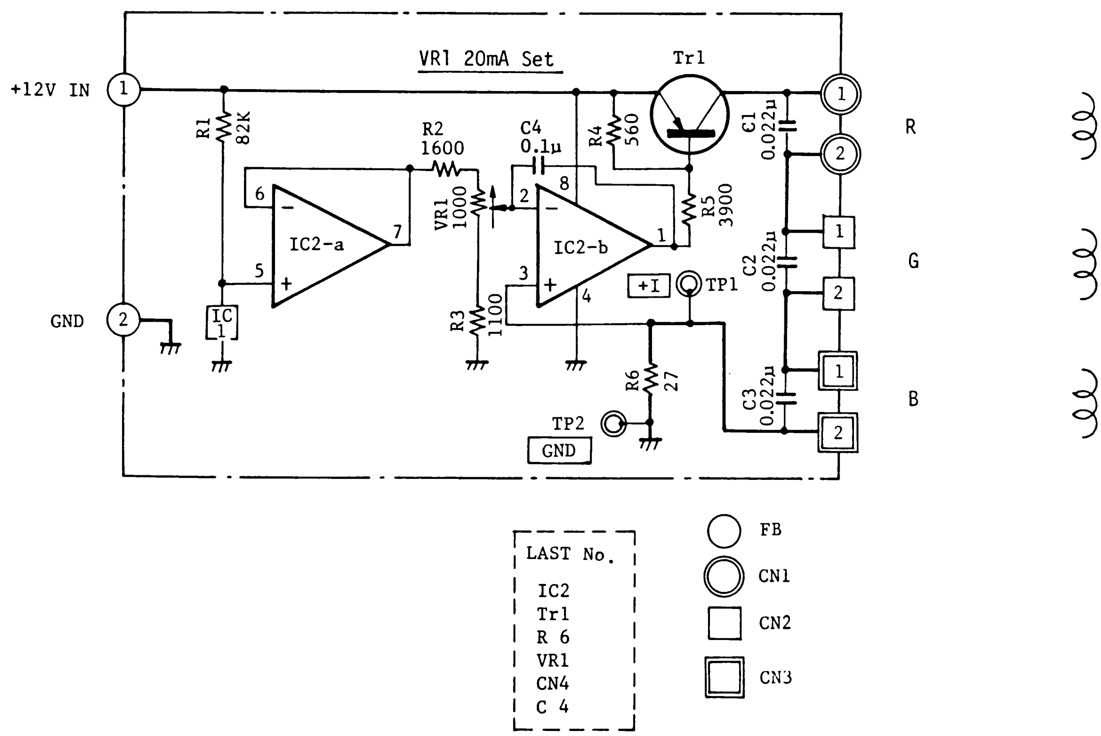
B SIDE

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is attached on the B side of the module.

SUB-F BOARD
Parts Layout

IC1 ; LM385Z1R2 Tr1 ; 2SA1213-0
IC2 ; µPC358G2



VR1 20mA Set 14mA～26mA VARIABLE
SET 20mA NOM 0.54V at TP1

SUB-F BOARD
Schematic Diagram
C4-220142

SECTION 6.2 DEF MODULE

1. Deflection Circuit

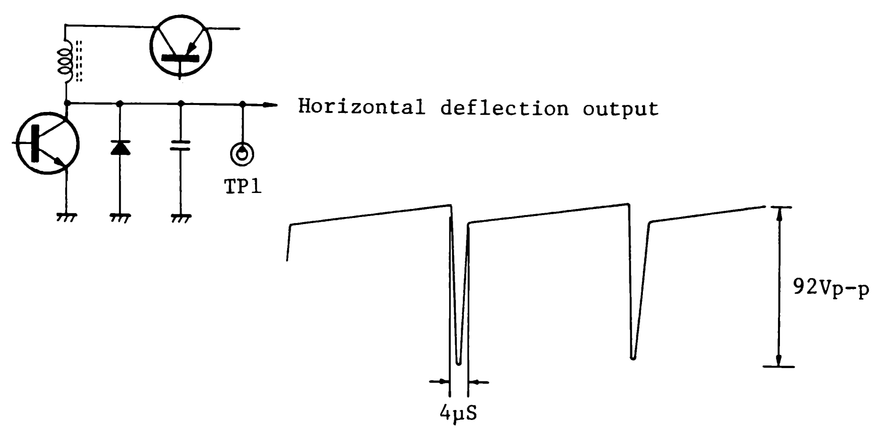
(1) Horizontal Deflection Circuit

The horizontal deflection pulse is derived from the CAM-HD signal by switching Tr4 in this circuit.

Each horizontal deflection pulse of the R, G and B channel is supplied in parallel, and applied to each deflection coil through each width coil (T1, T3 & T5) and linearity coil (T2, T4 & T6) of the R, G and B channel.

The width coil is used both for adjusting the horizontal size and geometric correction.

The linearity coil is used for adjusting the horizontal linearity and the linearity coil sawtooth amplifier of each channel is individually incorporated in it.



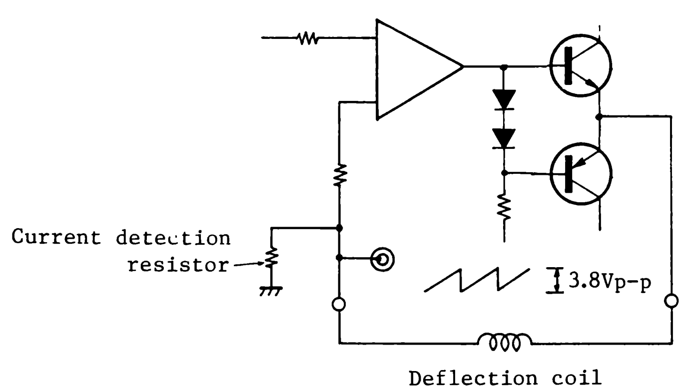
(2) Vertical Deflection Circuit

The V. Sawtooth signal is from the CAM-VD signal by oscillator which is comprising Tr18, Tr19, Tr20 and Tr21 in this circuit.

The V. Sawtooth signal is supplied to each drive amplifier of deflection coil of R, G and B channel.

The drive amplifier mixes linearity correction signal, geometric correction signal and so on, and the deflection coil is operated by constant current supplied from the drive amplifier.

Vertical deflection drive amplifier

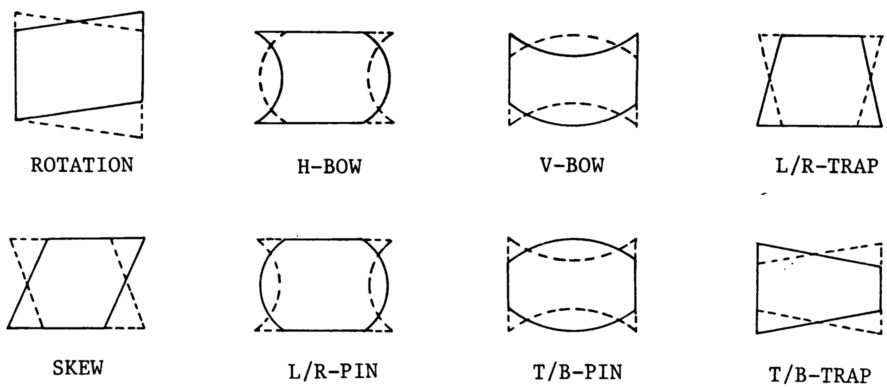


(3) Protection Circuit

H. Sawtooth signal and V. Sawtooth signal are detected by D14, D15 and D16 in this circuit. This circuit is operated so that the beam current of pick-up tube stops when either of above mentioned signals disappears.

2. Geometric Circuit

This circuit produces the signal which corrects the distortion of deflection system. The corrections of each picture of R, G and B are as follows:

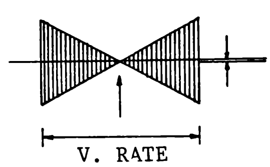


[Adjustment]

The OFF SET adjustment of Geometric circuit is as follows:

1 TRAP OFF SET (VR27) of TRAP MOD (IC12)

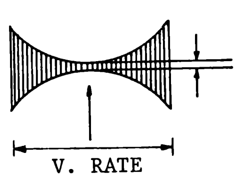
TP12



Set the control (VR27) so that the cross point is at center position of waveform.

2 PIN OFF SET (VR34) of L/R PIN MOD (IC13)

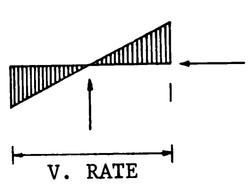
TP13



Set the control (VR34) for minimum sub-carrier.

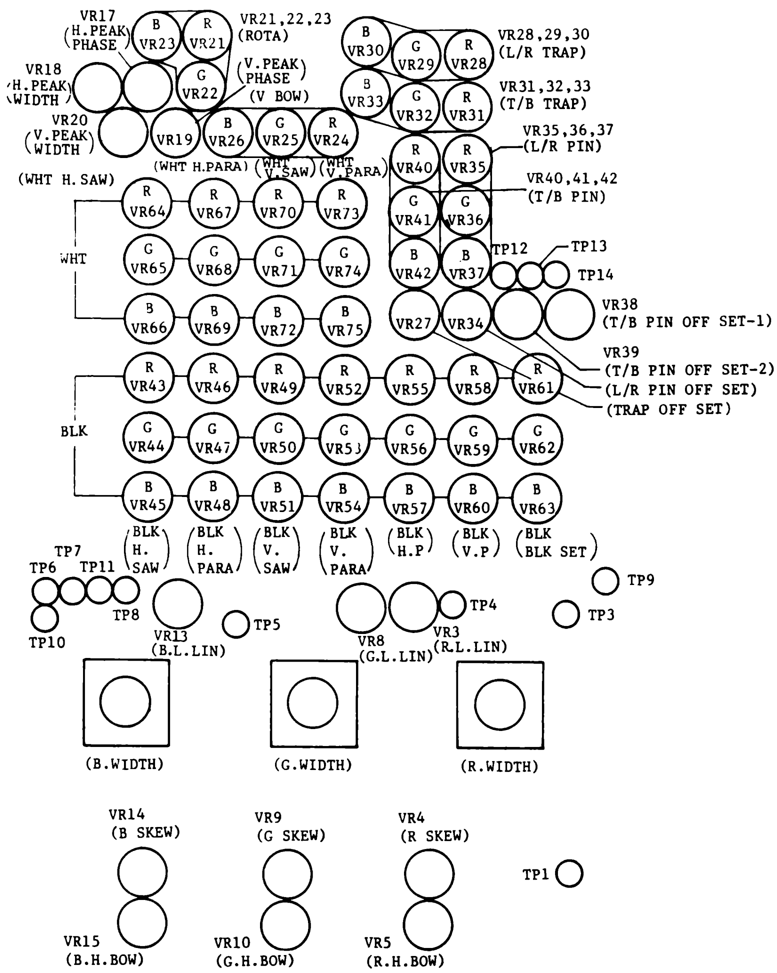
3 PIN OFF SET-1 (VR38) and PIN OFF SET-2 (VR39) of T/B PIN MOD (IC14)

TP14



- Set the control (VR39) so that this portion becomes flat. (OFF SET-2)
- Set the control (VR38) so that the cross point is at center position of waveform. (OFF SET-1)

The controls of Geometric and OFF SET are as illustrated below.



3. Shading Circuit

The black and white shading are corrected by using H.SAW, V.SAW, H.PARA and V.PARA signals.

The peak correction which corrects picture corner (corner shading) and Black Set function which prevents black level drift by Gain selection are also provided in this circuit.

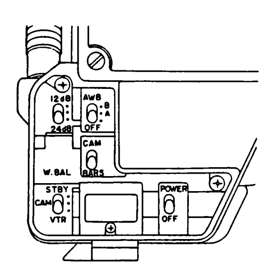
[Adjustment]

(1) Black Shading

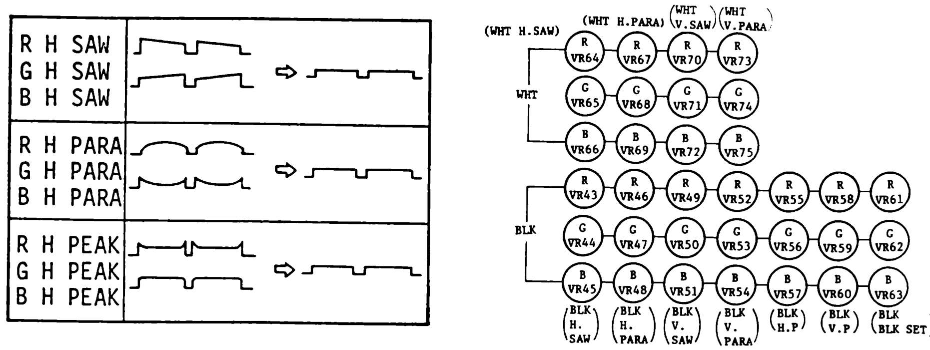
① Close the lens or cap the optical filter.

② Monitor the R, G and B video signals on the waveform monitor.

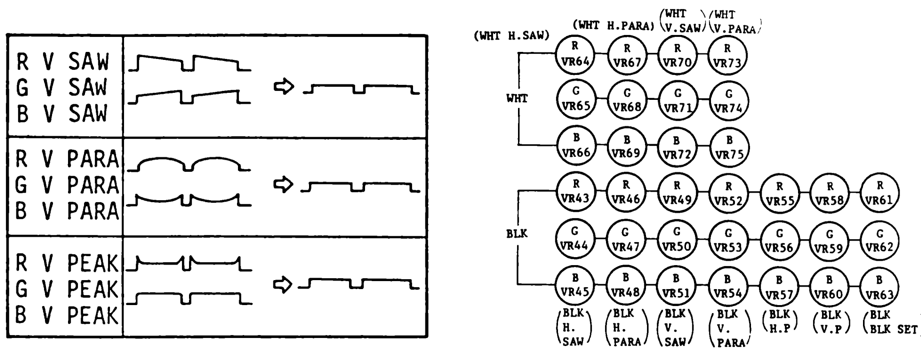
③ Adjust the R, G and B BLACK SET controls VR61 to VR63 until the pedestal level does not vary with the GAIN switch on the camera set to +12dB and +24dB.



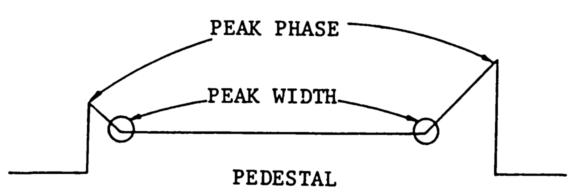
④ Watching the waveform monitor at the H rate, adjust each control.



⑤ Monitoring the waveform monitor at the V rate, adjust each control.



⑥ Horizontally and vertically correct the peak width and phase.



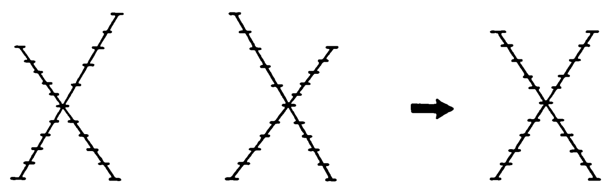
Peak levels of non-corrected video signals are not always horizontally and vertically symmetric.)

(2) White Shading

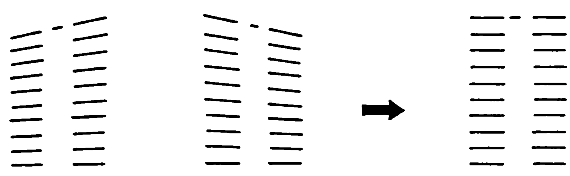
① Televise the grey scale chart. Adjust the lens iris until the video signals reach a level of 100%.

② Adjust white balance.

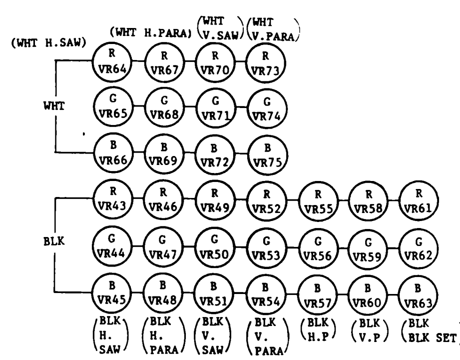
③ If white shading is in the R or G video signal as compared with the B video signal, adjust the white-shading control.



H. SAWTOOTH



V. SAWTOOTH



④ The B video signal controls are usually set to the center. When adjusting white shading of the B video signal, make the illumination completely flat.

4. ABC circuit

ABC (Auto Beam Control) circuit controls the G, electrode of pick-up tubes so that the sufficient beam current can be obtained against highlight picture area.

[Adjustment]

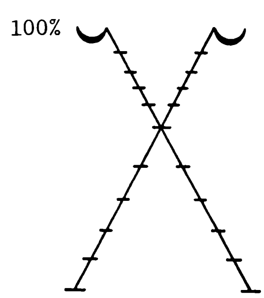
* Verify that AUTO WHITE switch is OFF position and ABC switch is OFF position. Coarse adjustment of the aspect, tracking, registration, beam set and focus setting shall be performed before the adjustment of ABC.
And also verify that the cathode voltage at TP29 in -45V. (In case it is not -45V, set it to -45V by adjusting the -45V SET control (VR95).

① Televise the grey scale.
Set the lens iris to F8. Under that condition, adjust illumination until the video level reaches 100% on the waveform monitor.

② Set the ABC switch to OFF position.

③ Open the iris, depressing the beam set switch.

④ Depressing the beam set switch, adjust the R, G, B beam set controls (VR105, VR109, VR113) until the video level returns to the 100% position.



Perform this adjustment for the R, G and B channels for 2.5 times beam setting.

⑤ Set the ABC switch to ON position.

⑥ Set the lens iris to F2.8 (leaving illumination as it is). Under this condition, monitor the waveform at the input (TP1) of the PROC module using an oscilloscope, adjust the GAIN on the oscilloscope until the signal reaches the 4 scale range.

⑦ Open the iris more and adjust the R,G,B Beam Clip controls (VR103, VR107, VR111) for 3 lens stops beam clipping.

Note: • BEAM CLIP adjustment must be done by the same procedure as mentioned above item 4 .

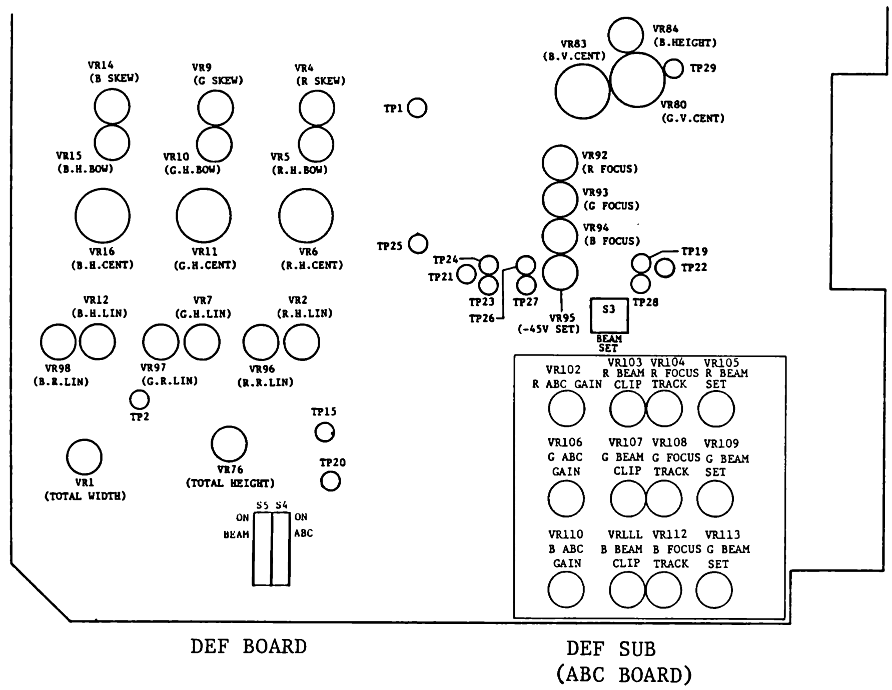
• Set the ABC GAIN control VR102, 106, 110 to maximum.

⑧ Turn the R,G,B ABC GAIN controls (VR102, VR106, VR110) CCW and set these controls to a position just before the ABC effect is lost.

⑨ Readjust the R,G,B ABC GAIN controls (VR102, VR106, VR110) observing the color monitor until comet-tails (obtained when the camera is panned) are not colored.

⑩ Adjust the R,G,B FOCUS TRACK controls (VR104, VR108, VR112) for optimum focus.

ABC Control

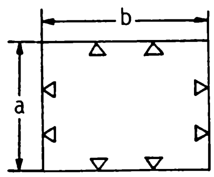


[Registration Adjustment]

(1) TOTAL HEIGHT, WIDTH

Make a pattern as shown in Fig. 1 and televise it in the position as shown in Fig.2. Adjust the horizontal and vertical deflection amplitude until the pattern can be fully obtained in the picture .

By this adjustment, the beam scanning area of pick-up tube is specified 11 mm ϕ of rated value (6.6 × 8.8 mm) Fujinon ×14 lens



	The value of d in Fig. 2					
	Canon X13 lens			Fujinon X14 lens		
d	3m	4m	5m	3m	4m	5m
a	164	220	276	147	197	242
b	217	293	364	196	263	322

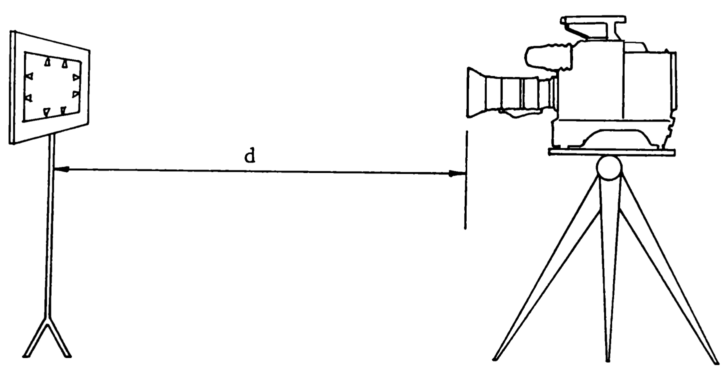
J13 X 9 A14 X 9.5

(unit in mm)

Fig. 1

How to make the pattern

lens (max. TELE end)
(set the zoom ring to TELE)



(the distance between glass face at front of lens and the pattern.)

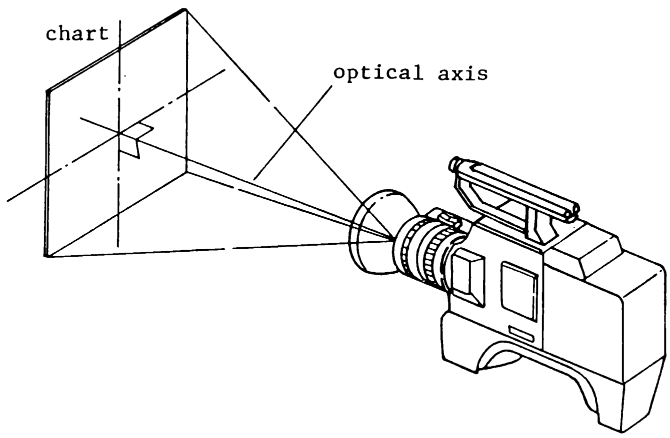
Fig. 2

(2) Linearity

① Televise the linearity chart. Monitor the video signal in the G channel on the picture monitor.

② Set the G ROT control VR22 on the DEF module to the center.

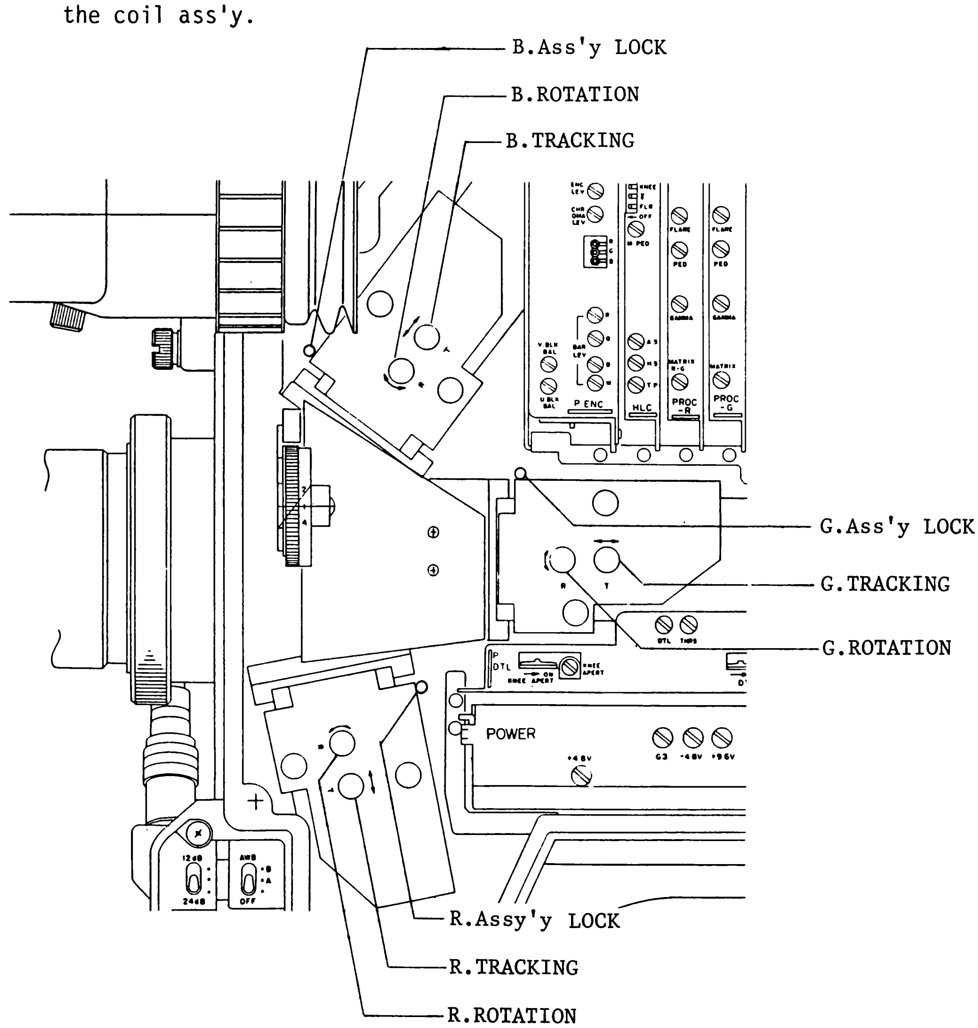
③ Horizontally level the linearity chart with the camera. Face the camera square to the linearity chart with equal distances from the camera top and bottom edges and the linearity chart.



④ Apply crosshatch signal to the picture monitor to superimpose it on the video signal of the camera.

⑤ Adjust tilt of the linearity chart at the center of the screen using the rotation mechanism on the coil ass'y.

Note: When adjusting the rotation mechanism and tracking mechanism, unlock the coil ass'y.



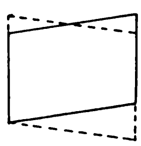
⑥ Correct rotation with the G ROT control VR22.

⑦ Match the linearity chart with the crosshatch using the following control's

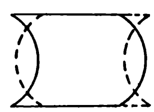
G. H. CENT VR11
G. V. CENT VR80
G. H. LIN VR7
G. RIGHT LINE VR97
G. SKEW VR9
G. V. LIN .... VR82 (TOTAL V. LIN)
G. ROT VR22
G. GEOM .... GEOMETRIC VR

GEOMETRIC

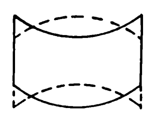
Geometric adjusting items:



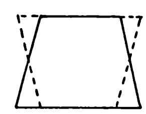
G.ROTATION
(VR22)



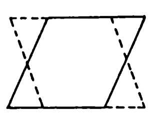
G.H-BOW
(VR10)



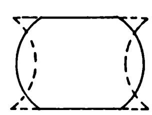
G.V-BOW
(VR25)



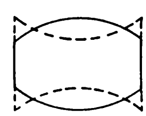
G. L/R-TRAP
(VR29)



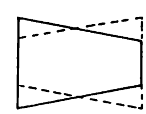
G.SKEW
(VR9)



G.L/R-PIN
(VR36)



G.T/B-PIN
(VR41)



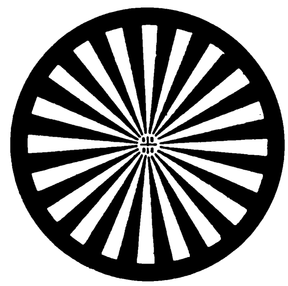
G. T/B-TRAP
(VR32)

The G WIDTH HEIGHT controls shall be set in the vicinity of these center excepting when the G-channel image tube is replaced, and matching can be adjusted by the TOTAL WIDTH HEIGHT controls.

(3) Tracking

Adjust tracking in the following manner when the image tube is replaced.
Fully open the lens iris. Decrease the illumination permitting appropriate output. Televise the chart.

(The illustration shows the tracking chart used in the factory.)



① Set the lens zoom control to "TELE" observing the picture monitor. Focus the lens.

② Set the lens zoom control to "WIDE". Check to ensure that the lens is focussed. Proceed as follows if out of focus.
Loosen the coil ass'y lock screw. Turn the tracking adjusting screw CCW or CW to focus the lens.

③ Turn the lens zoom control to "TELE" and "WIDE" to be sure that the lens is focussed.

④ Repeat the adjustments of steps ① to ③. Tighten the ass'y lock screw.

Note: 1. Rotation may change with the ass'y lock screw loosened. Check rotation before locking the coil ass'y.

2. Whenever performing tracking adjustment, check to ensure that the flange back of the lens is set.

DEF-A MODULE

Integrated Circuits

IC 1	uPC4558G2	NEC
IC 2	uPC4558G2	NEC
IC 3	uPC4558G2	NEC
IC 4	uPC4558G2	NEC
IC 5	uPC4558G2	NEC
IC 6	uPC4558G2	NEC
IC 7	uPC4558G2	NEC
IC 8	TL-062CPS	TEX
IC 9	TL-062CPS	TEX
IC 10	TL-062CPS	TEX
IC 11	TL-062CPS	TEX
IC 12	ST-203247	IKE
IC 13	ST-203247	IKE
IC 14	ST-203247	IKE
IC 15	TL-062CPS	TEX
IC 16	TL-062CPS	TEX
IC 17	TL-062CPS	TEX
IC 18	uPD4053BG	NEC
IC 19	uPD4053BG	NEC
IC 20	uPC4558G2	NEC
IC 21	uPC4558G2	NEC
IC 22	uPC4558G2	NEC
IC 23	uPD4053BG	NEC
IC 24	TL-062CPS	TEX
IC 25	TL-062CPS	TEX

Transistors

TR 1	2SC1623-L6,7	NEC
TR 2	2SC1623-L6,7	NEC
TR 3	2SA812-M6,7	NEC
TR 4	2SC2983LB-O,Y	TOS
TR 5	2SA1213-O	TOS
TR 6	2SC1623-L6,7	NEC
TR 7	2SC1623-L6,7	NEC
TR 8	2SC3074LB-Y	TOS
TR 9	2SA1244LB-Y	TOS
TR 10	2SC3074LB-O,Y	TOS
TR 11	2SA1244LB-Y	TOS
TR 12	2SC3074LB-O,Y	TOS
TR 13	2SA1244LB-Y	TOS
TR 14	2SC1623-L6,7	NEC
TR 15	2SC1623-L6,7	NEC
TR 16	2SC1623-L6,7	NEC
TR 17	2SC1623-L6,7	NEC
TR 18	2SC1623-L6,7	NEC
TR 19	2SA812-M6,7	NEC
TR 20	2SC1623-L6,7	NEC
TR 21	2SA812-M6,7	NEC
TR 22	2SC2873-O	TOS
TR 23	2SA1213-O	TOS
TR 24	2SC2873-O	TOS
TR 25	2SA1213-O	TOS
TR 26	2SC2873-O	TOS
TR 27	2SA1213-O	TOS
TR 41	2SC3360-N16,17	NEC
TR 42	2SC2873-O	TOS
TR 43	2SA812-M6,7	NEC
TR 44	2SA812-M6,7	NEC
TR 48	2SA812-M6,7	NEC
TR 49	2SC1623-L6,7	NEC

Diodes

D 1	V11N	HIT
D 2	1SS123-A7	NEC
D 3	1SS123-A7	NEC
D 4	1SS123-A7	NEC
D 5	1SS123-A7	NEC
D 6	1SS123-A7	NEC
D 7	1SS123-A7	NEC
D 14	1SS123-A7	NEC
D 15	V03E	HIT
D 16	V03E	HIT
D 17	1S2836-A4	NEC
D 18	1S2838-A6	NEC
D 22	1SS154-BA	TOS

Resistors

R 1	RMC1/10	20Kohm F	KMY
R 2	RMC1/10	10Kohm F	KMY
R 3	RMC1/10	3300ohm F	KMY
R 4	RMC1/10	100ohm F	KMY
R 5	RMC1/10	4300ohm F	KMY
R 6	RMC1/10	470ohm F	KMY
R 7	RMC1/10	2200ohm F	KMY
R 8	RMC1/10	6200ohm F	KMY
R 9	RMC1/10	2700ohm F	KMY
R 10	RMC1/10	8200ohm F	KMY
R 11	RMC1/10	10Kohm F	KMY
R 12	RMC1/10	10Kohm F	KMY
R 13	RMC1/10	7500ohm F	KMY
R 14	RMC1/10	18Kohm F	KMY
R 15	RMC1/10	30Kohm F	KMY
R 16	RMC1/10	10Kohm F	KMY
R 18	RMC1/10	10Kohm F	KMY
R 19	RMC1/10	20Kohm F	KMY
R 20	RMC1/10	10Kohm F	KMY
R 21	RMC1/10	56ohm F	KMY

Resistors

R 22	RMC1/10	1500ohm F	KMY
R 23	RMC1/10	20Kohm F	KMY
R 24	RMC1/10	33Kohm F	KMY
R 25	RMC1/10	51Kohm F	KMY
R 26	RMC1/10	100Kohm F	KMY
R 27	RMC1/10	1000ohm F	KMY
R 28	RMC1/10	470ohm F	KMY
R 29	RMC1/10	2000ohm F	KMY
R 30	RMC1/10	10Kohm F	KMY
R 31	RMC1/10	20Kohm F	KMY
R 32	RMC1/10	10Kohm F	KMY
R 33	RMC1/10	56ohm F	KMY
R 34	RMC1/10	1500ohm F	KMY
R 35	RMC1/10	20Kohm F	KMY
R 36	*		
R 37	RMC1/10	33Kohm F	KMY
R 38	RMC1/10	51Kohm F	KMY
R 39	RMC1/10	100Kohm F	KMY
R 40	RMC1/10	1000ohm F	KMY
R 41	RMC1/10	470ohm F	KMY
R 42	RMC1/10	10Kohm F	KMY
R 43	RMC1/10	20Kohm F	KMY
R 44	RMC1/10	10Kohm F	KMY
R 45	*		
R 46	RMC1/10	56ohm F	KMY
R 47	RMC1/10	1500ohm F	KMY
R 48	RMC1/10	20Kohm F	KMY
R 49	RMC1/10	33Kohm F	KMY
R 50	RMC1/10	51Kohm F	KMY
R 51	RMC1/10	100Kohm F	KMY
R 52	RMC1/10	1000ohm F	KMY
R 53	RMC1/10	2000ohm F	KMY
R 54	RMC1/10	470ohm F	KMY
R 55	RMC1/10	7500ohm F	KMY
R 56	RMC1/10	30Kohm F	KMY
R 57	RMC1/10	82Kohm F	KMY
R 58	RMC1/10	24Kohm F	KMY
R 59	RMC1/10	4700ohm F	KMY
R 60	RMC1/10	20Kohm F	KMY
R 61	RMC1/10	18Kohm F	KMY
R 62	RMC1/10	82Kohm F	KMY
R 63	RMC1/10	24Kohm F	KMY
R 64	RMC1/10	4700ohm F	KMY
R 65	RMC1/10	20Kohm F	KMY
R 66	RMC1/10	18Kohm F	KMY
R 67	RMC1/10	33ohm F	KMY
R 68	*		
R 69	RMC1/10	30Kohm F	KMY
R 70	RMC1/10	30Kohm F	KMY
R 71	RMC1/10	24Kohm F	KMY
R 72	RMC1/10	330Kohm F	KMY
R 73	RMC1/10	30Kohm F	KMY
R 74	RMC1/10	30Kohm F	KMY
R 75	RMC1/10	30Kohm F	KMY
R 76	RMC1/10	100Kohm F	KMY
R 77	RMC1/10	100Kohm F	KMY
R 78	RMC1/10	100Kohm F	KMY
R 79	RMC1/10	100Kohm F	KMY
R 80	RMC1/10	100Kohm F	KMY
R 81	RMC1/10	100Kohm F	KMY
R 82	RMC1/10	30Kohm F	KMY
R 83	RMC1/10	22Kohm F	KMY
R 84	RMC1/10	330Kohm F	KMY
R 85	RMC1/10	30Kohm F	KMY
R 86	RMC1/10	30Kohm F	KMY
R 87	RMC1/10	30Kohm F	KMY
R 88	RMC1/10	30Kohm F	KMY
R 89	RMC1/10	100ohm F	KMY
R 90	RMC1/10	1500ohm F	KMY
R 91	RMC1/10	5600ohm F	KMY
R 92	RMC1/10	30Kohm F	KMY
R 93	RMC1/10	10Kohm F	KMY
R 94	RMC1/10	10Kohm F	KMY
R 95	RMC1/10	20Kohm F	KMY
R 96	RMC1/10	20Kohm F	KMY
R 97	RMC1/10	20Kohm F	KMY
R 98	RMC1/10	39Kohm F	KMY
R 99	RMC1/10	39Kohm F	KMY
R100	RMC1/10	39Kohm F	KMY
R101	RMC1/10	3600ohm F	KMY
R102	RMC1/10	5100ohm F	KMY
R103	RMC1/10	15Kohm F	KMY
R104	RMC1/10	10Kohm F	KMY
R105	RMC1/10	10Kohm F	KMY
R106	RMC1/10	20Kohm F	KMY
R107	RMC1/10	20Kohm F	KMY
R108	RMC1/10	20Kohm F	KMY
R109	RMC1/10	30Kohm F	KMY
R110	RMC1/10	1300ohm F	KMY
R111	RMC1/10	13Kohm F	KMY
R112	RMC1/10	4300ohm F	KMY
R113	RMC1/10	10Kohm F	KMY
R114	RMC1/10	10Kohm F	KMY
R115	RMC1/10	39Kohm F	KMY
R116	RMC1/10	39Kohm F	KMY
R117	RMC1/10	39Kohm F	KMY
R118	RMC1/10	75Kohm F	KMY
R119	RMC1/10	75Kohm F	KMY
R120	RMC1/10	75Kohm F	KMY
R121	RMC1/10	75Kohm F	KMY
R122	RMC1/10	75Kohm F	KMY
R123	RMC1/10	75Kohm F	KMY
R124	RMC1/10	75Kohm F	KMY
R125	RMC1/10	75Kohm F	KMY
R126	RMC1/10	75Kohm F	KMY
R127	RMC1/10	75Kohm F	KMY

Resistors

R128	RMC1/10	75Kohm F	KMY
R129	RMC1/10	75Kohm F	KMY
R130	RMC1/10	13Kohm F	KMY
R131	RMC1/10	13Kohm F	KMY
R132	RMC1/10	13Kohm F	KMY
R133	RMC1/10	13Kohm F	KMY
R134	RMC1/10	13Kohm F	KMY
R135	RMC1/10	13Kohm F	KMY
R136	RMC1/10	43Kohm F	KMY
R137	RMC1/10	51Kohm F	KMY
R138	RMC1/10	43Kohm F	KMY
R139	RMC1/10	51Kohm F	KMY
R140	RMC1/10	43Kohm F	KMY
R141	RMC1/10	51Kohm F	KMY
R142	RMC1/10	75Kohm F	KMY
R143	RMC1/10	75Kohm F	KMY
R144	RMC1/10	75Kohm F	KMY
R145	RMC1/10	15Kohm F	KMY
R146	RMC1/10	5100ohm F	KMY
R147	RMC1/10	75Kohm F	KMY
R148	RMC1/10	75Kohm F	KMY
R149	RMC1/10	75Kohm F	KMY
R150	RMC1/10	75Kohm F	KMY
R151	RMC1/10	75Kohm F	KMY
R152	RMC1/10	75Kohm F	KMY
R153	*		
R154	RMC1/10	10Kohm F	KMY
R155	RMC1/10	75Kohm F	KMY
R156	RMC1/10	75Kohm F	KMY
R157	RMC1/10	75Kohm F	KMY
R158	RMC1/10	30Kohm F	KMY
R159	RMC1/10	30Kohm F	KMY
R160	RMC1/10	30Kohm F	KMY
R161	RMC1/10	68kohm F	KMY
R162	RMC1/10	68kohm F	KMY
R163	RMC1/10	68kohm F	KMY
R164	RMC1/10	100ohm F	KMY
R165	RMC1/10	2400ohm F	KMY
R166	RMC1/10	6200ohm F	KMY
R167	RMC1/10	6200ohm F	KMY
R168	RMC1/10	8200ohm F	KMY
R169	RMC1/10	5600ohm F	KMY
R170	RMC1/10	3000ohm F	KMY
R171	RMC1/10	3000ohm F	KMY
R172	RMC1/10	51Kohm F	KMY
R173	RMC1/10	82kohm F	KMY
R174	RMC1/10	220Kohm F	KMY
R175	RMC1/10	51Kohm F	KMY
R176	RMC1/10	6200ohm F	KMY
R177	RMC1/10	3900ohm F	KMY
R178	RMC1/10	150Kohm F	KMY
R179	RMC1/10	18ohm F	KMY
R180	RMC1/10	3000ohm F	KMY
R181	RMC1/10	2400ohm F	KMY
R182	RMC1/10	300ohm F	KMY
R183	RMC1/10	51Kohm F	KMY
R184	RMC1/10	82kohm F	KMY
R185	RMC1/10	220Kohm F	KMY
R186	RMC1/10	51Kohm F	KMY
R187	RMC1/10	6200ohm F	KMY
R188	RMC1/10	3000ohm F	KMY
R189	RMC1/10	18ohm F	KMY
R190	RMC1/10	2400ohm F	KMY
R191	RMC1/10	300ohm F	KMY
R192	RMC1/10	51Kohm F	KMY
R193	RMC1/10	82kohm F	KMY
R194	RMC1/10	220Kohm F	KMY
R195	RMC1/10	51Kohm F	KMY
R196	RMC1/10	6200ohm F	KMY
R197	RMC1/10	3900ohm F	KMY
R198	RMC1/10	150Kohm F	KMY
R199	RMC1/10	3000ohm F	KMY
R200	RMC1/10	18ohm F	KMY
R201	RMC1/10	2400ohm F	KMY
R202	RMC1/10	300ohm F	KMY
R205	RMC1/10	30Kohm F	KMY
R231	RMC1/10	30Kohm F	KMY
R232	RMC1/10	20Kohm F	KMY
R233	RMC1/10	30Kohm F	KMY
R234	RMC1/10	1000ohm F	KMY
R235	RMC1/10	30Kohm F	KMY
R237	RMC1/10	20Kohm F	KMY
R238	RMC1/10	30Kohm F	KMY
R239	RMC1/10	10Kohm F	KMY
R240	RMC1/10	1600ohm F	KMY
R241	RMC1/10	1000ohm F	KMY
R243	RMC1/10	30Kohm F	KMY
R244	RMC1/10	20Kohm F	KMY
R245	RMC1/10	30Kohm F	KMY
R247	RMC1/10	10Kohm F	KMY
R248	RMC1/10	3300ohm F	KMY
R249	RMC1/10	1500ohm F	KMY
R250	RMC1/10	1500ohm F	KMY
R251	RMC1/10	8200ohm F	KMY
R252	RMC1/10	5100ohm F	KMY
R253	RMC1/10	39Kohm F	KMY
R254	*		
R255	RMC1/10	9100ohm F	KMY
R256	RMC1/10	1300ohm F	KMY
R257	RMC1/10	100Kohm F	KMY
R258	RMC1/10	12Kohm F	KMY
R259	RMC1/10	100Kohm F	KMY
R264	RMC1/10	1000ohm F	KMY
R267	RMC1/10	18Kohm F	KMY
R269	RMC1/10	20Kohm F	KMY

DEF-A MODULE

Resistors

R270	RMC1/10 15Kohm F	KMY
R271	RMC1/10 10Kohm F	KMY
R272	RMC1/10 20Kohm F	KMY
R273	RMC1/10 15Kohm F	KMY
R274	RMC1/10 10Kohm F	KMY
R275	RMC1/10 20Kohm F	KMY
R276	RMC1/10 15Kohm F	KMY
R277	RMC1/10 10Kohm F	KMY
R278	RMC1/10 200ohm F	KMY
R285	RMC1/10 1000ohm F	KMY
R286	RMC1/10 1000ohm F	KMY
R287	RMC1/10 1000ohm F	KMY
R292	RMC1/10 3900ohm F	KMY
R296	*	
R297	RMC1/10 330Kohm F	KMY
R298	*	
R299	RMC1/10 51Kohm F	KMY
R300	RMC1/10 15Kohm F	KMY
R301	RMC1/10 20Kohm F	KMY
R351	RMC1/10 10Kohm F	KMY

Variable Resistors

VR 1	RJ-4W 5000ohm	CPL
VR 2	RJ-4W 10Kohm	CPL
VR 3	RJ-4W 500ohm	CPL
VR 4	RJ-4W 100Kohm	CPL
VR 5	RJ-4W 100Kohm	CPL
VR 6	POT1102P-1-502	MUR
VR 7	RJ-4W 10Kohm	CPL
VR 8	RJ-4W 500ohm	CPL
VR 9	RJ-4W 100Kohm	CPL
VR 10	RJ-4W 100Kohm	CPL
VR 11	POT1102P-1-502	MUR
VR 12	RJ-4W 10Kohm	CPL
VR 13	RJ-4W 500ohm	CPL
VR 14	RJ-4W 100Kohm	CPL
VR 15	RJ-4W 100Kohm	CPL
VR 16	POT1102P-1-502	MUR
VR 17	RJ-4W 100Kohm	CPL
VR 18	RJ-4W 10Kohm	CPL
VR 19	RJ-4W 100Kohm	CPL
VR 20	RJ-4W 10Kohm	CPL
VR 21	RJ-4W 100Kohm	CPL
VR 22	RJ-4W 100Kohm	CPL
VR 23	RJ-4W 100Kohm	CPL
VR 24	RJ-4W 100Kohm	CPL
VR 25	RJ-4W 100Kohm	CPL
VR 26	RJ-4W 100Kohm	CPL
VR 27	RJ-4W 50Kohm	CPL
VR 28	RJ-4W 100Kohm	CPL
VR 29	RJ-4W 100Kohm	CPL
VR 30	RJ-4W 100Kohm	CPL
VR 31	RJ-4W 100Kohm	CPL
VR 32	RJ-4W 100Kohm	CPL
VR 33	RJ-4W 100Kohm	CPL
VR 34	RJ-4W 10Kohm	CPL
VR 35	RJ-4W 100Kohm	CPL
VR 36	RJ-4W 100Kohm	CPL
VR 37	RJ-4W 100Kohm	CPL
VR 38	RJ-4W 50Kohm	CPL
VR 39	RJ-4W 20Kohm	CPL
VR 40	RJ-4W 100Kohm	CPL
VR 41	RJ-4W 100Kohm	CPL
VR 42	RJ-4W 100Kohm	CPL
VR 43	RJ-4W 100Kohm	CPL
VR 44	RJ-4W 100Kohm	CPL
VR 45	RJ-4W 100Kohm	CPL
VR 46	RJ-4W 100Kohm	CPL
VR 47	RJ-4W 100Kohm	CPL
VR 48	RJ-4W 100Kohm	CPL
VR 49	RJ-4W 100Kohm	CPL
VR 50	RJ-4W 100Kohm	CPL
VR 51	RJ-4W 100Kohm	CPL
VR 52	RJ-4W 100Kohm	CPL
VR 53	RJ-4W 100Kohm	CPL
VR 54	RJ-4W 100Kohm	CPL
VR 55	RJ-4W 100Kohm	CPL
VR 56	RJ-4W 100Kohm	CPL
VR 57	RJ-4W 100Kohm	CPL
VR 58	RJ-4W 200Kohm	CPL
VR 59	RJ-4W 200Kohm	CPL
VR 60	RJ-4W 200Kohm	CPL
VR 61	RJ-4W 50Kohm	CPL
VR 62	RJ-4W 50Kohm	CPL
VR 63	RJ-4W 50Kohm	CPL
VR 64	RJ-4W 100Kohm	CPL
VR 65	RJ-4W 100Kohm	CPL
VR 66	RJ-4W 100Kohm	CPL
VR 67	RJ-4W 100Kohm	CPL
VR 68	RJ-4W 100Kohm	CPL
VR 69	RJ-4W 100Kohm	CPL
VR 70	RJ-4W 100Kohm	CPL
VR 71	RJ-4W 100Kohm	CPL
VR 72	RJ-4W 100Kohm	CPL
VR 73	RJ-4W 100Kohm	CPL
VR 74	RJ-4W 100Kohm	CPL
VR 75	RJ-4W 100Kohm	CPL
VR 76	RJ-4W 5000ohm	CPL
VR 77	POT1102-1-503	MUR
VR 78	RJ-4W 500ohm	CPL
VR 79	RJ-4W 100Kohm	CPL
VR 80	POT1102-1-503	MUR
VR 81	RJ-4W 500ohm	CPL
VR 82	RJ-4W 100Kohm	CPL
VR 83	POT1102-1-503	MUR
VR 84	RJ-4W 500ohm	CPL
VR 85	RJ-4W 100Kohm	CPL
VR 92	RJ-4W 50Kohm	CPL
VR 93	RJ-4W 50Kohm	CPL
VR 94	RJ-4W 50Kohm	CPL
VR 95	RJ-4W 1000ohm	CPL
VR 96	RJ-4W 20Kohm	CPL
VR 97	RJ-4W 20Kohm	CPL
VR 98	RJ-4W 20Kohm	CPL

Capacitors

C 1	UMA1C470MCA	NCI
C 2	CM21CH101J25VDC	KYC
C 3	UMA0J101MCA	NCI
C 4	CM21W5R223M25VDC	KYC
C 5	CM32W5R104M25VDC	KYC
C 6	UMA1A330MCA	NCI
C 7	UMA0J470MCA	NCI
C 8	501N2003-472K1	NCC
C 9	*CM21W5R223M25VDC	KYC
C 10	UMA0J220MCA	NCI
C 13	CM21CH471J25VDC	KYC
C 14	CM21CH102J25VDC	KYC
C 15	CM32W5R104M25VDC	KYC
C 16	CM21W5R223M25VDC	KYC
C 17	UMA0J470MCA	NCI
C 18	268L3502-224M	NCC
C 19	CS06E0J470M1	NEC
C 20	UMA0J470MCA	NCI
C 21	UMA0J470MCA	NCI
C 22	CM32W5R104M25VDC	KYC
C 23	CM21W5R223M25VDC	KYC
C 24	CM32W5R104M25VDC	KYC
C 25	CM21W5R223M25VDC	KYC
C 26	UMA0J470MCA	NCI
C 27	268L3502-224M	NCC
C 28	CS06E0J470M1	NEC
C 29	UMA0J470MCA	NCI
C 30	UMA0J470MCA	NCI
C 31	CM32W5R104M25VDC	KYC
C 32	CM32W5R104M25VDC	KYC
C 33	CM21W5R223M25VDC	KYC
C 34	UMA0J470MCA	NCI
C 35	268L3502-224M	NCC
C 36	CS06E0J470M1	NEC
C 37	UMA0J470MCA	NCI
C 38	UMA0J470MCA	NCI
C 39	CM32W5R104M25VDC	KYC
C 40	CM21W5R223M25VDC	KYC
C 41	UMA1C470MCA	NCI
C 42	CM21W5R223M25VDC	KYC
C 43	UMA0J470MCA	NCI
C 44	CM21W5R223M25VDC	KYC
C 45	UMA0J101MCA	NCI
C 46	CM32W5R104M25VDC	KYC
C 47	CM21W5R223M25VDC	KYC
C 48	CM21CH331J25VDC	KYC
C 49	UMA0J220MCA	NCI
C 50	CM32W5R104M25VDC	KYC
C 51	UMA1C470MCA	NCI
C 52	UMA0J470MCA	NCI
C 53	CM21W5R223M25VDC	KYC
C 54	CM32W5R104M25VDC	KYC
C 55	UMA0J220MCA	NCI
C 56	UMA0J220MCA	NCI
C 57	UMA0J220MCA	NCI
C 58	UMA0J220MCA	NCI
C 59	UMA0J220MCA	NCI
C 60	UMA0J220MCA	NCI
C 61	UMA0J101MCA	NCI
C 62	UMA1C470MCA	NCI
C 63	UMA1A330MCA	NCI
C 64	268L1602-335M	NCC
C 65	UMA0J101MCA	NCI
C 66	UMA0J101MCA	NCI
C 67	UMA0J220MCA	NCI
C 68	UMA0J470MCA	NCI
C 70	CM21W5R223M25VDC	KYC
C 71	*	KYC
C 72	*	KYC
C 73	UMA0J220MCA	NCI
C 74	UMA0J470MCA	NCI
C 76	*	KYC
C 77	*	KYC
C 78	UMA0J101MCA	NCI
C 79	UMA0J220MCA	NCI
C 80	UMA0J470MCA	NCI
C 82	CM21W5R223M25VDC	KYC
C 83	*	KYC
C 84	UMA1C470MCA	NCI
C 85	*	KYC
C 87	CM21W5R223M25VDC	KYC
C 91	CM21CH471J25VDC	KYC
C 92	SM100VB3R3(M)	NCH
C 93	UMA1C100MCA	NCI
C 94	*	KYC
C 95	UMA1H100MCA	NCI
C 96	UMA1H100MCA	NCI
C 97	CM21W5R223M25VDC	KYC
C 98	UMA1C470MCA	NCI
C 99	UMA1H100MCA	NCI
C100	UMA1H100MCA	NCI
C101	UMA1H3R3MCA	NCI
C102	UMA1H3R3MCA	NCI
C103	501N2003-472K1	NCC
C104	CM32W5R104M25VDC	KYC
C105	UMA1V100MCA	NCI
C108	CM21W5R223M25VDC	KYC
C109	UMA1V220MCA	NCI
C110	CM21W5R223M25VDC	KYC
C111	UMA1V220MCA	NCI
C112	CM21W5R223M25VDC	KYC
C113	UMA1C100MCA	NCI
C114	UMA0J101MCA	NCI
C115	UMA1H100MCA	NCI
C121	CM21W5R223M25VDC	KYC
C122	CM21W5R223M25VDC	KYC
C123	UMA1V220MCA	NCI
C141	CM21CH120J25VDC	KYC
C142	CM21CH330J25VDC	IKE
C143	CM21CH331J25VDC	KYC
C144	CM21CH331J25VDC	KYC
C145	CM21CH331J25VDC	KYC
C146	CM21CH220J25VDC	KYC
C147	CM21CH220J25VDC	KYC
C148	CM21CH220J25VDC	KYC
C149	CM21W5R223M25VDC	KYC
C150	CM21W5R223M25VDC	KYC

Inductance Coiles

L 1	ST-202246A	IKE
L 2	ST-202311A	IKE
L 3	FS1012S-562J	TDK
L 4	FS1012S-562J	TDK
L 5	FS1012S-562J	TDK
L 6	ST-202246A	IKE
L 7	ST-202246A	IKE

Connectors

CN 1	PS-20PE-D4LT1-PN1	JAE
CN 2	PS-30PE-D4LT1-PN1	JAE
CN 3	MWP2P-1B	NBA

Switches

S 1	SM-03201-02	NAK
S 2	SM-03201-02	NAK
S 3	R-7019	TKO
S 4	SM-03201-02	NAK
S 5	SM-03201-02	NAK

Transformers

T 1	ST-203046	IKE
T 2	ST-202845B	IKE
T 3	ST-203046	IKE
T 4	ST-202845B	IKE
T 5	ST-203046	IKE
T 6	ST-202845B	IKE

DEF SUB BOARD

Transistors

TR 50	2SA812-M6,7	NEC
TR 51	2SA812-M6,7	NEC
TR 53	2SC1623-L6,7	NEC
TR 54	2SA1330-O6,7	NEC
TR 55	2SA812-M6,7	NEC
TR 56	2SC3360-N16,17	NEC
TR 57	2SC2873-O	TOS
TR 58	2SA812-M6,7	NEC
TR 59	2SA812-M6,7	NEC
TR 61	2SC1623-L6,7	NEC
TR 62	2SA1330-O6,7	NEC
TR 63	2SA812-M6,7	NEC
TR 64	2SC3360-N16,17	NEC
TR 65	2SC2873-O	TOS
TR 66	2SA812-M6,7	NEC
TR 67	2SA812-M6,7	NEC
TR 69	2SC1623-L6,7	NEC
TR 70	2SA1330-O6,7	NEC
TR 71	2SA812-M6,7	NEC
TR 72	2SC3360-N16,17	NEC
TR 73	2SC2873-O	TOS
TR 74	2SA812-M6,7	NEC

Diodes

D 22	1S2838-A6	NEC
D 23	1S2838-A6	NEC
D 24	RD22MB	NEC
D 25	RD22MB	NEC
D 26	1S2838-A6	NEC
D 27	1S2838-A6	NEC
D 28	1S2838-A6	NEC
D 29	1S2838-A6	NEC

Resistors

R301	RMC1/10 6800ohm F	KMY
R302	RMC1/10 8200ohm F	KMY
R303	RMC1/10 3600ohm F	KMY
R304	RMC1/10 3300ohm F	KMY
R305	RMC1/10 30Kohm F	KMY
R306	*	
R307	RMC1/10 1500ohm F	KMY
R308	RMC1/10 8200ohm F	KMY
R309	RMC1/10 10Kohm F	KMY
R310	RMC1/10 1500ohm F	KMY
R311	RMC1/10 5100ohm F	KMY
R312	RMC1/10 30Kohm F	KMY
R313	*RMC1/10 JP	KMY
R314	RMC1/10 30Kohm F	KMY
R315	RMC1/10 100Kohm F	KMY
R316	RMC1/10 100ohm F	KMY
R317	RMC1/10 6800ohm F	KMY
R318	RMC1/10 8200ohm F	KMY
R319	RMC1/10 3600ohm F	KMY
R320	RMC1/10 3300ohm F	KMY
R321	RMC1/10 30Kohm F	KMY
R322	*	
R323	RMC1/10 1500ohm F	KMY
R324	RMC1/10 8200ohm F	KMY
R325	RMC1/10 10Kohm F	KMY
R326	RMC1/10 1500ohm F	KMY
R327	RMC1/10 5100ohm F	KMY
R328	RMC1/10 30Kohm F	KMY
R329	*RMC1/10 JP	KMY
R330	RMC1/10 30Kohm F	KMY
R331	RMC1/10 100Kohm F	KMY
R332	RMC1/10 100ohm F	KMY
R333	RMC1/10 6600ohm F	KMY
R334	RMC1/10 8200ohm F	KMY
R335	RMC1/10 3600ohm F	KMY
R336	RMC1/10 3300ohm F	KMY
R337	RMC1/10 30Kohm F	KMY
R338	*	
R339	RMC1/10 1500ohm F	KMY
R340	RMC1/10 8200ohm F	KMY
R341	RMC1/10 10Kohm F	KMY
R342	RMC1/10 1500ohm F	KMY
R343	RMC1/10 5100ohm F	KMY
R344	RMC1/10 30Kohm F	KMY
R345	*RMC1/10 JP	KMY
R346	RMC1/10 30Kohm F	KMY
R347	RMC1/10 100Kohm F	KMY
R348	RMC1/10 100ohm F	KMY
R349	RMC1/10 4700ohm F	KMY
R350	RMC1/10 15Kohm F	KMY

Variable Resistors

VR102	RJ-4W	5000ohm	CPL
VR103	RJ-4W	5000ohm	CPL
VR104	RJ-4W	10Kohm	CPL
VR105	RJ-4W	20Kohm	CPL
VR106	RJ-4W	5000ohm	CPL
VR107	RJ-4W	5000ohm	CPL
VR108	RJ-4W	10Kohm	CPL
VR109	RJ-4W	20Kohm	CPL
VR110	RJ-4W	5000ohm	CPL
VR111	RJ-4W	5000ohm	CPL
VR112	RJ-4W	10Kohm	CPL
VR113	RJ-4W	20Kohm	CPL

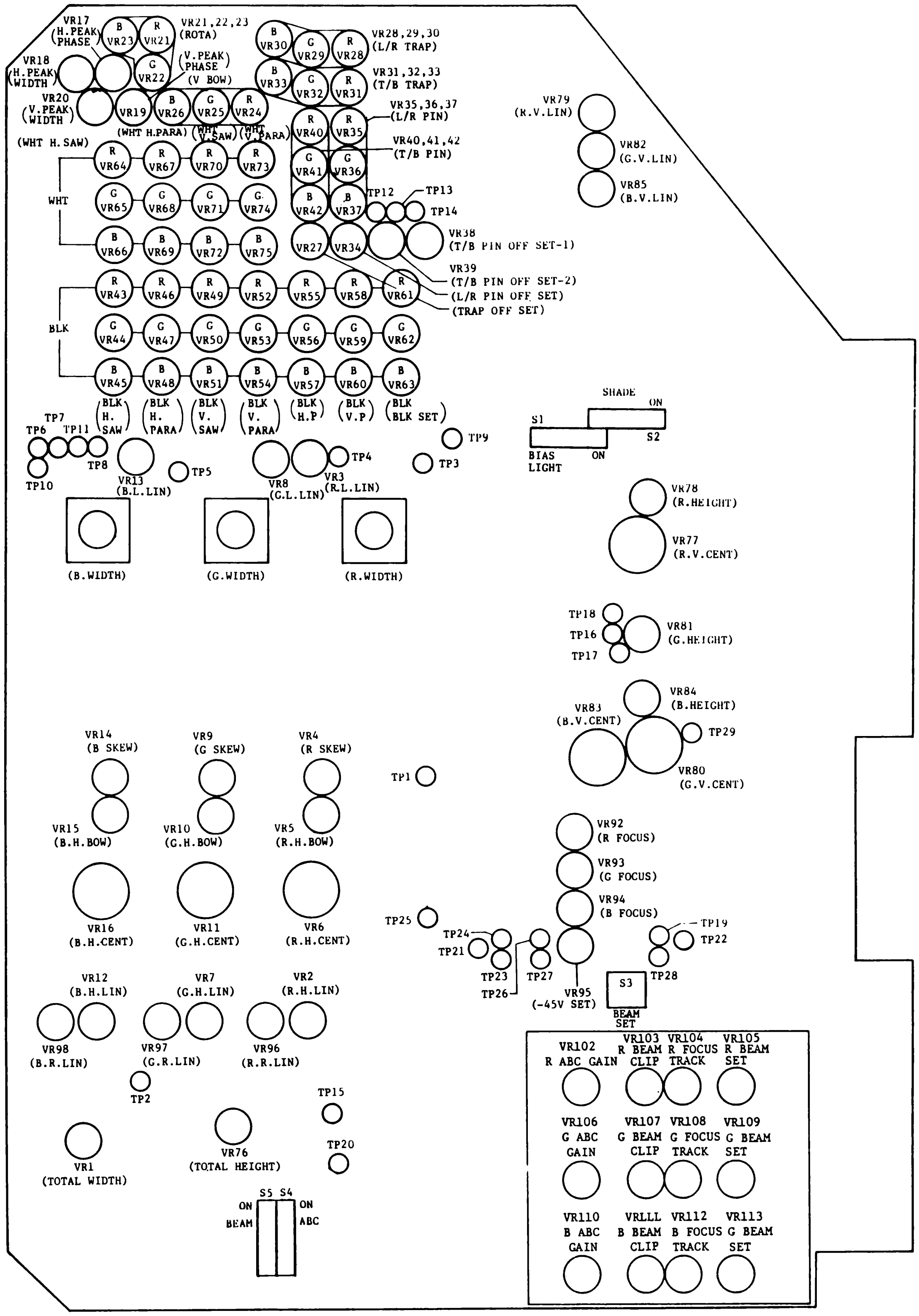
Capacitors

C127	CM21W5R223M25VDC	KYC
C128	268L1602-105M	NCC
C129	*	
C130	*CM21CH4R7C25VDC	KYC
C131	CM21CH120J25VDC	KYC
C132	CM21W5R223M25VDC	KYC
C133	268L1602-105M	NCC
C134	*	
C135	*CM21CH4R7C25VDC	KYC
C136	CM21CH120J25VDC	KYC
C137	CM21W5R223M25VDC	KYC
C138	268L1602-105M	NCC
C139	*	
C140	*CM21CH4R7C25VDC	KYC
C141	CM21CH120J25VDC	KYC

Terminales

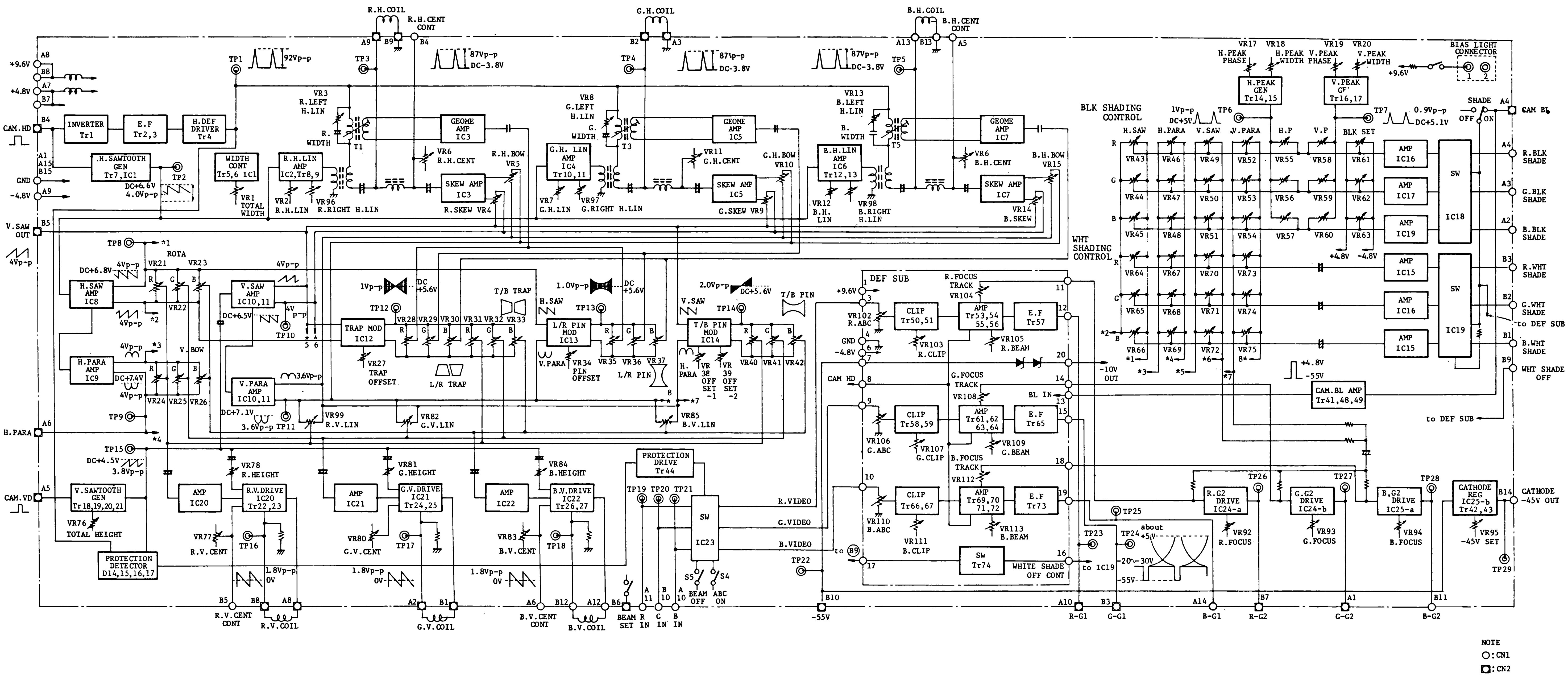
TB 1	CH-5-1	MAC
TB 2	CH-5-1	MAC
TB 3	CH-5-1	MAC
TB 4	CH-5-1	MAC
TB 5	CH-5-1	MAC
TB 6	CH-5-1	MAC
TB 7	CH-5-1	MAC
TB 8	CH-5-1	MAC
TB 9	CH-5-1	MAC
TB 10	CH-5-1	MAC
TB 11	CH-5-1	MAC
TB 12	CH-5-1	MAC
TB 13	CH-5-1	MAC
TB 14	CH-5-1	MAC
TB 15	CH-5-1	MAC
TB 16	CH-5-1	MAC
TB 17	CH-5-1	MAC
TB 18	CH-5-1	MAC
TB 19	CH-5-1	MAC
TB 20	CH-5-1	MAC

Fig. 6-2-a



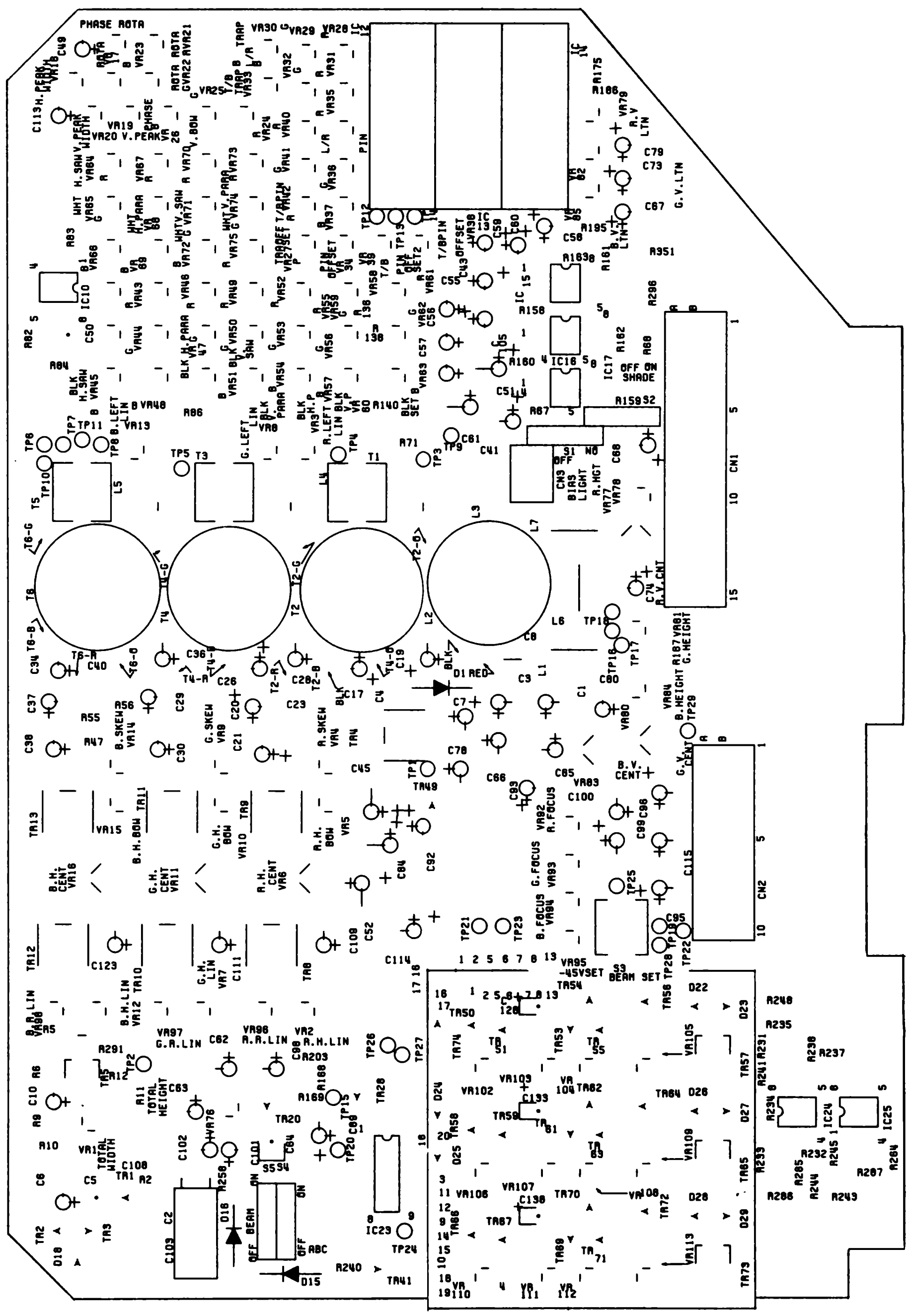
DEFLECTION-A
Controls

Fig. 6-2-b



DEFLECTION-A
Block Diagram

Fig. 6-2-c



A SIDE

B SIDE

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is ataached on the B side of the module.

DEFLECTION-A
Parts Layout

Fig. 6-2-d

DEFLECTION-A
Schematic Diagram
C11 - 220269

SECTION 6.3 PRE-AMP MODULE

PREAMPLIFIER module amplifies weak signals from the image tube.

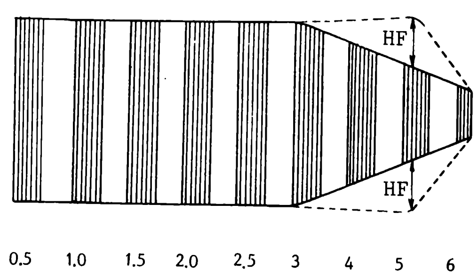
Signal current from the image tube is amplified by the negative feedback amplifier employing a low-noise FET for the first-stage. Its output level is 0.44 Vp-p when the signal current from the image tube is 0.22μA.

$$V_{out} = I_{sig} \times (R1 + R2)$$

[Adjustment]

(1) Response

Frame the camera on a modulation pattern. Measure a response of 5 MHz with 0.5 MHz, 100% (0.44 Vp-p) observed at the input TP (TP1) of the PROC module on an oscilloscope.

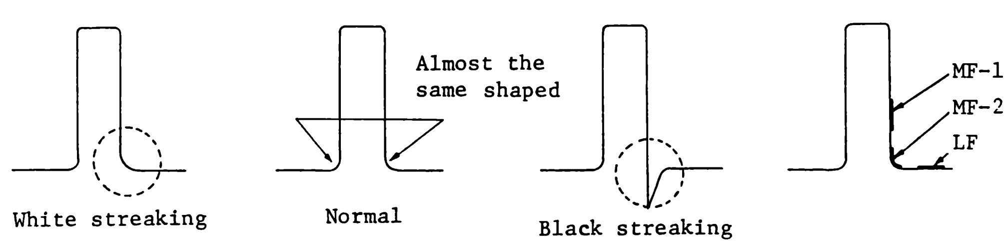


a. Adjust the BEAM FOCUS control on the DEF module for maximum DOM (Depth of modultion) at 5 MHz, for each channel (VR92, 93, 94).

b. Turn the HF control VR4 until modulation in 5 MHz region matches that of the image tube.

(2) Streaking

Frame the camera on a window pattern (GAMMA: ON). Turn the LF control VR3, MF-1 control VR2 and MF-2 control VR5 until no white or black streakings are noted on the picture and waveform monitors when camera output is set to 100%.



(3) CAL Level

① Adjust the CAL control VR6 only for the G channel video level of 0.44 Vp-p at TP-1 of the PROC module. (Check the CAL output on pulse modules should be 5 Vp-p)

② Levels in the R and B channels are different because respective image tubes vary in sensitivity. Frame the camera on the grey scale chart and set the levels of R and B after G channel level.

* After the adjustment of R, G, G white balance by framing the camera on a grey scale chart, set the CAL levels in the R and B channels (VR6) so that the output levels in R, G and B channels are equal to each other.

PRE AMP MODULE

Integrated Circits

IC	1	TL-062CPS	TEX

Transistors

TR	1	2SK316-PIK	MAT
TR	2	NTM3906-Y25	NEC
TR	3	NTM3906-Y25	NEC
TR	4	NTM3904-B25	NEC
TR	5	2SK372-BL	TOS
TR	6	2SA1213-O	TOS
TR	7	NTM3904-B25	NEC

Diodes

D	1	1S2838-A6	NEC

Resistors

R	1	SN14K2B	1Mohm F	KOA
R	2	SN14K2B	1Mohm F	KOA
R	3	RMC1/10	1000ohm F	KMY
R	4	RMC1/10	430ohm F	KMY
R	5	RMC1/10	910ohm F	KMY
R	6	RMC1/10	2700ohm F	KMY
R	7	RMC1/10	10Kohm F	KMY
R	8	RMC1/10	10Kohm F	KMY
R	9	RMC1/10	39ohm F	KMY
R	10	RMC1/10	2400ohm F	KMY
R	11	RMC1/10	30Kohm F	KMY
R	12	RMC1/10	330Kohm F	KMY
R	13	RMC1/10	75ohm F	KMY
R	14	RMC1/10	39ohm F	KMY
R	15	RMC1/10	7500ohm F	KMY
R	16	RMC1/10	620ohm F	KMY
R	17	RMC1/10	470ohm F	KMY
R	18	RMC1/10	3900ohm F	KMY
R	19	RMC1/10	11Kohm F	KMY
R	20	RMC1/10	10Kohm F	KMY
R	21	RMC1/10	12Kohm F	KMY
R	22	RMC1/10	10Kohm F	KMY
R	23	RMC1/10	3900ohm F	KMY
R	24	RMC1/10	470ohm F	KMY
R	25	RMC1/10	12Kohm F	KMY
R	26	RMC1/10	10Kohm F	KMY
R	27	RMC1/10	10Kohm F	KMY
R	28	RMC1/10	10Kohm F	KMY

Variable Resistors

VR	1	RJ-4W	5000ohm	CPL
VR	2	RJ-4W	2000ohm	CPL
VR	3	RJ-4W	500Kohm	CPL
VR	4	RJ-4W	1000ohm	CPL
VR	5	RJ-4W	100K0hm	CPL
VR	6	RJ-4W	50Kohm	CPL
VR	7	RJ-4W	5000ohm	CPL

Capacitors

C	1	UMA1C470MCA	NCI
C	2	CM21CH470J25VDC	KYC
C	3	CM21CH470J25VDC	KYC
C	4	CM21CH220J25VDC	KYC
C	5	CM21CH102J25VDC	KYC
C	6	CM21W5R223M25VDC	KYC
C	7	UMA1C470MCA	NCI
C	8	CM21W5R223M25VDC	KYC
C	9	UMA0J101MCA	NCI
C	10	UMA0J220MCA	NCI
C	11	UMA0J220MCA	NCI
C	12	CM21CH820J25VDC	KYC

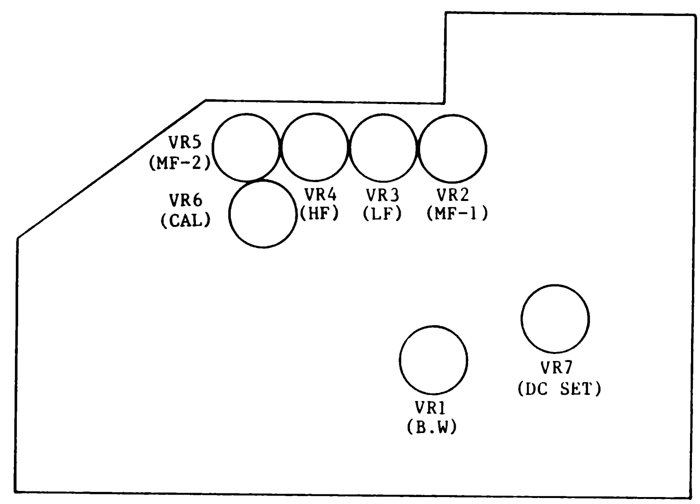
Inductance Coiles

L	1	TP0206-101K	TDK
L	2	TP0206-101K	TDK

Connectors

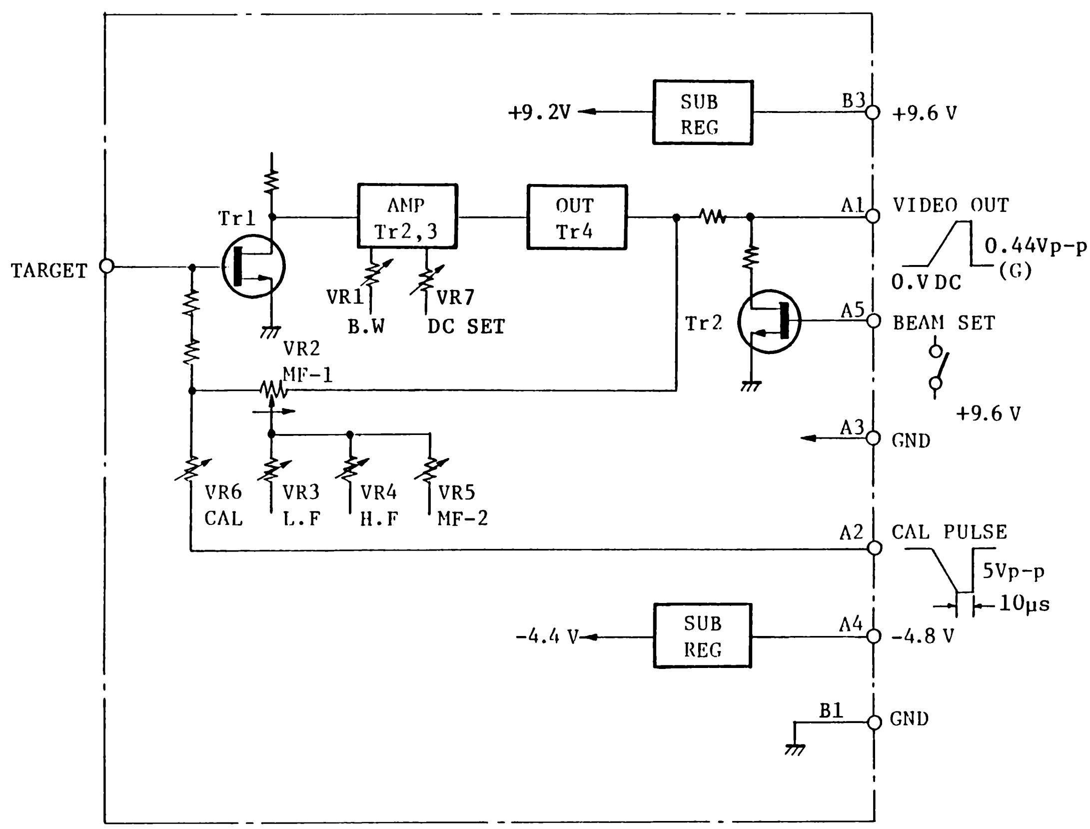
CN	1	PS-10PA-D4LT1- A1	JAE

Fig. 6-3-a



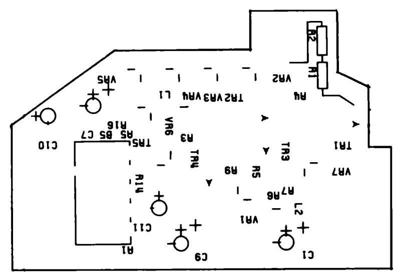
PRE-AMP
Controls

Fig. 6-3-b

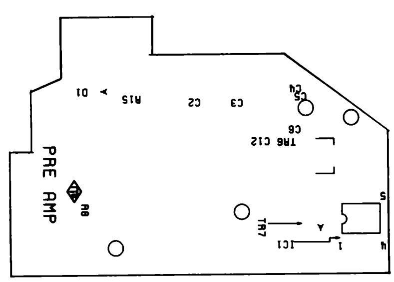


PRE-AMP Block Diagram

Fig. 6-3-c



A SIDE



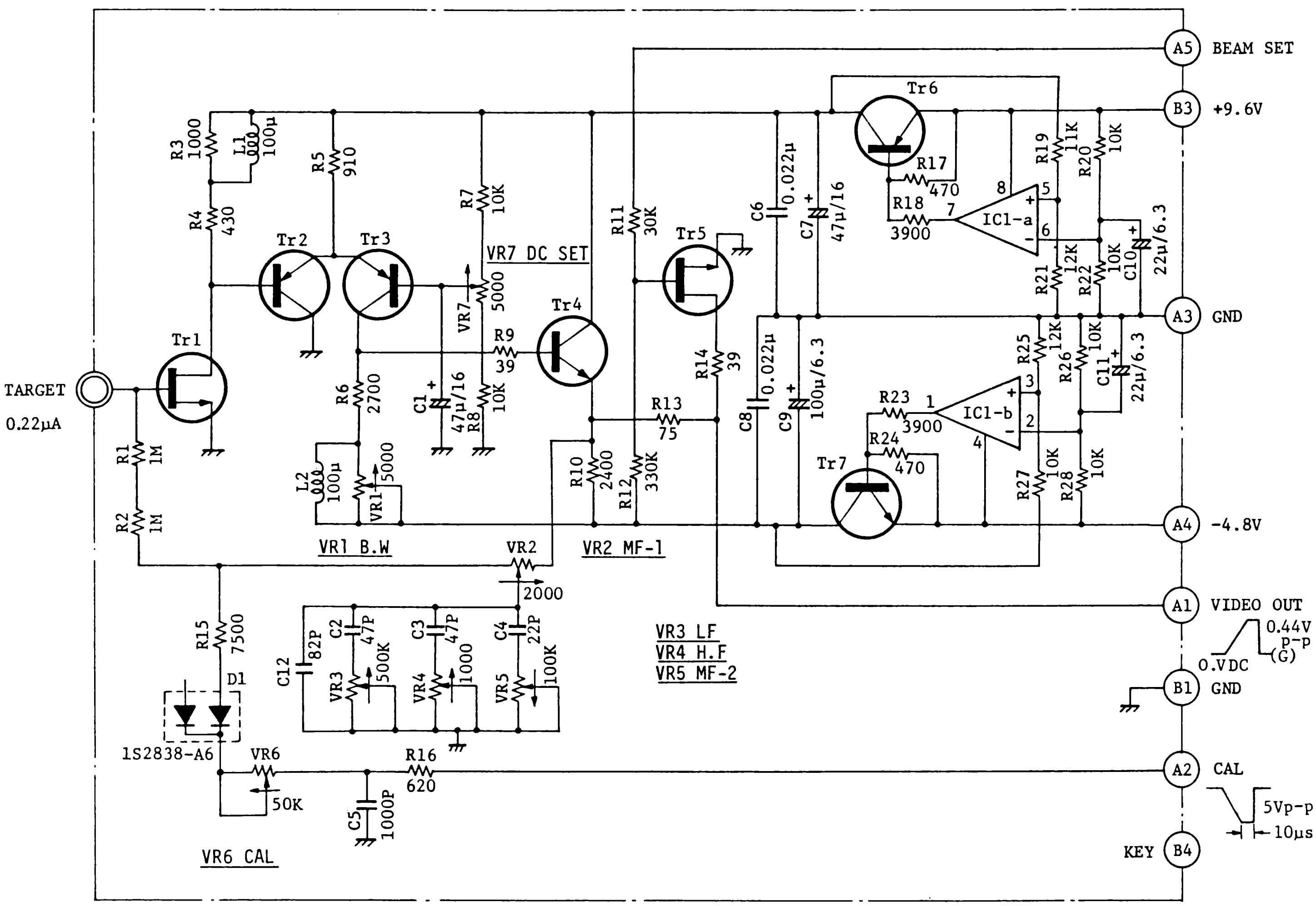
B SIDE

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is attached on the B side of the module.

PRE-AMP
Parts Layout

Fig. 6-3-d



IC1;TL062CPS
Tr1;2SK316-PIK
Tr2.3;NTM3906-Y25
Tr4.7;NTM3904-B25
Tr5;2SK372-BL
Tr6;2SA1213-0
CN1;PS-10PA-D4LT1-A1

LAST No.
IC1
Tr7
R28
C12
VR7
D1
L2

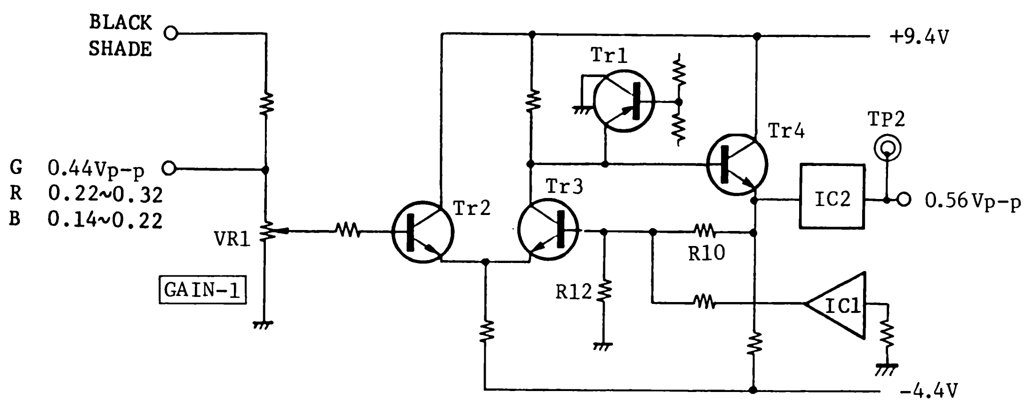
PRE-AMP
Schematic Diagram
C4-218361

SECTION 6.4 PROCESS(R,G,B) MODULE

PROCESS module amplifies and forms the video signal from PRE-AMPLIFIER modules. Its consists of three blocks: FRONT AMPLIFIER comprising black level stabilizer circuit, Gain control and flare correction circuit, and MIDDLE AMPLIFIER comprising pedestal control and gamma circuit, and END AMPLIFIER comprising video matrix, DTL edge mix circuit, black clip circuit and white clip circuit.

(1) FRONT AMPLIFIER

① Since R, G and B signal levels from the PREAMPLIFIER module differ from each other due to difference in sensitivity of the image tube, Tr2, Tr3 and Tr4 make them equal (0.56 Vp-p at TP2).



Tr2, Tr3 and Tr4 compose a non-inverting amplifier, which has amplification of almost(R12+R10)/R12. Tr1 is a white limit transistor that sets a high-limit level to 600%. This is because the highlight compression function is operated without any white limit. Black shading is corrected by mixing its signal with video input signal.

② Gain control consists of IC3 and Tr7 to Tr9. The amplification may be considered V_{out} =R41/R28. Level are increased up by changing a resistance value of R28, and its control is covered by Tr5 and Tr6.

Tr5 : +12dB
Tr5, Tr6: +24dB

Note: +24dB gain up is effected when Tr5 and Tr6 are controlled, at the same time.

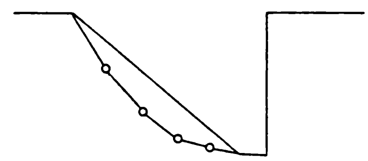
White shading is corrected by applying its signal to modulation input of IC3.

③ Flare circuit consists of IC4-b. Flare is such that pedestal levels of R and G rise with an increase of light and the picture becomes tinted. This results largely from the image tube. An integration circuit of IC4-b, C and R detects the value over the entire picture to correct pedestal level.

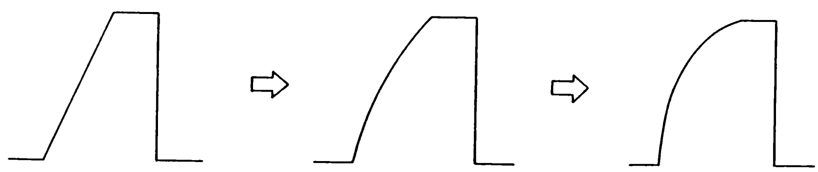
(2) MIDDLE AMPLIFIER

① Pedestal control varies clamp potential of clamp circuit (IC8, Tr15) in Video amplifier which is front stage of Gamma circuit . The pedestal of each channel and master pedestal are determined in this circuit.

② Gamma circuit consists of IC10 and Tr16, Tr17. Gamma curve is formed by the four broken line approximation system as shown in right-hand figure.



The GAMMA CORRECTED and LIN signals are mixed with each other by VR7. The mixing ratio of the GAMMA CORRECTED and LIN signals changes with VR7 adjustment.



MIN (1.0)
(LIN signal)

SET (0.45)
(GAMMA SET signal)

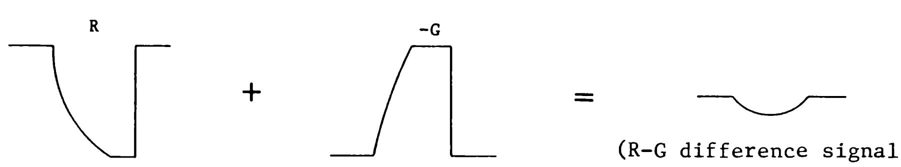
MAX
(GAMMA CORRECTED signal)

(3) END AMPLIFIER

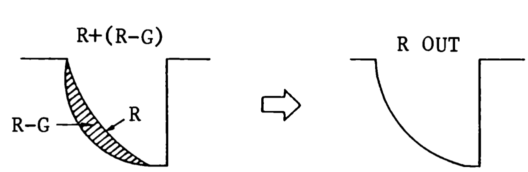
① Video matrix circuit consists of Tr19, Tr20 and Tr21.

The R-G control: VR11 in R-PROC module
The G-B control: VR11 in G-PROC module
The B-G control: VR11 in B-PROC module

For R-channel video matrix circuit, the balanced R and G video signals are mixed by VR11, the difference is 0 and the R video signal is not affected at all. A correction signal appears if a difference is noted between the R and G video signals as shown below.



Hence R + (R-G), and the R video signal corrected by R-G is as shown below.



Note : The final R signal output is positive.

② DTL edge mix is performed through Video amplifier comprising Tr23, Tr24 and Tr25.

③ Black clip and Blanker are performed by IC12 and IC13-a, and white clip is performed by Tr28 and Tr29.

[Adjustment]

(1) GAIN

① Turn on the CAL switch at the front of the PULSE module.

② Monitoring levels at TP2, through the oscilloscope, adjust the CAL levels to 0.56 Vp-p with the GAIN-1

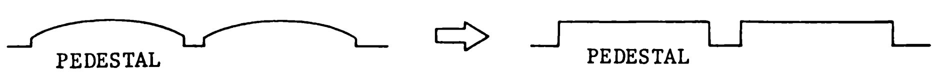
Note: PREAMPLIFIER module output has 0.44 Vp-p in the G channel, while levels in the R and B channels change with sensitivity of the image tube.
Therefore when the output level is 0.44 Vp-p in the G channel with the grey scale chart, adjust the control VR1 in R-PROC and B PROC so that the R and B output levels at TP2 become 0.56 Vp-p.

③ After finishing above item ②, verify that CAL signal is 0.52 Vp-p monitoring waveforms at TP3, through the oscilloscope.

(2) SHADE BAL (WHITE SHADING)

① Turn the GAIN control VR1 at the front of this module to MIN.

② Monitoring R, G and B signal waveforms on the waveform monitor, adjust the SHADE BAL control VR2 until H/V PARABOLA and sawtooth signals do not appear.



(3) FLARE OFFSET

① Set the GAIN control VR1 at the front of this unit to MIN.

② Set the FLARE control VR3 at the front of this module to MIN.

③ Monitor the waveformat TP3 on the oscilloscope.

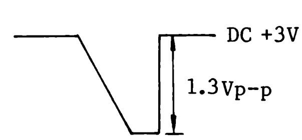
④ Turn on the FLARE switch at the front of the HLC module.

⑤ Adjust the OFFSET control VR4 until no step is seen during the blanking and video periods monitoring waveform at TP3 with the FLARE controls VR3 at the front of this module turned MAX to MIN alternately

(4) GAIN-2 SET

① Check for 0.5 Vp-p at TP4 (CAL signal).

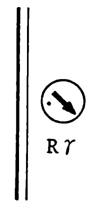
② Adjust the level to 1.3 Vp-p at TP5 with with the R GAIN control VR5.



(5) GAMMA BALANCE

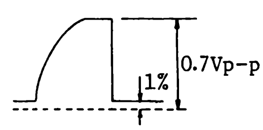
① Monitor R,G and B video signal levels at TP1 to TP3 at the front of the ENC module using the oscilloscope.

② Set the GAMMA control VR7 at the front of the PROC module to the position shown in the right-hand illustration.
(GAMMA ≒ 0.45 point)



③ Adjust R, G and B pedestal levels to 1% with the PEDESTAL control VR6 at the front of this module.

④ Adjust the levels to 0.7 Vp-p at TP1 to TP3 on the ENC module with GAMMA BALANCE control VR8.

R	TP1	ENC module	VR8	
G	TP2			
B	TP3			

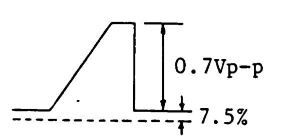
(6) GAIN-3

① Turn on the CAL switch at the front of the PULSE module.

② Adjust pedestal levels in the R, G and B channels to 7.5% on the waveform monitor using the controls at the front of the PROC module.

③ Turn the GAMMA control VR7 at the front of the PROC module to MIN.

④ Monitoring levels at TP1 to TP3 at the front of the ENC module on the oscilloscope, adjust VR12 until CAL levels excluding pedestal level reach 0.7 Vp-p.

R	ENC TP1,2,3	VR12	
G			
B			

(7) MATRIX-BAL

① Set the pedestal level of R, G and B to 5%.

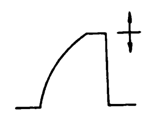
② Adjust the MATRIX BLK BAL control VR10 until the pedestal level does not vary with the MATRIX control (at the front of PROC unit) adjusted between MAX and MIN alternately.

③ Turn on the CAL switch on the PULSE module.

④ Monitor the R, G and B video signals at TP1 in the ENC module on an oscilloscope.

⑤ Check to ensure that the R, G and B video signals match each other in level.

⑥ Adjust the MATRIX WHT BAL control VR9 until the level in the R channel does not vary with the MATRIX control VR11 on the R-PROC module adjusted between MAX and MIN alternately (the matrix of the R-PROC module becomes R-G, the same procedure will be adjusted to G-PROC and B-PROC module).

R	ENC TP1,2,3	VR11	MAX ↕ MIN	VR9	 No variation shall be noted.
G					
B					

(8) WHITE CLIP

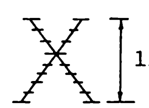
① Turn off the CAL switch on the PULSE module.

② Turn off the AUTO KNEE switch on the HLC module (to give MAN KNEE).

③ Televise the grey scale. Open the lens iris until video levels of 120% or more can be obtained.

④ Adjust the WHT CLIP control (VR9, VR10 and VR11) in the HLC module until the R, G and B video signals are clipped at 110% on the waveform monitor.

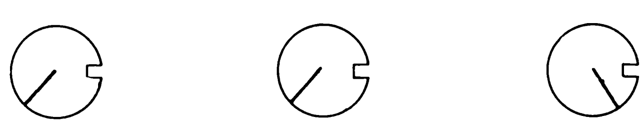
⑤ Check to ensure that no subcarrier is present on the ENC OUT signal in the white clip area.

R	WFM	VR9	 110%
G		VR10	
B		VR11	

└to control VR in the HLC module

(9) MATRIX (factory set standard)

① Set each MATRIX control to the following position.



R-G (R ch) G-B (G ch) B-G (B ch)

PROCESS(R,G,B) MODULE

Integrated Circuits

IC 1	OP-07DPS	TEX
IC 2	uPD4053BG	NEC
IC 3	MC1595L	MOT
IC 4	TL-062CPS	TEX
IC 5	uPD4053BG	NEC
IC 6	uPC4558G2	NEC
IC 7	TL-062CPS	TEX
IC 8	OP-07DPS	TEX
IC 9	uPD4053BG	NEC
IC 10	ST-203435	IKE
IC 11	OP-07DPS	TEX
IC 12	ST-203448	IKE
IC 13	TC50H000F	TOS

Transistors

TR 1	2SA812-M6,7	NEC
TR 2	2SC1623-L6,7	NEC
TR 3	2SC1623-L6,7	NEC
TR 4	2SC1623-L6,7	NEC
TR 5	2SK321-P	MAT
TR 6	2SK321-P	MAT
TR 7	2SC1623-L6,7	NEC
TR 8	2SC1623-L6,7	NEC
TR 9	2SC1623-L6,7	NEC
TR 10	2SA1213-O	TOS
TR 11	2SC2873-O	TOS
TR 12	NTM3906-Y25	NEC
TR 13	NTM3906-Y25	NEC
TR 14	2SA812-M6,7	NEC
TR 15	2SK94-X4	NEC
TR 16	2SA812-M6,7	NEC
TR 17	2SA812-M6,7	NEC
TR 18	2SC1623-L6,7	NEC
TR 19	2SC1623-L6,7	NEC
TR 20	2SC1623-L6,7	NEC
TR 21	2SC1623-L6,7	NEC
TR 22	2SA812-M6,7	NEC
TR 23	2SC1623-L6,7	NEC
TR 24	2SC1623-L6,7	NEC
TR 25	2SC1623-L6,7	NEC
TR 26	2SK94-X4	NEC
TR 27	2SA812-M6,7	NEC
TR 28	2SA812-M6,7	NEC
TR 29	2SC1623-L6,7	NEC
TR 30	2SK94-X4	NEC

Resistors

R 1	RMC1/10	7500ohm F	KMY
R 2	RMC1/10	1000ohm F	KMY
R 3	RMC1/10	15Kohm F	KMY
R 4	RMC1/10	5600ohm F	KMY
R 5	RMC1/10	100ohm F	KMY
R 6	RMC1/10	30Kohm F	KMY
R 7	RMC1/10	30Kohm F	KMY
R 8	RMC1/10	2400ohm F	KMY
R 9	RMC1/10	10Kohm F	KMY
R 10	RMC1/10	3300ohm F	KMY
R 11	RMC1/10	10Kohm F	KMY
R 12	RMC1/10	1000ohm F	KMY
R 13	RMC1/10	5100ohm F	KMY
R 14	RMC1/10	1000ohm F	KMY
R 15	RMC1/10	1000ohm F	KMY
R 16	RMC1/10	1500ohm F	KMY
R 17	RMC1/10	20Kohm F	KMY
R 18	RMC1/10	2400ohm F	KMY
R 19	RMC1/10	100ohm F	KMY
R 20	RMC1/10	3600ohm F	KMY
R 21	RMC1/10	5100ohm F	KMY
R 22	RMC1/10	220Kohm F	KMY
R 23	RMC1/10	220Kohm F	KMY
R 24	RMC1/10	33Kohm F	KMY
R 25	RMC1/10	2400ohm F	KMY
R 26	RMC1/10	2200ohm F	KMY
R 27	RMC1/10	2700ohm F	KMY
R 28	RMC1/10	3600ohm F	KMY
R 29	RMC1/10	1100ohm F	KMY
R 30	RMC1/10	820ohm F	KMY
R 31	RMC1/10	200ohm F	KMY
R 32	RMC1/10	3900ohm F	KMY
R 33	RMC1/10	3300ohm F	KMY
R 34	RMC1/10	24Kohm F	KMY
R 35	RMC1/10	3000ohm F	KMY
R 36	RMC1/10	8200ohm F	KMY
R 37	RMC1/10	10Kohm F	KMY
R 38	RMC1/10	1800ohm F	KMY
R 39	RMC1/10	10Kohm F	KMY
R 40	RMC1/10	3000ohm F	KMY
R 41	RMC1/10	3000ohm F	KMY
R 42	RMC1/10	8200ohm F	KMY
R 43	RMC1/10	5100ohm F	KMY
R 44	RMC1/10	100ohm F	KMY
R 45	RMC1/10	5100ohm F	KMY
R 46	RMC1/10	200ohm F	KMY
R 47	RMC1/10	5100ohm F	KMY
R 48	RMC1/10	68ohm F	KMY
R 49	RMC1/10	30Kohm F	KMY
R 50	RMC1/10	1000ohm F	KMY
R 51	RMC1/10	1000ohm F	KMY
R 52	RMC1/10	100Kohm F	KMY
R 53	RMC1/10	2000ohm F	KMY
R 54	RMC1/10	1000ohm F	KMY

Resistors

R 55	RMC1/10	30Kohm F	KMY
R 56	RMC1/10	11Kohm F	KMY
R 57	RMC1/10	12Kohm F	KMY
R 58	RMC1/10	6200ohm F	KMY
R 59	RMC1/10	3000ohm F	KMY
R 60	RMC1/10	470ohm F	KMY
R 61	RMC1/10	3900ohm F	KMY
R 62	RMC1/10	11Kohm F	KMY
R 63	RMC1/10	10Kohm F	KMY
R 64	RMC1/10	12Kohm F	KMY
R 65	RMC1/10	10Kohm F	KMY
R 66	RMC1/10	3900ohm F	KMY
R 67	RMC1/10	470ohm F	KMY
R 68	RMC1/10	12Kohm F	KMY
R 69	RMC1/10	10Kohm F	KMY
R 70	RMC1/10	10Kohm F	KMY
R 71	RMC1/10	10Kohm F	KMY
R 72	RMC1/10	1000ohm F	KMY
R 73	RMC1/10	1800ohm F	KMY
R 74	RMC1/10	2700ohm F	KMY
R 75	RMC1/10	10Kohm F	KMY
R 76	RMC1/10	100ohm F	KMY
R 77	RMC1/10	6200ohm F	KMY
R 78	RMC1/10	1500ohm F	KMY
R 79	RMC1/10	4700ohm F	KMY
R 80	RMC1/10	100Kohm F	KMY
R 82	RMC1/10	180Kohm F	KMY
R 83	RMC1/10	30Kohm F	KMY
R 84	RMC1/10	2000ohm F	KMY
R 85	RMC1/10	1100ohm F	KMY
R 86	RMC1/10	10ohm F	KMY
R 87	RMC1/10	1100ohm F	KMY
R 88	RMC1/10	1100ohm F	KMY
R 89	RMC1/10	3300ohm F	KMY
R 90	RMC1/10	240ohm F	KMY
R 91	RMC1/10	2700ohm F	KMY
R 92	RMC1/10	2700ohm F	KMY
R 93	RMC1/10	1300ohm F	KMY
R 94	RMC1/10	7500ohm F	KMY
R 95	RMC1/10	30Kohm F	KMY
R 96	RMC1/10	2000ohm F	KMY
R 97	RMC1/10	200ohm F	KMY
R 98	RMC1/10	560ohm F	KMY
R 99	RMC1/10	1200ohm F	KMY
R100	RMC1/10	1200ohm F	KMY
R101	RMC1/10	220Kohm F	KMY
R102	RMC1/10	10Kohm F	KMY
R103	RMC1/10	220Kohm F	KMY
R104	RMC1/10	2700ohm F	KMY
R105	RMC1/10	510ohm F	KMY
R106	RMC1/10	1300ohm F	KMY
R107	RMC1/10	4700ohm F	KMY
R108	RMC1/10	13Kohm F	KMY
R109	RMC1/10	10Kohm F	KMY
R110	RMC1/10	2400ohm F	KMY
R111	RMC1/10	510ohm F	KMY
R112	RMC1/10	5100ohm F	KMY
R113	RMC1/10	1100ohm F	KMY
R114	RMC1/10	1200ohm F	KMY
R115	RMC1/10	2000ohm F	KMY
R116	RMC1/10	1300ohm F	KMY
R117	RMC1/10	2000ohm F	KMY
R118	RMC1/10	10Kohm F	KMY
R119	RMC1/10	20Kohm F	KMY
R120	RMC1/10	1000ohm F	KMY
R121	RMC1/10	75Kohm F	KMY
R122	*		
R123	RMC1/10	JP	KMY
R124	RMC1/10	3900ohm F	KMY
R125	RMC1/10	3300ohm F	KMY
R126	RMC1/10	1100ohm F	KMY
R127	RMC1/10	5100ohm F	KMY
R128	RMC1/10	1000ohm F	KMY
R129	RMC1/10	2200ohm F	KMY
R130	RMC1/10	2200ohm F	KMY
R131	RMC1/10	6200ohm F	KMY
R132	RMC1/10	3000ohm F	KMY
R133	RMC1/10	3300ohm F	KMY
R134	RMC1/10	200ohm F	KMY
R135	RMC1/10	5600ohm F	KMY
R136	RMC1/10	1000ohm F	KMY
R137	RMC1/10	130ohm F	KMY
R138	*		
R139	RMC1/10	12Kohm F	KMY
R140	RMC1/10	1500ohm F	KMY
R141	RMC1/10	4300ohm F	KMY
R142	RMC1/10	200ohm F	KMY
R143	RMC1/10	10Kohm F	KMY
R144	RMC1/10	100Kohm F	KMY
R145	RMC1/10	100Kohm F	KMY

Variable Resistors

VR 1	RJ-4WS	1000ohm	CPL
VR 2	RJ-4W	20Kohm	CPL
VR 3	RJ-4WS	5000ohm	CPL
VR 4	RJ-4W	20Kohm	CPL
VR 5	RJ-4W	500ohm	CPL
VR 6	RJ-4W	20Kohm	CPL
VR 7	RJ-4W	500ohm	CPL
VR 8	RJ-4W	5000ohm	CPL
VR 9	RJ-4W	1000ohm	CPL
VR 10	RJ-4W	500Kohm	CPL
VR 11	RJ-4W	2000ohm	CPL
VR 12	RJ-4W	500ohm	CPL

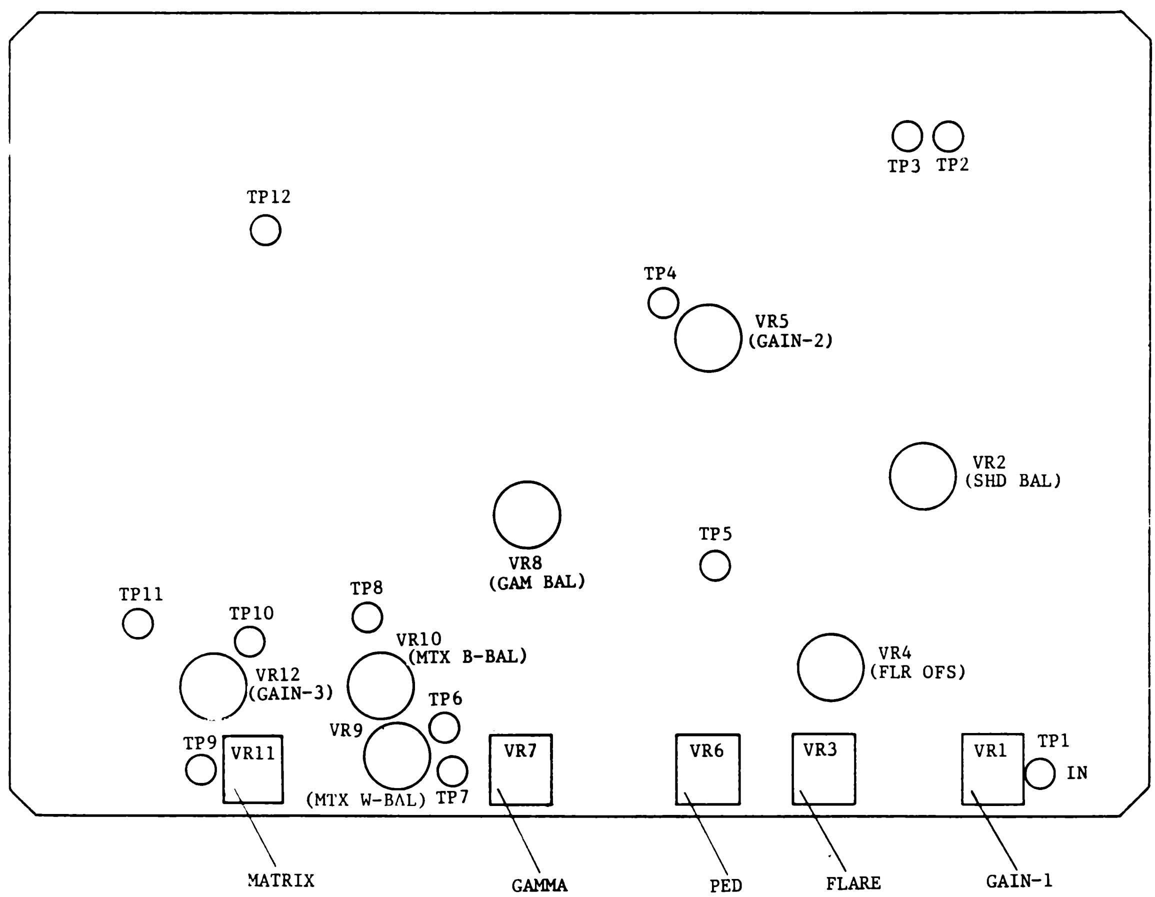
Capacitors

C 1	UMA1C470MCA	NCI
C 2	CM21W5R223M25VDC	KYC
C 3	UMAOJ101MCA	NCI
C 4	CM21CH3R3C25VDC	KYC
C 5	CM21W5R223M25VDC	KYC
C 6	UMA1A330MCA	NCI
C 7	UMA1A330MCA	NCI
C 8	CM21W5R223M25VDC	KYC
C 9	UMA1A330MCA	NCI
C 10	UMA1A330MCA	NCI
C 11	CM21W5R223M25VDC	KYC
C 12	CM21W5R223M25VDC	KYC
C 13	CM21W5R223M25VDC	KYC
C 14	CM21W5R223M25VDC	KYC
C 15	CM21CH330J25VDC	KYC
C 16	*	
C 17	CM21W5R223M25VDC	KYC
C 18	CM21W5R223M25VDC	KYC
C 19	*	
C 20	CM21CH100J25VDC	KYC
C 21	CM32W5R104M25VDC	KYC
C 22	268L2002-225M	NCC
C 23	268L2002-225M	NCC
C 24	CM21W5R223M25VDC	KYC
C 25	UMAOJ101MCA	NCI
C 26	CM21W5R223M25VDC	KYC
C 27	UMAOJ101MCA	NCI
C 28	UMAOJ220MCA	NCI
C 29	UMAOJ220MCA	NCI
C 30	CM21W5R223M25VDC	KYC
C 31	UMA1C470MCA	NCI
C 32	CM21W5R223M25VDC	KYC
C 33	UMAOJ101MCA	NCI
C 34	UMAOJ220MCA	NCI
C 35	UMA1V4R7MCA	NCI
C 36	CM21W5R223M25VDC	KYC
C 37	CM21CH4R7C25VDC	KYC
C 38	CM21W5R223M25VDC	KYC
C 39	CM21W5R223M25VDC	KYC
C 40	268L1602-105M	NCC
C 41	UMAOJ220MCA	NCI
C 42	CM32W5R104M25VDC	KYC
C 43	CM21CH6R8C25VDC	KYC
C 44	*	
C 45	CM21W5R223M25VDC	KYC
C 46	CM21W5R223M25VDC	KYC
C 47	CM21CH6R8C25VDC	KYC
C 48	268L2002-225M	NCC
C 49	268L2002-225M	NCC
C 50	CM32W5R104M25VDC	KYC
C 51	CM21W5R223M25VDC	KYC
C 52	CM21CH102J25VDC	KYC
C 53	*	
C 54	*	
C 55	CM21W5R223M25VDC	KYC
C 56	CM21W5R223M25VDC	KYC
C 57	CM32W5R104M25VDC	KYC
C 58	UMA1C470MCA	NCI
C 59	*	
C 60	*	
C 61	*	
C 62	CM21CH102J25VDC	KYC
C 63	CM21CH100J25VDC	KYC
C 64	CM21W5R223M25VDC	KYC
C 65	CM21CH100J25VDC	KYC

Connectors

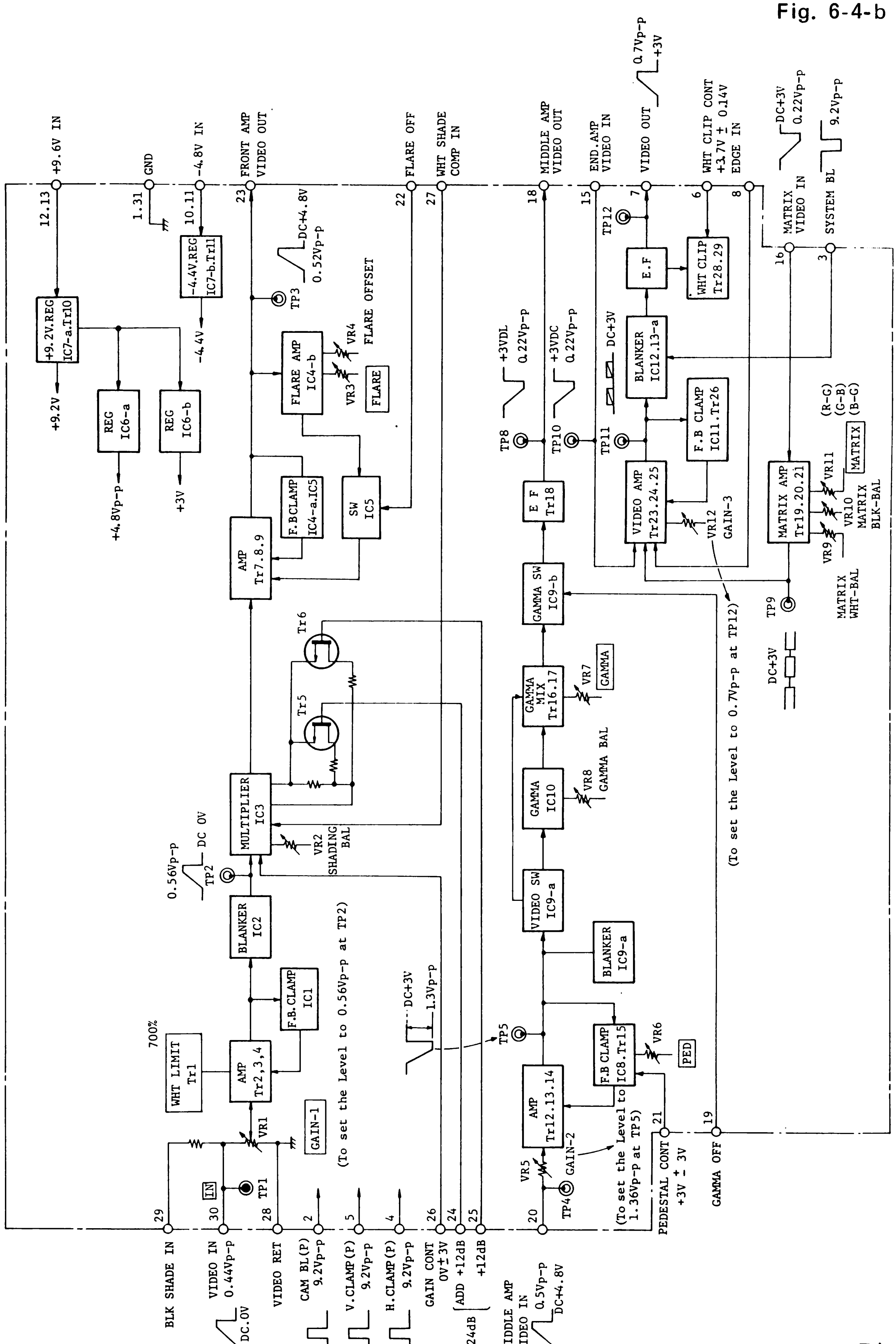
CN 1	MLF2B31P-J1	NBA

Fig. 6-4-a



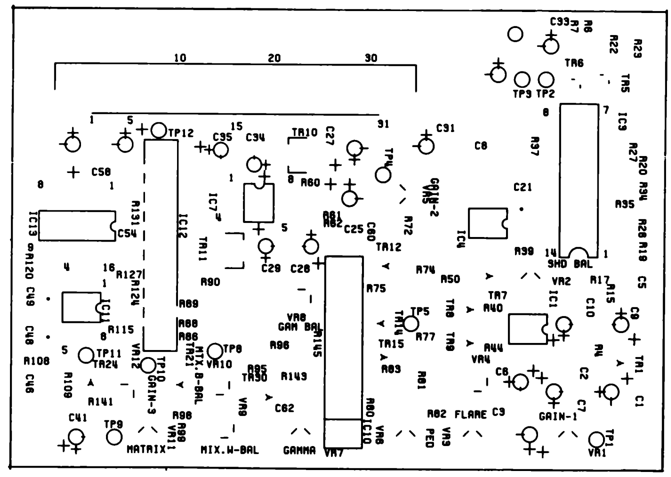
PROCESS (R,G,B)
Controls

Fig. 6-4-b

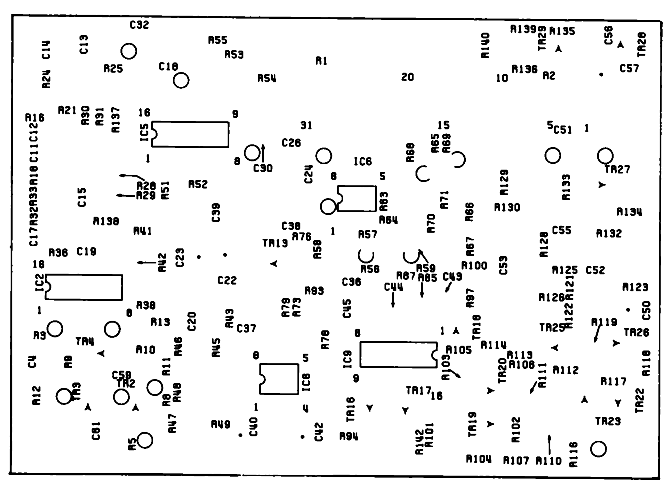


PROCESS (R, G, B)
Block Diagram

Fig. 6-4-c



A SIDE



B SIDE

A side : Discrete parts is attached on the A side of the module.

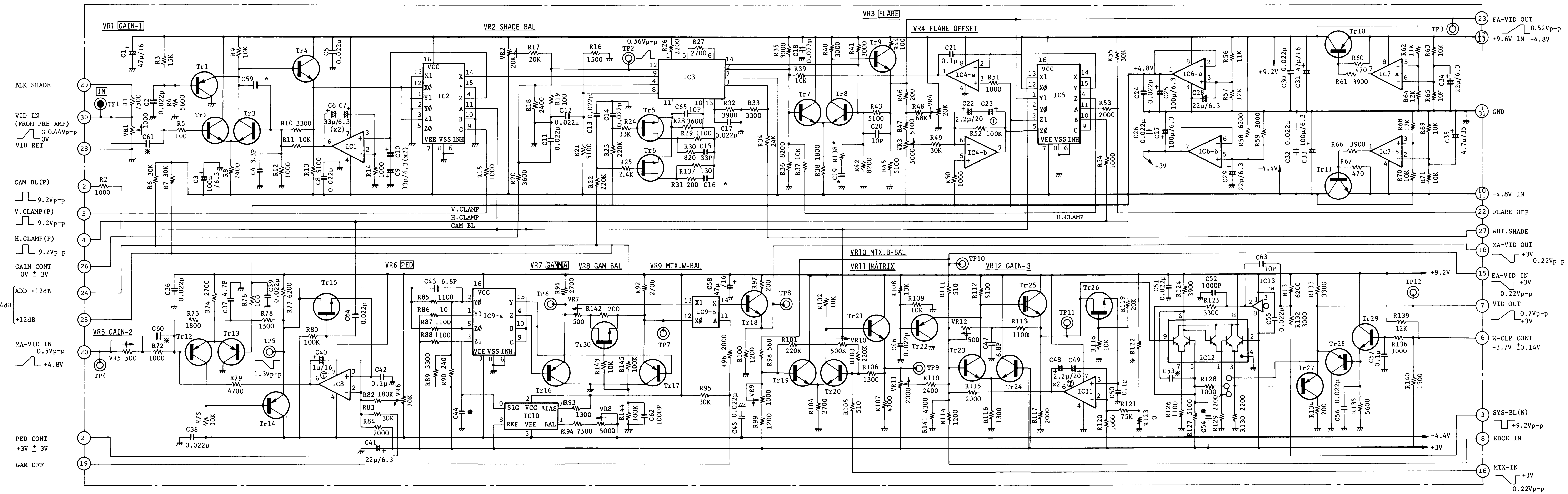
B side : Only chip parts is ataached on the B side of the module.

PROCESS (R ,G,B)
Parts Layout

IC1,8,11 ; OP-07DPS
IC2,5,9 ; uPD4053BG
IC3 ; MC1595L
IC4,7 ; TL062CPS
IC6 ; μPC4558G2
IC10 ; ST-203435
IC12 ; ST-203448
IC13 ; TC50H000F

Tr1,14,16,17,22,27,28 ;2SA812-M6,7
Tr2,3,4,7,8,9,18 19,20,21,23,24,25,29,;2SC1623-L6,7
Tr10 ; 2SA1213-0
Tr11 ; 2SC2873-0

Tr5,6 ; 2SK321P
Tr15,26,30 ; 2SK94-X4
Tr12,13 ; NTM3906-Y25



LOST No.	LAST No.
R 81	IC 13
	Tr 30
	R 145
	C 65
	VR 12
	TP 12

APEND

R137 (NEAR R30)	Tr30 (NEAR Tr17)
R138 (NEAR R42)	R142 (NEAR VR7)
C 58 (NEAR Tr18)	R143 (NEAR R92)
C 59 (NEAR Tr3)	R144 (NEAR R92)
C 60 (NEAR R72)	R145 (NEAR +24dB LINE)
R141 (NEAR R114)	C 62 (NEAR R92)
C 61 (NEAR VR1)	C 64 (NEAR Tr15)

NOTE 1. IC13-c -b -d -e -f +3V

NOTE 2.

VR11	MATRIX
Rch	(R-G)
Gch	(G-B)
Bch	(B-G)

PROCESS (R, G, B)
Schematic Diagram
C21-218363

SECTION 6.5 HLC MODULE

The HLC module consists of a highlight compression circuit and a Knee Aperture Circuit.

(1) The highlight compression circuit is compared of IC1 (ASC-AUTO SLOPE CONTROL-amplifier).
Only the G signal (processed by the highlight compression circuit) is sent to the knee aperture circuit. The signal passes through a delay line for phase matching with aperture signal in the knee aperture circuit and returns to the PROCESS module. The ASC (AUTO SLOPE CONTROL) amplifier is a unity amplifier. Therefore, the signal outputs (CAL signal) become 0.5 Vp-p at TP5, TP6 and TP7.

(2) The knee aperture circuit consists of a circuit to provide an edge signal to the areas where highlight compression is effected and a delay circuit to adjust the G video signal in phase with the edge signal.
The edge signal is produced from the G video signal just before highlight compression starts. The method is based on two differentiations of the video signal, (Tr8 + DL) + (Tr11 + DL). Boost frequency ranges from 4 to 5 MHz.
Tr1 to Tr3 compensates for video signal less of about 6dB, since the highlight compressed signal level is lowered by 6dB through a delay line.
This module contains pedestal control, white clip control, flare off, gamma off, knee off, auto knee off, white clip off functions.

Note: Set the threshold level to about 70% with VR8.
Check the KNEE APERT switch at the front of the DTL module.

[Adjustment]

* Before the auto knee adjustment, all the level set and confirmation of auto white balance using a grey scale shall be performed.

* Video level shall be measured using an oscilloscope.

① Turn on the KNEE switch (SW1-c) and turn off the AUTO KNEE switch (SW1-d) at the front of this module.

② Adjust the TOTAL KNEE POINT control (VR5) so that the peak level is effected for 92% input video level (TP1, 2, 3)

③ Open the iris for 200% input video level (open the iris by 1 stop or adjust for 0.8 Vp-p video level at TP1 (Gch) on the PROC module).
Adjust the MAN SLOPE control (VR6) for 110% peak video level.

④ Turn on the AUTO KNEE switch (SW1-d).

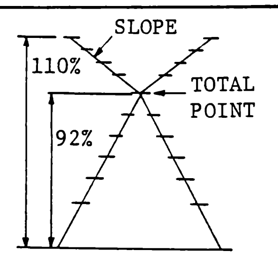
⑤ Open the lens iris for 400% video level (open the iris by 2 stops or adjust for 1.6 Vp-p at TP1 (Gch) on the PROC module).

⑥ Adjust the AUTO SLOPE control (VR7) for 110% peak video level.

⑦ Touch up the R POINT control (VR3) and the B POINT control (VR4) for R,G,B matched total point of 92%, if necessary.

⑧ Touch up the R,B SLOPE controls (VR1,2) for R,G,B matched peak level of 110%, if necessary.

Note: When following the above steps ⑦ and ⑧, check to make sure of no sub-carrier leakage.

TOTAL POINT		VR5	
R. POINT		VR3	
B. POINT	ENC	VR4	
AUTO SLOPE	OUT	VR7	
R SLOPE		VR1	
B SLOPE		VR2	

Note: Refer the procedure for white clip control & master pedestal control to PROCESS MODULE.

HLC MODULE

Integrated Circuits

IC 1	ST-203239	IKE
IC 2	TL-062CPS	TEX
IC 3	uPC4558G2	NEC
IC 4	TL-062CPS	TEX
IC 5	TL-062CPS	TEX

Transistors

TR 1	2SC1623-L6,7	NEC
TR 2	2SC1623-L6,7	NEC
TR 3	2SC1623-L6,7	NEC
TR 4	2SA812-M6,7	NEC
TR 5	2SC1623-L6,7	NEC
TR 6	2SA1213-O	TOS
TR 7	2SC2873-O	TOS
TR 8	2SC1623-L6,7	NEC
TR 9	2SC1623-L6,7	NEC
TR 10	2SA812-M6,7	NEC
TR 11	2SC1623-L6,7	NEC
TR 12	2SA812-M6,7	NEC
TR 13	2SA812-M6,7	NEC

Diodes

D 1	1S2836-A4	NEC
D 2	1S2836-A4	NEC
D 3	1S2836-A4	NEC
D 4	1S2836-A4	NEC
D 5	1S2838-A6	NEC

Resistors

R 1	RMC1/10 510ohm F	KMY
R 2	RMC1/10 750ohm F	KMY
R 3	RMC1/10 270ohm F	KMY
R 4	RMC1/10 510ohm F	KMY
R 5	RMC1/10 20Kohm F	KMY
R 6	RMC1/10 2000ohm F	KMY
R 7	RMC1/10 240ohm F	KMY
R 8	RMC1/10 240ohm F	KMY
R 9	RMC1/10 240ohm F	KMY
R 10	RMC1/10 240ohm F	KMY
R 11	RMC1/10 51Kohm F	KMY
R 12	RMC1/10 10Kohm F	KMY
R 13	RMC1/10 51Kohm F	KMY
R 14	RMC1/10 10Kohm F	KMY
R 15	RMC1/10 51Kohm F	KMY
R 16	RMC1/10 10Kohm F	KMY
R 17	RMC1/10 2400ohm F	KMY
R 18	RMC1/10 6800ohm F	KMY
R 19	RMC1/10 3000ohm F	KMY
R 20	RMC1/10 2400ohm F	KMY
R 21	RMC1/10 5600ohm F	KMY
R 22	RMC1/10 3000ohm F	KMY
R 23	RMC1/10 15Kohm F	KMY
R 24	RMC1/10 510ohm F	KMY
R 25	RMC1/10 9100ohm F	KMY
R 26	RMC1/10 3000ohm F	KMY
R 27	RMC1/10 2000ohm F	KMY
R 28	RMC1/10 1500ohm F	KMY
R 29	RMC1/10 240ohm F	KMY
R 30	RMC1/10 2000ohm F	KMY
R 31	RMC1/10 4300ohm F	KMY
R 32	RMC1/10 300ohm F	KMY
R 33	RMC1/10 300ohm F	KMY
R 34	RMC1/10 4300ohm F	KMY
R 35	RMC1/10 200ohm F	KMY
R 36	RMC1/10 2400ohm F	KMY
R 37	RMC1/10 470ohm F	KMY
R 38	RMC1/10 3900ohm F	KMY
R 39	RMC1/10 11Kohm F	KMY
R 40	RMC1/10 10Kohm F	KMY
R 41	RMC1/10 12Kohm F	KMY
R 42	RMC1/10 10Kohm F	KMY
R 43	RMC1/10 3900ohm F	KMY
R 44	RMC1/10 470ohm F	KMY
R 45	RMC1/10 12Kohm F	KMY
R 46	RMC1/10 10Kohm F	KMY
R 47	RMC1/10 10Kohm F	KMY
R 48	RMC1/10 10Kohm F	KMY
R 49	RMC1/10 100ohm F	KMY
R 50	RMC1/10 1500ohm F	KMY
R 51	RMC1/10 360ohm F	KMY
R 52	RMC1/10 10Kohm F	KMY
R 53	RMC1/10 12Kohm F	KMY
R 54	RMC1/10 4300ohm F	KMY
R 55	RMC1/10 360ohm F	KMY
R 56	RMC1/10 1500ohm F	KMY
R 57	RMC1/10 100ohm F	KMY
R 58	RMC1/10 4300ohm F	KMY
R 59	RMC1/10 10Kohm F	KMY
R 60	RMC1/10 10Kohm F	KMY
R 61	RMC1/10 10Kohm F	KMY
R 62	RMC1/10 10Kohm F	KMY
R 63	RMC1/10 18Kohm F	KMY
R 64	RMC1/10 5100ohm F	KMY
R 65	RMC1/10 2000ohm F	KMY
R 66	RMC1/10 20Kohm F	KMY
R 67	RMC1/10 30Kohm F	KMY
R 68	RMC1/10 30Kohm F	KMY
R 69	RMC1/10 30Kohm F	KMY

Resistors

R 70	RMC1/10 270Kohm F	KMY
R 71	RMC1/10 270Kohm F	KMY
R 72	RMC1/10 270Kohm F	KMY
R 73	RMC1/10 22Kohm F	KMY
R 74	RMC1/10 15Kohm F	KMY
R 75	RMC1/10 4300ohm F	KMY
R 76	RMC1/10 270Kohm F	KMY
R 77	RMC1/10 270Kohm F	KMY
R 78	RMC1/10 22Kohm F	KMY
R 79	RMC1/10 15Kohm F	KMY
R 80	RMC1/10 270Kohm F	KMY
R 81	RMC1/10 270Kohm F	KMY
R 82	RMC1/10 270Kohm F	KMY
R 83	RMC1/10 22Kohm F	KMY
R 84	RMC1/10 15Kohm F	KMY
R 85	RMC1/10 6800ohm F	KMY
R 86	RMC1/10 2000ohm F	KMY
R 87	RMC1/10 2000ohm F	KMY
R 88	RMC1/10 2000ohm F	KMY
R 89	RMC1/10 160ohm F	KMY
R 90	RMC1/10 160ohm F	KMY
R 91	RMC1/10 160ohm F	KMY

Variable Resistors

VR 1	RJ-4W 500ohm	CPL
VR 2	RJ-4W 500ohm	CPL
VR 3	RJ-4W 5000ohm	CPL
VR 4	RJ-4W 5000ohm	CPL
VR 5	RJ-4WS 10Kohm	CPL
VR 6	RJ-4WS 10Kohm	CPL
VR 7	RJ-4WS 20Kohm	CPL
VR 8	RJ-4W 2000ohm	CPL
VR 9	RJ-4W 20Kohm	CPL
VR 10	RJ-4W 20Kohm	CPL
VR 11	RJ-4W 20Kohm	CPL
VR 12	RJ-4WS 10Kohm	CPL

Capacitors

C 1	*	
C 2	*	
C 3	*	
C 4	UMA0J101MCA	NCI
C 5	CM21W5R223M25VDC	KYC
C 6	268L1602-105M	NCC
C 7	UMA1C220MCA	NCI
C 8	CM32W5R104M25VDC	KYC
C 9	UMA0J470MCA	NCI
C 10	UMA0J470MCA	NCI
C 11	UMA0J101MCA	NCI
C 12	UMA1C470MCA	NCI
C 13	CM21W5R223M25VDC	KYC
C 14	CM21CH6R8C25VDC	KYC
C 15	UMA1C470MCA	NCI
C 16	CM21W5R223M25VDC	KYC
C 17	UMA1C470MCA	NCI
C 18	UMA0J220MCA	NCI
C 19	CM21W5R223M25VDC	KYC
C 20	UMA0J101MCA	NCI
C 21	UMA0J220MCA	NCI
C 22	CM21W5R223M25VDC	KYC
C 23	CM21W5R223M25VDC	KYC
C 24	UMA1C470MCA	NCI
C 25	UMA0J470MCA	NCI
C 26	CM21W5R223M25VDC	KYC
C 27	CM21W5R223M25VDC	KYC
C 28	UMA0J101MCA	NCI
C 29	UMA0J220MCA	NCI
C 30	CM21W5R223M25VDC	KYC
C 31	UMA0J101MCA	NCI
C 32	UMA0J220MCA	NCI
C 33	UMA0J101MCA	NCI
C 34	UMA1H010MCA	NCI
C 35	UMA1H010MCA	NCI
C 36	UMA1H010MCA	NCI
C 37	CM21W5R223M25VDC	KYC

Connectors

CN 1	MLF2B31P-J1	NBA

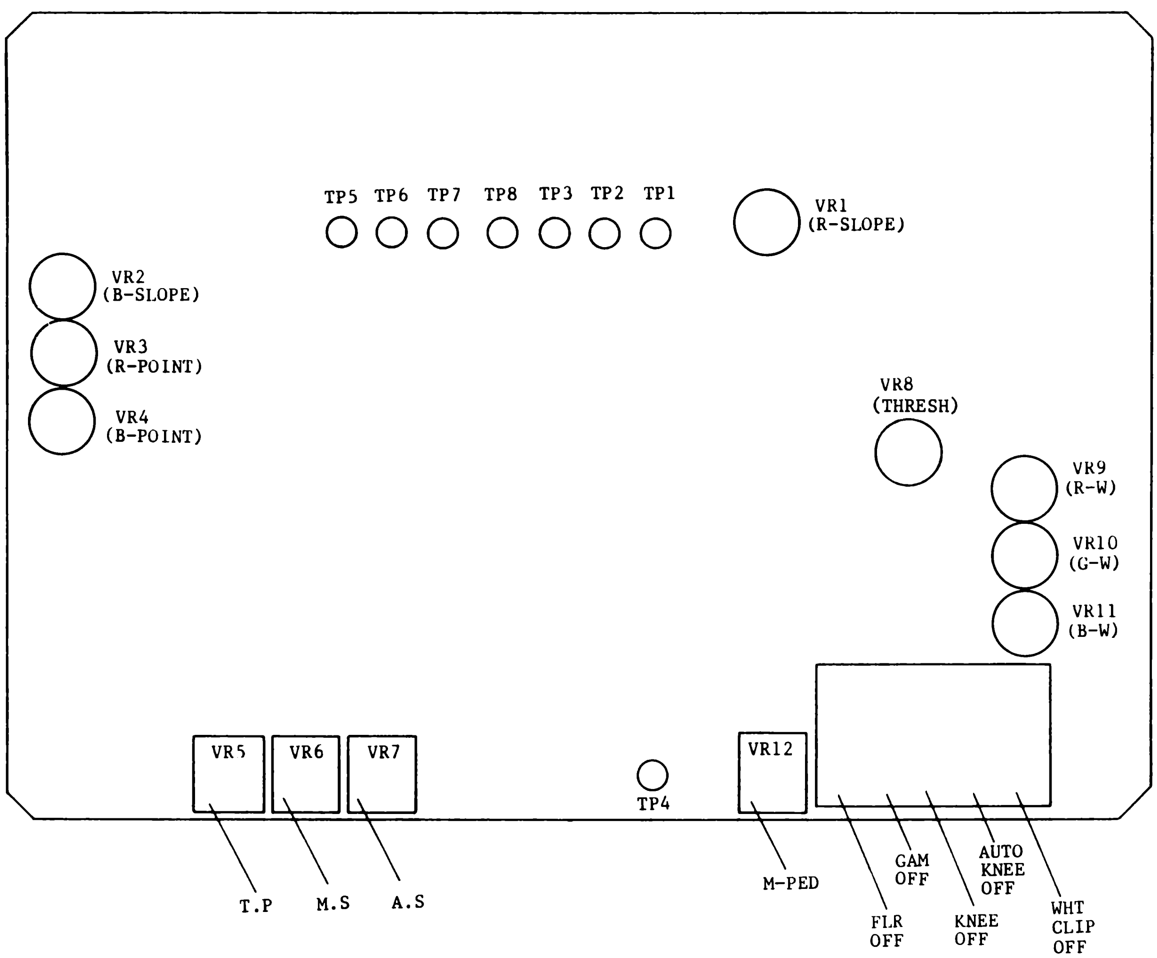
Switches

S 1	76PSB06	GRY

Delay Lines

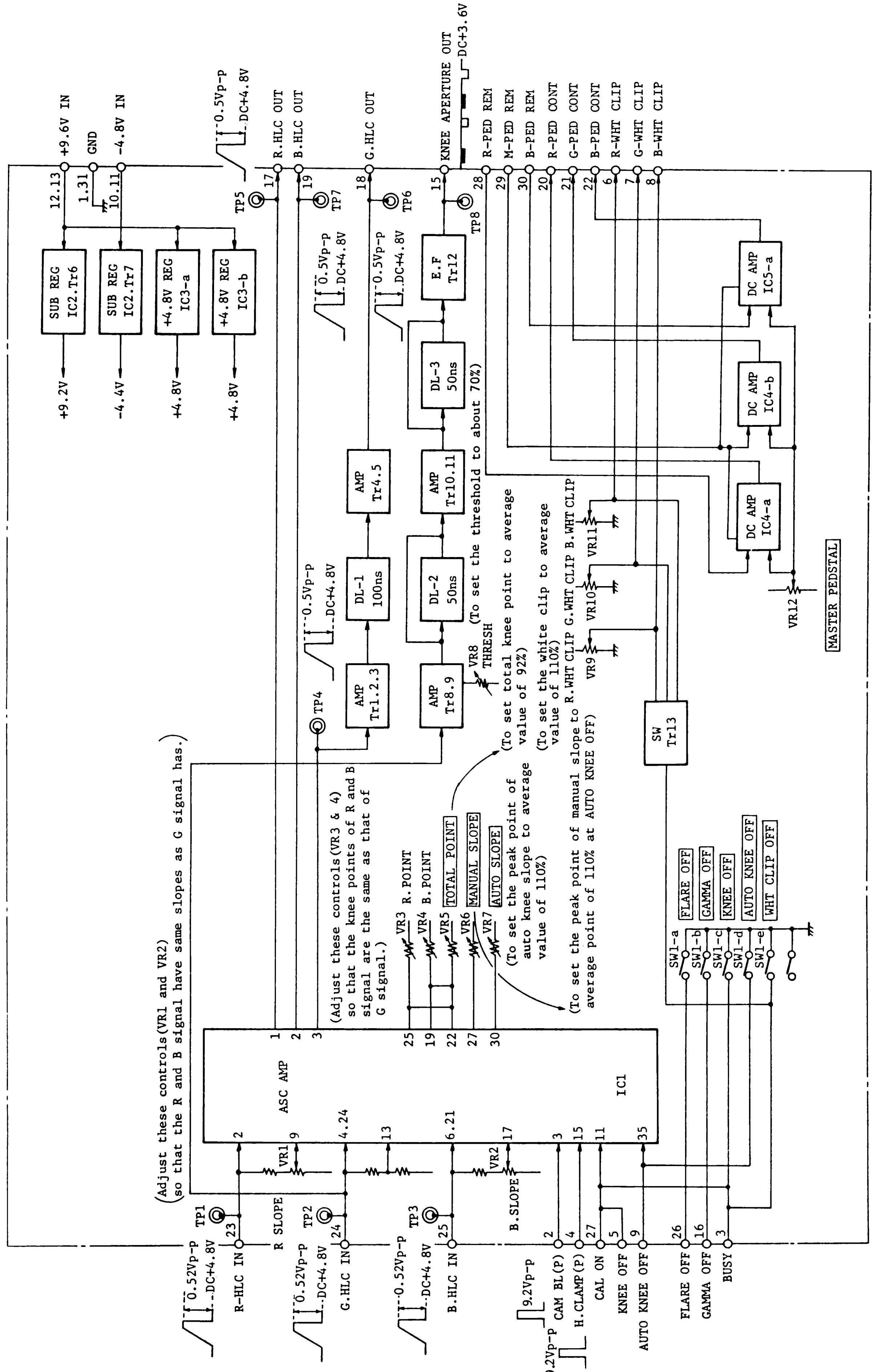
DL 1	ST-203469	IKE
DL 2	ST-203470	IKE
DL 3	ST-203470	IKE

Fig. 6-5-a



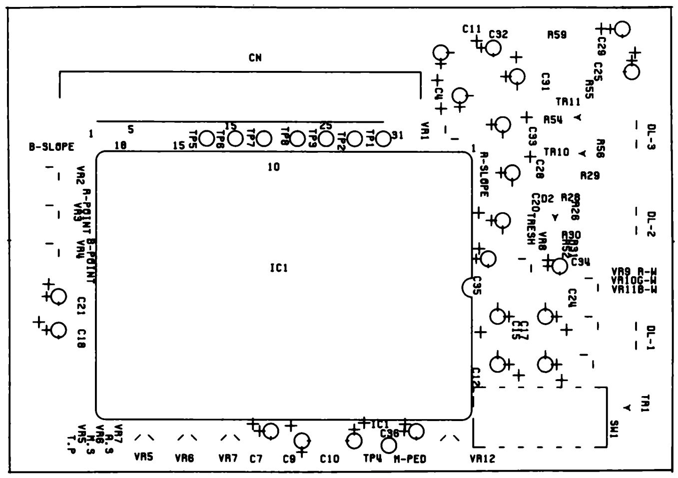
HLC
Controls

Fig. 6-5-b

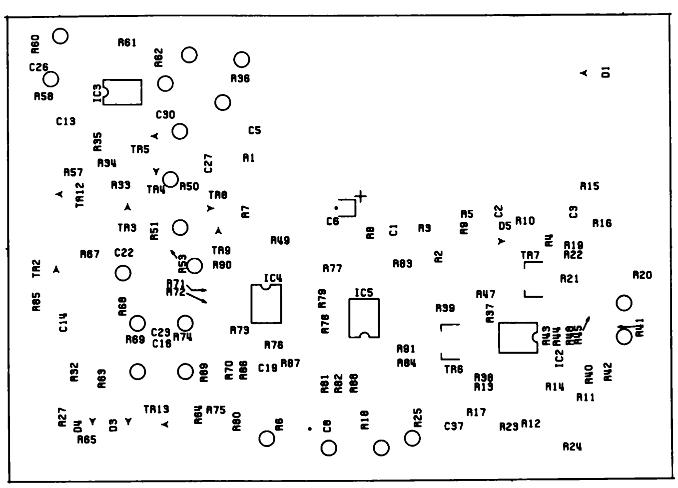


HLC
Block Diagram

Fig. 6-5-c



A SIDE



B SIDE

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is ataached on the B side of the module.

HLC
Parts Layout

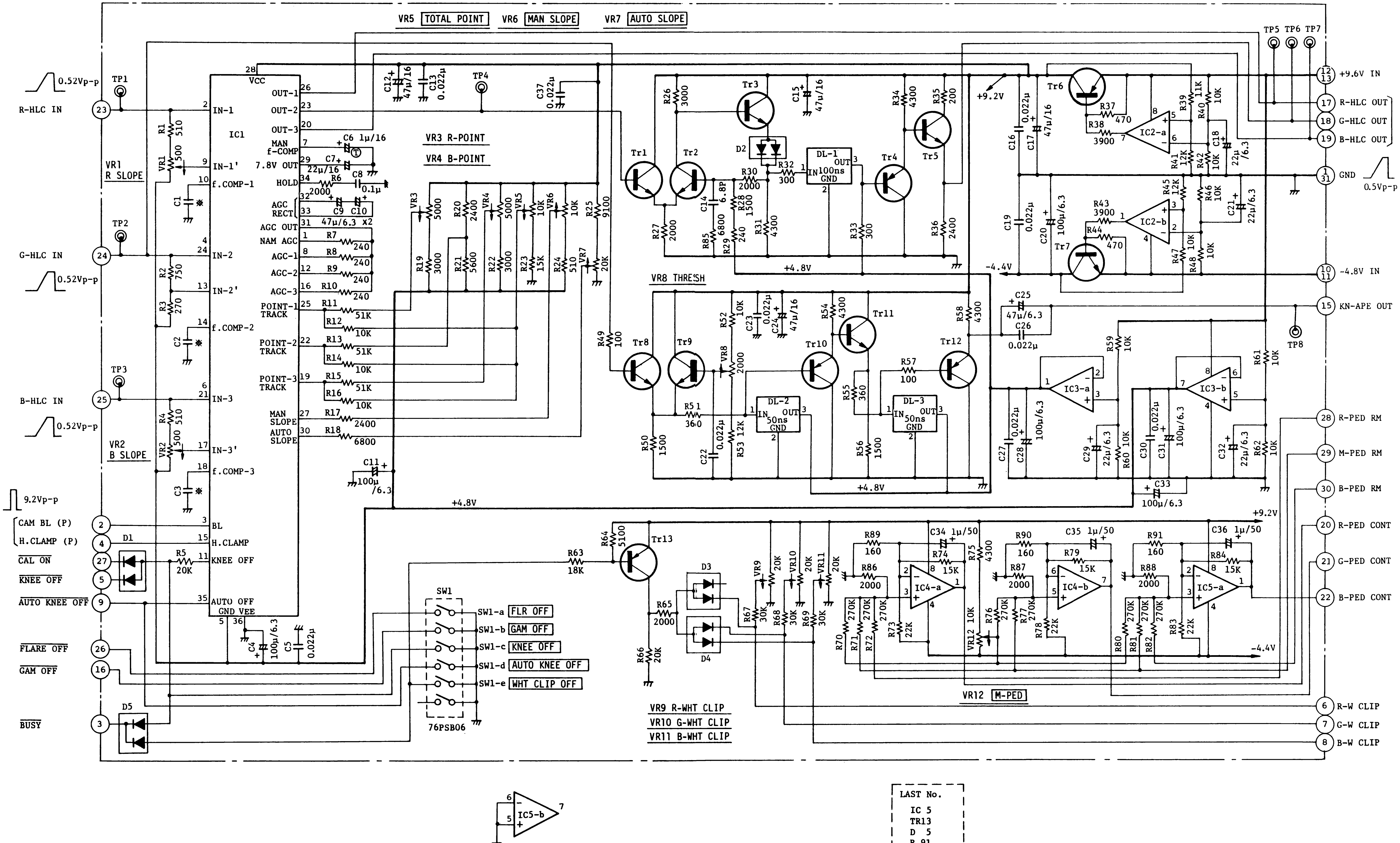
Fig. 6-5-d

IC1 ; ST-203239(ASC)
IC2,4,5 ; TL-062CPS
IC3 ; µPC4558G2

Tr1,2,3,5,8,9,11 ; 2SC1623-L6,7
Tr4,10,12,13 ; 2SA812-M6,7
Tr6 ; 2SA1213-O
Tr7 ; 2SC2873-O

D1,2,3,4 ; 1S2836-A4
D5 ; 1S2838-A6

DL1 ; ST-203469
DL2,3 ; ST-203470



LAST No.

IC 5
TR13
D 5
R 91
C 37
SW 1
DL-3
TP 8

HLC
Schematic Diagram
C3-218364

SECTION 6.6 DTL MODULE

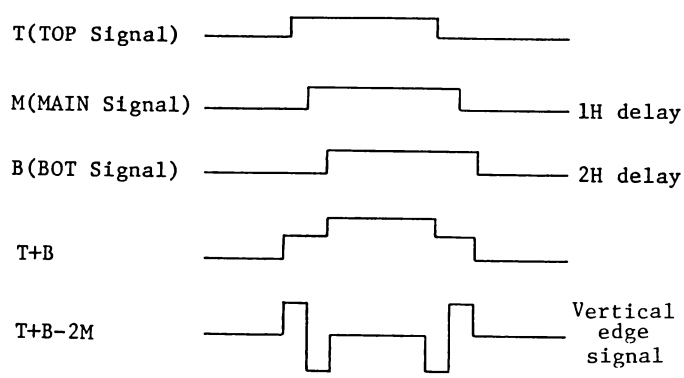
The DTL module produces horizontal and vertical edge signals.

The first-stage are amplifiers Tr1 and Tr2 which are inverting type. Input signals are G video, (GAMMA signal: GAMMA 0.45) KNEE APERTURE and a SAMPLE pulse (for AGC). The G video signal is amplitude-modulated at 30 MHz by IC2 to make it pass through the glass delay line. The signal, delayed 1H through the glass delay line DL1-a, enters the AGC circuit of Tr7, Tr12 and IC4-a, where its level is corrected. The corrected signal is modulated to the original G video signal by the demodulator IC3. The 1H-delayed G video signal is used as the MAIN signal. The signal is sent via the delay line DL2 and DL3 to the output amplifier of Tr24 to Tr26 to match it in phase with the H DTL edge signal. The MAIN signal delayed 1H via the DL1-a is further delayed 1H through the DL1-b. Its level is corrected by the AGC circuit of Tr19, Tr22 and IC7-a. The corrected signal is demodulated to the original G video signal level by the demodulator IC6. This signal becomes the BOTTOM signal. The output signal of the first-stage amplifier becomes the TOP signal.

TP2: TOP video signal ················ T
TP4: MAIN video signal ·············· M
TP7: BOTTOM video signal ·········· B

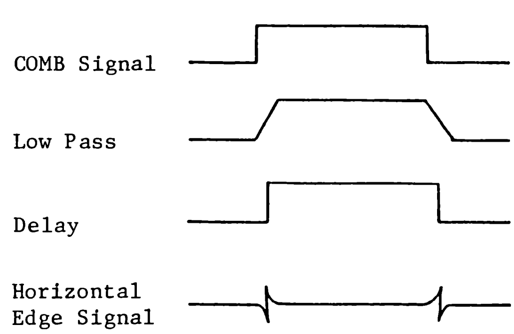
These signals are mixed together through based on the expression (T + B) - 2M.

The MIX signal becomes a vertical edge signal.

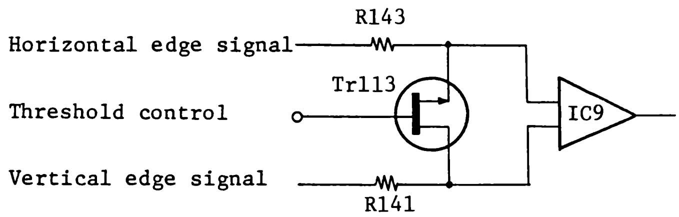


The horizontal edge signal is prepaired from the COMB signal by mixing the MAIN and BOTTOM signal is applied to the delay line DL4 and LPF (L7).

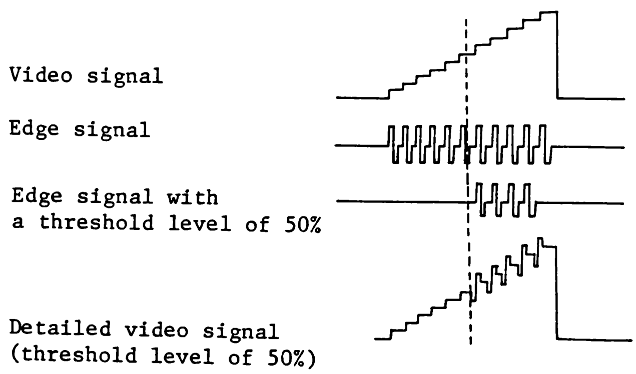
The difference signal is taken out by the differential amplifier of Tr107 and Tr108. This signal becomes the edge signal.



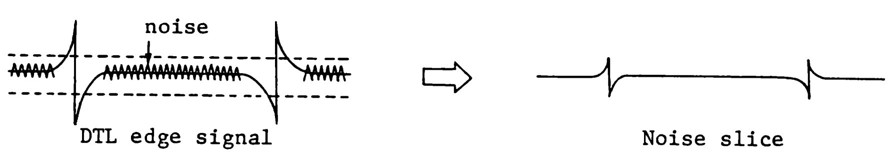
The horizontal and vertical edge signals are mixed in amplifier IC9. The threshold and DTL on/off controls are performed by shorting the input of IC9 with FET Tr113.



Threshold control is performed using the pinch off of the FET. The MAIN signal amplified by Tr112 is used for the threshold control signal, and the threshold point is determined by its DC potential.



The DTL edge signal mixed by the amplifier IC9 enters the noise slice circuit in order to improve the S/N ratio. The noise slice cuts off a noise component that is generated by the DTL edge signal.



DTL is automatically turned off when the auto white balance is operating or when the CAL switch is turned on.

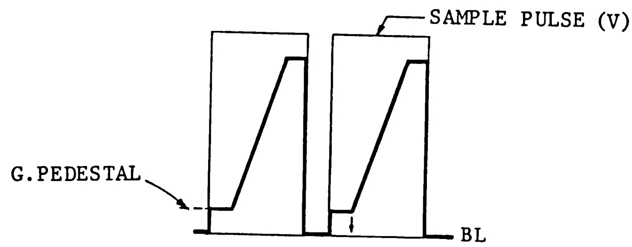
[Adjustment]

(1) SAMPLE LEVEL

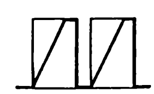
① Turn on the CAL switch on the PULSE module.

② Turn off the GAMMA switch on the HLC module.

③ Monitoring the level at TP2 (or the cathode of D1) on the oscilloscope, match G channel pedestal level to BL level, using the PED control VR6 on the PROC module.



④ Adjust the SAMPLE LEVEL control VR1 until the SAMPLE pulse becomes equal to the CAL level.

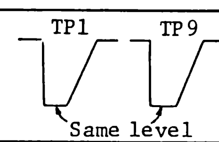
SAMPLE LEVEL	TP2 or cathode of D1	VR1	

(2) G LEVEL

Check the SAMPLE pulse level before proceeding to this adjustment.

① Monitor levels at TP1 (or pin ⑱ of the connector) and TP9 through the oscilloscope.

② Make the level at TP9 equal to that at TP1 with the G LEVEL control VR4.

Input at TP1	Output at TP9	VR4	

(3) MOD BIAS

This is a factory adjustment. Do not adjust it in any case other than operation failure.

Adjust the "DG" characteristics of the MAIN signal at TP4 to an optimum point using the MOD BIAS control VR3.

(4) COMB (only NTSC system)

This is a factory adjustment. Do not adjust it in any case other than operation failure. (In the PAL system, largely use VR's for adjustment.)

① Monitor potential at TP11 on the oscilloscope.

② Apply a signal of 3.58 MHz to input G VIDEO signal.

③ Adjust the 3.58 MHz component to a minimum with the COMB control VR103.

(5) DTL LEVEL

① Turn off the KNEE switch at the front of the HLC module.

② Turn off the KNEE APERT switch at the front of this module.

③ Turn on the DTL switch at the front of this module.

④ Set the DTL control VR110 at the front of this module to the center.

⑤ Frame the camera on a grey scale. Obtain the white balance.

⑥ Monitor the G video level on the waveform monitor and adjust the lens iris for 85% video level.

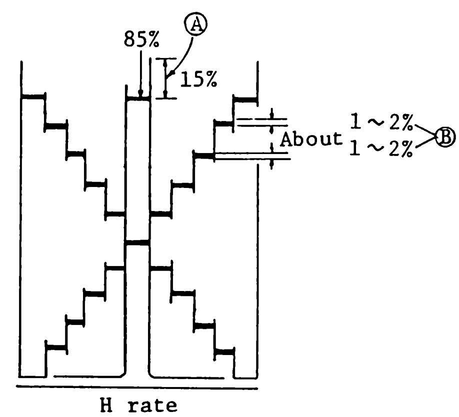
⑦ Adjust the edge level at point Ⓐ to 15% with the H.DTL control VR106.

⑧ Adjust the edge level at point Ⓑ to about 1 to 2% with the NOISE SLICE control VR108.

⑨ Adjust the SLICE BAL control VR109 until the edge level at point Ⓑ is 1 to 2% symmetrically across the base line.

⑩ Repeat the adjustments of steps ⑦, ⑧ and ⑨.

⑪ Adjust the H BAL control VR105 until the G video level does not vary with the H.DTL control VR106 turned.

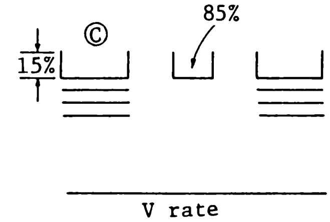


⑫ Adjust control CORE L7 (for TRIMING) until the whole edge picture is uniform at point Ⓑ.

⑬ Adjust the edge level at point Ⓒ to 15% with the V DTL level control VR104 on the front side of this module.

⑭ If the V edge level is horizontally asymmetric by mounting on the waveform monitor, adjust the V. BAL control VR102.

⑮ Adjust the V.VIDEO BAL control VR101 until the G video level does not vary when the V DTL control VR104 turned.



(6) KNEE APERTURE

① DTL and highlight compression adjustment must be completed.

② Monitor the ENC signal on the waveform monitor.

③ Frame the camera on a grey scale and obtain a white balance.

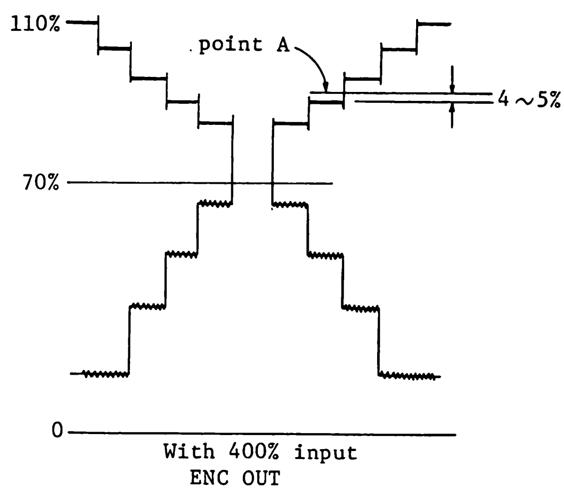
④ Turn on the AUTO KNEE switch at the front of the HLC module.

⑤ Adjust the lens iris for 400% video level.

⑥ Adjust the H. edge signal to a level of 4 or 5% with the KNEE APERT control VR2.

Note: 1) The edge monitoring point is point Ⓐ for the signal having a level near 100%.

2) Adjust the THRESH control VR8 on the HLC module so that the threshold level becomes about 70%.



DTL-V(PAL-B) MODULE

Integrated Circuits

IC 1	TL-062CPS	TEX
IC 2	NJM1496M	JRC
IC 3	uPC596C	NEC
IC 4	TL-062CPS	TEX
IC 6	uPC596C	NEC
IC 7	TL-062CPS	TEX
IC 8	TL-062CPS	TEX

Transistors

TR 1	NTM3904-B25	NEC
TR 2	2SC1623-L6,7	NEC
TR 3	2SK94-X4	NEC
TR 4	2SC2223-F14	NEC
TR 5	NTM3904-B25	NEC
TR 6	NTM3906-Y25	NEC
TR 7	2SC2223-F14	NEC
TR 8	2SC2223-F14	NEC
TR 9	2SC2223-F14	NEC
TR 10	2SC1623-L6,7	NEC
TR 11	2SC1623-L6,7	NEC
TR 12	2SK94-X4	NEC
TR 13	2SK94-X4	NEC
TR 14	2SC2223-F14	NEC
TR 15	2SC2223-F14	NEC
TR 16	2SC2223-F14	NEC
TR 17	NTM3904-B25	NEC
TR 18	NTM3906-Y25	NEC
TR 19	2SC2223-F14	NEC
TR 20	2SC2223-F14	NEC
TR 21	2SC1623-L6,7	NEC
TR 22	2SK94-X4	NEC
TR 23	2SK94-X4	NEC
TR 24	2SA812-M6,7	NEC
TR 25	2SC1623-L6,7	NEC
TR 26	2SC1623-L6,7	NEC
TR 27	2SA1213-O	TOS
TR 28	2SC1623-L6,7	NEC

Diodes

D 1	1S2838-A6	NEC
D 2	1SS123-A7	NEC
D 4	1SV68	HIT
D 5	1S2836-A4	NEC
D 7	1S2836-A4	NEC
D 8	1S2836-A4	NEC
D 9	1SS123-A7	NEC
D 11	1SV68	HIT
D 12	1S2836-A4	NEC

Resistors

R 1	RMC1/10 4300ohm F	KMY
R 2	RMC1/10 22Kohm F	KMY
R 3	RMC1/10 1500ohm F	KMY
R 4	RMC1/10 2000ohm F	KMY
R 5	RMC1/10 5100ohm F	KMY
R 6	RMC1/10 2400ohm F	KMY
R 7	RMC1/10 2700ohm F	KMY
R 8	RMC1/10 1000ohm F	KMY
R 9	RMC1/10 2000ohm F	KMY
R 10	RMC1/10 33Kohm F	KMY
R 11	RMC1/10 2000ohm F	KMY
R 12	RMC1/10 1000ohm F	KMY
R 13	RMC1/10 1100ohm F	KMY
R 14	RMC1/10 1300ohm F	KMY
R 15	RMC1/10 56ohm F	KMY
R 16	RMC1/10 820ohm F	KMY
R 17	RMC1/10 10kohm F	KMY
R 18	RMC1/10 1000ohm F	KMY
R 19	RMC1/10 1Mohm F	KMY
R 20	RMC1/10 510ohm F	KMY
R 21	RMC1/10 910ohm F	KMY
R 22	RMC1/10 4700ohm F	KMY
R 23	RMC1/10 10kohm F	KMY
R 24	RMC1/10 100kohm F	KMY
R 25	RMC1/10 100ohm F	KMY
R 26	RMC1/10 4300ohm F	KMY
R 27	RMC1/10 2200ohm F	KMY
R 28	*	
R 29	RMC1/10 2400ohm F	KMY
R 30	RMC1/10 33Kohm F	KMY
R 31	*	
R 32	RMC1/10 2000ohm F	KMY
R 33	RMC1/10 2000ohm F	KMY
R 34	RMC1/10 510ohm F	KMY
R 35	RMC1/10 1100ohm F	KMY
R 36	RMC1/10 510ohm F	KMY
R 37	RMC1/10 1200ohm F	KMY
R 38	RMC1/10 510ohm F	KMY
R 39	RMC1/10 1300ohm F	KMY
R 40	RMC1/10 1000ohm F	KMY
R 41	RMC1/10 100ohm F	KMY
R 42	RMC1/10 1000ohm F	KMY
R 43	RMC1/10 33Kohm F	KMY
R 45	RMC1/10 JP	KMY
R 47	RMC1/10 10kohm F	KMY
R 48	RMC1/10 3600ohm F	KMY
R 49	RMC1/10 10kohm F	KMY
R 50	RMC1/10 4700ohm F	KMY

Resistors

R 51	RMC1/10 3000ohm F	KMY
R 52	RMC1/10 1000ohm F	KMY
R 53	RMC1/10 750ohm F	KMY
R 54	RMC1/10 510ohm F	KMY
R 55	RMC1/10 910ohm F	KMY
R 56	RMC1/10 4700ohm F	KMY
R 57	RMC1/10 10kohm F	KMY
R 58	RMC1/10 100kohm F	KMY
R 59	RMC1/10 12kohm F	KMY
R 60	RMC1/10 2200ohm F	KMY
R 61	*RMC1/10 56ohm F	KMY
R 62	RMC1/10 2000ohm F	KMY
R 63	RMC1/10 2400ohm F	KMY
R 64	*	
R 65	RMC1/10 22Kohm F	KMY
R 66	RMC1/10 3000ohm F	KMY
R 67	RMC1/10 1000ohm F	KMY
R 68	RMC1/10 33Kohm F	KMY
R 69	RMC1/10 100ohm F	KMY
R 70	RMC1/10 33Kohm F	KMY
R 71	RMC1/10 2700ohm F	KMY
R 72	RMC1/10 4700ohm F	KMY
R 73	RMC1/10 1000ohm F	KMY
R 74	RMC1/10 510ohm F	KMY
R 75	RMC1/10 5100ohm F	KMY
R 76	RMC1/10 2000ohm F	KMY
R 77	RMC1/10 1000ohm F	KMY
R 78	RMC1/10 5100ohm F	KMY
R 79	RMC1/10 1000ohm F	KMY
R 80	RMC1/10 1000ohm F	KMY
R 83	RMC1/10 11kohm F	KMY
R 84	RMC1/10 470ohm F	KMY
R 85	RMC1/10 3900ohm F	KMY
R 86	RMC1/10 12kohm F	KMY
R 87	RMC1/10 10kohm F	KMY
R 88	RMC1/10 10kohm F	KMY
R 89	RMC1/10 3900ohm F	KMY
R 90	RMC1/10 470ohm F	KMY
R 91	RMC1/10 12kohm F	KMY
R 92	RMC1/10 10kohm F	KMY
R 93	RMC1/10 10kohm F	KMY
R 94	RMC1/10 10kohm F	KMY
R 99	RMC1/10 33Kohm F	KMY
R100	RMC1/10 18Kohm F	KMY

Variable Resistors

VR 1	RJ4W 10Kohm	CPL
VR 2	RJ4WS 5000ohm	CPL
VR 3	RJ4W 5000ohm	CPL
VR 4	RJ4WS 2000ohm	CPL
VR 5	RJ4W 500ohm	CPL
VR 6	RJ4W 500ohm	CPL

Capacitors

C 1	CM21CH820J25VDC	KYC
C 2	UMA0J101MCA	NCI
C 3	CM21CH6R8C25VDC	KYC
C 4	UMA0J220MCA	NCI
C 5	UMA0J220MCA	NCI
C 6	UMA1C470MCA	NCI
C 7	CM21W5R223M25VDC	KYC
C 8	CM21CH102J25VDC	KYC
C 9	CM21CH100J25VDC	KYC
C 10	CM21W5R223M25VDC	KYC
C 11	CM21W5R223M25VDC	KYC
C 12	CM21W5R223M25VDC	KYC
C 13	CM21W5R223M25VDC	KYC
C 14	CM21W5R223M25VDC	KYC
C 16	CM21W5R223M25VDC	KYC
C 17	UMA0J101MCA	NCI
C 19	CM21CH102J25VDC	KYC
C 20	CM21CH102J25VDC	KYC
C 21	CM32W5R104M25VDC	KYC
C 22	CM21W5R223M25VDC	KYC
C 23	CM21W5R223M25VDC	KYC
C 24	UMA1C470MCA	NCI
C 25	*	
C 26	CM21CH390J25VDC	KYC
C 27	*	
C 28	UMA0J220MCA	NCI
C 30	*	
C 31	UMA0J101MCA	NCI
C 32	268L1602-105M	NCC
C 33	CM21W5R223M25VDC	KYC
C 35	268L1002-475M	NCC
C 36	268L1002-475M	NCC
C 37	CM21W5R223M25VDC	KYC
C 39	CM21W5R223M25VDC	KYC
C 40	UMA1C470MCA	NCI
C 41	CM21W5R223M25VDC	KYC
C 42	CM21CH470J25VDC	KYC
C 43	CM21CH102J25VDC	KYC
C 44	CM21CH102J25VDC	KYC
C 45	CM21CH180J25VDC	KYC
C 46	CM21W5R223M25VDC	KYC
C 47	UMA1C470MCA	NCI
C 48	CM21W5R223M25VDC	KYC
C 49	UMA0J101MCA	NCI
C 50	CM21W5R223M25VDC	KYC
C 51	CM21CH102J25VDC	KYC
C 52	CM21CH102J25VDC	KYC

Capacitors

C 53	CM32W5R104M25VDC	KYC
C 54	UMA1A330MCA	NCI
C 55	CM21W5R223M25VDC	KYC
C 56	CM21CH390J25VDC	KYC
C 57	*	
C 58	CM21W5R223M25VDC	KYC
C 59	*	
C 60	*	
C 61	UMA0J220MCA	NCI
C 62	268L1602-105M	NCC
C 64	268L1002-475M	NCC
C 65	268L1002-475M	NCC
C 66	CM21W5R223M25VDC	KYC
C 67	CM21CH150J25VDC	KYC
C 70	CM21W5R223M25VDC	KYC
C 71	UMA1C470MCA	NCI
C 72	UMA0J220MCA	NCI
C 73	CM21W5R223M25VDC	KYC
C 74	UMA0J220MCA	NCI
C 75	UMA0J220MCA	NCI

Variable Capacitors

VC 1	TCX-3S3-AB	KYC
VC 2	TCX-3S3-AB	KYC

Inductance Coiles

L 1	*	
L 2	ST-203461	IKE
L 3	ST-203460	IKE
L 4	*	
L 5	ST-203461	IKE

Connectors

CN 1	MLF2B31P-J1	NBA
CN 2	14120-01-445	EMC

Switches

S 1	SM-03201-02	NKA
S 2	SM-03201-02	NKA

Delay Lines

DL 1	ST-202892A	IKE
DL 2	ST-203540	IKE
DL 3	ST-203609	IKE

Crystal

X 1	ST202834	IKE

DTL-H MODULE

Integrated Circuits

IC 5	NJM4556M	JRC
IC 9	uA733HC	FCH

Transistors

TR 29	2SA1213-O	TOS
TR101	2SC1623-L6,7	NEC
TR102	2SC1623-L6,7	NEC
TR103	2SC1623-L6,7	NEC
TR104	2SC1623-L6,7	NEC
TR105	2SC1623-L6,7	NEC
TR106	2SC1623-L6,7	NEC
TR107	2SC1623-L6,7	NEC
TR108	2SC1623-L6,7	NEC
TR109	2SC1623-L6,7	NEC
TR110	2SA1226-E4	NEC
TR111	2SA1226-E4	NEC
TR112	2SA1226-E4	NEC
TR113	2SK372-BL	TOS
TR114	2SC2223-F14	NEC
TR115	2SC2223-F14	NEC
TR116	2SA812-M6,7	NEC
TR117	2SK94-X4	NEC

Diodes

D101	1S2836-A4	NEC
D102	1SS154-BA	TOS
D103	1SS154-BA	TOS
D104	1S2838-A6	NEC
D105	1S2838-A6	NEC
D106	1SS154-BA	TOS

Resistors

R 44	RMC1/10 10Kohm F	KMY
R 46	RMC1/10 10Kohm F	KMY
R 81	RMC1/10 470ohm F	KMY
R 82	RMC1/10 3900ohm F	KMY
R 95	RMC1/10 3000ohm F	KMY
R 96	RMC1/10 11Kohm F	KMY
R 97	RMC1/10 12Kohm F	KMY
R 98	RMC1/10 12Kohm F	KMY
R101	RMC1/10 1200ohm F	KMY
R102	RMC1/10 1000ohm F	KMY
R103	RMC1/10 10Kohm F	KMY
R104	RMC1/10 100ohm F	KMY
R105	RMC1/10 10Kohm F	KMY
R106	RMC1/10 200ohm F	KMY
R107	RMC1/10 1500ohm F	KMY
R108	RMC1/10 2400ohm F	KMY
R109	RMC1/10 10Kohm F	KMY
R110	RMC1/10 510ohm F	KMY
R111	RMC1/10 2400ohm F	KMY
R112	RMC1/10 200ohm F	KMY
R113	RMC1/10 2700ohm F	KMY
R114	RMC1/10 4300ohm F	KMY
R115	RMC1/10 1300ohm F	KMY
R116	RMC1/10 24Kohm F	KMY
R117	RMC1/10 20Kohm F	KMY
R118	RMC1/10 1300ohm F	KMY
R119	RMC1/10 620ohm F	KMY
R120	RMC1/10 300ohm F	KMY
R121	*	
R122	RMC1/10 560ohm F	KMY
R123	RMC1/10 360ohm F	KMY
R124	RMC1/10 1500ohm F	KMY
R125	RMC1/10 2400ohm F	KMY
R126	RMC1/10 56ohm F	KMY
R127	RMC1/10 2400ohm F	KMY
R128	RMC1/10 1000ohm F	KMY
R129	RMC1/10 2000ohm F	KMY
R130	RMC1/10 30Kohm F	KMY
R131	RMC1/10 20Kohm F	KMY
R132	RMC1/10 30Kohm F	KMY
R133	RMC1/10 13Kohm F	KMY
R134	RMC1/10 1000ohm F	KMY
R136	RMC1/10 1300ohm F	KMY
R137	RMC1/10 56ohm F	KMY
R138	RMC1/10 1300ohm F	KMY
R139	RMC1/10 12Kohm F	KMY
R140	RMC1/10 100ohm F	KMY
R141	RMC1/10 1500ohm F	KMY
R142	RMC1/10 5100ohm F	KMY
R143	RMC1/10 1500ohm F	KMY
R144	RMC1/10 5100ohm F	KMY
R145	RMC1/10 100ohm F	KMY
R146	RMC1/10 3000ohm F	KMY
R147	RMC1/10 1800ohm F	KMY
R148	RMC1/10 1000ohm F	KMY
R149	RMC1/10 2200ohm F	KMY
R150	RMC1/10 1000ohm F	KMY
R151	RMC1/10 6200ohm F	KMY
R152	RMC1/10 6200ohm F	KMY
R153	RMC1/10 100ohm F	KMY
R154	RMC1/10 100ohm F	KMY
R155	RMC1/10 2700ohm F	KMY
R156	RMC1/10 10Kohm F	KMY
R157	RMC1/10 30Kohm F	KMY
R158	RMC1/10 30Kohm F	KMY
R159	RMC1/10 20Kohm F	KMY

Resistors

R160	RMC1/10 10Kohm F	KMY
R161	RMC1/10 330ohm F	KMY
R162	RMC1/10 3000ohm F	KMY
R163	RMC1/10 2200ohm F	KMY
R164	RMC1/10 10ohm F	KMY

Variable Resistors

VR101	RJ-4W 1000ohm	CPL
VR102	RJ-4W 5000ohm	CPL
VR103	RJ-4W 5000ohm	CPL
VR104	RJ-4W 2000ohm	CPL
VR105	RJ-4W 100ohm	CPL
VR106	RJ-4W 5000ohm	CPL
VR107	RJ-4WS 5000ohm	CPL
VR108	RJ-4W 2000ohm	CPL
VR109	RJ-4W 1000ohm	CPL
VR110	RJ-4WS 2000ohm	CPL
VR111	RJ-4W 5000ohm	CPL

Capacitors

C 38	268L6301-685M	NCC
C 69	268L6301-685M	NCC
C101	UMAOJ101MCA	NCI
C102	268L1002-156M	NCC
C103	268L1002-156M	NCC
C104	CM21CH220J25VDC	KYC
C105	CM21CH151J25VDC	KYC
C106	268L1002-475M	NCC
C107	UMAOJ220MCA	NCI
C108	CM21W5R223M25VDC	KYC
C109	CM21W5R223M25VDC	KYC
C110	CM21CH470J25VDC	KYC
C111	UMAOJ101MCA	NCI
C112	*	
C113	*CM21CH101J25VDC	KYC
C114	UMA1C100MCA	NCI
C115	CM21W5R223M25VDC	KYC
C116	CM21W5R223M25VDC	KYC
C117	268L1002-475M	NCC
C118	268L1002-475M	NCC
C119	UMA1C470MCA	NCI
C120	CM21W5R223M25VDC	KYC
C121	268L1002-475M	NCC
C122	268L1002-475M	NCC
C123	UMAOJ101MCA	NCI
C124	*	
C125	CM21W5R223M25VDC	KYC
C126	*	
C127	*	
C128	*	
C129	*	
C130	CM21CH4R7C25VDC	KYC
C131	CM21CH4R7C25VDC	KYC
C132	*	
C133	*	
C134	CM21W5R223M25VDC	KYC
C135	UMA1E4R7MCA	NCI
C136	CM21CH560J25VDC	KYC

Inductance Coiles

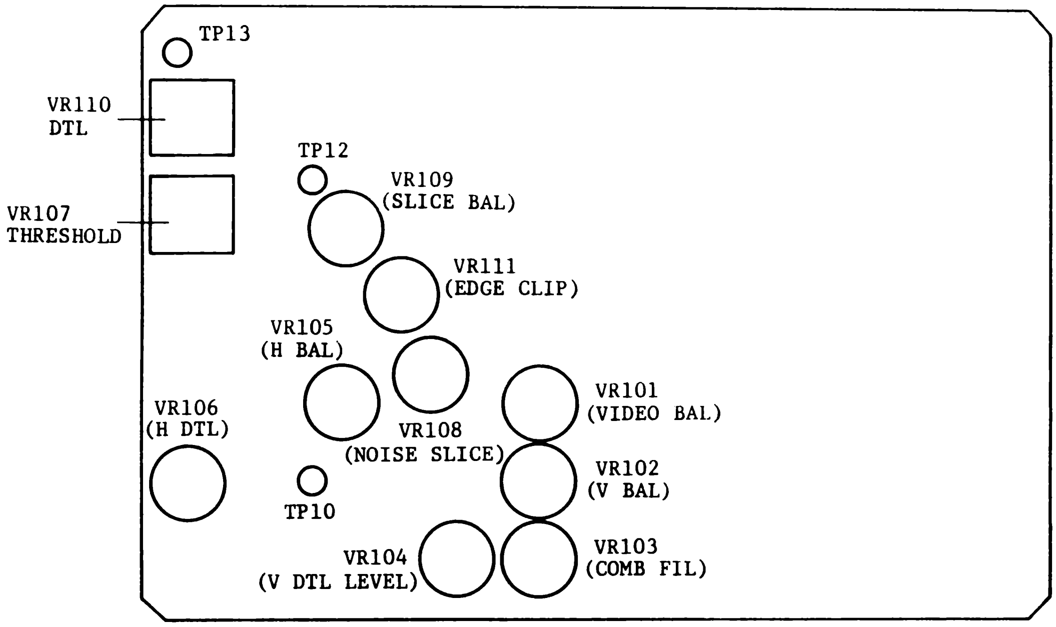
L 6	TP0410-101J	TDK
L 7	ST-203588	IKE

Connector

CN 1	14120-04-451	ELC

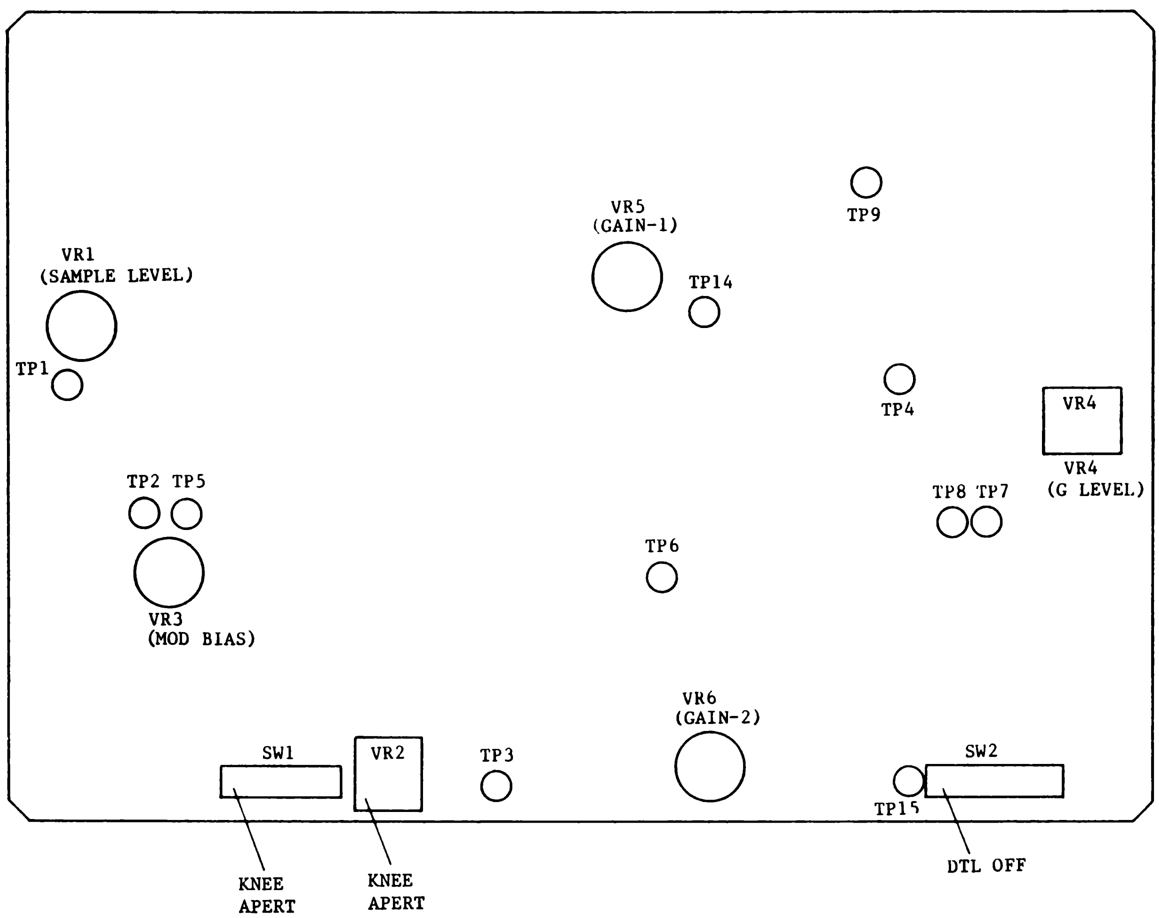
Delay Line

DL 4	ST-203469	IKE


TP13
VR110
DTL
VR107
THRESHOLD
TP12
VR109
(SLICE BAL)
VR111
(EDGE CLIP)
VR105
(H BAL)
VR106
(H DTL)
VR101
(VIDEO BAL)
VR108
(NOISE SLICE)
VR102
(V BAL)
TP10
VR104
(V DTL LEVEL)
VR103
(COMB FIL)

DTL-H

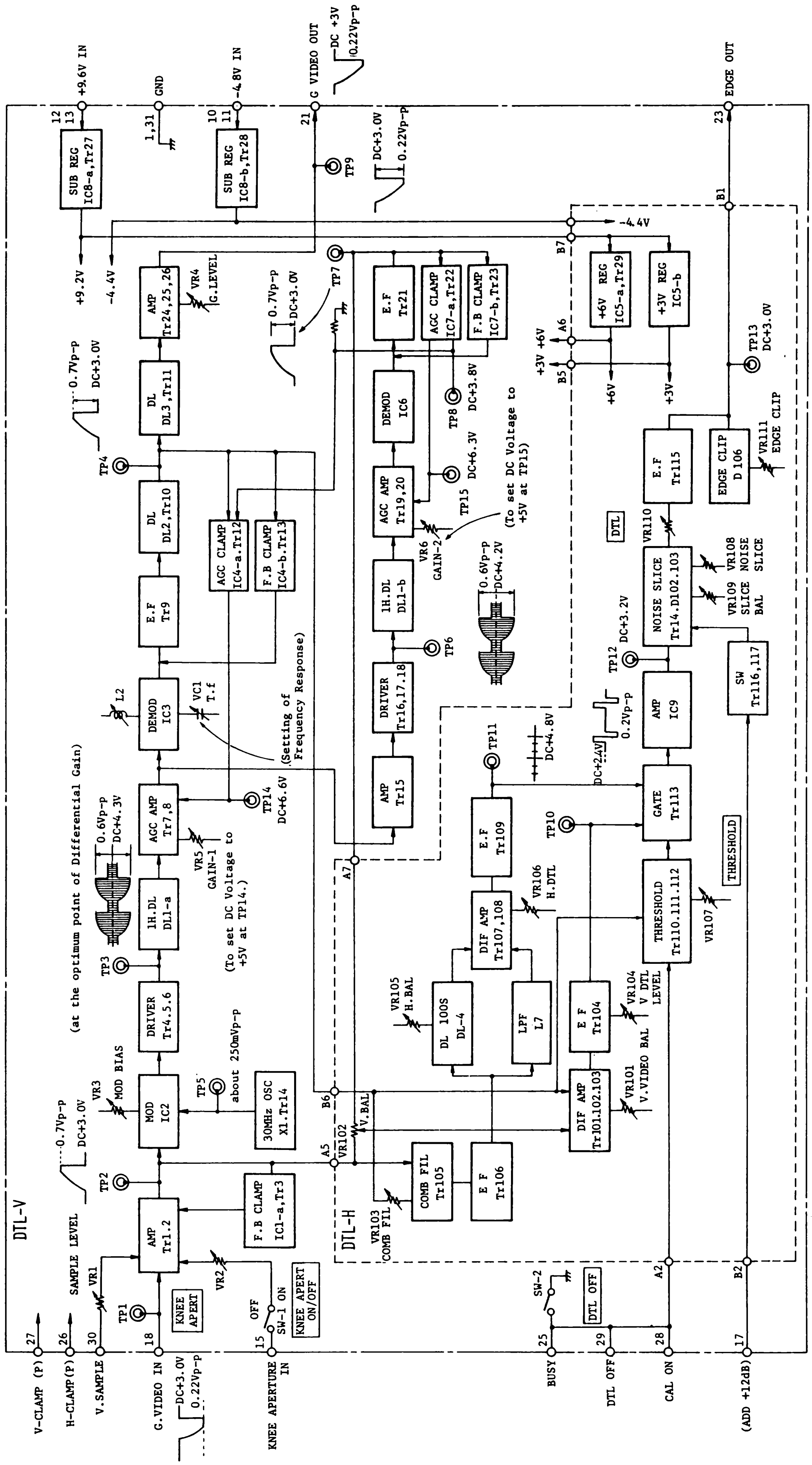
Fig. 6-6-a



DTL-V

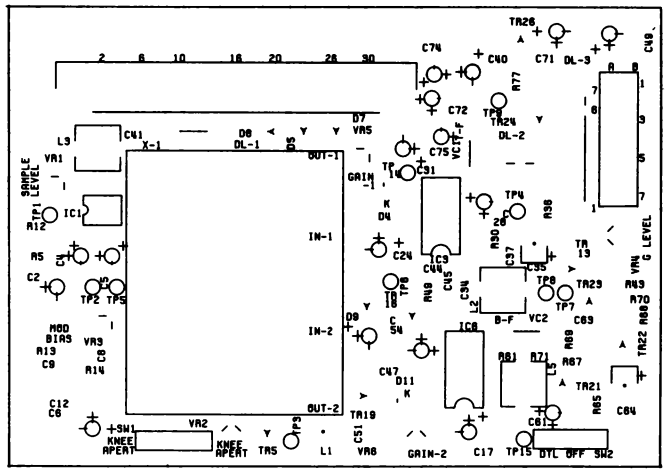
DTL
Controls

Fig. 6-6-b

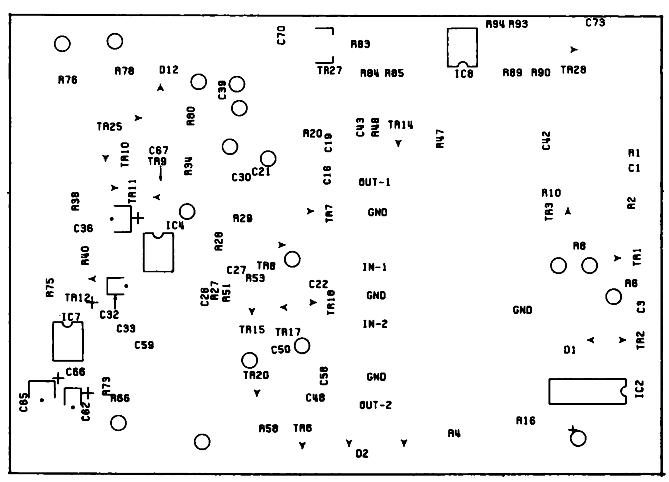


DTL
Block Diagram

Fig. 6-6-c



A SIDE



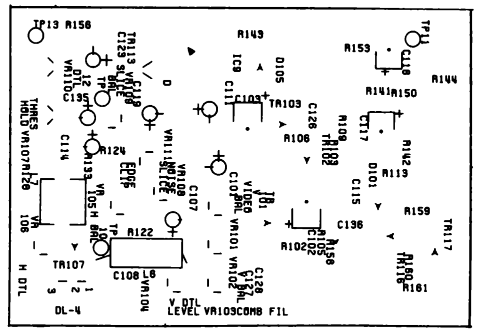
B SIDE

DTL-V

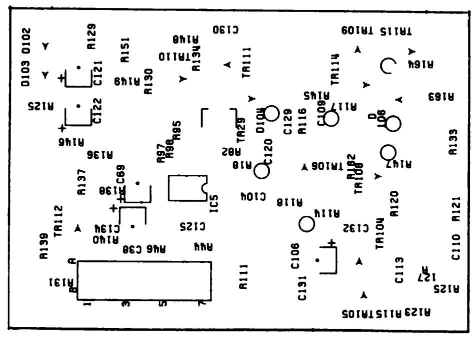
A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is ataached on the B side of the module.

DTL
Parts Layout

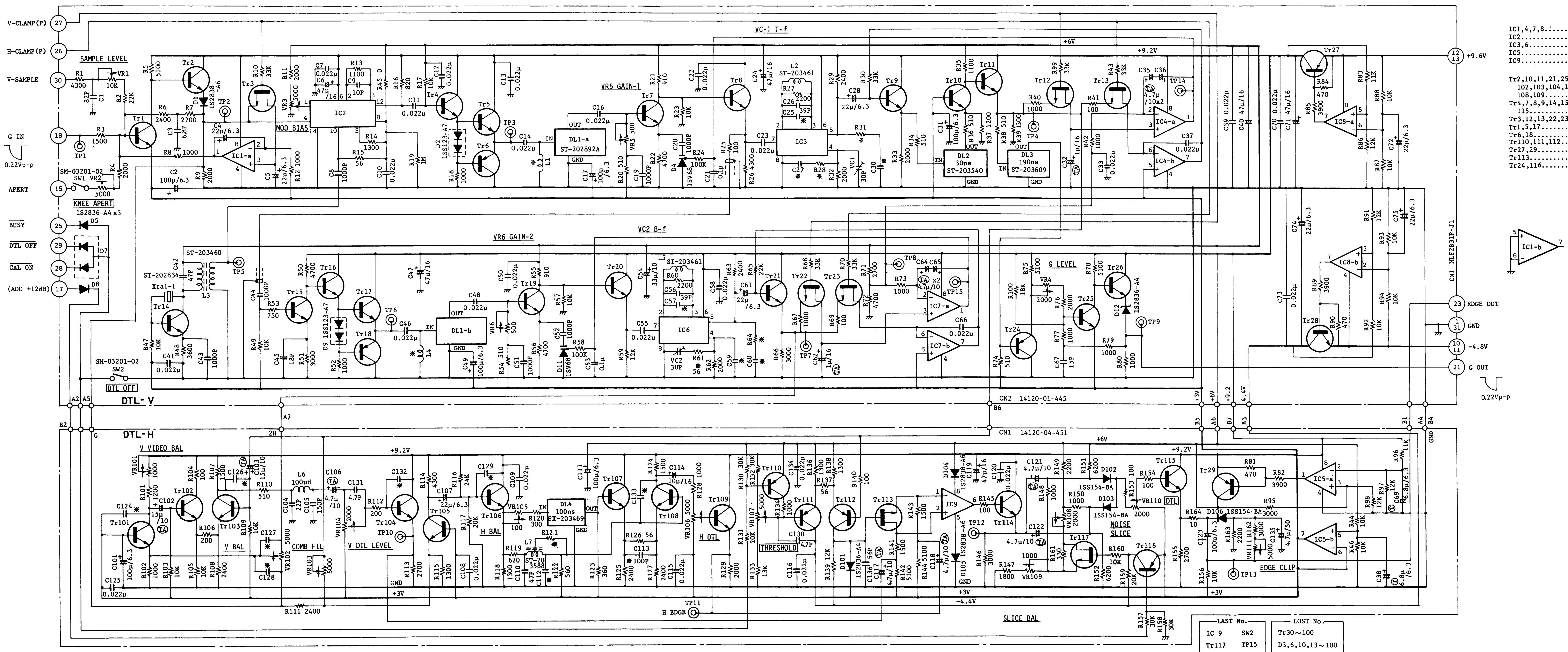


A SIDE



B SIDE

DTL-H



IC1,4,7,8.............TL062CPS
IC2...................NJM1496M
IC3,6.................μPC596C
IC5...................NJM4556M
IC9...................μA733HC

Tr2,10,11,21,25,26,28,101
102,103,104,105,106,107
108,109........2SC1623-L6,7
Tr4,7,8,9,14,15,16,19,20,114
115............2SC2223-F14
Tr3,12,13,22,23,117...2SK94-X4
Tr1,5,17.........NTM3904-B25
Tr6,18...........NTM3906-Y25
Tr110,111,112.....2SA1226-E4
Tr27,29...........2SA1213-O
Tr113.............2SK372-BL
Tr24,116..........2SA812-M6,7

LAST No.	
IC 9	SW2
Tr117	TP15
D106	VR111
R164	DL4
L 7	X'tal 1
C136	

LOST No.
Tr30∼100
D3,6,10,13∼100
R135
VR7∼100
C15,18,29,34,63 68,76∼100

DTL (PAL-B)
Schematic Diagram
C21-219785

SECTION 6.7 ENC MOUDLE (PAL-B)

The ENC module produces the PAL signal from R, G and B video.

The R, G and B video signals enter the analog switch IC1. The BAR signals are applied to one side of the analog switch IC1 which switches between the VIDEO or BAR signals. The outputs from IC1 are converted to the Y, U and V signals by the matrix module IC2.

The Y signal is mixed with SYNC signal and SYSTEM BL (SETUP) signal by the inverting amplifier of Tr7 and Tr8. The Y signal passes through delay line DL1 and its level is increased by the inverting amplifier Tr9 and Tr10.
DL1 matches the Y signal and the chroma signal in phase. The inverting amplifier Tr9 and Tr10 mixes the chroma signal with the Y signal. It applies the PAL signal from the camera to the outside. The output signal is clamped at blanking level (0 VDC).

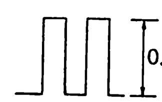
The U and V signals pass through low-pass filters FIL-1 and FIL-3 based on PAL standards and are clamped at 3 VDC by Tr15, IC4-a, and Tr22, IC6-a.
The U and V signals are modulated with a 4.4 MHz subcarrier by IC5 and IC7. A burst flag signal is mixed in the modulator.
The U and V signals modulated with subcarrier are mixed with the chroma signal at Tr16. Higher harmonic components are rejected from the chroma signal by a chroma filter, then the signal is amplified by the inverting amplifier Tr17 and Tr18 and mixed with the Y signal at the output of amplifier.

IC9 produces the BAR signals from SYS BL, H.BL and CAM VD signals.

[Adjustment]

Set the CAM/BAR switch to "BAR".

(1) R, G, B BAR
Monitoring levels at TP1 to TP3 of the ENC module on the oscilloscope, adjust to 0.525V with the R, G and B BAR controls VR17 to VR19.

R	TP1	VR17	 0.525Vp-p
G	TP2	VR18	
B	TP3	VR19	

(2) Black and White Balance

① Monitor the ENC signal on the waveform monitor.

② Alternately adjust the U and V BLK BAL controls VR7 and VR12 for minimum subcarrier.

③ Turn on TIE switches LB-1 and LB-2. Alternately adjust U and V WHT BAL controls VR5 and VR10 for minimum subcarrier.

④ Turn off the TIE switches if necessary to readjust the R and B BAR levels when there is a leakage at the level of WHT BAR signal

(3) Orthogonal confirmation of U and V

① Monitor the output signal of the ENC module on a vector scope.

② Turn off the V switch LB-7. (U signal on)

③ Adjust the phase of the vector scope to align the U axis.

④ Turn on the V switch LB-7, and turn off the U switch LB-5. (V signal on)

⑤ Align the phase of the V axis with the 90-degree phase control VC1.

(4) U GAIN

① Monitor the output signal of the ENC module on a vectorscope.

② Turn off the U switch LB-5.

③ Obtain the specified level with GAIN control on a vectorscope.

④ Turn on the U switch LB5, and turn off the V switch LB-7.(U signal on)

⑤ Adjust the U level by U GAIN control VR6.

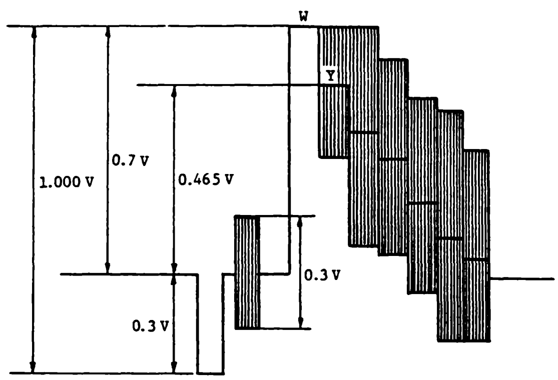
(5) Y-GAIN, SETUP, WHITE BAR

① Monitor the output signal of the ENC module on the waveform monitor.

② Adjust the SETUP level to min with the SETUP control VR1.

③ Adjust the ENC LEVEL control VR4 until the YELLOW BAR signal reaches 0.465 Vp-p (76.9%).

④ Adjust the 100% WHITE BAR LEVEL signal to 0.700V (100%) with VR20.



(6) SYNC, BURST

① Monitor the output signal of the ENC module on the waveform monitor.

② Adjust levels of the SYNC, BURST signals to 0.3 Vp-p with SYNC LEVEL control VR2, BURST LEVEL VR9.

(7) BURST Phase

① Monitor the output signal of the ENC module on a vector scope.

② Adjust the vectorscope phase to align the 12 vector color dots in their respective boxes.

③ Adjust the phase of the BURST signal to the 180° axis with the BURST PHASE control VR11.

ENC-Y MODULE(PAL-B)

Integrated Circuits

IC 1	uPD4053BG	NEC
IC 2	ST-203513	IKE
IC 3	TL-062CPS	TEX
IC 9	ST-202852A	IKE
IC 10	TL-062CPS	TEX

Transistors

TR 1	2SA812-M6,7	NEC
TR 2	2SA812-M6,7	NEC
TR 3	2SA812-M6,7	NEC
TR 4	2SA812-M6,7	NEC
TR 5	2SA812-M6,7	NEC
TR 6	2SA812-M6,7	NEC
TR 7	2SC1623-L6,7	NEC
TR 8	2SC1623-L6,7	NEC
TR 9	2SC1623-L6,7	NEC
TR 10	2SC1623-L6,7	NEC
TR 11	2SK94-X4	NEC
TR 12	2SA1213-O	TOS
TR 25	2SA812-M6,7	NEC
TR 26	2SC1623-L6,7	NEC

Diodes

D 1	RD2R4MB	NEC
D 2	RD5R6MB	NEC
D 3	1SS123-A7	NEC

Resistors

R 1	RMC1/10 10Kohm F	KMY
R 2	RMC1/10 100ohm F	KMY
R 3	RMC1/10 100ohm F	KMY
R 4	RMC1/10 100ohm F	KMY
R 5	RMC1/10 5100ohm F	KMY
R 6	RMC1/10 5100ohm F	KMY
R 7	RMC1/10 5100ohm F	KMY
R 8	RMC1/10 100ohm F	KMY
R 9	RMC1/10 100ohm F	KMY
R 10	RMC1/10 100ohm F	KMY
R 11	RMC1/10 1500ohm F	KMY
R 12	RMC1/10 820ohm F	KMY
R 13	RMC1/10 1500ohm F	KMY
R 14	RMC1/10 3000ohm F	KMY
R 15	RMC1/10 20Kohm F	KMY
R 16	RMC1/10 1200ohm F	KMY
R 17	RMC1/10 3900ohm F	KMY
R 18	RMC1/10 1800ohm F	KMY
R 19	RMC1/10 300ohm F	KMY
R 20	RMC1/10 2400ohm F	KMY
R 21	RMC1/10 300ohm F	KMY
R 22	*	
R 23	RMC1/10 620ohm F	KMY
R 24	RMC1/10 300ohm F	KMY
R 25	RMC1/10 100ohm F	KMY
R 26	RMC1/10 300ohm F	KMY
R 27	RMC1/10 1000ohm F	KMY
R 28	RMC1/10 1600ohm F	KMY
R 29	RMC1/10 2000ohm F	KMY
R 30	RMC1/10 510ohm F	KMY
R 31	RMC1/10 150ohm F	KMY
R 32	RE35YQ 300ohm F	SSM
R 33	RE35YQ 75ohm F	SSM
R 34	RMC1/10 100ohm F	KMY
R 35	RMC1/10 510ohm F	KMY
R 36	RMC1/10 62Kohm F	KMY
R 37	RNS1/8-C 1R5ohm F	KOA
R 38	RMC1/10 1000ohm F	KMY
R 39	RMC1/10 39Kohm F	KMY
R 40	RMC1/10 20Kohm F	KMY
R 41	RMC1/10 11Kohm F	KMY
R 42	RMC1/10 12Kohm F	KMY
R 43	RMC1/10 10Kohm F	KMY
R 44	RMC1/10 10Kohm F	KMY
R 45	RMC1/10 3000ohm F	KMY
R 46	RMC1/10 1000ohm F	KMY
R 47	RMC1/10 100ohm F	KMY
R 48	RMC1/10 100ohm F	KMY
R 49	RMC1/10 100ohm F	KMY
R 50	RNS1/8-C 1R5ohm F	KOA
R 51	RMC1/10 13Kohm F	KMY
R 52	RMC1/10 20Kohm F	KMY
R134	RMC1/10 10Kohm F	KMY
R135	RMC1/10 100Kohm F	KMY
R136	RMC1/10 100Kohm F	KMY
R137	RMC1/10 100Kohm F	KMY
R138	RMC1/10 51Kohm F	KMY
R139	RMC1/10 100Kohm F	KMY
R140	RMC1/10 100Kohm F	KMY
R141	RMC1/10 10Kohm F	KMY
R142	RMC1/10 20Kohm F	KMY
R144	RMC1/10 68ohm F	KMY
R148	RMC1/10 15Kohm F	KMY
R149	RMC1/10 9100ohm F	KMY
R150	RMC1/10 9100ohm F	KMY
R151	RMC1/10 9100ohm F	KMY
R152	RMC1/10 560ohm F	KMY
R153	RMC1/10 560ohm F	KMY

Resistors

R154	RMC1/10 560ohm F	KMY
R155	RMC1/10 11Kohm F	KMY
R156	RMC1/10 5600ohm F	KMY
R157	RMC1/10 22Kohm F	KMY
R158	RMC1/10 10Kohm F	KMY
R159	RMC1/10 5100ohm F	KMY
R160	RMC1/10 1000ohm F	KMY
R161	RMC1/10 6800ohm F	KMY
R165	RMC1/10 10Kohm F	KMY

Variable Resistors

VR 1	RJ-4W 5000ohm	CPL
VR 2	RJ-4WS 2000ohm	CPL
VR 3	RJ-4WS 500ohm	CPL
VR 4	RJ-4WS 500ohm	CPL
VR 16	RJ-4WS 2000ohm	CPL
VR 17	RJ-4WS 500ohm	CPL
VR 18	RJ-4WS 500ohm	CPL
VR 19	RJ-4WS 500ohm	CPL
VR 20	RJ-4WS 2000ohm	CPL

Capacitors

C 1	CM21W5R223M25VDC	KYC
C 2	UMA0J101MCA	NCI
C 3	*	
C 4	UMA1C470MCA	NCI
C 5	UMA1C470MCA	NCI
C 6	UMA0J101MCA	NCI
C 7	CM21CH180J25VDC	KYC
C 8	UMA0J101MCA	NCI
C 9	UMA0J101MCA	NCI
C 10	268L1602 335M	NCC
C 11	268L1602 105M	NCC
C 12	268L2002 225M	NCC
C 13	268L2002 225M	NCC
C 14	UMA0J220MCA	NCI
C 15	UMA0J101MCA	NCI
C 16	UMA0J101MCA	NCI
C 17	CM21CH390J25VDC	KYC
C 49	268L1002 155M	NCC
C 50	268L1002 155M	NCC
C 51	268L1002 155M	NCC
C 52	UMA1C470MCA	NCI
C 56	CM21CH151J25VDC	KYC
C 57	UMA0J101MCA	NCI
C 58	UMA0J101MCA	NCI
C 59	CM21CH151J25VDC	KYC
C 60	CM21CH330J25VDC	KYC
C 61	CM21CH330J25VDC	KYC
C 62	CM21CH560J25VDC	KYC
C 63	UMA0J220MCA	NCI
C 64	UMA1C470MCA	NCI

Inductance Coiles

L 1	ST-202246A	IKE
L 4	ST-202246A	IKE
L 5	ST-202246A	IKE

Connectors

CN 1	MLF-2B31P-J1	NBA
CN 2	14120-01-445	ELC
CN 3	14120-01-445	ELC

Delay Line

DL 1	ST-203512(Y,U,Vset)	IKE

Test Poles

TP 1	ST-4-1	MAC
TP 2	ST-4-1	MAC
TP 3	ST-4-1	MAC
TP 5	ST-4-1	MAC

EL BIT

LB 1	PS-3PF-S4T1-PKL1	JAE
LB 2	PS-3PF-S4T1-PKL1	JAE
LB 3	PS-3PF-S4T1-PKL1	JAE
LB 4	PS-3PF-S4T1-PKL1	JAE

Short Sockets

SS 1	PS-2SH4-1	JAE
SS 2	PS-2SH4-1	JAE

Short Sockets

SS 3	PS-2SH4-1	JAE
SS 4	PS-2SH4-1	JAE

ENC-UV MODULE(PAL-B)

Integrated Circuits

IC 4	uPC4558G2	NEC
IC 5	NJM1496M	JRC
IC 6	uPC4558G2	NEC
IC 7	NJM1496M	JRC
IC 8	NJM1496M	JRC

Transistors

TR 13	2SC1623-L6,7	NEC
TR 14	2SC1623-L6,7	NEC
TR 15	2SK94-X4	NEC
TR 16	2SC1623-L6,7	NEC
TR 17	2SC1623-L6,7	NEC
TR 18	2SC1623-L6,7	NEC
TR 19	2SA1213-O	TOS
TR 20	2SC1623-L6,7	NEC
TR 21	2SC1623-L6,7	NEC
TR 22	2SK94-X4	NEC
TR 23	2SC1623-L6,7	NEC
TR 24	2SA812-M6,7	NEC

Diodes

D 4	1SS123-A7	NEC

Resistors

R 53	RMC1/10 820ohm F	KMY
R 54	RMC1/10 2000ohm F	KMY
R 55	RMC1/10 1000ohm F	KMY
R 56	RMC1/10 1500ohm F	KMY
R 57	RMC1/10 3300ohm F	KMY
R 58	RMC1/10 100ohm F	KMY
R 59	RMC1/10 100ohm F	KMY
R 60	RMC1/10 2000ohm F	KMY
R 61	RMC1/10 300ohm F	KMY
R 62	RMC1/10 39Kohm F	KMY
R 63	RMC1/10 5100ohm F	KMY
R 64	RMC1/10 18Kohm F	KMY
R 65	RMC1/10 560ohm F	KMY
R 66	RMC1/10 10Kohm F	KMY
R 67	RMC1/10 100ohm F	KMY
R 68	RMC1/10 390ohm F	KMY
R 69	RMC1/10 1800ohm F	KMY
R 70	RMC1/10 750ohm F	KMY
R 71	RMC1/10 100Kohm F	KMY
R 72	RMC1/10 100ohm F	KMY
R 73	RMC1/10 200ohm F	KMY
R 74	RMC1/10 2700ohm F	KMY
R 75	RMC1/10 3900ohm F	KMY
R 76	RMC1/10 1000ohm F	KMY
R 77	RMC1/10 3000ohm F	KMY
R 78	RMC1/10 620ohm F	KMY
R 79	RMC1/10 620ohm F	KMY
R 80	RMC1/10 1800ohm F	KMY
R 81	RMC1/10 1500ohm F	KMY
R 82	RMC1/10 1600ohm F	KMY
R 83	RMC1/10 2000ohm F	KMY
R 84	RMC1/10 150ohm F	KMY
R 85	RMC1/10 100ohm F	KMY
R 86	RMC1/10 11Kohm F	KMY
R 87	RMC1/10 12Kohm F	KMY
R 88	RMC1/10 10Kohm F	KMY
R 89	RMC1/10 10Kohm F	KMY
R 90	RMC1/10 5100ohm F	KMY
R 91	RMC1/10 1000ohm F	KMY
R 92	RMC1/10 1300ohm F	KMY
R 93	RMC1/10 2000ohm F	KMY
R 94	RMC1/10 1000ohm F	KMY
R 95	RMC1/10 2000ohm F	KMY
R 96	RMC1/10 3300ohm F	KMY
R 97	RMC1/10 100ohm F	KMY
R 98	RMC1/10 100ohm F	KMY
R 99	RMC1/10 1300ohm F	KMY
R100	RMC1/10 300ohm F	KMY
R101	RMC1/10 39Kohm F	KMY
R102	RMC1/10 5100ohm F	KMY
R103	RMC1/10 18Kohm F	KMY
R104	RMC1/10 560ohm F	KMY
R105	RMC1/10 10Kohm F	KMY
R106	RMC1/10 100ohm F	KMY
R107	RMC1/10 470ohm F	KMY
R108	RMC1/10 1800ohm F	KMY
R109	RMC1/10 100Kohm F	KMY
R110	RMC1/10 200ohm F	KMY
R111	RMC1/10 100ohm F	KMY
R112	RMC1/10 620ohm F	KMY
R113	RMC1/10 2700ohm F	KMY
R114	RMC1/10 3900ohm F	KMY
R115	RMC1/10 3900ohm F	KMY
R116	RMC1/10 510ohm F	KMY
R117	RMC1/10 2700ohm F	KMY
R118	RMC1/10 3900ohm F	KMY
R119	RMC1/10 3000ohm F	KMY
R120	RMC1/10 100ohm F	KMY
R121	RMC1/10 330ohm F	KMY
R122	RMC1/10 100ohm F	KMY
R123	RMC1/10 1000ohm F	KMY
R124	RMC1/10 1000ohm F	KMY
R125	RMC1/10 220Kohm F	KMY
R126	RMC1/10 1000ohm F	KMY

Resistors

R127	RMC1/10 1000ohm F	KMY
R128	RMC1/10 470ohm F	KMY
R129	RMC1/10 1800ohm F	KMY
R130	RMC1/10 10ohm F	KMY
R131	RMC1/10 2000ohm F	KMY
R132	RMC1/10 6200ohm F	KMY
R133	RMC1/10 3000ohm F	KMY
R162	RMC1/10 510ohm F	KMY
R163	RMC1/10 510ohm F	KMY
R164	RMC1/10 100ohm F	KMY

Variable Resistors

VR 5	RJ-4WS 500ohm	CPL
VR 6	RJ-4W 500ohm	CPL
VR 7	RJ-4WS 10Kohm	CPL
VR 8	RJ-4W 50Kohm	CPL
VR 9	RJ-4W 2000ohm	CPL
VR 10	RJ-4WS 500ohm	CPL
VR 11	RJ-4W 1000ohm	CPL
VR 12	RJ-4WS 10Kohm	CPL
VR 13	RJ-4W 50Kohm	CPL
VR 14	RJ-4W 50Kohm	CPL
VR 15	RJ-4W 20Kohm	CPL
VR 10	RJ-4W 10Kohm	CPL
VR 11	RJ-4W 39Kohm	CPL

Capacitors

C 18	UMA1C470MCA	NCI
C 19	CM21W5R223M25VDC	KYC
C 20	UMA1A330MCA	NCI
C 21	UMA1C100MCA	NCI
C 22	CM21W5R223M25VDC	KYC
C 23	CM21W5R223M25VDC	KYC
C 24	CM32W5R104M25VDC	KYC
C 25	CM32W5R104M25VDC	KYC
C 26	CM21CH331J25VDC	KYC
C 27	CM21W5R223M25VDC	KYC
C 28	268L6301-476M	NCC
C 29	UMA0J220MCA	NCI
C 30	UMA1C470MCA	NCI
C 31	CM21W5R223M25VDC	KYC
C 32	UMA1A330MCA	NCI
C 33	UMA1C100MCA	NCI
C 34	CM21W5R223M25VDC	KYC
C 35	CM21W5R223M25VDC	KYC
C 36	CM32W5R104M25VDC	KYC
C 37	CM32W5R104M25VDC	KYC
C 38	CM21CH3R3C25VDC	KYC
C 39	UMA0J470MCA	NCI
C 40	UMA0J470MCA	NCI
C 41	CM32W5R104M25VDC	KYC
C 42	CM21W5R223M25VDC	KYC
C 43	CM32W5R104M25VDC	KYC
C 44	CM21CH680J25VDC	KYC
C 45	CM32W5R104M25VDC	KYC
C 46	CM21CH270J25VDC	KYC
C 47	UMA0J220MCA	NCI
C 48	UMA0J101MCA	NCI
C 65	*CM21CH560J25VDC	KYC
C 66	*	
C 67	FD35AX1H473M	TDK
C 68	FD35AX1H473M	TDK

Variable Capacitor

VC 1	DTM05A300	MUR

Inductance Coiles

L 2	TP0206-120K	TDK
L 3	ST-203514	IKE

Connectors

CN 4	14120-04-451	ELC
CN 5	14120-04-451	ELC

Filters

FIL 1	ST-203512(Y,U,Vset)	IKE
FIL 2	ST-203515	IKE
FIL 3	ST-203512(Y,U,Vset)	IKE

Thermisters

TH 1	D-2B(R)	HIT
TH 2	D-2B(R)	HIT

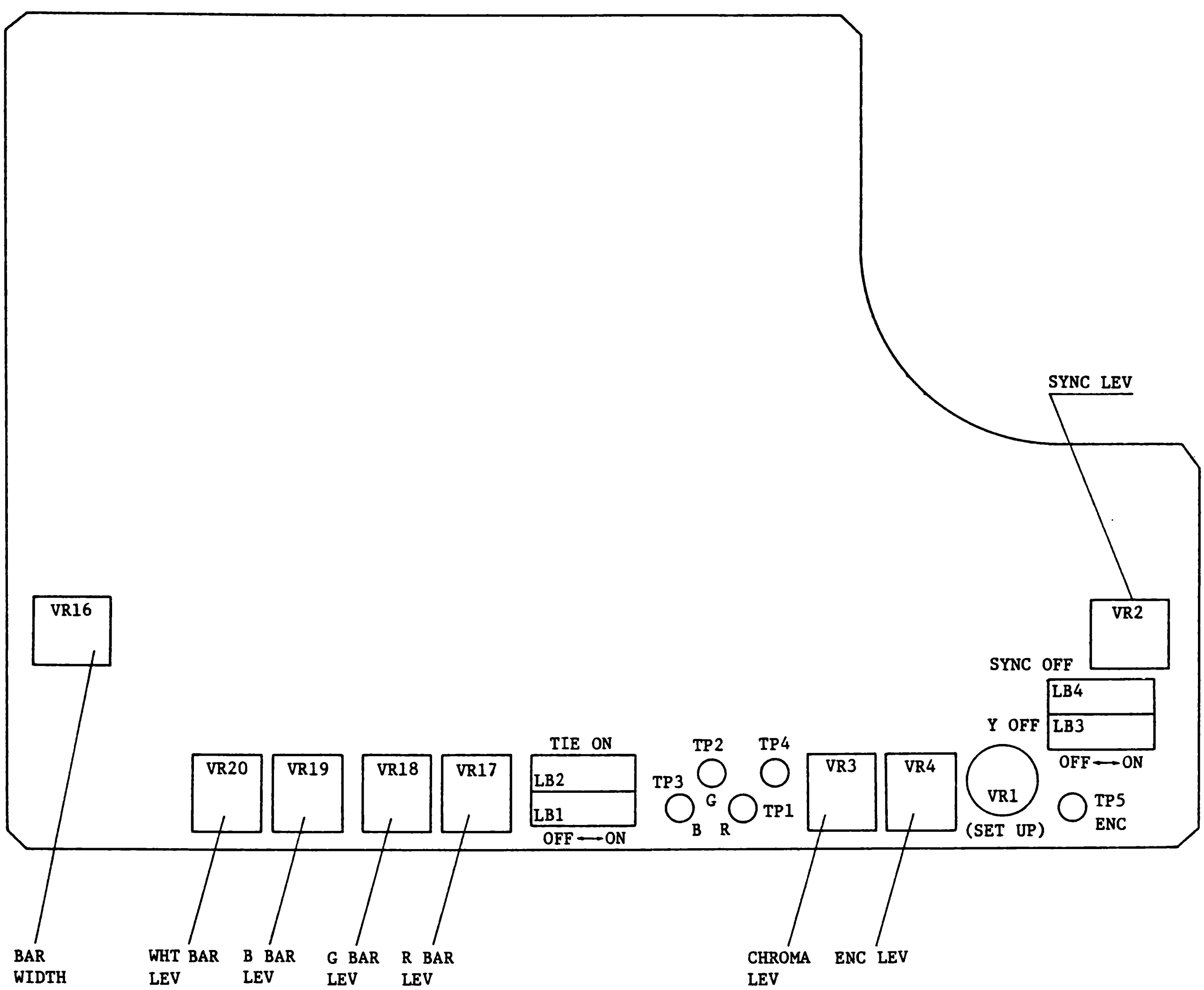
EL BIT

LB 5	PS-3PF-S4T1-PKL1	JAE
LB 6	PS-3PF-S4T1-PKL1	JAE
LB 7	PS-3PF-S4T1-PKL1	JAE

Short Sockets

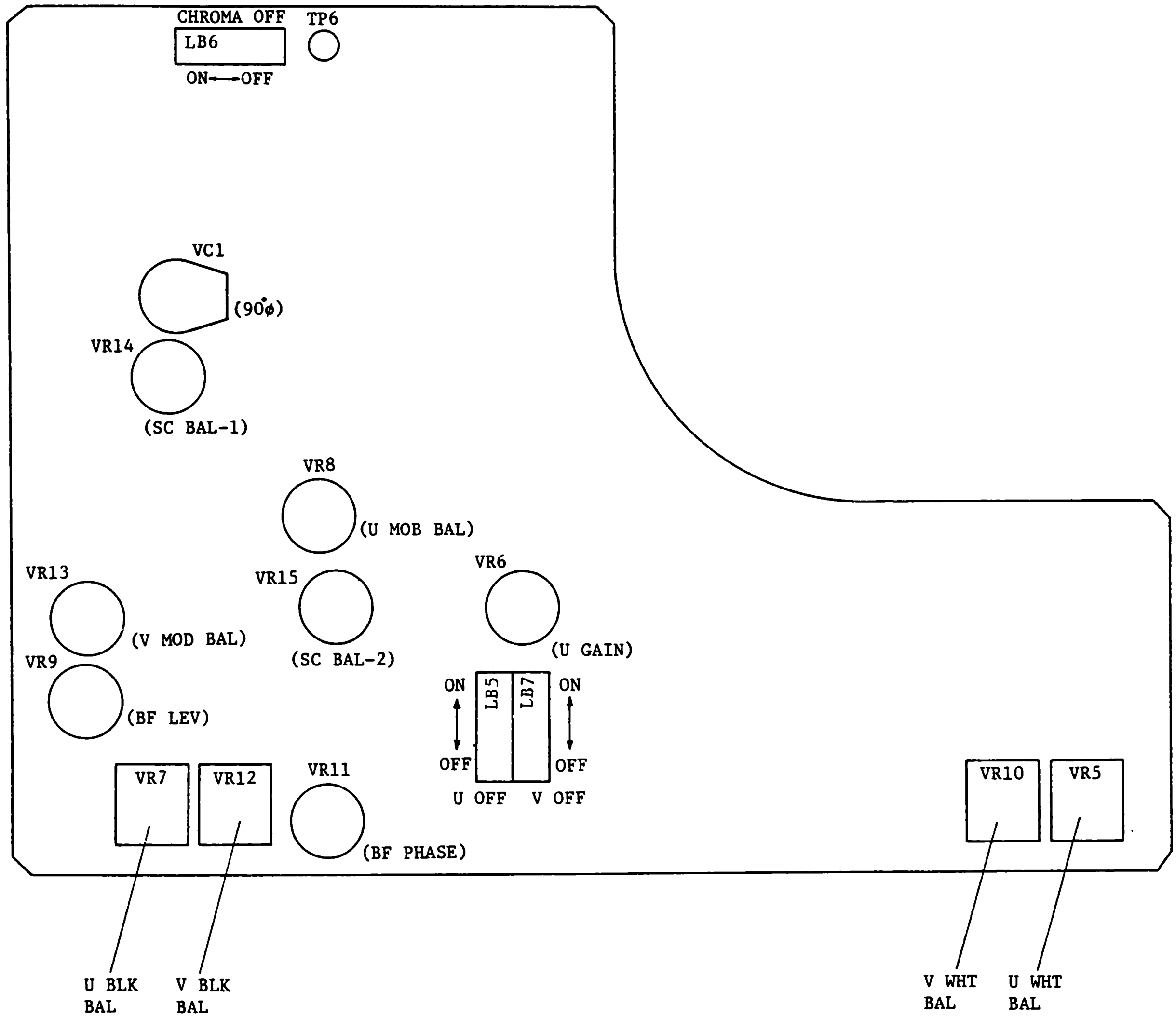
SS 5	PS-2SH4-1	JAE
SS 6	PS-2SH4-1	JAE
SS 7	PS-2SH4-1	JAE

Fig. 6-7-a



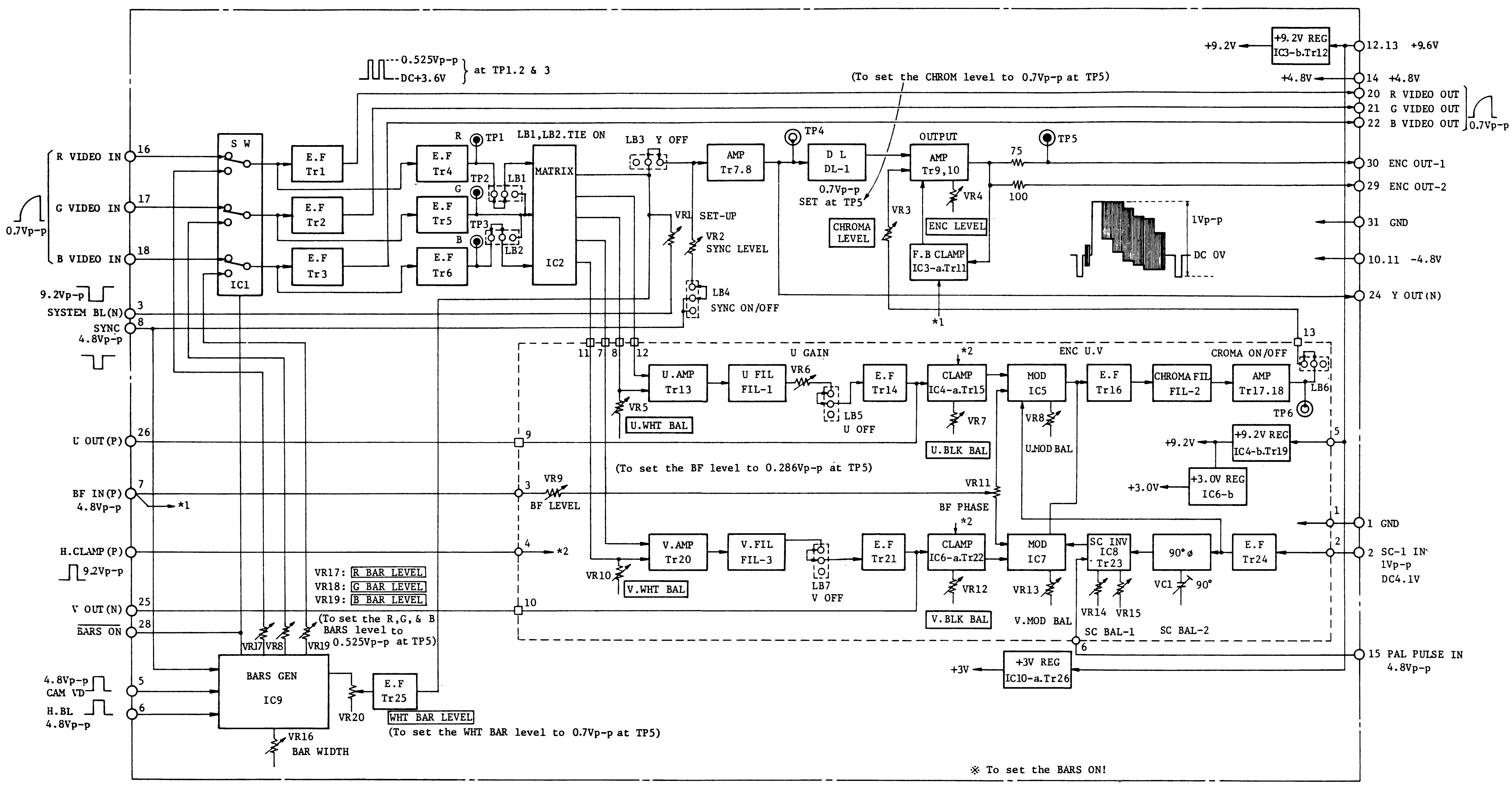
P.ENC-Y

ENC(PAL-B)
Controls


CHROMA OFF
LB6
ON OFF
TP6
VC1
(90°)
VR14
(SC BAL-1)
VR8
(U MOB BAL)
VR13
(V MOD BAL)
VR15
(SC BAL-2)
VR6
(U GAIN)
VR9
(BF LEV)
ON
OFF
LB5
LB7
ON
OFF
U OFF
V OFF
VR7
VR12
VR11
(BF PHASE)
VR10
VR5
U BLK BAL
V BLK BAL
V WHT BAL
U WHT BAL

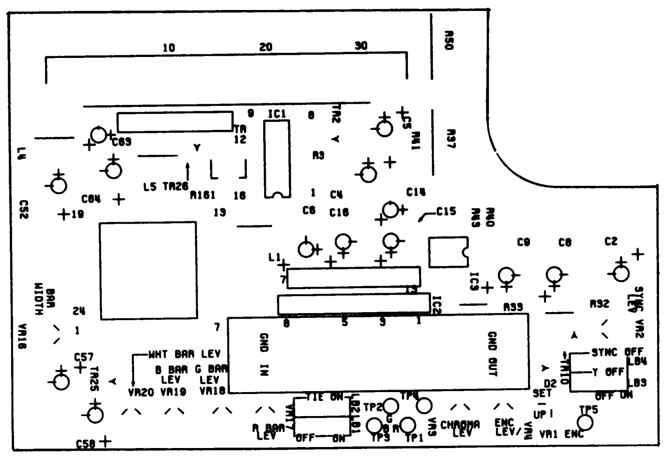
P.ENC-UV

Fig. 6-7-b

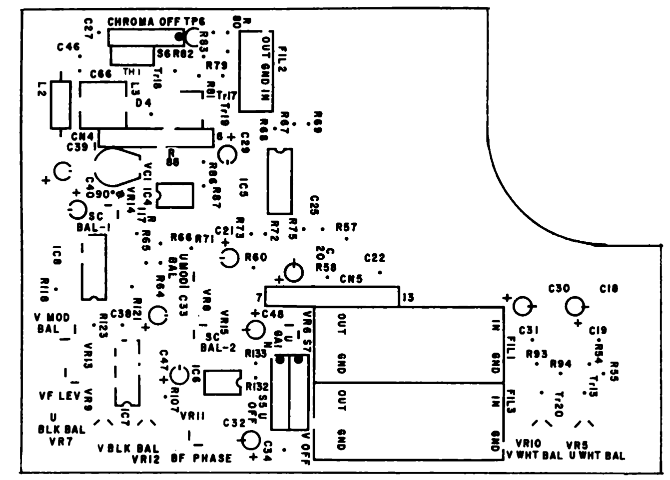


ENC(PAL-B)
Block Diagram

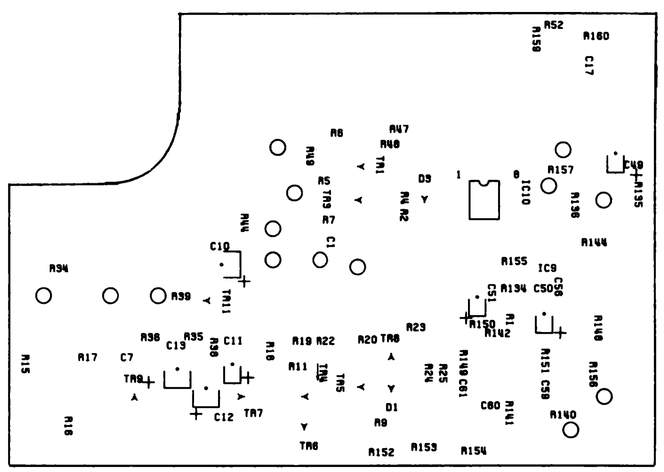
Fig. 6-7-c



A SIDE

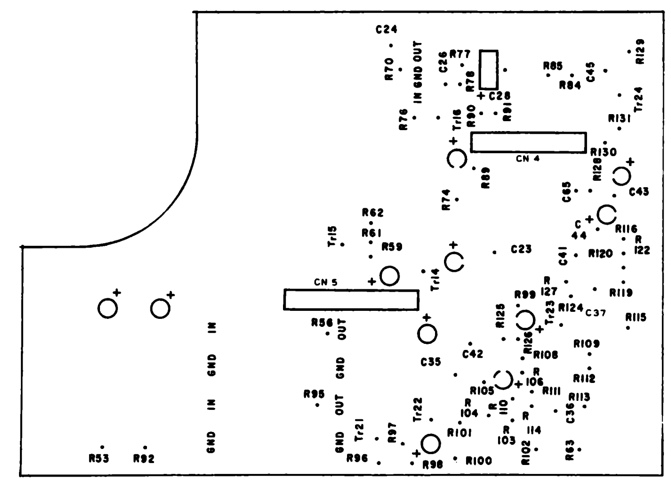


A SIDE



B SIDE

P.ENC-Y



B SIDE

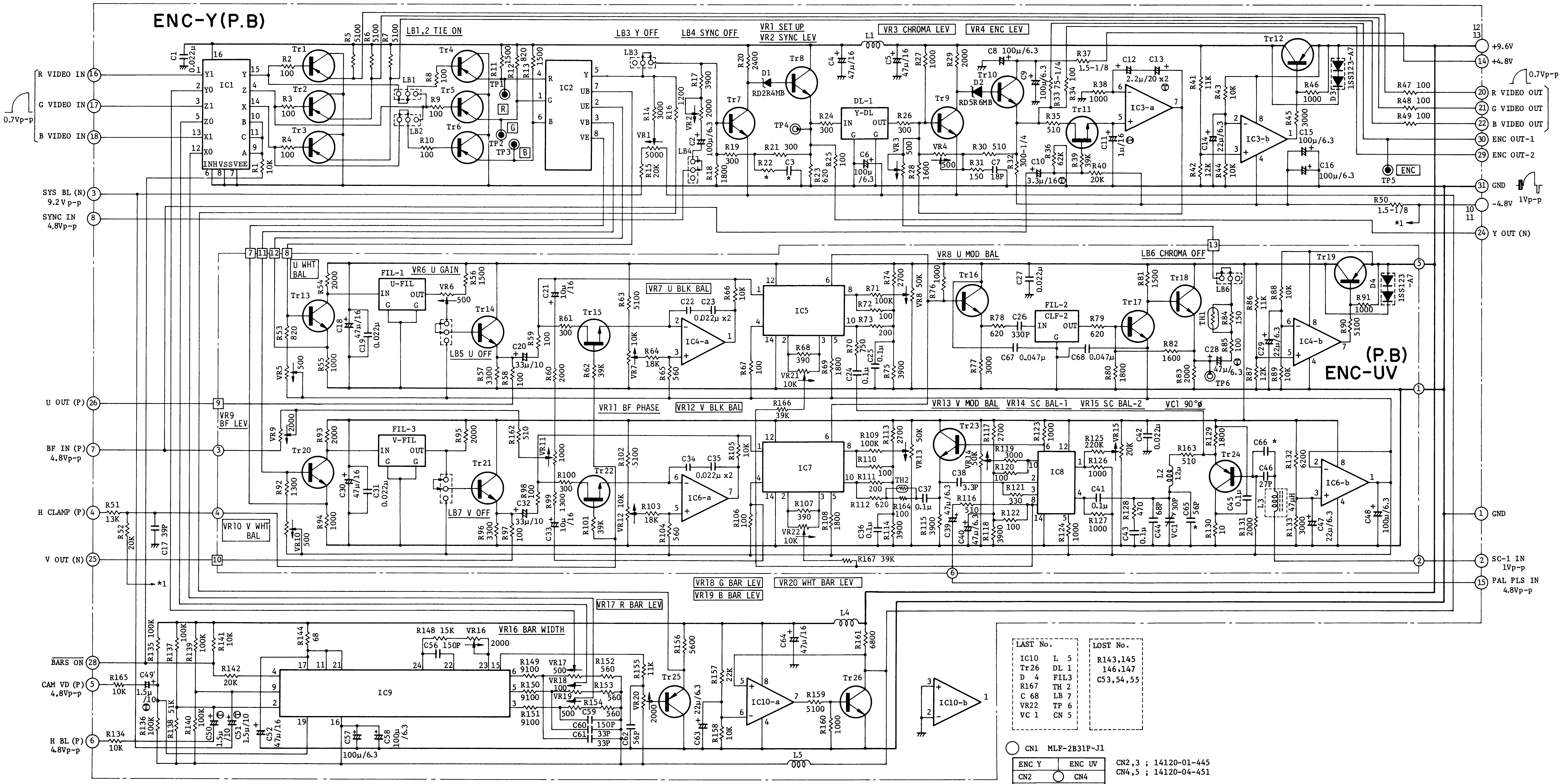
P.ENC-UV

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is ataached on the B side of the module.

ENC(PAL-B)
Parts Layout

Fig. 6-7-d



IC1 ; μPD4053BG
IC2 ; ST-203513
IC3,10 ; TL-062CPS
IC4,6 ; μPC4558BG2
IC5,7,8 ; NJM1496M
IC9 ; ST-202852A
Tr1,2,3,4,5,6,24,25 ; 2SA812-M6,7
Tr7,8,9,10,13,14,16,17 18,20,21,23,26 ; 2SC1623-L6,7
Tr12,19 ; 2SA1213-O
Tr11,15,22 ; 2SK94-X4
DL1,FIL1,FIL3 ; ST-203512
FIL2 ; ST-203515
L1,4,5 ; ST-202246A
L2 ; TP0206-120K
L3 ; ST-203514
VC1 ; DTM05A300
TH1,2 ; D-2B (R)

LAST No.	
IC10	L 5
Tr26	DL 1
D 4	FIL3
R167	TH 2
C 68	LB 7
VR22	TP 6
VC 1	CN 5

LOST No.
R143,145
146,147
C53,54,55

○ CN1 MLF-2B31P-J1

ENC Y		ENC UV
CN2	○	CN4
CN3	□	CN5

CN2,3 ; 14120-01-445
CN4,5 ; 14120-04-451

ENC (PAL-B)
Schematic Diagram
C21-218636

SECTION 6.8 PULSE (P.B.8) MODULE -1/2

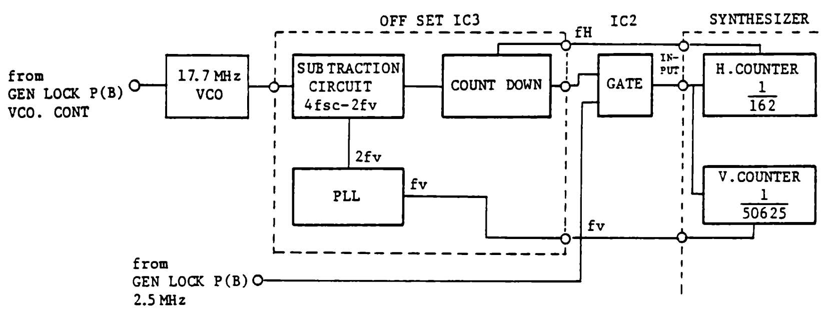
The PULSE module generates pulses used in the camera

The original frequency is 17.734475 MHz, which is generated by a quartz crystal oscillator. The 17.734475 MHz frequency is counted down ÷ 4 at IC1-a/IC1-b to prepare a subcarrier of 4.43361875 MHz and is shaped to a sine wave at TRP-1.

The subcarrier (fsc) and horizontal frequency (fh) have to satisfy the following equation (1).

$$fh = \frac{4 \cdot fsc - 2fv}{1135} \quad \cdots\cdots\cdots (1)$$

In the internal operation, the subcarrier and horizontal frequency are controlled by satisfying the equation (1) with OFF SET (IC3, 4) and SYNTHESIZER (IC11) since an external signal (VBS/BBS) in not available.



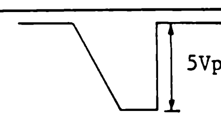
Adjustment

(1) CAL

① Turn on the CAL switch SW1 on this module.

② Monitor the waveform at TP6 on the oscilloscope.

③ Adjust its peak level to 5 Vp-p with the CAL LEV control VR105.

CAL	TP6	VR105	 5Vp-p

(2) EBU standard

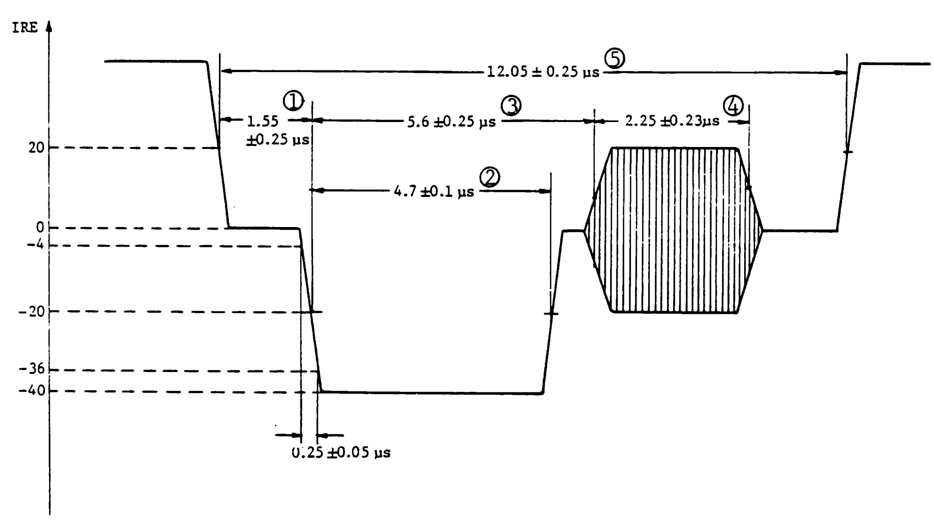
Monitor the ENC video (BNC connector on the camera) on the oscilloscope.
Televise a white area. Adjust the lens iris until a level of about 40% can be obtained.

① Front Porch
Adjust the SYNC PHASE control VR102 until there is 1.55μs ±0.25μs between VIDEO at +20 IRE and the -20 IRE point of SYNC.

② SYNC Width
Adjust the SYNC WIDTH control VR103 for 4.7μs ±0.1μs between the -20 IRE point of SYNC.

③ Breez Way
Adjust the BF PHASE control VR11 for 5.6μs ±0.1μs from the -20IRE point of SYNC to first zero cross point of the burst signal.

④ BF WIDTH
Adjust the BF WIDTH control VR12 for 2.25 ±0.23μs.



⑤ H. Blanking
Adjust the H. BL WIDTH control VR10 for 12.05μs ±0.25μs at a blanking of +20IRE.

(3) SC LEVEL

Adjust the SC level to 1.0Vp-p at TP1 with SC LEVEL control VR2.

(4) 25Hz OFF SET

This is a factory adjustment.
(VR3, 4, 5, 6, 7, 8)

(5) SCH PHASE

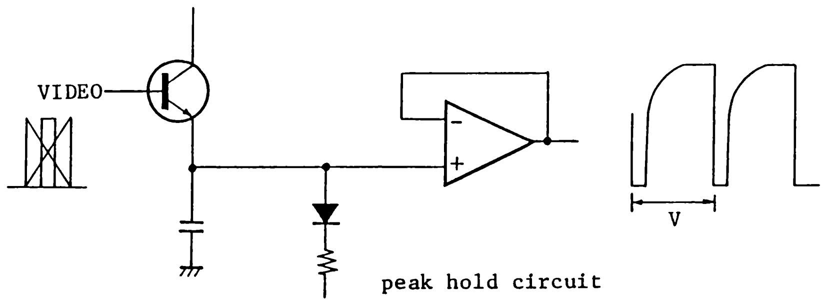
This is a factory adjustment.
(VR9)

PULSE (P.B.8) MODULE - (2/2)

The PULSE module consists of an auto white balance circuit, an iris control circuit, a monitor selector circuit and a character generator.

AUTO WHITE

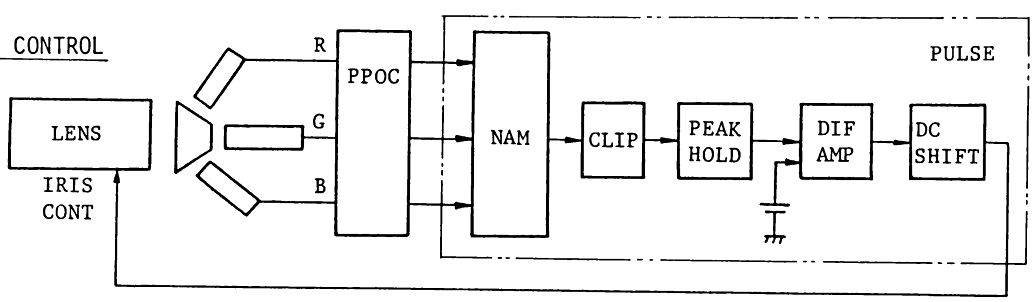
For auto white balance, peak values of the R, G and B video signals are detected by the peak hold circuit.



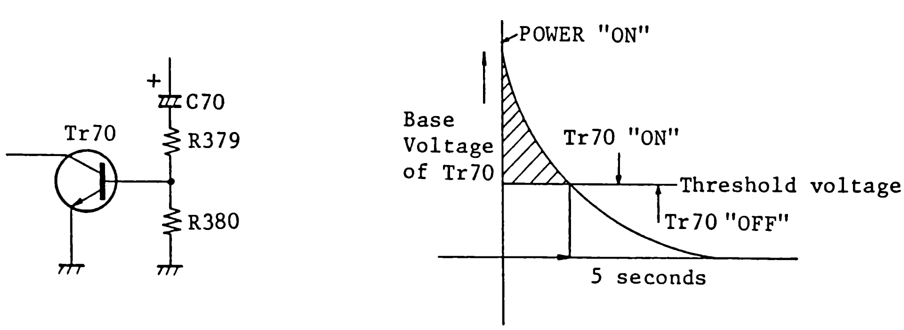
R, G and B signals held at peak enter the 10 BIT A/D CONVERTER IC34.

The signal converted to digital is operated by CPU (IC40) to control R/B gain. The CPU memory contains data on the auto white balance of two different scenes. A/B switch selection is possible. The CPU (IC40) is powered through connecter terminal CN1 (B1) to retain data for up to 48 hours.
Terminal voltage is normally +3.5 V.

IRIS CONTROL



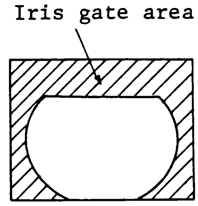
Iris waiting is provided to prevent the image tube from burning when power is first supplied (otherwise the iris would opens completely in auto iris mode for a time until the beam is present). The circuit consists of Tr40, Tr41 and Tr70.

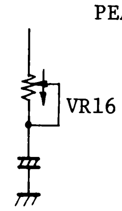


The base voltage of Tr70 varies as shown above when the POWER switch is turned on. Tr70 is on for about 5 seconds to keep the lens iris closed when the base voltage of Tr70 lowers and Tr70 switches off allowing the normal reference voltage via IC27 to open the iris.

Lens iris control has two modes; auto iris and manual iris. Auto iris mode controls the lens iris so that video level will be kept constant. Manual iris mode controls iris remotely.

Non additive mixture of R, G and B video and the AUTO IRIS amplifier (IC27) cut the signal at the top and edges of the picture to prevent iris closing in auto iris mode when highlights are in that area.





Iris detection of peak or APL may be predetermined by the PEAK/APL control (VR16).

The iris is closed during CAL on, Bars on, or STANDBY mode.

MONITOR SELECT

Two outputs of MON OUT and VF OUT are provided for monitor signal. In the normal operation, encoded output signal is applied from MON OUT and R + G + B signal is applied from VF OUT.

(The MON/ENC switch at the rear of the camera head shall be set to "ENC" in the normal operation.)

Monitor signal selection is made by the analog switch (IC24). When the monitor signal selection is necessary, open the cover at the rear of the camera head and set the MON VIDEO switch to "MON".

The flow of the MON OUT and VF OUT signals is as follows. When the MON VIDEO switch is set to "ENC", encoded signal is applied by the analog switch IC24.

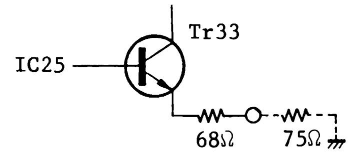
This signal is +6dB amplified through the grounded base amplifier Tr26 and Tr27. The output signal from Tr27 is mixed with the zebra signal and the bar signal by an amplifier Tr29 for VF Video signal.

The VF video signal goes to the output transistor Tr34 through the RET VIDEO selection switch (IC25).

Tr34 is an emitter-follower circuit to give the VF video signal a low impedance output.

The MON/OUT signal is switched to encoded signal by the analog switch IC25. Encoded video signal is applied from the MON OUT connector (BNC) when the MON/ENC switch at the rear of the camera head is set to "ENC".

The MON OUT signal is not supplied unless it is terminated.

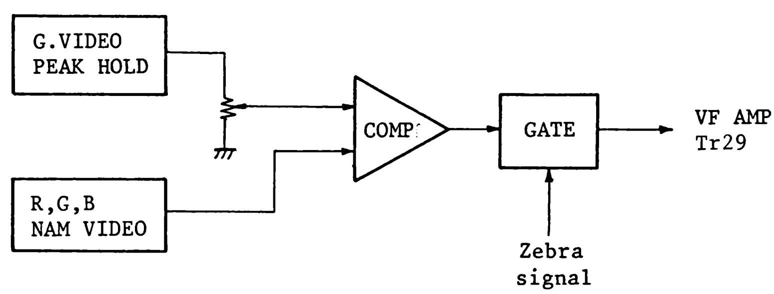


The VF circuit includes a LEVEL indicator as a warning to the cameraman when the signal exceeds 100% and a WHT IND circuit to comfirm proper execution of AWB function in the VF.

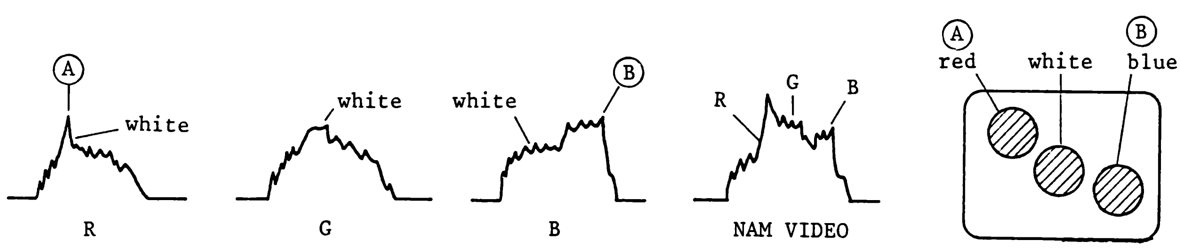
The LEVEL indicator (zebra) circuit uses signal of subcarrier ÷ 4 at IC28 for the zebra pattern.

The zebra pattern signal is gated by video exceeding 100% from the comparator IC29. The gated zebra pattern signal is mixed with the VF video signal by the amplifire of Tr29.

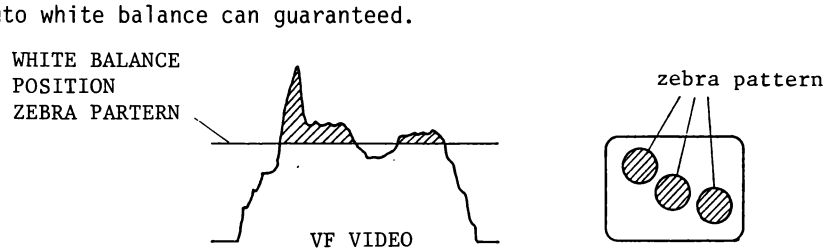
When the auto white balance function is operated, the white balance position indication, tells the operating area of the peak G video signal (auto white balance circuit matches the R & B video with the G) and use it, is as the deference in comparator IC29.



At the above operation if the NAM video signal is higher than G video, it is superimposed in that region on the viewfinder as a zebra pattern. Auto white balance operation matches the highest of the NAM video with G video level. Therefore, operation of the auto white balance tells the cameraman via the zebra pattern the area where it is being adjusted and if the zebra pattern appears in the area from the intended by the cameraman, another "whiter' object should be used. The white balance position indication automatically switches during operation of auto white and it can be operated even when the level indication is off.

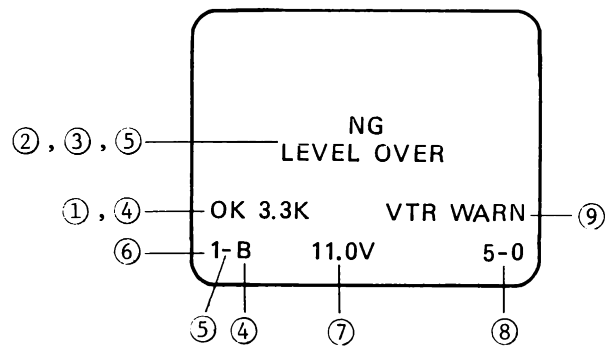


The centers of the video signal in the above diagram correspond to white areas. The circuit operates with the R channel at point A and the B channel at point B even if the cameraman thought the auto white balance secured in the white area. The AWB can be checked through the OK indicator lamp in the viewfinder, but white balance failuer will result using colored objects. If the operating region is checked in the viewfinder, the auto white balance can guaranteed.



Character Generator

The following characters can be displayed in the viewfinder through the TV DISPLAY CONTROLLER IC42.



① "OK 3.3K"

Obtained white balance with a scene color temperature of 3300°K.

② "NG LEVEL OVER"/"NG LEVEL UNDER"/"NG 5.9K"
Not obtained white balance

③ "AWB OFF"
The AWB switch is depressed while the switch is set to "OFF" position.

④ "3.4K"(AWB Ach 3.4K)/"B 5.4K"(AWB Bch 5.4K)
Displays the setting color temperature contained in the white balance memory for 3 seconds when the AWB switch position is changed. When the SW is only B-position, the "B" display will appear.

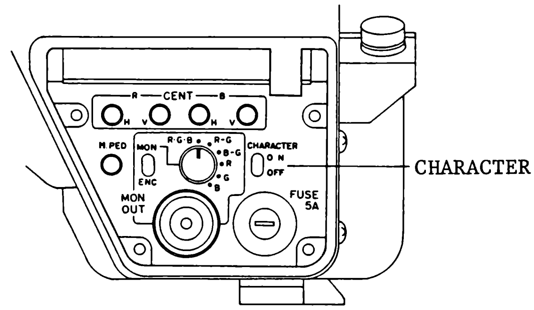
⑤ "MEMORY BREAK"
If the white balance memory becomes empty, AUTO WHITE comes back to PRESET status and this word blinks for thirty seconds after power is turned on. After thirty seconds passed, " ——— " mark is displayed on the next position of Filter position IND. of viewfinder screen and the mark disappears if automatic white balance is obtained. (A memory retained the correction data for 48 hours.)

⑥ Filter Position with ON/OFF Switch
"1" : 3000°K
"2" : 5600°K
"3" : 5600°K + 25% ND
"4" : CAP

⑦ Battery Warning
"11.0 V" : Lights up when the battery voltage drops down to 11.0 V.
"10.8 V" : Blinks when the battery voltage is below 10.8 V.

⑧ Tape Remaining Time
"5-0" : Blinks when the tape remaining time becomes less than five minutes.

⑨ "VTR WARN"
Indicates VTR malfunction.



* Character on/off switch for filter position is provided at the front of the camera head.

[Adjustment]

(1) Auto White Balance

Turn off the AUTO WHITE switch at the front of the camera head and check to make sure that R, B gain control outputs A15, B14 (CN1) are DC 0 V.

Touch up the R. GAIN OFFSET control or B GAIN OFFSET control if necessary.

Set the AUTO WHITE switch to A or B position.

① Frame the camera on a grey scale test chart.
Adjust for 100% (0.7 Vp-p) G ch video level.

② Adjust the R-GAIN-1 control (VR19) to match R ch Video level to G ch.

③ Adjust the B-GAIN-1 control (VR20) to match B ch Video level to G ch.

④ Adjust for 35% (0.25 Vp-p) G ch video level.

⑤ Adjust the R-GAIN-2 control (VR60) to match R ch Video level to G ch.

⑥ Adjust the B-GAIN-2 control (VR61) to match B ch Video level to G ch.

Note: The Auto White Balance SW should be on during the above adjustment.

(2) MODE SWITCH (LB1)

Turn off the MODE SWITCH (LB1) when special effect filter such as cross filters are utilized in the filter disks of 2.3.4.

Normally, the following filter disks are built into each position;

1 ······ 3000°K
2 ······ 5600°K
3 ······ 5600°K + 1/4ND
4 ······ CAP

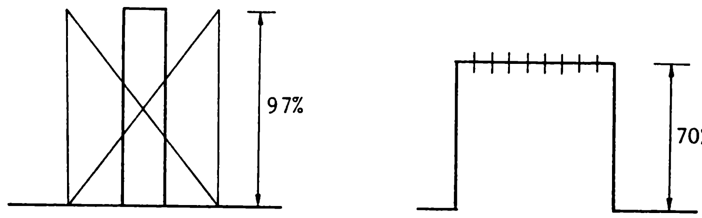
(3) BATTERY INDICATOR

Adjust VR21 so that the character of "10.8 V" is displayed in the Viewfinder when the camera input voltage at CN2 (B5) is 11.0 V.

(4) IRIS CONTROL (CUT, PEAK/APL)

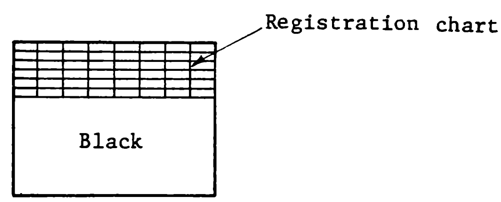
① Adjust the IRIS control (VR14) for 97% grey scale chart level in the AUTO IRIS mode.

② Adjust the PEAK/APL control (VR16) for 70% video level framing on a grey scale chart.



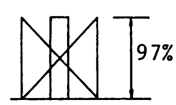
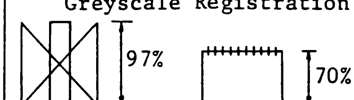
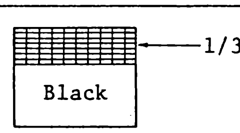
Greyscale chart Registration chart

③ Adjust the CUT control (VR15) so that Auto IRIS doesn't function when the camera is framed on the 1/3 of upper part of the picture by registration chart.



Screen

④ Repeat above steps ① ∿ ③.

IRIS	VR14		Repeat adjustments
PEAK/APL	VR16	Greyscale Registration chart 	
CUT	VR15		

* Set the OFFSET control (VR36) at the center position of potentiometer.

In case remote control equipment is used, set the iris control at the remote side to be center position and adjust the OFFSET control (VR36) so that F-position of lens IRIS will be F 5.6.

(5) MONITOR LEVEL

① Turn on the CAL switch.

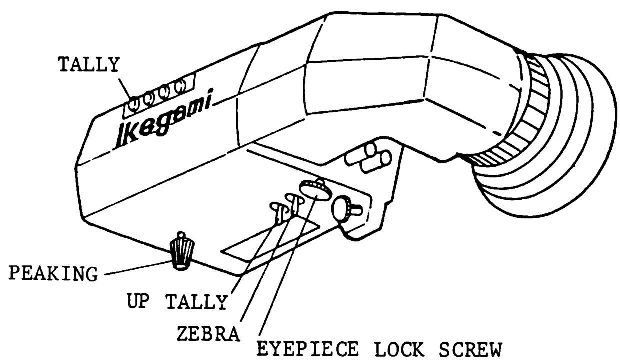
② Adjust the MON LEVEL control (VR13) to match the encoded video level to R + G + B video level.

* Level controls for RET VIDEO, R-G, B-G are not provided. So, Monitor output cannot be adjusted precisely. Allowance is ±2%.

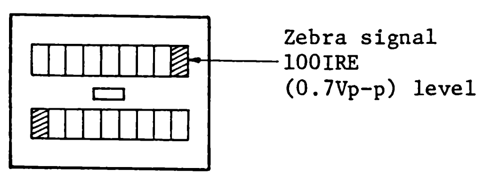
(6) LEVEL INDICATOR

① Frame the camera on a grey scale chart.
Adjust the lens iris for 100% video level.

② Turn on the ZEBRA switch on the viewfinder.



③ Adjust the LEVEL IND control (VR17) so that the zebra pattern is mixed with the video level that exceeds 100%.

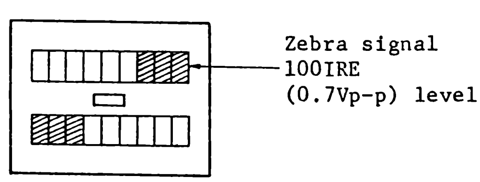


Scene in VF

(7) WHT IND

① Frame the camera on a grey scale chart.
Adjust the lens iris for 100% video level.

② Adjust the WHT IND control (VR18) so that zebra pattern is mixed with upper 3 chips of the grey scale after AWB OK indicator lights up.



Scene in VF

PULSE(P.B.8) MODULE

Integrated Circuits

IC 1	DN74LS76S	MAT
IC 2	TC40H000F	TOS
IC 3	NJM1496M	JRC
IC 4	NJM1496M	JRC
IC 5	TL-062CPS	TEX
IC 6	TL-062CPS	TEX
IC 7	uPD4001BG	NEC
IC 8	TC74HC04F	MAT
IC 9	TC40H002F	TOS
IC 11	uPD65021G-017	NEC
IC 12	MC14504BCP	MOT
IC 13	uPD4011BG	NEC
IC 14	uPD4528BG	NEC
IC 15	uPD4528BG	NEC
IC 16	ST-203520	IKE
IC 17	uPD4053BG	NEC
IC 18	TL-062CPS	TEX
IC 19	ST-203520	IKE
IC 20	TC74HC04F	MAT
IC 24	uPD4051BG	NEC
IC 25	uPD4053BG	NEC
IC 26	TL-062CPS	TEX
IC 27	ST-203452	IKE
IC 28	TC40H393F	TOS
IC 29	uPC319G2	NEC
IC 30	TL-062CPS	TEX
IC 31	TL-062CPS	TEX
IC 32	TL-062CPS	TEX
IC 33	TL-062CPS	TEX
IC 34	uPD7004C	NEC
IC 35	MBM27C64-30-CV-G	FJT
IC 36	TC74H373F	TOS
IC 37	TC74H138F	TOS
IC 38	TC40H000F	TOS
IC 39	TC40H004F	TOS
IC 40	HD6303F	HIT
IC 41	TC74H374F	TOS
IC 42	MB88303	FJT
IC 43	ST-203467A	IKE
IC 47	uPC319G2	NEC
IC 60	TL-062CPS	TEX
IC 70	LM385Z-1R2	NSC
IC 71	TC40H367F	TOS

Transistors

TR 1	NTM3906-Y25	NEC
TR 2	NTM3904-B25	NEC
TR 3	NTM3904-B25	NEC
TR 4	2SK94-X4	NEC
TR 5	2SK94-X4	NEC
TR 6	2SK94-X4	NEC
TR 7	2SC2223-F14	NEC
TR 8	2SC2223-F14	NEC
TR 9	NTM3904-B25	NEC
TR 11	2SA1213-O	TOS
TR 12	2SC2873-O	TOS
TR 17	2SA812-M6,7	NEC
TR 18	2SA812-M6,7	NEC
TR 19	2SA812-M6,7	NEC
TR 20	2SC1623-L6,7	NEC
TR 21	2SC1623-L6,7	NEC
TR 22	2SC1623-L6,7	NEC
TR 23	2SC1623-L6,7	NEC
TR 24	2SC1623-L6,7	NEC
TR 25	2SC1623-L6,7	NEC
TR 26	2SC1623-L6,7	NEC
TR 27	2SC1623-L6,7	NEC
TR 28	2SC1623-L6,7	NEC
TR 29	2SC1623-L6,7	NEC
TR 30	2SC1623-L6,7	NEC
TR 31	2SC1623-L6,7	NEC
TR 32	2SC1623-L6,7	NEC
TR 33	NTM3904-B25	NEC
TR 34	2SC1623-L6,7	NEC
TR 35	2SA1213-O	TOS
TR 36	2SC1623-L6,7	NEC
TR 37	2SC1623-L6,7	NEC
TR 38	2SC1623-L6,7	NEC
TR 40	2SA1213-O	TOS
TR 41	2SC1623-L6,7	NEC
TR 42	2SC1623-L6,7	NEC
TR 43	2SA812-M6,7	NEC
TR 44	2SC1623-L6,7	NEC
TR 45	2SA812-M6,7	NEC
TR 46	NTM3904-B25	NEC
TR 47	2SA812-M6,7	NEC
TR 48	2SA812-M6,7	NEC
TR 49	NTM3904-B25	NEC
TR 50	2SA812-M6,7	NEC
TR 51	2SA812-M6,7	NEC
TR 52	NTM3904-B25	NEC
TR 53	2SA812-M6,7	NEC
TR 54	NTM3904-B25	NEC
TR 55	NTM3904-B25	NEC
TR 56	NTM3904-B25	NEC
TR 57	NTM3904-B25	NEC
TR 70	NTM3904-B25	NEC
TR 80	NTM3906-Y25	NEC
TR101	NTM3904-B25	NEC
TR102	NTM3904-B25	NEC
TR103	NTM3906-Y25	NEC
TR104	NTM3904-B25	NEC
TR105	NTM3904-B25	NEC
TR106	NTM3906-Y25	NEC

Transistors

TR107	NTM3904-B25	NEC
TR108	NTM3906-Y25	NEC
TR109	NTM3906-Y25	NEC
TR110	NTM3904-B25	NEC
TR111	NTM3904-B25	NEC
TR112	NTM3906-Y25	NEC

Diodes

D 1	1S2838-A6	NEC
D 2	1S2836-A4	NEC
D 3	1S2836-A4	NEC
D 6	RD3R0MB	NEC
D 8	1S2836-A4	NEC
D 9	ERA81-001	FJE
D 10	1S2838-A6	NEC
D 11	1S2838-A6	NEC
D 12	RD4R3MB	NEC
D 13	1S2838-A6	NEC
D 14	1S2838-A6	NEC
D 15	1S2838-A6	NEC
D 16	1S2838-A6	NEC
D 17	1SS123-A7	NEC
D 18	1SS123-A7	NEC
D 19	1SS123-A7	NEC
D 20	1S2838-A6	NEC
D 21	1S2838-A6	NEC
D 22	1S2838-A6	NEC
D 24	1SS97	NEC
D 36	1SS123-A7	NEC
D 37	RD6R2MB	NEC
D 60	1S2836-A4	NEC
D 61	1S2836-A4	NEC
D 62	1S2836-A4	NEC
D 63	1SS123-A7	NEC
D 64	1SS123-A7	NEC
D 65	1SS123-A7	NEC
D 66	1SS123-A7	NEC
D101	1SS154-BA	NEC
D102	1SS154-BA	NEC
D103	1S2836-A4	NEC

Resistors

R 1	RMC1/10 2000ohm F	KMY
R 2	RMC1/10 100Kohm F	KMY
R 3	RMC1/10 5100ohm F	KMY
R 4	RMC1/10 6200ohm F	KMY
R 5	RMC1/10 6800ohm F	KMY
R 6	RMC1/10 3000ohm F	KMY
R 7	RMC1/10 5100ohm F	KMY
R 8	RMC1/10 4700ohm F	KMY
R 9	RMC1/10 2200ohm F	KMY
R 10	RMC1/10 30Kohm F	KMY
R 11	RMC1/10 10Kohm F	KMY
R 12	RMC1/10 510ohm F	KMY
R 13	RMC1/10 470ohm F	KMY
R 14	RMC1/10 30Kohm F	KMY
R 15	RMC1/10 7500ohm F	KMY
R 16	RMC1/10 7500ohm F	KMY
R 17	RMC1/10 680ohm F	KMY
R 18	RMC1/10 510ohm F	KMY
R 19	RMC1/10 510ohm F	KMY
R 20	RMC1/10 430ohm F	KMY
R 21	RMC1/10 5100ohm F	KMY
R 22	RMC1/10 470ohm F	KMY
R 23	RMC1/10 430ohm F	KMY
R 24	RMC1/10 1300ohm F	KMY
R 25	RMC1/10 240ohm F	KMY
R 26	RMC1/10 2000ohm F	KMY
R 27	RMC1/10 330ohm F	KMY
R 28	RMC1/10 2000ohm F	KMY
R 29	RMC1/10 510ohm F	KMY
R 30	RMC1/10 1000ohm F	KMY
R 31	RMC1/10 750ohm F	KMY
R 32	RMC1/10 3300ohm F	KMY
R 33	RMC1/10 1600ohm F	KMY
R 34	RMC1/10 2000ohm F	KMY
R 35	RMC1/10 10Kohm F	KMY
R 36	RMC1/10 2000ohm F	KMY
R 37	RMC1/10 10Kohm F	KMY
R 38	RMC1/10 2000ohm F	KMY
R 39	RMC1/10 2000ohm F	KMY
R 40	RMC1/10 2000ohm F	KMY
R 41	RMC1/10 330ohm F	KMY
R 42	RMC1/10 2000ohm F	KMY
R 43	RMC1/10 510ohm F	KMY
R 44	RMC1/10 1000ohm F	KMY
R 45	RMC1/10 750ohm F	KMY
R 46	RMC1/10 1600ohm F	KMY
R 47	RMC1/10 2000ohm F	KMY
R 48	RMC1/10 3300ohm F	KMY
R 49	RMC1/10 10Kohm F	KMY
R 50	RMC1/10 2000ohm F	KMY
R 51	RMC1/10 10Kohm F	KMY
R 52	RMC1/10 39Kohm F	KMY
R 53	RMC1/10 10Kohm F	KMY
R 54	RMC1/10 1000ohm F	KMY
R 55	RMC1/10 3000ohm F	KMY
R 56	RMC1/10 2000ohm F	KMY
R 57	RMC1/10 2200ohm F	KMY
R 58	RMC1/10 750ohm F	KMY
R 59	RMC1/10 10Kohm F	KMY

Resistors

R 60	RMC1/10 10Kohm F	KMY
R 61	RMC1/10 220Kohm F	KMY
R 62	RMC1/10 150Kohm F	KMY
R 63	RMC1/10 390Kohm F	KMY
R 64	RMC1/10 220Kohm F	KMY
R 65	RMC1/10 30Kohm F	KMY
R 66	RMC1/10 30Kohm F	KMY
R 67	RMC1/10 30Kohm F	KMY
R 68	RMC1/10 30Kohm F	KMY
R 69	RMC1/10 30Kohm F	KMY
R 70	RMC1/10 30Kohm F	KMY
R 72	RMC1/10 24Kohm F	KMY
R 73	RMC1/10 18Kohm F	KMY
R 74	RMC1/10 5600ohm F	KMY
R 75	RMC1/10 5100ohm F	KMY
R 76	RMC1/10 5100ohm F	KMY
R 77	RMC1/10 6800ohm F	KMY
R 78	RMC1/10 1000ohm F	KMY
R 79	RMC1/10 6800ohm F	KMY
R 80	RMC1/10 30Kohm F	KMY
R 81	RMC1/10 2000ohm F	KMY
R 82	RMC1/10 30Kohm F	KMY
R 83	RMC1/10 2000ohm F	KMY
R 84	RMC1/10 330ohm F	KMY
R 85	RMC1/10 470ohm F	KMY
R 86	RMC1/10 11Kohm F	KMY
R 87	RMC1/10 12Kohm F	KMY
R 88	RMC1/10 10Kohm F	KMY
R 89	RMC1/10 10Kohm F	KMY
R 90	RMC1/10 5600ohm F	KMY
R 91	RMC1/10 5600ohm F	KMY
R 92	RMC1/10 12Kohm F	KMY
R 93	RMC1/10 10Kohm F	KMY
R 94	RMC1/10 10Kohm F	KMY
R 95	RMC1/10 10Kohm F	KMY
R 97	RMC1/10 100ohm F	KMY
R 98	RMC1/10 100ohm F	KMY
R 99	RMC1/10 100ohm F	KMY
R100	RMC1/10 5100ohm F	KMY
R101	RMC1/10 5100ohm F	KMY
R102	RMC1/10 5100ohm F	KMY
R103	RMC1/10 1100ohm F	KMY
R104	RMC1/10 5600ohm F	KMY
R105	RMC1/10 3000ohm F	KMY
R106	RMC1/10 510ohm F	KMY
R108	RMC1/10 1200ohm F	KMY
R109	*	
R110	RMC1/10 30Kohm F	KMY
R111	RMC1/10 15Kohm F	KMY
R112	RMC1/10 91Kohm F	KMY
R113	RMC1/10 560ohm F	KMY
R114	RMC1/10 1200ohm F	KMY
R115	RMC1/10 1000ohm F	KMY
R116	RMC1/10 1000ohm F	KMY
R117	RMC1/10 1000ohm F	KMY
R118	RMC1/10 1000ohm F	KMY
R119	RMC1/10 510ohm F	KMY
R120	RMC1/10 510ohm F	KMY
R121	RMC1/10 510ohm F	KMY
R122	RMC1/10 1200ohm F	KMY
R123	RMC1/10 1200ohm F	KMY
R124	RMC1/10 1200ohm F	KMY
R125	RMC1/10 10Kohm F	KMY
R126	RMC1/10 10Kohm F	KMY
R127	RMC1/10 30Kohm F	KMY
R128	RMC1/10 30Kohm F	KMY
R129	RMC1/10 2400ohm F	KMY
R130	RMC1/10 680ohm F	KMY
R131	RMC1/10 100ohm F	KMY
R132	RMC1/10 1800ohm F	KMY
R133	RMC1/10 820ohm F	KMY
R134	RMC1/10 13Kohm F	KMY
R135	RMC1/10 30Kohm F	KMY
R136	RMC1/10 15Kohm F	KMY
R137	RMC1/10 4300ohm F	KMY
R138	RMC1/10 6200ohm F	KMY
R139	RMC1/10 2000ohm F	KMY
R140	RMC1/10 3300ohm F	KMY
R141	RMC1/10 43Kohm F	KMY
R142	RMC1/10 1300ohm F	KMY
R143	*RMC1/10 10Kohm F	KMY
R144	RMC1/10 30Kohm F	KMY
R145	RMC1/10 15Kohm F	KMY
R146	RMC1/10 4300ohm F	KMY
R147	RMC1/10 12Kohm F	KMY
R148	RMC1/10 10Kohm F	KMY
R149	RMC1/10 4300ohm F	KMY
R150	RMC1/10 24Kohm F	KMY
R151	RMC1/10 20Kohm F	KMY
R152	RMC1/10 3300ohm F	KMY
R153	RMC1/10 10Kohm F	KMY
R154	RMC1/10 10Kohm F	KMY
R155	RMC1/10 30Kohm F	KMY
R156	RMC1/10 30Kohm F	KMY
R157	RMC1/10 10Kohm F	KMY
R158	RMC1/10 6200ohm F	KMY
R159	RMC1/10 10ohm F	KMY
R160	RMC1/10 130ohm F	KMY
R161	RMC1/10 2400ohm F	KMY
R162	RMC1/10 430ohm F	KMY
R163	RMC1/10 3300ohm F	KMY
R164	RMC1/10 11Kohm F	KMY
R165	RMC1/10 12Kohm F	KMY
R166	RMC1/10 10Kohm F	KMY
R167	RMC1/10 10Kohm F	KMY
R168	RMC1/10 5100ohm F	KMY
R169	RMC1/10 20Kohm F	KMY

PULSE(P.B.8) MODULE

Resistors

R170	RMC1/10	100ohm F	KMY
R175	RMC1/10	3000ohm F	KMY
R177	RMC1/10	10Kohm F	KMY
R178	RMC1/10	3900ohm F	KMY
R179	RMC1/10	4700ohm F	KMY
R180	RMC1/10	3300ohm F	KMY
R181	RMC1/10	10Kohm F	KMY
R182	RMC1/10	300ohm F	KMY
R183	RMC1/10	2700ohm F	KMY
R184	RMC1/10	100ohm F	KMY
R185	RMC1/10	47Kohm F	KMY
R186	RMC1/10	5100ohm F	KMY
R187	RMC1/10	1Mohm F	KMY
R188	RMC1/10	20Kohm F	KMY
R189	RMC1/10	4700ohm F	KMY
R190	RMC1/10	6200ohm F	KMY
R191	RMC1/10	51Kohm F	KMY
R192	RMC1/10	10Kohm F	KMY
R193	RMC1/10	47Kohm F	KMY
R194	RMC1/10	30Kohm F	KMY
R195	RMC1/10	13Kohm F	KMY
R196	RMC1/10	2400ohm F	KMY
R197	RMC1/10	12Kohm F	KMY
R198	RMC1/10	5100ohm F	KMY
R199	RMC1/10	150ohm F	KMY
R200	RMC1/10	150Kohm F	KMY
R201	RMC1/10	5100ohm F	KMY
R202	RMC1/10	6200ohm F	KMY
R203	RMC1/10	4300ohm F	KMY
R204	RMC1/10	2000ohm F	KMY
R205	RMC1/10	10Kohm F	KMY
R206	RMC1/10	6200ohm F	KMY
R207	RMC1/10	2700ohm F	KMY
R208	RMC1/10	5600ohm F	KMY
R209	RMC1/10	1000ohm F	KMY
R210	RMC1/10	4300ohm F	KMY
R211	RMC1/10	2000ohm F	KMY
R212	RMC1/10	10Kohm F	KMY
R213	RMC1/10	13Kohm F	KMY
R214	RMC1/10	2700ohm F	KMY
R215	RMC1/10	5600ohm F	KMY
R216	RMC1/10	5100ohm F	KMY
R218	RMC1/10	4300ohm F	KMY
R219	RMC1/10	2000ohm F	KMY
R220	RMC1/10	10Kohm F	KMY
R221	RMC1/10	6200ohm F	KMY
R222	RMC1/10	2700ohm F	KMY
R223	RMC1/10	5600ohm F	KMY
R224	RMC1/10	30Kohm F	KMY
R225	RMC1/10	5100ohm F	KMY
R226	RMC1/10	18Kohm F	KMY
R227	RMC1/10	39Kohm F	KMY
R229	RMC1/10	43Kohm F	KMY
R230	RMC1/10	30Kohm F	KMY
R231	RMC1/10	22Kohm F	KMY
R232	RMC1/10	12Kohm F	KMY
R233	RMC1/10	30Kohm F	KMY
R234	RMC1/10	22Kohm F	KMY
R235	RMC1/10	12Kohm F	KMY
R236	RMC1/10	20Kohm F	KMY
R237	RMC1/10	10Kohm F	KMY
R238	RMC1/10	9100ohm F	KMY
R239	RMC1/10	10Kohm F	KMY
R240	RMC1/10	27Kohm F	KMY
R241	RMC1/10	10Kohm F	KMY
R242	RMC1/10	10Kohm F	KMY
R243	RMC1/10	10Kohm F	KMY
R244	RMC1/10	2000ohm F	KMY
R245	RMC1/10	10Kohm F	KMY
R246	RMC1/10	10Kohm F	KMY
R247	RMC1/10	2000ohm F	KMY
R248	RMC1/10	2000ohm F	KMY
R249	RMC1/10	2000ohm F	KMY
R250	RMC1/10	2000ohm F	KMY
R251	RMC1/10	20Kohm F	KMY
R252	RMC1/10	2000ohm F	KMY
R253	RMC1/10	2000ohm F	KMY
R254	RMC1/10	2000ohm F	KMY
R255	RMC1/10	10Kohm F	KMY
R256	RMC1/10	10Kohm F	KMY
R257	RMC1/10	10Kohm F	KMY
R258	RMC1/10	10Kohm F	KMY
R259	RMC1/10	10Kohm F	KMY
R260	RMC1/10	10Kohm F	KMY
R261	RMC1/10	10Kohm F	KMY
R262	RMC1/10	10Kohm F	KMY
R263	RMC1/10	10Kohm F	KMY
R264	RMC1/10	10Kohm F	KMY
R265	RMC1/10	10Kohm F	KMY
R315	RMC1/10	100Kohm F	KMY
R316	RMC1/10	10Kohm F	KMY
R317	RMC1/10	10Kohm F	KMY
R318	RMC1/10	100Kohm F	KMY
R319	RMC1/10	39Kohm F	KMY
R320	RMC1/10	18Kohm F	KMY
R321	RMC1/10	6800ohm F	KMY
R330	RMC1/10	10Kohm F	KMY
R331	RMC1/10	8200ohm F	KMY
R332	RMC1/10	10Kohm F	KMY
R333	RMC1/10	10Kohm F	KMY
R334	RMC1/10	91Kohm F	KMY
R335	RMC1/10	91Kohm F	KMY
R370	RMC1/10	20Kohm F	KMY
R371	RMC1/10	20Kohm F	KMY
R372	RMC1/10	5100ohm F	KMY
R373	RMC1/10	11Kohm F	KMY
R374	RMC1/10	12Kohm F	KMY

Resistors

R375	RMC1/10	10Kohm F	KMY
R376	RMC1/10	30Kohm F	KMY
R377	RMC1/10	8200ohm F	KMY
R378	RMC1/10	620ohm F	KMY
R379	RMC1/10	220Kohm F	KMY
R380	RMC1/10	330Kohm F	KMY
R381	RMC1/10	100Kohm F	KMY
R382	RMC1/10	10Kohm F	KMY
R383	RMC1/10	120ohm F	KMY
R387	RMC1/10	2000ohm F	KMY
R388	RMC1/10	33Kohm F	KMY
R390	RMC1/10	2400ohm F	KMY
R391	RMC1/10	1200ohm F	KMY
R392	RMC1/10	10Kohm F	KMY
R394	RMC1/10	620ohm F	KMY
R395	RMC1/10	56Kohm F	KMY
R396	RMC1/10	10Kohm F	KMY
R401	RMC1/10	1000ohm F	KMY
R402	RMC1/10	1000ohm F	KMY
R404	RMC1/10	100ohm F	KMY
R405	RMC1/10	100ohm F	KMY
R406	RMC1/10	100ohm F	KMY
R407	RMC1/10	10Kohm F	KMY
R408	RMC1/10	1000ohm F	KMY
R409	RMC1/10	10Kohm F	KMY
R410	RMC1/10	100ohm F	KMY
R411	RMC1/10	10Kohm F	KMY
R412	RMC1/10	10Kohm F	KMY
R413	RMC1/10	100ohm F	KMY
R414	*		
R415	RMC1/10	1000ohm F	KMY
R416	RMC1/10	75ohm F	KMY
R417	RMC1/10	100ohm F	KMY
R418	RMC1/10	2700ohm F	KMY
R419	RMC1/10	8200ohm F	KMY
R420	RMC1/10	1000ohm F	KMY
R422	RMC1/10	18Kohm F	KMY
R423	RMC1/10	1800ohm F	KMY
R424	RMC1/10	10Kohm F	KMY
R425	RMC1/10	1500ohm F	KMY
R426	RMC1/10	5100ohm F	KMY
R427	RMC1/10	10Kohm F	KMY
R428	RMC1/10	20Kohm F	KMY
R429	RMC1/10	4300ohm F	KMY
R430	RMC1/10	1500ohm F	KMY
R431	RMC1/10	5100ohm F	KMY
R432	RMC1/10	30Kohm F	KMY
R433	RMC1/10	3000ohm F	KMY
R434	RMC1/10	2000ohm F	KMY
R435	RMC1/10	10Kohm F	KMY
R436	RMC1/10	10Kohm F	KMY
R437	RMC1/10	10Kohm F	KMY

Variable Resistors

VR 1	RJ4W	2000ohm	CPL
VR 2	RJ4W	500ohm	CPL
VR 3	RJ4W	1000ohm	CPL
VR 4	RJ4W	2000ohm	CPL
VR 5	RJ4W	50Kohm	CPL
VR 6	RJ4W	2000ohm	CPL
VR 7	RJ4W	50Kohm	CPL
VR 8	RJ4W	2000ohm	CPL
VR 9	RJ4W	5000ohm	CPL
VR 10	RJ4W	20Kohm	CPL
VR 11	RJ4W	20Kohm	CPL
VR 12	RJ4W	10Kohm	CPL
VR 13	RJ4W	200ohm	CPL
VR 14	RJ4W	2000ohm	CPL
VR 15	RJ4W	2000ohm	CPL
VR 16	RJ4W	50Kohm	CPL
VR 17	RJ4W	5000ohm	CPL
VR 18	RJ4W	5000ohm	CPL
VR 19	RJ4W	2000ohm	CPL
VR 20	RJ4W	2000ohm	CPL
VR 21	RJ4W	20Kohm	CPL
VR 22	RJ4W	20Kohm	CPL
VR 23	RJ4W	20Kohm	CPL
VR 36	RJ4W	2Mohm	CPL
VR 60	RJ4W	10Kohm	CPL
VR 61	RJ4W	10Kohm	CPL
VR101	RJ4W	20Kohm	CPL
VR102	RJ4W	10Kohm	CPL
VR103	RJ4W	10Kohm	CPL
VR104	RJ4W	1000ohm	CPL
VR105	RJ4W	1000ohm	CPL

Capacitors

C 1	UMA1C470MCA	NCI
C 2	CM21W5R223M25VDC	KYC
C 3	CM32W5R104M25VDC	KYC
C 4	CM21CH390J25VDC	KYC
C 5	CM32W5R104M25VDC	KYC
C 6	CM21CH180J25VDC	KYC
C 7	CM21W5R223M25VDC	KYC
C 8	CM32W5R104M25VDC	KYC
C 9	*	
C 10	CM32W5R104M25VDC	KYC
C 11	CM21CH120J25VDC	KYC
C 12	CM21CH180J25VDC	KYC
C 13	CM32W5R104M25VDC	KYC
C 14	CM21CH100J25VDC	KYC

Capacitors

C 15	CM21W5R223M25VDC	KYC
C 16	CM32W5R104M25VDC	KYC
C 17	UMA1C100MCA	NCI
C 18	CM32W5R104M25VDC	KYC
C 19	CM21W5R223M25VDC	KYC
C 21	UMA1C100MCA	NCI
C 22	CM21W5R223M25VDC	KYC
C 23	CM32W5R104M25VDC	KYC
C 24	UMA1C100MCA	NCI
C 25	CM32W5R104M25VDC	KYC
C 26	CM21W5R223M25VDC	KYC
C 28	UMA1C100MCA	NCI
C 29	CM32W5R104M25VDC	KYC
C 30	268L1602-105M	NCC
C 31	CM21CH102J25VDC	KYC
C 32	CM21CH102J25VDC	KYC
C 33	CM32W5R104M25VDC	KYC
C 34	CM32W5R104M25VDC	KYC
C 35	CM21CH270J25VDC	KYC
C 37	CM21CH471J25VDC	KYC
C 38	CM21CH331J25VDC	KYC
C 39	CM21CH221J25VDC	KYC
C 40	CM21W5R223M25VDC	KYC
C 41	CM21CH220J25VDC	KYC
C 42	UMA1C470MCA	NCI
C 43	UMA0J220MCA	NCI
C 44	UMA0J101MCA	NCI
C 45	UMA0J220MCA	NCI
C 48	*	
C 49	UMA1A330MCA	NCI
C 50	CM21CH270J25VDC	KYC
C 51	CM21CH270J25VDC	KYC
C 52	*	
C 53	CM21CH100J25VDC	KYC
C 54	UMA1C470MCA	NCI
C 55	UMA0J470MCA	NCI
C 56	UMA1A330MCA	NCI
C 57	UMA1C470MCA	NCI
C 58	UMA0J470MCA	NCI
C 59	UMA1C470MCA	NCI
C 60	UMA1C470MCA	NCI
C 61	CM32W5R104M25VDC	KYC
C 62	UMA0J101MCA	NCI
C 63	UMA1C470MCA	NCI
C 64	CM21CH151J25VDC	KYC
C 65	UMA0J101MCA	NCI
C 66	UMA1C470MCA	NCI
C 67	UMA0J220MCA	NCI
C 69	UMA1C470MCA	NCI
C 70	UMA1V4R7MCA	NCI
C 71	UMA1A330MCA	NCI
C 72	UMA1C220MCA	NCI
C 73	UMA1C470MCA	NCI
C 74	CM21CH101J25VDC	KYC
C 75	268L1602-105M	NCC
C 76	UMA0J470MCA	NCI
C 77	CM21W5R223M25VDC	KYC
C 78	CM21W5R223M25VDC	KYC
C 79	CM32W5R104M25VDC	KYC
C 80	CM21W5R223M25VDC	KYC
C 81	UMA1H3R3MCA	NCI
C 82	UMA1C470MCA	NCI
C 83	CM21CH471J25VDC	KYC
C 84	CM32W5R104M25VDC	KYC
C 85	CM21CH471J25VDC	KYC
C 86	CM32W5R104M25VDC	KYC
C 87	CM21CH471J25VDC	KYC
C 88	CM32W5R104M25VDC	KYC
C 89	CM21W5R223M25VDC	KYC
C 90	CM32W5R104M25VDC	KYC
C 91	CM32W5R104M25VDC	KYC
C 92	CM21W5R223M25VDC	KYC
C 93	UMA0J470MCA	NCI
C 94	CM21W5R223M25VDC	KYC
C 95	CM32W5R104M25VDC	KYC
C 96	CM21CH330J25VDC	KYC
C 97	CM21CH330J25VDC	KYC
C 98	CM21CH6R8C25VDC	KYC
C 99	CM21CH6R8C25VDC	KYC
C100	CM21W5R223M25VDC	KYC
C101	CM21W5R223M25VDC	KYC
C102	UMA1HR47MCA	NCI
C103	CM21W5R223M25VDC	KYC
C104	CM21W5R223M25VDC	KYC
C105	UMA0J101MCA	NCI
C106	CM21W5R223M25VDC	KYC
C130	CM21W5R223M25VDC	KYC
C131	CM21CH3R3C25VDC	KYC
C133	UMA1C100MCA	NCI
C135	CM21CH331J25VDC	KYC
C136	CM21CH330J25VDC	KYC
C137	CM21CH6R8C25VDC	KYC
C150	UMA0J101MCA	NCI
C154	CM32W5R104M25VDC	KYC
C155	CM32W5R104M25VDC	KYC
C156	CM32W5R104M25VDC	KYC
C157	CM21W5R223M25VDC	KYC
C158	CM32W5R104M25VDC	KYC
C159	CM32W5R104M25VDC	KYC
C160	CM32W5R104M25VDC	KYC
C161	*CM21CH1R5C25VDC	KYC
C162	*CM21CH1R5C25VDC	KYC
C163	CM22W5R104M25VDC	KYC
C201	CM21CH102J25VDC	KYC
C202	CM21CH471J25VDC	KYC
C203	CM21CH151J25VDC	KYC
C204	CM21CH331J25VDC	KYC

Capacitors

C205	CM21W5R223M25VDC	KYC
C206	CM21CH330J25VDC	KYC
C207	CM21CH151J25VDC	KYC
C208	CM21CH220J25VDC	KYC
C209	CM43CH332M25VDC	KYC
C210	UMA0J101MCA	NCI
C211	CM21W5R223M25VDC	KYC
C212	CM21W5R223M25VDC	KYC
C213	CM21W5R223M25VDC	KYC
C214	UMA0J101MCA	NCI
C215	UMA0J101MCA	NCI
C216	CM32W5R104M25VDC	KYC
C217	UMA0J101MCA	NCI
C218	CM32W5R104M25VDC	KYC
C219	UMA0J101MCA	NCI
C220	CM21CH390J25VDC	KYC
C222	CM32W5R104M25VDC	KYC
C223	CM32W5R104M25VDC	KYC
C224	UMA1C100MCA	NCI
C225	CM21CH151C25VDC	KYC
C226	CM21CH151C25VDC	KYC

Inductance Coiles

L 1	TP0206-2R7K	TDK
L 3	ST-202246A	IKE
L 4	ST-203548	IKE
L101	ST-202246A	IKE
L102	ST-202246A	IKE

Connectors

CN 1	PS-34PE-D4LT1-PN1	JAE
CN 2	PS-50PE-D4LT1-PN1	JAE

Switch

S 1	SM-03201-02	NKA

Test Poles

TP 2	ST-4-1	MAC
TP 3	ST-4-1	MAC
TP 4	ST-4-1	MAC
TP 5	ST-4-1	MAC
TP 7	ST-4-1	MAC
TP 8	ST-4-1	MAC
TP 9	ST-4-1	MAC
TP 17	ST-4-1	MAC

Crystal

X 1	ST-203330	IKE
X 3	ST-203363	IKE

EL BIT

LB 1	PS-3PF-S4T1-PKL1	JAE

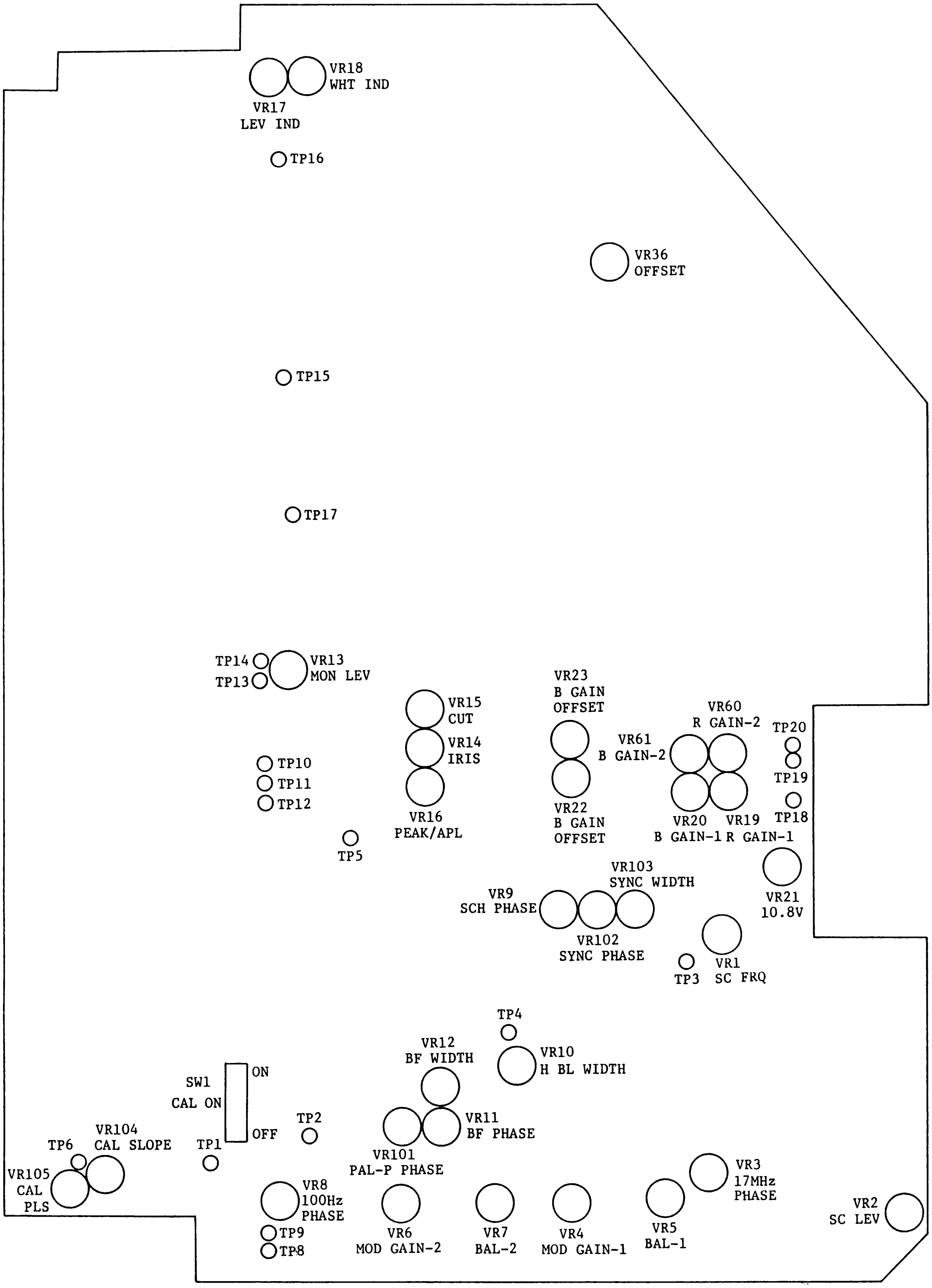
TRAP

TRP 1	LCS2H1H-102	TDK

Short Socket

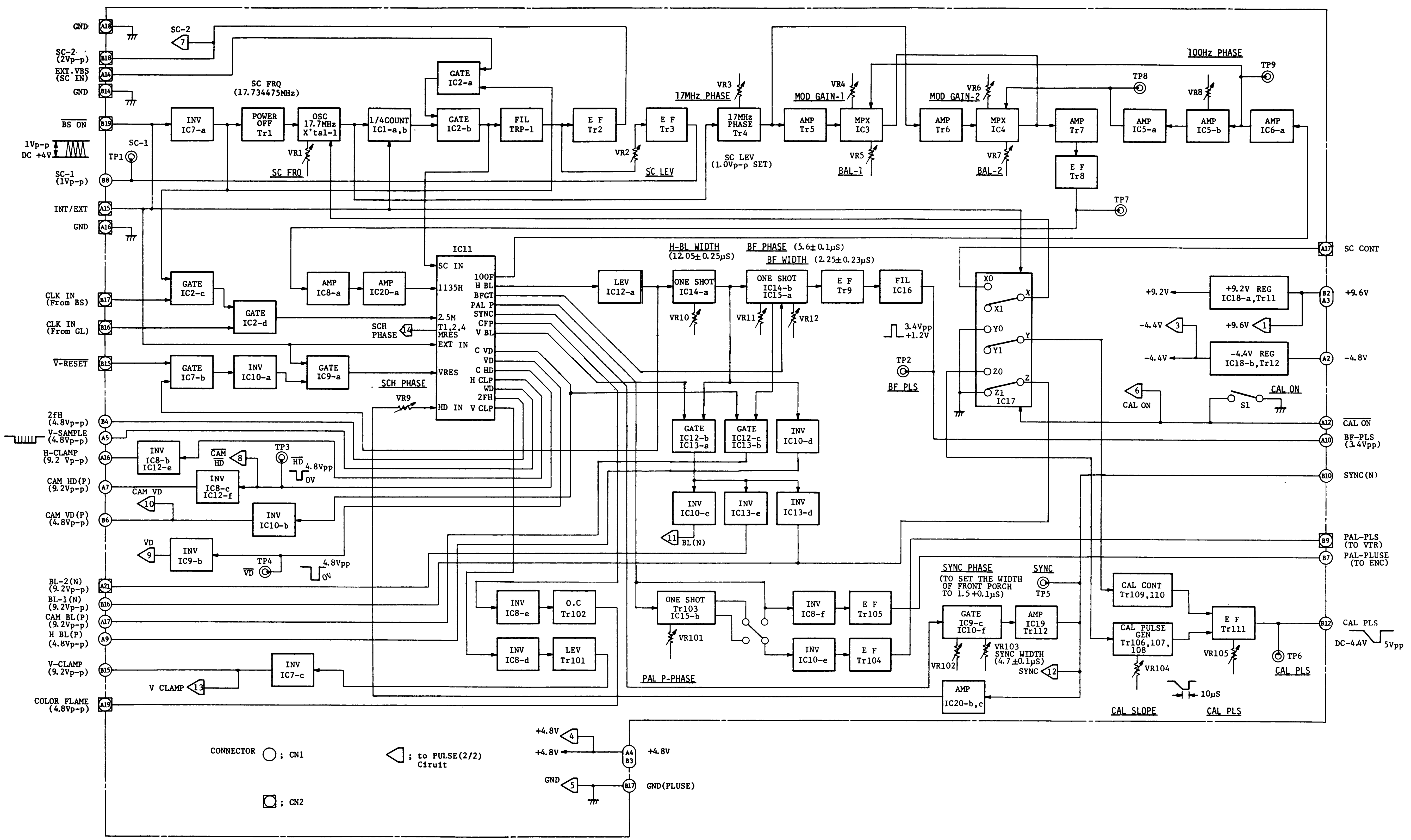
SS 1	PS-2SH4-1	JAE

Fig. 6-8-a

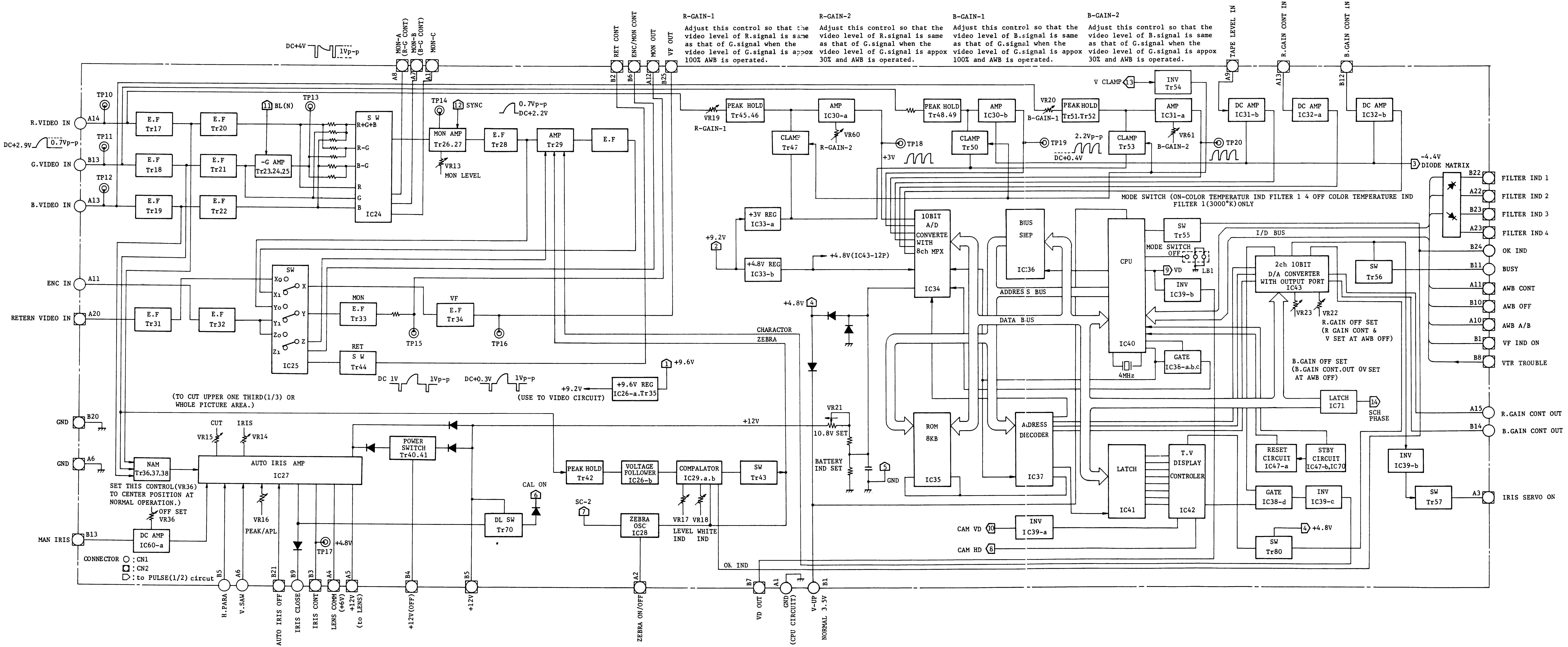


PULSE (P.B.8)
Controls

Fig. 6-8-b (1)



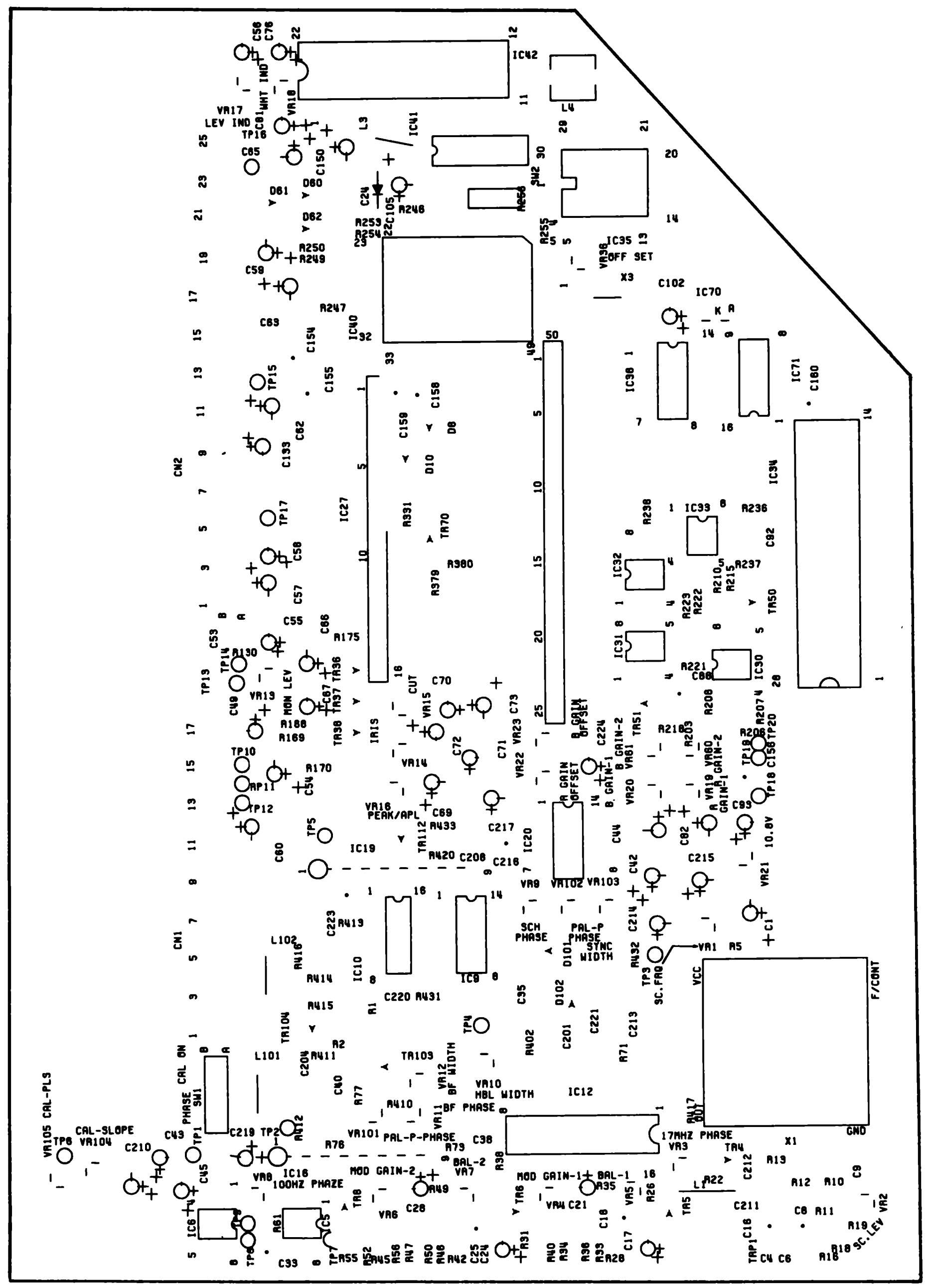
PULSE (P.B.8) 1/2
Block Diagram



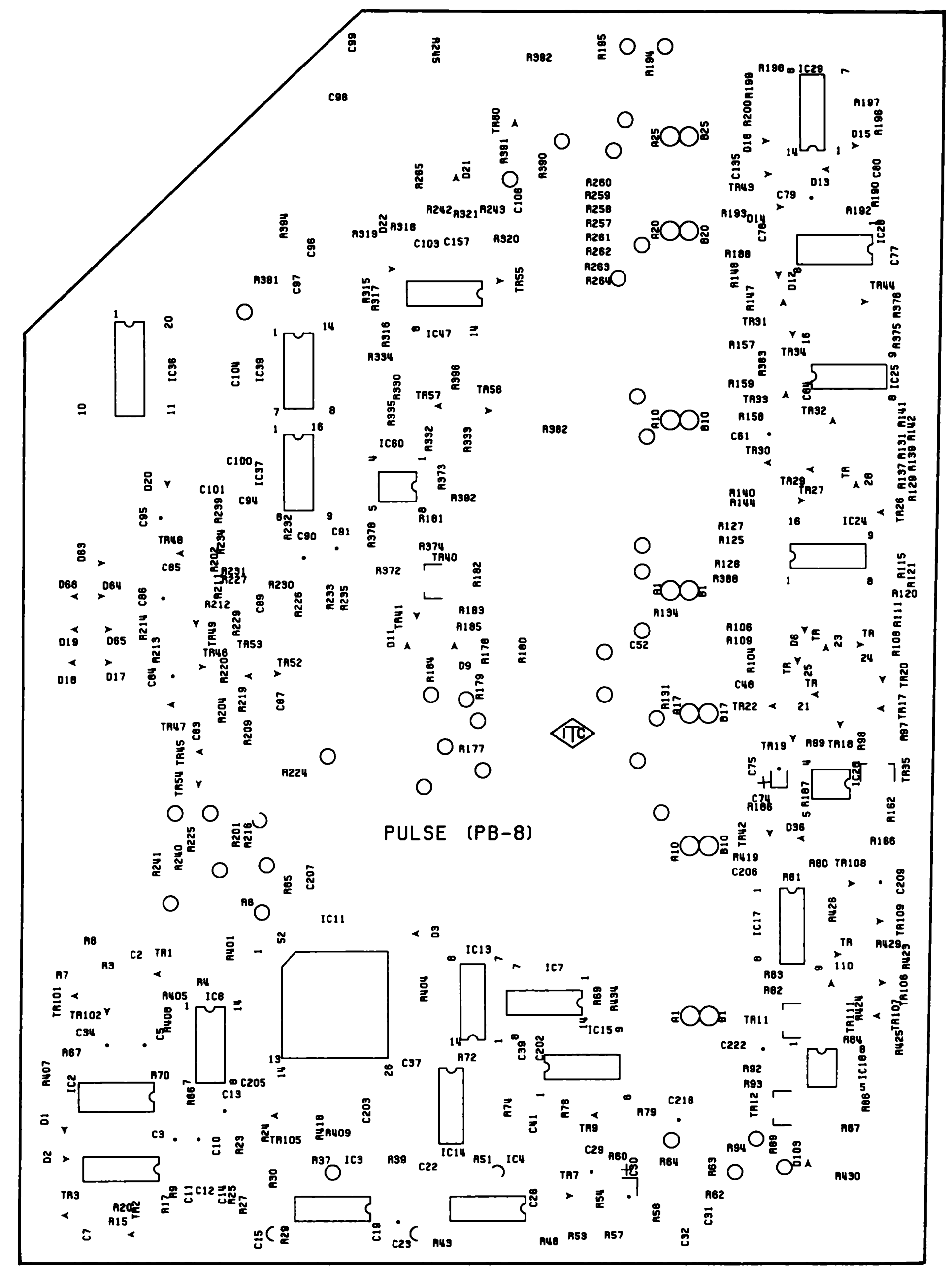
PULSE (P.B.8) 2/2

Block Diagram

Fig. 6-8-c



A SIDE



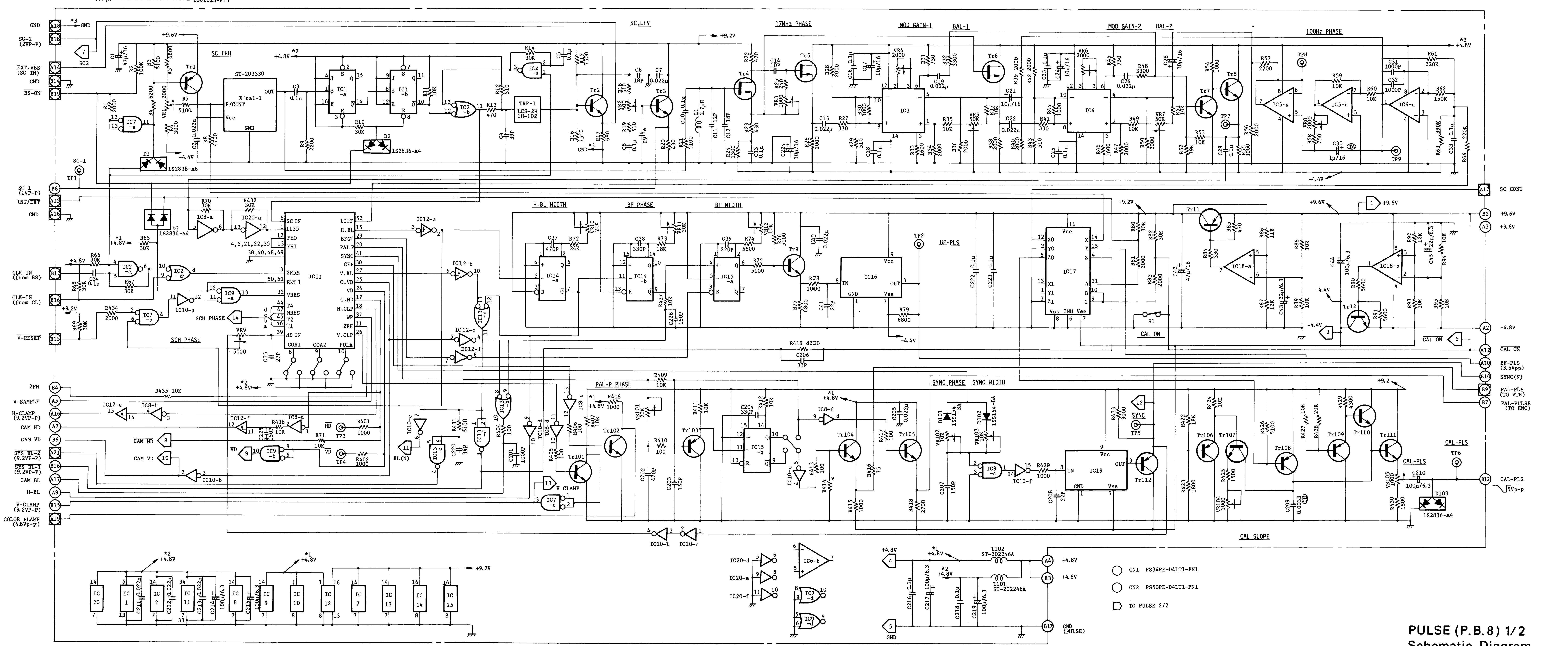
B SIDE

A side : Discrete parts is attached on the A side of the module.
B side : Only chip parts is attached on the B side of the module.

PULSE (P.B.8)
Parts Layout

Tr1,103,106,108,109,112 ---- NTM3906-Y25
Tr2,3,9,101,102,104,105,107,
110,111 ---- NTM3904-B25
Tr4,5,6 ---- 2SK94-X4
Tr7,8 ---- 2SC2223-F14
Tr11 ---- 2SA1213-O
Tr12 ---- 2SC2873-O
IC1 ---- DN74LS76S
IC2 ---- TC40H000F
IC3,4 ---- NJM1496M
IC5,6,18 ---- TL062CPS
IC7 ---- µPD4001BG
IC8,20 ---- TC74HC04F
IC9 ---- TC40H002F
IC10 ---- µPD4049UBG
IC11 ---- µPD65021G-017
IC12 ---- MC14504BCP
IC13 ---- µPD4011BG
IC14,15 ---- µPD4528BG
IC16,19 ---- ST-203520
IC17 ---- µPD4053BG
S1 ---- SM-03201-02

Fig. 6-8-d (1)



PULSE (P.B.8) 1/2
Schematic Diagram
C21-219699

Fig. 6-8-d (2)

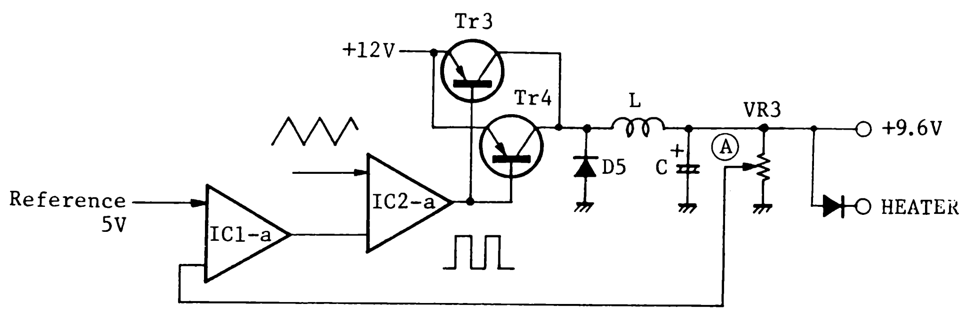
LAST No.	LOST No.
IC71	IC21～23,44～46,48～59,61～69
Tr112	Tr10,13～16,39,58～69,71～79
D183	81～100
R435	D4,5,7,23,25～35,38～59,67～100
VR105	R96,107,171～174,176,217,228
C224	266～314,322～329,336～369
L102	384～386,389,393,397～400,403
S 1	421
LB 1	VR24～35,37～59,62～100
TRP 1	C20,27,36,46,47,68,107～129
X'tal 3	132,134,138～149,151～153,164～200
	L2,5～100
	X'tal 2

PULSE (P. B. 8) 2/2
Schematic Diagram
C11-219431

SECTION 6.9 POWER MODULE

The POWER module produces voltages necessary in the camera. The voltages are +9.6V, +4.8 V, -4.8V, -55V, +955V and +320V.

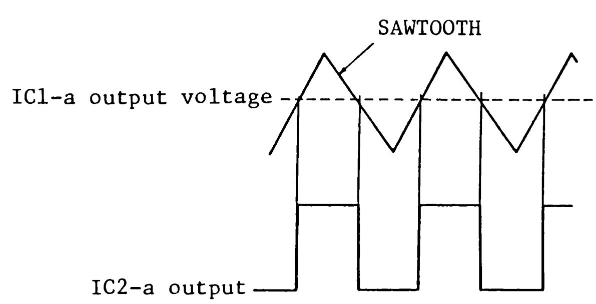
The voltages of +4.8 V and 9.6 V are generated in the same way. This discription is for +9.6 V. IC3-a generates a reference voltage of 5.0 V. IC2-b is sawtooth oscillator synchronized with HD of the camera.



IC1-a is a differential amplifier, which makes the reference voltage of 5.0 V equal to the voltage at Ⓐ (about 5 V through VR3) at all times.

IC2-a compares the IC1-a output voltage with the sawtooth to produce a square wave. The IC2-a square wave is switched by Tr2, current flows through the load (camera) while Tr3 & Tr4 are on, and current flows through D5 while Tr3 & Tr4 are off.

Output ripple is determined by the inductance L and the capacitance C. The voltage at point Ⓐ of VR3 will also vary if an input voltage of +12V (or the load) varies. However, the IC1-a output voltage varies to make the voltage at point Ⓐ constant with the differential amplifier of IC1-a.

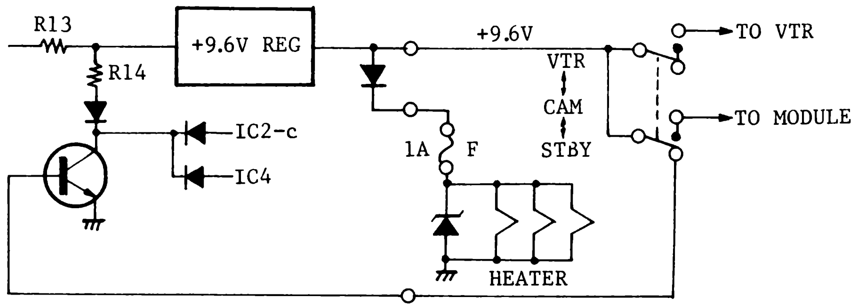


In the pulse width (duty) of IC2-a varies to control the on/off period of Tr3 and Tr4. As a result, the voltage of +9.6 V is kept stable through variations of the input voltage of the load.

An indipendent voltage stabilizer circuit composed of Tr5, 6 and IC1-b, IC2-c is used for +4.8V to supply stable voltage to camera.

The voltages of -4.8 V, +955 V, +320 V and -55 V are produced by the converter transformer T1. For IC4, +320 V is fed back to control the pulse width (duty) switching of Tr8 & Tr9 in order to stabilize the voltage.

The pulse width is controlled by Tr1 in the STBY mode. When the STBY/CAM/VTR switch on the camera is set to "STBY", Tr1 is on to turn off the control circuit that produces the voltages. However, only +9.6 V is not completely off, but lower to a voltage of about 4.5 V from R13 and R14 to preheat the image tube.



[Adjustment]

(1) Using a Digital volt meter, adjust the REF control (VR2) for +5 V at TP1

Note: Do not adjust it in any case other than operation failure.

(2) With the digital voltmeter, adjust the following voltages.

VOLTAGE	CONTROL	TEST POINT LOCATION
+9.6 V	VR3	Mother board J10, connector pin 9
+4.8 V	VR1	Mother board J10, connector pin 3
-4.8 V	VR4	Mother board J10, connector pin 19
+320 V	VR5	Mother board J10, connector pin 25

Note: An input impedance of 10MΩ or more is required for the digital voltmeter.

POWER-1 MODULE

Integrated Circuits

IC 4	MB3759PF	FJT

Transistors

TR 7	2SD1220-Y	TOS
TR 8	2SC3074-Y,O	TOS
TR 9	2SC3074-Y,O	TOS
TR 10	2SC1623-L6,7	NEC

Diodes

D 7	F114D	NEC
D 8	F114D	NEC
D 9	ERA81-004	FDK
D 10	ERA81-004	FDK
D 11	V11N	HIT
D 12	V11N	HIT
D 13	V11N	HIT
D 14	V11N	HIT
D 15	V11N	HIT
D 16	F114D	NEC
D 17	F114D	NEC
D 18	1S2838-A6	NEC
D 19	1S2838-A6	NEC
D 20	1SS123-A7	NEC
D 21	1SS123-A7	NEC

Resistors

R 34	RMC1/10 100ohm F	KMY
R 35	RMC1/10 5100ohm F	KMY
R 36	RMC1/10 5100ohm F	KMY
R 37	RMC1/10 100ohm F	KMY
R 38	RMC1/10 9100ohm F	KMY
R 39	RMC1/10 560ohm F	KMY
R 40	SN14C2H 4R7Mohm F	KOA
R 41	RMC1/10 30Kohm F	KMY
R 42	HES1/2 5100ohm F	HDK
R 43	HES1/2 18Kohm F	HDK
R 44	RMC1/10 330ohm F	KMY
R 45	RMC1/10 390ohm F	KMY
R 46	RMC1/10 330ohm F	KMY
R 47	RMC1/10 390ohm F	KMY
R 48	RMC1/10 33Kohm F	KMY
R 49	RMC1/10 33Kohm F	KMY
R 50	RMC1/10 33Kohm F	KMY
R 51	RMC1/10 10Kohm F	KMY
R 52	RMC1/10 10Kohm F	KMY
R 53	RMC1/10 30Kohm F	KMY
R 54	RMC1/10 18Kohm F	KMY
R 55	RMC1/10 10Kohm F	KMY
R 56	RMC1/10 30Kohm F	KMY
R 57	SN14K2B 10Kohm F	KOA
R 58	SN14K2B 100Kohm F	KOA
R 59	GS-1/2A 100Mohm J	TAM

Variable Resistors

VR 3	RJ-4WS 1000ohm	CPL
VR 4	RJ-4WS 1000ohm	CPL
VR 5	RJ-4WS 10Kohm	CPL

Capacitors

C 20	SXE16VB-120 6R3B	NCH
C 21	UMA1H2R2MCA	NCI
C 22	SXE10VB-120 5D	NCH
C 23	SXE10VB- 82 6R3A	NCH
C 24	SXE16VB-390 10E	NCH
C 25	SXE63VB-39 6R3D	NCH
C 26	SXE35VB-12 5A	NCH
C 27	FD95AX 104M	TDK
C 28	FD95AX 104M	TDK
C 29	FD95AX 104M	TDK
C 30	FD95AX 104M	TDK
C 31	FD95AX 104M	TDK
C 32	SXE16VB-120 6R3B	NCH
C 33	UMA1H100MCA	NCI
C 34	UMA1H100MCA	NCI
C 35	CM32W5R104M25VDC	KYC
C 36	553M6302 104K	NCC
C 37	CM43CH222M25VDC	KYC
C 38	CM21CH390J25VDC	KYC
C 39	SXE25VB-56 5D	NCH
C 40	FD95AX 104M	TDK
C 41	FD95AX 104M	TDK
C 42	FD95AX 104M	TDK
C 43	FD35AX1H222M	TDK
C 44	FD35AX1H222M	TDK

Inductance Coiles

L 7	ST-980411	IKE
L 8	ST-202246A	IKE
L 9	ST-980411	IKE
L 10	SA5x4x3F	TOS
L 11	ST-202246A	IKE
L 12	ST-202246A	IKE

Connectors

CN 1	PS-20SD-D4TS1-1	JAE
CN 2	MLF2B31P-J1	NBA

Transformer

T 1	ST-980390-1	IKE

Posisters

POS 1	PTH60U331M-31R5	MUR
POS 2	PTH60U331M-31R5	MUR

POWER-2 MODULE

Integrated Circits

IC	1	TL-062CPS	TEX
IC	2	uPC339G2	NEC
IC	3	TL-062CPS	TEX
IC	5	LM385Z-2R5	NSC

Transistors

TR	1	2SC1623-L6,7	NEC
TR	2	NTM3904-B25	NEC
TR	3	2SA1244LB-Y,O	TOS
TR	4	2SA1244LB-Y,O	TOS
TR	5	NTM3904-B25	NEC
TR	6	2SA1244LB-Y,O	TOS

Diodes

D	1	RD6R2MB	NEC
D	2	1S2838-A6	NEC
D	3	1S2838-A6	NEC
D	4	LM385Z2R5	NSC
D	5	ERC81-004	FDK
D	6	ERB81-004	FDK

Resistors

R	1	RMC1/10 33ohm F	KMY
R	2	RMC1/10 2000ohm F	KMY
R	3	RMC1/10 5100ohm F	KMY
R	4	RMC1/10 36Kohm F	KMY
R	5	RMC1/10 150Kohm F	KMY
R	6	RMC1/10 30Kohm F	KMY
R	7	RMC1/10 6200ohm F	KMY
R	8	RMC1/10 2000ohm F	KMY
R	9	RMC1/10 5100ohm F	KMY
R	10	RMC1/10 20Kohm F	KMY
R	11	RMC1/10 33Kohm F	KMY
R	12	RMC1/10 10Kohm F	KMY
R	13	RMC1/10 1800ohm F	KMY
R	14	RMC1/10 5100ohm F	KMY
R	15	RMC1/10 100ohm F	KMY
R	16	RMC1/10 11Kohm F	KMY
R	17	RMC1/10 7500ohm F	KMY
R	18	RMC1/10 5100ohm F	KMY
R	19	RMC1/10 150ohm F	KMY
R	20	RMC1/10 20Kohm F	KMY
R	21	RMC1/10 180Kohm F	KMY
R	22	RMC1/10 5600ohm F	KMY
R	23	RMC1/10 5600ohm F	KMY
R	24	RMC1/10 4700ohm F	KMY
R	25	RMC1/10 10Kohm F	KMY
R	26	RMC1/10 5100ohm F	KMY
R	27	RMC1/10 1000ohm F	KMY
R	28	RMC1/10 200ohm F	KMY
R	29	RE35YQ 510ohm F	SSM
R	30	RMC1/10 200ohm F	KMY
R	31	RE35YQ 510ohm F	SSM
R	32	RMC1/10 200ohm F	KMY
R	33	RMC1/10 430ohm F	KMY
R	60	RMC1/10 430ohm F	KMY

Variable Resistors

VR	1	RJ-4WS 1000ohm	CPL
VR	2	RJ-4WS 2000ohm	CPL

Capacitors

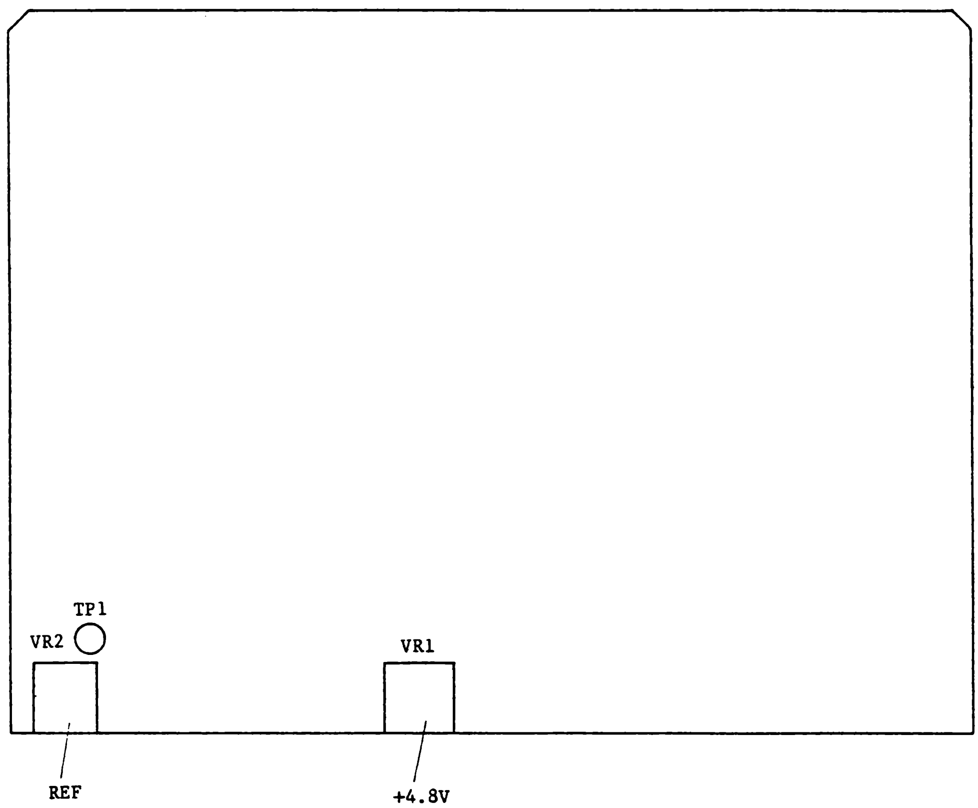
C	1	SXE25VB-39 6R3A	NCH
C	2	CM32W5R104M25VDC	KYC
C	3	CM21CH100J25VDC	KYC
C	4	CM21CH681J25VDC	KYC
C	5	553M6302 104K	NCC
C	6	CM32W5R104M25VDC	KYC
C	7	553M6302 104K	NCC
C	8	CM32W5R104M25VDC	KYC
C	9	268L6301 225M	NCC
C	10	553M6302 104K	NCC
C	11	SXC25VB-100	NCH
C	12	CM21CH102J25VDC	KYC
C	13	CM21CH102J25VDC	KYC
C	14	SXC16VB-100	NCH
C	15	UMA1C100MCA	NCI
C	16	SXE25VB-120 6R3D	NCH
C	17	CM21CH102J25VDC	KYC
C	18	SXE10VB-120 5D	NCH
C	19	UMA0J101MCA	NCI

Inductance Coiles

L	1	ST-203047	IKE
L	2	ST-980363	IKE
L	3	ST-980364	IKE
L	4	ST-202850	IKE
L	5	ST-980363	IKE
L	6	ST-980382	IKE

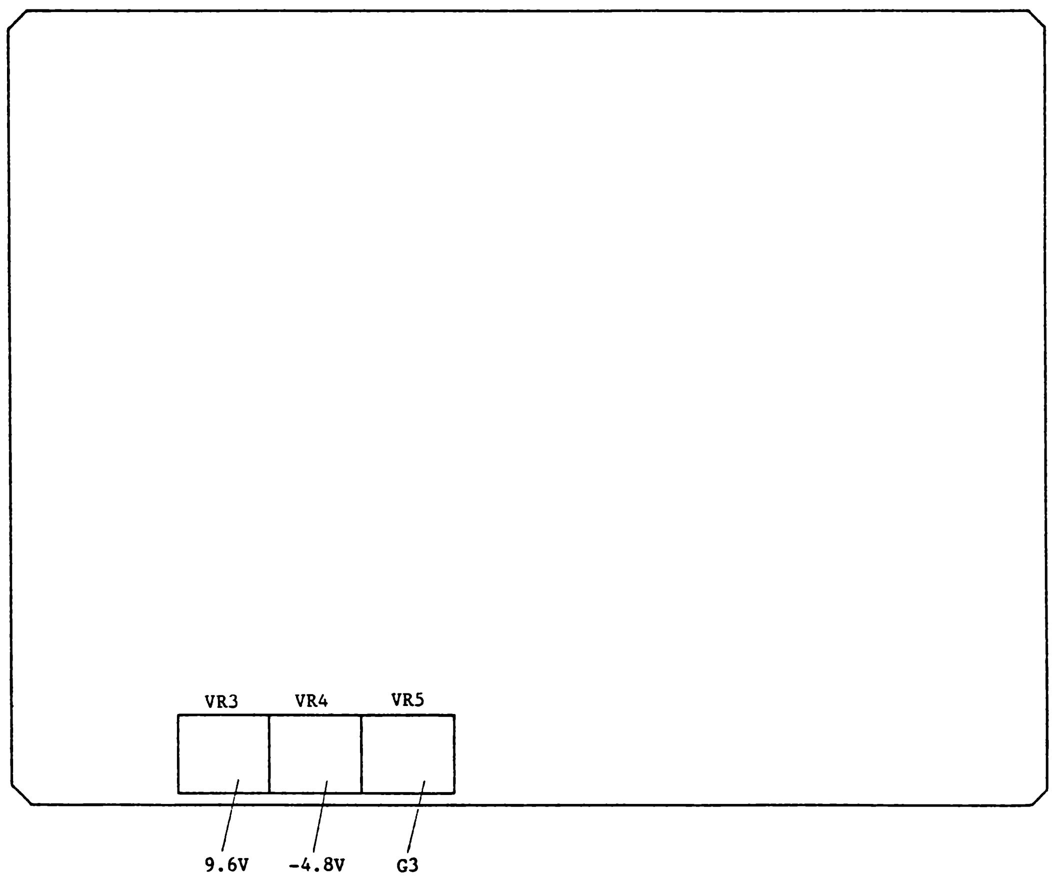
Connector

CN	1	PS20PA-D4R1-A1	JAE



POWER-2

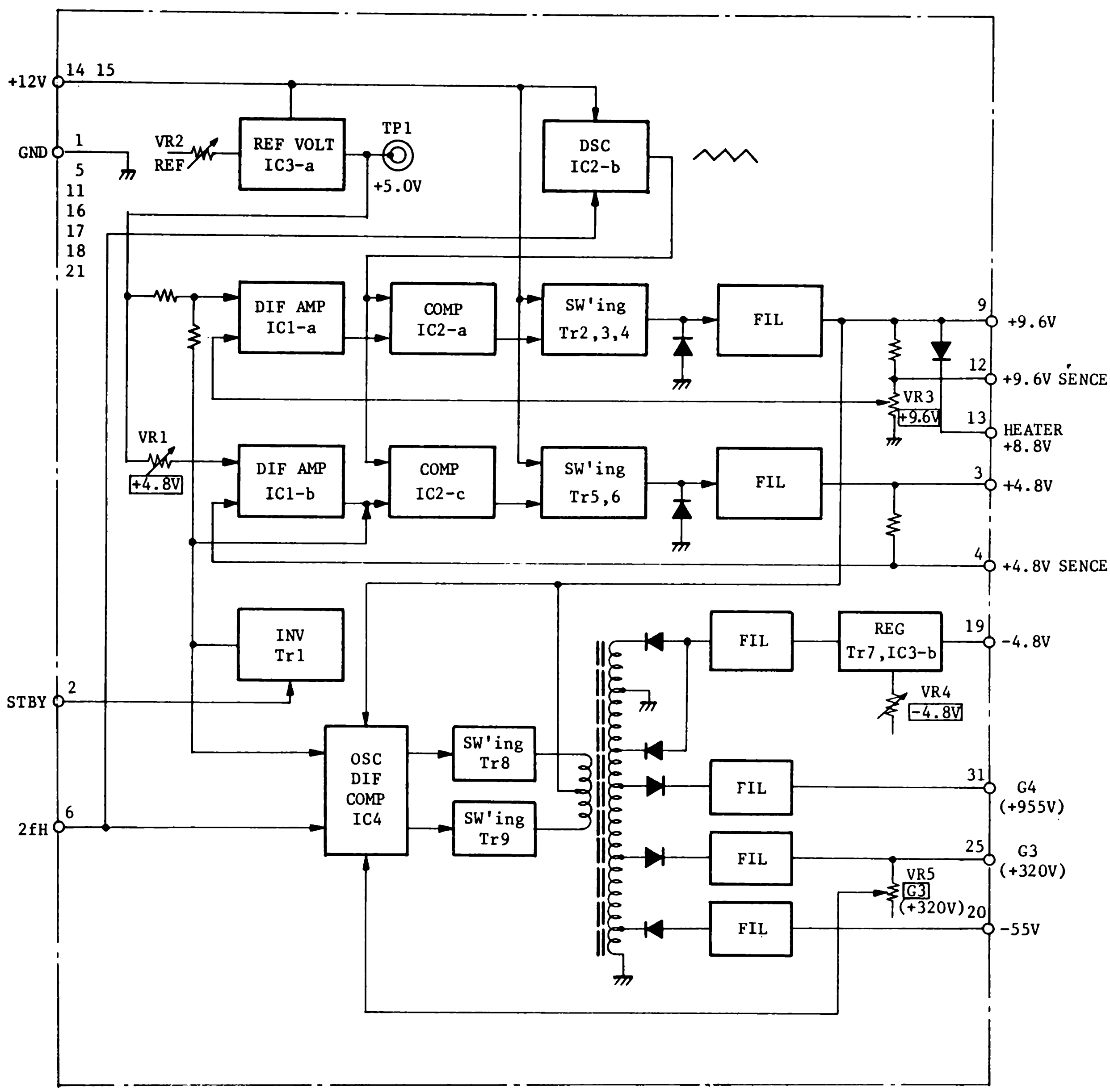
Fig. 6-9-a



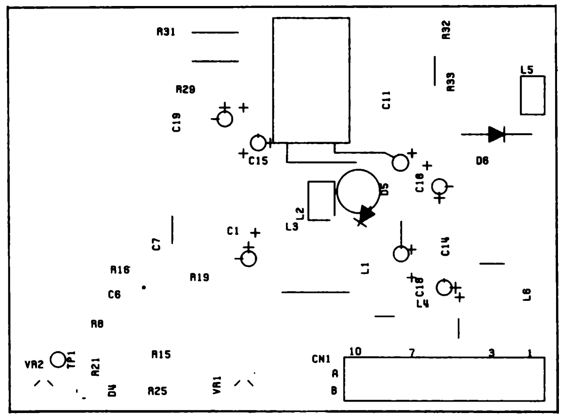
POWER-1

POWER
Controls

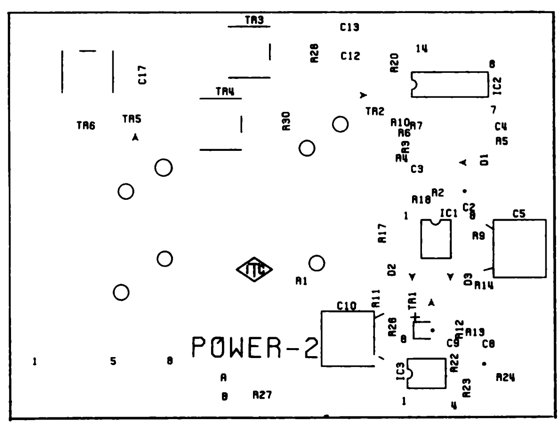
Fig. 6-9-b



POWER
Block Diagram



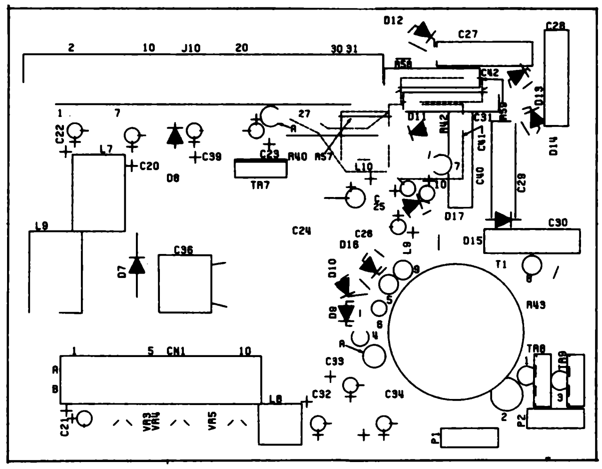
A SIDE



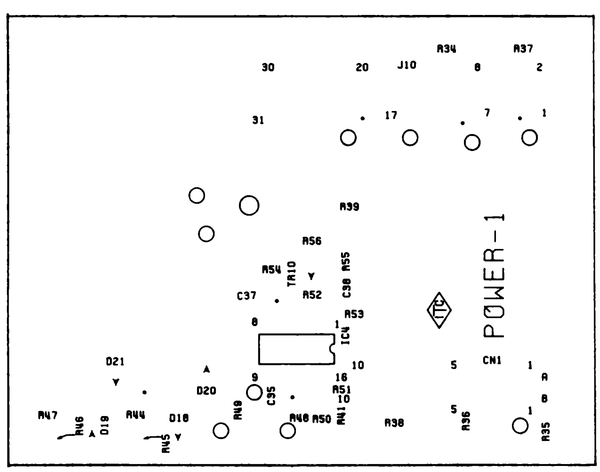
B SIDE

POWER-2

Fig. 6-9-c



A SIDE



B SIDE

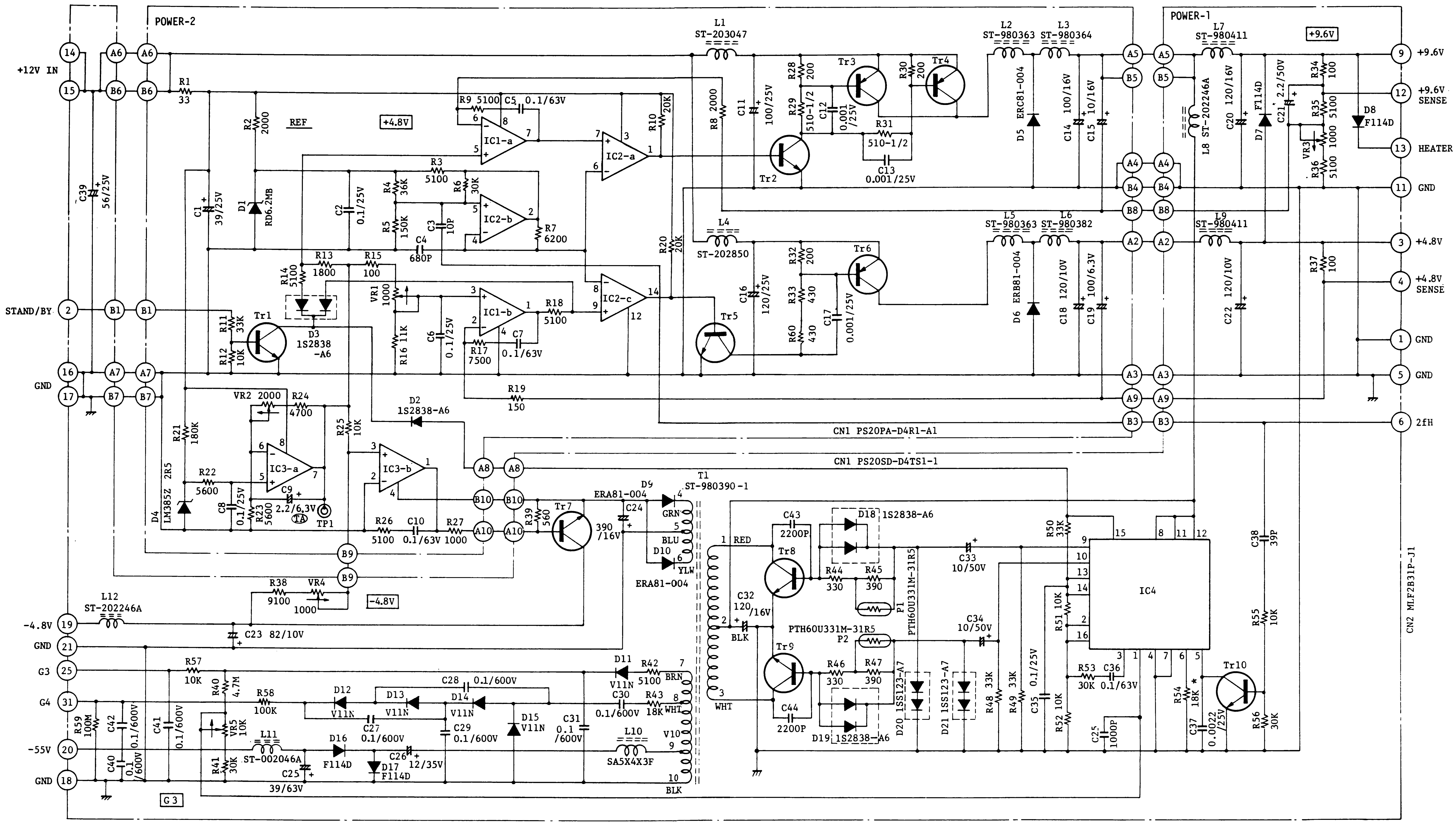
POWER-1

A side : Discrete parts is attached on the A side of the module.

B side : Only chip parts is ataached on the B side of the module.

POWER
Parts Layout

Fig. 6-9-d



IC1,3 : TL-062CPS
IC2 : μPC339G
IC4 : MB3759PF

Tr1,10 : 2SC1623-L7
Tr7 : 2SD1220Y
Tr2,5 : NTM3904-B25
Tr3,4,6: 2SA1244LBY,O
Tr8,9 : 2SC3074Y,O

POWER
Schematic Diagram
C3-980300

Adjustment

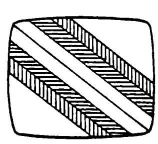
(1) Daily check

* To check the power supply, confirm that the BATT IND lamp is ON.
* Proper adjustment of the BRIGHTNESS control on the left side permits a light raster to develop after power has been turned ON.
* Reception of a video signal immediately produces an image. If no image appears, check the video signal.
* Feed a stepped-wave input signal and adjust the CONTRAST and the BRIGHTNESS controls on the left side until the proper graduation of WHITE and BLACK is achieved.
* TALLY indication is effected at two places ---- the front (UP TALLY) and the escutcheon (red light-emitting diode on the lower left side). The front UP TALLY can be independently turned ON/OFF by a switch at the lower side on the enclosure.
* ZEBRA switch: Turning ON this switch develops a zebra pattern when the WHITE signal has exceeded 100%.
* PEAKING: This is used to adjust the compensation for the high band of video input signals.

(2) Adjustment

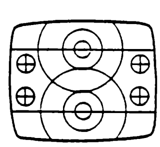
① Controls on DEF. BOARD

H. HOLD VR2



When the picture flows diagonally or horizontally, as shown in the figure on the left, adjust VR2, until it becomes stable.

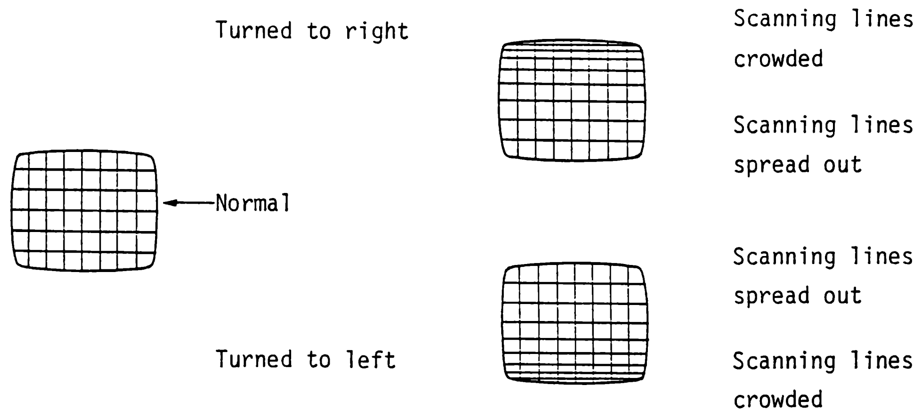
V. HOLD VR3



When the picture rolls vertically, as shown in the figure on the left, adjust VR3.

V. LIN VR8

VR8 is for linearity control of vertical deflection; it operates as shown in the following figure.



Vertical linearity can be calculated as follows. This applies to horizontal linearity.

A = Maximum value of spaces between bar signal
B = Minimum value of spaces between bar signal
C = Average value of spaces between bar signal

$$\text{Linearity} = \frac{A - B}{C} \times 1/2 \times 100\ (\%)$$

V.HEIGHT VR4

VR4 is for vertical amplitude control. Adjust V. HEIGHT control and V. LIN control alternately, and set the amplitude at 19mm.

H. LIN L2

Adjust so that horizontal spacing becomes approximately equal.

FOCUS VR5

Turn the CONTRAST control fully CCW and the BRIGHTNESS control fully CW; then adjust VR5 so that the scanning raster can be recognized.

SUB. BRIGHT VR7

This is used in conjunction with the BRIGHTNESS control to adjust screen brightness.

② Controls on VIDEO BOARD

+9V ADJ VR9

This is used to set voltage across the C53 to +9V.

VF15-12A

GENERAL

No.	Description	M.F.D
CRT		
V 1	40LB4	MID
CRT Socket		
V 1a	S7-506P-100	QQQ
Deflection Yoke		
DY 1	ST-901142	TTD
Multi Plyer		
D 8	ST-9598B	IKE
Variable Resistors		
VR 1	RV102YN15SB 1kΩ	COS
VR 6	RV102YN15SB 500kΩ	COS
Connectors		
CN 2	W-A3204-2B	SMK
CN 3	W-A3207-2B	SMK
CN 4	W-A3203-2B	SMK
Contact		
	W-T-0873	SMK
Diodes		
D 12	TLR143	TOS
D 13	TLR143	TOS
D 14	TLR143	TOS
D 15	TLR143	TOS
Other		
	B-16(S)	OKI

VIDEO

No.	Description	M.F.D
Integrated Circuit		
IC 2	μPC4081C2	NEC
Transistors		
Tr 1	NTM3906-Y25	NEC
Tr 2	NTM3904-B25	NEC
Tr 3	NTM3904-B25	NEC
Tr 4	NTM3904-B25	NEC
Tr 5	2SC2611	HIT
Tr 6	2SC1834L	NEC
Tr11	2SA950-0	TOS
Tr12	2SA1048LG	TOS
Tr14	2SA1010K/L	NEC
Tr15	3SK14	NEC
Diodes		
D 19	HZ6HLC-2	HIT
D 20	1S2836-A4	NEC
Delay Line		
DL 1	ZDL-502	SWCC
Inductor		
L 1	SP0406L-510K	TDK
L 3	ST-202032B	IKE
Variable Resistors		
VR 9	RJ-4WS-1000Ω	COP
VR10	RV102YN15SB 20kΩ	COS
Switches		
S 1	T101-M-H-Z-Q-E	C&K
S 2	T101-M-H-Z-Q-E	C&K
Resistors		
R 1	RE15YQ 120ΩF	SSM
R 2	RMC1/10 100ΩF	KMY
R 3	RMC1/10 24kΩF	KMY
R 4	SN14K2B 68kΩF	KOA
R 5	RMC1/10 1kΩF	KMY
R 6	RMC1/10 22ΩF	KMY
R 7	RMC1/10 15kΩF	KMY
R 8	RMC1/10 36kΩF	KMY
R 9	RMC1/10 470ΩF	KMY
R 10	*RE15YQ 360ΩF	SSM
R 11	SN14K2B 499ΩF	KOA
R 12	RMC1/10 470ΩF	KMY
R 13	RMC1/10 10kΩF	KMY
R 14	RMC1/10 33kΩF	KMY
R 15	RMC1/10 15kΩF	KMY
R 16	RMC1/10 100ΩF	KMY
R 17	RMC1/10 510ΩF	KMY
R 18	RMC1/10 10kΩF	KMY
R 19	SN14K2H 3kΩF	KOA
R 20	RMC1/10 150ΩF	KMY
R 21	*RE15YQ 10ΩF	SSM
R 24	RMC1/10 300ΩF	KMY
R 25	RMC1/10 47kΩF	KMY
R 26	ERC14GJ 106	MEC
R 28	RMC1/10 0ΩF	KMY
R 29	SN14K2B 200kΩF	KOA
R 30	RMC1/10 1kΩF	KMY
R 62	RMC1/10 3kΩF	KMY
R 63	RMC1/10 1500ΩF	KMY
R 64	RMC1/10 3kΩF	KMY
R 65	RMC1/10 3300ΩF	KMY
R 66	RMC1/10 4700ΩF	KMY
R 67	SN14K2H 510ΩF	KOA
R 68	RMC1/10 10kΩF	KMY
R 69	RMC1/10 270ΩF	KMY
R 75	RMC1/10 4700ΩF	KMY
R 77	RMC1/10 5600ΩF	KMY
R 78	RMC1/10 3300ΩF	KMY
R 79	RMC1/10 7500ΩF	KMY
R 80	RMC1/10 10kΩF	KMY

No.	Description	M.F.D
Capacitors		
C 1	KMA 16VB10	NCH
C 2	KMA 50VB3R3	NCH
C 3	TSD-S-1C 680M	HIT
C 4	KMA 10VB33	NCH
C 5	FD11Y5R1H 222H	TDK
C 6	KMA 16VB10	NCH
C 7	KMA 16VB10	NCH
C 8	*DM05C 470J3	SOS
C 10	501N5002 102K	NCC
C 12	501N5002 472K	NCC
C 13	CM21W5R 223M25VDC	KYC
C 14	DM10C 151J3	SOS
C 52	KXC 25VB33	NCH
C 53	UVS1A 471MPA	NCH
Connector		
CN 3	W-P9007	SMK

VF15-12A

DEF.

No.	Description	M.F.D
Integrated Circuit		
IC 1	HA11441	HIT
Transistors		
Tr 7	NTM3904-B25	NEC
Tr 8	2SD975	HIT
Tr 9	NTM3904-B25	NEC
Tr10	NTM3904-B25	NEC
Diodes		
D 2	1SS154-BA	TOS
D 3	1S1835	TOS
D 4	1S2836-A4	NEC
D 5	1S2836-A4	NEC
D 6	1S2836-A4	NEC
D 7	V11N	HIT
D 18	V11N	HIT
Transformer		
T 1	ST-9563B	IKE
Variable Resitors		
VR 2	RJ-4WS 5kΩ	COP
VR 3	RJ-4WS 5kΩ	COP
VR 4	RJ-4WS 200Ω	COP
VR 5	3321N-1-205Ω	MUR
VR 7	3321N-1-504Ω	MUR
VR 8	RJ-4WS 20kΩ	COP
Resistors		
R 27	RE15YQ 56ΩF	SSM
R 31	RMC1/10 6200ΩF	KMY
R 32	SN14K2B 68kΩF	KOA
R 33	RMC1/10 12kΩF	KMY
R 34	RMC1/10 470ΩF	KMY
R 35	RMC1/10 680ΩF	KMY
R 36	*RE15YQ 13kΩF	SSM
R 37	RMC1/10 1kΩF	KMY
R 38	RE15YQ 56ΩF	SSM
R 39	RMC1/10 510ΩF	KMY
R 40	RMC1/10 39kΩF	KMY
R 41	SN14K2B 56kΩF	KOA
R 42	RMC1/10 8200ΩF	KMY
R 43	RMC1/10 8200ΩF	KMY
R 44	RMC1/10 3900ΩF	KMY
R 45	RMC1/10 6800ΩF	KMY
R 46	RMC1/10 15kΩF	KMY
R 47	RE35YQ 100ΩF	SSM
R 48	RE15YQ 56ΩF	SSM
R 49	SN14L2B 3R9ΩF	KOA
R 51	*RE15YQ 1300ΩF	SSM
R 52	RMC1/10 1500ΩF	KMY
R 55	RMC1/10 180ΩF	KMY
R 56	SN14K2H 15ΩF	KOA
R 57	RE15YQ 5600ΩF	SSM
R 58	RMC1/10 15kΩF	KMY
R 59	RK14B2H 3R3MΩJ	KOA
R 60	RK14B2H 3R3MΩJ	KOA
R 61	SN14K2E 330kΩF	KOA
R 74	RMC1/10 300ΩF	KMY
R100	RE15YQ 910ΩF	SSM
Capacitors		
C 17	FD11Y5R1H 103M	TDK
C 18	CS15E1C 2R2M	NEC
C 19	FD11Y5R1H 103M	TDK
C 20	FD22C0G1H 472K	TDK
C 21	FD12Y5R1H 333M	TDK
C 22	TSD-S-1C 101M	NCH
C 23	KMA 50VB3R3	NCH
C 25	CS15E1C 4R7M	NEC
C 26	SMC50VB1BP	NCH
C 27	CM21W5R 223M25VDC	KMC
C 28	TSD-S-1C 101M	HIT
C 29	FD11Y5R1H 472M	TDK
C 30	CS15E1C 4R7M	NEC
C 31	CS15E1H R22M	NEC
C 32	KMA 10VB33	NCH
C 33	KXC 10VB100	NCH
C 34	ECQ-E2104KZ	MID
C 35	FD12Y5R1H 104M	TDK
C 36	KXC 10VB100	NCH
C 37	MR6BX2D 222K	TDK

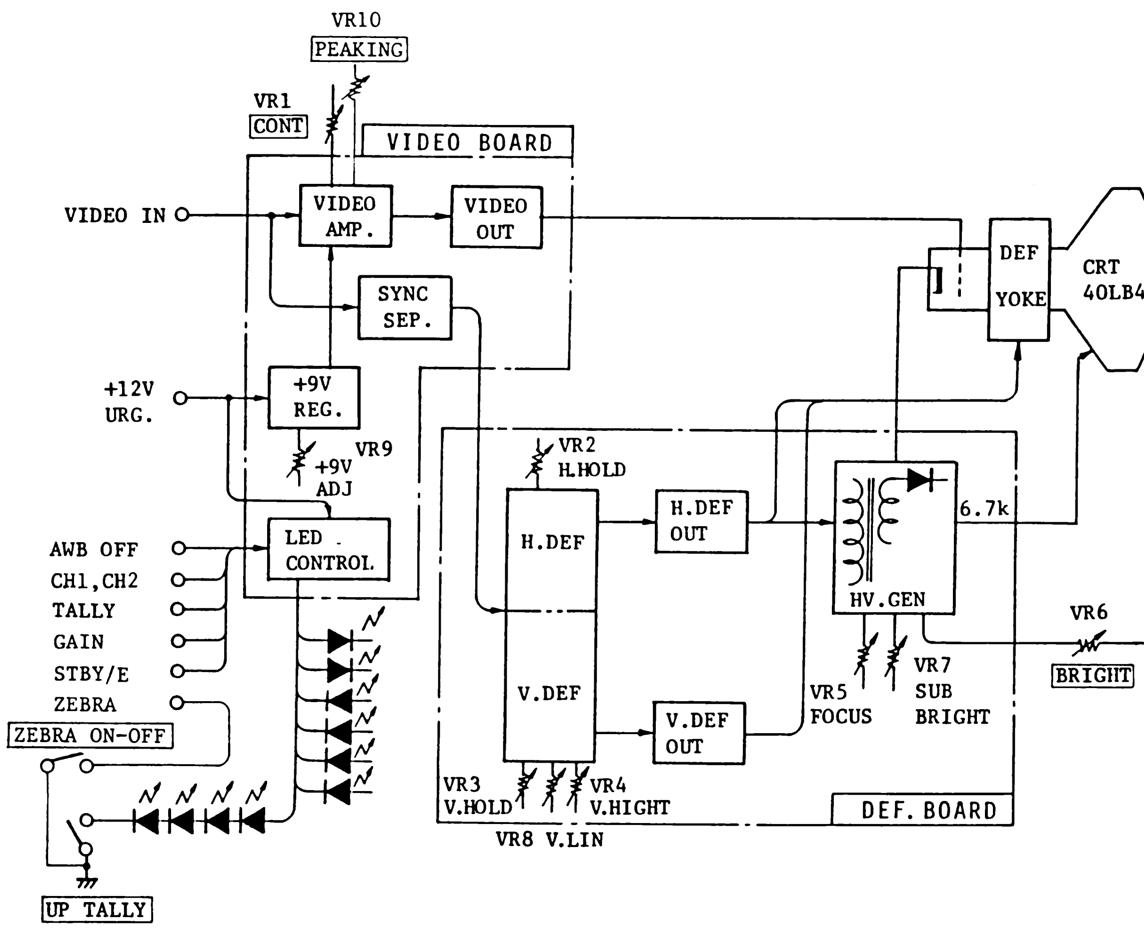
No.	Description	M.F.D
Capacitors		
C 38	MR6BX2D 222K	TDK
C 39	KXC 16VB33	NCH
C 40	MR5BX2A 222K	TDK
C 41	MR6BX2D 472K	TDK
C 42	SMC6.3VB 470	NCH
C 43	DD3180-362-4700-2KJ	MUR
C 44	DD31-6E103P500V02	MUR
C 45	MR6BX2D 103K	TDK
C 46	FD22Y5R1H 473M	TDK
C 48	FD11Y5R1H 472M	TDK
C 51	*DM05C 101J3	SOS
C 60	MR6BX2D 392K	TDK
C 61	FD11Y5R1H 222M	TDK
C 62	FD11Y5R1H 472M	TDK
Inductance Coil		
L 2	HL-1217C-01	TDK
Connectors		
CN 2	W-P9004	SMK
CN 4	W-P9003	SMK

SUB.

No.	Description	M.F.D
Connectors		
CN 1	DE-9P-T	JAE
CN A	PS-5PA-S4LT1-A1	JAE
Resistor		
R 23	SN14K2H 47ΩF	KOA
Diode		
D 1	V11N	HIT
Capacitor		
C 11	SMC50VB 2R2	NCH

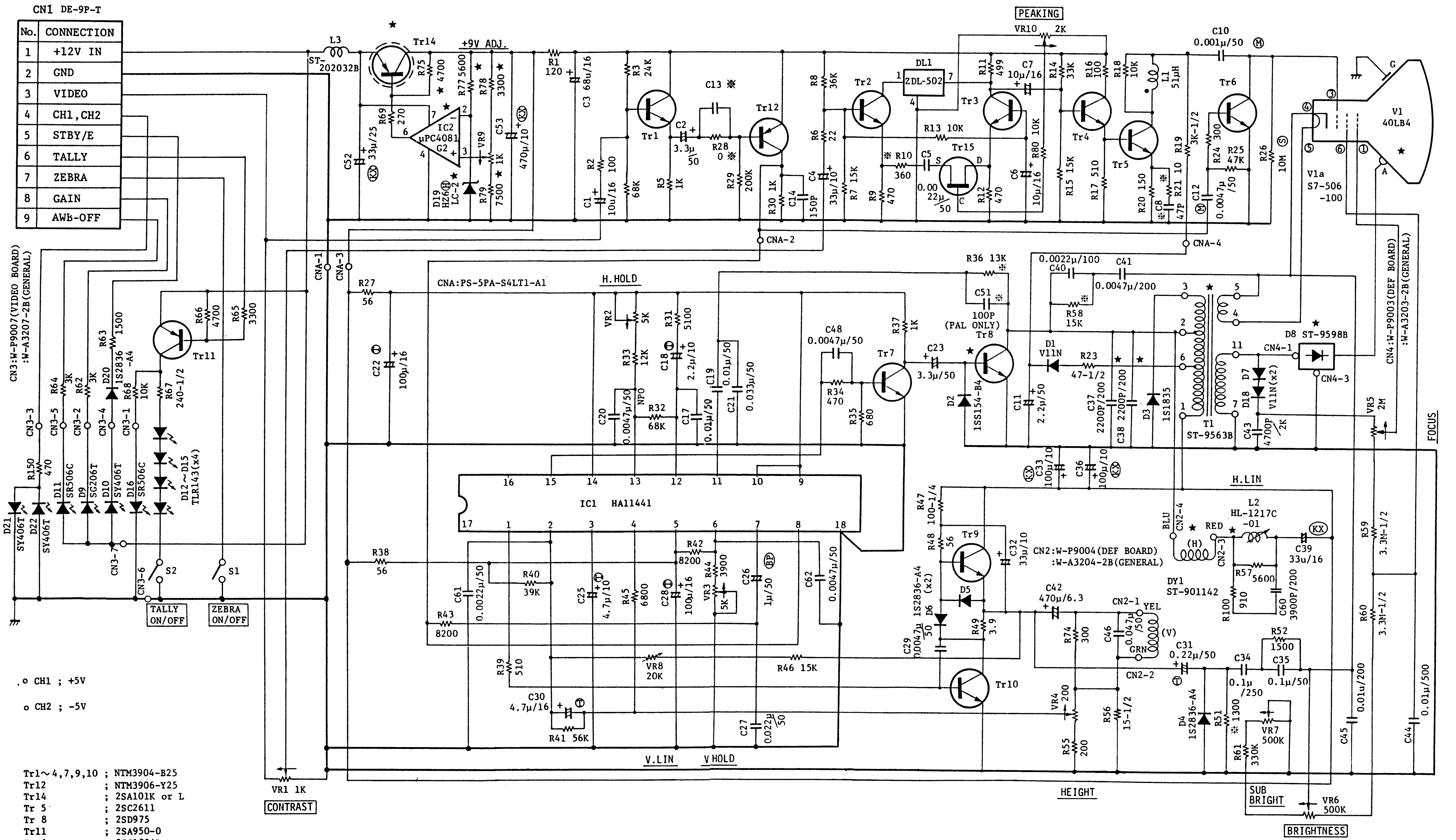
LED BOARD

No. Parts	Description	M.F.D
Diodes		
D 9	SG206T	NEC
D 10	SY206T	NEC
D 11	SR506C	NEC
D 16	SR606C	NEC
D 21	SY406T	NEC
D 22	SY406T	NEC
Resistor		
R150	RMC1/8 470ΩF	KMY



VF15-12A
VIEWFINDER
Block Diagram

Fig. 6-10-b



Tr1~4,7,9,10	;	NTM3904-B25
Tr12	;	NTM3906-Y25
Tr14	;	2SA1O1K or L
Tr 5	;	2SC2611
Tr 8	;	2SD975
Tr11	;	2SA950-O
Tr 6	;	2SC1834L
Tr15	;	3SK14(MOS FET)

NOTE 1 ★Marked parts are critical component of X ray radiation.

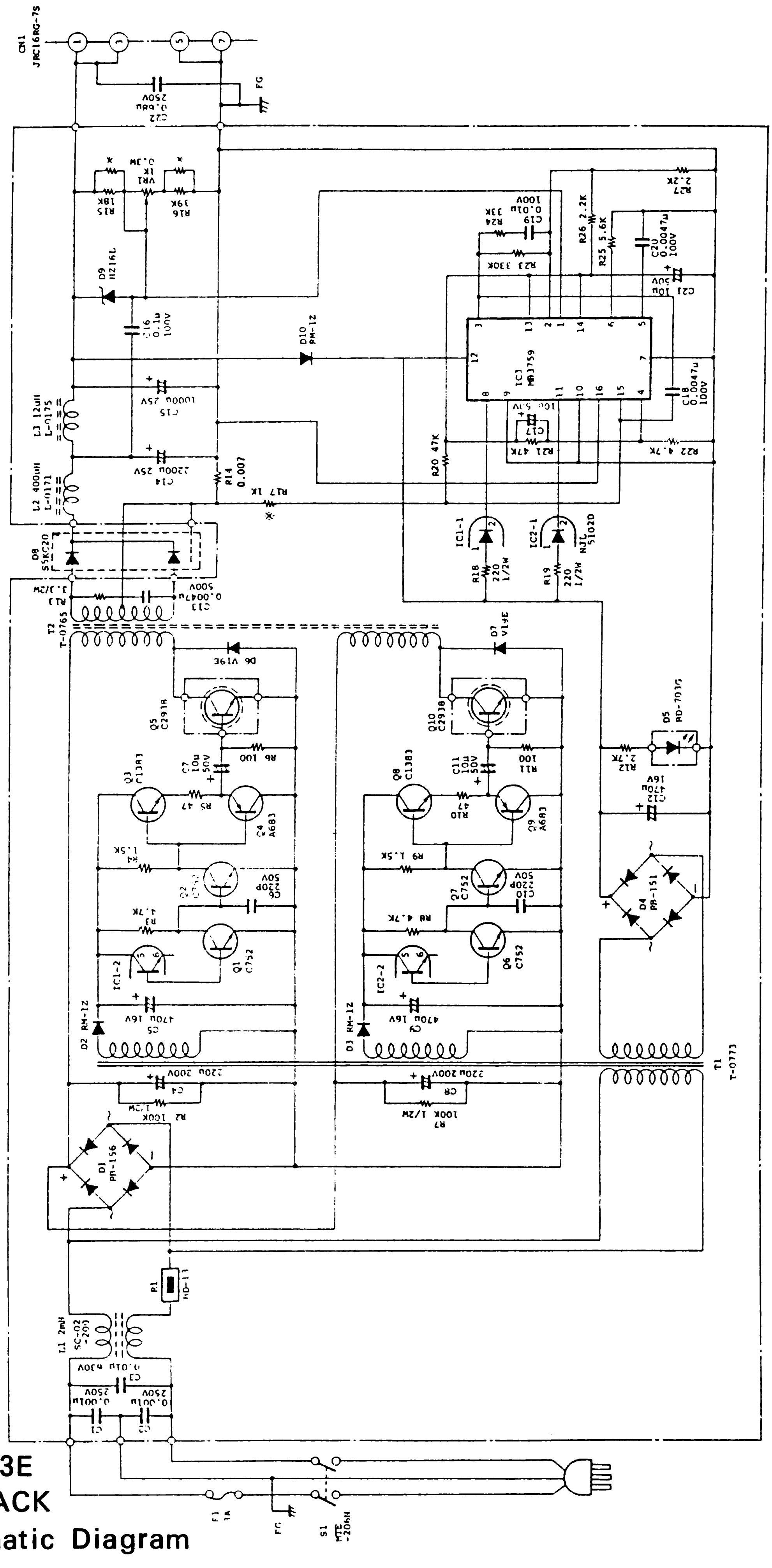
2 C51 is not used in NTSC SYSTEM.

VF15-12A VIEWFINDER
Schematic Diagram
C3-902335

No.	DESCRIPTION	M.F.D
	INTEGRATED CIRCUITS	
IC1	NJL5102D	JRC
IC2	NJL5102D	JRC
IC3	MB3759M	FJT
	TRANSISTORS	
Q1	2SC752	TOS
Q2	2SC752	TOS
Q3	2SC1383	NEC
Q4	2SA683	NEC
Q5	2SC2938	SHD
Q6	2SC752	TOS
Q7	2SC752	TOS
Q8	2SC1383	NEC
Q9	2SA683	NEC
Q10	2SC2938	SHD
	DIODES	
D1	8B-156	SKN
D2	RM-1Z	SKN
D3	RM-1Z	SKN
D4	RB-151	SKN
D5	8D-703G	OKA
D6	V19E	HIT
D7	V19E	HIT
D8	S5KC20	SHD
D9	HZ16L	HIT
D10	RM-1Z	SKN
	RESISTORS	
R1	BD-13	IDC
R2	ELR50-S- 100KΩJ	TEI
R3	ELR25-02-4.7KΩJ	TEI
R4	ELR25-02-1.5KΩJ	TEI
R5	ELR25-02- 47ΩJ	TEI
R6	ELR25-02- 100ΩJ	TEI
R7	ELR50-S- 100KΩJ	TEI
R8	ELR25-02-4.7KΩJ	TEI
R9	ELR25-02-1.5KΩJ	TEI
R10	ELR25-02- 47ΩJ	TEI
R11	ELR25-02- 100ΩJ	TEI
R12	ELR25-02-2.7KΩJ	TEI
R13	RSF2B 3.3ΩJ	KOA
R14	0.01Ω	IKE
R15	ELR25-02- 18KΩJ	TEI
R16	ELR25-02-3.9KΩJ	TEI
R17	ELR25-02- 1KΩJ	TEI
R18	ELR50-S- 220ΩJ	TEI
R19	ELR50-S- 220ΩJ	TEI
R20	ELR25-02- 47KΩJ	TEI
R21	ELR25-02- 47KΩJ	TEI
R22	ELR25-02-4.7KΩJ	TEI
R23	ELR25-02-330KΩJ	TEI
R24	ELR25-02- 33KΩJ	TEI
R25	ELR25-02-5.6KΩJ	TEI
R26	ELR25-02-2.2KΩJ	TEI
R27	ELR25-02-2.2KΩJ	TEI
VR1	TM62KPH 1KΩB	NOB
	CAPACITORS	
C1	ECK-DDS102MD	NEC
C2	ECK-DDS102MD	NEC
C3	MDD22J103M	NTK
C4	SL200T-220	NCH
C5	SM16VB-470	NCH
C6	ECK-F1H221KB2	NEC
C7	SM50VB-10	NCH
C8	SL200T-220	NCH
C9	SM16VB-470	NCH
C10	ECK-F1H221KBZ	NEC
C11	SM50VB-10	NCH
C12	SM16VB-470	NCH
C13	ECK-F2H472KB2	NEC
C14	SM25VB-2200	NCH
C15	SM25VB-1000	NCH
C16	CQ92MB2A104	OKA
C17	SM50VB-10	NCH
C18	CQ92MB2A472	OKA
C19	CQ92MB2A103	OKA
C20	CQ92MB2A472	OKA
C21	SM50VB-10	NCH
C22	MDD2-2E684M	NTK
	TRANSFORMERS	
T1	T-0773	IKE
T2	T-0765	IKE
	COILS	
L1	SC-02-200	TAM
L2	L-0171	IKE
L3	L-0175	IKE
	SWITCH	
S1	MTE206N	FJS
	FUSE	
F1	MF61NR3	TFC
	CONNECTOR	
CN1	JRC16RG-7S	HRS

No.	DESCRIPTION	M.F.D
	FUSE HOLDER & CAP	
	FEU031-1673	INT
	FEK031-1661	INT
	AC CORD	
	SJT-#18-3P	HEW

Fig. 6-11-a



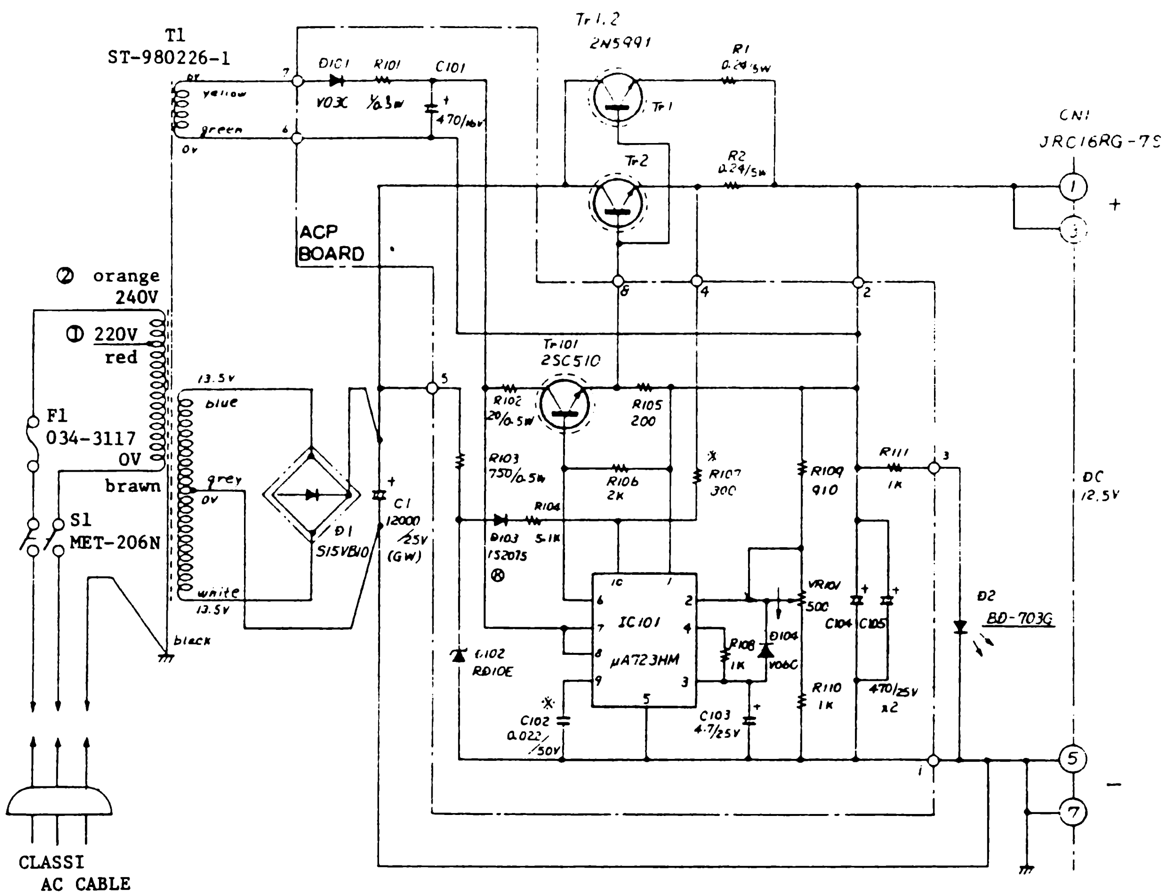
NOTE 1) UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W
ALL CAPACITORS IN F

2) * MARKED VALUES ARE SUBJECT
TO CHANGE WITHOUT NOTICE.

ACP-23E
AC PACK
Schematic Diagram

No.	DISCRIPTION	M.F.D
	INTEGRATED CIRCUI	
IC101	uA723HM	FCH
	TRANSISTERS	
Tr1	2N5991	MOT
Tr2	2N5991	MOT
Tr101	2SC510-0	TOS
	DIODES	
D1	S15VB10	SHD
D2	BD-703G	OKA
D101	V03C	HIT
D102	RD10E(B)	NEC
D103	1S2075 K	HIT
D104	V06C	HIT
	RESISTORS	
R1	RHA5G-0.24ΩJ	SEF
R2	RHA5G-0.24ΩJ	SEF
R101	ERX-12ANJ1R0	MEC
R102	HES1/2 20ΩJ	HDK
R103	HES1/2 750ΩJ	HDS
R104	RE35YQ 5100ΩF	SSM
R105	RE35YQ 200ΩF	SSM
R106	RE35YQ 2000ΩF	SSM
R107	RE35YQ 300ΩF	SSM
R108	RE35YQ 1000ΩF	SSM
R109	RE35YQ 910ΩF	SSM
R110	RE35YQ 1000ΩF	SSM
R111	RE35YQ 1000ΩF	SSM
VR101	PN822H-501V	NEC
	CAPACITORS	
C1	GW25LGSN-12000	NCH
C101	SL16VB 470	NCH
C102	501N5002 223K1	NCC
C103	SL25VB 4R7	NCH
C104	SL25VB 470	NCH
C105	SL25VB 470	NCH
	TRANSFOMERS	
T1	ST-980226-1	IKE
	FUSE	
	034-3117	INT
	SWHCHES	
S1	MTE206N	FJS
	HEAT SINK	
	KQD-10/8.2	MIZ
	FUSE HOLDER	
	FEU031-1673	INT
	SOCKET (FUSE USE)	
	FEK031-1663	INT
	CONNECTORS	
CN1	JRC16RG-7S	HRS
	AC CORD	
	ST-980223	IKE

Fig. 6-11-b



NOTE 1) USE THE LINE MARKED BY ① AT220V AC OR ② AT 240V AC
NO USED LINE IS COVERED BY TUBE.

2) UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W
ALL CAPACITORS IN uF

3) ※ MARKED VALUES ARE SUBJECT TO CHANCE WITHOUT NOTICE.

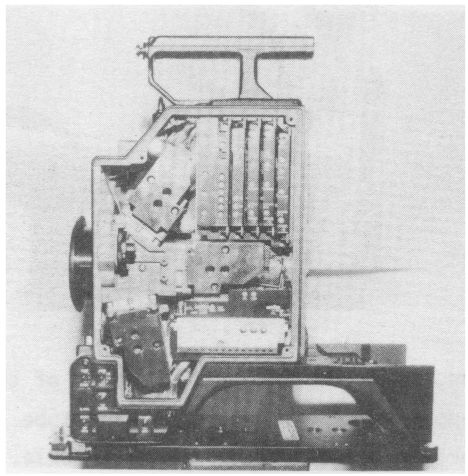
ACP-17E
AC PACK
Schematic Diagram

SECTION 7.0 MAINTENANCE

SECTION 7.1 IMAGE TUBE REPLACEMENT PROCEDURE

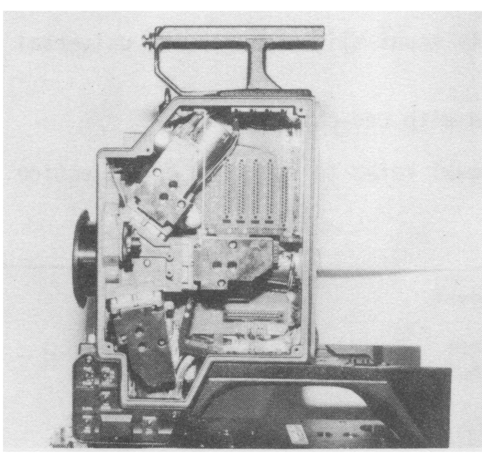
7.1.1 Deflection yoke assembly removal

1. With a coin, loosen the screws on the side panel. See *1 and remove it from the camera body.

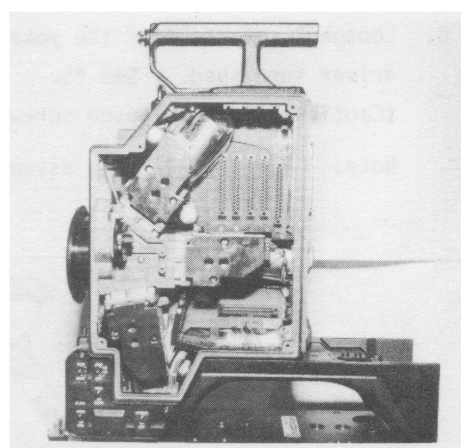


*1

2. Disconnect each module from the camera body.

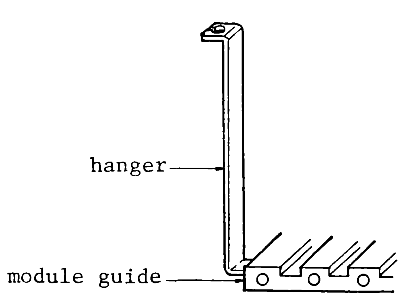


*2

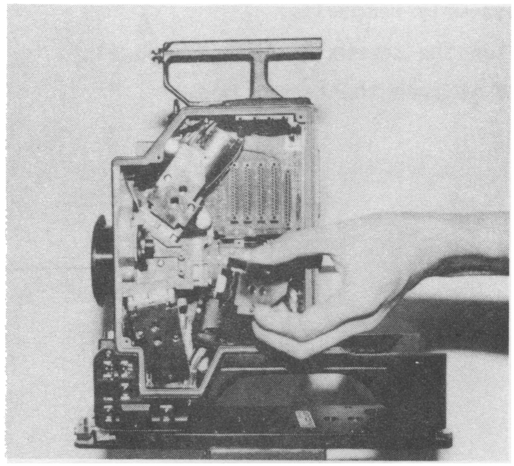


*3

3. For Bch, it is easy to disconnect when the hanger connected to the module guide is taken off.



4. Remove 2 screws securing the PRE AMP module. Draw the module the rear of the camera. Remove the connector. See *4.



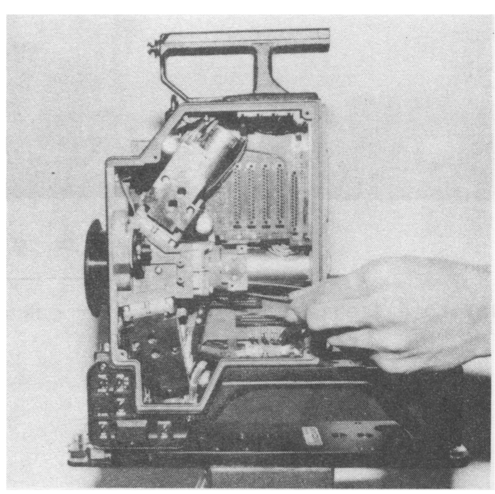
*4

Note: When plugging or unplugging the socket of the image tube, be careful not to apply undue force to the image tube. Be careful not to remove or distort the cover of the PRE AMP module. Also be careful not to bend the connecter pin upon removal & replacement of the PRE AMP module.

5. Use the same procedure for the other two channels.

6. Loosen 2 setscrews of the yoke assembly mount slightly with the universal screw-driver furnished. See *5.
(Caution: Do not loosen screws marked with red-color.)

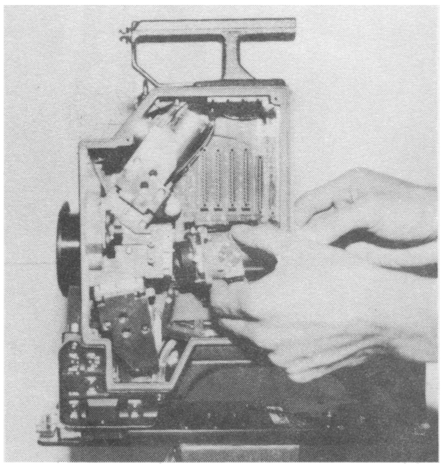
Note: For the Red yoke assembly removal refer to step 9 of this section.



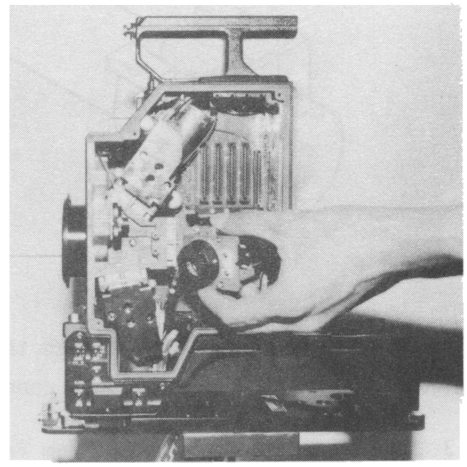
*5

7. Holding the yoke assembly by hand, unscrew the setscrews and shift the assembly backward slightly. Remove the yoke assembly from the camera body toward the front. See *6, *7.

Note: Avoid any intensive light from falling on the target surface of the image tube. The image tube should be carefully handled to prevent age. When the yoke assembly is removed, be careful to prevent entry of dust into the optical system. Cover the optical if there is such a risk.

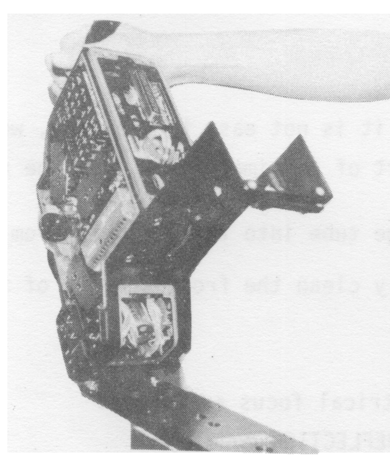


*6



*7

8. To remove the R channel yoke assembly, first remove the cover plate on the bottom of the camera. Then remove the assembly. See *8.

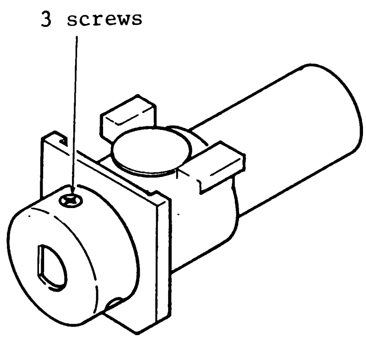


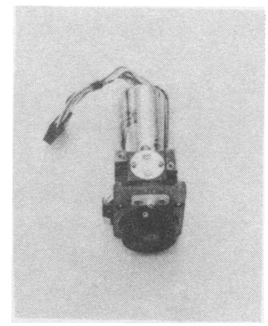
*8

7.1.2 Replacement of image tube

1. Remove the yoke assembly from the camera body.

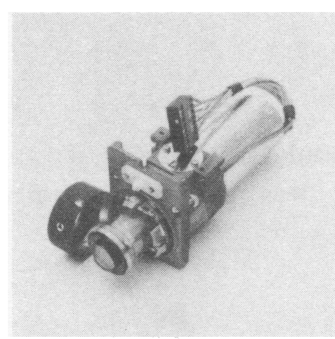
2. Loosen 3 screws on the tube cap and remove the tube cap at the front of the assembly.





* Caution: Remove it with the greatest possible care because the fine target lead wire is connected to the tube cap.

3. Draw out the image tube from front



* Caution: If it is not easy to draw out, we recommend that you push the rear part of the image tube from the rear of the yoke assembly.

4. Insert a new image tube into the assembly from the front.

Note: Completely clean the front surface of the tube before the image tube is inserted.

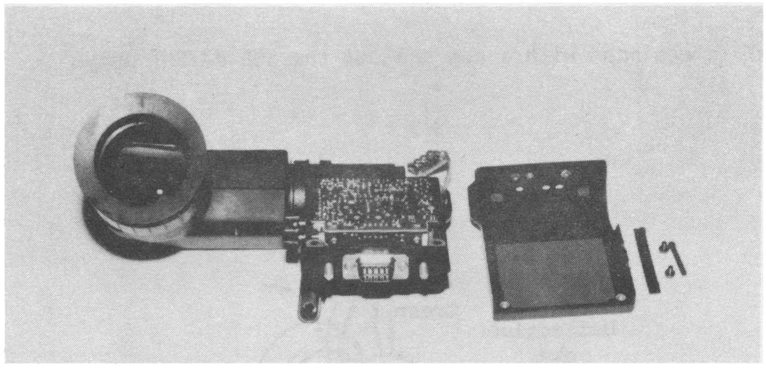
7.1.3 Beam set and electrical focus adjustment
(See PRE AMP and DEFLECTION module)

7.1.4 Beam scanning adjustment
(See DEFLECTION module)

7.1.5 Rotation and tracking adjustment
(See DEFLECTION module)

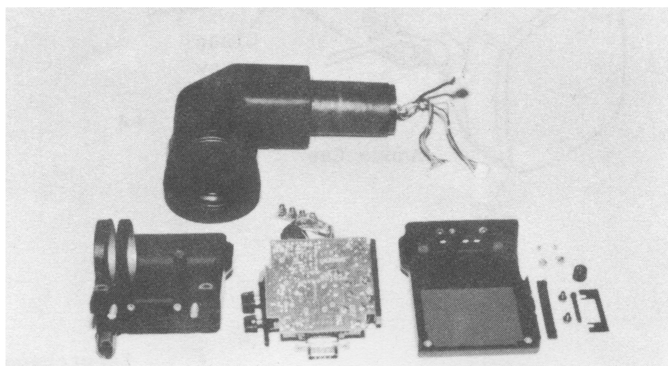
SECTION 7.2 VIEWFINDER DISASSEMBLY

(1) Remove the top cover from the viewfinder. See *1.



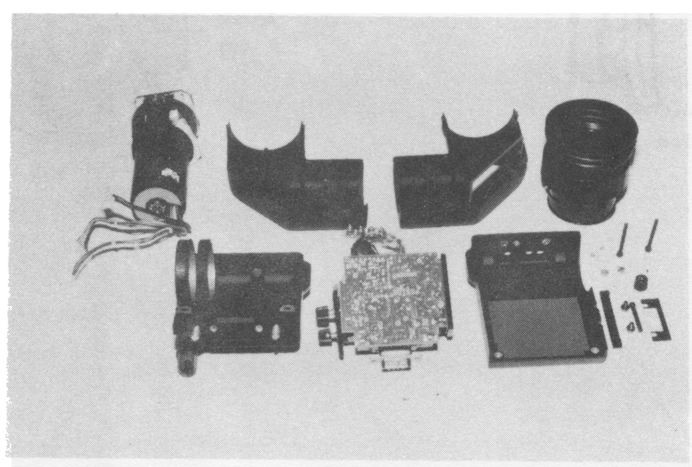
*1

(2) Remove the PC board and the deflection yoke connector and indicator lamp connector. See *2.



*2

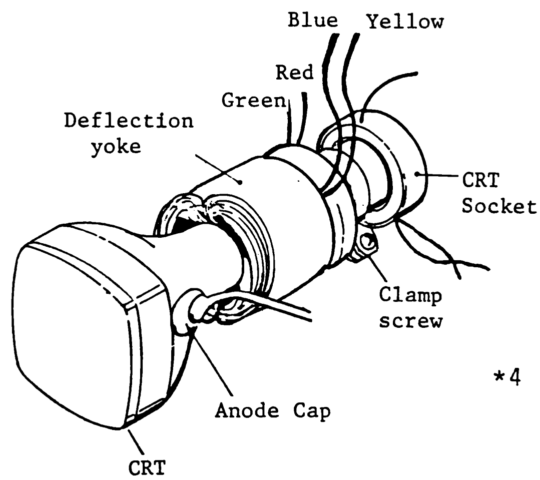
(3) Remove the eyepiece and the CRT sockets. See *3.



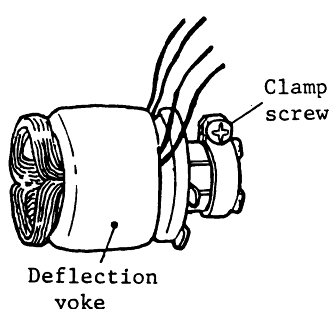
*3

(4) Remove the ground wire from the CRT. Remove the spring. Remove the escutcheon. Remove the anode cap (secured by a bundle of string.) Take *4, *5 and *6.

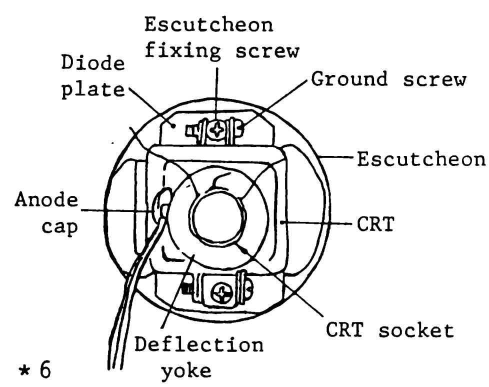
(5) If the CRT is replaced with a new one ,set the SUB BRIGHT only.



*4



*5



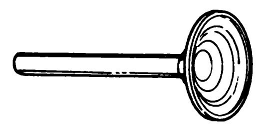
*6

SECTION 7.3 OPTICAL FILTER REPLACEMENT

(1) Remove 6 screws (6-M3) on the camera front as shown in Fig. 1 and remove the camera mount.

(2) Remove 2 screws (M2 with special pitch) and the support rings as shown in Fig. 2. In this case, pay attention not to drop the screws, support rings and the filter in the camera inside.

(3) Most convenient way of filter replacement is to use an absorbent tool as follows.



(4) Set the new filter by the support rings and the screws.

Caution: Do not turn the screws strongly for plastic filter turret. Clamping torque is approx 1.5 kg/cm.

(5) Rotating the filter disk, replace other filter in order of aboves (2) to (4).

(6) Attach the camera mount by 6 screws (6-M3) with clamping torque 6kg/cm.

(7) Apply the screw-lock-paint on each top of 6 screws after the filter replacement process is completed.

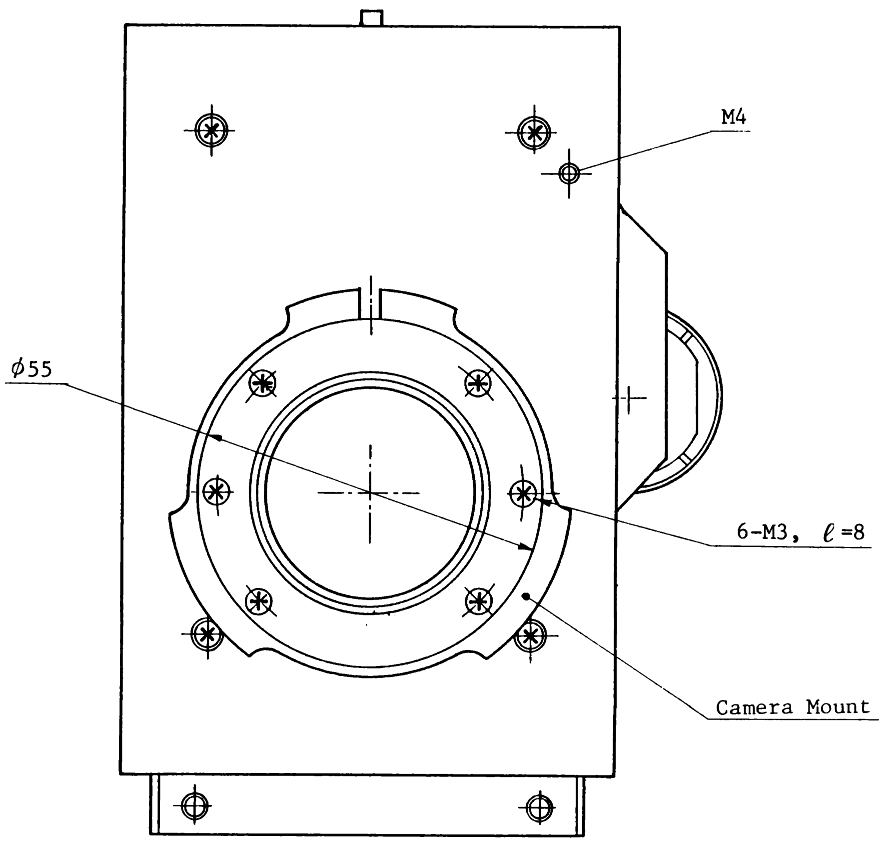


Fig. 1

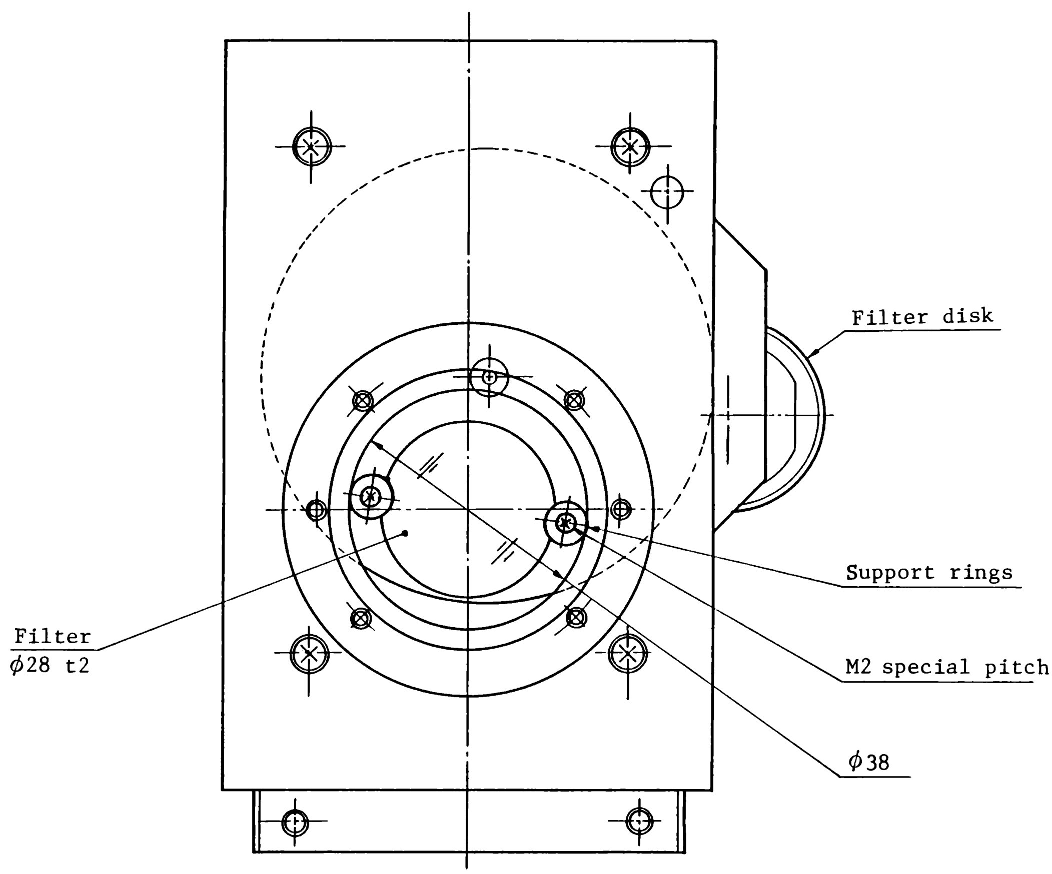

Filter disk
Support rings
Filter
ϕ28 t2
M2 special pitch
ϕ38

Fig. 2

SECTION 8.0 BATTERY

SECTION 8.1 Nickel Cadmium Battery

General

This battery is a type of alkaline battery which is called a cylindrical closed nickel cadmium storage battery". The anode is made of a nickel oxide and the cathode is made of a cadmium compound, and caustic potash is used as an electroyte. This battery is also beatured with a gas leak-free construction, resistance to overcharging and eased in handling.

Since the nominal terminal voltage of a single unit of the battery is 1.2V, ten batteries with uniform capacity are selected for this battery pack.

Specification

Nominal voltage:	12V
Nominal capacity:	4AH
Discharge ending voltage:	10.8V
Range of temperature:	When discharging; -20°C +50°C
	When charging; 0°C +45°C
Weight:	1800 g
Dimensions: (width x height x depth)	112 x 154 x 86 mm

SECTION 8.2 QUICK CHARGER FOR COLOR HANDY LOOKY (Model CHG-21A)

This quick charger is a compact, light-weight portable charger specially designed for the battery packs to be used in the color handy looky.

It automatically charges four battery packs one by one within a short time.

1. Features

(1) The automatic charging system of sequential switching type permits the quick charge of four battery packs connected to the connectors 1 to 4 in such an order.

(2) The new charge control method makes it possible to charge the battery pack almost to 100% without receiving any effect of the ambient temperature or the battery temperature.

(3) The charge can be made by the charging current, which is automatically selected according to the battery pack connected.

(4) The supply voltages can be changed by the rear voltage change switch to AC100V, 117V, 200V, 220V and 240V.

(5) The main circuit of the automatic charging system of sequential switching type is made contactless, thus improving the reliability.

(6) Appropriate safety measures are taken by the electronic timer, thermal fuse and thermal protector.

2. Specification

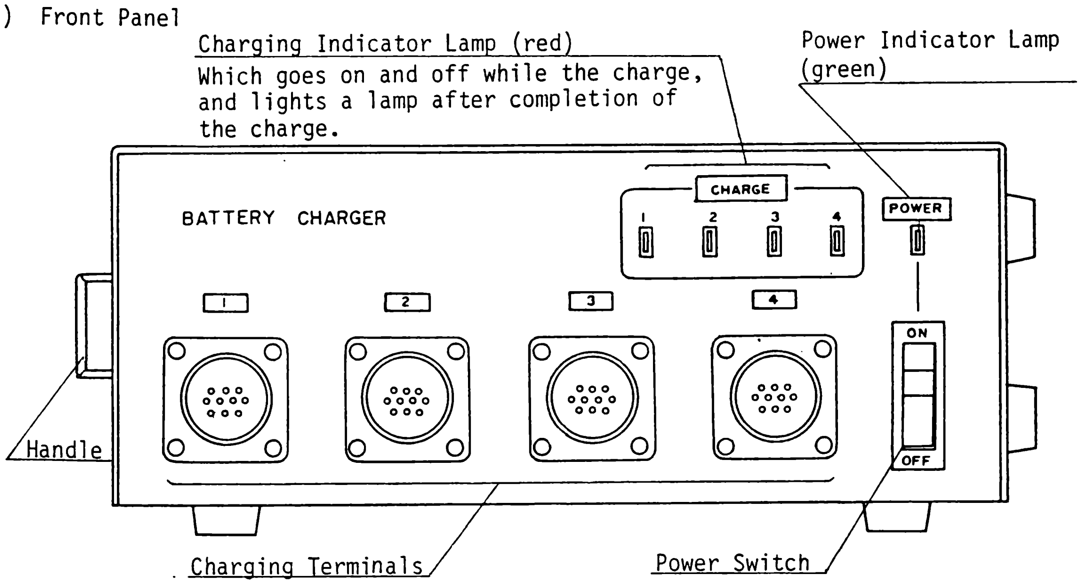
(1) Name	Quick Charge for Color Handy Looky	
(2) Model No.	CHG-21A	
(3) Electrical Specification		
a. Power Supply Voltage	AC100V, 117V, 200V, 220V, 240V	
b. Power Frequency	50 or 60Hz	
c. Charging Method		
° Quick Charge	Constant Current Charge by automatic sequential switching	
° Trickle Charge	Semi-constant current charge	
d. Charging Control	Drop voltage control method of peak voltage memory type	
e. Output		
° Output Voltage	DC12V	
° Charging Current	Quick Charge	2.2A and 1.8A
	Trickle Charge	about 0.12A x 4
(4) No. of Charging Output	4	
(5) Charging Time		
a. BAT-12B, BAT-12	about 2 hours (at 20°±5°C)	
b. BAT-13	about 1.5 hours (at 20°±5°)	
(6) Applicable Type of Battery	BAT-12B (BAT-12 and BAT-13 are changeable)	

(7) Outer Dimension 210mm (W) x 257mm (D) x 85mm (H)

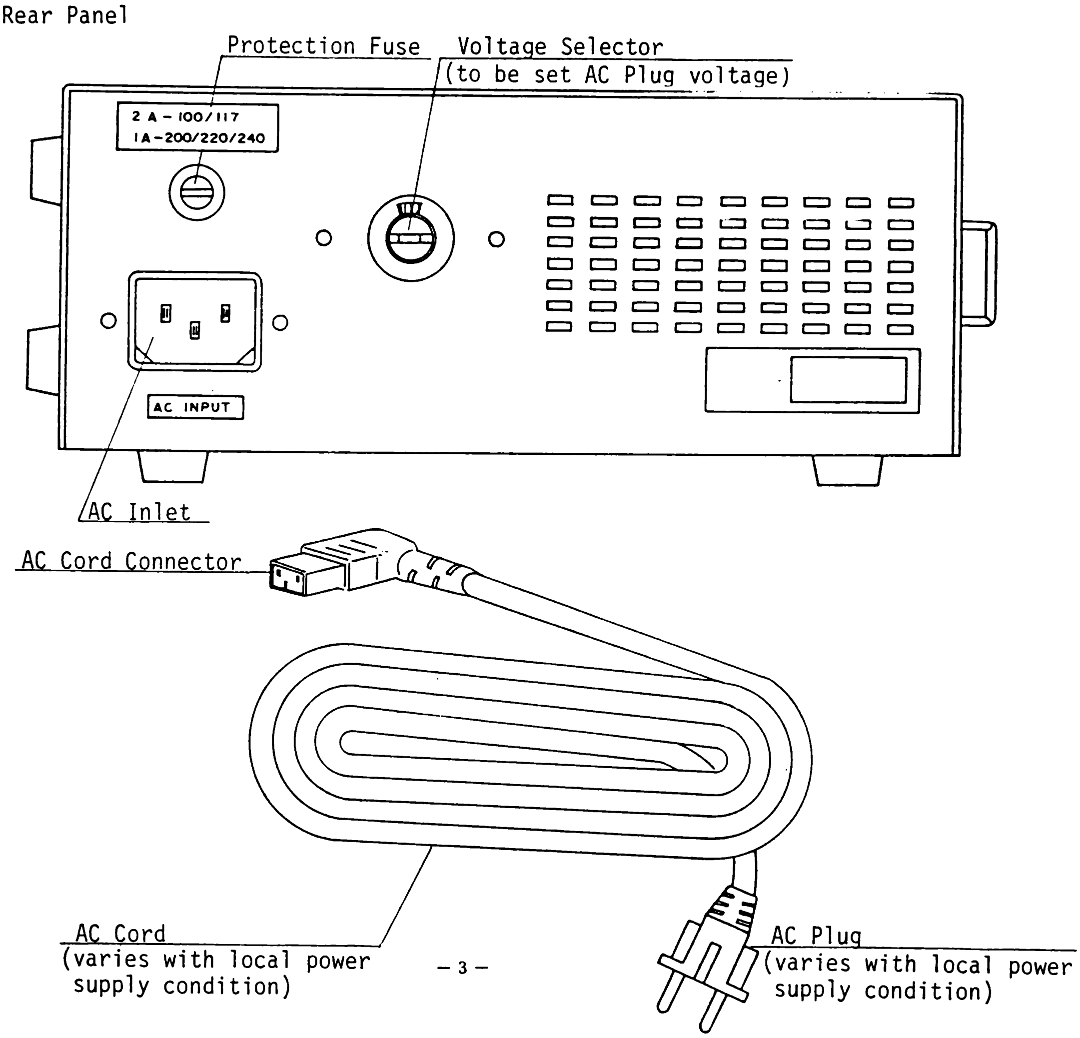
(8) Weight about 5.3 kg

3. Component Parts

(1) Front Panel



(2) Rear Panel



4. Handling

The quick charger CHG-21 can be operated in the following procedure.
please also see the front panel diagram and the rear panel diagram.

(1) Set the voltage selector on the rear panel to the voltage of the AC plug receptacle.

(2) Connect the AC cord connector of the attached AC cord to the AC inlet of the charger, and insert the AC plug into the plug receptacle.

(3' Connect the connector of each battery pack to the charging terminal, starting from No. 1 to No. 4.

(4) Turn on the power switch; then the power indicator lamp (green) comes on, and at the same time the charge starts with the battery pack connected to the charging terminal No. 1; the red charging indicator lamp is held on while it is being charged.
The other battery packs connected to the charging terminals Nos. 2, 3 and 4 are trickle-charged with a weak current (no charging indicator lamps are turned on).

(5) As the quick charge is completed with the battery pack on the charging terminal No. 1, the charging indicator lamp No. 1 lights a lamp, and switched the trickle charge automatically. At the same time, starts the quick charge to the battery pack which is connect to the charging terminal No. 2, and the charging indicator lamp No. 2 goes on and off.
(The same charging operation proceeds to No.2, No. 3 and No. 4, and it does not return to No. 1 after charging No. 4 pack.)
The battery packs fully charged can be removed and used immediately.

(6) As all the battery packs are changed, turn off the power switch, and pull out the AC cord from the plug receptacle.

(7) To charge other battery packs, keep off the power switch and connect the battery packs; then turn on the power switch. The charge starts with the battery pack on the charging terminal No. 1 (if any battery pack is connected with the power switch on, turn it off once; and make sure all the changing indicator lamps go out, then turn on the power switch).

(8) The charging terminal with no battery pack connected is skipped to the next terminal in the battery charging.

5. Caution

(1) Set the voltage of the AC plug receptacle to the voltage selector; otherwise a wrong voltage may prevent proper charging or cause abnormal heating or to blow the fuse.

(2) Use the quick charger at a well-ventilated place and shielded from the ray of sun or fire.
Do not prevent the heat radiation of the charger.

(3) Do not place the battery packs on the quick charger or near fire.

(4) Protect the quick charger from water or other liquid or metallic substance falling inside the charger.

6. Adjustment Procedure (reference only)

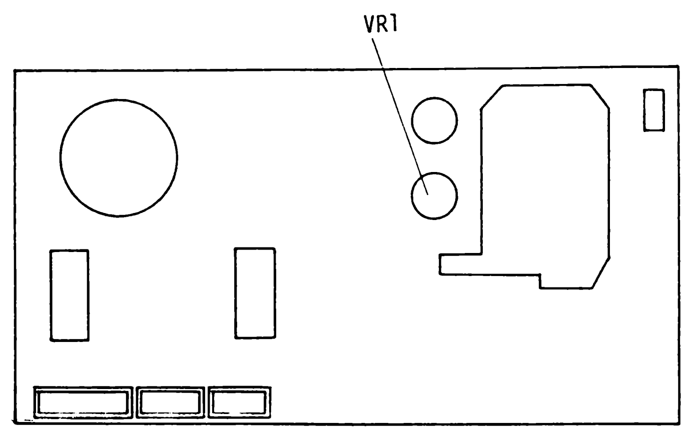
(1) Short-circuit the terminals 4 and 5 of the connector, and attach a DC ammeter (3A range, Class 0.5) and a load resistance (10 ohms, 30W) serially.

(2) Connect the connector to the charging terminal No. 1.

(3) Turn the dial VR1 of the PC board fully clockwise.

(4) Turn on the power switch (then the power indicator lamp and the charging indicator lamp of the charging terminal No. 1 come on).

(5) Turn VR1 to set the current to 2.2A.



GENERAL

Transistors

No.	Description	M.F.D
Q 1	2SC647	MAT
Q 2	2SC647	MAT
Q 5	2SC858	MAT
Q 6	2SC858	MAT
Q 7	2SC858	MAT
Q 8	2SC858	MAT

Resistors

No.	Description	M.F.D
R 1	MS2WOR1K	TDO
R 2	MS2WOR1K	TDO

Capacitors

No.	Description	M.F.D
C 2	ECQ 0.01μF 50WV	MAT

Transformer

No.	Description	M.F.D
T 1	HB51236AA	TKK

Switches

No.	Description	M.F.D
SW 1	SDE4SC04	ALP
SW 2	S-J2111	SMK

Connectors

No.	Description	M.F.D
CON1	JRC16RG-10P	HLR
CON2	JRC16RG-10P	HLR
CON3	JRC16RG-10P	HLR
CON4	JRC16RG-10P	HLR
AC IN	FN323-3/01	SAF

POWER

Integrated Circuits

No.	Description	M.F.D
IC101	MC7812	MOT
IC102	TA7504S	TOS
IC 1	CA3140E	RCA
IC 3	M51845L	MIT

Transistors

No.	Description	M.F.D
Q101	2SC1384	MAT
Q103	2SK163	NEC
Q 1	2SK163	NEC
Q 2	2SA564	MAT
Q 4	2SC828	MAT
Q 5	2SC828A	MAT
Q 6	2SC828A	MAT

Diodes

No.	Description	M.F.D
D101	S4VB10	SND
D102	V03C	HIT
D103	RD6A	NEC
D 1	MA1051	MAT
D 2	MA1051	MAT
D 3	MA150	MAT
D 4	MA150	MAT
D 6	MA150	MAT
D 7	MA150	MAT
D 8	MA150	MAT
D 9	RD12J	NEC

Resistors

No.	Description	M.F.D
R101	ERD25VJ 222	MAT
R102	ERD25VJ 222	MAT
R103	ERD25VJ 392	MAT
R104	ERD25VJ 104	MAT
R105	MS3W 0R33K	TDO
R106	MS3W 561K	TDO
R107	ERD25VJ 122	MAT

Resistors

No.	Description	M.F.D
R 0	ERD25VJ 222	MAT
R 1	ERD25VJ 105	MAT
R 2	ERD25VJ 102	MAT
R 3	ERD25VJ 104	MAT
R 4	ERD25VJ 102	MAT
R 5	ERD25VJ 104	MAT
R 6	ERD25VJ 562	MAT
R 7	ERD25VJ 562	MAT
R 8	ERD25VJ 121	MAT
R 9	ERD25VJ 103	MAT
R 10	ERD25VJ 224	MAT
R 11	ERD25VJ 304	MAT
R 12	ERD25VJ 102	MAT
R 13	ERD25VJ 102	MAT
R 14	ERD25VJ 224	MAT
R 15	ERD25VJ 334	MAT
R 16	ERD25VJ 562	MAT
R 17	ERD25VJ 103	MAT
R 18	ERD25VJ 103	MAT
R 19	ERD25VJ 562	MAT
R 20	ERD25VJ 222	MAT
R 21	ERD25VJ 222	MAT
VR 1	PM-10KPU 1kΩ	TTS

Capacitors

No.	Description	M.F.D
C101	ECEA 1V 103	MAT
C102	ECEA 1V 100	MAT
C103	ECEA 1E 220	MAT
C104	ECKF 1H 103	MAT
C 1	ECEA 16V 100T	MAT
C 2	ECEA 16V 100T	MAT
C 3	ECEA 1E 330	MAT
C 4	ECEA 16V 22T	MAT
C 5	ECEA 1E 330	MAT

CONT

Integrated Circuits

No.	Description	M.F.D
IC 1	MC14051B	MOT
IC 2	MC14071B	MOT
IC 3	MC14093B	MOT
IC 4	MC14584B	MOT
IC 5	MC14017B	MOT
IC 6	MC14503B	MOT
IC 7	MC14050B	MOT
IC 8	MC14017B	MOT
IC 9	MC14528B	MOT
IC10	ULN2081A	SPR
IC11	ULN2081A	SPR

Transistors

No.	Description	M.F.D
Q 1	2SA683	MAT
Q 2	2SA683	MAT
Q 3	2SA683	MAT
Q 4	2SA683	MAT

Diodes

No.	Description	M.F.D
D 1	1S2074H	HIT
D 2	1S2074H	HIT
D 3	1S2074H	HIT
D 4	1S2074H	HIT
D 5	1S2074H	HIT
D 6	S1B01-02	FJE
D 7	S1B01-02	FJE
D 8	S1B01-02	FJE
D 9	S1B01-02	FJE
D 10	S3VC10	SND
D 11	S3VC10	SND
D 12	S3VC10	SND
D 13	S3VC10	SND

Resistors

No.	Description	M.F.D
R 01	ERD25VJ 103	MAT
R 02	ERD25VJ 102	MAT
R 1	ERD25VJ 102	MAT
R 2	ERD25VJ 102	MAT
R 3	ERD25VJ 102	MAT
R 4	ERD25VJ 102	MAT
R 5	ERD25VJ 103	MAT
R 6	ERD25VJ 223	MAT
R 7	ERD25VJ 514	MAT

Resistors

No.	Description	M.F.D
R 8	ERD25VJ 334	MAT
R 9	ERD25VJ 103	MAT
R 10	ERD25VJ 472	MAT
R 11	ERD25VJ 103	MAT
R 13	ERD25VJ 103	MAT
R 14	ERD25VJ 103	MAT
R 15	ERD25VJ 103	MAT
R 16	ERD25VJ 103	MAT
R 17	ERD25VJ 103	MAT
R 18	ERD25VJ 103	MAT
R 19	ERD25VJ 103	MAT
R 20	ERD25VJ 103	MAT
R 21	ERD25VJ 472	MAT
R 22	ERD25VJ 472	MAT
R 23	ERD25VJ 472	MAT
R 24	ERD25VJ 472	MAT
R 25	ERD25VJ 472	MAT
R 26	ERD25VJ 472	MAT
R 27	ERD25VJ 472	MAT
R 28	ERD25VJ 472	MAT
R 29	ERD25VJ 102	MAT
R 30	ERD25VJ 102	MAT
R 31	ERD25VJ 102	MAT
R 32	ERD25VJ 102	MAT
R 33	ERD25VJ 102	MAT
R 34	ERD25VJ 102	MAT
R 35	ERD25VJ 102	MAT
R 36	ERD25VJ 102	MAT
R 37	ERD25VJ 472	MAT
R 38	ERD25VJ 472	MAT
R 39	ERD25VJ 472	MAT
R 40	ERD25VJ 472	MAT
R 41	ERD25VJ 471	MAT
R 42	ERD25VJ 471	MAT
R 43	ERD25VJ 471	MAT
R 44	ERD25VJ 471	MAT
R 45	MS5W 101K	TDO
R 46	MS5W 101K	TDO
R 47	MS5W 101K	TDO
R 48	MS5W 101K	TDO
R 49	ERD25VJ 103	MAT
R 50	ERD25VJ 103	MAT
R 51	ERD25VJ 101	MAT
R 52	ERD25VJ 101	MAT
R 53	ERD25VJ 101	MAT
R 54	ERD25VJ 101	MAT

Capacitors

No.	Description	M.F.D
C 0	ECEA 1E 220	MAT
C 1	ECQ 1V 684	MAT
C 2	ECSF 16E 22	MAT
C 3	ECQ 1H 104	MAT
C 4	ECSF 25E 4R7	MAT
C 5	ECEA 1H 010	MAT
C 6	ECEA 1H 010	MAT
C 7	ECEA 1H 010	MAT
C 8	ECEA 1H 010	MAT
C 9	ECEA 1H 010	MAT
C100	FCKF 1H 223	MAT
C101	FCKF 1H 223	MAT
C102	FCKF 1H 223	MAT
C103	FCKF 1H 223	MAT
C104	FCKF 1H 223	MAT
C105	FCKF 1H 223	MAT
C106	FCKF 1H 223	MAT
C107	FCKF 1H 223	MAT
C108	FCKF 1H 223	MAT

Relays

No.	Description	M.F.D
RY 1	LAD2 DC12V	OMR
RY 2	LAD2 DC12V	OMR
RY 3	LAD2 DC12V	OMR
RY 4	LAD2 DC12V	OMR

CONT SUB

Integrated Circuits

No.	Description	M.F.D
IC 1	MC14071B	MOT
IC 2	MC14081B	MOT
IC 3	MC14081B	MOT
IC 4	MC14013B	MOT
IC 5	MC14013B	MOT
IC 6	MC14050B	MOT

Capacitors

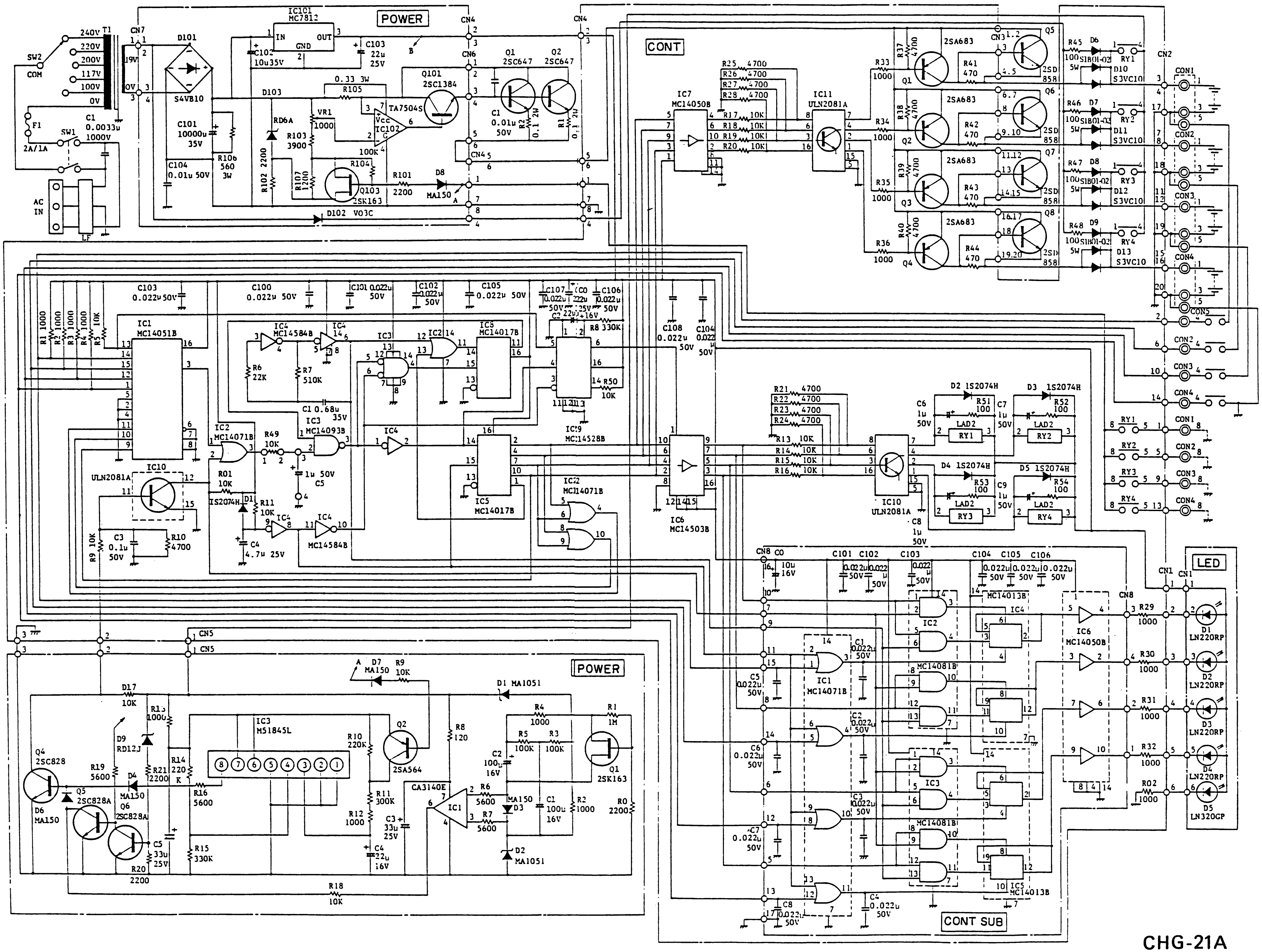
No.	Description	M.F.D
C 0	ECEA1C 100	MAT
C101	FCKF 1H 223	MAT
C102	ECKF 1H 223	MAT
C103	ECKF 1H 223	MAT
C104	ECKF 1H 223	MAT
C105	ECKF 1H 223	MAT

No.	Description	M.F.D
Capacitors		
C106	ECFK 1H 223	MAT
C 1	ECFK 1H 223	MAT
C 2	ECFK 1H 223	MAT
C 3	ECFK 1H 223	MAT
C 4	ECFK 1H 223	MAT
C 5	ECFK 1H 223	MAT
C 6	ECFK 1H 223	MAT
C 7	ECFK 1H 223	MAT
C 8	ECFK 1H 223	MAT

—— LED ——

D 1	LN220RP	MAT
D 2	LN220RP	MAT
D 3	LN220RP	MAT
D 4	LN220RP	MAT
D 5	LN320GP	MAT

Fig. 8



CHG-21A
Schematic Diagram

CANON TV ZOOM LENS

J13 x 9B31RS II HL-79E

INSTRUCTION MANUAL

TABLE OF CONTENTS

1. COMPONENTS PROVIDED

Lens Body 1

Hood 1

Hood Cap 1

Dust Cap 1

Lens Cap 1

Levers (For Zoom/Focus) 2

Connector Cap 1

OPTIONAL ACCESSORIES

Zoom Control Unit

Focus Control Unit

Teleside /converter X1.5

Wide Angle Attachment X0.75

Grip

2. SPECIFICATIONS

Application :	For 2/3" image tube ENG and portable TV cameras
Focal Length :	9-117mm With 2X extender : 18-234mm
Maximum Relative Aperture :	1:1.6(9-99mm) 1:1.9(at 117mm) With 2X extender : 1:3.2(18-198mm) 1:3.8(at 234mm)
Image Format :	8.8mm x 6.6mm(diagonal 11mm)
Angular Field of View :	52.1° x 40.3°(diagonal 62.9°)at 9mm 4.3° x 3.2°(diagonal 5.3°)at 118mm With 2X extender : 27.5°x 20.8° (diagonal 34.0°)at 18mm 2.2°x 1.6° (diagonal 2.7°)at 234 mm
*Minimum Object Distance(M.O.D.) :	0.8m(31.5") from front lens vertex
*Object Dimensions at M.O.D. :	72.2cm x 54.2cm(diagonal 90.3cm) at 9mm 5.6cm x 4.2cm(diagonal 7.0cm) at 117mm 28.43" x 21.34"(diagonal 35.55") at 9mm 2.20" x 1.65"(diagonal 2.76") at 117mm With 2X extender : 36.1cm x 27.1cm (diagonal 45.1cm)at 18mm 2.8cm x 2.1cm (diagonal 3.5cm)at 234mm 14.21" x 10.67" (diagonal 17.76")at18mm 1.10" x 0.83" (diagonal 1.38")at 234mm

* For these data at macro shooting, refer to SECTION 4.5 .

Clear Aperture of Front Glass :	ø72.6mm(ø2.86)
Clear Aperture of Rear Glass :	ø31.7mm(ø1.25")
Optical Back Focal Distance :	48.3mm(1.90")
Flange Back Focal Distance(F.B.) :	58mm(2.28") in air
Distance From Front Lens Vertex to Focal Place :	231.7mm(9.12") in air

Adjustable Range for F.B. : ±0.5mm

Mount : HL-79E

Size : 131mm(W) x 82mm(H) x 212mm(L)
5.16"(W) x 3.23(H) x 8.35"(L)

Weight : Approx. 1.45kg(3.2 lbs)

Power Supply : DC ±6V

Iris Input Voltage : -2.5V Open
+2.5V Closed

Extender : 2X extender is built in.
Extender selection lever is provided on extender unit.

Operation System :

- Zoom Control : Manual/motor drive control selectable with Zoom Operation Change-over Knob.

  Manual Control
  By Zoom Lever
  Turn lever clockwise for wide angle looking from camera side.
  Operational range : 9-117mm

  Motor Drive Control
  By Zoom Operation Switch
  Zooming speed can be changed by how much operation switch is pushed in.
  Operating time for total range :
  Approx. 1.5-60 seconds(only when the lens is used in horizontal position)

- Focus Control : By manual rotation of Focus Lever
  Turn lever clockwise for nearer objects looking from camera side.
  Focusing range : 0.8m - ∞ from front lens vertex

- Iris Control : Manual/servo control selectable by Iris Operation Change-over Switch
  Provided with Momentary Iris Auto Switch which overrides manual control momentarily with automatic control.

  A(AUTO) : Automatic iris control with signals from camera
  R(REMOTE) : Servo control by camera control

	unit. Minimum operating time for total range : Approx. 1.3sec.
	M(MANUAL) : Clockwise turn of iris ring toward closed end.
Macro Shooting :	By turning Macro Lever Clockwise Macro lever can be locked during normal shooting for safety.
	· Rotational angle of lever : 63°
	· Minimum object distance from front lens vertex : 10mm at 9mm on zoom ring

3. MOUNTING & ADJUSTMENT

3-1 Mounting Lens Onto Camera

(1) Position the camera horizontally or tilt it up slightly.

(2) Remove the dust cap from the rear of the lens.

(3) Join the locating pin of the lens mount with the camera mount, and clamp with the bayonet ring of the lens.

(4) Connect the connecting cable of the lens to the camera.

CAUTION : Never hold the lens mount to support the entire weight of the camera. This will damage various parts of the lens due to excessive strain on the mount and the housing.

3-2 Tracking Adjustment of Camera

If the focal plane of the lens and that of the image tubes do not coincide,the lens will move out of focus during zooming. Be sure to adjust the position of the image tubes prior to shooting.

(1) Switch on the camera for monitoring.

(2) Select an object approximately 2-2.5m(79-98") away from the lens.

(3) Lock the macro level.

(4) Open fully the iris of the lens.

(5) Set the focal length of the lens to maximum telephoto.

(6) Focus on the object by turning the focus ring for the Green channel.

(7) Set the focal length of the lens to maximum wide angle.

(8) Focus on the object for the Green channel by moving the image tube back and for-th.

(9) Repeat the steps (5) to (8) until no further adjustment is necessary.

(10) Move each of the image tubes for the Blue and Red channels back and forth so that its focal plane matches with that of the tube for the Green channel.

3-3 Tracking Adjustment of Lens

If the three image tubes of the camera are already in correct position, adjust the lens as follows :

(1) Select an object approximately 2-2.5m(79-98") away from the lens.

(2) Open fully the iris of the lens.

(3) Set the focal length of the lens to maximum telephoto.

(4) Focus on the object by turning the focus ring for the Green channel.

(5) Set the focal length of the lens to maximum wide angle. Release the Flange Back Adjusting Lock Screw of the lens using a screwdriver, move the Flange Back Adjusting Ring until you obtain correct focus for the Green channel and fasten the Lock Screw.

(6) Repeat the steps (3) to (5) until no further adjustment is necessary.

(7) If correct optical adjustment cannot be obtained despite the above steps, repeat the procedures described in <u>3-2. Tracking Adjustment of Camera.</u>

3-4 Iris End Adjustment & Iris Gain Adjustment

There are three holes on the front panel of the lens drive unit : two(marked 'C') are for iris end adjusting trimmers and the other is for iris gain adjusting trimmer. Adjust these trimmers as follows using a screwdriver.

(1) Set the iris operation change-over switches of the lens and the camera to R (REMOTE) position. (Short connector pin 35 to ground on GL module).

(2) Set the camera filter "CAP". Adjust the open end trimmer (marked 'O') so that the lens iris is f/1.6.
Turning the trimmer counterclockwise opens the lens iris.

(3) Set the camera BARS switch "ON". Adjust the closed end trimmer(marked 'C') so that the lens iris is completely closed.
Turning the trimmer counterclockwise closes the lens iris.

(4) Repeat the steps (2) & (3) several times and readjust if necessary.

(5) Set the iris operation change-over switches of the lens and the camera to A(AUTO) position. (Open connector pin 35 from ground on GL module) Then, adjust the lens iris to determine the maximum gain within the range where hunting is at minimum.

3-5 Mounting Filters

This lens is designed so that two types of filters can be attached to the lens hood unit.

The two filters are :

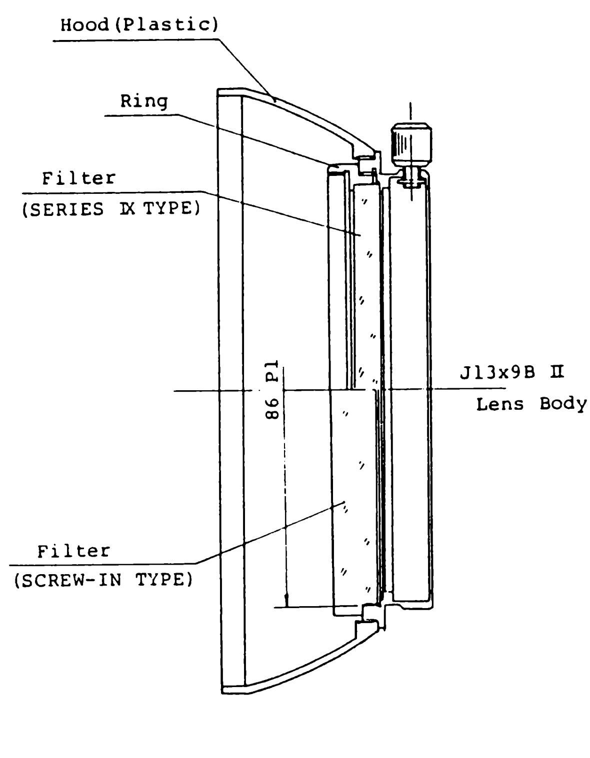
1) SERIES IX TYPE FILTER

2) 86mm P=1 SCREW-IN TYPE FILTER

Attaching procedure is as follows :
(Refer to the illustration.)

(1) SERIES IX TYPE FILTER
Turn the ring counterclockwise and remove it. Insert the filter into the ring and then replace the ring.

(2) 86mm P=1 SCREW-IN TYPE FILTER
Turn the ring counterclockwise and remove it. (Be sure not to lose the ring.) Screw the filter into the ring screw. Do not attach the filter without removing the ring, because there is danger that shading may be caused in the image format.
It is much easier to attach either filter if the hood has first been removed.
To remove the hood, turn it counterclockwise.



Cross Section of Lens Hood

4. OPERATION

4-1 Focusing

Focusing is made by turning the focus ring. Turn the ring clockwise for nearer objects.

Note : This lens is designed so that focusing can be made beyond the ∞ mark on the focus ring. It is because fluorite is used in this lens and the amount of focus deviation caused by temperature change is greater than that of ordinary optical glass. So take this into consideration when focusing with the focus ring. Of course, there is no problem when focusing through the monitor.

4-2 Zooming

(1) Operation Selection

Manual/motor drive operation is selectable with the Zoom Operation Change-over Knob.

AUTO .... motor drive

MANU .... manual operation

(2) Motor Drive

Use the Zoom Operation Switch. Press T for telephoto angle and W for wide angle. Zooming speed can be changed by how much the Zoom Operation Switch is pushed in.
Operation time for total range : approx. 1.5-60sec.
(only when the lens is used in horizontal position.)

(3) Manual Operation

Use the Zoom Ring. Turning the ring clockwise widens the angle.

4-3 Iris Operation

(1) Three types of iris operation can be selected with the Iris Operation Change-over Switch.

A(AUTO) .... Automatic iris operation by signals from camera

R(REMOTE) .... Servo control by iris dial of camera

M(MANUAL) .... Manual control by rotating iris ring. Turn ring clockwise for closed end.

(2) While the Momentary Iris Auto Switch is pressed during iris manual operation, the iris changes to automatic operation. This feature is useful when proper iris setting is momentarily needed.

In the past switching between remote and auto modes depended upon the operation method ring used, but the HL-79E permits automatic mode change this frees the cameraman from this action.

The camera, when operated as a single unit, can be operated by the auto iris regardless of remote and auto lens settings.

The remote mode is automatically switched by remotely sending an auto iris OFF control signal to the camera.

4-4 External Selection

The external selection lever is provided at the rear of the extender unit. Set the lever at the 2X position and the 2X extender is set in position for use.

Note : The 2X extender cannot be used for macro shooting.

4-5 Macro Shooting

(1) Operation

For macro shooting, pull the macro lever and release it, then turn the cacro ring clockwise looking from the camera side.

(2) Minimum Object Distance & Object Dimensions

	Scale of Zoom Ring	Setting of Macro Lever	Minimum Object Distance	Object Dimensions(cm)	Object Dimensions(")
Normal Shooting	9mm	Locked	0.8m(31.5")	72.2 x 54.2	28.43 x 21.34
	117mm	"	" "	5.6 x 4.2	2.20 x 1.65
Macro Shooting	9mm	Rotated 63° (See note 2)	10mm(0.393")	5.4 x 4.0	2.13 x 1.57

Note 1 : The minimum object distances are measured from the front lens vertex.

Note 2 : Macro shooting is possible no matter where the macro lever is positioned between the locked position and 63° rotated position.
At the intervening positions, the above data vary proportionally between the normal shooting and the macro shooting.

Note 3 : Macro shooting is impossible when the 2X extender is in position for use.

(3) Macro Shooting

For shooting objects at less than the normal minimum object distance of 0.8m, proceed as follows:

(a) Set the focus ring at the minimum object distance.

(b) Turn the macro lever fully clockwise.

(c) Focus on the object with the zoom ring.

(4) Multi-point Focus Shooting

When the focal length is varied under macro shooting conditions, the focus point changes correspondingly. This is what is called multi-point shooting. This technique can be used to obtain special effects in which the focus point is moved only by zooming. Proceed as follows :

Step	Setting of Control Parts		Object	Focus
	Macro Lever	Zoom Ring		
1	Locked	Narrow Side	Farthest	By Focus Ring
2	Macro Shooting Setting	Wide Side	Nearest	By Macro Lever
3	The best setting obtained in step 2.	Narrow Side	Farthest	By Focus Ring

When the lens is set at the wide end and zoomed, the focus point moves from the nearest object to the farthest object and diversified cuts are obtained.

5. LENS MAINTENANCE

5-1 Cleaning

Remove dust or dirt from the lens surface with a soft lens brush or a lens blower. Remove any finger prints or other stains by wiping the lens surface in a circular motion from the center to the circumference with a piece of cotton or lens cleaning paper moistened with commercially available lens cleaning solution.

5-2 Use In High Humidity or Under Wet Conditions

Since this lens is not water-proof, avoid exposing it directly to rain or snow. If the lens becomes damp because of use in mist or drizzle, wipe off the moisture with a soft dry cloth and seal the lens together with a desiccant in a vinyl bag to remove moisture which has entered the interior. When the lens must be used in rain, provision should be made to prevent it from getting wet.

5-3 Remarks on Use

It is important to avoid any shock to the lens, when carrying, mounting, or operating it. On a windy day or under dusty conditions, the lens should be mounted or dismounted quickly so as to prevent dust from entering the interior of the mount.

If the ambient temperature changes suddenly, the lens may blur on the inside so it cannot be used for a while. When it must be used under unusual conditions such as when chemical or special gases may come in direct contact with the lens, contact your Canon dealer for suggestions or what preparatory steps should be taken.

5-4 Overhauls & Information

In order to keep the lens in best condition, it is recommended that it be overhauled from time to time.

For other maintenance and information, contact your Canon dealer.

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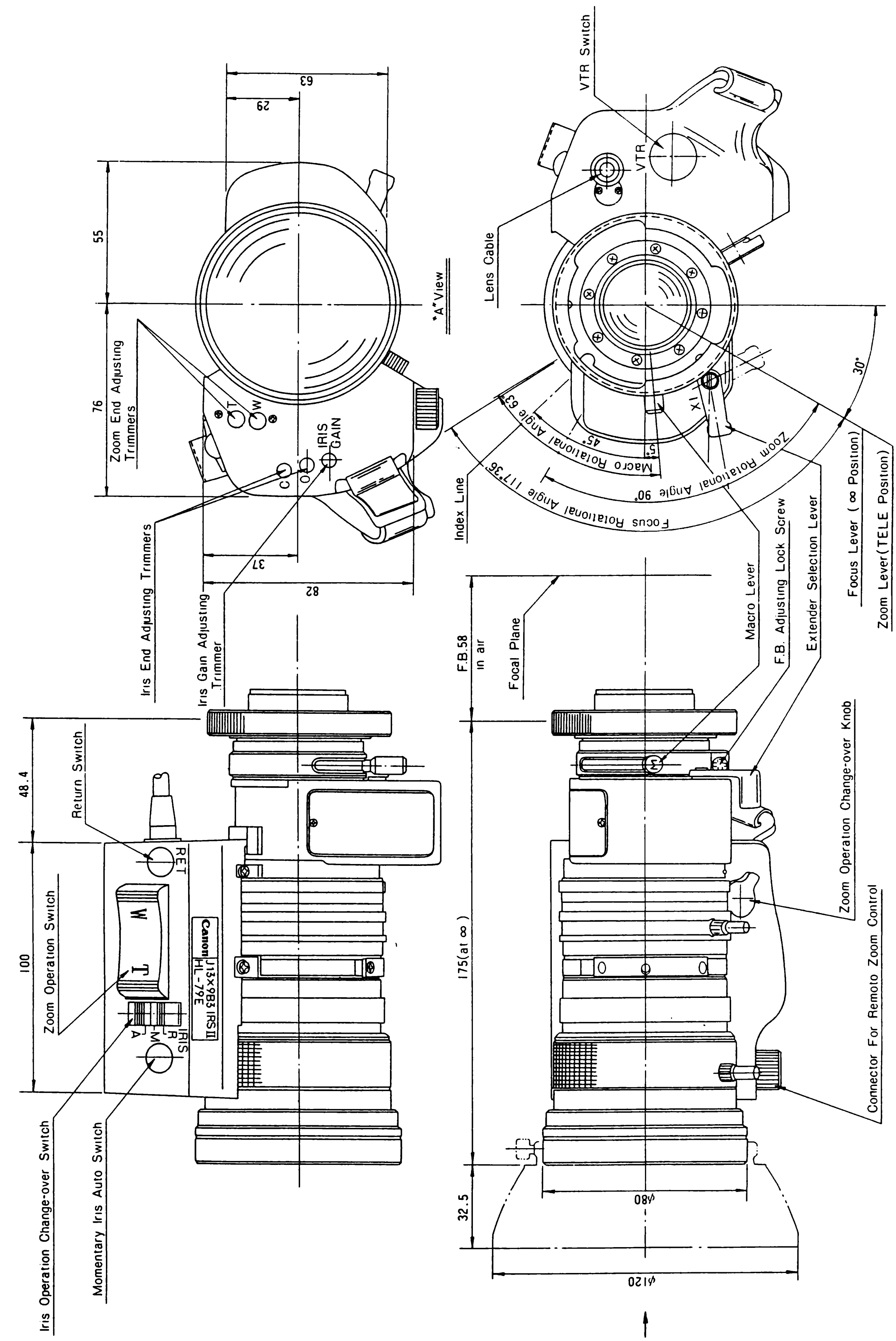
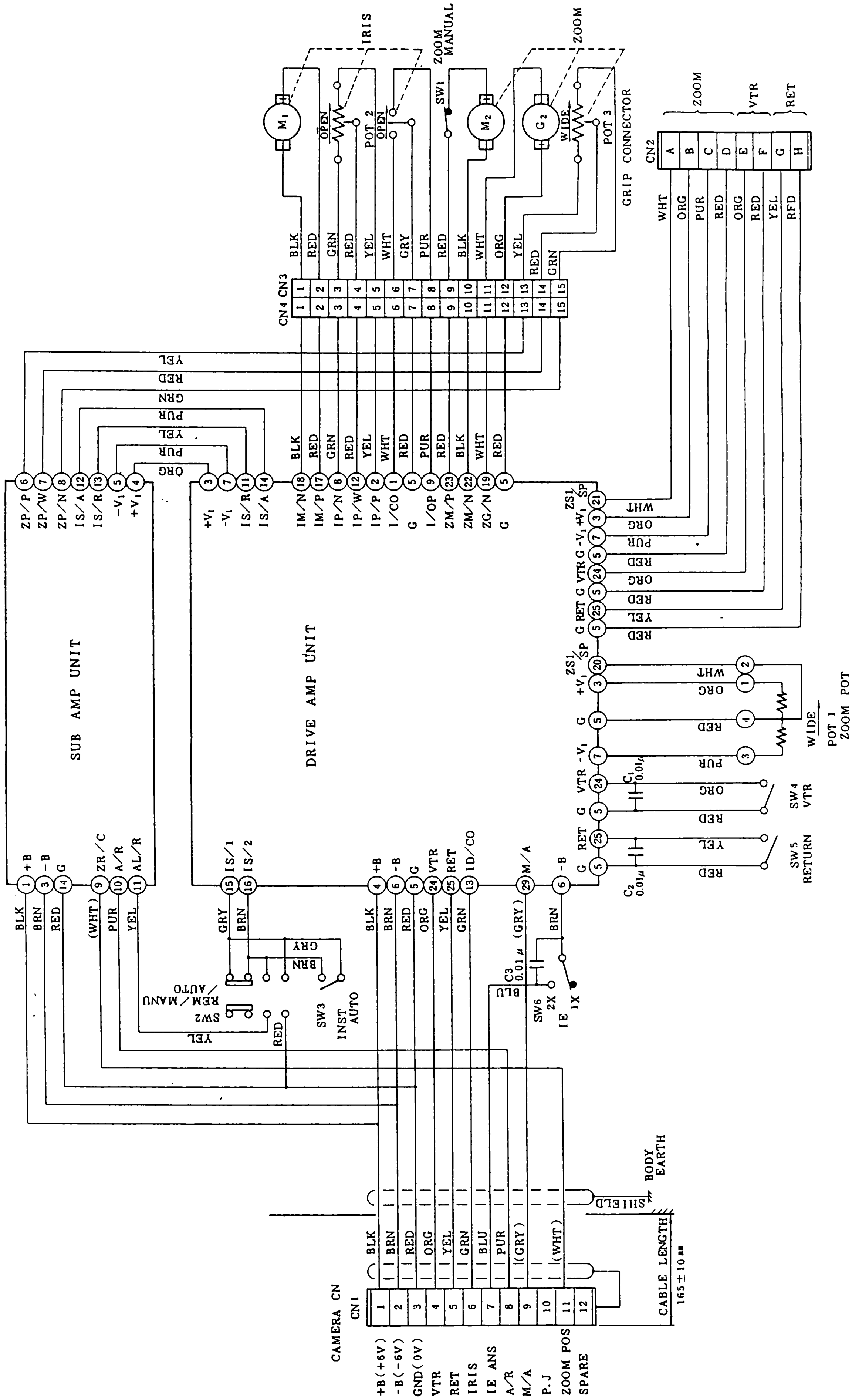
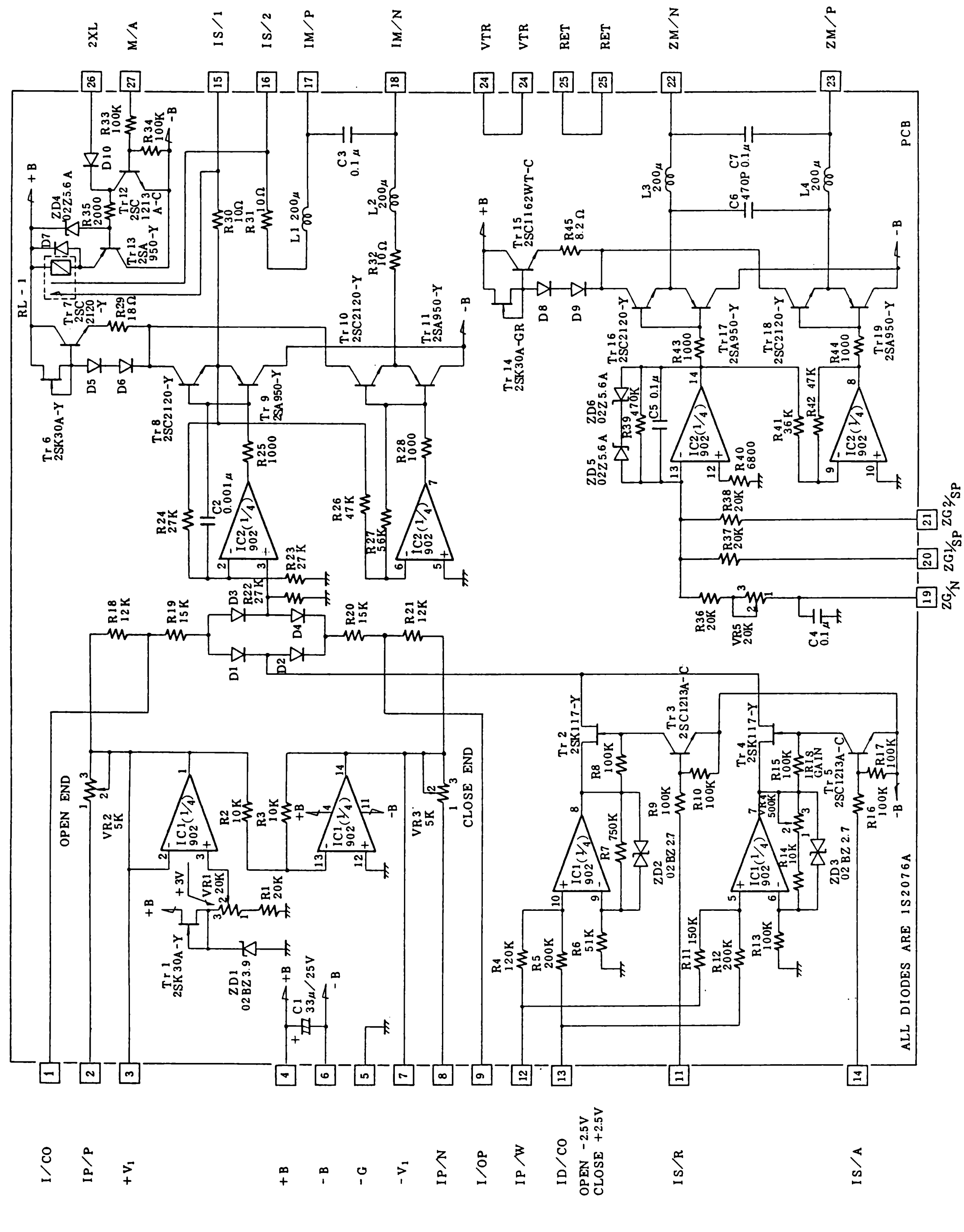


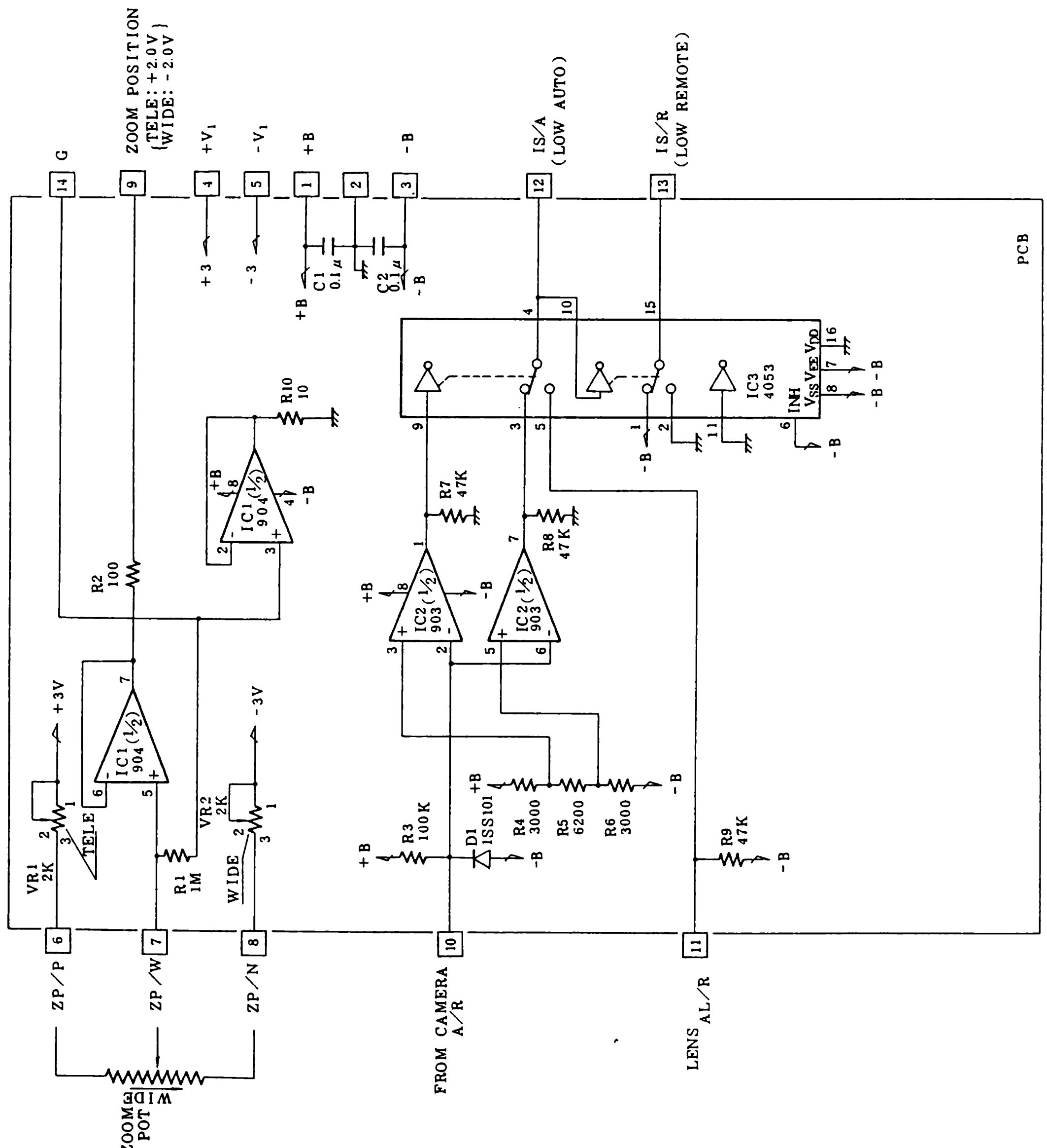
J13X9B3 IRIS II HL-79E
EXTERNAL VIEW



J13X9B3/HL-79E
GENERAL CIRCUIT DIAGRAM
(BG2-0666-A501-05)



J13X9B3/HL-79E
DRIVE AMP CIRCUIT DIAGRAM
(BG2-0667-A501-01)



J13X9B3/HL-79E
SUB AMP CIRCUIT DIAGRAM
(BG2-0704-A501-02)

FUJINON TV ZOOM LENS

A14 x 9FERM-11

INSTRUCTION MANUAL

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1. GENERAL DESCRIPTION

1.1 FEATURES

FUJINON TV ZOOM LENS A14X9FERM-11 is a portable 2/3" image format lens designed for camera IKEGAMI HL-79E.

In spite of its high zoom ratio of 1:14 (F1.7/9-126) and its built-in X2 range extender, this zoom lens is small and light in construction, with an F.f adjusting mechanism and a macro focusing mechanism. Further, this zoom lens is equipped with a drive unit, as standard equipment, which incorporates an iris and a zoom driving mechanism.

A variety of optional accessories permit manual operation, flexible cable operation and servo-controlled operation. This lens can therefore be used satisfactorily not only as shoulder camera use but also studio use.

1.2 LIST OF COMPONENTS

STANDARD

Zoom Lens	A14X9FERM-11	1
Lens Hood	27A2896090	1
Zoom Lever	47B1607400	1
Rubber Cap	57B3922140	5
Connector(8 way) Cap	57B1990290	1
Connector(12 way) Cap	57B3588320	1
Front Lens Cap	300M080N	1
Rear Lens Cap	300M035N	1
Lens Hood Cap	300M120N	1

OPTIONAL ACCESSORIES

Lens Grip	SRD-51/ERD-1
Grip Attachment	GHA-22
Extension Cable (for SRD)	ECC-1000
Zoom Manual Module	ZMM-7
Zoom Handle	CZH-4
Focus Servo Position Module	FSP-1
Focus Position Demand Unit	EPD-1B
Focus Manual Module	FMM-7
Focus Grip	CFH-1
Focus Manual Demand Unit	FMD-1L/FMD-1R
Mounting Clamp	MCA-1A
Flexible Cable	CFC-990
Pan Bar	PAL-1
Shot Box	ESB-1/ESB-2/ESB-3
Cable for Shot Box	EEC-1/EEC-2

Tele Converter	TCV-80 (1.8X)
Wide converter	WCV-80 (0.8X)

1.3 SPECIFICATIONS

(1) Optical and Mechanical

Application:		For IKEGAMI HL-79E
Focal Length:		9mm - 126mm [18mm - 252mm]
Zoom Ratio:		14X
Maximum Aperture (F-No.):		1.7(9-103mm) - 2.0(126mm) [3.4 - 4.0]
Maximum Photometric Aperture (T-No.):		1.9 [3.8]
Iris Range:		1.7 - 16, closed
Image Format:		11mm diag. (6.6mm x 8.8mm)
Back Focal Length:		47.51mm (in air) 66.46mm (including glass path)
Flange Focal Length:		58.00mm (in air) ±0.4mm adjustable 76.95mm (including glass path)
Focus Range:		Inf. -0.8m (from front lens vertex)
Shift of Front Lens:		5.95mm
Field Angle	Diagonal:	62°52'- 5° [33°59'- 2°30']
	Horizontal:	52°06'- 4° [27°28'- 2°]
	Vertical:	40°16'- 3° [20°47'-1°30']
Object Area at M.O.D.(0.8m):		WIDE 550mm x 733mm [275mm x 366mm] TELE 39mm x 52mm [20mm x 26mm]
Lens Construction:		14 groups, 19 elements [3 groups, 5 elements]
Clear Apeature of Lens:		Front 72.7mm dia. Rear 30.4mm dia.
Exit Pupil Position:		+93.5mm (from image plane) [-1487.0mm]
Front Thread:		77mm dia., P=0.75mm
Iris Control:		DC Servo, Manual
Zoom Control:		DC Servo, Manual, (Flexible Cable)
Focus Control:		Manual, (DC Servo, Flexible Cable)

Mount:	BAYONET Mount
Dimensions of Outline:	See Fig. 1 (in ILLUSTRATIONS)
Weight:	1.53 kg (without lens hood)

NOTE: A X2 range extender is incorporated as standard equipment, and the figures in the brackets indicate those when it is used.

(2) Electrical

1) Iris Control

Power Source Required

Voltage:	+6V - 0V - -6V
Current Consumption:	30mA (normal) 60mA (peak)

Characteristics

Control Signal:	-2.5V(open) - +2.5V(closed)
Operating Time for FULL Travel:	Approx. 1.5sec.
Relation between F-No. and Potentiometer:	See Fig. 1-1
Potentiometer Resistance (lens side):	10K ohms
Iris Momentary Switch:	Momentary Push Switch

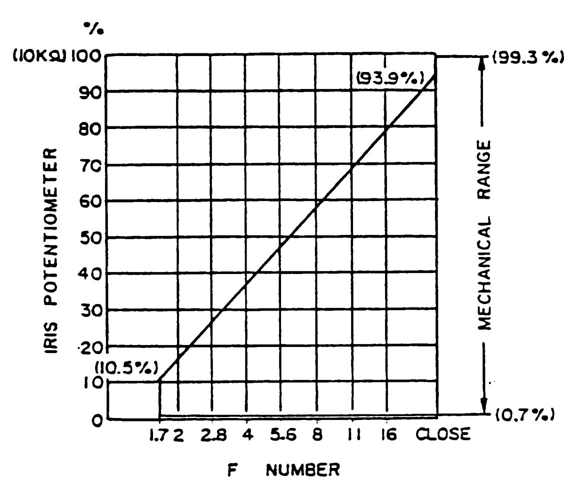


Fig. 1-1

2) Zoom Control

Power Source Required

Voltage:	+6V - 0V - -6V
Current Consumption:	60mA (normal) 130mA(peak)

Characteristics

Control Method:	Rate Servo Control
Operating Time for Full Travel:	Approx. 1.5sec. (at minimum) (horizontal posture)
Characteristic of Controls Thumb-Ring and seesaw Control:	See Fig. 1-2

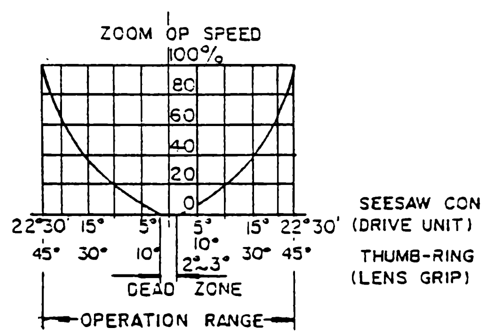


Fig. 1-2

3) VTR Switch — Alternate Push Switch

4) RET(EXT) Switch — Momentary Push Switch

2. OPERATING INSTRUCTION

At the beginning:

This zoom lens is designed so that the F.f and the iris control (iris end position and iris gain) can be adjusted on the lens side.

For adjustment of the F.f, refer to paragraph 2.6; for the iris control, 2.7.

If the lens is left in position on the camera body and the camera is not in use, be sure to place the lens cap (or the hood cap when the lens hood is on) in order to protect the front glass surface and the camera tube. Any dust, stain or fingerprints on the glass surfaces will lower the performance of the lens; any such foreign matter must be removed, in accordance with paragraph 3.1 (1).

For location of the components descrived in this section, refer to the related figures at the end of this manual.

2.1 Check before Use

Ensure that the lens unit, controls, and cables are connected securely and correctly both electrically and mechanically.

2.2 Switch on

The lens unit is not equipped with a power switch. When the power switch on the camera is turned on with the lens-camera connecting cable connected, the lens unit is ready for operation.

2.3 Zooming Operation

(1) Manual Operation

NOTE: Rotate the Zoom Mode Knob on the underside of the Drive Unit and set the letter 'M' (MANUAL) to the mark '.' on the cover.

Operation is performed by the Zoom Lever attached to the Zoom Ring. Needless to say, operation can also be done by directly turning the Zoom Ring. Counterclockwise rotation of the ring, viewed from the camera side, will zoom the lens to tele side. This total operation angle of the ring is 90°.

(2) Servo Operation by Drive unit

NOTE: Rotate the Zoom Mode Knob on the underside of the Drive Unit and set the letter 'S' (SERVO) on the knob to the mark '.' on the cover.

Operation is done by the seesaw Control located on the top of the Drive Unit. A push on the 'W' side will move the lens toward the wide side, while a push on the 'T' side will move the lens toward the tele side. Alteration of the push depth permits the continuous adjustment of the zooming speed. In this speed control, the end-to-end operating time is approximately 1.5 seconds at minimum. (See Fig. 1-2).

(3) Manual Operation by Zoom Handle -CZH-

Zooming operation is controlled by rotating the handle of the Zoom Handle (CZH). Clockwise rotation will zoom the lens to the wide side, while counterclockwise rotation zoom it to the tele side. Approximately 1.3 turns of the Zoom Handle will cause the lens to move through the whole zooming range.

(4) Servo Operation by Lens Grip -SRD, ERD-

NOTE: Rotate the Zoom Mode Knob on the underside of the Drive Unit and set the letter 'S' (SERVO) on the knob to the mark '.' on the cover.

Zooming operation is performed by rotating the thumb-ring of the Lens Grip. In the case of the SRD, clockwise rotation of the thumb-ring will move the lens to the tele side. The ERD is equipped with a Reverse Switch (slide switch) for changing the operating direction. The sliding of this switch to the right will cause the lens to zoom in the same direction as the SRD. Alteration of the rotating angle of the thumb-ring permits the continuous adjustment of the zooming speed. In this speed control, the end-to-end operating time is approximately 1.5 seconds at minimum. (See Fig. 1-2).

Both the SRD and ERD have a VTR switch (located above the thumb-ring) and a RETURN switch (located on the rear side of the grip).

(5) Servo Operation by Shot Box -ESB-

In the zoom servo operation using the Shot Box, there are two types of operation mode, rate operation and preset operation. With ESB-2, however, the rate operation can not be performed.

NOTE: Rotate the Zoom Mode Knob on the underside of the Drive Unit and set the letter 'S' (SERVO) on the knob to the mark '.' on the cover.

Rate Operation

The rate operation is done by rotating the thumb-ring located on the grip. The lens will zoom to tele side if the thumb-ring is rotated clockwise with the Reverse Switch (slide switch) slided to the right. The Reverse Switch is used for changing the zooming direction, so change it, as neccessary. Alteration of the rotating angle of the thumb-ring permits the continuous adjustment of the zooming speed. In this speed control, the end-to end operating time is approximately 1.5 seconds at minimum. Even during the preset operation mode, the mode can be changed over to the rate operation mode by turning the thumb-ring.

Preset Operation

There are five shot buttons on the Shot Box. If one of these buttons is pressed, the lens will move to a pre-determined position. The zooming spped can be adjusted by the Adjusting Knob on the box. The end-to-end operating time is approximately 1.5 seconds in the 'F' (FAST) position of the knob, and approximately 30 seconds in the 'S' (SLOW) position.

How to Preset

Press the shot button the presetting of which is desired. If the knob adjacent to the pressed button is turned, the zoom lens will move according to the movement of the knob. Select a desired zooming position using this knob. At this time, the zooming position can be confirmed by the zoom indicator on the box.

NOTES: 1. ESB-1 and ESB-3 are provided with a VTR switch (located above the thumb-ring) and a RETURN switch (located on the rear side of the grip).

2. All the Shot Boxes are provided with an Extender Selecting Knob, but it is not used for the operation of this lens.

2.4 Focusing Operation

(1) Manual Operation

This operation can be done by directly turning the Focus Ring. Counterclockwise rotation of the ring, viewed from the camera side, will move the lens toward the infinity side. The total operation angle of 143°corresponds to the focusing range of infinity to M.O.D.

(2) Manual Operation by Focus Grip (CFH) or Focus Manual Demand Unit (FMD)

By Focus Grip

Clockwise rotation of the grip will move the lens toward the near side.

By Focus Manual Demand Unit

There are two types of Focus Manual Demand Unit, FMD-1L and FMD-1R. In the case of the FMD-1L, clockwise rotation of the handle will move the lens toward the M . O.D. side.

Approximately two turns of the grip or the handle will move the lens over its entire focusing range.

(3) Servo Operation by Focus Position Demand Unit -EPD-

Operation is performed by rotating the handle of the unit. When the handle is rotated fully clockwise, the focus is driven to infinity, and when rotated fully counterclockwise, to M.O.D. The operating angle of the handle is approximately 320°.

(4) Servo Operation by Shot Box -ESB-

Operation is performed by rotating the handle of the Shot Box. When the handle is rotated fully clockwise, the focus is driven to infinity, and when rotated fully counterclockwise, to M.O.D. The operating angle of the handle is approximately 320°.

2.5 Iris Operation

There are three modes of iris operation, AUTO, MANUAL, and REMOTE.

-AUTO-
Set the iris mode to AUTO on the camera side. The iris will be automatically set to an optimum position by means of a signal from the camera, responding to the object brightness.

-REMOTE-
Set the iris mode to REMOTE on the camera side. The iris can be set to a desired position by means of the iris control dial on the camera side.

-MANUAL-
Set the iris mode switch on the lens to "M" and the iris mode to MANUAL on the camera side. To adjust the iris position, rotate the iris ring on the lens by hand. Even if in this switch position, the iris can be automatically set to an optimum position by pressing the IRIS MOMENTARY switch located on the top of the Drive Unit, while the switch is being pressed.

2.6 F.f Adjustment

<u>At the beginning:</u>

The lens incorporates a X2-extender. The F.f adjustment at the range of X1 is most recommended. There will be no change in F.f in spite of use of the extender, and the complete adjustment of the F.f at the range of X1 as instructed below eliminates the adjustment at the range of X2.

(1) Conditions of Object and Iris Position

Object:	an object large enough to provide clear and easy focusing(The Siemens star shown in Fig. 2-1 is recommended.)
Object distance:	about three meters (from front glass of the lens)
Iris position:	maximum aperture (To obtain this, adjust the object brightness or use neutral density filters.)

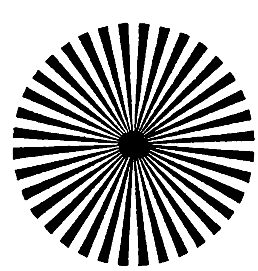


Fig. 2-1

(2) When Three Camera Tubes are Adjusted in Position

a. Loosen the F.f Lock Knob.

b. At the wide end in the zoom range, focus on the object by means of the F.f Adjusting Ring.

c. At the tele end, focus on the object by means of the Focus Ring.

d. Repeat steps 'b' and 'c' several times so that the F.f is adjusted completely.

e. Finally lock the F.f Adjusting Ring by means of the F.f Lock Knob.

(3) When Three Camera Tubes are out of Position

NOTE: IMPORTANT

For the optimum F.f put the F.f base mark and the index mark in line by rotating the F.f Adjusting Ring. Then tighten the F.f Lock Knob.

1) Perform the green channel tube adjustment observing its monitor image. Proceed as follows:

a. At the wide end in the zoom range, focus on the object by moving the green channel tube to and fro.

b. At the tele end, focus on the object by means of the Focus Ring.

c. Repeat steps 'a' and 'b' until optimum focus is obtained.

NOTE: For the camera tube adjustment, refer to the instruction of the camera.

2) Perform the red and blue channel tube adjustments as follows:

At the wide end in the zoom range, by moving the red or the blue channel tube to and fro, obtain optimum focus observing its monitor image.

2.7 Adjustment of Iris Control

In this lens, the iris end position and the iris gain can be adjusted through the holes in the front cover of the drive unit using a screwdriver.

(1) Adjustment of Iris End Position in REMOTE Mode

a. Set the iris mode to REMOTE on the camera side.

b. Rotate the iris control dial on the camera side fully to the open end. Adjust the trimmer adjacent to letters "R" and "O" so that the dot on the iris ring aligns with the datum line on the lens body.

c. Rotate the iris control dial on the camera side fully to the closed end. Adjust the trimmer adjacent to letters "R" and "C" so that the center of the letter "C" on the iris ring aligns with the datum line on the lens body.

d. Repeat steps b. and c. until the iris positions at both ends are adjusted completely.

NOTE: Once this adjustment is performed, the iris gain adjustment described below is required.

(2) Adjustment of Iris Gain in AUTO Mode

a. Set the iris mode to AUTO on the camera side.

b. Adjust the trimmer adjacent to letters "A" and "S" to obtain maximum iris gain within a range through which hunting will not occur.

c. Adjust the trimmer adjacent to letters "A" and "O" so that hunting will not occur when the camera pans from a fright object to a dark object which makes the iris move to its open end.

d. Adjust the trimmer adjacent to letters "A" and "C" so that hunting will not occur when the camera pans from a dark object to a bright object which makes the iris move to its closed end.

e. Repeat steps b. through d. several times.

2.8 Macro Focusing Operation

The Macro Ring Permits the use of the macro function of the lens.
The macro function procedure is as follows:

a. While pulling the Macro Lever, turn the Macro Ring fully in the direction of the arrow.

b. Turn the Focus Ring until it contracts the stopped on the M.O.D. side.

c. Focus adjustment is then made by turning the Zoom Ring.

NOTES: 1. When the macro lens function is being used, the normal zoom operation is inoperable conducted, as shown in Fig. 3-2.

2. To release the "macro" setting, turn the F.f Adjusting Ring counter-clockwise, viewed from the camera side, until it is restricted by the stopper. Then the tracking of the lens returns to its original state, permitting the normal operation.

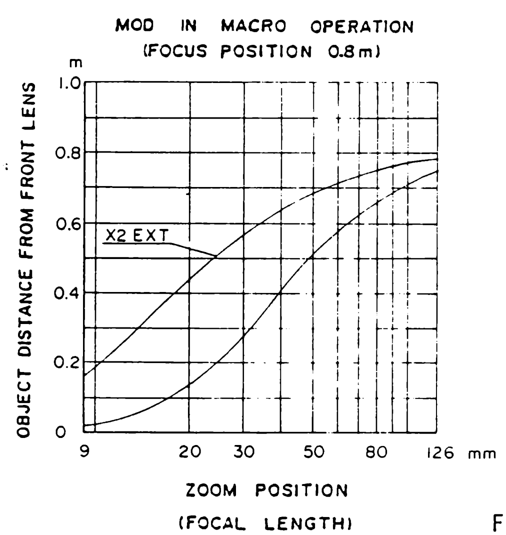


Fig. 2-2

2.9 Extender Operation

Normally the Extender Change Lever is in the position of X1. To set the extender, turn the lever to the position of X2.

This lever is not locked; it is kept in each position by means of a spring.

2.10 Converter Lens

When you require a longer or shorter focal length than that of the lens being used, the use of the tele converter or the wide converter will prove very expedient.

Listed below are the focal length and other data which vary by the use of a converter lens.

Converter Lens	Power	Apeature Ratio / Focal Length	MOD	Weight
-	-	1.7/ 9 ∿ 126 3.4/18 ∿ 252 (2x EXT)	0.8m	-
TCV80	1.8x (1.85x)	1.7/83 ∿ 233 3.4/33 ∿ 466 (2x EXT)	2.5m	1.2kg
WCV80	0.8x (0.78x)	1.7/ 7 ∿ 98 3.4/14 ∿ 196 (2x EXT)	0.45m	1.1kg

3. MAINTENANCE

3.1 Daily Maintenance

(1) Lens Cleaning

A special coating is provided on the glass surfaces to provent reflection. Dust, oil or fingerprints on the glass surface result in increased flare and lens performance deteriorated and also cause formation of mold. Remove any such foreign matter using the following procedures:

a. Prepare a mixture of 20% alcohol and 80% ether or Freon TF® and have available soft tissue or cotton fabric from oil.

b. Brush off any dust and dirt from the glass surface with a soft brush.

c. Fold the cloth to a suitable size and moisten it with the mixture. Lightly wipe the glass surface by moving the cloth in a spiral course from the center to the periphery.

d. If the glass does not come clean first time, use another cloth and wipe similarly. Repeat these steps several times until the glass is thoroughly cleaned.

(2) Check Connection Cords

Carefully inspect outer covering and terminals for cuts, scratches or other damages.

(3) Optional Accessories

When the driving power is achieved by using optional accessories, any meshing part must be normal in shape and free form dust or any other foreign matter. Carefully check all the optional equipment prior to its installation. any foreign matter should be removed immediately, and any malformed part should be serviced as soon as possible.

(4) Lens Cap

If the lens is left in position on the camera body and the camera is not in use, be sure to place the lens cap (or the hood cap when the lens hood is on) in order to protect the front glass surface and the camera tube.

3.2 Elimination of Water

If the moisture contained in the air is collected in the lens units, it may produce stubborn soils on the glasses and rust on the metal parts. Remove such moisture in the following manner:

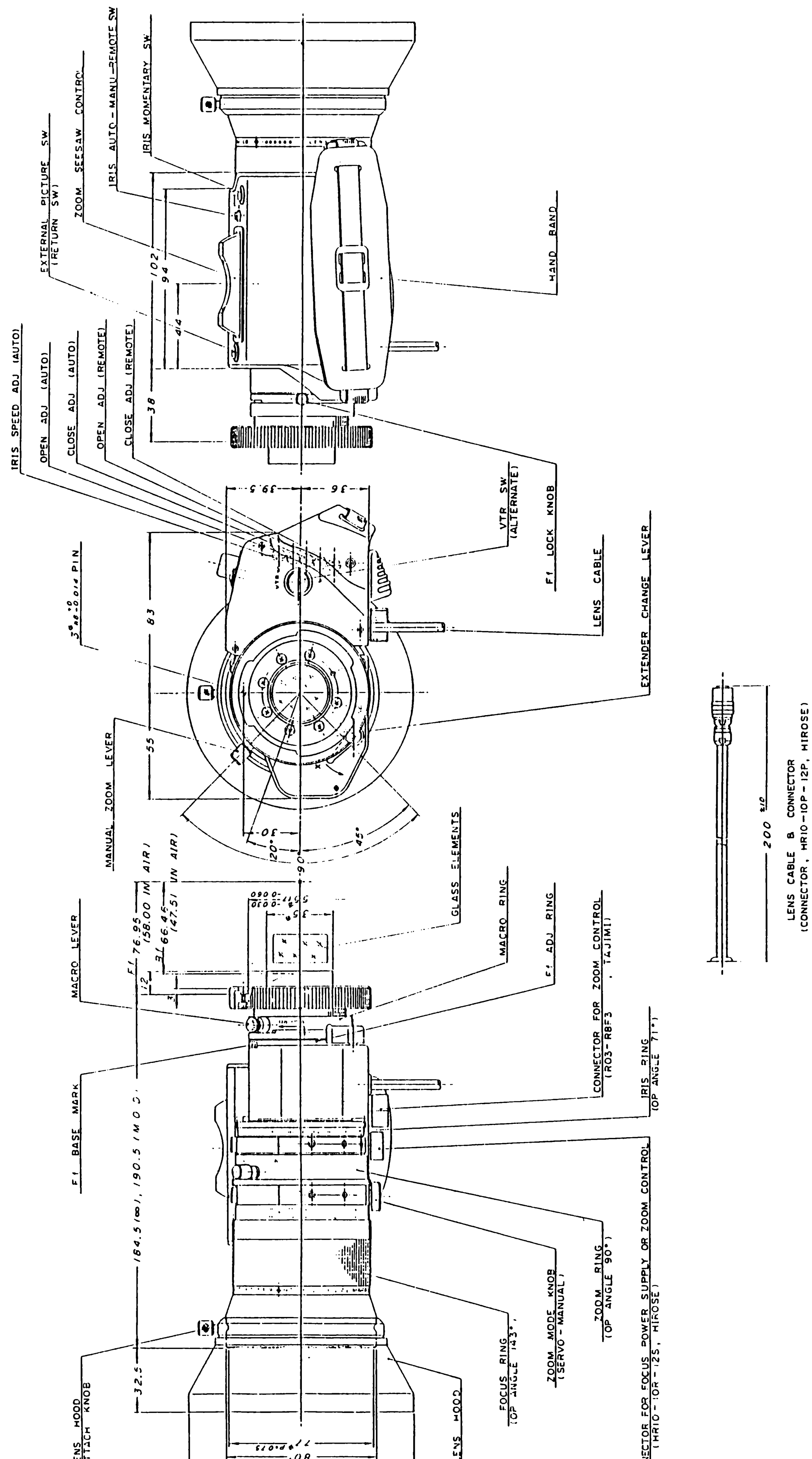
(1) Wipe away any moisture that has collected on the outside of the lens unit. Then place the lens unit in a sealed vinyl bag together with a drying agent so that the agent can absorb any moisture that remains.

NOTE: The time required for total drying will vary according to the size of the lens unit, the amount of moisture present and the quantity of the drying agent, used. However, it is recommeded that the lens unit be left in the bag for at least three hours. A new drying agent should be used for maximum effect.

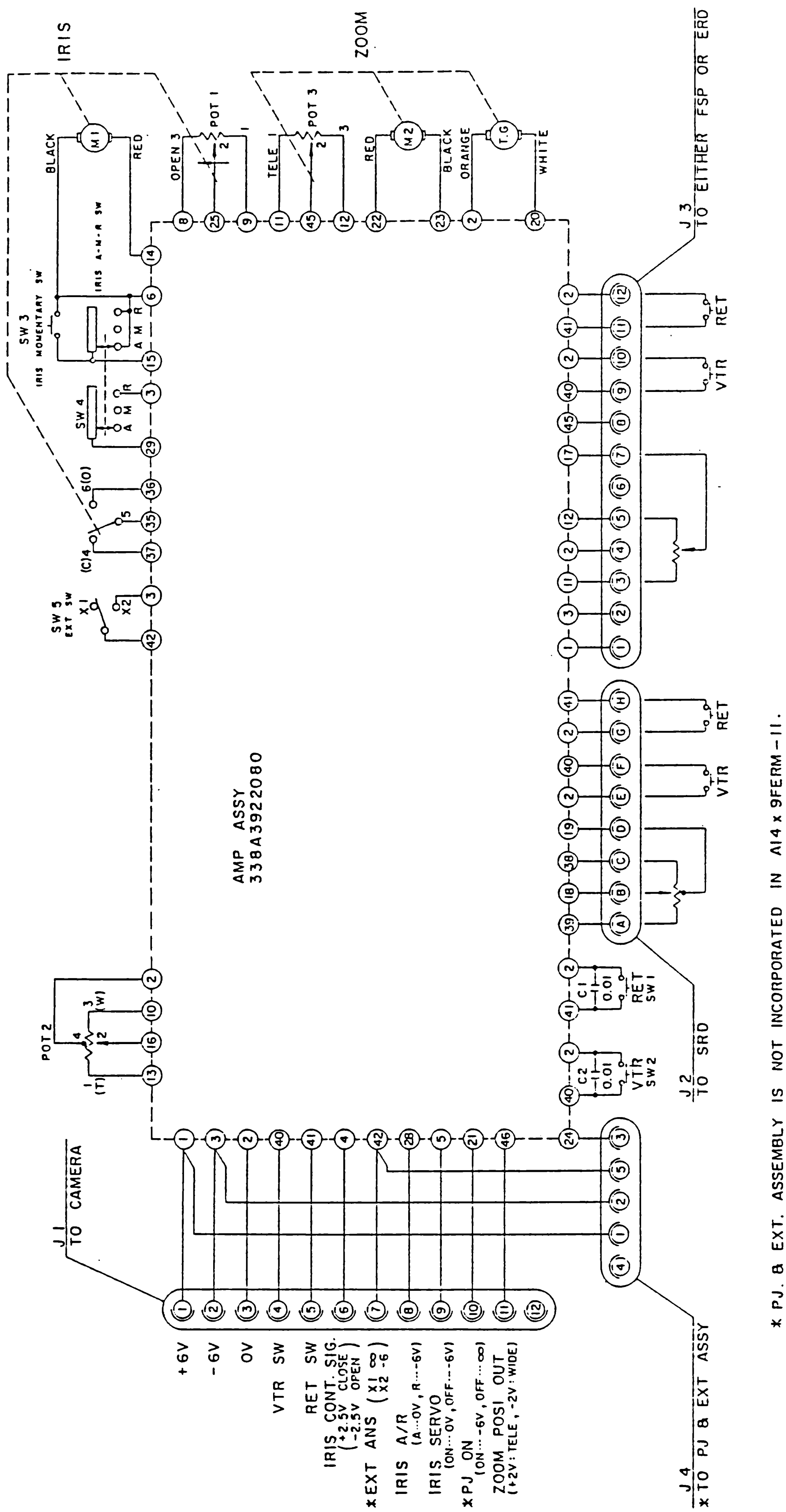
(2) If ample time is available for dehumidifying, leave the lens unit in a dry room after the moisture on the outside of the unit has been removed.

3.3 Storage of Lens

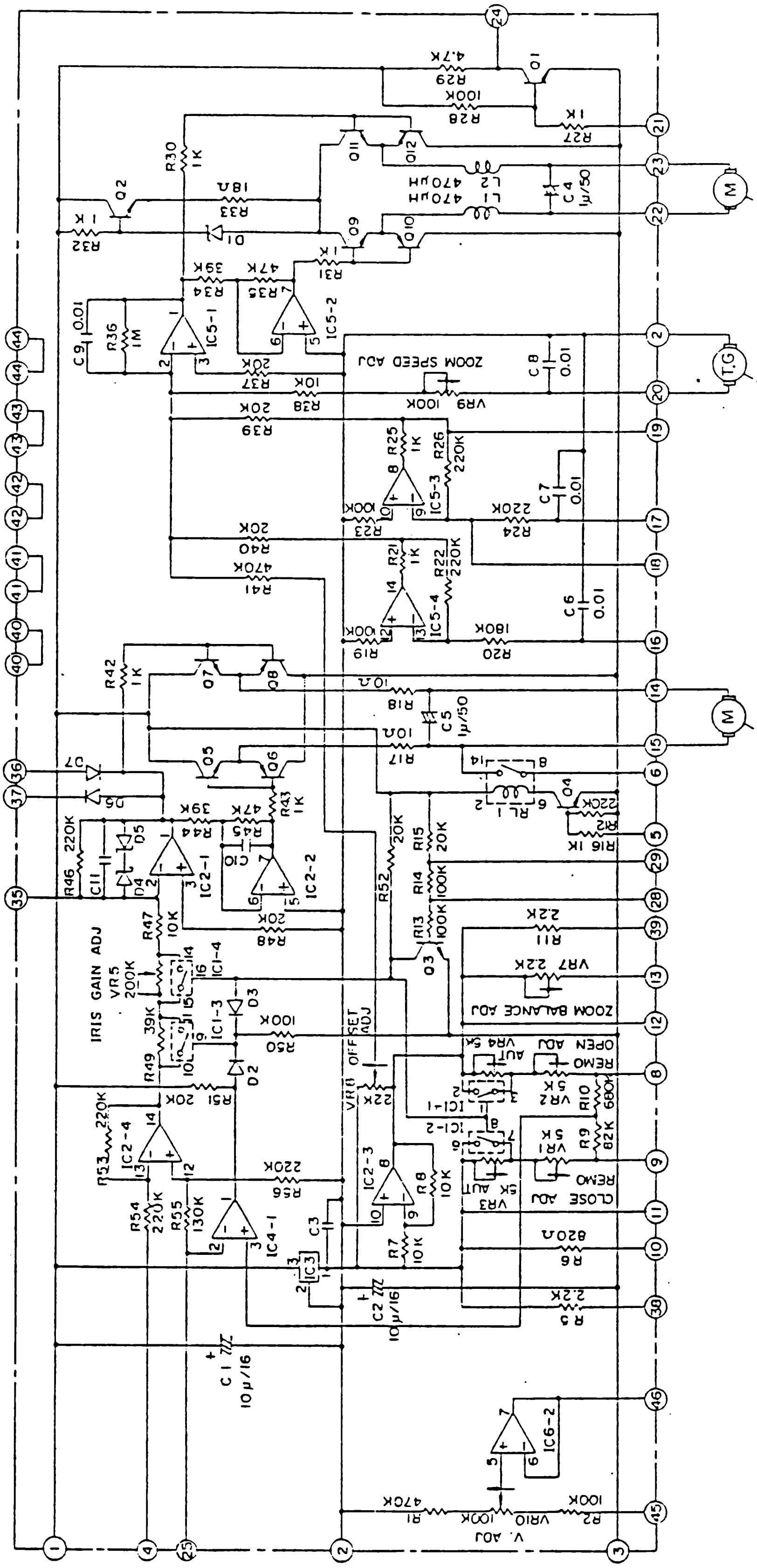
After use, wipe the lens clean, and with the lens cap on, place the unit in its storage box. For safe storage of the lens, avoid hot or humid place, and avoid places containing corrosive gas or salt. The lens should be occasinally removed and dried if stored for prolonged periods of time.



Dimension of Outline



Drive Unit
Wiring Diagram



Drive Unit
Iris Zoom amplifier
Circuit Diagram

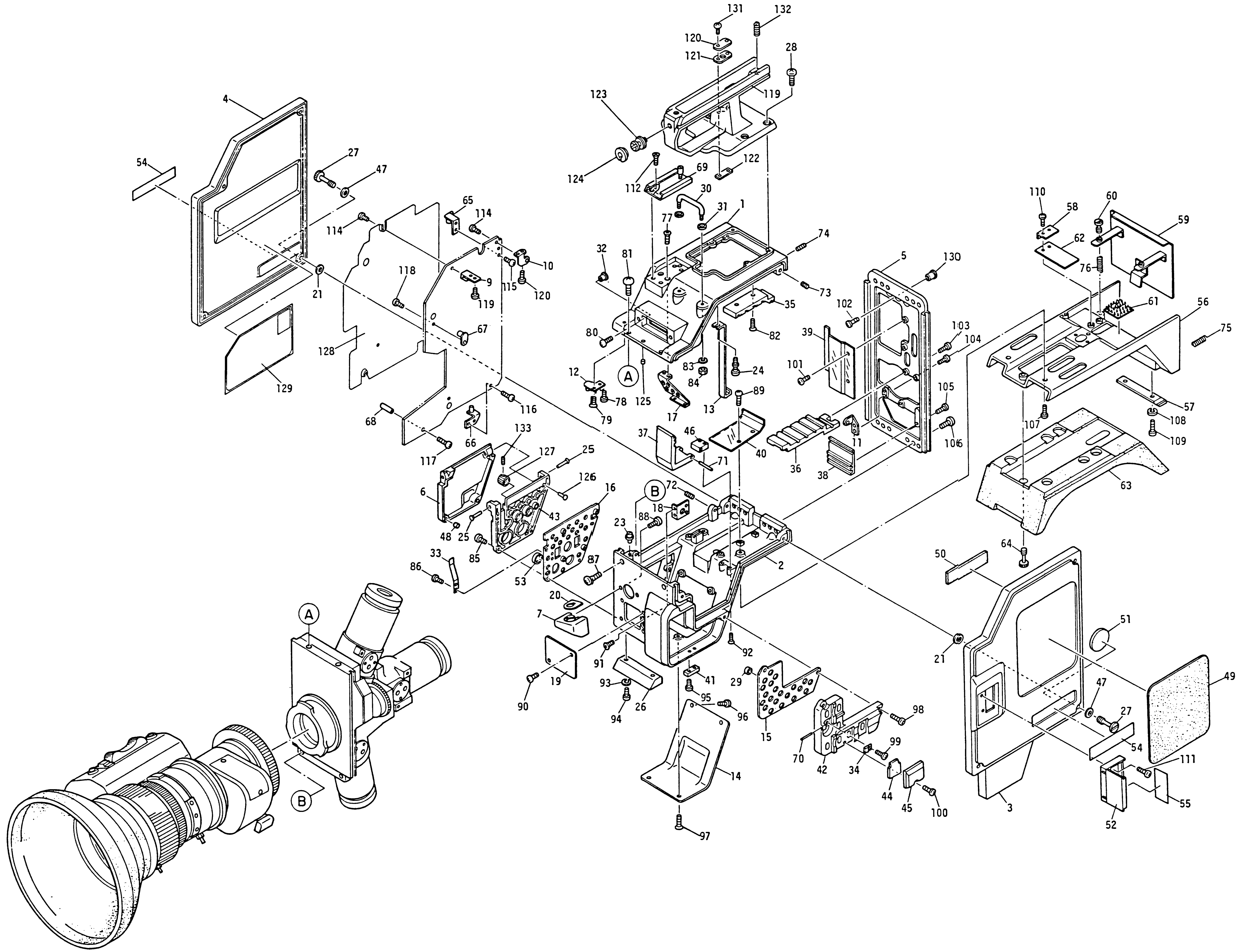
MECHANICAL PARTS LIST

No.	INDEX	PARTS No.	Q'ty
75	7-C	M4-1D(SUS)	2
76	7-B	M3-2D(SUS)	2
77	5-B	SM2.6-5	2
78	4-C	NMB2.6-5	1
79	4-C	SM2.6-5	1
80	4-C	BNMB2-6	2
81	4-B	BNMB4-8	2
82	5-C	NMB2.6-8	2
83	5-C	SW3	2
84	5-C	N3	2
85	3-D	BNMB2.6-10	4
86	3-D	NMB2-4	2
87	4-D	BNMB4-8	2
88	4-D	NMB3-8	2
89	5-C	NMB2-4	2
90	4-E	BNMB3-6	2
91	4-D	SM2.6-8	2
92	5-D	SM2.6-6	2
93	4-D	SW4	2
94	4-E	NM4-8	2
95	5-D	NMB2.6-6	4
96	5-E	BNMB3-6	2
97	5-E	BSM3-5	2
98	6-E	BNMB3-10	2
99	6-E	NMB2-4	1
100	6-E	BNMB2-6	1
101	5-C	NMB2-4	2
102	5-B	NMB2-6	2
103	6-C	BNMB2.6-8	2
104	6-C	BNMB2.6-6	2
105	6-C	BNMB2.6-6	2
106	6-C	NMB3-8	4
107	6-C	NMB4-8	4
108	7-C	SW4	2
109	7-C	NM4-8	2
110	6-B	BNMB2-4	2
111	7-E	BNMB2-4	2
112	4-B	SM2-4	4
113			
114	3-B	NMB2.6-5	4
115	4-B	NMB2-4	2
116	4-C	NMB2-4	2
117	3-C	NMB2.6-5	1
118	3-B	NMB2-4	2
119	5-A	002-227146	1
120	5-A	004-223281	1
121	5-A	004-223291	1
122	5-B	004-223282	1
123	4-A	004-223295	1
124	4-B	M4-285907	1
125	4-C	004-227723	1
126	4-C	004-225791	1
127	4-C	004-225794	1
128	3-C	004-227403	1
129	2-C	004-225779	1
130	6-B	004-214489	2
131	5-A	BNMB2-6	2
132	5-A	M4-1D(SUS)	1
133	4-C	HM2-2.5	2

No.	INDEX	PARTS No.	Q'ty
1	5-B	001-214145	1
2	5-D	001-214146	1
3	6-E	002-214148	1
4	2-A	002-214149	1
5	6-B	003-214147	1
6	3-C	004-214152	1
7	4-D	004-219070	1
8			
9	3-B	004-214474	1
10	4-B	004-214475	1
11	5-C	004-214476	1
12	4-C	004-214477	1
13	5-C	004-214479	1
14	5-E	004-214488	1
15	5-E	004-214491	1
16	4-C	004-225788	1
17	4-C	004-214758	1
18	4-D	004-214759	1
19	4-D	004-222380	1
20	4-D	004-210486	1
21	3-B,6-D	004-225562	8
22			
23	4-D	004-214478	1
24	5-C	004-216923	1
25	3-D,4-C	004-221967	2
26	4-E	004-222381	1
27	3-B,7-E	M4-266411C	8
28	5-A	M4-299872A	4
29	5-D	M4-299563	3
30	5-B	M4-284931B	1
31	5-B	M4-281328	2
32	4-B	M4-290762	2
33	3-D	004-221968	1
34	5-E	004-206906	1
35	5-B	004-214480	1
36	5-C	004-214482	1
37	4-C	004-214484	1
38	5-C	004-214485	1
39	5-C	004-214486	1
40	5-C	004-214487	1
41	5-D	004-214490	2
42	5-E	004-214494	1
43	4-D	004-225793	1
44	6-E	004-214498	1
45	6-E	004-214499	1
46	5-C	004-216922	1
47	3-B,7-D	004-221972	8
48	3-D	004-214501	2
49	7-D	004-222382	1
50	6-D	004-224166	1
51	7-D	004-224167	1
52	7-E	M4-283853	1
53	4-D	M4-290107	1
54	2-B,7-E	NP24953-Z	2
55	7-E	NP24365-Z	1
56	7-B	001-219213	1
57	7-C	004-215384	1
58	7-B	004-215390	1
59	7-B	003-221171	1
60	7-B	004-221172	2
61	7-B	004-221978	1
62	7-B	004-221979	1
63	7-C	002-219909	1
64	6-D	M4-283348	2
65	3-B	004-214864	1
66	3-C	004-214865	1
67	3-C	004-214866	2
68	3-C	3030A-14.5	1
69	5-B	SP83(Aℓ)	1
70	5-E	1010801-15018	2
71	5-C	1010801-10008	1
72	4-C	M2.6-1D(SUS)	2
73	5-B	M3-1D(SUS)	8
74	5-B	M4-1D(SUS)	8

K3-219251A

Fig. 10-1

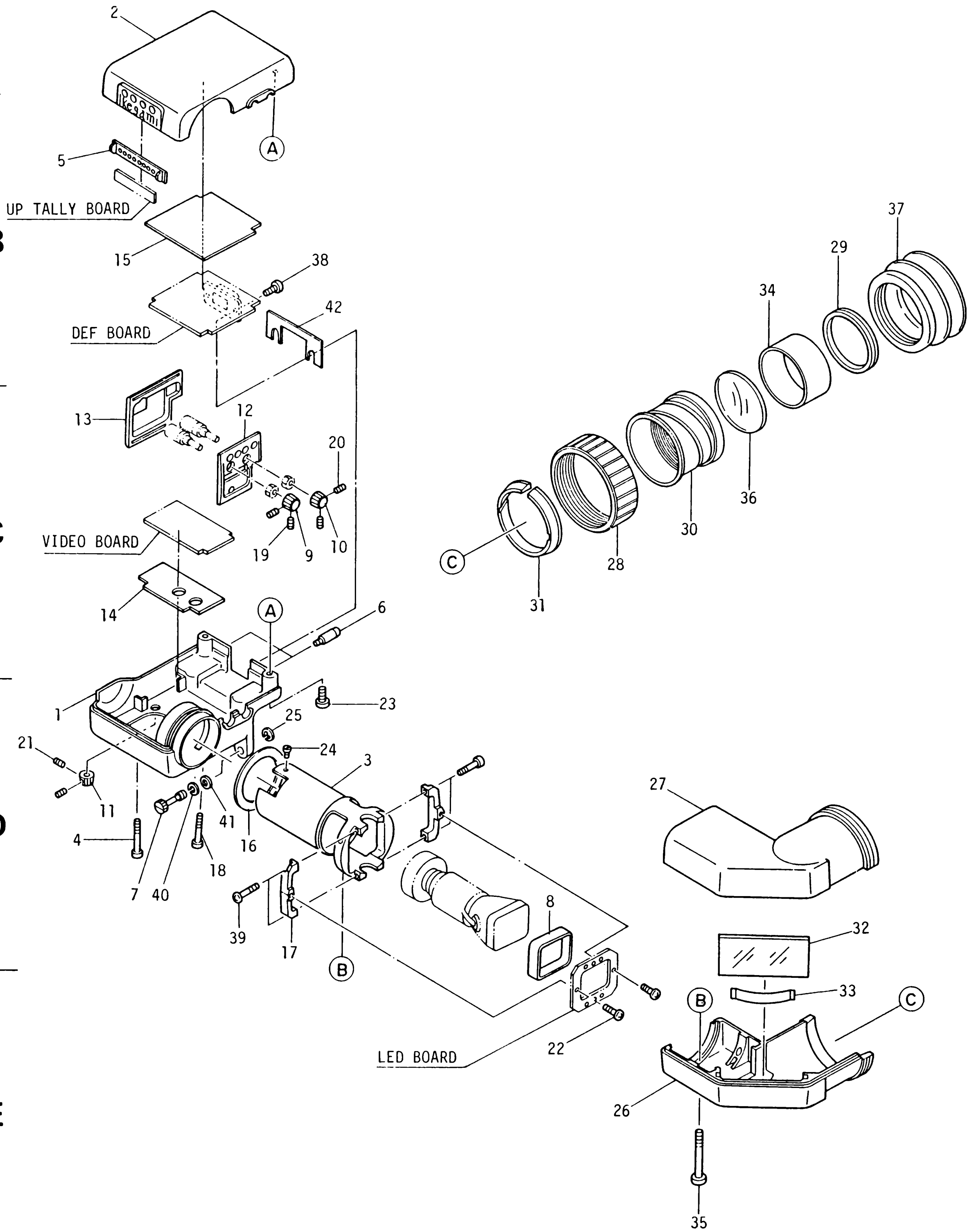


HL-95 UNICAM CAMERA HEAD
K3-219251A

IKEGAMI TSUSHINKI CO.,LTD

No.	INDEX	PARTS No.	Q'ty
1	1-D	M2-907176	1
2	1-A	M2-907177	1
3	2-D	M3-907190	1
4	1-D	M4-907813	1
5	1-B	004-206977	1
6	2-C	M4-907814	2
7	1-D	M4-295906	1
8	3-D	M4-281276	1
9	2-C	M4-907815-B	1
10	2-C	M4-907815-C	1
11	1-D	M4-907815-P	1
12	2-C	M4-907215	1
13	1-C	M4-907216	1
14	1-C	M4-907232-A	1
15	1-B	M4-907232-B	1
16	2-D	M4-907233	1
17	2-D	004-200239	2
18	2-D	M4-907817	1
19	2-C	(-)BHM2.6-3	2
20	2-C	(-)BHM2.6-3	2
21	1-D	(-)BHM2.6-3	2
22	3-E	BFM1.2-4	2
23	2-D	BFM3-4	2
24	2-D	1NM2-2	2
25	2-D	ETWJ-3	1
26	3-E	M3-907210	1
27	3-D	M3-907211	1
28	3-C	004-202079	1
29	4-B	M4-268144	1
30	3-C	M4-907212	1
31	3-C	004-202082	1
32	4-D	M4-905272	1
33	4-E	M4-908175	1
34	4-B	M4-908174	1
35	3-E	BFM2.6-32(F)	2
36	3-C	CONVEX +9ø42	1
37	4-B	M4-907213	1
38	2-B	NMB2.6-4	2
39	2-D	NM2.6-8	4
40	1-D	SW 4	1
41	2-D	HW 4	1
42	2-B	M4-908258	1

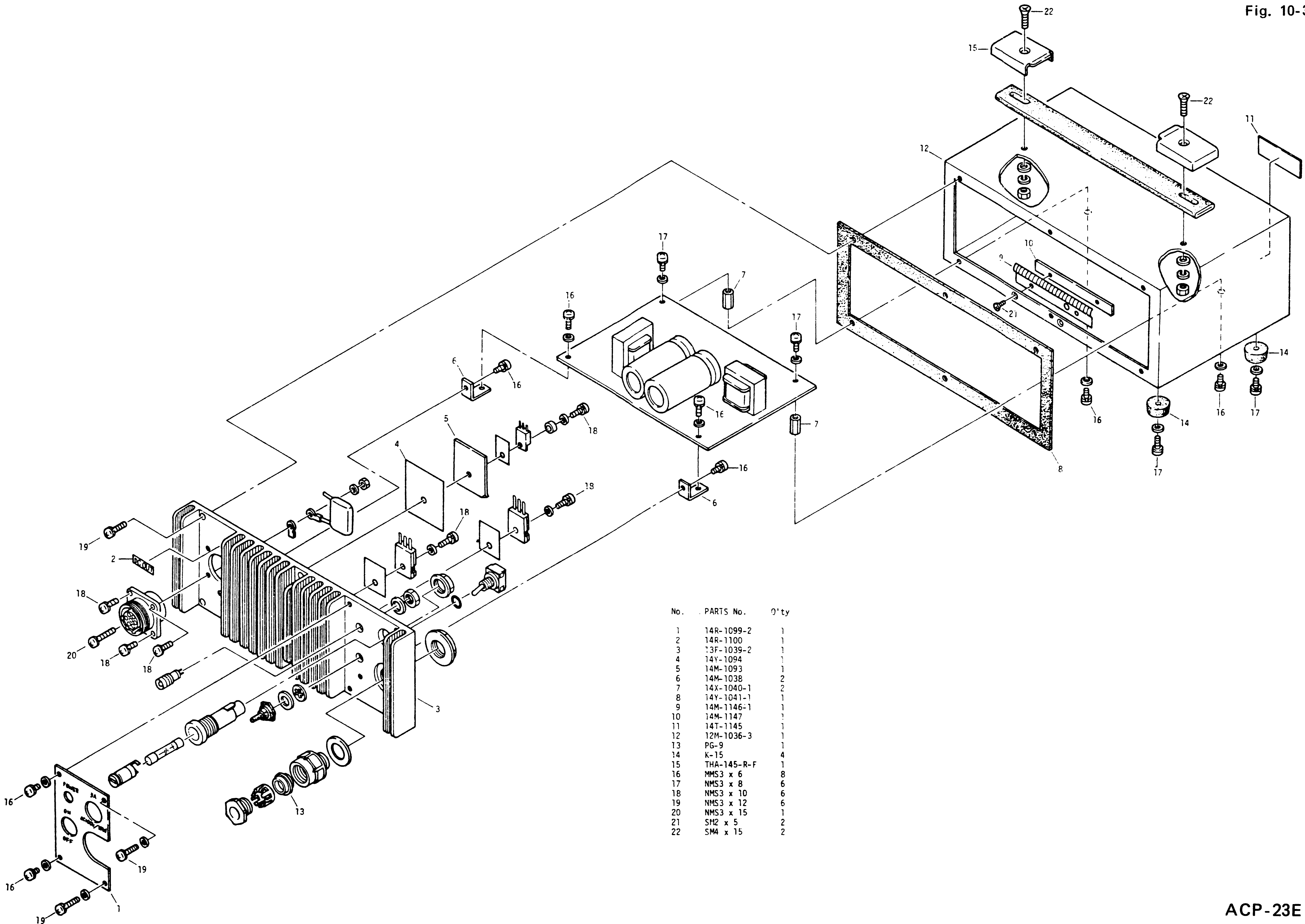
K4-903641-01



VF15-12A
VIEWFINDER
K4-903641-01

IKEGAMI TSUSHINKI CO.,LTD

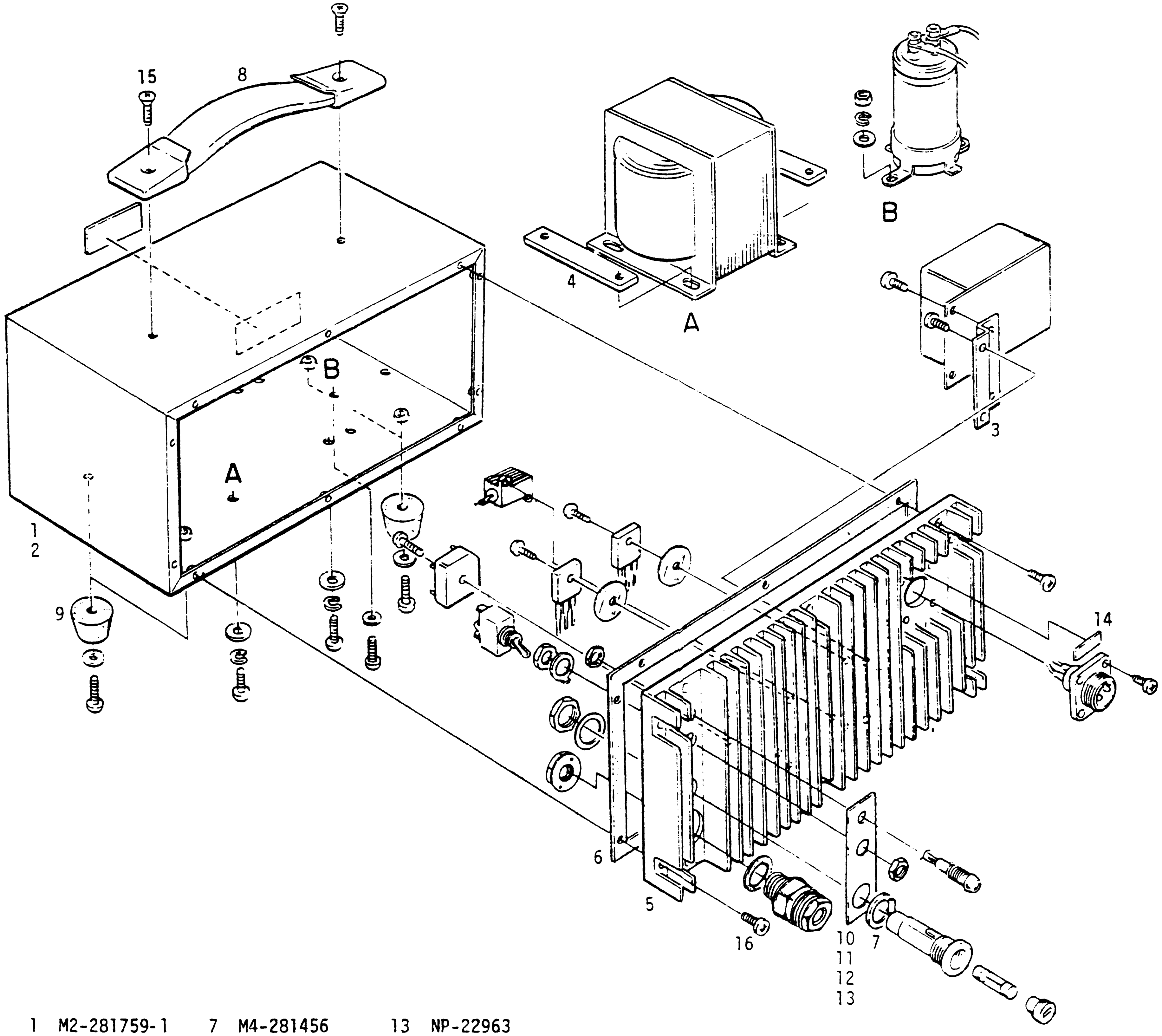
Fig. 10-3



No.	PARTS No.	Q'ty
1	14R-1099-2	1
2	14R-1100	1
3	13F-1039-2	1
4	14Y-1094	1
5	14M-1093	1
6	14M-1038	2
7	14X-1040-1	2
8	14Y-1041-1	1
9	14M-1146-1	1
10	14M-1147	1
11	14T-1145	1
12	12M-1036-3	1
13	PG-9	1
14	K-15	4
15	THA-145-R-F	1
16	MMS3 x 6	8
17	NMS3 x 8	6
18	NMS3 x 10	6
19	NMS3 x 12	6
20	NMS3 x 15	1
21	SM2 x 5	2
22	SM4 x 15	2

ACP-23E
AC PACK

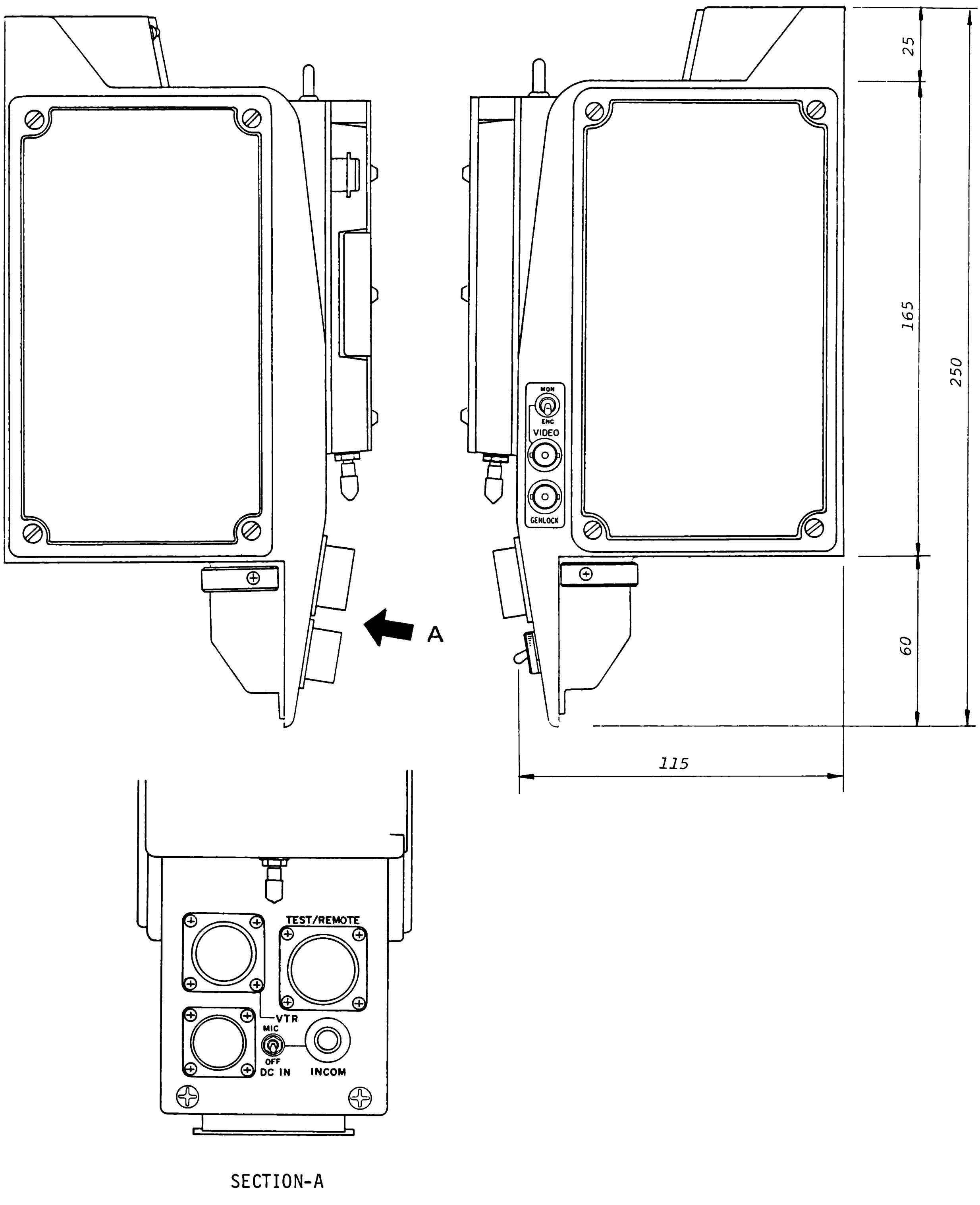
Fig. 10-4



1	M2-281759-1	7	M4-281456	13	NP-22963
2	M2-281759-2	8	THA-145-R-F	14	NP-22964
3	M4-281760	9	4850-20	15	MM4-10
4	M4-281761	10	NP-22960	16	TM3-8
5	M3-281762	11	NP-22961		
6	M4-281763	12	NP-22962		

ACP-17E
AC PACK

Fig. 11-0-a

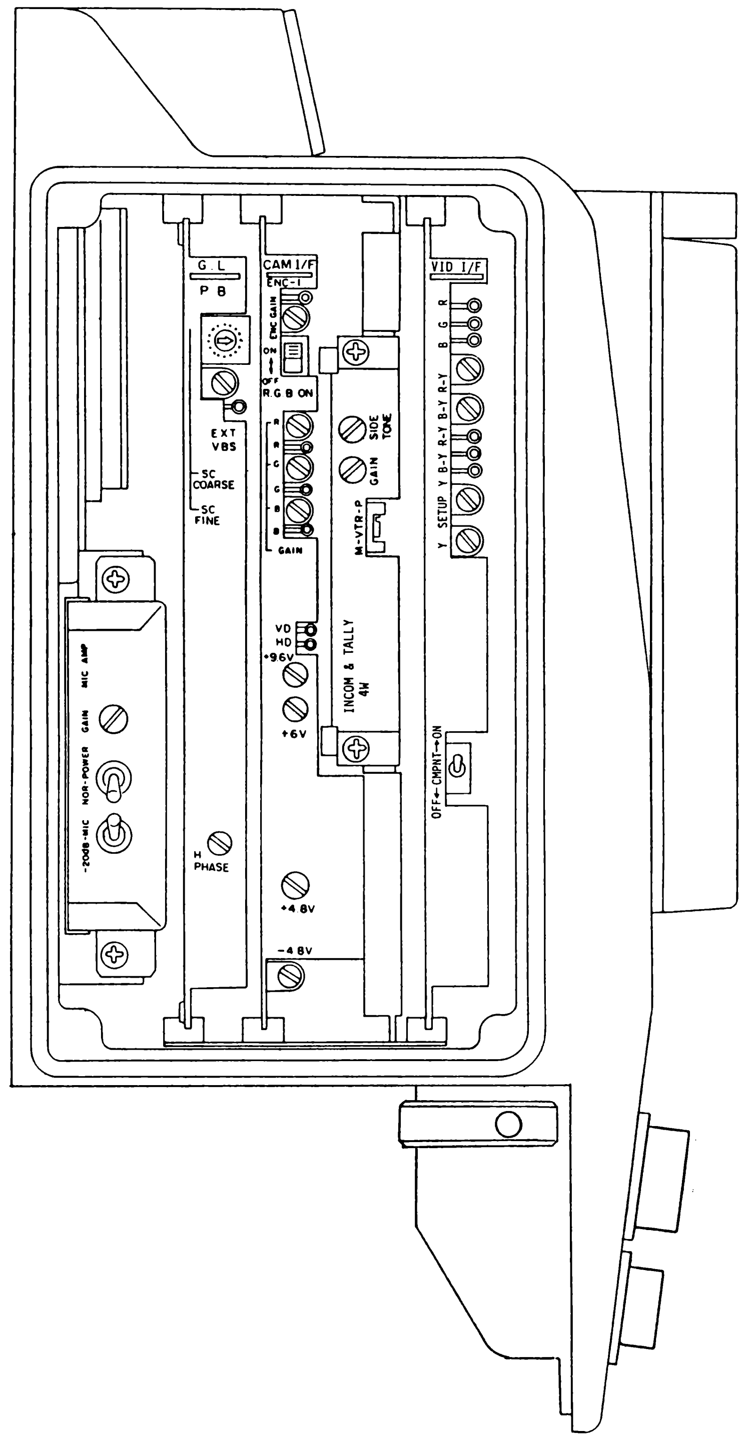


SECTION-A

CA-95C

External Appearance

Fig. 11-0-b



CA-95C
Module Layout

Diodes

D	1	BD-601R(BLK)	OKA

Resistors

R	1	RE15YQ 360ohm F	SSM
R	2	RE15YQ 75ohm F	SSM
R	3	RE15YQ 75ohm F	SSM
R	4	RE15YQ 150ohm F	SSM

Capacitors

C	1	FD76AX1H224M	TDK
C	2	UMA1C470MCA	NCI

Connectors

CN	1	2DC-79S	ITT
CN	2	00-82118-016-722-001	ELC
CN	3	PS-12SD-D4C2	JAE
CN	4	JRC13RG-5P	JAE
CN	5	SRCB02A21-26P	JAE
CN	6	KJ2E16A-35SN	ITT
CN	7	XLR-3-31-F77	JAE

Switches

S	1	AT1D-6M3	FJS
S	2	8J-1011	FJS
S	3	8J-1011	FJS

Jacks

J	1	MLF2B45R-J1	NBA
J	2	MLF2B45R-J1	NBA
J	3	MLF2B45R-J1	NBA
J	4	AJ-171W	ARA

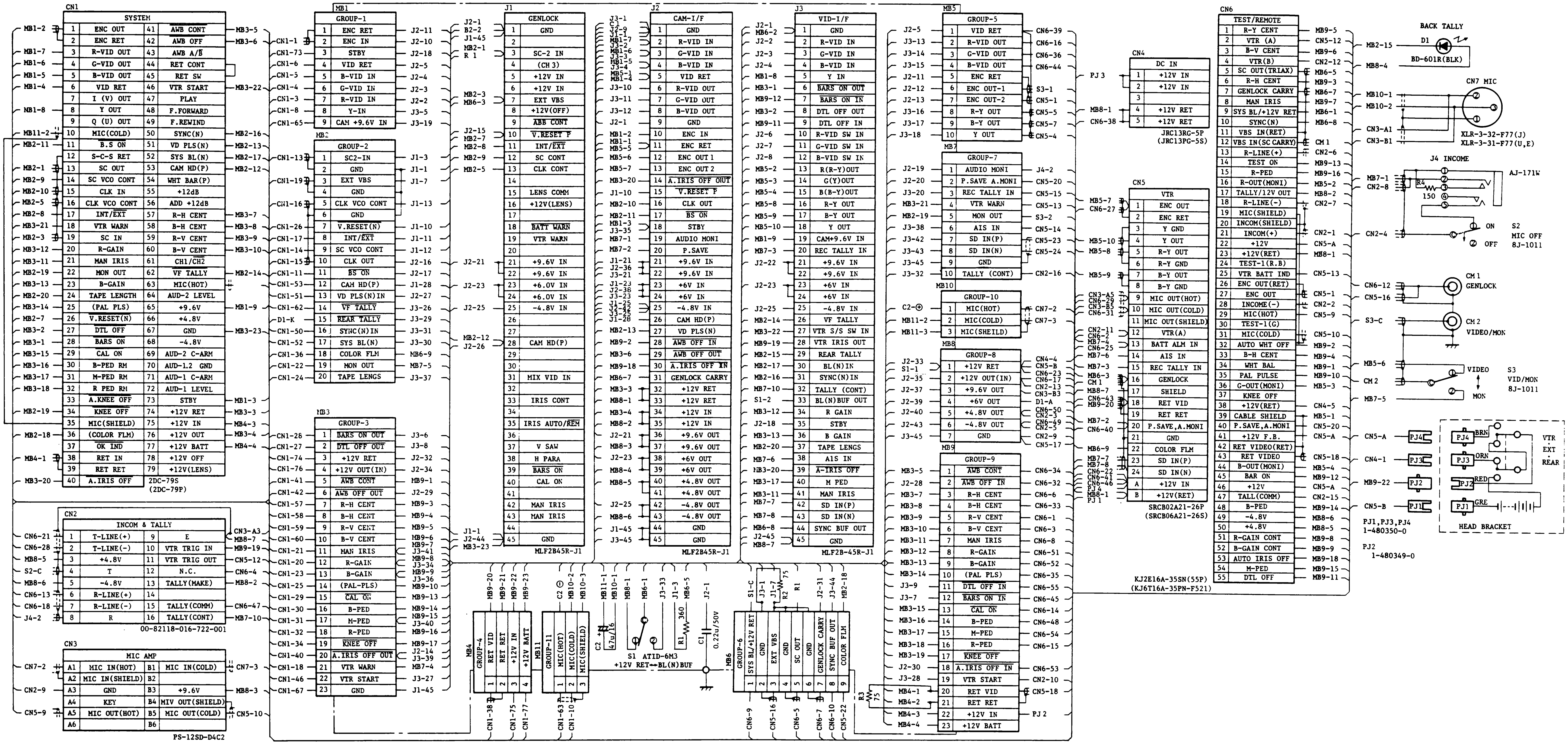
BNC Connectors

CM	1	BNC-258BR	TAJ
CM	2	BNC-258BR	TAJ

PIN JACKS

PJ	1	1-480350-0 (60618-5)	AMP
PJ	2	1-480349-0 (60617-5)	AMP
PJ	3	1-480350-0 (60618-5)	AMP
PJ	4	1-480350-0 (60618-5)	AMP

Fig. 11-1-a



CA-95C GENERAL
Schematic Diagram
C21-220308

CAM-I/F MODULE

Integrated Circits

IC 1	TL-062CP	TEX
IC 2	LM385Z-2R5	NSC
IC 3	TL-064CN	TEX
IC 4	LM339N	NSC
IC 5	TL-494CN	TEX
IC 6	TL-062CP	TEX
IC 7	BA1A4M	NEC

Transistors

TR 1	2N3904	NEC
TR 2	2N3904	NEC
TR 3	2N3904	NEC
TR 4	2N3904	NEC
TR 5	2N3904	NEC
TR 6	2N3904	NEC
TR 7	2N3904	NEC
TR 8	2N3904	NEC
TR 9	2N3904	NEC
TR 10	2N3906	NEC
TR 11	2N3906	NEC
TR 12	2N3904	NEC
TR 13	2N3904	NEC
TR 14	2N3904	NEC
TR 15	2N3904	NEC
TR 16	2N3904	NEC
TR 17	2N3906	NEC
TR 18	2N3904	NEC
TR 19	2SA1244-0	TOS
TR 20	2N3904	NEC
TR 21	2SA1244-0	TOS
TR 22	2N3904	NEC
TR 23	2SA1244-0	TOS
TR 24	2N3904	NEC
TR 25	2SC3074-0	TOS
TR 26	2SC3074-0	TOS
TR 27	2SC3074-0	TOS
TR 28	2N3904	NEC
TR 29	2N3904	NEC
TR 30	2N3904	NEC
TR 31	2N3904	NEC
TR 32	2N3904	NEC
TR 33	2N3904	NEC
TR 34	2N3904	NEC

Diords

D 1	RD4R3EB	NEC
D 2	RD4R3EB	NEC
D 3	RD4R3EB	NEC
D 4	RD2R4EB	NEC
D 5	1S953	NEC
D 6	1S953	NEC
D 7	RD6R2JB	NEC
D 10	ERC81-004	FJE
D 11	ERC81-004	FJE
D 12	1S953	NEC
D 13	1S953	NEC
D 14	1S953	NEC
D 15	1S953	NEC
D 16	1S953	NEC
D 17	1S953	NEC
D 18	ERA81-004	FJE
D 19	ERA81-004	FJE
D 20	1S953	NEC
D 21	1S953	NEC

Resistors

R 1	RE15YQ 10Kohm F	SSM
R 2	RE15YQ 1200ohm F	SSM
R 3	RE15YQ 3900ohm F	SSM
R 4	RE15YQ 2200ohm F	SSM
R 5	RE15YQ 1500ohm F	SSM
R 6	RE15YQ 2700ohm F	SSM
R 7	RE15YQ 300ohm F	SSM
R 8	RE15YQ 75ohm F	SSM
R 9	RE15YQ 10Kohm F	SSM
R 10	RE15YQ 1200ohm F	SSM
R 11	RE15YQ 3900ohm F	SSM
R 12	RE15YQ 2200ohm F	SSM
R 13	RE15YQ 2700ohm F	SSM
R 14	RE15YQ 1500ohm F	SSM
R 15	RE15YQ 300ohm F	SSM
R 16	RE15YQ 75ohm F	SSM
R 17	RE15YQ 10Kohm F	SSM
R 18	RE15YQ 1200ohm F	SSM
R 19	RE15YQ 3900ohm F	SSM
R 20	RE15YQ 2200ohm F	SSM
R 21	RE15YQ 1500ohm F	SSM
R 22	RE15YQ 2700ohm F	SSM
R 23	RE15YQ 300ohm F	SSM
R 24	RE15YQ 75ohm F	SSM
R 25	RE15YQ 6200ohm F	SSM
R 26	RE15YQ 3000ohm F	SSM
R 27	RE15YQ 3300ohm F	SSM
R 28	RE15YQ 10Kohm F	SSM
R 29	RE15YQ 10Kohm F	SSM
R 30	RE15YQ 11Kohm F	SSM
R 31	RE15YQ 12Kohm F	SSM
R 32	RE15YQ 820ohm F	SSM

Resistors

R 33	RE15YQ 2200ohm F	SSM
R 34	RE15YQ 10Kohm F	SSM
R 35	RE15YQ 10Kohm F	SSM
R 36	RE15YQ 12Kohm F	SSM
R 37	RE15YQ 10Kohm F	SSM
R 38	RE15YQ 470ohm F	SSM
R 39	RE15YQ 3900ohm F	SSM
R 41	RE15YQ 75ohm F	SSM
R 42	RE15YQ 10Kohm F	SSM
R 43	RE15YQ 2200ohm F	SSM
R 44	RE15YQ 620ohm F	SSM
R 45	RE15YQ 120ohm F	SSM
R 46	RE15YQ 2000ohm F	SSM
R 47	RE15YQ 1000ohm F	SSM
R 48	RNS1/8-C1R5ohm F	KOA
R 49	RE15YQ 10ohm F	SSM
R 50	RE15YQ 10ohm F	SSM
R 51	RE15YQ 75ohm F	SSM
R 52	RE15YQ 75ohm F	SSM
R 53	RE15YQ 1000ohm F	SSM
R 54	RE15YQ 10Kohm F	SSM
R 55	RE15YQ 10Kohm F	SSM
R 56	RE15YQ 20Kohm F	SSM
R 57	RE15YQ 33Kohm F	SSM
R 58	RE15YQ 100ohm F	SSM
R 59	RE15YQ 100Kohm F	SSM
R 60	RE15YQ 5600ohm F	SSM
R 61	RE15YQ 7500ohm F	SSM
R 62	RE15YQ 2000ohm F	SSM
R 63	RE15YQ 100Kohm F	SSM
R 64	RE15YQ 100Kohm F	SSM
R 65	RE15YQ 5100ohm F	SSM
R 66	RE15YQ 10Kohm F	SSM
R 67	RE15YQ 27Kohm F	SSM
R 68	RE15YQ 8200ohm F	SSM
R 70	RE15YQ 27Kohm F	SSM
R 71	RE15YQ 5100ohm F	SSM
R 72	RE15YQ 20Kohm F	SSM
R 73	RE15YQ 100ohm F	SSM
R 74	RE35YQ 510ohm F	SSM
R 75	RE15YQ 3900ohm F	SSM
R 76	RE15YQ 6200ohm F	SSM
R 77	RE15YQ 27Kohm F	SSM
R 78	RE15YQ 5100ohm F	SSM
R 79	RE15YQ 20Kohm F	SSM
R 80	RE15YQ 200ohm F	SSM
R 81	RE35YQ 510ohm F	SSM
R 82	RE15YQ 1200ohm F	SSM
R 83	RE15YQ 5100ohm F	SSM
R 84	RE15YQ 5100ohm F	SSM
R 85	RE15YQ 560ohm F	SSM
R 86	RE15YQ 1600ohm F	SSM
R 87	RE15YQ 10Kohm F	SSM
R 88	RE15YQ 30Kohm F	SSM
R 89	RE15YQ 18Kohm F	SSM
R 90	RE15YQ 10Kohm F	SSM
R 91	RE15YQ 10Kohm F	SSM
R 92	RE15YQ 30Kohm F	SSM
R 93	RE15YQ 3000ohm F	SSM
R 94	RE15YQ 10Kohm F	SSM
R 95	RE15YQ 33Kohm F	SSM
R 96	RE15YQ 33Kohm F	SSM
R 97	RE15YQ 510ohm F	SSM
R 98	RE15YQ 820ohm F	SSM
R 99	RE15YQ 820ohm F	SSM
R100	RE15YQ 360ohm F	SSM
R101	RE15YQ 1600ohm F	SSM
R102	RE15YQ 6200ohm F	SSM
R103	RE15YQ 4700ohm F	SSM
R104	RE15YQ 1000ohm F	SSM
R105	RE15YQ 3900ohm F	SSM
R106	RE15YQ 20Kohm F	SSM
R107	RE15YQ 18Kohm F	SSM
R108	RE15YQ 9100ohm F	SSM
R110	RE15YQ 1200ohm F	SSM
R111	RE15YQ 2700ohm F	SSM
R112	RE15YQ 20Kohm F	SSM
R113	RE15YQ 10Kohm F	SSM
R114	RE15YQ 20Kohm F	SSM
R115	RE15YQ 7500ohm F	SSM
R116	RE15YQ 9100ohm F	SSM
R117	RE15YQ 1000ohm F	SSM
R118	RE15YQ 4700ohm F	SSM
R119	RE15YQ 9100ohm F	SSM
R120	RE15YQ 4700ohm F	SSM
R121	RE15YQ 10Kohm F	SSM
R122	RE15YQ 9100ohm F	SSM
R123	RE15YQ 4700ohm F	SSM
R124	RE15YQ 24Kohm F	SSM
R125	RE15YQ 7500ohm F	SSM
R126	RE15YQ 100Kohm F	SSM
R127	RE15YQ 51Kohm F	SSM
R128	RE15YQ 56Kohm F	SSM
R129	RE15YQ 10Kohm F	SSM
R130	RE15YQ 15Kohm F	SSM

Variable Resistors

VR 1	RJ-4WS 2000ohm	CPL
VR 2	RJ-4WS 2000ohm	CPL
VR 3	RJ-4WS 2000ohm	CPL
VR 4	RJ-4WS 500ohm	CPL
VR 5	RJ-4WS 1000ohm	CPL
VR 6	RJ-4WS 500ohm	CPL
VR 7	RJ-4WS 200ohm	CPL

Variable Resistors

VR 8	RJ-4WS 500ohm	CPL

Capacitors

C 1	UMA1C470MCA	NCI
C 2	FD12COG1H070C	TDK
C 3	UMA1C470MCA	NCI
C 4	FD12COG1H070C	TDK
C 5	FD52AX1H-104M-1	TDK
C 6	FD12COG1H070C	TDK
C 7	UMA1C330MCA	NCI
C 8	UMA1C470MCA	NCI
C 9	UMAOJ101MCA	NCI
C 10	UMAOJ220MCA	NCI
C 11	UMAOJ220MCA	NCI
C 12	UMA1C470MCA	NCI
C 13	FD52AX1H-104M-1	TDK
C 14	UMAOJ101MCA	NCI
C 15	FD52AX1H-104M-1	TDK
C 16	UMA1C470MCA	NCI
C 18	UMAOJ101MCA	NCI
C 19	UMAOJ220MCA	NCI
C 22	UMAOJ101MCA	NCI
C 23	UMA1C330MCA	NCI
C 24	UMA1C470MCA	NCI
C 25	SXC25VB47	NCH
C 26	SXC25VB47	NCH
C 28	UMA1H2R2MCA	NCI
C 29	UMA1A330MCA	NCI
C 30	FD12COG1H820J	TDK
C 31	FD12COG1H471J	TDK
C 32	FD52AX1H-104M-1	TDK
C 33	FD52AX1H-104M-1	TDK
C 34	SXC16VB100	NCH
C 35	SXC16VB100	NCH
C 36	UMA1H2R2MCA	NCI
C 37	UMA1C470MCA	NCI
C 38	SXE16VB2208B	NCH
C 39	FD52AX1H-104M-1	TDK
C 40	FD52AX1H-104M-1	TDK
C 41	SXC16VB100	NCH
C 42	FD52AX1H-104M-1	TDK
C 43	SXC10VB100	NCH
C 44	SXE16VB39010E	NCH
C 45	UMAOJ220MCA	NCI
C 46	SXC10VB100	NCH
C 47	FD52AX1H-104M-1	TDK
C 48	FD12COG1H390J	TDK
C 49	FD52NP01H--222J	TDK
C 50	FD52AX1H-104M-1	TDK
C 51	UMA1H100MCA	NCI
C 52	UMA1H100MCA	NCI
C 53	SXE16VB1206R3B	NCH
C 54	SXE16VB39010E	NCH
C 55	SXC10VB100	NCH
C 56	DM05C 101J05	SOS
C 57	FD12COG1H221J	TDK
C 58	FD12COG1H331J	TDK
C 59	FD52AX1H-104M-1	TDK
C 60	FD35AX1H-102M	TDK
C 61	FD52AX1H-104M-1	TDK
C 62	FD12COG1H221J	TDK
C 63	FD12COG1H331J	TDK
C 64	FD52AX1H-104M-1	TDK
C 66	FD52AX1H-104M-1	TDK
C 67	FD52AX1H-104M-1	TDK
C105	FD52AX1H-104M-1	TDK

Inductance Coiles

L 1	ST-202246A	IKE
L 2	ST-202246A	IKE
L 3	ST-203047	IKE
L 4	ST-203047	IKE
L 5	ST-203529	IKE
L 6	ST-202032B	IKE
L 7	ST-202246A	IKE
L 8	ST-980382	IKE
L 9	ST-202032B	IKE
L 10	TP0206-180K	TDK
L 11	TP0206-180K	TDK

Connector

CN 1	MLF2B45P-J1	NBA

Switches

S 1	AT2D-6M3	FJS
S 2	SM03201-02	NKK
S 3	SM03201-02	NKK

Transformer

T 1	ST-203530	IKE

Terminales

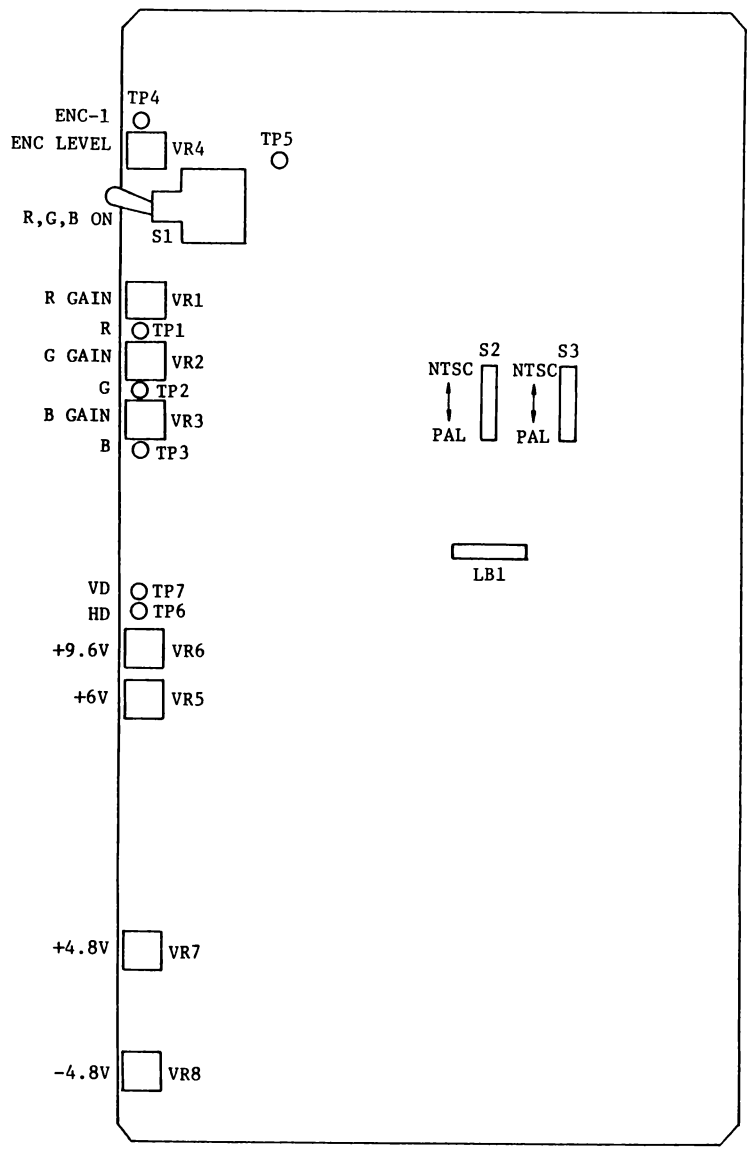
TB	1	TBP-6	IKE
TB	2	TBP-6	IKE
TB	3	TBP-6	IKE
TB	4	TBP-6	IKE
TB	5	TBP-6	IKE
TB	6	TBP-6	IKE
TB	7	TBP-6	IKE

EL BIT

LB	1	PS-3PF-S4T1-PKL1	JAE

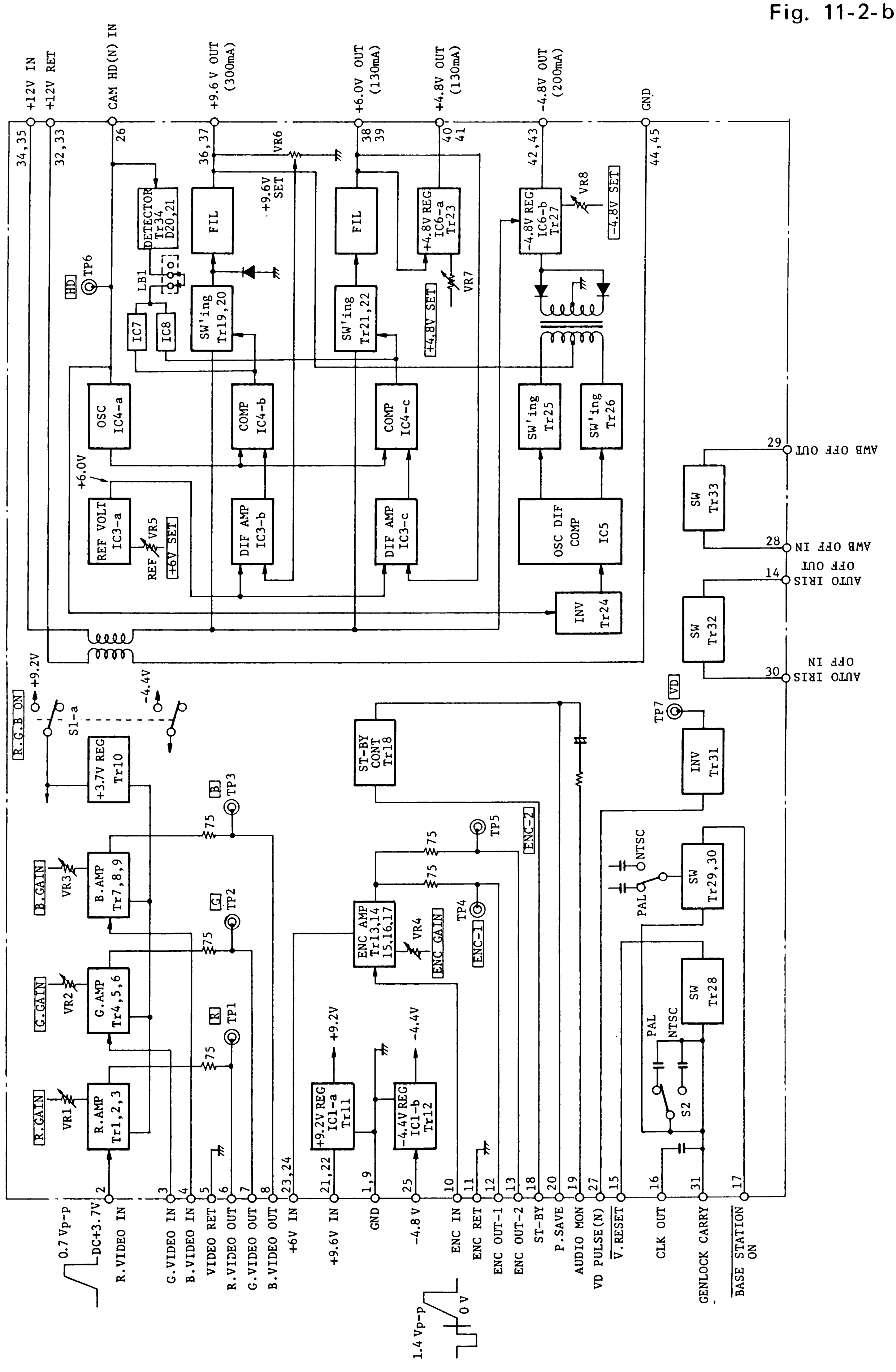
SHORT SOCKET

SS	1	PS-2SH4-1	JAE



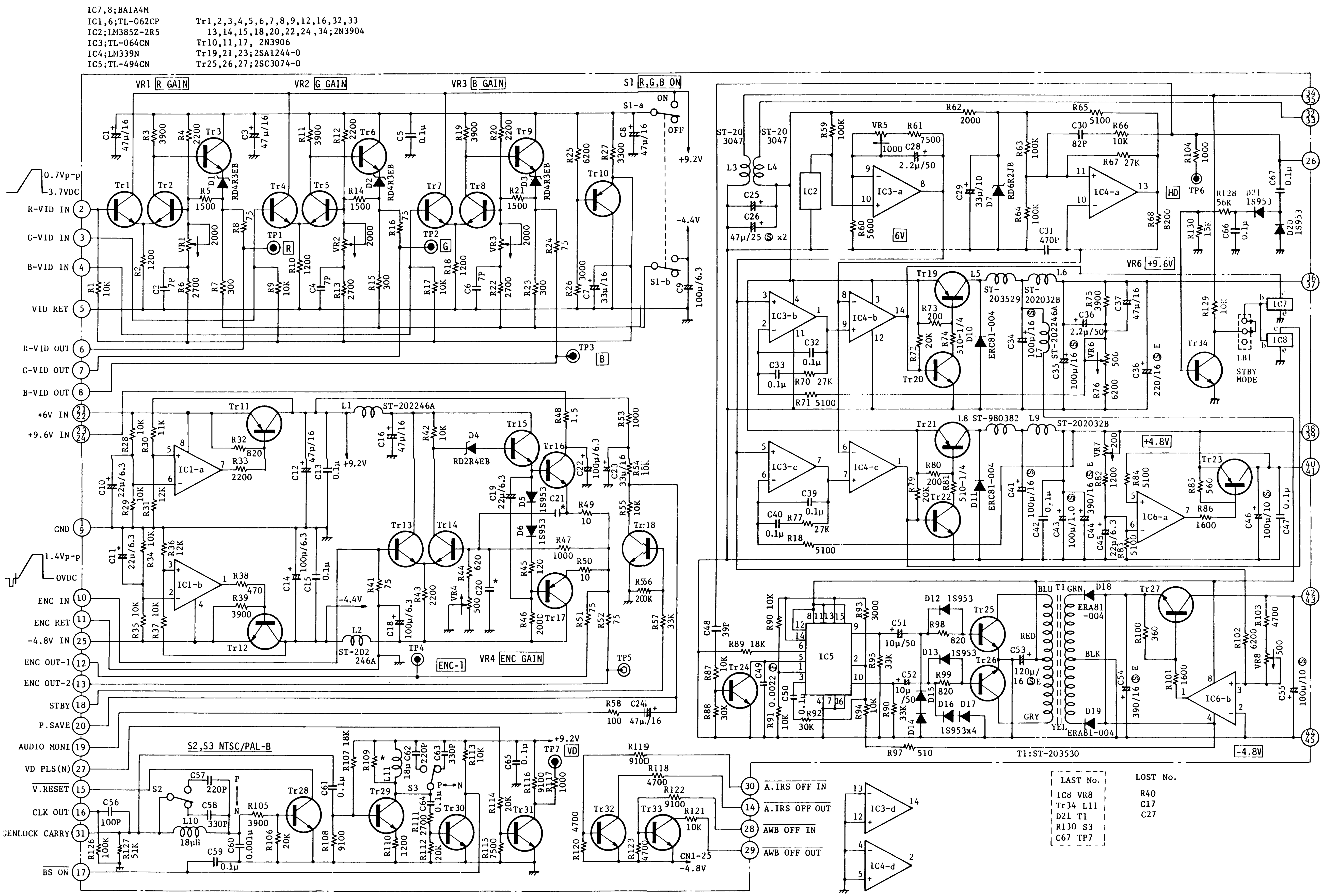
CAM I/F
Controls

Fig. 11-2-b



CAM-I/F
Block Diagram

Fig. 11-2-c



CAM-I/F
Schematic Diagram
C3-220414

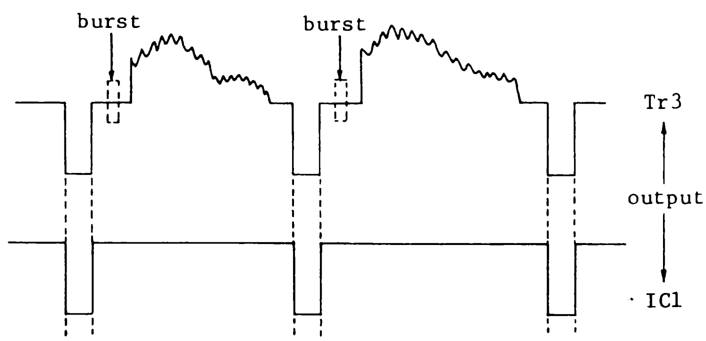
SECTION 11.3 GENLOCK MODULE (PAL-B)

The GENLOCK module consists of a circuit to phase the camera to an external synchronizing signal (VBS/BBS), a lens iris control circuit and a circuit to indicate a warning in the viewfinder when battery voltage lowers to 11.0V.

The GEN LOCK module seperates the external synchronizing signal (VBS/BBS) into horizontal/vertical synchronizing and the subcarrier signals.

Vertical Synchronizing Circuit

This is a filter circuit that kills the subcarrier component of the external synchronizing signal with Tr1, L1 and C2 to pass only the luminance signal (including SYNC). Tr2 and Tr3 are an inverting amplifier to separate of the luminance signal including SYNC at the next stage. IC1 is a SYNC separation circuit.

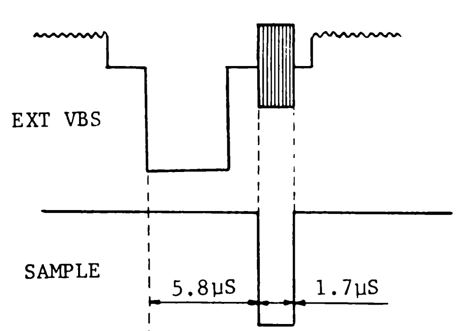


The CLK CONT signal controls the V. RESET and clock signal(10 MHz)of the synthesizer in the PULSE module. It is produced from the extracted SYNC signal.

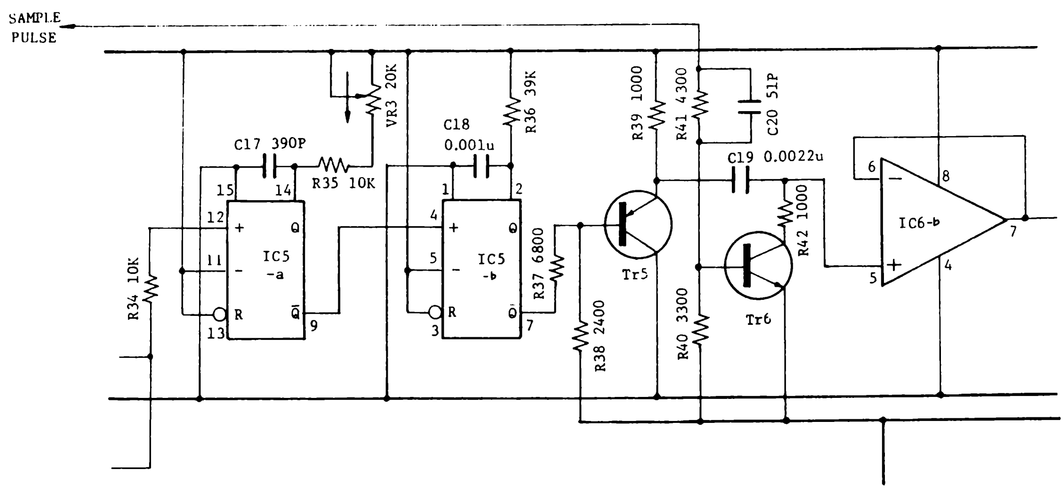
Horizontal Synchronizing Circuit

The horizontal synchronizing circuit controls a clock frequency used for the synthesizer in the PULSE module which phases each pulse used in the camera with the external synchronizing signal.

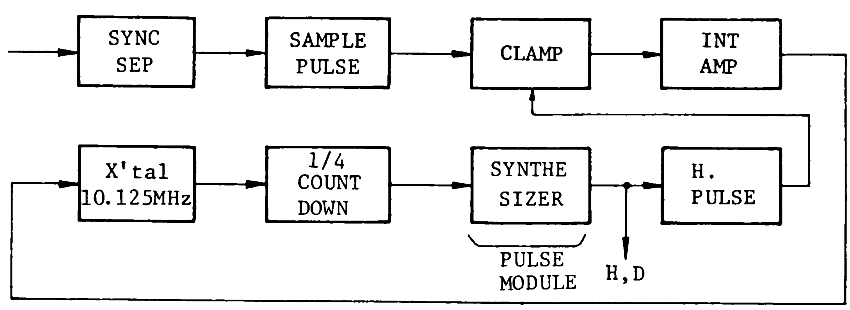
IC3-a produces H. SYNC from the SYNC signal. The SAMPLE signal is produced from the H. SYNC signal. Its phase is as shown below.compared to the external synchronizing signal. A pulse having a duty of about 50% is produced from the CAM HD signal by IC5-a/IC5-b.



The H. pulse of IC5-b is clamped to the emitter potential of Tr6 by the SAMPLE pulse with Tr5, Tr6 and IC6.

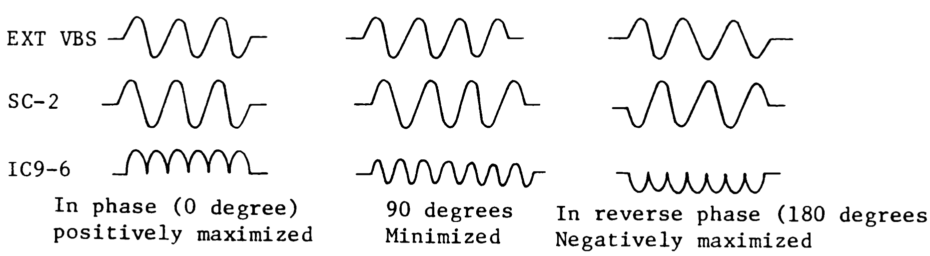


The output signal of IC6-a is integrated by IC6-b to control the clock frequency of the synthesizer in the PULSE module with the difference between internal voltage and the reference voltage, generated from the external synchronizing signal. The horizontal synchronizes the camera.

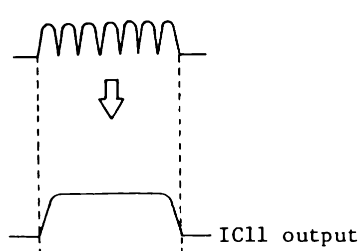


Color lock is to phase the subcarrier of the camera with an external subcarrier in frequency and phase. The circuit of Tr8 and TPR-1 exractburst from the EXT VBS signal. Tr9 and Tr10 amplifies the extracted subcarrier component.

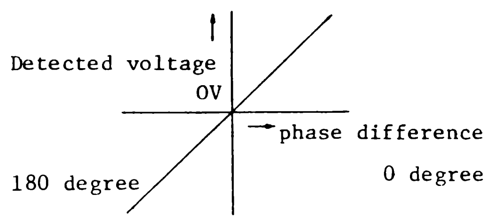
The subcarrier SC-2 in the camera changes 45 dgrees in phase through the delayline DL-1. Each subcarrier is switched by the analog switch IC23 (SC COARSE PHASE). The output phase of IC23 changes about 60 dgrees at T1, VR9 and C70. The SC-2 adjusted by IC23 and VR9 is adjusted in phase with the EXT VBS signal by IC9. The output of IC9 is minimized when the SC-2 is phased to the EXT VBS signal. It is maximized when they are in reverse phase (180 dgree) with each other.

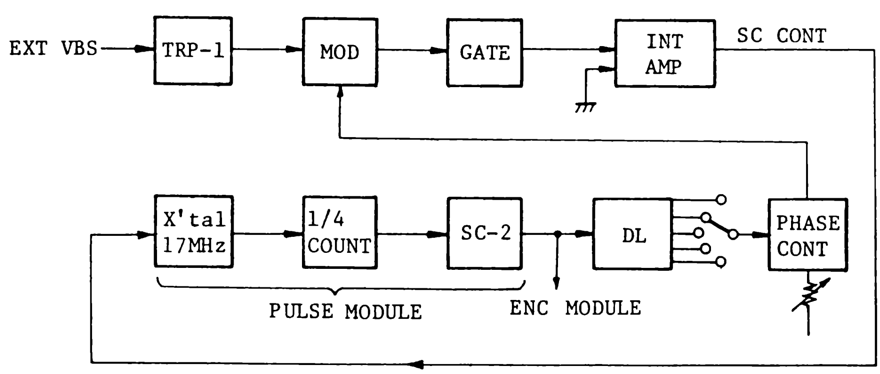


An envelope signal of the output waveform is taken out from the output of IC9 by a low-pass filter FIL1 (see the following diagram).



In this signal only the burst phase of the EXT VBS signal is passed by the analog switch IC8-b. The detected voltage is compared with the reference voltage by the differential amplifier IC13 and the phase of the SC-2 is controlled (SC CONT) by the difference voltage the subcarrier in the EXT VBS signal is always kept constant with the SC-2 in the camera. The phase where these are stabilize is at a phase difference of 90 degrees at the input point of the square modulator IC10.



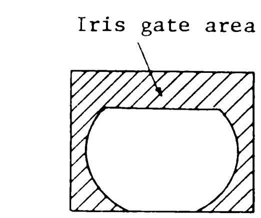


Not use

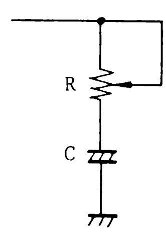
The Lens Iris Control Circuit

Lens iris control has two modes; auto iris and manuai iris. Auto iris mode control the lens iris so video level will always be constant. Manual iris mode removes the control from the remote module of the camera.

The MIX videi signal from the AUX module is blanked at the top and edges of the screen through Tr18 to prevent the iris from closing in the auto iris mode when a highright is in that area.



The signal clipped by Tr18 biases itself through VR7 and C58. The bias varies with resistance value of VR7. The self-bias varies to the peak hold voltage of the next stage (even if the video signal is the same) in oder to determine whether iris control is to be based on peak detection or APL.



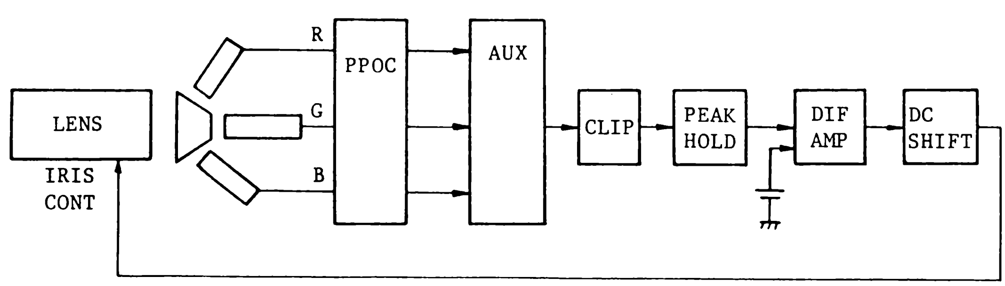
Resistance increase: Peak detection

Resistance decrease: APL detection

Peak detection: The iris operates with the highlights.
APL detection: The iris operates with the average value of the scene.

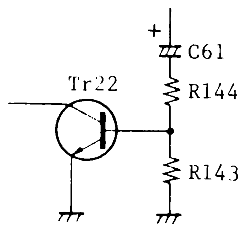
The potential held at peak is compared with the reference voltage by differential amplifier IC21 supplying an iris control signal via IC22 so that the differential input voltage of IC21 will always be equal. A variation of the iris means that the video level varies and the peak hold potential varies.

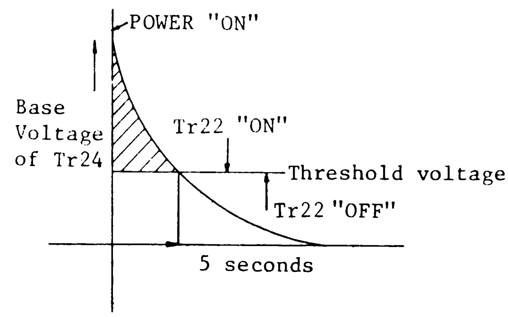
The iris is closed by grounding the reference voltage of IC21 (CAL on, BARS on, ABB).



Not use

Iris waiting is provided to prevent the image tube from burning when power is first supplied (otherwise the iris would open completely in auto iris mode for a time until the beam is present). The circuit consists of Tr22, R144, R143 and C61.





The base voltage of Tr22 varies as shown above when the POWER switch is turned on. Tr22 is on for about 5 seconds to keep the lens iris closed then the base voltage of Tr22 lowers and Tr22 switches off allowing the normal reference voltage via IC21 to open the iris.

The circuit that provides a warning to the viewfinder when the battery voltage lowers consists of IC24. When input voltage decreases to 11.0V or less, IC24-c oscillates to flash the lamp. When it lowers to 10.8V or less, IC24-a is switched on to light the lamp.

Adjustment

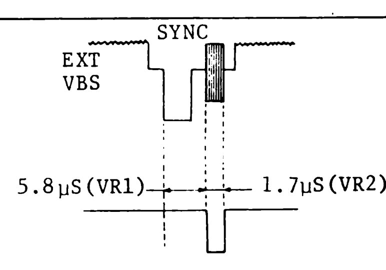
(1) SAMPLE PHASE AND WIDTH

① Apply the VBS signal to GL IN (BNC connector) of the camera.

② Monitor waveform at TP1 and TP3 on the oscilloscope.

③ Adjust sample phase to 5.8μs with the SAMPLE PHASE control VR1.

④ Adjust sample width to 1.7μs with the SAMPLE WIDTH control VR2.

TP1	VR1	
TP2	VR2	

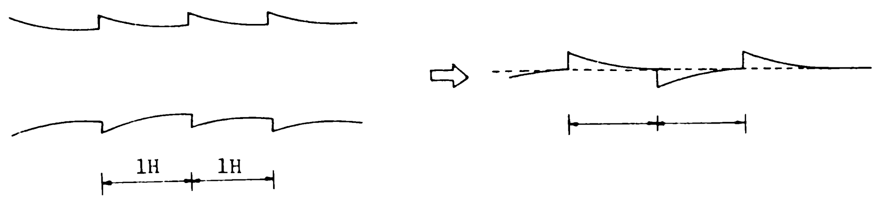
(2) OFFSET-1/2

Factory adjusted. Do not readjus unless this circuit has a failure.

① Apply an external synchronizing signal to the GL input of the camera.

② Monitor waveform at IC11-6 on the oscilloscope.

③ Adjust as shown below with the OFFSET-2 control VR5.



OFFSET-2 (VR5)

④ Monitor the ENC video signal on a vector scope.

⑤ Adjust the OFFSET-1 control VR4 until burst phase does not vary on a vector scope, even if the level of external synchronizing signal varies to -6dB.

Not use

(3) CUT, PEAK/APL AND IRIS

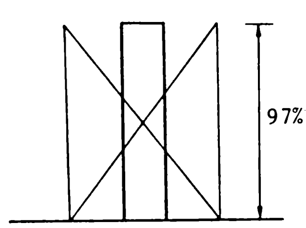
① Frame the greyscale.

② On the LENS switch to "A" to give auto iris mode. Adjust a level of the grey scale to 97% with the IRIS control VR8 on the front of this module.

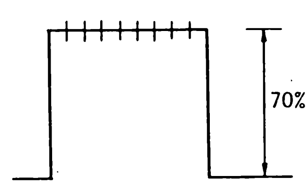
Note: Setting a level of the greyscale to 100% will excessively open the iris due to the AUTO KNEE effect.

③ Televise the registration chart. Adjust the PEAK/ APL control VR7 until the video level reaches 70%.

④ Repeat adjustments of steps ② and ③ 3 times.



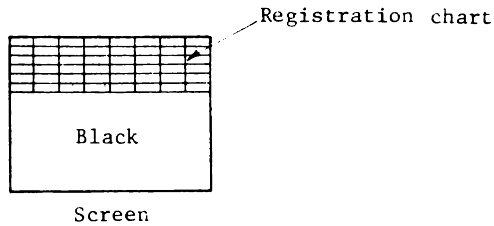
Greyscale chart



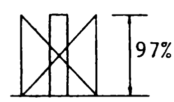
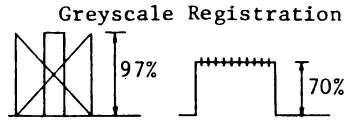
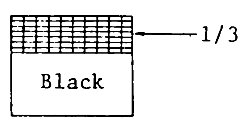
Registration chart

Not use

⑤ Adjust the CUT control VR6 until the auto iris does not react to the registration chart positioned at the top 1/3 of the screen.



⑥ The adjustment in step ⑤ will affect the adjustments in steps ① to ③. Repeat adjustment until the specifications of steps ②, ③ and ⑤ are satisfied.

IRIS	VR8		Repeat adjustments
PEAK/APL	VR7	Greyscale Registration chart 	
CUT	VR6		

(4) H. PHASE AND SC PHASE

① Apply the external synchronizing signal VBS to the GL input of the camera.

② Adjust the H PHASE control VR3 at the front of this module until the SYNC signal of the camera matches the VBS.
Adjustable range: ±3μs

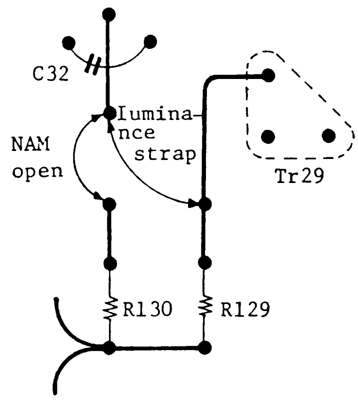
③ Adjust the SC COARSE PHASE control SW1 and SC FINE PHASE control VR9 at the front of this module until camera subcarrier matches the subcarrier of the VBS.
Adjustable range: SC COARSE PHASE; 720 degrees in 45-degree step
SC FINE PHASE; 60 degrees

Not use

(5) Changing iris operation from NAM signal to luminance signal

Cut the pattern between the emitter of Tr29 (on the AUX module) and pin (19) and strap R130 to pin (19) .

AUX module



: Strap

See the connection diagram of the AUX module.

Pattern side (center of the AUX module)

(6) SET-1 and SET-2

(1) Monitor the mother board MB8-1 using a digital voltmeter.

(2) Lower the input voltage of the camera below 12V.

(3) When the input voltage reaches 11.0V, adjust the SET-1 control VR10 until the indicator lamp BATT on the viewfinder flashes.

(4) When the input voltage reaches 10.8V, adjust the SET-2 control VR11 until the indicator lamp BATT on the viewfinder comes on.

VF	VR10	11.0V	Flashing
(BATT)	VR11	10.8V	Coming on

GENLOCK (PAL-B)

Integrated Circuits

No.	Description	M.F.D
IC 1	μA710HC	FCH
IC 2	μPD4049UBC	NEC
IC 3	CD4098BE	RCA
IC 4	CE4098BE	RCA
IC 5	CD4098BE	RCA
IC 6	TL082CP	TEX
IC 7	TC40H076P	TOS
IC 8	μPD4053BC	NEC
IC 9	MC1596L	MOT
IC10	Not used	
IC11	OP-07DP	TEX
IC12	TL082CP	TEX
IC13	OP-07DP	TEX
IC14	Not used	
IC15	μPD4040BC	NEC
IC16	μPD4073BC	NEC
IC17	μPD4027BC	NEC
IC18	TL082CP	TEX
IC19	CD4098BE	RCA
IC20	CD4098BE	NEC
IC21	TL062CP	TEX
IC22	TL062CP	TEX
IC23	μPD4051BC	NEC
IC24	LM339N	NSC

No.	Description	M.F.D
Tr 1	2N3906	NEC
Tr 2	2N3904	NEC
Tr 3	2N3904	NEC
Tr 4	2N3904	NEC
Tr 5	2N3906	NEC
Tr 6	2N3904	NEC
Tr 7	2N3904	NEC
Tr 8	2N3904	NEC
Tr 9	2SC2901	NEC
Tr10	2N3904	NEC
Tr11	2N3904	NEC
Tr12	2N3904	NEC
Tr13	2N3906	NEC
Tr14	2N3904	NEC
Tr15	2N3904	NEC
Tr16	2SC2901	NEC
Tr17	2N3906	NEC
Tr18	2N3904	NEC
Tr19	2N3904	NEC
Tr20	2N3906	NEC
Tr21	2SK43S-D	SONY
Tr22	2N3904	NEC
Tr23	Not used	
Tr24	2N3904	NEC
Tr25	2N3906	NEC
Tr26	2SA1244	TOS
Tr27	2N3904	NEC
Tr28	2N3904	NEC
Tr29	2N3904	NEC
Tr30	2N3904	NEC
Tr31	2N3904	NEC
Tr32	2N3906	NEC
Tr33	2N3904	NEC
Tr34	2N3906	NEC
Tr35	2N3904	NEC
Tr36	2N3906	NEC

Diodes

No.	Description	M.F.D
D 1	1SS99	NEC
D 2	1S953	NEC
D 3	1S953	NEC
D 4	1S953	NEC
D 5	1S953	NEC
D 6	Not used	
D 7	1S953	NEC
D 8	Not used	
D 9	RD5R6EB	NEC
D 10	1S953	NEC
D 11	1S953	NEC
D 12	1S953	NEC
D 13	1S953	NEC
D 14	1S953	NEC
D 15	Not used	
D 16	1S953	NEC
D 17	RD2R4EB	NEC
D 18	RD2R4EB	NEC
D 19	V03E	HIT
D 20	V03E	HIT
D 21	1S953	NEC
D 22	LM385Z	NSC
D 23	1S953	NEC

Resistors

No.	Description	M.F.D
R 1	RE15YQ 1000ΩF	SSM
R 2	RE15YQ 6800ΩF	SSM
R 3	RE15YQ 100ΩF	SSM
R 4	RE15YQ 6800ΩF	SSM
R 5	RE15YQ 1000ΩF	SSM
R 6	RE15YQ 1000ΩF	SSM

Resistors

No.	Description	M.F.D
R 7	RE15YQ 13kΩF	SSM
R 8	RE15YQ 6200ΩF	SSM
R 9	RE15YQ 4700ΩF	SSM
R 10	RE15YQ 3300ΩF	SSM
R 11	RE15YQ 20kΩF	SSM
R 12	RE15YQ 33kΩF	SSM
R 13	RE15YQ 4700ΩF	SSM
R 14	RE15YQ 5100ΩF	SSM
R 15	RE15YQ 3300ΩF	SSM
R 16	Not used	
R 17	RE15YQ 5100ΩF	SSM
R 18	Not used	
R 19	RE15YQ 100ΩF	SSM
R 20	RE15YQ 15kΩF	SSM
R 21	RE15YQ 5100ΩF	SSM
R 22	RE15YQ 5100ΩF	SSM
R 23	SN14K2B 75kΩF	KOA
R 24	RE15YQ 10kΩF	SSM
R 25	RE15YQ 10kΩF	SSM
R 26	Not used	
R 27	Not used	
R 28	Not used	
R 29	RE15YQ 10kΩF	SSM
R 30	RE15YQ 5100ΩF	SSM
R 31	RE15YQ 1000ΩF	SSM
R 32	Not used	
R 33	SN14K2B 100kΩF	KOA
R 34	RE15YQ 10kΩF	SSM
R 35	RE15YQ 10kΩF	SSM
R 36	SN14K2B 39kΩF	KOA
R 37	RE15YQ 6800ΩF	SSM
R 38	RE15YQ 2400ΩF	SSM
R 39	RE15YQ 1000ΩF	SSM
R 40	RE15YQ 3300ΩF	SSM
R 41	RE15YQ 4300ΩF	SSM
R 42	RE15YQ 1000ΩF	SSM
R 43	RE15YQ 10kΩF	SSM
R 44	RE15YQ 10kΩF	SSM
R 45	RE15YQ 5100ΩF	SSM
R 46	SN14K2B 150kΩF	KOA
R 47	RE15YQ 10kΩF	SSM
R 48	RE15YQ 3000ΩF	SSM
R 49	RE15YQ 10kΩF	SSM
R 50	RE15YQ 10kΩF	SSM
R 51	RE15YQ 8200ΩF	SSM
R 52	RE15YQ 100ΩF	SSM
R 53	RE15YQ 100ΩF	SSM
R 54	RE15YQ 3900ΩF	SSM
R 55	RE15YQ 1000ΩF	SSM
R 56	RE15YQ 10kΩF	SSM
R 57	RE15YQ 6200ΩF	SSM
R 58	RE15YQ 5100ΩF	SSM
R 59	RE15YQ 910ΩF	SSM
R 60	RE15YQ 1000ΩF	SSM
R 61	RE15YQ 200ΩF	SSM
R 62	RE15YQ 1000ΩF	SSM
R 63	RE15YQ 5600ΩF	SSM
R 64	RE15YQ 3900ΩF	SSM
R 65	RE15YQ 100ΩF	SSM
R 66	RE15YQ 100ΩF	SSM
R 67	RE15YQ 180ΩF	SSM
R 68	RE15YQ 1500ΩF	SSM
R 69	RE15YQ 1500ΩF	SSM
R 70	RE15YQ 100ΩF	SSM
R 71	RE15YQ 1500ΩF	SSM
R 72	RE15YQ 4300ΩF	SSM
R 73	RE15YQ 1000ΩF	SSM
R 74	RE15YQ 3000ΩF	SSM
R 75	RE15YQ 1000ΩF	SSM
R 76	RE15YQ 1300ΩF	SSM
R 77	Not used	
R 78	RE15YQ 51ΩF	SSM
R 79	RE15YQ 2000ΩF	SSM
R 80	RE15YQ 3000ΩF	SSM
R 81	RE15YQ 30kΩF	SSM
R 82	RE15YQ 33kΩF	SSM
R 83	SN14K2B 1MΩF	KOA
R 84	RE15YQ 5100ΩF	SSM
R 85	RE15YQ 33kΩF	SSM
R 86	RE15YQ 2000ΩF	SSM
R 87	SN14K2B 100kΩF	KOA
R 88	Not used	
R 89	Not used	
R 90	RE15YQ 33kΩF	SSM
R 91	RE15YQ 13kΩF	SSM
R 92	Not used	
R 93	RE15YQ 13kΩF	SSM
R 94	RE15YQ 13kΩF	SSM
R 95	RE15YQ 1000ΩF	SSM
R 96	SN14K2B 120kΩF	KOA
R 97	RE15YQ 1500ΩF	SSM
R 98	SN14K2B 100kΩF	KOA
R 99	RE15YQ 2000ΩF	SSM
R100	Not used	
R101	RE15YQ 3900ΩF	SSM
R102	RE15YQ 5100ΩF	SSM
R103	RE15YQ 5100ΩF	SSM
R104	RE15YQ 4700ΩF	SSM
R105	RE15YQ 4700ΩF	SSM
R106	RE15YQ 3600ΩF	SSM
R107	RE15YQ 3600ΩF	SSM
R108	SN14K2B 20kΩF	KOA
R109	SN14K2B 100kΩF	KOA
R110	RE15YQ 5100ΩF	SSM

Resistors

No.	Description	M.F.D
R111	RE15YQ 470ΩF	SSM
R112	RE15YQ 11kΩF	SSM
R113	RE15YQ 200ΩF	SSM
R114	*SN14K2B 51kΩF	KOA
R115	SN14K2B 51kΩF	KOA
R116	RE15YQ 13kΩF	SSM
R117	SN14K2B 51kΩF	KOA
R118	RE15YQ 1000ΩF	SSM
R119	RE15YQ 5100ΩF	SSM
R120	RE15YQ 8200ΩF	SSM
R121	RE15YQ 13kΩF	SSM
R122	RE15YQ 1000ΩF	SSM
R123	RE15YQ 18kΩF	SSM
R124	RE15YQ 10kΩF	SSM
R125	SN14K2B 100kΩF	KOA
R126	SN14K2B 100kΩF	KOA
R127	SN14K2B 100kΩF	KOA
R128	RE15YQ 18kΩF	SSM
R129	RE15YQ 10kΩF	SSM
R130	RE15YQ 3900ΩF	SSM
R131	RE15YQ 5100ΩF	SSM
R132	RE15YQ 5100ΩF	SSM
R133	RE15YQ 30kΩF	SSM
R134	SN14K2B 100kΩF	KOA
R135	RE15YQ 10kΩF	SSM
R136	RE15YQ 10kΩF	SSM
R137	RE15YQ 15kΩF	SSM
R138	RE15YQ 1000ΩF	SSM
R139	SN14K2B 68kΩF	KOA
R140	RE15YQ 2000ΩF	SSM
R141	RE15YQ 1000ΩF	SSM
R142	SN14K2B 200kΩF	KOA
R143	SN14K2B 680kΩF	KOA
R144	SN14K2B 470kΩF	KOA
R145	RE15YQ 10kΩF	SSM
R146	RE15YQ 10kΩF	SSM
R147	RE15YQ 18kΩF	SSM
R148	RE15YQ 10kΩF	SSM
R149	RE15YQ 1000ΩF	SSM
R150	RE15YQ 11kΩF	SSM
R151	RE15YQ 10kΩF	SSM
R152	RE15YQ 10kΩF	SSM
R153	RE15YQ 1000ΩF	SSM
R154	RE35YQ 10ΩF	SSM
R155	RE35YQ 10ΩF	SSM
R156	RE15YQ 2000ΩF	SSM
R157	RE15YQ 2000ΩF	SSM
R158	RE15YQ 6800ΩF	SSM
R159	RE15YQ 6800ΩF	SSM
R160	RE15YQ 1000ΩF	SSM
R161	RE15YQ 300ΩF	SSM
R162	RE15YQ 18kΩF	SSM
R163	RE15YQ 1000ΩF	SSM
R164	RE15YQ 13kΩF	SSM
R165	RE15YQ 10kΩF	SSM
R166	RE15YQ 750ΩF	SSM
R167	RE15YQ 300ΩF	SSM
R168	RE15YQ 300ΩF	SSM
R169	RE15YQ 30kΩF	SSM
R170	RE15YQ 30kΩF	SSM
R171	RE15YQ 30kΩF	SSM
R172	RE15YQ 13kΩF	SSM
R173	RE15YQ 10kΩF	SSM
R174	RE15YQ 680ΩF	SSM
R175	RE15YQ 100ΩF	SSM
R176	RE15YQ 20ΩF	SSM
R177	RE15YQ 2000ΩF	SSM
R178	SN14K2B 110kΩF	KOA
R179	RE15YQ 10kΩF	SSM
R180	RE35YQ 91kΩF	SSM
R181	RE15YQ 10kΩF	SSM
R182	RE35YQ 91kΩF	KOA
R183	RE15YQ 2000ΩF	SSM
R184	RE15YQ 2700ΩF	SSM
R185	RE15YQ 2700ΩF	SSM
R186	RE15YQ 10kΩF	SSM
R187	RE35YQ 100kΩF	KOA
R188	RE35YQ 91kΩF	KOA
R189	SN14K2B 200kΩF	KOA
R190	SN14K2B 200kΩF	KOA
R191	RE15YQ 10kΩF	SSM
R192	RE15YQ 3000ΩF	SSM
R193	RE15YQ 6200ΩF	SSM
R194	RE15YQ 30kΩF	SSM
R195	RE15YQ 3900ΩF	SSM
R196	SN14K2B 100kΩF	KOA
R197	RE15YQ 5100ΩF	SSM
R198	RE15YQ 4300ΩF	SSM
R199	RE15YQ 4300ΩF	SSM
R200	LOST	
R201	RE15YQ 10kΩF	SSM
R202	RE15YQ 5100ΩF	SSM
R203	RE15YQ 5100ΩF	SSM
R204	RE15YQ 9100ΩF	SSM
R205	RE15YQ 3600ΩF	SSM
R206	RE15YQ 5100ΩF	SSM
R207	Not used	
R208	RE15YQ 10kΩF	SSM
R209	RE15YQ 5100ΩF	SSM
R210	RE15YQ 18kΩF	SSM

GENLOCK (PAL-B)

Variable Resistors

No.	Description	M.F.D
VR 1	RJ-4W 5000Ω	CPL
VR 2	RJ-4W 5000Ω	CPL
VR 3	RJ-4WS 20kΩ	CPL
VR 4	RJ-4W 5000Ω	CPL
VR 5	RJ-4W 20kΩ	CPL
VR 6	RJ-4W 5000Ω	CPL
VR 7	RJ-4WS 10kΩ	CPL
VR 8	RJ-4WS 2000Ω	CPL
VR 9	RJ-4WS 1000Ω	CPL
VR10	RJ-4W 5000Ω	CPL
VR11	RJ-4W 5000Ω	CPL

Capacitors

No.	Description	M.F.D
C 1	KMA16VB47	NCH
C 2	DM05C270J05	SOS
C 3	DM05C360J05	SOS
C 4	CS06E1C100M1	NEC
C 5	KMA6R3VB47	NCH
C 6	KMA16VB47	NCH
C 7	KMA6R3VB47	NCH
C 8	*	
C 9	KMA10VB33	NCH
C 10	KMA50VB1R0	NCH
C 11	Not used	
C 12	DM12C621J1	SOS
C 13	DM05C220J05	SOS
C 14	DM05C241J05	SOS
C 15	DM05C300J05	SOS
C 16	DM05C131J05	SOS
C 17	DM05C391J05	SOS
C 18	FD35AX1H-102M	TDK
C 19	FD35AX1H-222M	TDK
C 20	DM05C510J05	SOS
C 21	FD52AX1H-104M-1	TDK
C 22	KMA50VB3R3	NCH
C 23	KMA50VB3R3	NCH
C 24	FD52AX1H-104M-1	TDK
C 25	KMA16VB47	NCH
C 26	DM05C201J05	SOS
C 27	FD52AX1H-104M-1	TDK
C 28	FD52AX1H-104M-1	TDK
C 29	FD52AX1H-104M-1	TDK
C 30	FD52AX1H-104M-1	TDK
C 31	FD52AX1H-104M-1	TDK
C 32	FD52AX1H-104M-1	TDK
C 33	KMA16VB47	NCH
C 34	KMA6R3VB100	NCH
C 35	FD35AX1H-222M	TDK
C 36	FD35AX1H-332M	TDK
C 37	FD35AX1H-103M	TDK
C 38	505N5002-682K	NCC
C 39	CS06E1V010M1	NEC
C 40	CS06E1V010M1	NEC
C 41	KMA16VB47	NCH
C 42	KMA16VB10	NCH
C 43	FD52AX1H-104M-1	TDK
C 44	FD52AX1H-104M-1	TDK
C 45	FD52AX1H-104M-1	TDK
C 46	KMA6R3VB100	NCH
C 47	KMA16VB47	NCH
C 48	KMA16VB47	NCH
C 49	DM12C681J1	SOS
C 50	FD52AX1H-104M-1	TDK
C 51	FD35AX1H-102M	TDK
C 52	DM12C681J1S	OSJ
C 53	FD35AX1H-102M	TDK
C 54	DM12C681J1	SOS
C 55	DM12C681J1	SOS
C 56	KMA16VB47	NCH
C 57	KMA6R3VB22	NCH
C 58	KMA16VB47	NCH
C 59	CS06E1E010M1	NEC
C 60	FD52AX1H-104M-1	TDK
C 61	KMA35VB4R7	NCH
C 62	KMA16VB22	NCH
C 63	KMA10VB33	NCH
C 64	KMA25VB33	NCH
C 65	FD52AX1H-104M-1	TDK
C 66	FD52AX1H-104M-1	TDK
C 67	FD52AX1H-104M-1	TDK
C 68	FD52AX1H-104M-1	TDK
C 69	FD52AX1H-104M-1	TDK
C 70	DM05C300J05	SOS
C 71	FD52AX1H-104M-1	TDK
C 72	Not used	
C 73	KMA25VB33	NCH
C 74	KMA35VB10	NCH
C 75	KMA50VB2R2	NCH
C 76	CS06E0J220M1	NEC
C 77	CS06E0J220M1	NEC
C 78	CS06E0J220M1	NEC
C 79	KMA16VB10	NCH
C 80	KMA16VB47	NCH
C 81	KMA16VB47	NCH
C 82	KMA6R3VB22	NCH
C 83	FD52AX1H-104M-1	TDK
C 84	KMA6R3VB22	NCH

Coils

No.	Description	M.F.D
L 1	TP0206-470K	TDK
L 2	ST-202246A	IKE
L 3	ST-202246A	IKE
L 4	ST-202246A	IKE

Connectors

No.	Description	M.F.D
CN 1	MLF2B45P-J1	NBA
CN 2	14120-01-445	INC
CN 3	14120-04-451	INC

Switch

No.	Description	M.F.D
S 1	S-1031C	CPL

Transformer

No.	Description	M.F.D
T 1	KP51-113B-5	TDK

Filter

No.	Description	M.F.D
FIL1	LCF5H1H-008	TDK

DL

No.	Description	M.F.D
DL 1	ZDL-847	SWC

Trap

No.	Description	M.F.D
TRP1	LCS2H1H-102	TDK

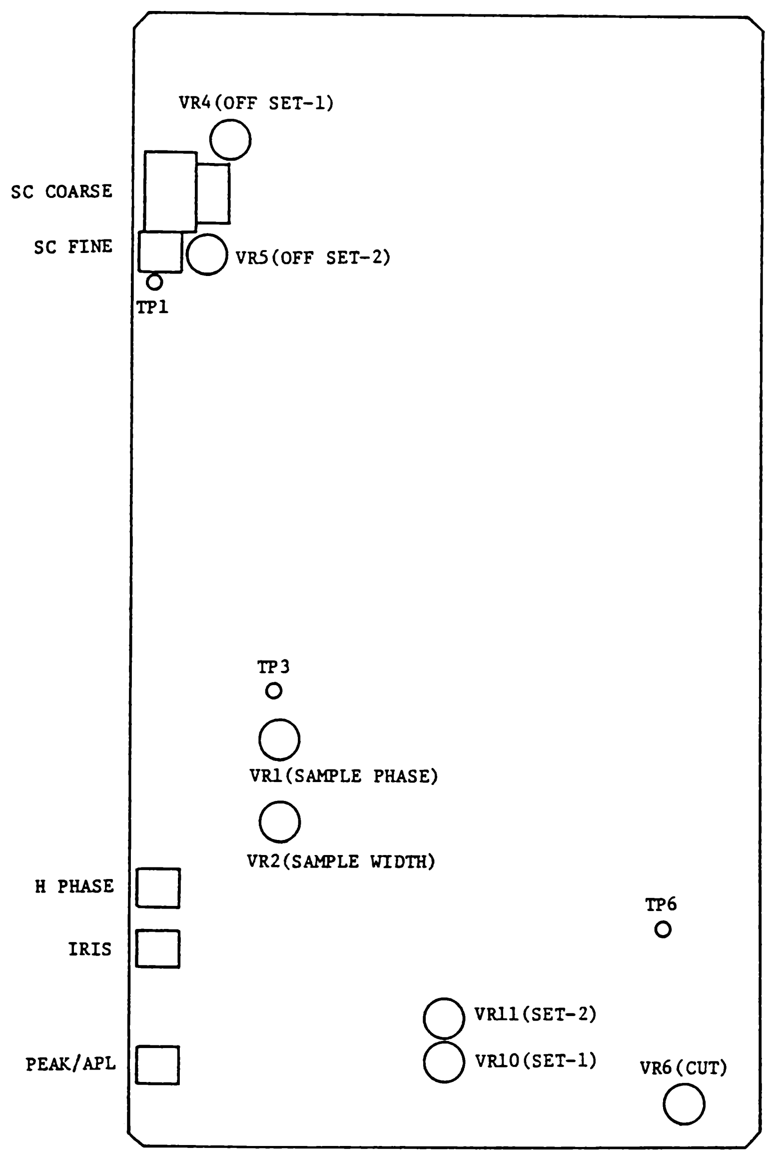
Test Points

No.	Description	M.F.D
TP 1	TBP-6	IKE
TP 2	Not used	
TP 3	TBP-6	IKE
TP 4	Not used	
TP 5	TBP-6	IKE
TP 6	TBP-6	IKE

Crystal

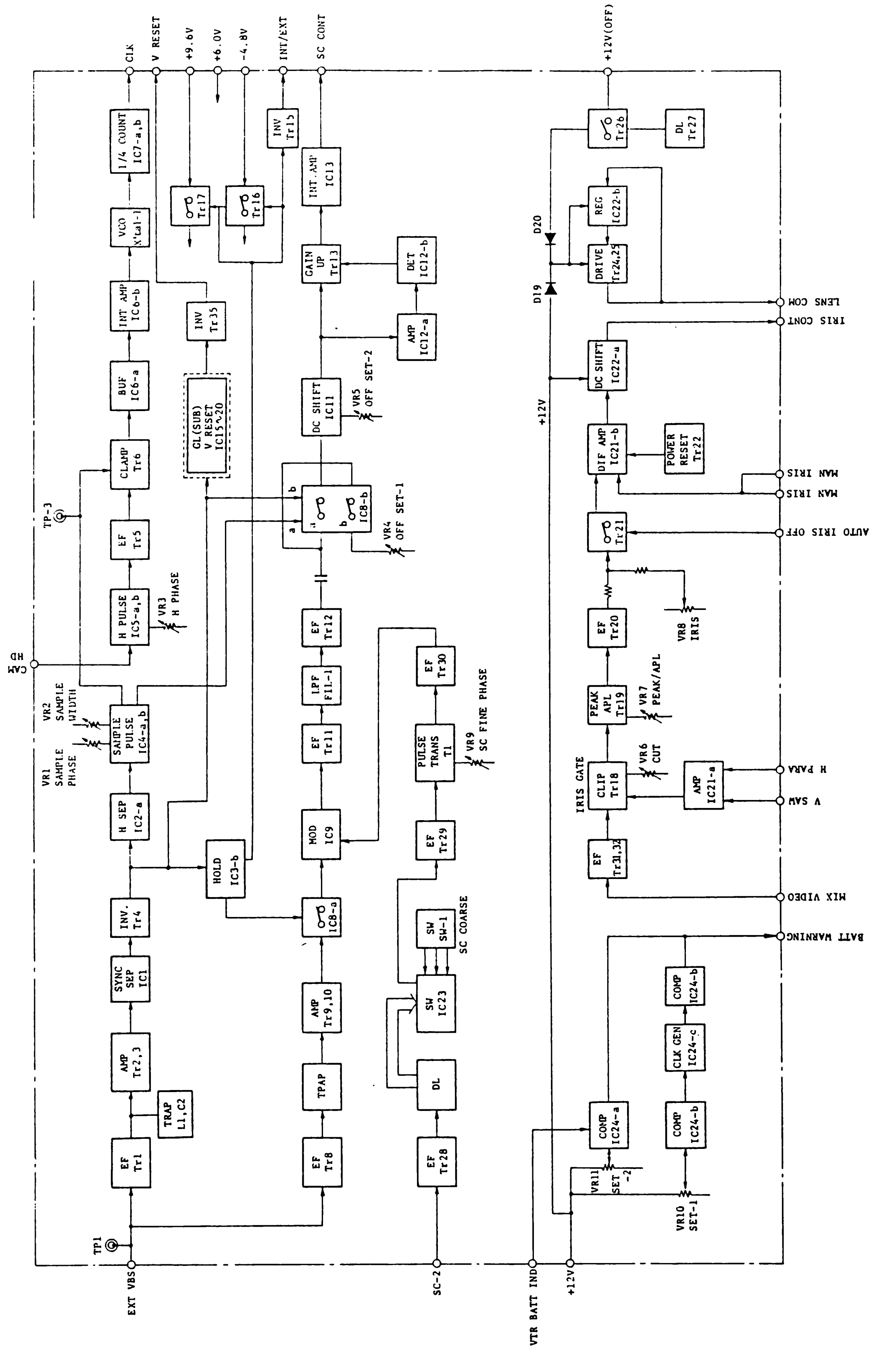
No.	Description	M.F.D
X'tal 1	ST-202931	IKE

Fig. 11-3-a



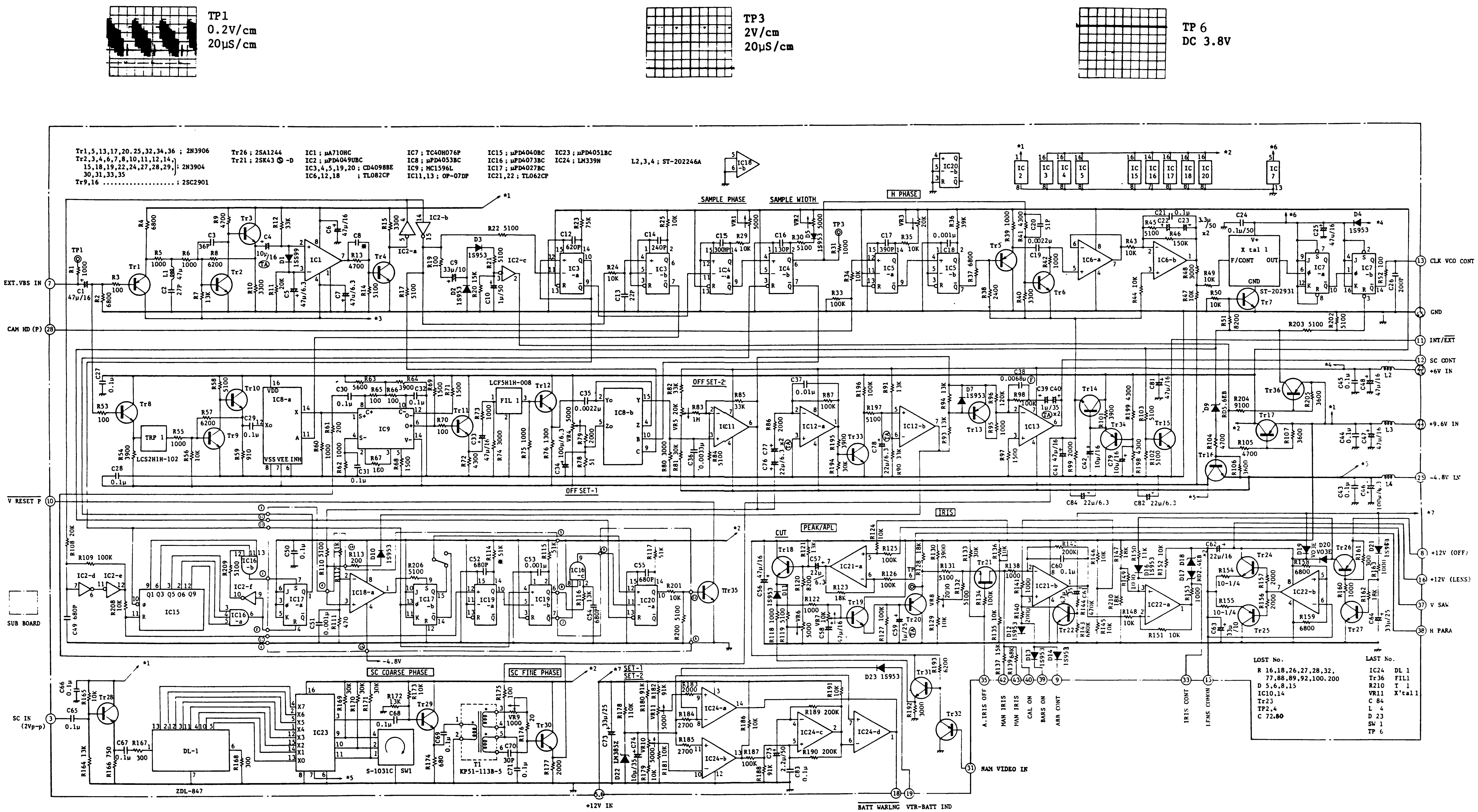
GENLOCK (PAL-B)
Controls

Fig. 11-3-b



GENLOCK (PAL-B)
Block Diagram

Fig. 11-3-c



GENLOCK (PAL-B)
Schematic Diagram
C21-217202

SECTION 11.4 INTERCOM & TALLY MODULE

(1) INTERCOM circuit

The microphone INTERCOM source is amplified by IC1-a and distributed to the TEST/ REMOTE connector via transformer T1.

The LINE signal is supplied from the high impedance transformer T2 (connected in parallel to T1) to the headphone via IC1-b. The GAIN is controlled by VR2.
The phase inverted output from IC1-a uses a SIDE TONE control VR1 because the microphone enters IC1-b from the parallel wired T1 and T2 transformers.
The switch S1-a can be used to select 2-wire or 4-wire operation. (e,g. when it is used with 4-wire operation, this switched should be turned to the 4-wire position, and also some component will be changed.)

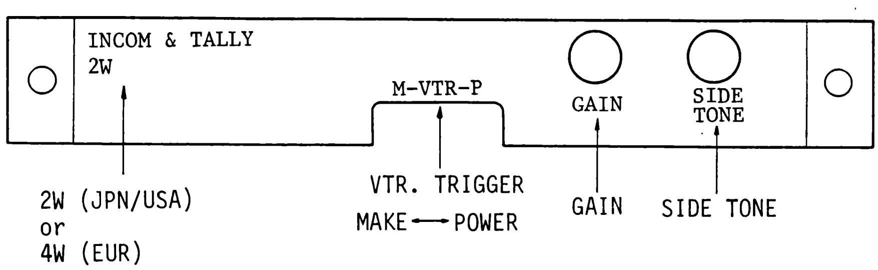
[Adjustment]

1) Listen to a LINE signal tone through the headphone, and turn VR2 GAIN adjuster until its volume is optimized.
2) Turn VR1 SIDE TONE adjuster until the microphone signal tone transmission has the best fidelity.

(2) TALLY circuit

The TALLY circuit is completed when a contact closure is made beween pins 13 (MAKE) and 15 (COMM), or when a voltage (+4.8V to +24V) is applied between pins 15 (COMM) and ground. This operates the red tally lamp in the viewfinder.

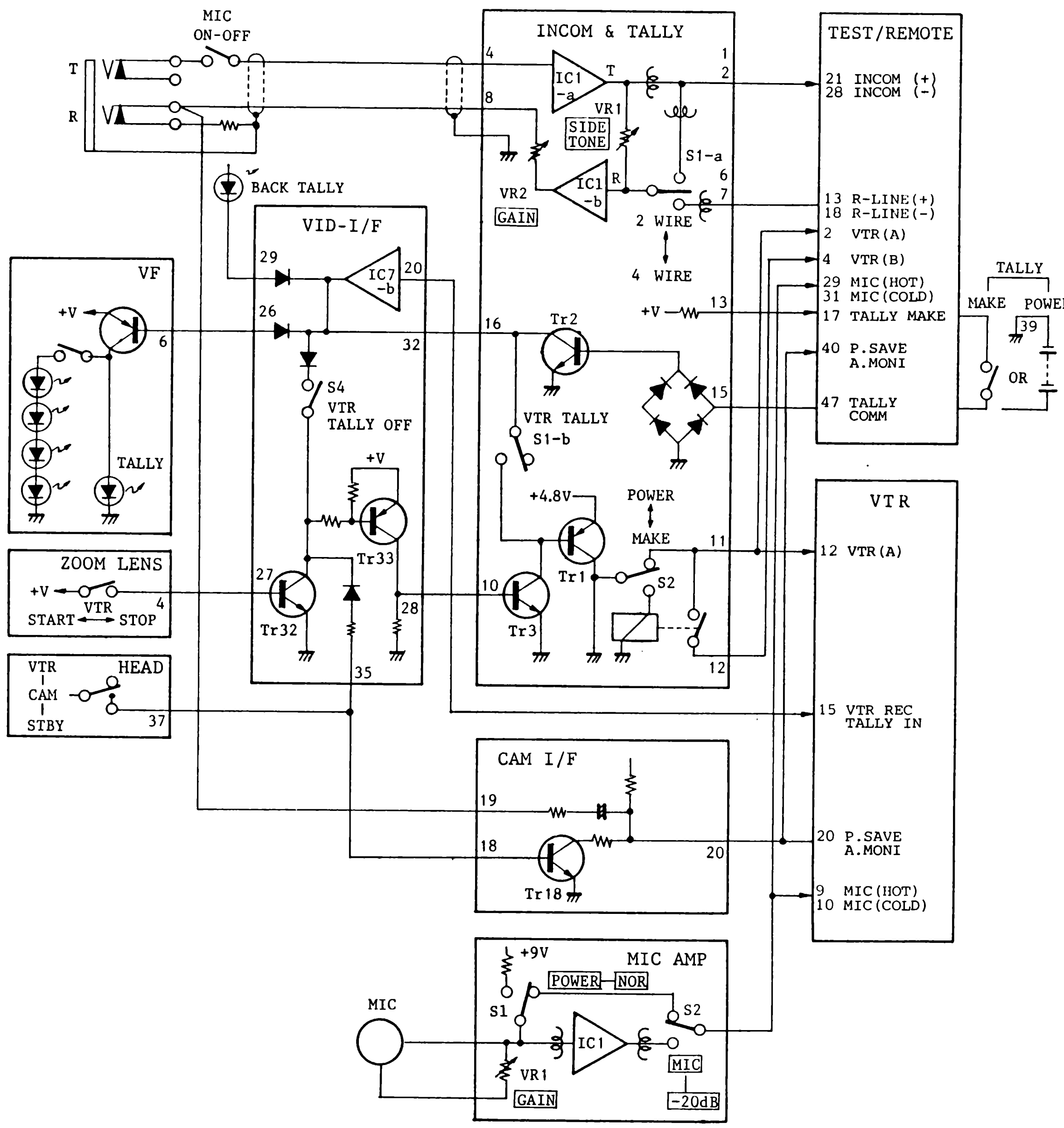
The switch S1-b is normally set to OFF position and, when the switch S4 in VID-I/F module is turned OFF and the VTR START switch on the lens is depress, a start control pulse is sent to the VTR and the viewfinder tally lights by the tally control signal from VTR connector Pin 15.



INTERCOM & TALLY MODULE

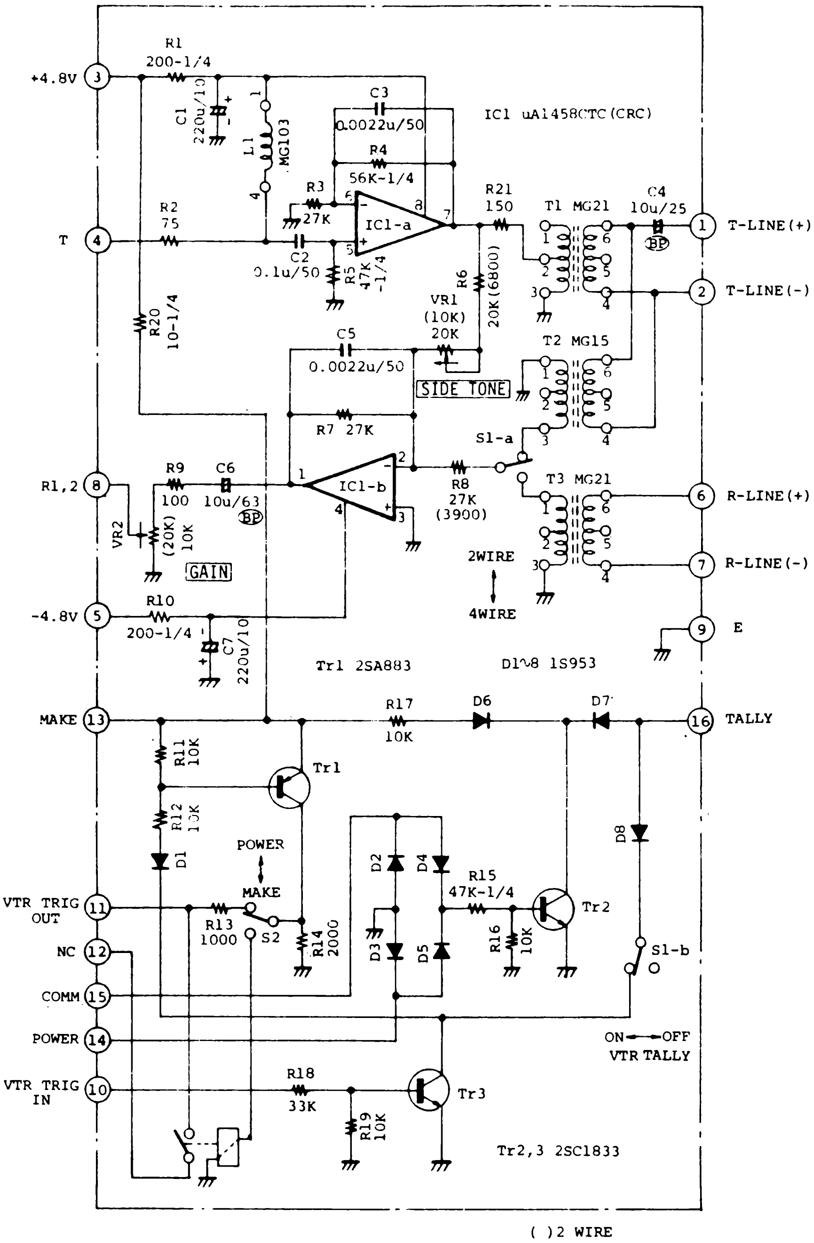
	2 WIRE			4 WIRE	
No.	DESCRIPTION	M.F.D	No.	DESCRIPTION	M.F.D
	INTEGRATED CIRCUITS			INTEGRATED CIRCUITS	
IC1	μA1458CTC (CRC)	FCH	IC1	μA1458CTC (CRC)	FCH
	TRANSISTORS			TRANSISTORS	
Tr1	2SA883L	NEC	Tr1	2SA883L	NEC
Tr2	2SC1833L	NEC	Tr2	2SC1833L	NEC
Tr3	2SC1833L	NEC	Tr3	2SC1833L	NEC
	DIODES			DIODES	
D1	1S953	NEC	D1	1S953	NEC
D2	1S953	NEC	D2	1S953	NEC
D3	1S953	NEC	D3	1S953	NEC
D4	1S953	NEC	D4	1S953	NEC
D5	1S953	NEC	D5	1S953	NEC
D6	1S953	NEC	D6	1S953	NEC
D7	1S953	NEC	D7	1S953	NEC
D8	1S953	NEC	D8	1S953	NEC
	RESISTORS			RESISTORS	
R1	RE35YQ 200 ΩF	SSM	R1	RE35YQ 200 ΩF	SSM
R2	RE15YQ 75 ΩF	SSM	R2	RE15YQ 75 ΩF	SSM
R3	RE15YQ 27K ΩF	SSM	R3	RE15YQ 27K ΩF	SSM
R4	RE35YQ 56K ΩF	SSM	R4	RE35YQ 56K ΩF	SSM
R5	RE35YQ 47K ΩF	SSM	R5	RE35YQ 47K ΩF	SSM
R6	RE15YQ 6800K ΩF	SSM	R6	RE15YQ 20K ΩF	SSM
R7	RE15YQ 27K ΩF	SSM	R7	RE15YQ 27K ΩF	SSM
R8	RE15YQ 3900K ΩF	SSM	R8	RE15YQ 27K ΩF	SSM
R9	RE15YQ 100 ΩF	SSM	R9	RE15YQ 100 ΩF	SSM
R10	RE35YQ 200 ΩF	SSM	R10	RE35YQ 200 ΩF	SSM
R11	RE15YQ 10K ΩF	SSM	R11	RE15YQ 10K ΩF	SSM
R12	RE15YQ 10K ΩF	SSM	R12	RE15YQ 10K ΩF	SSM
R13	RE15YQ 1000 ΩF	SSM	R13	RE15YQ 1000 ΩF	SSM
R14	RE15YQ 2000 ΩF	SSM	R14	RE15YQ 2000 ΩF	SSM
R15	RE35YQ 47K ΩF	SSM	R15	RE35YQ 47K ΩF	SSM
R16	RE15YQ 10K ΩF	SSM	R16	RE15YQ 10K ΩF	SSM
R17	RE15YQ 10K ΩF	SSM	R17	RE15YQ 10K ΩF	SSM
R18	RE15YQ 33K ΩF	SSM	R18	RE15YQ 33K ΩF	SSM
R19	RE15YQ 10K ΩF	SSM	R19	RE15YQ 10K ΩF	SSM
R20	RE35YQ 10 ΩF	SSM	R20	RE35YQ 10 ΩF	SSM
R21	RE15YQ 150 ΩF	SSM	R21	RE15YQ 150 ΩF	SSM
VR1	PN822H-203V	NEC	VR1	PN822H-203V	NEC
VR2	PN822H-103V	NEC	VR2	PN822H-103V	NEC
	CAPACITORS			CAPACITORS	
C1	SM10VB 220	NCH	C1	SM10VB 220	NCH
C2	FD76AX-1H-104M	TDK.A	C2	FD76AX-1H-104M	TDK,A
C3	FD35AX-1H-222M	TDK.A	C3	FD35AX-1H-222M	TDK,A
C4	25VB10BPDA8	NCH	C4	25VB10BPDA8	NCH
C5	FD35AX-1H-222M	TDK.A	C5	FD35AX-1H-222M	TDK,A
C6	6R3VB10BPDA8	NCH	C6	6R3VB10BPDA8	NCH
C7	SM10VB 220	NCH	C7	SM10VB 220	NCH
	INDUCTANCE COIL			INDUCTANCE COIL	
L1	MG103	TAM	L1	MG 103	TAM
	TRANSFORMERS			TRANSFORMERS	
T1	MG21	TAM	T1	MG21	TAM
T2	MG15	TAM	T2	LOST	
T3	MG21	TAM	T3	MG21	TAM
	RELAY			RELAY	
RL1	UDM105DN	SAN	PL1	UDM105DN	SAN
	SWITCHES			SWITCHES	
S1	TS-2	TKO	S1	TS-2	TKO
S2	TS-1	TKO	S2	TS-1	TKO
	CONNECTOR			CONNECTOR	
CN	8218-016-000-002	ELC	CN	8218-016-000-002	ELC

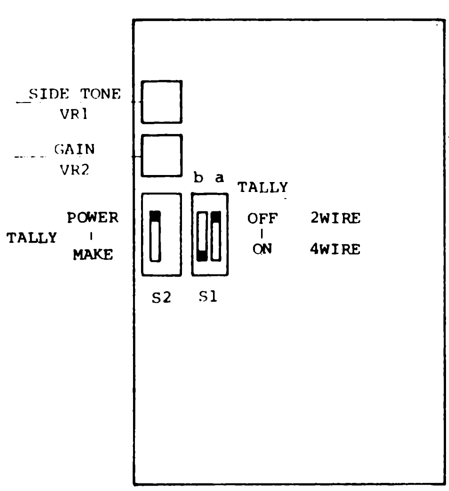
Fig. 11-4-a



INTERCOM & TALLY
Block Diagram

Fig. 11-4-b





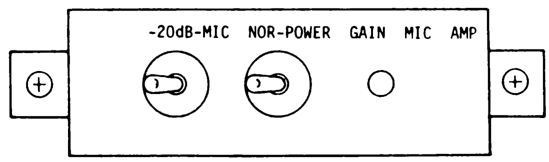
INTERCOM & TALLY
Schematic Diagram

SECTION 11.5 MIC AMP MODULE

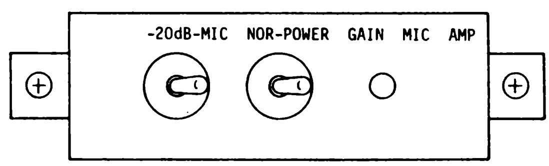
Adjusting Mike Amplifier

The following ways of use are permissible in accordance with the microphone used.

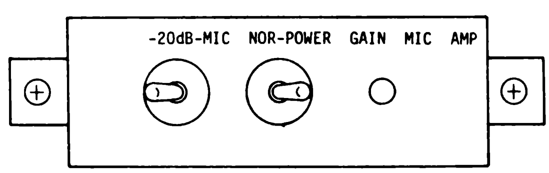
(1) Input of -50 dB, output of -20 dB.



(2) Input-output thru, power supply (+9 to +9.6V)



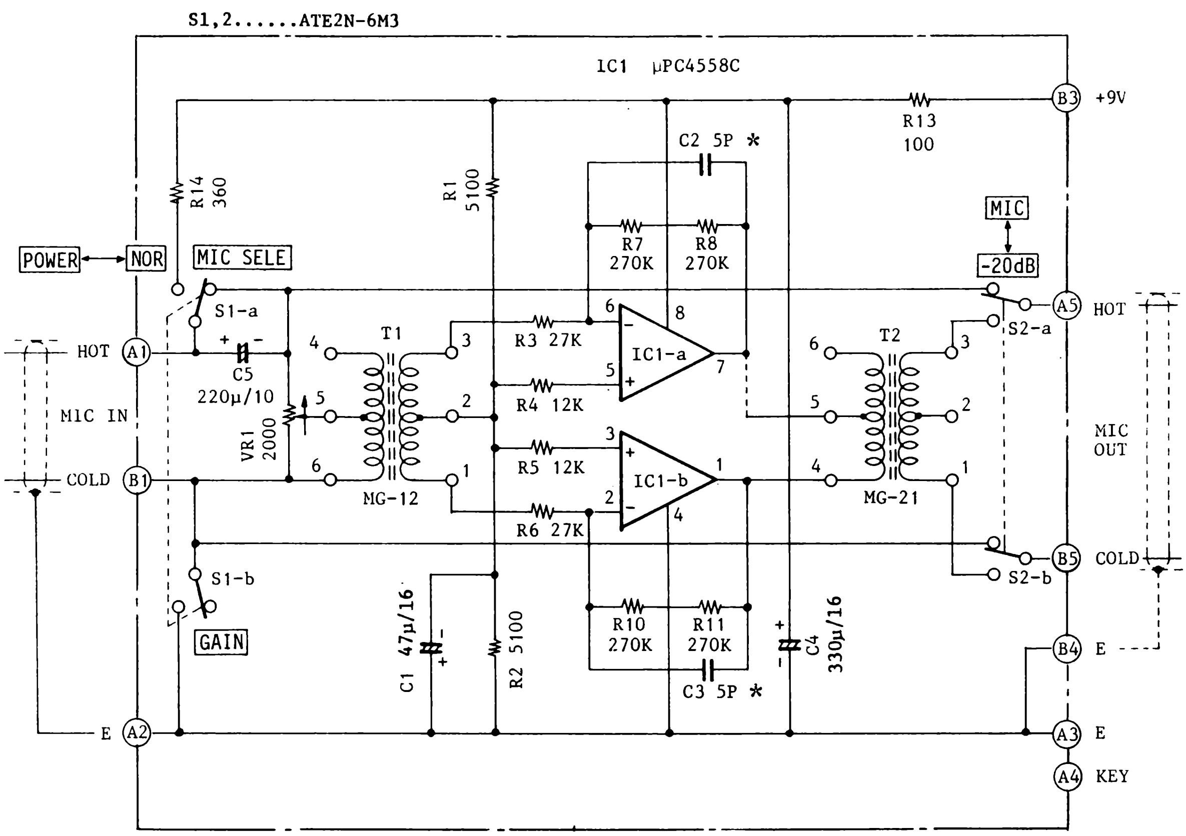
(3) Input of -20 dB, output of -60 dB, power supply (+9 to +9.6V) (when using the mike amplifier as a pad of -40 dB)



* Turn the GAIN control toward a minimum position to get input of -20 dB. Under that condition, adjust an output level to -60 dB.

MIC AMP MODULE

No.	Description	M.F.D
Integrated Circuits		
IC 1	μPC4558C	NEC
Resistors		
R 1	RE15YQ 5100ΩF	SSM
R 2	RE15YQ 5100ΩF	SSM
R 3	RE15YQ 27kΩF	SSM
R 4	RE15YQ 12kΩF	SSM
R 5	RE15YQ 12kΩF	SSM
R 6	RE15YQ 27kΩF	SSM
R 7	SN14K2B 270kΩF	KOA
R 8	SN14K2B 270kΩF	KOA
R 9	LOST	
R 10	SN14K2B 270kΩF	KOA
R 11	SN14K2B 270kΩF	KOA
R 12	LOST	
R 13	RE15YQ 100ΩF	SSM
R 14	RE15YQ 360ΩF	SSM
VR 1	RJ-4WS 2000Ω	CPL
Capacitors		
C 1	KMA 16VB47	NCH
C 2	*DM05C 050J05	SOS
C 3	*DM05C 050J05	SOS
C 4	KMA 16VB331	NCH
C 5	SM 10VB221	NCH
Transformers		
T 1	MG-12	TMR
T 2	MG-21	TMR
Switches		
S 1	ATE2N-6M3	FJS
S 2	ATE2N-6M3	FJS
Connector		
CN 1	PS12PA-D4LT1-A1	JAE



LAST No.	LOST No.
IC 1	R 9,12
R 14	VR 1
VR 1	
C 5	
T 2	
S 2	

MIC AMP
Schematic Diagram
C4-216031

VID I/F MODULE

Integrated Circits

IC 1	TL-062CP	TEX
IC 2	TL-062CP	TEX
IC 3	BA1A4M	NEC
IC 4	BA1A4M	NEC
IC 5	uPD4053BC	NEC
IC 6	uPD4528BC	NEC
IC 7	uPC393C	NEC
IC 8	uPD4049UBC	NEC

Transistors

TR 1	2N3904	NEC
TR 2	2N3904	NEC
TR 3	2N3904	NEC
TR 4	2N3904	NEC
TR 5	2N3904	NEC
TR 6	2N3904	NEC
TR 7	2N3904	NEC
TR 8	2N3906	NEC
TR 9	2N3904	NEC
TR 10	2N3904	NEC
TR 11	2N3904	NEC
TR 12	2N3904	NEC
TR 13	2N3906	NEC
TR 14	2N3906	NEC
TR 15	2N3906	NEC
TR 16	2N3904	NEC
TR 17	2N3906	NEC
TR 18	2N3904	NEC
TR 19	2N3904	NEC
TR 20	2N3904	NEC
TR 21	2N3904	NEC
TR 22	2N3904	NEC
TR 23	2N3906	NEC
TR 24	2N3904	NEC
TR 25	2N3904	NEC
TR 26	2N3904	NEC
TR 27	2N3904	NEC
TR 28	2N3906	NEC
TR 29	2N3904	NEC
TR 30	2N3904	NEC
TR 32	2N3904	NEC
TR 33	2N3906	NEC
TR 34	2N3906	NEC
TR 35	2N3904	NEC
TR 36	2N3906	NEC
TR 37	2N3906	NEC

Diords

D 1	RD5R1EB	NEC
D 2	1S953	NEC
D 3	1S953	NEC
D 4	RD5R1EB	NEC
D 5	1S953	NEC
D 6	1S953	NEC
D 7	1S953	NEC
D 8	1S953	NEC
D 9	1S953	NEC
D 10	1S953	NEC
D 11	1S953	NEC
D 12	RD5R1EB	NEC
D 13	1S953	NEC
D 14	1S953	NEC
D 15	1S953	NEC
D 16	1S953	NEC
D 17	1S953	NEC
D 18	1S953	NEC
D 19	1S953	NEC
D 20	1S953	NEC
D 21	1S953	NEC

Resistors

R 1	RE15YQ 100ohm F	SSM
R 2	RE15YQ 100ohm F	SSM
R 3	RE15YQ 100ohm F	SSM
R 4	RE15YQ 1500ohm F	SSM
R 5	RE15YQ 1500ohm F	SSM
R 6	RE15YQ 1500ohm F	SSM
R 7	RE15YQ 1800ohm F	SSM
R 8	RE15YQ 2000ohm F	SSM
R 9	RE15YQ 2000ohm F	SSM
R 10	RE15YQ 10Kohm F	SSM
R 11	RE15YQ 1600ohm F	SSM
R 12	RE15YQ 91ohm F	SSM
R 13	RE15YQ 7500ohm F	SSM
R 14	RE15YQ 1600ohm F	SSM
R 15	RE15YQ 3900ohm F	SSM
R 16	RE15YQ 300ohm F	SSM
R 17	RE15YQ 1500ohm F	SSM
R 18	RE15YQ 120ohm F	SSM
R 19	RE15YQ 2000ohm F	SSM
R 20	RNS1/8-C 1R5ohm F	KOA
R 21	RE15YQ 10ohm F	SSM
R 22	RE15YQ 10ohm F	SSM
R 23	RE15YQ 75ohm F	SSM
R 24	RE15YQ 1600ohm F	SSM

Resistors

R 25	RE15YQ 2000ohm F	SSM
R 26	RE15YQ 10Kohm F	SSM
R 27	RE15YQ 2000ohm F	SSM
R 28	RE15YQ 3300ohm F	SSM
R 29	RE15YQ 33ohm F	SSM
R 30	RE15YQ 1600ohm F	SSM
R 31	RE15YQ 91ohm F	SSM
R 32	RE15YQ 3000ohm F	SSM
R 33	RE15YQ 330ohm F	SSM
R 34	RE15YQ 1100ohm F	SSM
R 35	RE15YQ 120ohm F	SSM
R 36	RE15YQ 2000ohm F	SSM
R 37	RNS1/8-C 1R5ohm F	KOA
R 38	RE15YQ 10ohm F	SSM
R 39	RE15YQ 10ohm F	SSM
R 40	RE15YQ 75ohm F	SSM
R 41	RE15YQ 6200ohm F	SSM
R 42	RE15YQ 3000ohm F	SSM
R 43	RE15YQ 2200ohm F	SSM
R 44	RE15YQ 820ohm F	SSM
R 45	RE15YQ 470ohm F	SSM
R 46	RE15YQ 3300ohm F	SSM
R 47	RE15YQ 11Kohm F	SSM
R 48	RE15YQ 12Kohm F	SSM
R 49	RE15YQ 10Kohm F	SSM
R 50	RE15YQ 10Kohm F	SSM
R 51	RE15YQ 10Kohm F	SSM
R 52	RE15YQ 8200ohm F	SSM
R 53	RE15YQ 3000ohm F	SSM
R 54	RE15YQ 470ohm F	SSM
R 55	RE15YQ 12Kohm F	SSM
R 56	RE15YQ 10Kohm F	SSM
R 57	RE15YQ 10Kohm F	SSM
R 58	RE15YQ 10Kohm F	SSM
R 59	RE15YQ 4700ohm F	SSM
R 60	RE15YQ 100Kohm F	SSM
R 61	RE15YQ 20Kohm F	SSM
R 62	RE15YQ 20Kohm F	SSM
R 63	RE15YQ 2400ohm F	SSM
R 64	RE15YQ 820ohm F	SSM
R 65	RE15YQ 2000ohm F	SSM
R 66	RE15YQ 3600ohm F	SSM
R 67	RE15YQ 4700ohm F	SSM
R 68	RE15YQ 180ohm F	SSM
R 69	RE15YQ 820ohm F	SSM
R 70	RE15YQ 39ohm F	SSM
R 71	RE15YQ 470ohm F	SSM
R 72	RE15YQ 27ohm F	SSM
R 73	RE15YQ 2700ohm F	SSM
R 74	RE15YQ 10Kohm F	SSM
R 75	RE15YQ 470ohm F	SSM
R 76	RE15YQ 200ohm F	SSM
R 77	RE15YQ 3900ohm F	SSM
R 78	RE15YQ 1200ohm F	SSM
R 79	RE15YQ 4300ohm F	SSM
R 80	RE15YQ 4700ohm F	SSM
R 81	RE15YQ 2000ohm F	SSM
R 82	RE15YQ 33Kohm F	SSM
R 83	RE15YQ 3900ohm F	SSM
R 84	RE15YQ 1000ohm F	SSM
R 85	RE15YQ 390ohm F	SSM
R 86	RE15YQ 2000ohm F	SSM
R 87	RE15YQ 1800ohm F	SSM
R 88	RE15YQ 1500ohm F	SSM
R 89	RE15YQ 3000ohm F	SSM
R 90	RE15YQ 2000ohm F	SSM
R 91	RE15YQ 3900ohm F	SSM
R 92	RE15YQ 3900ohm F	SSM
R 93	RE15YQ 120ohm F	SSM
R 94	RE15YQ 2000ohm F	SSM
R 95	RNS1/8-C 1R5ohm F	KOA
R 96	RE15YQ 10ohm F	SSM
R 97	RE15YQ 10ohm F	SSM
R 98	RE15YQ 100ohm F	SSM
R 99	RE15YQ 75ohm F	SSM
R100	RE15YQ 1000ohm F	SSM
R101	RE15YQ 9100ohm F	SSM
R102	RE15YQ 4700ohm F	SSM
R103	RE15YQ 2000ohm F	SSM
R104	RE15YQ 2000ohm F	SSM
R105	RE15YQ 9100ohm F	SSM
R106	RE15YQ 4700ohm F	SSM
R108	RE15YQ 2000ohm F	SSM
R109	RE15YQ 13Kohm F	SSM
R110	RE15YQ 12Kohm F	SSM
R111	RE15YQ 10Kohm F	SSM
R112	RE15YQ 100Kohm F	SSM
R113	RE15YQ 12Kohm F	SSM
R114	RE15YQ 5100ohm F	SSM
R115	RE15YQ 1800ohm F	SSM
R116	RE15YQ 3300ohm F	SSM
R119	RE15YQ 16Kohm F	SSM
R120	RE15YQ 5100ohm F	SSM
R121	RE15YQ 10Kohm F	SSM
R122	RE15YQ 10Kohm F	SSM
R123	RE15YQ 10Kohm F	SSM
R124	RE15YQ 33Kohm F	SSM
R125	RE15YQ 2000ohm F	SSM
R126	RE15YQ 100ohm F	SSM
R128	RE15YQ 100ohm F	SSM
R129	RE15YQ 3900ohm F	SSM
R130	RE15YQ 22ohm F	SSM
R131	RE15YQ 10ohm F	SSM
R132	RE15YQ 10ohm F	SSM
R134	RE15YQ 3300ohm F	SSM

Resistors

R135	RE15YQ 10Kohm F	SSM
R136	RE15YQ 200ohm F	SSM
R137	RE15YQ 390ohm F	SSM
R138	RE15YQ 1000ohm F	SSM
R139	RE15YQ 4300ohm F	SSM
R140	RE15YQ 5100ohm F	SSM

Variable Resistors

VR 1	RJ-4W 500ohm	CPL
VR 2	RJ-4WS 1000ohm	CPL
VR 3	RJ-4W 1000ohm	CPL
VR 4	RJ-4WS 1000ohm	CPL
VR 5	RJ-4W 500ohm	CPL
VR 6	RJ-4W 5000ohm	CPL
VR 7	RJ-4W 200ohm	CPL
VR 8	RJ-4WS 2000ohm	CPL
VR 9	RJ-4WS 500ohm	CPL
VR 10	RJ-4W 20Kohm	CPL

Capacitors

C 1	UMA1C470MCA	NCI
C 3	UMAOJ220MCA	NCI
C 5	UMAOJ101MCA	NCI
C 6	SR295C104M	AVX
C 7	UMAOJ101MCA	NCI
C 9	UMAOJ220MCA	NCI
C 11	UMAOJ101MCA	NCI
C 12	UMA1C100MCA	NCI
C 13	UMAOJ101MCA	NCI
C 14	UMAOJ101MCA	NCI
C 15	SR295C104M	AVX
C 16	UMA1C470MCA	NCI
C 17	SR295C104M	AVX
C 18	UMAOJ101MCA	NCI
C 19	UMA1C100MCA	NCI
C 20	UMA1C100MCA	NCI
C 21	SR295C104M	AVX
C 22	UMA1C470MCA	NCI
C 23	UMA1C470MCA	NCI
C 24	SR295C104M	AVX
C 25	UMAOJ101MCA	NCI
C 26	UMAOJ101MCA	NCI
C 27	UMA1C470MCA	NCI
C 28	DM05C 100J05	SOS
C 30	DM05C 070J05	SOS
C 31	UMA1C470MCA	NCI
C 33	DM05C 020J05	SOS
C 35	UMAOJ220MCA	NCI
C 36	UMAOJ101MCA	NCI
C 38	UMA1H010MCA	NCI
C 39	UMA1H2R2MCA	NCI
C 40	UMA1H2R2MCA	NCI
C 41	DM05C 331J05	SOS
C 42	DM05C 161J05	SOS
C 43	UMA1C470MCA	NCI
C 44	DM05C 150J05	SOS

Inductance Coiles

L 1	ST-202246A	IKE
L 2	ST-202246A	IKE
L 3	ST-202246A	IKE

Connector

CN 1	MLF2B45P-J1	NBA

Switches

S 1	SM-03201-02	NKA
S 3	AT2D-6M3	FJS
S 4	SM-03201-02	NKA
S 5	SM-03201-02	NKA
S 6	SM-03201-02	NKA
S 7	SM-03201-02	NKA

Test Poles

TP 1	TBP-6	SJD
TP 2	TBP-6	SJD
TP 3	TBP-6	SJD
TP 4	TBP-6	SJD
TP 5	TBP-6	SJD
TP 6	TBP-6	SJD
TP 7	TBP-6	SJD
TP 8	TBP-6	SJD

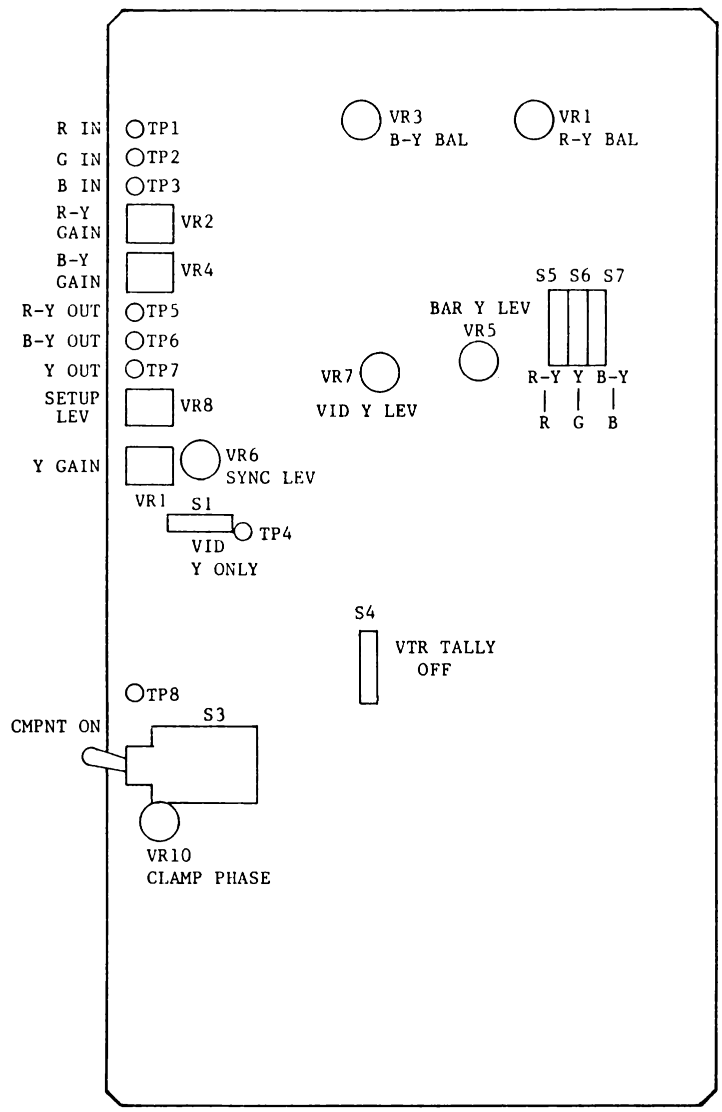
EL BIT

LB	1	PS-3PF-S4T1-PKL1	JAE

SHORT SOCKET

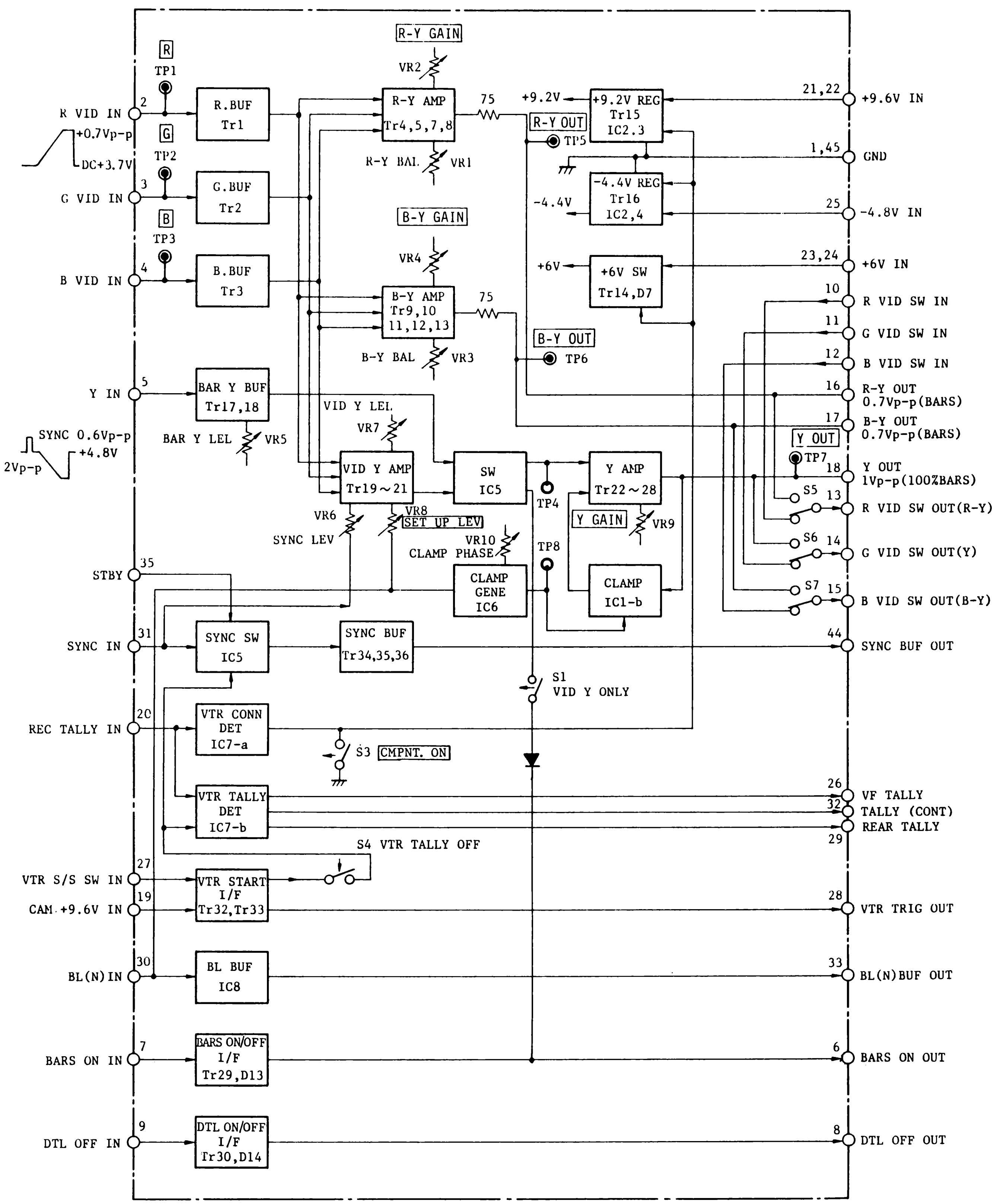
SS	1	PS-2SH4-1	JAE

Fig. 11-6-a



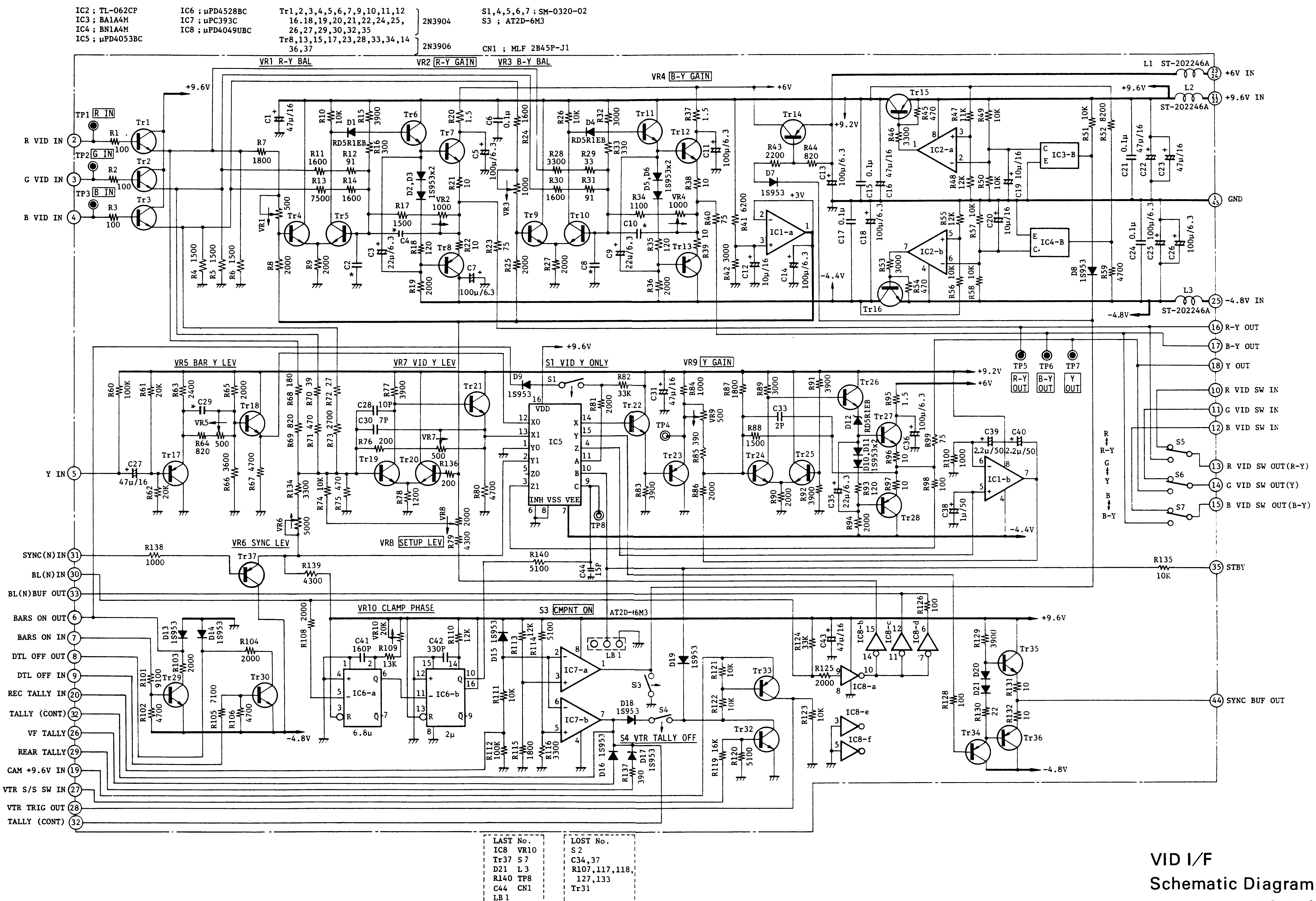
VID I/F
Controls

Fig. 11-6-b



VID I/F
Block Diagram

Fig. 11-6-c

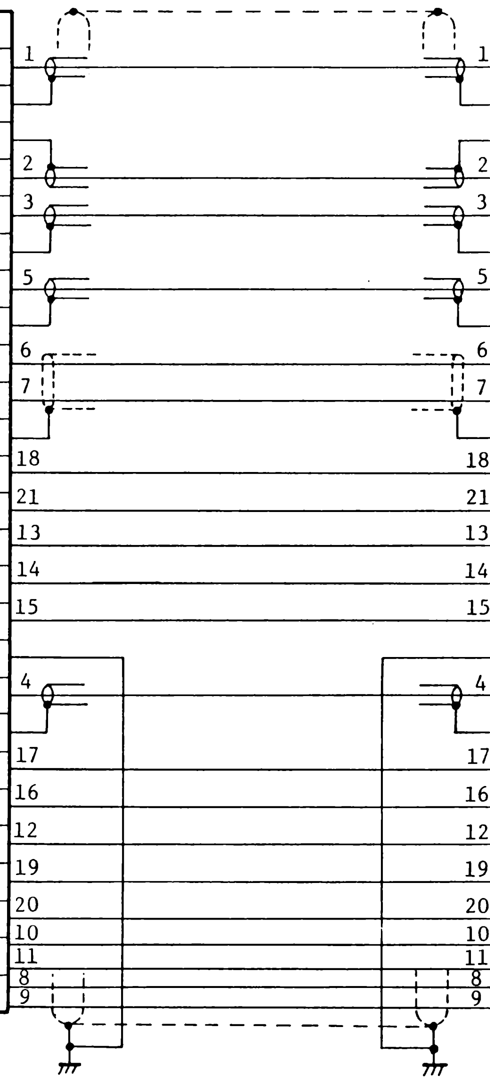


VID I/F
Schematic Diagram
C3-220014

CAMERA SIDE

No.	FUNCTION
1	ENC OUT
2	ENC RET
3	Y RET
4	Y OUT
5	R-Y OUT
6	R-Y RET
7	B-Y OUT
8	B-Y RET
9	MIC OUT (HOT)
10	MIC OUT (COLD)
11	MIC OUT (SHIELD)
12	VTR TRIG OUT
13	BATT ALM IN
14	
15	REC TALY IN
16	EXT VBS IN
17	CABLE SHIELD
18	RET VID IN
19	RET VID RET
20	P.SAVE/AUD.MONI
21	EXT VBS RET
22	COLOR FLM OUT
23	
24	
A	+12V IN
B	+12V RET

SRCB06A21-26S

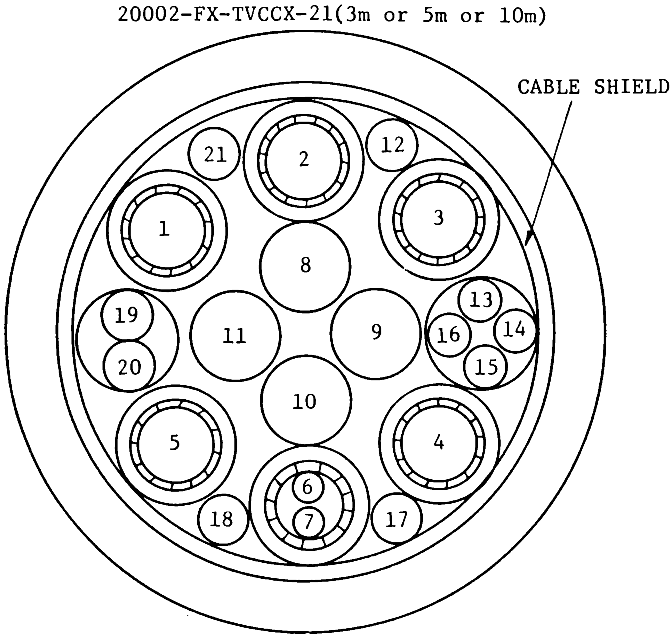


VCR SIDE

No.	FUNCTION
1	ENC OUT
2	ENC RET
3	Y RET
4	Y OUT
5	R-Y OUT
6	R-Y RET
7	B-Y OUT
8	B-Y RET
9	MIC OUT (HOT)
10	MIC OUT (COLD)
11	MIC OUT (SHIELD)
12	VTR TRIG OUT
13	BATT ALM OUT
14	
15	REC TALY
16	EXT VBS
17	CABLE SHIELD
18	RET VID IN
19	RET VID RET
20	P.SAVE/SUD.MONI
21	EXT VBS RET
22	COLOR FLM OUT
23	
24	
A	+12V IN
B	+12V RET

SRCB06A21-26P

20002-FX-TVCCX-21(3m or 5m or 10m)



1. BLACK
2. BROWN
3. RED
4. BLUE
5. YELLOW
6. RED
7. WHITE
8. BLACK
9. BLACK
10. WHITE
11. WHITE
12. BLACK
13. BROWN
14. RED
15. YELLOW
16. ORANGE
17. GREEN
18. BLUE
19. GRAY
20. WHITE
21. VIOLET

VTR CABLE
VC-3,5,10 (ZZ)
C4-220282

CAMERA SIDE

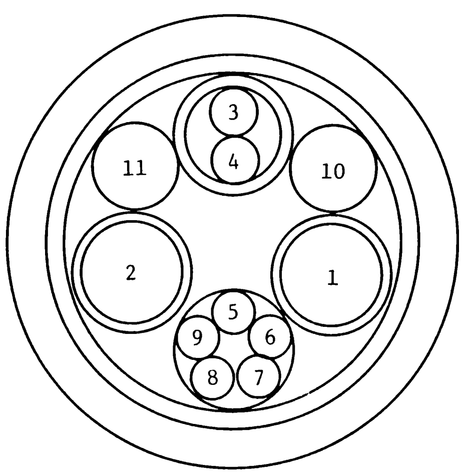
No.	FUNCTION	
1	ENC OUT	2
2	ENC RET	
3	Y RET	
4	Y OUT	
5	R-Y OUT	
6	R-Y RET	
7	B-Y OUT	
8	B-Y RET	
9	MIC OUT (HOT)	4
10	MIC OUT (COLD)	3
11	MIC OUT (SHIELD)	
12	VTR TRIG OUT	8
13	BATT ALM IN	5
14		
15	REC TALLY IN	7
16	EXT VBS IN	
17	CABLE SHIELD	
18	RET VID IN	1
19	RET VID RET	
20	P.SAVE/AUD.MONI	9
21	EXT VBS RET	
22	COLOR FLM OUT	6
23		
24		
A	+12V IN	10
B	+12V RET	11

SRCB06A21-26S

VTR SIDE

	No.	FUNCTION
11	1	DC (E)
10	2	DC 12V (HOT)
4	3	MIC (X)
3	4	MIC (Y)
	5	MIC (GND)
2	6	VIDEO IN (X)
	7	VIDEO (GND)
	8	VIDEO (GND)
1	9	VIDEO OUT
5	10	BATT IND OUT
6	11	COLOR FLM OUT
7	12	REC & ALM OUT
8	13	REC SIG IN
9	14	P.SAVE/AUD.MONI

SRCB06A16-14P



1. YELLOW
2. BLUE
3. WHITE
4. RED
5. BLACK
6. BROWN
7. RED
8. ORANGE
9. YELLOW
10. WHITE
11. BLACK

2969-TVCCX-11-I
(3m or 5m or 10m)

VTR CABLE
VC-3,5,10 (ZN)-11
C4-220528

VA-95S

VCR INTERFACE ADAPTOR

INSTRUCTION MANUAL

Ikegami

VA-95S VCR INTERFACE ADAPTOR

INSTRUCTION MANUAL

CONTENTS

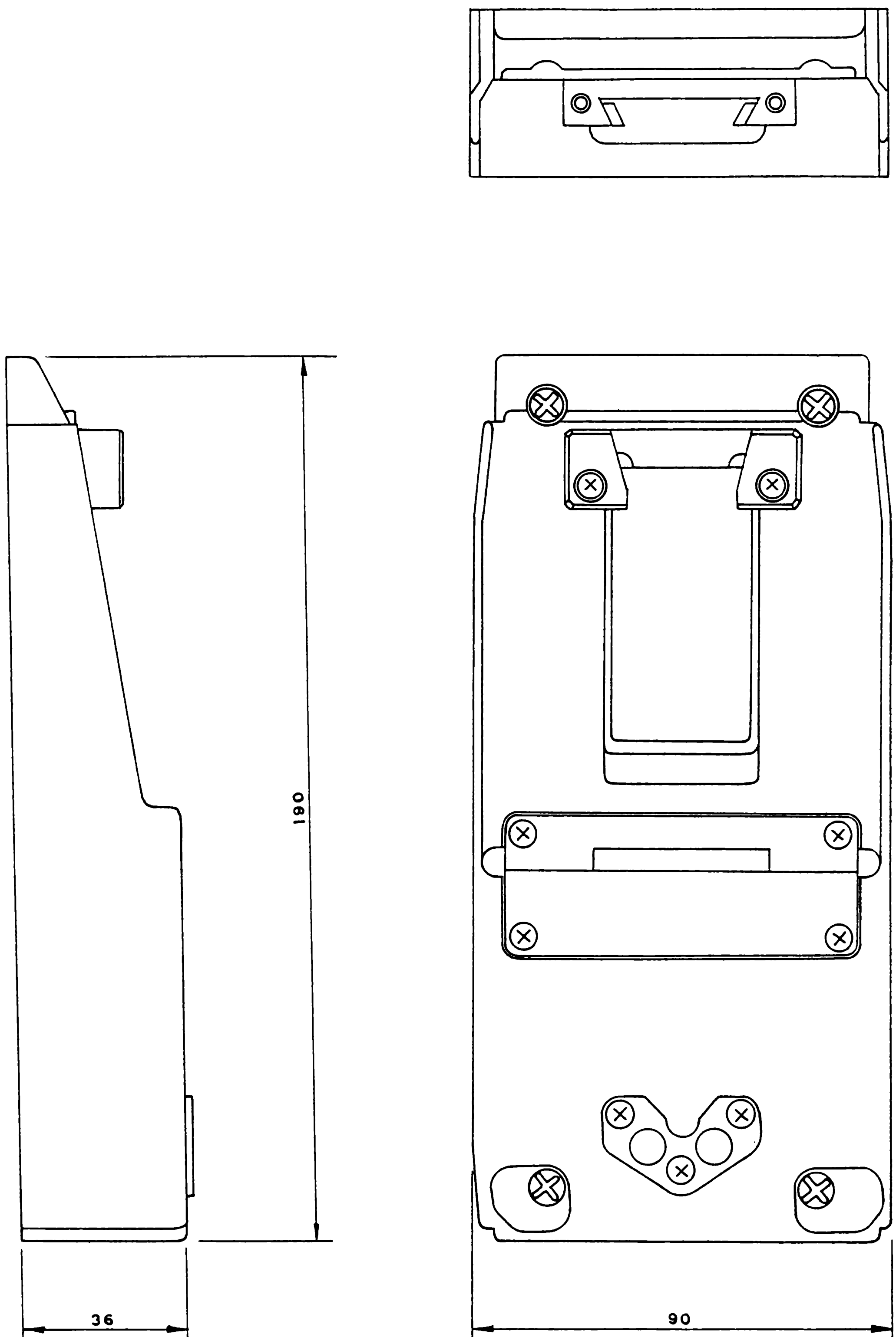
SECTION 1.0 SPECIFICATIONS

1.1 GENERAL

The VA-95S VCR interface adaptor is used to combine HL-95 UNICAM and BVV-1(A) BETACAM VCR for mechanical and electrical interface. This adaptor is designed compact, light weight and low power consumption. Chip parts are used as far as possible in electrical parts.

1.2 RATING

No.	Input signal	Specification of Input signal	Direction of signal	Output signal	Specification of Output signal	Remarks
1	Y signal	VS 1.8 Vp-p	CAM → VCR	Y signal	VS 1.0 Vp-p	Input:Negative 1kΩ
2	R VIDEO signal	V 0.7 Vp-p	CAM →	R-Y	V 0.7 Vp-p	75% COLOR BARS 1kΩ
3	G VIDEO signal	V 0.7 Vp-p	CAM →			
4	B VIDEO signal	V 0.7 Vp-p	CAM →	B-Y	V 0.7 Vp-p	75% COLOR BARS 1kΩ
5	SYNC	5.5 Vp-p	CAM → VCR	SYNC	4.8 Vp-p	
6	MIC	-60dBm	→ VCR	MIC	-60dBm	
7	VTR START/STOP	START +6V STOP open	CAM → VCR	VTR START/STOP	START +6V STOP open	
8	ST.BY/ OPE	ST.BY +9.6 V OPE open	CAM → VCR	POWER SAVE/OPE	POWER SAVE +5 V OPE 0V	
9	RECORD/ALARM	RECORD +5V ALARM +2.5 ∿+5V	VCR → CAM	TALLY/ALARM	TALLY 0 V ALARM 0 ∿ +12V	
10	TAPE REMAIN 1 TAPE REMAIN 2	0∿ 5V 0∿ 5V	VCR → CAM VCR → CAM	TAPE LENGTH	0 ∿ 5V	
11	IND AUDIO IN	-15dBs	VCR → CAM	CH 1 AUDIO IND	+4.8 V	
12			CAM → VCR	AUDIO CONTROL DC	0∿ +7V	



VA-95S

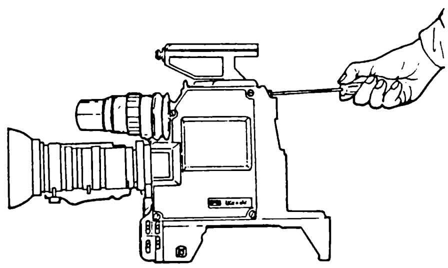
VCR INTERFACE ADAPTOR

EXTERNAL APPEARANCE

SECTION 2.0 OPERATION

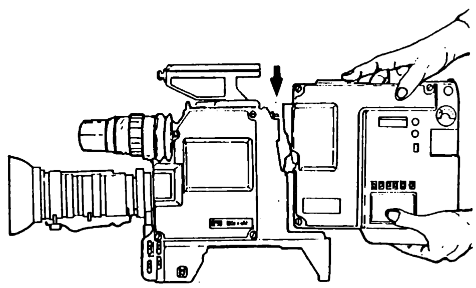
2.1 ASSEMBLY

2.1.1 Using the VCR built-in battery or EXT POWER



(1) Mount the VA-95S VCR interface adaptor to HL-95 UNICAM.

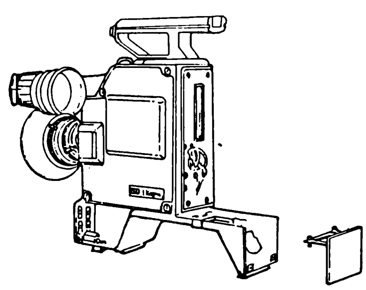
- o Fix the interface adaptor with screw(4) with care taken to the direction of the connecter.



(2) Mount the BETACAM VCR.

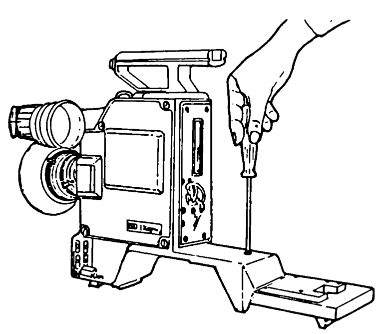
- o Remove the shoulder pad of BETACAM VCR.
- o Remove two screws(↓) on the V-wedge of the interface adaptor.
- o Fix the interface adaptor to the BETACAM VCR securely with these screws.

2.1.2 Using an other battery than VCR's built-in battery.



(1) Remove the blind panel

- o Loosen two screws fastening the blind panel of the universal mount of HL-95 UNICAM, and remove the blind panel.



(2) Set the battery holder.

- o Connect each connector of power line.
- o Set the battery holder in the space obtained by removing the blind panel, and fix it with four screws at upper and lower sides.

(3) Mount the VA-95S VCR interface adaptor and BATACAM VCR on the HL-95 UNICAM.

- o Mount the interface adaptor same as 2.1.1.

2.2 OPERATION

2.2.1 Power supply method

There are following three methods for the system using the VA-95S VCR interface adaptor.

① Use the BVV-1 built-in battery.
② Use the EXT POWER on the rear of BVV-1.
③ Set a battery in the battery mount.
Any one of these methods is all right, but don't use ① and ③ or ② and ③ at the same time.

2.2.2 Power on sequence

The power switch is provided in both HL-95 UNICAM and BVV-1 VCR. In the cases of ① and ② of 2.2.1, turn on the VCR first and then, the CAMERA. In the case of ③, this order is inversed. When the CAMERA and VCR are turned on simultaneously, the in-ruch current becomes too large affecting the battery life.

2.2.3 Operation procedure

① Turn the power switch on. The VF displays a message.
Verify that the message on the VF screen and LED indicator are normal.
② Connect the microphone to the AUDIO terminal of VCR or camera.
③ Adjust the white balance of camera.
④ Press the EJECT button of VCR, and insert a cassette tape.
The tape is then loaded, and the VCR goes to the STBY mode.
Adjust the time code.
⑤ Aim the camera and microphone at a subject and adjust the audio controller located below the front lens of the camera until the LED of CH1 in VF lights up.
(Effective for CH1)
⑥ Press the VTR START switch on the camera lens to start recording.
The VF TALLY lights up during recording.
⑦ To stop recording, press the VTR START switch again.
The VCR goes to the STBY mode and the TALLY goes out on the VF screen.

2.2.4 Precautions on operation

① The remaining tape length is indicated by blinking(1Hz) of "5-0" on the VF screen before five minutes to the tape end.
② The VCR status is indicated by blinking of TALLY.
See Table 2.

Table 2 Contents of TALLY

RECORD display	Just before tape end
Tape end	Just before battery Lower voltage
Battery expired	Abnormal recording
Serve disturbance	Dew in head and drum
Slack of tape	

Continuous lighting   1Hz blinking   4Hz blinking

When the TALLY goes to 4Hz blinking, the LED lights up on the side of VCR except for the case of tape end. Take a corrective action according to the instruction manual for VCR.

SECTION 3.0 SYSTEM DESCRIPTION

The VA-95S VCR interface adaptor consists of a video system of component signals, a control system hadling control, an audio circuit and a power circuit.

The system diagram of the interface adaptor is shown in Fig. 1.

3.1 VIDEO SYSTEM

(1) Y-channel

This is a circuit used to invert the Y-signal polarity generated from the camera ENCODER unit and output it at 1kΩ load by adjusting the level.

(2) R-Y and B-Y

These are circuits which receive R, G and B signals from the camera, adjust the white balance through the matrix circuits of R-Y and B-Y, and output the signals at 1kΩ load by adjusting the level.

(3) SYNC

This is no delay SYNC pulse amplifier provided class A amplifier.

3.2 CONTROL SYSTEM (including the monitor circuit)

(1) VTR START/STOP

The VTR START/STOP signal from the camera is supplied to the VCR.

(2) TALLY

The REC/ALARM voltage of VCR is +2.5V in the STBY mode and +5V in the record mode. The alarm signal is a square wave between +2.5V and +5V. The interface adaptor detects the signal of greater than +3.2V and converts it to 0 V. Thus, the ALARM signal is a square wave with the voltage of 0V ∿ +12V.

(3) TAPE REMAIN

The two bits binary tape remain signals from the VCR is conversed analog signal, and send to the camera.

(4) Power save

The STBY signal from the camera is attenuated to 4dB and sent to the VCR.

3.3 POWER SUPPLY

(1) 12V is transferred between the camera and VTR.

3.4 AUDIO CONTROL

(1) Audio Level Control

It sends a DC voltage of +7V to the audio controller and sends a regulated DC voltage to the audio control terminal of VCR.

(2) Audio Monitor

It amplifies and rectifies an audio monitor signal sent from VCR and detects a signal of more than 2V through a circuit having almost the same time constant as the VU meter of BVV-1A.

The detected signal serves to light up the LED (CH1) of VF.

Set the VR6 to light up at OVU level of BVV-1A.

(Caution)

When using the VA-95S equipped with this audio control, fit the audio controller to the camera.

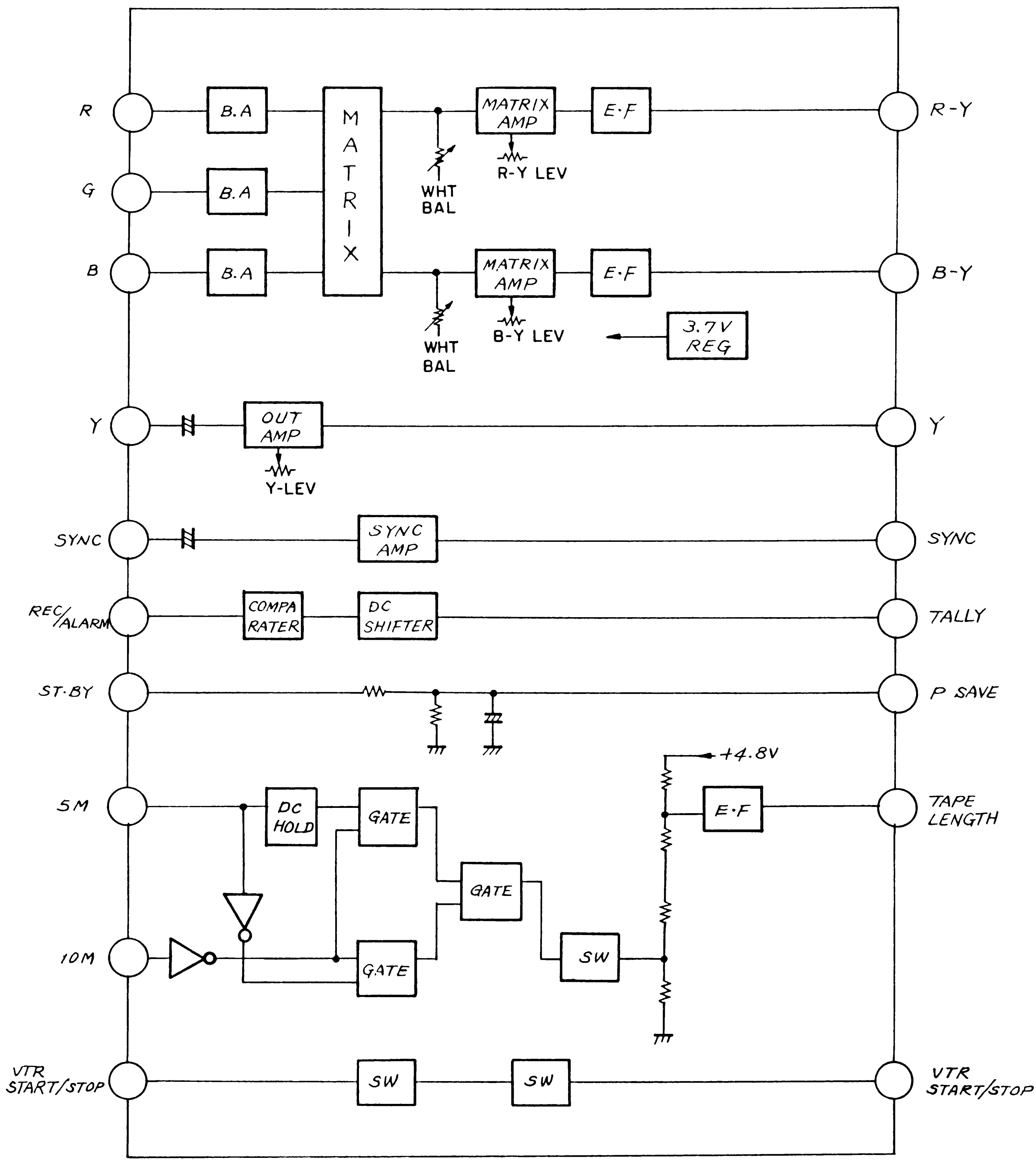
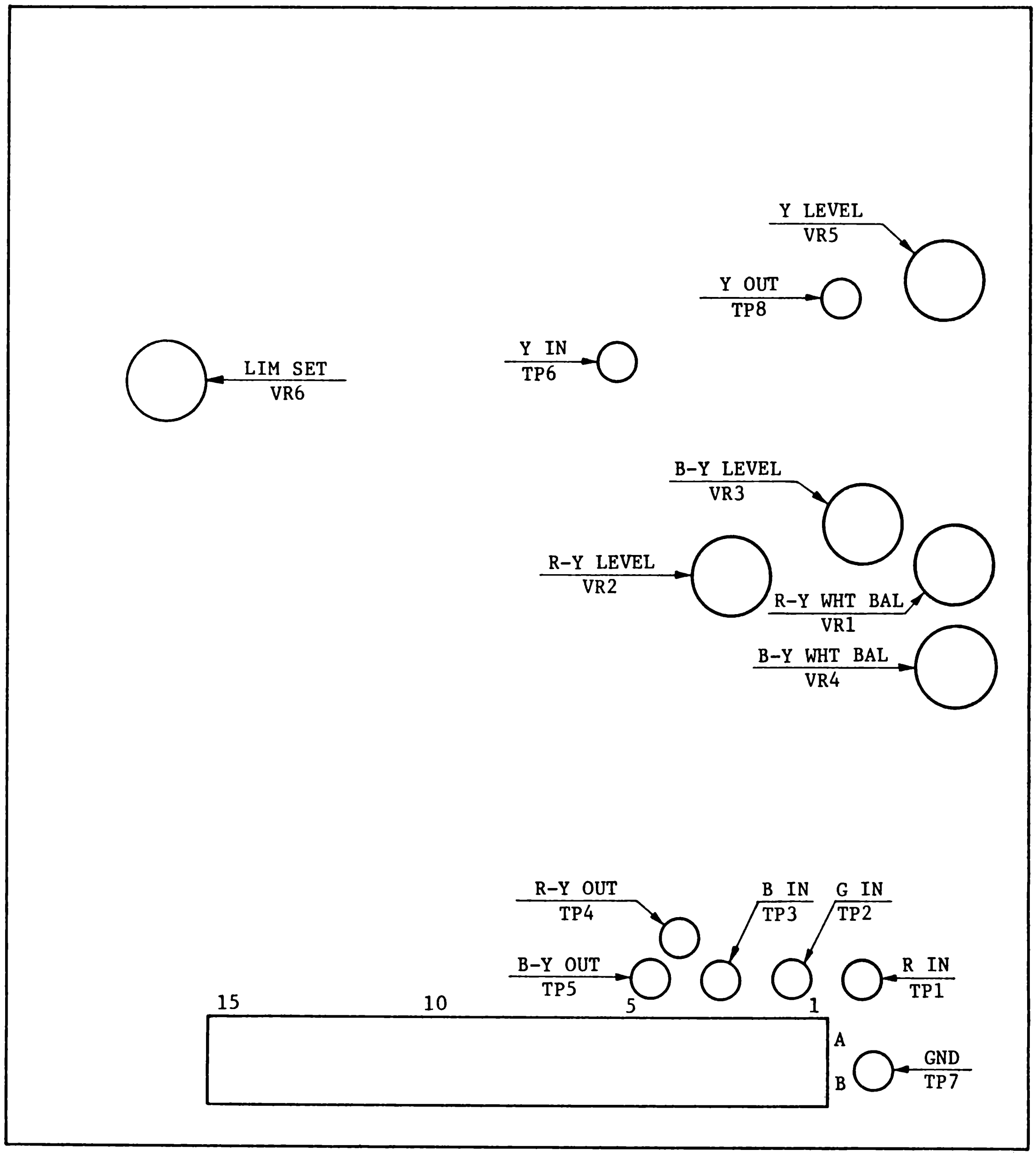


Fig. 3-1
VA-95S
Block Diagram



VIDEO AMP (β)

Fig. 4-1
VIDEO AMP (β)
Control Location

SECTION 4.0 MAINTENANCE

The interface adaptor needs to readjust when the camera is replaced or the camera is readjusted.

4.1 PREPARATION

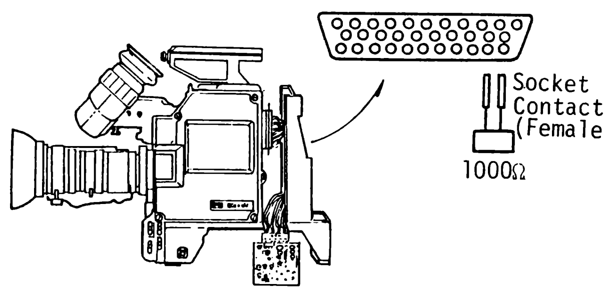
Remove the VCR and interface adaptor from the camera.

Remove the screws fastening the system connector of the interface adaptor and the printed circuit board, and set these component free. Connect the system connector to the camera so that the adjuster is set easy to see with a care taken not to make the printed circuit board contact with the other parts.

4.2 ADJUSTMENT

1. Y-level

Make the HL-95 a color bars, and confirm with an oscilloscope that the level of TP6 is 1.8Vp-p (excluding the DC component). Make connection between interface connectors No. 41 and No. 42 via a resistor of 1000Ω. Adjust the VR5 so that the level of TP8 becomes 1.0Vp-p.



2. R-Y

Confirm that the levels of TP1, TP2 and TP3 are 0.525V. Make connection between interface connectors No. 29 and No. 30 via a resistor of 1000Ω. Adjust the VR1 while observing the TP4 level with an oscilloscope so that the white part of 75% color bar becomes the same level in the BLK period. Adjust the VR2 so that the level becomes 0.7Vp-p.

Note: When the VR2 is adjusted, the white balance may be disturbed. Adjust it again in such cases.

3. Make connection between the interface connectors No. 49 and NO. 50 via a resistor of 1000Ω. Adjust the white balance with the VR3 while observing the TP5 level with an oscilloscope. Adjust the VR4 so that the B-Y level becomes 0.7Vp-p.

Interface with VA-95S and BVV-1(A)

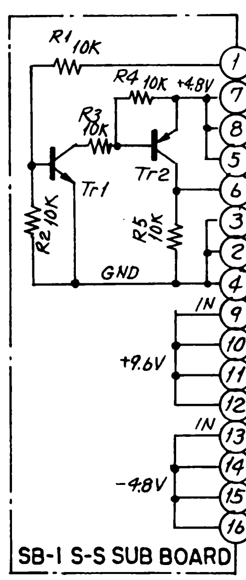
Pin No.	Name of Signals	Flow of signal CAM VCR	Remarks
1∿2	NC		
3	+9.6V OUT	→	
4	-4.8V OUT	→	
5	12V RET	→	
6	"	→	
7∿14	NC		
15	MIC SHIELD	→	
16	MIC HOT	→	-60dBm
17	MIC COLD	→	
18	RET VIDEO	←	1Vp-p/75Ω
19	RET VIDEO (RET)	←	
20	IND AUDIO IN	←	
21	NC		
22	TAPE REMAIN 1	←	REMAIN INDICATOR H(5V)
23	TAPE REMAIN 2	←	" H(5V)
24	RECORD/ALARM	←	5V RECORD 2.5V STBY 0V
25	WARNING	←	
26	NC		
27	VTR START STOP	→	START/$\overline{\text{STOP}}$
28	NC		
29	R-Y OUT	→	0.7Vp-p/1kΩ 75% Color bars
30	R-Y RET	→	
31	AUDIO CONTROL DC	→	0 ∿ +7V
32	POWER SAVE	→	H:4.8V POWER SAVE
33	AUDIO MON		Not used
34	SYNC OUT	→	Phase is the same as Y SYNC.
35	NC		
36	SHUTTER		Not used
37∿38	NC		
39	12V	→	
40	12V	→	
41	Y OUT	→	1Vp-p/1kΩ
42	Y RET	→	
43	ENC VIDEO	→	1Vp-p/75Ω
44	ENC RET	→	
45∿48	NC		
49	B-Y OUT	→	0.7Vp-p/1kΩ 75% Color bars
50	B-Y RET	→	

D02-50P-F0

VCR No.	CN1	To
1		
2		
3	+9.6V	SB1-⑩
4	-4.8V	SB1-⑭
5	12V RET	CN2-74
6	12V RET	
7		
8		
9		
10		
11		
12		
13		
14		
15	MIC SHIELD	
16	MIC HOT	CN2-63
17	MIC COLD	CN2-10
18	RET VIDEO	CN2-38
19	RET VID (RET)	
20	IND. AUDIO IN	CN3-B11
21		
22	H: TAPE REMAIN 1	CN3-B12
23	H: TAPE REMAIN 2	CN3-A13
24	H: REC/ALARM	CN3-B9
25	WARNING	CN2-18
26		
27	VTR START/STOP	SB1-⑥
28		
29	R-Y OUT	CN3-A4
30	R-Y RET	CN3-B4
31	CONTROL DC OUT	CN2-72
32	VCR POWER SAVE	CN3-A10
33		
34	SYNC OUT	CN3-B8
35		
36		
37	COLOR FLM	CN2-36
38		
39	+12V	CN2-76
40	+12V	
41	Y OUT	CN3-A6
42	Y RET	CN3-B6
43	ENC VIDEO	CN2-1
44	ENC RET	
45		
46		
47		
48		
49	B-Y OUT	CN3-A5
50	B-Y RET	CN3-B5

PS-30SD-D4C2

VIDEO AMP (B) No.	CN3	To
A1	R IN	CN2-3
B1	GND	CN2-6
A2	G IN	CN2-4
B2	GND	CN2-6
A3	B IN	CN2-5
B3	GND	CN2-71
A4	R-Y OUT	CN1-29
B4	GND	CN1-30
A5	B-Y OUT	CN1-49
B5	GND	CN1-50
A6	Y OUT	CN1-41
B6	GND	CN1-42
A7	Y IN	CN2-8
B7	CONTROL DC	CN2-70
A8	SYNC IN	CN2-50
B8	SYNC OUT	CN1-34
A9	TALLY OUT	CN2-62
B9	REC/ALARM	CN1-24
A10	VCR POWER SAVE	CN1-32
B10	AUDIO CH1 IND	CN2-61
A11	ST. BY	CN2-73
B11	AUDIO LED IND	CN1-20
A12	TAPE LENGTH	CN2-24
B12	10M	CN1-22
A13	5M	CN1-23
B13	KEY	
A14	-4.8V IN	SB1-⑮
B14	GND	SB1-④
A15	+4.8V IN	SB1-⑧
B15	+9.6V IN	SB1-⑪



SB1	To
1	CN2-46
7	CN2-66
8	CN3-A15
5	
6	CN1-27
3	
2	CN2-67
4	CN3-B14
9	CN2-65
10	CN1-3
11	CN3-B15
12	
13	CN2-68
14	CN1-4
15	CN3-A14
16	

2DC-79S

CAMERA No.	CN2	To
1	ENC OUT	CN1-43
2	ENC RET	
3	R VID IN	CN3-A1
4	G VID IN	CN3-A2
5	B VID IN	CN3-A3
6	VID RET	CN3-B1/B2
7		
8	Y VID IN	CN3-A7
9		
10	MIC COLD	CN1-17
11		
12		
13		
14		
15		
16		
17		
18	WARNING	CN1-25
19		
20		
21		
22		
23		
24	TAPE LENGTH	CN3-A12
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35	MIC SHIELD	
36	COLOR FLM	CN1-37
37		
38	RET VID	CN1-18
39	RET VID RET	R1 75
40		

CAMERA No.	CN2	To
41		
42		
43		
44	RET CONT	
45	RET SW	
46	VTR START/STOP	SB1-①
47		
48		
49		
50	SYNC IN	CN3-A8
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61	CH1 AUDIO IND	CN3-B10
62	$\overline{\text{TALLY}}$	CN3-A9
63	MIC HOT	CN1-16
64		
65	+9.6V IN	SB1-⑨
66	+4.8V IN	SB1-⑦
67	GND	SB1-②
68	-4.8V IN	SB1-⑬
69		
70	AUDIO-1 GND	CN3-B7
71	AUDIO-1 ARM	CN3-B3
72	AUDIO-1 LEV.	CN1-31
73	STBY	CN3-A11
74	+12V RET	CN1-5
75	+12V IN	
76	+12V OUT	CN1-39
77	+12V BATT	
78	+12V OFF	
79	+12V (LENS)	

Fig. 5-1
VA-95S
Schematic &
Wiring Diagram

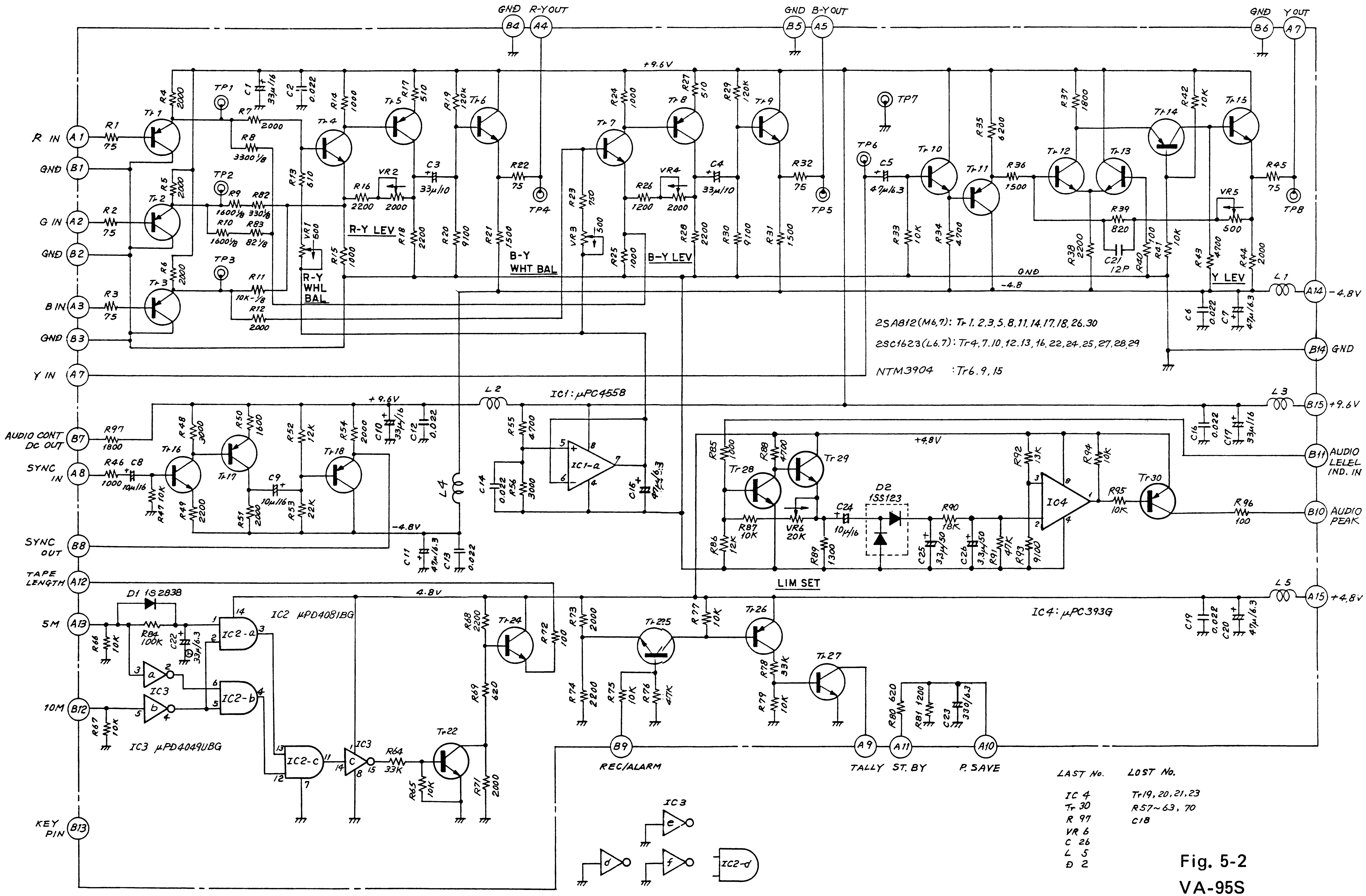


Fig. 5-2
VA-95S
VIDEO AMP (β)
Schematic Diagram

MANUFACTURERS CODE

AAH	Asahi Co., Ltd.	Japan
ABC	Allen-Bradley Co.	U.S.A.
ABI	Nippon Aviotronics Co., Ltd.	Japan
ALP	Alps Electric Co., Ltd.	Japan
AMD	Advanced Micro Devices	U.S.A.
AME	Amelco Semiconductor	U.S.A.
AMF	Amfenol-Borg Electronics Co., Ltd.	U.S.A.
AMP	AMP Inc.	Japan
ANA	Analog Devices	U.S.A.
ARA	Arai Musen Co., Ltd.	Japan
ARO	Arrow Electric Co., LTD.	Japan
ASA	Asahi Electric Mfg. Co., Ltd.	Japan
ASG	Asahi Glass	Japan
ASH	Ashida Sound Co., Ltd.	Japan
ASN	Alsan	U.S.A.
ASP	Asahi Print	Japan
ATC	Asahi Trans Co., Ltd.	Japan
AVX	AVX Co., Ltd.	Japan
BBL	Burr-Brown Research Corporation	U.S.A.
BDD	Bando Densen Co., Ltd.	Japan
BEC	Beckman Instruments Inc.	U.S.A.
BEN	Bendix Co., Ltd.	U.S.A.
BEY	Gotham Audio Co.	U.S.A.
BRG	Berg Electronics Devision Ei Dupon De Nemous & Co.	U.S.A.
CAN	Canon Inc.	Japan
CAS	Canon Seiki Co., Ltd.	Japan
CHM	Chiba Ohm	Japan
CHU	Chunichi Denshi Kogyo Co., Ltd.	Japan
CLD	Cleveland Electronics Inc.	U.S.A.
CND	Canon Electronics Co., Ltd.	Japan
CNL	Central Ab/Uscc	U.S.A.
CDD	Codix Corporation	Japan
COS	Tokyo Cosmos Electronics Co., Ltd.	Japan
CPL	Copal Electronics Co., Ltd.	Japan
CRB	Tokyo Musen Kizai Co., Ltd.	Japan
CRS	Cricson	U.S.A.
CSR	CSR Ind.	U.S.A.
C&K	C&K Components Inc.	U.S.A.
DAI	Dainichi Denshi Co., Ltd.	Japan
DAK	Daiko Electronics Co., Ltd.	Japan
DAL	Dale Electronics Ind.	U.S.A.
DDK	Daiichi Denshi Kogyo Ltd.	Japan
DET	Datel System's Inc.	U.S.A.
DGM	Daiei Gomu	Japan
DIA	Diaright	U.S.A.
DID	Daiichi Denchi Co., Ltd.	Japan
DIK	Daiichi Keiki Co., Ltd.	Japan
DIT	Daitou Tsushinki Co., Ltd.	Japan.
DKC	Denshi Kagaku Co., Ltd.	Japan
DKK	Daikin kogyo	Japan
DDK	Denki Onkyo Co., Ltd.	Japan
EDI	Electronics Devices Inc.	U.S.A.
EIE	EIE Co., Ltd.	Japan
ELC	Elco International Corp.	Japan
ELE	Electro Cube	U.S.A.
ELM	Elma Electronics A.G	Switzerland
ERI	Erie Technological Products Inc.	U.S.A.
ESA	Eisha Denshi Co., Ltd.	Japan
FCH	Fairchild Semiconductor	U.S.A.
FDK	Fuji Denki Kagaku Co., Ltd.	Japan
FER	Fernseh	Germany
FIS	Fisher	Switzerland
FJC	Fujicon Co., Ltd.	Japan
FJE	Fuji Electric Co., Ltd.	Japan
FJN	Fuji Shashin Koki Co., Ltd.	Japan
FJS	Fujisoku Electric Co., Ltd.	Japan
FJT	Fujitsu Ltd.	Japan
FKD	Fukuda S.S	Japan
FKK	Fujimoto Kinzoku Co., Ltd.	Japan
FKW	Fujikura Cable Works, Ltd.	Japan
FLT	Flat Denshi Co., Ltd.	Japan
FSO	Foster Electric Co., Ltd.	Japan
FRT	Ferten	Germany

FSO	Fuso Shoji Co., Ltd.	Japan
FUC	Fuji Ceramic Co., Ltd.	Japan
FUK	Fujiki Electric Co., Ltd.	Japan
FUS	Fukushima Futaba Electric Co., Ltd.	Japan
FTB	Futaba Denki	Japan
GES	General Semiconductor	U.S.A.
GIT	General Instrument	U.S.A.
GRY	Grayhill	U.S.A.
HAM	Hamai Electric Lamp Ind. Co., Ltd.	Japan
HAR	Harris Corpotation	U.S.A.
HAS	Hasegawa S.S	Japan
HCP	Hi-Comp Ltd.	Japan
HDK	Hokuriku Electric Ind. Co., Ltd.	Japan
HIM	Heinemann Electric Company	Germany
HIN	Hinomoto Gosei Jushi S.S	Japan
HIR	Hirose Electric Co.,Ltd.	Japan
HIT	Hitachi Ltd.	Japan
HKD	Hokuto Denshi	Japan
HON	Honda Tsushin Kogyo Co., Ltd.	Japan
HOS	Hoshiden Electronics Co., Ltd.	Japan
HOY	Hoya Glass	Japan
HOZ	Hozan Tool Ind. Co., Ltd.	Japan
HRA	Hirakawa Densen Co., Ltd.	Japan
HTO	Hakuto Co., Ltd.	Japan
HWC	Hanai Densen	Japan
IDC	Izumi Denki Corp.	Japan
IKE	Ikegami Tsushinki Co., Ltd.	Japan
IKN	Ikuno Electronic	Japan
INC	Inter Compo Inc.	U.S.A.
INS	Intersil	U.S.A.
INT	Inter Corpotation	U.S.A.
ISI	Ishizuka Electronics Corporation	Japan
ISS	Ito Seimitsu	Japan
ISK	Ishikawa Seisakushyo	Japan
IKJ	Ikejiri Denki Co., Ltd.	Japan
ITT	ITT Components Co., Ltd.	U.S.A.

IWT	Iwatsu Seimitsu Co., Ltd.	Japan
JAE	Japan Aviation Electronics Ind. Ltd.	Japan
JFC	Japan Fine Chemical Corp.	Japan
JFD	JFD Electric Corp.	Japan
JNB	Jinbo Electric Co., Ltd.	Japan
JND	Jyonan Denki Co., Ltd.	Japan
JOH	Johanson Mfg. Corp.	U.S.A.
JRC	New Japan Radio Co., Ltd.	Japan
JSR	Japan Servo Co., Ltd.	Japan
JUN	Junkosha Co., Ltd.	Japan
JMC	Japan Machnix Co., Ltd.	Japan
KAN	Kaneko Code Seizo Co.	Japan
KCK	KCK Co., Ltd.	Japan
KDK	Kawasaki Densen Co., Ltd.	Japan
KEI	Koeisha	Japan
KEL	KEL Corp.	Japan
KEN	Kenko	Japan
KGS	Kogyosha	Japan
KIG	Kings Electronics Company Inc.	U.S.A.
KIN	Kinseki Co., Ltd.	Japan
KIT	Kitagawa Gomu Kogyo Co., Ltd.	Japan
KKS	Kyoritsu Kinzoku	Japan
KMC	Kimachi Kikai Kogu	Japan
KMD	Kimura Denki Co., Ltd.	Japan
KMH	Komatsu Hofman	Japan
KMY	Kamaya Co., Ltd.	Japan
KOA	KOA Denko Co., Ltd.	Japan
KOM	KH Electronics Corp.	Japan
KON	Kondo Electric Co., Ltd.	Japan
KOZ	Kosmica	Japan
KYO	Kyoritsu Dengyo Co., Ltd.	Japan
KYS	Kyosera Co., Ltd.	Japan
LEM	Lemo	Switzerland
LEX	LEX Co., Ltd.	Japan
LTR	Litronix	Japan

LUX	LUX Corp.	Japan
MAC	MAC EIGHT Co., Ltd.	Japan
MAD	Matsushita Denko Co., Ltd.	Japan
MAR	Marcon Electronics Co., Ltd.	Japan
MAT	Matsushita Electric Ind. Co., Ltd.	Japan
MCD	Meiko Denshi	Japan
MCR	Micron Electric Co., Ltd.	Japan
MHC	Matsukyu Co., Ltd.	Japan
MID	Midori Precisions Co., Ltd.	Jqpan
MIM	Micro Metal	U.S.A.
MIN	Minmoter SA./Koshin Shoji	Switzerland
MIT	Mitsubishi Electric Corp.	Japan
MIY	Miyama Electric Co., Ltd.	Japan
MIZ	Mizutani Electric Ind. Co., Ltd.	Japan
MKS	Murakami Shikisai	Japan
MMD	Morimatsu Denshi Kogyo Co., Ltd.	Japan
MMM	Sumitomo 3M Co., Ltd.	Japan
MON	Mori Ohm	Japan
MON	Monsanto Company/General Instrument	U.S.A.
MOR	Mori Tsushinki Co., Ltd.	Japan
MOS	Mostec	U.S.A.
MOT	Motorola Semiconductor Products	U.S.A.
MRR	Moririca Electronics Co., Ltd.	Japan
MSH	Matsuzaki Vacuum Evaporation Co., Ltd.	Japan
MSS	Musashi Electric Co., Ltd.	Japan
MTK	Mitoku Electric Co., Ltd.	Japan
MTM	Mitsumi Electric Co., Ltd.	Japan
MTT	MTT Co., Ltd.	Japan
MTY	Mitsuya Denki Co., Ltd.	Japan
MUB	Murata Burns Co., Ltd.	Japan
MUR	Murata Mfg. Co., Ltd.	Japan
MYM	Miyama Electric Co., Ltd.	Japan
NAV	Nippon Aviotronics Co., Ltd.	Japan
NBA	Nihon Burndy Ltd.	Japan
NBT	Nippon Battery Co., Ltd.	Japan
NBL	Noble Musen Co., Ltd.	Japan
NBW	Nihon Blower	Japan
NCC	Matsuo Electric Co., Ltd.	Japan
NCH	Nippon Chemical Condenser Co.,	Japan
NCI	Nichicon Capacitor Ltd.	Japan
NDC	Nissei Electric Co., Ltd.	Japan
NDD	Nihon Denyow Co., Ltd.	Japan
NDP	Nihon Denpa	Japan
NEC	Nippon Electric Co., Ltd.	Japan
NEW	New Ohto Co., Ltd.	Japan
NFB	NF Circuit Design Block Co., Ltd.	Japan
NFK	Nippon Ferrite Kogyo Co., Ltd.	Japan
NIE	Nikkon Electronics Co., Ltd.	Japan
NIK	Nihon Koshuha Misawa S.S	Japan
NIN	Inter Rectifier Corp. Japan Co., Ltd.	Japan
NIP	Nippon Thermo Co., Ltd.	Japan
NIS	Nissho Electric	Japan
NJR	Nagano Japan Radio Co., Ltd.	Japan
NKA	Nihon Kaiheiki Ind. Co., Ltd.	Japan
NKK	Nikkan Kogyo	Japan
NMO	Nihon Molex	Japan
NSC	National Semiconductor Corporation	U.S.A.
NSS	Nihon Shiements	Japan
NTA	Nippon Tanshi	Japan
NTK	Nitsuko Ltd.	Japan
ODS	Ohkura Denshi Sangyo	Japan
OEL	Oshino Electric Lamp Works Ltd.	Japan
OEN	Oriental Motor Co., Ltd.	Japan
OIZ	Oizumi Mfg. Co., Ltd.	Japan
OKA	Okaya Electric Ind Co., Ltd.	Japan
OKI	Oki Electronics Co., Ltd.	Japan
OKW	Okita Works Co., Ltd.	Japan
OLM	Olympus Presision Co., Ltd.	Japan
OMD	Omori Denki Seisakusho Co., Ltd.	Japan
OMR	Tateishi Denki Co., Ltd.	Japan
ORI	Origin Electric Components	Japan
OSM	Ohshima Electric Co., Ltd.	Japan
OSS	OS Electronics Co., Ltd.	Japan
OTT	Otto Heil Ohg	Japan

OPM	Optimax Inc.	U.S.A.
PHI	Philips	Netherland
PIO	Pioneer Electronix Comp.	Japan
QQQ	Chuo Musen Co., Ltd.	Japan
RAY	Raytheon Semiconductor Division	U.S.A.
RCA	Radio Corporation of America	U.S.A.
RCL	RCL Co., Ltd.	U.S.A.
RED	Read Co., Ltd.	Japan
RIF	Aktiebolaget Rifa	Sweden
RKN	Riken Dengu Seizo Co., Ltd.	Japan
ROHM	Rohm Co., Ltd.	Japan
RYO	Ryosan Co., Ltd.	Japan
SAK	Sakae Tsushin Kogyo Co., Ltd.	Japan
SAM	Samtec	
SAN	Sanyo Electric Co.	Japan
SAT	Sato Parts Co., Ltd.	Japan
SCH	H/Schurter	Switzerland
SCS	Saito Code Seizo Co., Ltd.	Japan
SEF	Seidensha Electric Works Ltd.	Japan
SIG	Signetics Co., Ltd.	U.S.A.
SIL	Sylvania G.T & E.	U.S.A.
SIN	Shinmei Electric Co., Ltd.	Japan
SIZ	Shizuki Electric Company Inc.	Japan
SJD	Shoji Denki	Japan
SJK	Senju Kinzoku Kogyo Co., Ltd.	Japan
SKE	Sankei Engineering	Japan
SKK	Sinetsu Kagaku Kogyo Co., Ltd.	Japan
SKM	Shonan Komaku Kenkyujo	Japan
SKN	Sanken Electric Co., Ltd.	Japan
SKO	Sankosha	Japan
SLC	Siliconix Incorporated	U.S.A.
SLW	Sil Walker	U.S.A.
SMK	Showa Musen Kogyo Co., Ltd.	Japan
SNA	Sinagawa Densen	Japan
SND	Shindengen Electric Mfg. Co., Ltd.	Japan
SNE	Sanyo Electric Co., Ltd.	Japan
SNH	San Hayato Co., Ltd.	Japan
SNK	Sanko Co., Ltd.	Japan
SNS	Sanshin Denki Co., Ltd.	Japan
SNT	Shin Nittoku	Japan
SOD	Soko Denki	Japan
SOK	Soken Kogyo Co.	Japan
SONY	Sony Corp.	Japan
SOR	Soruton Co.	Germany
SOS	Soshin Electric Co., Ltd.	Japan
SPR	Sprague Products Company	U.S.A.
SRK	Schrack Electrical Sales Corp.	Germany
SRP	Sharp Co., Ltd.	Japan
SSI	Sansei Electric Co., Ltd.	Japan
SSM	Susumu Ind. Co., Ltd.	Japan
SSS	Solid State Scientific Inc.	
STA	Star Mfg. Co., Ltd.	Japan
STL	Stanley Electric Co., Ltd.	Japan
SUD	Sumida Electric Co., Ltd.	Japan
SUM	Sumitomo Electric Kogyo Co., Ltd.	Japan
SWCC	Showa Electric Wire & Cable Co., Ltd.	Japan
SYO	Tokyo Sanyo Electric Co., Ltd.	Japan
TAD	Taiko Denki Co., Ltd.	Japan
TAG	Tamagawa Denki	Japan
TAI	Tokai Denki Co., Ltd.	Japan
TAJ	Tajimi Musen Denki Co., Ltd.	Japan
TAM	Tama Electric Co., Ltd.	Japan
TCP	Toshiba Components Co., Ltd.	Japan
TDK	TDK Electric Co., Ltd.	Japan
TDD	Tokyo Denon Co., Ltd.	Japan
TEA	Teac	Japan
TEW	Tamura Electric Works Ltd.	Japan
TEX	Texas Instruments Products Inc.	U.S.A.
THK	Tohoku Metal Industries Ltd.	Japan
TKD	Tokyo Ko-on Denpa Co., Ltd.	Japan
TKO	Toko Ind.	Japan
TKR	Tokyo Takara Shokai	Japan
TLD	Teledyne	U.S.A.

TLM	Telmo	Japan
TMR	Tamura Seisakusho Co., Ltd.	Japan
TOB	Tobishi Kosan Co., Ltd.	Japan
TOD	Tokyo Denki CO., Ltd.	Japan
TOG	Tochigiya Co., Ltd.	Japan
TOI	Toai Co., Ltd.	Japan
TOK	Tokai Communication Ind. Ltd.	Japan
TOS	Toshiba Corp.	Japan
TOW	Towa Chikudenki Co., Ltd.	Japan
TOY	Toyo Musen Co., Ltd.	Japan
TRA	Transitron Electric Co.	U.S.A.
TRW	TRW Corp.	U.S.A.
TSK	Tokyo Sokutei Kizai Ltd.	Japan
TSM	Tokyo Shimoda Kogyo Co., Ltd.	Japan
TSS	Tamura Seiko	Japan
TSU	Tsumura Denshi Sangyo Co., Ltd.	Japan
TTD	Tokyo Tokushu Densen Co., Ltd.	Japan
TTE	Totsu Electronics Co., Ltd.	Japan
TTS	Teikoku Tsushin Kogyo Co., Ltd.	Japan
TWD	Tokiwa Denki Co., Ltd.	Japan
TWE	Towa Denki Co., Ltd.	Japan
TXT	Tektoronix Inc.	U.S.A.
TYC	Taiyo Yuden Co., Ltd.	Japan
TYE	Taiyo Electronics Co., Ltd.	Japan
TYD	Tokyo Denpa Co., Ltd.	Japan
TYO	Toyo Electronics Industry Corp.	Japan
TYT	Toyo Tokei Kogyo Co., Ltd.	Japan
TYX	Toyo Communication Equipment Co., Ltd.	Japan

UEL	Uro Electronics Ind. Co., Ltd.	Japan
UCD	Uchida Engineering Co.	Japan
UNI	Unizon Corp.	Japan
USI	Usio Denki	Japan
UUU	Sanyu Kogyo Co., Ltd.	Japan

VAR	Varo Inc.	

WIM	Wima Co., Ltd.	Germany
WAK	Waka S.S	

YAD	Yardney Electric Co., Ltd.	U.S.A.
YAG	Yagishita Electric Co., Ltd.	Japan
YAM	Yamaki Electric Co., Ltd.	Japan
YHL	Yamatake Honeywell Co., Ltd.	Japan
YHP	Yokogawa Hewlett-Packard Ltd.	Japan
YMD	Yamada Kogyo Co.	Japan
YMI	Yamaichi Electric Mfg. Co., Ltd.	Japan
YSD	Yasuda Denken Co., Ltd.	Japan

No.	Description		Mfd
Connectors			
CN 1	D02-50P-F0		JAE
CN 2	2DC 79S		JAE
CN 3	PS-30SD-D4C2		JAE
CN 4	A3-10D-2C		HIR

S-S SUB BOARD

Transistors			
Tr 1	2SC1623		NEC
Tr 2	2SA812		NEC
Resistors			
R 1	RMC1/10	10kΩF	KMY
R 2	RMC1/10	10kΩF	KMY
R 3	RMC1/10	10kΩF	KMY
R 4	RMC1/10	10kΩF	KMY
R 5	RMC1/10	10kΩF	KMY

VIDEO AMP (β)

Integrated Circuits

No.	Description	Mfd
IC 1	μPC4558G	NEC
IC 2	μPD4081BG	NEC
IC 3	μPD4049UBG	NEC
IC 4	μPC393G	NEC

Transistors

No.	Description	Mfd
Tr 1	2SA813	NEC
Tr 2	2SA812	NEC
Tr 3	2SA812	NEC
Tr 4	2SC1623	NEC
Tr 5	2SA812	NEC
Tr 6	NTM3904	NEC
Tr 7	2SC1623	NEC
Tr 8	2SA812	NEC
Tr 9	NTM3904	NEC
Tr10	2SC1623	NEC
Tr11	2SA812	NEC
Tr12	2SC1623	NEC
Tr13	2SC1623	NEC
Tr14	2SA812	NEC
Tr15	NTM3904	NEC
Tr16	2SC1623	NEC
Tr17	2SA812	NEC
Tr18	2SA812	NEC
Tr19	LOST	
Tr20	LOST	
Tr21	LOST	
Tr22	2SC1623	NEC
Tr23	LOST	
Tr24	2SC1623	NEC
Tr25	2SC1623	NEC
Tr26	2SA812	NEC
Tr27	2SC1623	NEC
Tr28	2SC1623	NEC
Tr29	2SC1623	NEC
Tr30	2SA812	NEC

Diodes

No.	Description	Mfd
D 1	1S2838	NEC
D 2	1SS123	NEC

Resistors

No.	Description	Mfd
R 1	RMC1/10 75ΩF	KMY
R 2	RMC1/10 75ΩF	KMY
R 3	RMC1/10 75ΩF	KMY
R 4	RMC1/10 2000ΩF	KMY
R 5	RMC1/10 2000ΩF	KMY
R 6	RMC1/10 2000ΩF	KMY
R 7	RMC1/10 2000ΩF	KMY
R 8	RE15YQ 3300ΩF	SSM
R 9	RE15YQ 1600ΩF	SSM
R 10	RE15YQ 1600ΩF	SSM
R 11	RE15YQ 10kΩF	SSM
R 12	RMC1/10 2000ΩF	KMY
R 13	RMC1/10 510ΩF	KMY
R 14	RMC1/10 1000ΩF	KMY
R 15	RMC1/10 1000ΩF	KMY
R 16	RMC1/10 2200ΩF	KMY
R 17	RMC1/10 510ΩF	KMY
R 18	RMC1/10 2200ΩF	KMY
R 19	RMC1/10 120kΩF	KMY
R 20	RMC1/10 9100ΩF	KMY
R 21	RMC1/10 1500ΩF	KMY
R 22	RMC1/10 75ΩF	KMY
R 23	RMC1/10 750ΩF	KMY
R 24	RMC1/10 1000ΩF	KMY
R 25	RMC1/10 1000ΩF	KMY
R 26	RMC1/10 1200ΩF	KMY
R 27	RMC1/10 510ΩF	KMY
R 28	RMC1/10 2200ΩF	KMY
R 29	RMC1/10 120kΩF	KMY
R 30	RMC1/10 9100ΩF	KMY
R 31	RMC1/10 1500ΩF	KMY
R 32	RMC1/10 75ΩF	KMY
R 33	RMC1/10 10kΩF	KMY
R 34	RMC1/10 4700ΩF	KMY
R 35	RMC1/10 6200ΩF	KMY
R 36	RMC1/10 1500ΩF	KMY
R 37	RMC1/10 1800ΩF	KMY
R 38	RMC1/10 2200ΩF	KMY
R 39	RMC1/10 820ΩF	KMY
R 40	RMC1/10 100ΩF	KMY
R 41	RMC1/10 10kΩF	KMY
R 42	RMC1/10 10kΩF	KMY
R 43	RMC1/10 4700ΩF	KMY
R 44	RMC1/10 2000ΩF	KMY
R 45	RMC1/10 75ΩF	KMY
R 46	RMC1/10 1000ΩF	KMY
R 47	RMC1/10 10kΩF	KMY
R 48	RMC1/10 3000ΩF	KMY
R 49	RMC1/10 2200ΩF	KMY
R 50	RMC1/10 1600ΩF	KMY
R 51	RMC1/10 2000ΩF	KMY
R 52	RMC1/10 12kΩF	KMY
R 53	RMC1/10 22kΩF	KMY
R 54	RMC1/10 2000ΩF	KMY
R 55	RMC1/10 4700ΩF	KMY
R 56	RMC1/10 3000ΩF	KMY

Resistors

No.	Description	Mfd
R 57	LOST	
R 58	LOST	
R 59	LOST	
R 60	LOST	
R 61	LOST	
R 62	LOST	
R 63	LOST	
R 64	RMC1/10 33kΩF	KMY
R 65	RMC1/10 10kΩF	KMY
R 66	RMC1/10 10kΩF	KMY
R 67	RMC1/10 10kΩF	KMY
R 68	RMC1/10 2200ΩF	KMY
R 69	RMC1/10 620ΩF	KMY
R 70	LOST	
R 71	RMC1/10 2000ΩF	KMY
R 72	RMC1/10 100ΩF	KMY
R 73	RMC1/10 2000ΩF	KMY
R 74	RMC1/10 2200ΩF	KMY
R 75	RMC1/10 10kΩF	KMY
R 76	RMC1/10 47kΩF	KMY
R 77	RMC1/10 10kΩF	KMY
R 78	RMC1/10 33kΩF	KMY
R 79	RMC1/10 10kΩF	KMY
R 80	RMC1/10 620ΩF	KMY
R 81	RMC1/10 1200ΩF	KMY
R 82	RE15YQ 330ΩF	SSM
R 83	RE15YQ 82ΩF	SSM
R 84	RMC1/10 100kΩF	KMY
R 85	RMC1/10 1000ΩF	KMY
R 86	RMC1/10 12kΩF	KMY
R 87	RMC1/10 10kΩF	KMY
R 88	RMC1/10 4700ΩF	KMY
R 89	RMC1/10 1300ΩF	KMY
R 90	RMC1/10 18kΩF	KMY
R 91	RMC1/10 47kΩF	KMY
R 92	RMC1/10 13kΩF	KMY
R 93	RMC1/10 9100ΩF	KMY
R 94	RMC1/10 10kΩF	KMY
R 95	RMC1/10 10kΩF	KMY
R 96	RMC1/10 100ΩF	KMY
R 97	RMC1/10 1800ΩF	KMY

Variable Resistors

No.	Description	Mfd
VR 1	RJ-4W 500Ω	CPL
VR 2	RJ-4W 2000Ω	CPL
VR 3	RJ-4W 500Ω	CPL
VR 4	RJ-4W 2000Ω	CPL
VR 5	RJ-4W 500Ω	CPL
VR 6	RJ-4W 20kΩ	CPL

Capacitors

No.	Description	Mfd
C 1	UMA1C330MCA	NCI
C 2	CM21W5R223M25VDC	KYS
C 3	UMA1A330MCA	NCI
C 4	UMA1A330MCA	NCI
C 5	UMA0J470MCA	NCI
C 6	CM21W5R223M25VDC	KYS
C 7	UMA0J470MCA	NCI
C 8	UMA1C100MCA	NCI
C 9	UMA1C100MCA	NCI
C 10	UMA1C330MCA	NCI
C 11	UMA0J470MCA	NCI
C 12	CM21W5R223M25VDC	KYS
C 13	CM21W5R223M25VDC	KYS
C 14	CM21W5R223M25VDC	KYS
C 15	UMA0J470MCA	NCI
C 16	CM21W5R223M25VDC	KYS
C 17	UMA1C330MCA	NCI
C 18	LOST	
C 19	CM21W5R223M25VDC	KYS
C 20	UMA0J470MCA	NCI
C 21	CM21CH120M25VDC	KYS
C 22	CS06E0J330M1	NEC
C 23	SXE6R3VB330	NCH
C 24	UMA1C100MCA	NCI
C 25	UMA1H3R3MCA	NCI
C 26	UMA1H3R3MCA	NCI

Inductance Coils

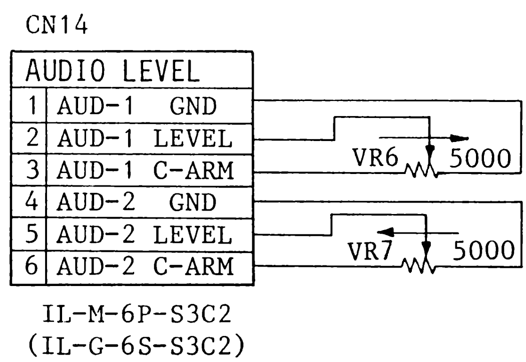
No.	Description	Mfd
L 1	ST-202246A	IKE
L 2	ST-202246A	IKE
L 3	ST-202246A	IKE
L 4	ST-202246A	IKE
L 5	ST-202246A	IKE

Test Poles

No.	Description	Mfd
TP 1	TBP-6	IKE
TP 2	TBP-6	IKE
TP 3	TBP-6	IKE
TP 4	TBP-6	IKE
TP 5	TBP-6	IKE
TP 6	TBP-6	IKE
TP 7	TBP-6	IKE
TP 8	TBP-6	IKE

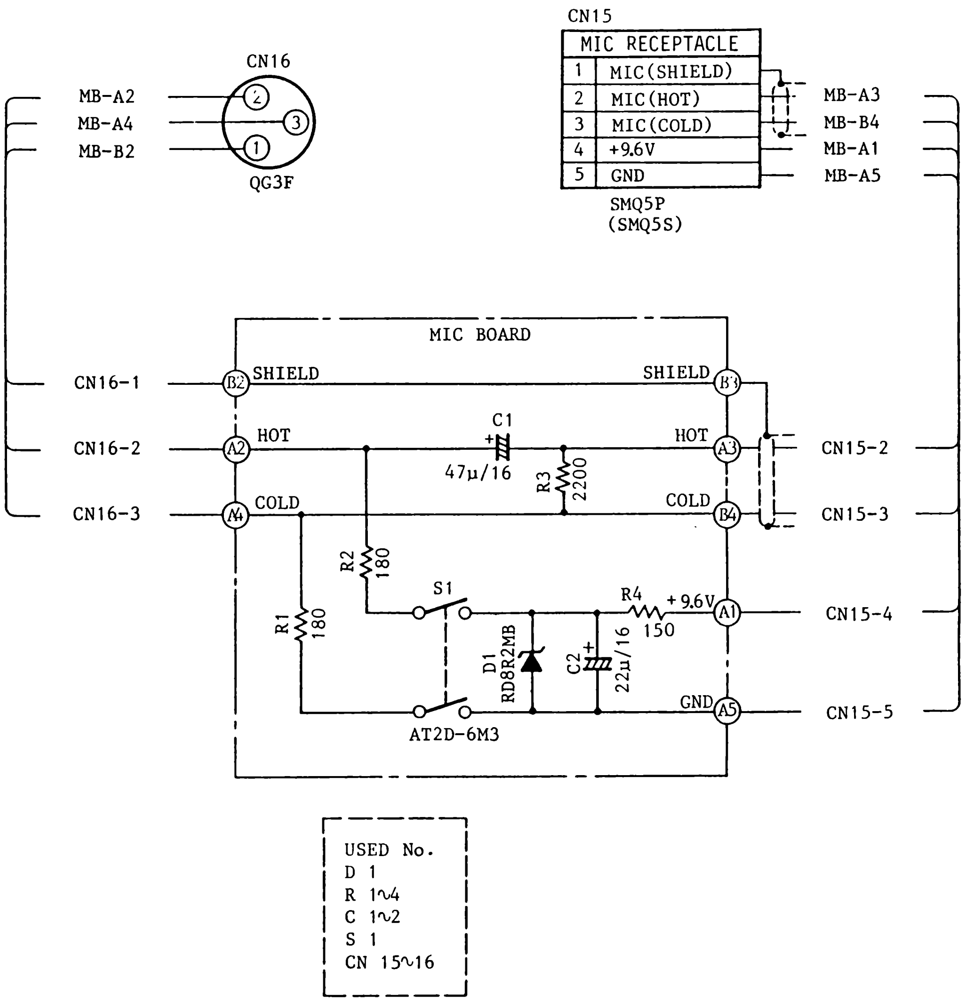
Connector

No.	Description	Mfd
CN 1	PS-30PA-D4LT1-A1	JAE



USED No.
VR6 ∿ 7
CN14

AUDIO CONTROLLER
Schematic Diagram
C4-219746



MIC RECEPTACLE
Schematic Diagram
C4-219747

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