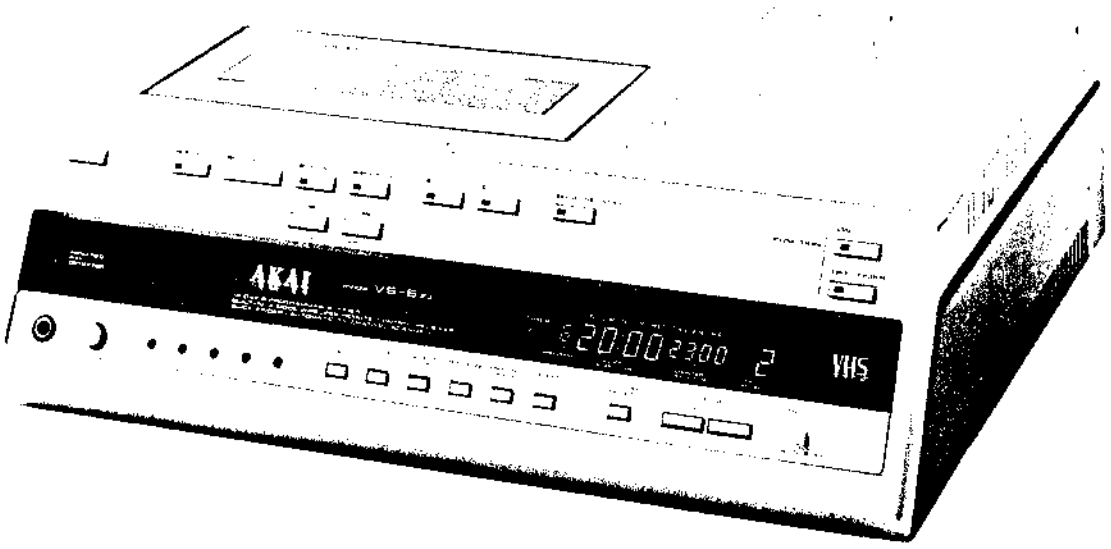
AKAI SERVICE MANUAL

VIDEO CASSETTE RECORDER

MODEL **VS-5EG/EK**

5EG/EK



VIDEO CASSETTE RECORDER

MODEL VS-5EG/EK

I. SPECIFICATIONS

FORMAT		VHS PAL Standard
VIDEO RECORDING SYSTEM		Rotary, slant azimuth two-head helical scan system
VIDEO SIGNAL SYSTEM		PAL colour and CCIR monochrome signals, 625 lines
TAPE WIDTH		12.7 mm
TAPE SPEED	NORMAL	23.39 mm/sec
	FF/REW	4 min. (AKAI E-240 cassette)
	QUICK FINDER	Approx. 9 times normal speed
RECORDING SPEED		240 min. (AKAI E-240 cassette)
POWER REQUIREMENTS		220V/110V (VS-5EG), 200V/240V (VS-5EK) AC selectable, 50 Hz 37 Watts (Including video timer)
OPERATING TEMPERATURE		5°C to 40°C
AERIAL INPUT	VS-5EG	VHF Band I, Channels 2 to 4, VHF Band III, Channels 5 to 12, UHF Band IV/V, Channels 21 to 69
	VS-5EK	UHF Band IV/V, Channels 21 to 69 only
AERIAL OUTPUT		UHF Channels 30 to 39 (adjustable) Set to channel 36 prior to shipment
VIDEO SIGNAL	INPUT	0.5 to 2.0 Vp-p/75 ohms (video/sync ratio should be normal)
	OUTPUT	1.0 Vp-p/75 ohms
	S/N	More than 43 dB
HORIZONTAL RESOLUTION		More than 240 lines
AUDIO SIGNAL INPUT	MIC	−70 dBs/high impedance unbalanced
	LINE	−20 dBs/50 kohms unbalanced
AUDIO SIGNAL OUTPUT		−6 dBs/less than 1 kohm unbalanced
S/N		More than 40 dB
FREQUENCY RESPONSE		70 Hz to 8 kHz
VIDEO TIMER	CLOCK DISPLAY	24 hour fluorescent digital display
	CLOCK REFERENCE	Locked to power line frequency, 50/60 Hz self select
	NUMBER OF PROGRAMS	9 programs possible: Five 14 days one time memory programs Two every day programs Two every week programs Sleeper operation possible
DIMENSIONS		440(W) x 133(H) x 398(D) mm (17.3 x 5.2 x 15.7 inches)
WEIGHT		12 kg (26.4 lbs)

* For improvement purposes, design and specifications are subject to change without notice.

SECTION 1

SERVICE MANUAL

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II. DISMANTLING OF UNIT

In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.

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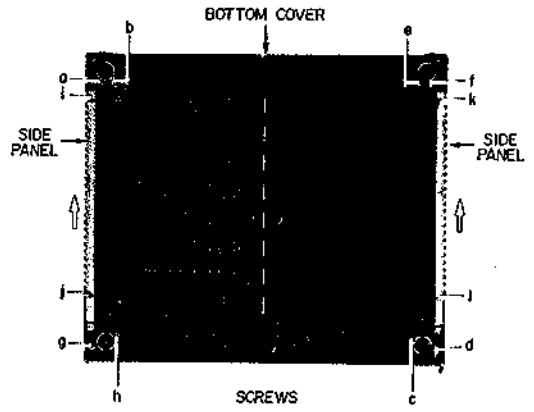

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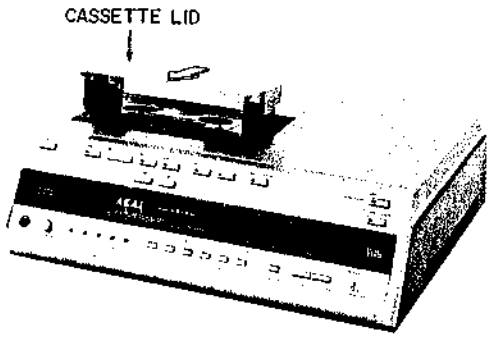

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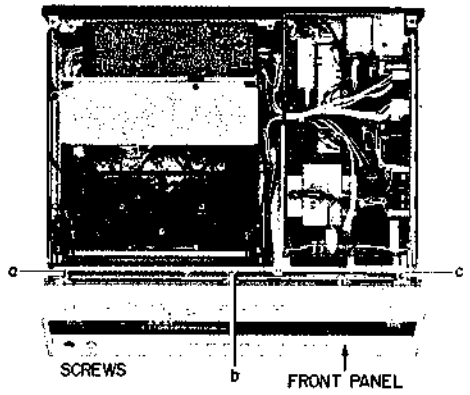

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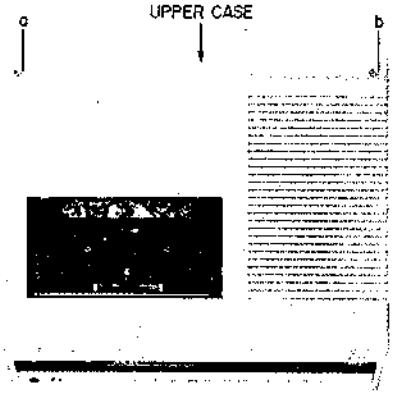

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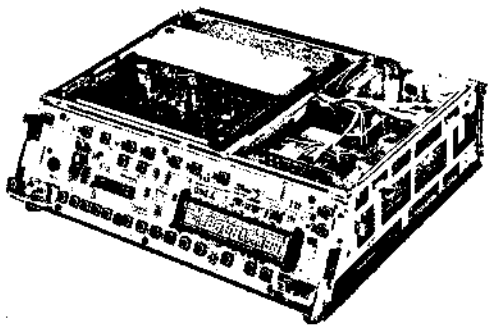


III. CONTROLS

1. VS-5EG/EK

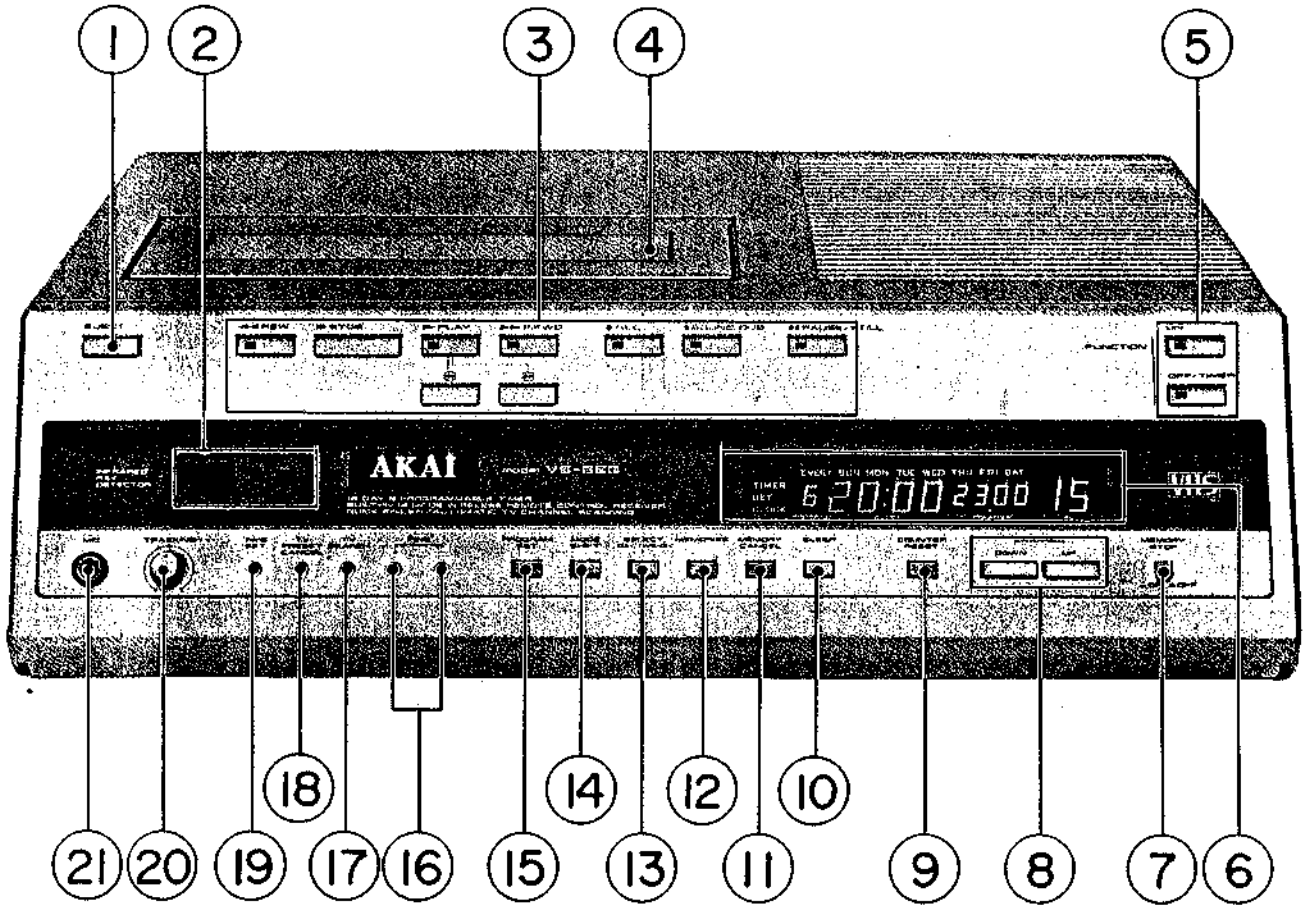


Fig. 1

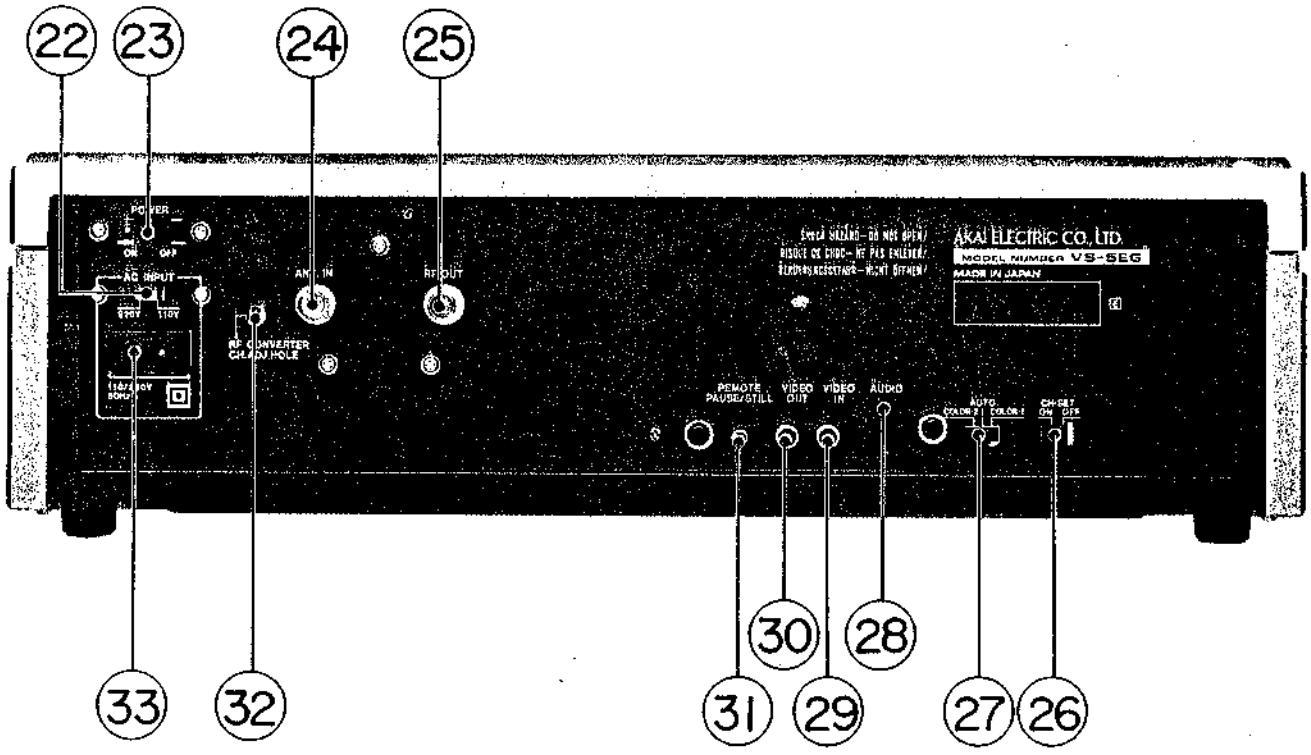


Fig. 2

2. REMOTE CONTROL UNIT RC-V5

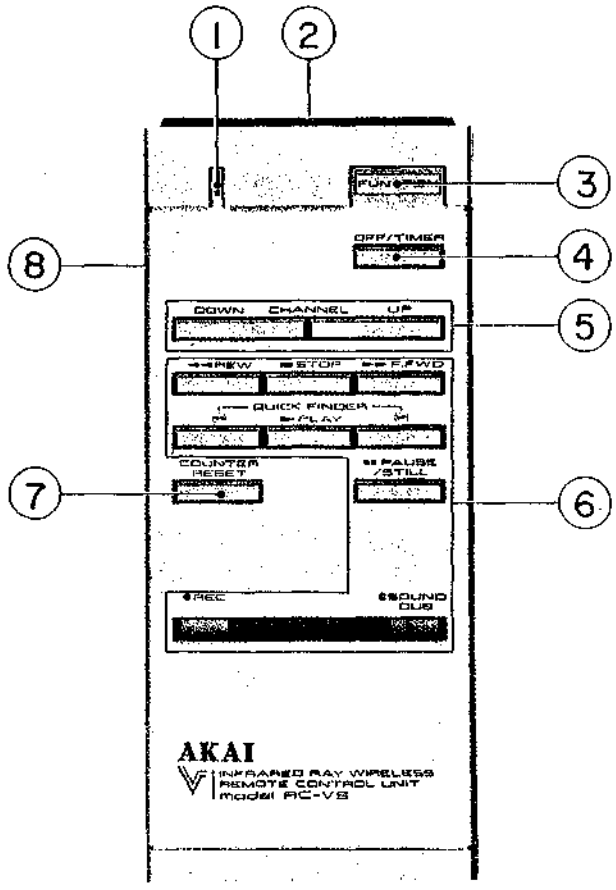


Fig. 3

1. EJECT BUTTON
2. INFRARED RAY DETECTOR and REMOTE CONTROL INDICATOR
3. OPERATING BUTTONS
4. CASSETTE HOLDER
5. FUNCTION BUTTONS (ON and OFF/TIMER)
6. DIGITAL DISPLAY (PROGRAM, CLOCK/START TIME, COUNTER/STOP TIMER and TV CHANNEL)
7. MEMORY STOP SWITCH
8. CHANNEL BUTTONS
9. COUNTER RESET BUTTON
10. SLEEP BUTTON
11. MEMORY CANCEL BUTTON
12. MEMORIZE BUTTON
13. SELECT DAY/TIME/CHANNEL (CH) BUTTON
14. MODE SHIFT BUTTON
15. PROGRAM SET BUTTON
16. FINE TUNING HOLES
17. TV SEARCH HOLE
18. TV PRESET CANCEL HOLE
19. TIME SET HOLE
20. TRACKING CONTROL
21. MICROPHONE (MIC) JACK
22. AC INPUT SELECTOR
23. POWER SWITCH
24. ANTENNA (ANT.) IN JACK
25. RF. OUT JACK
26. CHANNEL (CH.) SET SWITCH
27. VIDEO MODE SELECTOR
28. AUDIO JACK
29. VIDEO IN JACK
30. VIDEO OUT JACK
31. REMOTE PAUSE/STILL JACK
32. RF CONVERTER CHANNEL (CH.) ADJUSTMENT (ADJ.) HOLE
33. AC INLET

1. REMOTE CONTROL INDICATOR
2. TRANSMITTING WINDOW
3. FUNCTION BUTTON
4. OFF/TIMER BUTTON
5. CHANNEL BUTTONS
6. OPERATING BUTTONS
7. COUNTER RESET BUTTON
8. SAFETY LOCK

IV. PRINCIPAL PARTS LOCATION

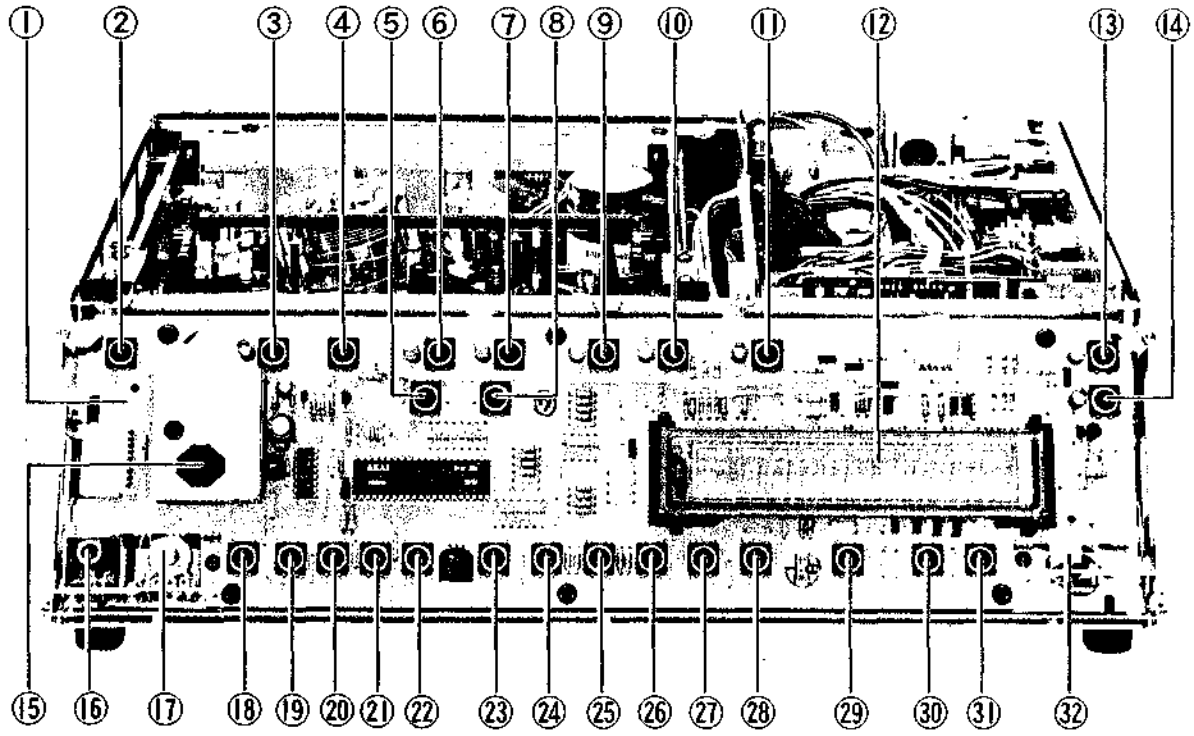


Fig. 4 Front View

1. DISPLAY P.C BOARD V1004A5440
2. EJECT SWITCH
3. REW SWITCH
4. STOP SWITCH
5. QUICK FINDER (◀◀) SWITCH
6. PLAY SWITCH
7. F.FWD SWITCH
8. QUICK FINDER (▶▶) SWITCH
9. REC SWITCH
10. SOUND DUB SWITCH
11. PAUSE/STILL SWITCH
12. DIGITAL DISPLAY
13. FUNCTION ON SWITCH
14. FUNCTION OFF/TIMER SWITCH
15. INFRARED RAY DETECTOR
16. MIC JACK
17. TRACKING VOLUME
18. TIMER SET SWITCH
19. TV PRESET CANCEL SWITCH
20. TV SEARCH SWITCH
21. FINE TUNING SWITCH (+)
22. FINE TUNING SWITCH (–)
23. PROGRAM SET SWITCH
24. MODE SHIFT SWITCH
25. SELECT DAY/TIME/CHANNEL SWITCH
26. MEMORIZE SWITCH
27. MEMORY CANCEL SWITCH
28. SLEEP SWITCH
29. COUNTER RESET SWITCH
30. CHANNEL SWITCH (DOWN)
31. CHANNEL SWITCH (UP)
32. MEMORY STOP SWITCH

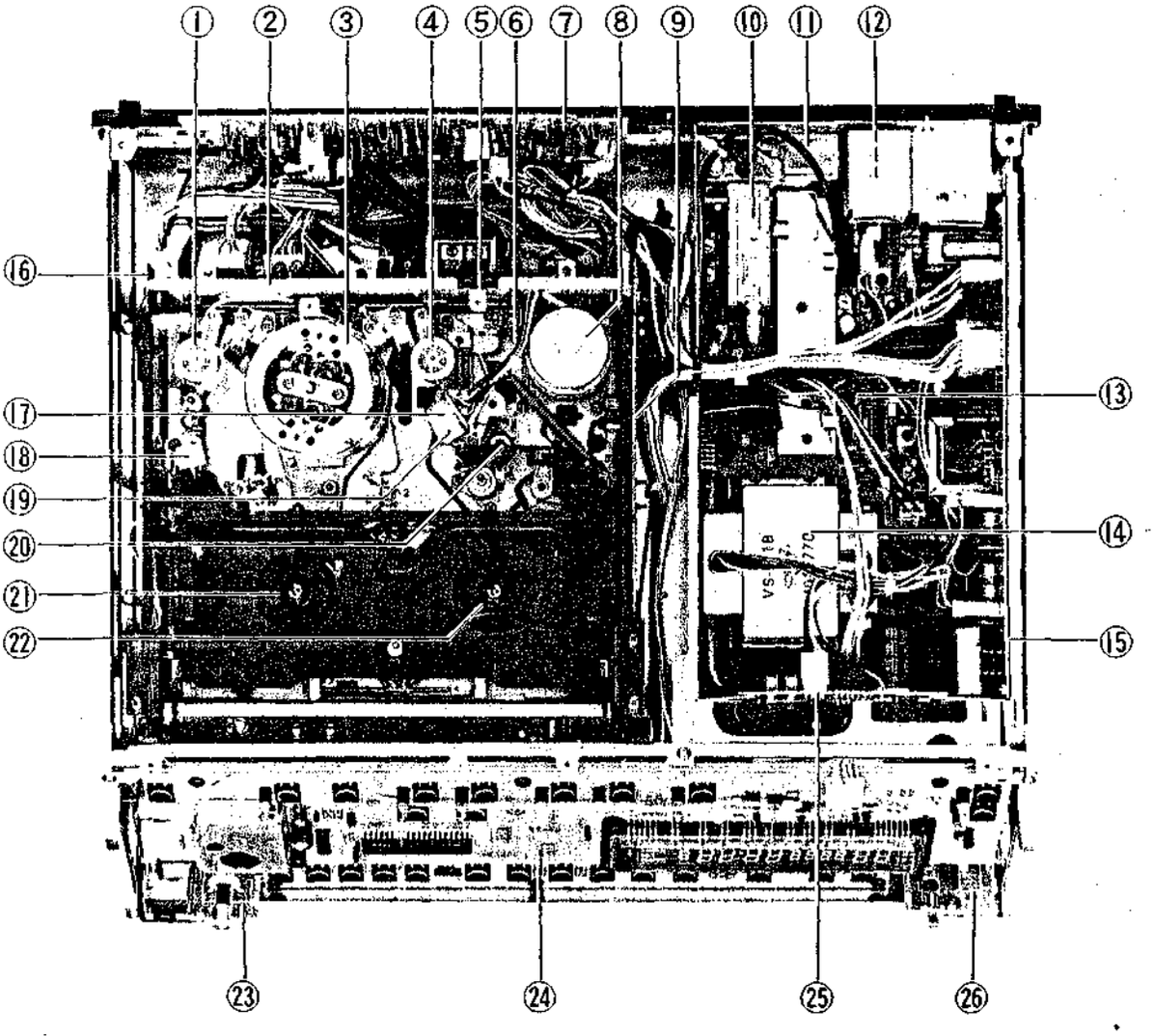


Fig. 5 Top View

1. S. IMPEDANCE ROLLER
2. DRUM MOTOR P.C BOARD V1004B5490
3. DRUM HEAD BLOCK
4. T.U IMPEDANCE ROLLER
5. CAPSTAN MOTOR P.C BOARD V1004B5491
6. C.M FILTER P.C BOARD V1004D5500
7. AUDIO P.C BOARD V1004A5350
8. CAPSTAN MOTOR
9. DRIVE P.C BOARD V1004B5360
10. TUNER UNIT
11. ANTENNA BOOSTER
12. RF CONVERTER
13. TUNER P.C BOARD KB240303
14. POWER TRANS
15. POWER SUPPLY P.C BOARD KA240178
16. SENSOR P.C BOARD V1004C5370
17. AUDIO ERASE HEAD
18. FULL ERASE HEAD
19. AUDIO/CONTROL HEAD
20. PINCH ROLLER
21. SUPPLY REEL
22. TAKE UP REEL
23. MIC P.C BOARD V1004C5380
24. DISPLAY P.C BOARD V1004A5440
25. POWER SUB P.C BOARD
26. MEMORY P.C BOARD V1004C5381

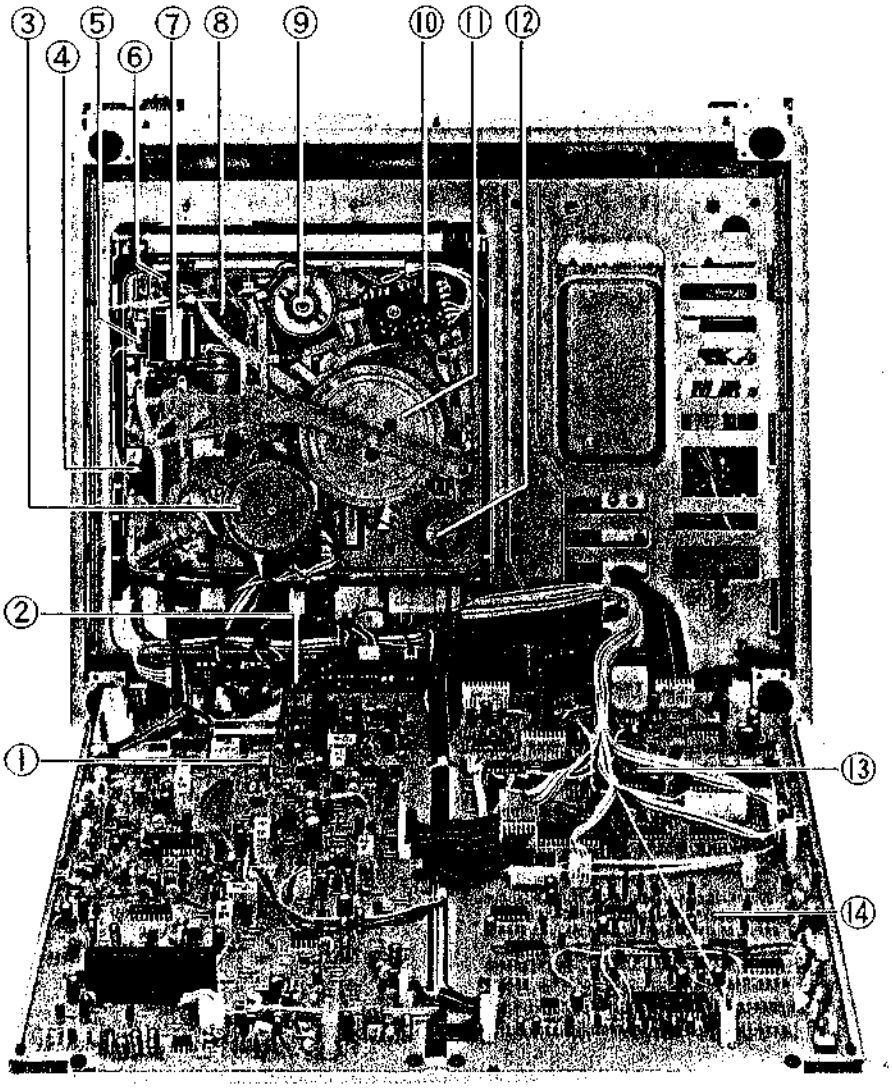


Fig. 6 Bottom View

1. VIDEO P.C BOARD V1004A5420
2. REAR P.C BOARD V1004C5390
3. DRUM MOTOR
4. LOADING SWITCH A
5. EJECT SWITCH
6. REC SAFETY SWITCH
7. LOADING MOTOR
8. LOADING SWITCH B
9. REEL MOTOR
10. MOTOR FILTER P.C BOARD V1004D5400
11. CAPSTAN FLYWHEEL
12. CAPSTAN MOTOR
13. SYSCON P.C BOARD V1004A5341
14. SERVO P.C BOARD V1004A5340

V. VOLTAGE CONVERSION

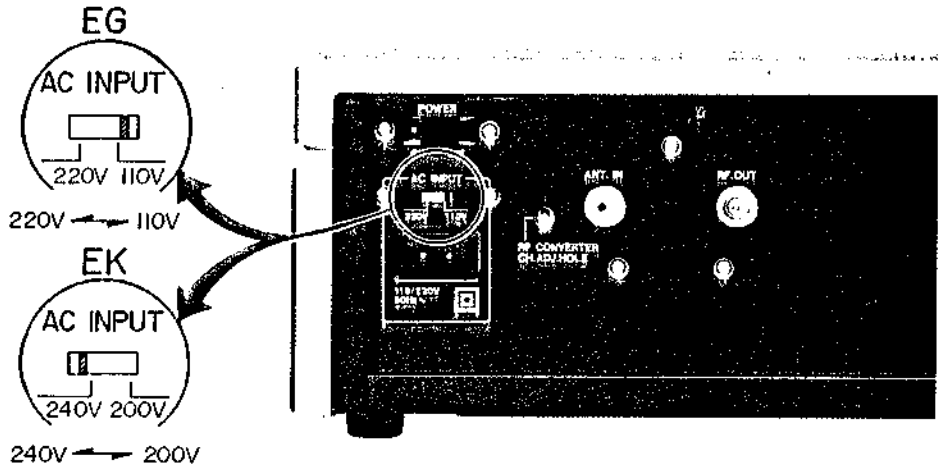


Fig. 7

Power requirements for electrical equipment differ from area to area. The operating voltage of VS-5 is preset to 220V (VS-5EG) or 240V (VS-5EK). Before connecting, check that the AC INPUT selector on the rear panel is set to the voltage for your area:
220V, 50 Hz for Europe except UK
240V, 50 Hz for UK
110V, 200V, 220V or 240V, 50 or 60 Hz for other countries. (If in doubt, consult a qualified electrician.)
If the AC INPUT is not set for your area:

1. Confirm that the POWER Switch on the rear panel is set to OFF.
2. Confirm that the POWER Cord is disconnected.
3. Move the AC INPUT selector with a screwdriver so that the marker is above the voltage for your area.

VI. CIRCUIT DESCRIPTION

1. MAIN FEATURES OF VS-5

Main features of VS-5 are as follows.

1-1. Buzzer Alarm

In any one of the following cases, the built-in buzzer issues a warning.

1) Tape End
When the clear tapes attached to the starting end and finishing end of the tape pass in front of the sensor in any mode.

2) Counter "0000"
When the counter passes "0000" in FF or REW.

3) Rec. Safety
Rec button or sound dub button is pressed when using the tape whose erasure prevention tab is snapped off.

4) Break-down
When break-down occurs in VS-5 for some reasons, the break-down is indicated and the power supply is cut off.

1-2. Quick Finder

- Noise-less playback of 9 time speed (normal and reverse direction) is possible, and since the noise bar is only produced in the fixed position, the picture does not flicker and it is easy to see.

1-3. STILL, Frame Advance, Slow Motion, Playback

1) STILL
Still picture can be obtained by pressing the PAUSE/STILL button while playing.

2) Frame Advance
One frame can be advanced each time the PAUSE/STILL button is pressed while playing.

3) Slow Motion
Slow motion playback is possible by pressing continuously the PAUSE/STILL button for more than 0.5 seconds.

It should be hoted that if the still mode is kept for more than 90 seconds, it will be automatically changed to the stop mode to protect the tape.

1-4. Auto Tuning Synthesizer Tuner

By pressing the TV Search button, the TV signal is automatically caught and the scanning is automatically stopped at the best point.
If the TV station is desired to be memorized, it can be stored in the desired channel by pressing the MEMORIZE button. The memory capacity consists of 16 channels (16 TV stations) and hey can be memorized at random regardless of the kind (high or low) of the frequency.

Also the auto tuning is available in the follwing order.

UHF → VHF (H) → VHF (L)

and the band is automatically switched and at the same time the band indication is changed as follows.

U → H → L

The channels are backed up by the internal rechargeable batteries for one week.

1-5. 14 Days (2 Weeks)/9 Programs Programmable Timer

9 program memory can store programs Ⓐ – Ⓒ as follows.

Ⓐ Once Program: Program ① – ⑤, once program stipulated within two weeks.

Ⓑ Everyday Program: Program ⑥ – ⑦, program to start and stop at a fixed time every day.

Ⓒ Weekly Program: Program ⑧ – ⑨, program at fixed time and on fixed day every week.

The program can be stored for one week by the built-in rechargeable battery. The indication after power failure is made by the lighting of the clock set. If any program is desired to be skipped, it can be skipped by pressing the Cancel button, and it can be read out and used (by pressing the Memorize button) provided that a new program is stored.

1-6. Front Operation Feather Touch Direct Function

The operation button is of feather touch type, and the lamp inside the operated button is lit so that it is easily confirmed which mode is being executed. Since the buttons not so often used during the ordinary operation are provided in the rear of the panel and operated by means of the operation rod provided, there is no fear of the memory erased due to misoperation.
For recording, just press the "REC" button (one touch recording method).

1-7. Infrared-ray Wireless Remote Control

The infrared-ray wireless remote control with the operational distance of about 6 m and the angle of 25° (in case of no reflection). The power can also be turned ON and OFF. Indicator lamps are provided so that the battery condition and transmitting condition can be seen at a glance. VS-5 itself incorporates an indicator lamp to show the receiving condition, and it can be confirmed whether the signal from the remote control has been transmitted correctly to the unit. The remote control has an "SAFETY LOCK" Switch to prevent its misoperation.

1-8. Auto REW Operation

When picture recording or playing back is completed, the tape is automatically rewinded to the tape counter "0000" (when counter memory is pressed) or to starting end of the tape. This function is very convenient especially in timer recording because the machine is stopped only after the tape is rewinded to the start when the recording is completed to the end of the tape thus enabling the record to be played back soon.

1-9. AEC Operation (Automatic Editing Control)

The unit incorporates the AEC mechanism which prevents the picture disturbance at the joint between a cut and a cut. It prevents the disturbance by rewinding the tape at an equal speed for a fixed time (a fixed length) and playing it back thus putting the track arrangement in order between the cuts.

1-10. Accurate Counter

If the tape passes the point of "0000" in FF or REW, the tape is forwarded or reversed a little to stop at the counter indication "0000".
When the tape is not loaded, the counter cannot be reset.

1-11. 4 Motors Mechanism

To stabilize the operation an independent motor is provided for each mechanism.
1) Head Motor (Quartz Direct Drive Method)
2) Capstan Motor
3) Loading Motor
4) Reel Motor

1-12. 3 Micro-processors

By using separate micro-processors, the complicated circuit are controlled comparatively simply.
1) Micro-processor for mechanism control
2) Micro-processor for tuner control
3) Micro-processor for timer control

Especially the memory in the timer and tuner circuits is backed up by the built-in rechargeable batteries, and when a power failure is detected, all the data stored in the timer and tuner are stored in the memory.
The unit has a program to check itself when the power is turned "ON", and if any abnormality is found, it issues the buzzer alarm and indicates "breakdown" on the FLD.

1-13. Breakdown Mechanism

When the self-checking mechanism finds a breakdown or the operation of the mechanism fails, the buzzer is sounded and the breakdown is indicated on the FLD. Also the breakdown turns the power OFF and makes all the operations disable. When the cause is removed, it can be reset by the OFF → ON operation of the main power.

1-14. Channel Set OSC

The unit incorporates an oscillator for channel setting so that the RF converter can be set swiftly and accurately in an empty channel of the TV.

1-15. Input Automatic Switching

When the video signal is inputted in EXTERNAL VIDEO IN TERMINAL, EXT. IN mode is automatically obtained.

2. SERVO CIRCUIT

2-1. Outline of Servo Circuit

The servo circuit of VS-5 uses the capstan servo system.
Therefore, for the tracking control when playing back, the drum motor is driven at a fixed phase and the C.T.L. phase is matched by controlling the speed of the capstan motor. The relationship between the reference signal and comparison signals of various modes is shown in Fig. 8.

	HEAD MOTOR		CAPSTAN MOTOR	
	REFERENCE	COMPARISON	REFERENCE	COMPARISON
REC	INPUT VIDEO V Sync	P.G.	INPUT VIDEO V Sync/2	$\frac{\text{C-FG}}{16}$
PB	* X'tal	P.G.	* X'tal	CTL
X9 PB	X'tal	P.G.	Drum P.G.	$\frac{\text{CTL}}{9}$

(* In AEC, the reference signal of PB is the input video V sync.)

Fig. 8

2-2. Drum Servo Circuit

2-2-1. Rec Mode

1) Phase Control

For the reference signal when recording, V-Sync is used which is the input signal separated through the Sync separator of the video circuit.

This signal is inputted in IC1 ㉗ and separated into two systems within the IC, and one signal is 1/2 counted down through MM, outputted from Pin ⑥ through CTL REC AMP, and supplied to C.T.L. Head through Terminal ②. Another signal is added as a trigger signal to the trapezoid wave form generator within the IC1 through FF. The comparison signal generated by the P.G Head is level adjusted by VR1 and supplied to Pin ㉔. Then, the signal is separated into two and added to Mono – Multi, where the phase of the switching pulse is adjusted (VR3, VR4) and they are outputted from Pin ⑳. A part of the above Mono-Multi output is again added to MM3 through the Gate. Here the switching point in recording is determined by the time constant by VR2 and C12. Then the output signal passes the gate and is added to S/H circuit (sample & Hold) as a sampling pulse. On the other hand, the trapezoidal wave produced by the trapezoidal wave form generator is also added to the S/H circuit and sampled by the above sampling pulse, and the output is stored in the hold circuit. (C14). The signal sampled and held is outputted from Pin ⑮, and then, the phase control signal is added to the speed control circuit through R17 and R21.

2) Speed Control

The output from DM-FG is amplified by IC5 1/2 and added to IC1 ⑭, and the input is added to the speed control MM within the IC5 as a trigger signal. The time constant of the speed Mono-Multi is determined by VR6, R23 and C16 because the IC2 electronic switches Pins ⑨ and ⑧ are energized in Rec mode. The output is taken out of Pin ⑧ and added to IC5 (1/2) Pin ⑥, and the output is taken out of Pin ⑦ and added D.M. control circuit through Terminal ③.

2-2-2. Play Back Mode

1) Phase Control Circuit

For the reference signal in PB mode, the signal generated by the X'tal OSC of Y/C PCB is used after being counted down to 50 Hz, as shown in Fig. 8. Others are exactly same as for recording mode.

2) Speed Control Circuit

a) Normal Speed Play Back

Exactly same operation as for recording.

b) Cue or Review

The relative speed of the video head and the tape in CUE (X9 forward play) is reduced by about 4% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are the same.

How the video head traces the pattern on the tape is shown in Fig. 9. On the other hand, the relative speed of the video head and the tape in REVIEW (X9 reverse play) is reduced by about 4.06% in comparison with that under normal condition. The reason is that the running direction of the tape and the rotating direction of the video head are opposite. As aforementioned, since f_H and f_V change in CUE and REVIEW thus making the synchronization of the TV picture unavailable, the stable picture will not be obtained on the TV screen.

To prevent this and to make f_H (horizontal frequency) of the playback video signal normal, the speed of the drum motor is changed.

f_V (vertical frequency) also changes but it will pose no problem because the vertical synchronization range of TV is wide.

* Reference:

○ Reduction of relative speed in CUE mode

$$\frac{-(1+9)\times 23.39}{(25\times 62\times 3.14)-23.39}\times 100 = 4.82\%$$

○ Increase of relative speed in REVIEW mode

$$\frac{(-1+9)\times 23.39}{(25\times 62\times 3.14)-23.39}\times 100 = 3.86\%$$

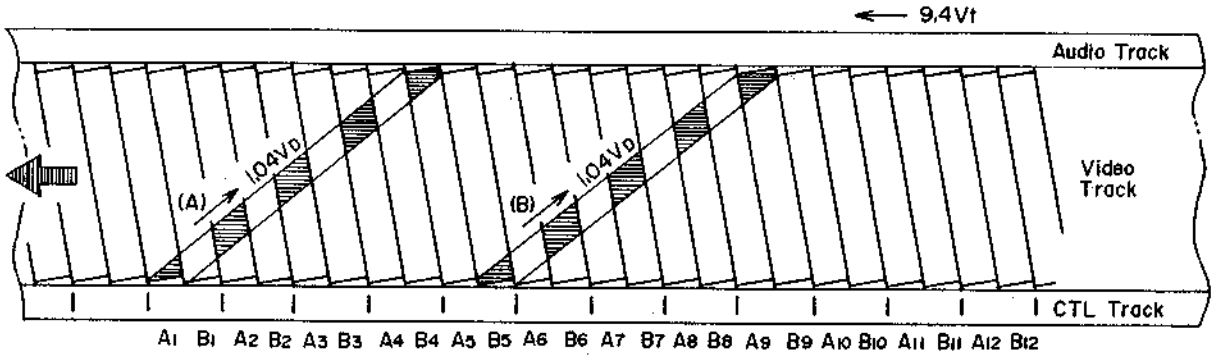
The output in each mode of IC3 is shown in Fig. 10.

c) CUE Mode

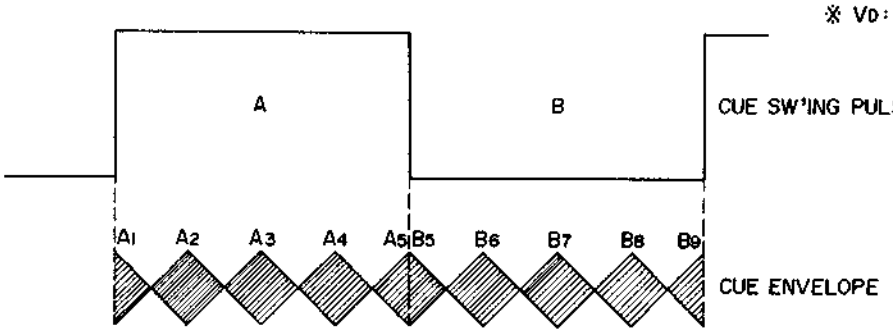
In CUE mode, IC3 ⑪ → 'H' → IC2 ⑫ → 'H' → IC2 ⑪ – ⑪ → ON as shown in Fig. 10, and the time constant of the speed control MM within IC1 is determined by VR5, R22 and C16, and the speed of the head motor is increased by the reduction (4.82%) of the relative speed of CUE mode described above.

d) REVIEW mode

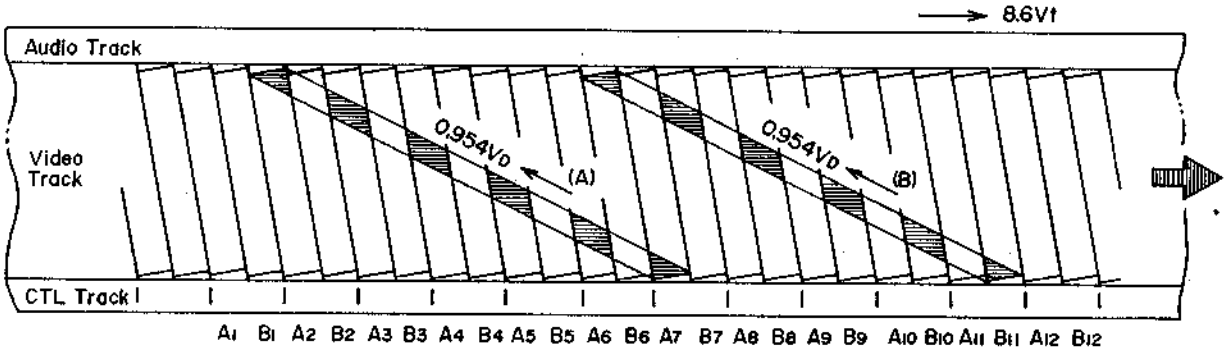
In REVIEW mode, IC3 ⑩ → 'H' → IC2 ⑬ → 'H' → IC2 ① – ② → ON as shown in Fig. 10, and the time constant of the speed control within IC1 is determined by VR7, R24 and C16, and the speed of the head motor is reduced by the increase (3.86%) of the relative speed of REVIEW mode described above.



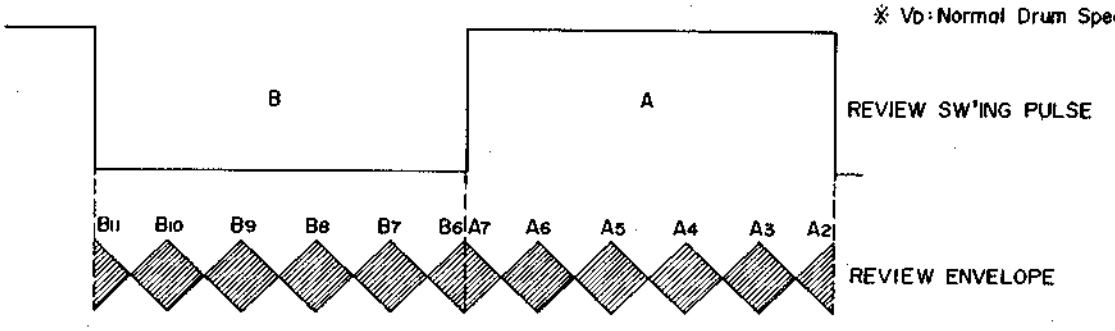
※ Vt : Normal Tape Speed
※ VD : Normal Drum Speed



(a) CUE MODE



※ Vt : Normal Tape Speed
※ VD : Normal Drum Speed



(b) REVIEW MODE

Fig. 9

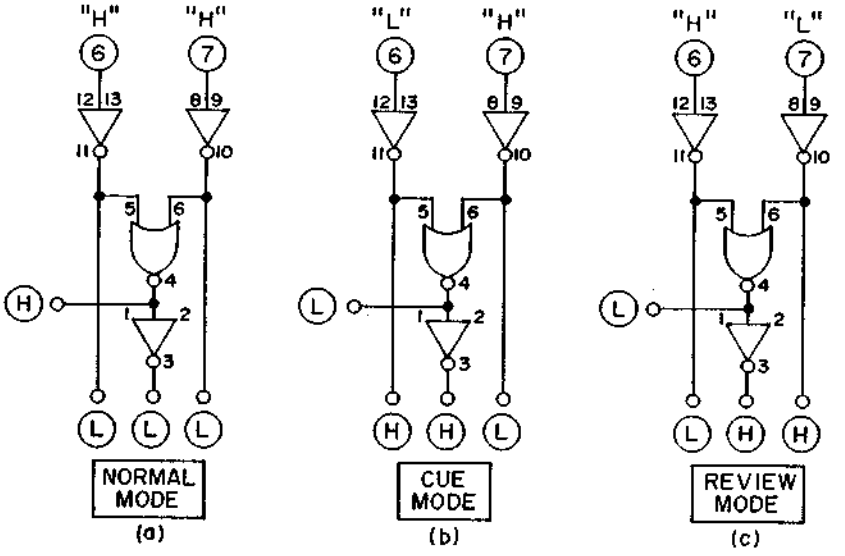


Fig. 10

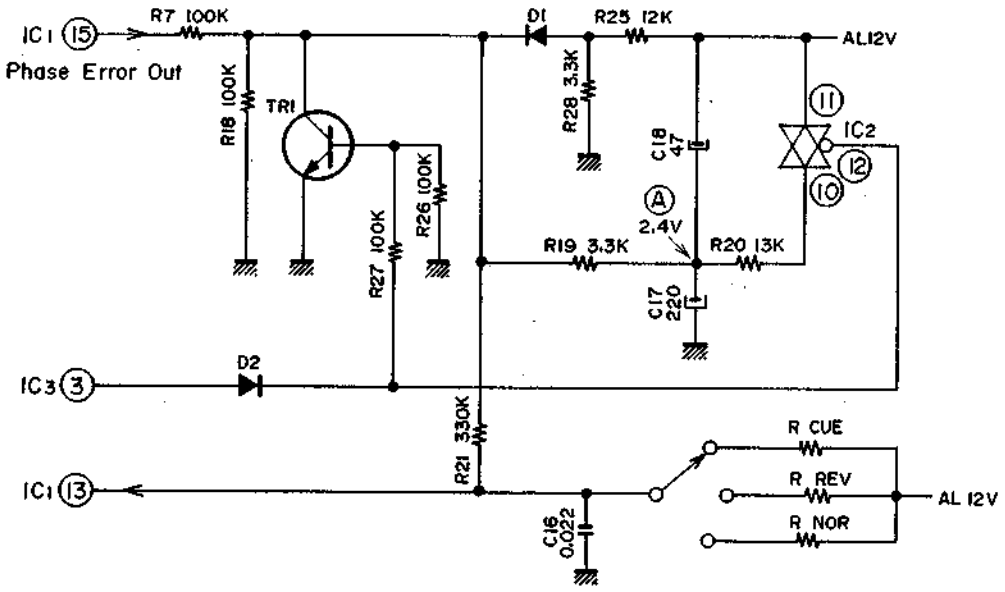


Fig. 11

3) Additional Circuit for Drum Motor Speed Control

Since the drum motor phase control is not required in SPEED mode, it is eliminated by turning TR1 ON.

IC3 ③ → 'H' → TR1 → ON → Phase Error Out → GND
IC3 ③ → 'H' → R19 → GND
IC3 ③ → 'H' → IC2 ⑫ → 'H' → IC2 ⑩ – ⑪ → ON → R20 → AL12V
→ C17 → charged to the voltage determined by R19, R20.

The circuit shown in Fig. 11 is intended to return the speed of the head motor to the steady rotation immediately when the mode is returned from SPEED to NORMAL, and it adds the potential given to C17 in SPEED play immediately to the speed control circuit in NORMAL mode instead of the phase error. To improve the rising from the power ON, C18 is inserted, and immediately when AC12V is supplied, this charges the potential at A point (Fig. 11) to the value of steady state (potential near to DC + 2.4V).

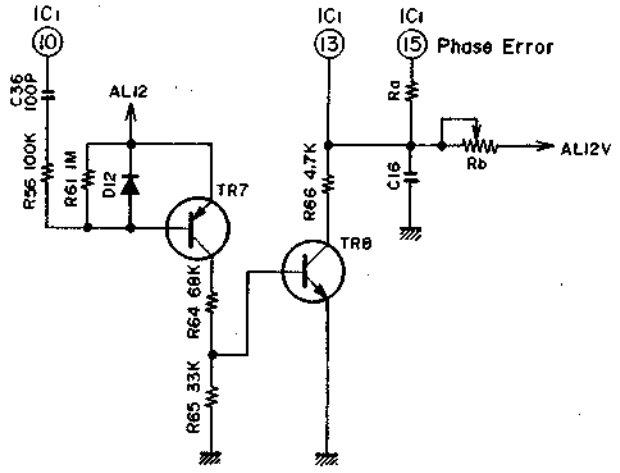


Fig. 12

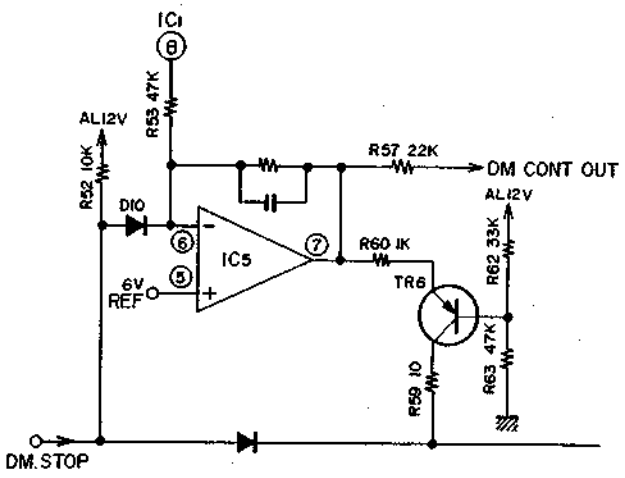


Fig. 13

The circuit shown in Fig. 12 is intended to prevent the Drum motor from being locked at double speed, and when it is being locked at double speed, IC1 ⑩ becomes 'L', TR7 ON, TR8 ON, and IC1 ⑬ is grounded by R66 to prevent the locking.

When DM starts,

IC1 ⑧ → L → IC5 ⑦ → H → TR6 → ON ┬ TR1 → ON
└ IC2 ⑫ → H → IC2 ⑩ – ⑪ → ON,

and it charges the alternate voltage for phase control to C17 and makes the phase control easier when the DM speed becomes constant.

(Same operation as for CUE/REVIEW)

2-3. Capstan Servo Circuit

2-3-1. Rec Mode

1) Speed Control Circuit

The capstan motor has FG. FG output is 500 rpm, 3,600 Hz.

The FG output of the capstan motor is amplified by TR5 and added to IC4 ⑯. The signal passes FG amplifier → FF1 → FF2 within the IC4 and is added to MM2. The time constant of MM2 is determined by C27, VR8 and R67. This is because the Rec mode forces normal speed as shown in Fig. 10, IC3 ④ → 'H' → IC8 ⑨, ⑩, ⑪ → H, and the electronic SW of IC8 is at the normal side, and VR8 and R67 are selected. Then, the signal passes the gate and makes the trapezoidal wave. (delayed signal).

The trapezoidal slope will be IC3 ③ → L → TR10 → OFF when normal, and is determined by R74 and R75. On the other hand, the signal from FF2 passes the inverter, and together with the signal from MM2, triggers FF3 and uses the output as a sampling pulse (current signal) to sample the trapezoidal wave previously made. The output is held in the hold circuit and outputted from IC4 ⑦, and the output is added to TR11 through the clamping circuit consisting of D14, R80 and R81, and the output is amplified about 30 dB by TR11 and taken out of P33 ④ as the capstan motor control output.

The signal from the phase control circuit is added to IC4 ③ and mixed with the speed control signal. Actually the apparent time constant is changed by adding the DC voltage of phase error to the circuit of IC4 MM2. (Fig. 14)

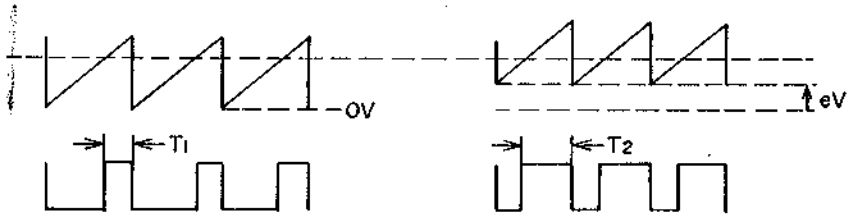


Fig. 14

2) Phase Control

The reference signal when recording is input V sync. The composite sync inputted into IC1 ㉖, after passing V_{SS} and FF within IC1, is outputted from IC1 ⑱ as V-pulse. As seen from the normal mode in Fig. 10, IC3 ④ → 'H' → IC6 ⑤ → 'H' → IC6 ③ – ④ → ON, and the signal is added to TR2. Passing the emitter follower of TR2, it is inputted from IC4 ⑬ to make the reference trapezoidal wave. In the case of comparison signal, the signal $\frac{400\text{ Hz}}{2}$ obtainable from IC4 ⑤ of the capstan motor FG circuit is amplified and inputted into the electronic SW IC8 ③, and the output can be obtained from IC8 ④ because of normal mode, and the output is inputted in the 1/8 countdown circuit IC7 ①. The output is taken out of IC7 ⑨ as 25 Hz. This is differentiated by R100 and C41, wave formed by TR15 and inputted to IC1 ③. In REC mode, the output is obtained from IC1 ② and it is again inputted into the electronic SW IC8 ① and taken out of IC8 ⑮. This is inputted into IC4 ⑮ and passed through the PG amplifier within the IC4 → MM1 → gate, and the sampling pulse as a comparison signal is obtained. In REC mode, J104 ② → L → TR3 → ON, so the time constant of MM1 is determined by R32, R11, R43 and C26.

The trapezoidal pulse (produced from input V sync), reference signal, is sampled by the sampling pulse ($\frac{400}{2} \times \frac{1}{8} = 25$ Hz), comparison signal, and is added to the speed control circuit of IC4 ③ through the hold circuit.

2-3-2. Normal PB Mode

1) Phase Control Circuit

The comparison signal of the phase control circuit is obtained from CTL head. The output of CTL head is inputted into IC1 ⑥. In PB mode, the CTL REC amplifier of IC1 is turned OFF, and the CTL amplifier output within the IC passes the electronic SW within the IC and is outputted from IC1 ②. In NORMAL mode, IC8 ① is selected and the output is made from IC8 ⑮. This is inputted into IC4 ⑮ and it passed through PG amplifier → MM1 → gate, and samples the reference signal as the sampling pulse. Here the tracking is controlled by MM1.

In PB,

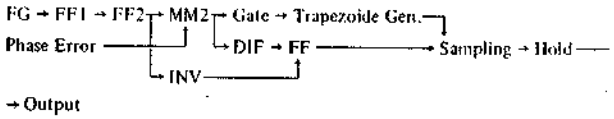
J104 ② → H → TR3 → OFF so the time constant of MM1 is determined
→ D7 → ON,

by EXT. VR, VR11, R43 and C26.

In the case of reference signal, the X'tal oscillator signal counted down to 50 Hz obtainable from the signal circuit as well as the drum motor circuit is inputted into IC1 ㉖ and 1/2 counted down to obtain 1/2V pulse from IC1 ⑱. This V pulse is inputted into IC4 ⑬ via IC6 electronic SW and TR2 to make the trapezoidal pulse, the reference signal within the IC4. This reference signal is sampled by the comparison signal (produced from CTL) previously made and is outputted from IC4 ⑨, and then it is inputted into the speed control circuit IC4 ③.

2) Speed Control Circuit

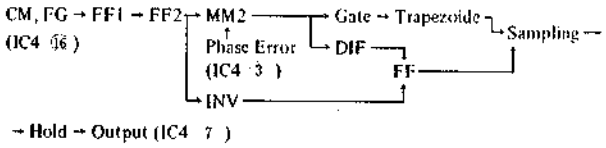
As in REC mode, from the signal from C.M. FG, the output is obtained within the IC4 by the following operation.



2-3-3. Speed Play Mode [in this mode, all the IC8 (electronic SWs) are at SPEED side]

1) Speed Control Circuit

In SPEED PLAY mode, the only difference in operation between CUE mode and REVIEW mode is that the time constant of MM2 within the IC4 for the speed control circuit is changed, and this part only will be described below. The signal from CM, FG is processed within the IC4 as follows to output the CM control signal.



a) CUE Mode

IC3 ⑪ → 'H' → IC6 ⑥ → 'H' → IC6 ⑧ – ⑨ → ON, so the time constant of MM2 is determined by VR10, R68 and C27.

Time constant for stable rotation at 9-fold speed.

b) REVIEW

IC3 ⑩ → 'H' → IC6 ⑫ → 'H' → IC6 ⑧ – ⑨ → ON, so the time constant of MM2 is determined by VR9, R69 and C27.

Time constant for stable rotation at 9-fold speed.

In SPEED mode, J104 ⑨ $\overline{X2}$ → L → IC4 ② → L → FF2 → operaton, so every other comparison signal is compared by the Mono-Multi time constant circuit designed so as to achieve stability usually at a set speed, and the speed system usually works to meet the speed logic, and as a result, the motor is driven at double speed. To achieve the rotation at 9-fold speed, the drive voltage of the CM drive circuit is made 30V instead of usual 17V. This switching is made by the power circuit.

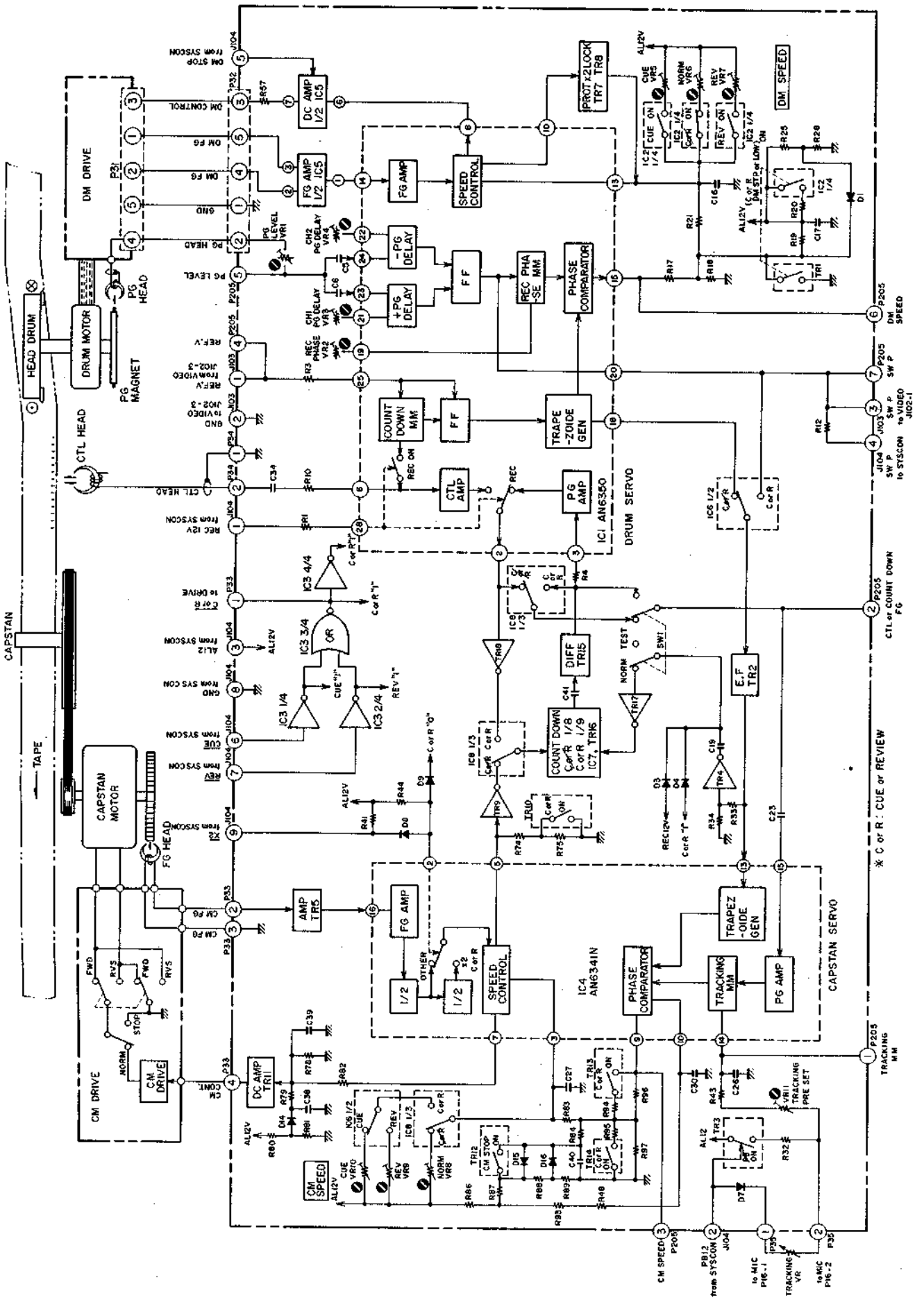


Fig. 15 SERVO BLOCK DIAGRAM

2) Phase Control Circuit

In SPEED PLAY, the phase control can match the phase of the video head with that of CTL by using as a reference the PG pulse obtainable from the head motor which is rotating quartz locked at a constant speed. As a result, the noise bar is fixed and easy-to-see picture is obtained.

In SPEED PLAY mode, IC3 ③ → 'H' → IC6 ⑬ → 'H' → IC6 ① – ② → ON, so 25 Hz obtained by the drum PG head is passed through IC1 ⑳ to IC6 ① – ②, and added to TR2. The TR2 Emitter follower output is added to IC4 ⑬ and converted into the trapezoidal wave within the IC4 as a reference signal. As for the comparison signal, the CTL signal (25 Hz x 9 = 225 Hz) obtainable from CTL head is inputted into IC1 ⑥ and outputted from IC1 ②. This is inputted into IC8 ⑤ through TR18 (inverter) and outputted from IC8 ④ and then, inputted into IC7 ①. Since the IC7 operates as 1/9 counter in SPEED PLAY mode (operational principle will be described later), from IC7 ⑨, 25 Hz is obtained. This is differentiated by C41 and R100, waveform shaped by TR15 and inputted into IC4 ⑮ IC8 ② → IC8 ⑮. It becomes the sampling pulse as a comparison signal by passing through PG → MM1 gate within the IC4. Here the reference signal (trapezoidal) produced from the drum PG is sampled by the comparison signal (sampling pulse) produced from the CTL and is outputted from IC4 ⑨ as a phase error.

3) 1/9 Count Down Circuit

In the circuit shown in Fig. 16, when NORMAL, Ⓐ is L, so D19 and D20 are cut off and TR16 is also cut off, therefore, no reset input from TR16, but when started, 1/2V sync is inputted and TR4 is turned ON by the first pulse after AL12 is added, and immediately when C19 is charged, TR17 is turned ON and the reset pulse is added to IC7 ②.

In SPEED, in Fig. 16, Ⓐ becomes 'H', and if there is no reset input when the 9th pulse of (IC7 ①) shown in the lower half of the Fig. 15 is inputted, then, Q1 → 'H', Q2 → 'L', Q3 → 'L', Q4 → 'H'. When both Q1 and Q4 become 'H', the potential at Ⓓ point becomes 'H', TR16 is turned ON, TR17 also ON, and the reset pulse is inputted into IC7 ②. Immediately when the reset pulse is inputted, Q1, Q2, Q3 and Q4 all become 'L'. With the reset point "0", the pulse is again counted. Therefore, the pulse of IC7 ⑨ will be one pulse output against 9 pulse input, i.e. 1/9.

4) Phase Compensation Circuit and Limiter Circuit

The phase error signal coming from IC4 ⑨ is passed through the phase compensation circuit for stabilizing the system and added to the MM2 circuit of the speed control circuit to control the phase of the motor.

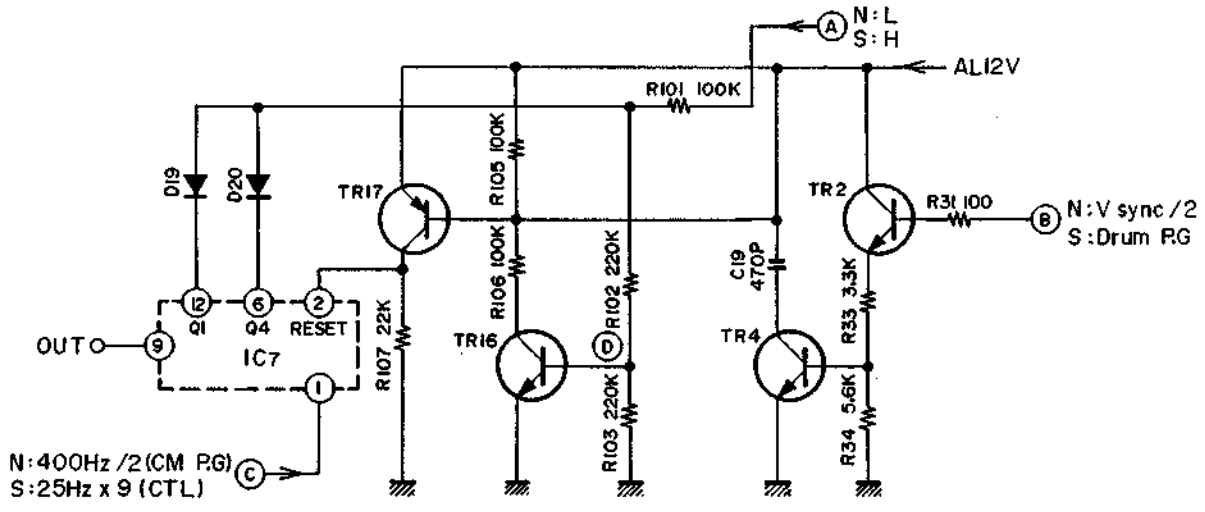


Fig. 16

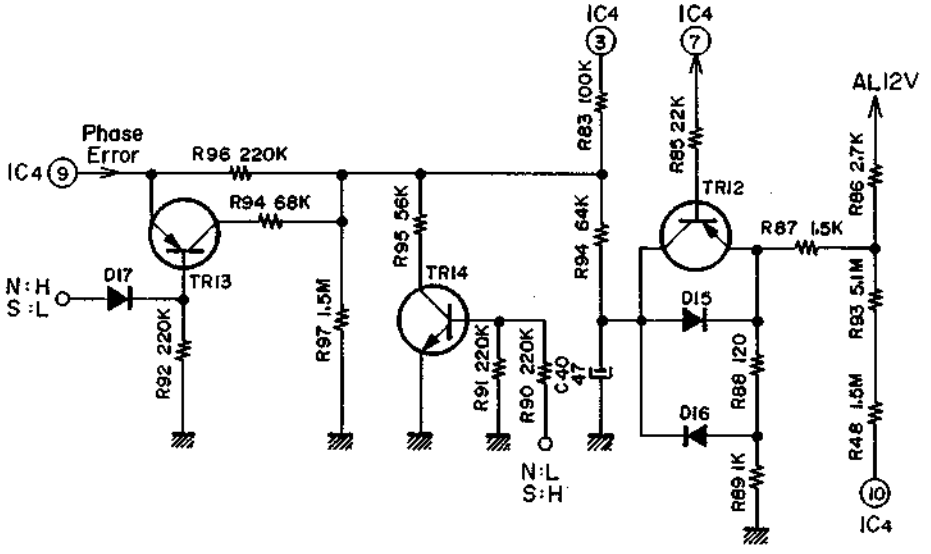


Fig. 17

a) Normal Mode

TR13 → OFF, TR14 Base → 'H' → TR14 → OFF, and then as shown in Fig. 18. At this time, the voltage applied to the IC4 ③ is determined by R96 and R97. In other words, the voltage of R97 is added to IC4 ③. The specified number of rotation at this time is 500rpm.

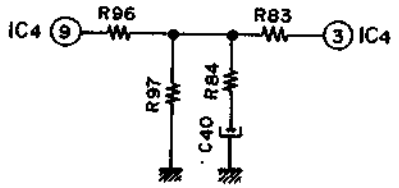


Fig. 18

b) Speed Play Mode

TR13 → ON, TR14 → ON, and then, as shown in Fig. 19. The voltage applied at this time is determined by R96//R94 and R95//R97. In other words, the voltage of R95//R97 is added to IC4. The specified number of rotation at this time is 4,500 rpm.

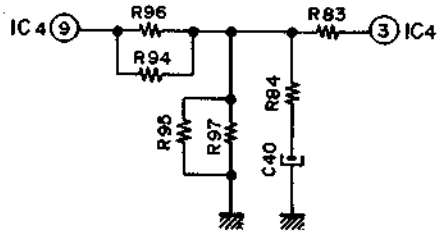


Fig. 19

c) Limiter Circuit

The charge-discharge time of C40 of the phase compensation circuit effects greatly the starting characteristic of the capstan motor. Therefore, the starting characteristic is improved by keeping the potential of C40 within the lock range of the phase control system and by shortening the charge-discharge time.

c-1) When motor starts:

IC4 ⑦ → L → TR12 → ON. Therefore, the voltage of C40 will be:

$$\frac{(R88 + R89) \times 12}{R86 + R87 + R88 + R89} \quad (V)$$

Not passing to R96 and R94 (time constant is small, R96 + R94 ≫ R87 + R86), the power is charged instantly to the value near the specified voltage.

c-2) Normal rotation

TR12 is cut off and the voltage E_C of C40 is kept within the following voltage range (servo lock range) and the limiter is applied to the phase error.

$$\frac{R89 \times 12}{Z} - 0.65 \leqq E_C \leqq \frac{(R88 + R89)}{Z}$$

$\times 12 + 0.65$

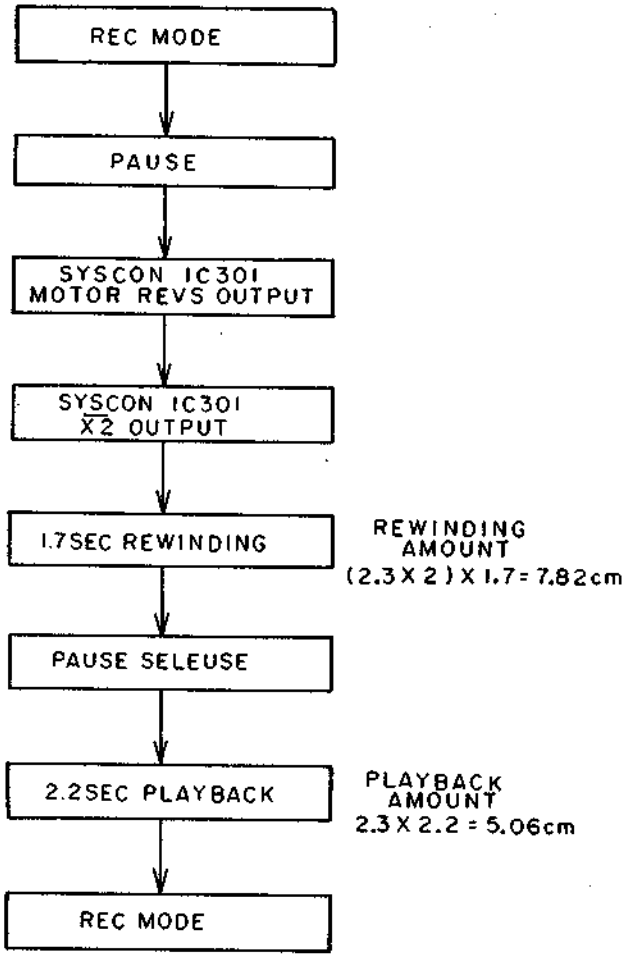


Fig. 20

2-4. A. E. C. (Automatic Editing Control)

This is the circuit to prevent the disturbance of the picture at the joints between pictures. This occurs because the next picture recording is started independently of the recorded track pattern and the new and old track patterns and control signals becomes discontinuous (uneven). To solve this problem, VS-5, when the pause button is pressed during recording, rotates the capstan motor at double speed with the pinch roller compressed, and rewinds for a fixed time (about 1.7 sec.) and waits for the next recording.

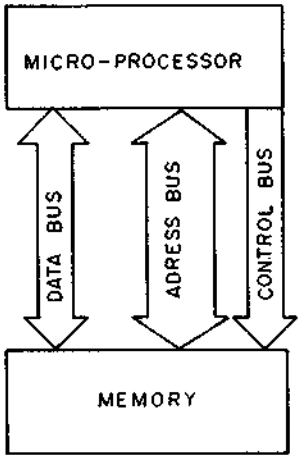
And when the pause is released, the playback mode is achieved (2.2 sec.) and after tracking, the recording is started. At this time, to prevent the occurrence of the phase disorder, the V. sync of input video signal is used as the servo reference signal when recording. (Fig. 8)

Motor reverse, $\overline{X2}$ (double speed) and rewinding time are all set by IC301 within the system control.

3. SYSTEM CONTROL AND TUNER & TIMER

System control circuit using two microprocessors carries out the control of tuner and timer system, and the control of system controls such as mode control, safety operation and warning operation. The memory of the tuner system is backed up for about one week by the built-in batteries when the power fails. For the principle of the microprocessors, refer to the special book. The principles are shown in Fig. 21.

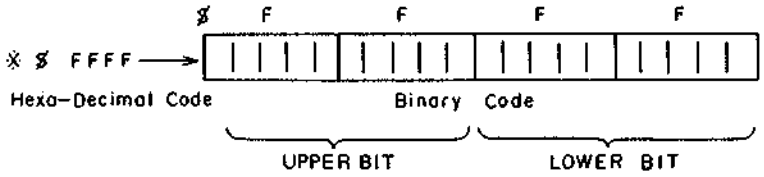
The output/input terminals of the microprocessors are shown in Fig. 22.

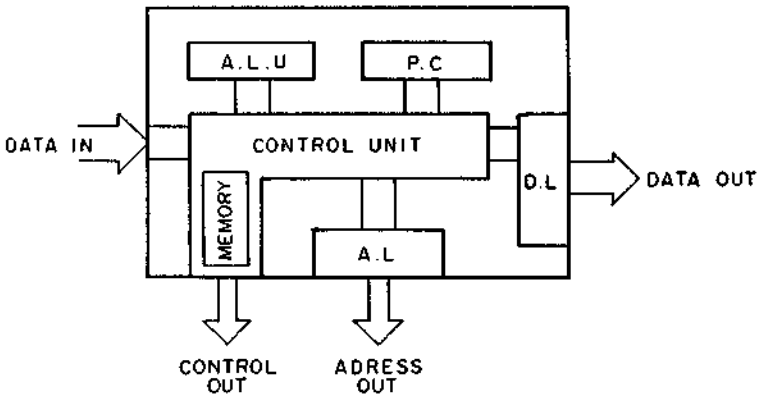


DATA BUS: WRITING & READING
* During Writing, Not Reading

ADDRESS BUS: RESERVING for Writing or Reading
($0000 ~ $FFFF)

CONTROL BUS: Commanding of Writing or Reading for Memory





(1) Fetch Cycle
- ① Read P.C # by Control Unit
- ② Set P.C Address on A.L by Control Unit
- ③ Send Address to Memory by Control Unit
- ④ Get Address Information by Control Unit
- ⑤ Store Information in Memory by Control Unit
  8 Bits → P.C +3

(2) Execution Cycle
- ① Processing Memory Information in A.L.U by Control Unit
- ② Send Result to D.L by Control Unit
- ③ Store Data in Memory by Control Unit

ALU: Arithmatic Logic Control Unit
P.C : Program Counter
A.L : Address Latch
D.L : Data Latch

Fig. 21

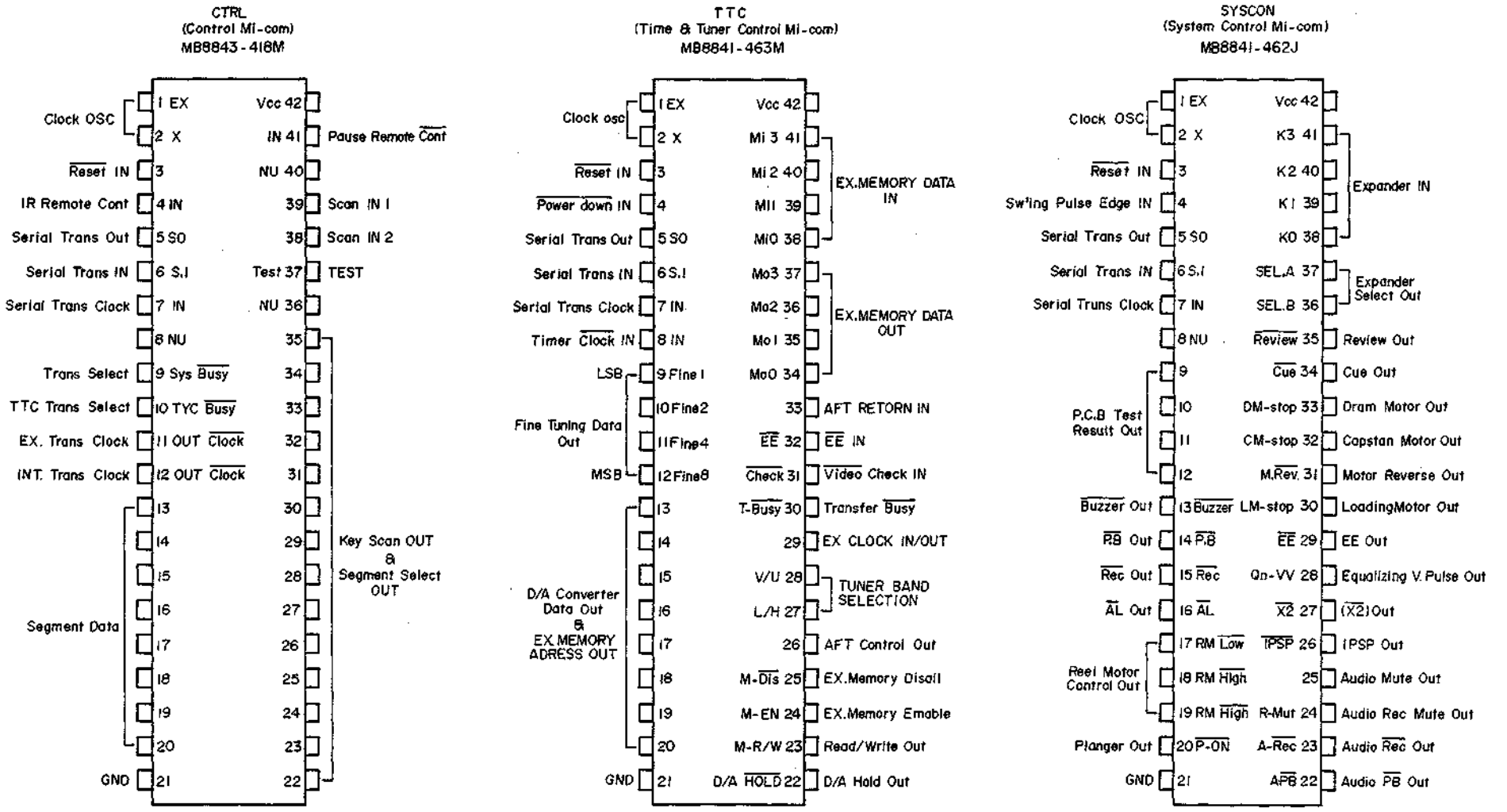

CTRL
(Control Mi-com)
MB8843-418M
Clock OSC
1 EX
2 X
Reset IN
3
IR Remote Cont
4 IN
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Trans Clock
7 IN
8 NU
Trans Select
9 Sys Busy
TTC Trans Select
10 TYC Busy
EX. Trans Clock
11 OUT Clock
INT. Trans Clock
12 OUT Clock
13
14
15
16
17
18
19
20
Segment Data
GND
21
Vcc 42
IN 41
Pause Remote Cont
NU 40
39
Scan IN 1
38
Scan IN 2
Test 37
TEST
NU 36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
Key Scan OUT
&
Segment Select
OUT
TTC
(Time & Tuner Control Mi-com)
MB8841-463M
Clock osc
1 EX
2 X
Reset IN
3
Power down IN
4
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Trans Clock
7 IN
Timer Clock IN
8 IN
LSB
9 Fine1
10 Fine2
Fine Tuning Data
Out
11 Fine4
MSB
12 Fine8
13
14
15
16
D/A Converter
Data Out
&
EX.MEMORY
ADRESS OUT
17
18
19
20
GND
21
Vcc 42
Mi 3 41
Mi 2 40
Mi1 39
Mi0 38
EX.MEMORY DATA
IN
Mo3 37
Mo2 36
Mo1 35
Mo0 34
EX.MEMORY DATA
OUT
33
AFT RETORN IN
EE 32
EE IN
Check 31
Video Check IN
T-Busy 30
Transfer Busy
29
EX CLOCK IN/OUT
V/U 28
L/H 27
TUNER BAND
SELECTION
26
AFT Control Out
M-Dis 25
EX.Memory Disall
M-EN 24
EX.Memory Emable
M-R/W 23
Read/Write Out
D/A HOLD 22
D/A Hold Out
SYSCON
(System Control Mi-com)
MB8841-462J
Clock OSC
1 EX
2 X
Reset IN
3
Swing Pulse Edge IN
4
Serial Trans Out
5 SO
Serial Trans IN
6 S.I
Serial Truns Clock
7 IN
8 NU
9
10
11
12
P.C.B Test
Result Out
Buzzer Out
13 Buzzer
PB Out
14 P.B
Rec Out
15 Rec
AL Out
16 AL
17 RM Low
18 RM High
19 RM High
Reel Motor
Control Out
Plunger Out
20 P-ON
GND
21
Vcc 42
K3 41
K2 40
K1 39
K0 38
Expander IN
SEL.A 37
SEL.B 36
Expander
Select Out
Review 35
Review Out
Cue 34
Cue Out
DM-stop 33
Dram Motor Out
CM-stop 32
Capstan Motor Out
M.Rev. 31
Motor Reverse Out
LM-stop 30
LoadingMotor Out
EE 29
EE Out
Qn-VV 28
Equalizing V.Pulse Out
X2 27
(X2) Out
IPSP 26
IPSP Out
25
Audio Mute Out
R-Mut 24
Audio Rec Mute Out
A-Rec 23
Audio Rec Out
APB 22
Audio PB Out

Fig. 22

3-1. Tuner & Timer Control Circuit

For the tuning method of VS-5, the voltage controlled synthesizer method is used. In this method, the tuning voltage is converted into the digital amount and stored in the memory, and the digital amount of the channel selected is again cconverted into the tuning voltage by the D/A converter.

The approximate diagram is shown in Fig. 23. Also VS-5 incorporates a program in the IC307 which reads out the data of this digital memory when timer recording and carries out the timer recording. This

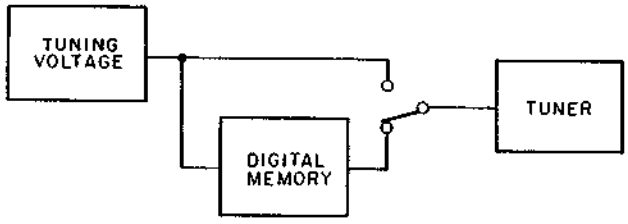
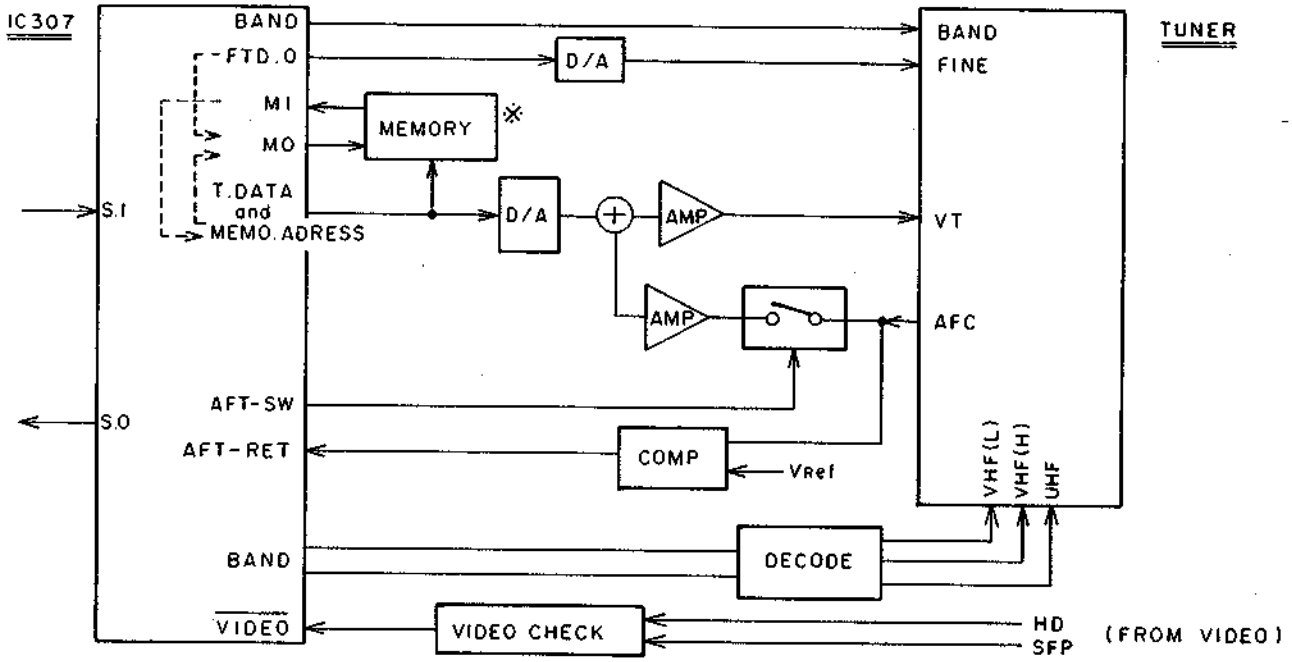


Fig. 23

IC307 and the circuits attached are called Tuner Timer Control Circuits hereinafter.



※ Date in memory

Tuning Data 8bits	Total 15bits
Band Data 2bits	
Fine Tuning Data 4bits	
Flag Data 1bits	

Fig. 24

3-1-1. Summary of Tuning

Fig. 24 is a block diagram of the tuning circuit. When any tuning commanding data enter the S.I. (Serial Input), IC307 outputs tuning data (VT: 8 bits) and band data (2 bits). The band data are directly supplied to the tuner, but the tuning data are converted into analogue voltage by the D/A converter and then supplied to the tuner. In the tuner, the tuning frequency is changed by this tuning voltage, and when a TV station is received, the voltage proportional to the tuning status is outputted to the AFC output of the tuner. This voltage is checked by the comparator and the exact tuning point is detected. If there is any deviation from the exact tuning point, the FINE tuning button is pressed to issue the fine tuning command to IC307 through the S.I. input. By this instruction, the fine tuning data (4 bits) are outputted from FTDO (Fine-Tuning Data Output), D/A converted, and inputted into the "FINE" of the Tuner.

If the "memorize" button is pressed when the tuning is completed, the address of the channel shown on the display is outputted from the Memory-Address Terminals, and the total 15 bits including tuning data (8 bits), fine data (4 bits), band data (2 bits) and flag data (1 bit) are stored in the same address as 4 words (16 bits).

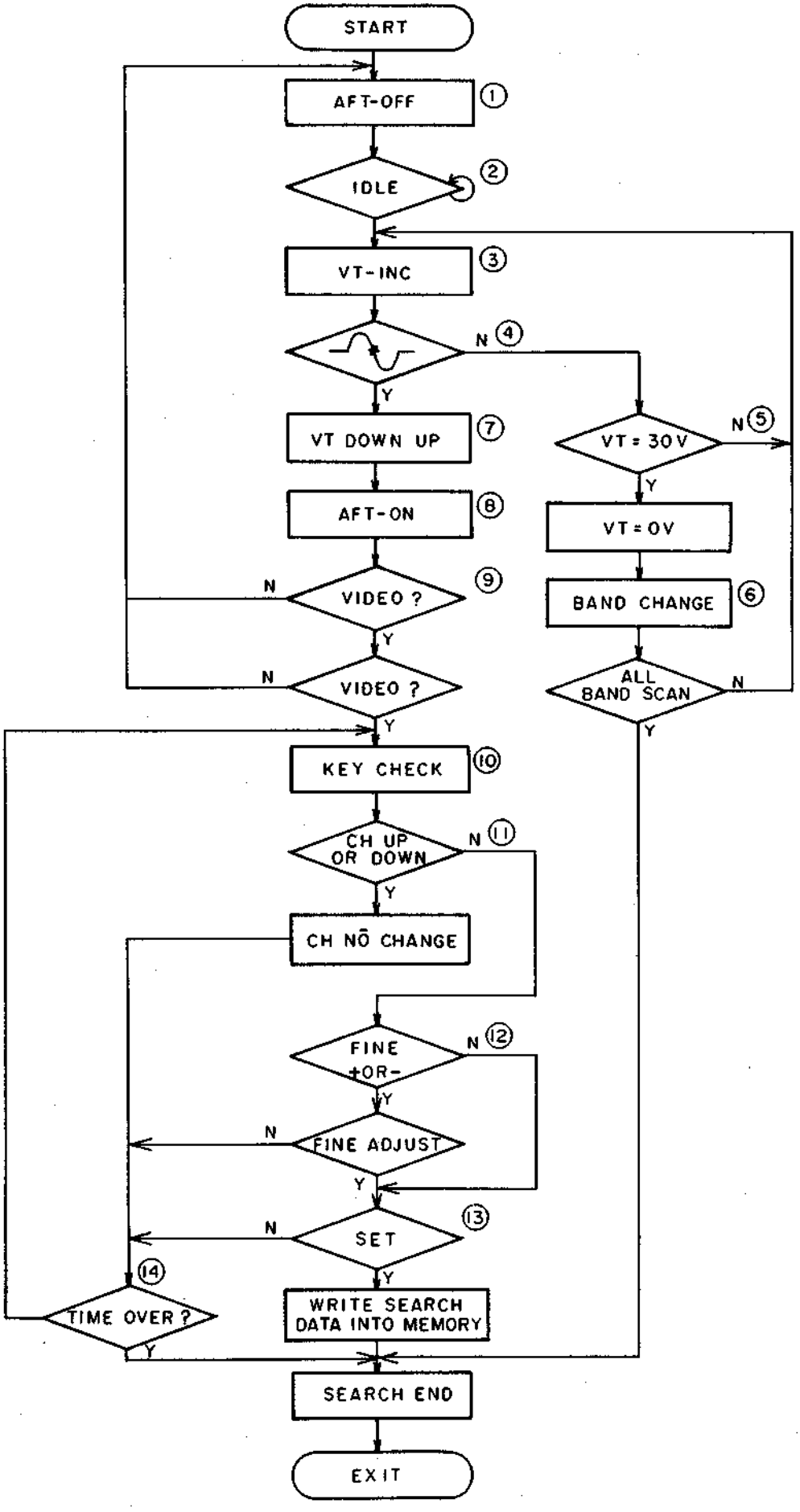

START
AFT-OFF
①
IDLE
②
VT-INC
③
N ④
Y
VT DOWN UP
⑦
AFT-ON
⑧
N
VIDEO ?
⑨
Y
N
VIDEO ?
Y
KEY CHECK
⑩
CH UP OR DOWN
N ⑪
Y
CH NO CHANGE
FINE +OR-
N ⑫
Y
N
FINE ADJUST
Y
N
SET
⑬
Y
⑭
TIME OVER ?
Y
WRITE SEARCH DATA INTO MEMORY
SEARCH END
EXIT
VT = 30V
N ⑤
Y
VT = 0V
BAND CHANGE
⑥
ALL BAND SCAN
N
Y

Fig. 25

3-1-2. TV-Search

The TV-Search is executed in accordance with the flow chart shown in Fig. 25. Each operation is described on basis of this flow chart.

1) If any AFT data exist, correct tuning is impossible, so the AFT circuit is turned OFF, and only the data from the microcomputer are supplied to the tuner. (IC307 ㉖ → 'L' → IC311 ⑫ → 'L' → IC311 ⑩ – ⑪ → OFF).
2) When the AFT SW is turned OFF, a change will occur in the AFC output of the tuner to change the AFT-Return Signal, and therefore, scanning is delayed for about 60 mS. (By the program within IC307).
3) Determination of intervals to increase VT. Depending on the band, they will change as shown in Fig. 26.

	VHF (L)	VHF (H)	UHF
FAST	60 mS	60 mS	60 mS
SLOW	30 mS	30 mS	12 mS

Fig. 26

Into the tuner, data are inputted depending on each mode by IC307 ㉘ and ㉗, and at the same time, 'H' is added when IC311 ⑤ is 'U', and IC311 ③ – ④ → ON.

4) When the tuner receives broadcast or noise, the waveform shown in Fig. 27 is outputted at AFC OUT. This AFC output is inputted in IC313 ⑥. This circuit is called AFC comparator and the operation is described by using Fig. 28.

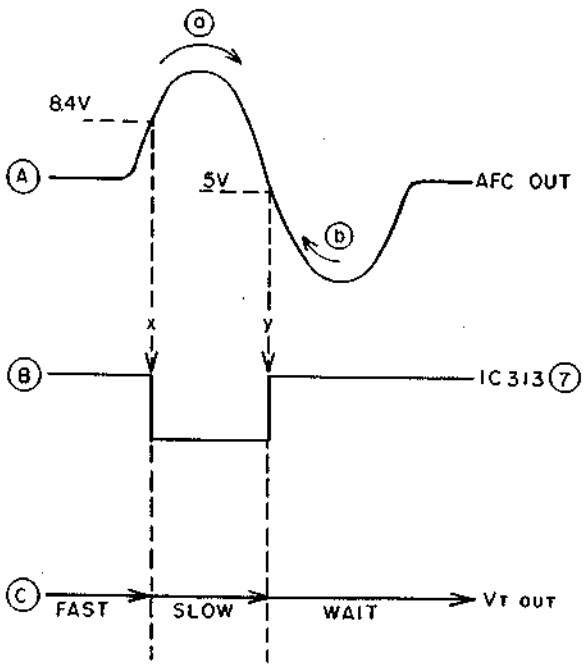


Fig. 27

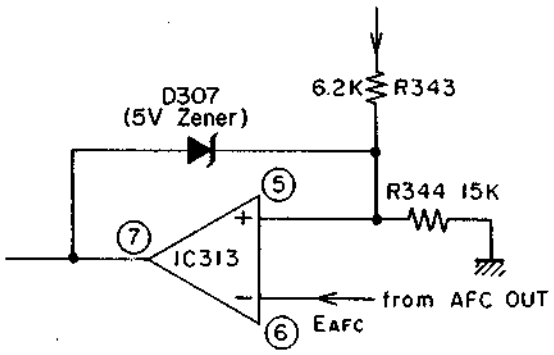


Fig. 28

If the voltage of AFC OUT of IC313 ⑥ is E_{AFC}, and when the tuner is not receiving a TV station, E_{AFC} < IC313 ⑤ → IC313 ⑦ → H → D307 → OFF. At this time, the voltage of IC313 ⑤ is: $\frac{12}{R343 + R344} \times R344 = 8.4V$.

If the tuner receives a TV station and E_{AFC} < 8.4V, then IC313 ⑦ → 'L' → D307 → ON → IC313 ⑤ → 5V → VT → SLOW. And when the tuner passes the exact tuning point, E_{AFC} < 5V → IC313 ⑦ → H → D307 → OFF → VT → WAIT.

5) For the VT, the tuner requires the change of 0 ~ 30V and the microcomputer output is 8 bits.

Therefore, one-STEP is $\frac{30V}{256} = 117\ mV \fallingdotseq 120\ mV$.

One-STEP change means in frequency:

VHF (Low) : 0.16 MHz
VHF (High) : 0.25 MHz
UHF : 1.68 MHz (all average)

8 bits output from microcomputers ⑬ ~ ⑳ is inputted into IC309 D-A converter IC309 ⑤ ~ ⑫, taken out of IC309 ④ as analogue current output, converted into analogue voltage by IC310, and CR302 and added to Analogue SW IC311 ①. On the other hand, IC307 ㉒ → 'L' → TR310 → ON → IC311 ⑥ → H → IC311 ⑧ – ⑨ → ON → C306 (terminal voltage) is passed through R351 (When UHF, ON between TC311 ③ and ④, so directly), added to IC312 ⑥, inverted by IC312 and added to IC310 ②. This terminal voltage of C306 will be the reference voltage in tuning. (This reference voltage is a little higher than the flat portion of Fig. 27, and the reason is that it can be drawn sufficiently even when it enters the ⓑ part).

Therefore, when AFT-ON, if the voltage of AFC OUT is higher (or lower) than the reference voltage, any malfunction due to disturbance such as the temperature change of the tuner is prevented by lowering (or increasing) the voltage by the difference.

6) The band is scanned in the order of VHF (low) → VHF (high) → UHF, and the VT at the search start will be the voltage previously set.

When neither broadcast nor noise is received, 4

bands including the band at start are scanned. The band scanning signal is outputted by the microcomputer IC307 ㉘ and ㉗.

7) IC313 ⑦ changes at the exact tuning point or near to it as shown by y point of Fig. 27 Ⓑ. The VT changes slowly because it passes the differentiation circuit after IC309 (DA converter). Therefore, the scanning is finished at a point beyond the best tuning point. Here, after one step down, the exact tuning point is checked by the program incorporated within the microcomputer IC307. If the exact tuning point is the place where one step is returned, it is kept as it is, but if different, one step is returned to the original place. After AFT is turned ON, video or noise is determined.

8) When the exact tuning point is confirmed by the above 7), microcomputer

IC307 ㉖ → H → IC311 ⑫ → H →
IC311 ⑩ – ⑪ → ON
TR310 → OFF → IC311 ⑥ → L
→ IC311 ⑧ – ⑨ → OFF

and, AFT is in ON position.

9) AFT SW is turned ON to achieve the normal control status. (For the video check, see the following 10.)

10) About 500 ms after the AFT SW is turned ON, the video-check is made to determine whether the signal being received is video signal or noise, and if it is determined as video signal, another video-check is made after 60 msec. If the result is video signal (IC315 ③ → 'L') the search-end mode, and the searched data can be set. (The keys acceptable in the search-end mode are: FINE +, FINE –, SET, CH-UP, CH-DOWN). The operation of the video check circuit is as follows.

The operation of the circuit is described by using Fig. 29.

In Fig. 29, SFP and HD are supplied from IC8 within the Video P.C Board, and SFP is $\frac{1}{160}$ of 160 fH oscillated by VCO (SYNC. FRONT PULSE) and outputted from IC8 ④, and HD is the input video signal sync-separated. The output terminal is IC8 ⑱. Therefore, when the video signal exists, HD and SFP are in fixed phase relationship, but in the case of noise, SFP is the one free oscillated by VCO, and VD receives the input of noise only.

Gates 3 and 4 are circuits to detect whether the HD phase (equivalent to sync phase) is in agreement with the phase of SFP.

When the video signal is correctly inputted into the video amplifier, 160 fH is locked by the input sync and has the same phase, and at that time, the output will be "L" at the point where the phases are in conformity as shown in Ⓐ. Since the time constant of the discharging direction of C324 of R366//D308 and C324 circuits is almost '0', Ⓖ is made 'L' by the pulse. In the case of noise, it is very rare that the phases of SFP and noise are in conformity and that Ⓐ becomes 'L', and the level is 'H'. Gate 2 and TR312 are the circuits to check that there is no noise in the part other than the sync. SFP is inverted by TR312, and the leading edge of waveform Ⓒ is delayed by dt by C325. Therefore, it becomes 'H' when it is in the oblique line part of the waveform Ⓒ. If there is video input, the phases of Ⓒ′ and HD are in agreement and Ⓕ keeps 'H', but in the case of noise, it becomes 'L' when noise is inputted. In C323, R365 (charging circuit) and C323, R369 (discharging circuit), R365 ≫ R364, so the level of Ⓓ is 'L' and output E is H. On the contrary, when there is video input, both Ⓑ and Ⓓ become 'H' and the output is 'L'. (See Fig. 30)

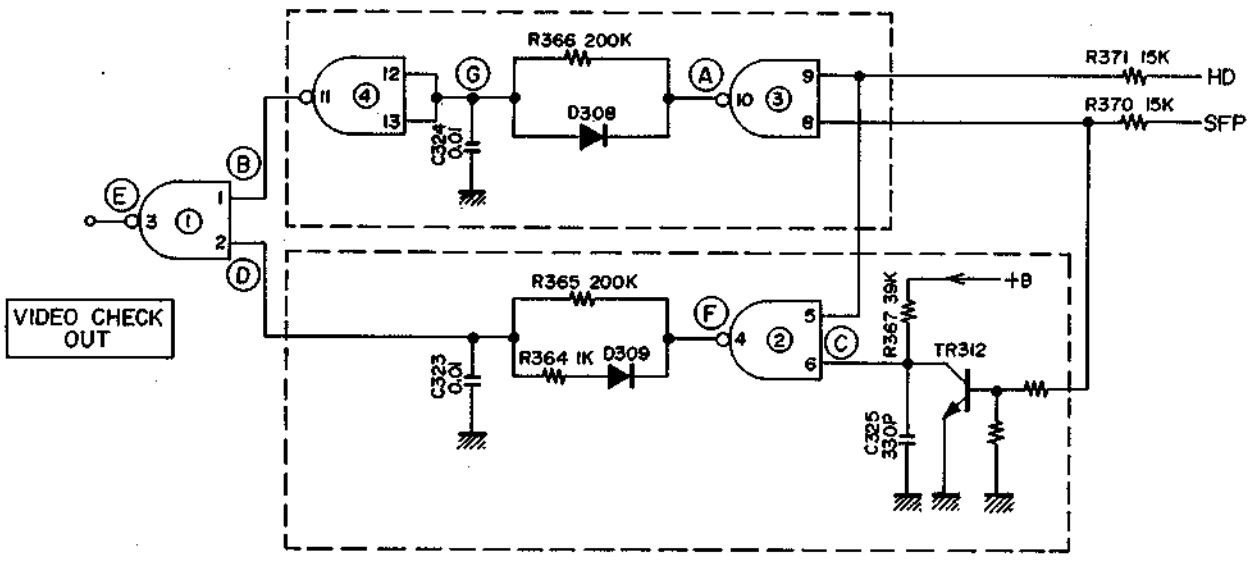


Fig. 29

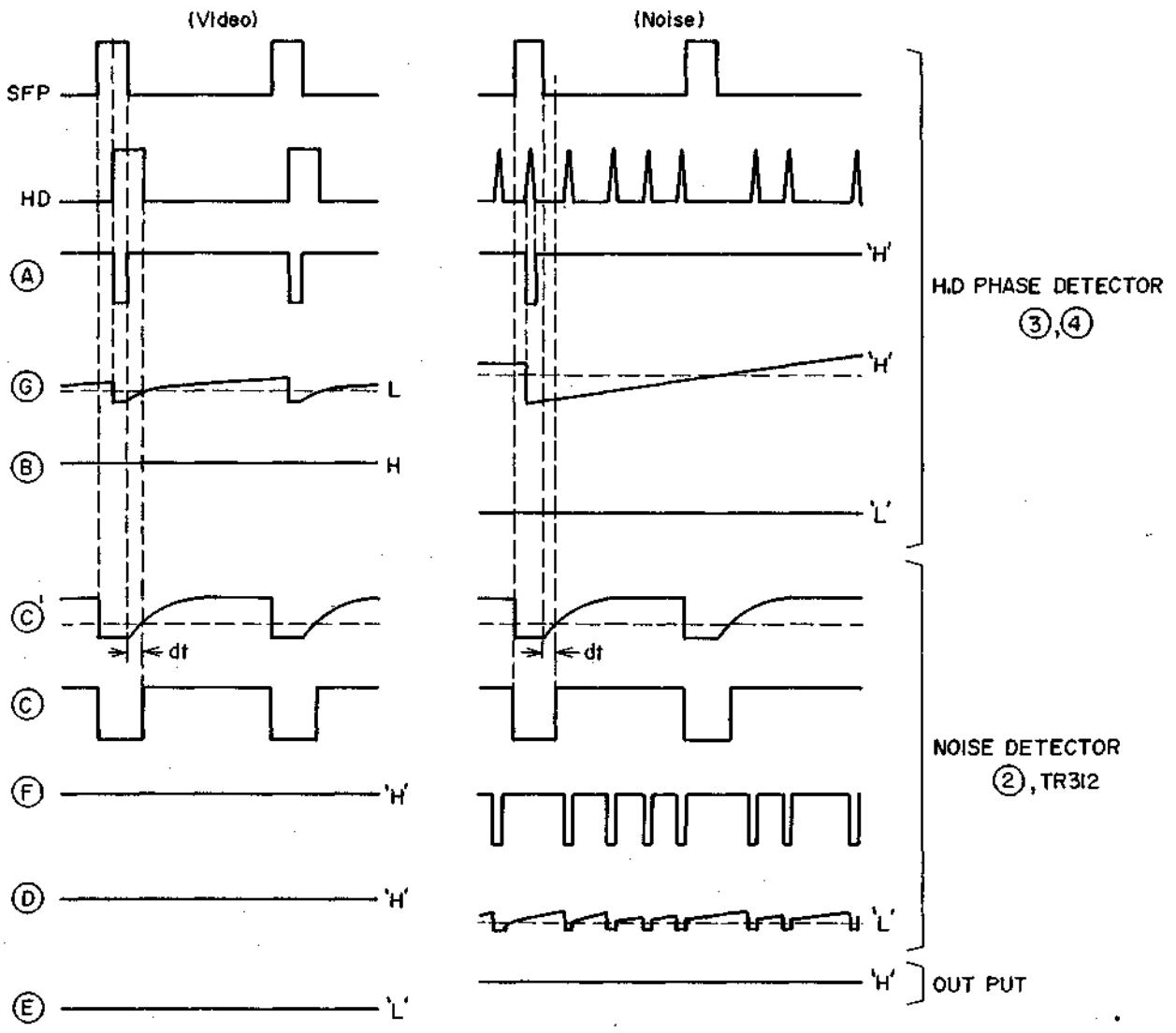

(Video)
(Noise)
SFP
HD
A
G
L
B
H
C'
dt
C
F
'H'
D
'H'
E
'L'
'H'
'H'
'L'
H.D PHASE DETECTOR
③,④
'L'
NOISE DETECTOR
②, TR312
'H'
OUT PUT

Fig. 30

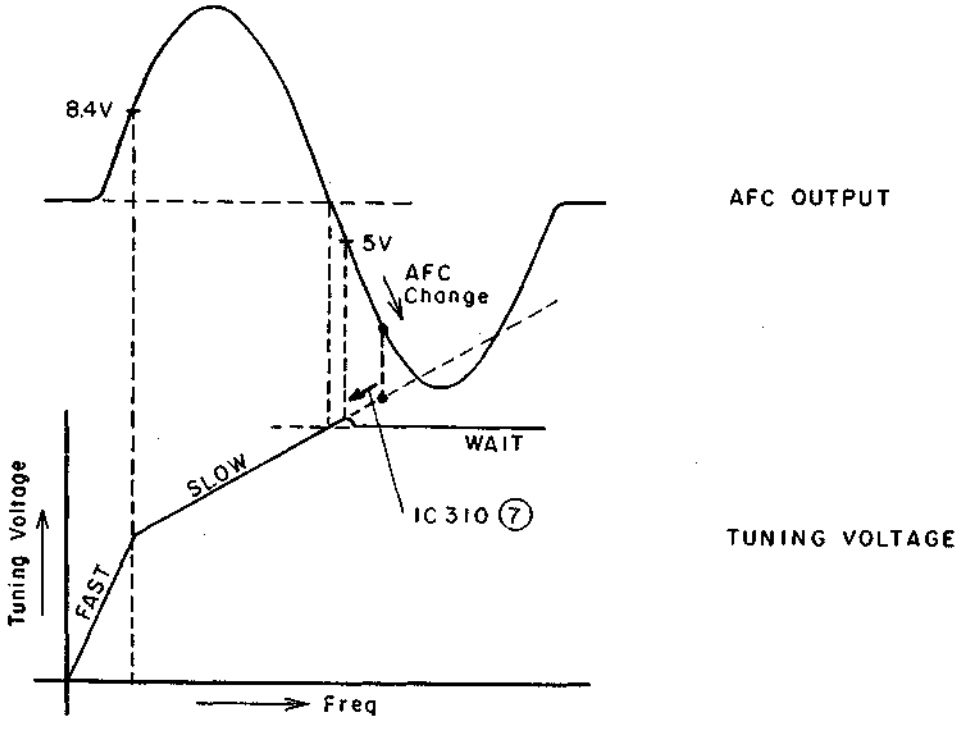

8.4V
5V
AFC
Change
AFC OUTPUT
WAIT
SLOW
FAST
IC 310 ⑦
Tuning Voltage
Freq
TUNING VOLTAGE

Fig. 31

11) Channel to be set is selected.

12) FINE is processed by 4 bits within the microcomputer and outputted from IC307 ⑨ ~ ⑫ as 4 bit output. This data are converted into DC by simple D/A converter IC312 and added to the tuner to make fine adjustment when a TV station is received. At this time, AFT is already operation, and the operation is described. When AFT is OFF, IC311 ⑧ – ⑨ is ON, so to the adder the voltage produced in IC312 ⑦ by the voltage differentiated by R346 and R345 is added. When AFT is ON, IC311 ⑧ – ⑨ is OFF, and conversely IC311 ⑩ – ⑪ is ON, and to the IC312 ⑦, the voltage produced in IC312 ⑦ by the signal from AFC is added. If AFC voltage is reduced and the frequency is increased due to the temperature change, etc., IC312 ⑦ rises and IC310 ⑧ falls and the frequency is reduced. (Fig. 31). FINE is to change the center frequency of AFC and about ±300 kHz of change is possible by ±3V.

13) By pressing the SET (Memorize) key, the memory output order is inputted into IC307. By this order, addressing is carried out by 8 bits of IC307 ⑬ ~ ⑳ (fixed by set channel), and then, the aforementioned 16 bit data (VT: 8 bits, Fine 4 bits, Band 2 bits, Flag 1 bit) are outputted from IC307 ㉞ ~ ㊲, as one word = 4 bits, and stored in IC308.

14) If there is no key input for more than 20 sec. in the search-end mode, the tuner process is automatically finished.

3-1-3. Channel Select

The manual memory data reading and the memory data reading when timer recording are carried out by the function key or the timer instruction of IC307. If any one of these instructions is inputted, the address is specified, and the data stored in the address are outputted in 16 bits (one word = 4 bits) as in the above 13 from IC308 ⑩, ⑫, ⑭ and ⑯, and inputted into IC307 ⑨ ~ ⑫. On basis of this data, 8 bit VT output from IC307 ⑬ ~ ⑳, 4 bit FINE data output from ⑨ ~ ⑫, and 2 bit band output from ㉗ – ㉘ are outputted to the respective circuits.

3-1-4. Power Down Protection

1) Power Down Detector

A power down detector circuit is provided to detect the power down immediately and to save the necessary data in the external memory while the microcomputer is able to operate. (Fig. 32)

If power down occurs at X point, IC313 ① becomes 'H', and the potential at Ⓐ point is charged to the level shifted by D312 and TR313 (0.6 × 2 = 1.2V) but when the level at Ⓒ passes the threshold level of TR313, ③ will be 5V → 'L', and the power down detecting signal is issued. (Y point). Since the voltage of the capacitor in the power circuit starts decreasing at Z point, during the time t between Y and Z, power is supplied to IC307 from the capacitor. Since the power failure interruption occurs in IC307 due to the power down at Y point (IC307 ④ is the power down input), the necessary data are saved during this time t (completed in about 4 msec).

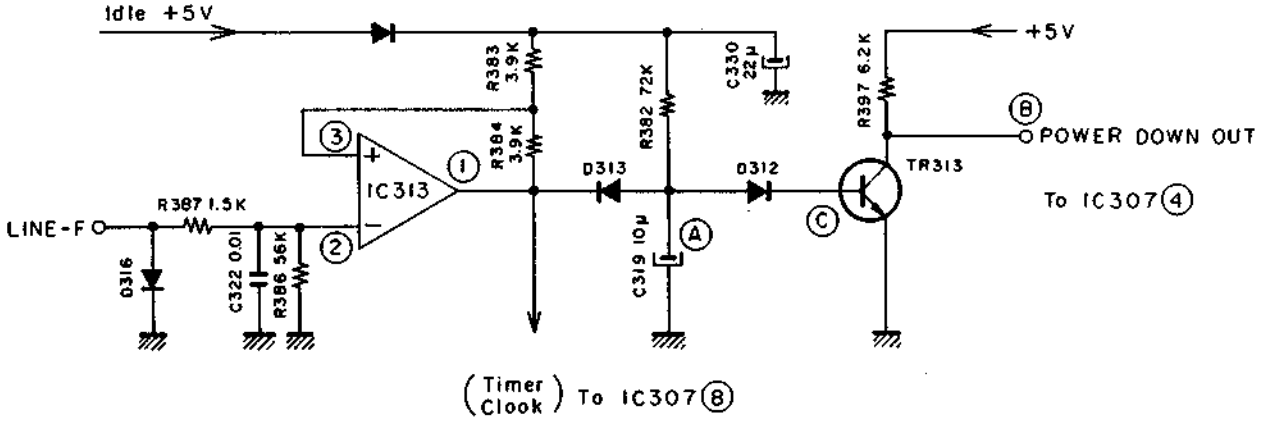


Fig. 32

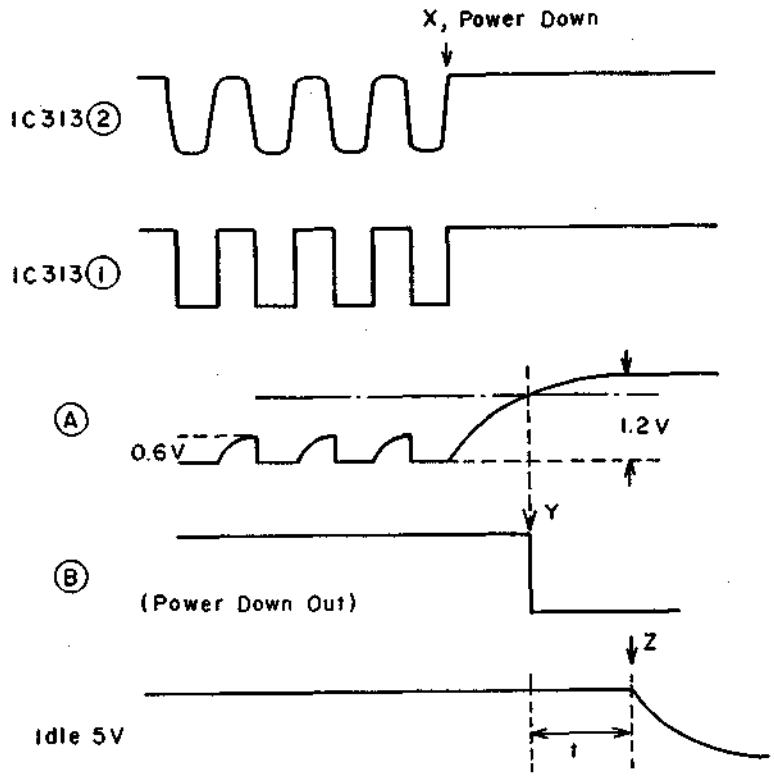


Fig. 33

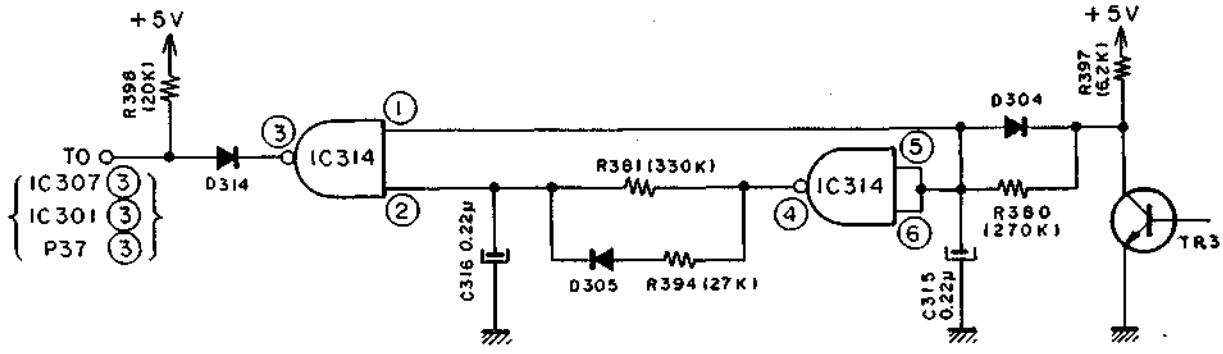


Fig. 34

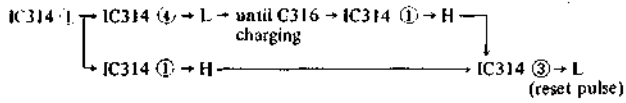
2) Reset Circuit

The microcomputers (IC307, etc) must be reset at the time of power up, otherwise, the program may start from an abnormal address.

This circuit uses IC314 2/4 which is backed up by batteries.

Until the voltage of C315 passes the threshold of IC314 ⑤ and ⑥ after power is turned ON, IC314 ⑤, ⑥ → L → IC314 ④ → H → C316 → charging → until C316 passes the threshold level of IC314 → 'L' → IC314 ③ → H.

If the voltage of C315 passes the threshold level of IC314 ③, ⑥ and



See Fig. 34 and Fig. 35.

When power down, TR313 is ON, so → IC314 ⑤, ⑥ / ① → 'L' → IC314 ③ → 'H'.

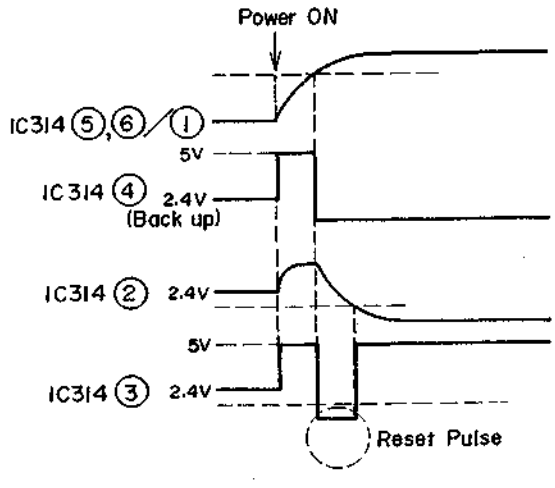


Fig. 35

3) Memory Erasure Prevention Circuit

Since the output of the microcomputers is disturbed by the voltage less than the specified voltage (5 ± 0.5V), a protective circuit must be provided in the external memory (IC308) directly connected to the TTC microcomputer (IC307), otherwise, the memory contents may be changed by the spikes which occur when power is turned ON or OFF.

Therefore, as shown in Fig. 36, RS-FF is made by using 2/4 IC314 to control the disable terminal of the external memory (IC308).

When power is ON, IC314 ③ → H → C318 → Charge up → IC314 ⑧ → H, then IC314 ⑪ → 'L', so the Disable of IC308 (memory) is released, and the Enable ('H') is added to the memory from IC307 ㉔ to make the memory enable. In the case of power down, Power down detector out → 'L' → IC307 ④ → L → Microcomputer data seved → IC307 ㉕ → L → IC314 ⑬ → L → IC314 ⑪ → 'H' → IC308 ⑲ → 'H' → IC308 disable, and the memory contents are protected.

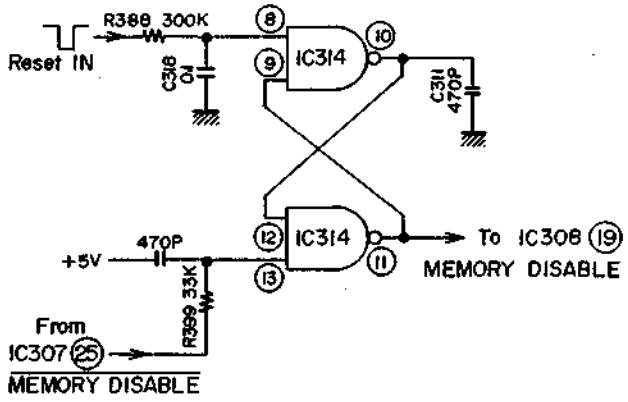
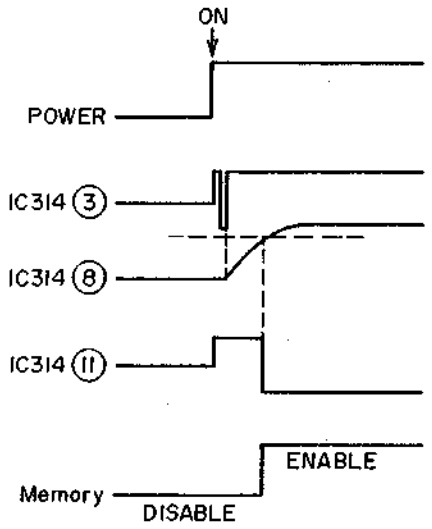


Fig. 36



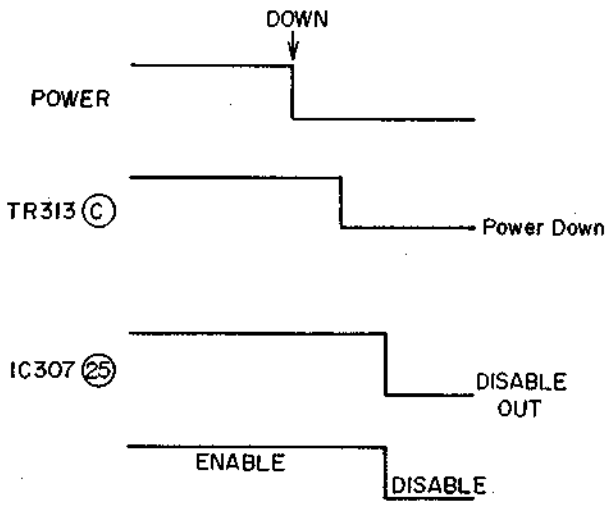


Fig. 37

4) Back Up

At a power failure, the external memory IC308 and IC314 (RS-FF) are backed up by Ni-Cd batteries. The reason the IC314 is backed up is that this IC controls the memory Enable/Disable of IC308.

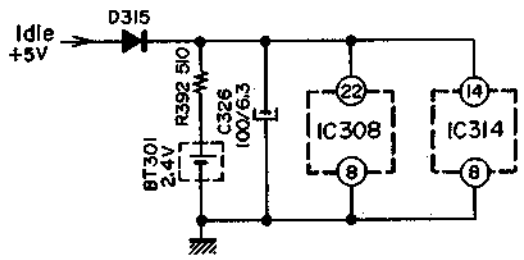


Fig. 38

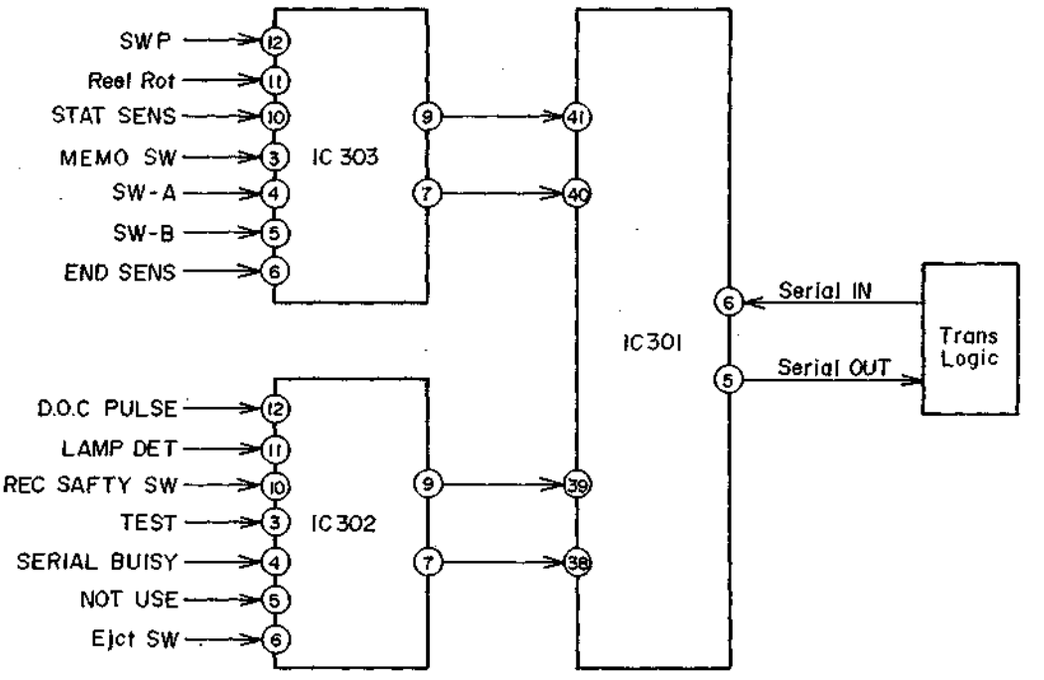


Fig. 39

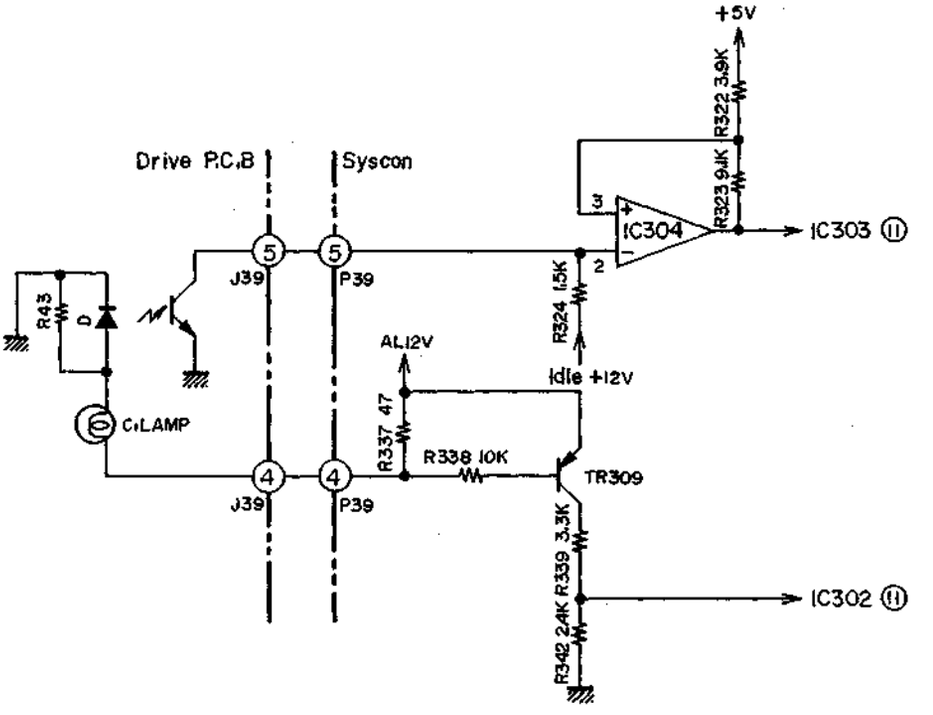


Fig. 40

3-2. System Control Circuit

The system control circuit consists of the micro-computer (IC301) for system control and two data selectors (IC302, IC303). Each mode data is inputted into IC301 as a serial signal through the transfer logic circuit, and all kinds of the warning data, as a parallel input of 16 bits (actually part of them is not used), divided into 8 bits each to IC302 and IC303 and then selected into 2 bits each by the same IC and is inputted into IC301 as 4 bit parallel signal.

3-2-1. Reel Rotating Pulse and Lamp Detector

The lamp is lit through R337 (47 ohms) when AL+12 is issued after power is turned ON. If normal, TR308 'B' → L → TR309 → ON → IC302 ⑪ → 'H' but if the lamp is burned out or being burnt, TR309 'B' → H → TR309 → OFF → IC302 ⑪ → 'L' and the lamp abnormality is detected, then IC301 ㉘ → 'L' and the buzzer is sounded, and the data indicating the break-down is sent to TTC through the serial out terminal (IC301 ⑤). If POWER ON button is pressed under

such circumstances, the buzzer sounds and power goes OFF.

The reel rotation is detected by the photo interrupter, and the LED is put in series with the lamp to utilize the lamp current effectively. R43 is a shunt resistance. IC304, R322 and R323 make a Schmitt circuit and the leading edge of the reel pulse is detected by the microcomputer (IC303). In the microcomputer program, the tape count mode is determined by this pulse. In the case of power OFF, stand-by or no cassette, regardless of the input, it will be minus during the tape loading, and in other cases, it will be plus or minus in accordance with the M-REV output (IC301 ㉛) produced within the microcomputer.

This pulse is also used to detect the reel stop. If there is no leading edge input within 1.7 sec. in FF or REW or within 2.1 sec. in PLAY, S-DUB, CUE and REVIEW, it is taken as real stop, and the buzzer is sounded and STOP mode is started. If there is any one leading edge within that time, the time is counted from the edge, and when the next edge does not come within the time shown in Fig. 41, it is taken as reel stop and as described above, the buzzer is sounded and STOP mode starts.

Mode	No Pulse Interval
FF or REW	More than 0.12 sec
Cue or Review	More than 0.3 sec
Normal Speed	More than 1.3 sec

Fig. 41

3-2-2. Drum Motor Load Detection

Overload is detected by watching the interval of the leading edges of the switching pulse. If a leading edge does not come within 0.5 sec. after PAUSE mode started, it is taken that the drum is not rotating and the buzzer is sounded and STOP mode starts. If any one leading edge is inputted within 0.5 sec., and if the next edge does not come within 0.1 sec. from the edge, it is judged that the drum load is too heavy, and the buzzer is sounded and STOP mode starts.

3-2-3. Loading and Unloading Detection

At the same time when the loading motor is turned ON and the loading cam start rotating, the next safety timer is set depending on the mode within the microcomputer.

Tape Loading and Unloading	4 sec.
Idler Loading and Unloading	1.7 sec.
Cassette Unloading	1.7 sec.

If the loading SWs 'A' and 'B' are not turned ON within the time, the microcomputer judges that there was some serious trouble, and indicates the breakdown immediately after 0.3 sec. and at the same time $\overline{AL}$ output (IC301 ⑯) becomes 'H', TR303 is turned OFF, and AL + 12 becomes 'O'. Then, the TR of the power circuit is turned OFF, and the power is cut off. If the front POWER SW is turned ON under the breakdown caused by the loading or unloading trouble, another breakdown will occur except when the cassette unloading trouble is detected, and no reset is available.

Therefore, to release the breakdown due to the loading/unloading trouble, the POWER SW must be turned OFF once and then must be switched ON again. If the cause is not removed in such cases, the breakdown will occur continuously after 4.3 sec. (4 sec. + 0.3 sec.) or 2.0 sec. (1.7 sec. + 0.3 sec.).

3-3. Additional Circuits

3-3-1. Transfer Logic Circuit

Since VS-5 uses three microcomputers (Control, Syscon, TTC), it is necessary to transfer data among these three microcomputers. Therefore, the Control microcomputer takes the initiative to exchange data synchronously with TTC and Syscon.

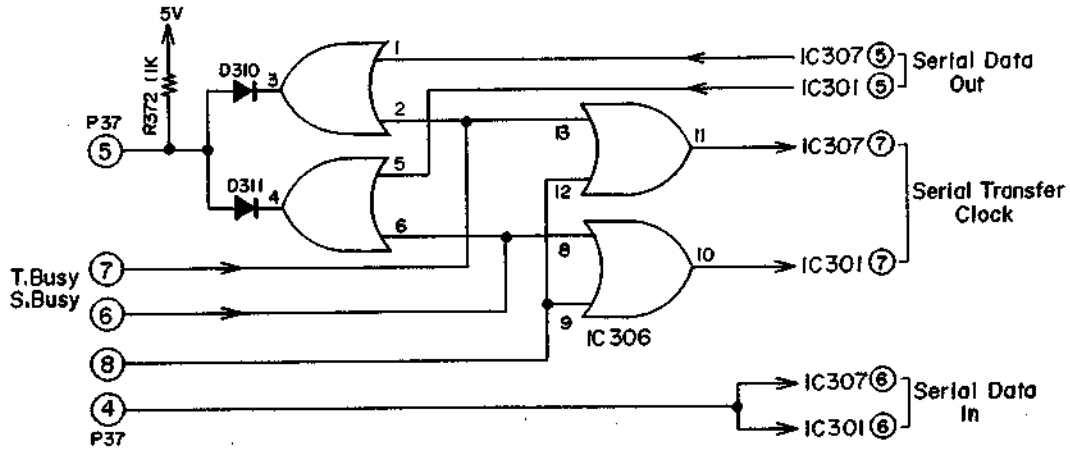


Fig. 42

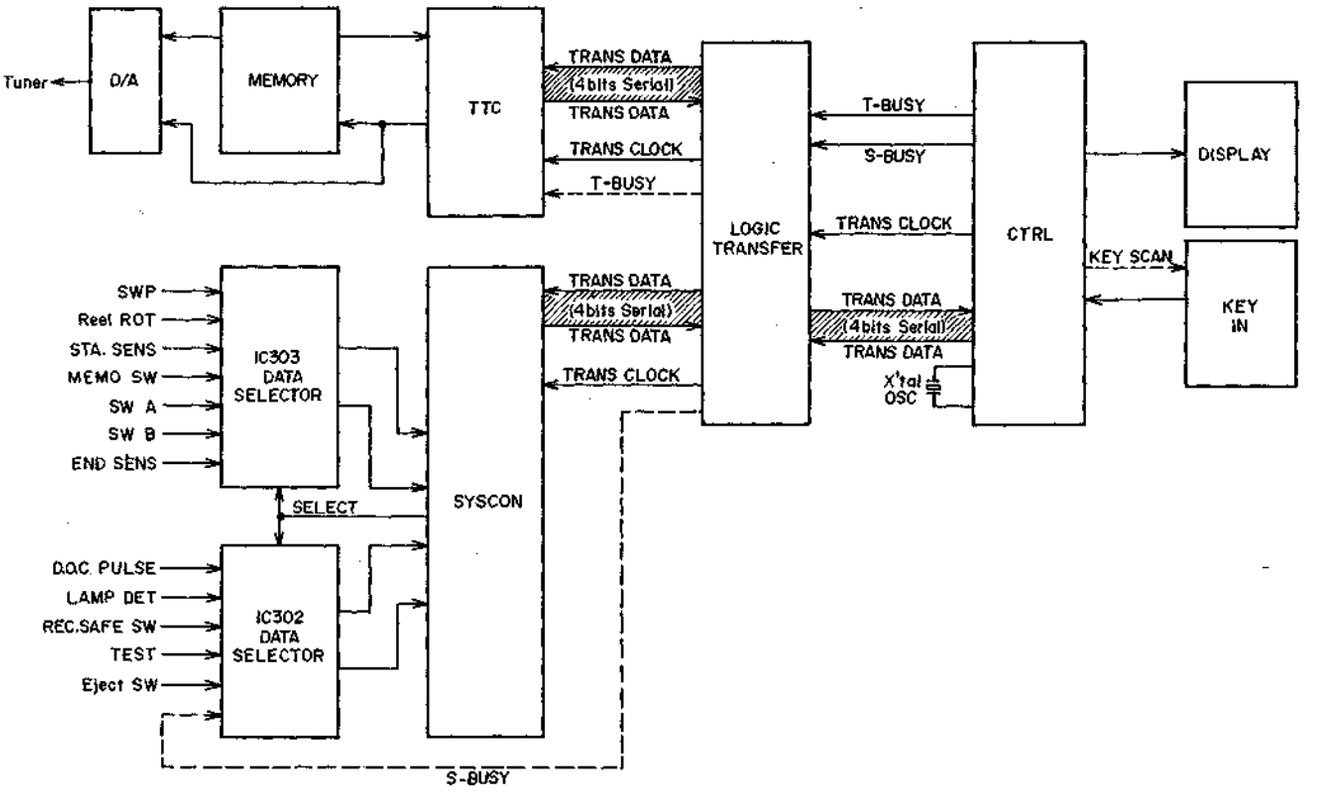


Fig. 43

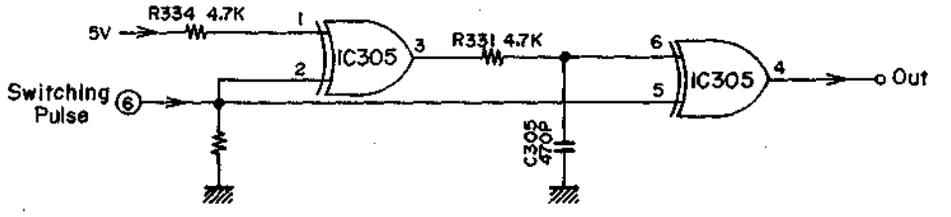


Fig. 44

In T-Busy cycle, IC306 ② / ⑬ becomes 'H' and IC306 ⑥ / ⑧ becomes 'L', and data is inputted into IC301 ⑦, and the data from IC301 ⑤ is inputted into LC306 ⑤ and outputted from IC306 ④. TTC/Syscon/CTRL signal block diagram is shown in Fig. 43.

3-3-2. Pseudo V Pulse Generation (Equalizing Pulse)

In STILL, 50 Hz is made synchronizing with the edge of the switching pulse to prevent the picture deviation which is caused by the existence of 1.5H difference per field. This is executed by the program of the microcomputer. See Figs. 44 to 46.

3-3-3. Buzzer Circuit

Syscon microcomputer (IC301) ⑬ → L → IC305 OSC → Oscillation or the buzzer can be driven directly by the microcomputer because piezoelectric type is used.

A	B	Q
H	H	L
H	L	H
L	H	H
L	L	L

EX-OR TRUTH TABLE

Fig. 45

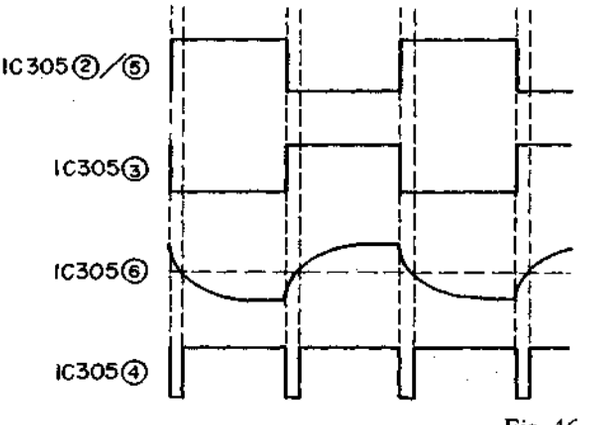


Fig. 46

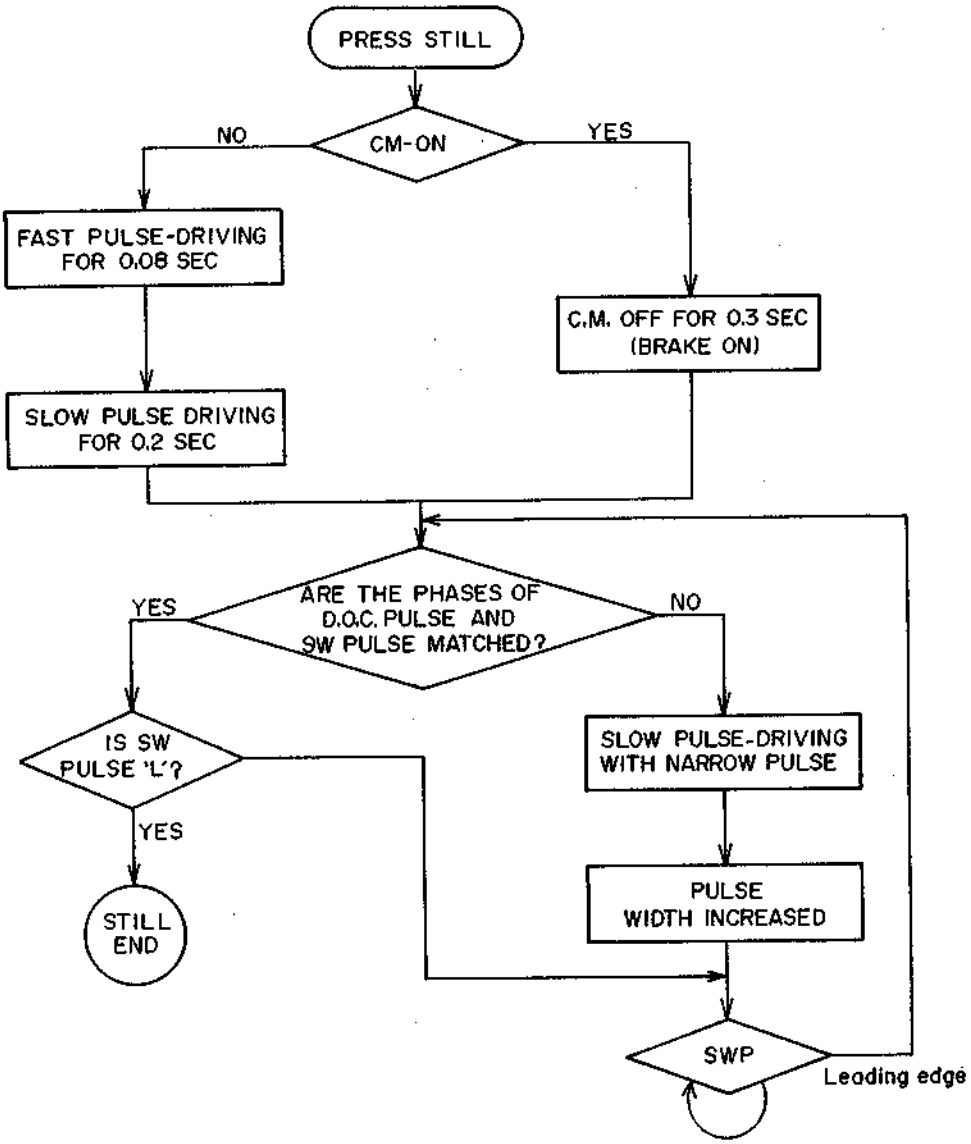


Fig. 47

3-3-4. STILL Control

VS-5 obtains the still picture by pulse-driving the capstan motor (C.M.) thus feeding the tape little by little and by comparing the phases of the DOC-Pulse made by the video circuit and of the drum FF in accordance with the program of the following (Fig. 47) within the IC301. The pulse-driving pulse is triggered by the up-edge of the drum FF (switching pulse).

Therefore, the synchronization is 25 Hz. When the STILL key is pressed, check is made to see whether the CM is operating and if it is operating, brake is applied for 0.3 sec. to bring it almost to the stop.

If the CM is not operating, it is taken as frame advance, and the tape is pulse-driven fast for the first 0.08 sec. and a little slower for the next 0.2 sec. to shorten the reverse channel playback.

Then, check is made of the phases of the DOC pulse and the switching pulse, and if the leading edge of the SW pulse matches the phase of the DOC, the still status is achieved. If they are not matched, resetting is made and the tape is fed slowly being pulse-driven with slow pulse length.

Even if the phase are matched, the work should not be stopped so soon because it will go too far if the tape speed is not sufficiently slow. Therefore, check must be made to confirm that the speed is sufficiently slow and when the phases are matched 5 times, the STILL is finished.

If the phases are not continuously matched 5 times, the pulse-driving is continued slowly until 5 time matching of the phases is achieved. However, despite the fact that the slow driving is possible under the normal temperature, it may happen that the pulse does not move so smoothly under the low temperature. Therefore, each time they are not matched, the pulse width is increased a little. In this way, VS-5 uses the microcomputer to achieve STILL, and consequently no adjustment is possible after the picture is actually stopped. But from many experimental results, the best value is set so that there will be no problem. Therefore, in such cases, it is necessary to check whether the operation of the driving system is correctly being carried out.

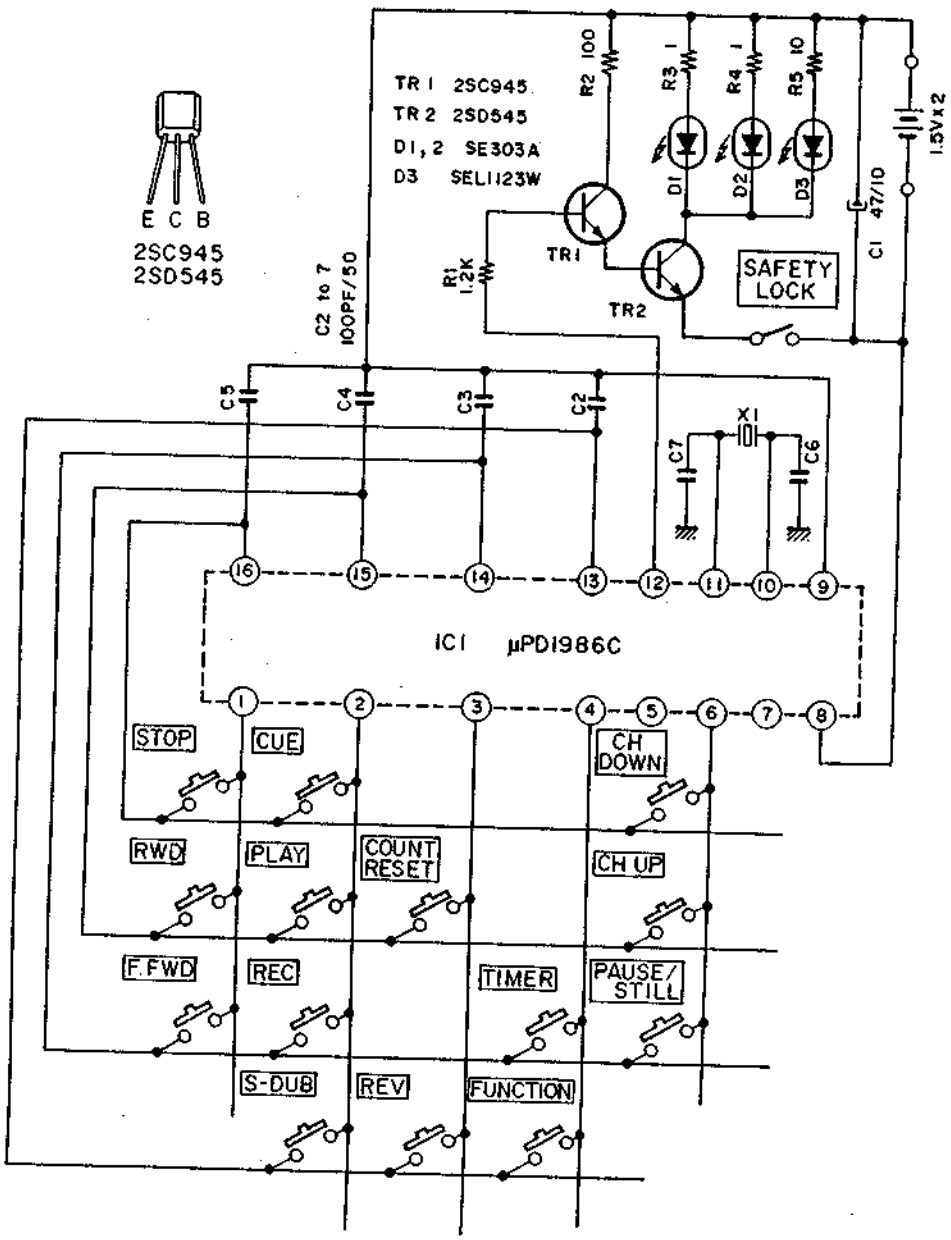


Fig. 48

3-4. Remote Control Unit

Infrared-ray IC MPD1986C is used. The carrier is 38 kHz. While the keys, CHANNEL UP, CHANNEL DOWN and PAUSE/STILL are pressed, the pulses as shown in Fig. 49 are transmitted continuously at the interval of 36 msec.

Other keys do not work after the signal is issued twice, thus saving the battery. To prevent the unnecessary transmission, the power SW is provided at the side.

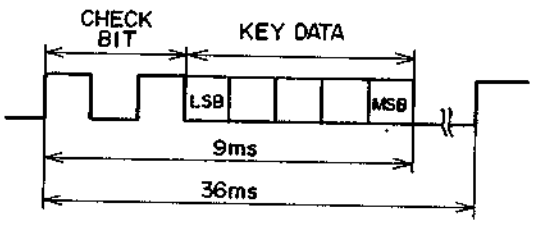


Fig. 49

4. VIDEO AMPLIFIER CIRCUIT

4-1. Y Signal System

4-1-1. Recording Circuit

1) 5 MHz LPF (LCB-51)

The input video signal is terminated by 75 ohms within the rear substrate and enters 5M LPF LCB-51. The LPF is to correct the phase distortion of Y and chroma of the recording system and delays the Y signal by 0.2 msec. using a LPF of 5 MHz. Fig. 51 shows the delay time relationship of the filters.

2) AGC (AN6310)

The video signal passing the 5 MHz LPF enters AGC of AN6310.

One of the reasons AN6310 is used for the IC of recording system instead of HA11701 (VS-9700) is its superior AGC characteristic. Both ICs are keyed + peak type AGC but there is a considerable difference between them in input and output characteristic (Fig. 52), i.e. the AGC characteristic of HA11701 was that a constant level could not be obtained at the time of excessive input and for the signal with high luminance such as VIT signal

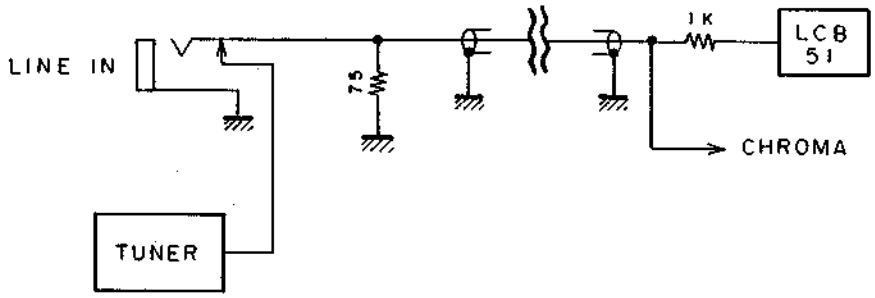
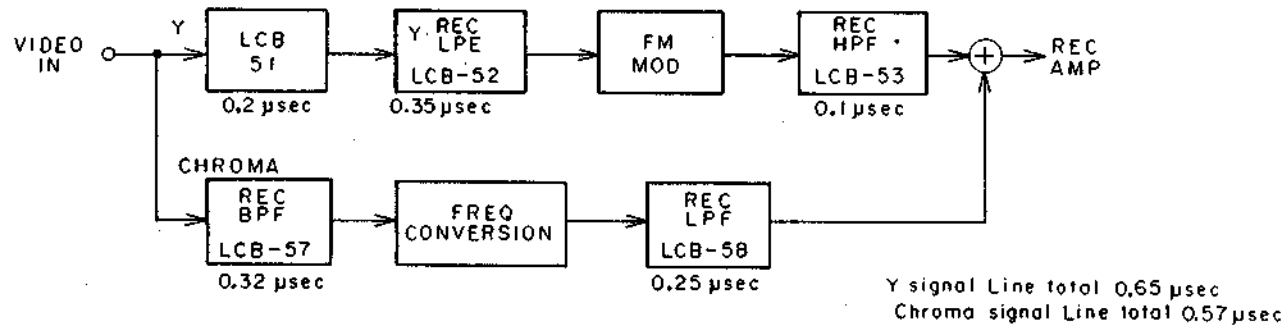


Fig. 50



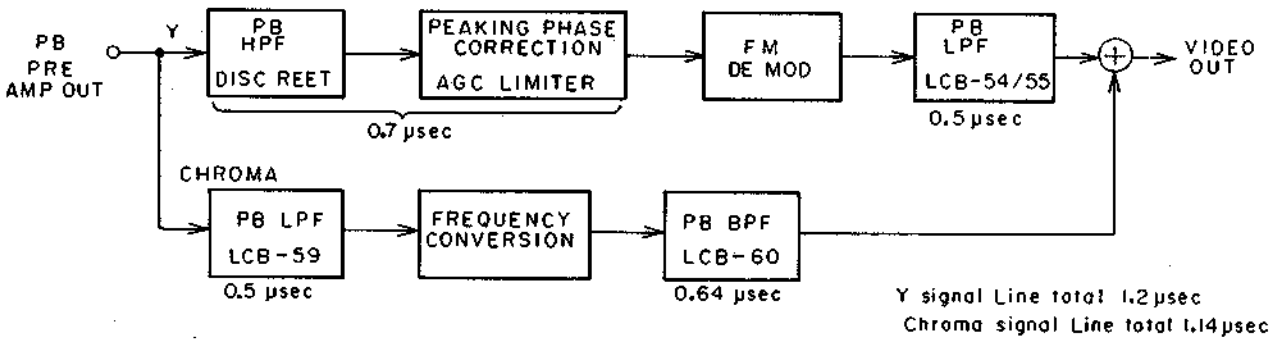


Fig. 51

(recognizing signal in V blanking), the level could not be sufficiently controlled and buzz was produced. On the other hand, in case of the AGC characteristic of AN6310, the level is sufficiently controlled as shown in Fig. 52, and even when such a signal enters, no excessive input will go into the RF converter and buzz will not be produced so easily.

The keyed + peak AGC means that when the peak-to-peak is within a certain size, AGC works so as to keep the size of SYNC constant and when the peak-to-peak reaches a certain level, it works so as to keep the entire level constant. The VIT signal is the signal put into the V blanking immediately after the V SYNC by TV stations, etc., to compensate and recognize the characteristic of the transmitting system, but there is a large APL fluctuation after the V SYNC and it seems that some stations have excessively large VIT signals and they are one of the causes for buzz. (VS-9700).

Also, it seems that some stations input a static picture called teletext also immediately after the V SYNC in addition to the VIT signal and that the SYNC ratio of the video signal varies widely depending on the stations, and these also produce buzz. If AN6310 (improved version of AN6300) as the AGC, the peak does not exceed a certain level and the buzz problem is solved. In case of the AGC output level, the gain is changed by VR1 (20K) to control the E-E level. The AGC time constant is determined by C and R of Pin ④.

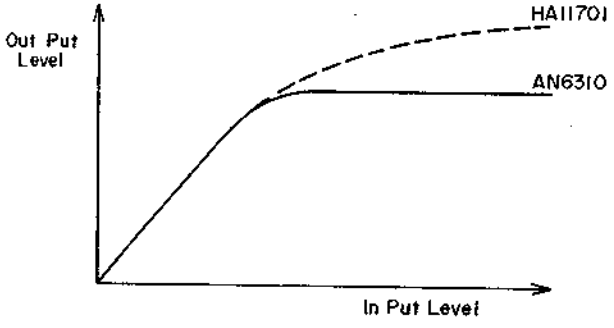


Fig. 52

3) REC Y LPF (LCB-52)

The signal from AGC partially enters HA11703 as E-E, and is outputted to VIDEO OUT by E-E and PB switching. Fig. 53 shows the characteristic of LCB-52. The signal from the AGC enters REC-Y-LPF LCB-52 and the chroma signal of 4.43 MHz is removed. Since VS-5 does not change the band by color and B/W, the signal always passes this filter. Therefore, Pin ㉓ (Color-B/W change-over) of AN6310 is connected to Vcc and no change-over is made. Phase characteristic is improved because REC and PB are not using a same LPF.

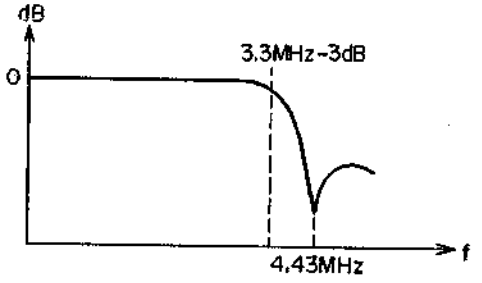


Fig. 53

4) Non-linear Emphasis

After the LPF, the signal enters the non-linear emphasis.

The non-linear emphasis is more effective for the signal with smaller amplitude, and if this process is made when recording, S/N and modulation factor will be improved when regenerating. As shown in Fig. 54, it uses the characteristic of diode, and if the level is large, the diode is turned ON and no emphasis is applied by the time constant of C1 R1 and C2 R2 and if the level is small, D1 and D2 are OFF, and by the time constant of C1, R1 and R2, emphasis is applied. Therefore, the frequency characteristic of the signal with smaller level can be reduced that much, and the S/N of the flat part can be improved. If the frequency characteristic is left as it is when regenerating, the modulation factor will be increased to the extent that emphasis was applied when recording. VS-5 has the emphasis of 3 ~ 4 dB for the signal of −20 dB. (Fig. 55)

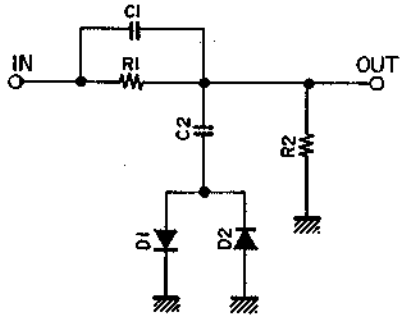


Fig. 54

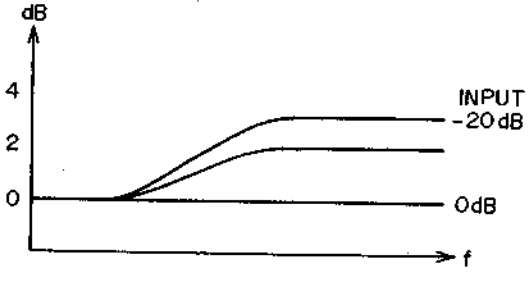


Fig. 55

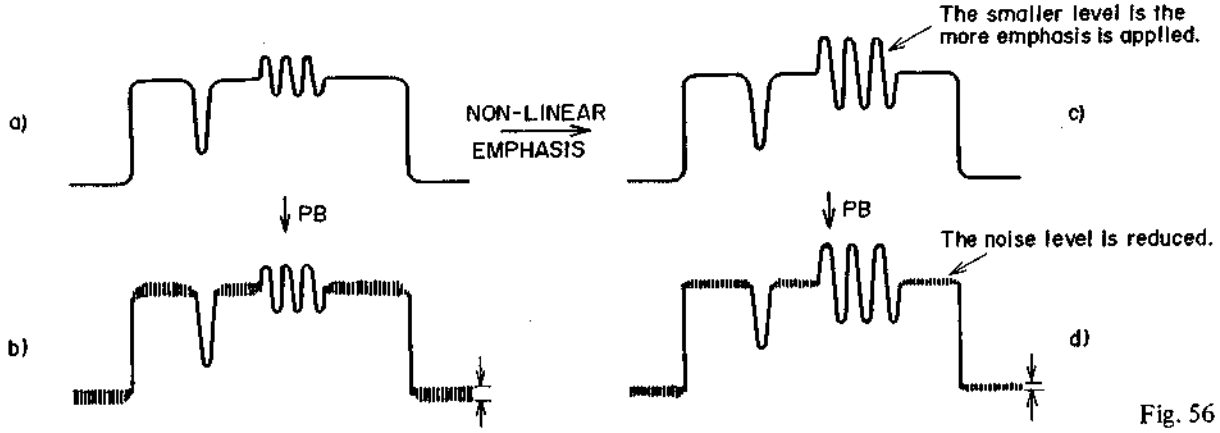


Fig. 56

For the actual waveform, the S/N can be improved as shown in Fig. 56.
On voltage of the diode is 0.2 to 0.3V (1SS16), so the input of the nonlinear emphasis is about 2 Vp-p. Since the chroma signal which was not removed by the REC LPF because the emphasis was on or the chroma signal leaking due to the pattern is leveled up, a trap (27pF, 27μH) is provided to eliminate it.

5) CLAMP, PRE-EMPHASIS, DARK CLIP, WHITE CLIP

After the non-linear emphasis, the signal passes Clamp, Pre-emphasis and Clip and enters FM modulator. The clamp is to make the carrier frequency of SYNC TIP constant. Than, the ordinary pre-emphasis is applied. This curve is stipulated by the VHS specification and is shown in Fig. 57. This is determined by C and R connected to Pin ⑪ of AN6310.
Then dark clip and white clip are applied. This clip circuit is called soft clip circuit. By this method, the waveform is clipped as if it were crushed from the top as shown in Fig. 58. Fig. 59 shows the circuit.

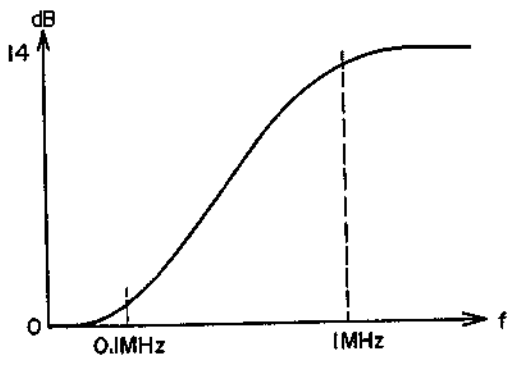


Fig. 57

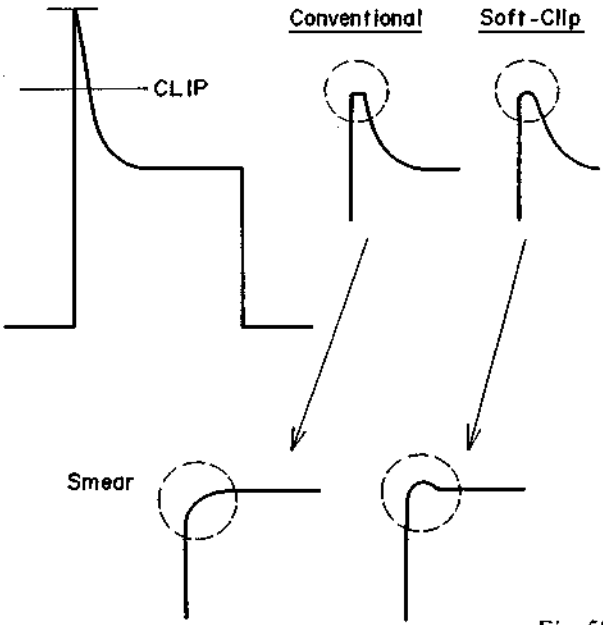


Fig. 58

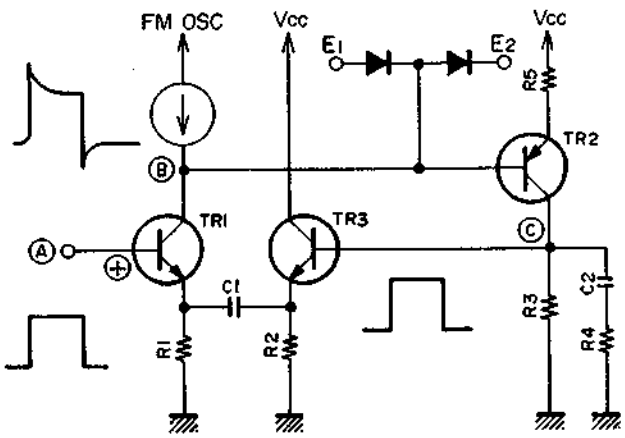


Fig. 59

a) Q1, Q2 and Q3 set up a differential amplifier. The constant-current source of collector load of Q1 is FM OSC and the frequency changes in proportion to the collector current of Q1.

b) If Ⓐ is inputted to ⊕ of the amplifier, the output Ⓒ is negatively fed back to the base of ⊖ input Q3.
R3, R4 and C2 set up a de-emphasis.

c) As a result, at FM OSC (collector of Q1), the pre-emphasized waveform which will be the same waveform as that of the input Ⓐ when the de-emphasis is transmitted, is produced.

d) The waveform preemphasized by the voltage of E1 and E2 is clipped. But for the same reason as given in ③, the waveform is so clipped that it will become approximately the same as the input waveform when de-emphasized.

e) As a result, the smear due to clipping is improved.

The clip level is determined by VR3 (white clip) and VR4 (dark clip) and is adjusted to 160% and −40% respectively.

6) FM Modulator

The signal is modulated into FM by the FM modulator within AN6310. The oscillation frequency is determined by the capacity 75p (68p + 7p) + α (trimmer) or Pins ⑬ and ⑭, and is set at 3.8 MHz by SYNC TIP.

7) REC Y HPF (LCB-53)

The FM signal enters HPF (LCB-53) to eliminate the interference with the chroma. It always passes this filter because there is no Color-B/W change-over. The cut-off frequency is 1.4 MHz.
This is received by EF and sent to REC AMP.

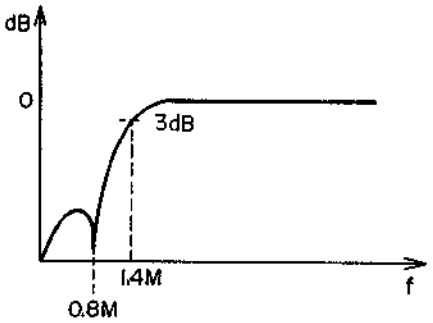


Fig. 60

8) REC AMP

As shown in Fig. 61 (a), the REC AMP of VS-9700 determines the REC AMP frequency characteristic (VHS specification) by applying the feedback Z to the Gain −A amplifier, and the output is constant-voltage driven.

On the other hand, the REC AMP of VS-5 determines the frequency characteristic with the preceding amplifier (TR4, 5) and after that, it provides the constant-current buffer (TR6, 7) and the output is constant-current driven. The advantage of the constant-current type is that the current does not change even if the inductance of the head changes a little. For example, in the case of constant-voltage type, if the inductance has changed due to the wear or time aging of the head, the current will be changed in proportion to the inductance thus changing the recording current, but in the case of the constant-current type, the current will remain constant even if the inductance is changed thus assuring the constant recording current. Also, the frequency characteristic of REC AMP is determined by C29 (7p), C28 (11p) and R31 (1.5K). (Fig. 62). Fig. 63 shows the recording signal mixer section, and the FM signal of Y and chroma signal (low band conversion 627 kHz) are mixed before the REC AMP. The power supply of the REC AMP is controlled by the signal REC MUTE as shown in Fig. 64. This is to prevent the recording current because the regenerating mode is provided once when AEC (electronic editing).

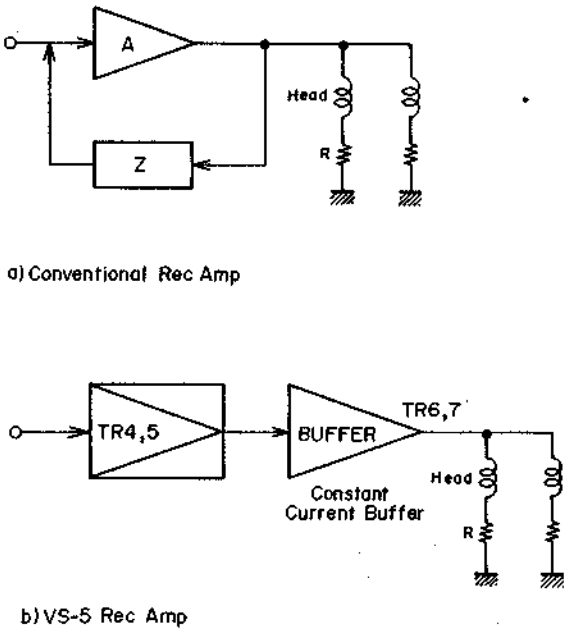


Fig. 61

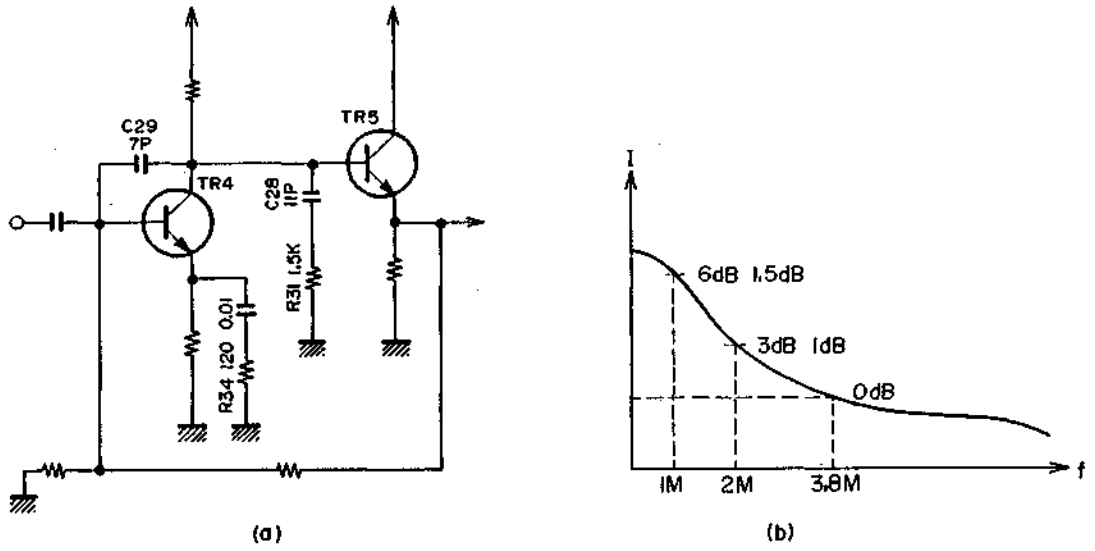


Fig. 62

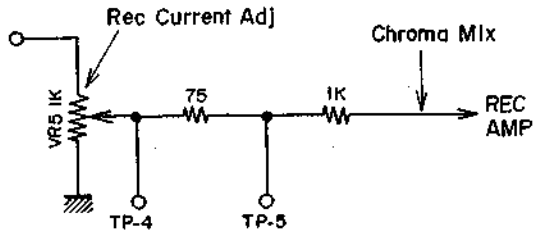


Fig. 63

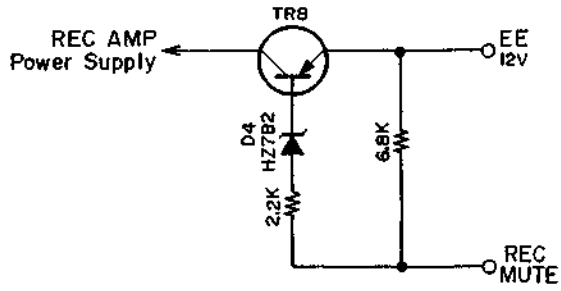


Fig. 64

4-1-2. Y Signal Play Back Circuit

1) Pre Amplifier

For the matching with the head, the peaking frequency (4.5 MHz) is adjusted by the trimmer condensers VC 2 and 3 and the damping (4.5M/1M:1.8) by VR6 and VR7. VS-9700 applies the peaking of LCR at Pins ⑧ and ⑭ of AN6320N, but VS-5 has a peaking circuit at a later stage and it has not peaking in here.

The output of the pre amplifier is made at EF when CH1 and CH2 are switched. It has no such PB FM balance as provided in VS-9700 but instead, it used AGC HA11718 to eliminate this adjustment.

The output of the pre amplifier is outputted by the connector at TP6 as FM envelope.

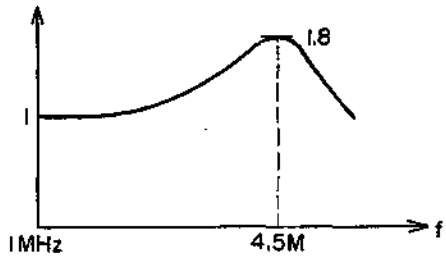


Fig. 65

2) HPF, PEAKING, PHASE COMPENSATION

HPF is provided discrete and the characteristic is shown in Fig. 66.

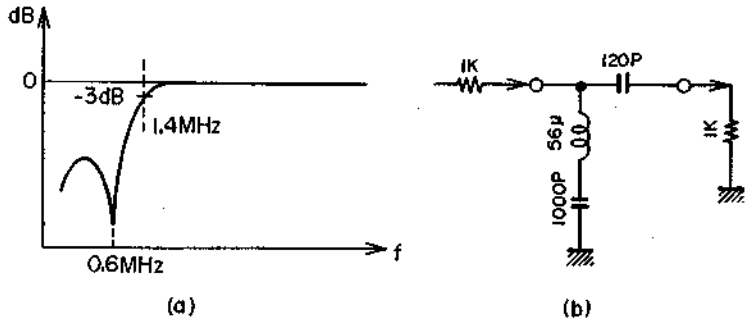


Fig. 66

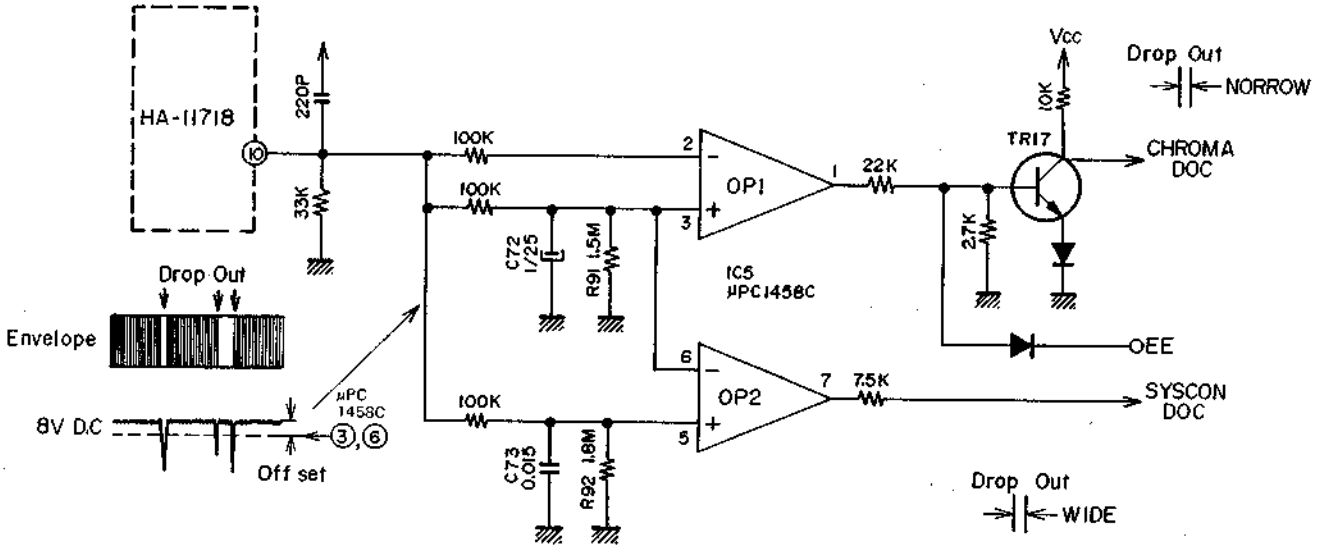


Fig. 67

Fig. 68

After the HPF, peaking is applied by TR13 nearly to 5.5 MHz. The resonance with the head and the peaking at a later stage amount to the total peaking of about 4 times.

3) AGC, DOC

Due to the provision of PB system AGC, FM balance at PB is not required. HA11718 includes pre amplifier, AGC and DOC, but the pre amplifier and AGC, if used simultaneously, may interfere each other in PAL band, and also there are many use problems such as oscillation, and therefore, AGC and DOC only are used and for the head amplifier, AN6320N is used. DOC detection sensitivity is changed by the resistance R85 (3.3K) of Pin ⑨.

4) DOC Pulse

The chroma circuit of VS-5 is designed not to gate AFC and burst when there is a drop-out in the function of AN6362. For this reason, DOC pulse is required. Also, when STILL, the microcomputer sends the noise bar to the lower part of the picture by using the DOC pulse.

At Pin ⑩ of HA11718 there appear waveforms as shown in Fig. 67, in proportion to the drop-outs. From these the DOC pulse is made with the use of an operational amplifier (μPC 1458C). To eliminate the dispersion of the DOC pulse (it is necessary to adjust by means of VR to restrict the dispersion) due to the dispersion of the DC voltage of PIN ⑩, the output of Pin ⑩ is smoothed to be a reference voltage and compared by 1458 to produce

the pulse. For this reason the DOC pulse is not adjusted. R91 is for offsetting the reference voltage and so designed that the pulses are prevented from occuring unnecessarily. Unlike the DOC for chroma, the DOC pulse to be sent to SYSCON must be relatively wide, and therefore, it is rounded by C73. R92, also for offsetting, determines the output amount of the SYSCON DOC pulse. (Fig. 68).
The diode provided in the emitter, base of TR17 of chroma DOC is intended to prevent the DOC pulse from going to the chroma circuit under EE condition.

5) Double Limiter (1st Limiter)
The short wave length recording of PAL needs a double limiter to prevent the over modulation. The circuit consists of a high pass amplifier and a diode limiter. (Figs. 69, 70)

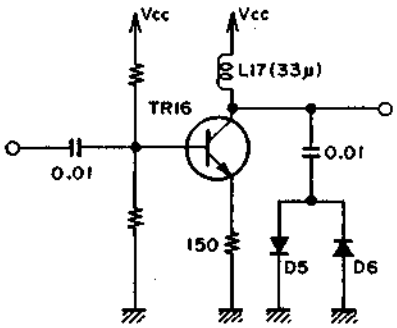


Fig. 69

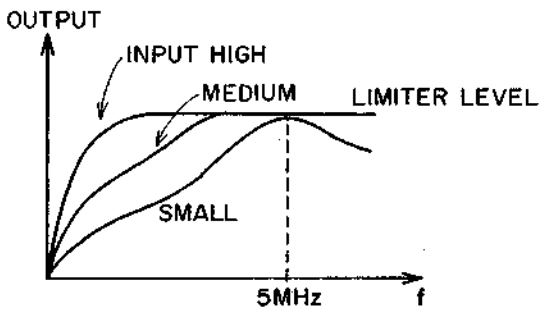


Fig. 70

6) PB Y LPF (LCB54, 55)
The characteristic of LCB54 and 55 is shown in Fig. 71, and they have the total delay time of 0.5 msec.

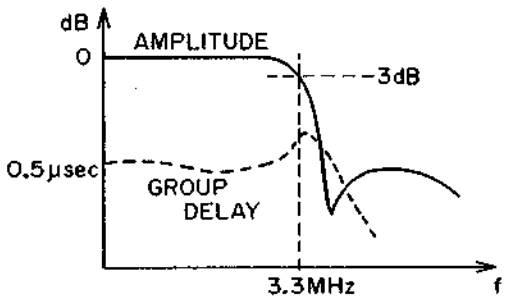


Fig. 71

7) De-emphasis
De-emphasis is the circuit shown in Fig. 72 and TR18 sets up the amplifier to determine PB Y level and the peaking through C84, L23 and R102. The de-emphasis consists of R104, R105 and C85//C86.
The peaking of C84, L23 and R102 is to increase the percentage modulation and raises about 2.3 MHz. This makes the video frequency characteristic in recording and regenerating almost flat.

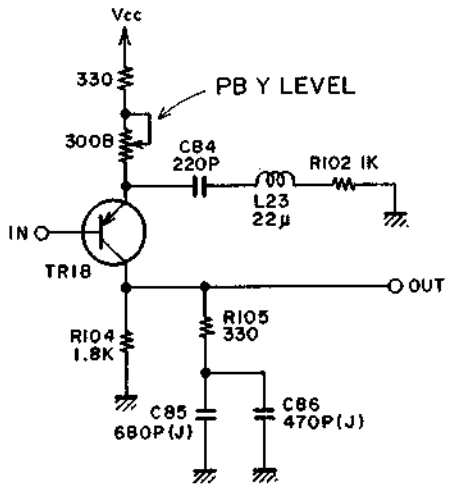


Fig. 72

8) Noise-Cancel
The noise cancel is shown in Fig. 73, and the regenerative video signal enters ⑫, and the one with the high part removed by R115 and C93 enters ⑪. After taking the difference between ⑫ and ⑪, those processed by the limiter are outputted to ⑬. Therefore, here come out the small level components in high band, especially those

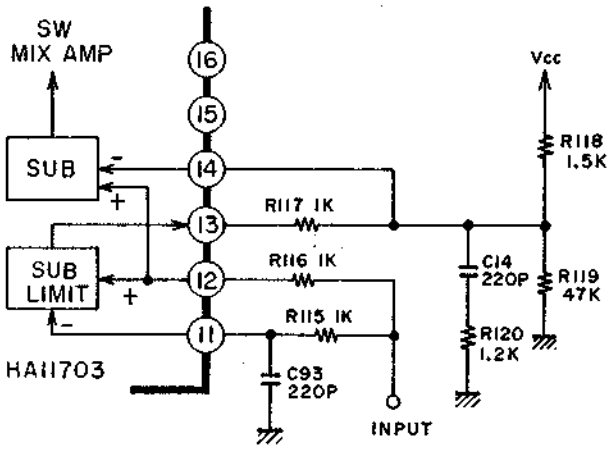


Fig. 73

containing much noise. (large level high band components are processed by the limiter and the amplitude is controlled). These are corrected slightly by the filter of R120, inputted in ⑭ and withdrawn from the input signal of ⑫. Thus the noise components only of the regenerative video signal are removed and the S/N is improved. The filters of C94 and R120 are to cancel noise components only and not to cancel the high band too much.

9) MIX, V. PULSE INSERTION, SW (EE/PB)

The video signal passing the noise cancel is mixed with the regenerative chroma signal ⑮ by HA11703 and switched to EE or PB by an electronic switch. This change-over is controlled by the

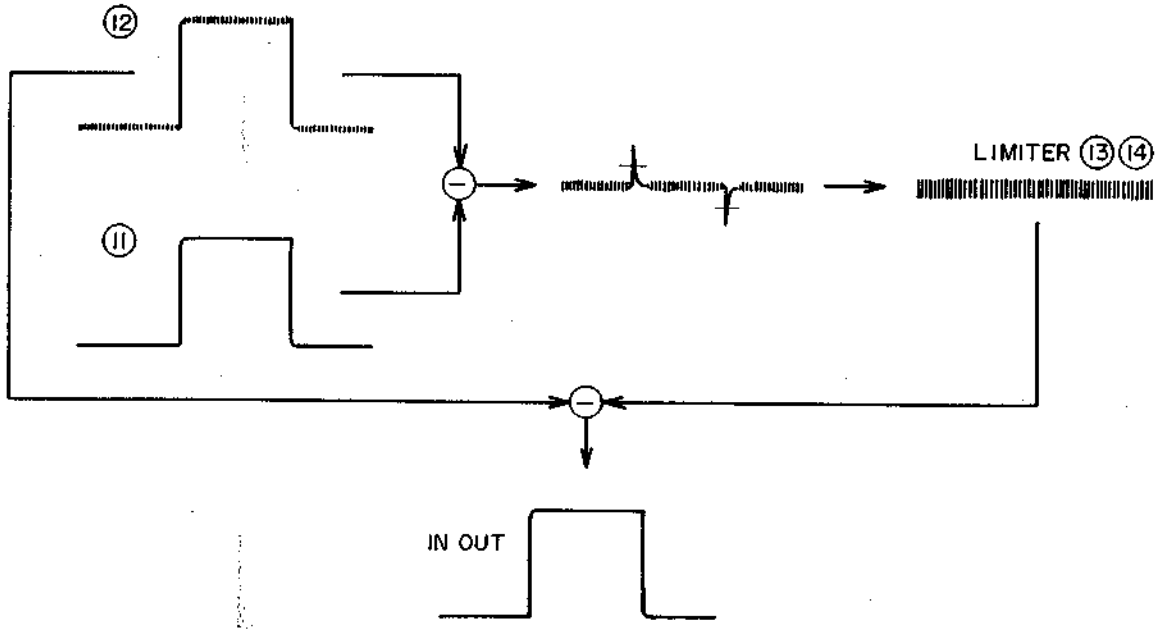


Fig. 74

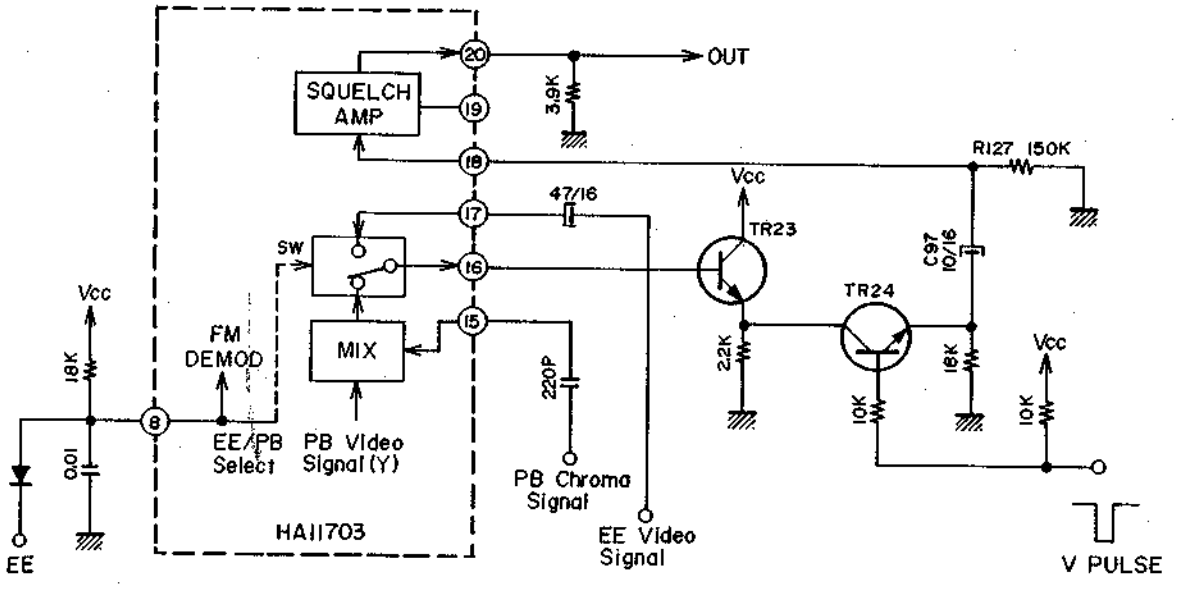


Fig. 75

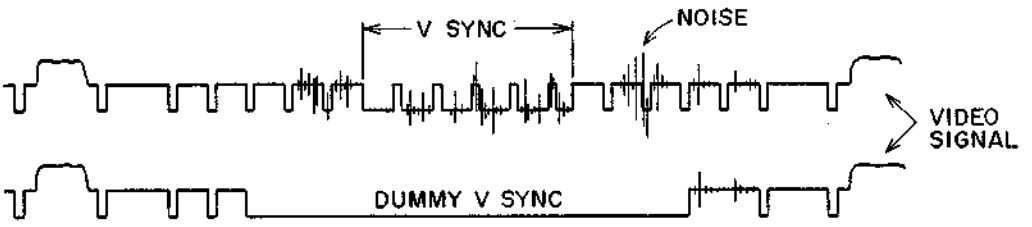


Fig. 76

voltage of Pin 8 (also the bias power source of FM demodulator). (Therefore, if the picture is not changed to PB in the play mode, it is necessary to check the voltage of EE). V. pulse (false pulse . . . In the case of STILL and varying speed regeneration, noise bar appears near the V. SYNC and V. SYNC tends to be disturbed. Therefore, the false V. SYNC is inserted forcefully. This is sent from SYSCON) is inserted by TR24.

When the V pulse is high, TR24 is turned ON, and the signal is normally transmitted. When it becomes low, TR24 is turned OFF, blanking is applied. Since Pin ⑱ of IC HA11703, C97 and R127 set up a clamp, when TR24 is OFF, it is fixed to the SYNC level.

Pins ⑱ ~ ⑳ are video amplifiers of 6 dB, and Pin ⑳ is about 2 Vp-p. The balance is outputted by TR25. (LINE OUT . . . VIDEO OUT-1).

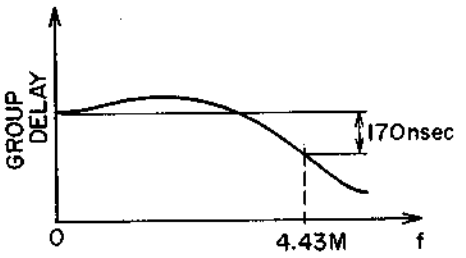


Fig. 77

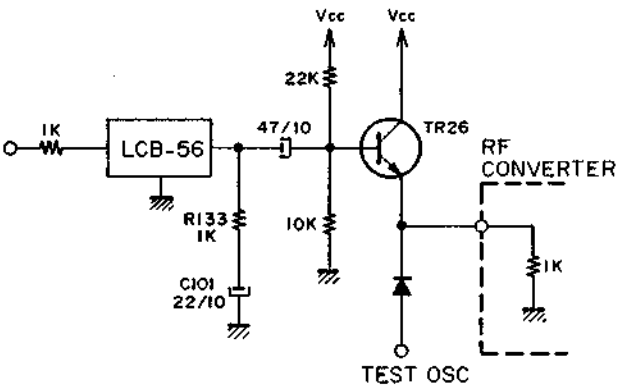


Fig. 78

10) RF Converter VIDEO OUT (VIDEO OUT-2)

The video signal to be sent to the RF converter is given a prescribed delay characteristic by the equalizer LCB-56. (Fig. 77)

C101 after LCB-56 raises the low band by sub-correction.

TR26 is received by EF and the emitter resistance by the RF converter side. When TEST OSC (described later) is ON, bias is applied through the diode and TR26 is turned OFF, and the TEST signal is transmitted to the RF converter.

11) TEST OSC

TEST OSC issues the false signal to assist the TV side when it tries to search for the output of the RF converter.

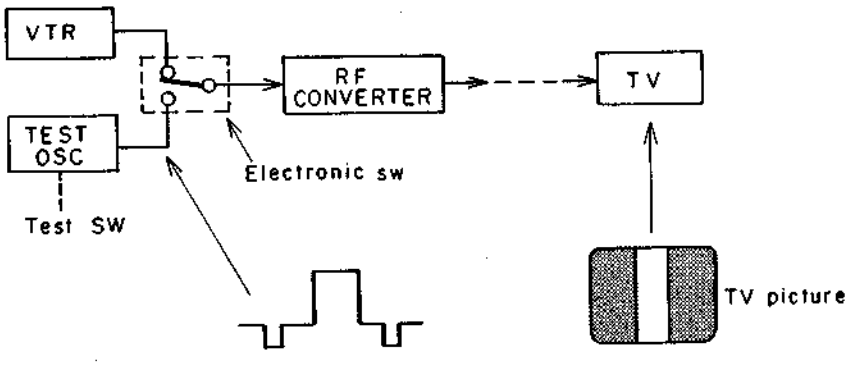


Fig. 79

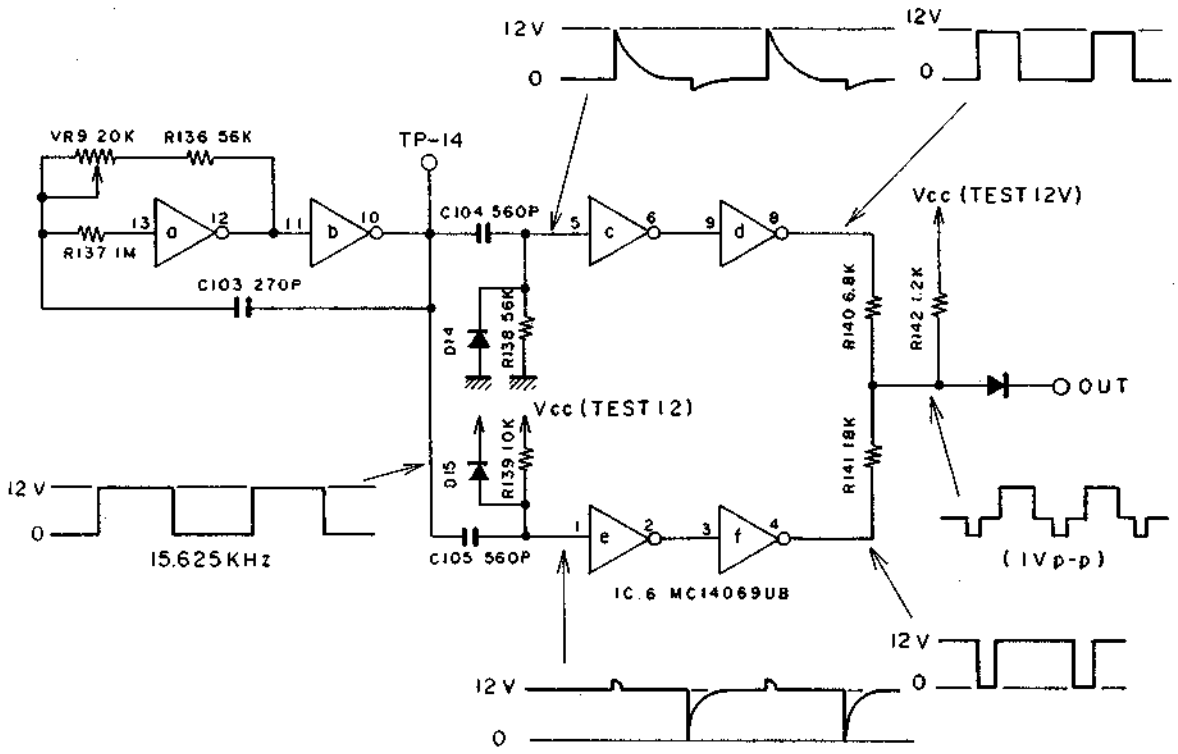


Fig. 80

The TEST OSC (Fig. 80) is operated when the TEST SW on the rear panel is turned ON and 12V is applied to the IC6 MC14069UB V_{CC}.
Firstly square waves are oscillated by the inverters a and b. The oscillation frequency is determined by C103, R136 and VR9, and adjusted to 15.625 kHz by VR9. Note that oscillation may not occur if the IC is not of un-buffer type, MC14069UB. Then, the frequency is differentiated and the pulses are shaped (inverters c, d, e and f) from ⊕ edge and ⊖ edge, and mixed by R140 and R141 to obtain the required waveform. The amplitude is determined by R142, bias is applied by Vcc, TR26 is turned OFF, and the TEST signal is sent to the RF converter.

4-2. Chroma Signal Circuit

Fig. 81 shows the block diagram of the chroma signal circuit.

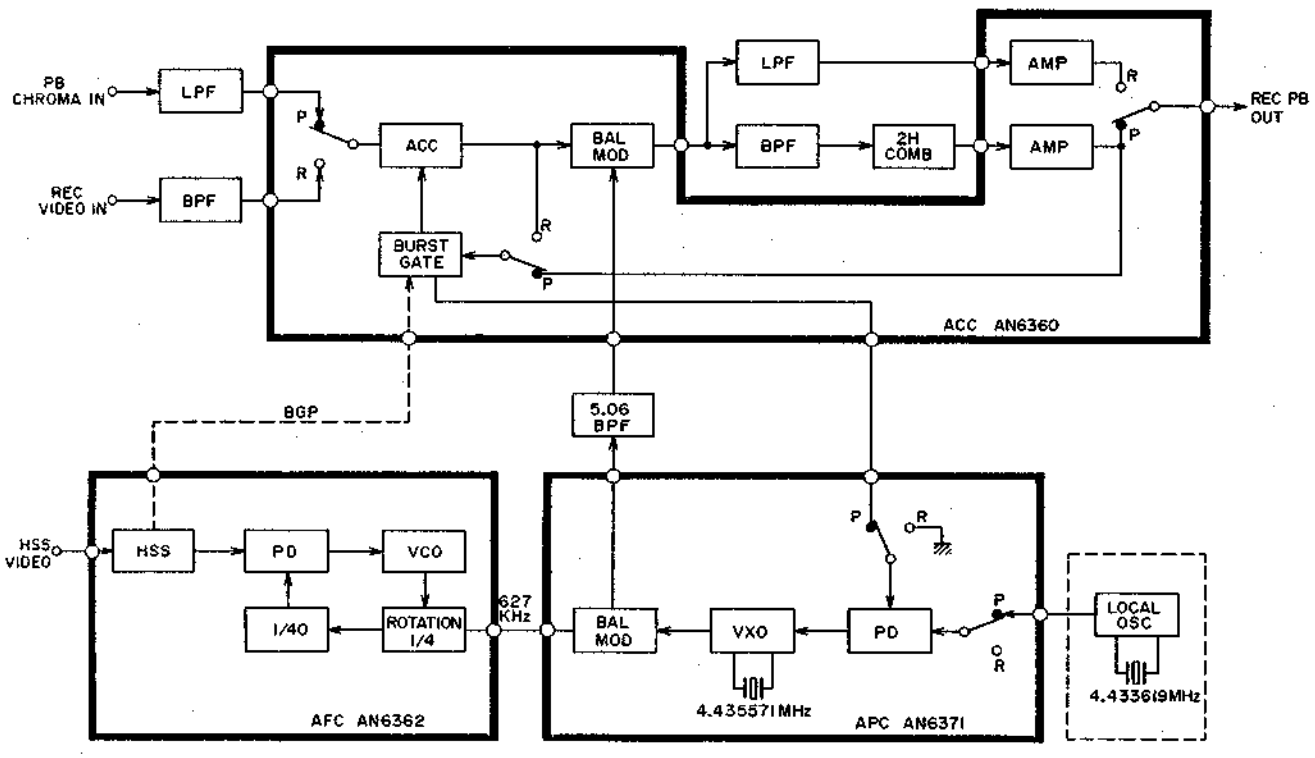


Fig. 81

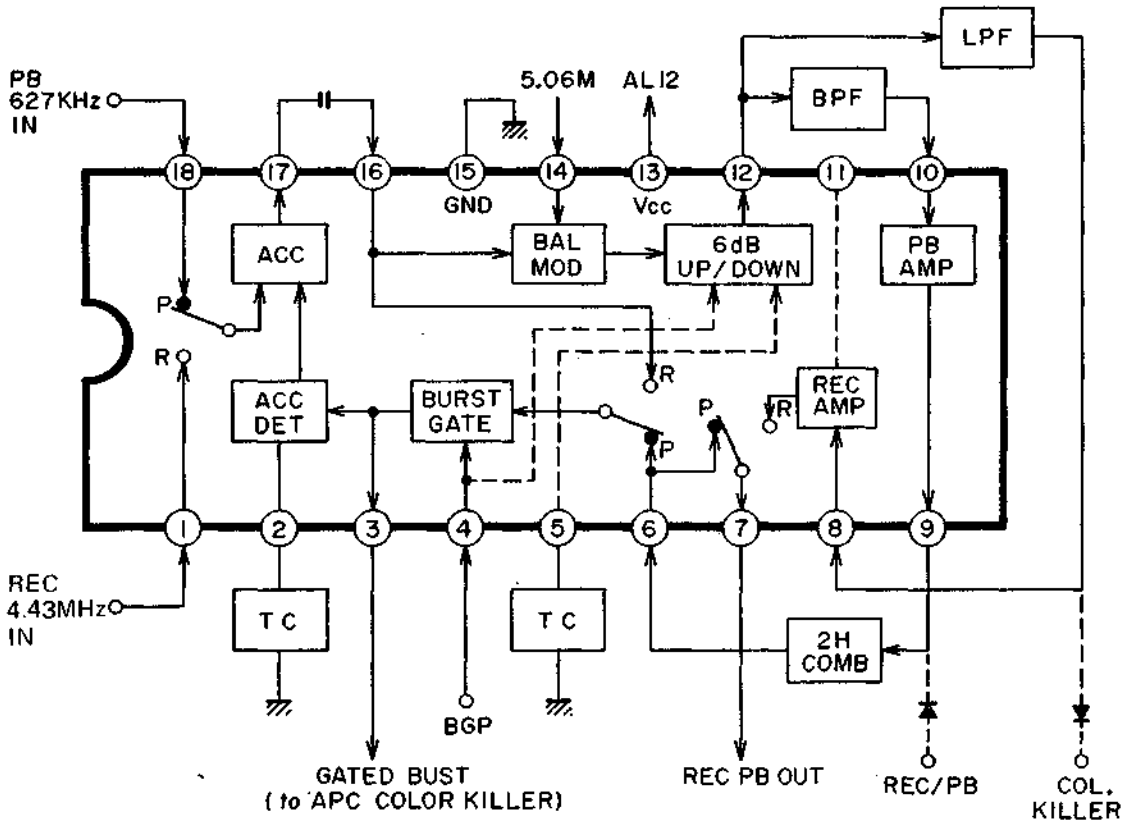


Fig. 82

4-2-1. ACC

Fig. 82 shows the internal block diagram of ACC circuit.

The low chroma signal in PB and 4.43MHz signal in REC enter ⑱ and ① respectively, and after changed over by the switch, enter ACC. The switch of REC/PB is controlled by the voltage of Pin ⑨.

The time constant of ACC is determined by Pin ② and is detected by the burst level of the ACC output in REC and 2H comb filter output in PB. The ACC output ⑰ together with 5.06 MHz from ⑭ enters BAL MOD (balanced modulator), and after frequency converted, comes out to ⑫. The output ⑫ passes LPF (LCB-58) in REC and BPF (LCB-60) in PB and enters REC amplifier or PB amplifier. Then, the PB with the crosstalk removed by the comb filter enters ⑥ and is outputted to ⑦ after REC/PB switching. The output of chroma signal for both REC and PB comes out at Pin ⑦.

④ is B.G.P. input and at ③ the gated burst is outputted and sent to APC and color killer.

1) REC BPF LCB-57

REC BPF is to take out only 4.43MHz chroma signal from the video input signal. The characteristic is shown in Fig. 83, and the signal is received by EF (TR28) and put into AN6360 ①.

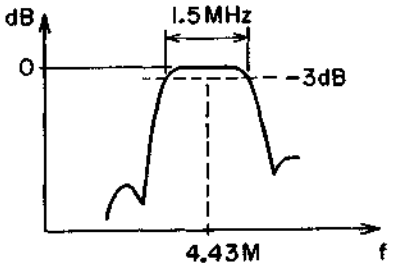


Fig. 83

2) PB LPF LCB-59

PB LPF is to take out the low converted chroma signal (low chrma) 627 kHz from the pre-amplifier output during PB and also adjust the phase relation between Y and chroma during PB. The characteristic is shown in Fig. 84 and it has the delay of 0.35 msec. After LCB-59, the signal is amplified by TR27. (about 200 mVp-p color bar at 6360 ⑱).

L, C and R in TR27 collector:

L27, C109 . . . . Trap to remove H periodic noise from TV, etc.

L28, C110 . . . . 75 kHz audio bias trap (for sound dub)

R149, C108 . . . CR for correcting frequency characteristic in REC and PB total

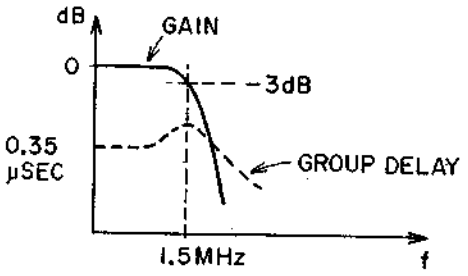


Fig. 84

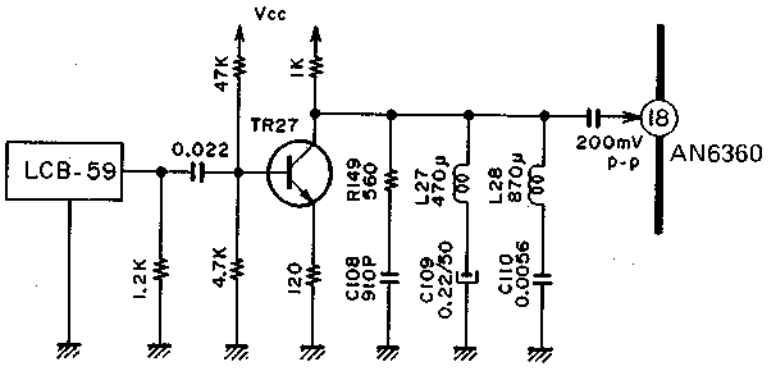


Fig. 85

3) ACC DET

The value of C is changed by TR29 so that the time constant of ACC will be fast in PB and relatively slow in REC.

4) REC LPF LCB-58

REC LPF LCB-58 is to take out only low chroma signal from the frequency converted signal (Pin ⑫), and the characteristic is shown in Fig. 86.

There is a C and R network in the vicinity of REC LPF as shown in Fig. 87, and it is to correct the frequency characteristic in PB and REC total (Same for R149 and C108 in the vicinity of PB LPF LCB-59) (Fig. 88)

Both CR networks are designed to stress the low band (eliminating the high band). The frequency characteristic of chroma is preferably flat at 4.43 MHz ± 500 kHz. When it is converted into the low chroma, it must be flat at 627 kHz ± 500 kHz. But the electromagnetic conversion characteristic of the head – tape system is 6 dB/oct and the higher the band, the larger the output, but when a certain level (around 1 MHz) is reached, the output becomes smaller due to the gap loss (Fig. 88 (b)). Therefore, it is necessary to correct this characteristic so that it becomes almost flat in REC and PB total. This is done by the C and R network in the vicinity of LPF of PB and REC.

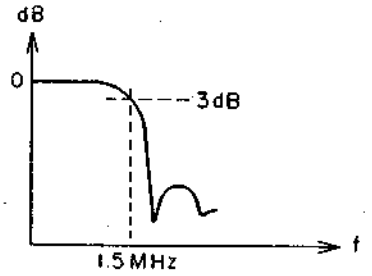


Fig. 86

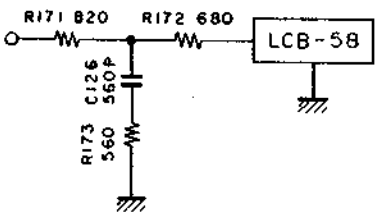


Fig. 87

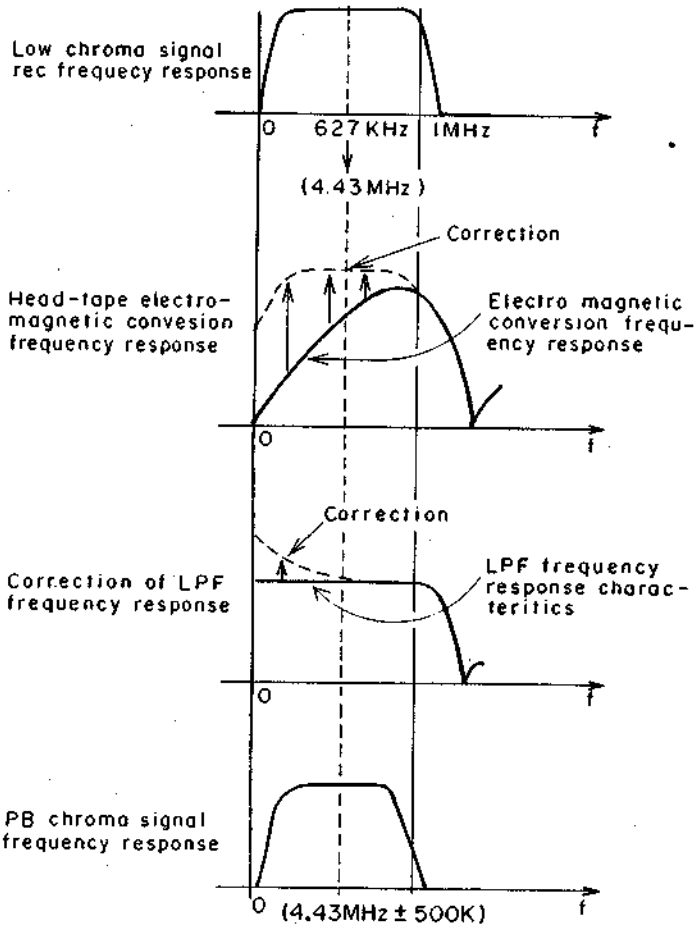


Fig. 88

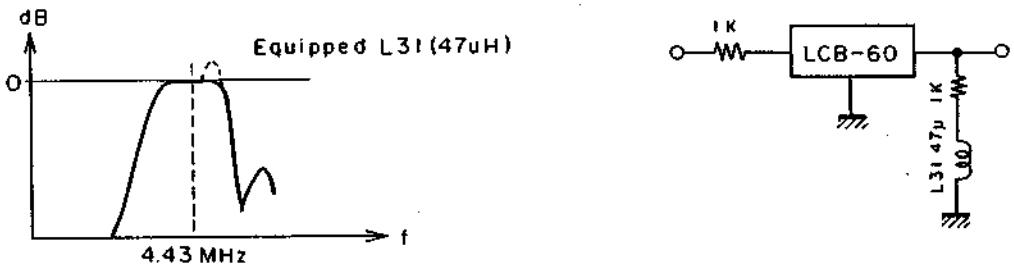


Fig. 89

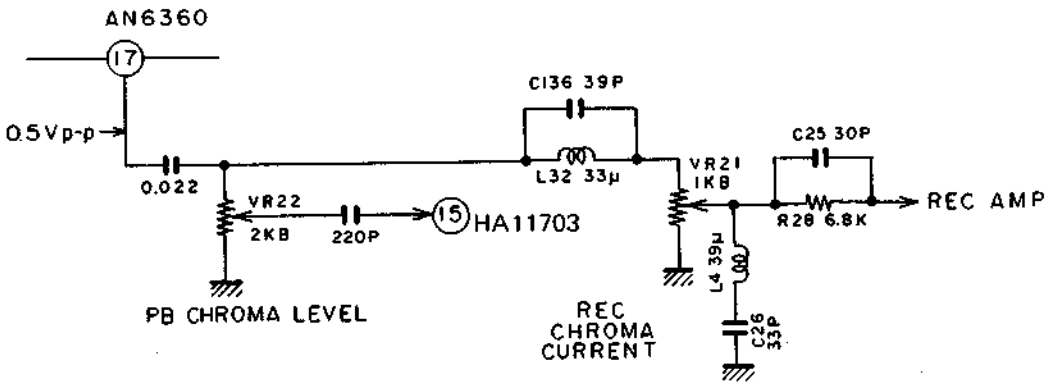


Fig. 90

5) PB BPF LCB-60

LCB-60 is to take out the chroma signal of 4.43 MHz from the output ⑫ of BAL MOD during PB. (Fig. 89). Here is also provided L31 (47 μ) behind the filter to correct the frequency characteristic same as above. (When 4.43 MHz is converted into low band, the band frequency is reversed in plus and minus. Therefore, the correction by L31 as in Fig. 89 is the correction in the same direction as the correction in Fig. 88.

6) PB, REC CHROMA OUT

The chroma is outputted from AN6360 ⑦ and the PB enters HA11703 ⑮ at VR22 and is mixed with Y. REC passes the traps of C136, L32 and L4, C26 and goes to REC AMP for mixing. These traps are intended to prevent the 4.43 MHz from returning to the pre-amplifier through the REC AMP during PB. The chroma recording current is shown in Fig. 91, and it is corrected by C25 (30p) to be flat.

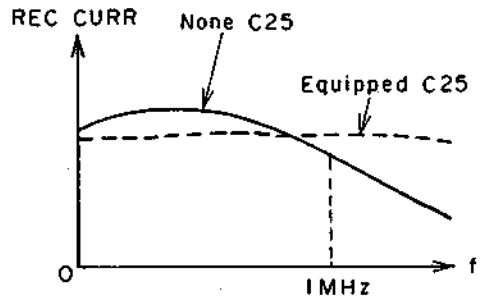


Fig. 91

4-2-2. AFC Circuit

Fig. 92 shows the internal block of IC AN6362 of AFC. Video signal for HSS (from VIDEO OUT TR25) from Pin ⑧ is entered through the filter. After amplified, it enters SYNC SEPA and the output comes from ③ and it will be the source of REF V (for servo). Also, HD pulse is outputted from ⑱ by the SYNC SEPA (→ BGP). SYNC enters AFC loop, and after rotation controlled, 625 kHz is outputted at ⑫. VCO output (1/160) of AFC is outputted at ④ as SFP (SYNC FRONT PULSE). This SFP and HD are sent to SYSCON to be used for the tuner searching (To judge whether it is the video signal or not). The frequency of SFP, if measured, naturally shows 15.625 kHz if AFC is locked. The time constant of AFC is governed by C and R of Pin ⑯, and the free run frequency is adjusted by VR24 of Pin ⑭ so that Pin ⑯ DC will be 4.6V when the video signal is inputted. (TP-31).

Pin ⑮ is to run the current (15 mA) for the internal I^2L logic circuit. Pin ① is the internal power source and Ⓒ for smoothing.

Fig. 93 shows the phase relationship among SYNC, HD and SFP of the input video signal. Pin ⑪ is for controlling the rotation.

90° phase delay at 0V, 90° phase advance at 2.5V and rotary stop at 6V. In PAL, CH1 is rotary stop and CH2 is 90° delay, so swing is made to 0 ~ 6V by SW pulse. In EGN, rotation of NTSC, so it is designed so that it can be changed to the swing at 0 ~ 2.5V.

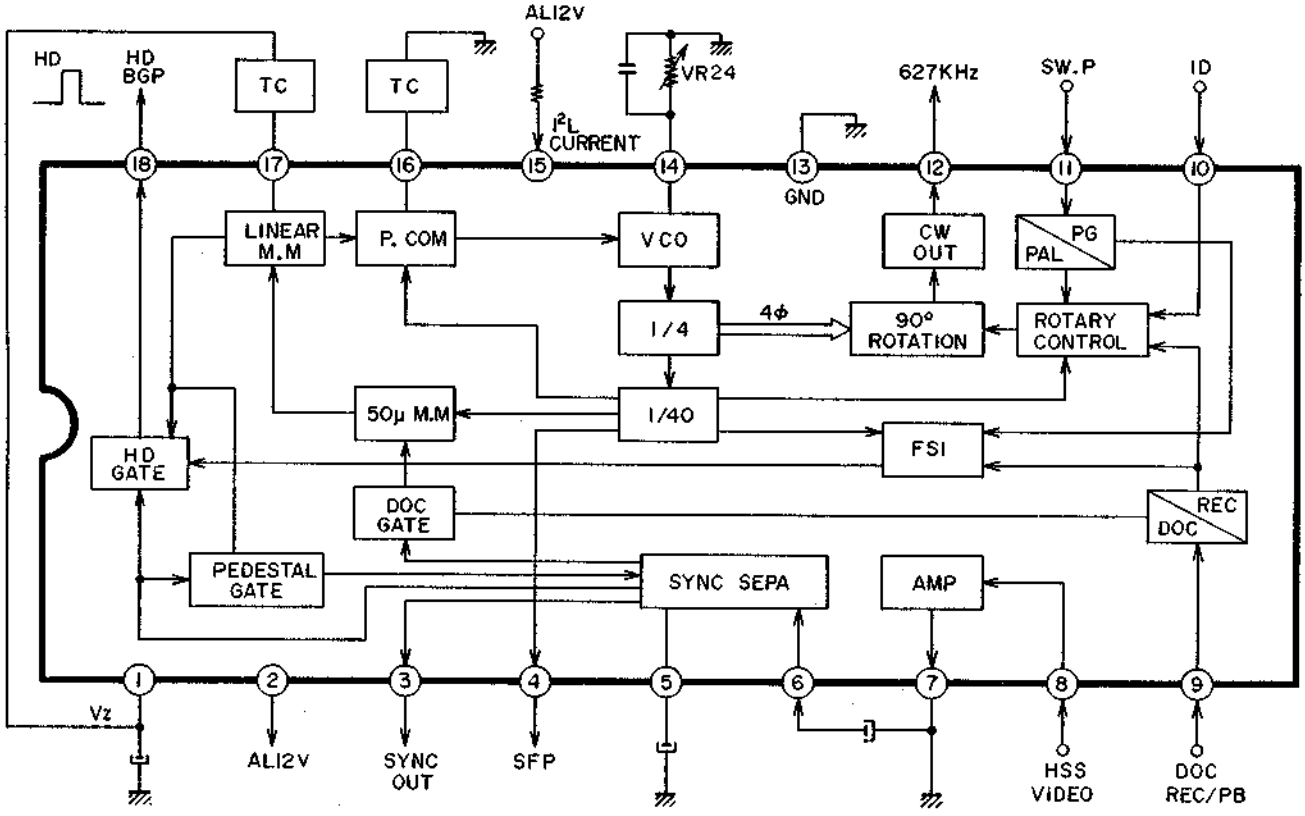


Fig. 92

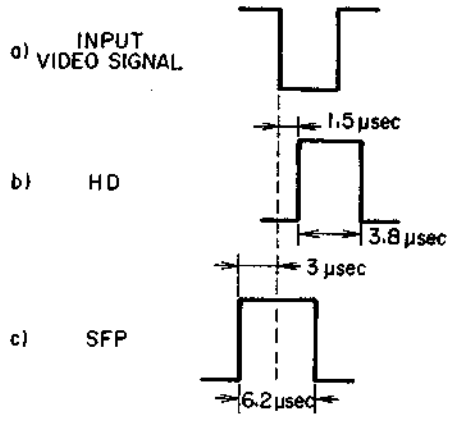


Fig. 93

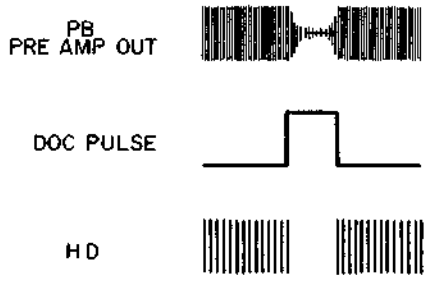


Fig. 94

1) DOC Circuit

Since noise is produced during the drop-out if any, it is effective to have the function to prohibit AFC and HD. This function is provided by adding the DOC pulse to Pin ⑨. When a drop-out occurs, HD is prohibited as shown in Fig. 94, BGP disappears in the meantime, and the burst is not gated. Therefore, there will be less hue disturbance when the drop-out is removed.

2) FSI Function

FSI is to inhibit HD for 7 ~ 8 hours after V SYNC as shown in Fig. 95. This is to prevent the hue disorder due to the skew in the first field part.

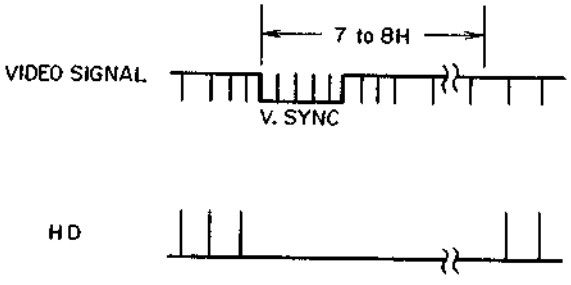


Fig. 95

That is, it inhibits APC (burst is not gated) while AFC is not stable and actuates APC when it becomes stable. This only functions during PB and during REC, change-over is made by applying the voltage to Pin ⑨.

3) HSS Video Filter

Pin ⑧ video for HSS is inputted after chroma, noise and other are removed by the filter as shown in Fig. 96. This affects the characteristic of AFC.

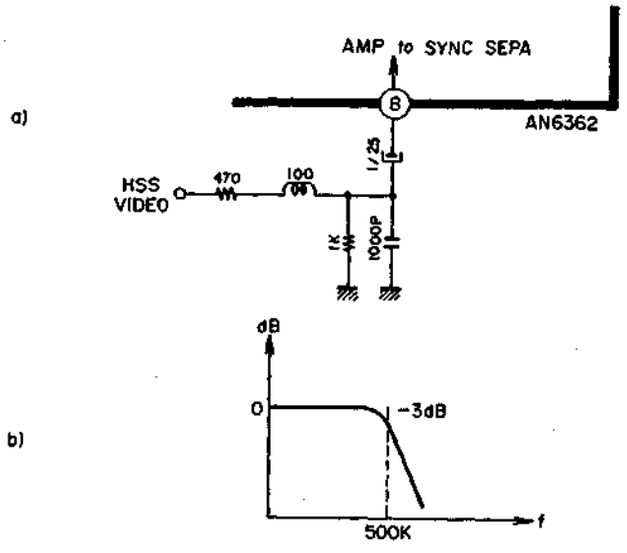


Fig. 96 HSS Video Filter

4) BGP

Burst gate pulse is produced from HD as shown in Fig. 97.

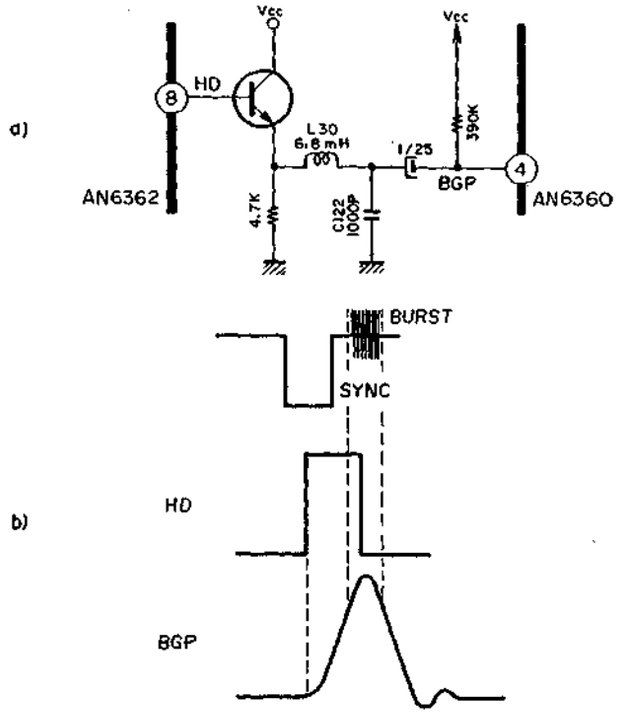


Fig. 97

4-2-3. APC

Fig. 98 shows the internal block of IC AN6371 of APC.

APC makes phase comparison between the burst signal from ⑬ and 90° shifted signal of ⑭ and

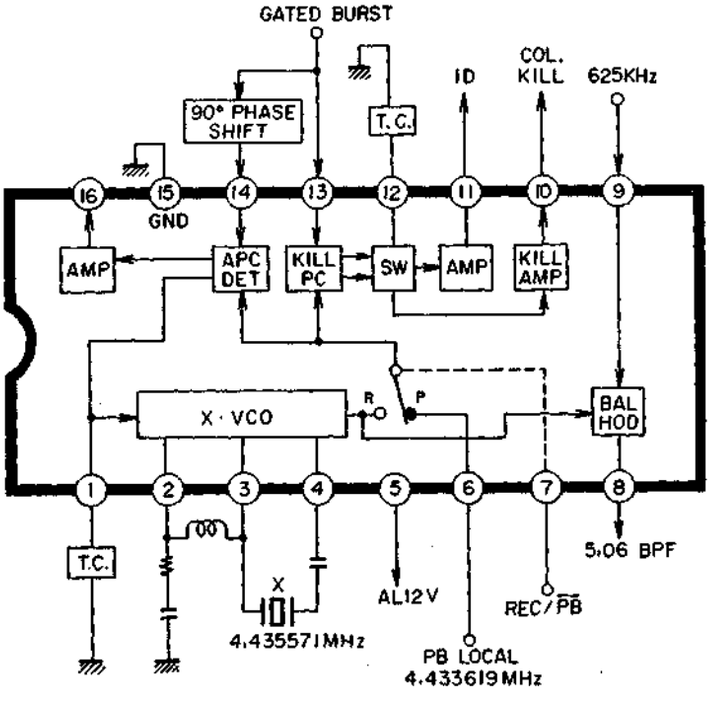


Fig. 98

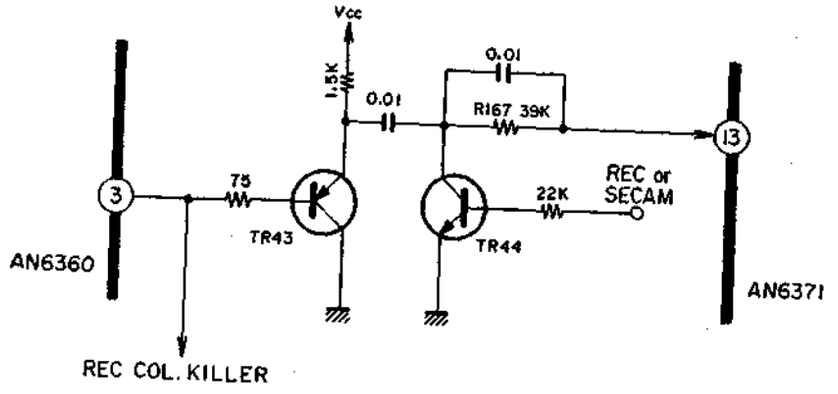


Fig. 99

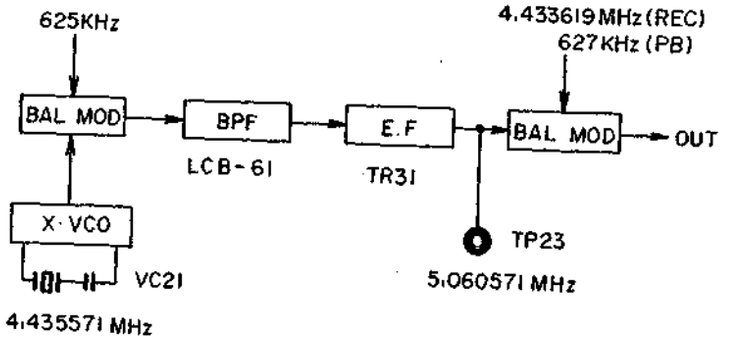


Fig. 100

VCO output (in REC) or LOCAL 4.43 MHz (in PB) Pin ⑥. REC/PB is controlled by the voltage of Pin ⑦. (it is necessary to lower the voltage under 0.7V during PB). The time constant of APC is governed by ①. Since APC is not locked (4.433619 MHz and 4.435571 MHz) during REC in PAL, the fixed oscillation is achieved by not inputting the burst.

② is the time constant of the killer and APC color killer is outputted at Pin ⑩ (DC10V fro color, 0 for B/W). If there is no burst input (no signal), this output becomes high. ⑪ is ID output.

The sub-converter (BAL MOD) balance-modulates 625 kHz from AN6362 (AFC) through ⑨ and 4.43 MHz of VCO and outputs them to ⑧.

1) Burst Input Circuit

The gated burst of AN6360 ③ is transmitted to APC (AN6371) but since in PAL, APC is not locked during REC, the burst is cut and 4.43M (4.435571 MHz) is oscillated fixed. During REC and SECAM (also fixed oscillation in EG, SECAM), TR44 is turned ON to cut the burst. R167 39K is to secure the R167 39K is to secure the oscillation.

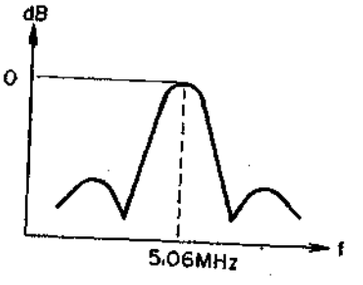


Fig. 101

2) 5.06 MHz BPF

The VCO oscillation frequency in REC is adjusted by the frequency of 5.06 MHz of TP23. In such a case, if 625 kHz is phase rotated, the correct frequency can not be measured, and therefore, the rotation is stopped (SECAM MODE) and the adjustment is made by VC21 so as to achieve 5.06057 (4.435571 MHz + 625 kHz) Hz. This VC21 can be adjusted through the hole of the front display PCB and TP23 can also be fine-adjusted in line because the connector is exposing.

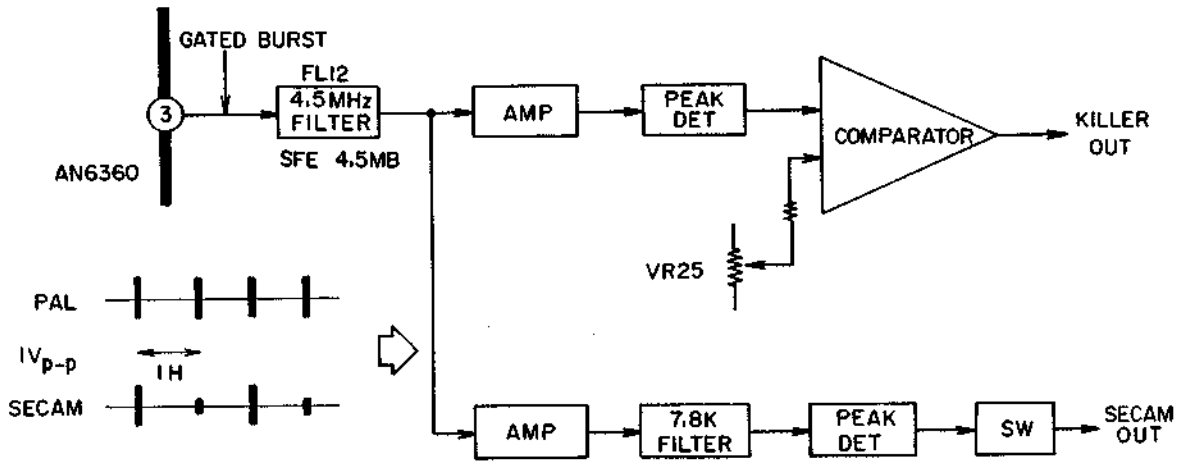


Fig. 102

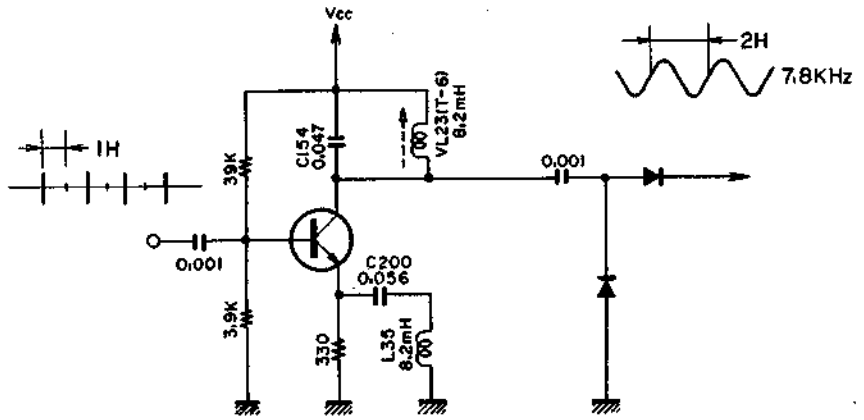


Fig. 103

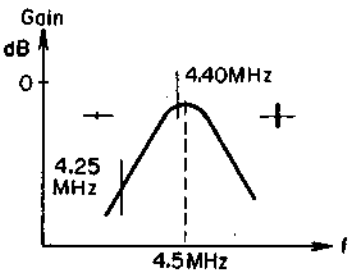


Fig. 104

4-2-4. REC Color Killer and SECAM Detector

In PAL the color killer cannot be used because APC is not locked during REC, and the color killer must be provided especially for REC.

VS-5 uses the color killer of level detection system. The gated burst passes the ceramic filter of 4.5 MHz and enters the color killer and SECAM detector. This filter removes noise in PAL (level difference between B/W and PAL is increases) and produces the level difference per one hour (7.8 kHz) in SECAM. This is amplified by the color killer, peak detected by two diodes and compared by IC11 (MPC741C). The reference is adjusted by VR25. The reference should be −12 dB in 75% color bar (level where the monitor becomes B/W). Since the carrier frequency of SECAM signal is changing to 4.40 MHz and 4.25 MHz every one hour, the amplitude per one hour (7.8 kHz) is taken out by utilizing the slope of the 4.5MHz ceramic filter and identified. In VS-5, the LC peaking is also put into the emitter to increase the level of 7.8 kHz. This assured that the level ratio between PAL and SECAM is more than 20 dB even during PB. VL23 adjusts the resonance frequency of L and C so that 7.8 kHz will be maximum during SECAM. SECAM DET is not needed by EK. During SECAM (EG SECAM), the SECAM detector output (high in SECAM, low in PAL and B/W) controls the following.

a) Stops rotation
Since the phase rotation is not carried out both for REC and PB in SECAM, Pin ⑪ of AN6362 (AFC) is made high (6 ~ 7V) by D27 to stop the rotation.

b) Cuts 2H delay
Since there is no need of passing this because of no rotation and no possibility of removing the crosstalk, TR32 is turned OFF by D19.

c) Fixes the VCO oscillation of APC
In principle, APC is not needed because SECAM is FM, and fixed frequency can be oscillated. Therefore, like in REC, the burst input of AN6371 is cut by TR44.

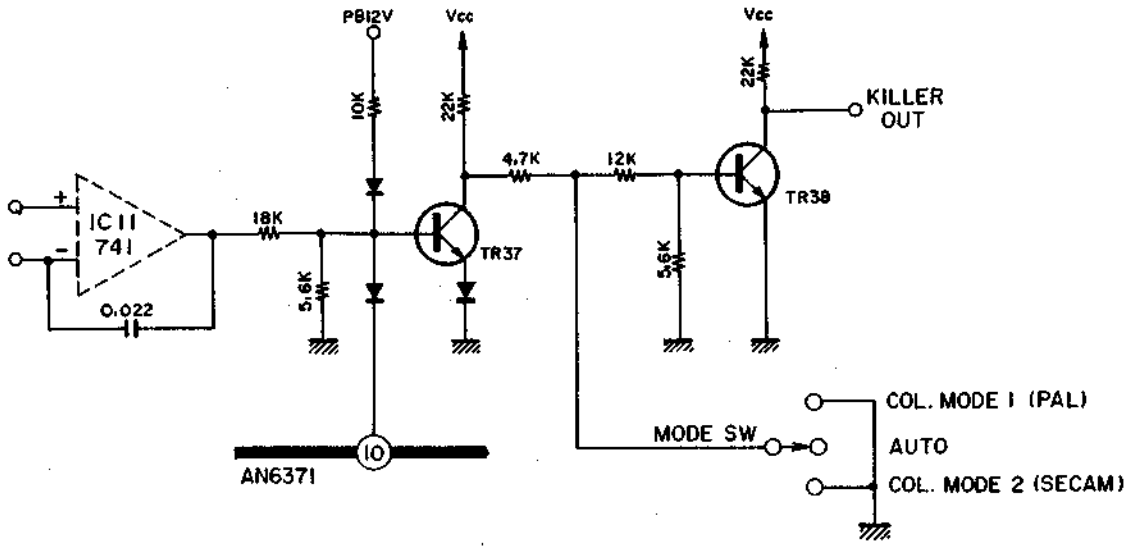


Fig. 105

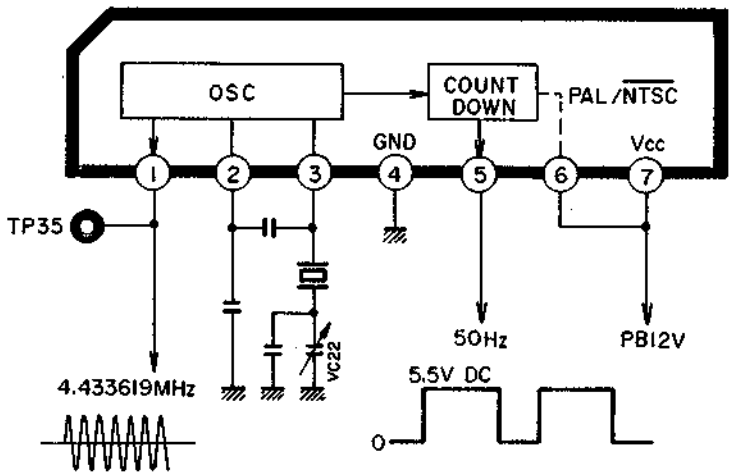


Fig. 106

1) REC and PB Color Killer Change-over
Change-over is necessary because REC uses the level detector and PB uses the killer of APC as aforementioned, and also needed is the control circuit by forced mode SW. This is the circuit shown in Fig. 105. (in SECAM, the APC killer is not locked and becomes Low but SECAM DET cuts the burst and as a result, the APC killer becomes High.)

2) Mode SW
VS-5 has a mode SW (3 positions) on its rear panel which can achieve the mode change such as "forced PAL", "AUTO" and "forced SECAM". This was selected by considering the malfunction problem of the SECAM detector and the fact that the TV is watched far often in color than in B/W.

3) 4.433619 MHz Local OSC
Fig. 106 shows the internal block of AN6342N. This IC is to output PB4.43MHz FIX LOCAL OSC and 50 Hz for servo reference (reference V). 50 Hz is obtained by dividing 4.43 MHz (1/88672).
The oscillator frequency is adjusted by VC22 to 4.433619 MHz.

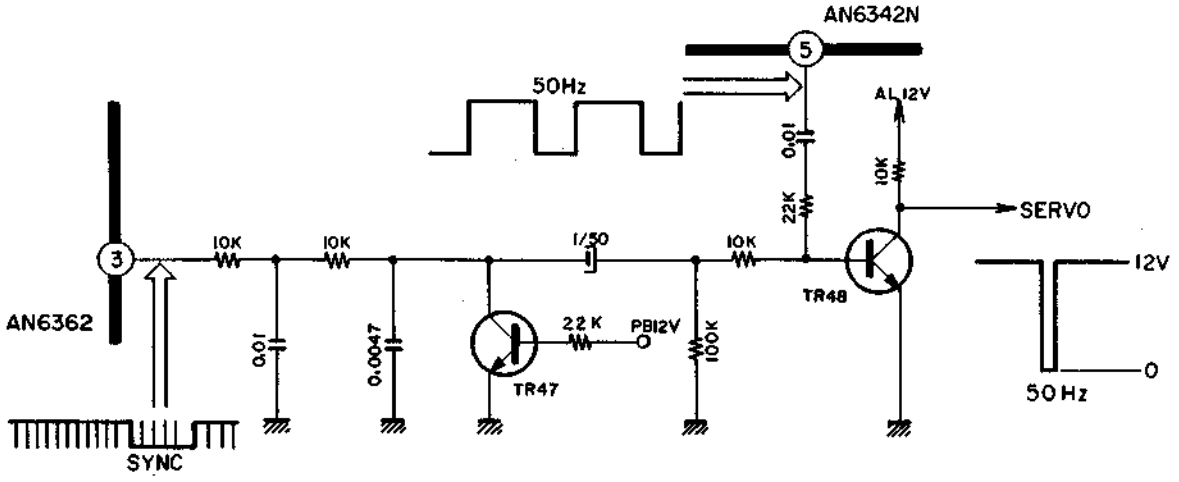


Fig. 107

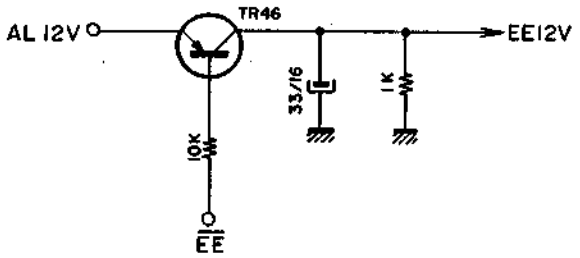


Fig. 108

4) REF V Circuit

As the reference signal of Servo, it is necessary to send V of input video signal in REC and the accurate 50 Hz pulse in PB.

The video signal V is taken out by integrating the SYNC of AN6362 ③ or produced from 50 Hz of AN6342N in PB and switched by TR47 and 48 to be sent to the servo.

5) EE12V

The control line $\overline{EE}$ comes from the SYSCON, but the video circuit uses EE12V which is obtained through the TR46 switching. (Fig. 108)

VII. MECHANICAL ADJUSTMENT

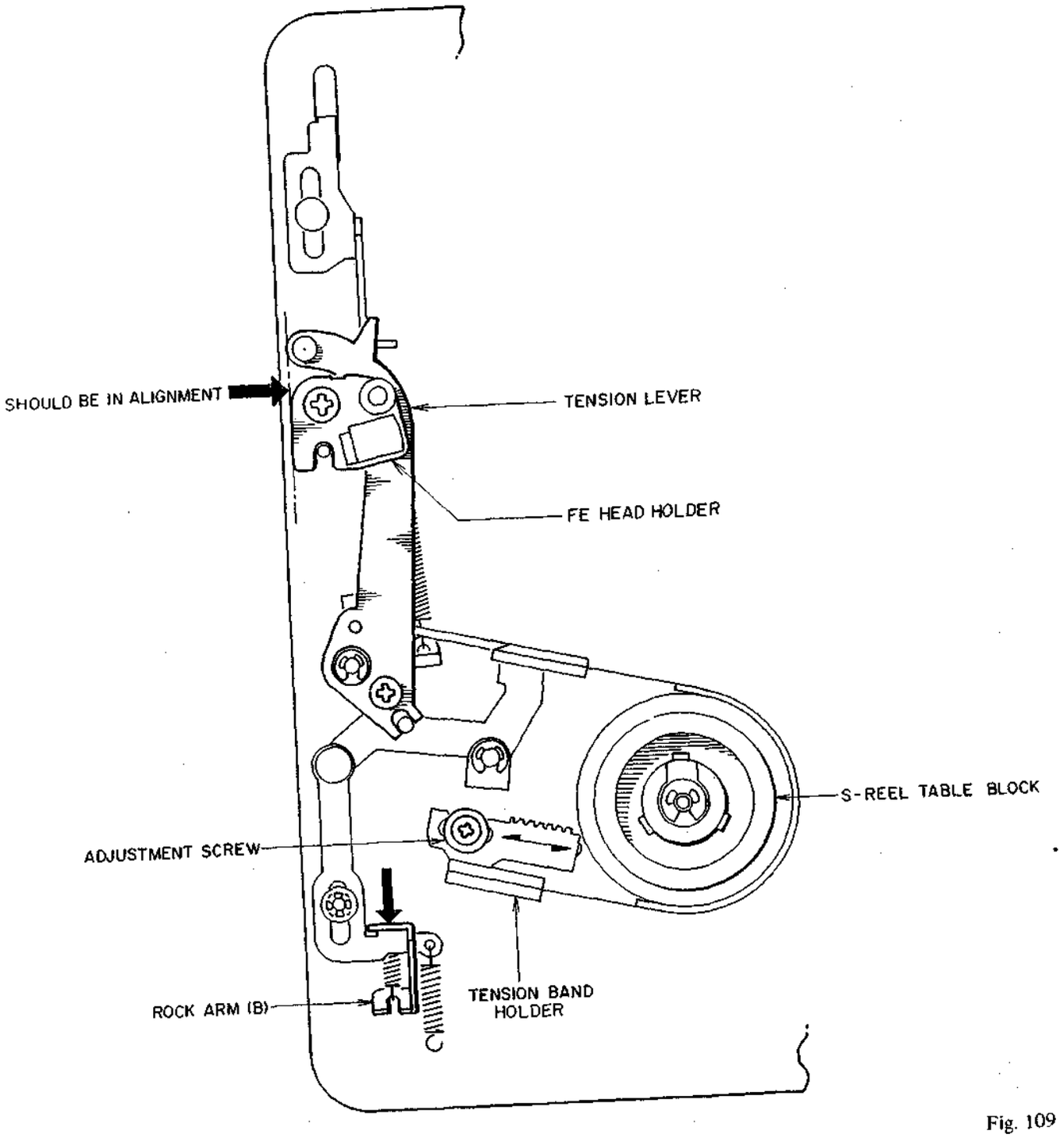


Fig. 109

1. TENSION LEVER POSITION ADJUSTMENT (Refer to Fig. 109)

1) Place the cassette holder in EJECT position.
2) Cover the detector lamp with a tape, etc. so that no light will leak.
3) Press the rock arm (B) in the arrow direction, and achieve PLAY mode.
4) Switch OFF the power switch on the rear panel and maintain the loading position.
5) Loosen the adjustment screw and adjust the tension band holder so that the tension lever and FE head holder are in alignment as shown in Fig. 109, and tighten the adjustment screw.
6) After adjustment, paint-lock the adjustment screw.

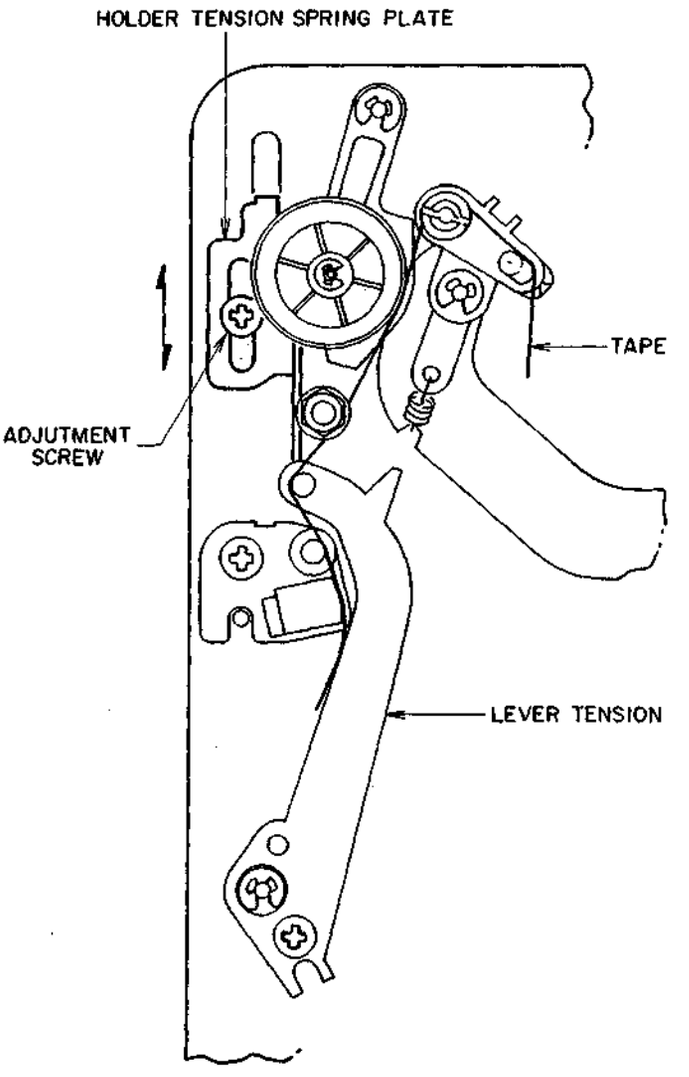


Fig. 110

2. BACK TENSION ADJUSTMENT

(Refer to Figs. 110, 111)

1) Set the back tension adj. jig (BT-001) shown in Fig. 111 and achieve PLAY mode.
2) Loosen the adjustment screw shown in Fig. 110, adjust the holder tension spring plate so that back tension will be 20 gf-cm, and tighten the adjustment screw.
3) After adjustment, paint-lock the adjustment screw.

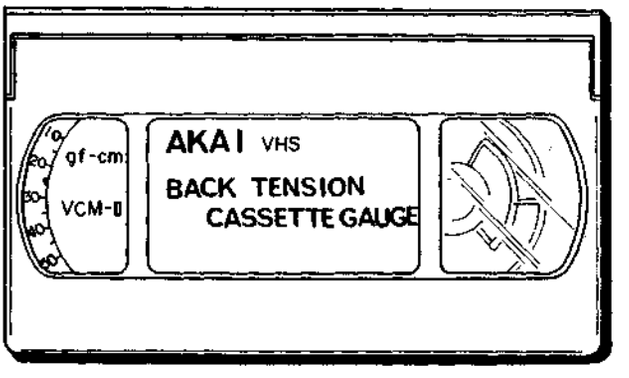


Fig. 111

3. CHECKING THE VARIOUS TORQUES
(Refer to Figs. 112, 113)

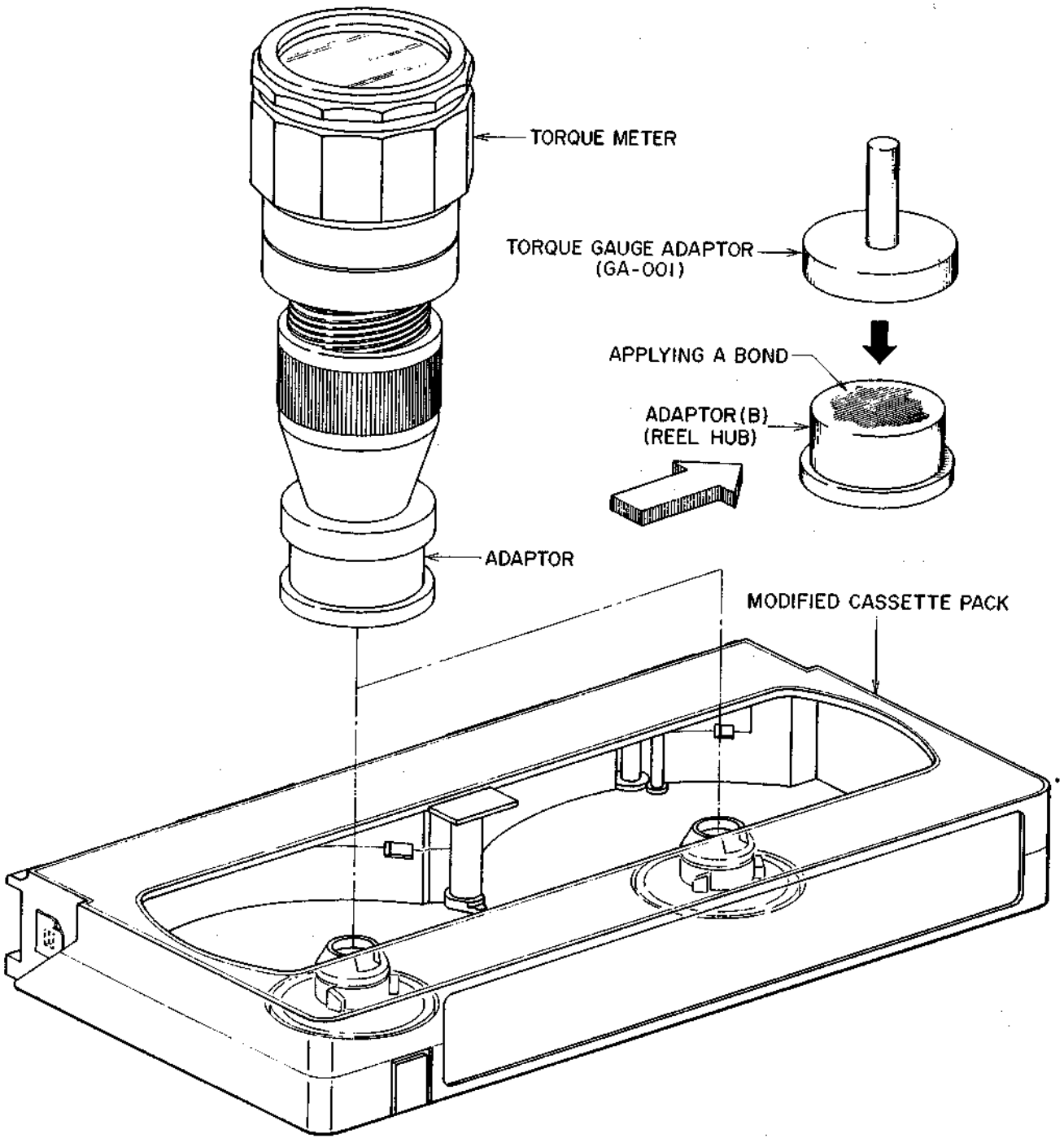


Fig. 112

Measuring Item	Mode	Measuring Point	Result
PLAY Torque	PB	Take-up Reel	$120\ ^{+60}_{-40}$ g.cm
FF Torque	FF	Take-up Reel	More than 400 g.cm
REW Torque	REW	Supply Reel	More than 400 g.cm
Cue Torque	Cue	Take-up Reel	$120\ ^{+60}_{-40}$ g.cm
Review Torque	Review	Supply Reel	$200\ ^{+50}_{-40}$ g.cm
Unloading Torque	PB → STOP	Supply Reel	$120\ ^{+60}_{-40}$ g.cm

Fig. 113

NOTE: 1. The unloading torque operation is in three stages so finally, check that during unloading the tape is winding into the cassette pack correctly.

2. A modified cassette pack is shown in Fig. 112. The upper side of the cassette pack has been cut away and the tape taken out.
   There is black tape inside the pack to prevent light from the start and end sensors. This modified pack is very useful in checking in each mode so we recommend you make your own from a defective cassette pack.
   This modified cassette pack is not available from Akai.

3. (How to make a Torque Gauge Adapter)
   Adapter (B) is not supplied by Akai so make one by removing the reel hub of the VHS cassette tape E-120.
   Use after fixing the adapter (B) to the Torque gauge adapter (GA-001).

VIII. REPLACEMENT OF VIDEO HEAD ASSEMBLY

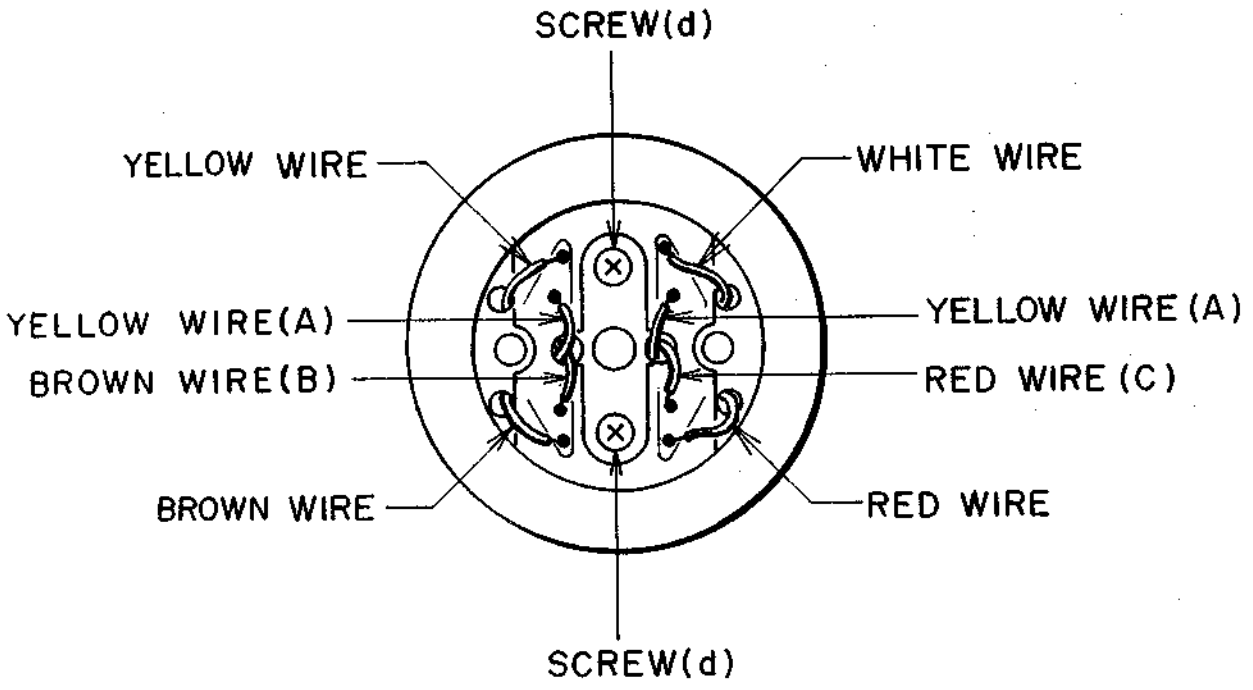


Fig. 114 Replacement of Video Head Assembly

1. Unsolder the wire (A), then unsolder the brown wire (B) and red wire (C).
2. Remove the two screws (d), then pull up the upper drum assembly.
3. Install the new head assembly and solder the wires as shown in Fig. 114.
4. Fasten two screws (d).
5. After replacement, the following adjustments are necessary.
   1) PB Tracking Adjustment (Servo P.C Board Step 4)
   2) PB Switching Point Adjustment (Servo P.C Board Step 5)
   3) REC Switching Point Adjustment(Servo P.C Board Step 6)
   4) Video Head Q (Quality factor) and resonance Adjustment (Video P.C Board Step 9)
   5) PB Y Level Adjustment (Video P.C Board Step 10)
   6) PB Chroma Level Adjustment (Video P.C Board Step 12)

IX. TAPE TRANSPORT ADJUSTMENT

1. TAPE GUIDE HEIGHT ADJUSTMENT

1) Set the cassette tape and achieve PLAY mode.
2) Make adjustment with the supply guide height adjustment nut so that the lower part of the tape will pass the lower part of the guide pole without curling as shown in Fig. 115.
3) Make the same adjustment as that in 2) with the take-up guide height adjustment nut.

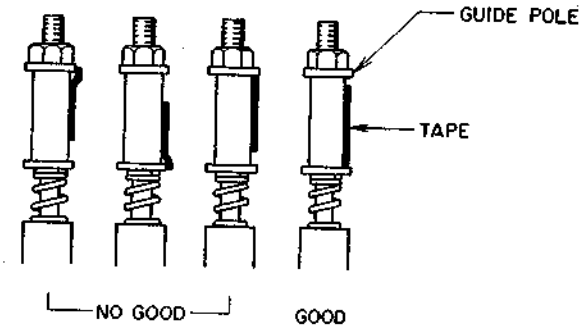


Fig. 115

2. GUIDE ROLLER HEIGHT ADJUSTMENT

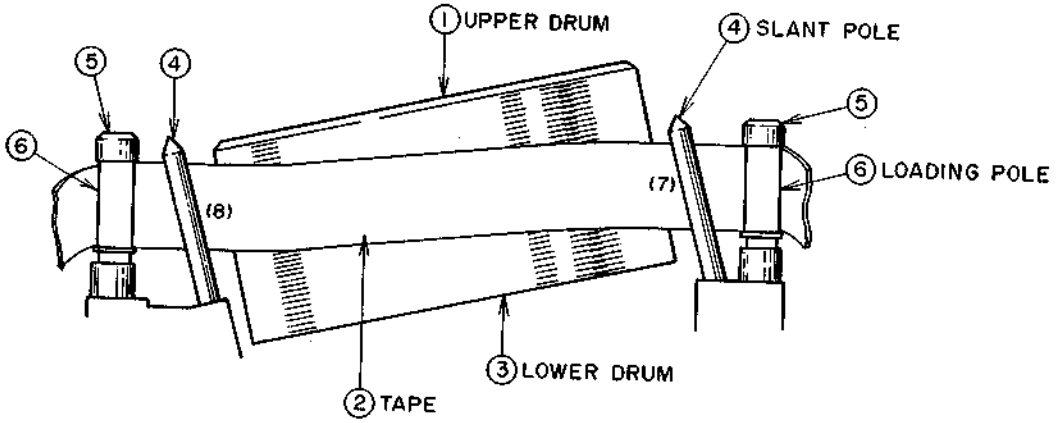


Fig. 116

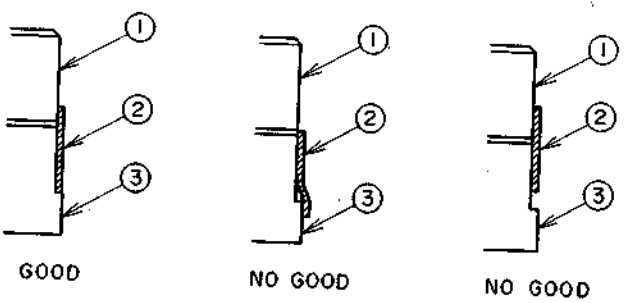


Fig. 117

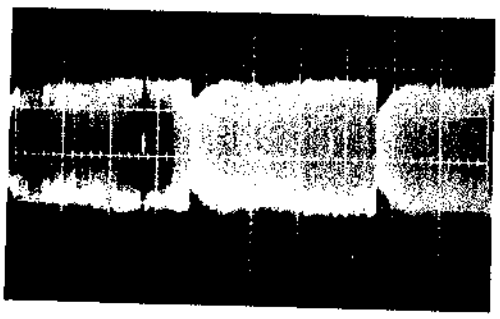


Fig. 119

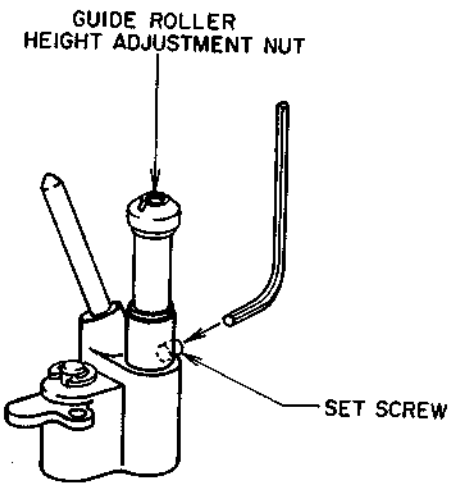


Fig. 118

1) Slightly loosen the set screw at the lower part of the guide roller so that the guide roller can be adjusted with reasonable tightness (See Fig. 118).
2) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
3) Set the reference tape TF-508RF and achieve PLAY mode.
4) Seeing to it that the oscilloscope shows such a waveform as shown in Fig. 119 and also watching the point (7) of Fig. 116, adjust the height of the guide roller (R) so that the tape runs without curling as shown in Fig. 117 (a).
5) Similarly, adjust the height of the guide roller (L) watching the waveform on the oscilloscope and the point (8) of Fig. 116.
6) Make sure that there is no shaking in the picture of the monitor TV.
7) Fix the guide roller with the set screw.

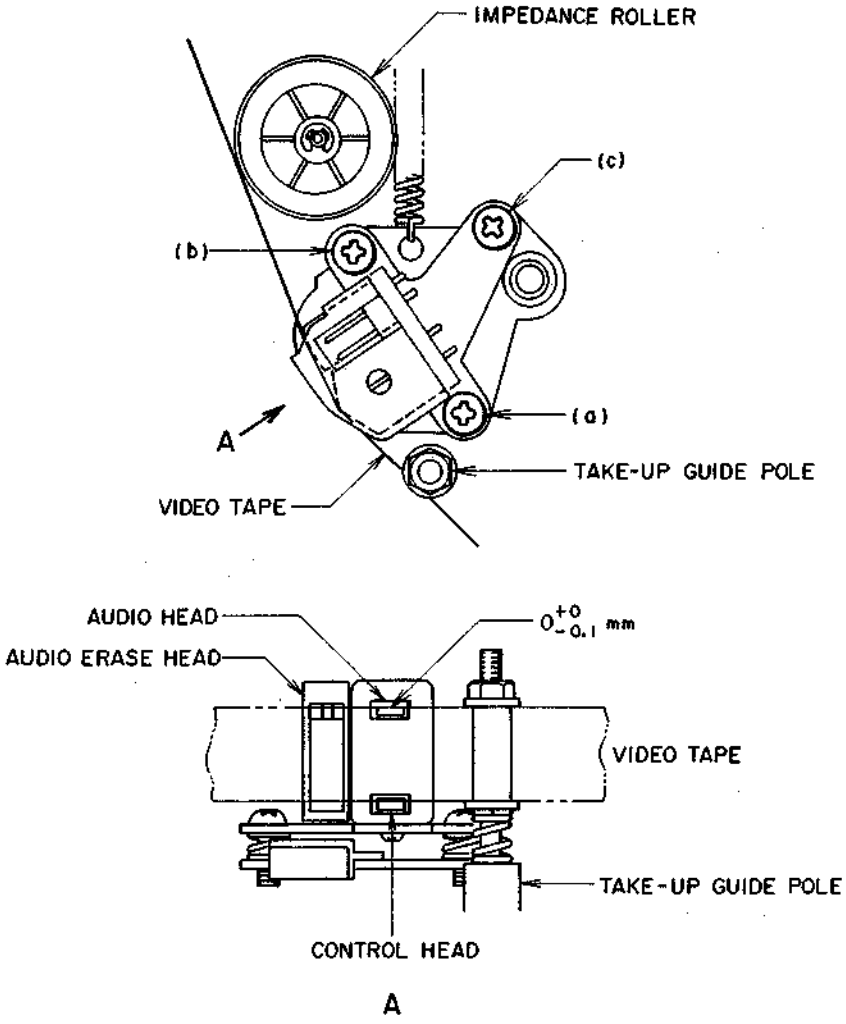


Fig. 120

3. AUDIO/CONTROL HEAD HEIGHT, TILT AND AZIMUTH ADJUSTMENT

1) Connect an AC Volt Meter to Audio Out.
2) Playback the reference tape TF-508RF.
3) Turn screws (a), (b) and (c) in order slightly but by exactly the same amount. Adjust the audio output level to its maximum. Take screw (a) as your standard and use screw (b) for azimuth adjustment. Adjust screw (c) until there is no tape wrinkle in the guide pole section, the audio output level is at maximum and there is the minimum possible level fluctuation.
   Then raise and lower screw (a) very slightly and adjust (b) and (c), and set to the point for maximum output.

NOTE: Repeat the adjustment of tape guide height, guide roller height and audio/CTL several times in order to achieve the perfect tape running.

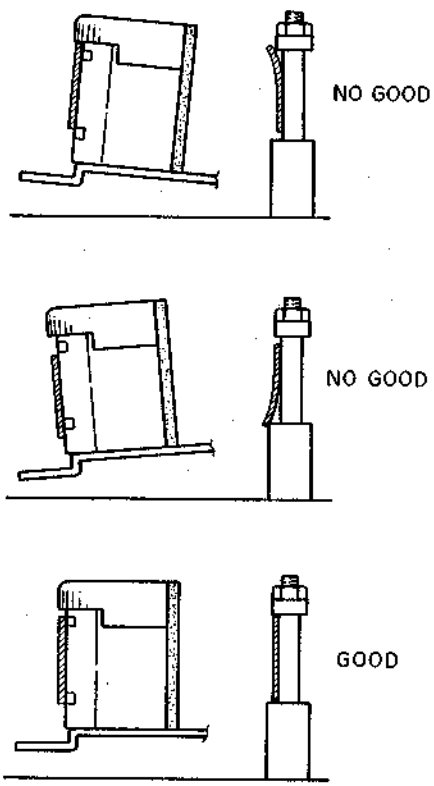


Fig. 121

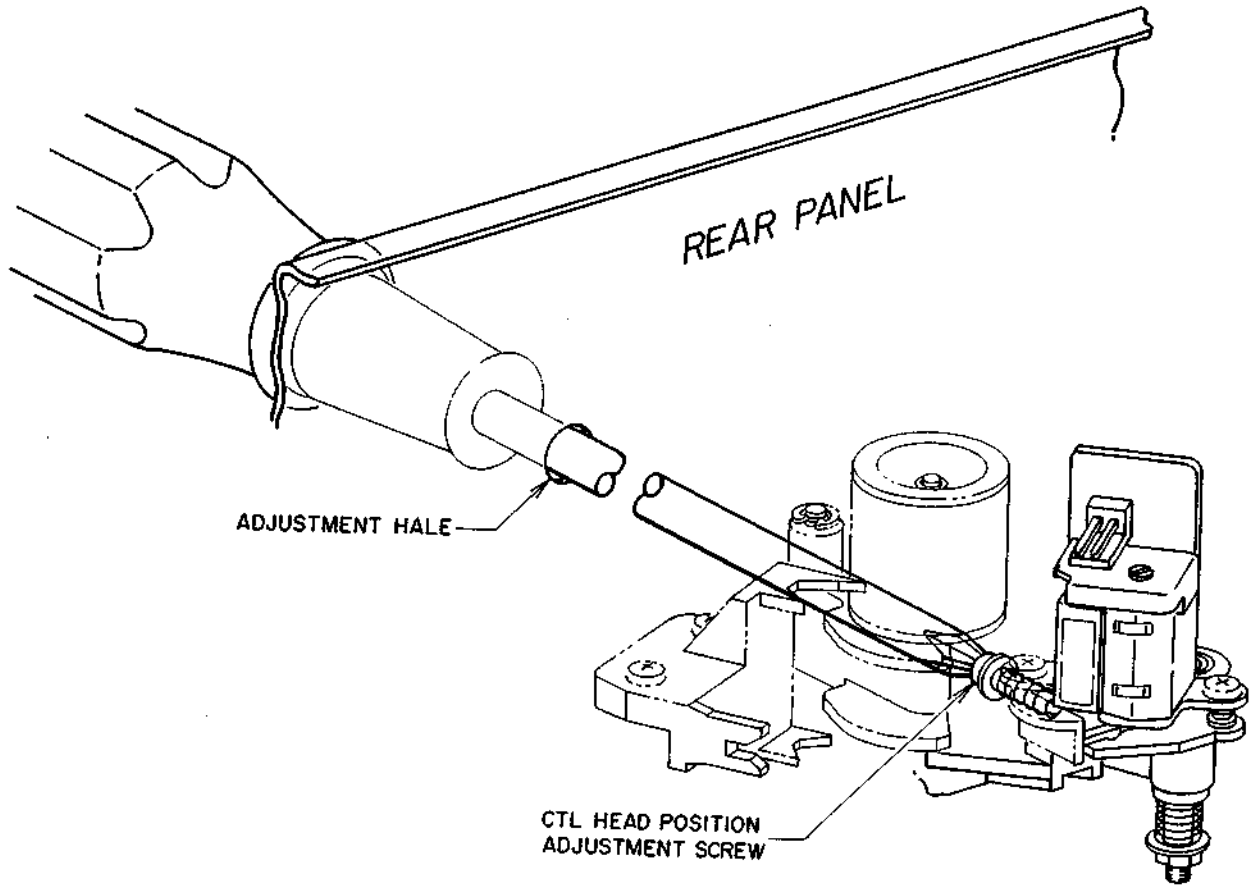


Fig. 122

4. CONTROL HEAD POSITION ADJUSTMENT

1) Connect an oscilloscope to TP6 (FM envelope out) of the Video P.C Board.
2) Set the reference tape TF-508RF and achieve the PLAY mode.
3) Insert a driver into the CTL head position adjustment screw through the adjustment hole in the center of the rear panel.
4) While watching the waveform of the oscilloscope, turn tracking volume on the front panel and confirm in which direction from the click position the maximum point of the waveform is located.
5) Turn back the tracking volume to the click position and carry out the following a) or b) adjustment.
   a) If the maximum point of the waveform is reached by turning the tracking volume clockwise, turn the adjusting driver counterclockwise and make adjustment to the maximum point.
   b) If the maximum point of the waveform is reached by turning the tracking volume counterclockwise, turn the adjusting driver clockwise to make adjustment to the maximum point.

NOTE: Make these adjustments only after the tape running is completely adjusted.

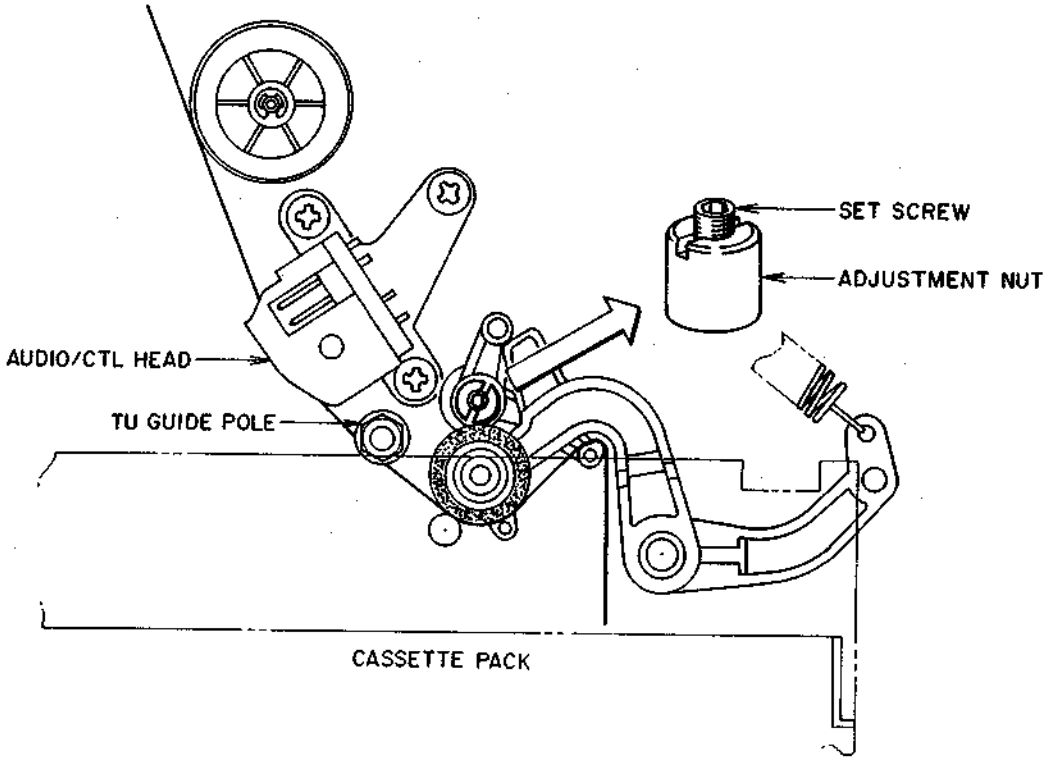


Fig. 123

5. ADJUSTMENT OF QUICK FINDER (REVIEW) RUN

1) Set the recording and playback tape E-240 and wind it up.
2) Press the PLAY button and REVIEW button to achieve the REVIEW mode.
3) Loosen the set screw in Fig. 123 so that the adjustment nut can be turned.
4) While watching the tape running on the take-up guide pole, turn the adjustment screw slowly so as to eliminate the curling of the tape (Fig. 124 (C)).
5) Tighten the set screw and fix the adjustment screw.

NOTE: If the adjustment nut is turned too fast, some deviation may be found after adjustment because the tape running does not follow such a fast pace.

6) After the completion of adjustment, press the stop button once, and after unloading the tape, recheck the review run.

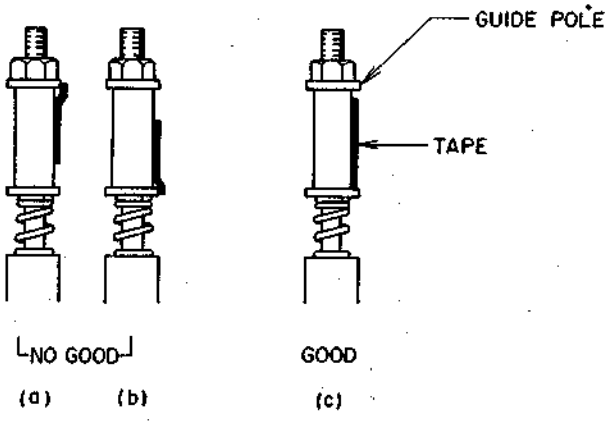


Fig. 124

X. ELECTRICAL ADJUSTMENT

1. POWER SUPPLY P.C BOARD ADJUSTMENT

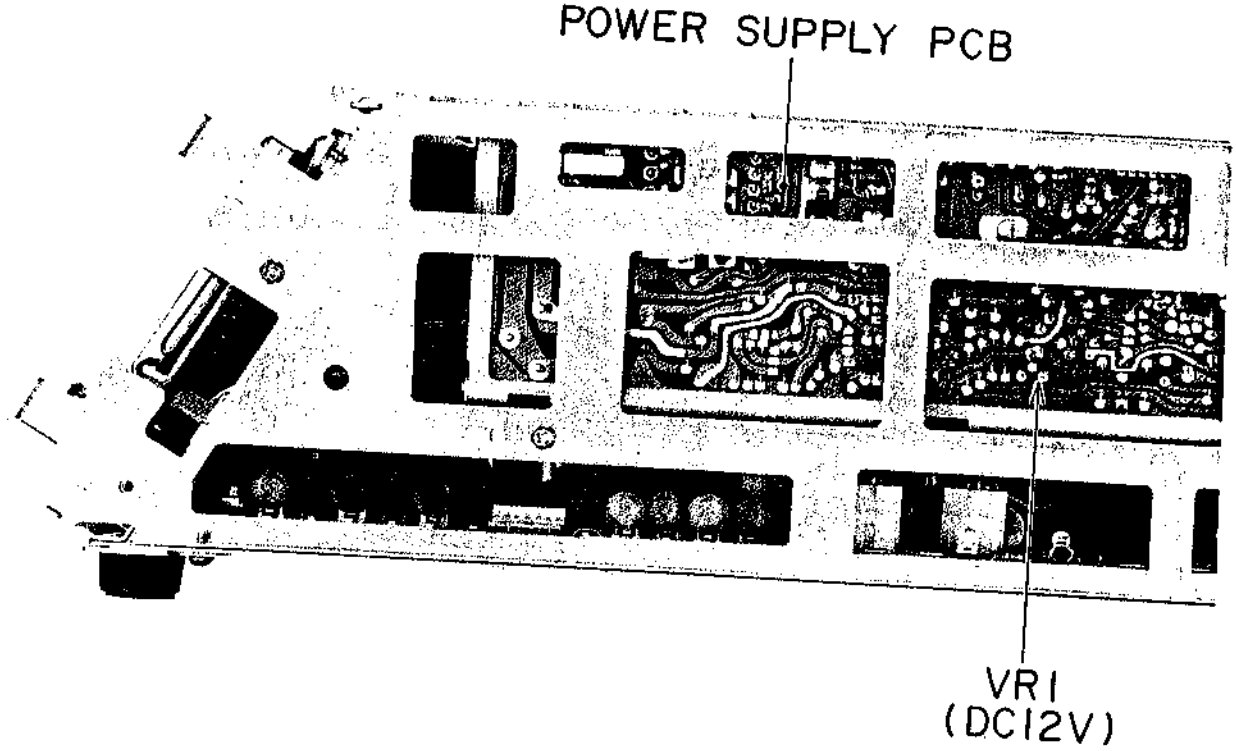


Fig. 125 DC 12V Adjustment Point (Right Side View)

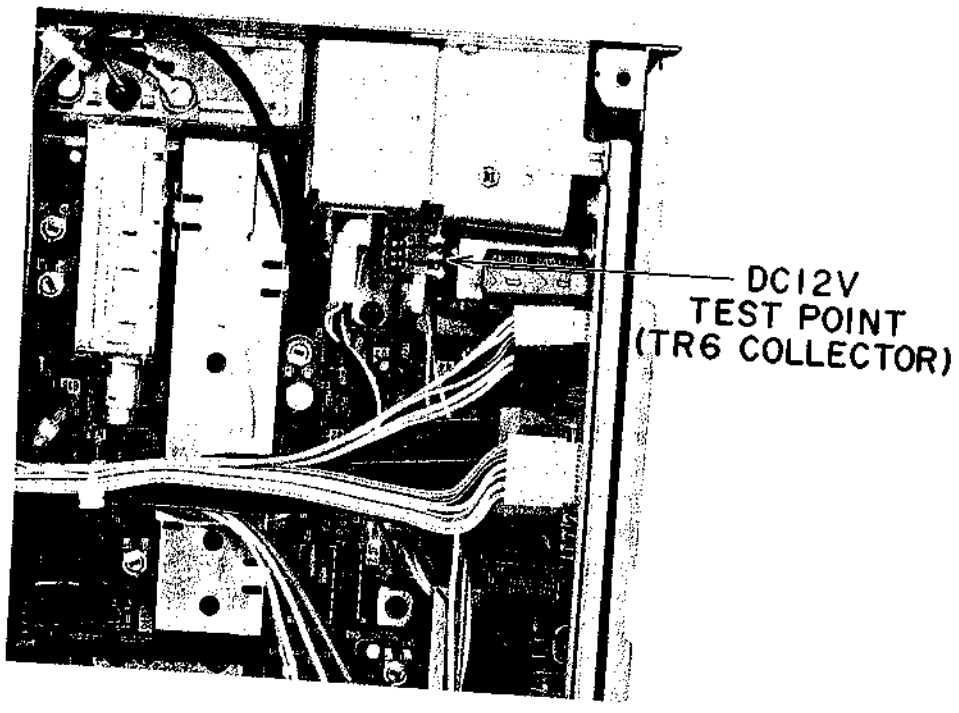


Fig. 126 DC 12V Test Point

1) Connect the DC voltmeter to the test point (TR6 collector).
2) Turn ON the function switch to achieve the STOP mode.
3) Adjust the VR1 on the Power Supply P.C Board so that the voltage at the test point will be 12V ± 0.05V.

2. SERVO P.C BOARD ADJUSTMENT

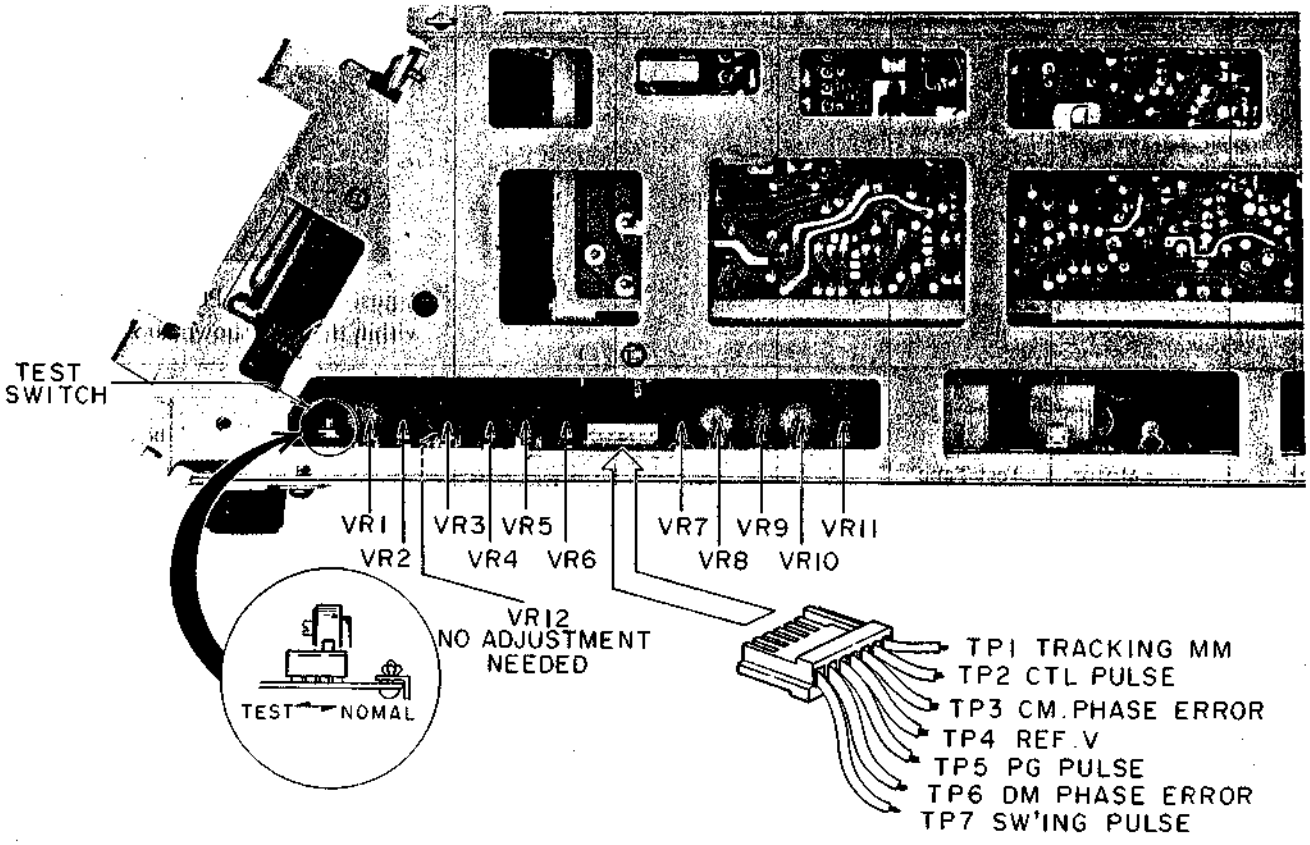


Fig. 127 Servo P.C Board V1004A5340 (Right Side View)

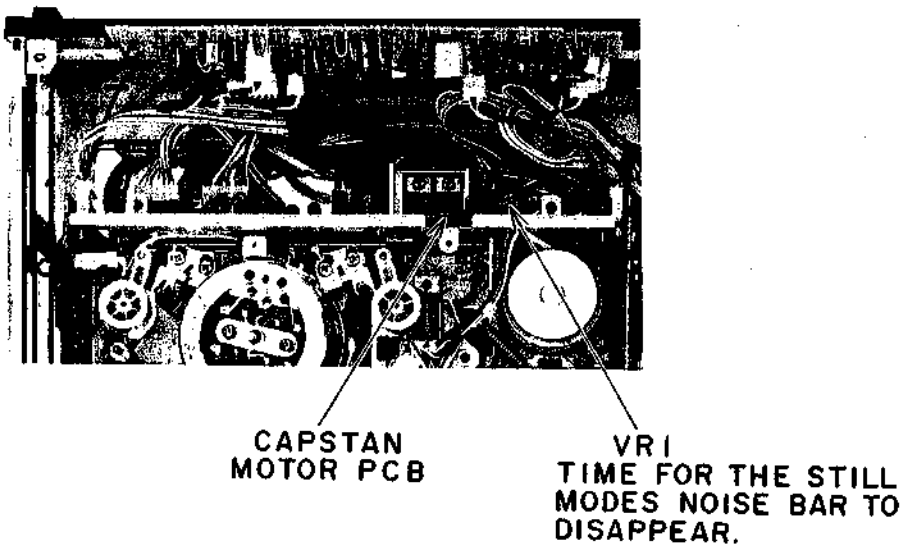
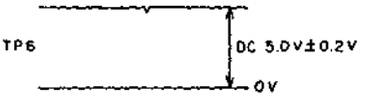
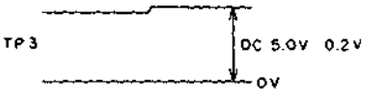
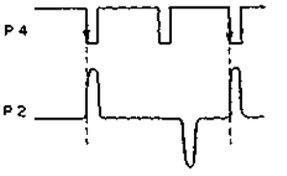
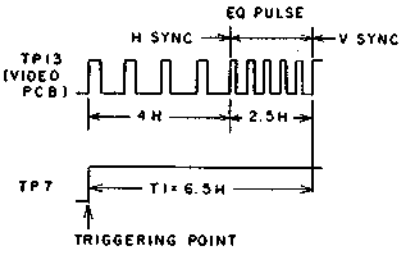
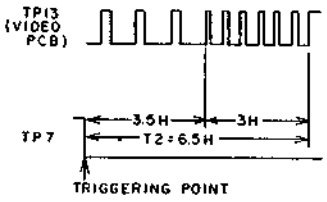
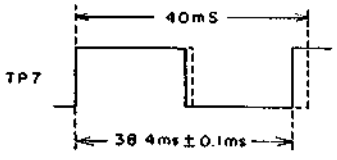
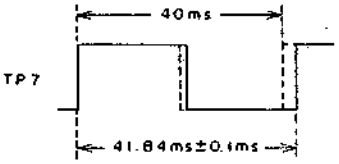
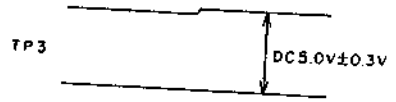
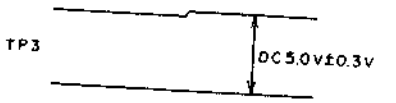
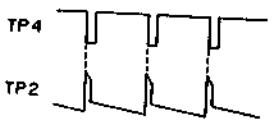


Fig. 128 Capstan Motor P.C Board V1004B5491

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
1	PG Pulse	Test Tape (TF-508RF)	PB	TP5	VR1	 Adjust so that the PG waveform is within the level shown above.
2	Drum Motor Normal Speed	Test Tape (TF-508RF)	PB	TP6	VR6	 Adjust so that the drum servo phase error voltage is within DC 5.0V ± 0.2V.
3	Capstan Motor Normal Speed	Test Tape (TF-508RF)	PB	TP3	VR8	 Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.2V.
4	Tracking Preset (EXT-Tracking volume is set to OFF Position.)	Test Tape (TF-508RF)	PB	TP4 (REF-V) TP2 (CTL Pulse)	VR11	 Adjust so that the start-down waveform portion of REF-V (Servo standard signal) is brought in line with the phase of CTL pulse start-up waveform portion.

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
5	PB Switching Point	Test Tape (TF-508RF)	PB	TP13 (Video PCB) TP7	VR2 (CH1) VR3 (CH2)	  Adjust T1 with VR2 to 6.5H and T2 to 6.5H with VR3. The difference between T1 and T2 should be within 1H.
6	REC Switching Point	Color Bar from Color Bar Generator	REC	TP13 (Video PCB) TP7	VR4	Adjust T1 and T2 waveforms in step 5 to 6.5H ± 1H.
7	Drum Cue Speed	Test Tape (TF-508RF)	PB Cue (Quick Finder)	TP7	VR5	 Adjust so that the switching pulse width is within 38.4 ms ± 0.1 ms (4.0% increase in speed)
8	Drum Motor Review Speed	Test Tape (TF-508RF)	PB Review (Quick Finder)	TP7	VR7	 Adjust so that the switching pulse width is within 41.84 ms ± 1 ms (4.6% increase in speed).

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
9	Capstan Motor Cue Speed	Test Tape (TF-508RF)	PB Cue (Quick Finder)	TP3	VR10	 Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.3V.
10	Capstan Motor Cue Speed	Test Tape (TF-508RF)	PB Review (Quick Finder)	TP3	VR9	 Adjust so that the capstan servo phase error voltage is within DC 5.0V ± 0.3V.
11	Time for the still mode's noise bar to disappear.	Test Tape (TF-508RF)	PAUSE/ STILL	Monitor Screen	VR1 (Capstan Motor PCB)	Adjust the VR1 so that the noise bar disappears smoothly.
12	TEST SW (Tape Speed Check SW) Confirm Operation	Test Tape (TF-508RF)	PB	TP4 (REF-V) TP2 (FG Count Down)		 When TEST SW is switched to TEST, waves as shown above will appear on TP2.

3. VIDEO P.C BOARD ADJUSTMENT

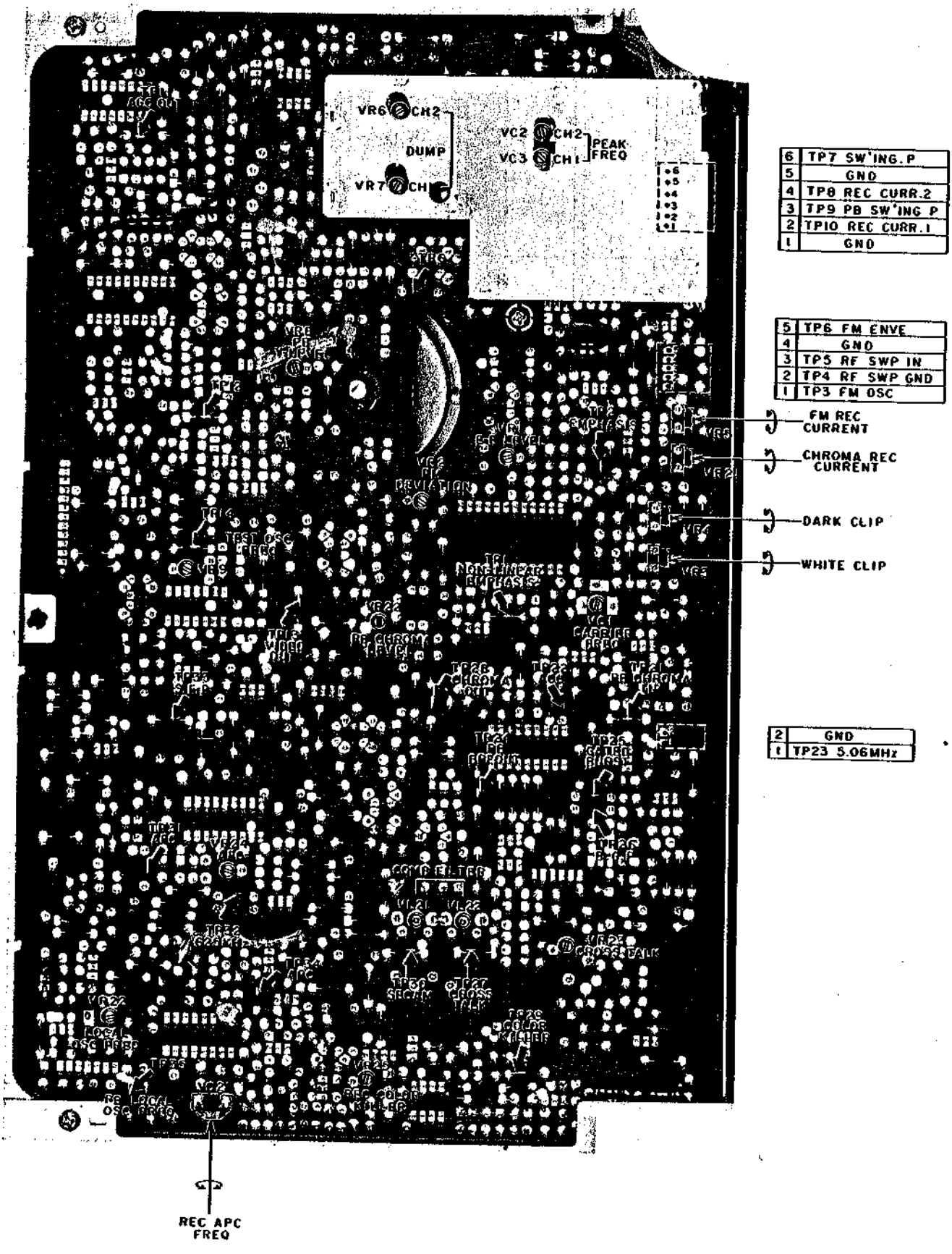
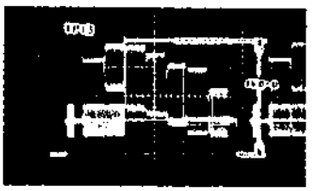
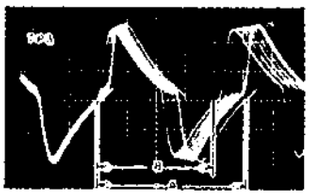
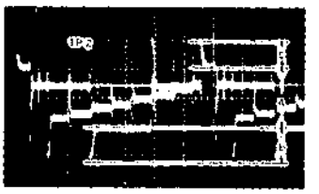
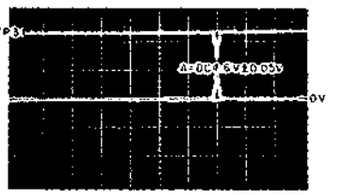
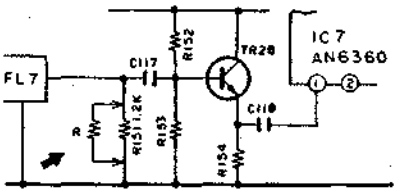
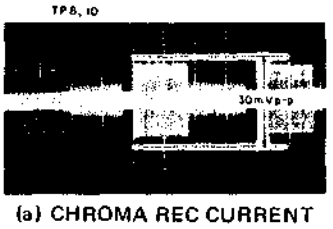
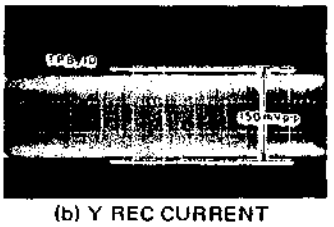
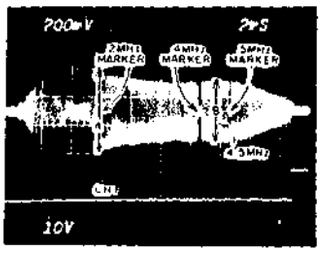
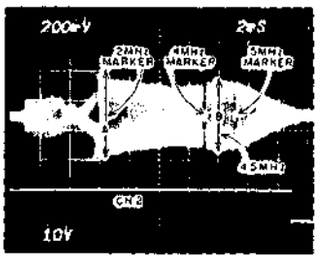
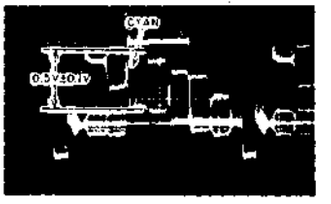


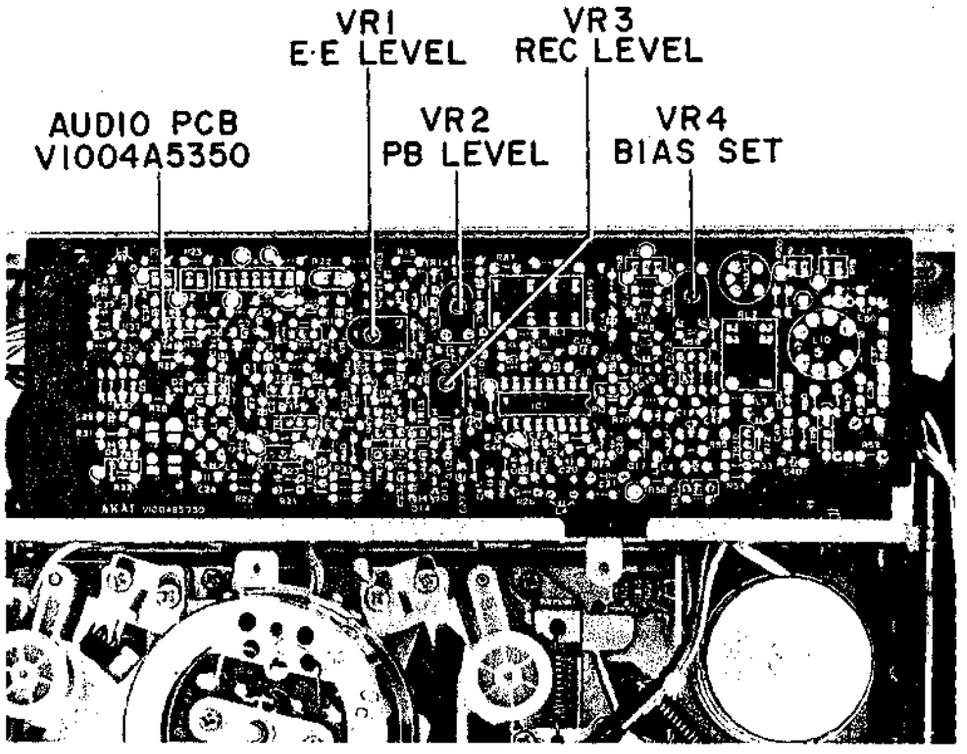
Fig. 129

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
1	E-E Level	Color Bar from Color Bar Generator	E-E	TP13	VR1	 Adjust so that the video output is 1 Vp-p.
2	Carrier and Deviation	Color Bar from Color Bar Generator	REC	TP3	VC1 (Carrier set) VR2 (Deviation)	 Carrier set A = 0.263 μs Deviation B = 0.208 μs
3	White Clip and Dark Clip	Color Bar from Color Bar Generator	REC	TP2	VR3 (White Clip) VR4 (Dark Clip)	 White Clip A:B = 1:0.65 Dark Clip A:C = 1:0.45
4	Test OSC	No Signal	STOP	TP14	VR9	Set the CH SET switch to "ON" (Rear Panel) and connect the frequency counter to TP14. At this time, adjust so that the frequency is within 15.625 kHz ± 100 Hz.
5	AFC	Color Bar from Color Bar Generator	E-E	TP31	VR24	 Adjust so that "A" is within DC 4.6V ± 0.05V.
6	APC	Color Bar from Color Bar Generator	E-E	TP23	VC21	5.060571 ± 10 Hz

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
7	Rec Color Killer	Color Bar from Color Bar Generator	E-E	Monitor screen	VR25	 R=120ohms : MONO CHROME R=150ohms : COLOR Set the mode switch of rear panel to "AUTO". Connect 120 ohms resistance and subsequently 150 ohms resistance to the R151 (1.2 ohms) of Video PCB. At this time, adjust so that a monochrome picture appears at 120 ohms and a color picture appears at 150 ohms.
8	Rec Current	Color Bar from Color Bar Generator	REC	TP8 TP10	VR21 (CHROMA) VR5 (Y)	 (a) CHROMA REC CURRENT  (b) Y REC CURRENT 1) Fully turn the VR5 clockwise. 2) Adjust the Chroma Rec current so that TP8 and TP10 waveforms are set to 30 mVp-p by the VR21. 3) Adjust the Y Rec current so that the TP8 and TP10 waveforms are set to 150 mVp-p by the VR5.

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
9	Video Head Resonance and Q (quality factor)	Test Tape (TF-515SW)	PB	TP6	VC2 VR7 (CH1) VC3 VR6 (CH2)	  1) Apply DC +12V to the TP7. 2) Fully turn the VR7 clockwise and then adjust the VC2 so that the peak frequency is 4.8 MHz. 3) Adjust the VR7 so that "Q" is set at a ratio of A : B = 1 : 0.8. 4) Connect the TP7 to the GND level and adjust the CH2 (VC3, VR6) in the same way as in the CH1.
10	PB Y Level	Test Tape (TF-510CB)	PB	TP13	VR8	 Adjust so that the video output is 1 Vp-p.
11	Local OSC	Test Tape (TF-510CB)	PB	TP35	VC22	4.433619 MHz ± 15 Hz
12	PB Chroma Level	Test Tape (TF-510CB)	PB	TP13	VR22	 As shown in the figure above, adjust so that a cyan level is within 0.5V ± 0.1 Vp-p.

4. AUDIO P.C BOARD ADJUSTMENT



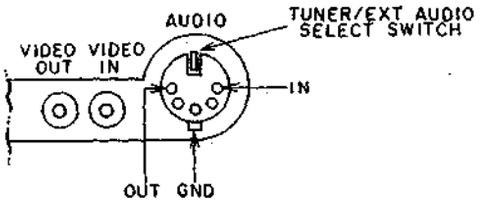


Fig. 130

Step	Adjustment Item	Input	Mode	Test Point	Adjustment Parts	Result & Remarks
1	E-E Level	Audio Input 1 kHz, −20 dB	E-E	Audio Out	VR1	−6 dBm ± 0.5 dBm
2	PB Level	Test Tape TF-513LS (1,000 Hz)	PB	Audio Out	VR2	−6 dBm ± 0.5 dBm
3	Rec Level	Audio Input 1 kHz, −20 dB	REC/PB	Audio Out	VR3	−6 dBm ± 0.5 dBm
4	Frequency Response	Audio Input 100 Hz, −20 dB 1 kHz, −20 dB 7 kHz, −20 dB	REC/PB	Audio Out	VR4	100 Hz : −6 dBm ± 1 dBm 1 kHz : −6 dBm ± 0.5 dBm 7 kHz : −6 dBm $^{+2}_{-3}$ dBm
5	Distortion Factor	Audio Input 1 kHz, −20 dB	REC/PB	Audio Out	Confirm	Less than 3%
6	Adjust by repeating steps 3, 4 and 5.					

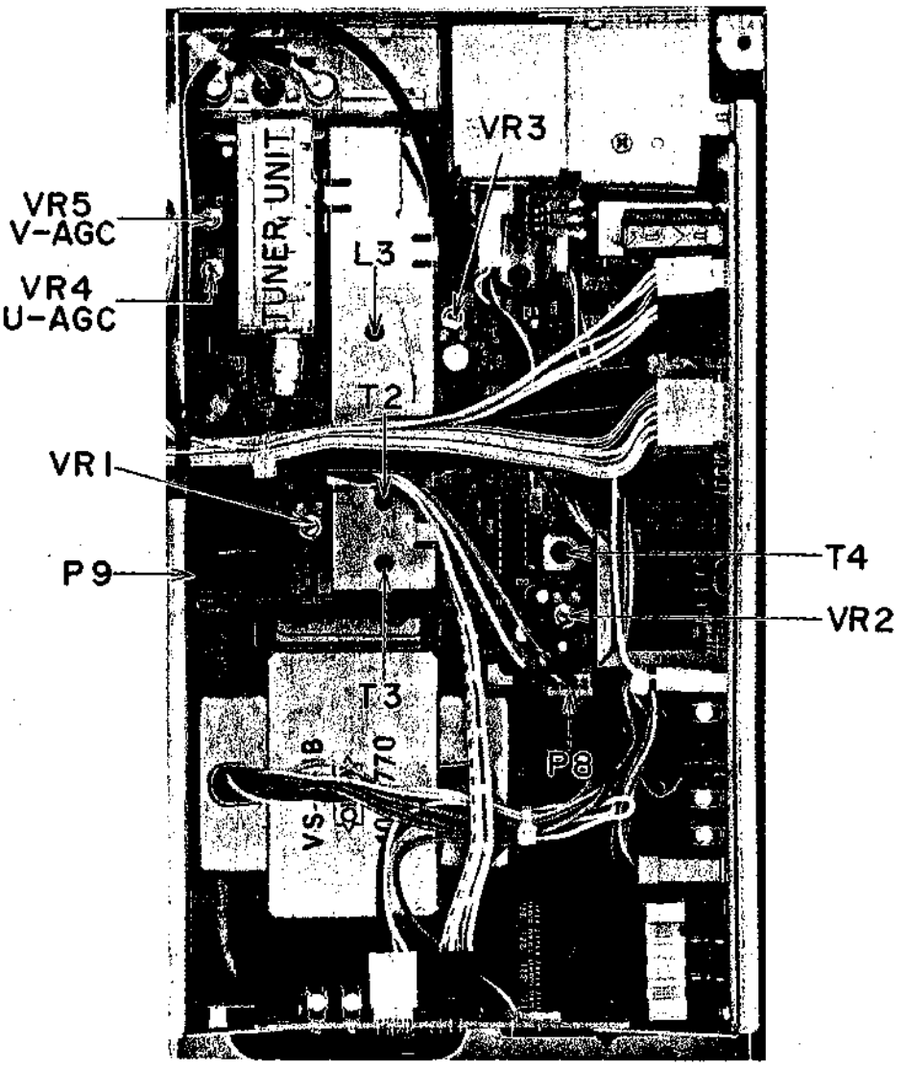


Fig. 131

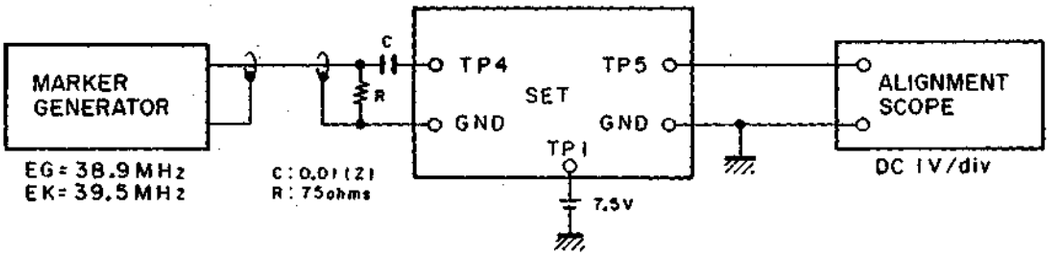


Fig. 132

5. TUNER ADJUSTMENT

Since the adjustment of the Tuner P.C Board requires a special jig, avoid touching the adjustment point. But should any adjustment become necessary, use the following adjustment method.

5-1. Tank Coil Adjustment

1) Apply 50 mVp-p in IF frequency (EG = 38.9 MHz, EK = 39.5 MHz) to TP4 (IF terminal) on the Tuner P.C Board.
2) Connect the alignment scope to TP5 (intersection between L4 and R16).
3) Apply DC7.5V to TP1 (IF AGC).
4) Adjust T2 so that the DC voltage appearing on the alignment scope will be minimum.

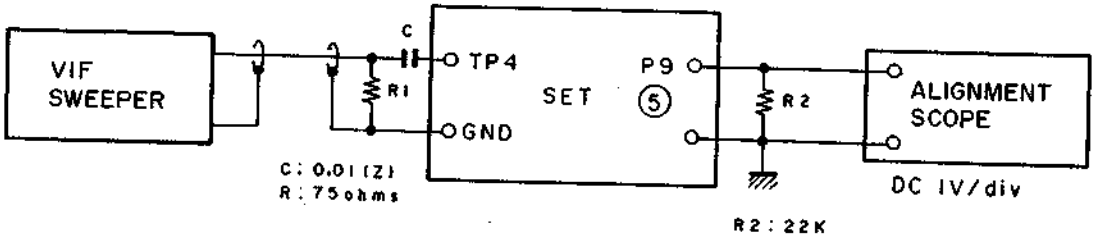


Fig. 133

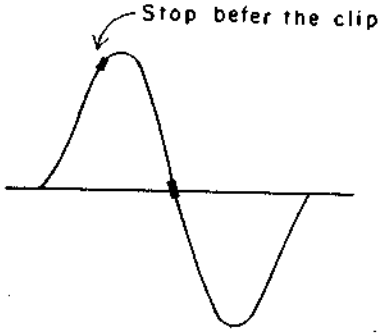


Fig. 134

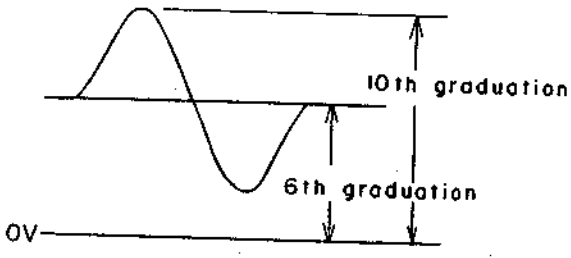


Fig. 135

5-2. AFC Adjustment

1) Connect VIF sweeper output 70 dB to the tuner IF (TP4).
2) Connect the alignment scope to the AFC terminal (Pin ⑤ of P9).
3) Make sure that VR1 is in the center, give an optional size to the waveform with the IF AGC volume, and make approximate adjustment with T3 so that the marker will be positioned at 6th graduation of the alignment scope.
4) Stop with IF AGC volume before the waveform is clipped (Fig. 134).
5) Stop with VR1 before the waveform is clipped.
6) Adjust with T3 so that the marker (EG = 38.9 MHz, EK = 39.5 MHz) will be at 6th graduation of the alignment scope. (Fig. 135).

5-3. VIF Adjustment

1) Apply VIF sweeper output 70 dB to TP4 (IF).
2) Connect the emitter of TR2 to the alignment scope.
3) Connect dummy resistors of 100 ohms to both ends of the tank coil (TP2, TP3).
4) Set the alignment scope to 10th graduation by means of the IF AGC volume and adjust the marker position as shown in Fig. 137 (a) and (b).

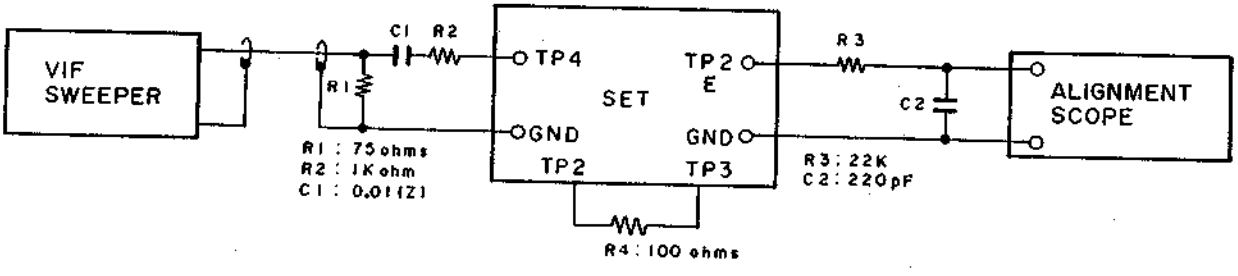


Fig. 136

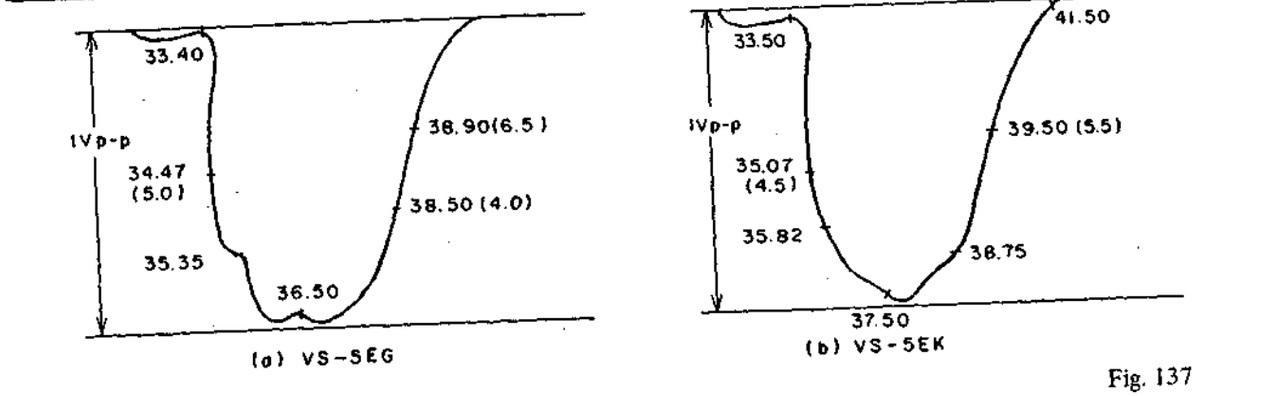


Fig. 137

5-4. SIF Adjustment

1) Apply DC 6.0V to Pin ⑥ of P9.
2) Connect an AC voltmeter and a distortion meter to Pin ③ of P8.
3) Connect an oscilloscope to Pin ① of P8.
4) Add the following RF signals to ANT IN.

EG model	VHF 12CH (color bar)	58 dB
	UHF 50CH (Philips)	
EK model	UHF 30CH (color bar)	

5) Receive 12CH (color bar), turn AFC ON and OFF with the tuning knob to adjust the waveform to the extent that the size will not change, and turn AFC ON. (For EK model, adjust with UHF 30CH).
6) Turn VR2 fully anticlockwise, and adjust with T4 so that the reading of the AC voltmeter will be maximum and that the distortion factor will be minimum.
7) Adjust with VR2 so that the reading of the AC voltmeter will be –17 dB.

5-5. Video Out Adjustment

Under the aforementioned condition, adjust with VR3 so that the video signal level of the oscilloscope will be 1 Vp-p.

5-6. RF AGC Adjustment

1) Under the aforementioned condition, connect a digital voltmeter to the AGC terminal (TP-5).
2) Receive 12CH (color bar) and adjust with VR5 so that DC 6.5V ± 0.2V is achieved (EG model).
3) Receive 50CH (Philips), and adjust with VR4 so that DC 6.5V ± 0.2V is achieved (EG model).
4) Receive 30CH (color bar) and adjust with VR4 so that DC 6.5V ± 0.2V is achieved (EK model).

6. 38 kHz TUNING COIL ADJUSTMENT (REMOTE CONTROL)

1) Connect an oscilloscope to TP.
2) Keep pushing the PAUSE/STILL button on the remote control unit, and observe the waveform at TP.
3) Change the direction of the remote control unit to decrease the input to the detector as much as possible (for example by transmitting toward the wall and receiving the reflected wave).

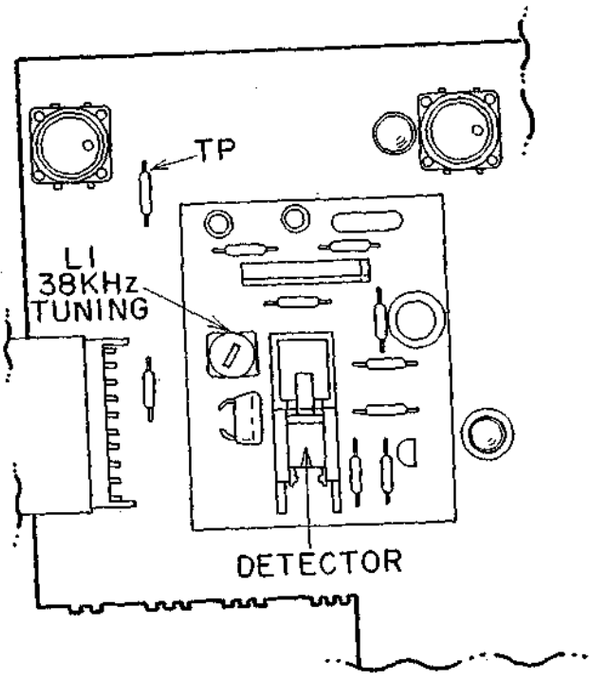


Fig. 138 Display P.C Board

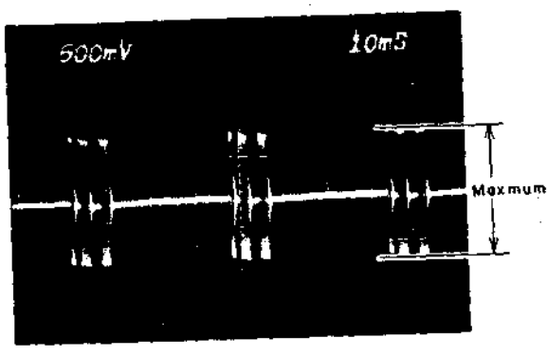


Fig. 139

4) Adjust L1 so that the amplitude of the waveform at TP increases to the maximum.

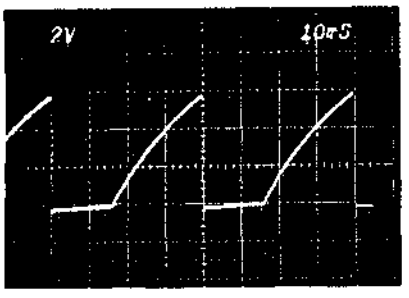
NOTE: If the waveform amplitude remains unchanged when L1 is turned, it is because the input level is so high as to cause the receiving circuit's AGC to work.
In this case, adjust after reducing the input to the detector.

XI. VARIOUS WAVEFORMS AT EACH TEST POINT

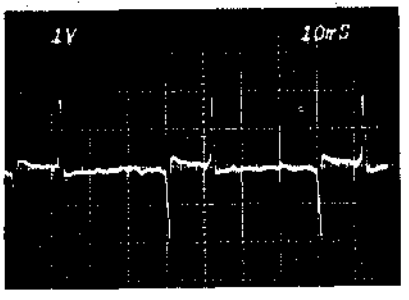
NOTES: 1. All the waveforms are measured using the VS-5EG.
2. Use the Color Bar Tape (TF-510CB) as the playback tape and the Color Bar Signal 1 Vp-p from SSG as the input during recording.
3. If not specially instructed take the waveform when the oscilloscope is in the AC Mode.
4. Showing the Volt/cm for left upper side figure and Time/cm for right upper side figure on the waveform photos.
(For example: making an ofservation at TP1 under 2V/cm, 10mS/cm condition).

1. SERVO P.C BOARD

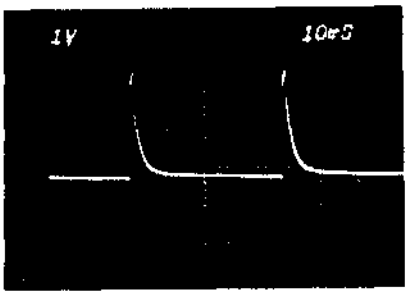
TP1 (PB, REC)



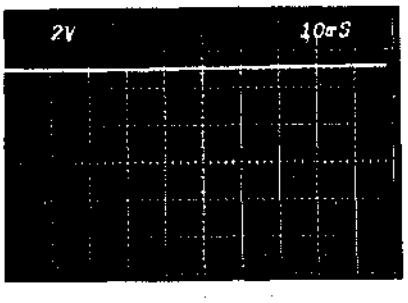
TP2 (PB)



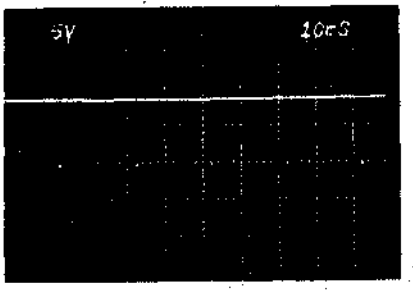
TP2 (REC)



TP3 DC (PB, REC)

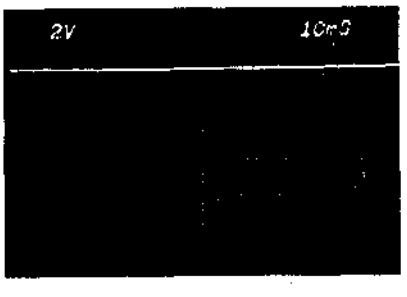


TP4 (PB, REC)

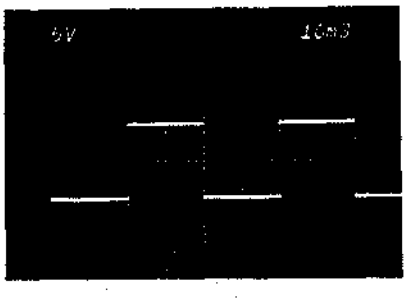


TP5 (PB, REC)

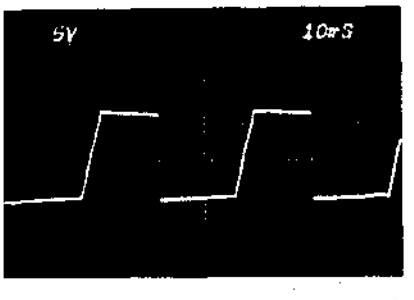
TP6 DC (PB, REC)



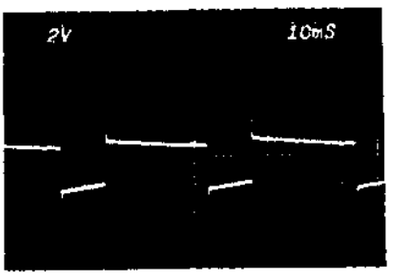
TP7 (PB, REC)



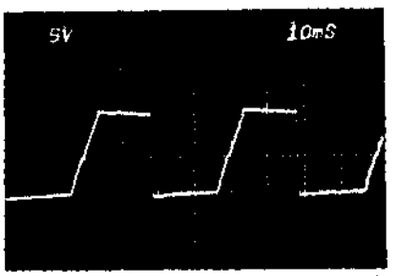
CC1 (PB, REC)



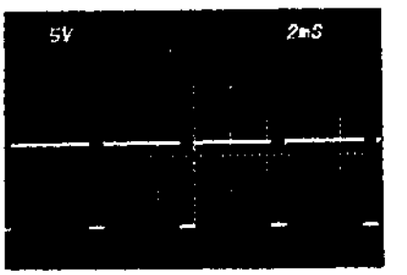
CC2 (REC)



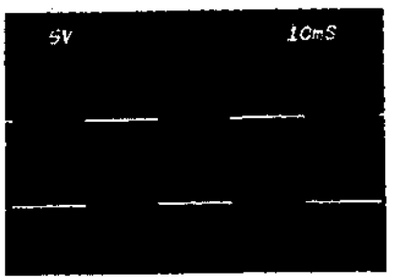
CC3 (PB, REC)



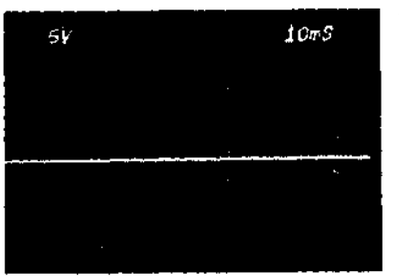
CC4 (PB, REC)



CC5 (PB, REC)

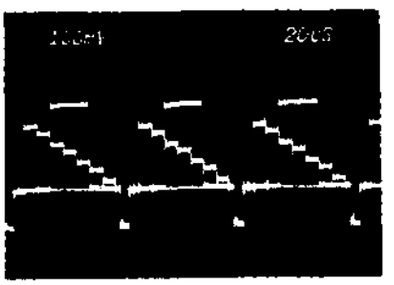


CC6 (PB)

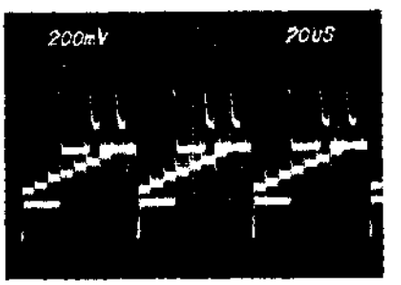


2. VIDEO P.C BOARD

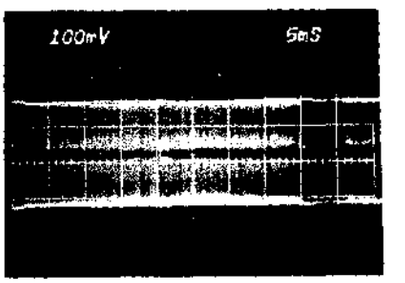
TP1 (EE, PB)



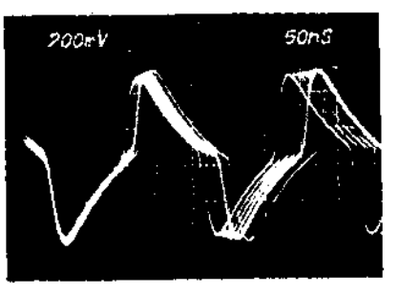
TP2 (EE)



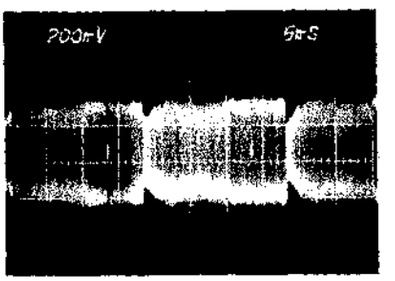
TP3 (REC)



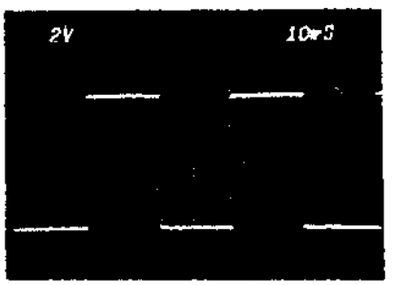
TP3 (REC)



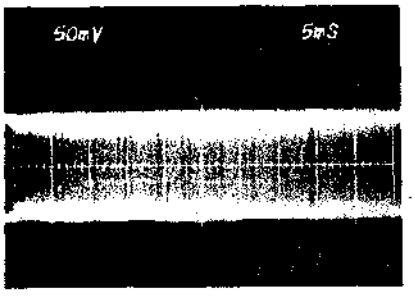
TP6 (PB)



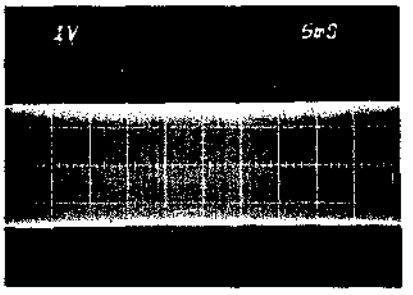
TP7 (PB, REC)



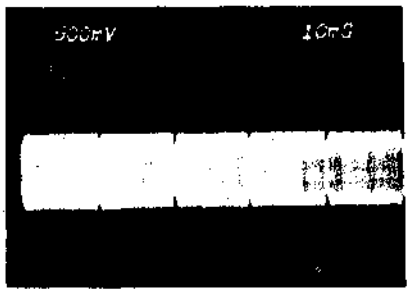
TP8, TP10 (REC)



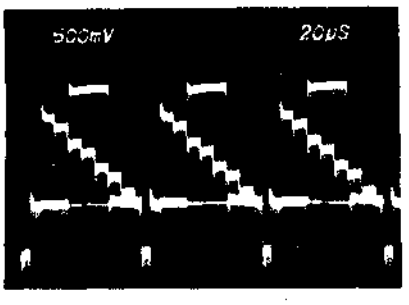
TP9 (REC)



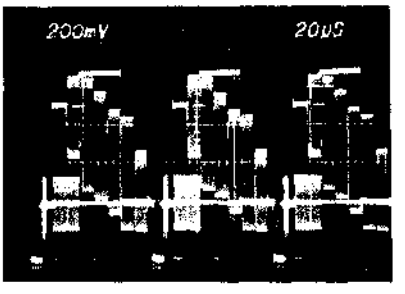
TP11 (PB)



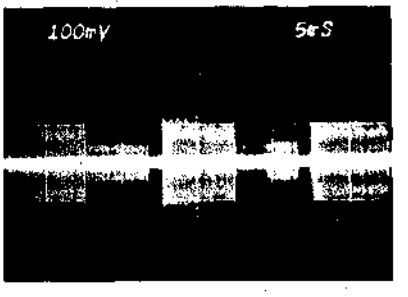
TP12 (PB)



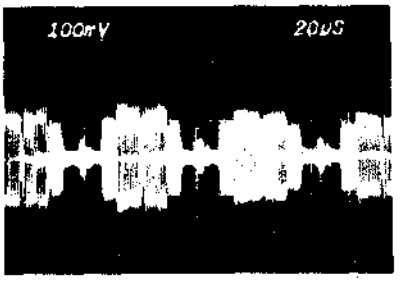
TP13 (EE, PB)



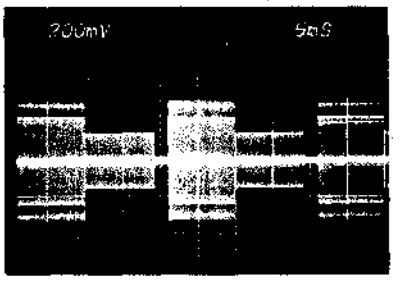
TP21 (PB)



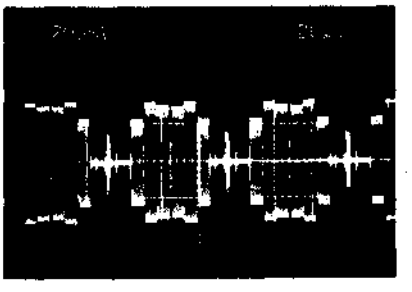
TP21 (PB)



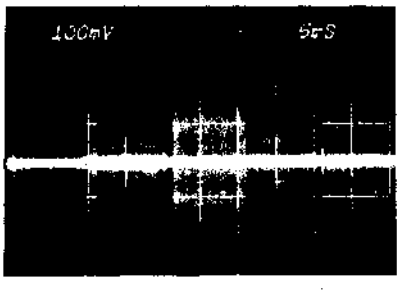
TP22 (REC)



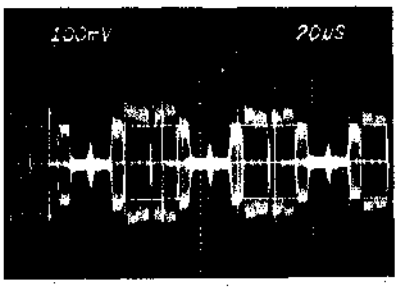
TP22 (REC)



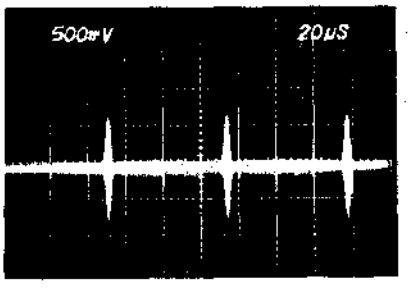
TP24 (PB)



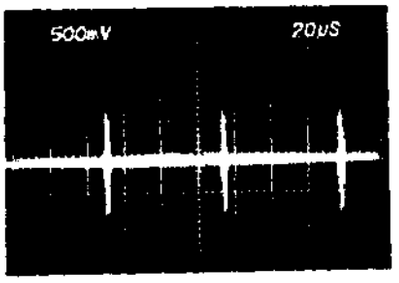
TP24 (PB)



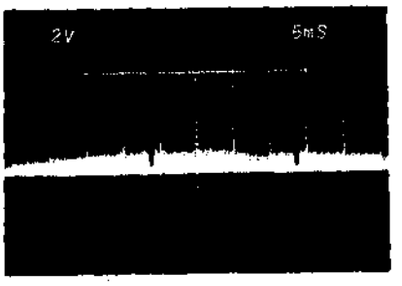
TP25 (PB)



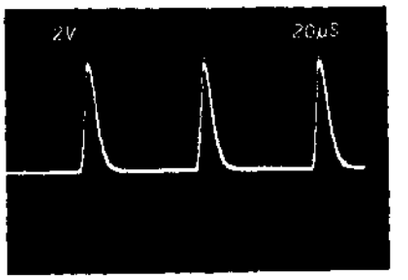
TP25 (EE)



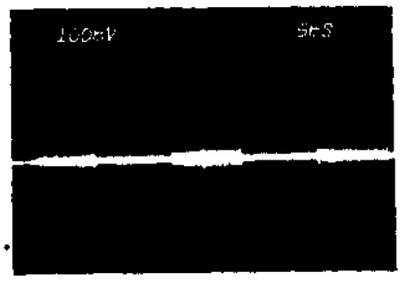
TP26 (PB, REC)



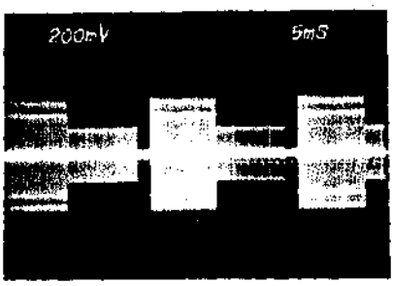
TP26 (PB, REC)



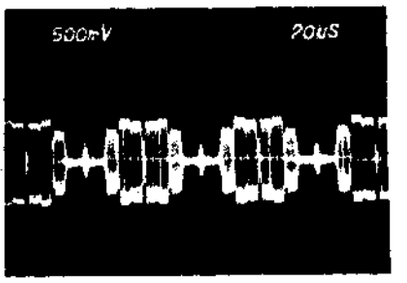
TP27 (PB)



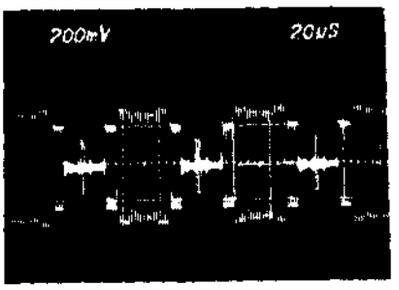
TP28 (PB, REC)



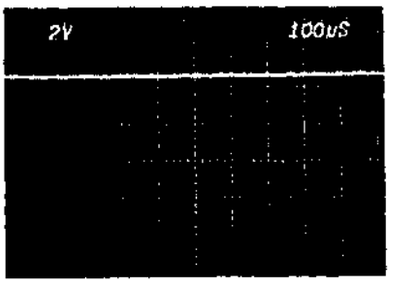
TP28 (PB)



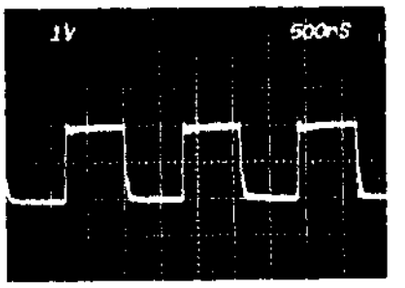
TP28 (REC)



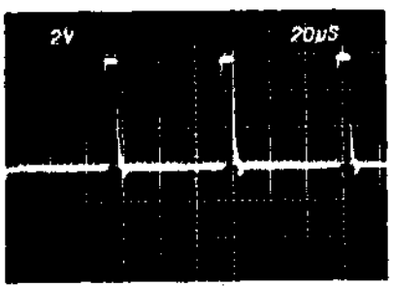
TP31 DC (EE, PB)



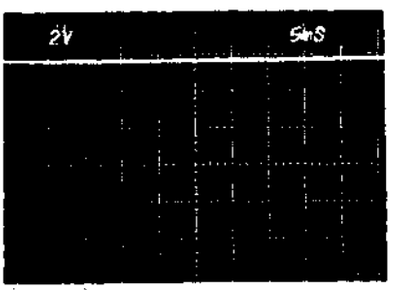
TP32 (EE, PB)



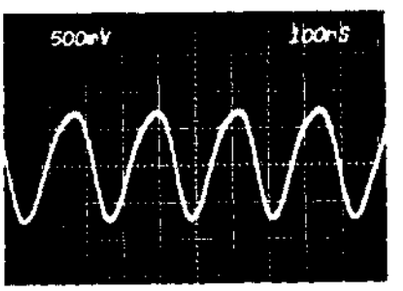
TP33 (EE, PB)



TP34 DC (EE, PB)



TP35 (PB)

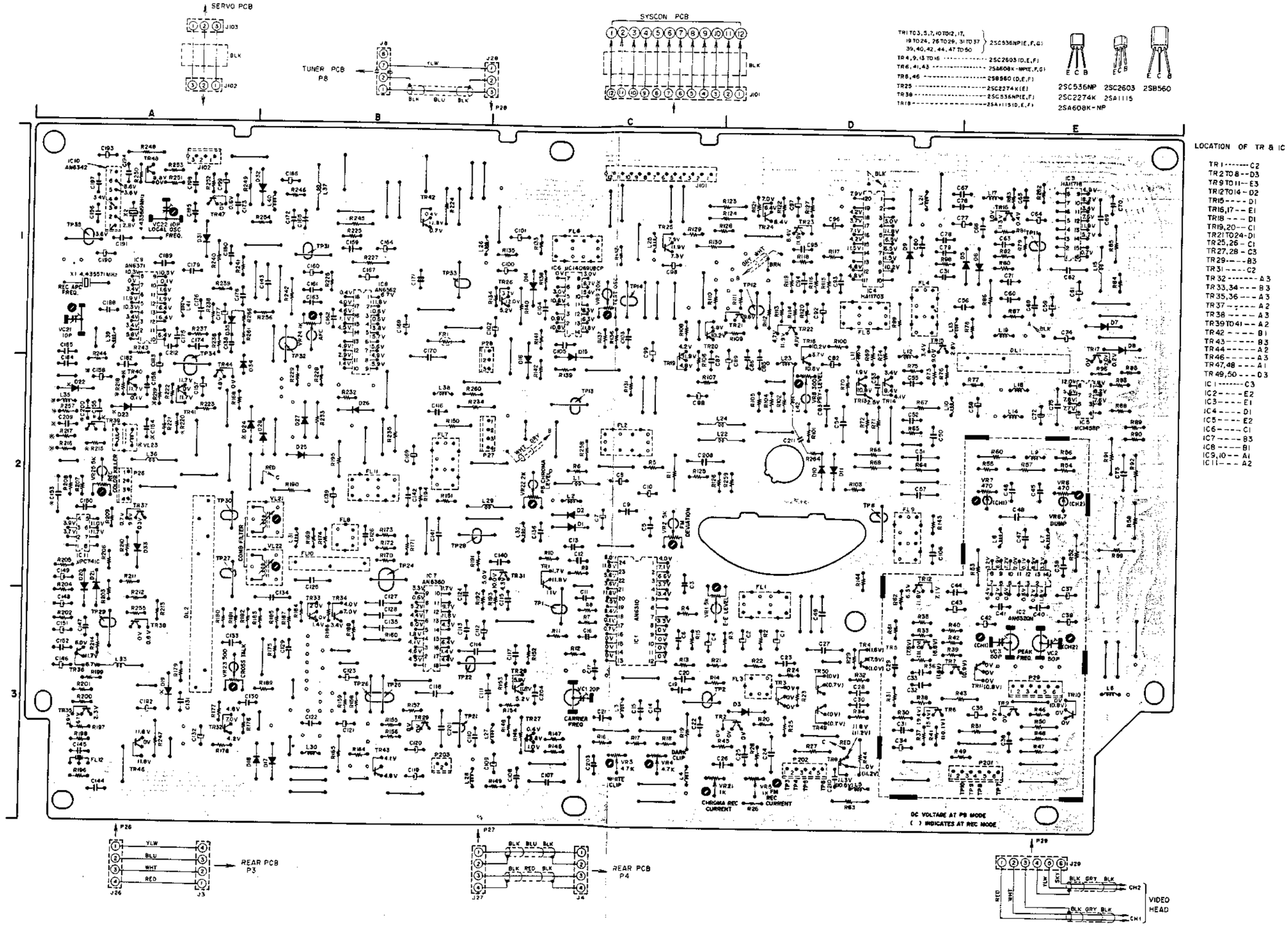


XII. P.C BOARD TITLES AND IDENTIFICATION NUMBERS

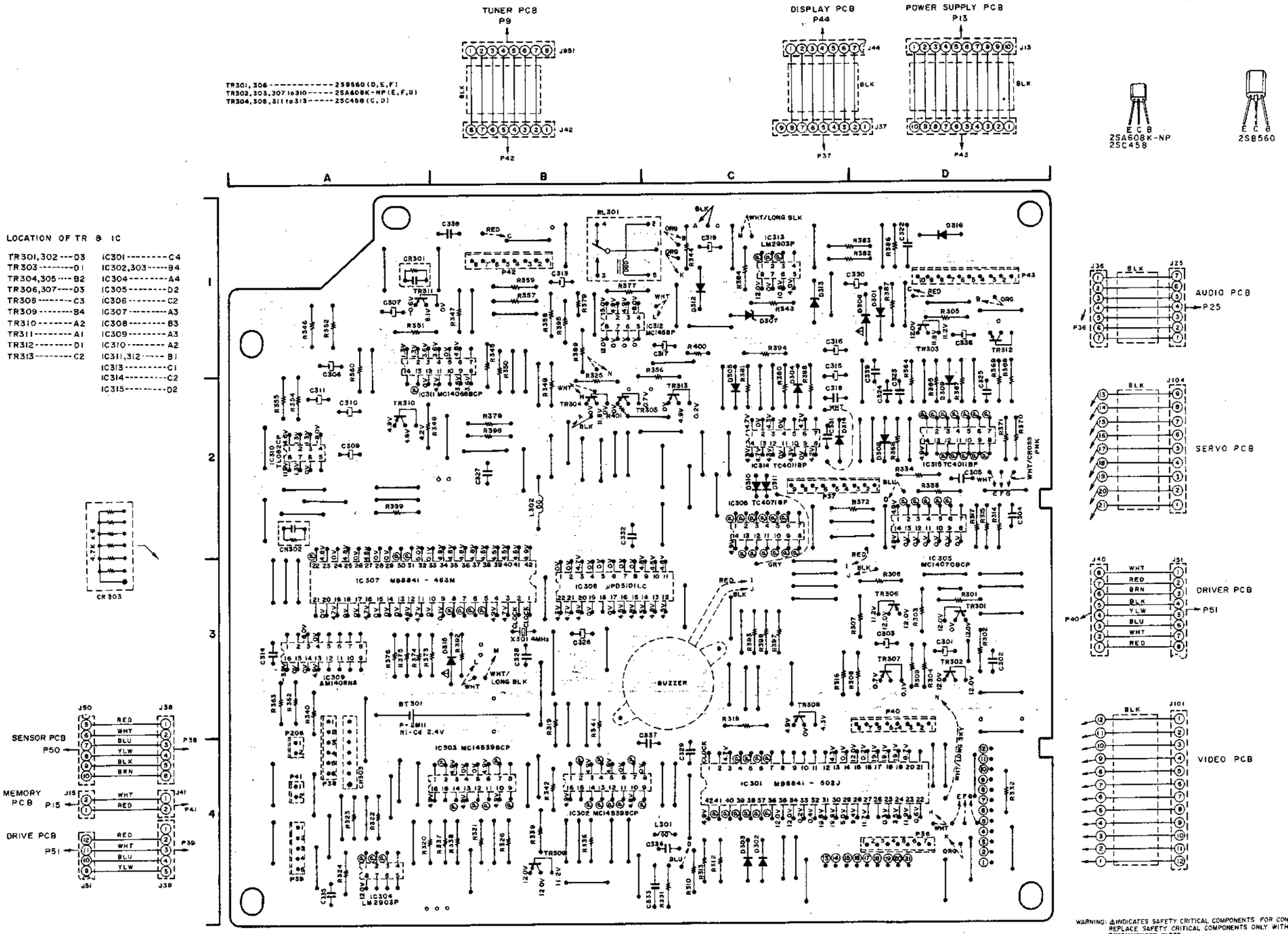
P.C Board Title	P.C Board Number
Video P.C Board	V1004A5420
Audio P.C Board	V1004A5350
Servo P.C Board	V1004A5340
Syscon P.C Board	V1004A5341
Display P.C Board	V1004A5440
Drive P.C Board	V1004B5360
Capstan Motor P.C Board	V1004B5491
Drum Motor P.C Board	V1004B5490
Rear P.C Board	V1004C5390
Mic P.C Board	V1004C5380
Memory P.C Board	V1004C5381
Sensor P.C Board	V1004C5370
Audio Head P.C Board	V1004D5410
Full Erase P.C Board	V1004D5411
Motor Filter P.C Board	V1004D5400
CM Filter P.C Board	V1004D5500
Power Supply P.C Board	KA240178
Tuner P.C Board	
Power Sub P.C Board	
TR P.C Board	
RS SW P.C Board	V1004C5371
SW A P.C Board	V1004C5372
SW B P.C Board	V1004C5373
EJ.S SW P.C Board	V1004C5374
Lower Drum P.C Board	VS-8068
Upper Drum P.C Board	VS-8012

XIII. COMPOSITION OF VARIOUS P.C BOARDS

1. VIDEO P.C BOARD V1004A5420 (2ED)



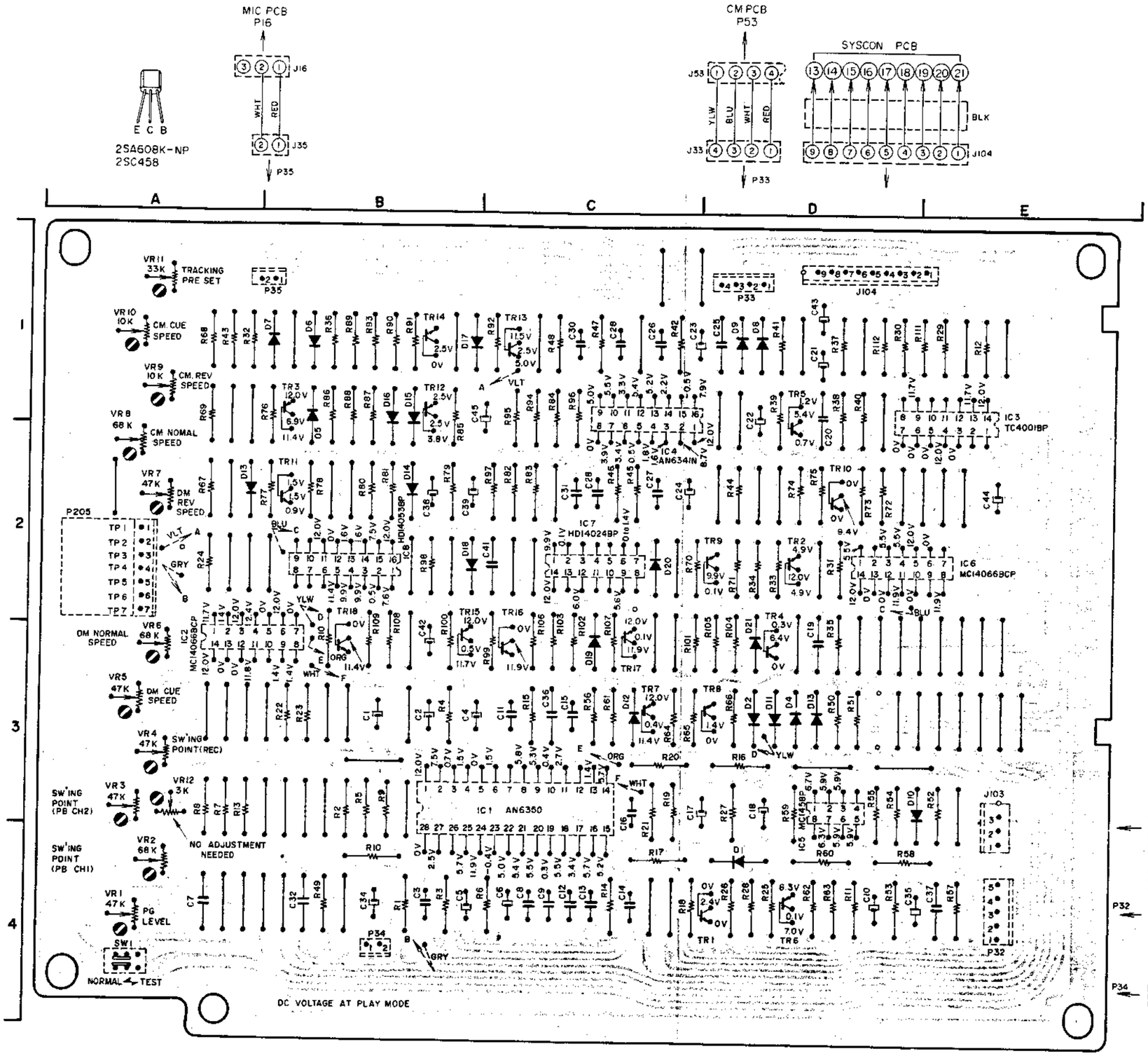
2. SYSCON P.C BOARD V1004A5341 (3ED)



WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQU LES COMPOSANTS CRITIQUES DE SÛRETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

3. SERVO P.C BOARD V1004A5340

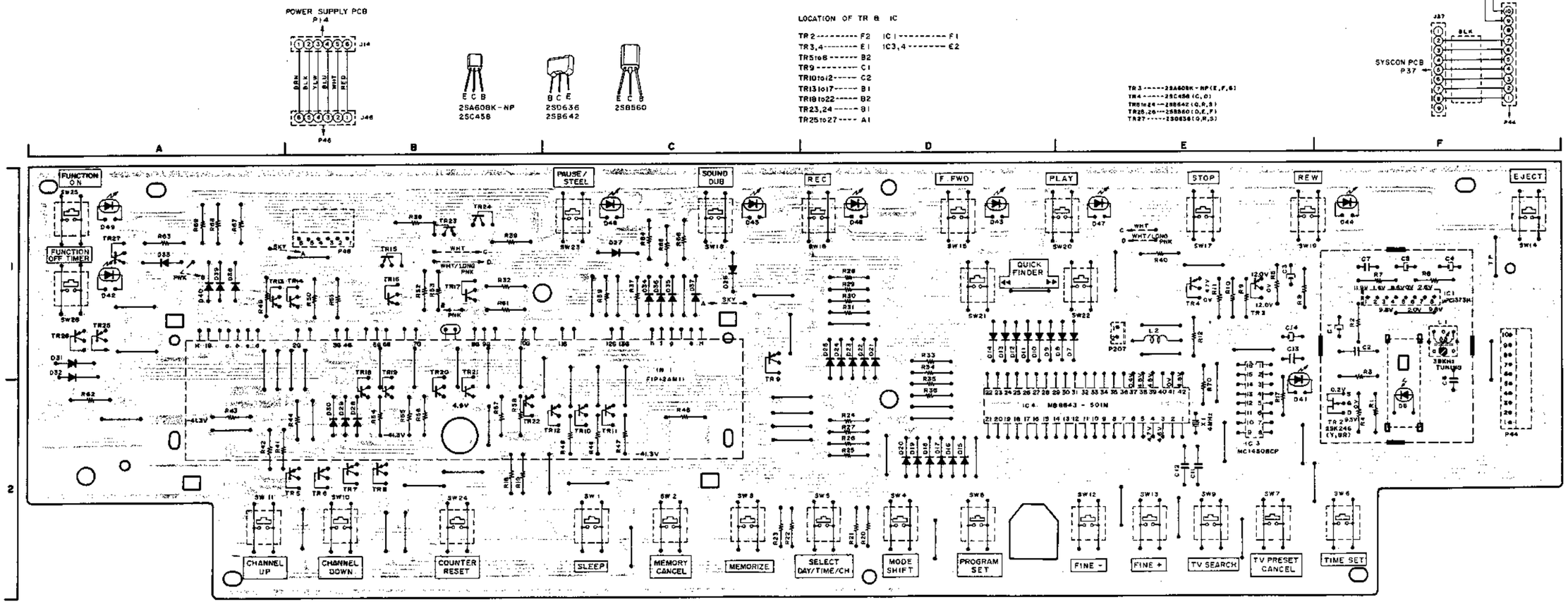


LOCATION OF TR & IC

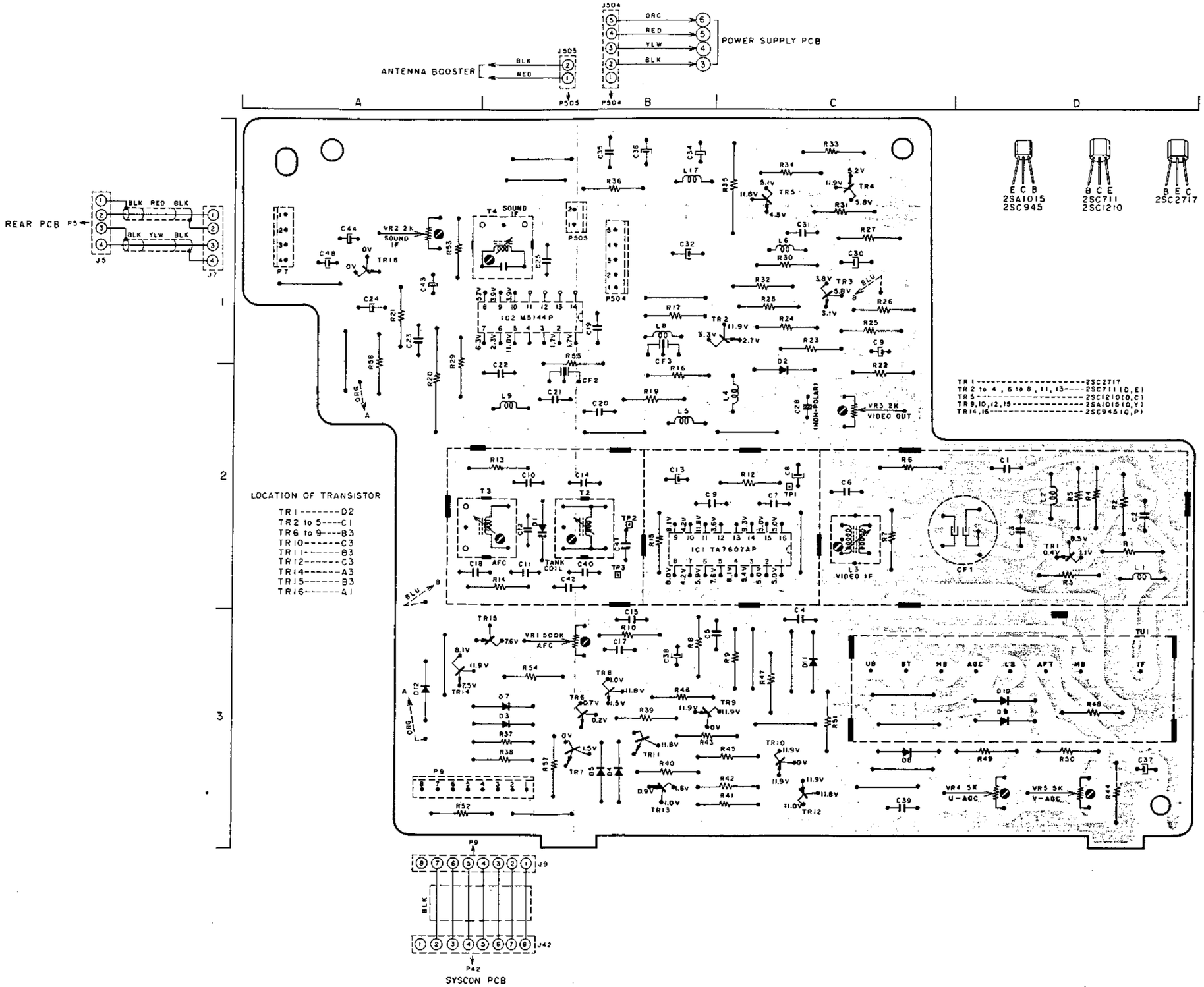
TR1 --- D4	IC1 --- C3
TR2 --- D2	IC2 --- A3
TR3 --- B1	IC3 --- E1
TR4 --- D3	IC4 --- C1
TR5 --- D1	IC5 --- D3
TR6 --- D4	IC6 --- D2
TR7 --- C3	IC7 --- C2
TR8 --- D3	IC8 --- B2
TR9 --- D2	
TR10 --- D2	
TR11 --- B2	
TR12 --- B1	
TR13 --- C1	
TR14 --- B1	
TR15 --- B3	
TR16,17 - C3	
TR18 --- B3	

TR1,2,4,5,8 to 11,14,16,18 ------ 2SC458(C,D)
TR3,6,7,12,13,15,17 ------ 2SA608K-NP(E,F,G)

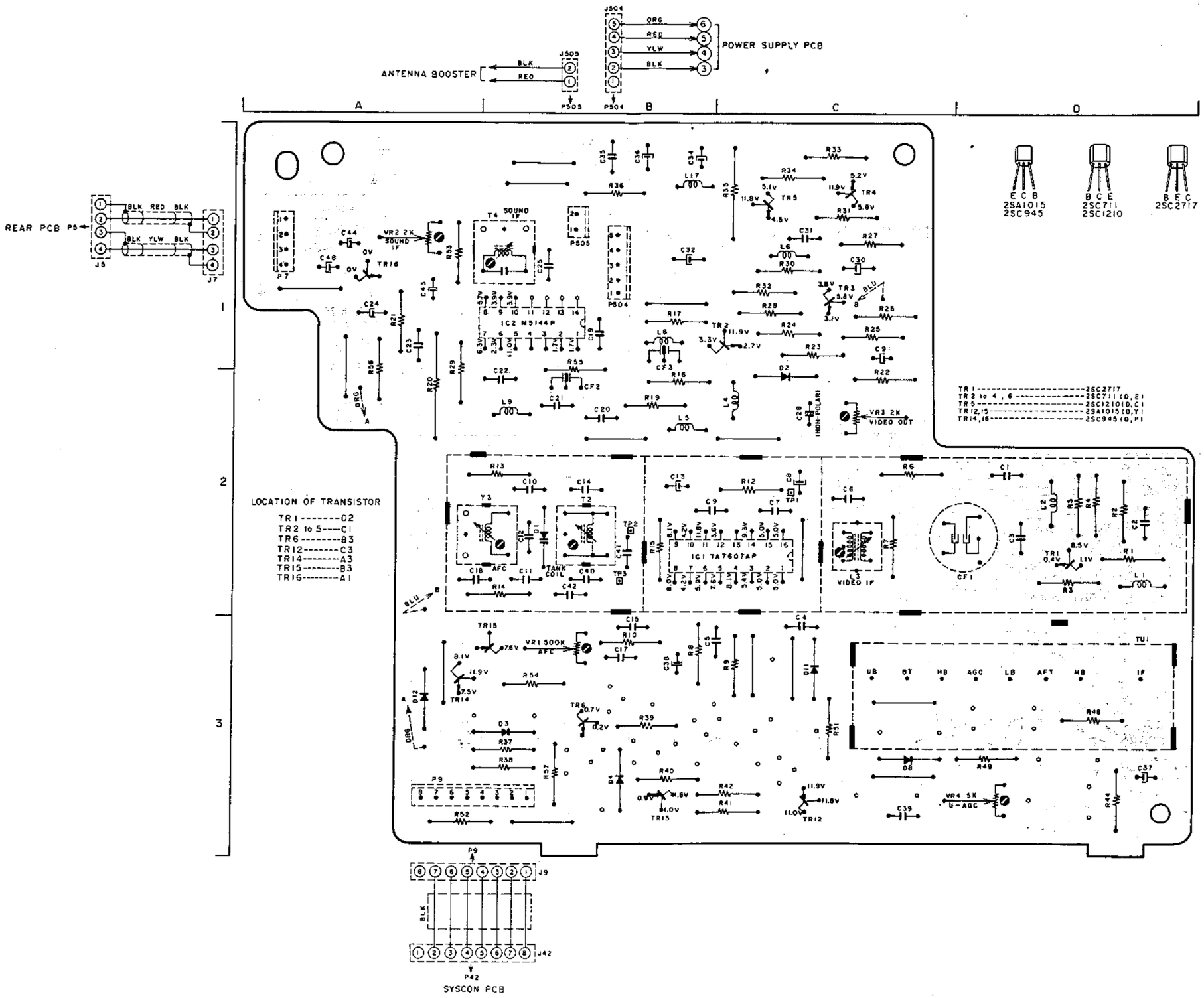
4. DISPLAY P.C BOARD V1004A5440 (4ED)



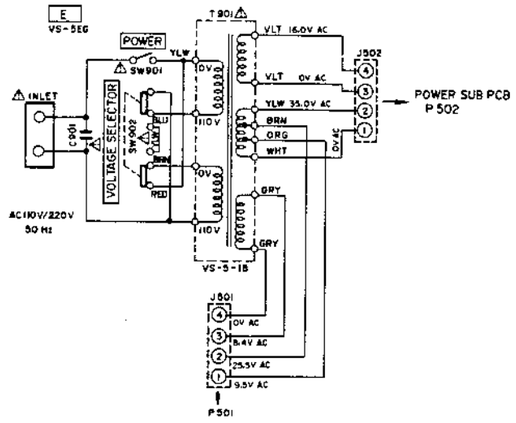
5. TUNER P.C BOARD (EG)

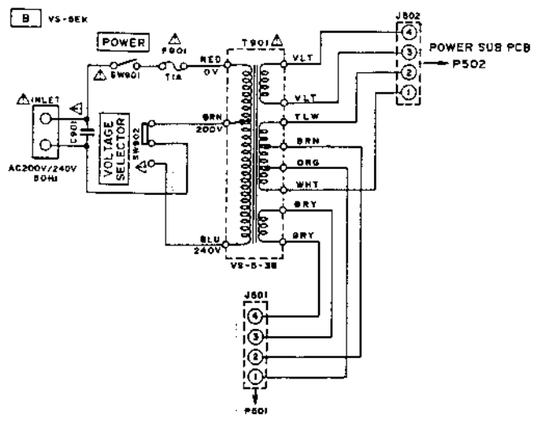


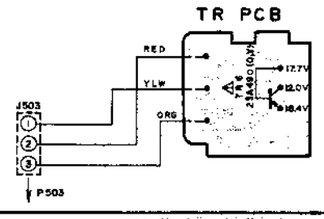
6. TUNER P.C BOARD (EK)

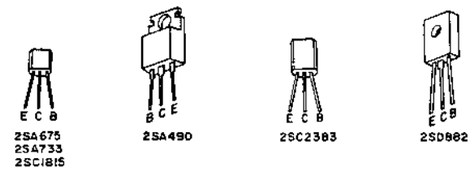


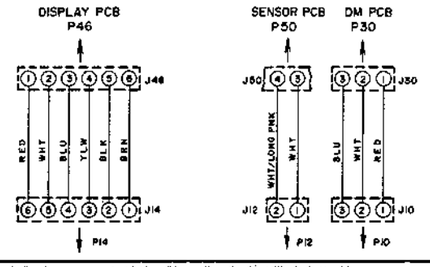
7. POWER SUPPLY P.C BOARD KA240178C and TR P.C BOARD



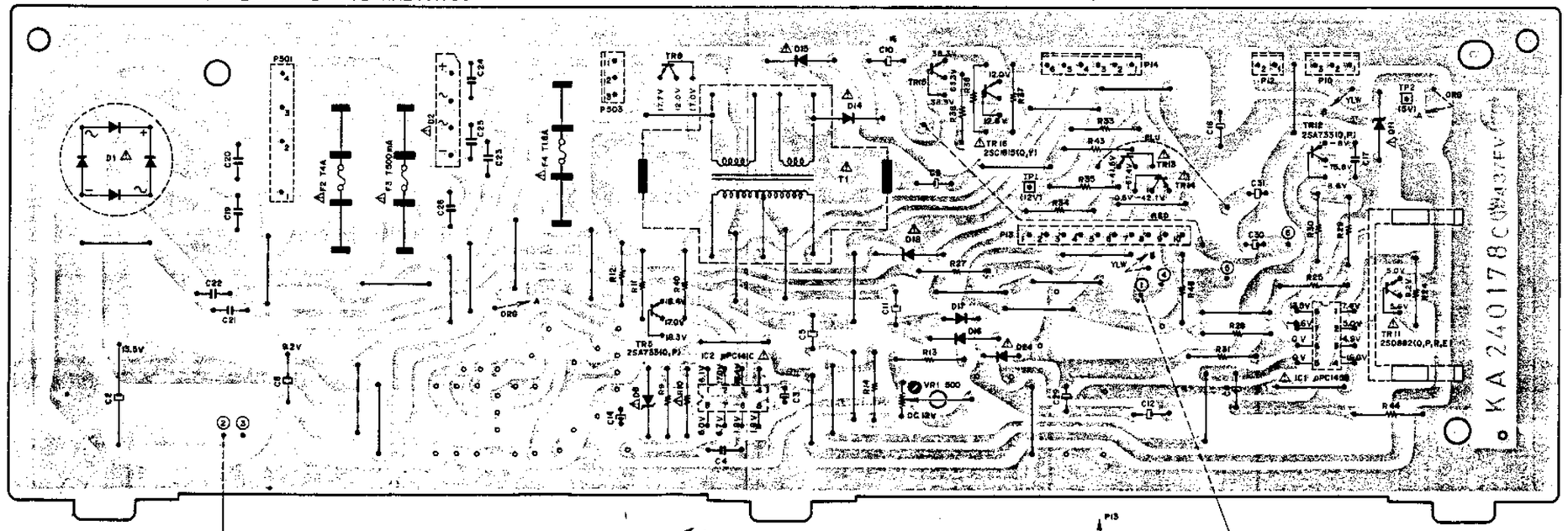








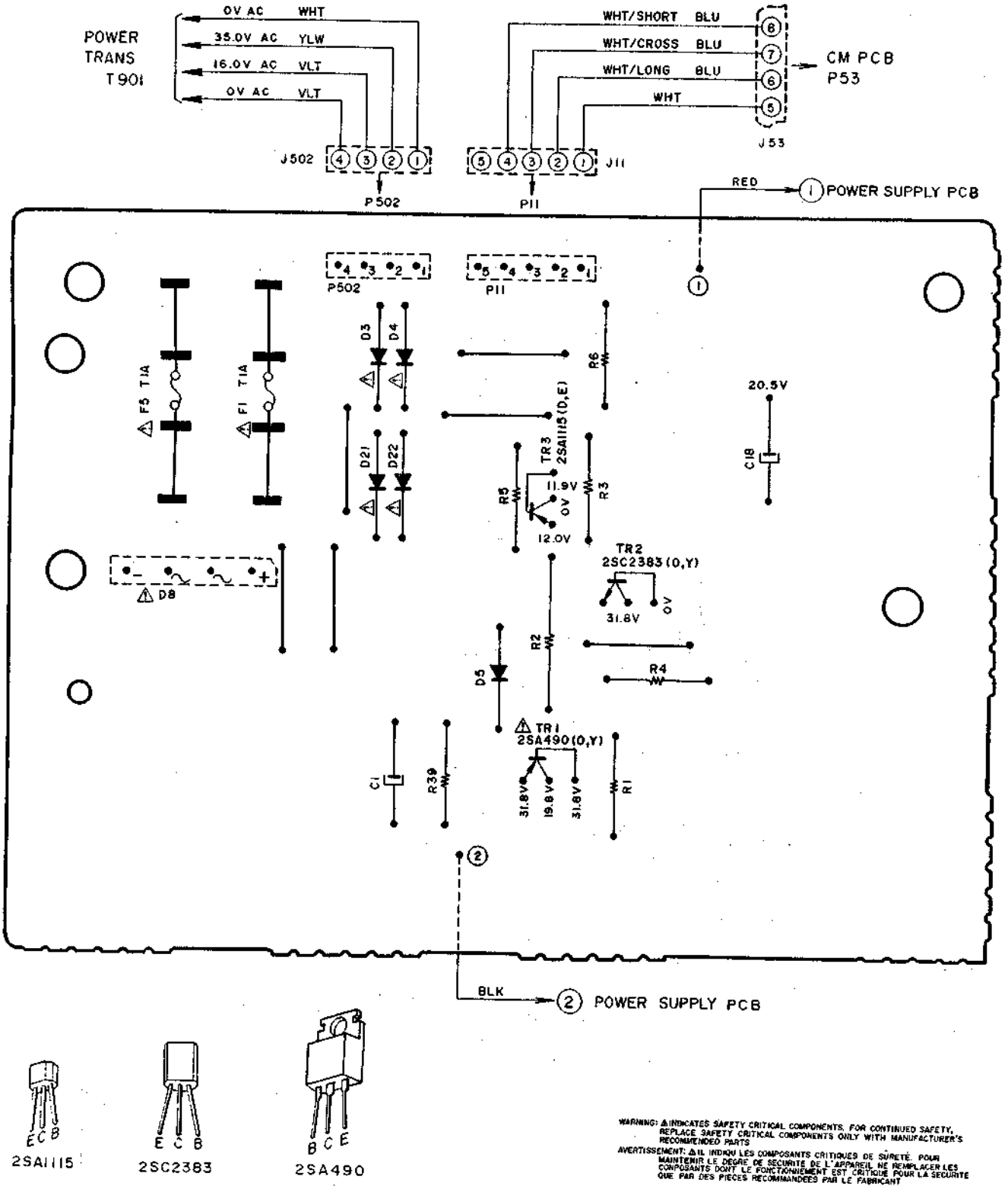
POWER SUPPLY PCB KA240178C



WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQUE LES COMPOSANTS CRITIQUES DE SURETÉ. POUR MAINTENIR LE DEGRE DE SECURITE DE L' APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

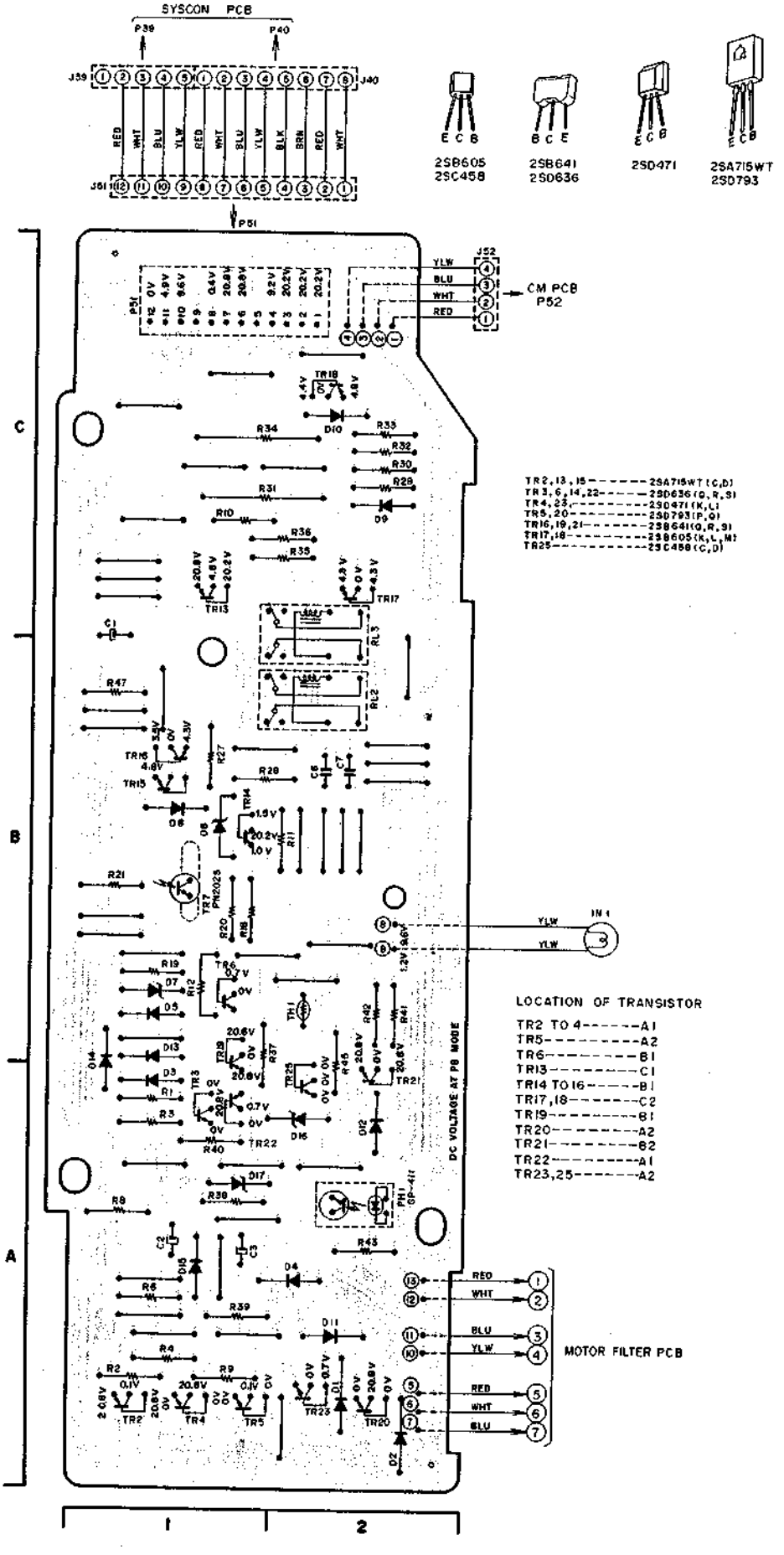
8. POWER SUB P.C BOARD



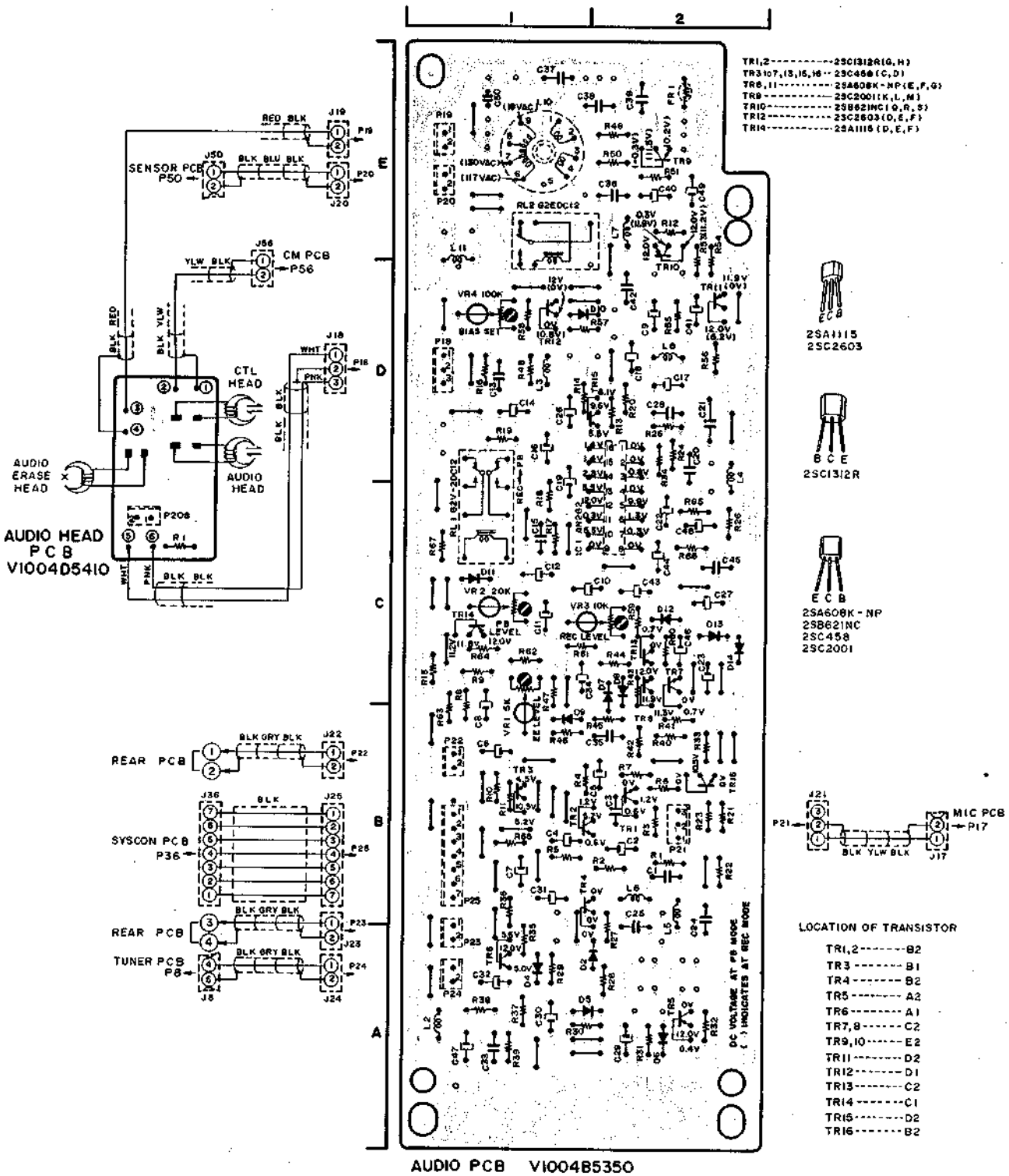
WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQU LES COMPOSANTS CRITIQUES DE SURETÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SÉCURITÉ QUE PAR DES PIÈCES RECOMMANDÉES PAR LE FABRICANT

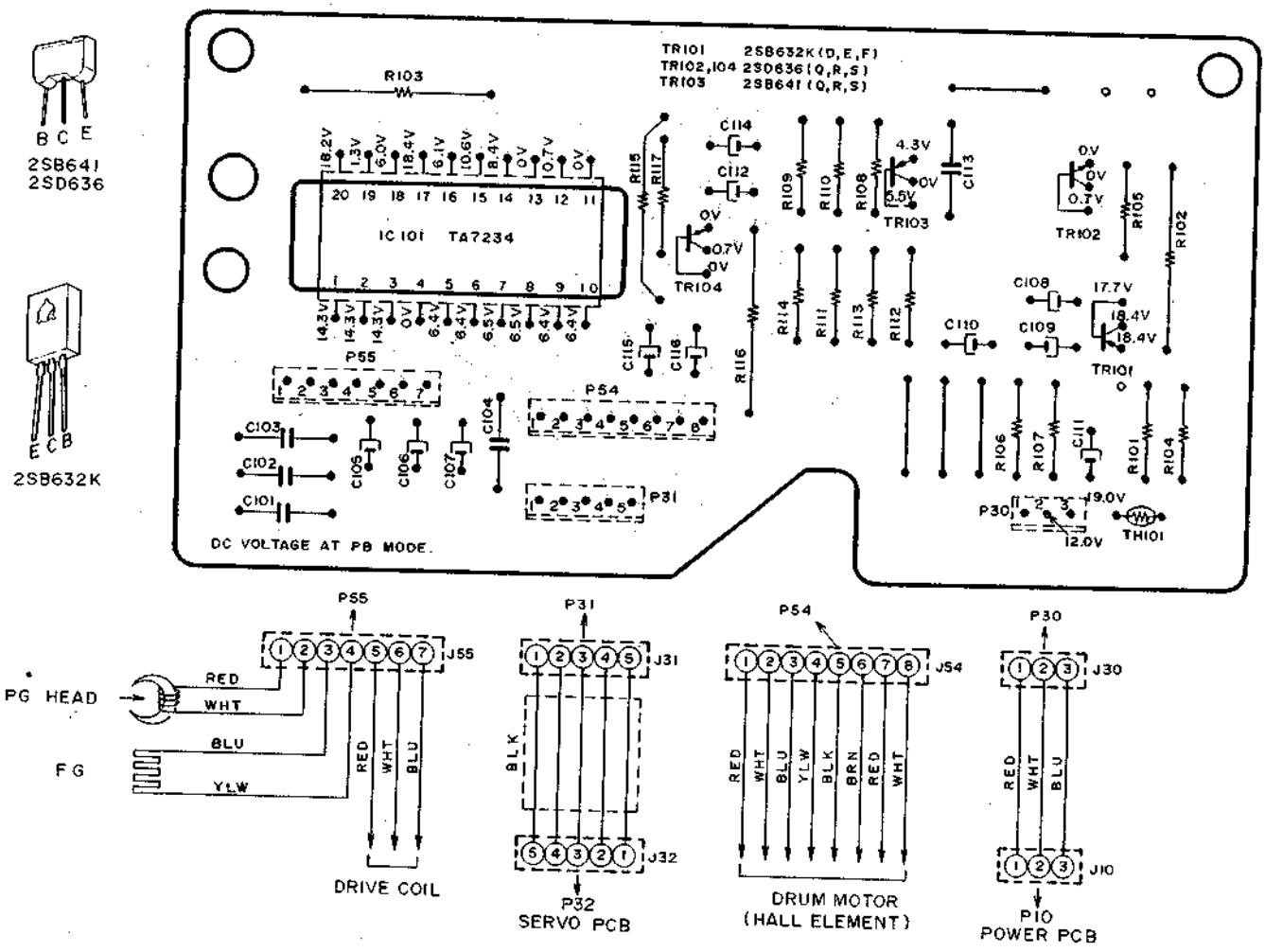
9. DRIVE P.C BOARD V1004B5360



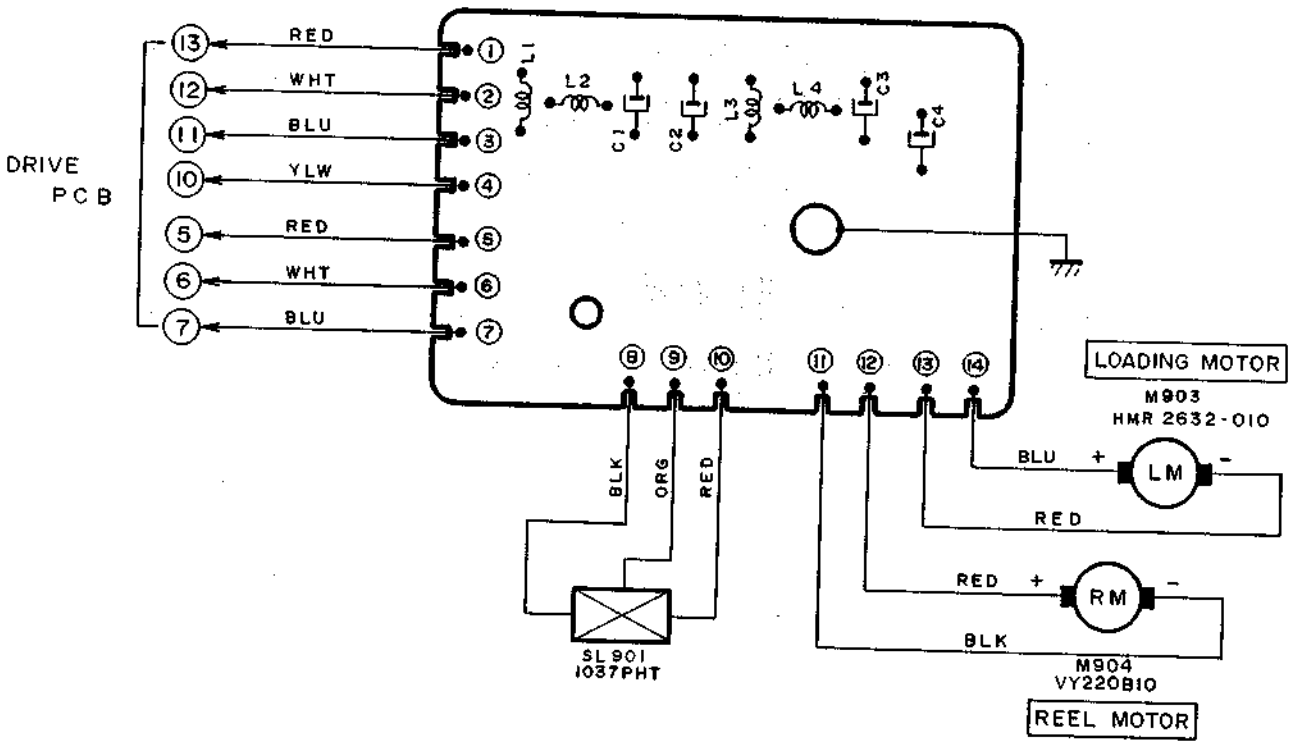
10. AUDIO P.C BOARD V1004B5350 (3ED) and AUDIO HEAD P.C BOARD V1004D5410



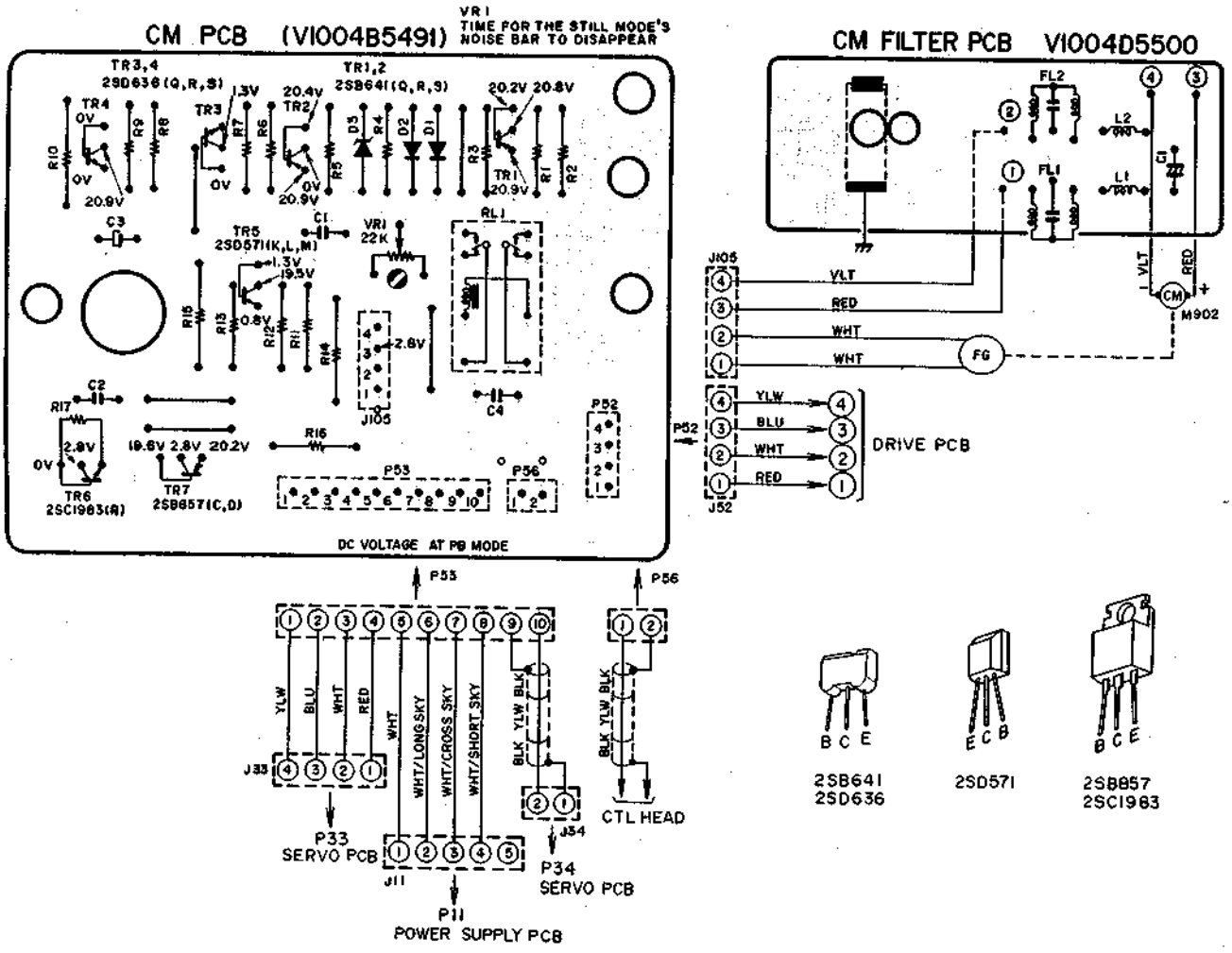
11. DRUM MOTOR P.C BOARD V1004B5490



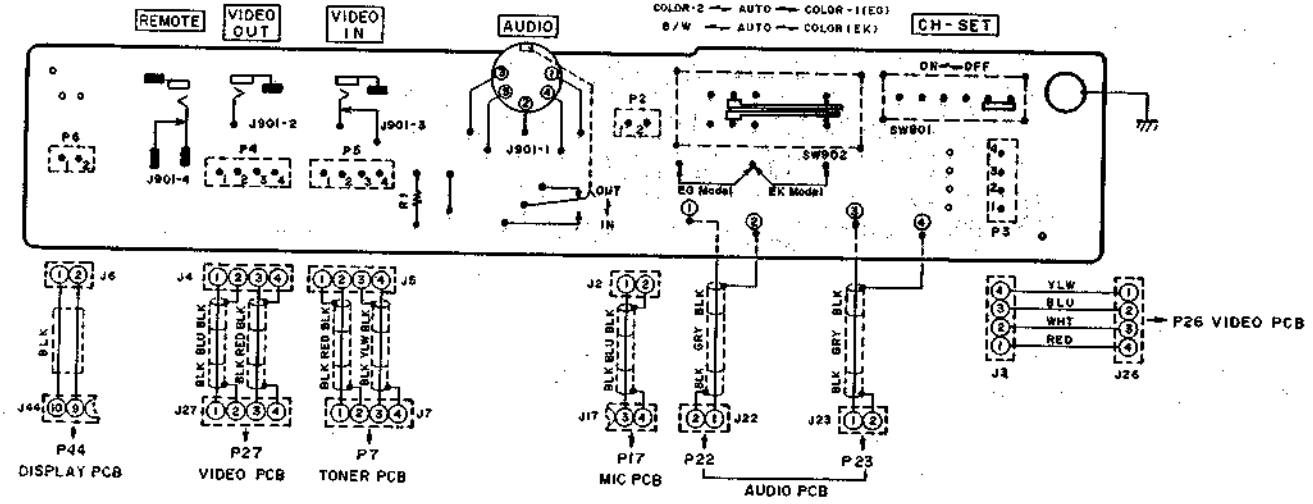
12. MOTOR FILTER P.C BOARD V1004D5400 (2ED)



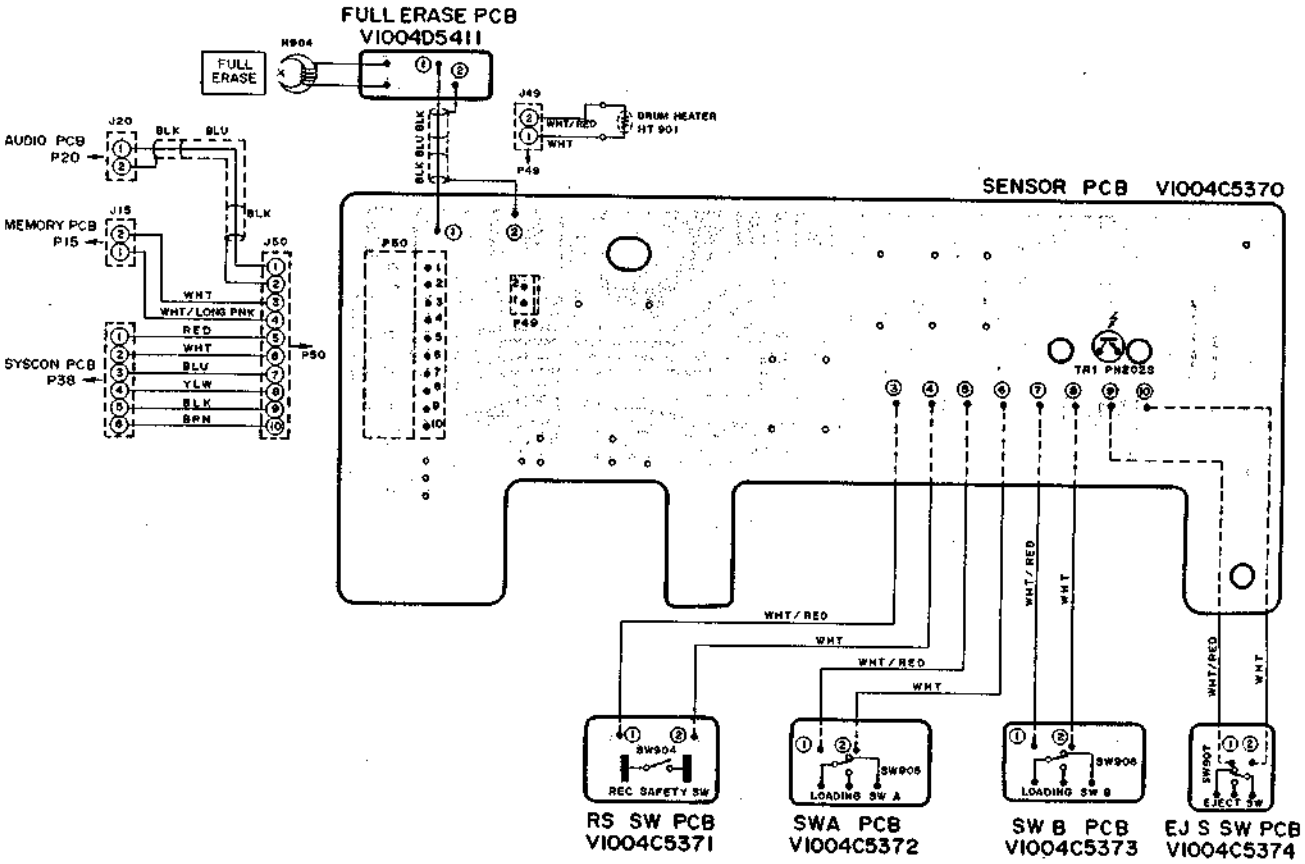
13. CM P.C BOARD V1004B5491 and CM FILTER P.C BOARD V1004D5500



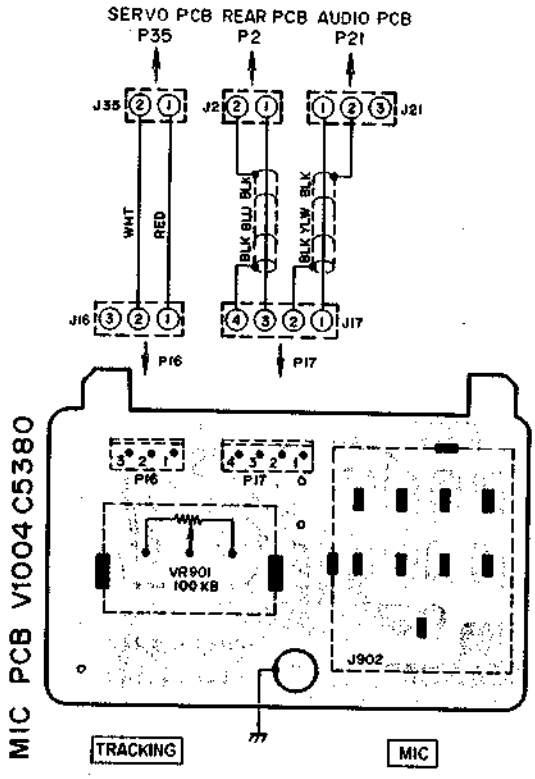
14. REAR P.C BOARD V1004C5390 (2ED)



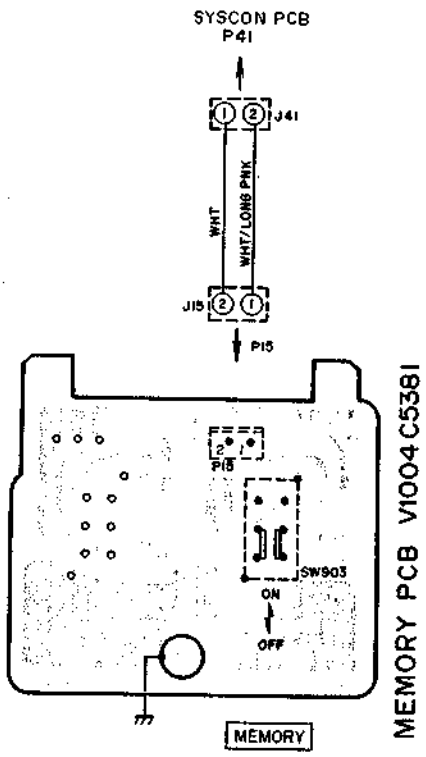
15. SENSOR P.C BOARD V1004C5370, FULL ERASE P.C BOARD V1004D5411, RS. SW P.C BOARD V1004C5371, SW A P.C BOARD V1004C5372, SW B P.C BOARD V1004C5373 and EJ.S SW P.C BOARD V1004C5374



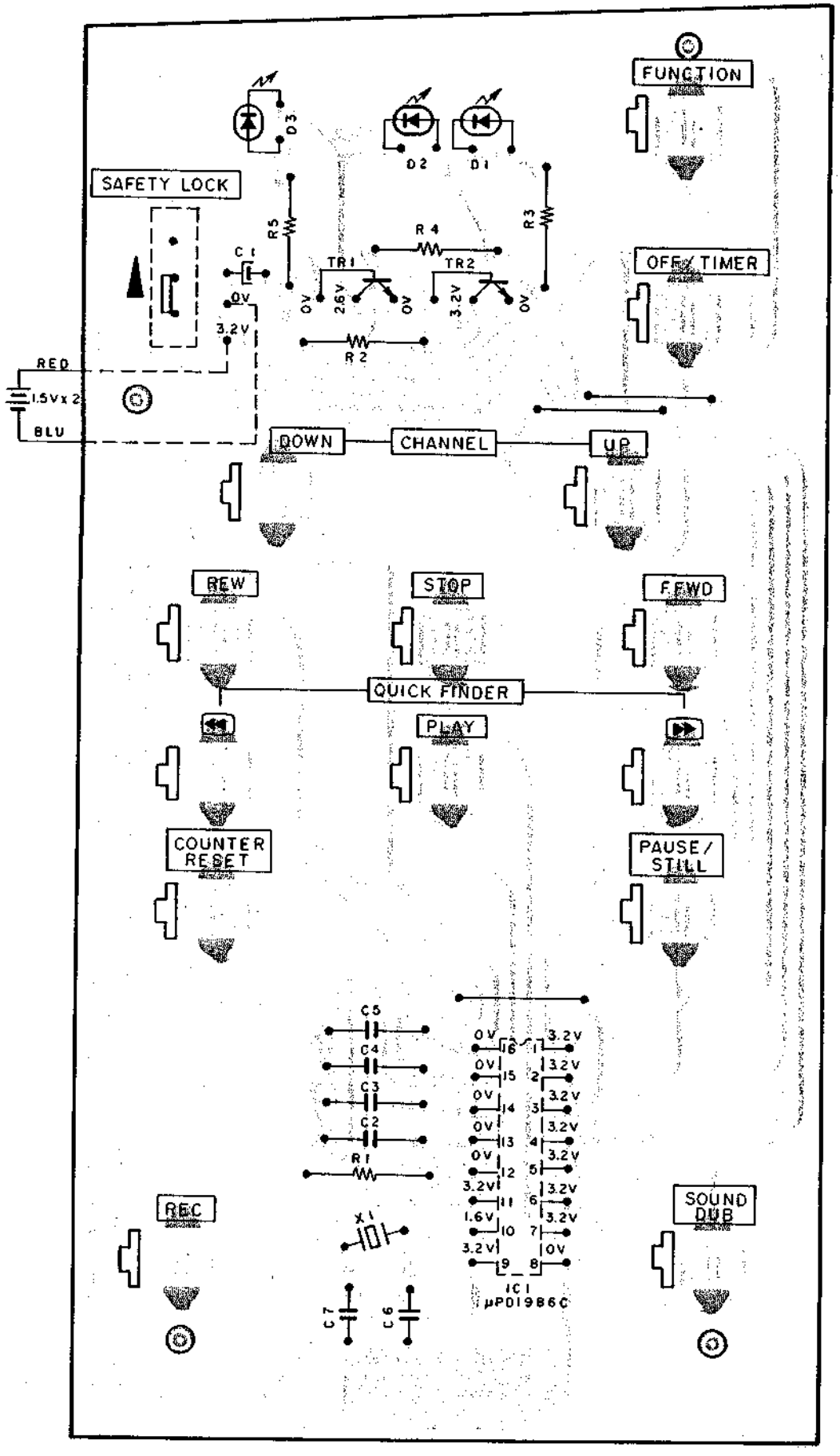
16. MIC P.C BOARD V1004C5380



17. MEMORY P.C BOARD V1004C5381



18. REMOTE CONTROL UNIT RC-V5



SECTION 2

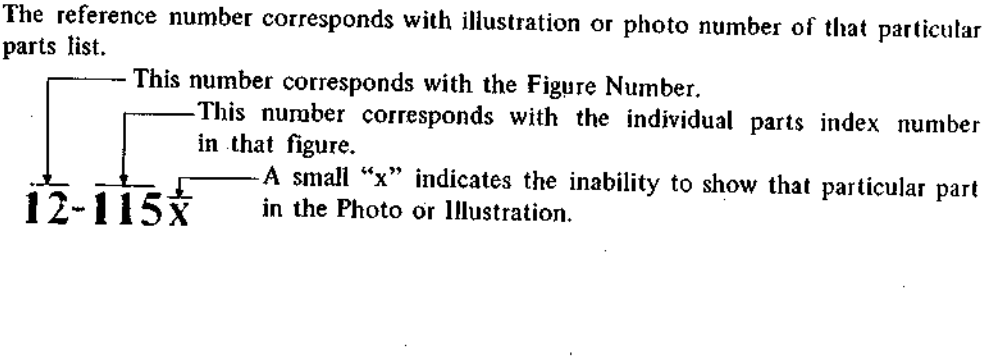
PARTS LIST

TABLE OF CONTENTS

Resistor and Capacitor which is not listed in this parts list, please refer to COMMON LIST FOR SERVICE PARTS.

HOW TO USE THIS PARTS LIST

1. This parts list is compiled by various individual blocks based on assembly process.
2. When ordering parts, please describe parts number, serial number, and model number in detail.
3. How to read List



Ref. No.	Parts No.	Description
		FLYWHEEL BLOCK #13
12-115x	800425	Flywheel Block Assy. Comp.
12-116	244506	Flywheel Only
12-117x	244754	Felt, Flywheel
12-118	251324	Main Metal Case
12-119	253080	Main Metal

4. The symbol numbers shown on the P.C. Board list can be matched with the Composite Views of Components of the Schematic Diagram or Service Manual.
5. Please utilize separate "Common List for Service Parts" for Resistor Parts orders.
6. The shape of the parts and parts name, etc. can be confirmed by comparing them with the parts shown on the Electrical Parts Table of P.C. Board.
7. Both the kind of part and installation position can be determined by the Parts Number. To determine where a parts number is listed, utilize Parts Index at end of Parts List.
   It is necessary first of all to find the Parts Number. This can be accomplished by using the Reference Number listed at right of parts number in the Parts Index. (meaning of ref. no. outlined in Item 3 above).
8. Utilize separate "Price List for Parts" to determine unit price. The most simple method of finding parts Price is to utilize the reference number.

CAUTION:
1. When placing an order for parts, be sure to list the parts no. model no., and description. There are instances in which if any of this information is omitted, parts cannot be shipped or the wrong parts will be delivered.
2. Please be careful not to make a mistake in the parts no. If the parts no. is in error, a part different from the one ordered may be delivered.
3. Because parts number and parts unit supply in the Preliminary Service Manual (Basic Parts List) may be partially changed, please use this parts list for all future reference.

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS.

AVERTISSEMENT: ⚠ IL INDIQU LES COMPOSANTS CRITIQUES DE SURETE. POUR MAINTENIR LE DEGRE DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT.

1. RECOMMENDED SPARE PARTS

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare parts Items.

REF. NO.	PARTS NO.	DESCRIPTION
1-1	BHV1004A280A	UPPER DRUM BLK VS-5EG
1-2	BM324475	MOTOR DDV5-1C
1-3	BM325491	MOTOR FG DMF-4907A
1-4	BM325617	MOTOR MXN-12AD08B
1-5	BM325314	MOTOR VY220B10
1-6	BR317908	SUPPLY REEL TABLE BLK
1-7	BR327789	TU REEL TABLE ASSY
1-8	BT705472	⚠ TRANS POWER KX590176
1-9	BT705526	⚠ TRANS POWER VS-5-1B (EG)
1-10	BT705527	⚠ TRANS POWER VS-5-3B (EK)
1-11	BV330111	ANT BOOSTER YBC1-001
1-12	BV327845	EJECTER ASSY
1-13	BVV1004A230A	LOADING BLK VS-5EG
1-14	BVV1004A300A	LOWER DRUM BLK VS-5EG
1-15	BV330110	RF CONVERTER MBK3-253 (EK)
1-16	BV330109	RF CONVERTER MDK3-253 (EG)
1-17	BVV1004A160A	ROLLER PINCH BLK VS-5EG
1-18	BV327815	TU IDLER ASSY
1-19	ED780019	D LED SEL1123W
1-20	ED706226	D LED SE303A INFRARED
1-21	ED324943	D LED SLP-134A RED
1-22	ED324943	D LED SLP-134A RED
1-23	ED324823	D LED SLP-234C GRN
1-24	ED330238	D PHOTO PH302
1-25	ED200469	D SILICON H DS448 FA5 F10
1-26	ED523427	D SILICON H 1SS16
1-27	ED557447	D SILICON H 1S1588
1-28	ED309437	D SILICON H 1S1926-M
1-29	ED316143	D SILICON H 1S2473HS F10
1-30	ED705467	D SILICON M4B51-14
1-31	ED705468	D SILICON T1B4B41
1-32	ED200468	D SILICON V DS448 VB3
1-33	ED560913	D SILICON V 1S2473VE
1-34	ED323979	D SILICON W03B F12 150/1.0A
1-35	ED306109	D SILICON W03B 100/1.0A
1-36	ED705479	D SILICON 1SV70
1-37	ED604541	D SILICON 1S2076
1-38	ED704267	D SILICON 10E-1
1-39	ED329058	D ZENER H HZ5 C1
1-40	ED330428	D ZENER H WZ-090
1-41	ED327059	D ZENER H WZ-100
1-42	ED570521	D ZENER H XZ-049
1-43	ED570521	D ZENER H XZ-049
1-44	ED705470	D ZENER HZ11C1
1-45	ED705469	D ZENER HZ6C-2
1-46	ED323892	PHOTO SENSOR GP-411
1-47	EE330106	TV TUNER CBE1-002 (EK)
1-48	EE330292	TV TUNER CDE1-011 (EG)
1-49	EF354295	⚠ FUSE T 1.6AT CEE
1-50	EF375660	⚠ FUSE T 1AT CEE
1-51	EF375660	⚠ FUSE T 1AT CEE
1-52	EF564491	⚠ FUSE T 4AT CEE
1-53	EF375647	⚠ FUSE T 500MAT CEE
1-54	EI322365	DL EFD-EN645A11E
1-55	EI322394	DL EFD-JN124A11A
1-56	EI328690	IC AM1408N8
1-57	EI634454	IC AN262
1-58	EI324204	IC AN6310
1-59	EI321076	IC AN6320N
1-60	EI321604	IC AN6341N
1-61	EI324203	IC AN6342N
1-62	EI326044	IC AN6350
1-63	EI324151	IC AN6360
1-64	EI324160	IC AN6362
1-65	EI324182	IC AN6371
1-66	EI322309	IC HA11703
1-67	EI324107	IC HA11718
1-68	EI325992	IC HD14024BP
1-69	EI328593	IC HD14053BP
1-70	EI326159	IC LM2903P

REF. NO.	PARTS NO.	DESCRIPTION
1-71	EI326159	IC LM2903P
1-72	EI324000	IC MB8841 463M
1-73	EI323995	IC MB8841 502J
1-74	EI330451	IC MB8843 501M
1-75	EI324250	IC MC14050BCP
1-76	EI304475	IC MC14066BCP
1-77	EI304475	IC MC14066BCP
1-78	EI304475	IC MC14066BCP
1-79	EI324117	IC MC14069UBCP
1-80	EI330392	IC MC14070BCP
1-81	EI319496	IC MC14539BCP
1-82	EI330392	IC MC1458P
1-83	EI704201	IC M5144P
1-84	EI330431	IC TA7234
1-85	EI705494	IC TA7607P
1-86	EI313797	IC TC4001BP
1-87	EI304657	IC TC4011BP
1-88	EI324687	IC TC4071BP
1-89	EI324255	IC TL082CP
1-90	EI203040	IC μA741CP
1-91	EI330226	IC μPC1373H
1-92	EI308473	IC μPC141C
1-93	EI301748	IC μPC1458C
1-94	EI780020	IC μPD1986C
1-95	EI328692	IC μPD5101LC
1-96	EI780021	OSC CE
1-97	EI327364	OSC X'TAL HC-33/U 4.435571 MHZ
1-98	EI309878	OSC X'TAL 4.433619 MHZ
1-99	EJ301513	⚠ SOCKET INLET S-16453 E 2P
1-100	EJ319158	JACK PLATE VS-5 B0002
1-101	EJ330544	PHONE J 3P HLJ0315-010 6.3 2T
1-102	EL330446	PL SPL HOLDER LAMP
1-103	EM318923	IND FL FIP12AM11 CHARACTER
1-104	EO330256	OSC CE F85-006 4MHZ
1-105	EO330256	OSC CE F85-006 4MHZ
1-106	EP318925	RELAY POWER FBR221D006 2TR 6V
1-107	EP318925	RELAY POWER FBR221D006 2TR 6V
1-108	EP330266	RELAY POWER G2U-112P 1TR 12V
1-109	EP200175	RELAY SIGNAL G2E 1TR 12V
1-110	EP327336	RELAY SIGNAL G2V-2 2TR 12V
1-111	EP319333	SOLENOID W/TAP 1037PLT 15V
1-112	ER705495	FILTER CE F1024 38.9MHZ
1-113	ER705496	FILTER CE F1025 39.5MHZ
1-114	ER705499	FILTER CE SFE 5.5MHZ
1-115	ER705500	FILTER CE SFE 6MHZ
1-116	ER328237	FILTER CE SFE4.5MB 4.5MHZ
1-117	ER705501	FILTER CE TPS 5.5MHZ
1-118	ER705502	FILTER CE TPS 6MHZ
1-119	ER324339	FILTER LC AP LCB-56
1-120	ER324375	FILTER LC BP LCB-57 4.43MHZ
1-121	ER324470	FILTER LC BP LCB-60 4.43MHZ
1-122	ER325807	FILTER LC BP LCB-61 5.06MHZ
1-123	ER324305	FILTER LC HP LCB-53
1-124	ER324258	FILTER LC LP LCB-51
1-125	ER324259	FILTER LC LP LCB-52
1-126	ER324309	FILTER LC LP LCB-54
1-127	ER324398	FILTER LC LP LCB-58
1-128	ER324469	FILTER LC LP LCB-59
1-129	ER330625	FILTER LP LCB-62
1-130	ER705460	R CT RGC2T 2W R100G
1-131	ES705533	⚠ SW SEESAW SDE3S2023
1-132	ES705534	⚠ SW TKR-22293
1-133	ES318284	SW LEVER SCL101R23A 1-01-02N
1-134	ES319124	SW LEVER SCL101S 1-01-02N
1-135	ES319156	SW MICRO SS-1-E-4 UC
1-136	ES319334	SW SLIDE HSW0273-220 1-02-02
1-137	ES319352	SW SLIDE HSW0372-030 2-02-03
1-138	ES326043	SW SLIDE SSS322001 2-02-02N

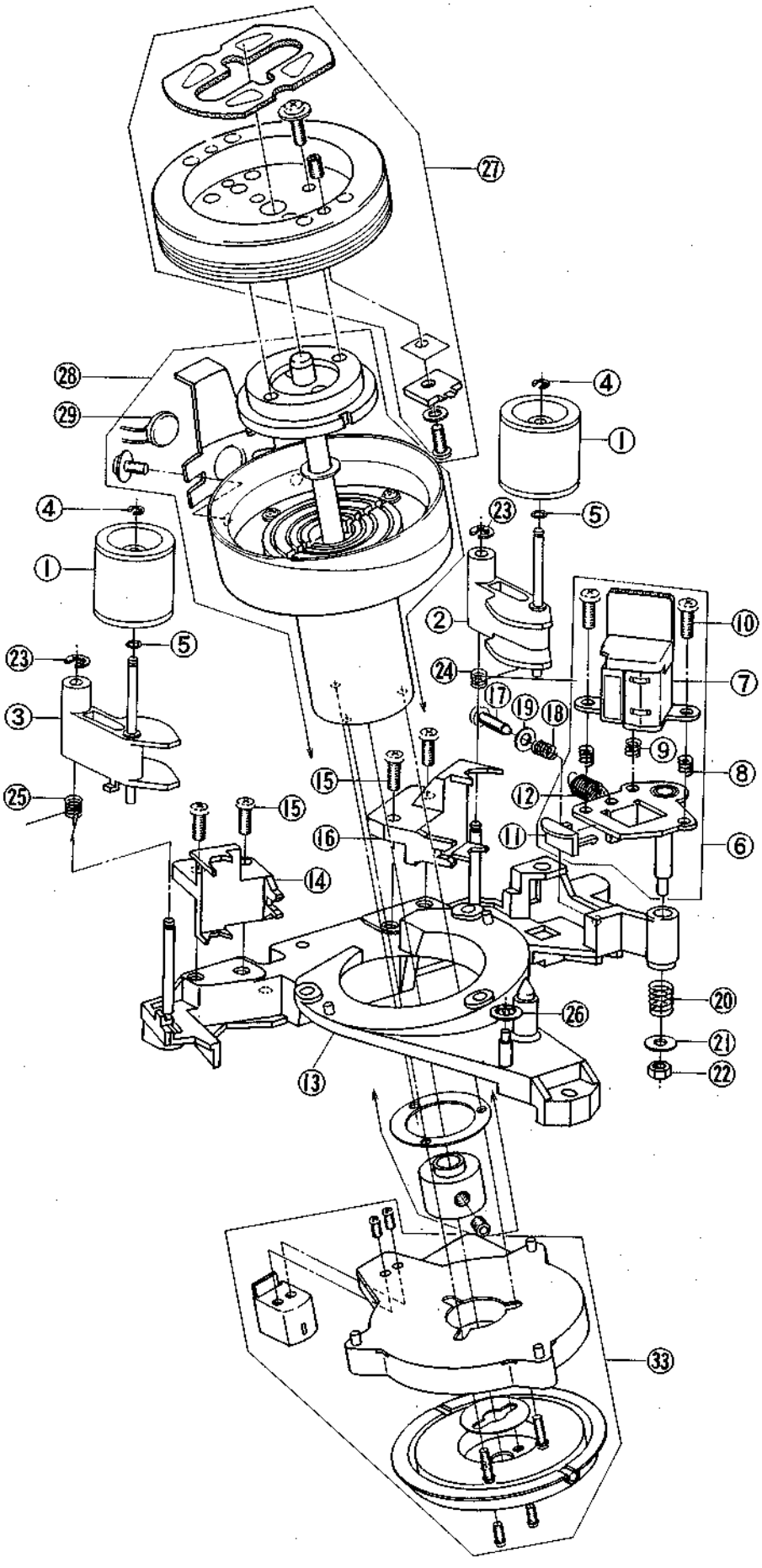
When ordering parts, please quote Parts Number, Description and Model Number.

REF. NO.	PARTS NO.	DESCRIPTION
1-139	ES315362	SW TACT AKC8S
1-140	ET330533	POSISTER PTH61G04BD3R3N
1-141	ET330535	TR FET 2SK246 Y,GR
1-142	ET318308	TR PHOTO PN202S
1-143	ET318308	TR PHOTO PN202S
1-144	ET325501	TR 2SA1015 O,Y
1-145	ET200479	TR 2SA1115 D,E,F
1-146	ET633677	TR 2SA490 O,Y
1-147	ET322778	TR 2SA608K-NP E,F,G
1-148	ET554657	TR 2SA733A P,Q
1-149	ET554657	TR 2SA733A P,Q
1-150	ET200925	TR 2SA970 GR
1-151	ET207145	TR 2SB560 D,E,F
1-152	ET330543	TR 2SB621NC Q,R,S
1-153	ET330430	TR 2SB632K D,E,F
1-154	ET322598	TR 2SB632K E,F
1-155	ET200415	TR 2SB641 Q,R,S
1-156	ET330216	TR 2SB642 Q,R,S
1-157	ET330885	TR 2SB857 C,D
1-158	ET301154	TR 2SC1162 C,D
1-159	ET522270	TR 2SC1210 D
1-160	ET517263	TR 2SC1312R G,H
1-161	ET325899	TR 2SC1983 R
1-162	ET322412	TR 2SC2001 K,L,M
1-163	ET310833	TR 2SC2274K E
1-164	ET200480	TR 2SC2603 D,E,F
1-165	ET705480	TR 2SC2717
1-166	ET309334	TR 2SC458 C,D
1-167	ET342707	TR 2SC536NP E,F
1-168	ET621235	TR 2SC536NP E,F,G
1-169	ET356962	TR 2SC640 C
1-170	ET328553	TR 2SC945A K,P
1-171	ET639437	TR 2SC945L Q,P
1-172	ET398711	TR 2SC945L Q,R
1-173	ET318604	TR 2SD545NP E,F
1-174	ET200741	TR 2SD571 K,L,M
1-175	ET330542	TR 2SD592NC R,S
1-176	ET310148	TR 2SD612K E,F
1-177	ET200412	TR 2SD636 Q,R,S
1-178	ET303895	TR 2SD667 C,D
1-179	ET303895	TR 2SD667 C,D
1-180	EV319159	VR ROTARY 16P10x1D B104
1-181	EV705536	VR TM8KV-2S B501
1-182	HE325273	HEAD E HV113201 V
1-183	HR325263	HEAD COMBO HV225315
1-184	MB326474	BELT CAPSTAN
1-185	MB322303	BELT DETECTION
1-186	MB780029	BELT LOADING
1-187	MIB328611	FLYWHEEL PART
1-188	MI327773	IDLER ASSY
1-189	MI326478	ROLLER IMPEDANCE
1-190	VTB319445	LOADING LEADER (L) PART
1-191	VTB319446	LOADING LEADER (R) PART
1-192	VT318087	V BLOCK (L)
1-193	VT318088	V BLOCK (R)
1-194	VT317947	VERTICAL POLE PART (P)

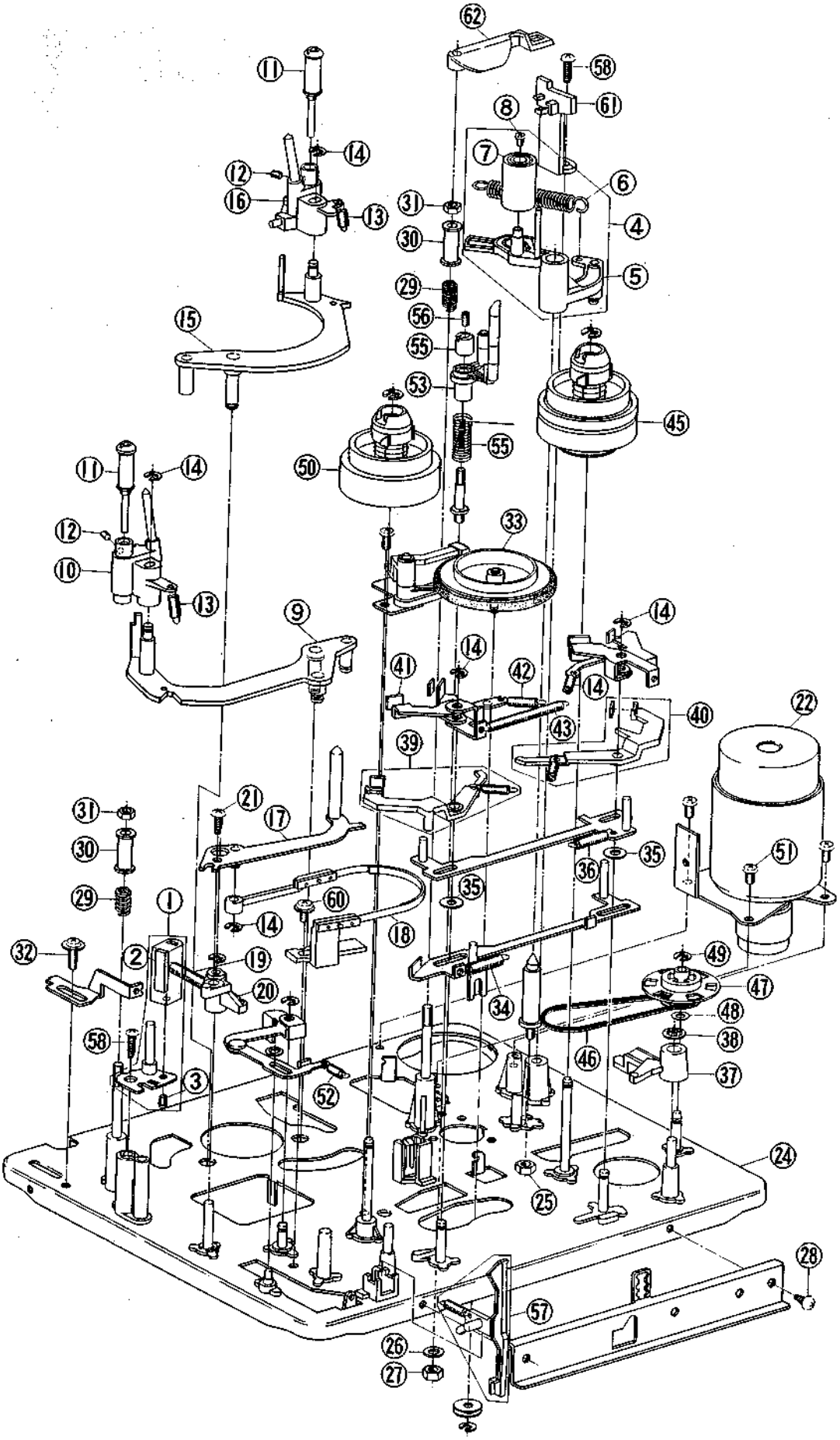
2. HEAD DRUM BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
		ROLLER IMPEDANCE BLOCK
2-1	MI326478	ROLLER IMPEDANCE
2-2	VTB327708	LEVER RZ PART
2-3	VTB327729	LEVER LZ PART
2-4	ZW356657	RING E 150SUP CMT
2-5	ZW259334	PW2.05x035x025PSL
		AC. H BLOCK
2-6	BHV1004A260A	AC. H BLK VS-5EG
2-7	HR325263	HEAD COMBO HV225315
2-8	ZG330641	SP PUSH ACH
2-9	ZG332459	SP PUSH ACH (2)
2-10	ZS421806	PAN30x08STL CMT
2-11	HZ327755	GUIDE ACH
2-12	ZG327757	SP PULL ACH SET
		DRUM BASE BLOCK
2-13	BVB327700	CHASSIS DRUM PART
2-14	VT318087	V BLOCK (L)
2-15	ZS321298	BID30x08STL CMT
2-16	VT318088	V BLOCK (R)
2-17	ZS305246	ADJUST SCREW (B)
2-18	ZG330868	SP PUSH TRACKING
2-19	ZW306464	PW31x070x050STL CMT
2-20	ZG331178	SP PUSH PRESS ACH
2-21	ZW550642	PW31x080x050STL CMT
2-22	ZW516993	N30STL CMT 1
2-23	ZW357164	RING E230SUP CMT
2-24	ZG327736	SP TORSION RZ
2-25	ZG327740	SP TORSION LZ
2-26	ZW340648	RING CS190STL PKR
		UPPER DRUM BLOCK
2-27	BHV1004A280A	UPPER DRUM BLK VS-5EG
		LOWER DRUM BLOCK
2-28	BVV1004A300A	LOWER DRUM BLK VS-5EG
2-29	ET324474	POSISTER PTH499D09BF200N030
		HEAD DRUM BLOCK
2-30x	ZS421806	PAN30x08STL CMT
2-31x	ZW328150	PW30x060x013PSL
2-32x	ZS609491	PAN30x10STL CMT PW080
2-33	BM324475	MOTOR DDV5-1C

HEAD DRUM BLOCK



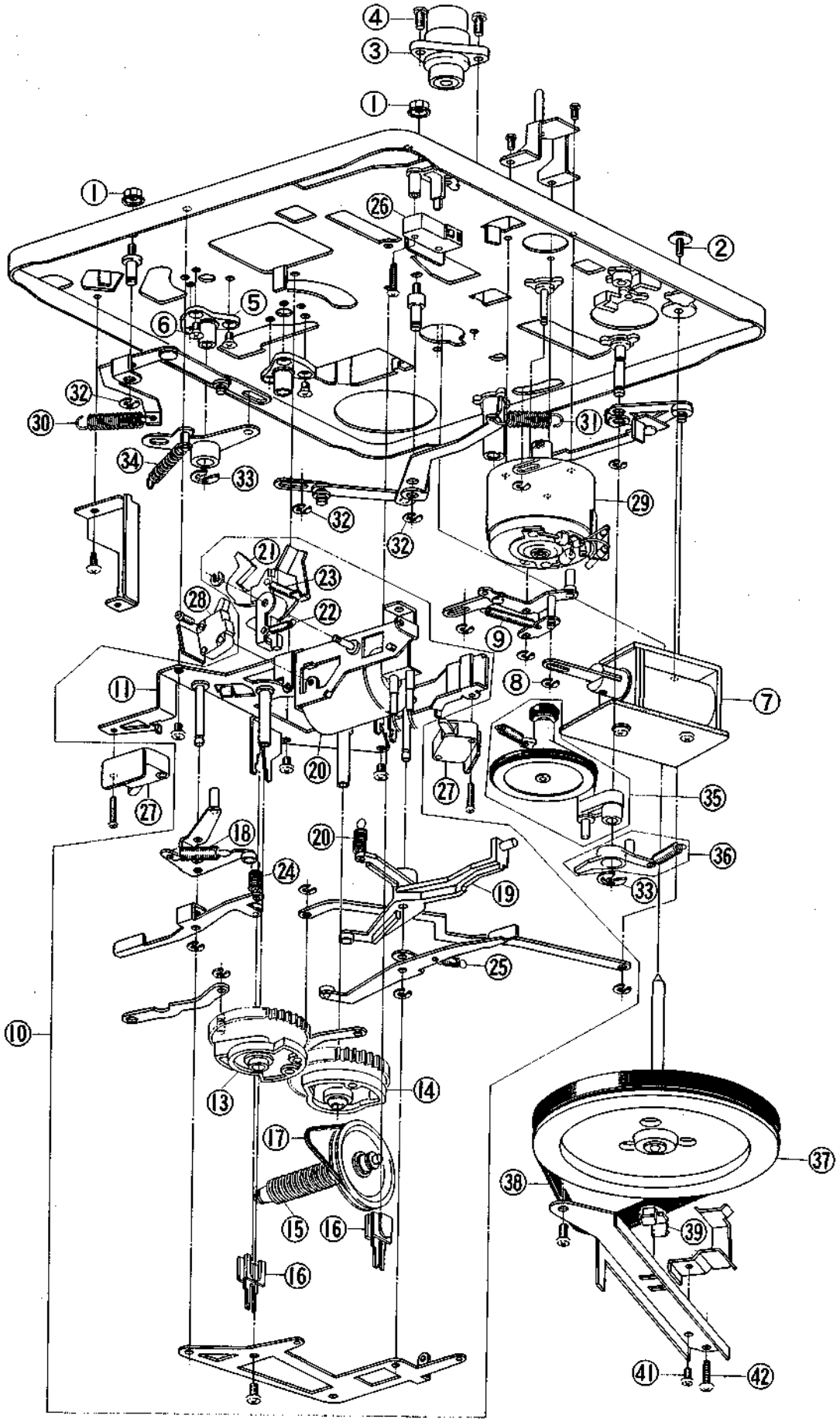
MECHA FRAME BLOCK (1)



3. MECHA FRAME BLOCK (1)

REF. NO.	PARTS NO.	DESCRIPTION
	HOLDER ERASE HEAD BLOCK	
3-1	BVV1004A070A	HOLDER EH BLK VS-5EG
3-2	HE325273	HEAD E HV113201 V
3-3	ZS477876	PAN20×03STL CMT
	LEVER PINCH ROLLER BLOCK	
3-4	BVV1004A150A	LEVER PINCH ROLLER BLK VS-5EG
3-5	MLB326296	LEVER PINCH ROLLER PART
3-6	ZG330058	SP T2-6.3/0.8-45 T2-202
3-7	BVV1004A160A	ROLLER PINCH BLK VS-5EG
3-8	ZS477876	PAN20×03STL CMT
	LEVER LOADING (L) BLOCK	
3-9	VTB326329	LEVER LOADING (L) PART
3-10	VTB319445	LOADING LEADER (L) PART
3-11	VT317947	VERTICAL POLE PART (P)
3-12	ZS318212	6SET23×030SCM PKR WP
3-13	ZG318043	LEADER SPRING
3-14	ZW357164	RING E230SUP CMT
	LEVER LOADING (R) BLOCK	
3-15	BVB326347	LEVER LOADING (R) PART
3-16	VTB319446	LOADING LEADER (R) PART
	TENSION ARM BLOCK	
3-17	VTB326468	LEVER TENSION PART
3-18	VT328134	TENSION BAND ASSY
3-19	ZG331128	SP T2-4.0/0.4-45 T2-120
3-20	VT326470	HOLDER TENSION LEVER
3-21	ZS310984	PT BR30×08STL CMT
	CAPSTAN MOTOR BLOCK	
3-22	BM325491	MOTOR FG DMF-4907A
3-23x	ZS558101	PAN30×06STL CMT TW
	MECHA FRAME BLOCK	
3-24	BVV1004A015A	MECHA FRAME BLK VS-5EG
3-25	ZW609434	N FRANGE 30STL CMT
3-26	ZW306464	PW31×070×050STL CMT
3-27	ZW516993	N30STL CMT 1
3-28	ZS325495	T2BR30×06STL CMT
3-29	ZG328225	SP C-3.5/0.8-10.0G C-102G
3-30	MH321724	GUIDE TAPE
3-31	ZW516993	N30STL CMT 1
3-32	ZS328607	TRIPLE SCREW PAN30×05
3-33	MI327773	IDLER ASSY
3-34	ZG313001	SP T1-4.0/0.4-22.4 T1-114
3-35	ZW259503	PW31×080×050NYL
3-36	ZG332463	SP T2-3.2/0.29-20 T2-064
3-37	ML330640	LEVER BRAKE RELEASER
3-38	ZW653163	RING CS280STL PKR
3-39	MLV1004A090A	LEVER FF BRAKE BLK VS-5EG
3-40	MLV1004A100A	LEVER REW BRAKE BLK VS-5EG
3-41	VT322159	SHEET BRAKE (A)
3-42	ZG318204	SP T2-3.2/0.29-16 T2-062
3-43	ZG312955	SP T1-3.2/0.29-40.0 T1-070
3-44	ZG318228	SP T2-3.2/0.29-14 T2-061
3-45	BR327789	TU REEL TABLE ASSY
3-46	MB322303	BELT DETECTION
3-47	MI322304	WHEEL DETECTION
3-48	ZW324417	PW31×060×050PSL
3-49	ZW357164	RING E230SUP CMT
3-50	BR317908	SUPPLY REEL TABLE BLK
3-51	ZS325495	T2BR30×06STL CMT
3-52	ZG318228	SP T2-3.2/0.29-14 T2-061
3-53	BVB326220	LEVER REVIEW PART
3-54	ZG326247	SP TORSION REVIEW
3-55	ZS326246	NUT ADJUST
3-56	ZS328608	6SET26×030SCM PKR FP
3-57	BVV1004A170A	LEVER REC SAFETY BLK VS-5EG
3-58	ZS323993	PT BR30×10STL CMT
3-59x	ZW269954	PW31×070×025PSL
3-60	ZS200614	TRIPLE SCREW PAN30×06
3-61	VT326471	HOLDER OPENER
3-62	VT326477	GUIDE CAP

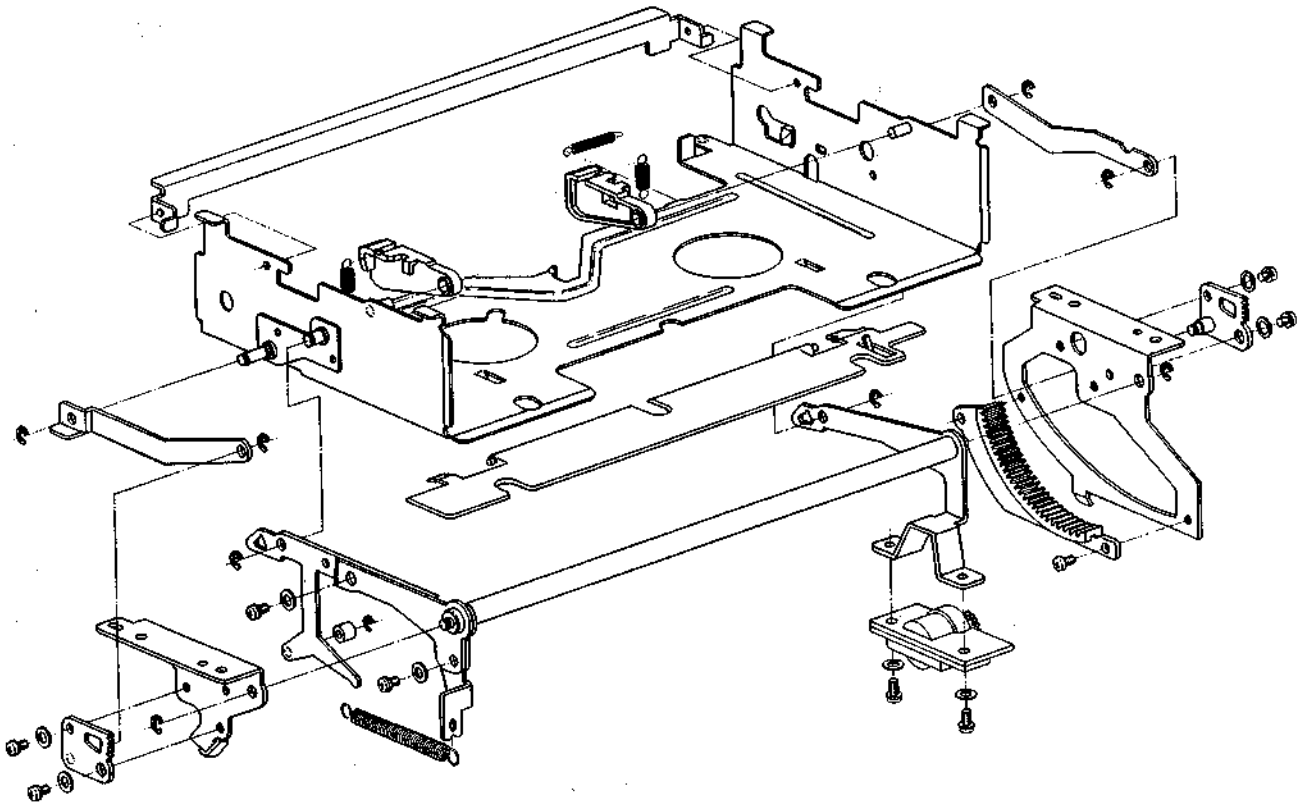
MECHA FRAME BLOCK (2)



4. MECHA FRAME BLOCK (2)

REF. NO.	PARTS NO.	DESCRIPTION
4-1	ZW609434	N FRANGE 30STL CMT
4-2	ZS328607	TRIPLE SCREW PAN30x05
4-3	MZB321701	HOLDER CAPSTAN PART
4-4	ZS379350	PAN30x06STL CMT
4-5	MV322302	METAL LOADING
4-6	ZS444330	CTS30x04STL CMT
	PLUNGER BLOCK	
4-7	EP319333	SOLENOID W/TAP 1037PLT 15V
4-8	ZW357164	RING E230SUP CMT
4-9	ZG328661	SP T2-3.2/0.29-25 T2-066
	LOADING BLOCK	
4-10	BVV1004A230A	LOADING BLK VS-5EG
4-11	BM780041	LOADING MOTOR SUB ASSY
4-12	BM325617	MOTOR MXN-12AD08B
4-13	VT780025	LOADING GEAR A ASSY
4-14	VT780026	LOADING GEAR B SUB ASSY
4-15	VT780027	LOADING WARM ASSY
4-16	VT780028	HOLDER GEAR SHAFT
4-17	MB780029	BELT LOADING
4-18	ZG780032	SP TENSION LEVER RETURN
4-19	BL780033	BRAKE LEVER ASSY
4-20	ZG780035	SP BRAKE LEVER
4-21	ML780036	LOCK ARM (A)
4-22	ZG780037	SP LOCK RETURN
4-23	ZG780038	SP LOCK HOLD
4-24	ZG780039	SP SW A
4-25	ZG780040	SP SW B
4-26	ES319156	SW MICRO SS-1-E-4 UC (SW904)
4-27	ES318284	SW LEVER SCL101R23A 1-01-02N (SW905, 906)
4-28	ES319124	SW LEVER SCL101S 1-01-02N (SW907)
4-29	BM325314	MOTOR VY220B10
4-30	ZG328610	SP T2-6.3/0.8-28 T2-198
4-31	ZG313085	SP T1-6.3/0.8-25.0 T1-197
4-32	ZW270101	RING E300SUP CMT
4-33	ZW290283	RING U 285SUP CMT
4-34	ZG321769	SP T2-5.0/0.55-35.5 T2-161
4-35	BV327815	TU IDLER ASSY
4-36	BVV1004A220A	LEVER TU IDLER KICK BLK VS-5EG
4-37	MIB328611	FLYWHEEL PART
4-38	MB326474	BELT CAPSTAN
4-39	VT326476	HOLDER PIVOT
4-40x	ZW259738	PW41x070x025PSL
4-41	ZS379350	PAN30x06STL CMT
4-42	ZS323993	PT BR30x10STL CMT

EJECTER BLOCK



5. EJECTER BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
5-1	BV327845	EJECTER ASSY

6. VIDEO P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
6-1	BAV1004A460A	PC VIDEO (PAL) BLK VS-5EG
6-2	BAV1004A460B	PC VIDEO (PAL) BLK VS-5EK
6-IC1	EI324204	IC AN6310
6-IC2	EI321076	IC AN6320N
6-IC3	EI324107	IC HA11718
6-IC4	EI322309	IC HA11703
6-IC5	EI330393	IC MC1458P
6-IC6	EI324117	IC MC14069UBCP
6-IC7	EI324151	IC AN6360
6-IC8	EI324160	IC AN6362
6-IC9	EI324182	IC AN6371
6-IC10	EI324203	IC AN6342N
6-IC11	EI203040	IC μA741CP
6-TR1to3	ET621235	TR 2SC536NP E,F,G
6-TR4	ET200480	TR 2SC2603 D,E,F
6-TR5	ET621235	TR 2SC536NP E,F,G
6-TR6	ET322778	TR 2SA608K-NP E,F,G
6-TR7	ET621235	TR 2SC536NP E,F,G
6-TR8	ET330543	TR 2SB621NC Q,R,S
6-TR9	ET200480	TR 2SC2603 D,E,F
6-TR10to12	ET621235	TR 2SC536NP E,F,G
6-TR13to16	ET200480	TR 2SC2603 D,E,F
6-TR17	ET621235	TR 2SC536NP E,F,G
6-TR18	ET200479	TR 2SA1115 D,E,F
6-TR19to24	ET621235	TR 2SC536NP E,F,G
6-TR25	ET310833	TR 2SC2274K E
6-TR26to29	ET621235	TR 2SC536NP E,F,G
6-TR30to37	ET621235	TR 2SC536NP E,F,G
6-TR38	ET342707	TR 2SC536NP E,F
6-TR39,40	ET621235	TR 2SC536NP E,F,G (EG)
6-TR41	ET322778	TR 2SA608K-NP E,F,G
6-TR42	ET621235	TR 2SC536NP E,F,G
6-TR43	ET322778	TR 2SA608K-NP E,F,G
6-TR44	ET621235	TR 2SC536NP E,F,G
6-TR46	ET330543	TR 2SB621NC Q,R,S
6-TR47to50	ET621235	TR 2SC536NP E,F,G
6-D1,2	ED523427	D SILICON H 1SS16
6-D3	ED200469	D SILICON H DS448 FA5 F10
6-D5to9	ED200469	D SILICON H DS448 FA5 F10
6-D10,11	ED309437	D SILICON H 1S1926-M
6-D14to16	ED200469	D SILICON H DS448 FA5 F10
6-D17	ED316143	D SILICON H 1S2473HS F10
6-D18	ED200469	D SILICON H DS448 FA5 F10
6-D19	ED200469	D SILICON H DS448 FA5 F10(FG)
6-D20,21	ED200469	D SILICON H DS448 FA5 F10
6-D22to24	ED200469	D SILICON H DS448 FA5 F10(EG)
6-D25to28	ED200469	D SILICON H DS448 FA5 F10
6-D31to33	ED200469	D SILICON H DS448 FA5 F10
6-D34	ED200468	D SILICON V DS448 VB3
6-D35	ED560913	D SILICON V 1S2473VE
6-VC1	EC257354	C S-FIX H ECV-1ZW20×44 2.5-20
6-VC2,3	EC318315	C S-FIX H ECV-1ZW50×44 5.0-50
6-VC21	EC325060	C S-FIX V ECV-1ZW10×40
6-VC22	EC318375	C S-FIX H ECV-1ZW10×44 2.0-10
6-FR1	ER200595	⚠ R FUSE ERD2FC F10 1/4W 5R6J
6-VR1,2	EV315540	R S-FIX H D8 3P 502
6-VR3,4	EV330365	R S-FIX V H1052A 3P 0.15W 472
6-VR5	EV330366	R S-FIX V H1052A 3P 0.15W 102
6-VR6,7	EV361800	R S-FIX H SR19R 3P 0.15W 471
6-VR8	EV323885	R S-FIX H D8 3P 301
6-VR9	EV315753	R S-FIX H D8 3P 203
6-VR21	EV330366	R S-FIX V H1052A 3P 0.15W 102
6-VR22	EV322411	R S-FIX H D8 3P 202
6-VR23	EV319381	R S-FIX H D8 3P 501
6-VR24	EV316442	R S-FIX H D8 3P 102
6-VR25	EV315540	R S-FIX H D8 3P 502
6-VL21,22	EO322349	COIL VARI 1 T-4-A 8.2μH
6-VL23	EO325093	COIL VARI 1 T-6 8.2MH (EG)
6-L1	EO318381	COIL FIX 1 LAL04 220μH K
6-L2	EO330240	COIL FIX 1 EL0606SKI 47μH K
6-L3	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L4	EO330242	COIL FIX 1 EL0606SKI 39μH K
6-L5,6	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L7,8	EO330244	COIL FIX 1 EL0606SKI 2.2μH K

REF. NO.	PARTS NO.	DESCRIPTION
6-L9	EO330245	COIL FIX 1 EL0606SKI 10μH K
6-L10	EO330246	COIL FIX 1 EL0606SKI 56μH K
6-L11	EO330247	COIL FIX 1 EL0606SKI 27μH K
6-L12	EO330250	COIL FIX 1 EL0606SKI 22μH K
6-L13	EO330248	COIL FIX 1 EL0606SKI 33μH K
6-L14	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L15	EO318381	COIL FIX 1 LAL04 220μH K
6-L17	EO330248	COIL FIX 1 EL0606SKI 33μH K
6-L18,19	EO330249	COIL FIX 1 EL0606SKI 8.2μH K
6-L21	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L22	EO318381	COIL FIX 1 LAL04 220μH K
6-L23	EO330250	COIL FIX 1 EL0606SKI 22μH K
6-L24	EO318381	COIL FIX 1 LAL04 220μH K
6-L25,26	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L27	EO330251	COIL FIX 1 EL0606SKI 470μH K
6-L28	EO322315	COIL FIX 1 EL0810SKI 820μH J
6-L29	EO318381	COIL FIX 1 LAL04 220μH K
6-L30	EO318383	COIL FIX 1 FL07H 6.8MH J
6-L31	EO330240	COIL FIX 1 EL0606SKI 47μH K
6-L32	EO330248	COIL FIX 1 EL0606SKI 33μH K
6-L33	EO318381	COIL FIX 1 LAL04 220μH K
6-L35	EO379923	COIL FIX 1 FL07H 8.2MH (EG)
6-L36,37	EO318381	COIL FIX 1 LAL04 220μH K
6-L38	EO330252	COIL FIX 1 EL0606SKI 100μH K
6-L39	EO330246	COIL FIX 1 EL0606SKI 56μH K
6-L40	EO330241	COIL FIX 1 EL0606SKI 220μH K
6-L41	EO330240	COIL FIX 1 EL0606SKI 47μH K
6-L42	EO332315	COIL FIX 1 LAL04 120μH J
6-FL1	ER324258	FILTER LC LP LCB-51
6-FL2	ER324259	FILTER LC LP LCB-52
6-FL3	ER324305	FILTER LC HP LCB-53
6-FL4	ER324309	FILTER LC LP LCB-54
6-FL5	ER330625	FILTER LP LCB-62
6-FL6	ER324339	FILTER LC AP LCB-56
6-FL7	ER324375	FILTER LC BP LCB-57 4.43MHZ
6-FL8	ER324398	FILTER LC LP LCB-58
6-FL9	ER324469	FILTER LC LP LCB-59
6-FL10	ER324470	FILTER LC BP LCB-60 4.43MHZ
6-FL11	ER325807	FILTER LC BP LCB-61 5.06MHZ
6-FL12	ER328237	FILTER CE SFE4.5MB 4.5MHZ
6-X1	EI327364	OSC X'TAL HC-33/U 4.435571MHZ
6-X2	EI309878	OSC X'TAL 4.433619MHZ
6-DL1	EI322365	DL EFD-EN645A11E
6-DL2	EI322394	DL EFD-JN124A11A
6-C3	EC307793	C EC V F05 NP SM 220M 10DC
6-C16	EC332052	C EC V F05 NP SM 4R7M 35DC
6-C171	EC200949	C EC V F05 NP SM 470M 10DC
6-3	TP326491	HINGE PC ROD

7. SERVO P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
7-1	BAV1004A450A	PC SERVO BLK VS-5EG (INCLUDING SERVO PCB & SYS. CON. PCB)
		SERVO P.C BOARD BLOCK
7-IC1	EI326044	IC AN6350
7-IC2	EI304475	IC MC14066BCP
7-IC3	EI313797	IC TC4001BP
7-IC4	EI321604	IC AN6341N
7-IC5	EI330393	IC MC1458P
7-IC6	EI304475	IC MC14066BCP
7-IC7	EI325992	IC HD14024BP
7-IC8	EI328593	IC HD14053BP
7-TR1,2	ET309334	TR 2SC458 C,D
7-TR3	ET322778	TR 2SA608K-NP E,F,G
7-TR4,5	ET309334	TR 2SC458 C,D
7-TR6,7	ET322778	TR 2SA608K-NP E,F,G
7-TR8to11	ET309334	TR 2SC458 C,D
7-TR12,13	ET322778	TR 2SA608K-NP E,F,G
7-TR14	ET309334	TR 2SC458 C,D
7-TR15	ET322778	TR 2SA608K-NP E,F,G
7-TR16	ET309334	TR 2SC458 C,D
7-TR17	ET322778	TR 2SA608K-NP E,F,G
7-TR18	ET309334	TR 2SC458 C,D
7-D1	ED200469	D SILICON H DS448 FA5 F10
7-D2to13	ED557447	D SILICON H 1S1588
7-D14,15	ED200469	D SILICON H DS448 FA5 F10
7-D16to19	ED557447	D SILICON H 1S1588
7-D20,21	ED200469	D SILICON H DS448 FA5 F10
7-SW1	ES326043	SW SLIDE SSS322001 2-02-02N
7-VR1	EV325993	R S-FIX V H1052A 3P 0.15W 473
7-VR2	EV323880	R S-FIX V CR29R 3P 0.50W 683
7-VR3to5	EV323881	R S-FIX V CR29R 3P 0.50W 473
7-VR6	EV323880	R S-FIX V CR29R 3P 0.50W 683
7-VR7	EV323881	R S-FIX V CR29R 3P 0.50W 473
7-VR8	EV330258	R S-FIX V H1052A 3P 0.15W 683
7-VR9,10	EV325994	R S-FIX V H1052A 3P 0.15W 103
7-VR11	EV325995	R S-FIX V H1052A 3P 0.15W 333
7-VR12	EV200466	R S-FIX H EVN38 3P 302
7-L1	EO357287	COIL FIX 1 FL05H 100μH K
7-R7,8	ER330272	R MF H F10 1/4W 3302F
7-R13	ER318335	R MF H F10 1/4W 8202F
7-R17	ER317658	R MF H F10 1/4W 1003F
7-R18	ER314630	R MF H 1/4W 1003F
7-R19	ER311773	R MF H 1/4W 3301F
7-R20	ER323374	R MF H F10 1/4W 1302F
7-R22	ER330273	R MF H F10 1/4W 1693F
7-R23	ER330274	R MF H F10 1/4W 2003F
7-R24	ER318323	R MF H F10 1/4W 1803F
7-R25	ER314597	R MF H 1/4W 1302F
7-R28	ER311773	R MF H 1/4W 3301F
		SYS. CON. P.C BOARD BLOCK
7-IC301	EI323995	IC MB8841 502J
7-IC302,303	EI319496	IC MC14539BCP
7-IC304	EI326159	IC LM2903P
7-IC305	EI330392	IC MC14070BCP
7-IC306	EI324687	IC TC4071BP
7-IC307	EI324000	IC MB8841 463M
7-IC308	EI328692	IC μPD5101LC
7-IC309	EI328690	IC AM1408N8
7-IC310	EI324255	IC TL082CP
7-IC311	EI304475	IC MC14066BCP
7-IC312	EI330393	IC MC1458P
7-IC313	EI326159	IC LM2903P
7-IC314,315	EI304657	IC TC4011BP
7-TR301	ET207145	⚠ TR 2SB560 D,E,F
7-TR302,303	ET322778	⚠ TR 2SA608K-NP E,F,G
7-TR304,305	ET309334	TR 2SC458 C,D
7-TR306	ET207145	⚠ TR 2SB560 D,E,F
7-TR307to310	ET322778	TR 2SA608K-NP E,F,G
7-TR311to313	ET309334	TR 2SC458 C,D
7-D301	ED323979	D SILICON W03B F12 150/1.0A
7-D302to305	ED557447	D SILICON H 1S1588
7-D306	ED306109	⚠ D SILICON W03B 100/1.0A
7-D307	ED570521	D ZENER H XZ-049
7-D308,309	ED557447	D SILICON H 1S1588
7-D310,311	ED200468	D SILICON V DS448 VB3
7-D312	ED557447	D SILICON H 1S1588
7-D313	ED200469	D SILICON H DS448 FA5 F10
7-D314	ED557447	D SILICON H 1S1588
7-D315	ED306109	⚠ D SILICON W03B 100/1.0A
7-D316	ED557447	D SILICON H 1S1588
7-RL301	EP330266	RELAY POWER G2U-112P 1TR 12V
7-X301	EO330256	OSC CE F85-006 4MHZ
7-BT301	AX325991	BATTERY P-2M11
7-L301,302	EO575651	COIL FIX 1 FL07H 100μH K
7-CR301	ER330314	COMP CR EXRP101K433S
7-CR302	ER330313	COMP CR EXRP150K272S
7-CR303	ER330267	COMP R 01-0320
7-R345	ER323875	R MF H F10 1/4W 3900F
7-R346	ER317684	R MF H F10 1/4W 9100F
7-R352	ER311774	R MF H 1/4W 9102F
7-R357	ER314632	R MF H 1/4W 3902F
7-2	VT325900	BUZZER PKM11-4A0

When ordering parts, please quote Parts Number, Description and Model Number.

8. AUDIO P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
8-1	BAV1004A040A	PC AUDIO BLK VS-5EG
8-IC1	EI634454	IC AN262
8-TR1,2	ET517263	TR 2SC1312R G,H
8-TR3to7	ET309334	TR 2SC458 C,D
8-TR8	ET322778	TR 2SA608K-NP E,F,G
8-TR9	ET322412	TR 2SC2001 K,L,M
8-TR10	ET330543	TR 2SB621NC Q,R,S
8-TR11	ET322778	TR 2SA608K-NP E,F,G
8-TR12	ET200480	⚠ TR 2SC2603 D,E,F
8-TR13	ET309334	TR 2SC458 C,D
8-TR14	ET200479	⚠ TR 2SA1115 D,E,F
8-TR15,16	ET309334	TR 2SC458 C,D
8-D2	ED200468	D SILICON V DS448 VB3
8-D4to14	ED200468	D SILICON V DS448 VB3
8-VR1	EV315412	R S-FIX H D8 3P 502
8-VR2	EV315414	R S-FIX H D8 3P 203
8-VR3	EV315416	R S-FIX H D8 3P 103
8-VR4	EV321637	R S-FIX H D8 3P 104
8-RL1	EP327336	RELAY SIGNAL G2V-2 2TR 12V
8-RL2	EP200175	RELAY SIGNAL G2E 1TR 12V
8-L2,3	EO357287	COIL FIX 1 FL05H 100μH K
8-L4	EO369178	COIL FIX 1 FL07H 1.5MH J
8-L5	EO318383	COIL FIX 1 FL07H 6.8MH J
8-L6	EO419602	COIL FIX 1 FL05H 47μH K
8-L7	EO243977	COIL FIX 1 FL07H 1MH J
8-L8	EO357287	COIL FIX 1 FL05H 100μH K
8-L10	EO323938	COIL OSC 1 32-1296-12 70KHZ
8-L11	EO318882	COIL FIX 2 47-0079-01 950μH
8-FR1	ER318647	R FUSE ERD2FC F10 1/4W 4R7J
8-C36	EC200592	C STY V T05 CQT92 331J 125DC
8-C37	EC330441	C PP V F10 PFH 153J 400DC
8-C50	EC330442	C PP V F10 PFH 123J 400DC
8-2	ZW698940	RV NYL40x060 BL

9. DISPLAY P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
9-1	BAV1004A060A	PC DISPLAY BLK VS-5EG
9-IC1	EI330226	IC μPC1373H
9-IC3	EI324250	IC MC14050BCP
9-IC4	EI330451	IC MB8843 501M
9-TR2	ET330535	TR FET 2SK246 Y, GR
9-TR3	ET322778	TR 2SA608K-NP E,F,G
9-TR4	ET309334	TR 2SC458 C,D
9-TR5to24	ET330216	TR 2SB642 Q,R,S
9-TR25,26	ET207145	TR 2SB560 D,E,F
9-TR27	ET200412	TR 2SD636 Q,R,S
9-D6	ED330238	D PHOTO PH302
9-D7to40	ED200469	D SILICON H DS448 FA5 F10
9-D41to44	ED324823	D LED SLP-234C GRN
9-D45,46	ED324943	D LED SLP-134A RED
9-D47,48	ED324823	D LED SLP-234C GRN
9-D49	ED324943	D LED SLP-134A RED
9-SW1to26	ES315362	SW TACT AKC8S
9-IN1	EM318923	IND FL FIP12AM11 CHARACTER
9-L1	EO330326	COIL VARI 1 7PA 5MH
9-L2	EO318379	COIL FIX 1 LAL04 100μH K
9-X1	EO330256	OSC CE F85-006 4MHZ
9-2	VT327211	SHIELD CASE REMOCON (A)
9-3	VT327212	FILTER
9-4	VT326856	HOLDER LED (A)
9-5	VT326870	HOLDER LED (B)
9-6	VT326873	CAP LED
9-7	VT326610	HOLDER DISPLAY (A)
9-8	VT326829	HOLDER DISPLAY (B)
9-9	VT326787	HOLDER PHOTO DIODE
9-10	ZW698940	RV NYL40x060 BL

10. DRIVE P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
10-1	BVA1004A350A	PC DRIVE BLK VS-5EG
10-TR2	ET322598	⚠ TR 2SB632K E,F
10-TR3	ET200412	TR 2SD636 Q,R,S
10-TR4	ET330542	TR 2SD592NC R,S
10-TR5	ET310148	TR 2SD612K E,F
10-TR6	ET200412	TR 2SD636 Q,R,S
10-TR7	ET318308	TR PHOTO PN202S
10-TR13	ET322598	TR 2SB632K E,F
10-TR14	ET200412	TR 2SD636 Q,R,S
10-TR15	ET322598	TR 2SB632K E,F
10-TR16	ET200415	TR 2SB641 Q,R,S
10-TR17,18	ET330543	TR 2SB621NC Q,R,S
10-TR19	ET200415	TR 2SB641 Q,R,S
10-TR20	ET310148	TR 2SD612K E,F
10-TR21	ET200415	⚠ TR 2SB641 Q,R,S
10-TR22	ET200412	TR 2SD636 Q,R,S
10-TR23	ET330542	TR 2SD592NC R,S
10-TR25	ET309334	TR 2SC458 C,D
10-D1,2	ED323979	D SILICON W03B F12 150/1.0A
10-D3to5	ED200469	D SILICON H DS448 FA5 F10
10-D6	ED570521	D ZENER H XZ-049
10-D7	ED327059	D ZENER H WZ-100
10-D8to15	ED200469	D SILICON H DS448 FA5 F10
10-D16	ED330428	D ZENER H WZ-090
10-D17	ED327059	D ZENER H WZ-100
10-RL2,3	EP318925	RELAY POWER FBR221D006 2TR 6V
10-PH1	ED323892	PHOTO SENSOR GP-411
10-IN1	EL330446	PL SPL HOLDER LAMP
10-TH1	ET330533	⚠ POSISTER PTH61G04BD3R3N
10-R31	ER439132	R OMF H 2W 151K
10-R34	ER330408	R OMF H 2W 121K

11. DRUM P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
11-1	BAV1004A530A	PC DRUM MOTOR BLK VS-5EG (INCLUDING DRM MOTOR PCB & CAPSTAN MOTOR PCB)

DRUM MOTOR P.C BOARD BLOCK

11-IC101	EI330431	IC TA7234
11-TR101	ET330430	⚠ TR 2SB632K D,E,F
11-TR102	ET200412	TR 2SD636 Q,R,S
11-TR103	ET200415	TR 2SB641 Q,R,S
11-TR104	ET200412	TR 2SD636 Q,R,S
11-TH101	ET330533	⚠ POSISTER PTH61G04BD3R3N
11-R102	ER330537	R OMF H SNP 2W 102J
11-R103	ER330540	R MF H SNP 2W 2R2J
11-R115	ER330538	R OMF H SNP 2W 331J
11-R116,117	ER330539	R OMF H SNP 2W 221J

CAPSTAN MOTOR P.C BOARD BLOCK

11-TR1,2	ET200415	TR 2SB641 Q,R,S
11-TR3,4	ET200412	TR 2SD636 Q,R,S
11-TR5	ET200741	TR 2SD571 K,L,M
11-TR6	ET325899	⚠ TR 2SC1983 R
11-TR7	ET330885	⚠ TR 2SB857 C,D
11-D1,2	ED200469	D SILICON H DS448 FA5 F10
11-D3	ED327059	D ZENER H WZ-100
11-VR1	EV330453	R S-FIX V H1052A 3P 0.15W 223
11-RL1	EP318925	RELAY POWER FBR221D006 2TR 6V

When ordering parts, please quote Parts Number, Description and Model Number.

12. TUNER P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
12-1	BA705538	PC TUNER BLK VS-5 (EG)
12-2	BA705539	PC TUNER BLK VS-5 (EK)
12-3	EE330292	TV TUNER CDE1-011 (EG)
12-4	EE330106	TV TUNER CBE1-002 (EK)
12-IC1	EI705494	IC TA7607P
12-IC2	EI704201	IC M5144P
12-TR1	ET705480	TR 2SC2717
12-TR2to4	ET356962	TR 2SC640 C
12-TR5	ET522270	TR 2SC1210 D
12-TR6to8	ET639437	TR 2SC945L Q,P (EG)
12-TR9,10	ET325501	TR 2SA1015 O,Y (EG)
12-TR11	ET639437	TR 2SC945L Q,P
12-TR12	ET325501	TR 2SA1015 O,Y (EG)
12-TR13	ET639437	TR 2SC945L Q,P (EG)
12-TR14	ET639437	TR 2SC945L Q,P
12-TR15	ET325501	TR 2SA1015 O,Y
12-TR16	ET639437	TR 2SC945L Q,P
12-D1	ED705479	D SILICON 1SV70
12-D2	ED604541	D SILICON 1S2076
12-D3to5	ED604541	D SILICON 1S2076 (EG)
12-D7	ED604541	D SILICON 1S2076 (EG)
12-D8	ED604541	D SILICON 1S2076
12-D9,10	ED604541	D SILICON 1S2076 (EG)
12-D11,12	ED604541	D SILICON 1S2076
12-L1	EO705481	COIL FIX 1 144LZ 1μH K
12-L2	EO705482	COIL FIX 1 144LZ 0.82μH K (EG)
12-L2	EO705481	COIL FIX 1 144LZ 1μH K (EK)
12-L3	EO705483	COIL FIX 1 1.4μH
12-L4	EO705484	COIL FIX 1 4.7μH K
12-L5	EO705485	COIL FIX 1 33μH K
12-L6	EO701411	COIL RF SPL 15μH
12-L7	EO705487	COIL FIX 1 100μH K
12-L8	EO701411	COIL RF SPL 15μH
12-L9	EO705488	COIL FIX 1 12μH K (EG)
12-L9	EO705489	COIL FIX 1 10μH K (EK)
12-T2	EO705490	COIL TKXNAAS-27899RY
12-T3	EO705491	COIL TKXNS-279789NK
12-T4	EO705492	COIL TKACS-27617NK (EG)
12-T4	EO705493	COIL TKACS-27618NK (EK)
12-CF101	ER705495	FILTER CE F1024 38.9MHZ (EG)
12-CF101	ER705496	FILTER CE F1025 39.5MHZ (EK)
12-CF102	ER705499	FILTER CE SFE 5.5MHZ (EG)
12-CF102	ER705500	FILTER CE SFE 6MHZ (EK)
12-CF103	ER705501	FILTER CE TPS 5.5MHZ (EG)
12-CF103	ER705502	FILTER CE TPS 6MHZ (EK)
12-VR1	EV572433	R S-FIX H V8K4-1 3P 504
12-VR2,3	EV464196	R S-FIX H V8K4-1 3P 202
12-VR4	EV464207	R S-FIX H V8K4-1 3P 502
12-VR5	EV464207	R S-FIX H V8K4-1 3P 502 (EG)
12-R20	ER702565	⚠ R FUSE 1/4 470J
12-C8	EC305423	C TT V D R47M 35DC
12-C12	EC705473	C CE LH680J 50DC
12-C14	EC705474	C CE CH2R0C 50DC
12-C25	EC705476	C CE RH8R0D 50DC (EG)
12-C25	EC705477	C CE RH6R0D 50DC (EK)
12-C31	EC705478	C CE CH620J 50DC
12-C40	EC705474	C CE CH2R0C 50DC
12-C41	EC200481	C CE V F05 CH 360J 50DC
12-C42	EC200494	C CE V F05 100J 50DC

13. POWER SUPPLY P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
13-1	BA705542	PC POWER BLK (INCLUDING POWER SUPPLY PCB, POWER SUB PCB, TR PCB)
		POWER SUPPLY P.C BOARD BLOCK
13-IC1	EI301748	⚠ IC μPC1458C
13-IC2	EI308473	⚠ IC μPC141C
13-TR5	ET554657	⚠ TR 2SA733A P,Q
13-TR8	ET200479	TR 2SA1115 D,E,F
13-TR11	ET301154	⚠ TR 2SC1162 C,D
13-TR12	ET554657	TR 2SA733A P,Q
13-TR13	ET200925	⚠ TR 2SA970 GR
13-TR14	ET200925	⚠ TR 2SA970 GR
13-TR15	ET303895	TR 2SD667 C,D
13-TR16	ET398711	⚠ TR 2SC945L Q,R
13-D1	ED705467	⚠ D SILICON M4B51-14
13-D2	ED705468	⚠ D SILICON T1B4B41
13-D6	ED705469	⚠ D ZENER HZ6C-2
13-D8	ED705468	D SILICON T1B4B41
13-D11	ED329058	⚠ D ZENER H HZ5 C1
13-D14	ED704267	⚠ D SILICON 10E-1
13-D15	ED704267	⚠ D SILICON 10E-1
13-D16	ED704267	D SILICON 10E-1
13-D17	ED704267	D SILICON 10E-1
13-D18	ED705470	⚠ D ZENER HZ11C1
13-D24	ED704267	D SILICON 10E-1
13-T1	BT705472	⚠ TRANS POWER KX590176
13-F2	EF564491	⚠ FUSE T 4AT CEE
13-F3	EF375647	⚠ FUSE T 500MAT CEE
13-F4	EF354295	⚠ FUSE T 1.6AT CEE
13-VR1	EV705536	VR TM8KV-2S B501
13-R10	ER705459	⚠ R FUSE FMR W 1/4W 100J
13-R12	ER705460	R CT RGC2T 2W R100G
13-R13	ER310326	R MF H 1/4W 1002F
13-R14	ER314599	R MF H 1/4W 1501F
13-R25	ER310436	R MF H 1/4W 3901F
13-R44	ER302353	R MF H F10 1/4W 2701F
13-C1	EC705462	C CE 222M 50DC
13-C2	EC705461	C EC 153M 25DC
13-C9,10	EC705463	C EC 101M 100DC
13-C18	EC705465	C EC 472 35DC
13-C30,31	EC705466	C EC 4R7 100DC
		POWER SUB P.C BOARD BLOCK
13-TR1	ET633677	TR 2SA490 O,Y
13-TR2	ET303895	TR 2SD667 C,D
13-TR3	ET200479	TR 2SA1115 D,E,F
13-D3	ED704267	D SILICON 10E-1
13-D4	ED704267	D SILICON 10E-1
13-D5	ED704267	D SILICON 10E-1
13-D21,22	ED704267	D SILICON 10E-1
13-F1	EF375660	⚠ FUSE T 1AT CEE
13-F5	EF375660	⚠ FUSE T 1AT CEE
		TR P.C BOARD BLOCK
13-TR6	ET633677	⚠ TR 2SA490 O,Y

14. REAR P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
14-1	BAV1004A020A	PC REAR BLK VS-5EG
14-J901	EJ319158	JACK PLATE VS-5 B0002
14-SW901	ES319334	SW SLIDE HSW0273-220 1-02-02
14-SW902	ES319352	SW SLIDE HSW0372-030 2-02-03
14-2	ZW263946	RV NYL40×050

15. MEMORY P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
	MIC P.C BOARD BLOCK	
15-J902	EJ330544	PHONE J 3P HLJ0315-010 6.3 2T
15-VR901	EV319159	VR ROTARY 16P10×1D B104
	MEMORY P.C BOARD BLOCK	
15-SW903	ES328771	SW PUSH SPJ222N 2-02-02N

16. SENSOR P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
	SENSOR P.C BOARD BLOCK	
16-TR1	ET318308	TR PHOTO PN202S
	REC SAFETY SW P.C BOARD BLOCK	
16-SW904	ES319156	SW MICRO SS-1-E-4 UC
	LOADING SW (A,B) P.C BOARD BLOCK	
16-SW905,906	ES318284	SW LEVER SCL101R23A 1-01-02N
	EJECT P.C BOARD BLOCK	
16-SW907	ES319124	SW LEVER SCL101S 1-01-02N

17. CM FILTER P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
17-L1	EO669273	COIL FIX 2 FL5R200 18μH
17-FL1,2	ER330465	FILTER LC DST310-55B271M
17-C1	EC330466	C EC V F05 NP SM 4R7M 50DC

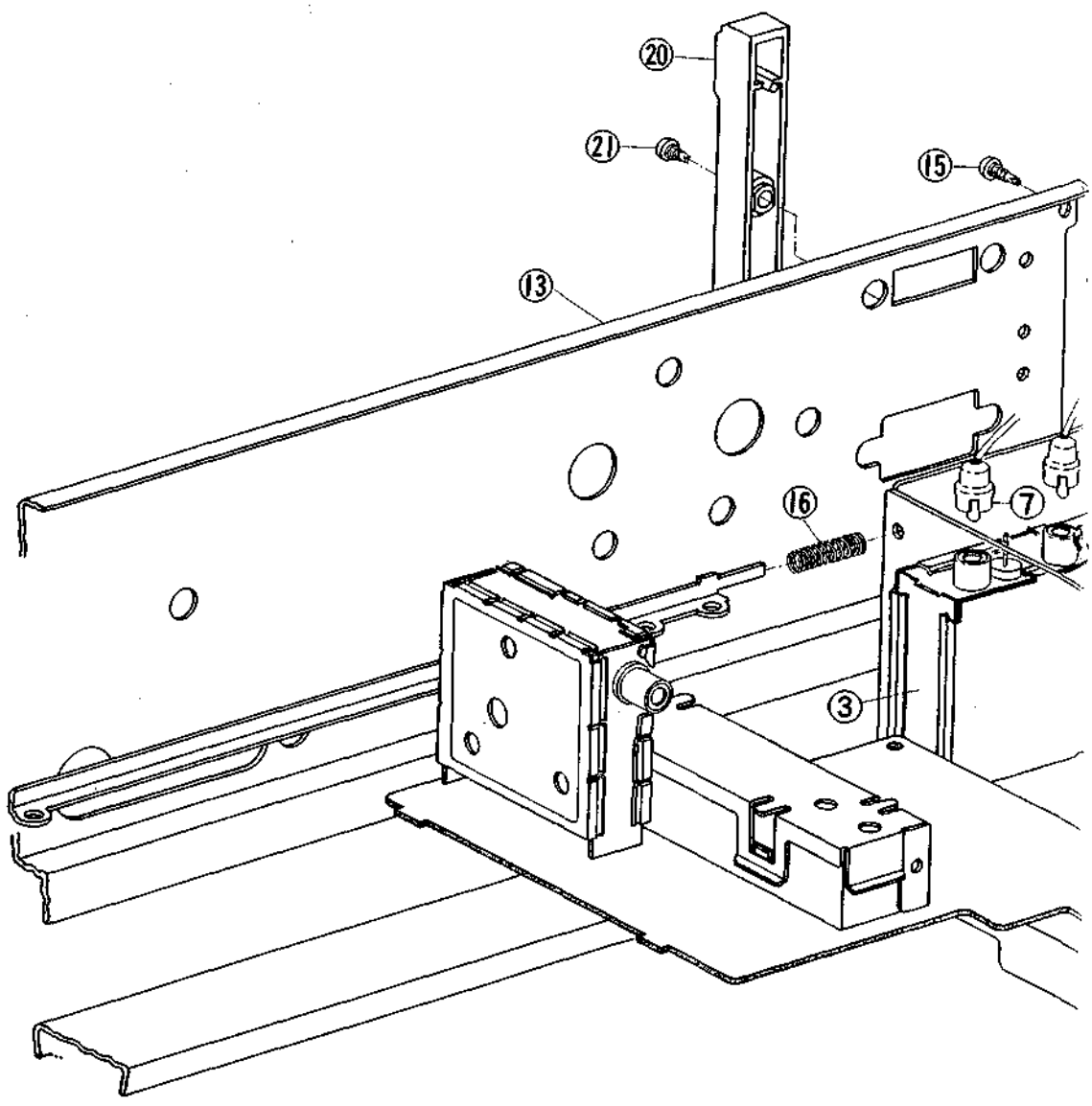
18. MOTOR FILTER P.C BOARD BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
18-L1to4	EO405630	COIL FIX 1 FL05H 82μH K

19. REMOTE CONTROL (RC-V5) BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
19-1	AX328710	REMOCON UNIT RC-V5
19-IC1	EI780020	IC μPD1986C
19-TR1	ET328553	TR 2SC945A K,P
19-TR2	ET318604	TR 2SD545NP E,F
19-D1,2	ED706226	D LED SE303A INFRARED
19-D3	ED780019	D LED SEL1123W
19-X1	EI780021	OSC CE
19-SW1	ES780015	SW SLIDE

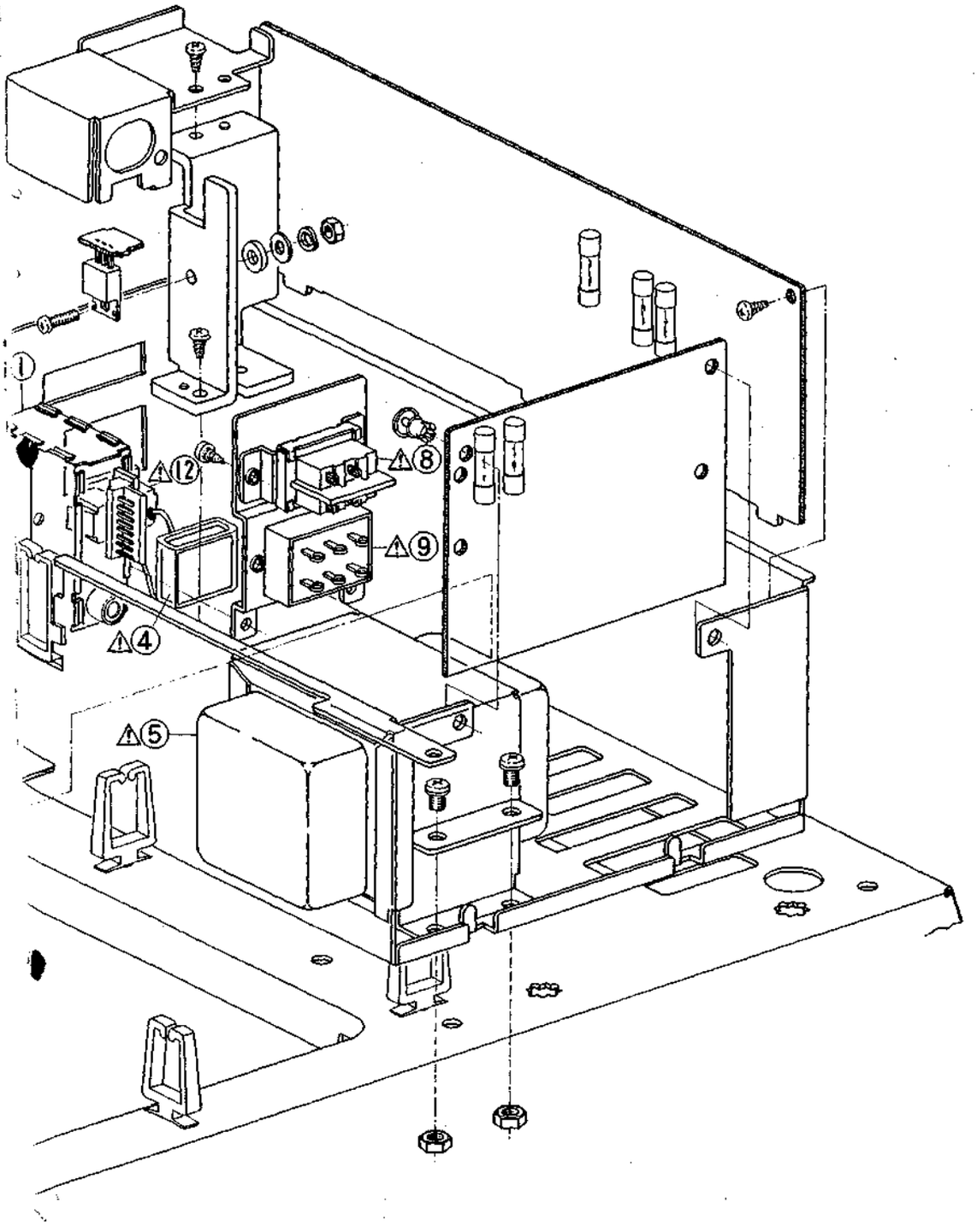
POWER & RF BLOCK



20. POWER & RF BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
20-1	BV330109	RF CONVERTER MDK3-253 (EG)
20-2x	BV330110	RF CONVERTER MBK3-253 (EK)
20-3	BV330111	ANT BOOSTER YBC1-001
20-4	EC325485	⚠ C MP V 473M 250AC
20-5	BT705526	⚠ TRANS POWER VS-5-1B (EG)
20-6x	BT705527	⚠ TRANS POWER VS-5-3B (EK)
20-7	EW705529	COAXIAL CABLE 1.5C 2V KC243462A1
20-8	ES705533	⚠ SW SEESAW SDE3S2023
20-9	ES705534	⚠ SW TKR-22293
20-10x	EF375660	⚠ FUSE T 1AT CEE
20-11x	EJ592503	FUSE CLIP H0426-A 5.2MM

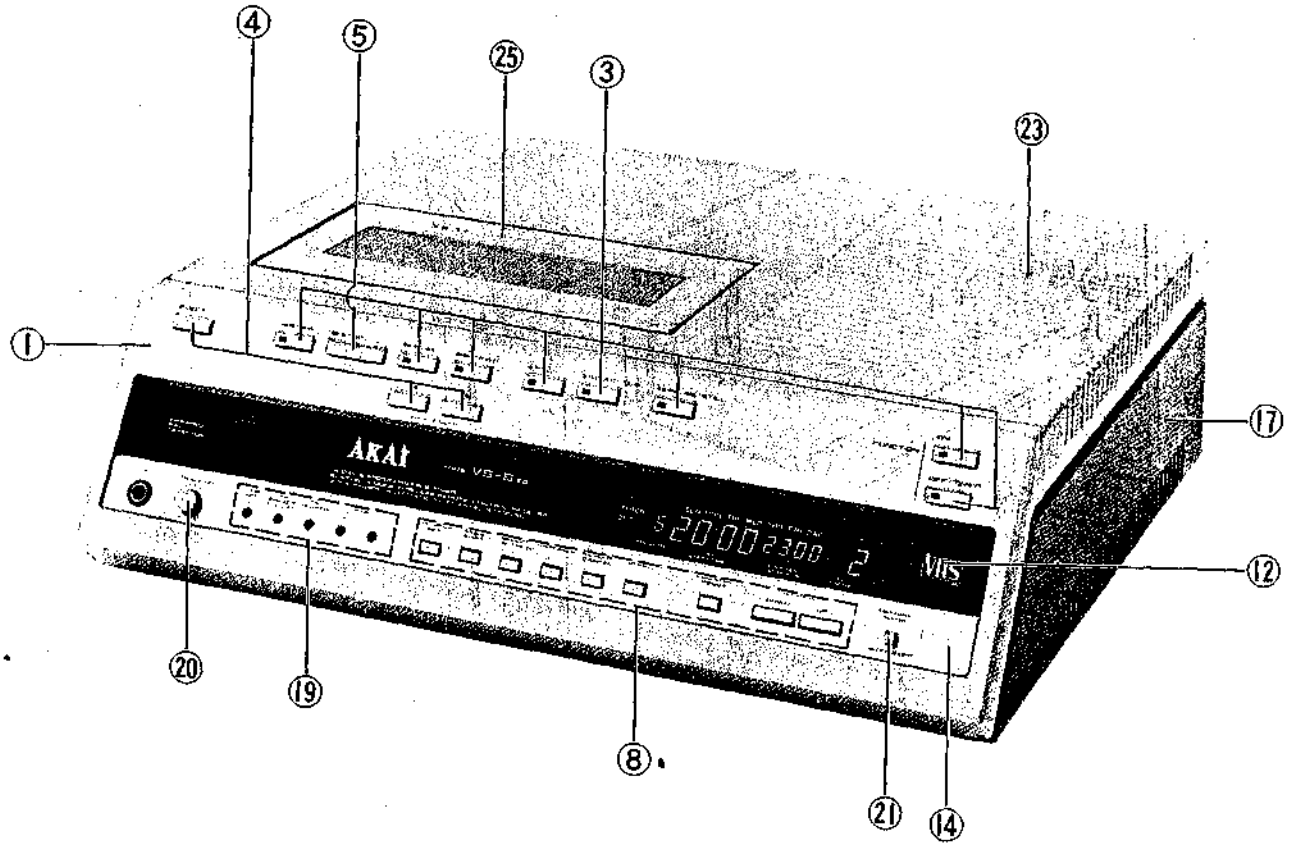
When ordering parts, please quote Parts Number, Description and Model Number.



REF. NO.	PARTS NO.	DESCRIPTION
20-12	EJ301513	⚠ SOCKET INLET S-I6453 E 2P
20-13	SP328220A	PANEL REAR VS-5EG
20-14x	SP328220B	PANEL REAR VS-5EK
20-15	ZS447761	T2BR30x06STL BNI
20-16	ZG313193	SP C-4.5/0.6-20.0-0 C-040
20-17x	VT327946	HOLE PLUG 417
20-18x	ZS330841	-FFL20x1.8STL NI3
20-19x	MZ327113	SHIELD CASE PRE AMP (A)
20-20	SA327691	FOOT VERTICAL
20-21	ZS463353	T2BR30x08STL BNI

When ordering parts, please quote Parts Number, Description and Model Number.

FINAL ASSEMBLY BLOCK



21. FINAL ASSEMBLY BLOCK

REF. NO.	PARTS NO.	DESCRIPTION
		FRONT PANEL BLOCK
21-1	BDV1004A430A	PANEL FRONT BLK VS-5EG
21-2x	BDV1004A430B	PANEL FRONT BLK VS-5EK
21-3	SK327694	KNOB OPERATION
21-4	SK327685	KNOB OPERATION SUB
21-5	SK327684	KNOB STOP
21-6x	MZ327509	HOLDER CASE
21-7x	ZS310984	PT BR30x08STL CMT
21-8	SK327676	KNOB FUNCTION
21-9x	ZG332009	PT BR30x06STL CMT
21-10	SK327682	KNOB SUB FUNCTION
21-11x	ZS310984	PT BR30x08STL CMT
21-12	BDB327392A	PANEL DISPLAY VS-5EG PART
21-13x	BDB327392B	PANEL DISPLAY VS-5EK PART
21-14	SP327469A	PANEL FUNCTION (A) (ENGLISH)
21-15x	VT327847	TRAN LEG T-H
21-16x	ZS523664	T2BR30x10STL CMT
21-17	SP327692	CASE SIDE (R)

REF. NO.	PARTS NO.	DESCRIPTION
21-18x	ZS311745	T2BR30x08STL BNI PW080
21-19x	SP327693	CASE SIDE (L)
21-20	SK327689	KNOB TRACKING
		FINAL ASSEMBLY BLOCK
21-21	SK327686	KNOB PUSH
21-22x	ZW322110	PW61x100x100NYL
21-23	SP327696	CASE UPPER
21-24x	ZS321783	ST BID40x10STL NI3
21-25	BD327698A	LID CASSETTE (ENGLISH)
21-26x	SP327697	COVER BOTTOM
21-27x	ZS311745	T2BR30x08STL BNI PW080
21-28x	EW315767	⚠ AC CORD 2 CORES KP-419C/KS-15 E (EG)
21-29x	EW322400	⚠ AC CORD 2 CORES GTBS-2F/KS-15 B (EK)
21-30x	EW321758	CORD VY-15 ANTENNA CABLE

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4. VS-5 EG/EK NO. 12-3 1621638A VIDEO (PAL) SCHEMATIC DIAGRAM
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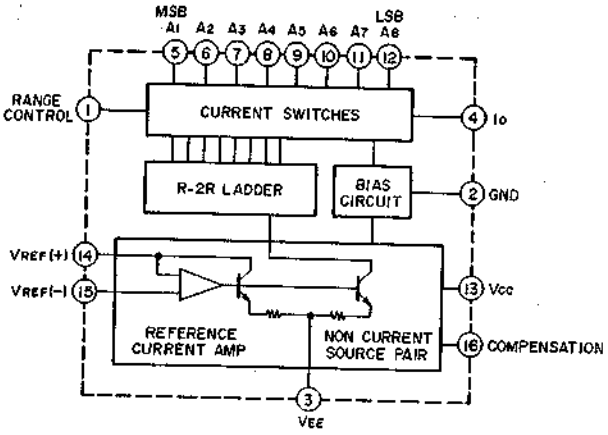
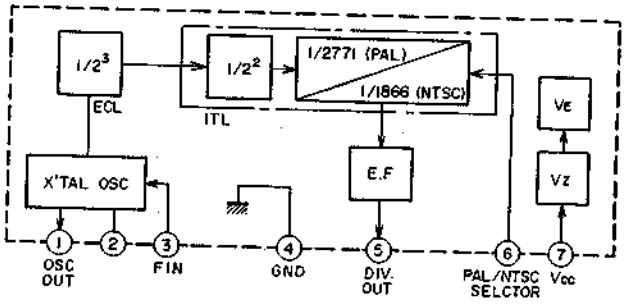
12. VS-5 EG NO. 12-11 1621646A TUNER SCHEMATIC DIAGRAM
13. VS-5 EK NO. 12-12 1621647A TUNER SCHEMATIC DIAGRAM

AM1408A8



AN6342N



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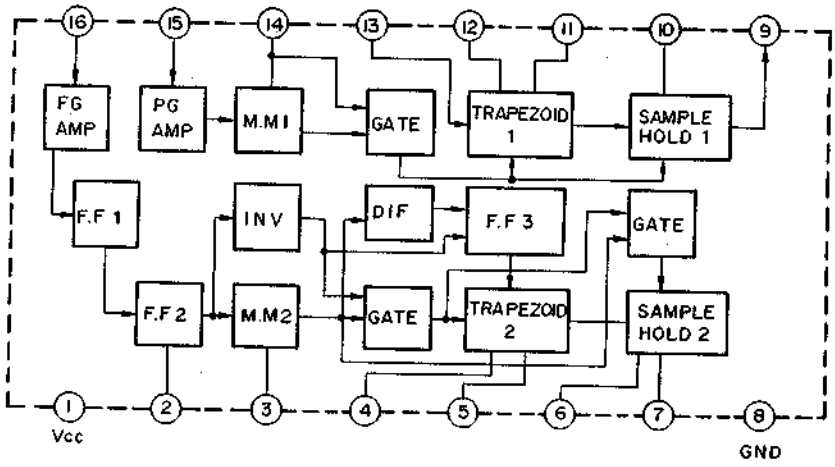
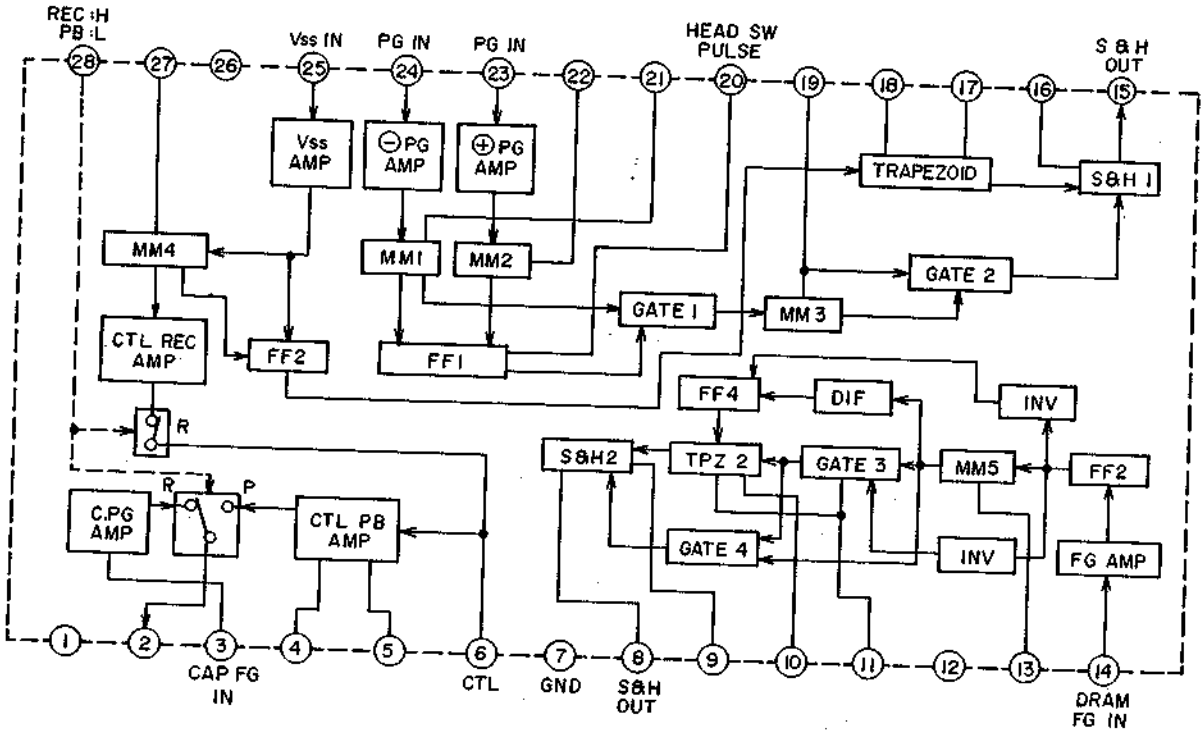
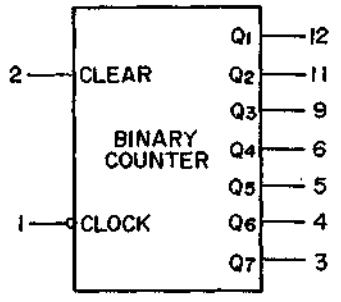


AN6350



HD14024BP

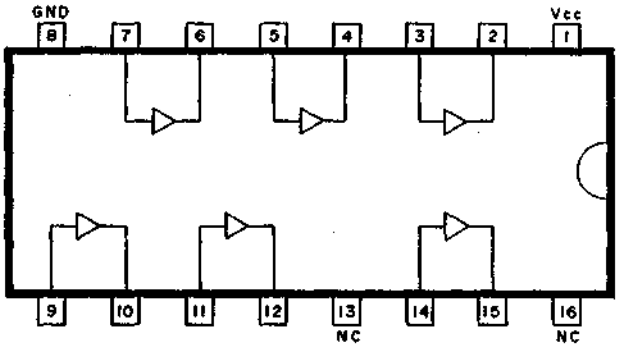


VDD : 14
Vss : 7
NC : 8,10,13

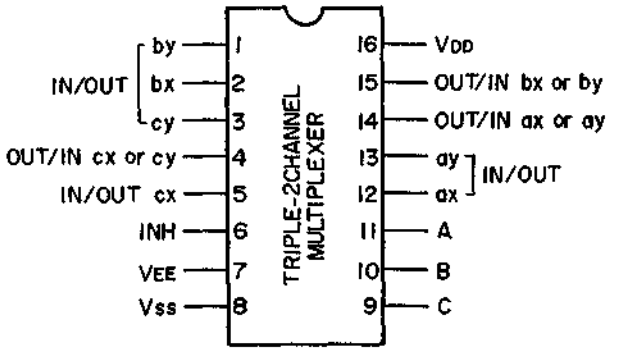
CLOCK Δ	CLEAR	OUTPUT STATE
※	H	ALL OUTPUTS="L"
↓	L	NO CHANGE
↓	L	ADVANCE TO NEXT STATE

Δ:LEVEL CHANGE, ※:DON'T CARE

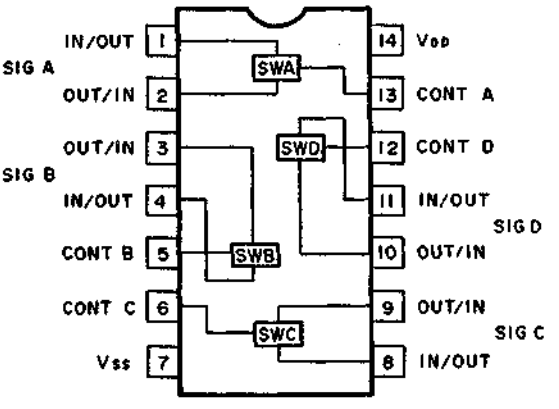
MC14050BCP



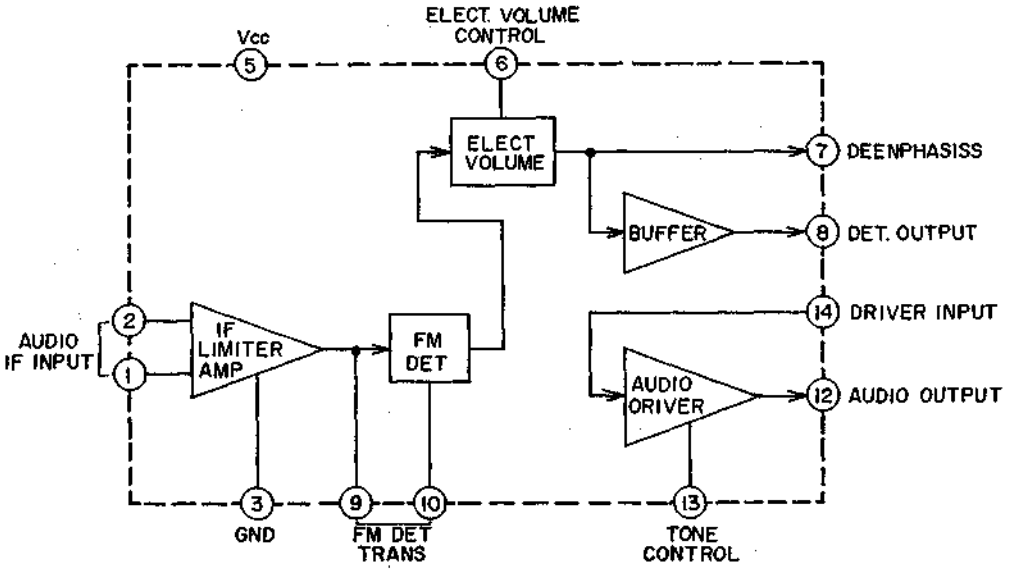
HD14053BP



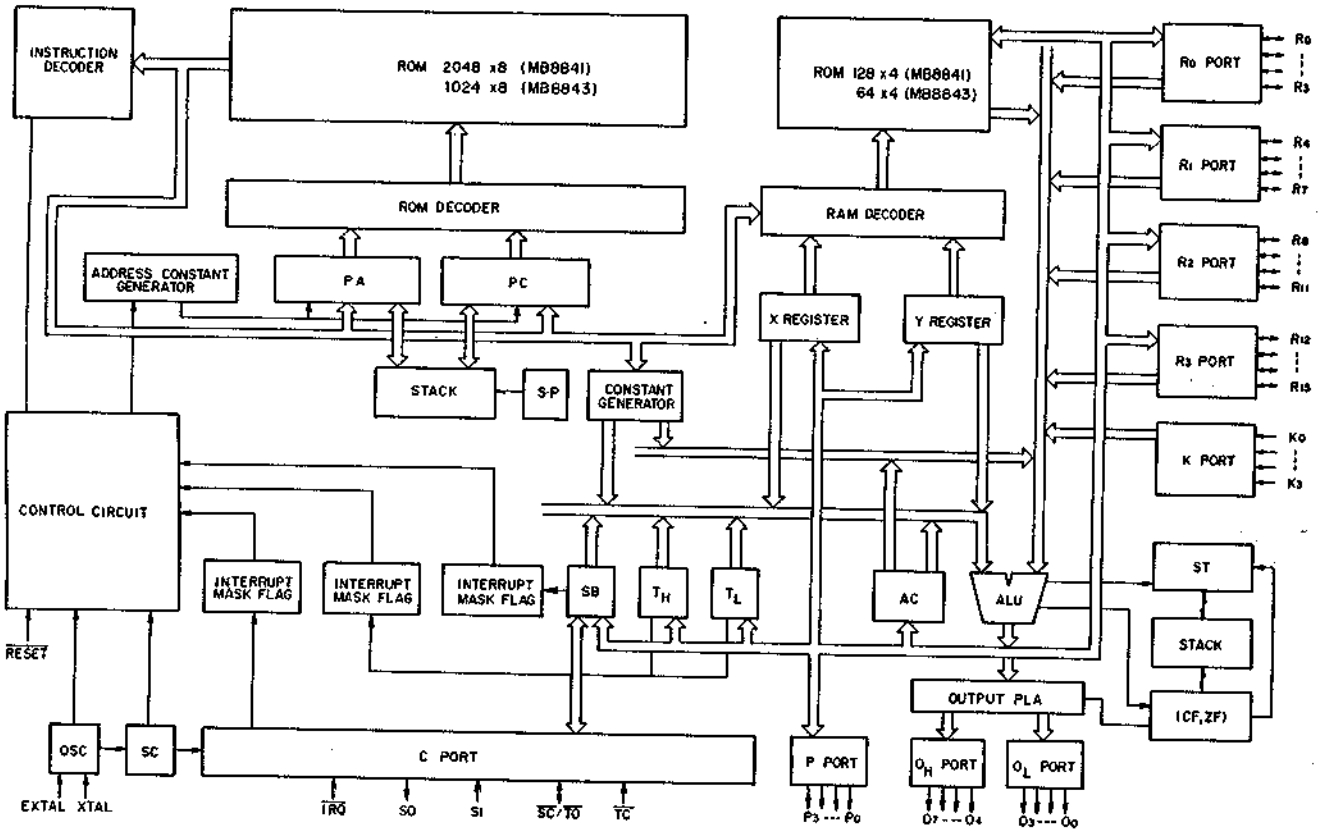
MC14066BCP



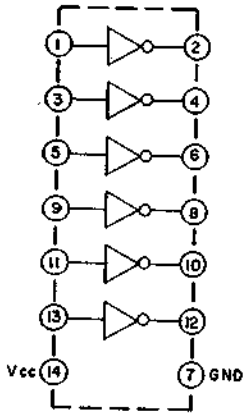
M5144P



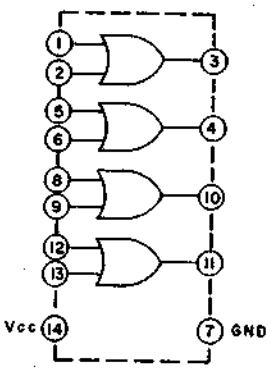
MB8841-462J/MB8843-501M



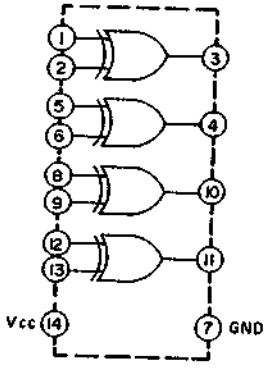
MC14069UBCP



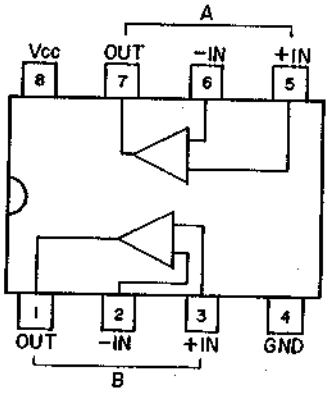
MC14071BP



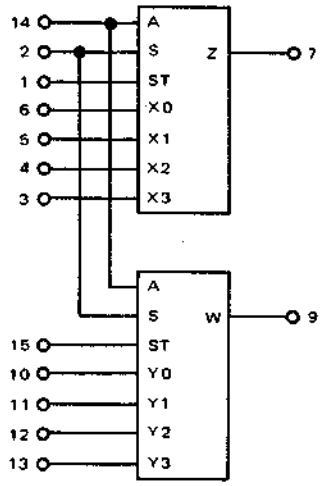
MC14070BCP



MC1458P/LM2903P/μPC1458



MC14539BCP

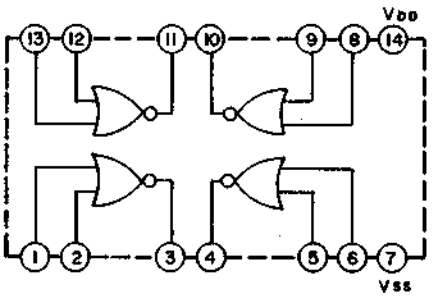


V_{DD} = Pin16
V_{SS} = Pin8

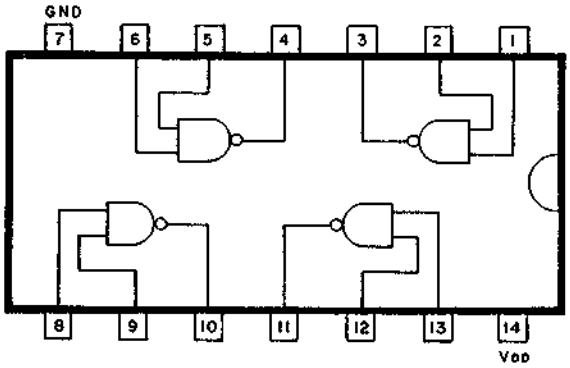
ADDRESS INPUTS		DATA INPUTS					
		X3	X2	X1	X0		OUT PUTS
S	A	Y3	Y2	Y1	Y0	ST,ST	Z,W
X	X	X	X	X	X	1	0
0	0	X	X	X	0	0	0
0	0	X	X	X	1	0	1
0	1	X	X	0	X	0	0
0	1	X	X	1	X	0	1
1	0	X	0	X	X	0	0
1	0	X	1	X	X	0	1
1	1	0	X	X	X	0	0
1	1	1	X	X	X	0	1

X = Don't Care

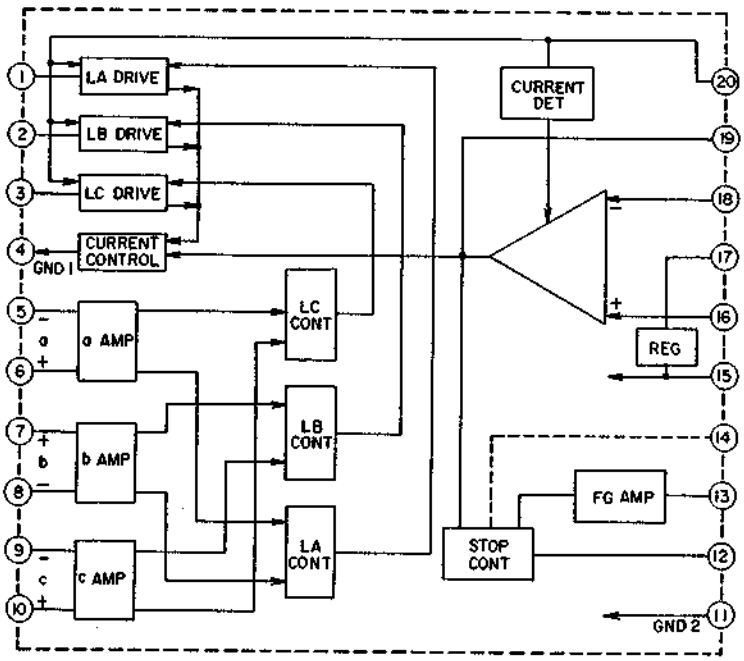
TC4001BP



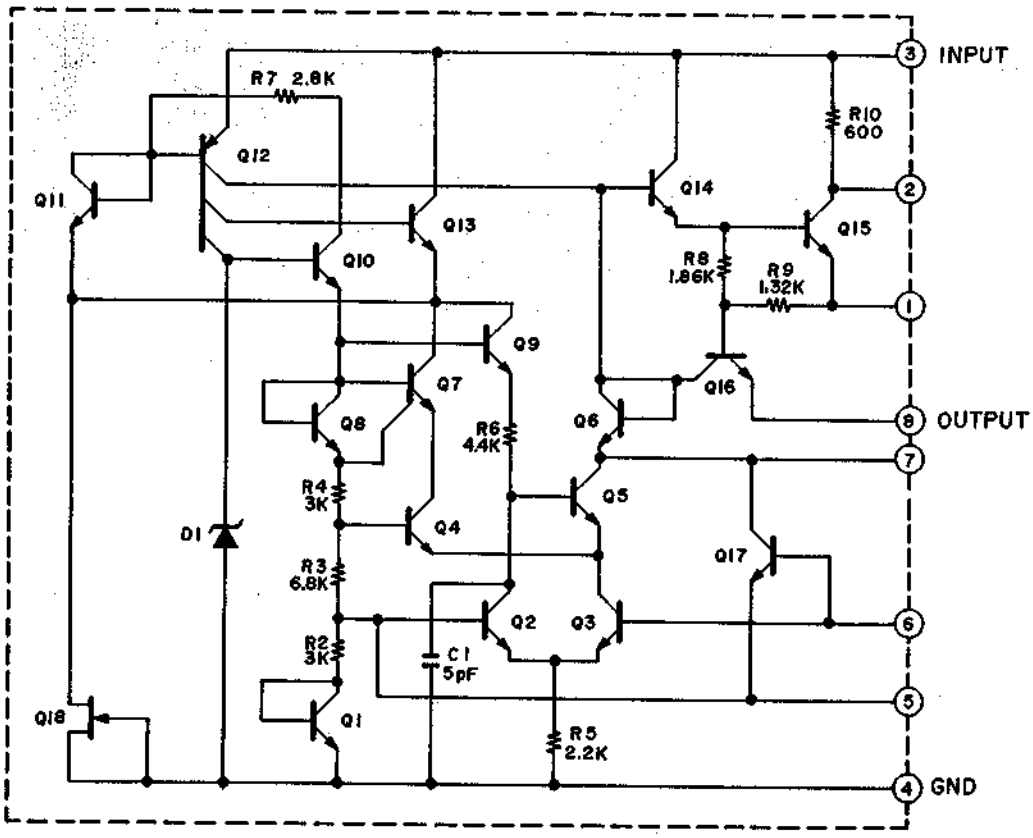
TC4011BP



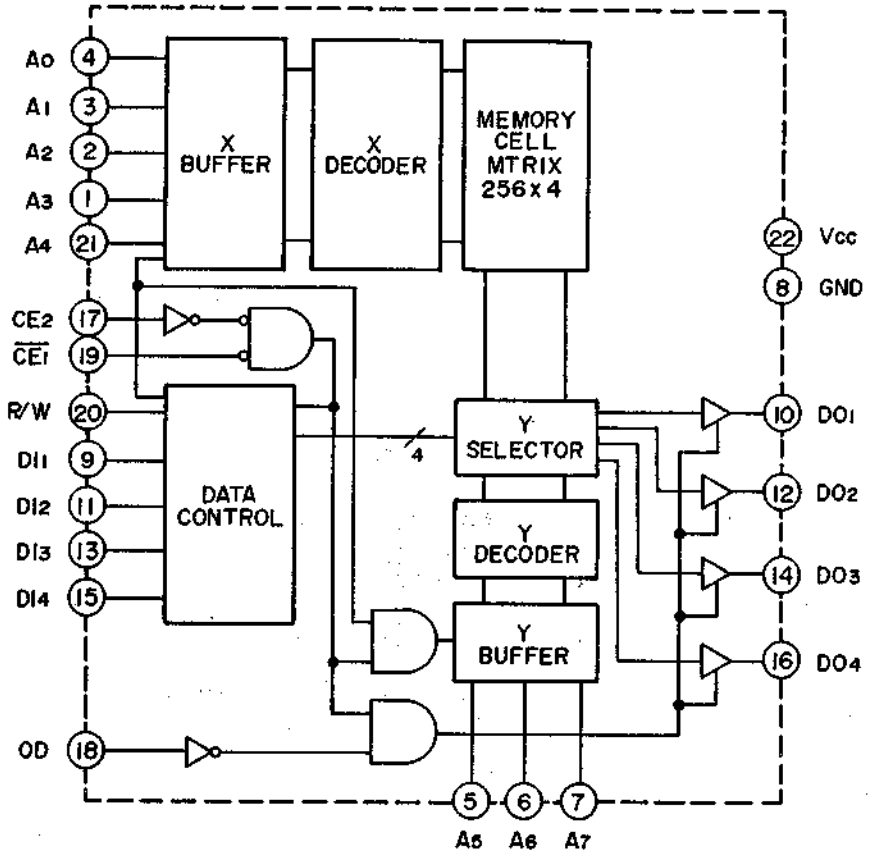
TA7234



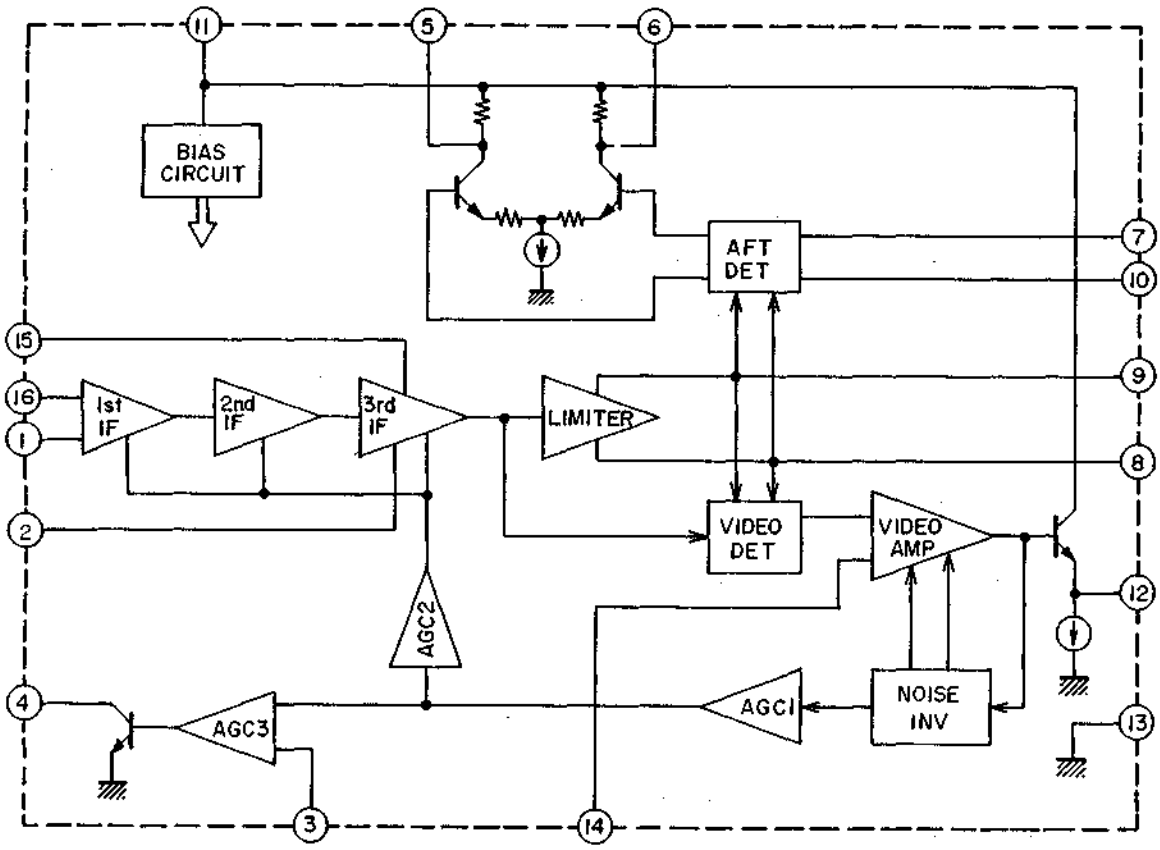
μPC141C



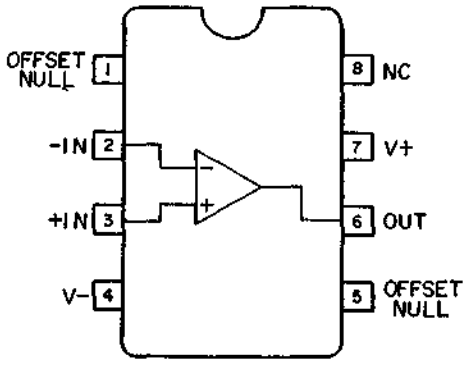
μPD5101LC



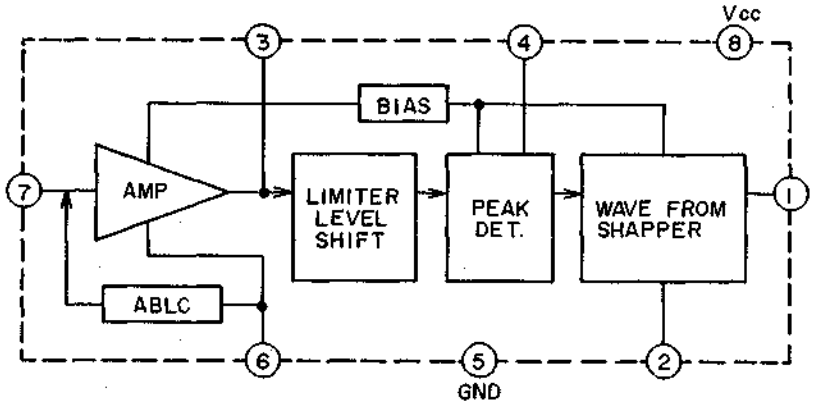
TA7607P



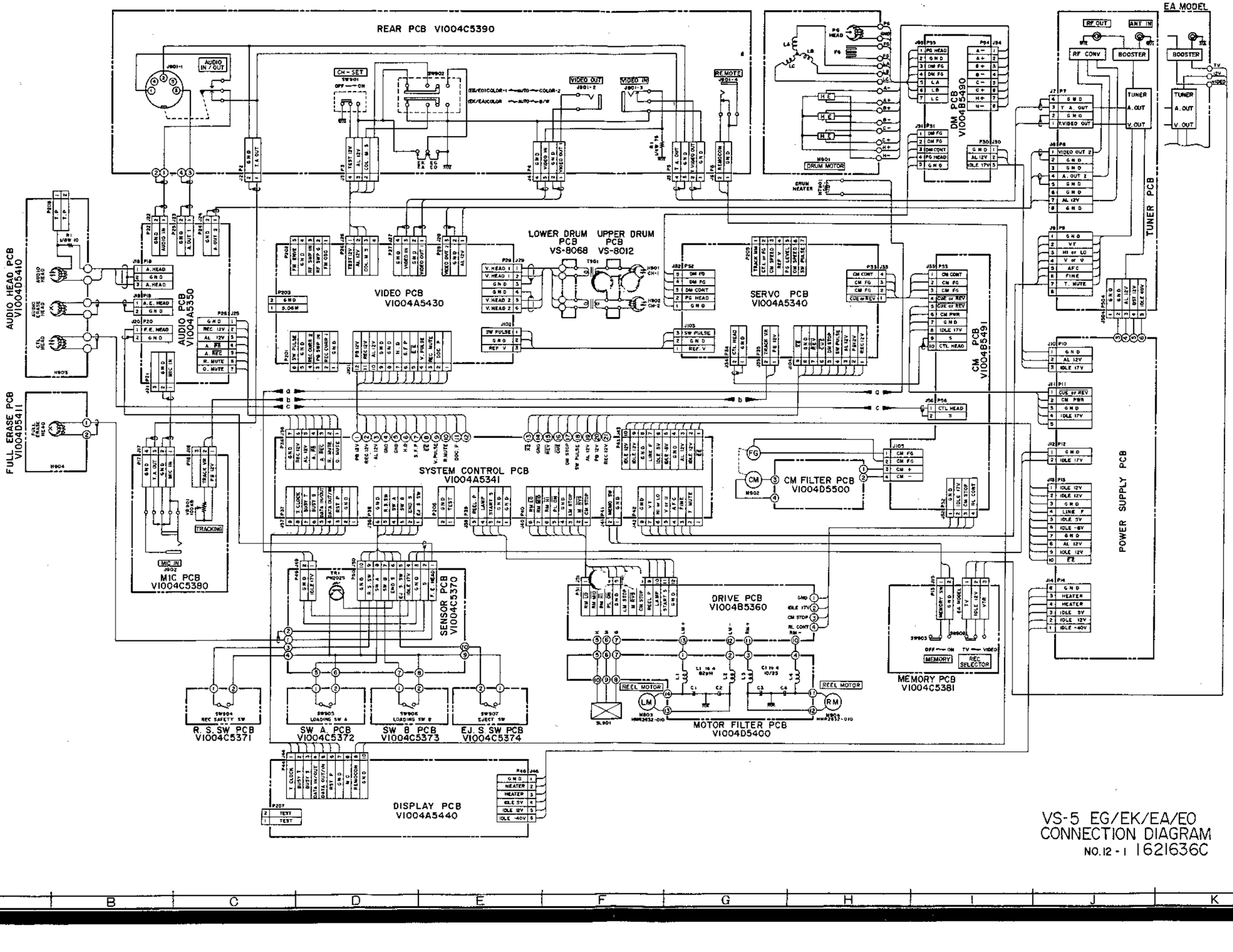
μA741CP/TL082CP



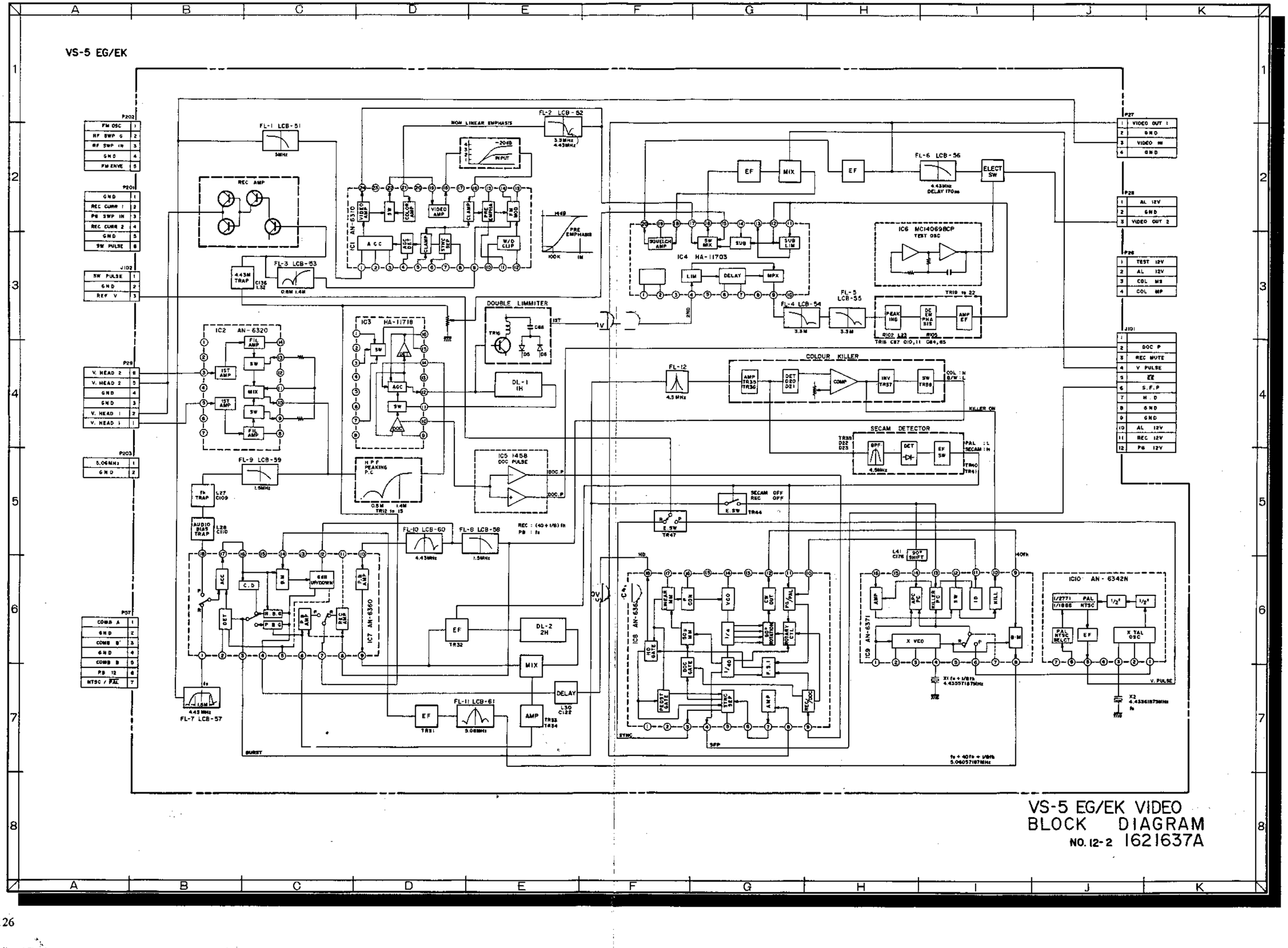
μPC1373H



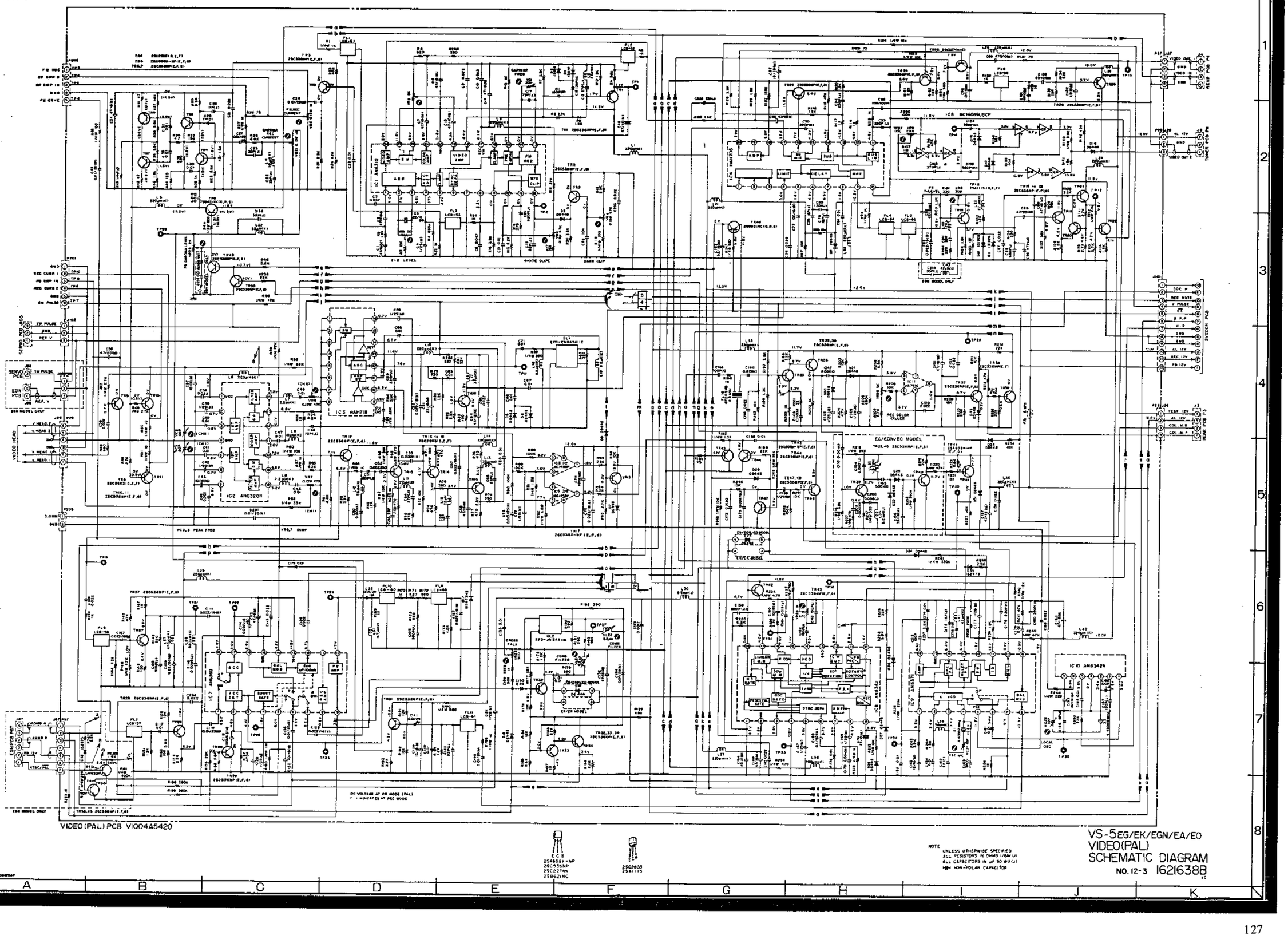
VS-5 EG/EK/EA/EO



VS-5 EG/EK



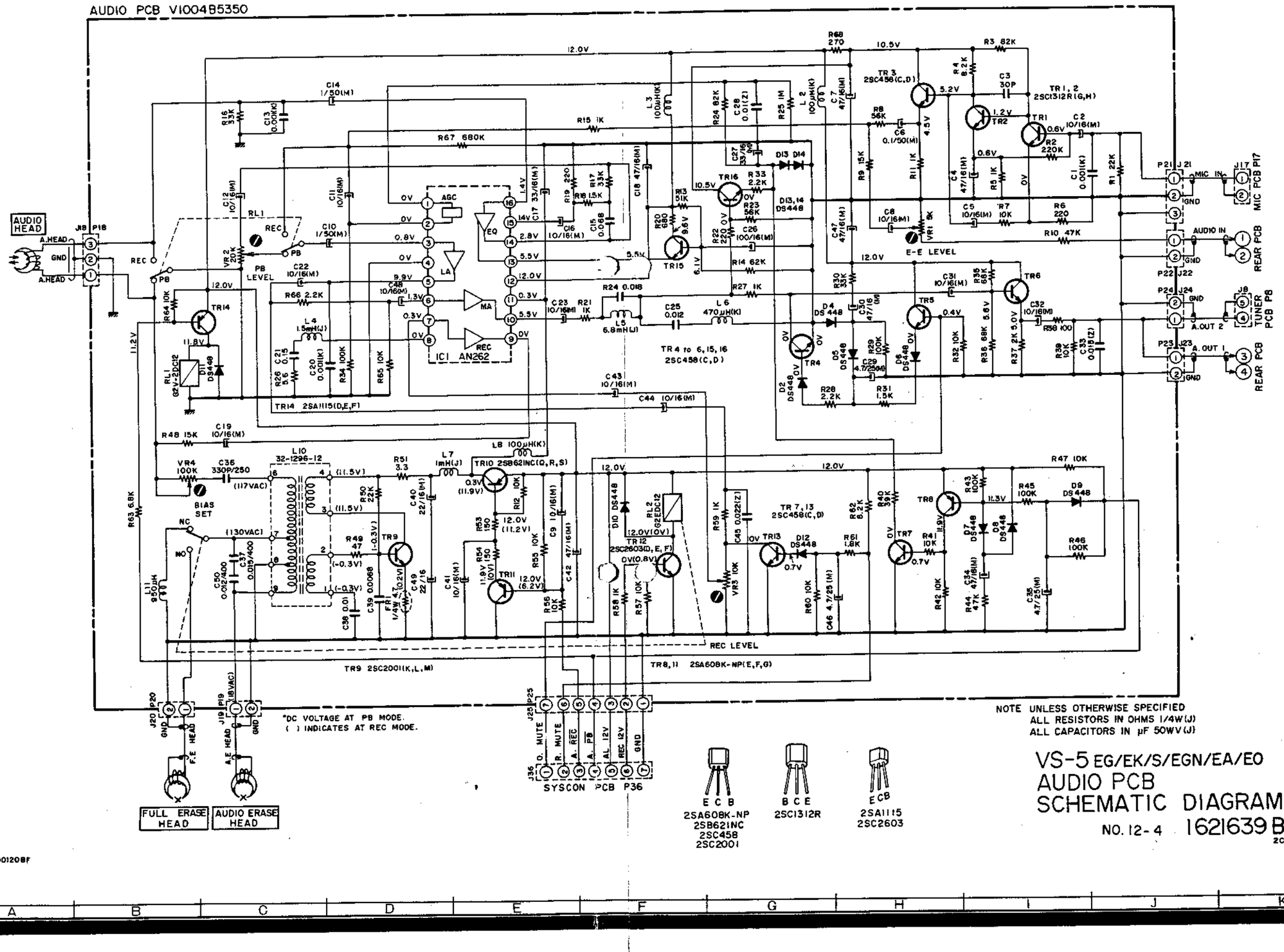
VS-5 EG/EK VIDEO BLOCK DIAGRAM
NO. 12-2 1621637A



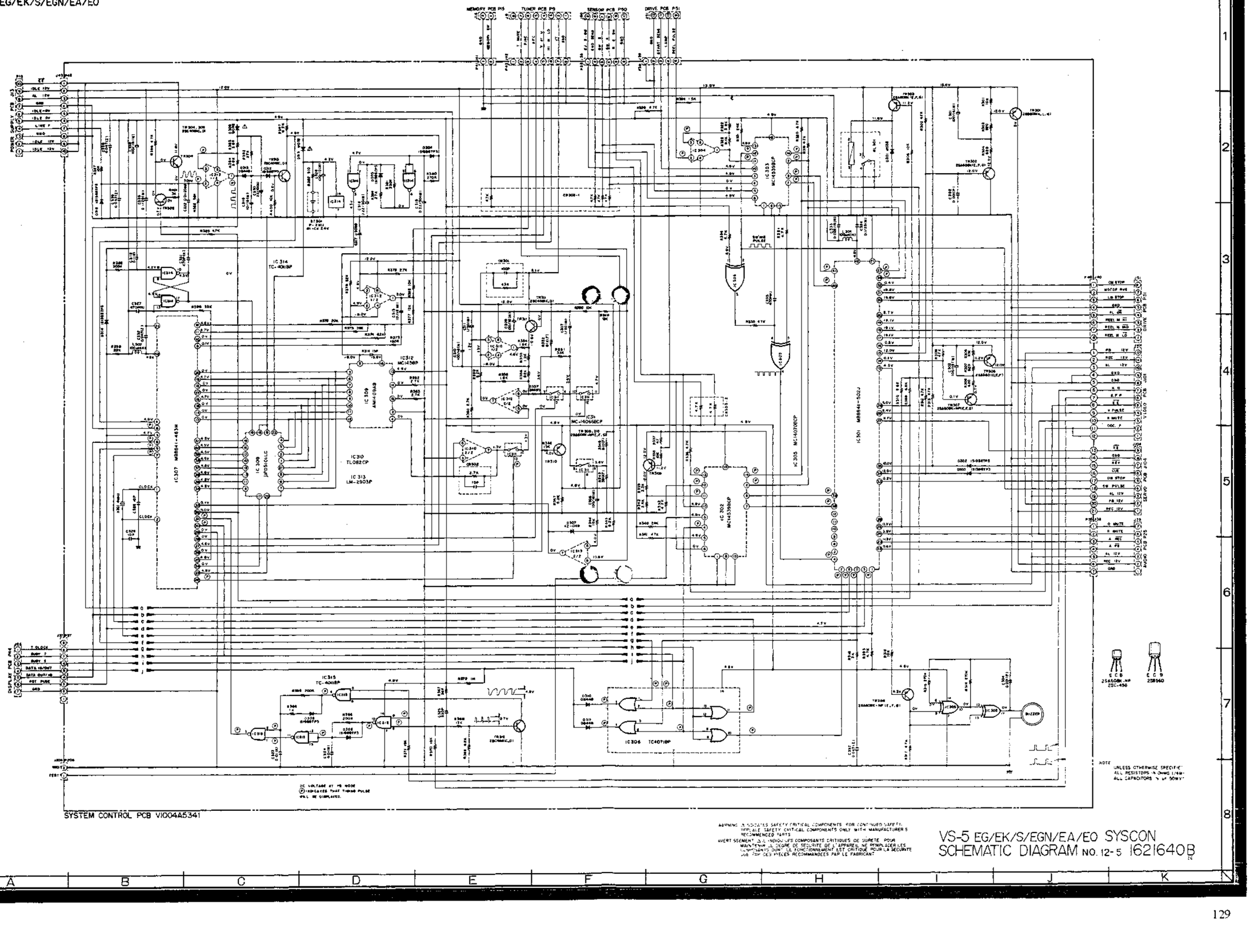
VS-5EG/EK/EGN/EA/EO
VIDEO(PAL)
SCHEMATIC DIAGRAM
NO. 12-3 16216388

VS-5 EG/EK/S/EGN/EA/EO

AUDIO PCB V10048535O

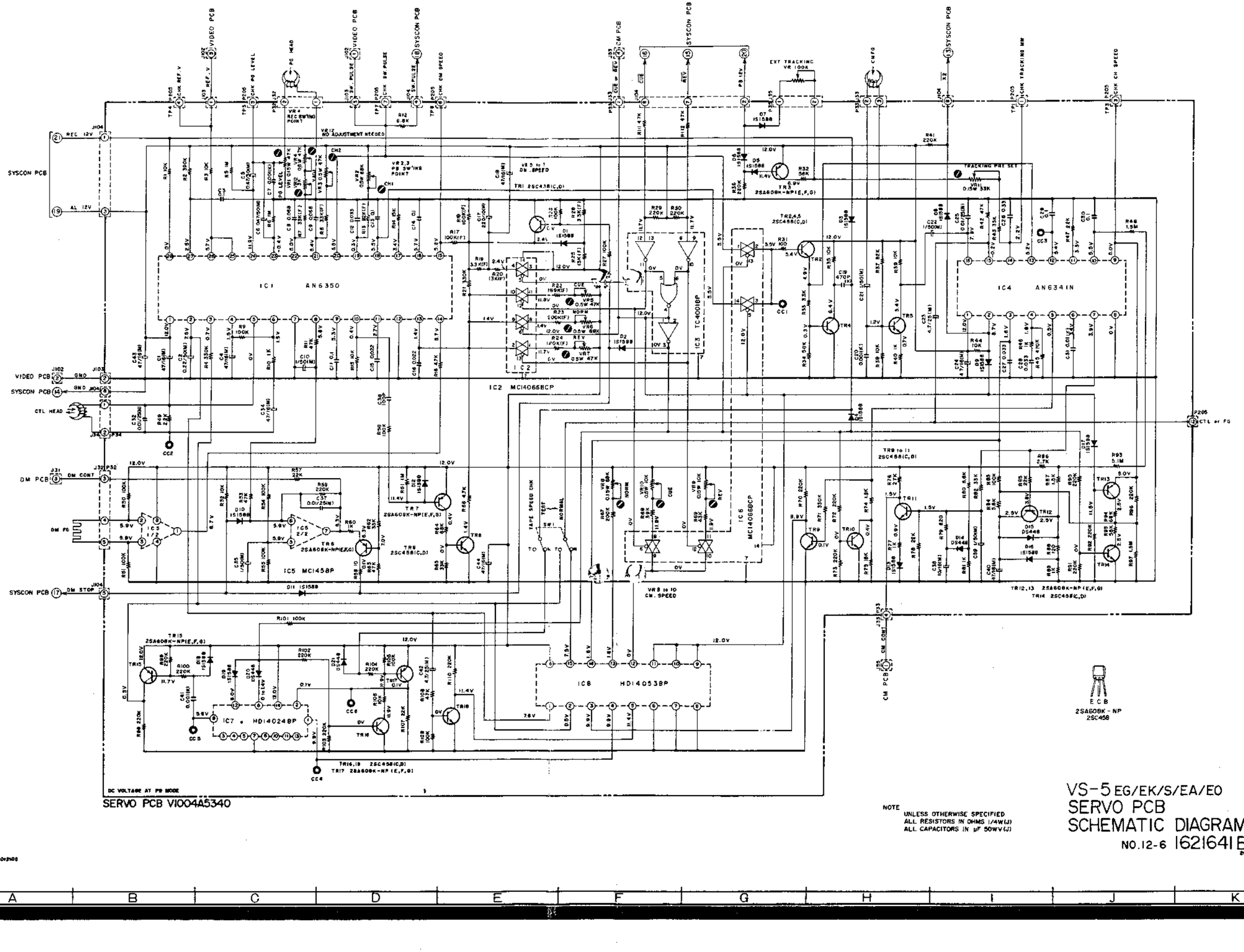


VS-5 EG/EK/S/EGN/EA/EO

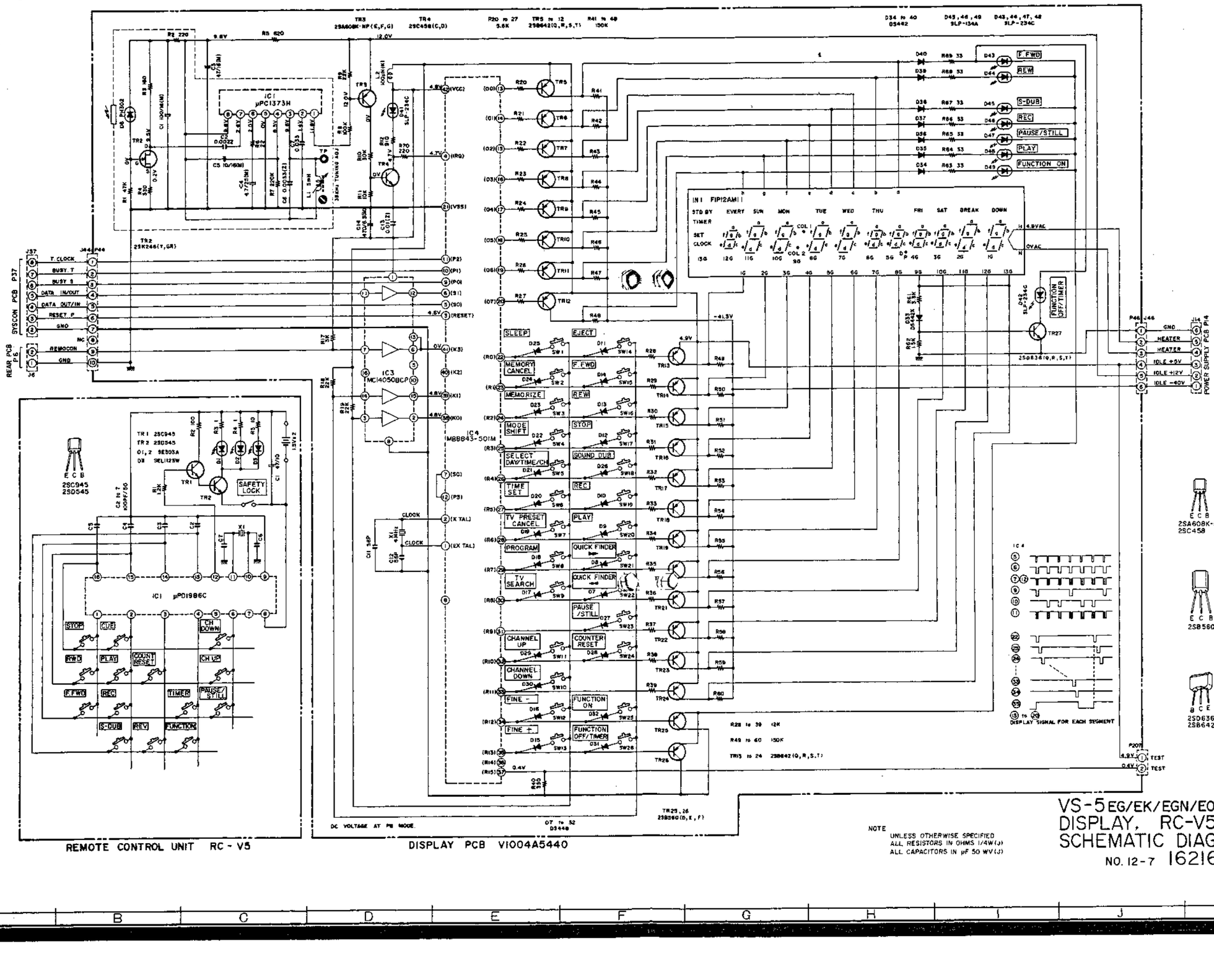


VS-5 EG/EK/S/EGN/EA/EO SYSCON
SCHEMATIC DIAGRAM NO. 12-5 1621640B

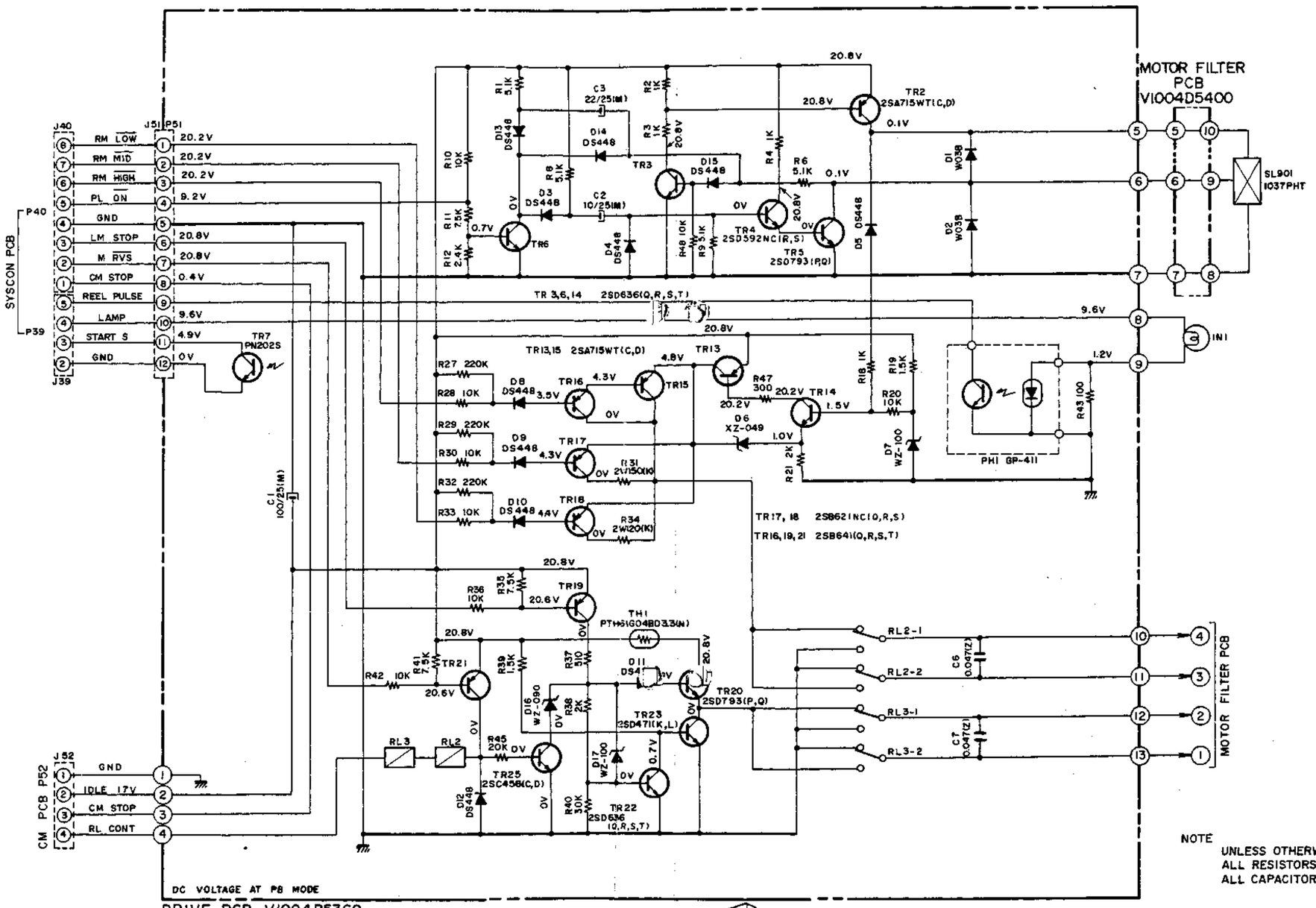
VS-5 EG/EK/S/EA/EO

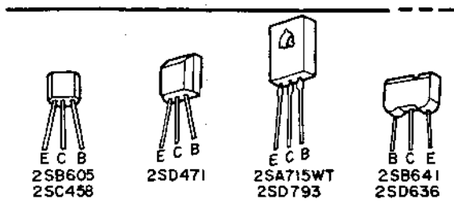


VS-5 EG/EK/EGN/EA/EO



VS-5 EG/EK/S/EGN/EA/EO





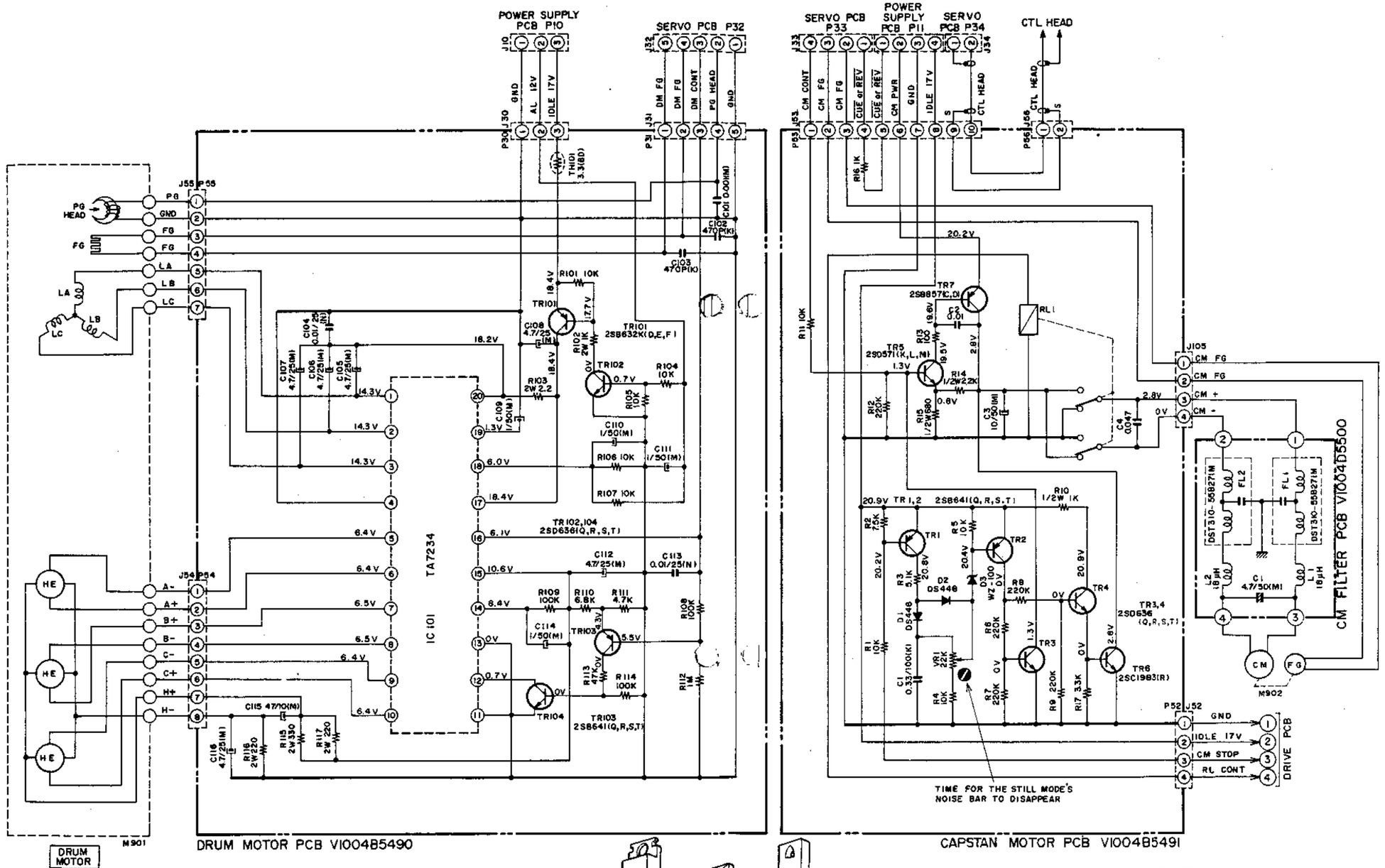
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)

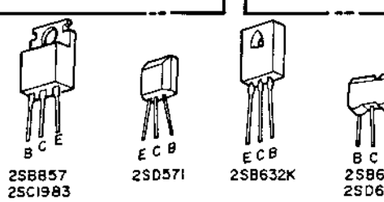
VS-5 EG/EK/S/EGN/EA/EO DRIVE PCB SCHEMATIC DIAGRAM

NO. 12-8 1621643B 2C

001212E

VS-5 EG/EK/S/EGN/EA/EO





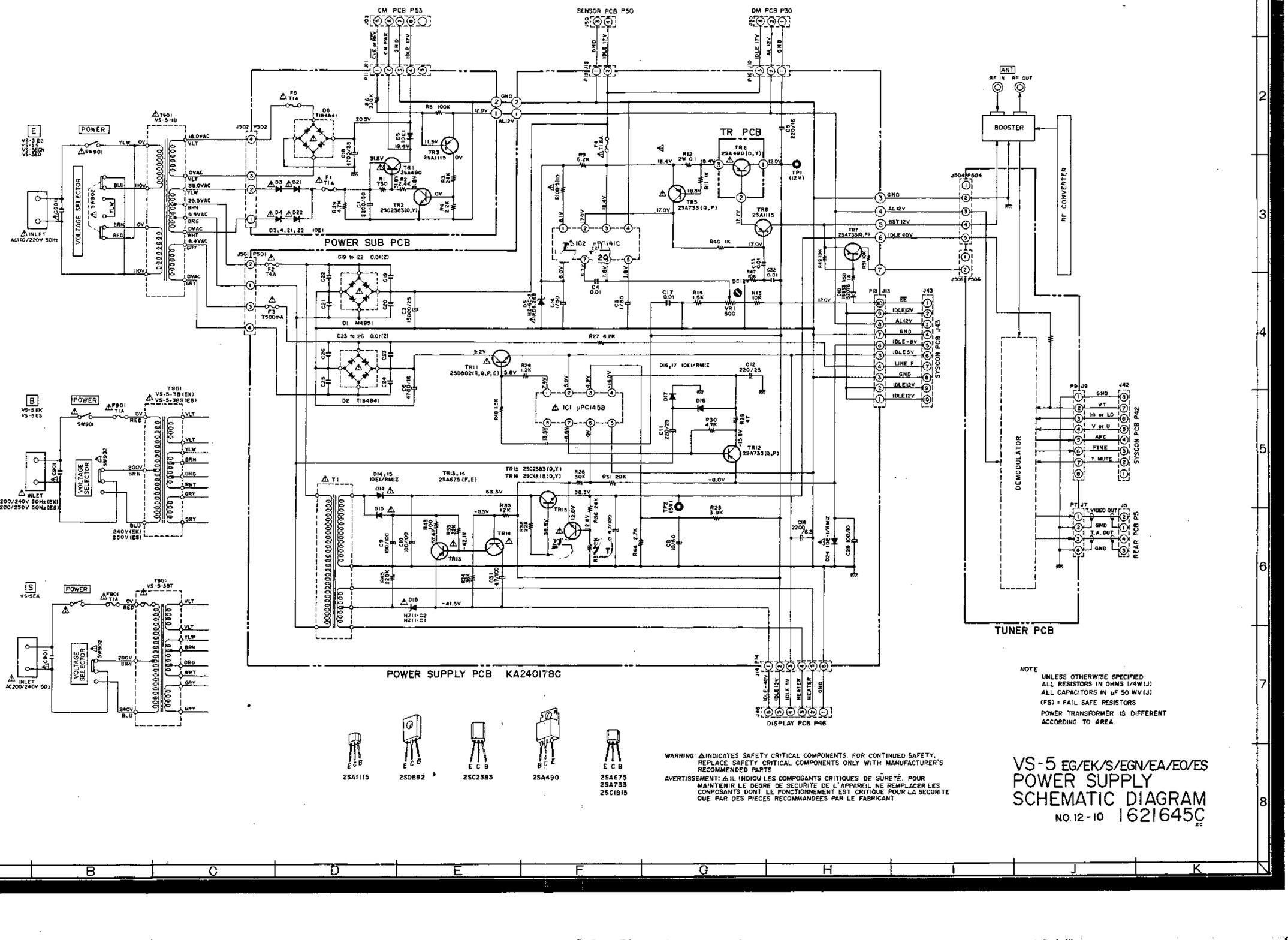
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)

VS-5 EG/EK/S/EGN/EA/EO DRUM/CAPSTAN MOTOR SCHEMATIC DIAGRAM

NO.12-9 1621644B

001213E

VS-5 EG/EK/S/EGN/EA/EO/ES



2SA1115 2SD882 2SC2383 2SA490 2SA675 2SA733 2SC1815

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQUE LES COMPOSANTS CRITIQUES DE SÛRETÉ. POUR MAINTENIR LE DEGRÉ DE SECURITE DE L'APPAREIL NE REMPLACER LES COMPOSANTS DONT LE FONCTIONNEMENT EST CRITIQUE POUR LA SECURITE QUE PAR DES PIECES RECOMMANDEES PAR LE FABRICANT

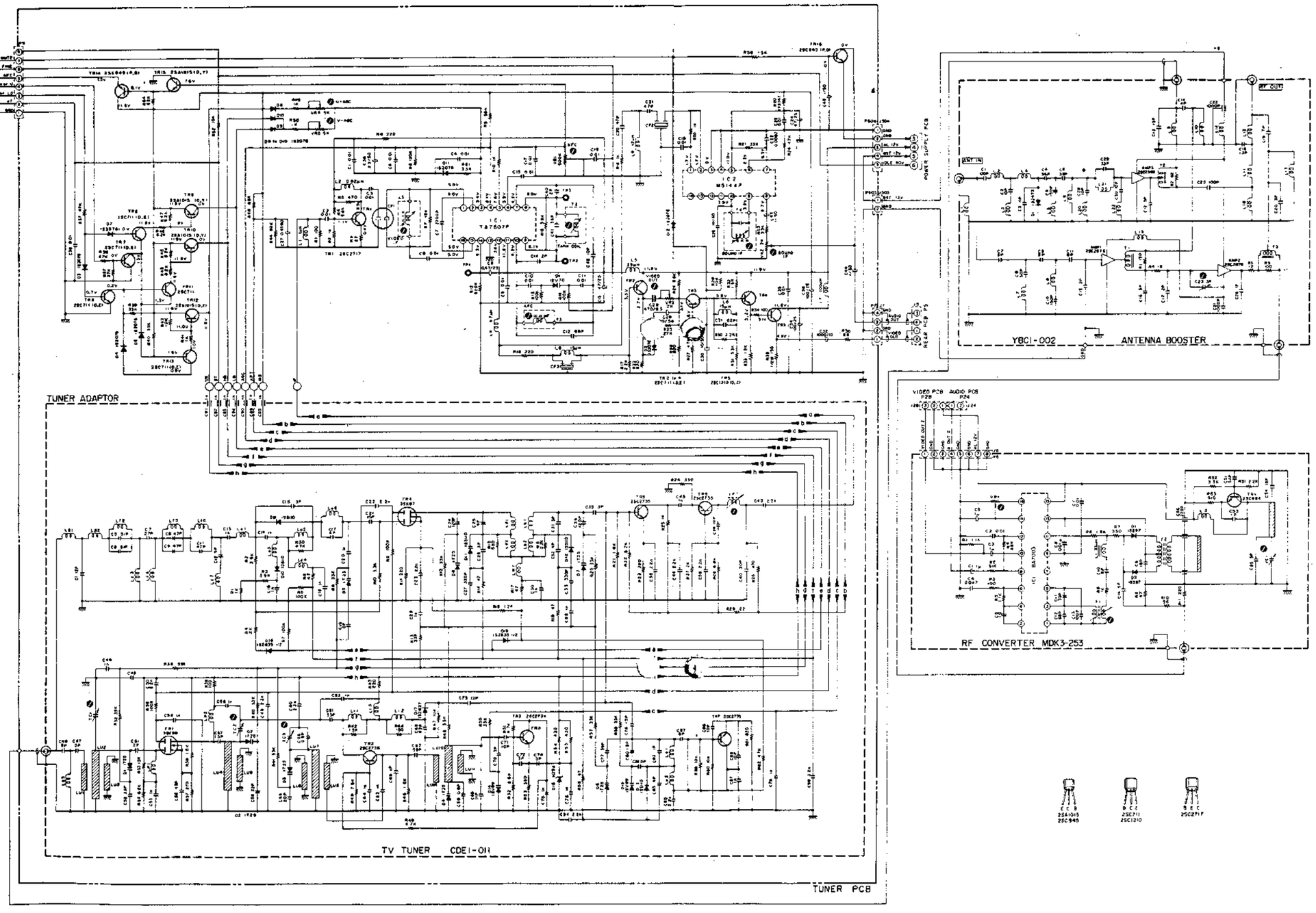
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W (J)
ALL CAPACITORS IN μF 50 WV (J)
(FS) = FAIL SAFE RESISTORS
POWER TRANSFORMER IS DIFFERENT ACCORDING TO AREA.

VS-5 EG/EK/S/EGN/EA/EO/ES POWER SUPPLY SCHEMATIC DIAGRAM

NO. 12-10 1621645C 2C

001215

VS-5 EG

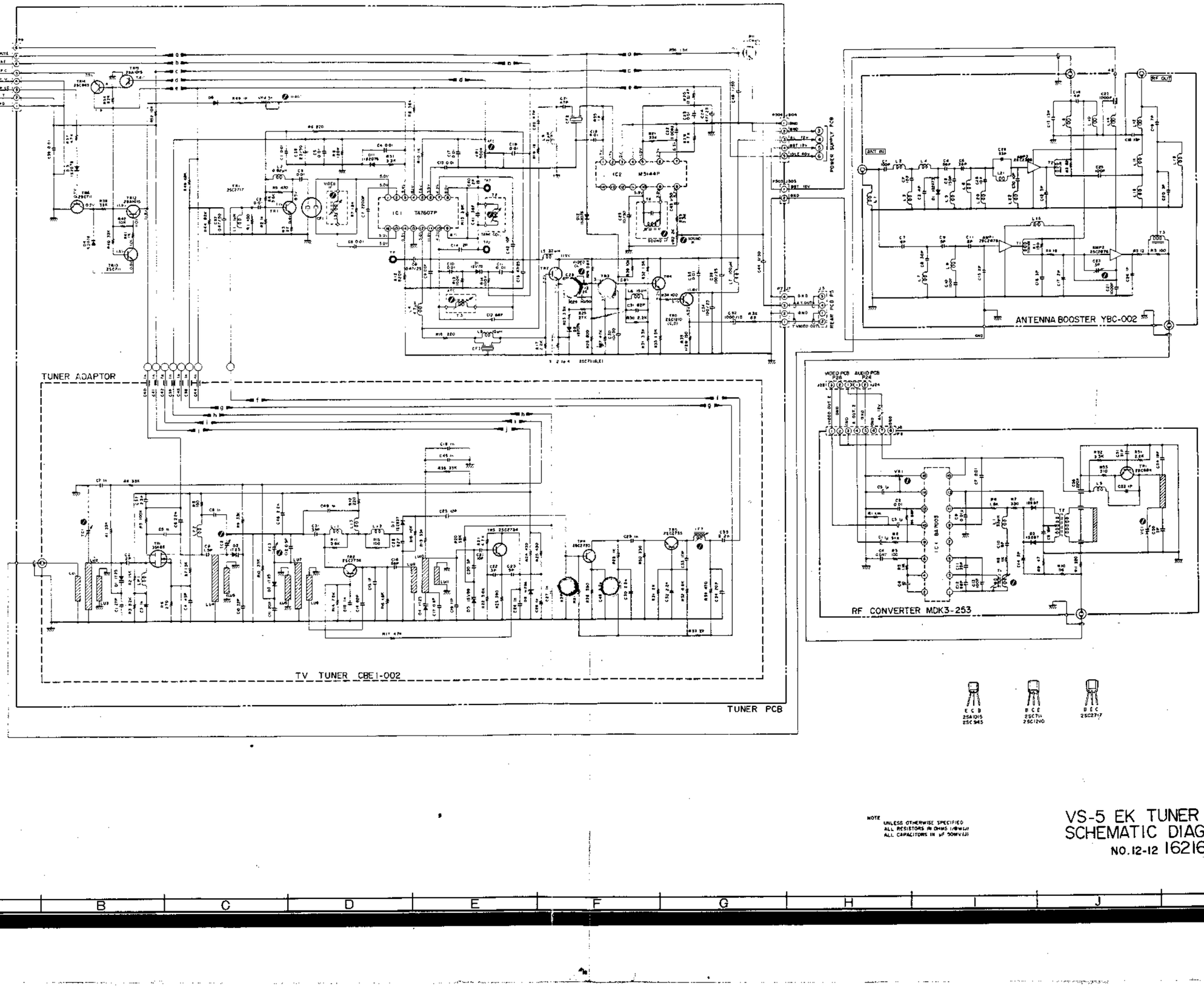


NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS (Ω)
ALL CAPACITORS IN μF

VS-5 EG TUNER SCHEMATIC DIAGRAM

NO.12-11 1621646A

VS-5 EK



NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/8W±5%
ALL CAPACITORS IN μF 50WV±5%

VS-5 EK TUNER SCHEMATIC DIAGRAM

NO.12-12 1621647A