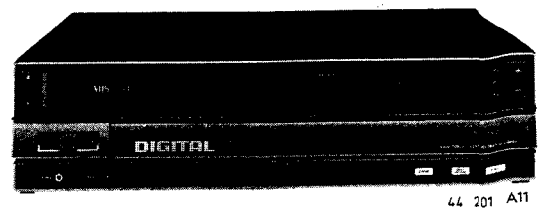
Video cassette recorder VR6943/00A/02A

Service
Service
Service



44 201 A11

Service Manual

VHS
PAL

VR6943/00A/02A Is a video cassette recorder with a TV-reception part and electronic timer, suitable for recording and playing back TV signals, which meet the CCIR-PAL B.G. standard.
The signals are recorded on tape according to the VHS standard.

CONTENTS

Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

Documentation Technique Service Dokumentation Documentazione di Servizio Huolte-Ohje Manual de Servicio Manual de servicio

Subject to modification
4822 726 14538
Printed in The Netherlands

Published by Service Consumer Electronics
CS1 7723

SPECIFICATIONS

Format:	VHS PAL standard
Video recording system:	Two rotary-head helical scan system
Video signals:	PAL colour and B/W signals, 625 lines
Recording/playing:	8 hours max. with 240 tape
Tape width:	12.7 mm
Tape speed:	SP 23.39 mm/sec. LP 11.70 mm/sec.
Antenna:	75 Ω unbalanced
Receiving channel:	UHF channel 21 - 69 VHF channel 2 - 12 S1 - S41
RF converter output signal:	UHF channel 30 - 39 (adjustable). Preset to CH 36
Power requirement:	AC 220 V, 50 Hz
Power consumption:	Approx. 51 W (with antidew heater)
Operating temperature:	5°C to 40°C
Storage temperature:	−20°C to 55°C
Weight:	9.3 kg
Dimensions:	430 mm (W) x 388 (D) x 115 mm (H)
Video	
Input:	1.0 Vp-p, 75 Ω
Output:	1.0 Vp-p, 75 Ω
Audio	0 dB= 0.775 Vrms
Input:	Line: −3.8 dB, more than 50 kΩ (at 21 pin terminal)
Output:	Line: −3.8 dB, less than 1 kΩ (at 21 pin terminal)
Accessories included:	Antenna 75 Ω coaxial connector cable (plug provided) Operation manual Remote control unit • UM-4 dry battery (1.5 V) x 2 pcs. • Audio cable (RCA-pin type)

* As part of our policy of continuous improvement, we reserve the right to alter design and specifications without notice.

Note: The antenna must correspond to the new standard DIN 45325 (IEC 169-2) for combined VHF/UHF antenna with 75 Ω connector.

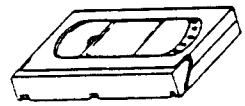
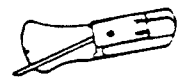
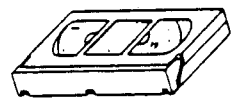
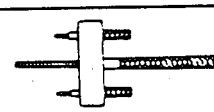
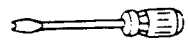
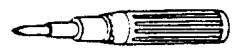
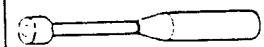
ADJUSTMENT, REPLACEMENT, ASSEMBLING, AND TOOLS NECESSARY FOR MECHANICAL ADJUSTMENT

• Outline

Periodical maintenance is necessary for efficient operation. In some instances field service may be achieved with common tools. More extensive service will require special tools and test equipment. Appropriate tools should be used at all times.

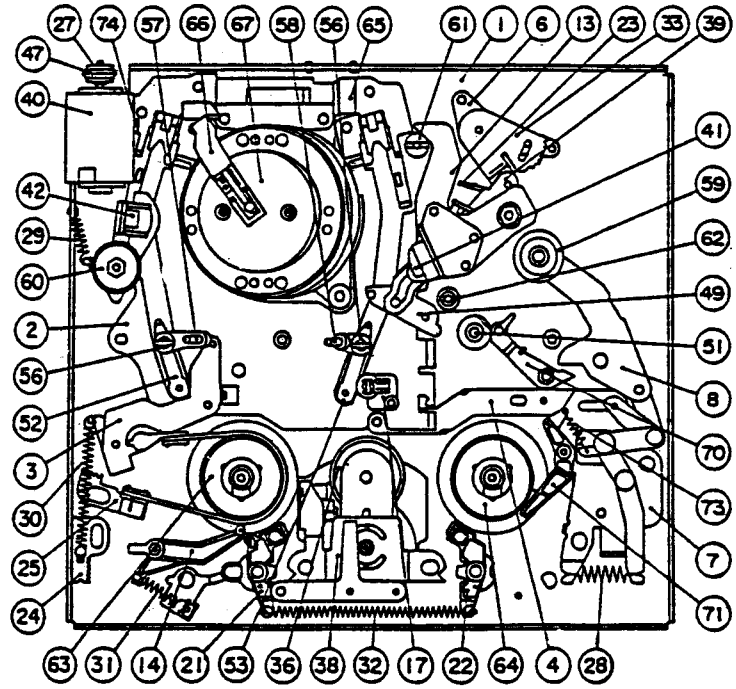
TOOLS NECESSARY FOR ADJUSTING THE MECHANICAL UNITS

The following tools are recommended for proper service and satisfactory repair.

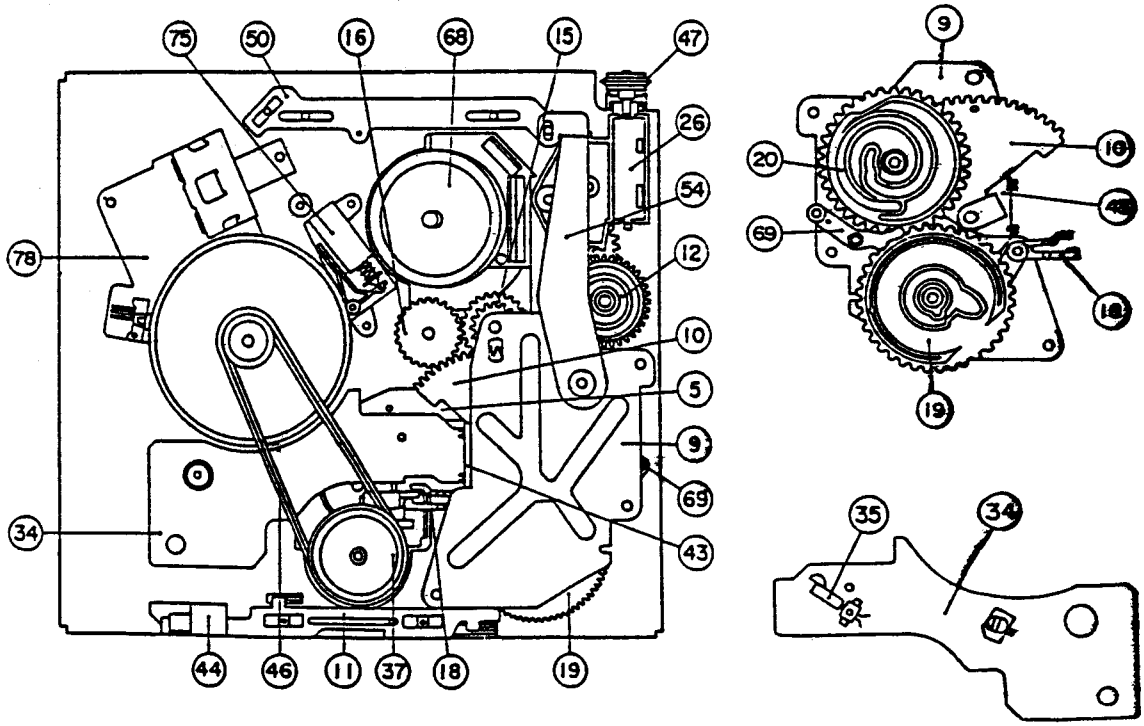
No.	Jig Item	Part No.	Configuration	Remarks
1	Reel Disk Height Adjusting Jig	JiGRH0002		These Jigs are used for checking and adjusting the Reel Disk Height.
2	Master Plane Jig	JiGMP0001		
3	A/C Head Tilt Adjusting Jig	JiGACH51B		This Jig is used for height adjustment of the running tape to the Video Head.
4	Torque Gauge 90g	JiGTG0090		These Jigs are used for checking and adjusting the torque of Take-up and Supply Reel disks.
	Torque Gauge 1.2kg	JiGTG1200		
5	Gauge Head	JiGTH0006		
6	Cassette Torque Gauge	JiGVHT-063		This cassette torque gauge is used for checking and adjusting torque of take-up and supply reel and for measuring tape back tension.
7	Tension Gauge (300g)	JiGSG0300		There are several Gauges used for the tension measurements, 300g and 2.0kg.
	Tension Gauge (2.0kg)	JiGSG2000		
8	Hex Wrench (0.9mm)	JiGHW0009		These Jigs are used for loosening or tightening special Hexagon type screws.
	Hex Wrench (1.2mm)	JiGHW0012		
	Hex Wrench (1.5mm)	JiGHW0015		
9	Alignment Tape (PAL)	VROCPSV		This tape is especially used for electrical fine adjustment.
10	Drum Replacing Jig	JiGDT-0001 or JiGDT-0001CD		This is used for the replacement of the VCR's upper drum.
11	Tension Gauge Adaptor	JiGADP003		This Jig is used for the tension gauge. Rotary Transformer Clearance Adjusting Jig.
12	Special Bladed Screwdriver	JiGDRIVERH-4		This Screwdriver is used for adjusting the guide roller height.
13	Tension Band and Plate Adjusting Jig	JiGDRIVER-6		This Jig is used for adjusting tension band and tension plate adjustment.
14	Torque Driver	JiGTD1200		This Jig is used for fixing measurement, 12kg.
15	AC Head Height Adjusting Box Driver	JiGDRIVER110-7		This Jig is used for height adjustment of the A/C head.

LOCATION OF MECHANICAL PARTS

- **TOP VIEW**



- **BOTTOM VIEW**



LOCATION LIST OF MECHANICAL PARTS

No.	Part Name	No.	Part Name
1	Main chassis ass'y	40	Loading motor
2	Guide plate ass'y	41	Audio/control head
3	Tension arm ass'y	42	Full-erase head
4	Shifter (B) ass'y	43	Cam switch
5	Shifter (A) ass'y	44	Brake solenoid
6	Intermediate lever (A)	45	DEW sensor angle
7	Pinch link plate ass'y	46	Reel belt
8	Pinch roller lever	47	Loading belt
9	Reinforcement angle ass'y	48	—
10	Segment gear ass'y	49	Half load lever
11	Brake drive lever	50	Half load shifter ass'y
12	Half loading cam	51	Capstan shaft
13	Audio/control head arm	52	Pole base (A)
14	Auxiliary brake lever	53	Pole base (B)
15	Loading gear (A)	54	Cam lever ass'y
16	Loading gear (B)	55	—
17	LED holder	56	Guide roller (supply side/take-up side)
18	Torque change lever	57	Supply slant pole
19	Brake cam	58	Take-up slant pole
20	Master cam	59	Pinch roller
21	Supply brake lever	60	Supply roller
22	Take-up brake lever	61	X-position adjusting nut
23	Audio/control head arm spring	62	Retaining guide
24	Tension adjusting plate	63	Supply reel disk
25	Tension band ass'y	64	Take-up reel disk
26	Loading block	65	Drum base
27	Loading motor pulley	66	Earth brush
28	Pinch pressure spring	67	Drum
29	Full-erase head arm spring	68	Drum motor
30	Tension arm spring	69	Tension release lever
31	Auxiliary brake spring	70	Reverse guide arm ass'y
32	Main brake spring	71	Universal brake
33	Intermediate lever (B)	72	—
34	Reel sensor PWB	73	Universal brake spring
35	Shifter switch	74	—
36	Reel idler	75	DD brake solenoid
37	Reel pulley	76	—
38	Reel drive unit angle	77	—
39	Connection plate	78	Capstan motor

NOTE:
Current JiGMA0001 contains master plane (JiGMP0001) and Disk Height Adjusting Jig (JiGRH0001). Even though new Disk Height Adjusting Jig (JiGRH0002) covers wider height, this new Jig (JiGRH0002) can be used for current JiGRH0001, however current Jig (JiGRH0001) cannot be used as JiGRH0002. Master plane (JiGMP0001) can be used with JiGRH0001, and also JiGRH0002.

* * * * * * * *

MECHANICAL PARTS REQUIRING PERIODICAL INSPECTION

Use the following table as a guide to maintain the mechanical parts in good operating condition.

Parts \ Maintained every	500 hrs.	1000 hrs.	1500 hrs.	2000 hrs.	3000 hrs.	Remarks
Guide roller ass'y	□	□	□	□	□	Abnormal rotation or significant vibration requires replacement.
Supply impedance roller	□	□	□	□	□	
Supply impedance roller (inner)		□		□	□	Clean with pure high quality isopropyl alcohol.
Supply impedance roller flange B	□	□	□	□	□	Clean tape contact area with the specified cleaning liquid.
Retaining guide	□	□	□	□	□	
Guide flange B	□	□	□	□	□	
Slant pole	□	□	□	□	□	
Video head	□	○□	□	○□	○□	Clean tape contact area with the specified cleaning liquid.
Full-erase head	□	□	□	□	□	
A/C head	□	□	□	□	□	
Capstan belt		□		○		Clean rubber and rubber contact area with the specified cleaning liquid.
Pinch roller	□	□	□	□	○□	
Reel belt		□		○		
Loading belt		□		○		
Capstan motor					○	
Loading motor					○	
Supply/take-up reel disk		□ △		□ △		Clean with pure high quality isopropyl alcohol.
Tension band ass'y					○	
Reel drive unit					○	
Reel idler	□	□	□	□	□	
Reel pulley	□	□	□	□	□	
Supply/take-up brake lever				○		

Note: ○ : Part replacement
□ : Cleaning (For cleaning, use a lint-free cloth dampened with pure isopropyl alcohol).
△ : Oil refilling (The indicated point should be lubricated with high quality spindle oil every 1000 hrs).

This model has no adjusting volumes for torques, tension, etc. If the reading is outside the specified range, clean or replace the part.

REMOVAL ADJUSTMENT AND REPLACEMENT OF CASSETTE HOUSING CONTROL ASSEMBLY

Notes:

1. During removal and installation be careful not to strike the nearby guide pin, drum, etc.
2. Before removal or installation, be sure to unplug the recorder from the AC outlet.

- **Removal**

1. Put the unit in the cassette ejected position.
2. Disconnect the connector at the right side of the cassette housing control assembly. (Be careful not to break the leads.)
3. Remove the two cassette housing installation screws.
4. Move the cassette housing control assembly (Fig. 1-1) in the direction of arrow ⇒ Ⓑ, and pull it out straight upward.

- **Assembly**

1. Connect the connector at the right side of the cassette housing control assembly.
2. Insert the tabs of the cassette housing control assembly into mechanical chassis, move it in the direction of arrow ⇒ Ⓐ, and secure temporarily. Check to be sure that the cassette housing control assembly is in the correct position, and then tighten the two screws (XHPS330P06WS0).
3. Correctly place the lead wiring of the connector at the right side of the cassette housing control assembly.

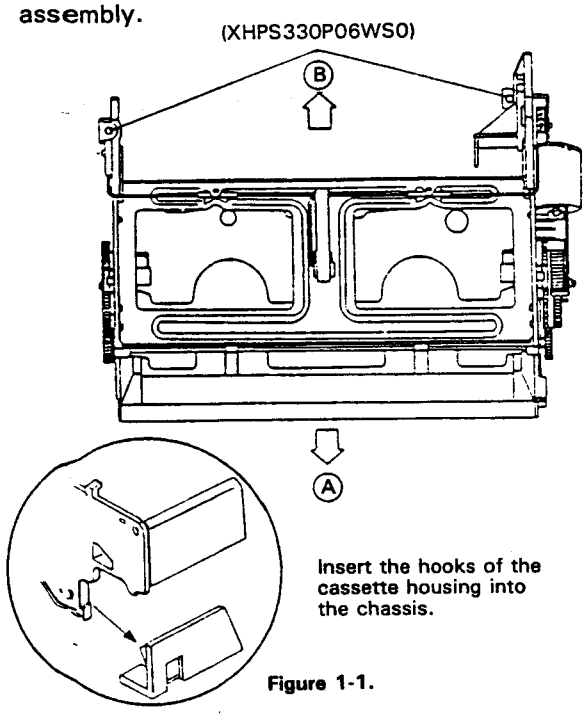


Figure 1-1.

DISASSEMBLY AND REASSEMBLY OF WORM WHEEL ASSEMBLY

- **Disassembly (Fig. 1-2)**

1. Remove the lead connector ① from the cassette relay PWB.
2. Loosen the two tabs Ⓐ at the cassette relay PWB and remove the cassette relay PWB from the frame.
3. Remove the screw ② from the cassette motor bracket and detach the cassette motor assembly together with the cassette relay PWB from the cassette housing frame.
4. Withdraw the worm wheel assembly ③.

- **Reassembly (Fig. 1-2)**

1. Move the cassette slider assembly towards the cassette lid.
2. Turn the phase gear ⑤ clockwise until it stops.
3. After setting up the worm wheel assembly, fit the alignment mark Ⓒ of the worm wheel assembly to the alignment mark Ⓑ of the phase gear. Then insert them into the frame shaft: this time, check that the tab Ⓓ of the cassette slider assembly is engaged with the drive arm groove.
   The worm wheel is likely to fall off the frame shaft in this step: be sure to hold the worm wheel by hand.
4. Align the tab Ⓔ of the timing lever with the worm wheel groove Ⓖ and secure the worm wheel assembly with the screw ②.
5. Align the tab Ⓕ of the timing lever with the groove Ⓗ of the cassette mode switch ⑥, and secure the cassette relay PWB with the frame's tab Ⓐ: this time, check that the two tabs ① of the cassette mode switch are surely engaged with the cassette motor bracket groove Ⓙ.
6. Insert the lead connector into the socket of the cassette relay PWB.

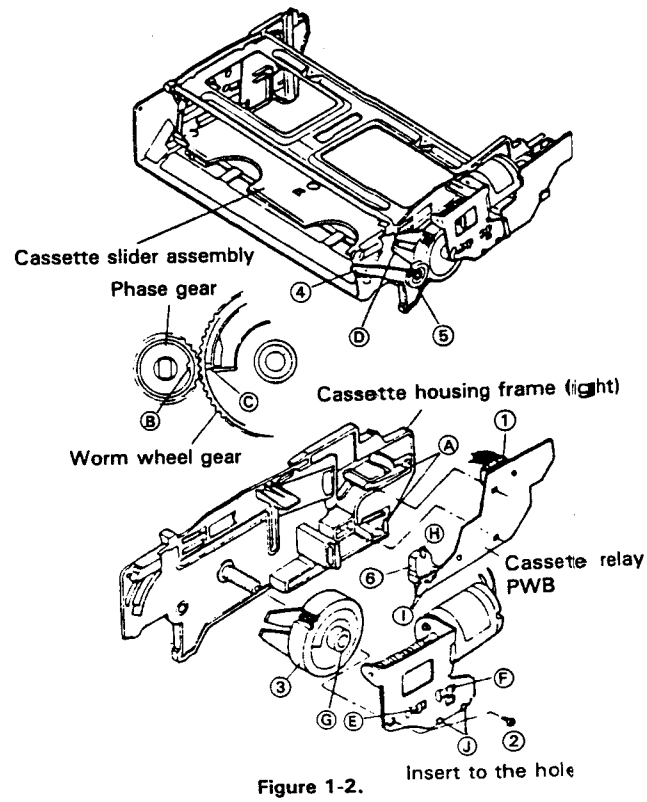


Figure 1-2.

- **Set up of worm wheel assembly (Fig. 1-3)**

1. Put the tab Ⓐ of the drive ① into the hole Ⓑ of the drive gear ②.
2. Hook both ends of the drive spring ③ onto the tab Ⓐ of the drive arm and tab Ⓒ of the drive gear respectively.
3. hook one end Ⓔ of the drive reciprocating spring ④ onto the tab Ⓓ of the drive gear assembly and mount another end Ⓕ of the drive reciprocating spring onto the tab Ⓖ of the drive gear: this time, hold the end Ⓕ of the drive reciprocating spring by hand.
4. Fit the tab worm wheel gear ⑤ onto the tag Ⓖ of the drive gear.
5. Using a tapered screwdriver, hook the end Ⓕ of the drive reciprocating spring onto the tab Ⓙ of the worm wheel gear: check that both ends of the drive reciprocating spring have been engaged with the respective tabs of the drive gear assembly.
6. holding the drive gear by hand, turn the worm wheel gear by the other hand counterclockwise. Then tab Ⓒ of the drive gear will be engaged with the hole ⓘ of the worm wheel gear ⑤ .
   (The worm wheel gear doesn't tend to rotate reversely but it is likely to slip out of the shaft Ⓗ of the driver gear. To avoid this, hold both the drive gear and worm wheel gear by hand.)

REPLACEMENT OF LOCK RELEASE LEVER

- **Disassembly (Fig. 1-4)**

1. Turn the worm gear ① by hand counterclockwise until the cassette slider assembly ② reaches the bottom position.
2. Slightly extend the right and left frames ③ to allow the tabs Ⓐ of the cassette slider assembly ② to go out of the holes of the right and left frames.
3. Pushing the tabs Ⓑ of the slider holder (right) ④ , pull the slider holder (right) out of the cassette slider ⑤.
4. Remove the lock release lever ⑥ from the slider holder (right).

- **Reassembly (Fig. 1-4)**

1. Put the lock release lever ⑥ to the slider holder (right) ④ : check that the tab Ⓒ of the slider holder (right) is surely engaged with the hole Ⓓ of the lock release lever.
2. Move the lock release lever so that it is positioned inside the tab of the cassette slider ⑤.
3. Extend the right and left frames and let the right and left tabs Ⓐ of the cassette slider assembly be engaged with the grooves of the right and left frames.
   For easy insertion, set the drive arm (left) ⑦ at 5 mm away from its bottom by turning the worm gear clockwise, first.
4. After the above procedures, check that the tab ⓐ of the cassette slider assembly is engaged with the portion Ⓔ of the drive arm (left) ⑦.

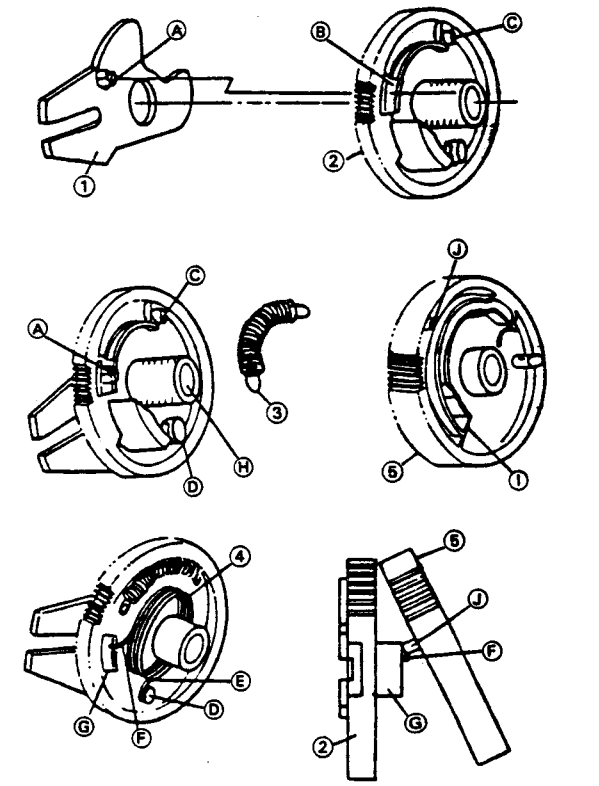


Figure 1-3.

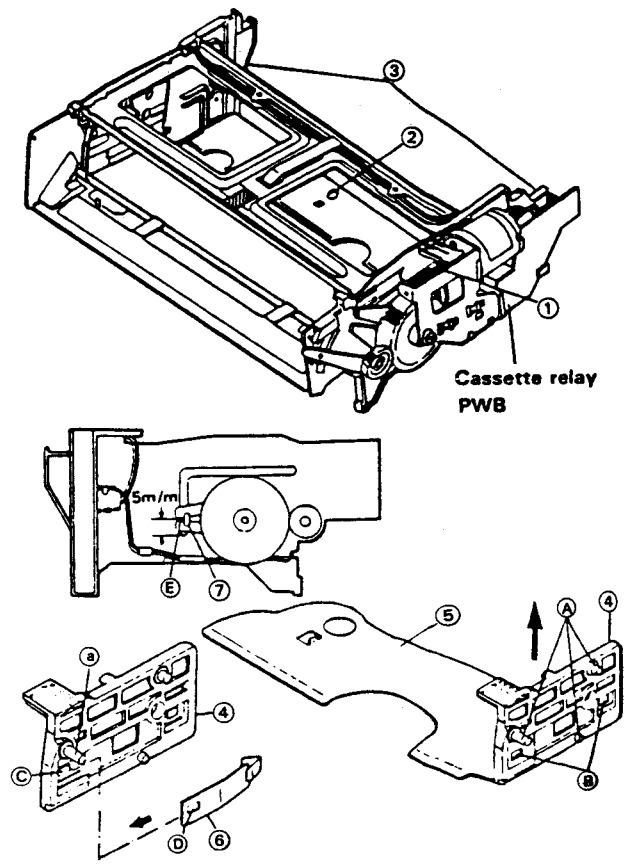


Figure 1-4.

TO RUN A TAPE WITHOUT CASSETTE HOUSING CONTROL ASSEMBLY

1. Open the lid of a cassette tape by hand and hold it open with a piece of vinyl tape.
2. Set the cassette tape in the tape mechanism. Then, stabilize the cassette tape with a weight (500 g or less).
   Note: The weight should not be more than 500 g.

REMOVAL AND HEIGHT ADJUSTMENT OF REEL DISKS

- **Removal of supply reel disk:**

1. Remove tension band ⑥ and tension arm ②.
2. Remove the split washer ①.
3. Pull the supply reel disk ③ upwards, and replace.

* At this time, remove the height adjusting washer ⑤ and clean it.

- **Removal of take-up reel disk:**

1. Remove the split washer ①.
2. Pull the take-up reel disk ④ upwards, and replace.

* At this time, remove the height adjusting washer ⑤ and clean it.

Notes:

1. After replacing either of the reel disks, be sure to perform the height adjustment procedure.
2. Take care as not to damage the tension band.
3. Be careful not to deform the auxiliary brake lever, supply brake lever, take-up brake lever and universal brake lever. (See page 3; item 14, 21, 22 and 71.)
4. Check the tension pole position. (See pages 11 and 12.)

- **Replacement of supply reel disk:**

1. Clean the reel disk shaft, and set the height adjusting washer ⑤.
2. Place the new supply reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.
4. Take the new supply reel disk off, apply oil (high quality spindle oil) to the reel disk shaft and again place the disk onto the shaft.
5. Replace the split washer ①.
6. Replace the tension arm ② and tension band ⑥.

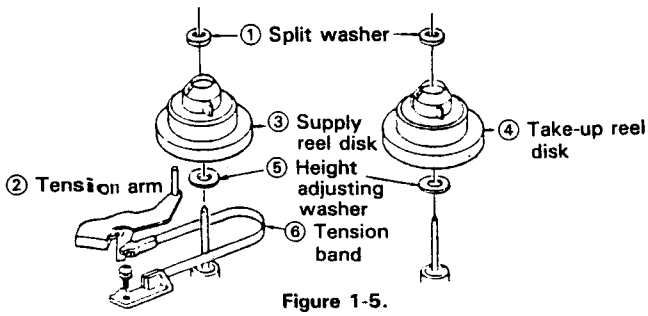


Figure 1-5.

- **Replacement of take-up reel disk:**

1. Clean the disk shaft, and set the height adjusting washer ⑤.
2. Place the new take-up reel disk onto the shaft.
3. Adjust the reel disk height by using the master plane and reel disk height adjusting jig.
4. Take the new reel disk off, apply oil (high quality spindle oil) to the reel disk shaft and again place the disk onto the shaft.
5. Replace the split washer ①.

Notes:

1. Take care not to damage the reel disk shaft's surface with the tools.
2. After replacement, check back the tension in the video search (VS) mode (see page 11) and checking of brake torque. (See page 13.).

HEIGHT ADJUSTMENT

1. Remove the cassette housing, and place the master plane onto the mechanical unit as shown in Fig. 1-6. (a), taking care not to hit the drum.
2. Insure that the reel disk is lower than part Ⓐ but higher than the part Ⓑ of Fig. 1-6. (b), by using the reel disk height adjusting jig. If the height is not correct use the height adjusting washers. Backlash on the shaft should be 0.1 to 0.8 mm.
   Note: Whenever replacing the reel disk, perform the height adjustment.

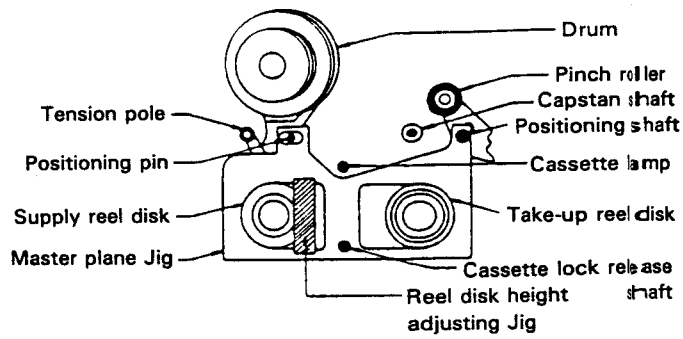


Figure 1-6. (a) top view

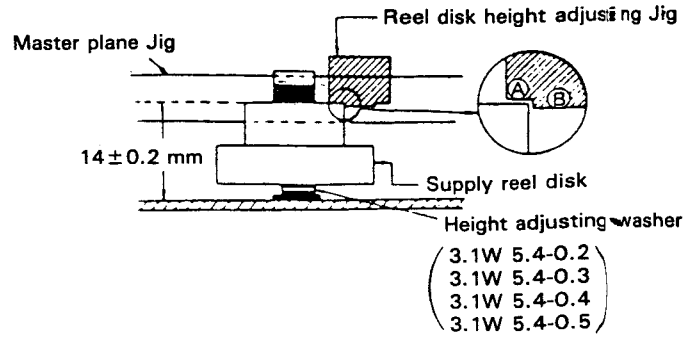


Figure 1-6. (b) side view

ADJUSTMENT OF FAST FORWARD TORQUE

Notes:
1. The torque gauge is liable to slip off the reel disk when rotation starts.
2. Perform this check without the use of a cassette tape.

- **Checking (See Fig. 1-7)**

1. Remove the cassette housing.
2. Set the torque gauge on the take-up reel disk and push the fast forward button.
3. Turn the torque gauge very slowly by hand (one rotation every 2 to 3 seconds) and check that it indicates a little more than 600 g.cm. Check that there is no slippage between the reel idler and relay idler or take-up reel disk.

- **Adjustment**

If the fast forward torque is less than 600 g.cm, use isopropyl alcohol to clean the relay idler, reel idler and take-up reel disk, then recheck the torque. If the fast forward torque is still less than 600 g.cm, replace the reel belt.

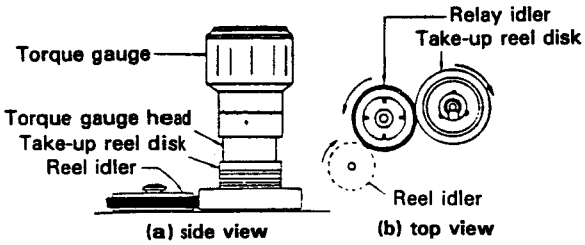


Figure 1-7.

ADJUSTMENT OF REWIND TORQUE

Notes:
1. The torque gauge is liable to slip off the reel disk when rotation starts.
2. Do not check the reel disks, and avoid making this measurement for an extended period.

- **Checking (See Fig. 1-8)**

1. Remove the cassette housing.
2. Set the torque gauge on the supply reel disk and push the rewind button.
3. Turn the torque gauge very slowly by hand (one rotation every 2 to 3 seconds) until it indicates a little more than 600 g.cm. Check that there is no slippage between the reel idler and relay idler or supply reel disk.

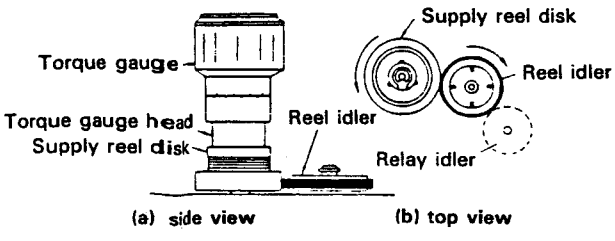


Figure 1-8.

- **Adjustment**

If the rewind torque is less than 600 g.cm, use isopropyl alcohol to clean the relay idler, reel idler and supply reel disk, then recheck the torque. If the rewind torque is still less than 600 g.cm, replace the reel belt.

ADJUSTMENT OF PLAYBACK TORQUE

- **Checking**

1. Remove the cassette housing.
2. Place a torque cassette in the mechanism and set the mechanism to the record mode. Check that the torque is within the specified ranges.
   Torque in mode: 110 ± 40 g.cm

Note:
The measured torque fluctuates due to the rotational deviation of the reel drive unit. Use the center of the fluctuating range as the measured value.

3. If the torque is outside the specified range, clean the reel idler, take-up reel disk, and relay idler with isopropyl alcohol. Then recheck the torque.
4. Check that the torque in the record mode is within the specified ranges.
5. If the playback torque is still outside the specified range, replace the reel drive unit.

CHECKING THE FAST FORWARD BACK TENSION

Note:
Set the torque gauge securely on the supply reel disk; if the torque gauge is loose above the reel disk an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing.
2. Push the fast forward button to place the unit in the fast forward mode.
3. Place the torque gauge on the supply reel disk, turn it clockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 37 ± 5 g.cm.

CHECKING THE REWIND BACK TENSION

Note:
Set the torque gauge securely on the reel disk: if the torque gauge is loose above the reel disk an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing.
2. Push the rewind button to place the unit in the rewind mode.
3. Place the torque gauge on the take-up reel disk, and turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is within 20 ± 5 g.cm.

CHECKING THE VIDEO SEARCH BACK TENSION

Note:
Set the torque gauge securely on the take-up reel disk; if the torque gauge is loose above the reel disk an inaccurate measurement will result.

- **Checking**

1. Remove the cassette housing.
2. Push the play button to place the unit in the playback mode.
3. Push the video search forward button to place the unit in the video search rewind mode.
4. Place the torque gauge on the take-up reel disk, turn it counterclockwise very slowly (one rotation every 2 to 3 seconds) and check that the torque is between 40 ± 8 g.cm.

CHECKING THE PINCH ROLLER PRESSURE

1. Remove the cassette housing.
2. Push the play button to place the unit in the playback mode.
3. Hook the tension gauge adaptor around the pinch roller shaft.
4. Using a tension gauge, pull the pinch roller in the direction of arrow → Ⓐ so that the pinch roller moves away from the capstan shaft.
5. Gradually release the pressure in the direction of arrow → Ⓑ to allow the pinch roller to touch the capstan shaft. When the pinch roller just touches the capstan shaft, read the indication on the gauge.
6. Check that the reading of the tension gauge is in the range of 1000 to 1200 g.cm.

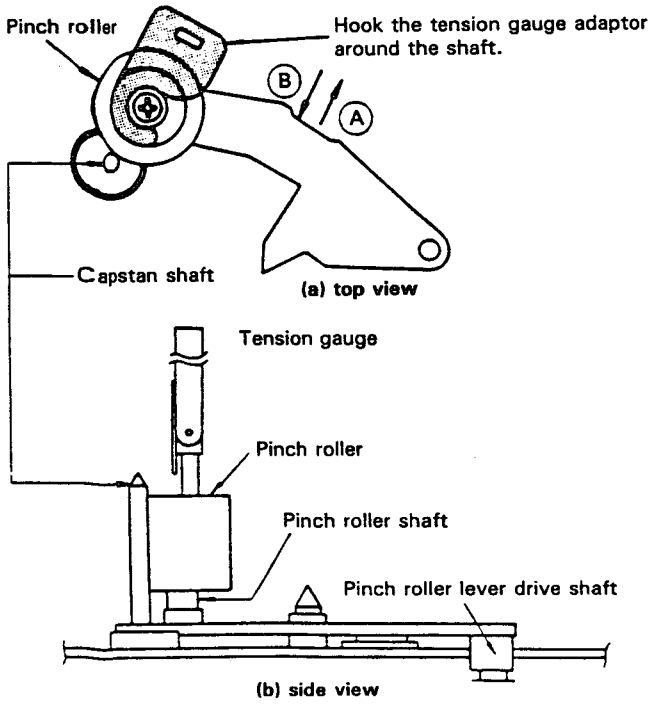
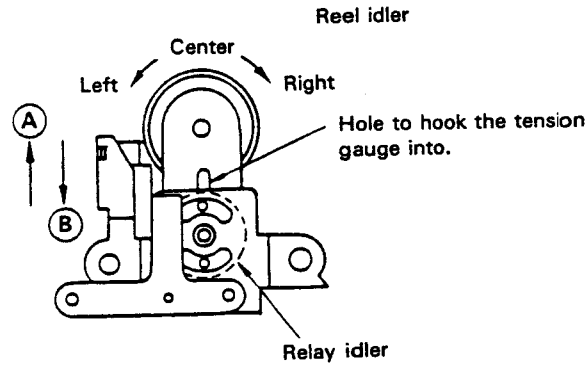


Figure 1-9.

CHECKING THE REEL IDLER PRESSURE

1. Remove the cassette housing.
2. Place the reel idler in its center position as shown in Fig. 1-10.
3. Using a tension gauge, push the reel idler in the direction of arrow → Ⓐ, so that the reel idler moves away from the relay idler.
4. Release the pressure gradually in the direction of arrow → Ⓑ, so that the reel idler touches the relay idler again. Check that the reading of the tension gauge is within 105 to 145 g.cm.



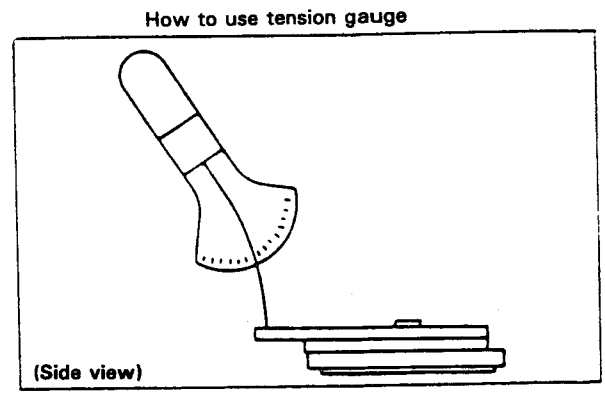


Figure 1-10.

ADJUSTMENT OF TENSION POLE

- **Position checking (Fig. 1-11)**

1. Remove the cassette housing.
2. Load a video cassette tape and push the record button to place the unit in the recording mode.
3. The pole bases A and B (see page 3; item 51 and 53.) operate to bring the tape outside the cassette housing and simultaneously the tension pole moves to the left, loading the tape. At that time (loading mode), check the position of the tension pole.
4. At the end of the tape (E-180), check that the tension pole's center is 0.6 to 1.0 mm to the right of the supply impedance roller's center.
5. Check that the tape is neither curled against the flange of the supply impedance roller nor mounted over it.
6. During the video search REW mode, check that the supply reel disk is free of the tension band.

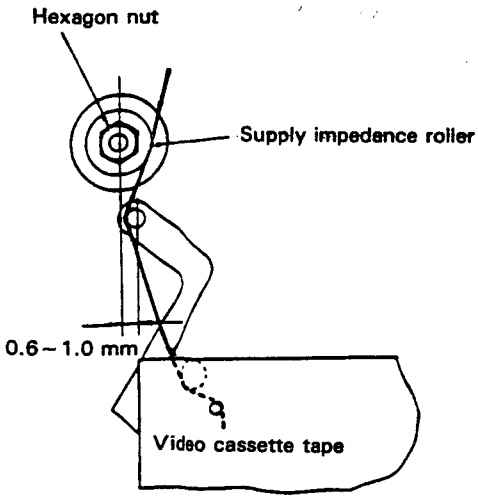


Figure 1-11.

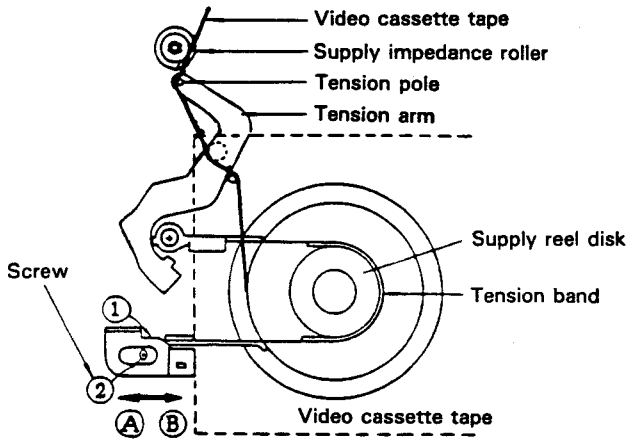


Figure 1-12.

- **Position adjustment (Fig. 1-12)**

1. If the tension pole is more than 1.0 mm to the right of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow → Ⓑ, and tighten the screw ②.
2. If the tension pole is less than 0.6 mm to the right of the supply impedance roller's center, shift the tension band control bracket ① in the direction of arrow → Ⓐ, and tighten the screw ②.

Notes:

1. After the adjustment, apply glyptal on the screw.
2. If the screw is tightened beyond its limit (5 kg.cm), its effect becomes nil (be careful not to overtighten.) Use the specified torque driver (JiGTD1200).

ADJUSTMENT OF RECORD/PLAYBACK BACK TENSION

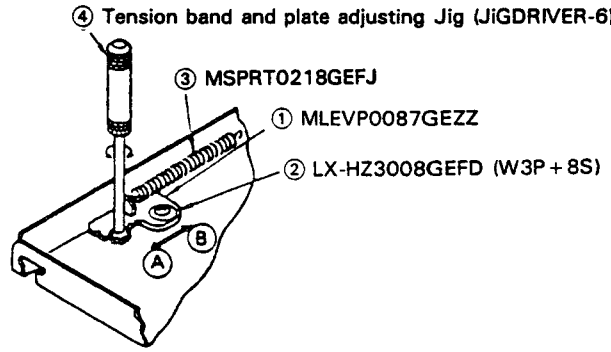
When using a torque meter cassettte

- **Checking**

1. Remove the cassette housing.
2. Put a back tension torque meter cassette tape into the unit.
3. Push the record button to place the unit in the recording mode. Check that the reading of the cassette tape's pointer is 50 to 58 g.cm.
4. Make sure the video cassette tape is wound over the retaining guide.
5. Make sure that the tape is not slack nor damaged at either end.

- **Adjustment**

1. If the tape tension is less than the specified value move the tension adjust plate by tension band and plate adjusting jig ④ in the direction of arrow → Ⓐ in Fig. 1-13, and tighten the screw ②.
2. If the tape tension exceeds the specified value move the tension adjust plate by tension band and plate adjusting jig ④ in the direction of arrow → Ⓑ in Fig. 1-13, and tighten the screw ②.



{ Toward Ⓐ if lower than specified value
{ Toward Ⓑ if higher than specified value

Figure 1-13.

Note:

Be careful not to tighten the screw too much, because this will damage the screw threads of the chassis. Be sure to use the specified Jig (JiGDRIVER-6).

CHECKING THE BRAKE TORQUE

A) Checking the brake torque at the supply side.

- **Checking**

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.
3. Separate the reel idler from the supply reel disk and place the torque gauge on the supply reel disk.
4. Slowly rotate the torque gauge in the clockwise (CW) direction so that the reel disk and the gauge needle rotate at the same speed. Repeat for the counterclockwise (CCW) direction of the supply brake. Check that the values are within the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm) and that the brake torque in the CW direction is at least twice as high as the brake torque in the CCW direction at the take-up reel disk.

- **Adjustment**

1. If the supply brake torque is outside the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm), clean the supply reel disk, and then recheck.
2. If the supply brake torque is still outside the specified range, replace the main brake spring, and then recheck.

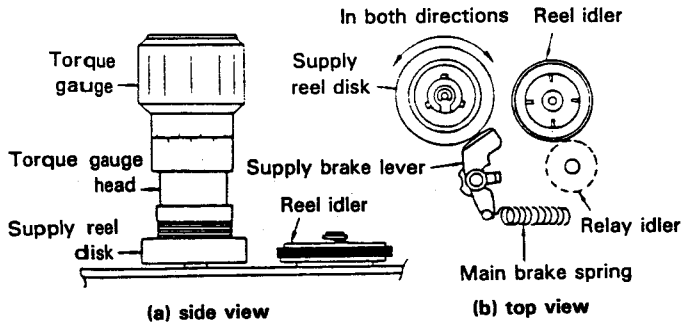


Figure 1-14.

B) Checking the brake torque at the take-up side.

- **Checking**

1. Remove the cassette housing assembly.
2. Check that the mechanism is in the stop mode.
3. Separate the reel idler from the take-up reel disk and place the torque gauge on the take-up reel disk.
4. Slowly rotate the torque gauge in the CW direction so that the reel disk and the gauge needle rotate at the same speed. Repeat for the CCW direction of the take-up brake. Check that the values are within the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm) and that the brake torque in the CW direction is at least twice as high as the brake torque in the CCW direction at the supply reel disk.

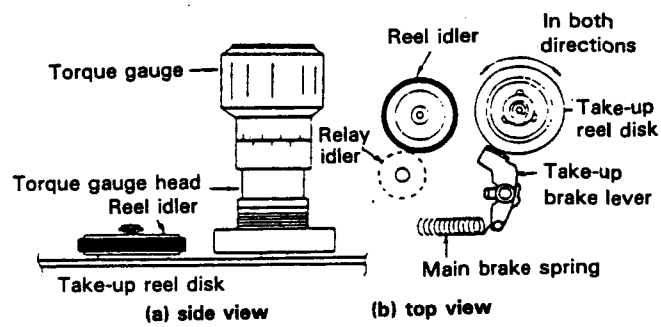


Figure 1-15.

- **Adjustment**

1. If the take-up brake torque is outside the specified ranges (CW direction = 280 to 720 g.cm, CCW direction = 110 to 230 g.cm), clean the take-up reel disk, and then recheck.
2. If the take-up brake torque is still outside the specified range, replace the main brake spring, and then recheck.

REPLACEMENT OF A/C (Audio Control) HEAD

Note:

After replacement, check for smooth tape movement. Under all circumstances avoid touching the head (indicated by "→" in Fig. 1-17(c)).

- **Replacement (See Figs. 1-16 and 1-17)**

1. Unsolder the leads attached to the A/C head PWB and remove them from the PWB.
2. Loosen the tilt adjusting screw ② by using a phillips screwdriver.
3. Remove the azimuth adjusting screw ⑤ (3P+ 8S) with a phillips screwdriver.
4. Remove the A/C head screw ④ with a phillips screwdriver, paying attention to the spring ⑦ between the A/C head screw ④ and A/C head assembly ①.
5. Remove the connector soldered to the A/C head PWB, and solder the connector onto the new A/C head PWB.
6. The A/C head assembly ① is attached so that the A/C head arm and A/C head plate stand arerough-ly parallel to one another.
7. Set the A/C head tilt according to Fig. 1-19.
8. Play an alignment tape and roughly adjust the height of the A/C head, by eye, by turning the A/C head adjusting hexagon nut with the special nut driver until the tape comes to the positionshown below. (See Fig. 1-16).

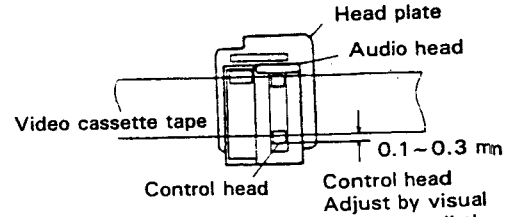
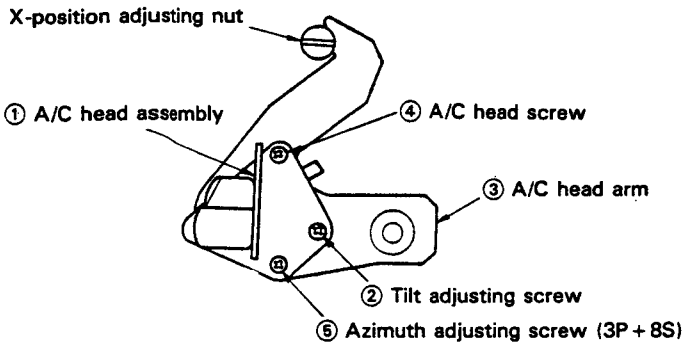
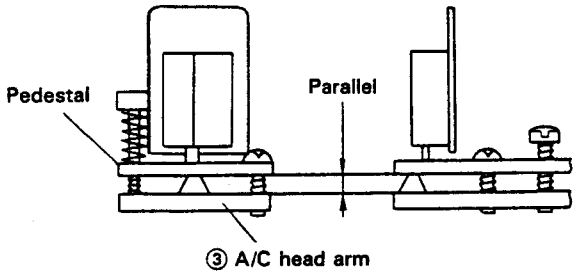


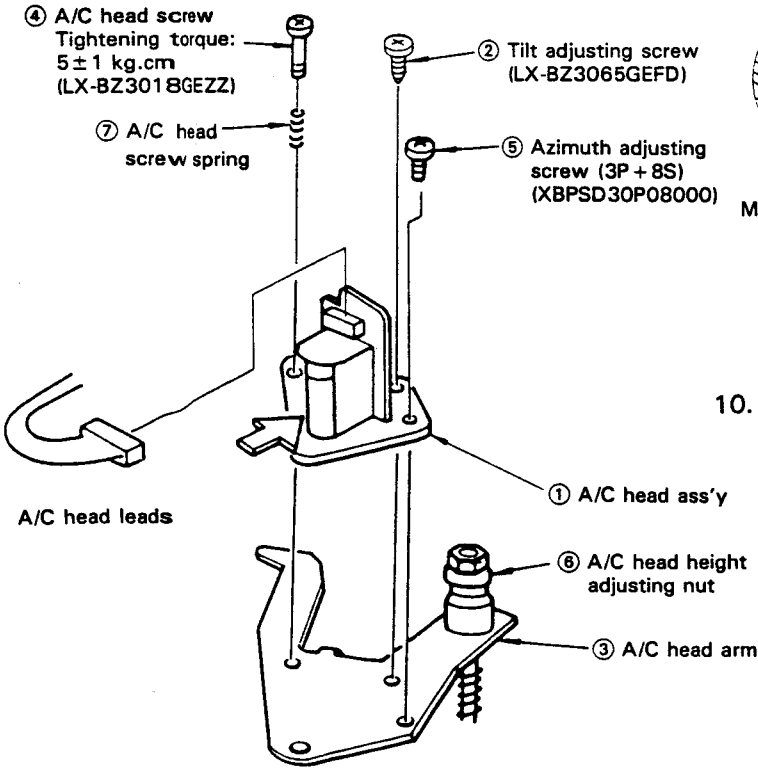
Figure 1-16.



(a)



(b)



(c)

Figure 1-17.

9. Set the mechanism to the unloading mode. Place the A/C head tilt adjusting jig on the main chassis as shown in Figs. 1-18 and 1-19. Slowly turn the set screw with a hex wrench (1.5 mm JiGHW0015) until there is no gap between the jig and the A/C head.

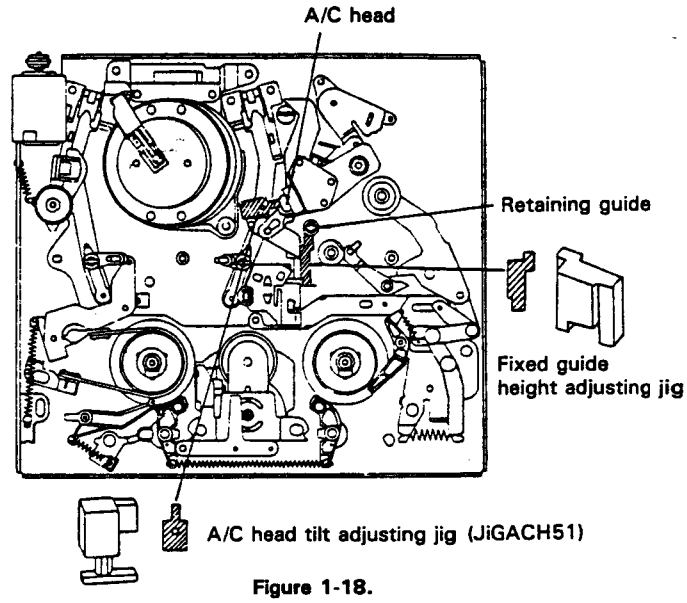


Figure 1-18.

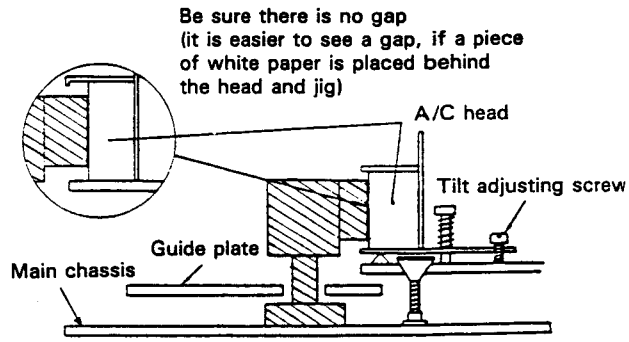


Figure 1-19.

10. When A/C head replacement has been completed, adjust the tape drive train.

ADJUSTMENT OF TAPE TRAVEL

1. Check and adjust the positionof the tension pole. And check and adjust back tention.
2. Set the tilt angle of the audio/control head as shown in Fig. 1-19.
   Note:
   If the audio/control head is adjusted, check and set the tilt angle as in the case of replacement.
3. After completing setting, execute preliminary adjustment of tape travel.
   a. Connect an oscilloscope to TP2203 (playback chrominance) and TP2201 (ground). Allow the playback chrominance signal to be triggered by the head switching pulse of TP2202.
   b. Loosen the setscrew of the guide roller, and tighten it loosely by using a guide roller adjusting screwdriver (JiGDRIVERH-4) to such an extent so that the guide roller turns smoothly.
   c. Set an alignment tape (VRōCPSV) on the reel disk.
      Note:
      When setting the cassette tape on the reel disk without cassette housing, fix the cassette tape with weight of 400 to 650g.
   d. Set playback mode.
   e. Observe the playback chrominance envelope waveform and check flatness of the playback chrominance envelope, turning the tracking control clockwise and counterclockwise.
      If the playback chrominance output changes almost flat when the tracking control is turned clockwise and counterclockwise, it is good. If the flatness is poor, adjust the guide roller so that the playback chrominance output becomes nearly flat.
      Adjust the X-posibion adjusting nut so that the playback chrominance envelope becomes almost maximum in the tracking center. In the case of rough adjustment, pay particular attention to the outlet side (See Fig. 1-21)

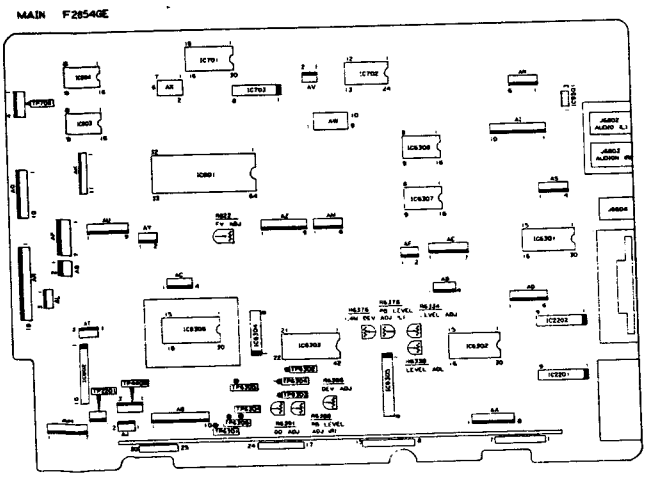


Figure 1-20.

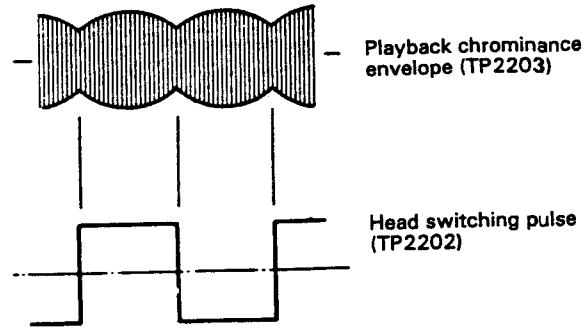


Figure 1-21.

4. When rough adjustment of the tape travel is finished, adjust the audio/control head's height and azimuth.
   a. Play an alignment of the tape, audio 6 kHz (picture is monoscope), and observe the audio output on an oscilloscope from the audio output terminal.
   b. Adjust the azimuth adjusting screw ⑤ (3P + 8S) to obtain the maximum audio output level.
   c. Slowly rotate the audio/control head's height adjusting hexagon nut ③ by the specified box driver (JiGDRIVER 110-7) to obtain the maximum audio output level.
   d. After the height adjustment, play the alignment tape, audio 6 kHz monoscope, and perform adjustment stated in 4-b. above. After adjustment, apply screwlock to the setscrews and nuts to fix.
5. After the audio/control head adjustment, proceed to final tape travel adjustment and X-position adjustment.
   a. Connect as stated in 3-a.
   b. Play an alignment tape (VRōCPSV).
   c. Observing the envelope on the oscilloscope, finely adjust the guide roller height. Rotate the tracking control clockwise and counterclockwise to adjust the guide roller so as to attain the best flatness of envelope. If the video tape deviates up or down the helical lead, the playback chrominance envelope waveform is as shown in Fig. 1-22. Attain the best flatness of envelope, following the procedure shown in Fig. 1-22.

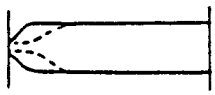
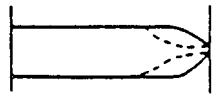
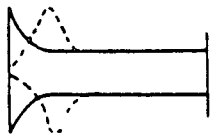
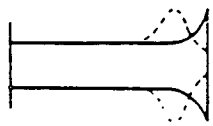
	Tape too high		Tape too low	
	Supply side	Take-up side	Supply side	Take-up side
				
				
Adjustment	Supply side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope	Take-up side guide roller rotated in clockwise direction (lowers guide roller) to flatten envelope	Supply side guide roller rotated in counterclockwise direction (raises guide roller) to give the tape some play. The supply side guide roller is then rotated in the clockwise direction to flatten the envelope.	Take-up side guide roller rotated in counterclockwise direction (raises guide roller) to give the tape some play. The take-up side guide roller is then rotated in the clockwise direction to flatten the envelope

Figure 1-22.

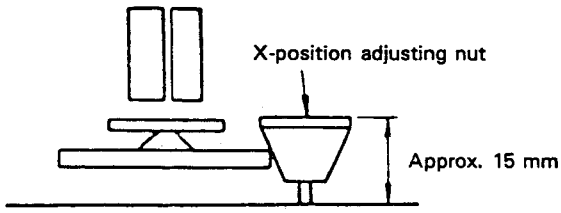


Figure 1-23

REPLACEMENT OF UPPER DRUM

Note:
The engagement between the lower drum (outer diameter) and the upper drum (inner diameter) is very accurate, in the order of microns, and care should be paid to their replacement. Even a slight entry of foreign material will affect the accuracy of their reassembly.

- **Replacement (See Fig. 1-24)**

1. Unsolder the leads ① to ④ from the video head and remove them.
2. Remove the two screws ⑤ (brass screws with washers (W3P+9S)) using a phillips screwdriver.
3. Withdraw the upper drum by pulling it up with the upper drum replacement jig. (Refer to Fig. 1-24).

Notes:
1. Avoid touching the drum surface with bare hands.
2. Do not hit the screws when tightening them.

- **Reassembly**

1. Set the new drum for replacement, as shown in Fig. 1-24, and position the leads properly.

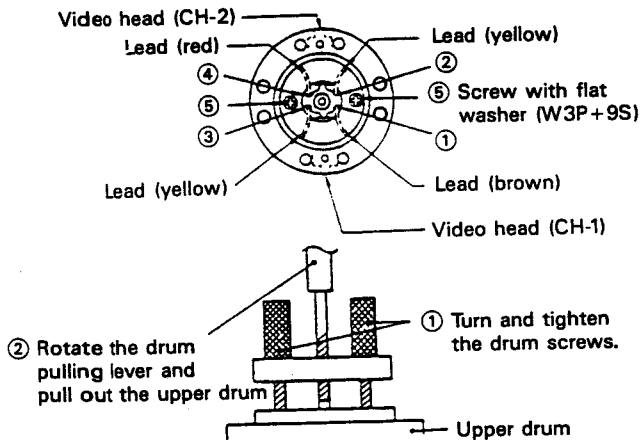


Figure 1-24.

Notes:
1. Before replacing the upper drum, check that there are no scratches or dust on the edge or the outer surface of the lower drum.
2. Before replacing the upper drum, check that there are no scratches or dust on the edge or the inner surface of the upper drum.
3. On assembling these parts, slowly insert the upper drum onto the lower drum with the utmost care, so that the upper drum is not tilted.
4. When assembling these parts, do not allow foreign material to come between them.
5. Do not use excessive force when driving in the screws.

2. Fasten the upper drum in place with the two screws ⑤.
3. Solder the leads from the video head ① to ④ to their respective pads.

Note:
Soldering should be performed quickly and carefully without touching adjacent patterns.

4. After replacement, be sure to check the tape drive train adjustment and the following.
   - Adjustment of the playback switching point (See page 22)
   - Checking and adjustment of the X-position (See page 15)
   - Adjustment of the slow tracking preset (in both the SP and LP modes)

REPLACEMENT OF THE MECHANISM CONTROL ASSEMBLY

- **Removal (Fig. 1-25)**

1. Unsolder the cam switch terminal.
2. Remove the E-ring ①.
3. Remove the three screws ② (LX-HZ3027GEFD).
4. Remove the mechanism control assembly ③.

- **Installation (Fig. 1-25.)**

1. Remove the cut poly-slider washer ④.
2. Remove the relay gear (B) ⑤.
3. Adjust the position of the shifter assembly (A) 11 so that the alignment hole Ⓐ of the chassis is aligned with the alignment holes of the shifter assembly and brake drive lever 13. (Remove the main brake spring 14 for easier positioning.)
4. Remove the tension arm spring, and fully turn loading gears (A) ⑧ and (B) ⑩ in the direction indicated by the arrow Ⓑ, to get the mechanism in the unloading mode.
5. Turn the brake cam ⑥ of the mechanism control assembly in the direction indicated by the arrow until the alignment hole Ⓖ of the segment gear is at the center of the segment alignment hole for the auxiliary angle.
6. Attach the mechanism control assembly ③ to the main chassis. This can be done easily if the shifter assembly (A) 11 is moved to the left and right. Secure the three screws ②.
7. Put the E-ring ① on.
8. Solder the cam switch terminal.
9. Install the relay gear (B) ⑤.
10. Install the washer ④.
11. Attach any removed springs such as the main brake spring 32. (See page 3)

Notes:
1. Do not exceed the specified torque when tightening the screw or the threads in the boss may become damaged.
2. After replacement, check the position of the parts, and confirm that the unit operates in all modes.

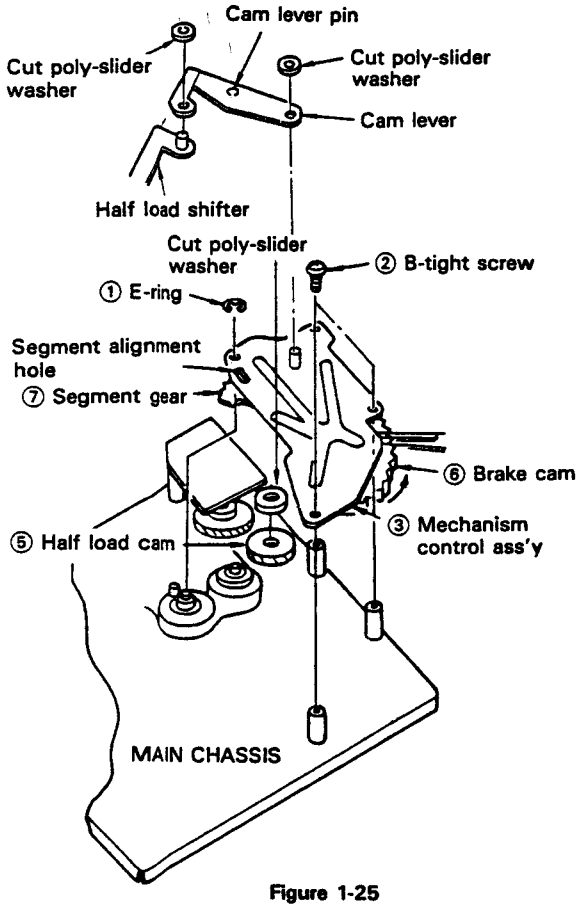


Figure 1-25

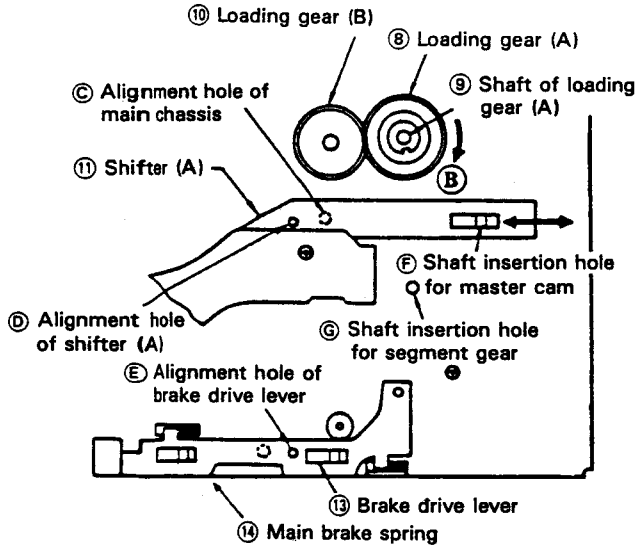


Figure 1-26

REPLACEMENT OF THE CAM SWITCH

- **Removal (Fig. 1-27.)**

1. Remove the cut poly-slider washer ① and tension release lever ⑧.
2. Detach the brake cam ②, segment gear ⑦ and master cam ⑤ from the mechanism bracket ③.
3. Remove the cam switch ④ while keeping its clips in the arrow directions. (See Fig. 1-27 (B).)

- **Installation**

1. Put the cam switch ④ to the brake cam ②.
2. Install the assembly of the cam switch ④, brake cam ② and tension release lever ⑧ to the mechanism control bracket ③.

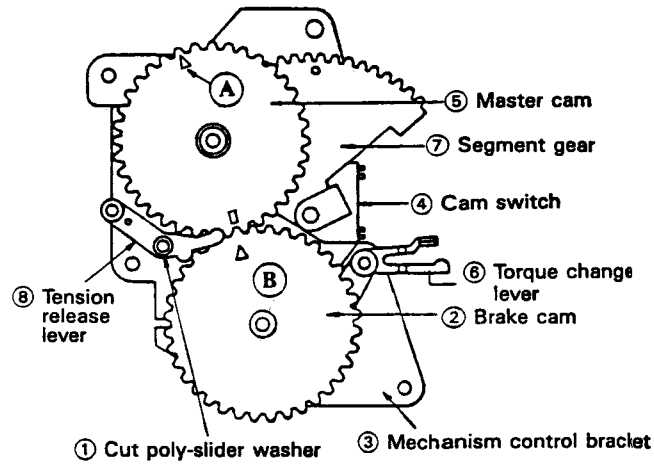
Note:

When attaching to the mechanism control unit, make sure that the alignment mark Ⓐ of the master cam is aligned with alignment mark Ⓑof the brake cam, and line up the torque change lever with the groove on the brake cam.

3. Put the cut poly-slider washer ① on.

Notes:

1. After assembly, rotate the brake cam anc check that the torque change lever goes into the groove on the cam.
2. When replacing the master cam and brake cam, be sure to apply a light coating of grease to the cam groove.



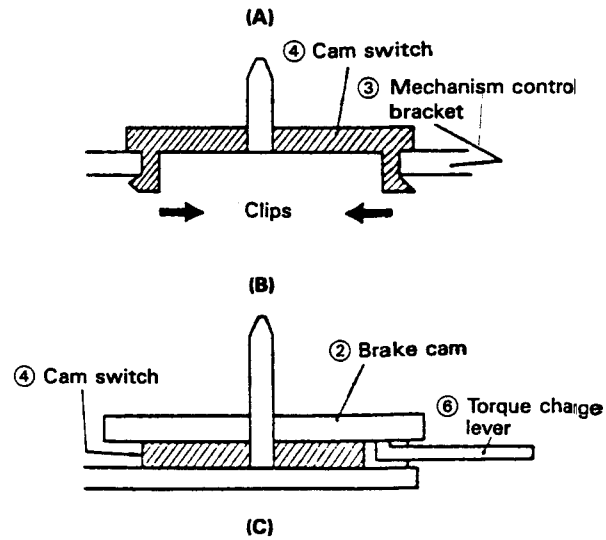


Figure 1-27.

REPLACEMENT OF THE CAPSTAN D.D. (DIRECT DRIVE) MOTOR

- **Removal**

1. Remove the lead wire connector ① (flat type) from the capstan D.D. control PWB ⑥. When removing the connector, push down on the board in order to prevent the board from breaking.
2. Remove the screw ④ which holds the capstan D.D. motor heat sink sink panel onto the main chassis.
3. Remove the three screws ② 2.6P+5.55 (S-cup) (LX-HZ3036GEFD), and remove the capstan D.D. motor 5 from the main chassis.

- **Installation**

1. Mount the capstan motor on the main chassis while making sure that the capstan shaft does not come into contact, and attach it with the three screws ②.
2. Attach the capstan D.D. motor heat sink panel on the main chassis with the cup-tight screw ④.
3. Insert the lead wire connector ① (flat type) into the capstan D.D. motor control PWB ⑥.

Notes:

1. After installing the capstan D.D. motor, be sure to rotate the capstan motor and check the movement.
2. Check and adjust the servo circuit.

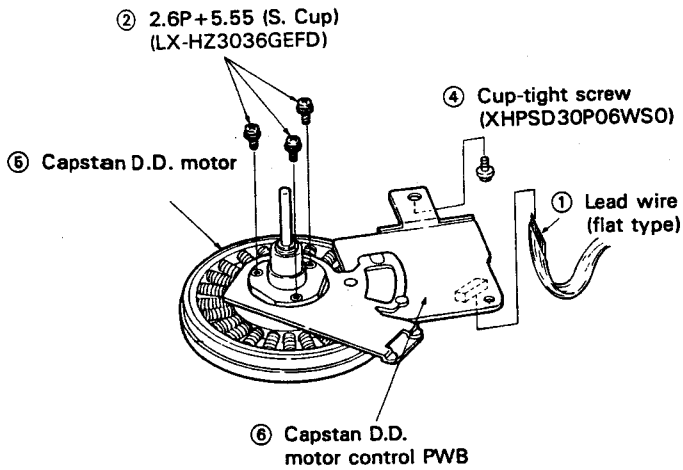


Figure 1-28.

CHECKING THE UNIVERSAL BRAKE LEVER

- **Checking**

1. Remove the cassette housing.
2. Push the playback button to set the unit to the playback mode.
3. Remove the reel idler from the take-up reel disk, and set the torque gauge (JIGTG0090).
4. Slowly rotate the torque gauge so that the reel disk and torque gauge pointer turn with the equal speed, and check that the set value is as specified (within 40 ± 10 g.cm).

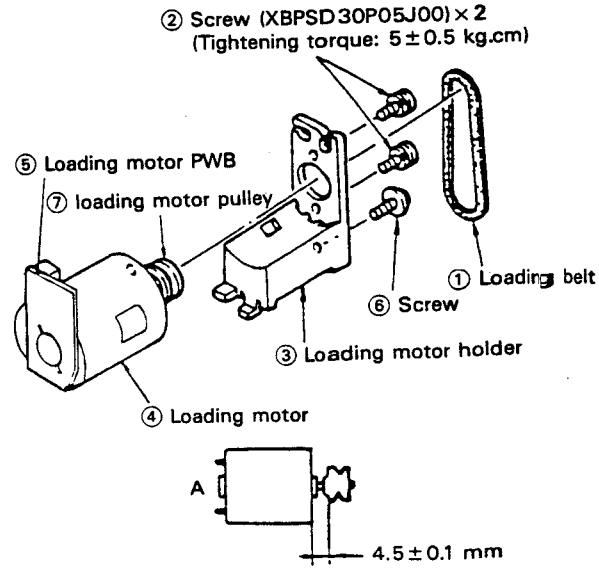
REPLACEMENT OF THE LOADING MOTOR

- **Replacement (Fig. 1-29.)**

1. Remove the four screws (XEBSD40P16000) securing the mechanism chassis to the plastic frame.
2. Disconnect the drum D.D. (direct drive) motor lead connector and the loading motor relay lead NF connector.
3. Remove the loading belt ①.
4. Remove the cup-tight screw ⑥ (XHPSD-30P08WS0). Tilt the mechanism chassis for easy removal.
5. Remove the two screws ② (XBPSD30P05J00) and remove the loading motor ④ from the loading motor holder ③.
6. Remove the loading motor PWB ⑤.
7. Replace the loading motor along with the pulley ⑦.

Notes:

1. Check that the space between the motor and the loading motor pulley is 4.5±0.1 mm.
2. After installing the loading motor, be sure to rotate the loading motor and check for smooth movement.



Hold A (in figure above) and press with a force not exceeding 5 kg.

Figure 1-29.

REPLACEMENT OF D.D. (DIRECT DRIVE) MOTOR

- **Removal (Fig. 1-30.)**

1. Remove the two screws ① (SW3P+5S) which hold the D.D. rotor assembly in place, using a phillips screwdriver.
2. Remove the D.D. rotor assembly by pulling it straight out.
3. Remove the three brass screws ② (2.6P+14S) which hold the D.D. stator assembly in place, using a phillips screwdriver.
4. Remove the D.D. stator assembly by pulling it straight out.

- **Assembly**

1. Place the D.D. stator assembly on top of the lower drum.
2. Secure the D.D. stator with the three brass screws ② (2.6P+14S) using a phillips screwdriver.

Note:

Be careful not to scratch the core, windings, or hall device.

3. Insert the D.D. rotor assembly into the drum shaft.

Note:

Insert directly into the direction of the shaft. (Refer to Fig. 1-30 for the installation direction.)

4. Secure the D.D. rotor assembly by the screws ①.
5. Secure the D.D. rotor assembly so that the installation positioning holes in the D.D. rotor assembly and lower drum match.
6. After replacement of the D.D. motor as shown above, proceed with the adjustment of the playback switching point.

Notes:

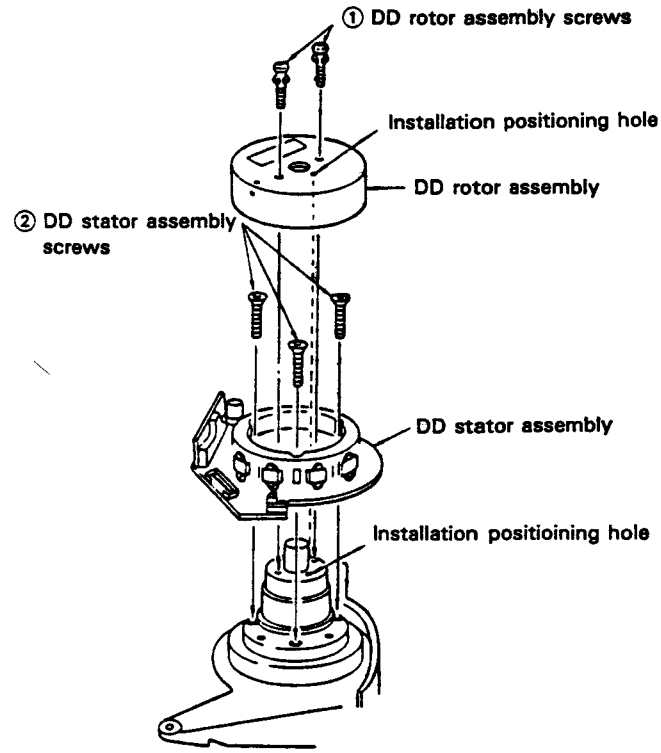
1. Be sure not to damage the upper drum or the video head.
2. Be sure that the hall device is not damaged by the D.D. rotor assembly or other parts.

REPLACEMENT OF DD BRAKE SOLENOID

1. Remove the solenoid wires from the PWB.
2. Remove the two screws ① (XHPSD30P06WS0) fastened to the DD motor base plate.
3. Remove the DD brake lever spring ② (MSPRT0239GEFJ).
4. Remove the slit washer ③ (LX-WZ1006GE00).
5. Lift the DD brake lever ④ (MLEVP0102GEZZ) in the direction A.
6. Remove the two screws ⑦ (XBPSD20P04J00) and two spacers ⑩ (PSPAX0011GEZZ) securing the solenoid ⑤ (RPLU-0077GEZZ) and the DD brake mounting plate.
7. Remove the spring ⑧ (MSPRC0116GEFJ) and slit washer ⑨ (LX-WZ1001GE00) from the iron core.
8. Replace the solenoid.

Note:

Check that there is a clearance between the iron core and the DD brake lever when the iron core and solenoid are in close contact.



Note: Secure the DD rotor assembly so that the installation positioning holes in the DD rotor assembly and lower drum match.

Figure 1-30

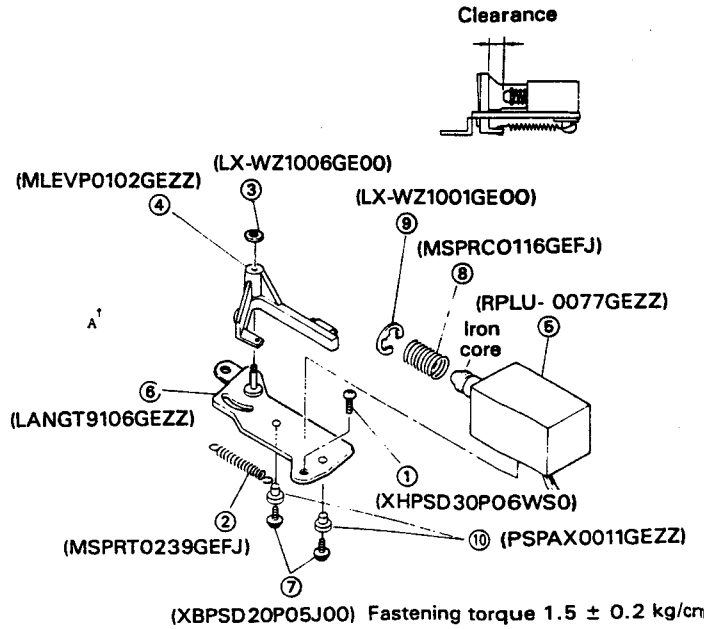


Figure 1-31

HALF LOADING POST POSITIONING

Notes:

1. The half loading post requires repositioning in the following occasions.
   1) When the A/C head has been removed or replaced.
   2) When the A/C head height, head azimuth or X-position has been readjusted.
   3) When the half loading-related parts (half load cam, cam lever, half load shifter, intermediate lever, coupling plate, half load lever and half load lever spring) have been removed or replaced.
   4) When the mechanical control unit has been removed or replaced.
2. The half loading post should be checked and repositioned, if necessary, before bringing the machine jin the playback mode, in any of the following occasions. Replacement of the A/C head (the A/C head height, head azimuth, and tilt must be finely adjusted, and the X-position adjusting nut height roughly adjusted, in this case), replacement of the half loading-related parts, and replacement of the mechanical control unit.
3. When the A/C head has been replaced, make the X-position adjustment first and then check the half loading post position. Readjust the position as required.

- **Procedure:**

1. Remove the cassette housing.
   Note: This adjustment can also be made without removing the cassette housing. But be sure to disconnect the connector off the right side of the housing.
2. Make sure the machine is in the stop mode.
3. Keep the intermediate lever screw (XBPSD-26P05JSO) tight with a tightening torque of about 1 kg-cm. Now turn the intermediate lever in the direction of arrow A, using the geared driver (JiGDRIVER-6).
4. Turn the intermediate lever in the direction of arrow B. Apply a torque driver to the half loading post, and tighten up the intermediate lever screw for proper half loading post positioning.
   Note: Use the torque driver (JiGTD1200) for this purpose. Set the tightening torque to 5 kg-cm.
5. Set the machine in the eject mode to return the half loading post back. Next set the machine in the stop mode again (to allow the half loading post to come out) to see if the clearance between the half loading post and the A/C head is as specified (0.4-0.7 mm).
6. Actually run the tape to make sure there is no problem with the FF, REW and PB modes.
   Note: When the A/C head has been replaced, roughly adjust the half loading post position (the above steps 1-5). Then adjust the A/C head's X-position and finely adjust the half loading post position (the above steps 1-6).

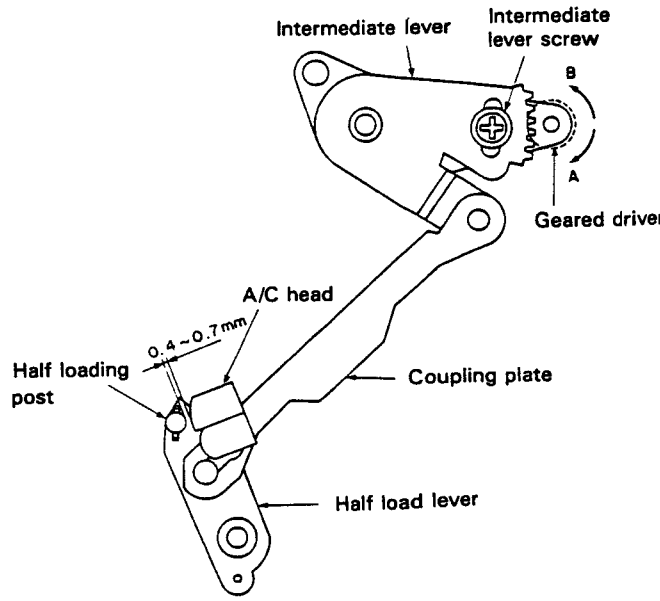


Figure 1-32.

ADJUSTMENT OF ELECTRICAL CIRCUITRY

Prior to the adjustment:
Most of the electrical adjustments are required after mechanical parts (video head included) have been replaced. Check that all the mechanical functions are normal before attempting adjustment of the electrical circuits.
Electrical adjustments require proper troubleshooting. After repair or parts replacement the following alignments may be required.

Note:
In the table below, instruments, test points and instrument readings are listed in this order.

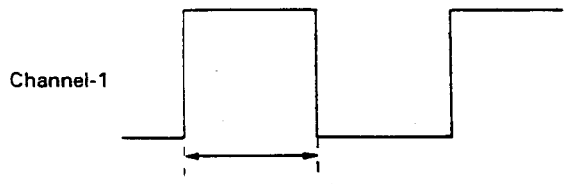
• ADJUSTMENT OF SERVO CIRCUIT

Tracking preset adjustment: R8114

Oscilloscope	CH-1: TP701	Shown in Figure 2-1

(Internal Trigger: CH-1(+) Side)

1. Insert the alignment tape (VROCPSV) into the unit.
2. Playback the tape and set the playback tracking control at the "center click" position.
3. Adjust R8114 (preset control) to provide the waveform.



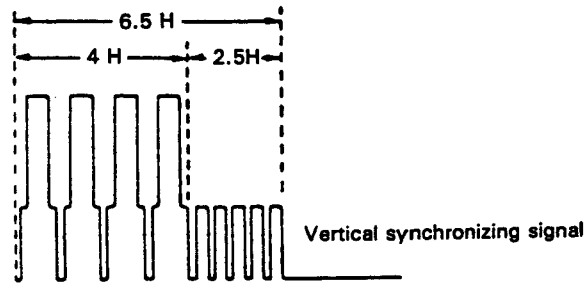
Vertical: Channel-1 2V/div
Horizontal: 5 msec/div

Figure 2-1.

Adjustment of the playback switching point: R8121

Oscilloscope	CH-1: TP703 CH-2: video output terminal	Shown in Figure 2-2

1. Insert the alignment tape (VROCPSV) into the unit.
2. Using the puls (-) trigger slope of the oscilloscope, adjust R8121 (SW POINT) to provide a waveform of 6.5 ± 0.5 H as shown in Fig. 2-2.
3. Disconnect the oscilloscope.
4. Remove the alignment tape.



(a) Switching point (R8121)

Figure 2-2.

• ADJUSTMENT OF Y/C CIRCUIT

Adjustment of EE level: R253

Note:
Connect a 75 ohm resistor between the video output and ground.

Oscilloscope	Video Output Terminal	Shown in Figure 2-3

(External Trigger: TP2201 on Main PWB.)

1. Put the unit in the record mode.
2. Apply a colour bar signal to the unit.
3. Adjust R253 (EE level control) so that the waveform.
4. Remove the 75 ohm resistor.

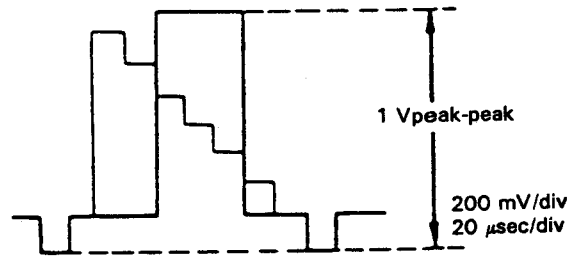


Figure 2-3.

Adjustment of playback video signal level: R209

Note:
Connect a 75 ohm resistor between the video output and ground.

Oscilloscope	Video Output Terminal	Shown in Figure 2-4

(External Trigger: TP2201)

1. Put the unit in the playback mode, an alignment tape (VROCPSV) with a colour bar waveform.
2. Adjust R209 (playback level control) so that the waveform.
3. Remove the 75 ohm resistor.

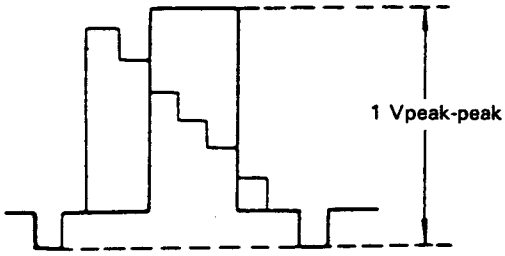


Figure 2-4.

Adjustment of FM 3.8 MHz and 4.8 MHz: R216, R222

1. Turn R229 (white clip control) counter clockwise as far as it will go and release the white clip.
2. Confirm that EE level and PB level are within the specified values.
3. Put the unit in the record mode.
4. Connect a frequency counter to ⑤ Pin of IC201 and adjust R216 (FM carrier) so that the reading becomes 3.8 MHz.
5. Apply a colour bar signal to that unit.
6. Connect the oscilloscope (external trigger: TP2201) to video output (75 Ω terminal). When the auto record and playback level is less than 1.0Vp-p, turn R222 (deviation) counterclockwise; when it is more than 1.0 Vp-p, turn R222 clockwise. Repeat this until the reading becomes 1.00 ± 0.05 Vp-p. (Refer to Fig. 2-3)
7. Unplug the standard colour bar and input a pin plug and short circuit the input. Connect a frequency counter to ⑤ Pin of IC201 and confirm that the reading is 3.8 MHz.
8. White clip controls are released at step 1, so re-adjustment must be performed.

Adjustment of white clip: R229

Oscilloscope	TP204	Shown in Figure 2-5

1. Put the unit in the record mode.
2. Apply a colour bar signal (stair-case waveform) to the unit.
3. Adjust R229 (white clip control) so that the resultant waveform.

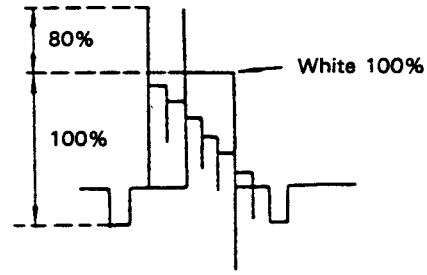


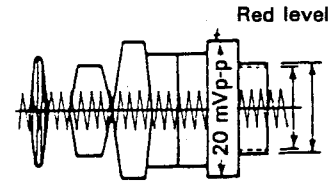
Figure 2-5.

Adjust of FM record circuit: R263, R515

Dual-trace Oscilloscope	GND: TP-32 CH-1 SIG: TP-31 (On the Head Amp PWB)	20 mVp-p (Figure 2-6) 90 mVp-p (Figure 2-7)

(External Trigger: TP2201/The GND of the external trigger should not be connected to ground.)

1. Put the unit in the record mode.(LP MODE)
2. Apply a colour bar signal to the unit.
3. Connect the GND of the dual-trace oscilloscope to TP-32, CH-1 SIG to TP-31.
4. Set R263 (Record FM level control) to "minimum" position.
5. Adjust R515 (record chroma level control) so that the red signal output is 20 mVp-p. (Fig. 2-6).
6. Adjust R263 (record FM) so that the sync tip is 90 mVp-p. (Fig. 2-7)



Level difference of both channels (R515).

Figure 2-6.

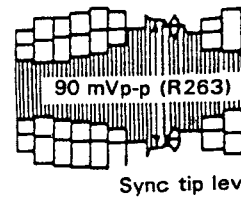


Figure 2-7.

APC Adjustment: R507

Frequency Counter	Y/C PWB Connector 12 pin	4.433619 MHz ± 10 Hz

1. Insert the alignment tape (VROCPSV) into the unit.
2. Adjust R507 so that the frequency 4.433619 MHz ± 10 Hz.

• ADJUSTMENT OF NORMAL AUDIO CIRCUIT

Adjustment of the playback output level: R609 (on Audio PWB)

VTVM	Audio Output RCA Terminals	−9 dBm ±0.5 dBm

1. Playback an alignment tape (VROCPSV) with 1 kHz signal, for level calibration.
2. Adjust R609 (playback level control) to attain an output level.

Erase Voltage/oscillator frequency checking

Oscilloscope Frequency Counter	Both Terminals of Full Erase Head	40 Vp-p 70 kHz ± 7 kHz (Figure 2-8)

1. Put the unit in the record mode.
2. Make sure the erase voltage is more than 40 Vp-p.
3. Make sure the oscilloscope frequency is 70 kHz ± 7 kHz.

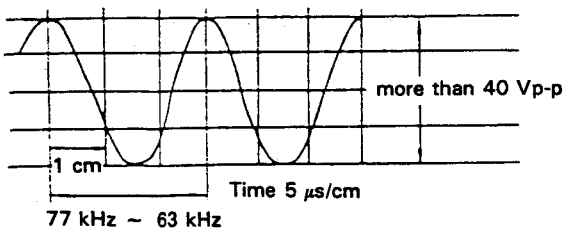


Figure 2-8.

Ajdustment of the bias current: R622

VTVM	GND: TP602 SIG: TP601	2.4 mV ± 0.1 mV (240 ± 10 μA)

1. Put the unit the record mode.
2. Adjust R622 (bias current control) so that the bias current.

Record level checking

VTVM	Audio Output Terminal	−5 dBm ± 3 dBm

1. Apply a 1 kHz, −8 dBm to the audio input RCA terminals, record it and then play it back.
2. When playing back, see that the audio output.
3. If not −5 dBm (±3 dBm), repeat the above adjustments.

• ADJUSTMENT OF SLOW/STILL CIRCUIT

Adjustment of SP slow tracking preset: R8117

1. Either receive a commercial broadcasting or input the video signal to the video input teminal (the input switch is outside of the unit).
2. Set the recording time switch to the SP mode, record a tape, and play it back.
3. Push the slow speed button to playback the recorded tape at a slow speed.
4. Set the slow tracking control to the center position.
5. Observing the monitor screen, adjust the R8117 (slow tracking preset (SP)) to the position where the noise bars disappear from the screen.
6. Push the play button to put the unit in the playback mode, and then push the pause/still button to reproduce a still picture. At this time, check to see if any noise does not appear on the screen. (Repeat a few times.)

Adjustment of LP slow tracking preset: R8115

1. Either receive a commercial broadcasting or input the video signal to the video input terminal (the input switch is outside of the unit).
2. Set the recording time switch to the LP mode, record a tape, and play it back.
3. Push the slow speed button to playback the recorded tape at a slow speed.
4. Set the slow tracking control to the center position.
5. Observing the monitor screen, adjust R8115 (slow tracking preset (LP)) to the position where the noise bars disappear from the screen.
6. Push the play button to put the unit in the play mode, and then push the pause/still button to reproduce a still picture. At this time, check to see if any noise does not appear on the screen.

Adjustment of still picture vertical syncronization: R823

1. Playback a tape in the SP mode.
2. Push the pause/still button to reproduce a still picture.
3. Observing the monitor screen, adjust R823 (adjustment of SP still picture vertical sync.—adjusted from the bottom of the unit) to the position where vertical jitter disappears from the screen.

• ADJUSTMENT OF ON-SCREEN DISPLAY (O.S.D.) CIRCUIT

The ON-SCREEN DISPLAY system is designed to display at a time and confirm program NO., channel, week/day, starting time and length on the TV monitor screen, though they were displayed and confirmed on the fluorescent tube of timer.

Adjustment of colour burst signal

1. Set to OSD mode.
2. Connect the frequency counter to TP-5902 (signal) and TP-5901 (GND) on the OSD PWB, and adjust the trimmer C5907 (on the IF PWB) to obtain 17.734475 MHz ± 60Hz:

Position (lateral) of program characters

After setting to OSD mode, display the content of the program on the monitor screen, and adjust the trimmer C5905 (on the IF PWB) so that the program characters (program NO., channel, month/day, starting time and length stop time) are arranged properly on the screen.

• ADJUSTMENT OF Hi-Fi (HIGH-FIDELITY) AUDIO CIRUCIT

Adjustment of E-E level

1. Apply a signal of −8 dBm, 1 kHz, sine wave to the RCA input terminals.
2. Set the record level control at its center click position.
3. Connect a VTVM to RCA output pin and adjust R8122 (left channel control) and/or R8123 (right channel control) so that the VTVM reads −5 dBm.

Adjustment of reference signal deviation

1. Apply a signal of −8 dBm, 1 kHz, since wave to the audio input RCA terminals.
2. Adjust the record controls so that the audio output is −5 dBm.
3. Connect a spectrum analyzer to TP6306 (for the right channel) and TP6305 (for the left channel), TP6304 (ground) and adjust R6386 (right channel control) and R6376 (left channel control) so that the deviation is ±50 kHz.

Note:

This adjustment should be performed after the adjustment of Hi-Fi PB playback tape.

Adjustment of reference signal deviation (using an oscilloscope)

1. Take the same procedures in steps 1 and 2 as in "Adjustment of reference signal deviation."
2. Connect an oscilloscope to TP6306 (for the right channel) and TP6305 (for the left channel). (At the time, set the oscilloscope at 0.2μ sec/div. 10mV/div.).
3. Adjust the peak level of the vertical signal to be at 4th unit of the scale of oscilloscope.
4. Adjust the oscilloscope to obtain the output waveform as shown in Fig. 2-9.
5. Adjust R6386 (right channel control) and R6376 (left channel control) so that the part A of output waveform is as shown in Fig. 2-9.
6. While the unit is in the record and/or playback mode, check that the audio output is within −5 dB ±1 dB. If this value is not attained, readjust R6376 and R6386.

Note:

This adjustment should be performed after the adjustment of Hi-Fi playback level.

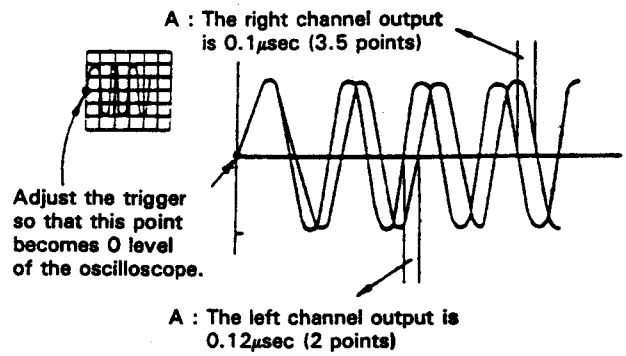


Figure 2-9

Adjustment of drop-out level

1. Set the unit in the playback mode.
2. Adjust R6391 (drop-out level control) so that the voltage of TP6303 is 2.6V (DC).

Adjustment of high-fidelity playback level

1. Play a high-fidelity standard type.
2. Connect a VTVM to the audio output terminal and set the audio output switch at Hi-Fi/Stereo position.
3. Adjust R6388 (right channel playback control) and R6378 (left channel playback control) so that the VTVM reading is within −5 dB ±1 dB for both channels.

Adjustment of level meter

1. Apply a signal of −8 dBm to the RCA Input Terminals, 1 kHz, sine wave to the audio input terminal.
2. Adjust the record level control so that the output level is −5 dBm for both right and left channels.
3. Adjust R6334 (left channel control) and R6338 (right channel control) so that the level meter indicates 0 dB for both channels.

Adjustment: Digital (A) K2648HE51

Write phase adjustment

1. Set the unit to the EE STROBE mode.

Note:
Do not use the AUX input or MULTI STROBE mode.

2. Input a colour bar signal.
3. Connect an oscilloscope to TP2801 and adjust C2804 (Write Phase Adj.) for a duty cycle of 50 ±10%. (Fig. 2-10)

Read phase adjustment

1. Set the unit to the EE STROBE mode.

Note:
Do not use the AUX input or MULTI STROBE mode.

2. Input a colour bar signal.
3. Connect an oscilloscope to TP2802 and adjust C2810 (Read Phase Adj.) for a duty cycle of 50 ±10%. (Fig. 2-10)

Picture position adjustment

1. Alternate between the EE and STROBE modes.
2. Input a colour bar signal.
3. While alternating between the EE and STROBE modes, adjust C2804 (Write Phase Adj.) and C2810 (Read Phase Adj.) so that the colour bar stops at the right and left position and shift is eliminated. (Fig. 2-11)

Note:
Adjust the trimmer carefully, as excessive change will impair the memory picture.

Adjustment: Digital (B) K2856HE50

Sub 4.43 MHz adjustment

1. Set the unit to the EE (AUX) mode.
2. Remove the SJ connector.
3. Connect a frequency counter to TP2606 (GND) and TP2605 (Sub 4.43 MHz) and adjust C2609 (Sub 4.43 MHz Adj.) to obtain a frequency counter reading of 4433.62 ±0.02 kHz at TP2605. (Fig. 2-12)

Master 4.43 MHz adjustment

1. Set the unit to the EE (AUX) mode.
2. Remove the SJ connector.
3. Connect a frequency counter to TP2702 (GND) and TP2701 (Master 4.43 MHz) and adjust C2727 (Master 4.43 MHz Adj.) to obtain a frequency counter reading of 4433.62 ±0.02 kHz at TP2701. (Fig. 2-13)

Note:
After adjusting both 4.43 MHz, be sure to replace the SJ connector to the previous place.

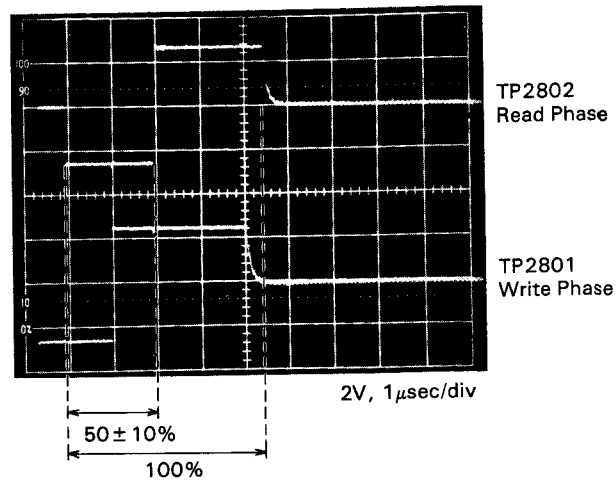


Figure 2-10

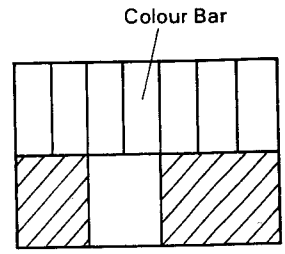


Figure 2-11

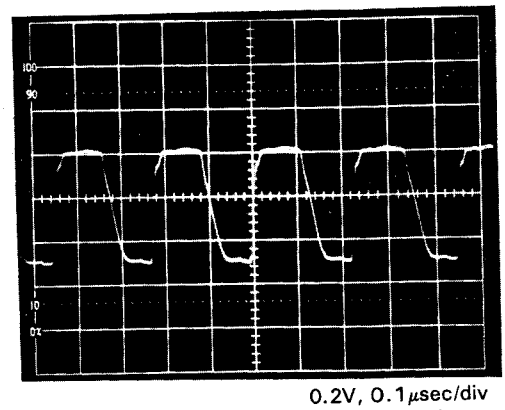


Figure 2-12

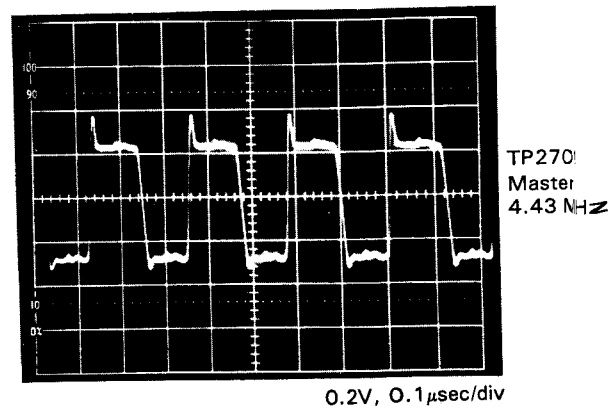


Figure 2-13.

Initial set adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect CH-2 probe to TP2601 (B-Y)
   - Connect CH-1 probe to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2606 (Colour Level Adj.) so that the R-Y waveform becomes approximately 1 Vp-p. (Fig. 2-14)

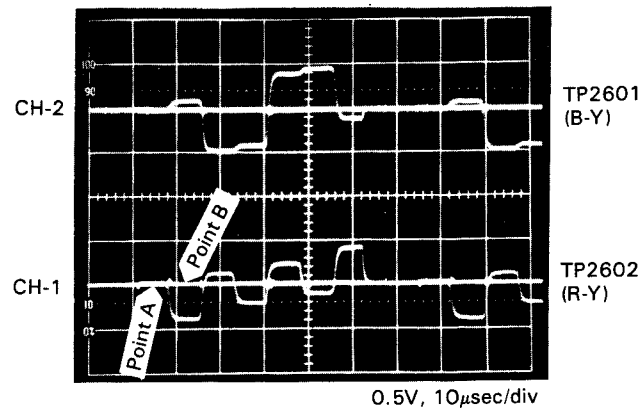


Figure 2-14

Burst phase adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect CH-2 probe to TP2601 (B-Y).
   - Connect CH-1 probe to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2631 (Burst Phase Adj.) with an oscilloscope so that cracking in point A of Fig. 2-14 is minimized.

1H gain adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect CH-2 probe to TP2601 (B-Y).
   - Connect CH-1 probe to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2619 (1H Gain Adj.) with an oscilloscope so that cracking in point B of Fig. 2-14 is minimized.

1H phase adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect CH-2 probe to TP2601 (B-Y).
   - Connect CH-1 probe to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust L2601 (1H Phase Adj.) with an oscilloscope for minimum overall blur of the R-Y waveform. (Fig. 2-14)

B-Y output precise adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect CH-2 probe to TP2601 (B-Y).
   - Connect CH-1 probe to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Repeat burst phase adjustment, 1H gain adjustment, and 1H phase adjustment with R2631, R2619, and L2601, until cracking and blur of the waveform are minimized. (Fig. 2-14)

Colour level adjustment

1. Set the unit to the AUX mode.
2. Input a colour bar signal.
3. Connect an oscilloscope as follows:
   - Connect the probe (CH-1 AC) to TP2602 (R-Y).
   - Connect TP2603 to ground.
   - Connect the trigger (TRG EX) to TP2604 (Write H Blank).
4. Adjust R2606 (Colour Level Adj.) so that the R-Y waveform amplitude becomes 1 ±0.04 Vp-p. (Fig. 2-14)

Carrier balance adjustment

1. Set the unit to the EE (AUX) STROBE mode.
2. Remove the SJ connector.
3. Connect an oscilloscope as follows:
   - Connect TP2702 to ground.
   - Connect a probe to TP2703 (Chroma).
   - Connect the trigger (TRG EX) to TP2704 (C Sync).
4. Adjust R2710 (B-Y Carry BAL.) and R2709 (R-Y Carry BAL) using a alternately to minimize noise at point A in Fig. 2-15.

Note:

After adjusting, be sure to replace the SJ connector to the previous place.

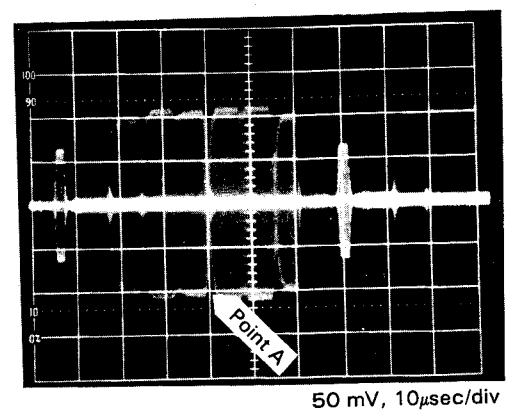


Figure 2-15

Burst flug level adjustment

1. Set the unit to the STROBE (TUNER) mode.
2. Input a video signal which contains a picture of a human.
3. Switch between the STROBE and EE mode and adjust R2702 (Burst Flug Level Adj.) so that colour depth on the monitor is identical in both modes.

Note:

It is preferable to use the video input of the monitor.

Colour phase adjustment of picture in picture

1. Set the unit to the EE (AUX) Picture in Picture mode.
2. Input a video signal which contains a picture of a human.
3. Adjust R2742 (Burst Phase Adj. Pin P) so that the colour phase of main picture and sub picture is identical.

Note:

It is preferable to use the video input of the monitor.

- **H-S Detection Circuit**

PLL frequency adjustment: R1416

1. Connect the frequency counter to the fosc pin of TP1402 after passing through the buffer shown in the figure on the left.
2. Connect 1μ (50V) between TP1403 and the GND. (Remove the connection after completing adjustment.)
3. Adjust R1416 so that the value of the counter display becomes 15.625 kHz.

Within ±50 Hz

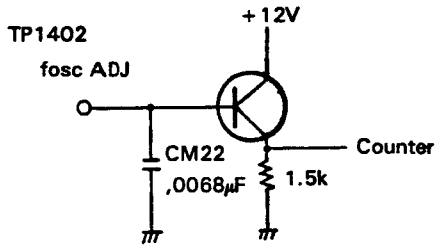


Figure 2-16

Test Point Layout

MAIN F2854GE

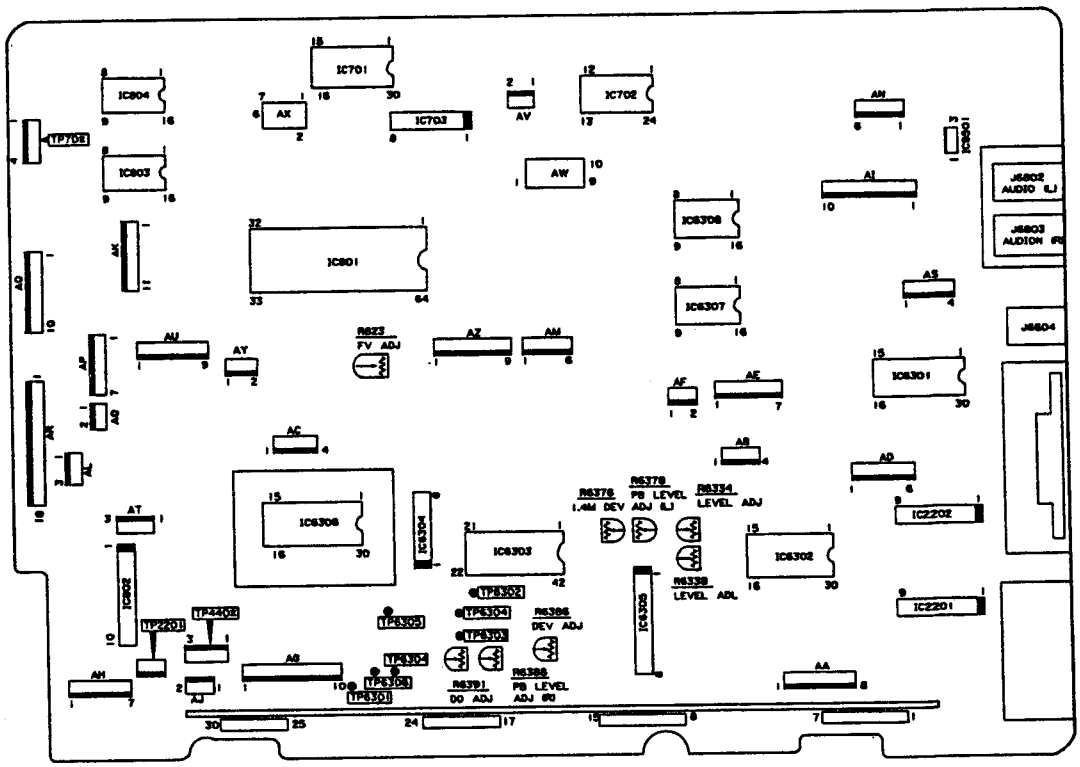


Figure 2-17. Main Circuit

Y/C F2885GE

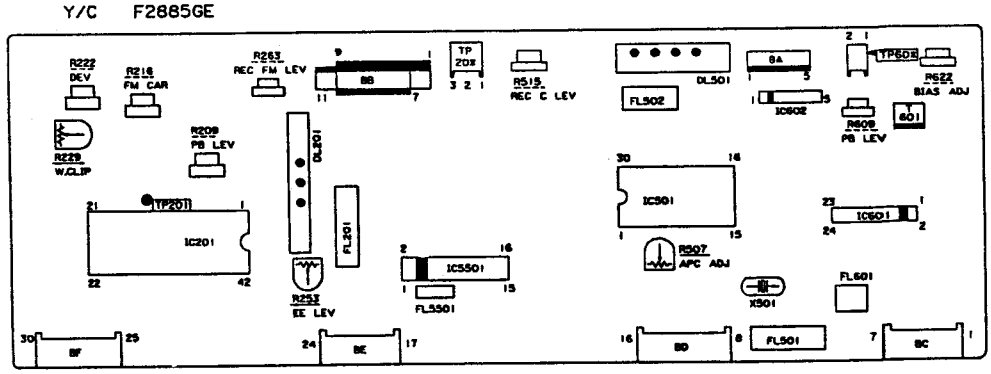


Figure 2-18. Audio, Y/C Circuit

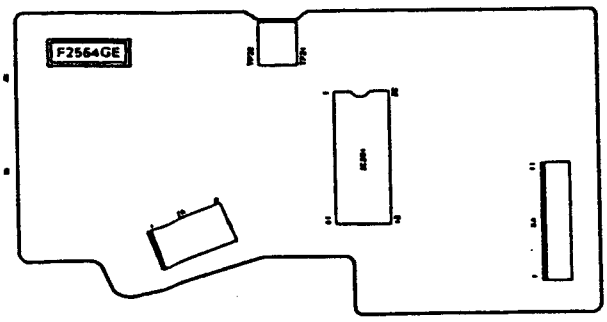


Figure 2-19. Head Amp Circuit

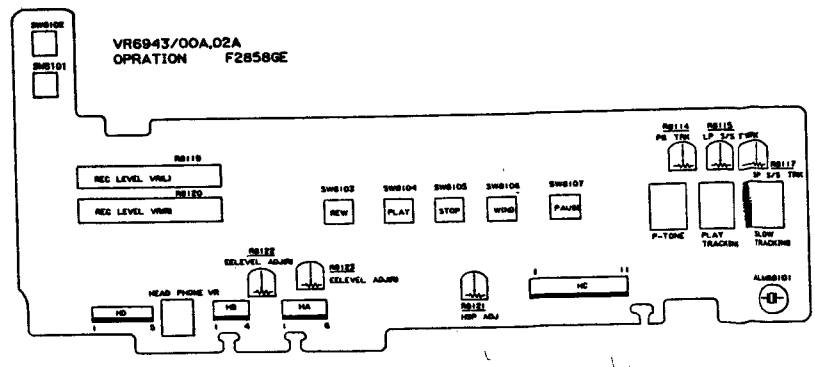


Figure 2-20. Operation Circuit

F2855GE

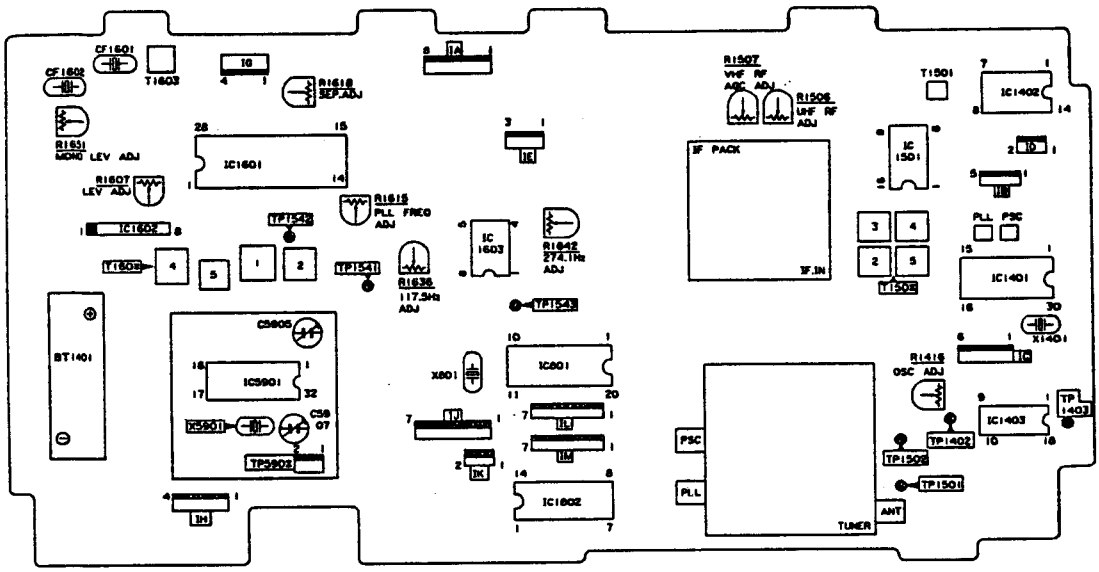


Figure 2-21. IF Circuit

DIGITAL(A) F2648GE

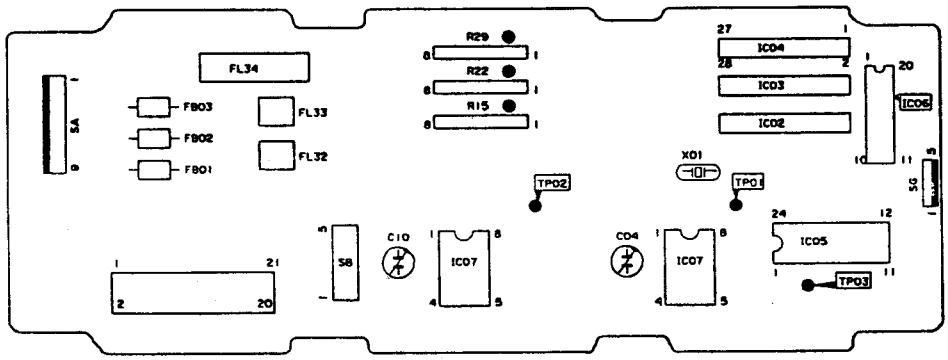


Figure 2-22. Digital (A) Circuit

DIGITAL(B) F2856GE

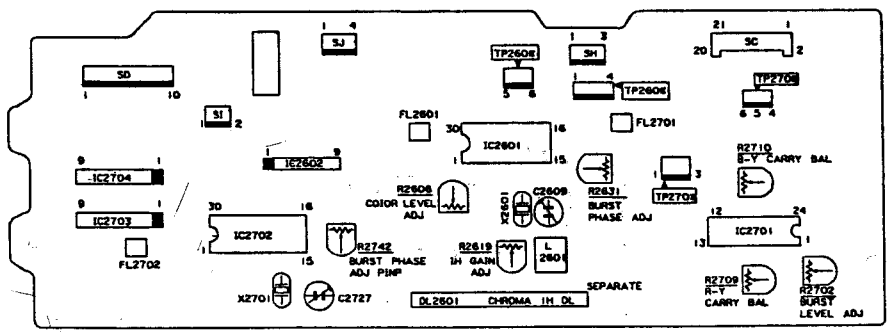
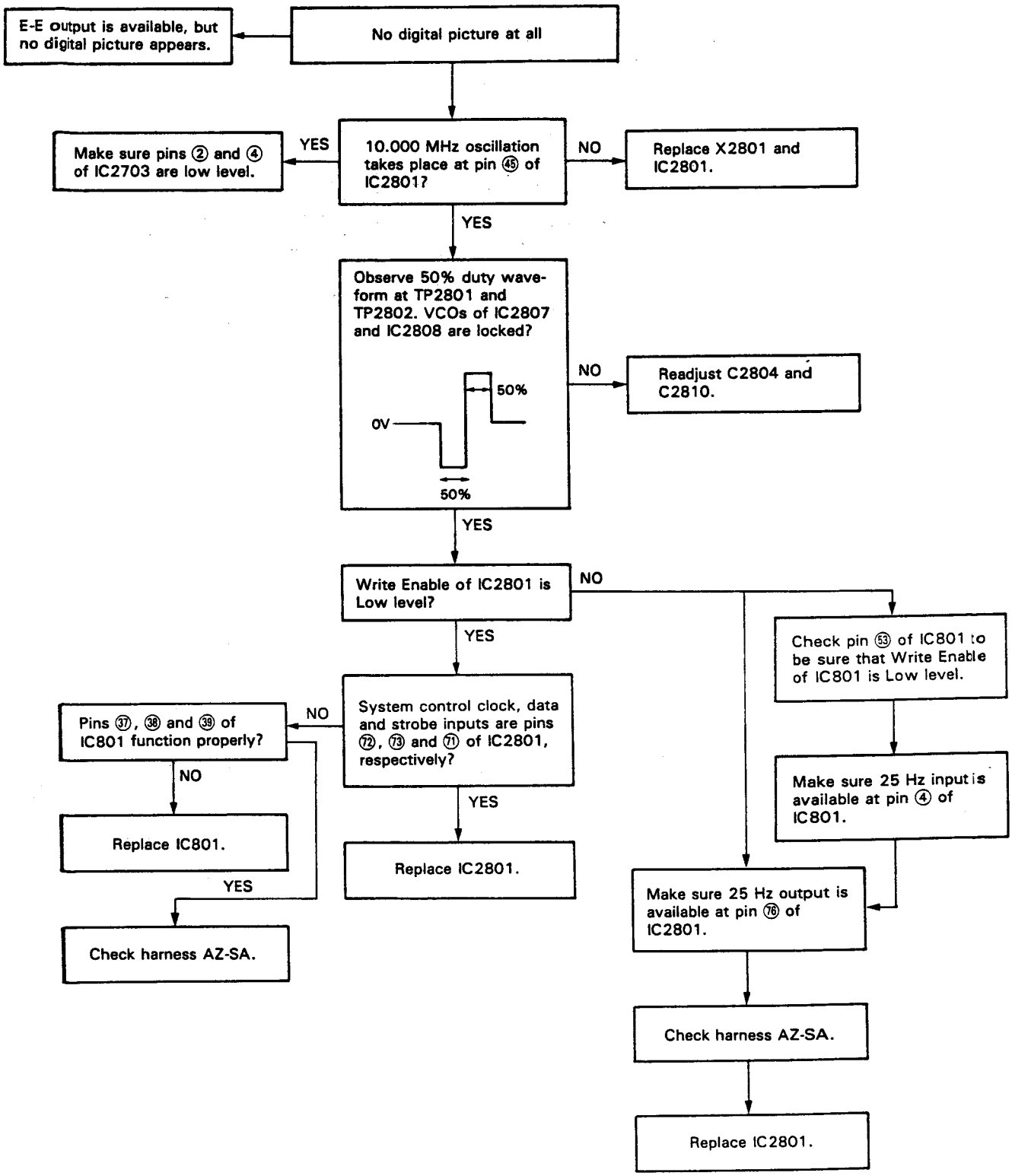
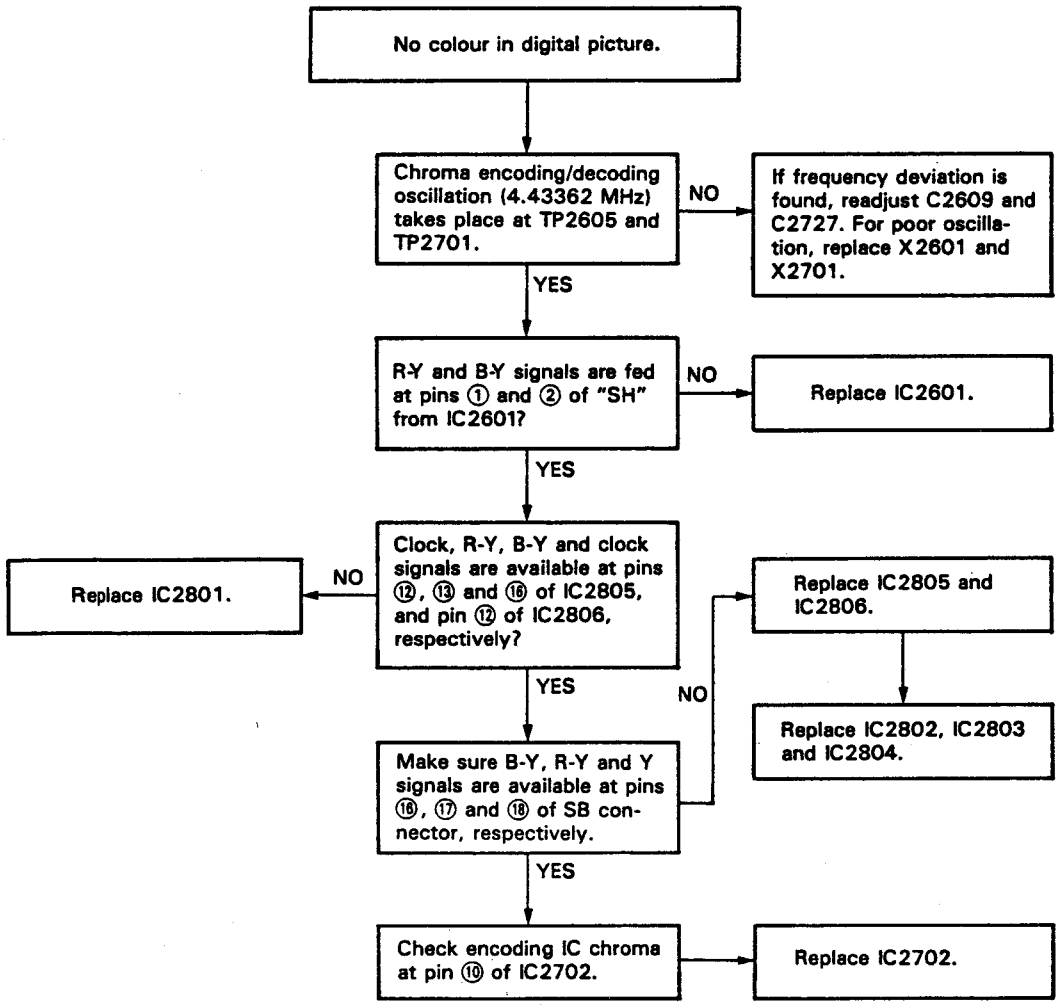


Figure 2-23. Digital (B) Circuit

DIGITAL MEMORY (1) TROUBLESHOOTING



DIGITAL MEMORY (2) TROUBLESHOOTING



TROUBLESHOOTING GUIDE

• TROUBLES OF CONTROL SYSTEM (SERVO, SYSTEM CONTROLLER CIRCUIT)

No.	Problems	Probable causes and countermeasures
1.	No power is supplied.	• The fuse is blown out; check if there occurs a short-circuit in the internal circuit. • Check if there are produced AT5V, UR (unregulated) 15V and AT9V in the power circuit; if not, this means that the power circuit is defective. • Check if the system controller (IC801) is normally functioning; check if there are produced reset signals at pin ㊺ of IC801 and clock signal at pins ㊻ and ㊼ of IC801. • Check if the power control signal (Low level) goes out of pin ⑲ of IC801.
2.	No operation is available.	• Check if the start sensor signal (cassette housing side) and end sensor signal are applied to pins ㊶ and ㊷ of IC801 respectively. • Check if the unit is in timer mode. • Check if the unit is in sensor stop mode. • The cam switch is poorly adjusted for its positioning.
3.	After tape loading, the unit is stopped with the tape kept would over the drum, or the cassette can't be ejected.	• The cam switch is poorly adjusted for its positioning. • IC802 or IC701 is defective.
4.	The unit will stop immediately after it is set in playback or record mode.	• Check if the head switching pulse is applied to pin ③ (for the drum sensor) of IC801. • Check if the drum motor is rotating. • Check if the drum pulse generator's signal is applied to pin ⑦ of the servo circuit IC701.
5.	The unit will stop a few seconds after it has been set in playback or record mode.	• Check if the reel pulse is applied to pin ⑨ (for the reel sensor) of IC801. • Check if the capstan motor is rotating. • Check if the reel idler is stained or defective.
6.	The tape is not running (the tape is not taken up.)	• The reel idler is defective. • The reel brake is defective. • Q807 is defective.
7.	• The unit stops sometimes during playback or recording. • The tape can't be taken up when tape unloading. • The tape is scratched when it is wound. • Video search is impossible.	• Check if there are produced capstan motor control signals at the system controller (servo strobe signal at ㊲ of IC801, servo clock signal ㊳ of IC801, servo data signal at ㊴ of IC801, capstan motor pull up signal at pin ㉙ of IC801, capstan motor unloading signal at pin ㉚ of IC801, cassette motor control signal at pin ㊷ of IC801, loading motor control signal at pin ㊸ of IC801, cassette and loading motors reverse control signal at pin ㊶ of IC801). • IC701, IC702 and IC703 are defective.
8.	Fine noises appear at the reproduced picture.	• The playback phase control is misadjusted (R8121). • The tracking preset control is misadjusted (R8114).

No.	Problems	Probable causes and countermeasures
9.	Noises appear intermittently at the reproduced picture.	• Check for the capstan servo circuit (capstan frequency generator's signal at pin ⑭ of IC702 and playback control signal at pin ① of IC702).
10.	The picture collapses in the horizontal direction.	• The drum servo circuit is defective. • Check if there are drum frequency generator's signal applied to pin ⑥ of IC701 and drum pulse generator's signal to pin ⑦ of IC701. • Check if there is reference signal (4.43 MHz) at pin ① of IC701.

• TROUBLES OF SOUND AND REPRODUCED PICTURE (Y/C AND AUDIO CIRCUIT)

No.	Problems		Probable causes and countermeasures
1.	No picture appears.	At E-E mode	• Check if the video signal (E-E signal) is applied to pin ② of IC201, if the video signal goes out of pin ㉙, and if proper voltage is applied to each pin of IC201.
		At playback of standard tape.	Make sure that there appears a normal picture at E-E mode. • Check if the playback FM signal is applied to pin ⑩ of IC201. • Check if the playback FM signal is applied to pins ⑲ and ⑳ of IC301.
		At playback of the tape recorded by oneself.	Before this checking, make sure that normal playback is possible with standard tape. • Check if there is FM signal at pin ① of IC201. • Check if there is video signal at pin ㊴ of IC201. • Check if there is video signal at pin ㉙ of IC201.
2.	No colour appears.		• Check if there is chroma signal at pin ㉚ of IC501. • APC is misadjusted (R507). It is not allowed to re-adjust them, this means that IC501 is defective. • Check if IC501 is normally functioning.
3.	The picture collapses when the tape recorded by oneself is played back. 		• Check if there is a normal voltage at each pin of the head amplifier.
4.	Noises appear on the whole of picture when the tape recorded by oneself is played back.		• Check if there is a normal voltage at each pin of the head amplifier. • Clean the video head or replace it a new one.
5.	Noise is noticeable at E-E mode or when the tape recorded by oneself is played back.		• The tuner and/or RF converter are defective.

No.	Problems	Probable causes and countermeasures
6.	Noises appear on the picture when the tape is played back with standard tape.	• Clean the video head or replace it a new one.
7.	There appears no E-E sound.	• ALC at IC601 operates improperly. • Check if there is audio signal at pin ⑯ of IC601. • The audio muting circuit is defective.
8.	There appears on sound at playback mode.	• The audio head is defective. • Check if playback audio signal is applied to pin ⑦ of IC601 and goes out of pin ⑯.
9.	Sound is distorted.	• The audio head is magnetized or defective. • Bias current is insufficient.
10.	There reasonance in the recording or playback is incorrect.	• The audio head is magnetized or defective. • Bias oscillator circuit is defective.
11.	Recording is impossible.	• Bias oscillator circuit is not normally functioning.
12.	Noise and hum appear frequently during playback or recording.	• The audio head is defective.

GLOSSARY

	Abbreviation	
A	ABSS	Auto Blank Section Scan
	AFC	Automatic Frequency Control
	AFT	Automatic Fine Tuning
	AGC	Automatic Gain Control
	ALC	Automatic Level Control
	APC	Automatic Phase Control
	AD	Address
	AL	After Loading
	ACL	All Clear
	AT	All Time
	AV (A/V)	Audio/Video
	A-Mute	Audio Mute
C	CAP	Capstan
	CAP.M.	Capstan Motor
	C.FG	Capstan Frequency Generator
	C.PG	Capstan Pulse Generator
	CST	Cassette
	CST.M.	Cassette Motor
	CSA	Cassette Switch-A
	CSB	Cassette Switch-B
	CSD	Cassette Swtich-D
	CH	Channel
	CTL	Control
D	D.D.	Direct Drive
	D.F.F.	D-Flip-Flop
	DM	Drum Motor
	D.FG	Drum Frequency Generator
	D.PG	Drum Pulse Generator
	D.TPG	Drum Trapezoidal Generator
	DET	Detector
	DUB	Dubbing
E	EE	Electric to Electric
	EF	Emitter Follower
	EP	Extended Play
	ES	End Sensor
F	F-ADV-P	Frame Advance Pulse
	FWD	Forward
	F/R	Forward/Reverse
	FF	Fast Forward
	FM	Frequency Modulation
	F.G.	Frequency Generator
	F.E.	Full Erase
	FV	False Vertical Sync.
H	HIFI	High Fidelity
	HPA	High Pass Amplifier
	HPF	High Pass Filter
	HS (H/S)	Half Speed
	HSP	Head Switching Pulse
	H. SYNC	Horizontal Sync.
I	ID	Identical Amplifier
	IF	Intermediate Frequency

	Abbreviation	
J	J.K.F-F	J.K.Flip-Flop
K	KE	Key Entry
L	LED	Light Emitting Diode
	LDM	Loading Motor
	LPF	Low Pass Filter
	LP	Long Play
M	MIC	Microphone
	MM	Mono-multi Vibrator
N	NC	Non Connection
	NS (N/S)	Normal Speed
O	OSC	Oscillator
P	PAD	Power Assisted Drive
	PAM	Pulse Amplitude Modulation
	PCM	Pulse Code Modulation
		Pulse Count Modulation
	PDM (PWM)	Pulse Duration Modulation
		Pulse Width Modulation
	PFM	Pulse Frequecny Modulation
	PPM	Pulse Phase Modulation
	PB	Playback
	PG	Phase Generator
	PR	Pinch Roller
	PWB	Printed Wiring Board
R	REC	Record
	REM (R/C)	Remote Control
	REV	Reverse
	REW	Rewind
	RF	Radio Frequency
S	S/H	Sample and Hold
	SN	Signal to Noise
	SP	Standard Play
	SS	Start Sensor
	SSVM	Solid State Voltmeter
	STILL-H	Still Mode High Level
	SUP-REEL	Supply Reel
	SW	Switch/Switching
T	TPG	Trapezoidal Generator
	TU-REEL	Take-up Reel
U	UL	Unloading
	UR	Un regulated
V	VCO	Voltage Controlled Oscillator
	VCR	Voltage Controlled Resistor
	V-MUTE	Video Mute
	V-LOCK	Vertical Lock for False Vertical Sync Signal
	VS (PS)	Video Search (Pictue Scan)
	VSF	Video Search Forward
	VSR	Video Search Reverse
	VTVM	Vacuum Tube Voltmeter

SCHEMATIC DIAGRAM

IMPORTANT SAFETY NOTICE:
BE SURE TO USE GENUINE PARTS FOR SECURING THE SAFETY AND RELIABILITY OF THE SET.
PARTS MARKED WITH "⚠" AND PARTS SHADED (IN BLACK) ARE ESPECIALLY IMPORTANT FOR MAINTAINING THE SAFETY AND PROTECTING ABILITY OF THE SET.
BE SURE TO REPLACE THEM WITH PARTS OF SPECIFIED PART NUMBER.

SAFETY NOTES:
1. *DISCONNECT THE AC PLUG FROM THE AC OUTLET BEFORE REPLACING PARTS.*
2. *SEMICONDUCTOR HEAT SINKS SHOULD BE REGARDED AS POTENTIAL SHOCK HAZARDS WHEN THE CHASSIS IS OPERATING.*

NOTES:
1. *The unit of resistance "ohm" is omitted (k = 1000 ohm, M = 1 Meg ohm).*
2. *All resistors are 1/8 watt, unless otherwise noted.*
3. *The unit of capacitance "F" is omitted (μ = μF, p = μμF).*

VOLTAGE MEASUREMENT CONDITIONS:
1. *DC voltages are measured between points indicated and chassis ground by VTVM, with AC220V/50Hz supplied to unit and all controls are set to normal viewing picture unless otherwise noted.*
2. *Voltages are measured with 10000μV B & W or colour signal.*

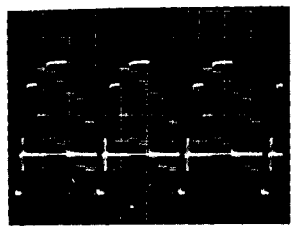
WAVEFORM MEASUREMENT CONDITIONS:
1000μV 87.5 percent modulated colour bar signal is fed into tuner:

CAUTION:
This circuit diagram is original one. Therefore there may be a slight difference from yours.

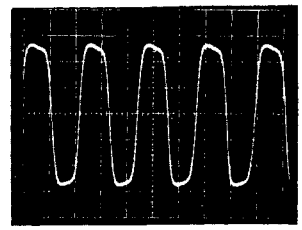
WAVE FORMS

SYSTEM CONTROL, SERVO, IF PWBs

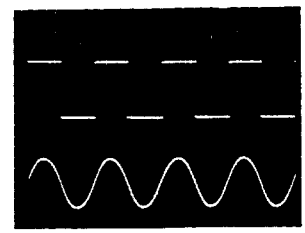
Video output terminal
(Video output is shorted with a 75 ohm resistor.)
Video signal
200mV/Division
20μsec/Division
–Playback mode–



Video output terminal (E-E level)
(Video output is shorted with a 75 ohm resistor.)
Video signal
200mV/Division
20μsec/Division
–Record mode–

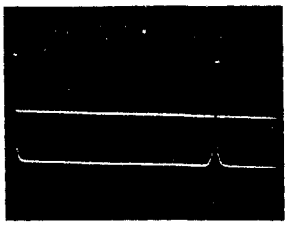


Y/C Module ⑫ pin
4.43 MHz oscillation signal
200mV/Division
0.1μsec/Division



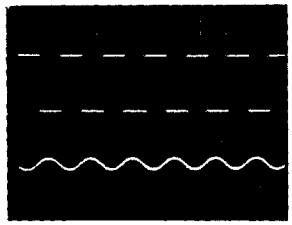
IC702 ⑭ pin
Capstan frequency generator pulse (output)
2V/Division
0.5msec/Division

Connector AW ③ pin
Capstan frequency generator signal (input)
1V/Division
0.5msec/Division
–Record mode–



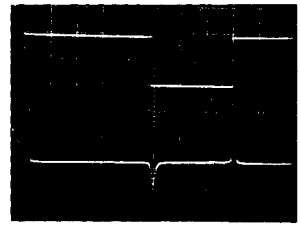
IC702 ⑱ pin
Drum phase generator pulse (output)
2V/Division
5msec/Division

Connector AN ① pin
Drum phase generator pulse (input)
200mV/Division
5msec/Division
–Record mode–



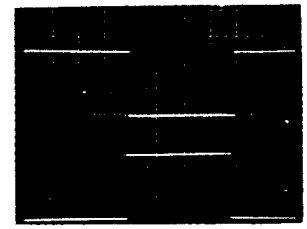
IC702 ㉓ pin
Drum frequency generator pulse (output)
2V/Division
1msec/Division

Connector AN ③ pin
Drum frequency generator signal (input)
50mV/Division
1msec/Division
–Record mode–



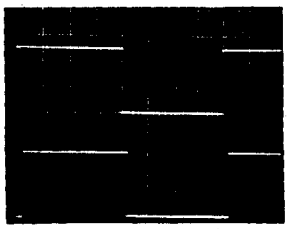
TP702
Playback control pulse
2V/Division
5msec/Division

IC702 ③ pin
Playback control pulse
500mV/Division
5msec/Division
–Playback mode–



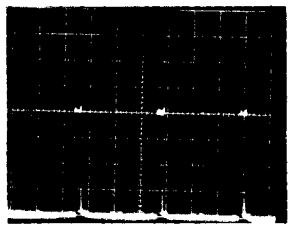
TP703
Head switching pulse
2V/Division
5msec/Division

TP701
Tracking MM pulse
2V/Division
5msec/Division
–Playback mode–

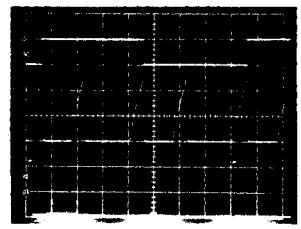


TP703
Head switching pulse
2V/Division
5msec/Division

TP701
Tracking MM pulse
2V/Division
5msec/Division
–Record mode–



TP2201
Horizontal sync pulse
1V/Division
20μsec/Division
–Record mode–

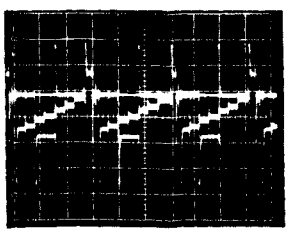


IC701 ⑨ pin
Head switching pulse
5V/Division
5msec/Division

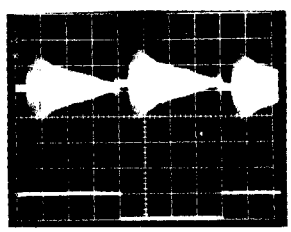
IC701 ⑧ pin
Drum pulse generator MM
2V/Division
5msec/Division

IC701 ⑦ pin
Drum pulse generator (input)
2V/Division
5msec/Division

Y/C, AUDIO PWB

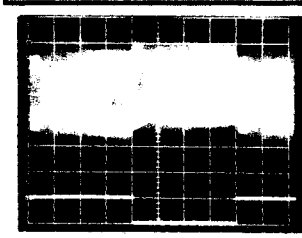


TP204
White/Dark clip signal
200mV/Division
20μsec/Division
–Record mode–



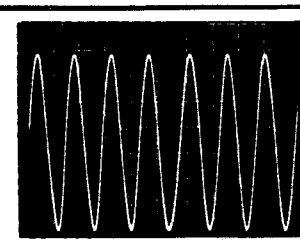
TP203
Playback preamp. signal
100mV/Division
5msec/Division

TP201
Head switching pulse
5V/Division
5msec/Division
–Playback mode–

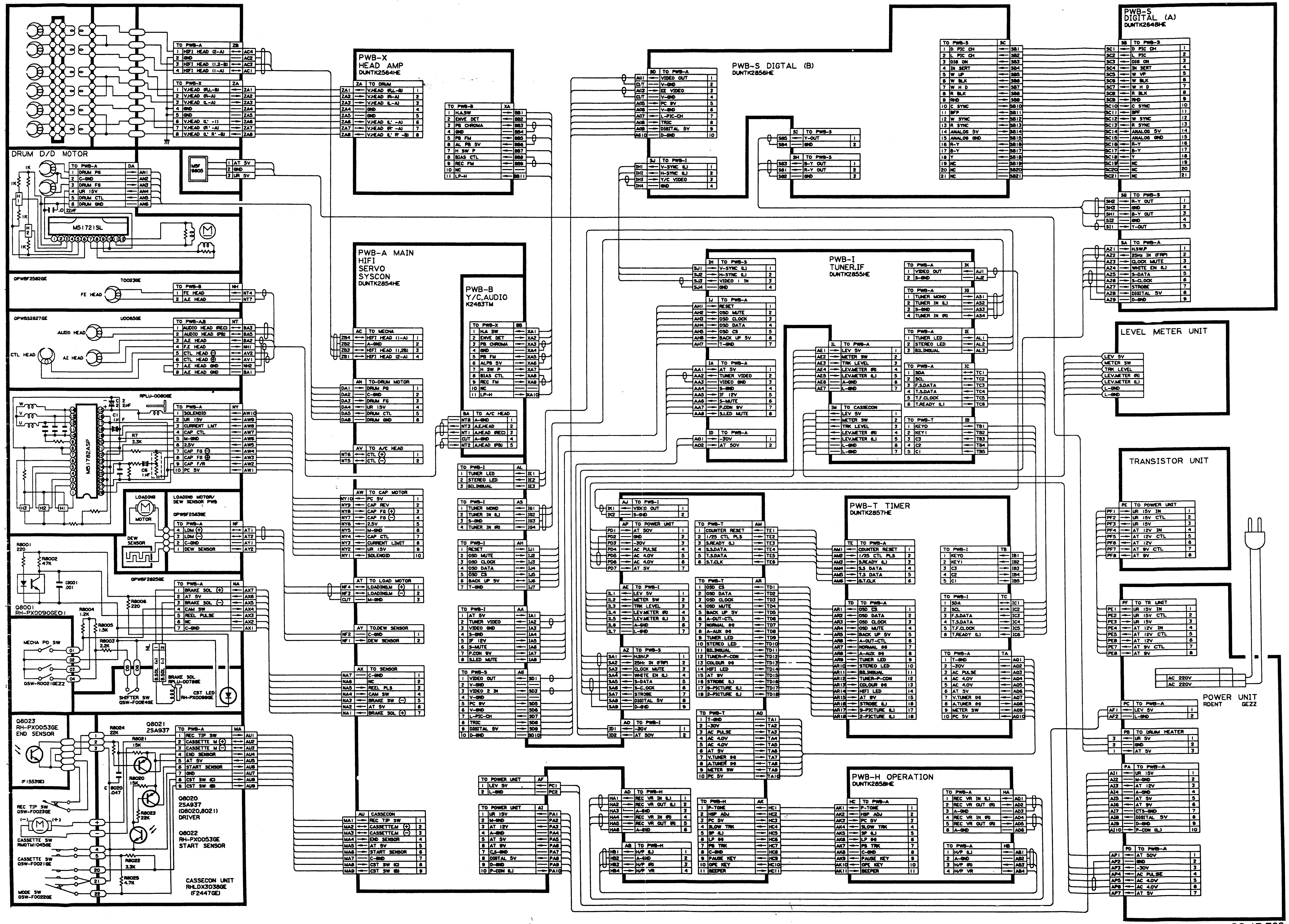


TP203
Playback preamp. signal
50mV/Division
5msec/Division

TP201
Head switching pulse
5V/Division
5msec/Division
–Playback mode–



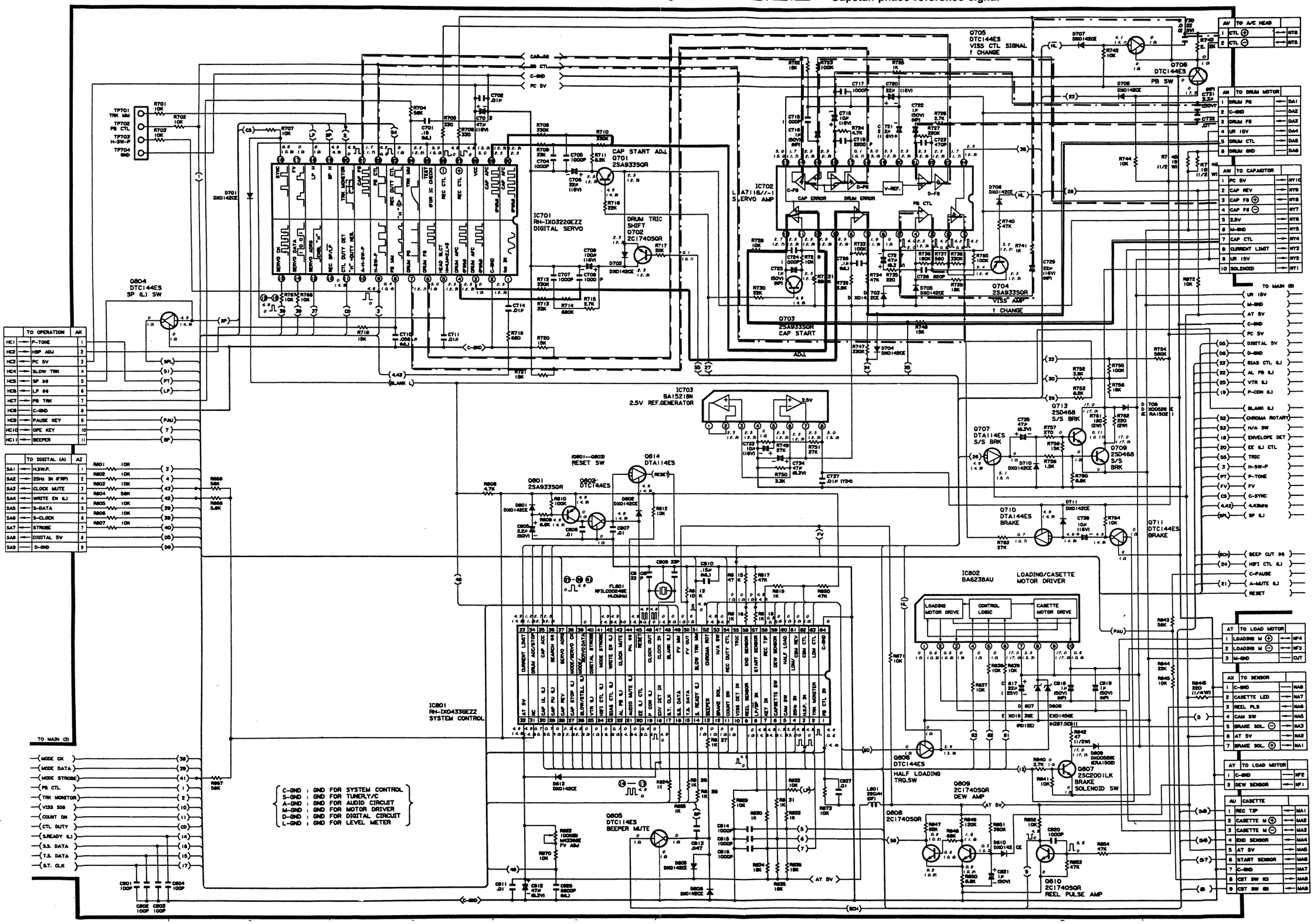
Connector BA ④, ⑤ pin
(Between Audio erase head and Ground.)
10V/Division
10μsec/Division
–Record mode–


DRUM D/D MOTOR
M51721SL
FE HEAD
AUDIO HEAD
CTL HEAD
AE HEAD
M51782ASP
LOADING MOTOR/DEW SENSOR PWB
DEW SENSOR
MECHA PO SW
Q8001 RH-PX0090GEO1
Q8023 RH-PX0053GE END SENSOR
Q8021 2SA937
Q8020 2SA937 (Q8020,8021) DRIVER
Q8022 RH-PX0053GE START SENSOR
CASSECON UNIT RHLDX3038GE (F2447GE)
REC TIP SW
CASSETTE SW
MODE SW
CST LED RH-PX0099GE
BRAKE SOL
SHIFTER SW
PWB-X HEAD AMP DUNTK2564HE
PWB-A MAIN HIFI SERVO SYSCON DUNTK2854HE
PWB-B Y/C,AUDIO K2483TM
PWB-S DIGTAL (B) DUNTK2856HE
PWB-S DIGITAL (A) DUNTK2648HE
PWB-I TUNER,IF DUNTK2855HE
PWB-T TIMER DUNTK2857HE
PWB-H OPERATION DUNTK2858HE
LEVEL METER UNIT
TRANSISTOR UNIT
POWER UNIT RDENT GEZZ
AC 220V

PWB-A, SYSTEM CONTROL, SERVO CIRCUIT SCHEMATIC DIAGRAM (MAIN 1)

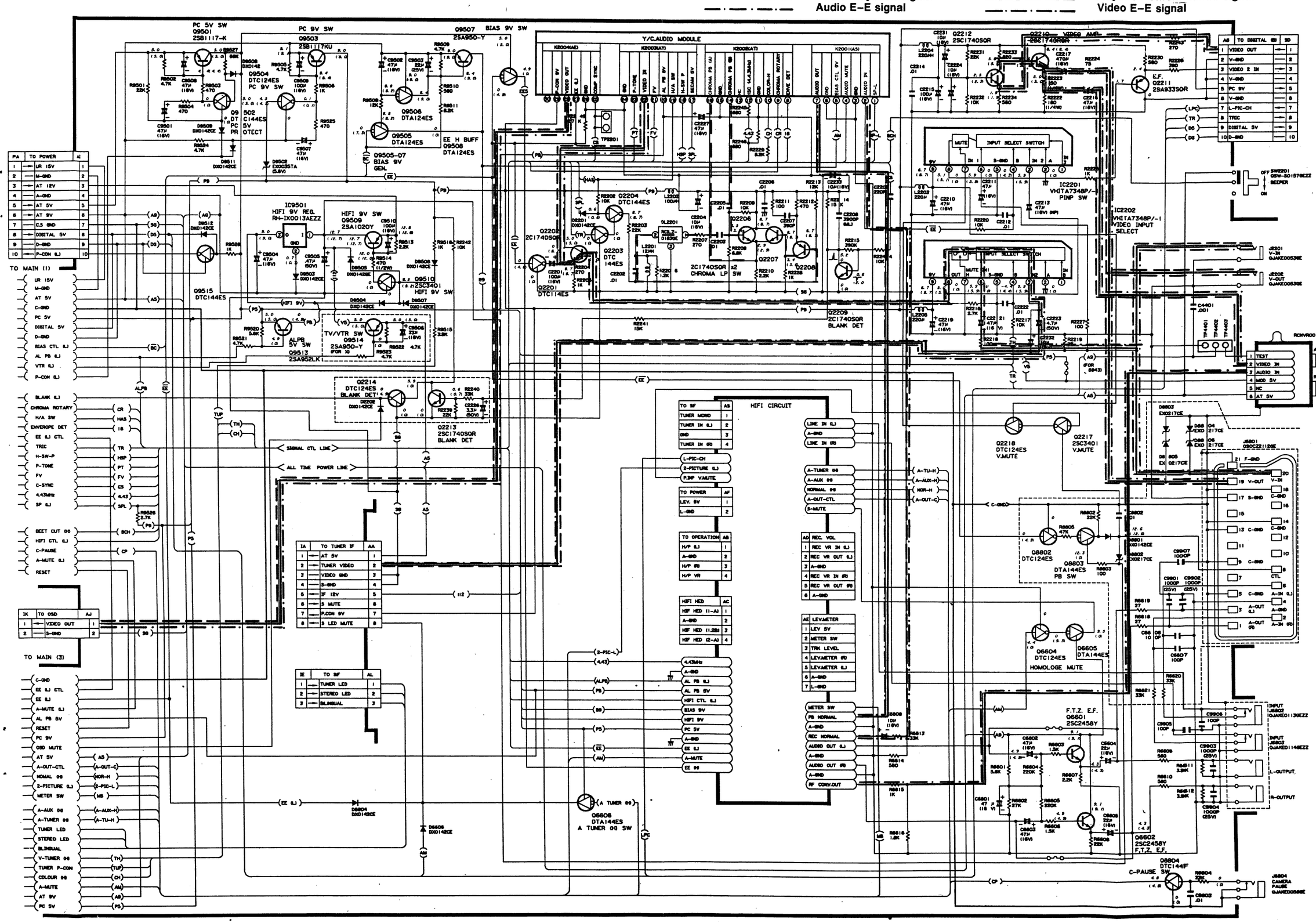
Drum Control signal
Drum frequency reference signal
Drum phase reference signal

Capstan Control signal
Capstan frequency reference signal
Capstan phase reference signal



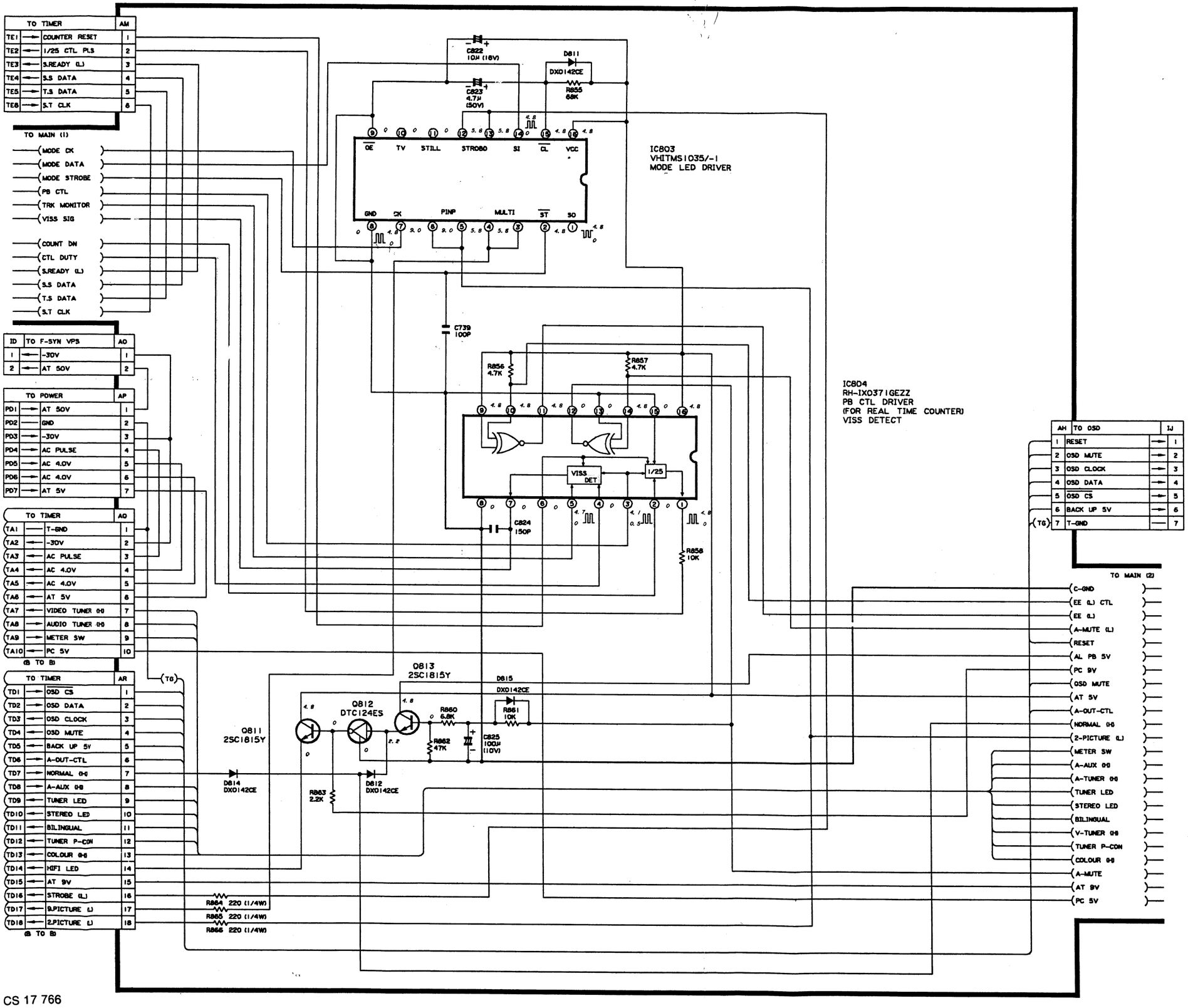
CS 17 764

Record Luminance signal
Record Chrominance signal
Audio Record signal
Audio Playback signal
Audio E–E signal
Playback Luminance signal
Playback Chrominance signal
Video E–E signal



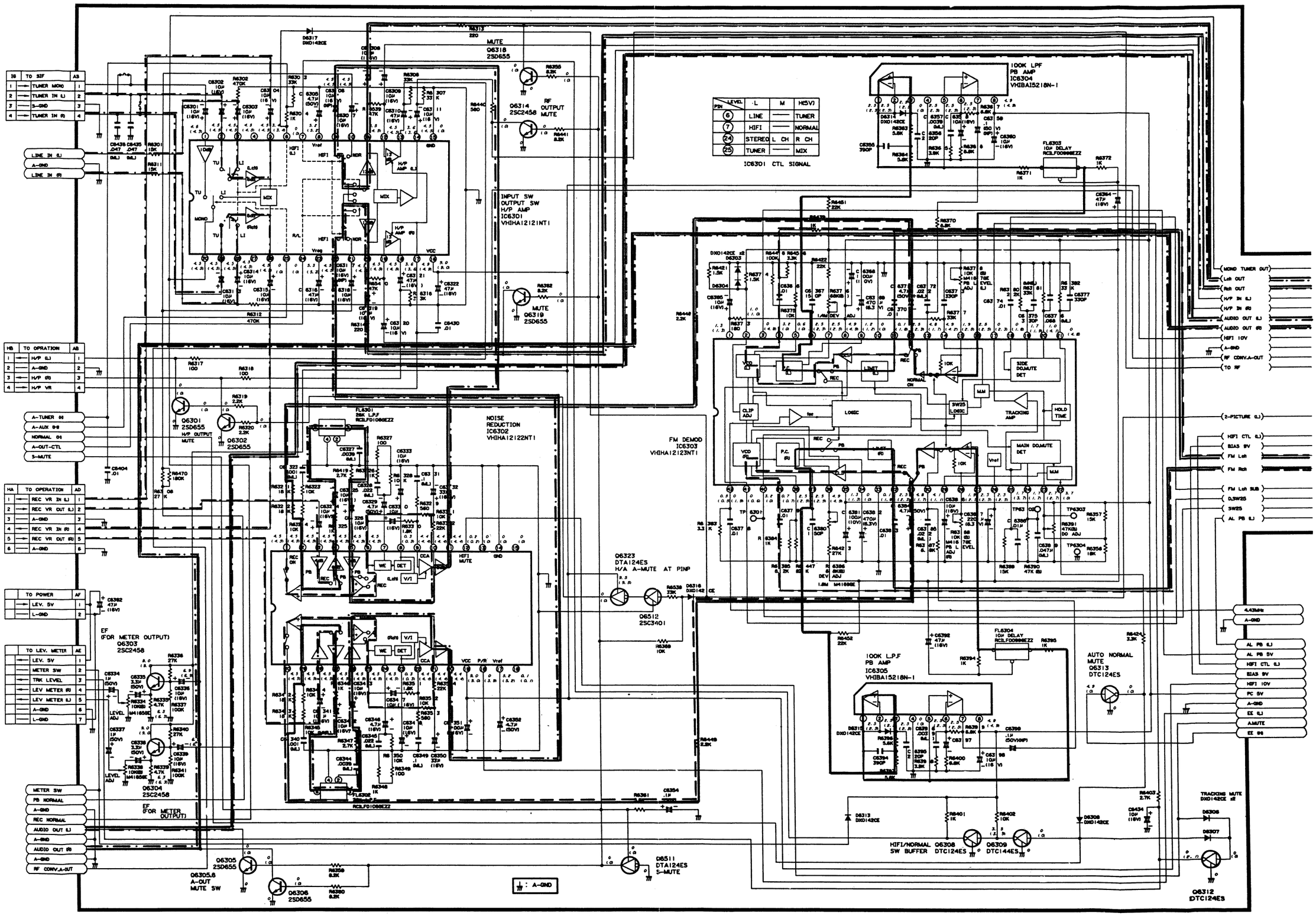
CS 17 765

PWB-A, SYSTEM CONTROL, SERVO CIRCUIT SCHEMATIC DIAGRAM (MAIN 3)



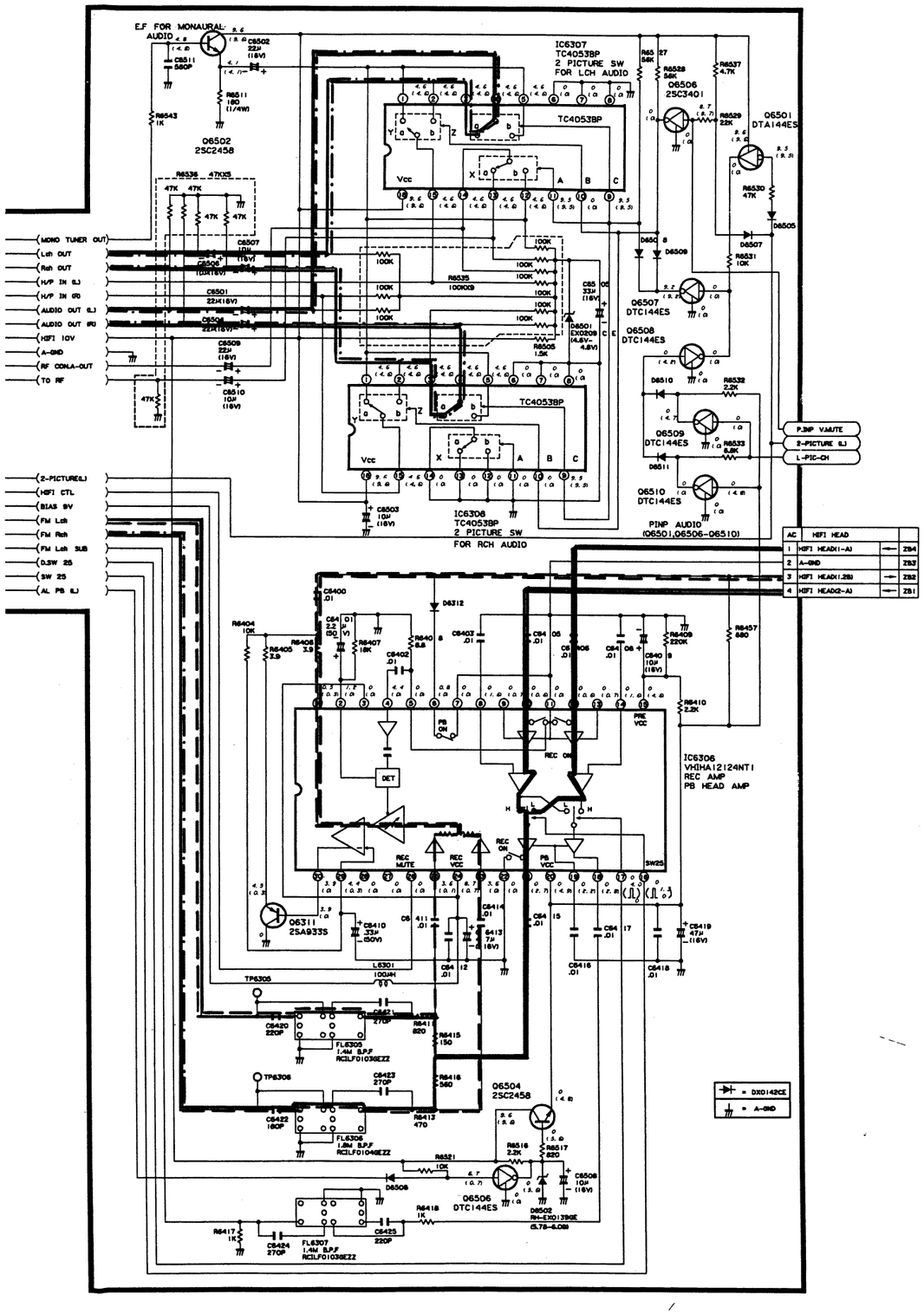
Left Channel Playback
Left Channel Record
Left Channel EE Video

Right Channel Playback
Right Channel Record
Right Channel EE Audio



CS 17 767

PWB-A, HIFI (2) CIRCUIT SCHEMATIC DIAGRAM (MAIN 5)

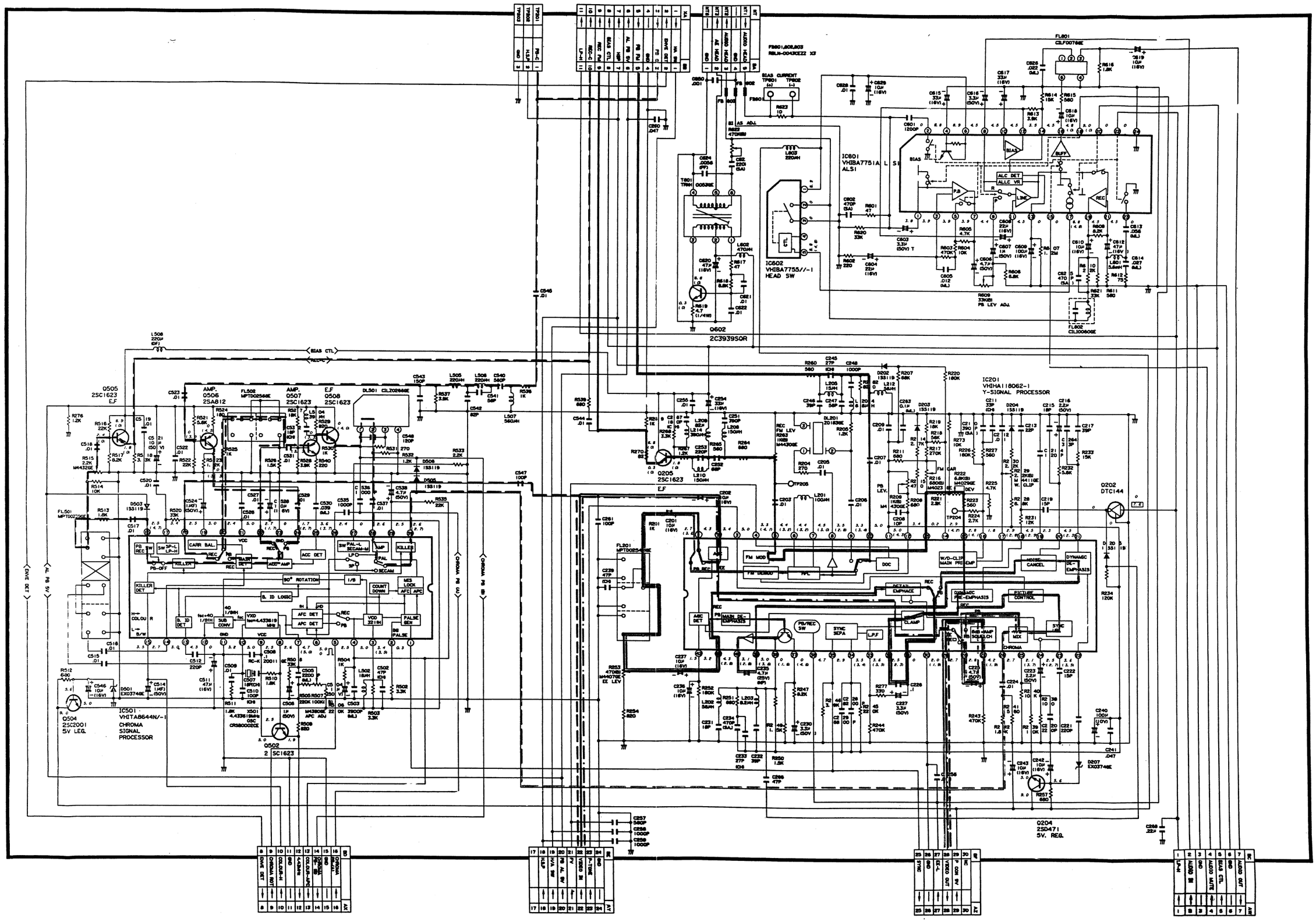


Left Channel Playback
Left Channel Record
Left Channel EE Video

Right Channel Playback
Right Channel Record
Right Channel EE Audio

Record Luminance signal
Record Chrominance signal
Video E–E signal

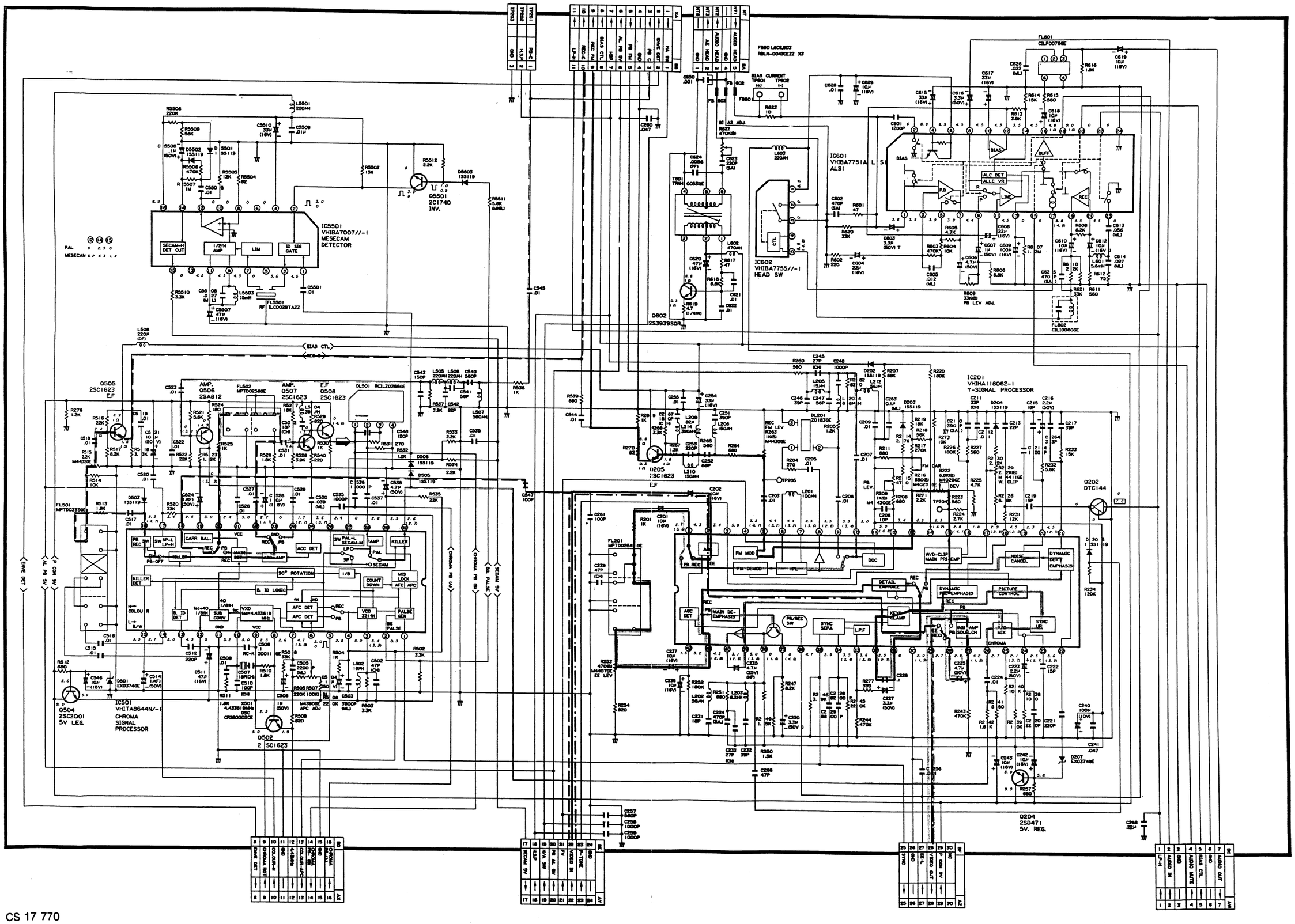
Playback Luminance signal
Playback Chrominance signal



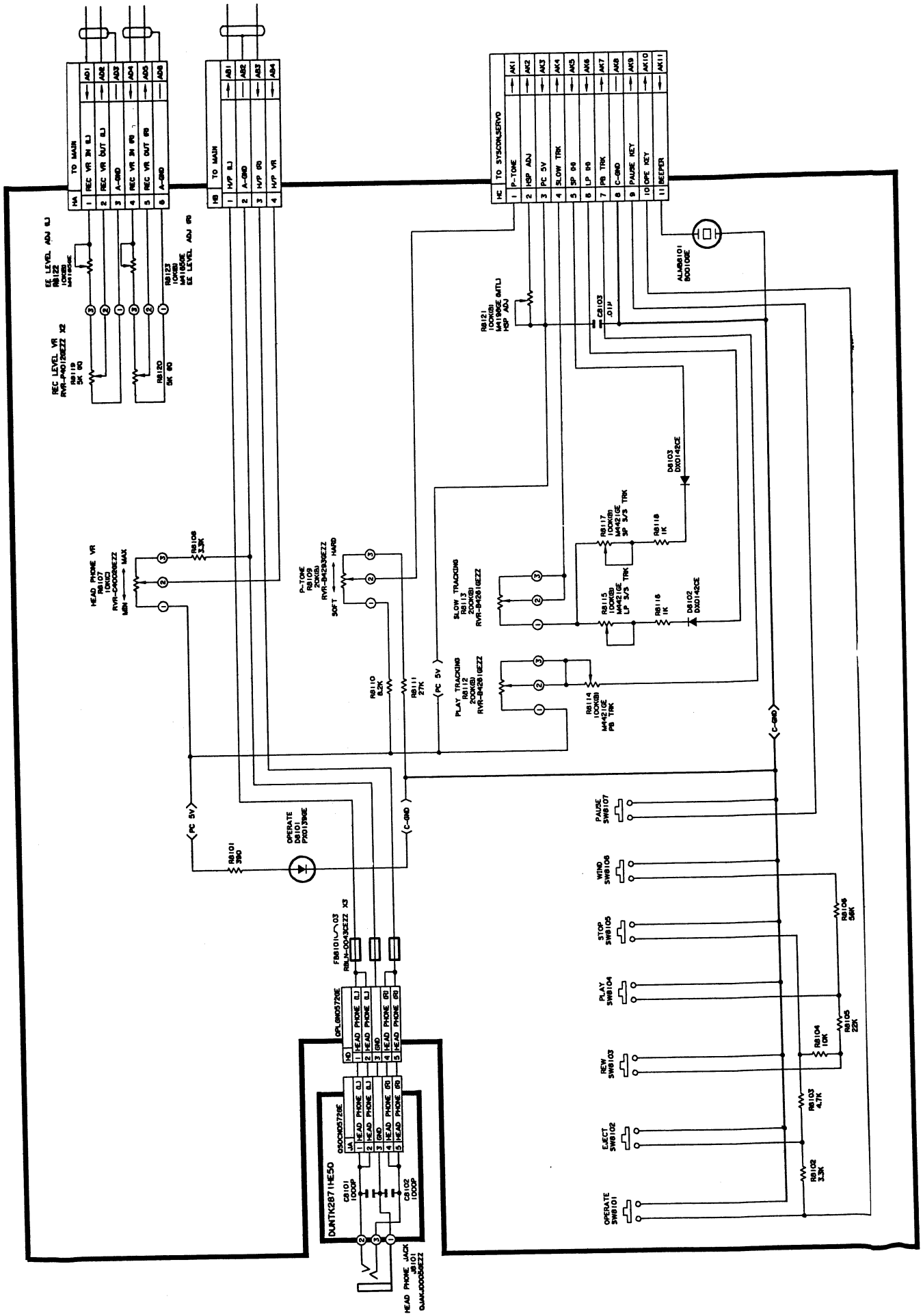
CS 17 769

PWB-B, Y/C AUDIO CIRCUIT SCHEMATIC DIAGRAM (VR6943/02A)

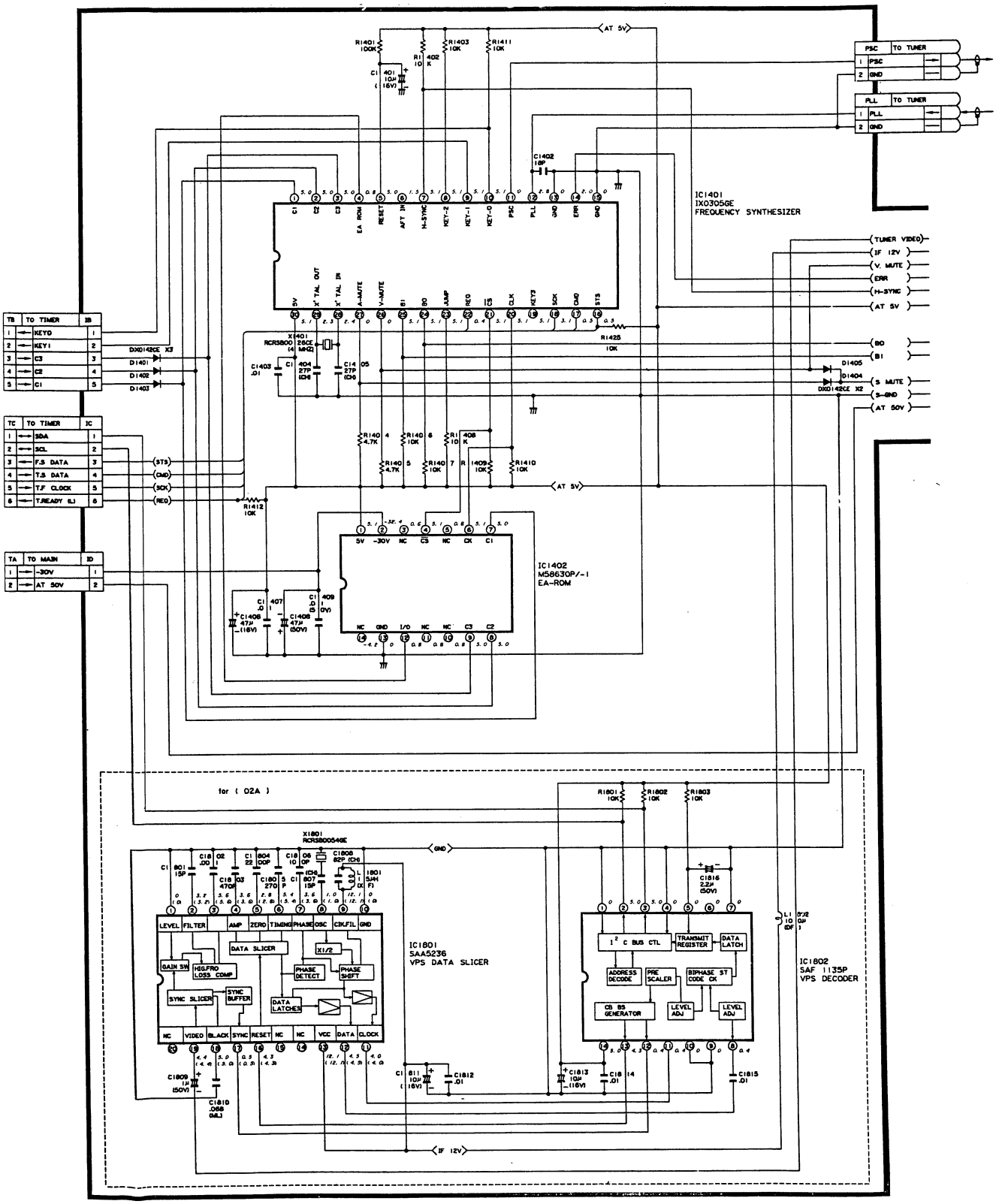
Record Luminance signal
Record Chrominance signal
Video E–E signal
Playback Luminance signal
Playback Chrominance signal

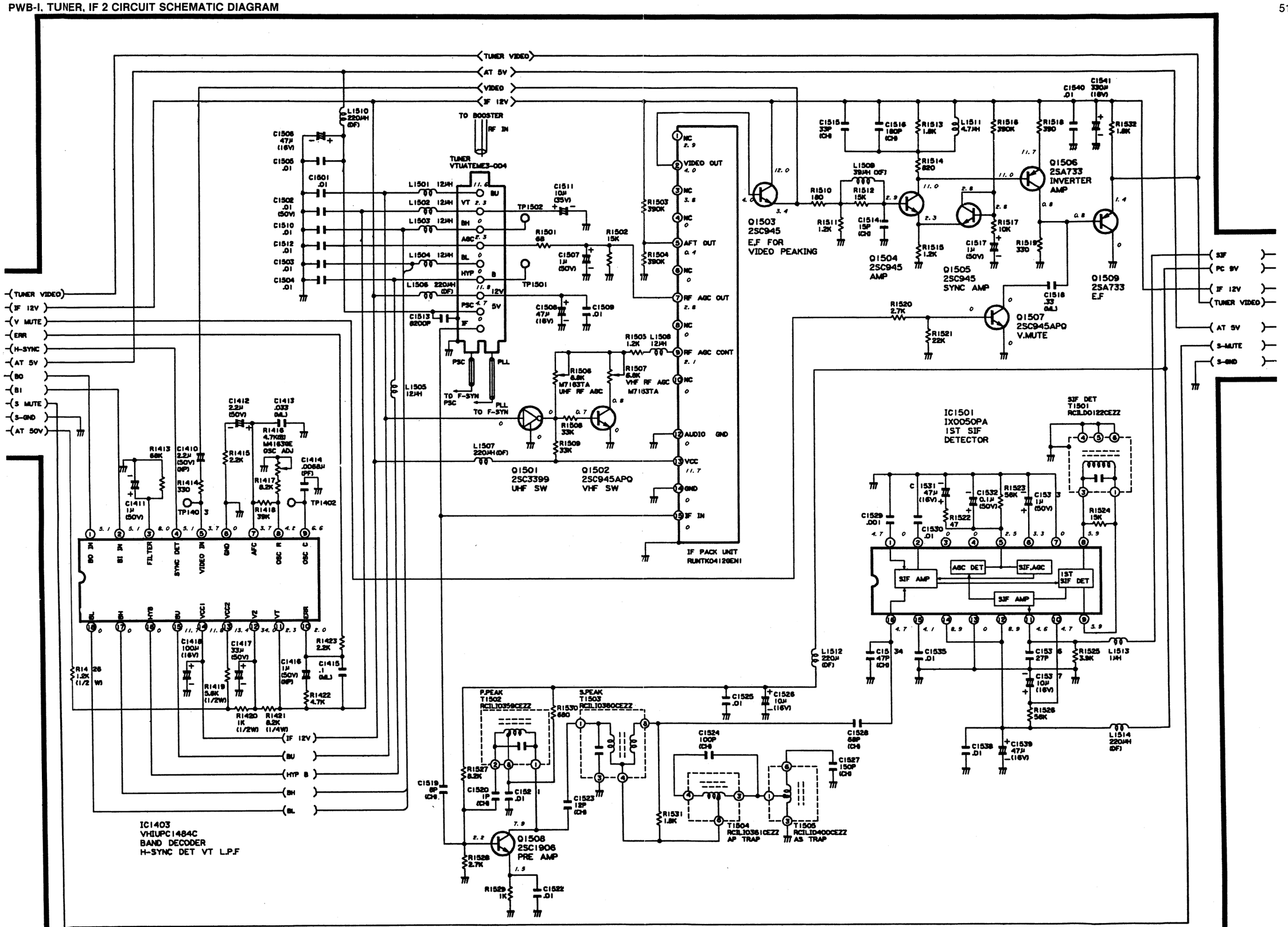


PWB-H, OPERATION CIRCUIT SCHEMATIC DIAGRAM



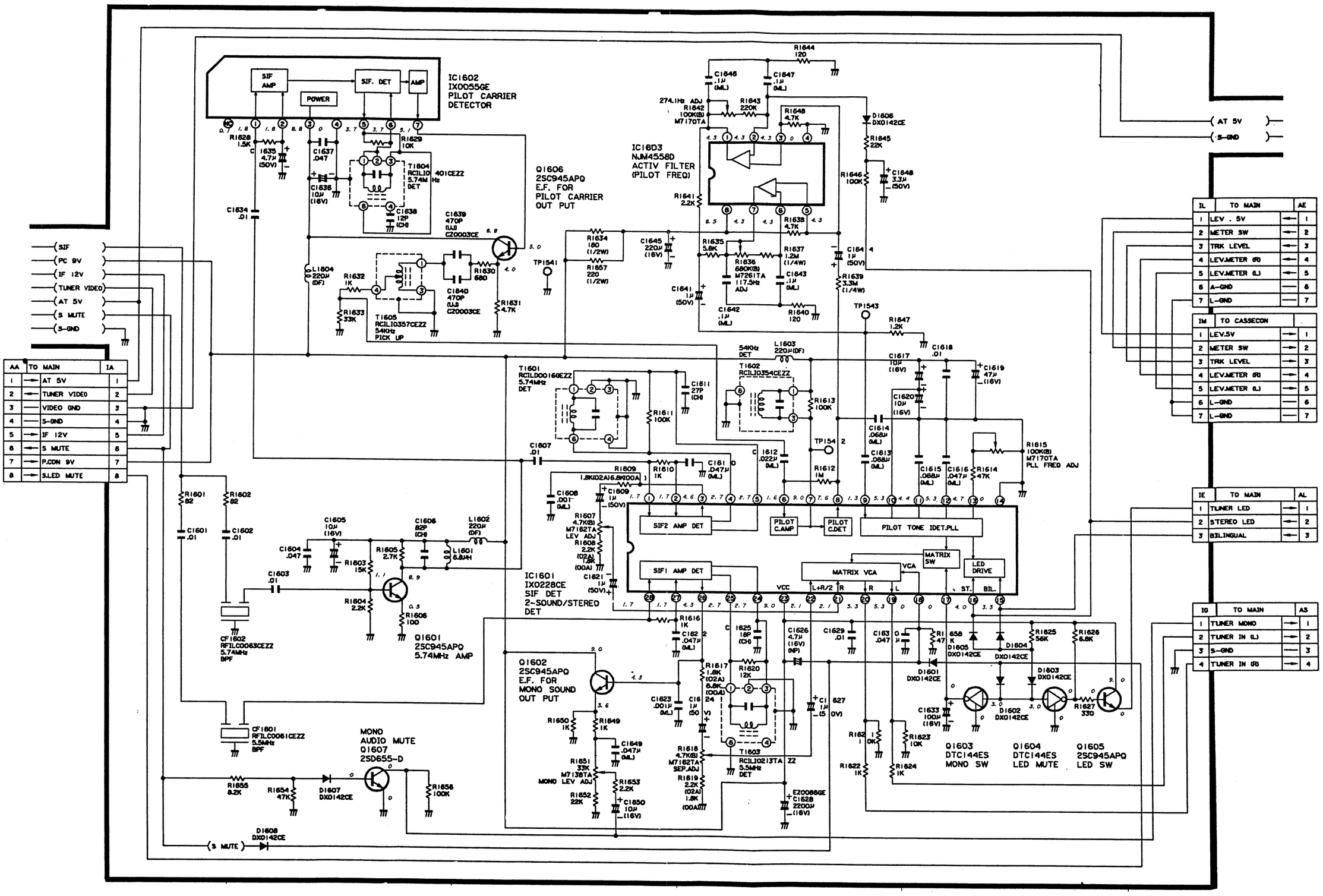
PWB-I, F-SYN, VPS (TUNER, IF 1) CIRCUIT SCHEMATIC DIAGRAM




TUNER VIDEO
AT 5V
VIDEO
IF 12V
TO BOOSTER
RF IN
TUNER VTUATEME3-004
L1510 220UH (DF)
C1506 47µ (16V)
C1505 .01
C1501 .01
C1502 .01 (50V)
C1510 .01
C1512 .01
C1503 .01
C1504 .01
L1501 12UH
L1502 12UH
L1503 12UH
L1504 12UH
L1506 220UH (DF)
C1513 6200P
BU
VT
BH
AGC
BL
HYP
B
12V
PSC
5V
IF
PLL
TP1502
TP1501
R1501 68
R1502 15K
C1511 10µ (35V)
C1507 1µ (50V)
C1508 47µ (16V)
C1509 .01
L1505 12UH
TO F-SYN
PSC
PLL
TO F-SYN
NC
VIDEO OUT
AFT OUT
RF AGC OUT
RF AGC CONT
AUDIO GND
VCC
GND
IF IN
R1503 390K
R1504 390K
R1505 1.2K
L1508 12UH
R1506 6.8K M7163TA UHF RF AGC
R1507 6.8K VHF RF AGC M7163TA
R1508 33K
R1509 33K
L1507 220UH (DF)
Q1501 2SC3399 UHF SW
Q1502 2SC945APQ VHF SW
IF PACK UNIT RUNTK0412GEN1
Q1503 2SC945 E.F FOR VIDEO PEAKING
R1510 180
R1511 1.2K
L1509 39UH (DF)
R1512 15K
C1514 15P (CH)
R1513 1.8K
L1511 4.7UH
R1514 820
R1515 1.2K
R1516 390K
C1515 33P (CH)
C1516 180P (CH)
R1517 10K
C1517 1µ (50V)
R1518 390
R1519 330
C1540 .01
C1541 330µ (16V)
R1532 1.8K
Q1504 2SC945 AMP
Q1505 2SC945 SYNC AMP
Q1506 2SA733 INVERTER AMP
Q1509 2SA733 E.F
C1518 .33 (MF)
R1520 2.7K
R1521 22K
Q1507 2SC945APQ V.MUTE
SIF
PC 9V
IF 12V
TUNER VIDEO
AT 5V
S-MUTE
S-GND
TUNER VIDEO
IF 12V
V MUTE
ERR
H-SYNC
AT 5V
BO
BI
S MUTE
S-GND
AT 50V
R1413 68K
C1410 2.2µ (50V) (NP)
R1414 330
TP1403
C1411 1µ (50V)
C1412 2.2µ (50V)
R1415 2.2K
C1413 .033 (MF)
R1416 4.7K(B) M41639E OSC ADJ
C1414 .0068µ (PP)
R1417 8.2K
R1418 39K
TP1402
BO IN
BI IN
FILTER
SYNC DET
VIDEO IN
GND
AFC
OSC R
OSC C
BL
BH
HYB
BU
VCC1
VCC2
V2
VT
ERR
C1418 100µ (16V)
C1417 33µ (50V)
C1416 1µ (50V) (NP)
C1415 .1 (MF)
R1423 2.2K
R1422 4.7K
R1419 5.6K (1/2W)
R1420 1K (1/2W)
R1421 8.2K (1/4W)
R14 26 1.2K (1/2 W)
IC1403 VHIUPC1484C BAND DECODER H-SYNC DET VT L.P.F
IC1501 IX0050PA 1ST SIF DETECTOR
SIF DET T1501 RCILD0122CEZZ
C1531 47µ (16V)
C1532 0.1µ (50V)
R1523 56K
C153 3 1µ (50V)
R1524 15K
R1522 47
C1529 .001
C1530 .01
SIF AMP
AGC DET
SIF AGC
1ST SIF DET
SIF AMP
C15 34 47P (CH)
C1535 .01
C153 6 27P
C153 7 10µ (16V)
R1525 3.9K
L1513 1µH
R1526 56K
C1538 .01
C1539 47µ (16V)
L1514 220UH (DF)
L1512 220µ (DF)
P.PEAK T1502 RCILI0359CEZZ
S.PEAK T1503 RCILI0380CEZZ
R1530 680
C1525 .01
C1526 10µ (16V)
C1528 68P (CH)
C1524 100P (CH)
C1527 150P (CH)
T1504 RCILI0361CEZZ AP TRAP
T1505 RCILI0400CEZZ AS TRAP
R1531 1.8K
C1519 6P (CH)
R1527 8.2K
C1520 1P (CH)
C152 1 .01
C1523 12P (CH)
Q1508 2SC1906 PRE AMP
R1528 2.7K
R1529 1K
C1522 .01
IF 12V
BU
HYP B
BH
BL

CS 17 77.3

PWB-I, SIF (TUNER, IF 3) CIRCUIT SCHEMATIC DIAGRAM



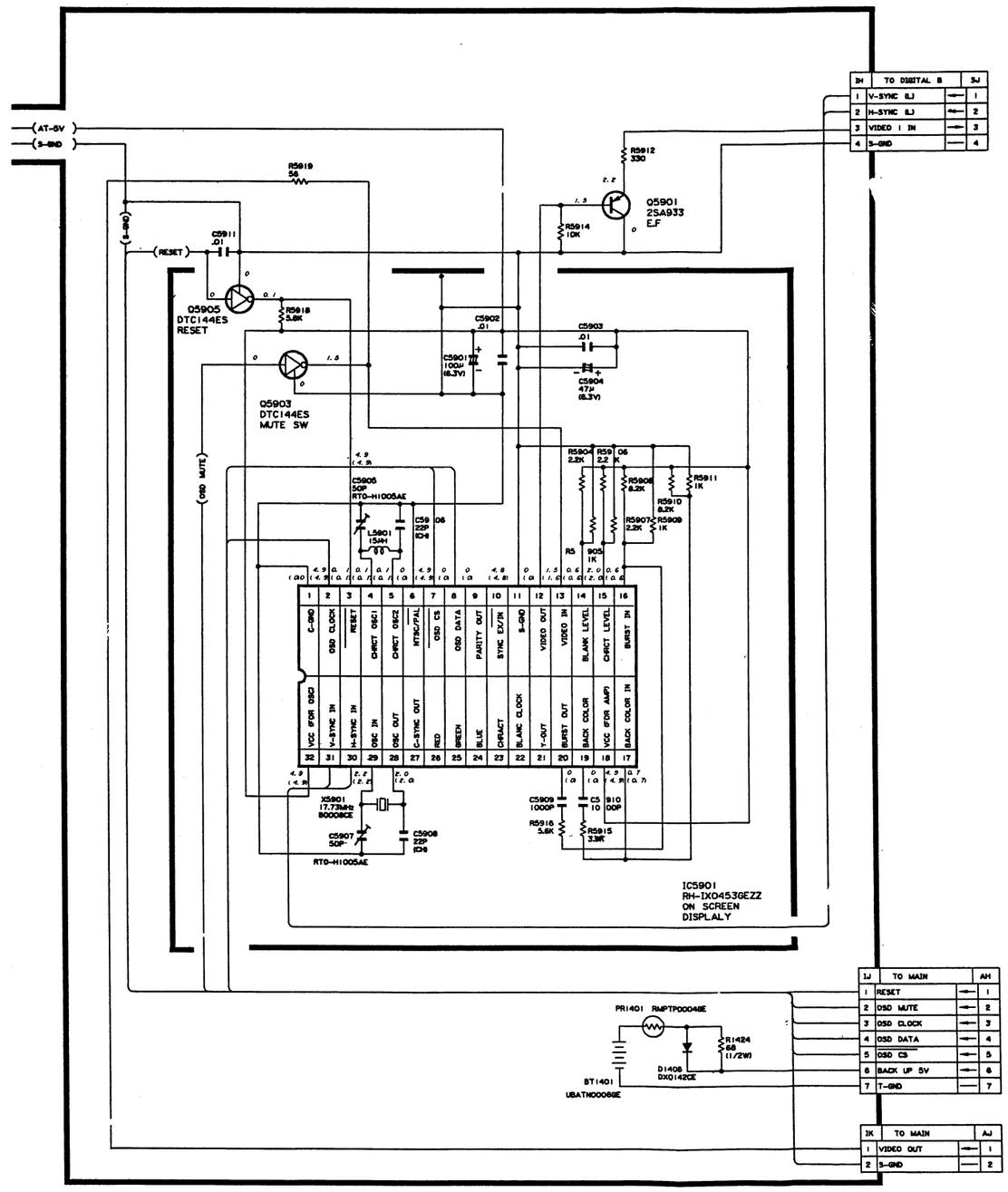
AA	TO MAIN		IA
1	←	AT 5V	1
2	—	TUNER VIDEO	2
3	—	VIDEO GND	3
4	—	S-GND	4
5	→	IF 12V	5
6	←	S MUTE	6
7	→	P.CON 9V	7
8	→	S.LED MUTE	8

IL	TO MAIN		AE
1	LEV . 5V	←	1
2	METER SW	←	2
3	TRK LEVEL	←	3
4	LEV.METER (R)	←	4
5	LEV.METER (L)	←	5
6	A-GND	—	6
7	L-GND	—	7

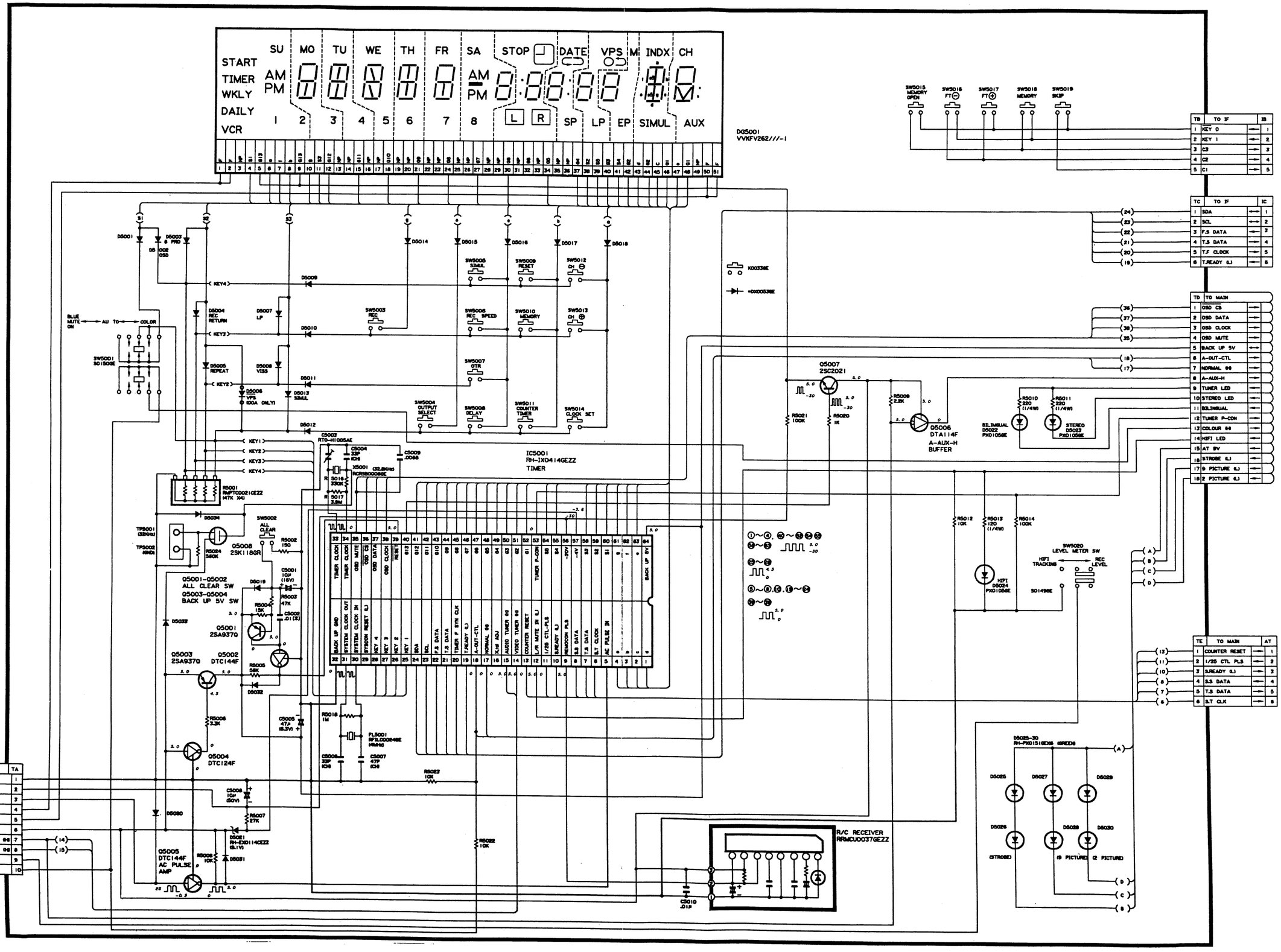
IM	TO CASSECON		
1	LEV.5V	→	1
2	METER SW	→	2
3	TRK LEVEL	→	3
4	LEV.METER (R)	→	4
5	LEV.METER (L)	→	5
6	L-GND	—	6
7	L-GND	—	7

IE	TO MAIN		AL
1	TUNER LED	→	1
2	STEREO LED	→	2
3	BILINGUAL	→	3

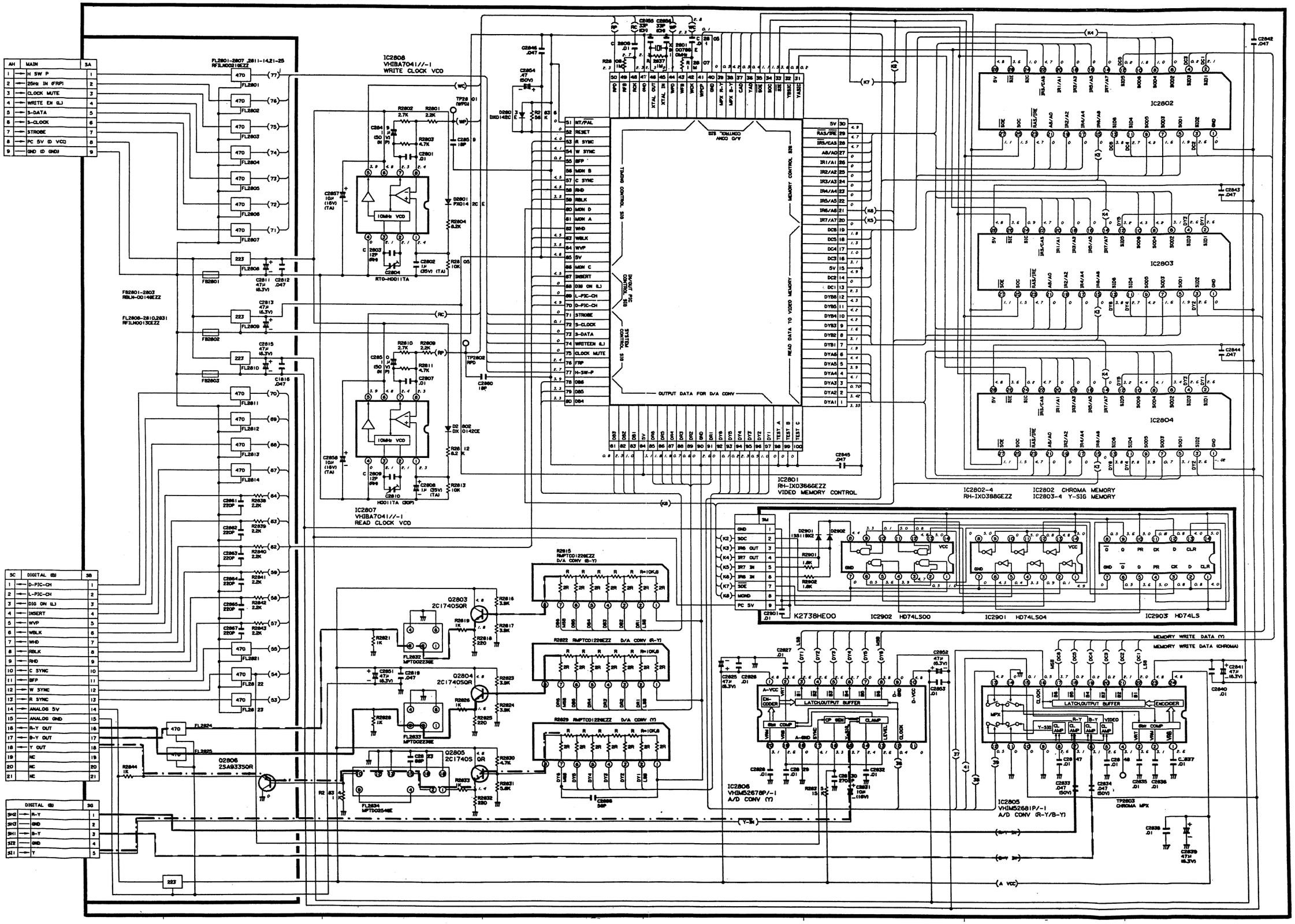
IG	TO MAIN		AS
1	TUNER MONO	→	1
2	TUNER IN (L)	→	2
3	S-GND	—	3
4	TUNER IN (R)	→	4


IM TO DIGITAL B SJ
1 V-SYNC (L) 1
2 H-SYNC (L) 2
3 VIDEO 1 IN 3
4 S-GND 4
(AT-5V)
(S-GND)
R5919 56
C5911 .01
(RESET)
Q5905 DTC144ES RESET
R5918 5.6K
Q5903 DTC144ES MUTE SW
(OSD MUTE)
C5902 .01
C5901 100µ (6.3V)
C5903 .01
C5904 47µ (6.3V)
R5912 330
Q5901 2SA933 E,F
R5914 10K
R5904 2.2K
R5906 8.2K
R5907 2.2K
R5908 1K
R5910 8.2K
R5911 1K
R5905 1K
C5905 50P RTG-H1005AE
L5901 15µH
C5906 22P (CH)
C5909 1000P
C5910 000P
R5916 5.6K
R5915 3.3K
X5901 17.73MHz 8000862E
C5907 50P RTG-H1005AE
C5908 22P (CH)
C-GND
OSD CLOCK
RESET
CHRCT OSC1
CHRCT OSC2
NTSC/PAL
OSD CS
OSD DATA
PARITY OUT
SYNC EX/IN
S-GND
VIDEO OUT
VIDEO IN
BLANK LEVEL
CHRCT LEVEL
BURST IN
VCC (FOR OSC)
V-SYNC IN
H-SYNC IN
OSC IN
OSC OUT
C-SYNC OUT
RED
GREEN
BLUE
CHRACT
BLANK CLOCK
Y-OUT
BURST OUT
BACK COLOR
VCC (FOR AMP)
BACK COLOR IN
IC5901
RH-IX0453GEZZ
ON SCREEN
DISPLALY
IJ TO MAIN AH
1 RESET 1
2 OSD MUTE 2
3 OSD CLOCK 3
4 OSD DATA 4
5 OSD CS 5
6 BACK UP 5V 6
7 T-GND 7
PR1401 RMPTP00046E
R1424 68 (1/2W)
D1408 DX0142CE
BT1401 UBATN0006GE
IK TO MAIN AJ
1 VIDEO OUT 1
2 S-GND 2

PWB-T, TIMER CIRCUIT SCHEMATIC DIAGRAM



CS 17 776


IC2808
VHIBA7041//-1
WRITE CLOCK VCO
IC2807
VHIBA7041//-1
READ CLOCK VCO
IC2801
RH-IX0366GEZZ
VIDEO MEMORY CONTROL
IC2802-4
RH-IX0388GEZZ
IC2802 CHROMA MEMORY
IC2803-4 Y-SIG MEMORY
IC2806
VHIM52678P/-1
A/D CONV (Y)
IC2805
VHIM52681P/-1
A/D CONV (R-Y/B-Y)
K2738HE00
IC2902 HD74LS00
IC2901 HD74LS04
IC2903 HD74LS
MEMORY WRITE DATA (Y)
MEMORY WRITE DATA (CHROMA)
CHROMA MPX
TP2803

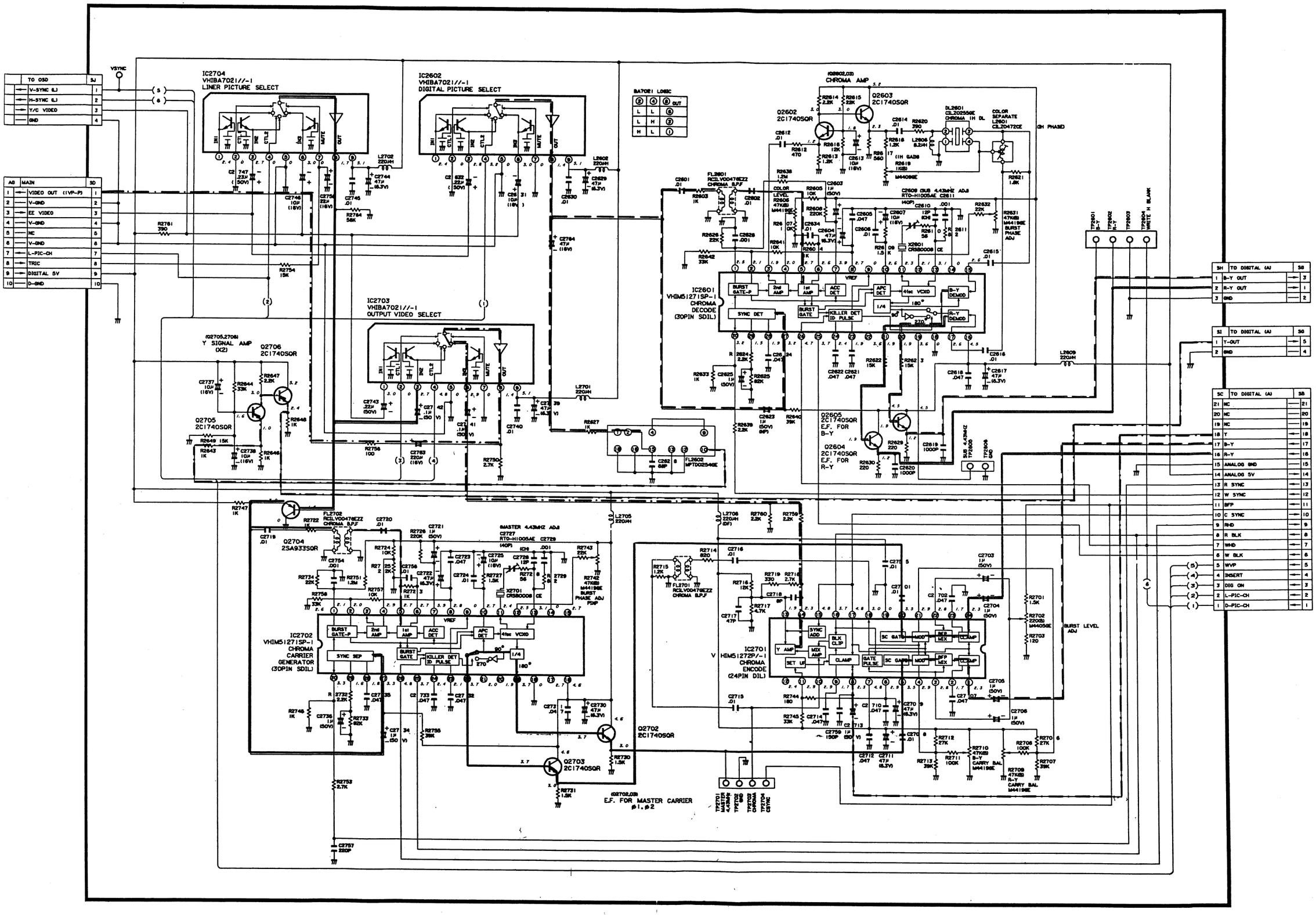
CS 17 777

PWB-S, DIGITAL (B) CIRCUIT SCHEMATIC DIAGRAM

Video (Normal master)
Video (Normal sub.)
Video (Digital)

Sub Carrier
Chrominance
Luminance

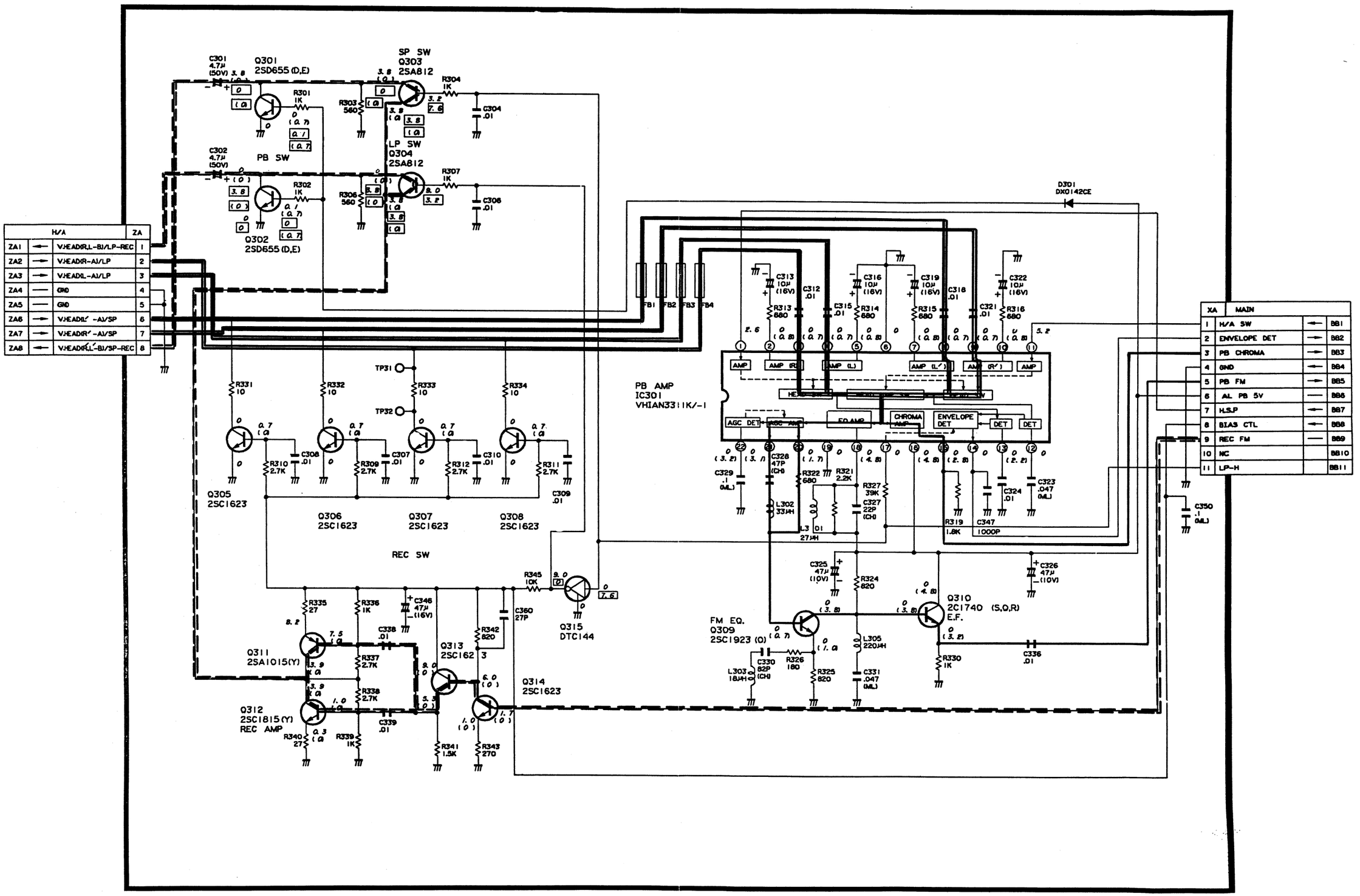
R-Y
B-Y



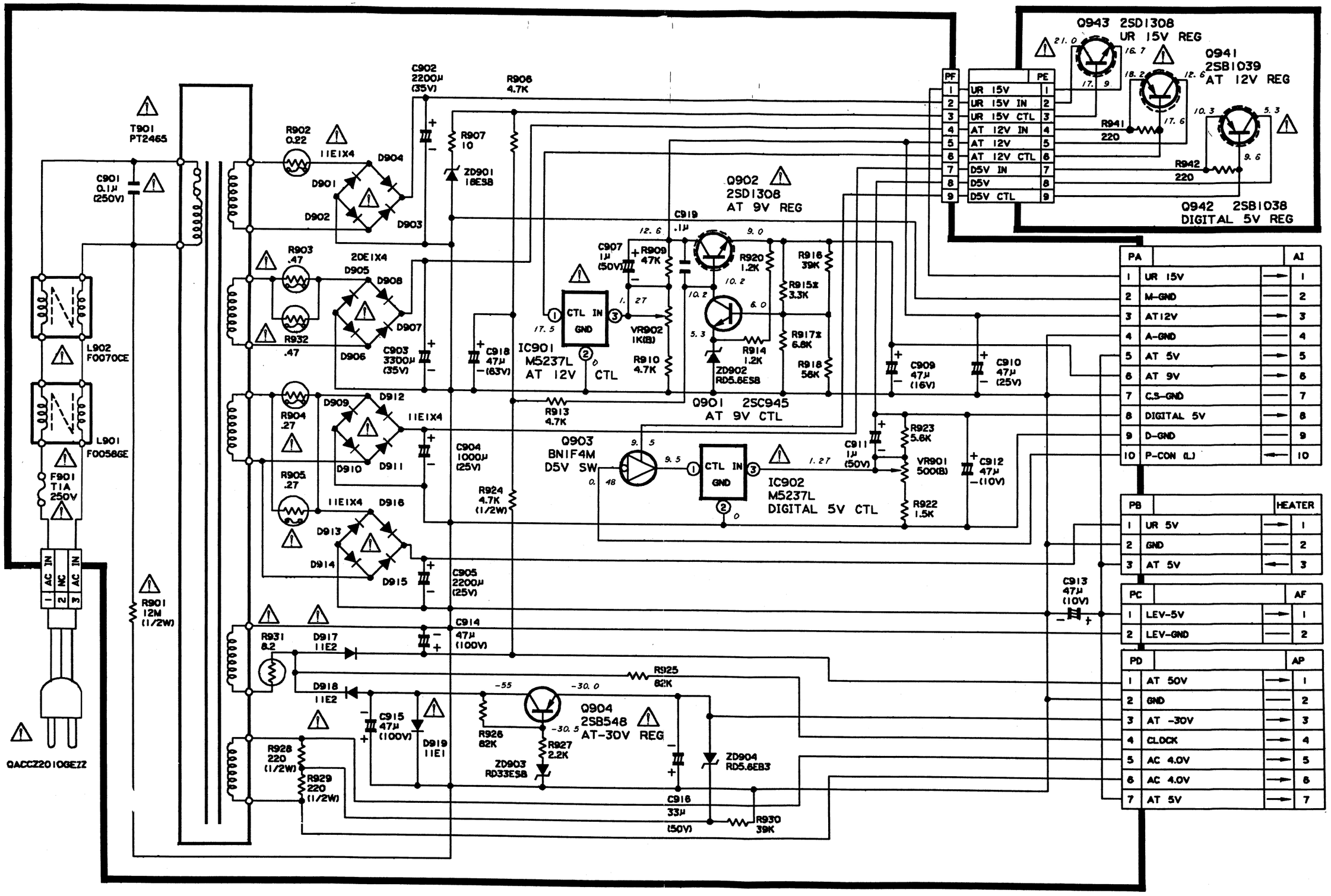
CS 17 778

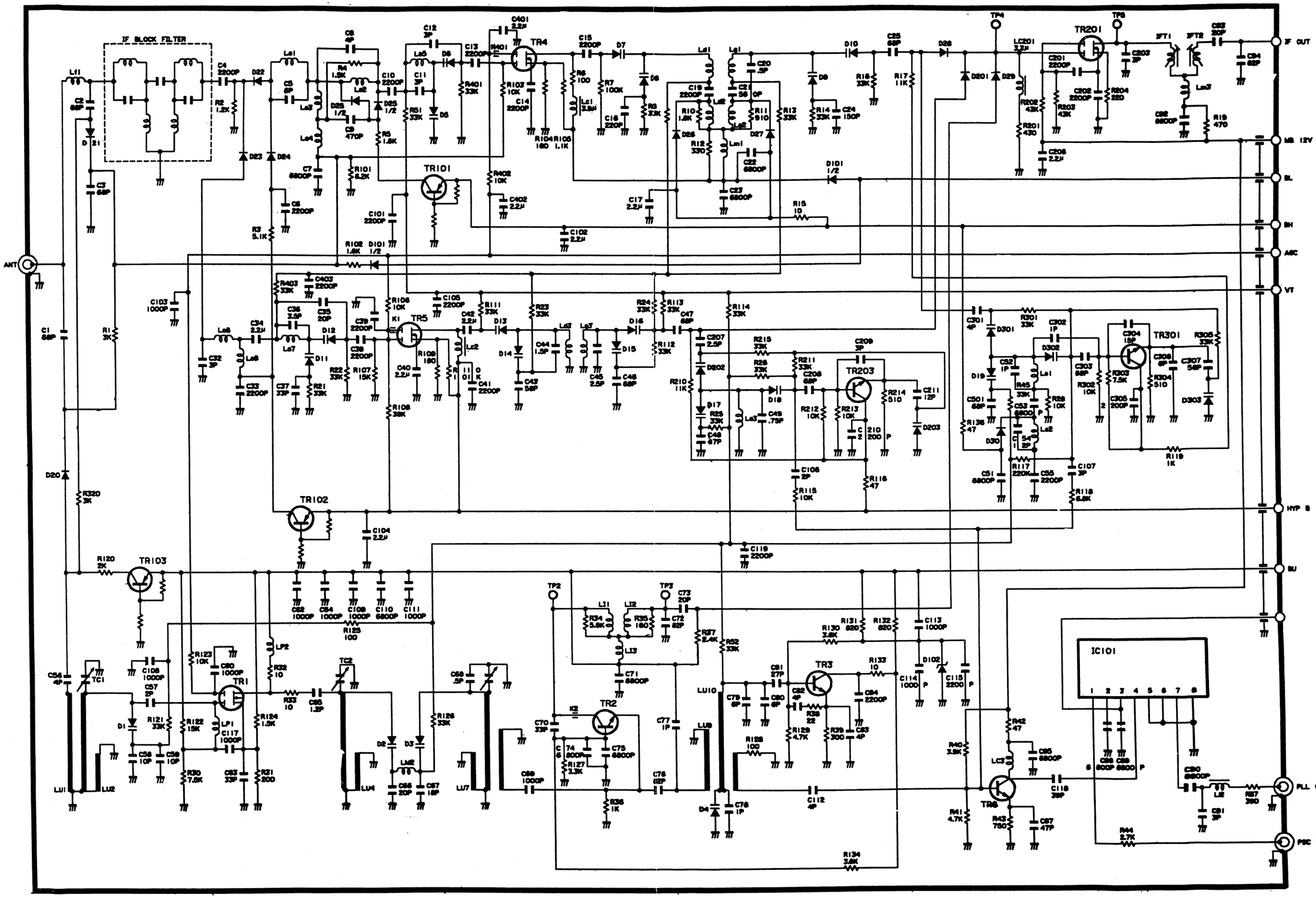
Record FM signal
Playback FM signal

Record Chrominance signal
Playback Chrominance signal



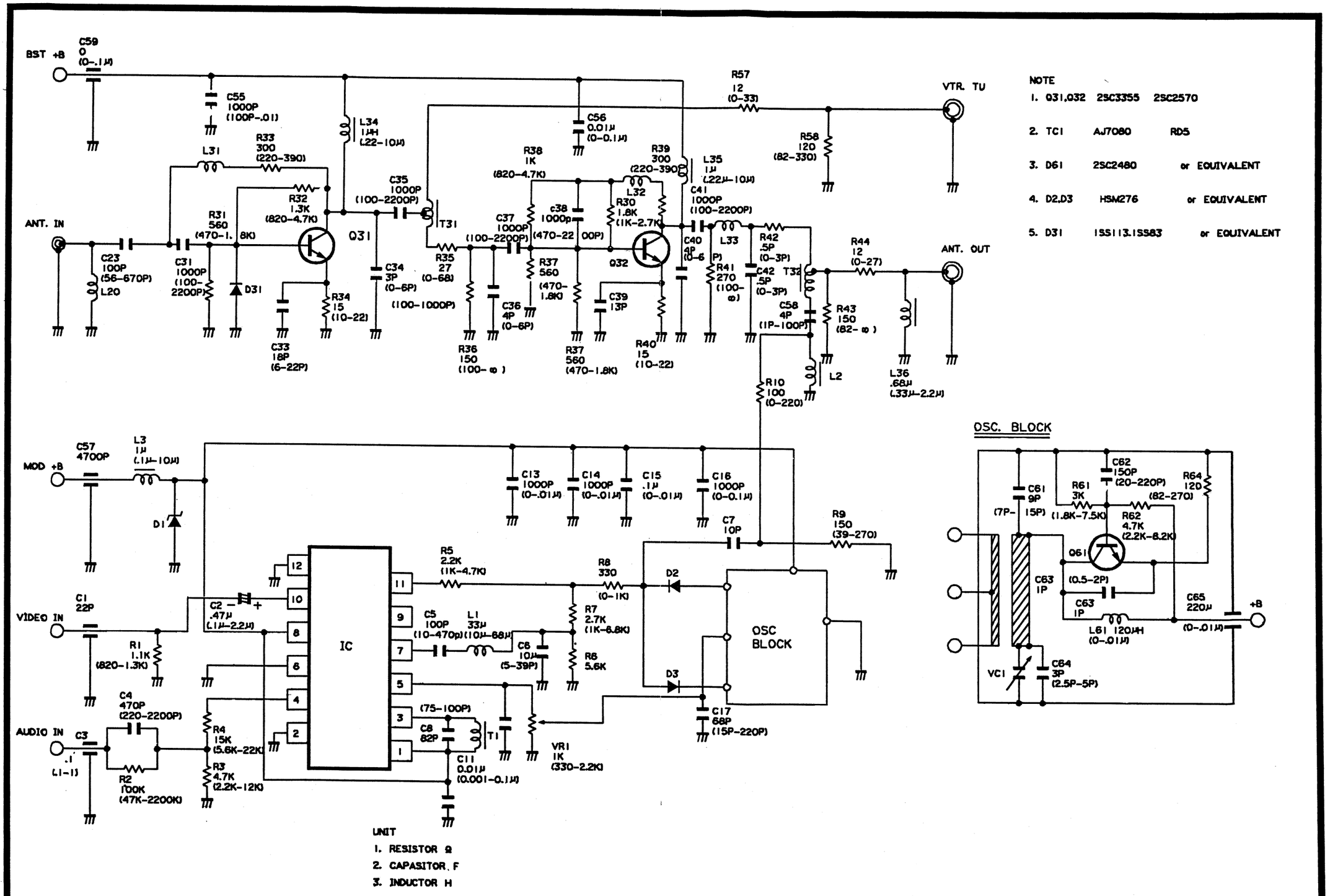
PWB-P, POWER CIRCUIT SCHEMATIC DIAGRAM




IF BLOCK FILTER
TR4
TR101
TR102
TR103
TR1
TR2
TR3
TR5
TR6
TR201
TR203
TR301
IC101
TP2
TP3
TP4
TP5
ANT
IF OUT
MB 12V
BL
BH
AGC
VT
HYP B
BU
PLL OUT
PSC IN

CS 17 781

RF CONVERTER SCHEMATIC DIAGRAM



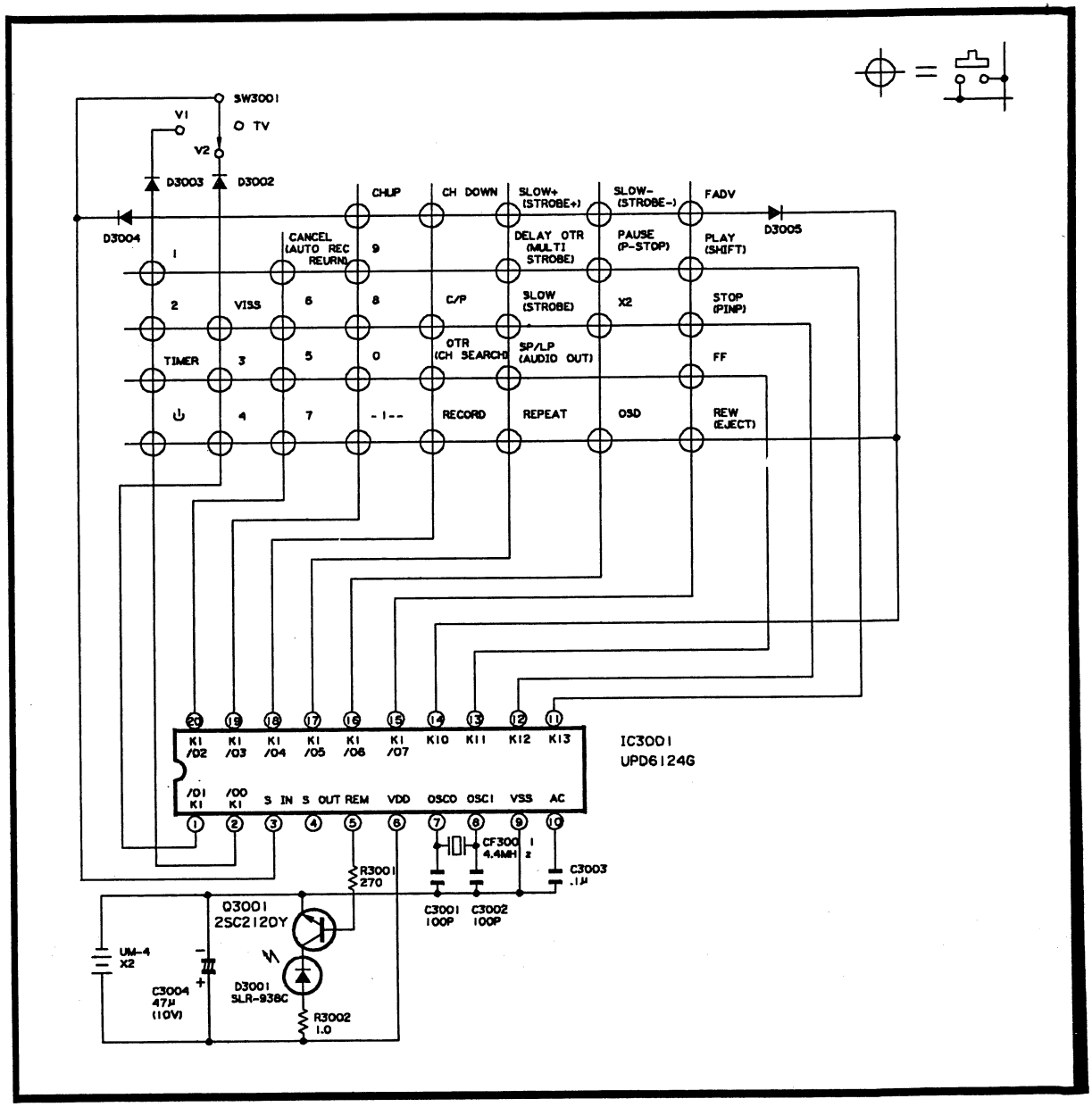
NOTE

1. Q31,Q32 2SC3355 2SC2570
2. TC1 AJ7080 RD5
3. D61 2SC2480 or EQUIVALENT
4. D2,D3 HSM276 or EQUIVALENT
5. D31 1SS113,1SS83 or EQUIVALENT

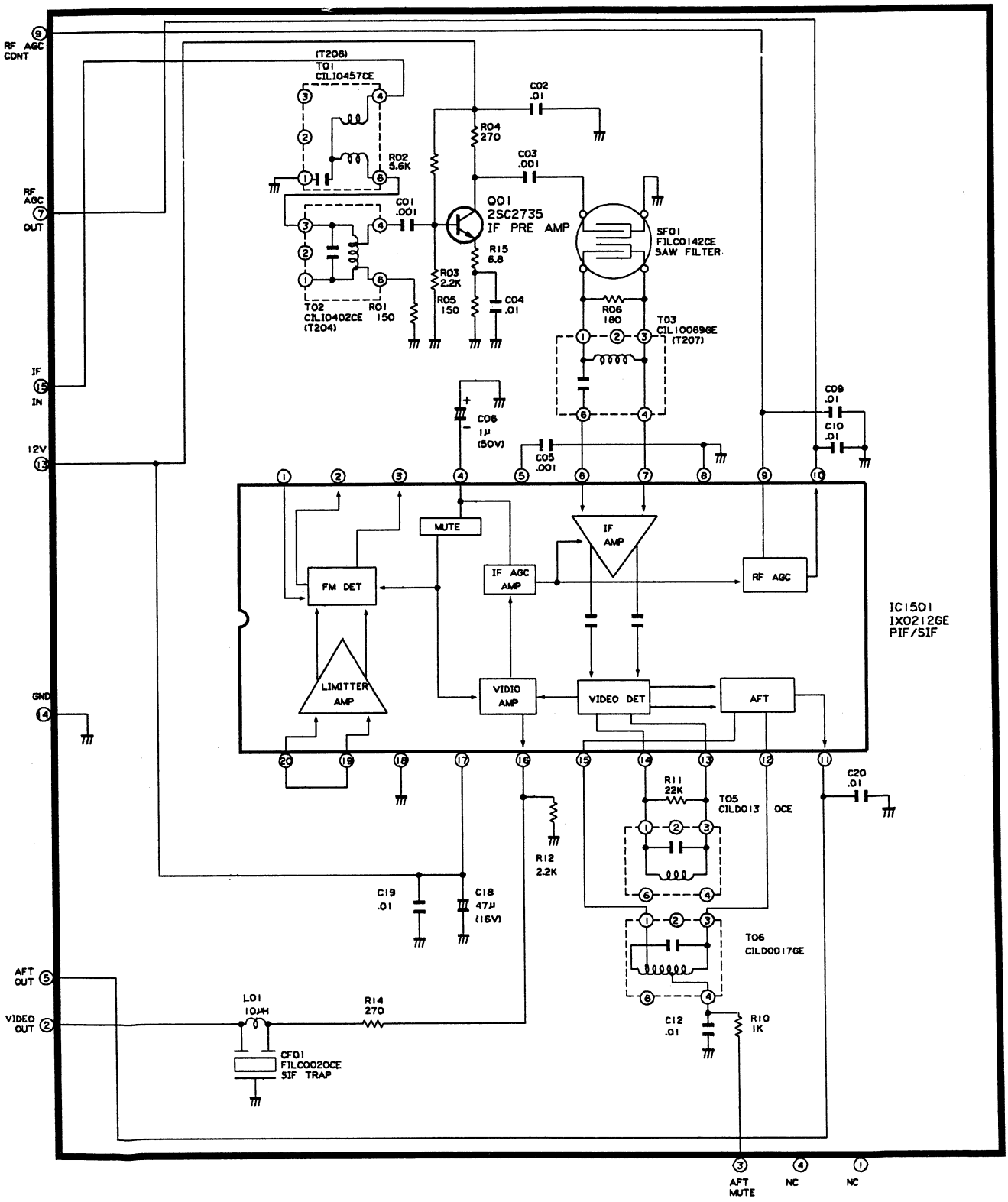
OSC. BLOCK

UNIT

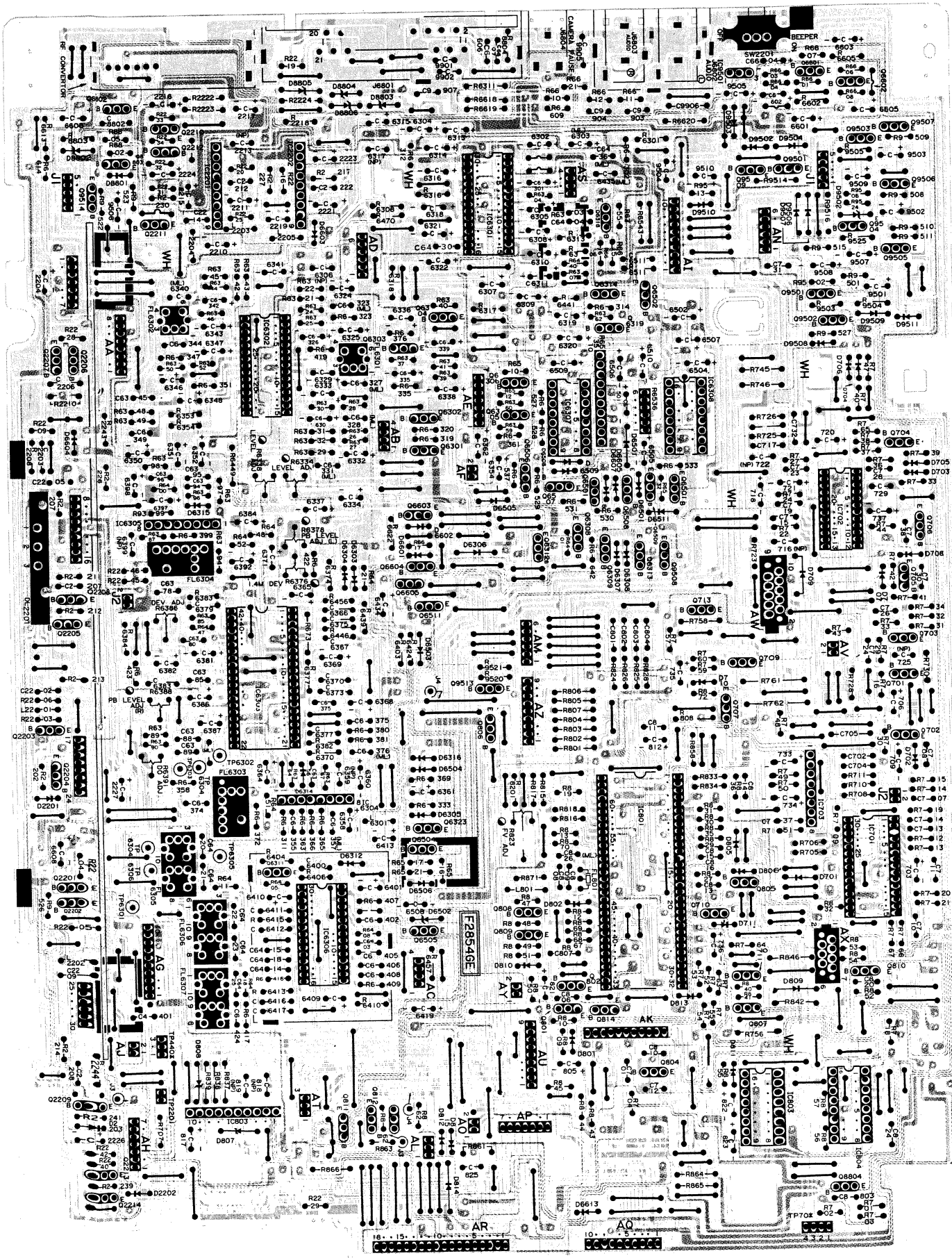
1. RESISTOR Ω
2. CAPASITOR, F
3. INDUCTOR H


SW3001
V1
TV
V2
D3003
D3002
D3004
D3005
CH UP
CH DOWN
SLOW+ (STROBE+)
SLOW- (STROBE-)
FADV
CANCEL (AUTO REC RETURN)
DELAY QTR (MULTI STROBE)
PAUSE (P-STOP)
PLAY (SHIFT)
VISS
C/P
SLOW (STROBE)
X2
STOP (PINP)
TIMER
QTR (CH SEARCH)
SP/LP (AUDIO OUT)
FF
RECORD
REPEAT
OSD
REW (EJECT)
KI /02
KI /03
KI /04
KI /05
KI /06
KI /07
KI0
KI1
KI2
KI3
IC3001
UPD6124G
/01 KI
/00 KI
S IN
S OUT
REM
VDD
OSCO
OSCI
VSS
AC
CF3001 4.4MHz
C3003 .1μ
R3001 270
C3001 100P
C3002 100P
Q3001 2SC2120Y
UM-4 X2
C3004 47μ (10V)
D3001 SLR-938C
R3002 1.0

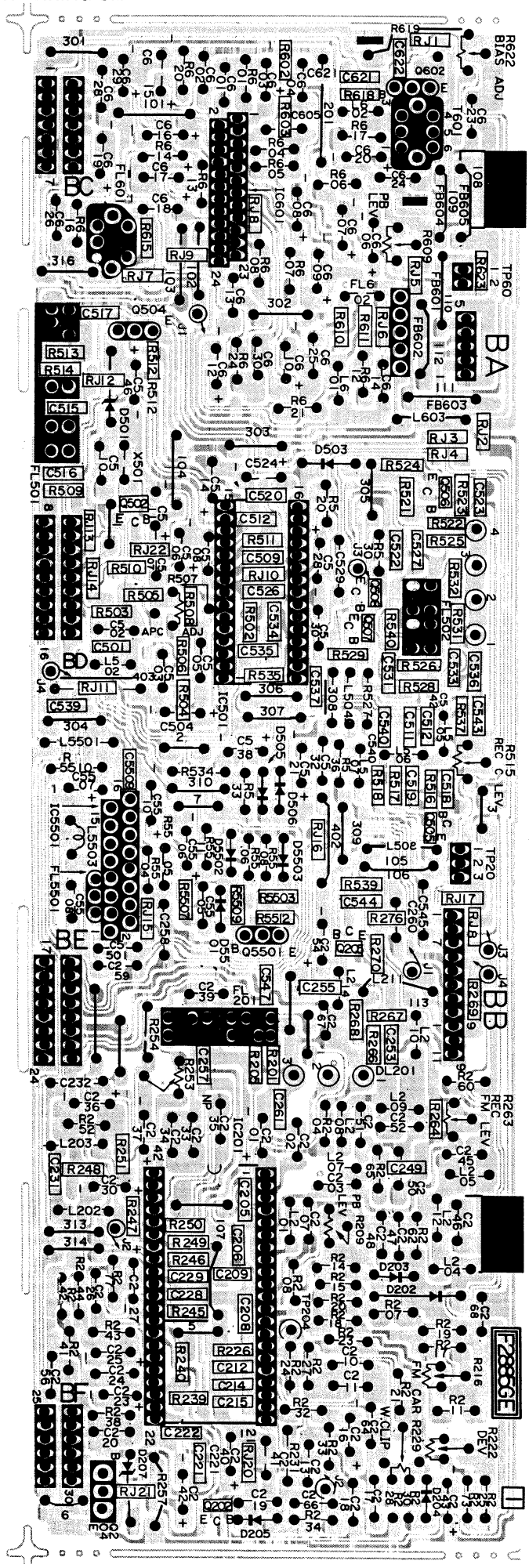
IF UNIT SCHEMATIC DIAGRAM

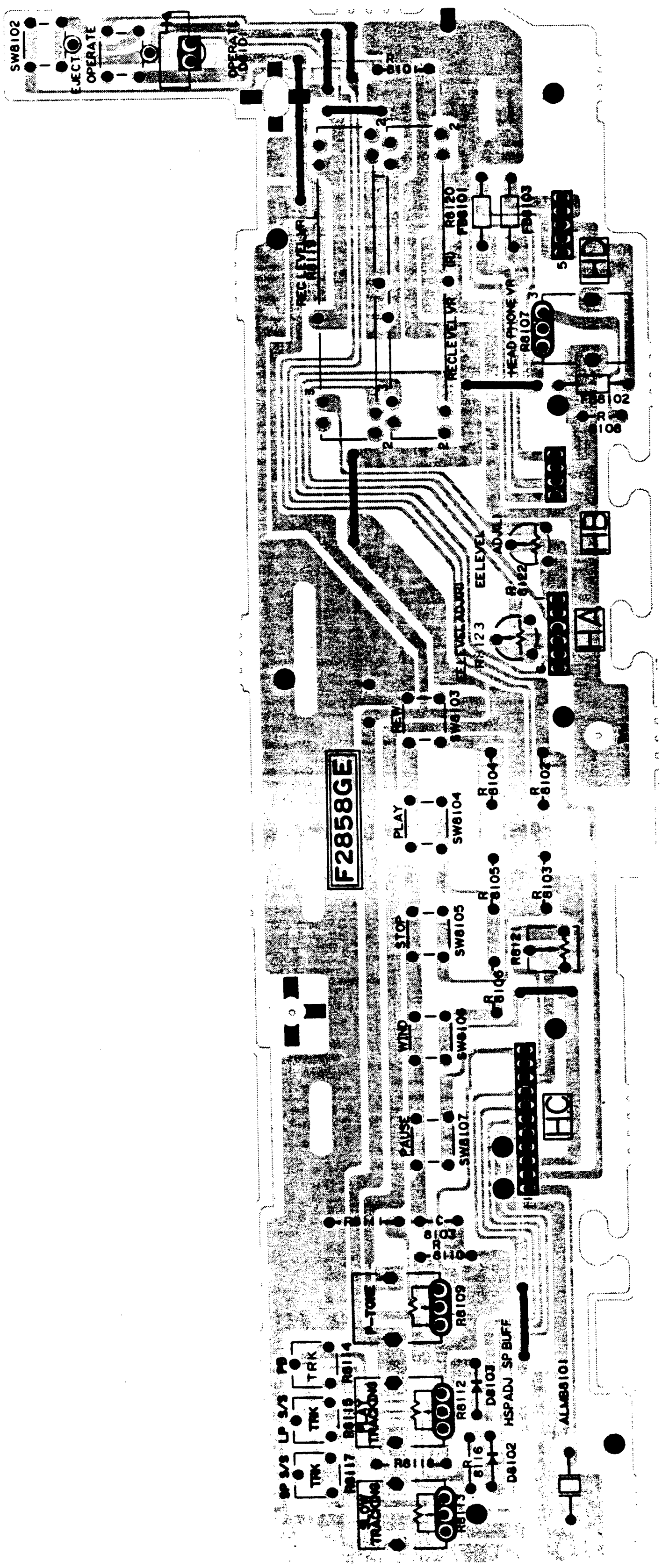


PWB-A, SYSTEM CONTROL SERVO HIFI CIRCUIT WIRING SIDE PWB

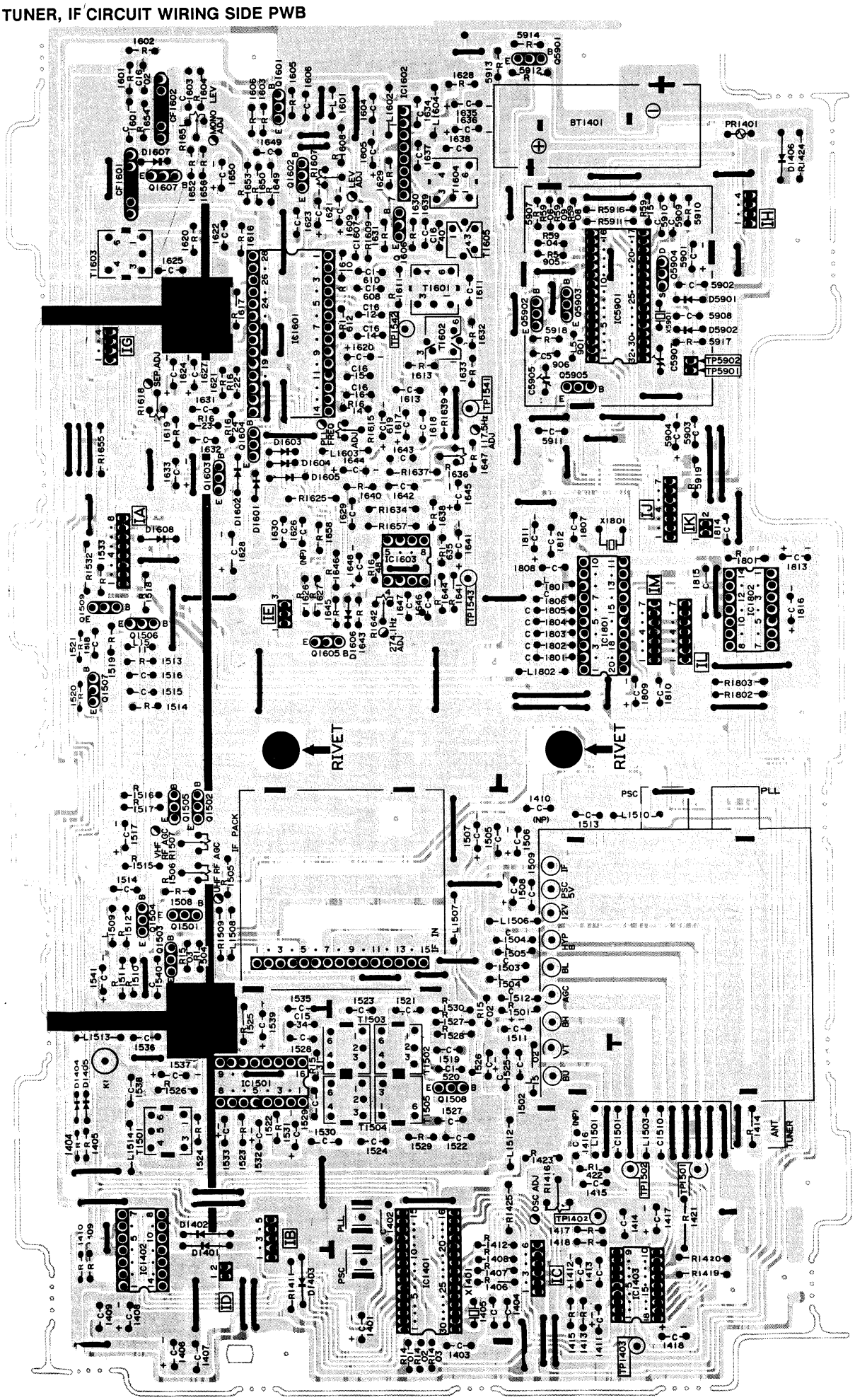


PWB-B, Y/C AUDIO CIRCUIT WIRING SIDE PWB

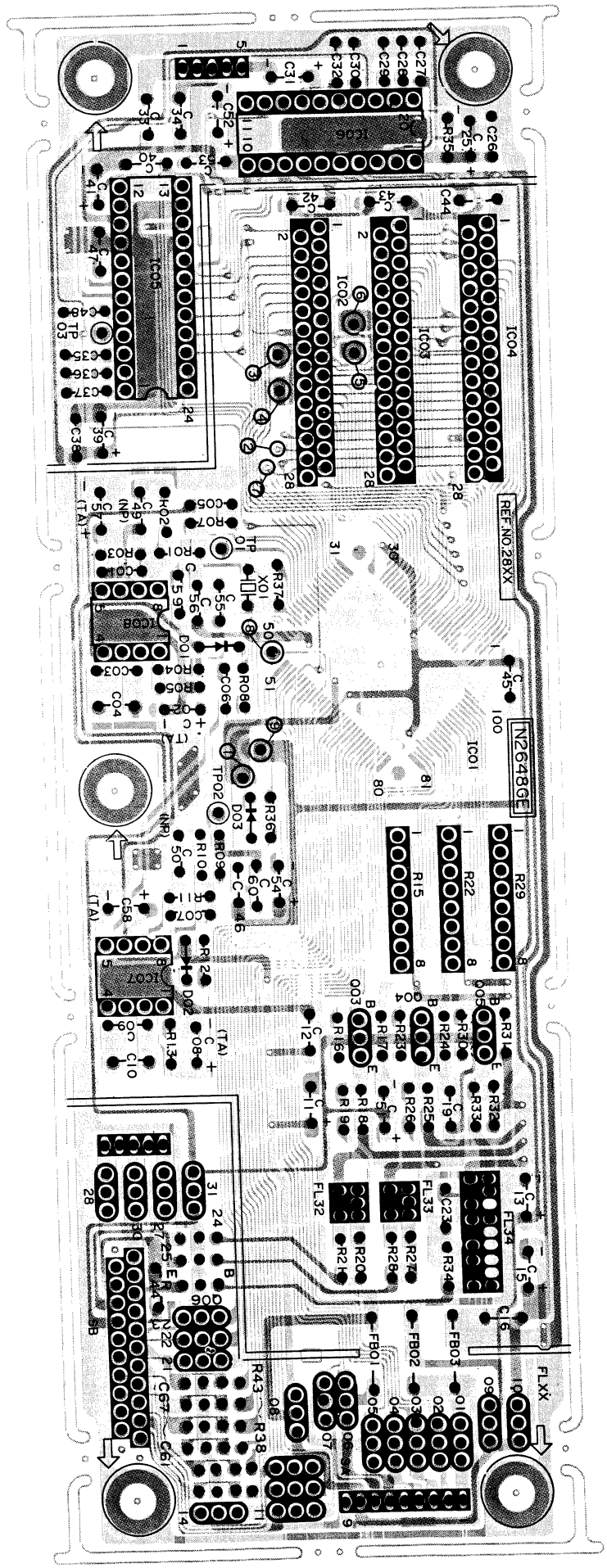



F2858GE
PLAY
STOP
WIND
PAUSE
HA
HB
HC
HD
SW8104
SW8105
SW8107
EJECT
OPERATE

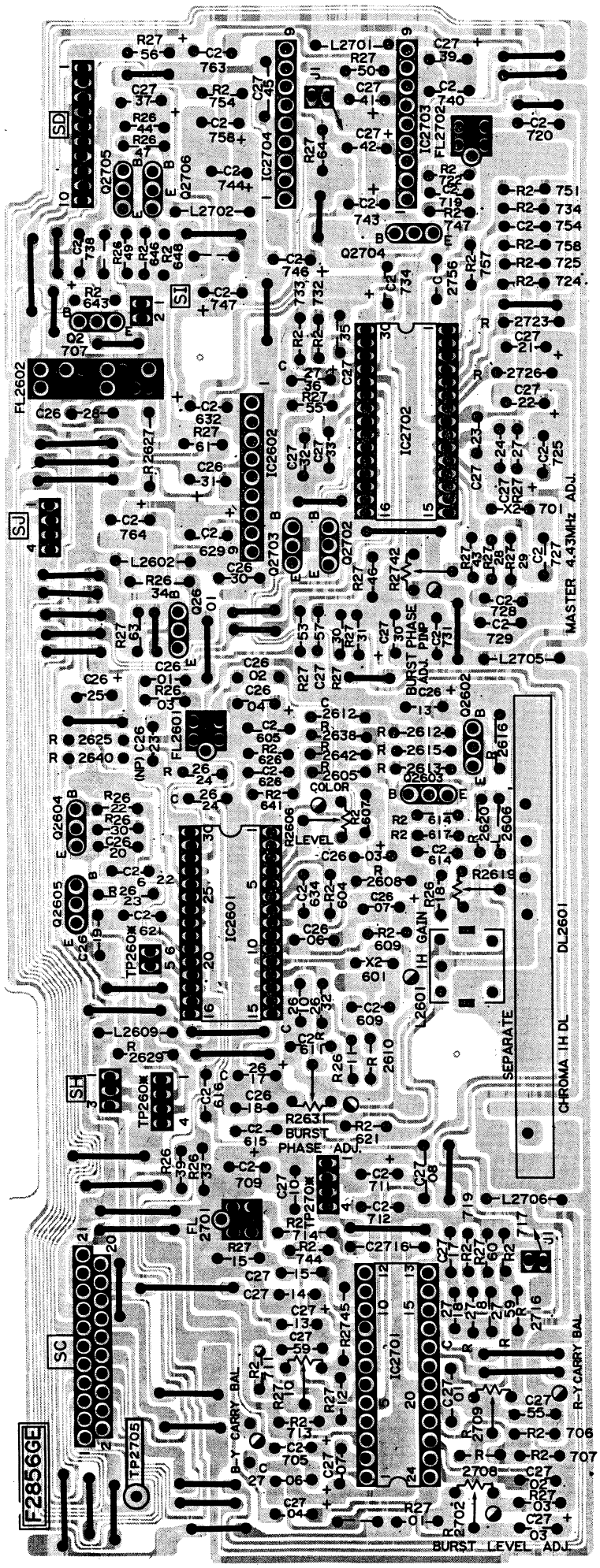
PWB-I, TUNER, IF CIRCUIT WIRING SIDE PWB

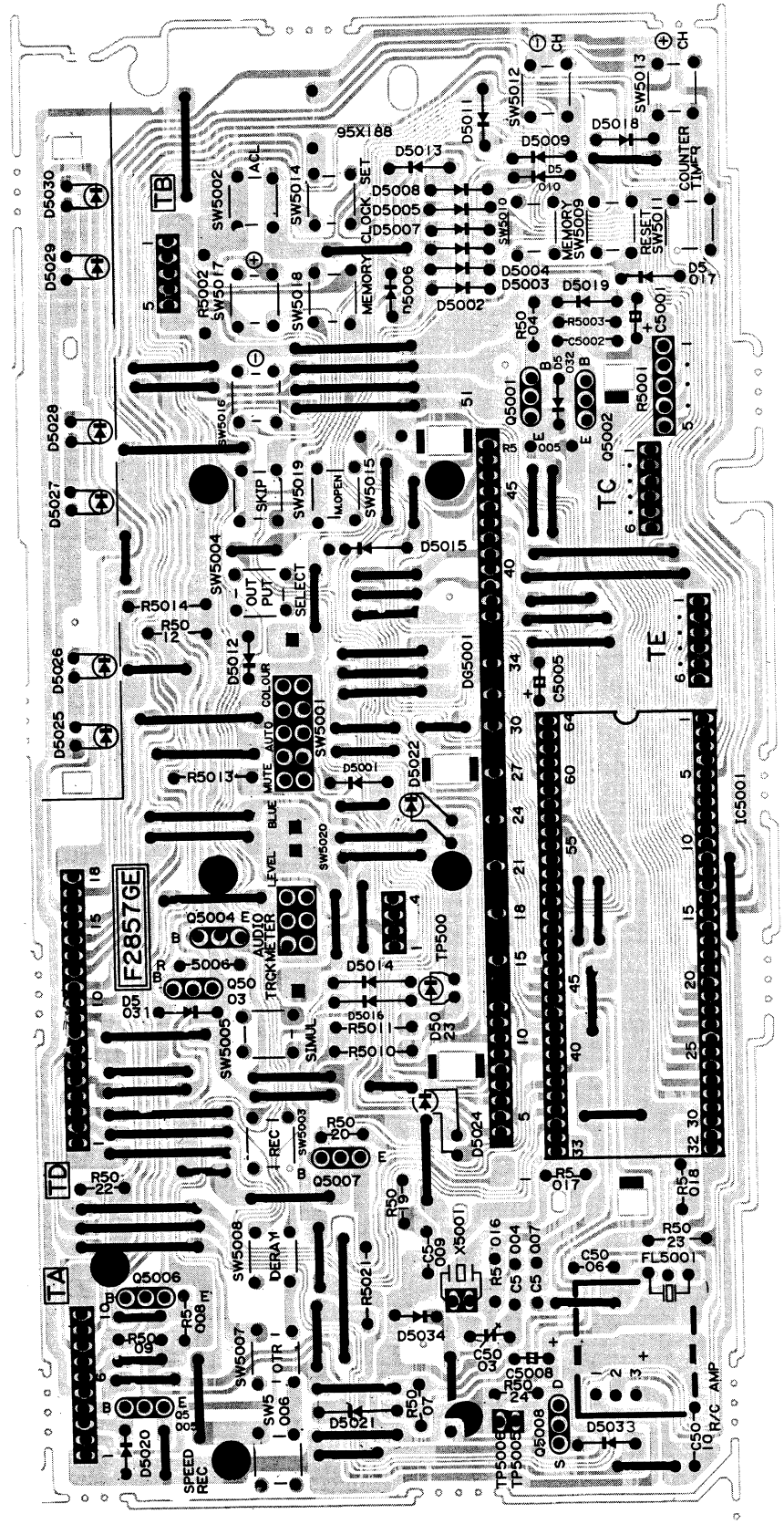


PWB-S, DIGITAL (A) CIRCUIT WIRING SIDE PWB

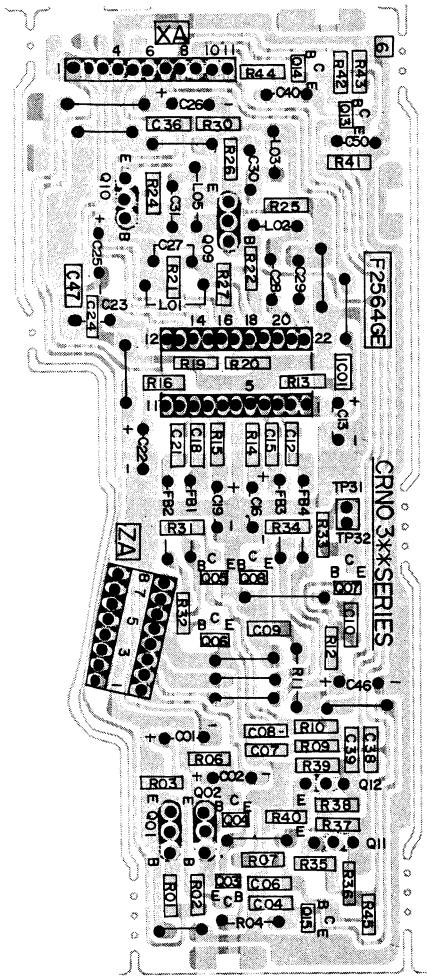


PWB-S, DIGITAL (B) CIRCUIT WIRING SIDE PWB

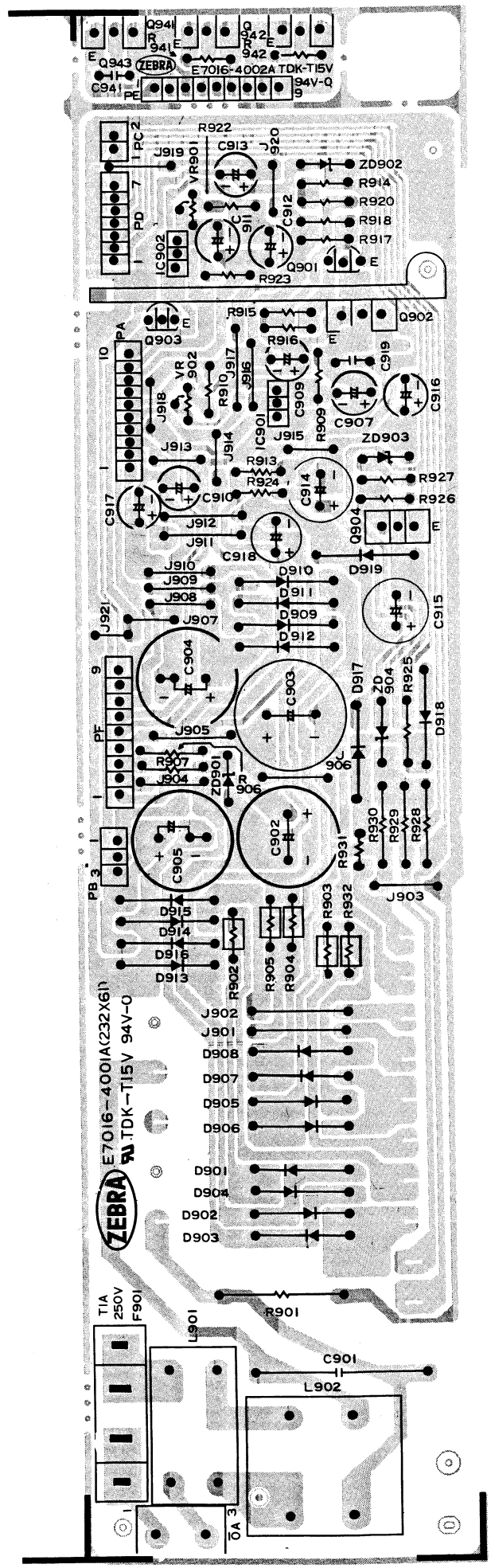


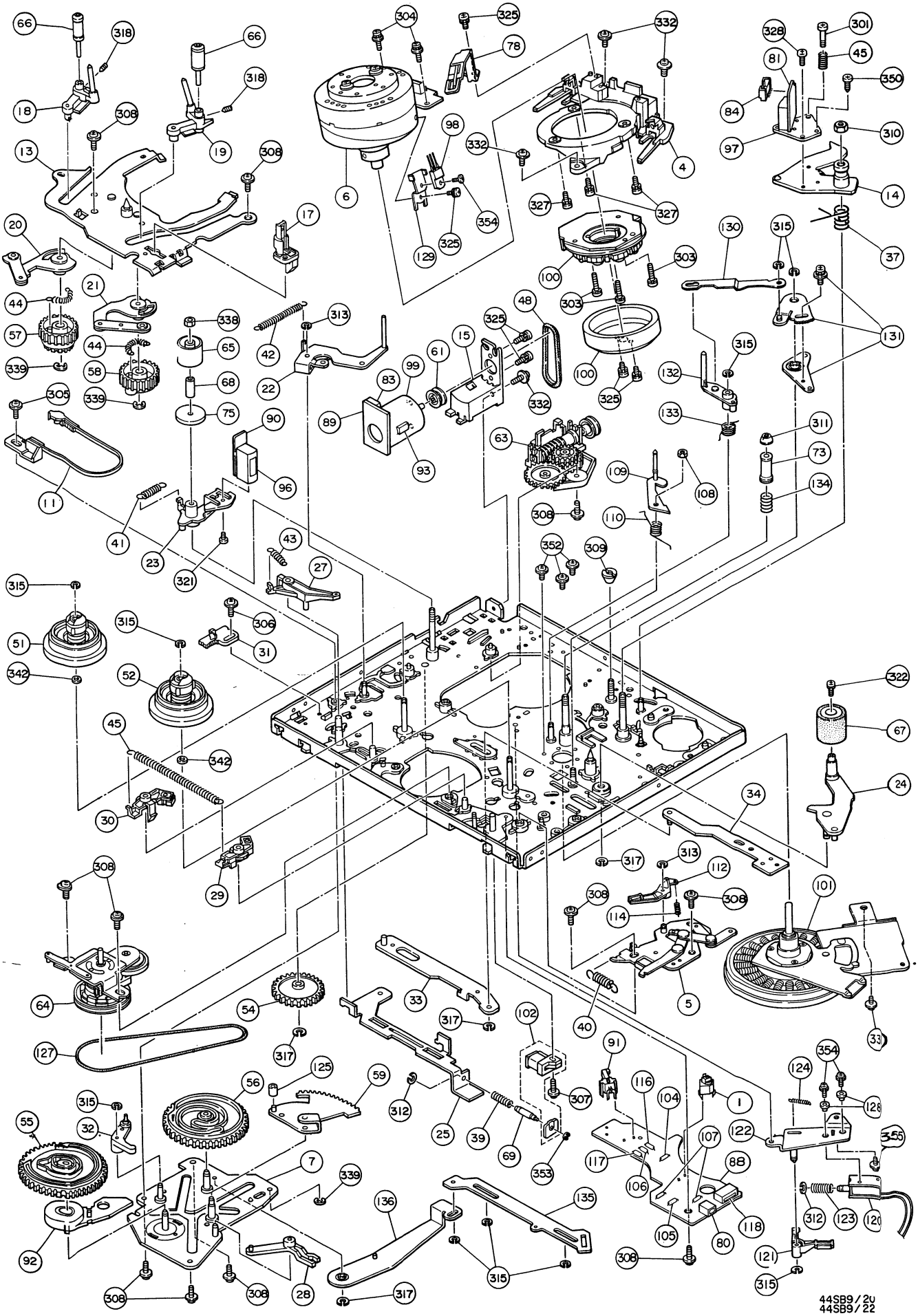

F2857GE
95X188
TA
TB
TC
TD
TE
IC5001
D5001
D5002
D5003
D5004
D5005
D5006
D5007
D5008
D5009
D5011
D5012
D5013
D5014
D5015
D5016
D5017
D5018
D5019
D5020
D5021
D5022
D5023
D5024
D5025
D5026
D5027
D5028
D5029
D5030
D5031
D5033
D5034
Q5001
Q5002
Q5004
Q5005
Q5006
Q5007
Q5008
R5001
R5002
R5003
R5004
R5005
R5006
R5007
R5008
R5009
R5010
R5011
R5012
R5013
R5014
R5015
R5016
R5017
R5018
R5020
R5021
R5022
C5001
C5002
C5003
C5004
C5005
C5006
C5007
C5008
C5009
C5010
FL5001
X5001
TP5006
TP5007
TP500
SW5001
SW5002
SW5003
SW5004
SW5005
SW5006
SW5007
SW5008
SW5009
SW5010
SW5011
SW5012
SW5013
SW5014
SW5015
SW5016
SW5017
SW5018
SW5019
SW5020
DG5001
SPEED REC
DERAM
SIMUL
REC
SELECT
OUT PUT
SKIP
M.OPEN
MEMORY
CLOCK SET
MEMORY
RESET
COUNTER TIMER
CH
CH
AUTO
MUTE
COLOUR
BLUE
LEVEL
AUDIO TRACKMETER
R/C AMP

PWB-X HEAD AMPLIFIER CIRCUIT WIRING SIDE PWB

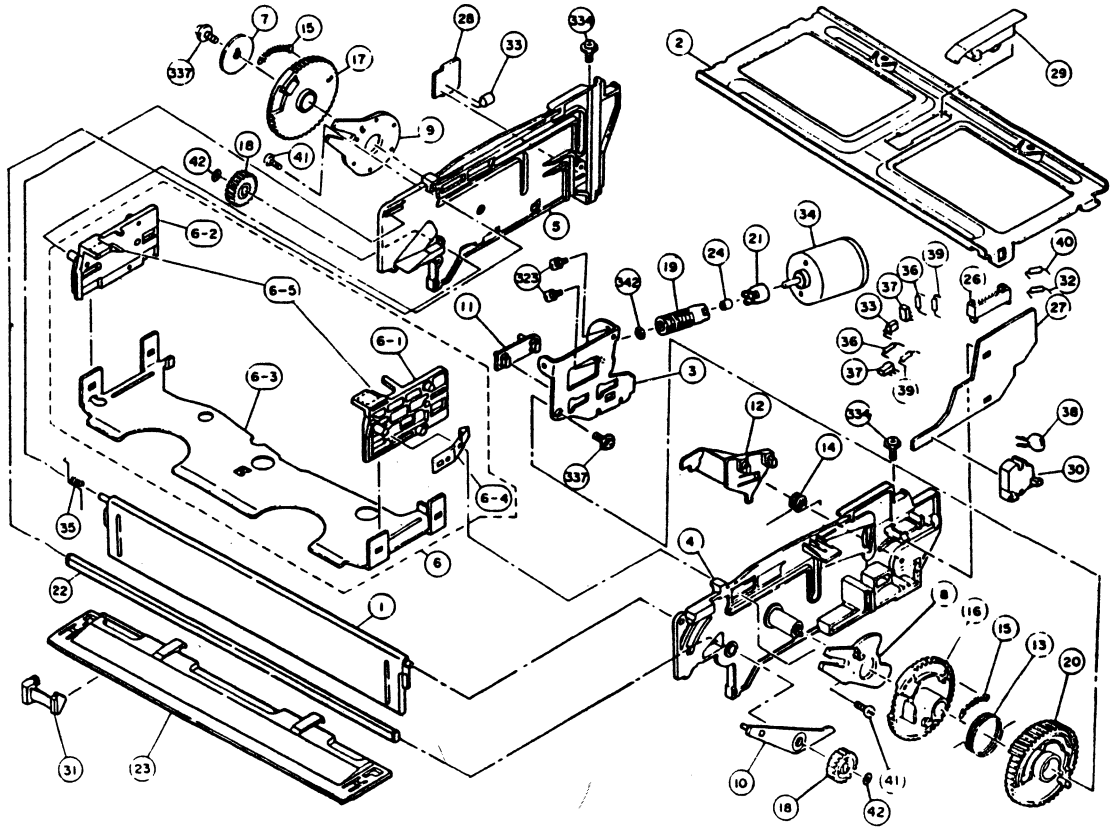


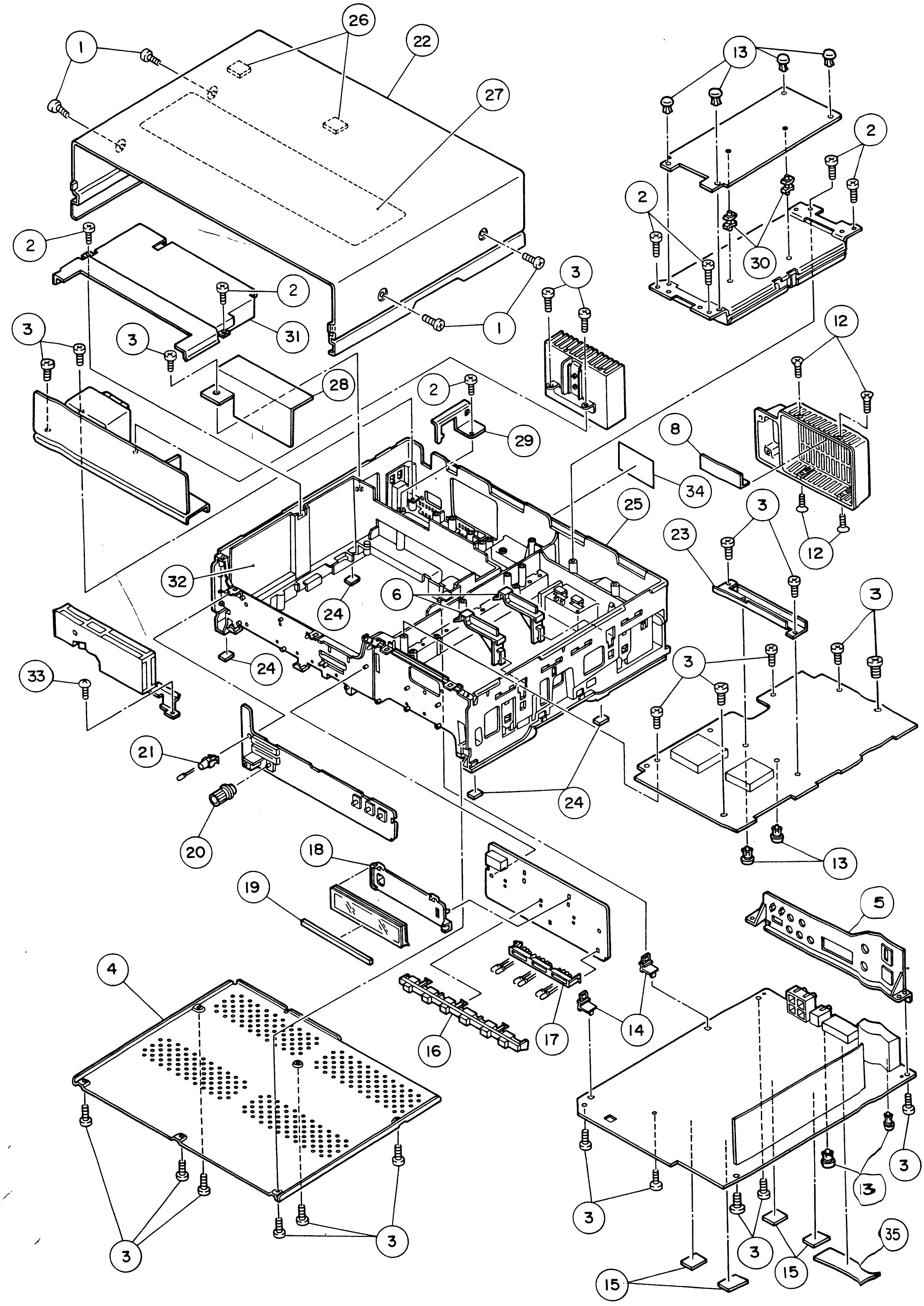
POWER CIRCUIT WIRING SIDE PWB




44SB9/20
44SB9/22

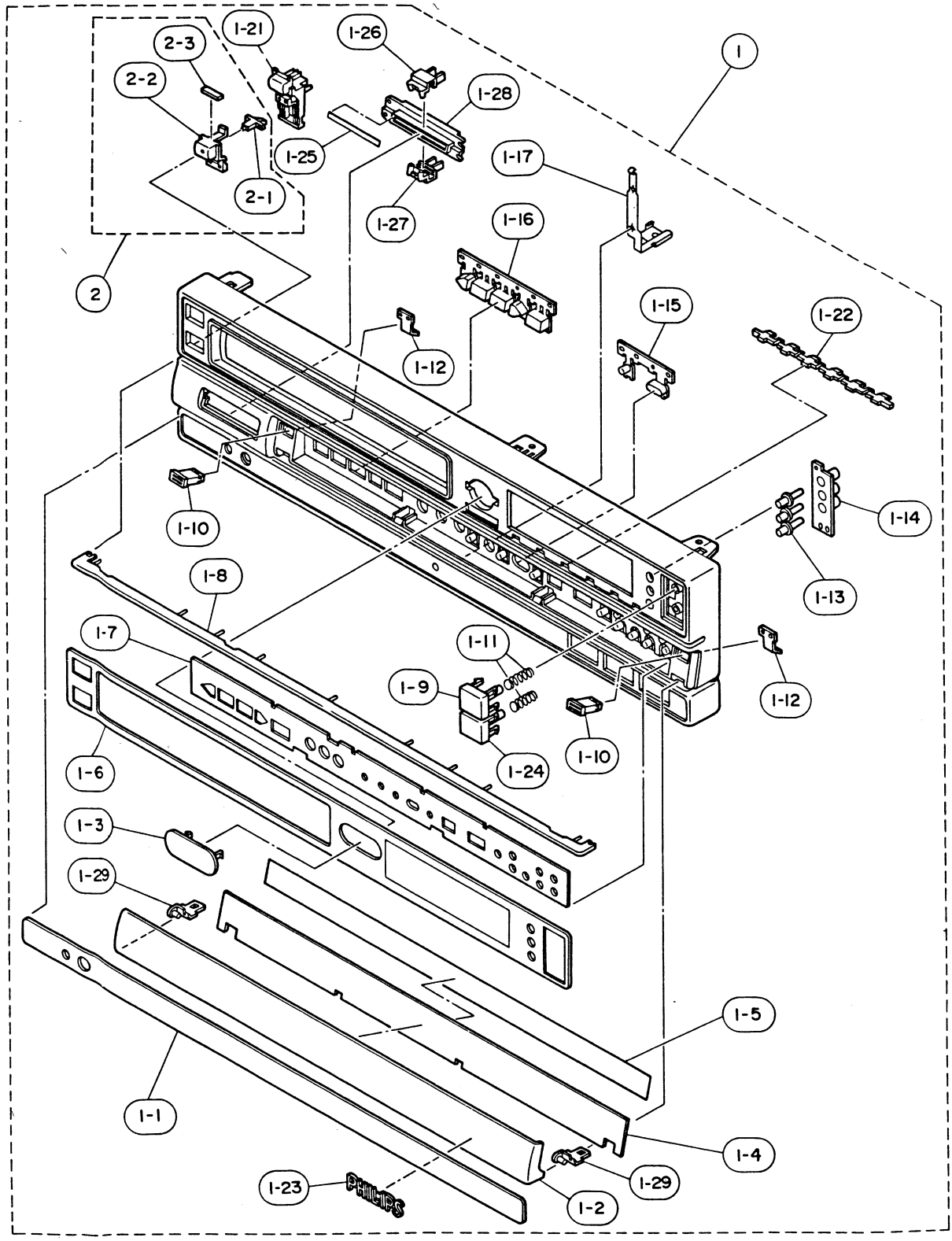
CASSETTE HOUSING CONTROL PARTS DIAGRAM




1
26
22
27
13
2
2
2
30
2
3
3
1
2
31
3
28
29
12
8
34
25
3
23
12
32
6
24
3
3
24
33
3
21
24
20
13
18
19
5
4
14
17
16
3
13
3
3
3
15
35
15
3
15

CS 17 795

FRONT-PARTS


1
2
2-1
2-2
2-3
1-1
1-2
1-3
1-4
1-5
1-6
1-7
1-8
1-9
1-10
1-11
1-12
1-13
1-14
1-15
1-16
1-17
1-21
1-22
1-23
1-24
1-25
1-26
1-27
1-28
1-29
PHILIPS

PRINTED WIRING BOARDS ASSY

POSNR	DESCRIPTION	ORDERING CODE
PWB-A	MAIN CIRCUIT	
PWB-B	Y/C AUDIO CIRCUIT	
PWB-H	OPERATING CIRCUIT	
PWB-I	TUNER IF CIRCUIT	
PWB-P	POWER CIRCUIT	
PWB-S	DIGITAL CIRCUIT (A)	
PWB-S	DIGITAL CIRCUIT (B)	
PWB-T	TIMER CIRCUIT	
PWB-X	HAAD AMPLIFIER CIRC.	

FRONT PANEL PARTS

1	FRONT PANEL ASSY	4822 443 40694
2	STANDBY BUTTON ASS'Y	4822 410 25977
1-1	DIGITAL INDECA.PLATE	4822 454 20865
1-2	DOOR	4822 443 62571
1-3	REMOTE CONTR.COOVER	4822 443 62194
1-4	DOOR ANGLE	4822 403 53501
1-5	DOOR LABEL	4822 454 20867
1-6	FRONT INDICATION PLA	4822 454 20868
1-7	DOOR INDICATION PLAT	4822 454 20866
1-8	ACCENT LINE	4822 454 20717
1-9	CHANNEL,BUTTON +	4822 410 26702
2-1	STANDBY LED COVER	4822 443 62568
2-2	STANDBY BUTTON	4822 410 26699
2-3	MOLT	4822 464 50727
1-10	MAGNET	4822 417 41015
1-11	CHANNEL BUTTON SPRIN	4822 492 42143
1-12	MAGNET HOLDER	4822 256 91339
1-13	COUNTER BUTTON	4822 410 25981
1-14	COUNTER BUTTON HOLDE	4822 403 53229
1-15	RECORD/OTHER BUTTON	4822 410 26705
1-16	MODE BUTTON	4822 410 26704
1-17	EARTH PLATE	4822 403 53505
1-21	EJECT BUTTON	4822 410 26701
1-22	SYSTEM LED COVER	4822 443 62325
1-23	PHILIPS BADGE	4822 459 10835
1-24	CHANNEL,BUTTON -	4822 410 26703
1-25	RECORD LEVEL INDICAT	4822 454 20864
1-26	RECORD LEVEL KNOB (U	4822 410 26707
1-27	RECORD LEVEL KNOB	4822 410 26708
1-28	RECORD LEVEL G-PLATE	4822 464 50726
1-29	DOOR HOLDER	4822 256 91338

POSNR	DESCRIPTION	ORDERING CODE
	MECHANICAL CABINET PARTS	
1	SCREW FOR UPPER CABI	4822 502 12993
2	SCREW FOR DIGITAL DR	4822 502 12542
3	SCREW FOR IF, BOTTOM	4822 502 11787
4	BOTTOM PLATE	4822 443 61589
5	ANTENNA TERMINAL PLA	4822 443 62569
6	ANGLE FOR CABINET-A	4822 403 53502
7	ANGLE FOR CABINET-B	4822 403 53503
8	ANGLE FOR RADIATOR	4822 403 53504
9	Y/C MODULE HOLDER	4822 255 70243
10	HEAD AMP HOLDER	4822 256 91341
11	POWER UNIT EARTH	4822 290 30245
12	SCREW FOR RADIATOR C	4822 502 13146
13	RIBET	4822 532 21321
14	HINGE FOR MAIN	4822 417 10843
15	SPACER	4822 535 91777
16	SYSTEM LED HOLDER	4822 256 91267
17	DIGITAL LED HOLDER	4822 255 40884
18	DIGITRON HOLDER	4822 256 91274
20	HEAD PHONE KNOB	4822 410 26706
21	POWER LED HOLDER	4822 255 40802
22	UPPER CABINET	4822 443 30734
23	ANGLE FOR IF/TUNER	4822 403 53499
24	FELT	4822 466 61717
25	P FRAME	4822 464 50725
26	SPACER	4822 532 52018
27	SHEET	4822 466 92279
28	INSULATOR	4822 325 20186
29	HEAD AMP HOLDER	4822 256 91342
30	PWB HOLDER	4822 256 91337
31	SHIELD CASE COVER	4822 443 62572
32	SHIELD CASE FRAME	4822 443 62353
33	SCREW,HEAD AMP	4822 502 11774
	MISCELLANEOUS	
5	OPTICAL REM.CONTROL	4822 218 30449

PWB-A MAIN CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 701	2SA933SQR	4822 130 60148
Q 702	2C1740SQR	4822 130 60147
Q 703	2SA933SQR	4822 130 60148
Q 704	2SA933SQR	4822 130 60148
Q 705	DTC144ES	4822 130 42594
Q 706	DTC144ES	4822 130 42594
Q 707	DTA114ES	4822 130 60766
Q 709	2SD468-C	4822 130 41422
Q 710	DTA144ES	4822 130 42682
Q 711	DTA144ES	4822 130 42682
Q 713	2SD468-C	4822 130 41422
Q 801	2SA933SQR	4822 130 60148
Q 802	DTC144ES	4822 130 42594
Q 804	DTC144ES	4822 130 42594
Q 805	DTC114ES	4822 130 60624
Q 806	DTC144ES	4822 130 42594
Q 807	2SC2001LK	4822 130 60258
Q 808	2C1740SQR	4822 130 60147
Q 809	2C1740SQR	4822 130 60147
Q 810	2C1740SQR	4822 130 60147
Q 811	2SC1815Y	4822 130 41947
Q 812	DTC124ES	4822 130 42683
Q 813	2SC1815Y	4822 130 41947
Q 814	DTA114ES	4822 130 60766
Q 2201	DTC114ES	4822 130 60624
Q 2202	2S1740SQR	4822 130 60147
Q 2203	DTC144ES	4822 130 42594
Q 2204	DTC144ES	4822 130 42594
Q 2206	2C1740SQR	4822 130 60147
Q 2207	2C1740SQR	4822 130 60147
Q 2208	2SA933SQR	4822 130 60148
Q 2209	2C1740SQR	4822 130 60147
Q 2210	2C1740SQR	4822 130 60147
Q 2211	2SA933SQR	4822 130 60148
Q 2212	2C1740SQR	4822 130 60147
Q 2213	2C1740SQR	4822 130 60147
Q 2214	DTA124ES	4822 130 42593
Q 6301	2SD655-DE	4822 130 41607
Q 6302	2SD655-DE	4822 130 41607
Q 6303	2SC2458Y	4822 130 42375
Q 6304	2SC2458Y	4822 130 42375
Q 6305	2SD655-DE	4822 130 41607
Q 6306	2SD655-DE	4822 130 41607
Q 6308	DTC124ES	4822 130 42683
Q 6309	DTC144ES	4822 130 42594
Q 6311	2SA933SQR	4822 130 60148
Q 6312	DTV124ES	4822 130 61297
Q 6313	DTV124ES	4822 130 61297
Q 6314	2SC2458Y	4822 130 42375
Q 6318	2SD655-DE	4822 130 41607

POSNR	DESCRIPTION	ORDERING CODE
Q 6319	2SD655-DE	4822 130 41607
Q 6323	DTA124ES	4822 130 42593
Q 6501	DTA144ES	4822 130 42682
Q 6502	2SC2458Y	4822 130 42375
Q 6504	2SC2458Y	4822 130 42375
Q 6506	DTC144ES	4822 130 42594
Q 6507	DTC144ES	4822 130 42594
Q 6508	DTC144ES	4822 130 42594
Q 6509	DTC144ES	4822 130 42594
Q 6510	DTC144ES	4822 130 42594
Q 6511	DTA124ES	4822 130 42593
Q 6601	2SC2458Y	4822 130 42375
Q 6602	2SC2458Y	4822 130 42375
Q 6603	DTC144ES	4822 130 42594
Q 6604	DTC124ES	4822 130 42683
Q 6605	DTA144ES	4822 130 42682
Q 8802	DTC124ES	4822 130 42683
Q 8803	DTA144ES	4822 130 42682
Q 8804	DTA144ES	4822 130 42682
Q 9501	2SB1117KU	4822 130 60151
Q 9502	DTC144ES	4822 130 42594
Q 9503	2SB1117KU	4822 130 60151
Q 9504	DTC124ES	4822 130 42683
Q 9505	DTA124ES	4822 130 42593
Q 9506	DTA124ES	4822 130 42593
Q 9507	2SA950-Y	4822 130 42278
Q 9508	DTA124ES	4822 130 42593
Q 9509	2SA1020Y	4822 130 42371
Q 9510	2SC3401	4822 130 42437
Q 9513	2SA952LK	4822 130 60149
Q 9514	DTC144ES	4822 130 42594

INTEGRATED CIRCUITS

IC 701	SERVO CONTROL	4822 209 72473
IC 702	SERVO AMPLIFIER	4822 209 72477
IC 703	REF.GEN.2.5V	4822 209 72475
IC 801	SYSTEM CONTROL	4822 209 73516
IC 802	CASS. MOT DRIVER	4822 209 72522
IC 803	MODE LED DRIVER	4822 209 83528
IC 804	VISS DETECT	4822 209 72768
IC2201	P IN P SWITCH	4822 209 82968
IC2202	VIDEO INPUT SEL	4822 209 82968
IC6301	I/O SWITCH H/P AMP.	4822 209 72575
IC6302	NOISE REDUCTION	4822 209 73517
IC6303	FM DEMODULATOR	4822 209 72576
IC6304	PB AMPLIFIER	4822 209 72475
IC6305	PB AMPLIFIER	4822 209 72475
IC6306	REC AMP-PB.GEAD AMP.	4822 209 72577
IC6307	2 P SWITCH LCH AUDIO	5322 209 10576
IC6308	2 P SWITCH RCH AUDIO	5322 209 10576
IC9501	HIFI 9V REG.	4822 209 72573

POSNR	DESCRIPTION	ORDERING CODE
	DIODES	
D 701	1SS133	4822 130 31626
D 702	1SS133	4822 130 31626
D 703	1SS133	4822 130 31626
D 704	1SS133	4822 130 31626
D 705	1SS133	4822 130 31626
D 706	1SS133	4822 130 31626
D 707	1SS133	4822 130 31626
D 708	1SS133	4822 130 31626
D 709	1SS133	4822 130 80411
D 710	1SS133	4822 130 31626
D 711	1SS133	4822 130 31626
D 801	1SS133	4822 130 31626
D 802	1SS133	4822 130 31626
D 805	1SS133	4822 130 31626
D 806	1SS133	4822 130 31626
D 807	HZS12EB3	4822 130 80415
D 808	HZS7.5EB1	4822 130 80684
D 809	ERA1502	4822 130 80411
D 810	1SS133	4822 130 31626
D 811	1SS133	4822 130 31626
D 812	1SS133	4822 130 31626
D 813	1SS133	4822 130 31626
D 814	1SS133	4822 130 31626
D 815	1SS133	4822 130 31626
D 2201	1SS133	4822 130 31626
D 2202	1SS133	4822 130 31626
D 2203	1SS133	4822 130 31626
D 6303	1SS133	4822 130 31626
D 6304	1SS133	4822 130 31626
D 6305	1SS133	4822 130 31626
D 6306	1SS133	4822 130 31626
D 6307	1SS133	4822 130 31626
D 6308	1SS133	4822 130 31626
D 6309	1SS133	4822 130 31626
D 6312	1SS133	4822 130 31626
D 6313	1SS133	4822 130 31626
D 6314	1SS133	4822 130 31626
D 6315	1SS133	4822 130 31626
D 6316	1SS133	4822 130 31626
D 6317	1SS133	4822 130 31626
D 6501	HZ5B1	4822 130 33638
D 6502	HZ6B1	4822 130 80999
D 6503	1SS133	4822 130 31626
D 6504	1SS133	4822 130 31626
D 6506	1SS133	4822 130 31626
D 6508	1SS133	4822 130 31626
D 6509	1SS133	4822 130 31626
D 6510	1SS133	4822 130 31626
D 6511	1SS133	4822 130 31626
D 6601	1SS133	4822 130 31626
D 6602	1SS119	4822 130 32362
D 6603	1SS133	4822 130 31626
D 6604	1SS133	4822 130 31626
D 8801	1SS133	4822 130 31626
D 8802	RD15EB1	4822 130 33794

POSNR	DESCRIPTION	ORDERING CODE
D 8802	RD15EB1	4822 130 33794
D 8803	RD15EB1	4822 130 33794
D 8804	RD15EB1	4822 130 33794
D 8805	RD15EB1	4822 130 33794
D 8806	RD15EB1	4822 130 33794
D 9502	RD3.9EBB1	4822 130 32487
D 9503	1SS133	4822 130 81001
D 9504	1SS133	4822 130 81001
D 9505	1SS133	4822 130 81001
D 9506	1SS133	4822 130 81001
D 9507	1SS133	4822 130 31626
D 9508	1SS133	4822 130 31626
D 9509	1SS133	4822 130 31626
D 9511	1SS133	4822 130 31626
D 9512	1SS133	4822 130 31626

CAPACITORS

C 709	100UF,16V,ELECTROLYT	4822 124 40866
C 716	1.0UF,50V,ELECTROLYT	4822 124 41037
C 722	1.0UF,50V,ELECTROLYT	4822 124 41037
C 725	1.0UF,50V,ELECTROLYT	4822 124 41037
C 729	22UF,16V,ELECTROLYTI	4822 124 41634
C 818	1.0UF,50V,ELECTROLYT	4822 124 41037
C 819	1.0UF,50V,ELECTROLYT	4822 124 41037
C 2201	100UF,16V,ELECTROLYT	4822 124 40866
C 2208	.0039UFN50V,MYLAR	4822 121 42776
C 2213	47UF,16V,ELECTROLYTI	4822 124 40885
C 2217	470UF,16V,ELECTROLYT	4822 124 41636
C 6307	10UF,16V,ELECTROLYTI	4822 124 41036
C 6317	10UF,16V,ELECTROLYTI	4822 124 41036
C 6327	.0039UF,50V,MYLAR	4822 121 42776
C 6328	.022UF,50V,MYLAR	4822 121 42216
C 6344	.0039UF,50V,MYLAR	4822 121 42776
C 6345	.022UF,50V,MYLAR	4822 121 42216
C 6348	10UF,16V,TANTALUM	4822 124 10743
C 6351	100UF,16V,ELECTROLYT	4822 124 40866
C 6357	.0039UF,50V,MYLAR	4822 121 42776
C 6359	0.1F,50V,ELECTROLYTI	4822 124 41635
C 6368	100UF,10V,ELECTROLYT	4822 124 40865
C 6369	470UF,6.3V,ELECTROLY	4822 124 41302
C 6372	.022UF,50V,MYLAR	4822 124 41637
C 6381	100UF,10V,ELECTROLYT	4822 124 40865
C 6382	470UF,6.3V,ELECTROLY	4822 124 41302
C 6385	.022UF,50V,MYLAR	4822 121 42216
C 6387	220UF,6.3V,ELECTROLY	4822 124 41483
C 6396	.0039UF,50V,MYLAR	4822 121 42776
C 6399	0.1F,50V,ELECTROLYTI	4822 124 41635

POSNR	DESCRIPTION	ORDERING CODE
	CONTROLS	
R 823	FALSE VERT SYNC	4822 100 11189
R 6334	METER LEV ADJ (R)	4822 100 10906
R 6338	METER LEV ADJ (R)	4822 100 10906
R 6376	DEV.ADJ.	4822 100 11254
R 6378	PB.LEV.ADJ.	4822 100 10906
R 6386	DEV.ADJ.	4822 100 11254
R 6388	PB LEV ADJ	4822 100 10906
	RESISTORS	
R 761	180OHM,2W,METAL	4822 116 80345
R 762	220OHM,2W,METAL OXID	4822 116 80346
R 6615	RESISTOR/00	4822 116 80961
R 6616	RESISTOR/00	4822 116 80498
R 6615	RESISTOR/02A	4822 116 80976
R 6616	RESISTOR/02A	4822 116 80975
	COILS AND FILTERS	
DL2201	DELAY LINE	4822 158 10741
FL 801	FILTER	4822 157 52212
FL6301	FILTER	4822 153 90048
FL6302	FILTER	4822 153 90048
FL6303	FILTER	4822 157 53324
FL6304	FILTER	4822 157 53324
FL6305	FILTER	4822 153 90046
FL6306	FILTER	4822 153 90047
FL6307	FILTER	4822 153 90046
L 801	220UH	4822 157 10135
L 2201	12UH	4822 157 10232
L 2202	100UH	4822 157 10141
L 2203	220$U	4822 157 10135
L 2204	220$U	4822 157 10135
L 2205	220$U	4822 157 10135
L 6301	100UH	4822 157 10141

POSNR	DESCRIPTION	ORDERING CODE
	MISCELLANEOUS	
AA	PLUG	4822 265 51122
AB	PLUG	4822 265 40497
AC	PLUG	4822 265 40497
AD	PLUG	4822 267 40651
AE	PLUG	4822 265 51121
AF	PLUG	4822 265 30419
AG	PLUG	4822 265 51125
AH	PLUG	4822 265 51122
AJ	PLUG	4822 265 30419
AK	PLUG	4822 265 51126
AM	PLUG	4822 267 40651
AO	PLUG	4822 265 30419
AP	PLUG	4822 265 51121
AQ	SOCKET	4822 267 50805
AR	SOCKET	4822 267 50852
AT	PLUG	4822 265 30422
AU	PLUG	4822 265 51123
AV	PLUG	4822 265 30419
AW	SOCKET	4822 267 50793
AX	SOCKET	4822 264 50184
AY	PLUG	4822 265 30419
AZ	PLUG	4822 265 51123
IF	IF-UNIT	4822 214 32339
J 6801	SOCKET	4822 267 50816
J 6802	JACK	4822 267 30913
J 6803	JACK	4822 267 30914
J 6804	JACK	4822 267 30744
K 2001	PLUG	4822 264 50186
K 2002	PLUG	4822 264 50188
K 2003	PLUG	4822 264 50187
K 2004	PLUG	4822 264 50185
R 6535	PACKAGED CIRCUIT	4822 102 50053
R 6536	PACKAGED CIRCUIT	4822 102 50054
RF-CON	RF CONVERTER	4822 218 30437
SW2201	SWITCH	4822 276 12344
TP 701	PLUG	4822 265 30352
TP 702	PLUG	4822 265 30352
TP 703	PLUG	4822 265 30352
TP 704	PLUG	4822 265 30352
TUNER	TUNER	4822 210 10326

PWB-B LUMINANCE/CROMINANCE CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 202	(DTC144)	4822 130 60146
Q 204	(2SD471LK)	4822 130 43347
Q 205	(2SC1623L)	4822 130 42466
Q 502	(2SC1623L)	4822 130 42466
Q 504	(2SC2001LK)	4822 130 60258
Q 505	(2SC1623L)	4822 130 42466
Q 506	(2SA812M)	4822 130 42463
Q 507	(2SC1623L)	4822 130 42466
Q 508	(2SC1623L)	4822 130 42466
Q 602	(2SC1509R)	4822 130 61376
Q 5501	(2SC1740)	4822 130 60147
	INTEGRATED CIRCUITS	
IC 201	HA118085	4822 209 73743
IC 501	TA8644N/-1	4822 209 72478
IC 601	BA7751ALG	4822 209 72017
IC 602	BA7755	4822 209 72018
IC5501	BA7007	4822 209 82553
	DIODES AND CRYSTAL	
D 202	(1SS119)	4822 130 32362
D 203	DIODE (1SS119)	4822 130 32362
D 204	DIODE (1SS119)	4822 130 32362
D 205	(1SS119)	4822 130 32362
D 207	ZENER DIODE	4822 130 80552
D 501	ZENER DIODE	4822 130 80552
D 503	DIODE (1SS198)	4822 130 80585
D 505	1SS119	4822 130 32362
D 506	1SS119	4822 130 32362
D 5003	1SS119	4822 130 32362
D 5501	1SS119	4822 130 32362
D 5502	1SS119	4822 130 32362
X 501	CRYSTRAL	4822 242 70337

POSNR	DESCRIPTION	ORDERING CODE
	CAPACITORS	
C 235	4.7UF, 25V, 20%, ELE	4822 124 22458
C 240	100UF, 10V, ELECTR	4822 124 40865
C 503	3900PF, MYLAR	4822 121 42776
C 505	2200PF, MYLAR	4822 121 42127
C 609	100UF, 16V, ELECT	4822 124 22456
C 613	0.056F, MYLAR	4822 121 42231
C 614	.027F, MYLAR	4822 121 42128
C 624	5600PF, 100V	4822 121 51391
C 626	.022F, MYLAR	4822 121 42216
C 5508	.027F, MYLAR	4822 121 42128
	CONTROLS	
R 209	PLAYBACK LEVEL	4822 100 11238
R 216	FM CARRIER	4822 100 11433
R 222	DEVIATION	4822 100 11434
R 229	2.2K OHM WHITE CLIP	4822 100 11224
R 253	470 OHM E-E LEVEL	4822 100 11222
R 263	1K OHM REC FM LEVEL	4822 100 11238
R 507	100K OHM APC ADJ.	4822 100 11237
R 515	OHM	4822 100 11239
R 609	33K OHM PB LEVEL	4822 100 11226
R 622	470K OHM BIAS LEVEL	4822 100 11227
	COILS AND TRANSFORMERS	
DL 201	FILTER	4822 158 10741
DL 501	DELAY LINE	4822 157 90211
FL 201	FILTER	4822 157 53147
FL 501	FILTER	4822 157 52771
FL 502	FILTER	4822 157 53148
FL 601	FILTER	4822 157 53146
FL 602	FILTER	4822 157 53285
FL5501	FILTER	4822 154 10048
L 201	100UH	4822 157 10141
L 202	56UH	4822 157 10235
L 203	8.2UH	4822 157 53287
L 204	68UH	4822 157 10271
L 205	15UH	4822 157 10267
L 208	150UH	4822 157 10274
L 209	82UH	4822 157 10236
L 210	150UH	4822 157 10274
L 211	220UH	4822 157 10135
L 212	56UH	4822 157 10146
L 214	390 UH	4822 157 10263
L 502	18UH	4822 157 53286

POSNR	DESCRIPTION	ORDERING CODE
L 504	39UH	4822 157 10269
L 505	220UH	4822 157 10276
L 506	220UH	4822 157 10276
L 507	560UH	4822 157 10264
L 601	5.6MH	4822 157 10275
L 602	470UH	4822 157 10244
L 603	220UH	4822 157 10135
L 5501	220 UH	4822 157 10135
L 5503	1.5 MH	4822 157 10218
T 601	OSC.TRANSFORMER BIAS	4822 146 21365

MISCELLANEOUS

BA	PLUG (5 PIN)	4822 264 40247
BB	PLUG (11 PIN)	4822 265 51126
BC	SOCKET (7 PIN)	4822 267 50789
BD	SOCKET (9 PIN)	4822 267 50792
BE	SOCKET (8 PIN)	4822 267 50791
BF	SOCKET (6 PIN)	4822 267 50788
FB 601	FERRITE BEAD	4822 526 10404
FB 603	FERRITE BEAD	4822 526 10404
TP 203	PLUG (3 PIN)TP201	4822 264 40246
2 PIN	PLUG (2 PIN)	4822 265 30331

PWB-H OPERATION CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	DIODES	
D 8101	LED (POWER RED)	4822 130 80417
D 8102	DIODE (1SS133)	4822 130 31626
D 8103	DIODE (1SS133)	4822 130 31626
	CONTROLES	
R 8107	HEAD PHONE MIN/MAX	4822 100 11432
R 8109	PICTURE TONE	4822 100 11047
R 8112	TRACKING PLAY	4822 100 11045
R 8113	TRACKING SLOW	4822 100 11045
R 8114	PLAYBACK TRK	4822 100 11225
R 8115	LP S/S TRK	4822 100 11225
R 8117	SP S/S TRK	4822 100 11225
R 8119	REC LEVEL (L)	4822 100 11435
R 8120	REC LEVEL (R)	4822 100 11435
R 8121	HSP ADJ.	4822 100 11237
R 8122	EE LEVEL (L)	4822 100 10906
R 8123	EE LEVEL (R)	4822 100 10906
	MISCELLANEOUS	
AL8101	BEEPER (ALARM)	4822 280 10198
FB8101	BALUN	4822 526 10404
FB8102	BALUN	4822 526 10404
FB8103	BALUN	4822 526 10404
HA	TO MAIN	4822 265 20405
HB	TO MAIN	4822 265 30361
HC	TO SYSCON/SERVO	4822 265 20406
HD	TO PWB HEAD PHONE	4822 265 20404
J 8101	HEAD PHONE JACK	4822 267 30999
JA	ON PWB HEAD PHONE	4822 267 31001
SW8101	SWITCH (OPERATE)	4822 276 11361
SW8102	SWITCH (EJECT)	4822 276 11361
SW8103	SWITCH (REW)	4822 276 11361
SW8104	SWITCH (PLAY)	4822 276 11361
SW8105	SWITCH (STOP)	4822 276 11361
SW8106	SWITCH (WIND)	4822 276 11361
SW8107	SWITCH (PAUSE)	4822 276 11361

PWB-I TUNER IF CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 1501	2SC3399	4822 130 42384
Q 1502	2SC945APQ	4822 130 42301
Q 1503	2SC945APQ	4822 130 42301
Q 1504	2SC945APQ	4822 130 42301
Q 1505	2SC945APQ	4822 130 42301
Q 1506	2SA733APQ	4822 130 42271
Q 1507	2SC945APQ	4822 130 42301
Q 1508	2SC1906	4822 130 42285
Q 1509	2SA733APQ	4822 130 42271
Q 1601	2SC945APQ	4822 130 42301
Q 1602	2SC945APQ	4822 130 42301
Q 1603	DTC144ES	4822 130 42594
Q 1604	DTC144ES	4822 130 42594
Q 1605	2SC945APQ	4822 130 42301
Q 1606	2SC945APQ	4822 130 42301
Q 1607	2SD655-DE	4822 130 41607
Q 5901	2SA933SQR	4822 130 60148
Q 5903	DTC144ES	4822 130 42594
Q 5905	DTC144ES	4822 130 42594
	INTEGRATED CIRCUITS	
IC1401	FREQ SYNTESIZER	4822 209 73461
IC1402	EA-ROM	4822 209 51546
IC1403	BAND DEC./H.SYNC DET	4822 209 73745
IC1501	IST SIF DETECTOR	4822 209 80596
IC1601	SIF/2-SOUND DET.	4822 209 81116
IC1602	PILOT CARRIER DET.	4822 209 82247
IC1603	FILTER(PILOT FRQ)	4822 209 80401
IC1801	VPS-DATA (VR6943/02A)	4822 209 73744
IC1802	VPS-DECOD.(VR6943/02A)	4822 209 73463
IC5901	ON SCREEN DISPLAY	4822 209 73742
	DIODES	
D 1401	1SS133	4822 130 31626
D 1402	1SS133	4822 130 31626
D 1403	1SS133	4822 130 31626
D 1404	1SS133	4822 130 31626
D 1405	1SS133	4822 130 31626
D 1406	1SS133	4822 130 31626
D 1601	1SS133	4822 130 31626
D 1602	1SS133	4822 130 31626
D 1603	1SS133	4822 130 31626
D 1604	1SS133	4822 130 31626

POSNR	DESCRIPTION	ORDERING CODE
D 1605	1SS133	4822 130 31626
D 1606	1SS133	4822 130 31626
D 1607	1SS133	4822 130 31626
D 1608	1SS133	4822 130 31626

CAPACITORS

C 1414	6800PF,100V,	4822 121 51254
C 1416	1.0UF,50V,ELECTROLYT	4822 124 41037
C 1418	100UF,16V,ELECTRLYTI	4822 124 40866
C 1612	.002UF,MYLAR	4822 121 42216
C 1633	100UF,16V,ELECTROLYT	4822 124 40866
C 1645	220UF,16V,ELECTROLYT	4822 124 22477
C 5901	100UF,6.3V,ELECTROLY	4822 124 40864

CONTROLS AND TRIMMERS

C 5905	TRIMMER CAPACITOR	4822 125 50258
C 5907	TRIMMER CAPACITOR	4822 125 50258
R 1416	OSC.ADJ.	4822 100 11128
R 1506	UHF RF AGC	4822 100 10747
R 1507	UHF RF AGC	4822 100 10747
R 1607	LEVEL ADJ.	4822 100 10708
R 1615	PIL FRQ ADJ.	4822 100 10712
R 1618	SEP.ADJ.	4822 100 10708
R 1636	1175 H2 ADJ.	4822 100 10912
R 1642	274.1 HZ ADJ.	4822 100 10712
R 1651	MONO LEVEL ADJ.	4822 100 10536

COILS AND TRANSFORMER

CF1601	FILTER	4822 242 70405
CF1602	FILTER	4822 242 70449
L 1501	12UH	4822 157 10232
L 1502	12UH	4822 157 10232
L 1503	12UH	4822 157 10232
L 1504	12UH	4822 157 10232
L 1505	12UH	4822 157 10232
L 1506	220UH	4822 157 10135
L 1507	220UH	4822 157 10135
L 1508	12UH	4822 157 10232
L 1509	39UH	4822 157 53824
L 1510	220UH	4822 157 10135
L 1511	4.7UH	4822 157 53825
L 1512	220UH	4822 157 10135
L 1513	1UH	4822 157 53823
L 1514	220UH	4822 157 10135
L 1601	6.8UH	4822 157 52965
L 1602	220UH	4822 157 10135
L 1603	220UH	4822 157 10135
L 1604	220UH	4822 157 10135

POSNR	DESCRIPTION	ORDERING CODE
L 1801	15UH(VR6943/02A)	4822 157 10267
L 1802	100UH(VR6943/02A)	4822 157 10141
L 5901	15UH	4822 157 10267
T 1501	DRTECTION COIL	4822 157 52423
T 1502	IF COIL	4822 157 52425
T 1503	IF COIL	4822 157 52426
T 1504	IF COIL	4822 157 52427
T 1505	IF COIL	4822 157 52428
T 1601	DETECTION COIL	4822 157 52422
T 1602	IF COIL	4822 157 51363
T 1603	IF COIL	4822 157 53826
T 1604	IF COIL	4822 157 52429
T 1605	IF COIL	4822 158 20401

MISCELLANEOUS

IA	PLUG	4822 265 40566
IB	PLUG	4822 265 30467
IC	PLUG	4822 265 30468
ID	PLUG	4822 265 20286
IE	PLUG	4822 265 30466
IF	IF PACK	4822 214 32339
IG	PLUG	4822 265 30498
IH	PLUG	4822 265 30498
IJ	PLUG	4822 265 40566
IK	PLUG	4822 265 20286
IL	PLUG	4822 265 51121
IM	PLUG	4822 264 50183
PR1401	PACKGED CIRCUIT	4822 111 90588
RF CON	RF CONVERTER	4822 214 32395
TUNER	VHF TUNER	4822 210 40359
X 1401	CRYSTAL	4822 242 72276
X 1801	CRYSTAL(VR6943/02A)	4822 242 72277
X 5901	CRYSTAL	4822 242 72098

PWB-S(1) DIGITAL (A) CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 2803	(2SC1740SQR)	4822 130 60147
Q 2804	(2SC1740SQR)	4822 130 60147
Q 2805	(2SC1740SQR)	4822 130 60147
Q 2806	(2SA933SQR)	4822 130 60148
	INTEGRATED CIRCUITS	
IC2801	IX0366GEZZ	4822 209 72836
IC2802	IX0388GEZZ	4822 209 72837
IC2803	IX0388GEZZ	4822 209 72837
IC2804	IX0388GEZZ	4822 209 72837
IC2805	M52681P	4822 209 72849
IC2806	M52678P	4822 209 72848
IC2807	BA7041	4822 209 72847
IC2808	BA7041	4822 209 72847
IC2901	HD74LS04	4822 209 73752
IC2902	HD74LS00	5322 209 81623
IC2903	HD74LS74	4822 209 71969
	DIODES	
D 2801	(1SS133)	4822 130 31626
D 2802	(1SS133)	4822 130 31626
D 2803	(1SS133)	4822 130 31626
D 2901	(1SS119)	4822 130 32362
D 2902	(1SS119)	4822 130 32362
	CAPACITORS	
C 2802	1UF,35V,TANTALUM NPO	4822 121 41368
C 2808	1UF,35V,TANTALUM NPO	4822 121 41368
C 2849	1UF,50V,ELECTR.NOPOL	4822 124 41037
C 2850	1UF,50V,ELECTR.NOPOL	4822 124 41037
C 2857	10UF,16V,TANTALUM NP	4822 124 10357
C 2858	10UF,16V,TANTALUM NP	4822 124 10357

POSNR	DESCRIPTION	ORDERING CODE
	TRIMMERS	
C 2804	WRITE CLOCK VCO	4822 125 50374
C 2810	READ CLOCK VCO	4822 125 50374
	COILS	
FL2801	FILTER	4822 242 72133
FL2802	FILTER	4822 242 72133
FL2803	FILTER	4822 242 72133
FL2804	FILTER	4822 242 72133
FL2805	FILTER	4822 242 72133
FL2806	FILTER	4822 242 72133
FL2807	FILTER	4822 242 72133
FL2808	FILTER	4822 242 72132
FL2809	FILTER	4822 242 72132
FL2810	FILTER	4822 242 72132
FL2811	FILTER	4822 242 72132
FL2812	FILTER	4822 242 72132
FL2813	FILTER	4822 242 72132
FL2814	FILTER	4822 242 72133
FL2821	FILTER	4822 242 72133
FL2822	FILTER	4822 242 72133
FL2823	FILTER	4822 242 72133
FL2824	FILTER	4822 242 72133
FL2825	FILTER	4822 242 72133
FL2831	FILTER	4822 242 72132
	MISCELLANEOUS	
FB2801		4822 148 80811
FB2802		4822 148 80811
FB2803		4822 148 80811
FL2832	1.400.000 MHZ	4822 242 71459
FL2833	1.400.000 MHZ	4822 242 71459
FL2834		4822 157 53147
R 2815		4822 116 90335
R 2822		4822 116 90335
R 2829		4822 116 90335
SB		4822 267 60226
SG	PLUG (5 PIN)	4822 265 40498
SM	PLUG	4822 266 40153
X 2801		4822 116 90334

PWB-S(2) DIGITAL (B) CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 2602	(2SC1740SQR)	4822 130 60147
Q 2603	(2SC1740SQR)	4822 130 60147
Q 2604	(2SC1740SQR)	4822 130 60147
Q 2605	(2SC1740SQR)	4822 130 60147
Q 2702	(2SC1740SQR)	4822 130 60147
Q 2703	(2SC1740SQR)	4822 130 60147
Q 2704	(2SA933SQR)	4822 130 60148
Q 2705	(2SC1740SQR)	4822 130 60147
Q 2706	(2SC1740SQR)	4822 130 60147
	INTEGRATED CIRCUITS	
IC2601	M51271SP-1	4822 209 72878
IC2602	TA7348P	4822 209 82968
IC2701	M51272P	4822 209 72888
IC2702	M51271SP-1	4822 209 72878
IC2703	TA7348P	4822 209 82968
IC2704	TA7348P	4822 209 82968
	TRIMMERS	
C 2609	CHROMA DECOD.OSC.ADJ	4822 125 50366
C 2727	CHROMA CARRI.OSC.ADJ	4822 125 50366
	COILS	
DL2601	CHOMA DELAY LINE	4822 157 53408
FL2601	CHROMA BAND PASS FIL	4822 157 53407
FL2701	CHROMA BAND PASS FIL	4822 157 53407
FL2702	CHROMA BAND PASS FIL	4822 157 53407
L 2601	COLOR SEPARATE	4822 157 53444
L 2606	8.2UH	4822 157 53287
L 2701	220UH	4822 157 10135
L 2702	220UH	4822 157 10135
L 2705	220UH	4822 157 10135
L 2706	220UH	4822 157 10135

POSNR	DESCRIPTION	ORDERING CODE
	CONTROLS	
R 2606	47K OHM,COLOR LEV.AD	4822 100 11279
R 2619	1K OHM 1H GAIN ADJ.	4822 100 11223
R 2631	47K OHM BURST CLEAN.	4822 100 11279
R 2702	10K OHM CARRY BAL.AD	4822 100 11278
R 2709	47K OHM CARRY BAL.AD	4822 100 11279
R 2710	47K OHM CARRY BAL.AD	4822 100 11279
R 2742	47K OHM CARRY BAL.AD	4822 100 11279
	MISCELLANEOUS	
C 2601	CRYSTAL OSCILATOR	4822 242 72098
FL2602	PACKAGE CIRCUIT	4822 157 53147
SC	SOCKET (21 PIN)	4822 267 60224
SD	PLUG (12 PIN)	4822 265 51127
SH	PLUG (3 PIN)	4822 265 30422
SI	PLUG (2 PIN)	4822 265 30419
SJ	PLUG (4 PIN)	4822 265 40497
TP2601	PLUG (4 PIN)	4822 265 30332
TP2602	PLUG (4 PIN)	4822 265 30332
TP2603	PLUG (4 PIN)	4822 265 30332
TP2604	PLUG (4 PIN)	4822 265 30332
TP2605	PLUG (2 PIN)	4822 267 20245
TP2606	PLUG (2 PIN)	4822 267 20245
TP2701	PLUG (4 PIN)	4822 265 30332
TP2702	PLUG (4 PIN)	4822 265 30332
TP2703	PLUG (4 PIN)	4822 265 30332
TP2705	PLUG (4 PIN)	4822 265 30332
X 2701	CRYSTAL OSCILATOR	4822 242 72098

PWB-T TIMER CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 5001	2SA937-Q	4822 130 42277
Q 5002	DTC144ES	4822 130 42594
Q 5003	2SA937-Q	4822 130 42277
Q 5004	DTC124ES	4822 130 42683
Q 5005	DTC144ES	4822 130 42594
Q 5006	DTA114ES	4822 130 60766
Q 5007	2SC2021-Q	4822 130 42289
	INTEGRATED CIRCUITS	
IC5001	TIMER	4822 209 73446
	DIODES	
D 5001		4822 130 80626
D 5002		4822 130 80626
D 5003		4822 130 80626
D 5004		4822 130 80626
D 5005		4822 130 80626
D 5007		4822 130 80626
D 5008		4822 130 80626
D 5009		4822 130 80626
D 5010		4822 130 80626
D 5011		4822 130 80626
D 5012		4822 130 80626
D 5013		4822 130 80626
D 5014		4822 130 80626
D 5015		4822 130 80626
D 5016		4822 130 80626
D 5017		4822 130 80626
D 5018		4822 130 80626
D 5019		4822 130 80626
D 5020		4822 130 80626
D 5021	RD9.1EB2	4822 130 33871
D 5022		4822 130 80618
D 5023		4822 130 80618
D 5024	DIODE	4822 130 80618
D 5025		4822 130 81105
D 5026		4822 130 81105
D 5027		4822 130 81105
D 5028		4822 130 81105
D 5029		4822 130 81105
D 5030		4822 130 81105
D 5032	ERA 1502	4822 130 80626
D 5033		4822 130 80626

POSNR	DESCRIPTION	ORDERING CODE
	TRIMMERS	
C 5003	TRIMMER	4822 125 50366
	COILS AND TRANSFORMERS	
FL5001	FILTER	4822 157 52212
	MISCELLANEOUS	
R 5001	PACKAGED CIRCUIT	4822 209 72561
RECEIV	REMOTE RECEIVER	4822 214 32172
SW5001	SWITCH	4822 276 12298
SW5002	SWITCH	4822 276 11362
SW5003	SWITCH	4822 276 11362
SW5004	SWITCH	4822 276 11362
SW5005	SWITCH	4822 276 11362
SW5006	SWITCH	4822 276 11362
SW5007	SWITCH	4822 276 11362
SW5008	SWITCH	4822 276 11362
SW5009	SWITCH	4822 276 11362
SW5010	SWITCH	4822 276 11362
SW5011	SWITCH	4822 276 11362
SW5012	SWITCH	4822 276 11362
SW5013	SWITCH	4822 276 11362
SW5014	SWITCH	4822 276 11362
SW5015	SWITCH	4822 276 11362
SW5016	SWITCH	4822 276 11362
SW5017	SWITCH	4822 276 11362
SW5018	SWITCH	4822 276 11362
SW5019	SWITCH	4822 276 11362
SW5020	SWITCH	4822 276 12266
TA	PLUG	4822 264 50191
TB	PLUG	4822 265 30644
TC	PLUG	4822 265 30645
TD	PLUG	4822 265 30646
TE	PLUG	4822 265 30643
TP5001	PLUG	4822 265 30332
TP5002	PLUG	4822 265 30332
TP5003	PLUG	4822 265 30332
TP5004	PLUG	4822 265 30332
X 5001	CRYSTAL	4822 242 70857

PWB-X HEAD AMPLIFIER CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 301	(2SD655) (D.E.)	4822 130 41607
Q 302	SWITCHING, PLAYBACK	4822 130 41607
Q 303	(2SA812)	4822 130 42463
Q 304	(2SA812)	4822 130 42463
Q 305	(2SC1623)	4822 130 42466
Q 306	(2SC1623)	4822 130 42466
Q 307	SWITCHING, RECORD	4822 130 42466
Q 308	SWITCHING, RECORD	4822 130 42466
Q 309	FM EQUALIZER	4822 130 41389
Q 311	AMPLIFIER, RECORD	4822 130 41505
Q 312	AMPLIFIER, RECORD	4822 130 41947
Q 313	AMPLIFIER, RECORD	4822 130 42466
Q 314	AMPLIFIER, RECORD	4822 130 42466
Q 315	(DTC144)	4822 130 60146
	INTEGRATED CIRCUIT	
IC 301	AMPLIFIER, PLAYBACK	4822 209 72089
	COILS	
L 301	27UH	4822 157 10254
L 302	33UH	4822 157 53305
L 303	18UH	4822 157 53278
L 305	220UH	4822 157 10276
	MISCELLANEOUS	
(XA)	PLUG 11 PIN (XA)	4822 265 51203
(ZA)	SOCKET 8 PIN (ZA)	4822 267 50807
FB 1	BALUN	4822 157 53472
FB 2	BALUN	4822 157 53472
FB 3	BALUN	4822 157 53472
FB 4	BALUN	4822 157 53472
TP 31	PLUG (2 PIN)	4822 265 30331
TP 32	PLUG (2 PIN)	4822 265 30331

PWB-P POWER CIRCUIT

POSNR	DESCRIPTION	ORDERING CODE
	TRANSISTORS	
Q 901	2SC945	4822 130 41198
Q 902	2SD1308	4822 130 42318
Q 903	BN1F4M	4822 130 61377
Q 904	2SB548	4822 130 60954
Q 941	2SB1039	4822 130 60592
Q 942	2SB1038	4822 130 42686
Q 943	2SD1308	4822 130 42318
	INTEGRATED CIRCUITS	
IC 901	M5237L	4822 209 70287
IC 902	M5237L	4822 209 70287
	DIODES	
D 901	11E1	4822 130 80205
D 902	11E1	4822 130 80205
D 903	11E1	4822 130 80205
D 904	11E1	4822 130 80205
D 905	20E1	4822 130 81106
D 906	20E1	4822 130 81106
D 907	20E1	4822 130 81106
D 908	20E1	4822 130 81106
D 909	11E1	4822 130 80205
D 910	11E1	4822 130 80205
D 911	11E1	4822 130 80205
D 912	11E1	4822 130 80205
D 913	11E1	4822 130 80205
D 914	11E1	4822 130 80205
D 915	11E1	4822 130 80205
D 916	11E1	4822 130 80205
D 917	11E1	4822 130 80205
D 918	11E1	4822 130 80205
D 919	11E1	4822 130 80205
ZD 901	RD18ESB	4822 130 80582
ZD 902	RD5.6ESB	4822 130 80581
ZD 903	RD33ESB	4822 130 80586
ZD 904	RD5.6ESB	4822 130 80581

POSNR	DESCRIPTION	ORDERING CODE
	CAPACITORS	
C 901	0.1UF,250V,CERAMIC	4822 121 51292
C 902	2200UF,35V,ELECTROLY	4822 124 41432
C 903	3300UF,35V,ELECTROLY	4822 124 40873
C 904	1000UF,25V,ELECTROLY	4822 124 41076
C 905	2200UF,25V,ELECTROLY	4822 124 41077
C 914	47UF,100V,ELECTROLYT	4822 124 41274
C 915	47UF,100V,ELECTROLYT	4822 124 41274
	RESISTORS	
R 901	12M OHM,1/2W,SOLID	4822 116 53279
R 902	0.22 OHM,1/4W,FUSE	4822 116 80898
R 903	0.47 OHM 1/4W FUSE	4822 116 80978
R 904	0.27 OHM 1/4W FUSE	4822 116 80977
R 905	0.27 OHM,1/4,FUSE	4822 116 80977
R 931	8.2 OHM,POSITIVE COE	4822 115 10087
R 932	0.47 OHM,1/4W,FUSE	4822 116 80978
VR 901	500 OHM,POT,DIGITAL	4822 100 11436
VR 902	1K OHM,POT,ALL TIME	4822 116 80889
	COIL AND TRANSFORMER	
L 901	LINE FILTER	4822 157 53822
L 902	FILTER	4822 158 10662
T 901	PT2465	4822 146 21385
	MISCELLANEOUS	
CORD	AC CORD	4822 321 10577
F 901	FUSE T1A,250V	4822 252 51021
HOLDER	FUSE HOLDER	4822 256 30283
OA	PLUG (3PIN)	4822 265 30516
PA	PLUG (10PIN)	4822 265 40719
PB	PLUG (3PIN)	4822 265 30647
PC	PLUG (2PIN)	4822 265 20273
PD	PLUG (7PIN)	4822 265 40695
PE	PLUG (9PIN)	4822 265 40756
PF	PLUG (9PIN)	4822 265 40756

POSNR	DESCRIPTION	ORDERING CODE
	MECHANICAL PARTS	
BAT(+)	BATTERY TERMINAL (+)	4822 290 80777
BAT(-)	BATTERY TERMINAL (-)	4822 290 80778
CAB A	CABINET A	4822 432 30316
CAB C	CABINET B	4822 432 30318
CAP	CAP-FILTER	4822 381 11031
COVER	BATTERY COVER	4822 443 62197
KEY	RUBBER KEY	4822 410 26816
SCREW	SCREW	4822 502 12927
TERMIN	BATTERY TERMINA(+,-)	4822 290 80776
	ELECTRICAL PARTS	
DIODE	DIODE	4822 130 80992
FILTER	CERAMIC	4822 242 72348
IC	INTEGRATED CIRCUIT	4822 209 73473
KNOB	SLIDE KNOB	4822 411 61537
LED	LED - DIODE	4822 130 80421
SWITCH	SLIDE SWITCH	4822 277 21273
TRANSM	TRANSMIT (2SC2120Y)	4822 130 42292

MECHANISM CHASSIS PARTS

POSNR	DESCRIPTION	ORDERING CODE
1	LED SENSOR	4822 130 33016
4	DRUM BASE-B	4822 532 81088
5	PINCH ROL REL PL ASS	4822 403 52514
6	DRUM ASS'Y	4822 691 20481
7	MECH.CONTROL BRACKET	4822 403 53554
11	TENSION BAND ASS'Y	4822 358 20274
13	GUIDE PLATE ASS'Y	4822 464 50467
14	AUDIO/CONTROL HD.PL.	4822 464 50742
15	LOADING MOT HOLD	4822 464 50476
18	POLE BASE A ASS'Y	4822 464 50483
19	POLE BASE B ASS'Y	4822 464 50484
20	LOADING ARM A ASS'Y	4822 403 52518
21	LOADING ARM B ASS'Y	4822 403 52519
22	TENSION ARM ASS'Y	4822 403 52521
23	FULL ERASE HEAD ARM	4822 403 53497
24	PINCH ROL LEV ASS	4822 403 52863
25	BRAKE DRIVE LEV ASS	4822 403 52525
27	AUX BRAKE LEVER	4822 403 52532
28	TORQUE CHANGE LEVER	4822 403 52533
29	TAKE-UP BRAKE LEVER	4822 403 52534
30	SUPPLY BRAKE LEVER	4822 403 52535
31	TENSION ADJ LEVER	4822 403 52536
32	TENSION RELEASE LEV.	4822 403 53324
33	SHIFTER ASSY (A)	4822 403 52539
34	SHIFTER ASS'Y (B)	4822 403 52541
35	A/C HEAD SPRING	4822 492 32208
37	A/C HEAD ARM SPRING	4822 492 41383
39	BRAKE LOCK SPRING	4822 492 41385
40	PINCH PRESS SPRING	4822 492 41393
41	FE HEAD ARM SPRING	4822 492 41394
42	TENSION ARM SPRING	4822 492 41395
43	AUX BRAKE SPRING	4822 492 42207
45	MAIN BRAKE SPRING	4822 492 41398
48	LOADING BELT	4822 358 30507
51	SUPPLY REEL DISK ASS	4822 528 81066
52	TAKE-UP REEL DISK AS	4822 528 81195
55	BRAKE CAM	4822 522 32419
56	MASTER CAM	4822 522 32418
57	LOADING GEAR (A) ASS	4822 522 31974
58	LOADING GEAR(B) ASSY	4822 522 31975
59	SEGMENT GEAR ASS'Y	4822 522 32325
60	SEGMENT GEAR ROLLER	4822 528 90667
61	LOADING MOTOR PULLEY	4822 528 80995
63	LOADING BLOCK ASS'Y	4822 464 50743
64	REEL DRIVE UNIT	4822 528 70504
65	SUPPLY IMP ROLLER	4822 528 81045
66	GUIDE ROLLER ASS	4822 528 90549
67	PINCH ROLLER ASS	4822 528 90551
69	BRAKE LOCK SHAFT	4822 535 91922
73	RETAINING GUIDE	4822 403 53452

POSNR	DESCRIPTION	ORDERING CODE
75	SUPPLY IMP.FLANGE	4822 466 92204
78	EARTH BRUSH ASS	4822 464 50599
80	PLUG, 2PIN (NL)	4822 265 30331
82	A/C HEAD PWB (NF)	4822 214 32209
84	PLUG, 8PIN (NT)	4822 265 30573
88	REEL SENSOR PWB	4822 214 32208
89	LOAD MOD DEWSENS PWB	4822 214 32001
90	FULL ERASE HEAD PWB	4822 214 31999
91	SHIFTER SWITCH	4822 277 30735
92	CAM SWITCH	4822 276 12492
97	A/C HEADS ASS'Y	4822 249 10363
98	I.C.	4822 209 72578
99	LOADING MOTOR	4822 361 60449
100	DIRECT DRIVE MOT ASS	4822 361 60462
101	CAPSTAN DD MOTOR	4822 361 60466
102	BRAKE SOLENOID	4822 528 70468
104	1000PF, 20%, 50V	4822 122 32732
105	47KOHM,5%,1/4W,(8002	4822 116 52284
106	2.2KOHM,5%,1/4W,	4822 116 52256
107	220 OHM, 5%,1/4W	4822 116 52215
108	ADJUSTING NUT	4822 505 10786
109	REVERSE GUIDE LEVER	4822 403 53303
110	REVERSE GUIDE SPRING	4822 492 41386
112	UNIV BRAKE LEVER	4822 403 10285
114	UNIV BRAKE SPRING	4822 492 42206
115	SUPPLY ROLLER SPACER	4822 532 61097
116	1.2KOHM,5%,1/4W	4822 116 52207
117	1.5KOHM,5%,1/4W	4822 116 80347
118	SOCKET, 7 PIN (NA)	4822 267 50781
120	D.D. BRAKE SOLENOID	4822 528 70505
121	D.D. BRAKE LEVER ASS	4822 403 10286
122	DD BRAKE FIXING	4822 403 53557
123	RELEASE SPRING	4822 492 42203
124	D.D. BRAKE SPRING	4822 492 42205
127	REEL BELT	4822 358 30879
128	SPACER, FOR DD SOLEN	4822 532 52008
129	HEATER BRACKET	4822 403 53302
130	CONNECTION PLATE	4822 403 53444
131	INTERMEDIATE LEVER	4822 403 53453
132	HALF LOAD LEVER ASSY	4822 403 53446
133	HALF LOAD LEV.SPRING	4822 492 32879
134	RETAINING GUIDE SPRI	4822 492 70078
135	HALF LOAD SHIFTER	4822 403 53451
136	CAM LEVER ASS'Y	4822 403 53447
G-TAPE	CONDUCTIVE TAPE	4822 466 92255
SPRING	ELECTRO-STATIC D-SPR	4822 492 42273

CASSETTE HOUSING CONTROL PARTS

POSNR	DESCRIPTION	ORDERING CODE
1	UPPER PLATE	4822 443 30736
3	MOTOR ANGLE ASS	4822 403 53232
5	FRAME (LEFT)	4822 464 50473
6	SLIDER ASS'Y	4822 403 53559
7	DRIVE WASHER	4822 530 80272
8	DRIVE ARM (RIGHT)	4822 403 52522
9	DRIVE ARM (LEFT)	4822 403 52523
10	CASSETTE COVER ARM	4822 403 52816
11	TINMING LEVER	4822 403 52528
12	COVER OPEN LEVER	4822 403 52529
13	DRIVE RECIPR SPRING	4822 492 41387
14	OPEN LEVER SPRING	4822 492 41388
15	DRIVE SPRING	4822 492 41392
16	DRIVE GEAR (RIGHT)	4822 522 32386
17	DRIVE GEAR (LEFT)	4822 522 31971
18	PHASE GEAR	4822 522 31972
19	WORM GEAR	4822 522 32365
20	WORMWHEEL GEAR	4822 522 32387
21	MOTOR PULLEY	4822 528 70467
22	MAIN SHAFT	4822 535 91928
23	DOWN GUIDE	4822 464 50489
24	WORM ANTI-VIBR RUBBE	4822 462 71342
26	SOCKET (9 PIN)	4822 265 51124
28	END SENSOR P.W.B.	4822 466 10515
30	MODE SWITCH	4822 276 11595
31	MIST ERAS PREV SWITC	4822 276 11596
32	RESISTOR	4822 116 52269
33	PHOTO-TRANSISTOR	4822 130 32491
34	CASSETTE MOTOR	4822 361 60459
35	CASSETTE COVER SPRIN	4822 492 41971
37	TRANSISTOR	4822 130 42277
39	RESISTOR (22KOHM)	4822 116 53278
40	RESISTOR	4822 116 52283
42	CUT-WASHER	4822 502 12986
6-3	SLIDER	4822 403 53558
ASS'Y	CASSETTE HOUSING ASS	4822 443 62586

FIXING MATERIAL

301	AC HEAD SCREW	4822 502 11728
302	SCREW	4822 502 11842
303	SCREW	4822 502 12678
305	SCREW	4822 502 11733
306	SCREW	4822 502 11734
307	SCREW	4822 502 12052
308	SCREW	4822 502 12053
309	ADJUSTING NUT	4822 505 10937
310	ADJUSTING NUT	4822 505 10938
311	NUT	4822 505 10739

POSNR	DESCRIPTION		ORDERING CODE
312	WASHER		4822 530 80249
313	WASHER		4822 532 11239
315	WASHER		4822 530 80261
317	WASHER		4822 532 11241
318	FIXING SCREW		4822 502 11738
321	SCREW		4822 502 11744
322	SCREW		4822 502 11753
323	SCREW		4822 503 11003
325	SCREW		4822 502 11755
327	SCREW SW3P+6S-NI		4822 502 13164
328	SCREW		4822 502 11762
331	SCREW		4822 502 11774
332	SCREW		4822 502 11783
334	SCREW		4822 503 11007
337	SCREW		4822 503 11004
339	E RING		4822 532 11127
342	WASHER	(0,5)	4822 532 11136
342		(0.13)	4822 532 11134
342		(0.2)	4822 532 11243
342		(0.3)	4822 532 11244
342		(0.4)	4822 532 11245
350	SCREW		4822 502 12051
352	SCREW		4822 502 12925
354	SCREW		4822 502 11757

SERVICE TOOLS

Description	Ordering-code
Height adjusting jig	4822 395 80215
Master plane	4822 395 80193
A/C head tilt jig	4822 395 80212
Fixed guide adjusting jig	4822 395 80214
Torque gauge 90 gcm	4822 395 80196
Torque gauge 1200 gcm	4822 395 80197
Gauge head	4822 395 80198
Torque cassette	4822 395 80217
Tension gauge 300g	4822 395 80194
Tension gauge 2000g	4822 395 80216
Gauge adaptor	4822 395 80213
Hex wrench 0.9 mm	4822 395 80189
Hex wrench 1.2 mm	4822 395 80191
Hex wrench 1.5 mm	4822 395 80192
Drum replacement jig	4822 395 80186
Box driver 4	4822 395 50192
Box driver	4822 395 50
Alignment tape PAL	4822 397 30107
Screw driver	4822 395 50189
Torque driver	5322 395 54047
Tension band adj.	4822 395 50191