

TASCAM

TEAC Professional Division

SERVICE MANUAL

246

PORTASTUDIO

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PRECAUTIONS

- Value of "dB" in the Data refers to 0 dB (1V), except where specified.
- The AC voltmeter used in the procedures must have an input impedance of 1 M-ohms or more.
- Resistor values are in ohms (k = 1,000 ohms, M = 1,000,000 ohms).
- All capacitor values are in microfarads (p = picofarads).
- ⚠ parts marked with this sign are safety critical components. They must always be replaced with identical components — refer to the TEAC parts list and ensure exact replacement.
- Improvements may result in Specifications and Service Data changes.
- dbx noise reduction system made under license from dbx, incorporated. The name "dbx" and the dbx symbol are trademarks of dbx, Incorporated.

1. SPECIFICATIONS AND SERVICE DATA

MECHANICAL CHARACTERISTICS

Tape	Compact cassette, 70 μ s, Hi-bias (Type II) tape
Track Format	4-track, 4-channel
Head Configuration	1 Erase, 1 Record/ Reproduce
Motors	1 FG Servo-controlled DC Capstan; 1 DC Reel; 1 DC ancillary
Tape Speeds³⁾	3-3/4 ips (9.5 cm/s) and 1-7/8 ips (4.8 cm/s)
Speed Accuracy	± 1.0 % deviation
Pitch Control	± 12 %
Fast Wind Time	Approx. 85 seconds for C-60
Pause Start Time	Less than 0.5 sec. to reach standard Wow and Flutter
Dimensions (W x H x D)	500 x 401 x 123 mm (19-11/16" x 15-13/16" x 4-13/16")
Weight (net)	10.3 kg (22.7 lbs)

ELECTRICAL CHARACTERISTICS

MIXER SECTION

MIC/LINE Input	
Input Impedance	100k ohms, unbalanced
Source Impedance	Less than 10k ohms
Nominal Input Level	-60 dBV (1 mV), MIC (Trim max.) -10 dBV (0.3 V), LINE (Trim min.) +15 dBV (5.6 V)
Maximum Input Level	
LINE B Input	
Input Impedance	28k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+15 dBV (5.6 V)
PGM Buss Input	
Input Impedance	22k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+15 dBV (5.6 V)

INSERTION

SEND (Tip)	
Output Impedance	100 ohms
Nominal Load Impedance	10k ohms
Minimum Load Impedance	1.7k ohms
Nominal Output Level	-10 dBV (0.3 V)
Maximum Output Level	+15 dBV (5.6 V)
RECEIVE (Ring)	
Input Impedance	68k ohms
Nominal Input Level	-10 dBV (0.3 V)
Maximum Input Level	+15 dBV (5.6 V)

PGM/EFFECT/MONITOR Output

Output Impedance	100 ohms
Nominal Load Impedance	10k ohms
Minimum Load Impedance	1.7 kohms
Nominal Output Level	-10 dBV (0.3 V)
Maximum Output Level	+15 dBV (5.6 V)

HEADPHONES Output

Nominal Load Impedance	8 ohms, stereophones
Maximum Output Level	100 mW/ch. (8 ohms)

Equalizer	
Type	2-band, peak/dip, sweepable
Frequencies	Low/Mid; 62 Hz to 1.5 kHz Mid/High; 1 kHz to 8 kHz
Boost/Cut Range	±12 dB
Input Overload Indicator	Activates at 24 dB above nominal
PGM Buss Peak Indicator	Activates at 8 dB above nominal

RECORDER SECTION

Tape Out	
Output Impedance	100 ohms
Nominal Load Impedance	10k ohms
Minimum Load Impedance	1.7k ohms
Nominal Output Level	-10 dBV (0.3 V)
Maximum Output Level	+15 dBV (5.6 V)
Bias Frequency	85 kHz
Equalization	High Speed; 3,180 μ s + 35 μ s Low Speed; 3,180 μ s + 70 μ s
Record Level Calibration	160 nWb/m (0 VU reference)
Noise Reduction	4 Channel, dbx II, dual process
Power Requirements	
USA/CANADA	120 V AC, 60 Hz
EUROPE	220 V AC, 50 Hz
UK/AUSTRALIA	240 V AC, 50 Hz
GENERAL EXPORT	100/120/220/240 V AC, 50/60 Hz
Power Consumption	40 W

TYPICAL PERFORMANCE CHARACTERISTICS

MIXER SECTION

Frequency Response	20 Hz — 20 kHz $\pm$ 1 dB
Signal-to-Noise Ratio	IHF A WTD/UNWTD (20 — 20 kHz)
1 Mic to PGM Out	68 dB/65 dB
1 Line to PGM Out	85 dB/80 dB
Total Harmonic Distortion ²⁾	0.05 %, nominal level
Crosstalk ²⁾	65 dB

RECORDER SECTION

Wow and Flutter³⁾ HIGH speed	0.04 % (NAB weighted) $\pm$ 0.06 % peak (DIN/IEC/ANSI weighted)
LOW speed	0.05 % (NAB weighted) $\pm$ 0.1 % peak (DIN/IEC/ANSI weighted)
Frequency Response⁴⁾ (Record/Reproduce)	
HIGH speed	20 Hz — 18 kHz 40 Hz — 14 kHz, $\pm$ 3 dB
LOW speed	40 Hz — 14 kHz 40 Hz — 12.5 kHz, $\pm$ 3 dB
Signal-to-Noise Ratio⁴⁾ (Reference to 3 % THD)	IHF A WTD/UNWTD (20 — 20 kHz)
HIGH speed	95 dB/90 dB with dbx* 58 dB/55 dB without dbx
LOW speed	93 dB/88 dB with dbx 57 dB/54 dB without dbx
Total Harmonic Distortion^{1, 4)}	
HIGH speed	1.0 %, 0 VU, with/without dbx
LOW speed	1.0 %, 0 VU, with/without dbx

Adjacent Channel Separation²⁾	70 dB with dbx (0 VU)
	55 dB without dbx
Erase (referenced to 3 % THD level)	70 dB at 1 kHz

SERVICE DATA

Tape Speed:	
Deviation:	3,000 Hz $\pm$ 30 Hz
Width of deviation:	Within 30 Hz
Pitch Control:	
Minimum:	Less than 2,610 Hz
Maximum:	More than 3,390 Hz
Take-up Torque:	
At play and record:	40 to 50 g-cm (0.49 to 0.7 oz-inch)
At FF:	Higher than 55 g-cm (0.76 oz-inch)
At REW:	80 to 150 g-ms (1.11 to 2.08 oz)
Pinch Roller Pressure:	350 to 500 g-ms (12.34 to 17.64 oz)
Wow & Flutter:	Refer to Section 4-4-9
Frequency Response:	
Mic/Line INPUT $\rightarrow$ PGM OUT, EFFECT OUT, MONITOR OUT	20 Hz to 20,000 Hz $\pm$ 1 dB
Parametric EQ:	Refer to Section 4-5-7
Overall:	Refer to Section 4-6-7
Overall SN Ratio:	Refer to Section 4-6-9
Overall Distortion:	Refer to Section 4-6-8
Erasing Ratio:	Refer to Section 4-6-10
Headphones (L, R):	Maximum 900mV at 8 ohms

2. CIRCUIT DESCRIPTION

2-1 OUTLINE

Electric circuit section consists of an amplifier circuit section, control circuit section which processes operation modes of the tape deck and associated control signals, driver section which drives motor, and power supply circuits which supply power to each circuit.

The amplifier circuit section contains mixer amplifiers, recording/-reproducing amplifiers, dbx encoders, dbx decoders, recording bias circuit, meter amplifiers and monitor amplifiers.

The control circuit consists of a main unit composed of four-bit single tip microcomputer, input-port extension interface IC and output-port extension interface IC, and logic circuits.

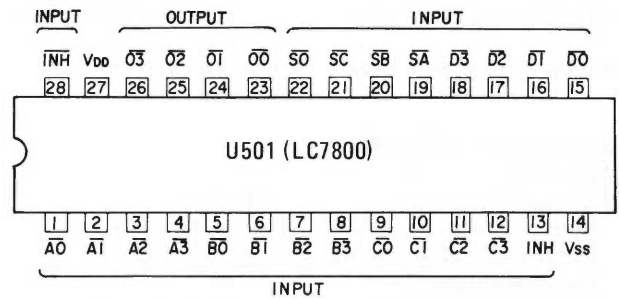
2-2 CONTROL CIRCUIT

The control circuit, as shown in Fig. 2-2, consists of the main unit composed of four-bit single tip microcomputer (U502), input-port extension interface IC (U501), and output-port extension interface IC (U503), and the logic circuits.

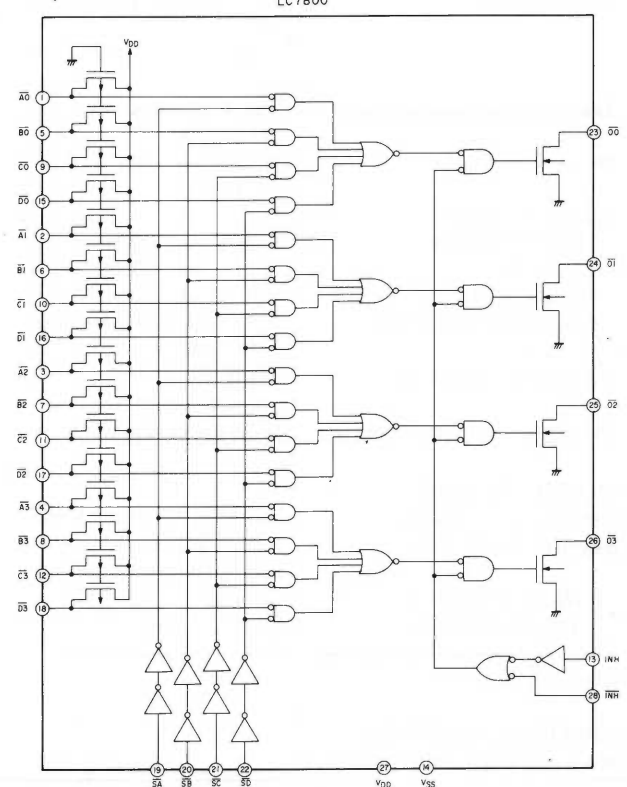
1. Reading of operation input

- 1) The input-port extension IC U501 is composed as shown in Fig. 2-1 and operation switches of the deck are connected to its input terminals as shown in Fig. 2-2.
- 2) Output terminals (C0 - C3) of the microcomputer U502 generates four-phase scanning pulses as shown in Fig. 2-2, and they are connected to the terminals SA - SD of U501.
- 3) U501 makes logical operations on the input (L level) from the operation switch(es) of the deck and the scanning pulses, sending the result from the 00 - 03 terminals to the A0 - A3 terminals of the microcomputer. The microcomputer analyzes the signals and knows which one of the operation switches was pressed, thereby generating an output required for the specified operation according to the inner program.
- 4) However, as for zero stop, zero play, memory stop and memory REW, U501 is not used but a separate circuit is used as shown in Fig. 2-2.

Pin Layout



Equivalent Circuit



Truth Table

INPUT																						OUTPUT			
DATA INPUT																SELECT INPUT				INHIBIT INPUT					
A				B				C				D													
A0	A1	A2	A3	B0	B1	B2	B3	C0	C1	C2	C3	D0	D1	D2	D3	SA	SB	SC	SD	INH	INH	O0	O1	O2	O3
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	0	1	1
1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	0	1
1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	0
1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	0	1	1	1	0	1	0	1	1	1
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	0
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	0	1	1	1	1
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1	*	1	1	1	1
*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	1	1	1	1

Note: 1: "H" level, 0: "L" level, *: don't care

Fig. 2-1
U501 (LC7800)

A. PLAY Mode

- 1) When the PLAY switch is pressed, PLAY terminal in the Fig. 2-2 turns to L and A1 terminal of U501 also turns to L (refer to Fig. 2-3).
- 2) As a result, pin 26 H0(PLAY) of U502 turns to L, and output pin 2 of inverter U508 turns to H. Transistor Q506 turns "ON", determining voltage on the mode terminal. This mode control voltage is supplied to the driver section via P504.
- 3) The mode control voltage supplied to the driver section is input to pin 3 of U501 in the drive PCB and compared with voltage applied to pin 2, and the resultant difference output voltage drives Q501 (Q502) which in turn drives the mecha-driver motor (i.e. mode setting cam), thus setting the PLAY mode.

- 4) As pin 2 of U508 turns to H level, pin 16 of U507 in the CONT (A) PCB Assembly turns to L level, lighting PLAY LED D505 as a result.
- 5) As was described previously, output pin 2 of U508 turns to H level in the PLAY mode, output pin 8 of U509 turns to L, output pin 4 of U508 turns to H and output pin 11 of U507 turns to L, as the result, Q504 turns "ON". Consequently, FWD terminal of P504 turns to H level.
- 6) The H level voltage from FWD terminal of P504 is applied to the input pin 5 of the operational amplifier U501 (5, 6, 7) in the motor drive PCB assembly circuit on the drive PCB, and rotates the reel motor in the forward direction.

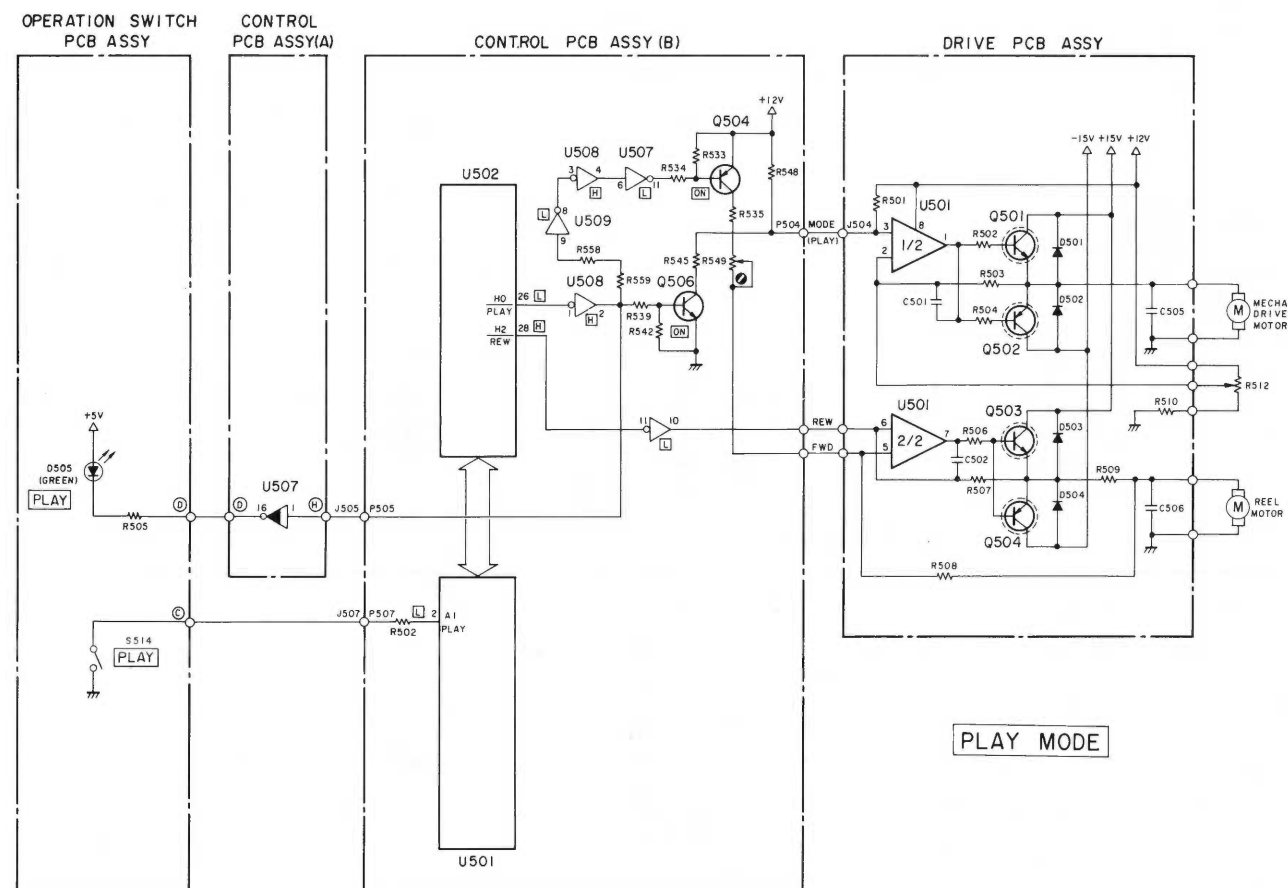


Fig. 2-3

B. REC Mode

- 1) The B0 terminal of U501 turns to L level when REC and PLAY switches are pressed to start recording function. This turns D1 (REC) terminal of U502 to L level and conducts the upper side of diode D 508 connected to the D1 terminal, turning the transistor Q501 "ON". Consequently LED terminal of P501 turns to H level. This signal is applied to REC function switch as a REC mode signal used for lighting LEDs, etc.
- 2) The L level signal from the D1 terminal is also applied to Q503 base, conducting Q503. This turns Q503 collector to H level, and output pin 10 of the next inverter U507 to H level. This signal is then inverted by the inverter U507 on the CONT (A) PCB Assembly to light REC.LED (D507).

- 3) The H level signal from Q503 collector is also applied to the REC terminal of P501, and is used as a control signal for the amplifier circuit.
- 4) The H level signal from output pin 2 of U508 on control PCB assembly (B) is applied to PLAY.LED via the inverter U507 (1, 16) as was described in the PLAY mode, and lights up the LED. Also the signal turns on Q504 via U509 (9, 8), U508 (3, 4) and U507 (6, 11), and turns FWD terminal of P504 to H level to generate control voltage for the REEL motor to rotate in the forward direction.

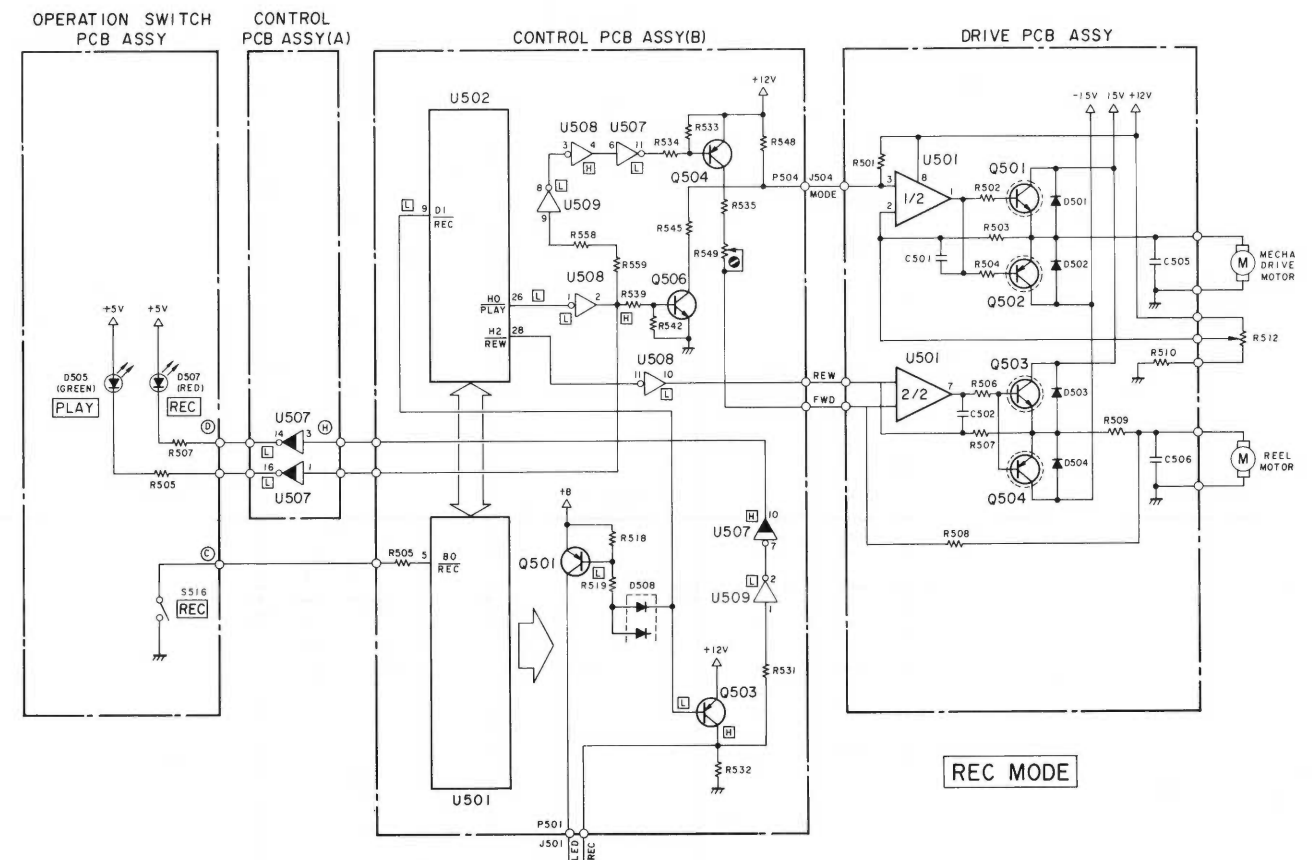


Fig. 2-4

C. PAUSE Mode

- 1) When the PAUSE switch is pressed, B1 of U501 turns to L level along with H3 (PAUSE) of U502. Consequently output pin 8 of U508 turns to H level, turning on the transistor Q507. As a result, voltage for PAUSE mode is generated at the mode terminal of P504. This voltage is then transmitted to pin 3 of the operational amplifier U501 in the driver section to set the mode control cam to the PAUSE mode.
- 2) The H level voltage from pin 8 of U508 is also applied to pin 2 of U507 on CONT (A) PCB Assembly, turning pin 15 to L level. Consequently PAUSE LED (D506) on the OPE SW PCB lights up.
- 3) 1 Hz pulse is always output from terminal D3 of U502 and input to pin 11 of U504. The inverted output is then input to the right diode of D509 from pin 10 and applied to the REC.LED via U507 (3 – 14), turning the LED on or off.

- 4) When PAUSE switch is pressed, L level signal from H0 terminal of U502 turns to H level. Q504 turns off as a result and FWD terminal of P504 turns to L level.

REW terminal of P504, on the other hand, has been maintained at L level, therefore electrical potential difference between the two terminals becomes zero. In other words, the input electrical potential difference between two input terminals of the operational amplifier for the reel motor control circuit on the driver section reduces to zero, thus the REEL motor stops.

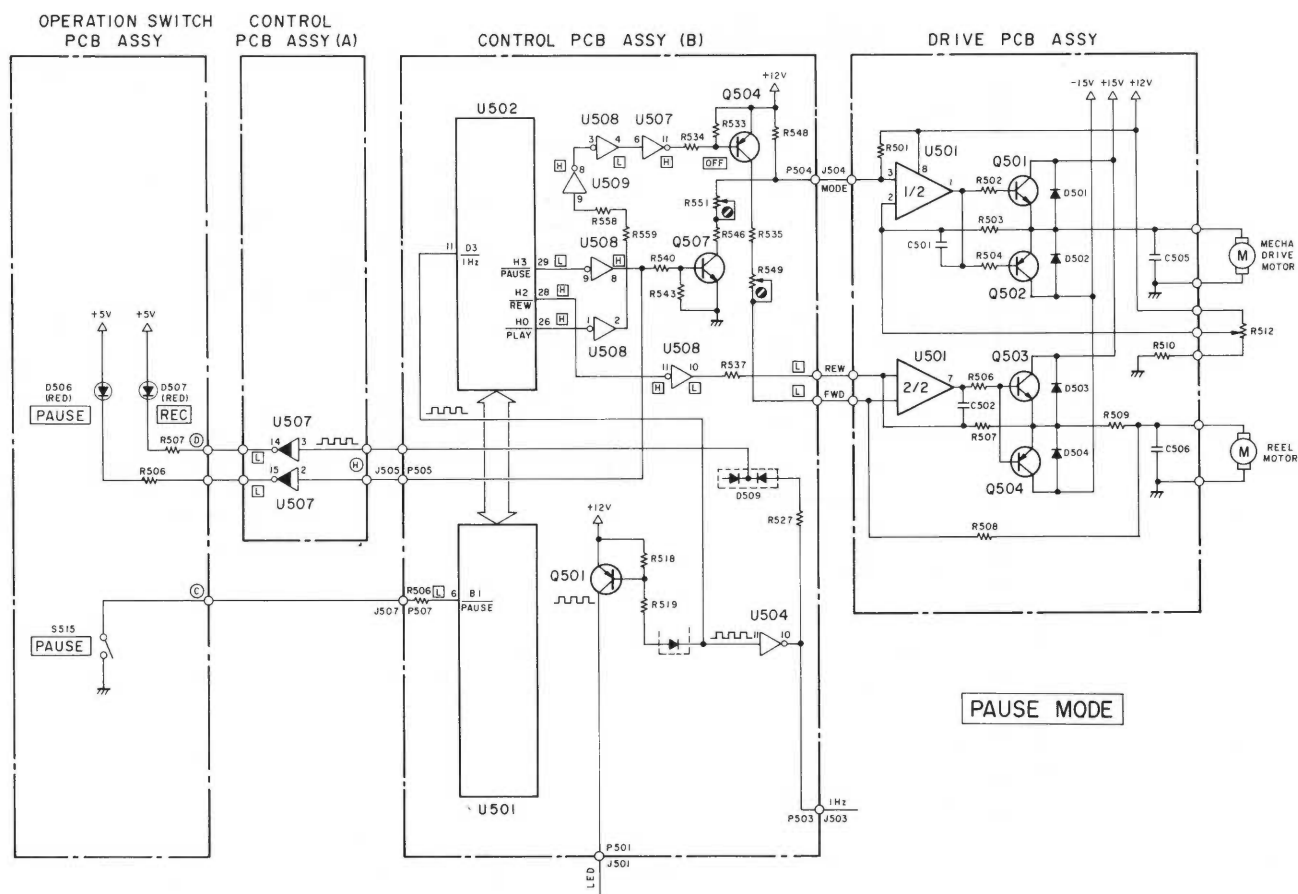


Fig. 2-5

D. REW Mode

- 1) When the REW switch is pressed, terminal A3 of U501 turns to L level, H2 (REW) terminal of U502 and D2 (FAST) terminal turn to L level. Consequently, output from output pin 10 of inverter U508 turns to H level. This output is input to the driver section via P504 as the REW output.
- 2) The REW voltage applied to the driver section passes through the motor drive circuit to rotate the REEL motor in the reverse direction.
- 3) Output pin 6 of U508 also turns to H level turning on transistor Q505, and generates voltage for the mode control. This voltage is then input to pin 3 of comparator U501 in the driver section, and rotates the motor which sets the operational mode cam.

E. FF Mode

- 1) When the FF switch is pressed, both A2 terminal of U501 and H1 (FF) terminal of U502 turn to L level. D2 (FAST) terminal also turns to L level as in the REW mode.
- 2) The L level voltage of H1 is inverted and output from pin 12 of U508, then enter the driver section as the FWD voltage for rotating the REEL motor in the normal direction.
- 3) The L level voltage at D2 operates in the same way as in the REW mode.

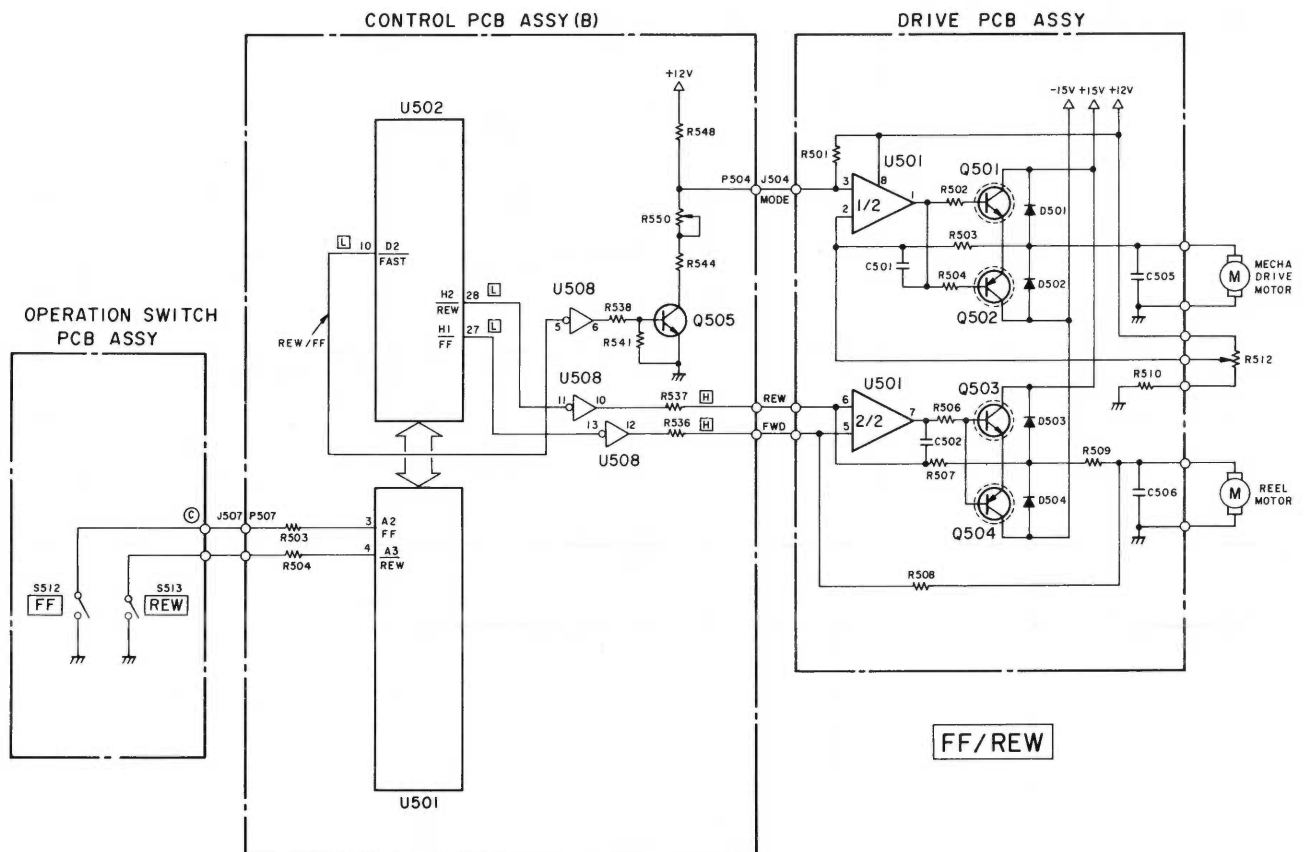


Fig. 2-6

F. POWER ON MUTE Circuit

This circuit resets the microcomputer at a transient time period during which power line voltage increases or decreases due to the on-off operation of the power switch, thus preventing occurrence of abnormal phenomena by suspending operation of the micro-computer.

- 1) When the power switch is turned on, voltage at the secondary side of the power transformer is applied to rectification diodes D008 and D009.

The rectified DC voltage then enters the power circuit board via the terminal (P503) MUT of CONT (B) PCB Assembly and is applied to pin 5 of inverter U507.

In this case, as the filtering capacitor in the power supply circuit is relatively small, the rectified voltage rises to its steady state in a relatively short period. When this voltage rises to H level, pin 12 of U507 develops L level.

This signal is then applied to the input pin 3 of the inverter U509 (3, 4), and its output pin 4 develops H level. However, as pin 4 is connected to the circuit with a relatively large time constant consisting of R524 and C515, the hot side of C515

maintains L level until C515 is charged fully with the power voltage. In other words input side of U509 turns to L level with output side turning to H level, and output pin 10 of U509 turns to L level.

With this L level voltage applied to the micro-computer U502 and RESET terminal of the output port extension IC U503, these ICs are reset until C515 is fully charged and the ICs completely stop functioning.

After the time equivalent to the time constant have lapsed, the hot side of C515 turns to H level and this makes pin 10 of U509 develop H level, turning RESET terminals of both ICs to H level. That is both ICs have been set to a standby mode and are ready to accept commands.

- 2) Because value of the filter capacitor C023 in the rectification circuit is relatively small, its terminal voltage immediately falls to L level when the power switch is turned off. Consequently input pin 5 of U507 on CONT (B) PCB Assembly turns to L level and output pin 4 of U509(3,4) also momentarily turns to L level. Since cathode side of diode D510 rapidly turns to L level, pins 10 and 13 of U509 turn to L level, resetting U502 and U503.

G. Amplifier Circuit Control Signal

U503 is an extension IC to generate control signals for four channels of the amplifier circuits.

Control signals internally processed by the micro-computer and extension IC are applied to the amplifier circuit via the output terminals P514, P513, P512 and P511 of CONT (B) PCB Assembly.

The output of each terminal is shown in the following chart.

Terminal No.	Signal	STOP	PLAY	REC	Remarks
1	dbx Sig	L	L	H	H: Encode L: Decode
2	Play Mut	L	H	L	H: Mute off L: Mute on
3	Rec Mut	L	L	H	H: Mute off L: Mute on
4	Relay	H	H	L	H: Off L: On (Rec mode)

These signals are applied to the amplifier circuit of the channels determined by FUNCTION switch.

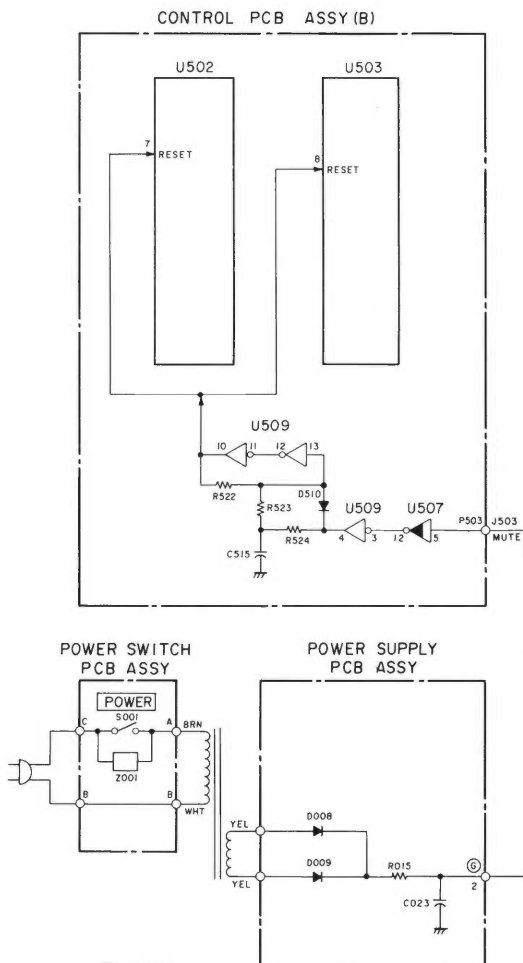


Fig. 2-7

2-3 RECORD, PLAYBACK CIRCUIT

This circuit is composed of record/playback amplifier circuits, dbx encoder/decoder, and a bias generator.

1. An audio signal generated by the playback head in the playback mode passes along the heavy line routines in the figure and is processed.
2. Q103 is a switch to match characteristics of the playback amplifier to a tape speed selected. In the Hi speed mode, H level signal is applied to the gate of Q103, and in the Low speed L level signal is applied.
3. Transistor Q123 functions as the muting switch which turns off in the playback mode and turns on in the record mode.
4. Transistors, Q118, Q117, Q106, Q108, Q107, Q109, Q110, Q111, Q112, Q511, Q510, Q115, and Q114 function as the switches which select decode or encode mode of the dbx NR system. They are set to ON and OFF in the playback mode as shown in the figure to create the decode mode.
5. U104 (8, 9) and U104 (4, 3) are analogue switches to set the encode and decode modes, U104 (4, 3) closes and U104 (8, 9) opens in the playback mode (decode). These analogue switches are controlled by Q118 and Q117 located just below the switches in the schematic.
6. The right analogue switches U104 (11, 10) and U104 (1, 2) are controlled by dbx IN/OUT signals. U104 (11, 10) opens and U104 (1, 2) closes when the NR system is actuated. When the dbx system is disabled, U104 (11, 10) closes and U104 (1, 2) opens. Consequently an input signal applied to pin 8 or 4 of U104 is directly output to pin 10 of U104, by-passing the dbx circuit.
7. In the record mode, the status of ON and OFF operation of the decode/encode switching transistors for the dbx NR system is reversed and set the dbx circuit to the encode mode. A recording signal is recorded via the route shown by the heavy line in the Fig. 2-9.
8. Q119 is a switching transistor for REC.MUTE, and is off when recording and on when reproducing.
9. Q121 and Q120 are switches to compensate for the level deviation produced by tape speed switching; Q120 turns on in the Hi speed mode and Q121 turns on in the LO speed mode, thus adjusting the recording level. Q122 also turns on in the LO speed compensating frequency characteristic.
10. Q610, Q611 and Q612 are turned on by the record mode signal, actuating the bias voltage amplifier to supply the bias voltage required in recording.

REC/PLAY PCB ASSY

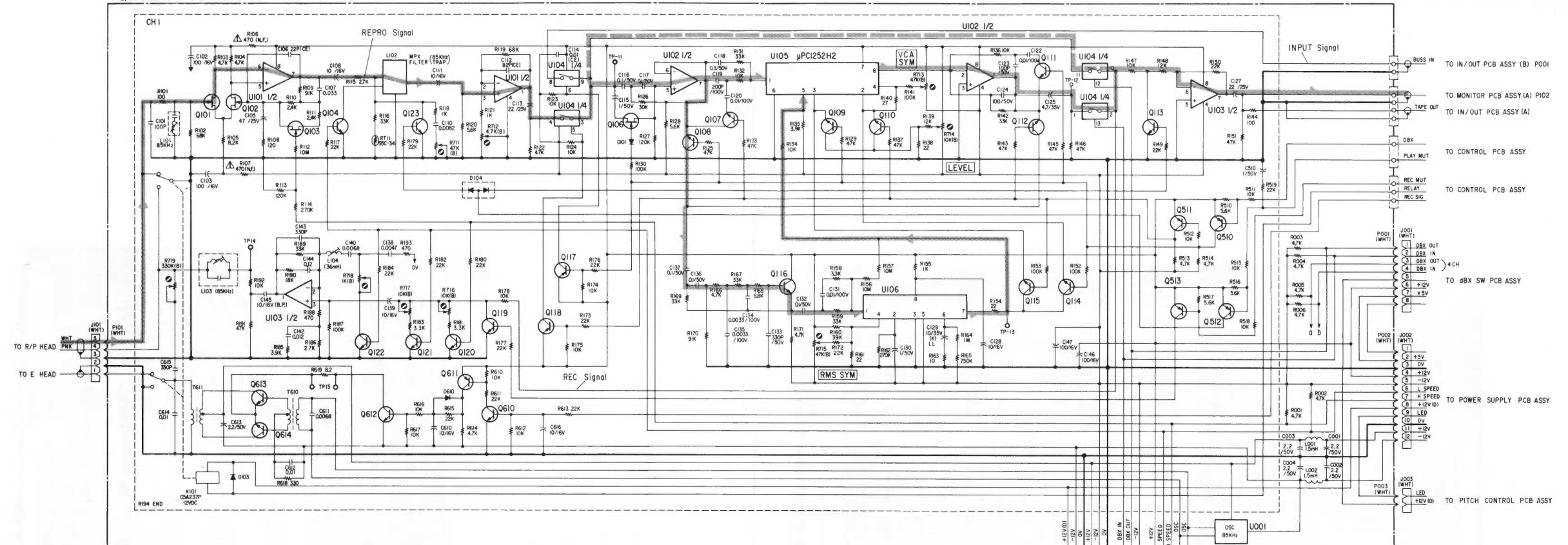


Fig. 2-8 a Signal in the Decode Mode

REC/PLAY PCB ASSY

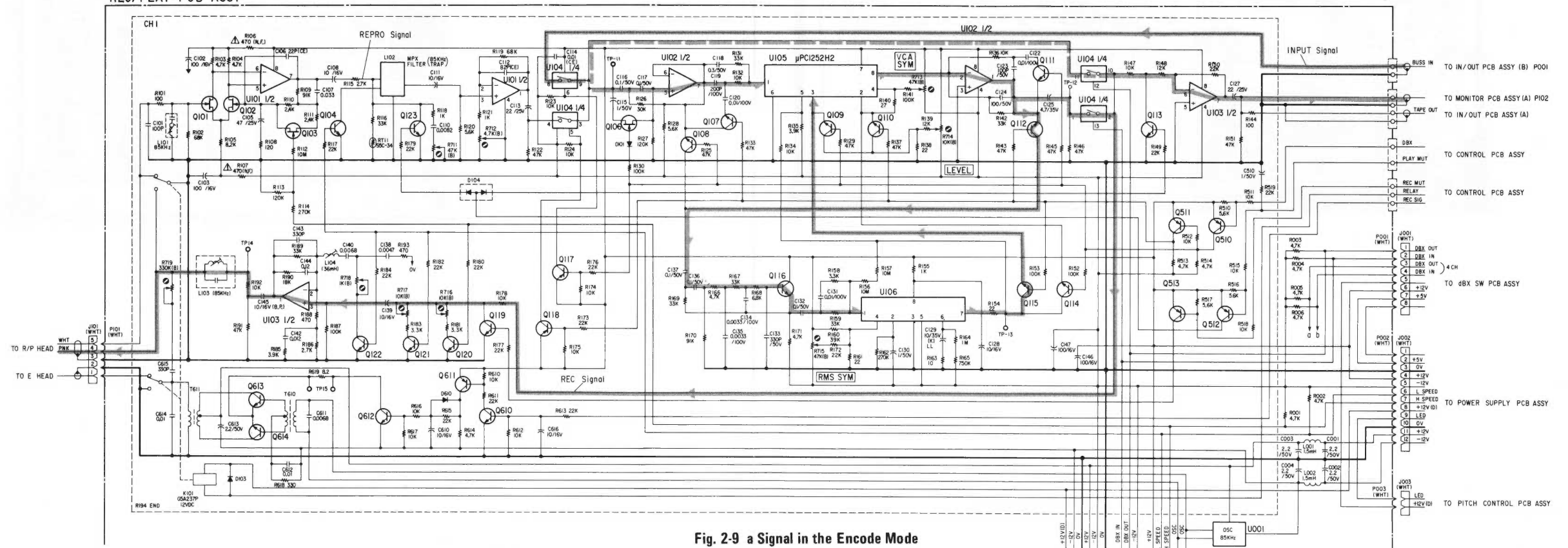
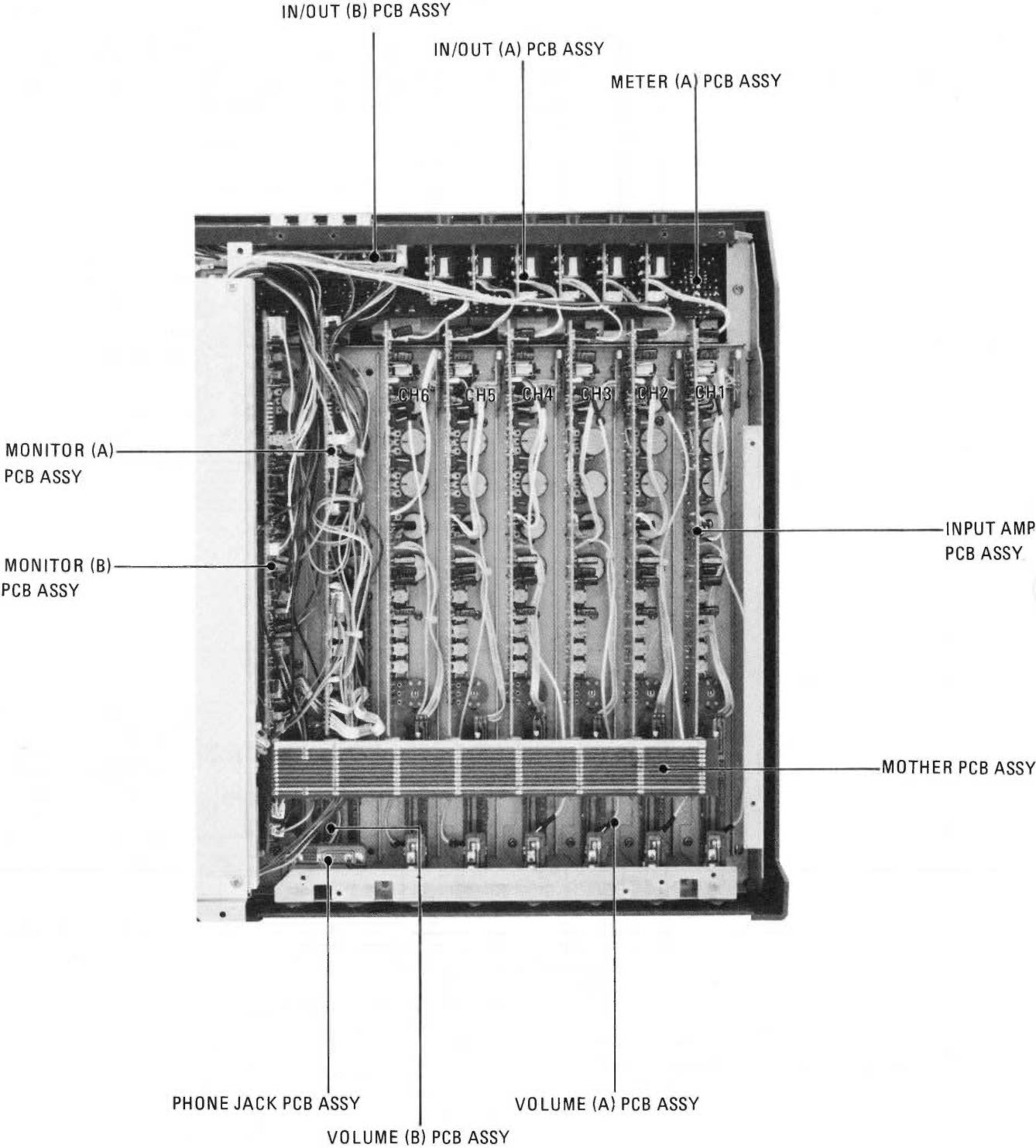
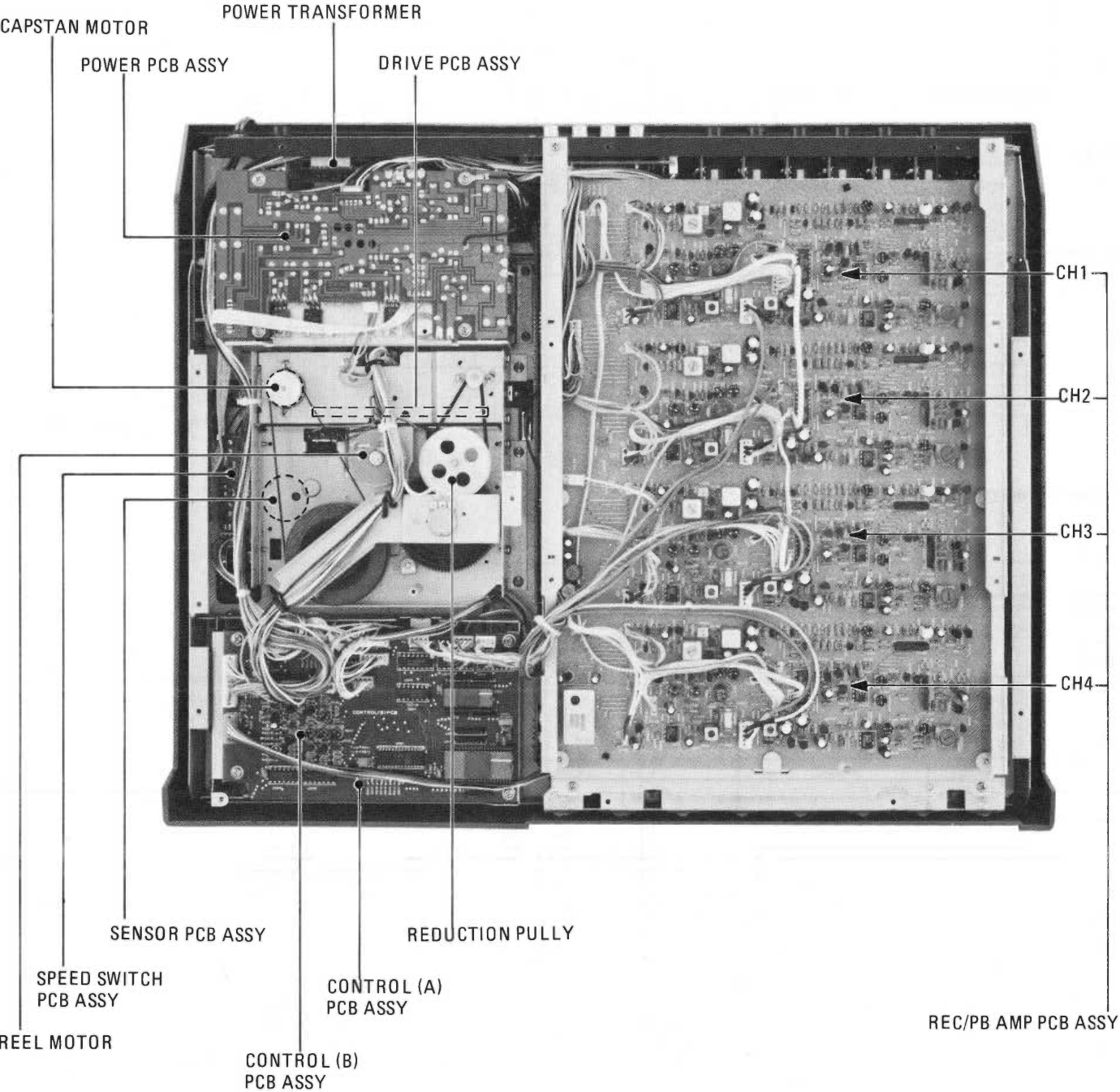


Fig. 2-9 a Signal in the Encode Mode

3. MAJOR PARTS LOCATION



4. MAINTENANCE

4-1 ADJUSTING TOOLS AND EQUIPMENT

The special tools and equipment required for adjusting the Model 246 are as follows:

- 1) Head Height Adjusting Jigs

Check base plate jig	TEAC Parts No. 5030610000
Tape guide, pinch roller jig	TEAC Parts No. 5030613000
- 2) Linear Tension Gauge 0 to 500 gms. (0 to 17.6 Oz)
- 3) Torque Meter

Cassette torque meter	0 to 100 g-cm (0 to 1.39 oz-in.) SONY Corp. TW 211
Cassette torque meter	0 to 160 g-cm (0 to 2.22 oz-in.) Silver Co. SRK-160
- 4) Crab Eye Screwdriver
- 5) Mirror Type Cassette TEAC MTT-902T (C-90) Parts No. 4900015220 (Internal use)
- 6) Test Tapes

TEAC MTT-111 (Flutter, 3kHz)
TEAC MTT-150 (Level, Dolby B Type)
TEAC MTT-356 (Frequency, 31.5 Hz to 14 kHz)
- 7) Blank Tape

TEAC MTT-5561 (Type II) or equivalent

4-2 DEFINITION AND MEASUREMENT CONDITIONS

1. Standard voltage 0dBV = 1.0V
Reference:
LINE nominal input level: -10dBV (316mV)
PGM nominal output level: -10dBV (316mV)
2. The output load is 10 k Ω unless otherwise noted.
3. The output impedance of the oscillator connected to the MIC/LINE should be less than 10 k Ω .
4. Performance checks and adjustments in playback or record mode should be performed with the tape speed set to LOW unless otherwise noted.
5. Before making performance checks and adjustments in playback or record mode, always demagnetize and clean components touching tape surface.

4-3 DISASSEMBLY OF MAJOR PARTS

Sometimes it is difficult to see how to disassemble the parts. The following explains how to remove the major parts.

For detailed disassembly instructions, refer to the Exploded View-1 (Page 33, 35, 38).

4-3-1 Trim Cover Assembly

- 1) Pull off each fader knob and control knobs on the top panel and remove the bottom cover.
- 2) Remove the nine tapping screws (a) and one screw (b) from the bottom side. Refer to Fig. 4-3-1.

NOTES: The screws behind the Assembly can be easily removed if the screwdriver is magnetized.

4-3-2 Mechanism Assembly

- 1) Remove bottom cover, remove the five screws (c) holding the mechanism assembly. Refer to Fig. 4-3-2.

4-3-3 Heads

- 1) Remove the head cover using a crab-eye driver.
- 2) Remove the bottom cover, and turn the reduction pulley (Refer to Fig. 4-3-2) by hand to bring the head base upon the PLAY position.
- 3) Remove one record/playback head mounting screw and the azimuth adjusting screw. When removing the erase head, remove two screws securing the head. (Refer to Fig. 4-3-3)

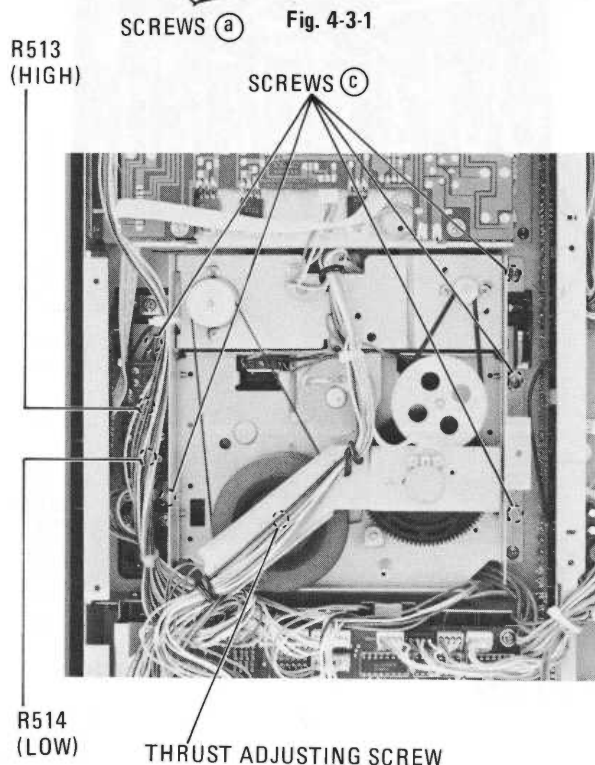
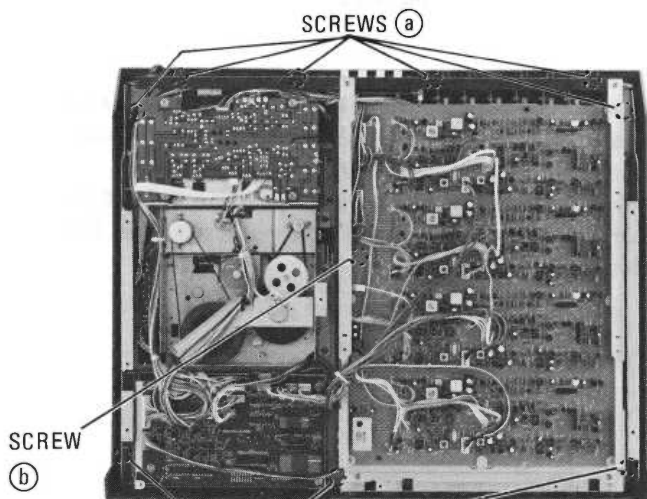


Fig. 4-3-2

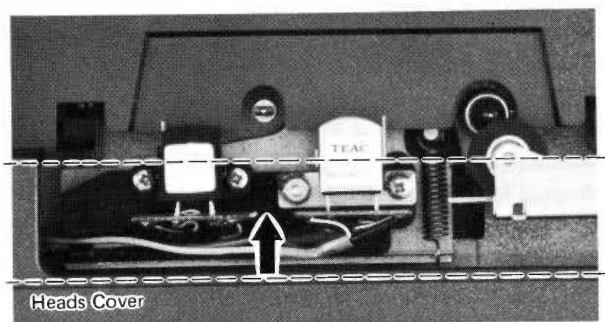


Fig. 4-3-3

4-3-4 Input Amplifier PCB Ass'y, Monitor Amplifier PCB Ass'y

- 1) Remove fader knobs and other control knobs on the top panel, and the mother PCB on bottom side.
- 2) Remove the screw (d) to remove the Input amplifier PCB Assembly, and screw (e) to remove the monitor amplifier PCB Assembly. Refer to Fig. 4-3-4

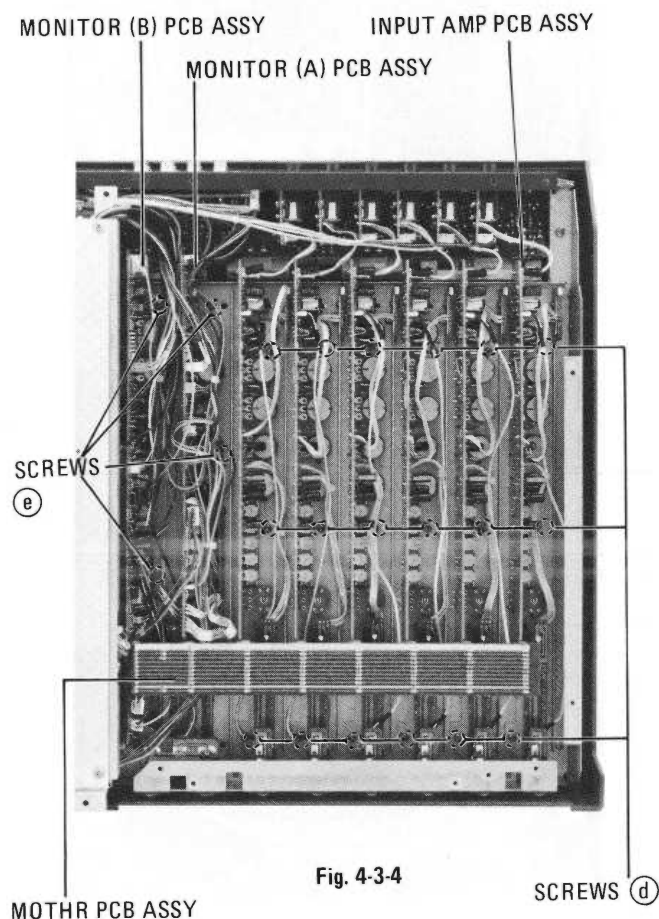


Fig. 4-3-4

4-4 CHECK AND ALIGNMENT OF TAPE DECK SECTION

4-4-1 Capstan Assembly Thrust

Turn the thrust adjusting screw (Plastic); Refer to Fig. 4-3-2. Provided on the bottom of the flywheel so that thrust of the capstan shaft is within 0.1 mm to 0.2 mm.

4-4-2 Micro Switch Assembly Clearance

This adjustment should be made for both the Cassette-In switch and the Record Protection switch.

First, loosen two microswitch mounting screws and adjust the mounting position of the switch so that the micro switch actuator is positioned within the setting range(s) as shown in Fig. 4-4-1.

After completion of the adjustment, actually load the tape deck with a blank tape, and check to see the switches turn on and off.

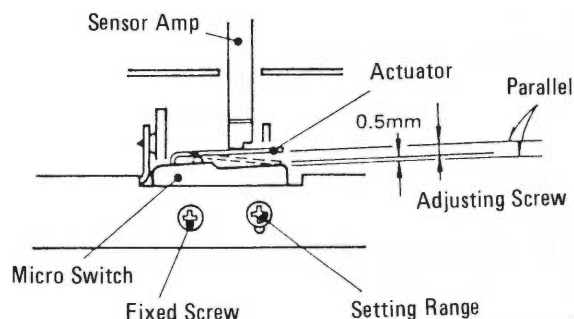


Fig. 4-4-1

4-4-3 Head Base Position

STOP Mode

- 1) With the deck set to STOP mode, observe stop position of the head base and note the position.
- 2) Turn the reduction pulley with your hand and observe whether the head base comes to the same position as noted or exceeds the position. If exceed, adjust the trim pot 552. (Refer to Fig. 4-4-2)

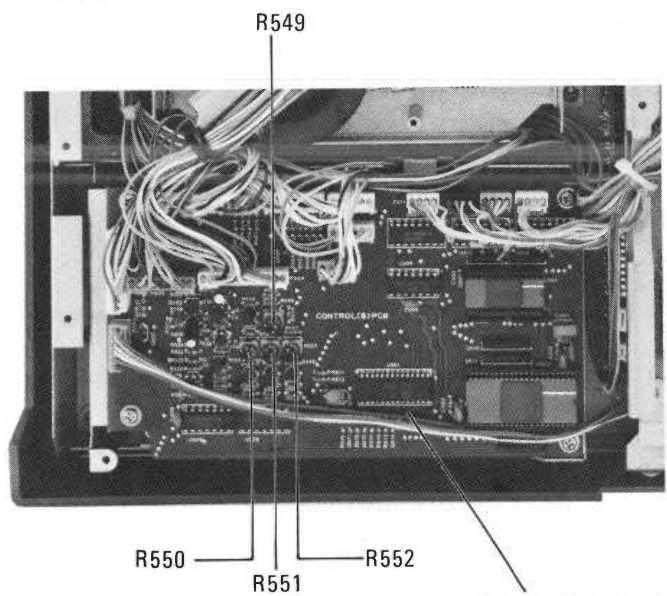


Fig. 4-4-2

- 3) Run the deck in PLAY mode, then STOP mode, and finally turn the power off. Repeat this sequence two times. Then observe the stop position of the head base again. If the head base still exceeds the position noted, adjust R552 again and repeat the steps 1 and 3 until the head base comes to the most forward position.

FF and RWD Mode

Run the deck in the FF or RWD mode and make sure a clearance between each brake drum and the brake pad is approx. 1.5 to 2 mm. If not, adjust R550. (Refer to Fig. 4-4-2) After the adjustment has been completed, repeat switching operations from the STOP to FF or RWD two or three times and make sure the clearance "a" is within the specified range. If the "a" is not within 1.5 to 2 mm, adjust R550 again. Refer to Fig. 4-4-3.

PAUSE Mode

Set the deck to PAUSE mode and observe the clearance "b" between the pinch roller and capstan shaft. It should be approx. 0.5 to 1 mm. If not, adjust the trim pot R551 (Refer to Fig. 4-4-2). After completion of the adjustment, repeat switching operations from STOP to PAUSE mode two or three times, and make sure the clearance "b" is within the specified range. Also make sure there is a clearance "c" between the head base and a spring stud. (Refer to Fig. 4-4-3)

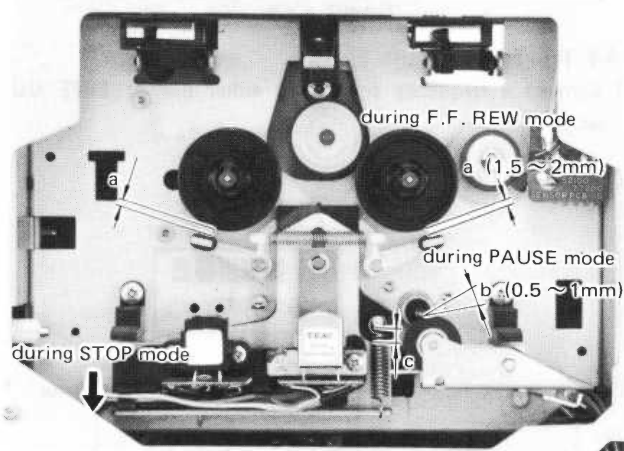


Fig. 4-4-3

4-4-4 Pinch Roller Pressure

First remove the bottom cover and the Trim cover as shown in section 4-3.

- 1) Turn the Cassette-In switch on with a finger or using a rubber ring.
- 2) Run the deck in PLAY mode and hook a tension gauge to a small opening on the pinch roller arm as illustrated.
- 3) Pull the gauge until the pinch roller moves away from the capstan shaft by approx. 2 mm, and then allow the pinch roller to just touch the capstan shaft again. Read the gauge when the pinch roller just starts to rotate.

The reading should be between 350 and 500 g.

NOTE: (1) During PLAY operation, make sure there is a little clearance "a" between the pinch roller arm and the spring arm. (Refer to Fig. 4-4-4 (A))

- (2) When replacing the pinch roller arm spring, always position the spring around the lower half of the spring shaft as shown in the photo. (Refer to Fig. 4-4-4 (B))

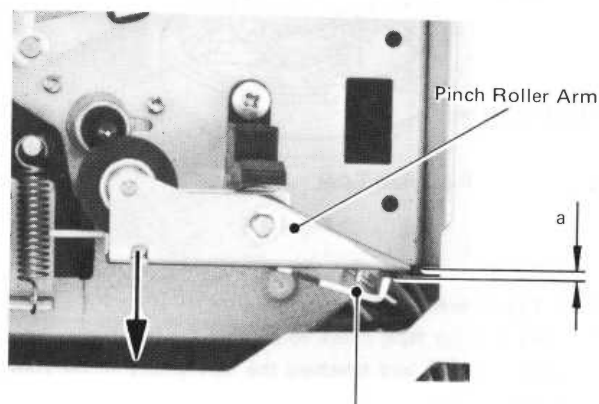


Fig. 4-4-4 (A) Spring Arm

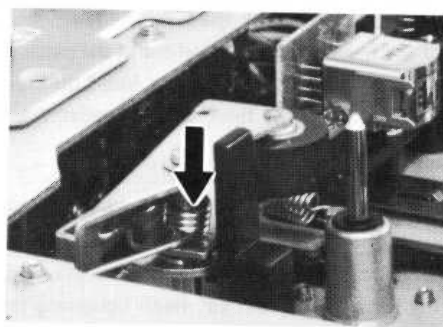


Fig. 4-4-4 (B)

4-4-5 Take-Up Torque

Take-up Torque For Playback & Recording

Load a cassette torque meter instead of a cassette tape in the cassette holder, and run the deck in PLAY mode. Take-up torque of the right reel table should be 40 – 50 g. If not, adjust the trim pad R549 (Fig. 4-4-2) to read 45 g-cm. After completion of the adjustment repeat the STOP and PLAY mode operations 2 to 3 times, and then make sure the torque reading is within the limits. Back tension torque (left reel table) should be 2 to 4 g-cm. If the torque is still out of the limits, adjust the torque adjusting ring provided on the right reel table. The torque can be adjusted in three values as shown in Fig. 4-4-5. Turn the torque adjusting ring with the tab A pulling slightly upward and place the tab on one of three stepped portions having pawls to fix the tab.

FF and REW Torque

Load a cassette torque meter in the cassette holder and measure starting torque for both F.F and REW operations with the tape rewound close to beginning of the tape or wound close to end of the tape, respectively.

The reading should be:

F.F. torque (right reel table): between 55 and 150 g-cm.

REW torque (left reel table): between 80 and 150 g-cm.

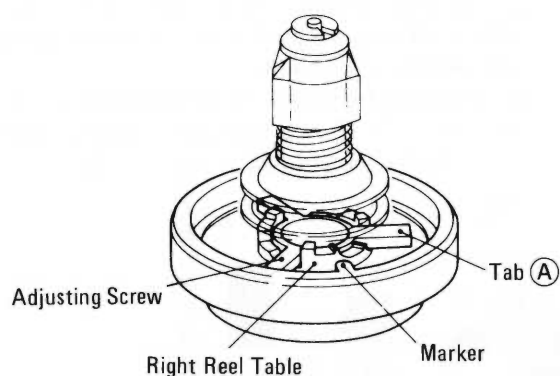


Fig. 4-4-5

4-4-6 Tape Travel

- 1) Using a mirror tape, check to see that the tape is running stably without curling and touching the tape guides on the erase and rec/play heads.
- 2) If there is curling of the tape affecting the response or damaging the tape, it is necessary to check the head guide height, perpendicularity of the head face, and alignment of the pinch roller in relation to the capstan. If the guide is low, insert the required amount of 0.1 mm or 0.2 mm thick washers under the head mounting legs.

NOTE: Always adjust the head azimuth when the head height was adjusted.

Be sure not to tighten the head fixed screw too hard. Turn the screw by approx. 45° (with tightening torque of 2 kg-cm after the screw has started to work).

4-4-7 Head Azimuth

Fine adjustment of the record/playback head should be made after the tape travel check had been completed. Before proceeding the adjustment, remove the head cover mounted on the Trim panel assembly.

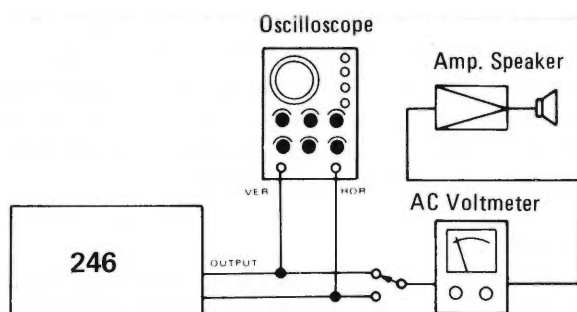


Fig. 4-4-6

- 1) Connect a vertical input terminal of an oscilloscope to the TAPE OUT "1" jack and a horizontal input terminal to the TAPE OUT "4" jack.
- 2) Load the deck with a test tape MTT-150 and playback the tape at the Low speed.

- 3) First, reproduce a test tone, and coarsely adjust the azimuth adjusting nut to obtain approx. zero phase difference as shown in the illustration below. •
- 4) Reproduce the test tape MTT-357 and precisely adjust the head azimuth adjusting screw so that maximum and equal output is obtained at 10 kHz in each channel.

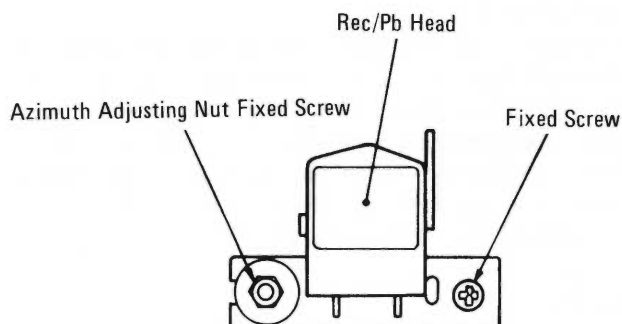


Fig. 4-4-7

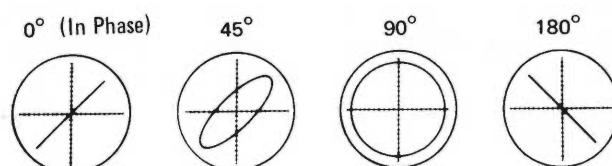


Fig. 4-4-8

4-4-8 Tape Speed

- 1) Connect a frequency counter to either one of TAPE OUT jacks.

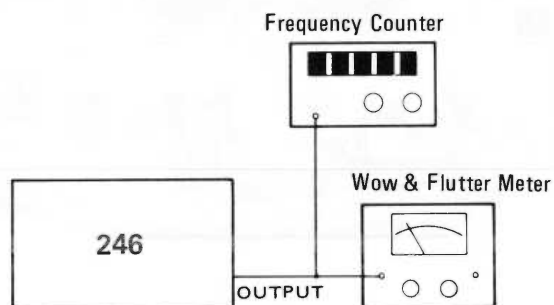


Fig. 4-4-9

- 2) Playback a wow & flutter test tape MXT-111 (tape speed 9.5 cm/sec), and following values will be obtained.
Deviation : 3,000 Hz $\pm$ 30Hz
Width of deviation : Within 30 Hz
Pinch control range : Min. less than 2610 Hz at fully CCW Max. higher than 3390 Hz at fully CW

* Minimum tape speed is obtained with the pitch control rotated fully counterclockwise and maximum tape speed with fully clockwise.

Test tapes: MTT-111 for low speed
MXT-111 for high speed

- 3) If the speed is out of the limits, adjust as follows:
- Remove the bottom cover and the Trim cover assembly as mentioned in section 4-3.
 - Clean the tape path and check the pinch roller pressure and take-up torque.
 - If they are normal, place the PITCH control in the center "0" position, and reproduce approx. mid portion of the test tape.
 - Adjust the trim pots (Refer to Fig. 4-3-2) provided on the rear side of the PITCH control variable resistor with a small "-" driver to obtain $3,000 \text{ Hz} \pm 5 \text{ Hz}$ reading on the frequency counter.

The adjustment should be performed at least one minute after the capstan motor has been started to rotate.

Low speed : R514

High speed : R513

4-4-9 Wow and Flutter

Before measuring wow and flutter, read the following and decide which one of two methods is to be used. Then connect test equipment as shown in Fig. 4-4-10, or connect a wow and flutter meter to one of TAPE OUT jacks (and a signal oscillator to the PGM BUSS IN Jack).

1) Reproduce Method:

Wow & Flutter is measured by reproducing a Wow & Flutter Test Tape.

Record/Reproduce Method: Wow and Flutter is measured by reproducing a 3 kHz tone recorded on a blank tape with the tape deck under test.

Use a blank tape of MTT5561 or equivalent.

NOTE: When measuring with the Record/Reproduce method, the recorded section should be reproduced repeatedly to obtain a mean value.

Be careful not to read the meter for those parts of the tape in which wow and flutter components in recording and reproducing cancel each other.

- Set the wow and flutter meter controls to the standard to be used. Set the weighting control to the DIN/IEC/ANSI position or JIS/NAB position.
- The measurement should be performed at both beginning and end of the tape. The measurement results will differ slightly according to the method and equipment used.

NOTE: Proceed to the measurement after cleaning the tape path, especially capstan shaft, pinch roller, and the head surfaces.

Reproduce Method:

- High speed 0.04 (NAB weighted)
 ± 0.06 (DIN/IEC/ANSI weighted)
- Low speed 0.05 (NAB weighted)
 ± 0.09 (DIN/IEC/ANSI weighted)

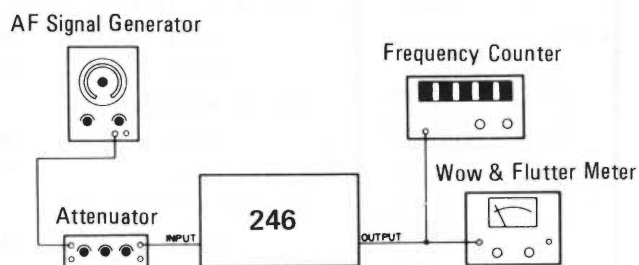


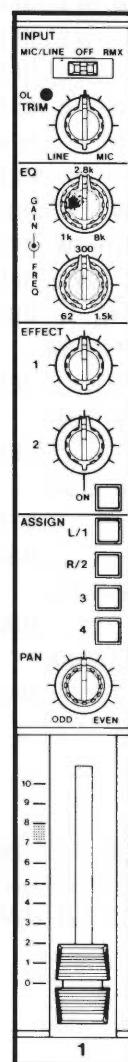
Fig. 4-4-10

4-5 SIGNAL PATH AND RESPONSE CHECK OF MIXER SECTION

The internal adjustment of the Mixer Section is restricted to the item 4-5-2, Level Adjustment of VU Meter.

4-5-1 Setting of Each Switch and Control

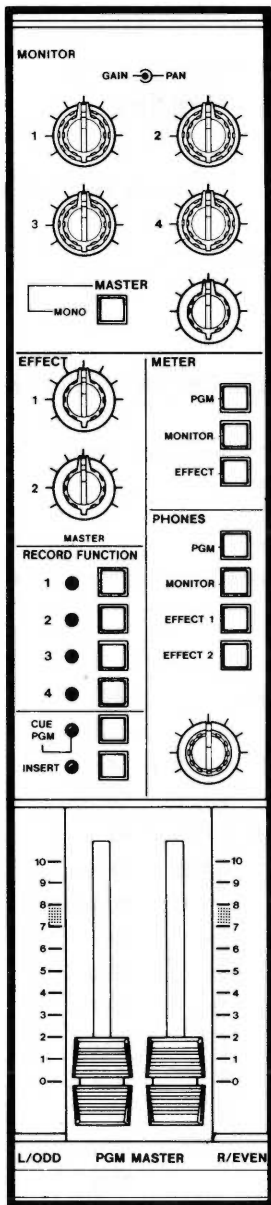
Before checking, set each switch and control in the mixer section as follows:



- | | | |
|-----------------------|--------|----------|
| (1) INPUT LEVER SW | : | MIC/LINE |
| (2) TRIM VR | : | LINE |
| (3) EQ VR (1K - 8K) | FREQ : | 1K |
| | GAIN : | Center |
| (4) EQ VR (62 - 1.5K) | FREQ : | 62 |
| | GAIN : | Center |
| (5) EFFECT 1 VR | : | MIN |
| (6) EFFECT 2 | SW : | OFF |
| | VR : | MIN |
| (7) ASSIGN SW | 1/L : | OFF |
| | 2/R : | OFF |
| | 3 : | OFF |
| | 4 : | OFF |
| (8) PAN VR | : | ODD |
| (9) INPUT FADER | : | MIN |

INPUT 1 ~ 6

Fig. 4-5-1 (A)



PGM MASTER

Fig. 4-5-1 (B)

4-5-2 PGM OUT Level and VU Meter

- 1) Apply -10dBV (0.3V), 1 kHz signal to the PGM BUSS IN terminal, then connect the level meter to the PGM OUT terminal.
- 2) Adjust PGM MASTER fader so that -10dBV (0.3V) PGM output is obtained.

Fader position (both L/ODD and R/EVEN) :
Reading within $7 \sim 8$

Deviation between channels :

Within $\pm 1\text{dB}$ with the standard set at CH 1, 2.

- (10) MONITOR VR 1
GAIN : MIN
PAN : L
- (11) MONITOR VR 2
GAIN : MIN
PAN : L
- (12) MONITOR VR 3
GAIN : MIN
PAN : L
- (13) MONITOR VR 4
GAIN : MIN
PAN : L
- (14) MASTER VR : MIN
- (15) MONO SW : OFF
- (16) EFFECT MASTER 1 VR : MIN
- (17) EFFECT MASTER 2 VR : MIN
- (18) REC FUNCTION SW 1 : OFF
SW 2 : OFF
SW 3 : OFF
SW 4 : OFF
- (19) CUE, PGM SW : PGM
- (20) INSERT SW : OFF
- (21) METER PGM SW : ON
MONITOR SW : OFF
EFFECT SW : OFF
- (22) PHONES PGM SW : ON
MONITOR SW : OFF
EFFECT 1 SW : OFF
EFFECT 2 SW : OFF
- (23) PGM MASTER FADER
L/ODD : MIN
R/EVEN : MIN
- (24) PGM MASTER FADER
R/EVEN : MIN

- 3) Push the CUE/PGM switch and check that VU meter of PGM/TRK indicates 0VU under the above condition when PGM output -10dBV is obtained.

Adjustment is made through a hole on the rear panel with the following half-fixed resistors.

CH 1 : R 104 CH 3 : R 304
CH 2 : R 204 CH 4 : R 404

- 4) With the condition set in the above step 2, check PGM/MONITOR/EFFECT VU meter indicates 0VU with the METER switch placed in the PGM position.

Adjustment is made with the following half-fixed resistor.

PGM L : R103
PGM R : R203

4-5-3 PEAK LED of VU Meter

Check PEAK LED on the VU meter of PGM/TRK 1 $\sim$ 4 lights up when PGM OUT is turned to -5dBV (562mV) in the steps 1 $\sim$ 2 of the above item 4-5-2.

Check also the LED turns off when PGM OUT is turned to -6dBV (501mV) reducing 1dB .

4-5-4 INSERT Output Level

- 1) As shown in the following figure, connect the level meter to the insert terminal, (2 - 6) of the MIC/LINE amplifier using RCA phone plug.

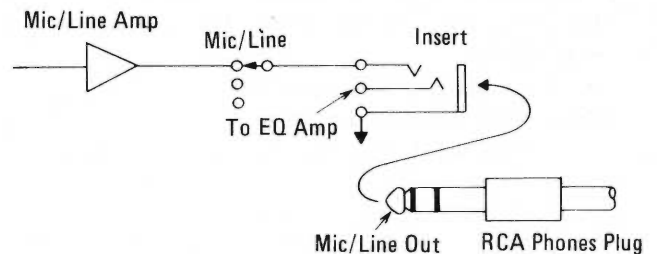


Fig. 4-5-2

- 2) Set INPUT selector to the MIC/LINE side.
- 3) Check output level of INSERT is -10dBV (0.3V) $\pm 1\text{dB}$ when 1 kHz signal at the reference level is applied to the MIC/LINE INPUT 1 (2 - 6) terminal(s) with the TRIM control set.
With TRIM control set to MIN: input signal -10 dBV
With TRIM control set to MAX: input signal -60dBV (1mV)
- 4) As for channels 5 and 6, turn the INPUT selector to the LINE (B) side and apply -10dBV signal to LINE (B) IN terminal. Then proceed to check in the same manner.

4-5-5 OL (OVER LOAD) Indicator

- 1) Check LED lights up when the input level is increased by 25dB from the reference level in the step 3 of the above item 4-5-4 and the LED turns off when the input level is decreased by 3dB (22dB).
- 2) Check output waveform of INSERT is not distorted under the above condition.

4-5-6 MIC/LINE INPUT → PGM OUT

- 1) Turn on the PAN to ODD and ASSIGN to L/1 with PGM Master Fader in the steps 1, 2 of the above item 4-5-2 and TRIM in the item 4-5-4 set.
- 2) Adjust the INPUT fader so that the output level of PGM OUT 1/L turns to -10dBV (0.3V) with the reference input level signal on the MIC/LINE INPUT 1 terminal.
Fader position at this time is within the range of 7 ~ 8.
- 3) When completing the above procedure 2, push ASSIGN switches for desired channels and turn the PAN control toward ODD or EVEN position to see the signal is shared to each PGM output terminal.
Output level is decreased by approx. 2.5dB from the reference output level (-10dBV) with the PAN control set at the center position. (12 o'clock)
As for the input channels 2 – 6, check for the ASSIGN and PAN in the same manner.

4-5-7 EQ Response (MIC/LINE IN → PGM OUT)

- 1) Apply the reference input signal to the MIC/LINE INPUT terminal as described in the step 1, 2 of the above item 4-5-6, and set in a way that the signal with the reference output level -10dBV is output to PGM OUT 1/L terminal.
- 2) Turn the EQ knob (external axis) fully to the "62" side, then set the GAIN knob of the EQ knob (internal axis) at the right most position.
Check the peak level of 62 Hz is within $60\text{ Hz} \pm 20\%$ ($48\text{ Hz} \sim 72\text{ Hz}$) by changing the frequency of the input signal.
Check also the output level at that time exceeds the reference level by more than $+10\text{dB}$.
Check the output level lowers the reference level by more than -10dB with the GAIN knob turned left most.
- 3) Return the EQ and GAIN knobs moved for proceeding the check to their center position (12 o'clock) after the check has been completed.
- 4) Check each frequency response following the above procedures 2 and 3.
Frequency response is within $\pm 20\%$ of the input signal frequency, and PGM OUT level varies from more than $+10\text{dB}$ at maximum to less than -10dB at minimum.

4-5-8 MIC/LINE INPUT → EFFECT OUT

- 1) Following the procedures 1 of the item 4-5-7 just above, set INPUT fader so that the output level of PGM OUT 1/L turns to -10dBV .
- 2) Turn on the EFFECT (2) switch of input and turn the EFFECT knobs 1 and 2 to their maximum position.
Then adjust EFFECT MASTER knobs 1 and 2 so that the output level of EFFECT OUT 1 and 2 turns to -10dBV (0.3V).
Check the EFFECT MASTER knob is between 2 and 3 o'clock.

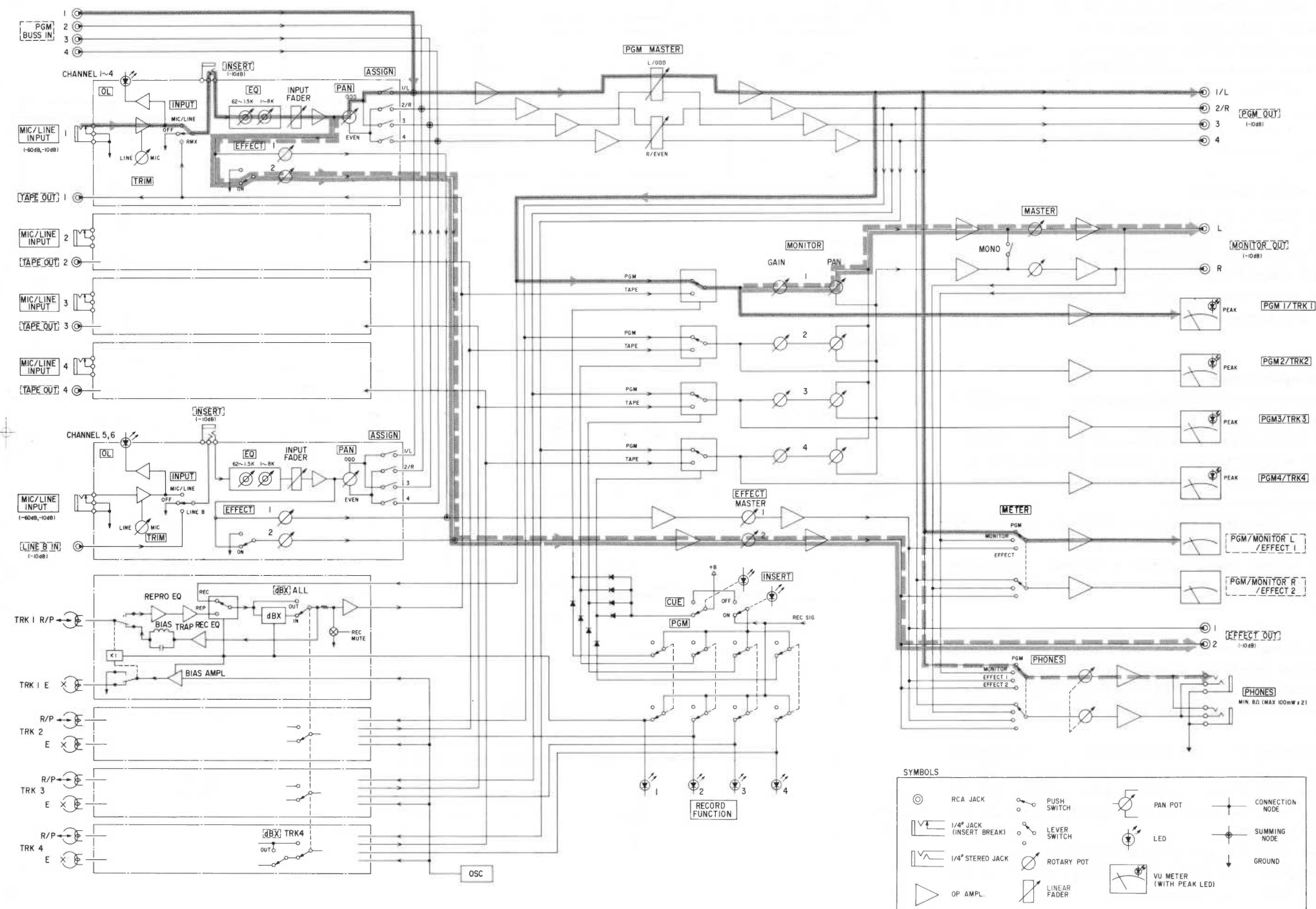


Fig. 4-5-3

4-5-9 MIC/LINE INPUT → MONITOR OUT

- 1) Following the procedures 1 of the item 4-5-7, set the output level of PGM OUT 1/L to -10dBV .
- 2) Turn on the CUE/PGM switch, then set the MONITOR GAIN 1 to the maximum and MONITOR PAN 1 to L (left most).
- 3) Turn MONITOR MASTER knob so that the output level of MONITOR OUT L turns to -10dBV (0.3V).
Check the MONITOR MASTER knob is between 2 and 3 o'clock.
- 4) Check the output level of MONITOR OUT L is decreased by $6 \pm 1.5\text{dB}$ from the reference level, when MASTER MONO switch is turned on.
- 5) As for MONITOR OUT R, check for it with the MONITOR PAN 1 set to R (right most).

4-5-10 Frequency Response

- 1) Check frequency response when the reference output -10dBV is output from item 4-5-6 (MIC/LINE INPUT → PGM OUT), 4-5-8 (MIC/LINE INPUT → EFFECT OUT) and 4-5-9 (MIC/LINE INPUT → MONITOR OUT) respectively.
Check output is within $\pm 1\text{dB}$ from the reference output of 1 kHz, varying frequency of the input signal from 20 Hz ~ 20 kHz.

4-5-11 Headphone Output

- 1) Connect an 8 ohm resistor and a level meter to the PHONES 1 jack on the front panel.
- 2) With the condition that the reference output signal -10dBV is output to the PGM OUT 1/L terminal in the item 4-5-6, place the PHONE switch in the PGM position, and adjust the phone knob to its maximum position.
- 3) When the phone knob is adjusted to its maximum position, the output level of the channel L exceeds 900mV.
- 4) Check for the channel R output in the same manner, when the reference output is transmitted to the PGM OUT 2/R terminal.

4-5-12 Pingpong Recording

The pingpong recording is to record signals, that are created by mixing signals applied to the PGM BUSS IN (and MIC/LINE IN) inputs with those being played back from a tape track onto another tape track.

Fig. 4-5-4 denotes an example of the signal route for the pingpong recording. Signals played back from the track 1 pass through the dbx decoder, INPUT selector and EQ amplifier, and then split into two routes by the PAN control to be mixed with signals played back from PGM BUSS IN.

The mixed signals, after passing through PGM OUT and dbx encoder, can be recorded on the track 3 and 4 if the RECORD FUNCTION switch are placed in 3 and 4 positions.

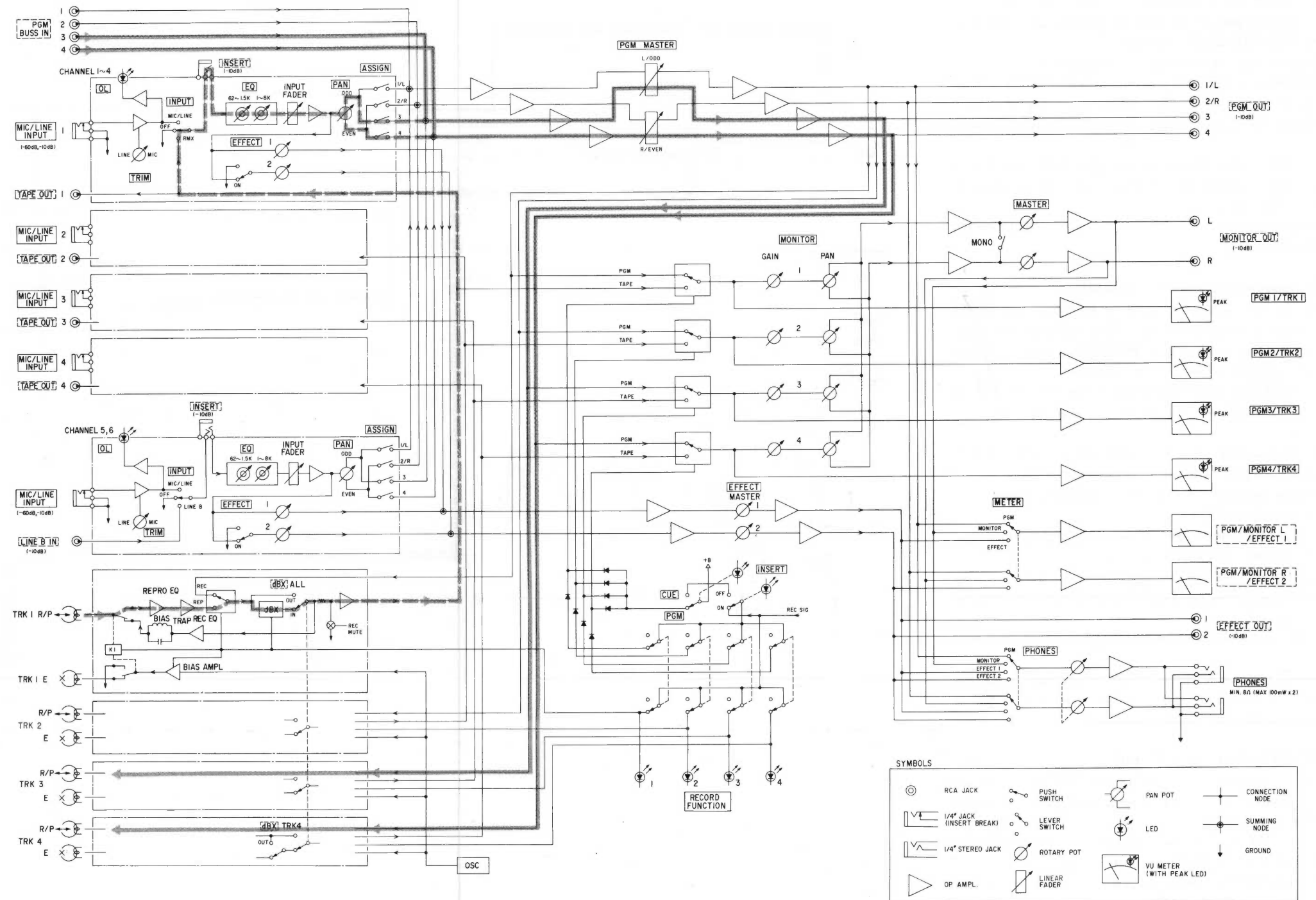


Fig. 4-5-4

4-6 RECORD/PLAYBACK AMPLIFIER CHECKS AND ADJUSTMENT

4-6-1 Playback Level

- 1) Connect a level meter to the TAPE OUT "1" jack on the rear panel.
- 2) Playback a test tape MTT-150, 400 Hz, and adjust the trim pot R712 for -7 dBV (447 mV) reading on the level meter. (Refer to Fig. 4-6-1) Under this condition, the VU meter will deflect 3

VU ± 1 when the CUE/PGM switch below the RECORD FUNCTION switch is set to the PGM position.

- 3) Connect the level meter to the remaining channel outputs (2, 3, 4) and proceed to the adjustment in the same manner by adjusting.

TRK 1 ~ TRK 4: R712 ~ R742

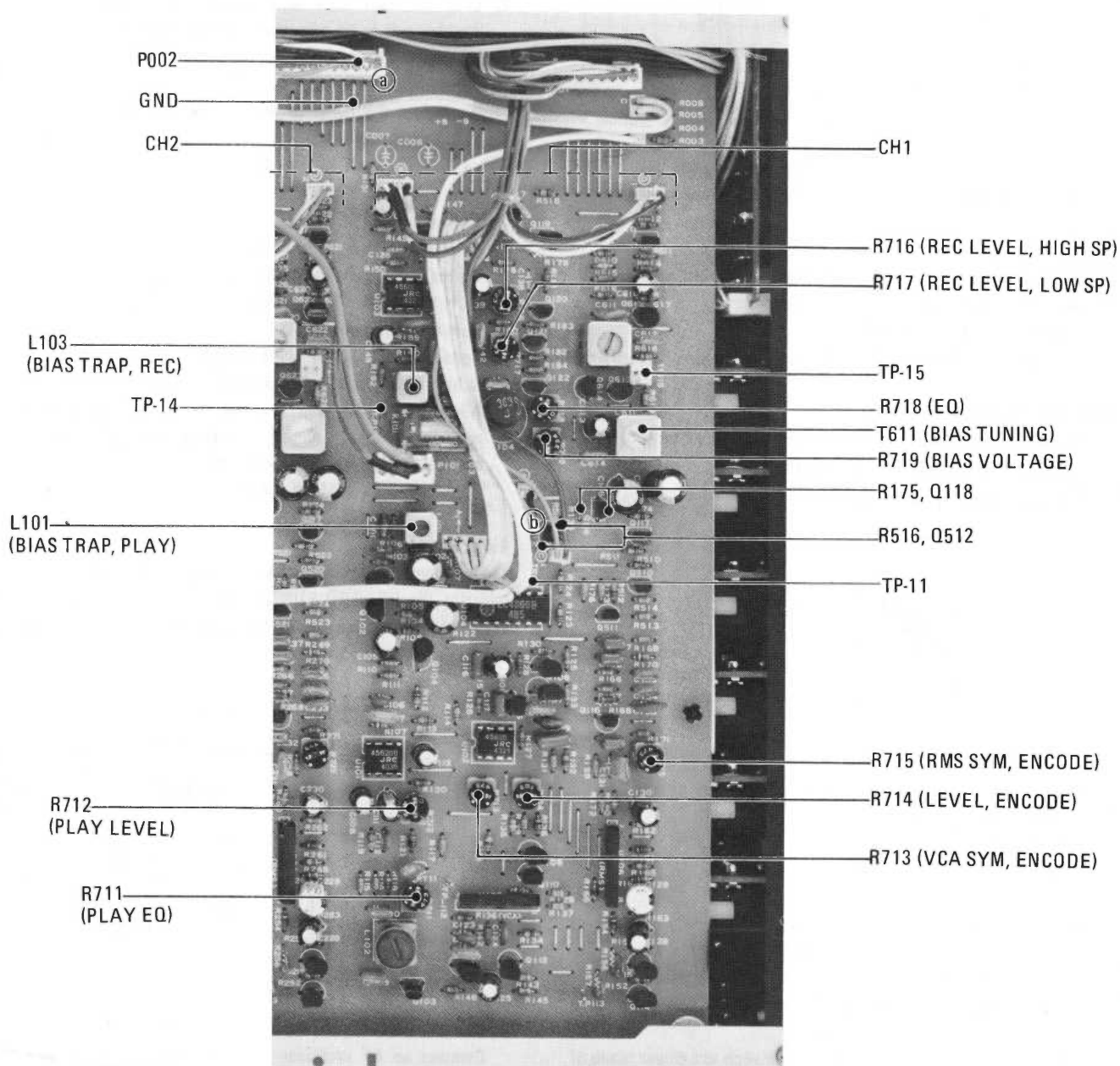


Fig. 4-6-1

4-6-2 Playback Frequency Response

- 1) Connect a level meter to the TAPE OUT "1" jack on the side panel.
- 2) Playback a test tape MTT-356 and reads the output level; it should be within the following limits.

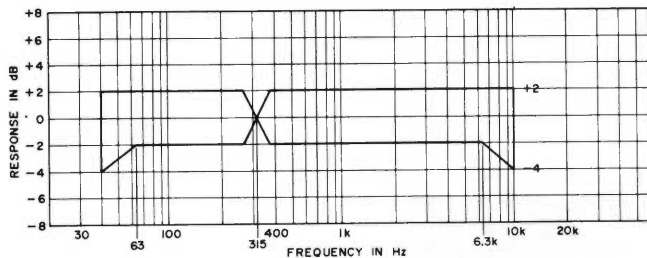
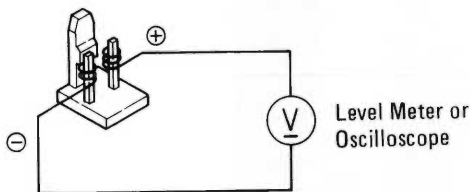


Fig. 4-6-2

- 3) If the output level is out of the limits, adjust the trim pot R711.
- 4) For the remaining channels (2, 3, 4), also check in the same manner.
CH 1 ~ CH4: R711 ~ R741
- 5) Set the tape speed to HIGH. Reproduce 6.3 kHz signal (12.6 kHz) on the test tape and make sure to see:
315 Hz x 2: 0dB $\pm$ 1.5dB
6.3 kHz x 2: 0dB $\pm$ 3 dB
 -4 dB ..referred to the value of 315 Hz x 2.

4-6-3 Bias Tuning (T611 - 641)

- 1) Connect a level meter or an oscilloscope to the TP terminal of a record/playback amplifier to be adjusted.
CH 1 ~ CH 4: TP 15 ~ TP45



- 2) Load a blank tape MTT-5561 and set only the channel to be adjusted to the record mode.
- 3) Adjust each coil for minimum level.
CH 1 ~ CH 4: T 611 ~ T641

Notes:

- * To protect transistors perform adjustment with only the channel to be adjusted set to the record mode.
- * In this adjustment, if the bias level is set to maximum, the bias amplifier may be over loaded and damaged. So please refrain to set the bias level to the maximum.
- * When adjusting, use non-inductive driver such as a driver made of plastic, wood, etc.

4-6-4 Bias Trap

The bias trap has been fixed at the factory and no adjustment is necessary except when:

- a. the REC/PB head was replaced.
- b. the REC/PB amplifier PCB unit was replaced.
- c. Excessive bias leakage was observed.

Playback system (L101 - 401)

- 1) Connect a level meter or an oscilloscope to the TAPE OUT jack to be adjusted on the rear panel.
- 2) Load the tape deck with a blank tape (MTT5561) and set the channels to be adjusted to the PLAY mode and the remaining channels to REC mode.
- 3) Adjust each bias trap for minimum bias leakage (minimum reading on the meter or minimum amplitude on scope display) from the adjacent channels.
CH 1 ~ CH 4: L101 ~ L401

Record system (L103 - 403)

- 1) Connect the level meter or the oscilloscope to the TP terminal of the record/playback amplifier to be adjusted.
CH 1 ~ CH 4: TP14 ~ TP44
Common terminal = GND
- 2) Load the deck with a blank tape MTT-5561 and set the channel to be adjusted to the record/pause mode at no signal.
- 3) Adjust each bias trap for minimum bias leakage (minimum reading on the meter or minimum amplitude on the scope display) from the adjacent channels.
CH 1 ~ CH 4: L103 ~ L403

4-6-5 Bias Voltage

The bias voltage is applied to a bias trim pot for each track by selecting the RECORD FUNCTION switches properly and the bias voltage to be applied to the head can be varied to a considerable level by rotating the trim pot.

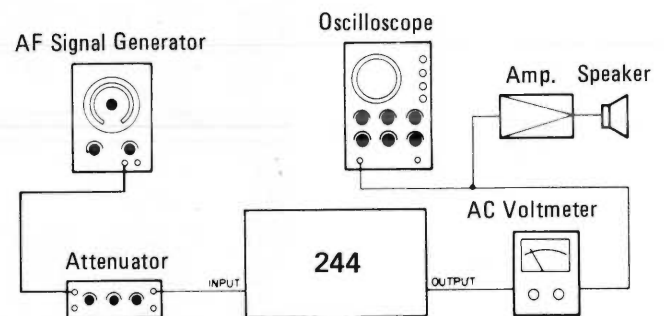


Fig. 4-6-3

- 1) Connect the test equipments as shown in Fig. 4-6-3.
Connect an AF oscillator to the PGM BUSS IN "1" jack and a level meter to the TAPE OUT "1" jack. Adjust PGM MASTER fader until the PGM OUT level of -10 dBV is obtained as mentioned under steps 1 and 2 in the item 4-5-2.
- 2) Load a blank tape MTT-5561 in the deck.

- 3) Place the RECORD FUNCTION switch in the TRK "1" position to set the TRK "1" to the record mode.
Also set the dbx to out position and the tape speed to HIGH. Under this condition, the VU meter will show 0VU. If the meter deflection error is observed, perform readjustment as shown in the item 4-5-2.
- 4) Reduce the input signal level by 20 dB from the reference level or to -30 dBV (31.6mV).
- 5) Record a 6.3 kHz signal and then playback the signals. Adjust the bias adjustment trim pot R719 so that the bias current increases until the output level drops by 3 dB from the peak value.

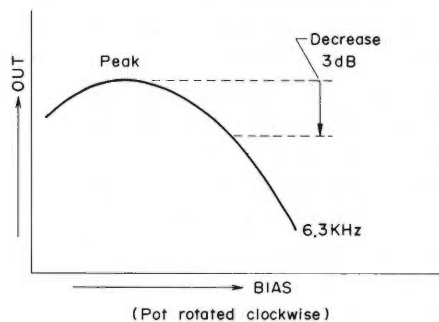


Fig. 4-6-4

- 6) Adjust for the remaining tracks in the same way.
TRK1 ~ TRK4: R719 ~ R749

4-6-6 Record Level

- 1) Connect test equipments as shown in Fig. 4-6-3, and adjust PGM MASTER fader on the front panel so that -10 dBV is obtained at the PGM OUT jack as mentioned in the item 4-5-2 (steps 1 and 2).
- 2) Load a blank tape MTT-5561 in the deck.
- 3) Set the TRK "1" to the record mode using the RECORD FUNCTION switch.
- 4) Record an input signal of -10 dBV, 400 Hz at Low speed. Playback the signal just recorded and adjust R717 until -10 dBV output is obtained at the TAPE OUT "1" jack.
(In the similar way adjust R716 at HIGH speed modes)
- 5) For the remaining tracks, adjust the recording level in the same way.
LOW speed CH 1 ~ 4: R717 ~ R747
HIGH speed CH 1 ~ 4: R716 ~ R746

4-6-7 Overall Frequency Response

- 1) Connect the test equipments as shown in Fig. 4-6-3 and adjust PGM MASTER fader so that -10 dBV is obtained at the PGM OUT jack as mentioned under the item 4-5-2 (steps 1 and 2).
- 2) Load a blank tape MTT-5561 in the deck.
- 3) Decrease the input signal level by 20dB from the reference level or set the input signal level to -30 dBV (31.6mV).

- 4) Vary the input signal frequency while recording at both tape speeds, and check frequency response. For the specifications, refer to Fig. 4-6-5.

- 5) If poor frequency response is observed over higher frequencies at low speed, adjust the trim pots:

CH 1 ~ CH 4 : R718 ~ R748

- * If the output reading is out of the limits, readjust the bias voltage as shown under 4-6-5. When the high frequency output level is lower than the limit, decrease the bias voltage slightly, and when higher increase the bias slightly. However, recording distortion may increase if the bias voltage is lowered excessively, so make sure the distortion is within the limit, at 400 Hz.

NOTE: Varying the bias voltage may upset the recording level adjustment, so always make sure the recording level and readjust the level again as necessary by referring to the section 4-6-6.

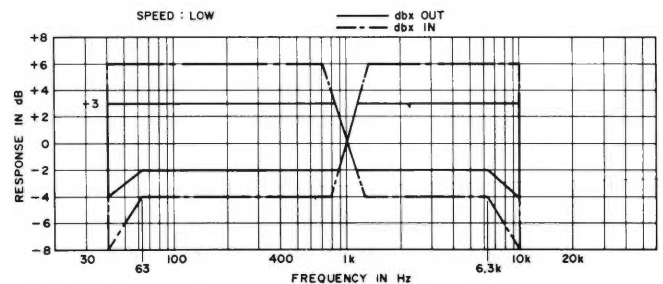


Fig. 4-6-5 (A)

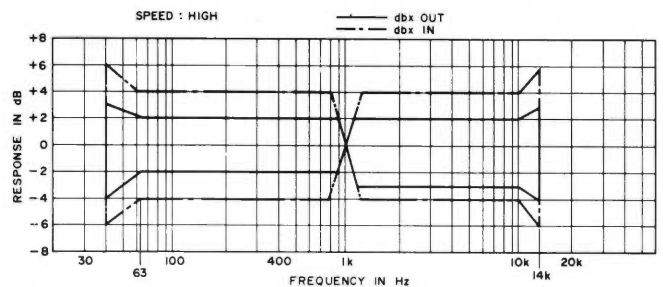


Fig. 4-6-5 (B)

4-6-8 Overall Distortion

- 1) Set and adjust the test setup as mentioned under the step 1 in item 4-6-6 Record Level.
- 2) Vary the frequency of the reference input signal to 1,000 Hz, and record and playback the frequency.
- 3) Measure the distortion; it should be less than 2.0% at LOW speed or less than 1.8% at HIGH speed.
If not:
 - * Readjust the bias voltage.
 - * Try to erase the erase head and record/playback heads, or replace the head(s).
 - * Check for overall S/N.

4-6-9 Overall SN Ratio

- 1) Set and adjust the test set-up as mentioned under the step 1 in item 4-6-6 Record Level.
- 2) Record the reference input signal, and then remove the input plug and continue the recording with no signal applied.
- 3) Playback both the reference signal and no signal just recorded and read the level difference between the outputs.
- 4) The difference (SN) should be higher than 45 dB for each channel at both the LOW and HIGH speed mode, when measured through a 20 Hz to 20 kHz filter.

If the SN is out of the limit:

- * Erase the erase head, record/playback heads and tape path with a tape eraser.
- * Check for normal erasing ratio.
- * Readjust the bias traps.
- * Recheck the SN by using another test tape.

4-6-10 Erasing Ratio

- 1) Connect test equipments as shown in Fig. 4-6-6 and adjust the controls and switches as mentioned under the step 1 in item 4-6-6, Record Level.
- 2) Adjust the signal generator to provide 1 kHz, 0 dBV (1V) and record it. Playback the signal just recorded and read, and note the output level.
- 3) Rewound the tape up to the beginning of the tape just recorded. Remove the plug from the PGM BUSS IN jack and then record no signal on the tape just recorded with the 1 kHz signal.
- 4) Rewound the tape just recorded with no signal and playback it. Read the output level with the level meter, the sensitivity of which is increased.
- 5) Compare the output levels obtained in the steps 2 and 4; the level difference should be higher than 65 dB for each channel at both LOW and HIGH speed.

If not :

- * Clean the tape transport path.
- * Check the tape transport mechanism.

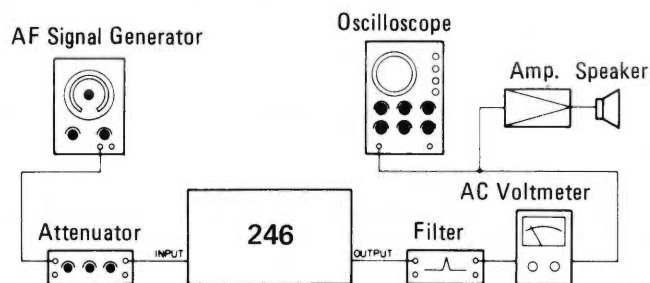


Fig. 4-6-6

4-6-11 Crosstalk Between Channels

- 1) Set and adjust output level -10 dBV at PGM OUT as mentioned under step 1 in 4-6-6 Record Level.

- 2) Record the reference signal of 1 kHz, -10 dBV (0.3V) on an adjacent channel to be measured. Rewound the tape just recorded and playback it. Measure the leakage output levels to the adjacent channels through a 1 kHz filter, and measure ratio(s) against the reference level.

- 3) The ratio should be higher than 50 dB for each channel.

4-6-12 dbx Amplifier

Adjustment is not required except when recording/reproducing amplifier PCB Ass'y is replaced.

ENCODE Amplifier

1 RMS SYM

- 1) Connect an oscilloscope between the recording/reproducing amplifier TP-13 ($\sim$ TP-43) and pin 3 of the connector P002 (Refer to GND, Fig. 4-6-1 (a)).
- 2) Apply signal of -10 dBV (0.3V), 100Hz to CH1 ($\sim$ 4) of PGM BUSS IN and set PGM MASTER fader so that PGM OUT level obtains -10 dBV.
- 3) Insert a cassette half into the deck, then set 1 ($\sim$ 4) at the REC/PAUSE mode using dbx IN.
- 4) Adjust the half-fixed resistor R715 ($\sim$ R745) in a way that waveform of TP-13 ($\sim$ TP-43) terminal turns to a sine wave with 200Hz as shown in Fig. 4-6-7.

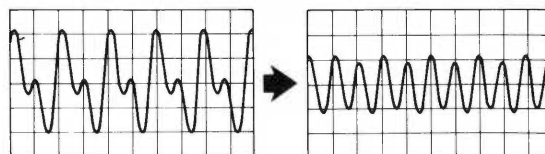


Fig. 4-6-7

2 VCA SYM

- 1) Apply step wave (a) signal from the dbx designated circuit as shown in Fig. 4-6-8 to TP-13 ($\sim$ TP-43) terminal. Then connect TP-11 ($\sim$ TP-41) terminal to pin 3 of the connector D002 (Refer to GND, Fig. 4-6-1 (a)) to lead to the ground.
- 2) Connect TAPE OUT 1 ($\sim$ 4) terminal to the "VER" side of the oscilloscope and sawtooth signal (b) to the "HOR" side.
- 3) Short-circuit both ends of resistor R516 ($\sim$ R546) or in-between of base and emitter (Refer to Fig. 4-6-1 (b)) of Q512 ($\sim$ Q542).
- 4) As in the item 1 RMS SYM, set the deck CH 1 ($\sim$ 4) at REC/PAUSE mode using dbx IN.
- 5) Adjust the half-fixed resistor R713 ($\sim$ R743) in a way that waveform of the oscilloscope obtains the minimum voltage value (maximum; less than 5mV) as shown in Fig. 4-6-9.

Function Generator Schematic

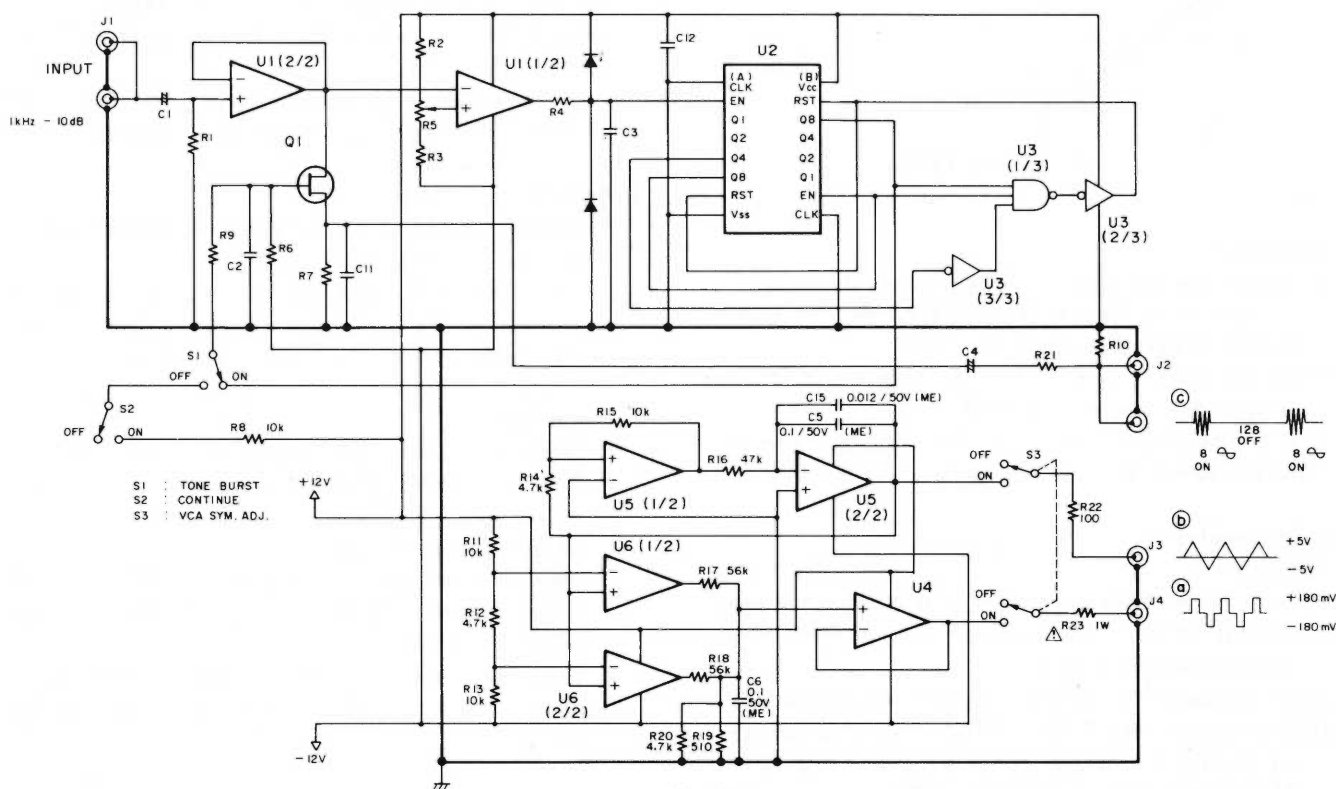


Fig. 4-6-8

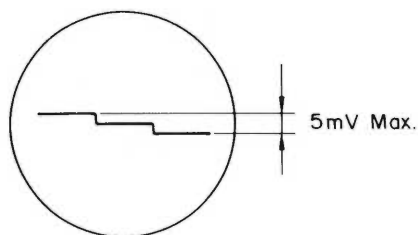


Fig. 4-6-9

3 Level

- 1) Apply signal of 1 kHz, -10dBV (0.3V) to PGM BUSS IN CH 1 (~ 4), then connect a level meter to TPE OUT 1 (~ 4).
- 2) Short-circuit both ends of resistor R516 (~ R546) or in-between of base and emitter (Refer to 4-6-1 (b)) of Q512 (~ Q542).
- 3) As in the item 1 RMS SYM, set the deck CH 1 (~ 4) at REC/ PAUSE mode using dbx IN.
- 4) Check TAPE OUT output is -10dBV (0.3V) ± 1 . Adjust it with the half-fixed resistor R714 (~ R744) if necessary.

4 Frequency Response

- 1) Increase the input signal frequency up to 100 Hz turning the condition in the item 3 Level (1 kHz, -10dBV, INPUT). Check TAPE OUT 1 (~ 4) output at this time increases by 0.5dB ± 1 from that of 1 kHz. Furthermore check the output decreases by 3.2dB ± 1 from that of 1 kHz, when input signal frequency is turned to 10 kHz.

5 Noise Reduction Effect

Decrease input signal level by 60dB from -10dBV under the item 3 Level condition.

Check TAPE OUT 1 (~ 4) output at this time decreases by 30dB ± 1 .

Check also TAPE OUT output increases by 10dB ± 1 when input signal is increased by 20dB from -10dBV.

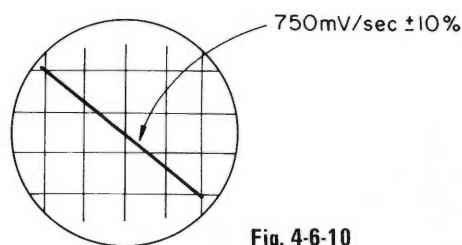


Fig. 4-6-10

6 Release Rate

- 1) Feed a tone burst signal ③ (8 cycles on — 12 cycles off) as shown in Fig. 4-6-8 to the PGM BUSS IN 1 (~ 4) and connect on oscilloscope to TP-13 (~ TP-43).
- 2) Set the deck 1 (~ 4) to REC PAUSE mode with the dbx IN as mentioned in the item RMS SYM.
- 3) Under the condition, make sure that a diagonal line on the scope is within 750mV/sec $\pm 10\%$ as shown in Fig. 4-6-10.

DECODE Amplifier

1 RMS SYM

- 1) Connect the oscilloscope between recording/reproducing amplifier TP-13 (~ TP-43) and pin 3 of connector P002 (Refer to GND, Fig. 4-6-1 ①).
- 2) Set the deck at to reproducing pause mode using dbx IN.
- 3) Short-circuit resistor R175 (~ R475) of recording/reproducing amplifier or in-between of base and emitter of Q118 (~ Q418) to open pin 3 — 4 of U104 (~ U404).
- 4) Connect a generator to TP-11 (~ TP-41) and pin 3 of connector P002, then apply signal of 100 Hz, -10dBV (0.3V).
- 5) Check TP-13 (~ TP-53) waveform outputs a sine wave of 200 Hz as shown in Fig. 4-6-7.

2 VCA SYM

- 1) Apply step wave signal ② from the circuit in Fig. 4-6-8 to TP-13 (~ TP-43) terminal.
Then connect TP-11 (~ TP-41) terminal to pin 3 of connector P002 before leading to the ground.
- 2) Connect TAPE OUT 1 (~ 4) terminal to the "VER" side of the oscilloscope and sawtooth signal ② in Fig. 4-6-8 to the "HOR" side.
- 3) Set the deck at reproducing pause mode using dbx IN.
- 4) Check waveform on the oscilloscope is less than 5mV (Refer to Fig. 4-6-9).

3 Level

- 1) Set the deck to reproducing pause mode using dbx IN.
- 2) Short-circuit resistor R175 (~ R475) of the recording/reproducing amplifier or in-between of base and emitter of Q118 (~ Q418) to open pin 3 — 4 of U104 (~ U404).
- 3) Connect a generator to TP-11 (~ TP-41) and pin 3 of connector P002, and apply signal of 1 kHz, -10dBV (0.3V). Then connect a level meter to TAPE OUT.
- 4) Check TAPE OUT 1 (~ 4) output at this time is -10dBV ± 1 .

4 Frequency Response

Increase the input signal frequency up to 100 Hz turning the condition in the item 3 Level (1 kHz, -10dBV, INPUT).

Check TAPE OUT output at this time decreases by 0.72dB ± 1 from that of 1 kHz.

Furthermore check the output increases by 6.5dB ± 1 from that of 1 kHz, when input signal frequency is turned to 10 kHz.

5 Noise Reduction Effect

- 1) Decrease input signal level by 30dB from -10dBV under the condition of item 3 Level.

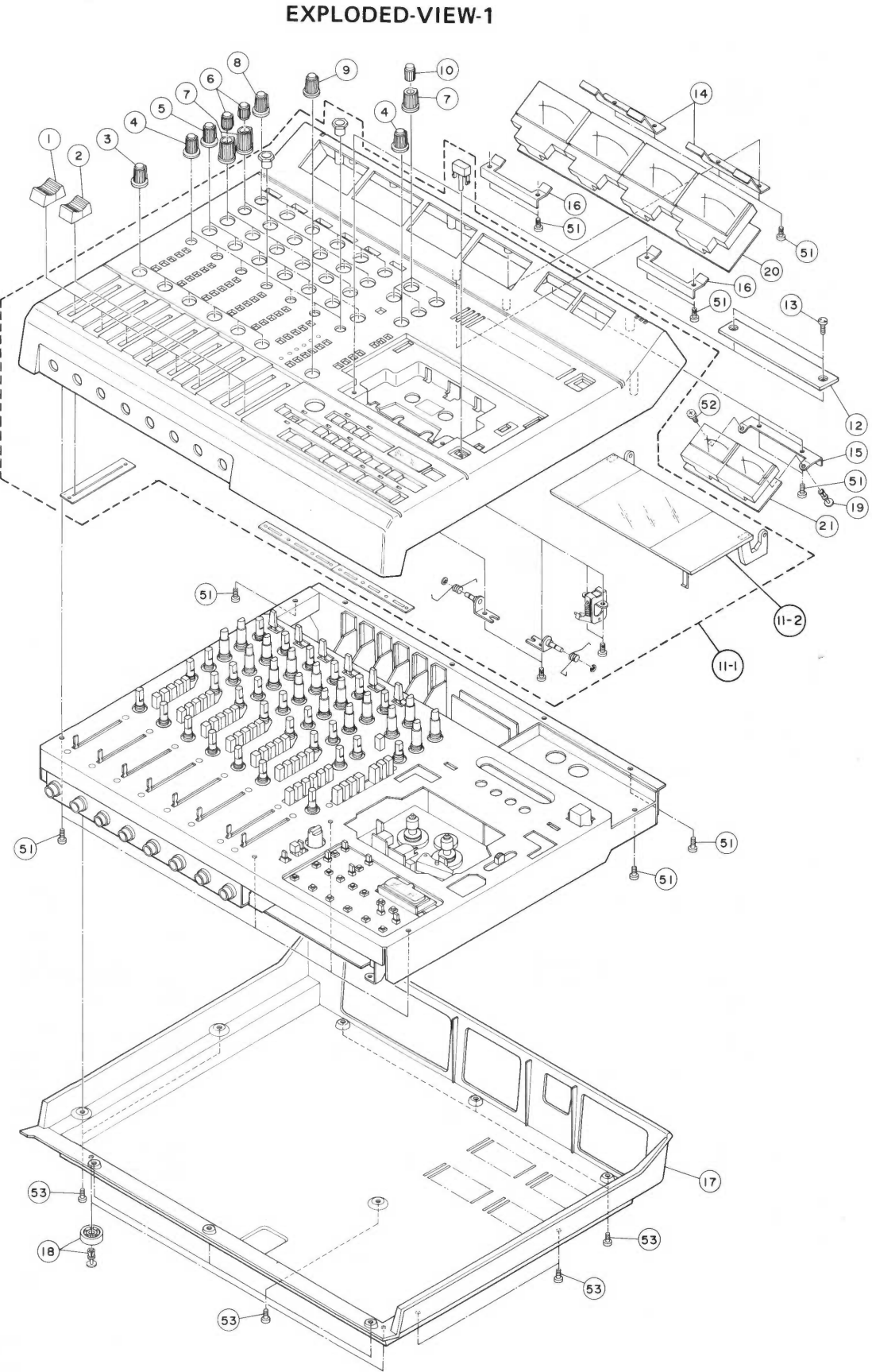
Check TAPE OUT output at this time decreases by 60dB ± 1 .

Check also TAPE OUT output increases by 20dB ± 1 when input signal is increased by 10dB from -10dBV.

6 Release Rate

- 1) Set the deck to reproducing pause mode using dbx IN.
- 2) Short-circuit resistor R175 (~ R475) of recording/reproducing amplifier or in-between of base and emitter of Q118 (~ Q418) to open pin 4 — 3 of U104.
- 3) Apply tone burst signal ③ in Fig. 4-6-8 to TP-11 (~ TP-41) and pin 3 of connector P002, then connect the oscilloscope to TP-13 (~ TP-43).
- 4) Check inclination of the waveform appearing on the oscilloscope at this time is 750 mV/sec $\pm 10\%$ as shown in Fig. 4-6-10.

5. EXPLODED VIEW AND PARTS LIST



EXPLODED VIEW-1

Parts marked with *require longer delivery time.

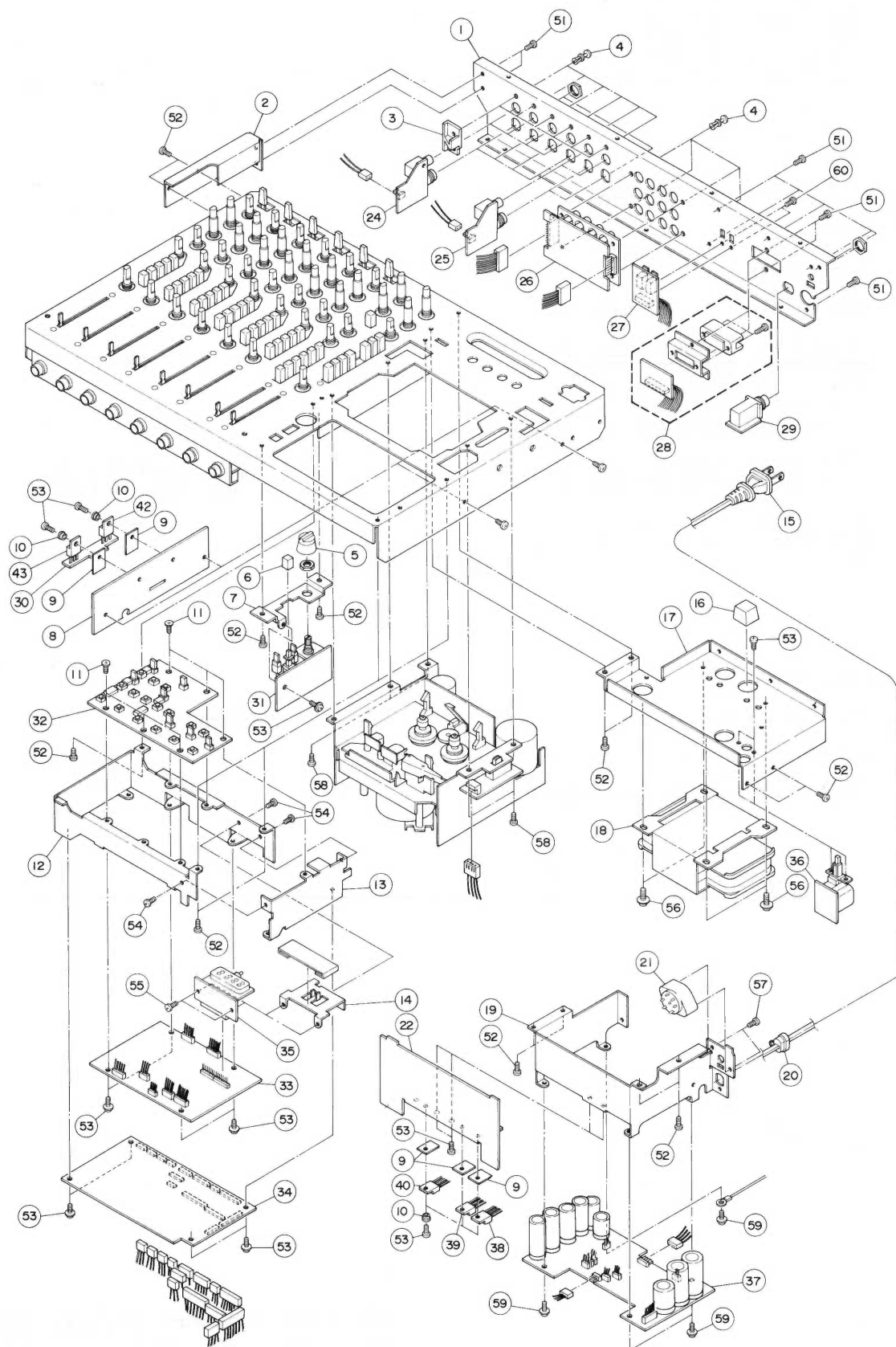
REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
1- 1	5800715400	KNOB,FADER (C)	
1- 2	5800715500	KNOB,FADER (M)	
1- 3	5800756100	KNOB ASSY A	
1- 4	5800720500	KNOB ASSY E	
1- 5	5800720400	KNOB ASSY D	
1- 6	5800719700	KNOB ASSY A	
1- 7	5800720000	KNOB B	
1- 8	5800720200	KNOB ASSY B	
1- 9	5800756300	KNOB ASSY C	
1-10	5800719800	KNOB ASSY B	
1-11-1	*5800692800	CASE ASSY	
1-11-2	5800692400	COVER,CASSETTE	
1-12	*5800690600	COVER, HEAD	
1-13	5800724800	SCREW, A	
1-14	*5800690900	BRACKET, METER (A)	
1-15	*5800691000	BRACKET, METER (B)	
1-16	*5800690100	BRACKET, METER (C)	
1-17	*5800693000	COVER, BOTTOM	
1-18	*5800304200	FOOT (P4-8)	
1-19	*5534878000	RIVET,PUSH B	
1-20	*5200168500	METER PCB ASSY(A)	Ref. Pages 49 & 62
1-21	*5200168600	METER PCB ASSY(B)	Ref. Pages 50 & 63
1-52	*5780003006	SCREW,BIND M3X6	
1-53	*5780023008	SCREW,BIND M3X8 NI B	

INCLUDED ACCESSORIES

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
	*5700070400	OWNER'S MANUAL [J]	
	*5700070400	OWNER'S MANUAL [Except J]	
	*5700070600	OWNER'S MANUAL [E,C]	

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA
[A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

EXPLODED-VIEW-2



EXPLODED VIEW-2

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
2- 1	*5800691901	PANEL, REAR	
2- 2	*5800689900	CHASSIS, SIDE	
2- 3	*5800690700	HOLDER, JACK	
2- 4	*5534878000	RIVET, PUSH B	
2- 5	5800714800	KNOB, PITCH CONTROL	
2- 6	5800714700	BUTTON, PUSH	
2- 7	*5800689600	BRACKET, PITCH CONTROL	
2- 8	*5800731300	HEAT SINK (B)	
2- 9	*5033291000	PLATE, INSULATOR	
2-10	*5033295000	TUBE, INSULATOR	
2-11	*5800400900	SCREW,	
2-12	*5800691801	BRACKET, CONTROL PCB (A)	
2-13	*5800691501	BRACKET, CONTROL PCB (B)	
2-14	*5800689801	BRACKET, COUNTER	
2-15	△ 5128027000	CORD, AC [J]	
	△ 5350010700	CORD, AC [C]	
	△ 5350010800	CORD, AC [US, GE]	
	△ 5350008200	CORD, AC [E]	
	△ 5128047000	CORD, AC [UK]	
	△ 5350008300	CORD, AC [A]	
2-16	5800173100	BUTTON, POWER	
2-17	*5800692100	BRACKET, TRANSFORMER	
2-18	△ 5320035201	TRANSFORMER, POWER [J]	
	△ 5320035301	TRANSFORMER, POWER [U, C]	
	△ 5320035401	TRANSFORMER, POWER [GE]	
	△ 5320035501	TRANSFORMER, POWER [E, UK, A]	
2-19	*5800691700	BRACKET, POWER PCB	
2-20	*5317001700	BUSHING, CORD 4N-5 [C, UK]	
	*5534660000	BUSHING, CORD 4N-4 [J, US, GE, E, A]	
2-21	△ 5302101700	SW., VOLTAGE SELECT FS907G [GE]	
2-22	*5800691600	HEAT SINK (A)	
2-23	*5800690200	BRACKET, FUSE PCB	
2-24	*5200167400	IN/OUT PCB ASSY(A)-1	Ref. Pages 51 & 64
2-25	*5200167410	IN/OUT PCB ASSY(A)-2	Ref. Pages 51 & 64
2-26	*5200168100	IN/OUT PCB ASSY(B)	Ref. Pages 51 & 64
2-27	*5200168800	DBX SW PCB ASSY	Ref. Pages 53 & 65
2-28	*5200168900	REMOTE PCB ASSY	Ref. Page 66
2-29	*5200169000	PCB ASSY, PUNCH IN/OUT	Ref. Page 66
2-30	*5210180900	TR PCB	
2-31	*5200169900	PCB ASSY, PITCH CONTROL	Ref. Pages 53 & 65
2-32	*5200169300	OPE SW PCB ASSY	Ref. Pages 47 & 60
2-33	*5200169200	PCB ASSY, CONTROL (A)	Ref. Pages 48 & 61
2-34	*5200170500	PCB ASSY, CONTROL (B)	Ref. Pages 49 & 61
2-35	*5200169400	JOINT PCB ASSY	Ref. Page 66
2-36	*5200170300	PWR SW PCB ASSY [J]	Ref. Pages 52 & 64
	*5200170310	PWR SW PCB ASSY [US]	Ref. Pages 52 & 64
	*5200170320	PWR SW PCB ASSY [C]	Ref. Pages 52 & 64
	*5200170330	PWR SW PCB ASSY [GE]	Ref. Pages 52 & 64
	*5200170340	PWR SW PCB ASSY [E, UK, A]	Ref. Pages 52 & 64
2-37	*5200170200	P.SUPPLY PCB ASSY [J, US, C, GE]	Ref. Pages 51 & 63
	*5200170210	P.SUPPLY PCB ASSY [E, UK, A]	Ref. Pages 51 & 63
2-38	△ 5145129000	SI. TR. 2SB-507 (Q002)	
2-39	△ 5145087000	SI. TR. 2SD-313E (Q001)	
2-40	△ 5220415100	IC, NJM7805A (U003)	

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA

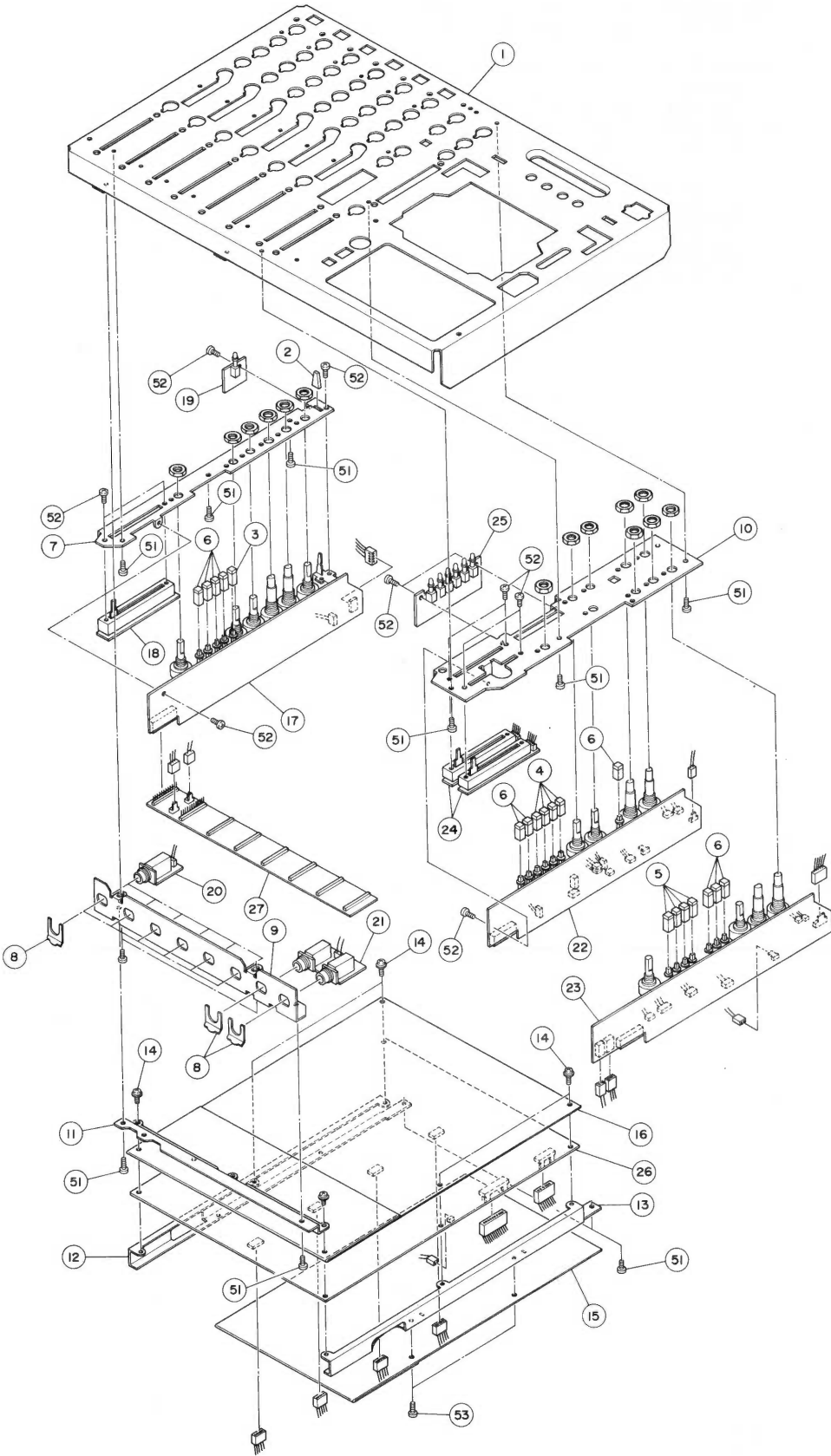
[A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

EXPLODED VIEW-2

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
2-41	Vacant		
2-42	5220420400	IC,NJM79M12A (U002)	
2-43	5220413000	IC,NJM78M12A (U001)	
2-51	*5780023006	SCREW, BIND M3X6 (BK NI)	
2-52	*5783003005	SCREW, PAN S TITE M3X5	
2-53	*5780003006	SCREW,BIND M3X6	
2-54	*5780103005	SCREW, PAN M3X5	
2-55	*5780002605	SCREW, BIND M2.6X5	
2-56	*5783074008	SCREW,PAN CUP S TITE M4X8	
2-57	*5781113008	SCREW,BIND TAP M3X8	
2-58	*5780003004	SCREW, BIND M3X4	
2-59	*5783103006	SCREW M3X6	
2-60	*5780022004	SCREW, BIND M2X4 (BK NI)	

EXPLODED-VIEW-3

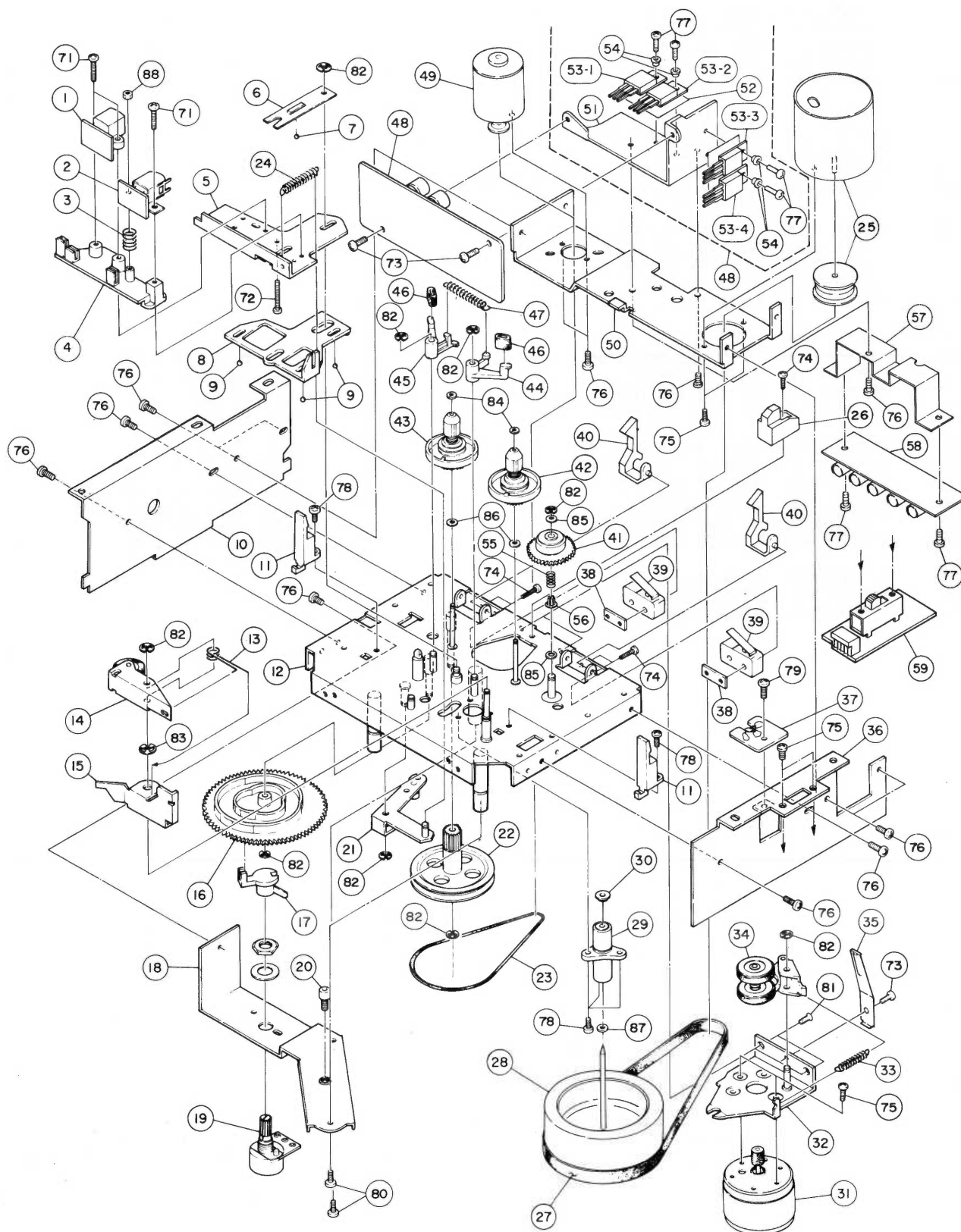


EXPLODED VIEW-3

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
3- 1	*5800692700	CHASSIS, MAIN	
3- 2	5800690800	KNOB, LEVER	
3- 3	5800541700	KNOB, ASSIGN (B)	
3- 4	5800541800	KNOB, ASSIGN (C)	
3- 5	5800541900	KNOB, ASSIGN (D)	
3- 6	5800542000	KNOB, ASSIGN (E)	
3- 7	*5800691101	BRACKET, INPUT PCB	
3- 8	*5317003200	PLATE, MOUNT	
3- 9	*5800691400	BRACKET, JACK	
3-10	*5800692000	BRACKET, MONITOR PCB	
3-11	*5800691300	BRACKET, RP PCB (C)	
3-12	*5800692200	BRACKET, RP PCB (L)	
3-13	*5800692300	BRACKET, RP PCB (R)	
3-14	*5783103008	SCREW, M3X8	
3-15	*5800758300	PAPER, SHIELD	
3-16	*5800758200	PLATE, SHIELD	
3-17	*5200167100	INPUT AMP PCB ASSY	Ref. Pages 45 & 58
3-18	*5200167500	VR PCB ASSY(A)	Ref. Pages 52 & 64
3-19	*5200167300	LED PCB ASSY(A)	Ref. Pages 53 & 65
3-20	*5200167200	MIC JACK PCB ASSY	Ref. Pages 53 & 65
3-21	*5200168300	PHONE JACK PCB ASSY	Ref. Pages 52 & 64
3-22	*5200167700	MONITOR PCB ASSY(A)	Ref. Pages 45 & 59
3-23	*5200167800	MONITOR PCB ASSY(B)	Ref. Pages 45 & 60
3-24	*5200167900	VR PCB ASSY(B)	Ref. Pages 52 & 64
3-25	*5200168200	LED PCB ASSY(B)	Ref. Pages 53 & 65
3-26	*5200170400	R/P PCB ASSY	Ref. Pages 43 & 54
3-51	*5783003005	SCREW, PAN S TITE M3X5	
3-52	*5780003006	SCREW, BIND M3X6	
3-53	*5783033006	SCREW, BIND S TITE M3X6	

EXPLODED-VIEW-4



EXPLODED VIEW-4

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
4-1	5378600900	HEAD,ERASE 4CH	
4-2	5378601200	HEAD, R/P 4-4	
4-3	5800114700	SPRING,HEAD ADJ	
4-4	5800279203	BRACKET, HEAD	
4-5	*5800472102	BASE, HEAD	
4-6	*5800114900	SPG.,BASE PLATE PRESSURE	
4-7	5540055000	STEEL BALL 20	
4-8	*5800122802	SLIDER	
4-9	5540056000	STEEL BALL 30	
4-10	*5800689701	BRACKET, MECHA (R)	
4-11	5800274100	GUIDE,CASSETTE	
4-12	*5800278601	CHASSIS ASSY,MECHA.	
4-13	5800276100	SPG.,P.ROLLER	
4-14	5800275700	PINCH ROLLER ASSY	
4-15	*5800276201	ARM, SPRING	
4-16	5800122700	CAM,CONTROL	
4-17	5800116700	JOINT	
4-18	*5800274700	PLATE, THRUST	
4-19	5282009600	VR.,10KB	
4-20	5534744000	SCREW,THRUST	
4-21	*5800304400	ARM ASSY,BASE	
4-22	5800117200	PULLEY,REDUCTION	
4-23	5800275300	BELT,CONTROL	
4-24	5800304100	SPRING,BASE ARM	
4-25	5370006000	MOTOR ASSY,DC CAP. VFB2RK	
4-26	*5800274200	PLATE,STABILITY	
4-27	5800275200	BELT,CAPSTAN	
4-28	5800238600	CAPSTAN ASSY	
4-29	5800106200	HOUSING ASSY,CAPSTAN	
4-30	5534130000	OIL CAP	
4-31	5370001200	MOTOR,R,DC	
4-32	*5800121801	BRACKET ASSY,R.MOTOR	
4-33	5800115800	SPG.,IDLER ARM	
4-34	5800107801	IDLER ASSY	
4-35	5800274802	SPG.,PRESSURE	
4-36	*5800691200	BRACKET, MECHA (L)	
4-37	*5200169700	SENSOR PCB ASSY	Ref. Pages 52 & 64
4-38	*5554447000	BRACKET, SWITCH	
4-39	5301455300	SW.,MICRO SS-5GL	
4-40	*5800117301	ARM,SENSOR	
4-41	5800304600	GEAR ASSY,COUNTER	
4-42	5800108701	TABLE ASSY,REEL; R	
4-43	5800107300	REEL TABLE ASSY;L	
4-44	*5800131701	ARM ASSY,BRAKE ARM;R	
4-45	*5800131601	ARM ASSY,BRAKE ARM;L	
4-46	*5800126401	SHOE,BRAKE	
4-47	5800114800	SPRING,BRAKE	
4-48	*5200169600	DRIVE PCB ASSY	Ref. Pages 50 & 63
4-49	5370005100	MOTOR,C.	
	5800123300	PULLEY,V	
4-50	*5800278702	ADAPTOR	
4-51	*5581038000	HARNESS CLIP A	
4-52	*5800323600	PLATE ASSY DRIVER	
4-53-1	5230781400	TR 2SC3421(O) (Q501) (Q503)	
4-53-2	5230019300	TR 2SA1358(O) (Q502) (Q504)	

EXPLODED VIEW-4

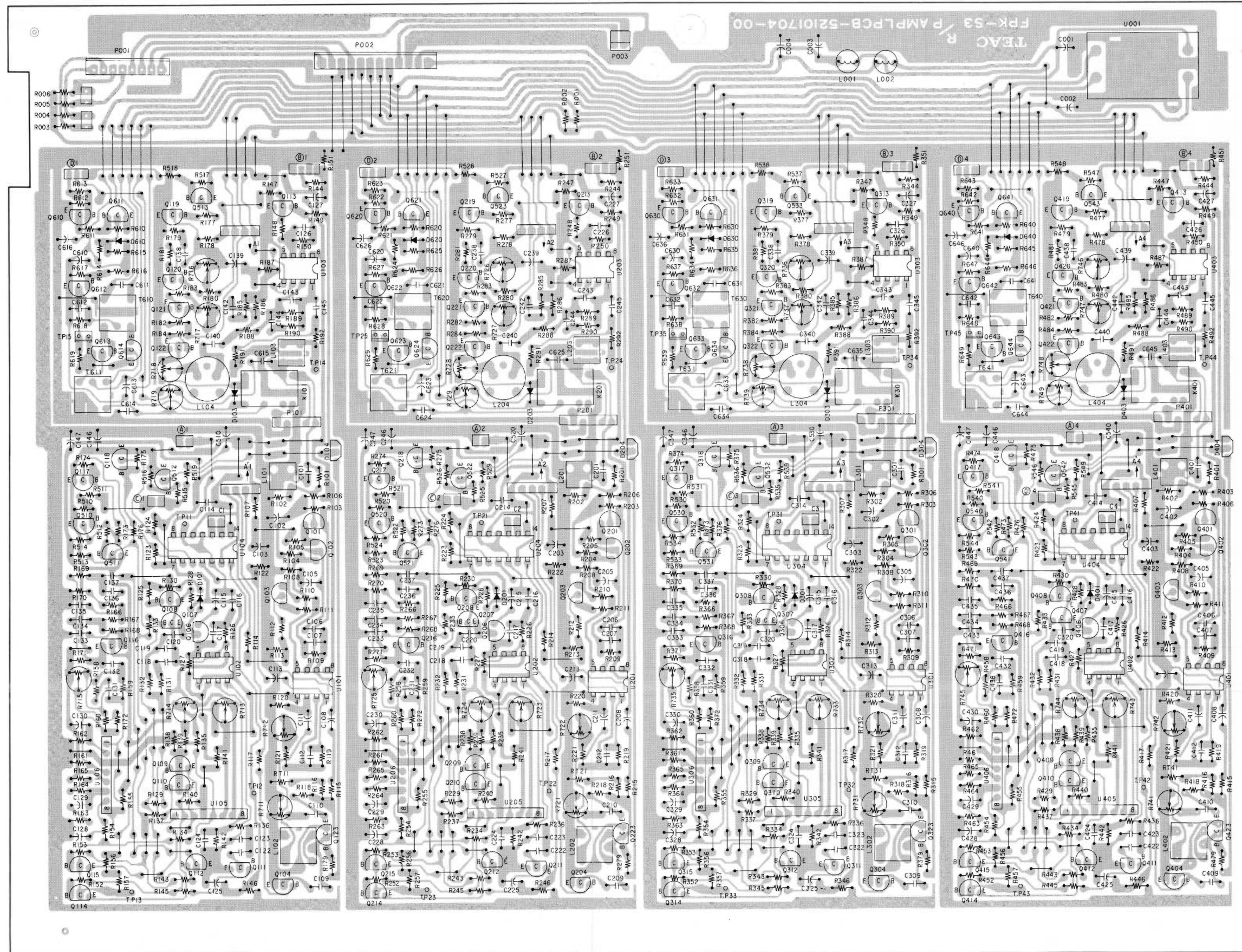
Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
4-54	*5033295000	TUBE,INSULATOR	
4-55	5800124300	SPRING,TENTION	
4-56	*5800159100	BRACKET, SPRING	
4-57	*5800690200	BRACKET, FUSE PCB [E,UK,A]	
4-58	*5200079300	FUSE PCB ASSY [E,UK,A]	Ref. Page 66
4-59	*5200169800	SPEED SW PCB ASSY	
4-71	*5780002016	SCREW, BIND M2X16	
4-72	*5780002020	SCREW, BIND M2X20	
4-73	*5783032605	SCREW, BIND S TITE M2.6X5	
4-74	*5783032606	SCREW, BIND S TITE M2.6X6	
4-75	*5780002603	SCREW,BIND M2.6X3	
4-76	*5783033006	SCREW, BIND S TITE M3X6	
4-77	*5780003006	SCREW, BIND M3X6	
4-78	*5783002606	SCREW, PAN S TITE M2.6X6	
4-79	*5783033005	SCREW, BIND S TITE M3X5	
4-80	*5783002605	SCREW, S TITE M2.6X5	
4-81	*5783042605	SCREW,C.SUNK, S TITE 2.6X5	
4-82	*5786002000	RING, E-TYPE;2MM	
4-83	*5786003000	RIIG, E-TYPE;3MM	
4-84	*5785331100	WASHER,CUT-TYPE,2 X 3.6 X 0.5T	
4-85	*5785303000	WASHER,POLIS, 2X5.5X0.25T	
4-86	*5785301100	WASHER, FLAT;1.5 X 4 X 0.25T	
4-87	*5785302200	WASHER,POLIS, 2.6X5X0.25T	
4-88	*5781812000	NUT,M2	

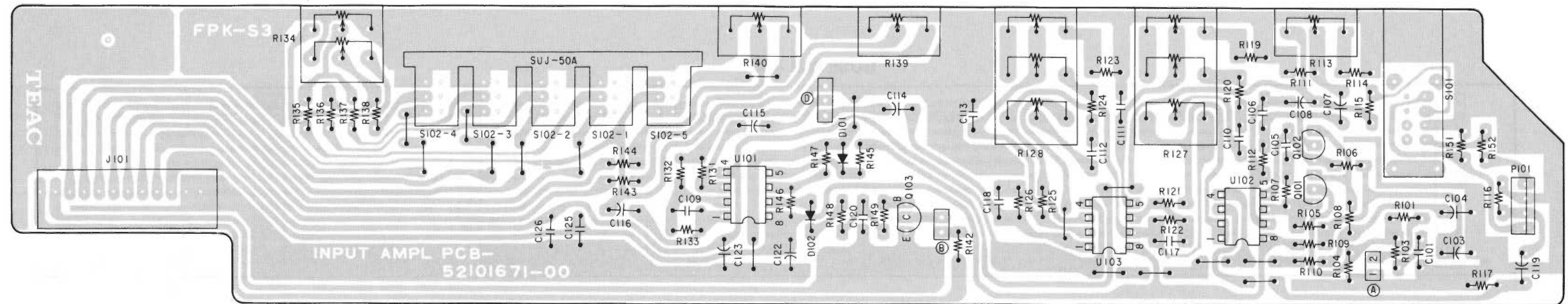
[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA
[A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

6. PCB BOARDS AND PARTS LIST

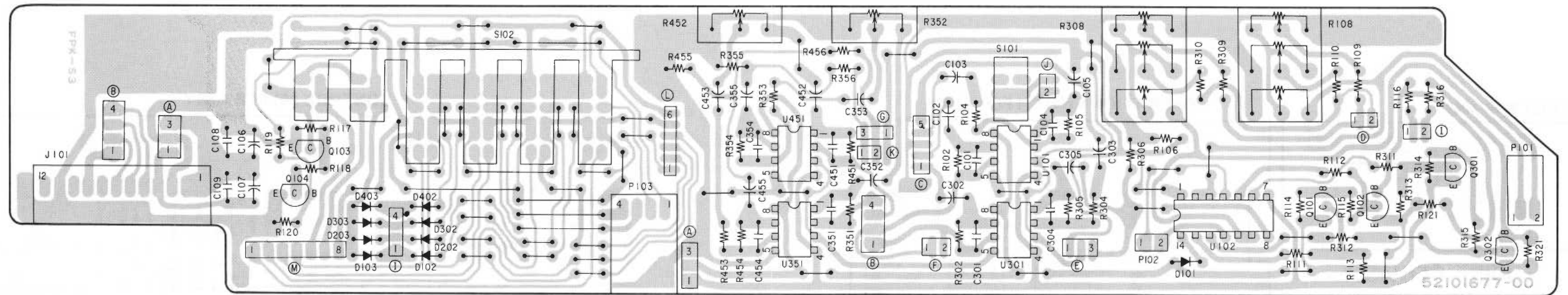
REC/PLAY AMPL PCB ASSY



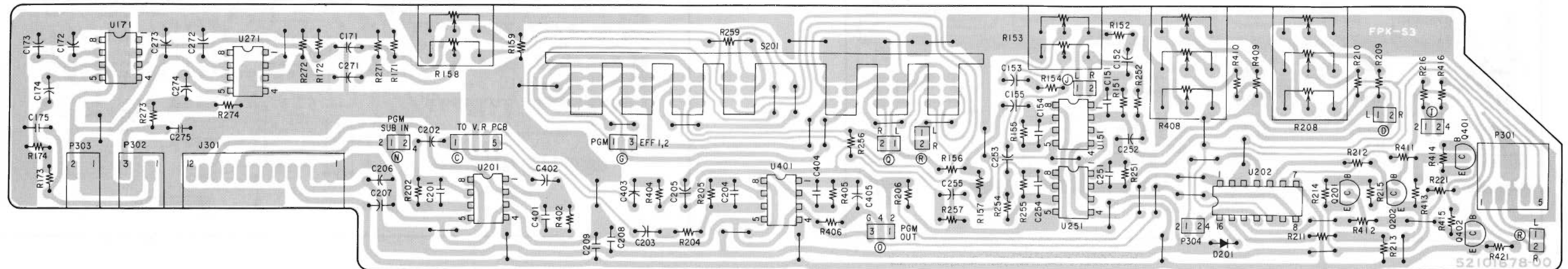
INPUT AMP PCB ASSY



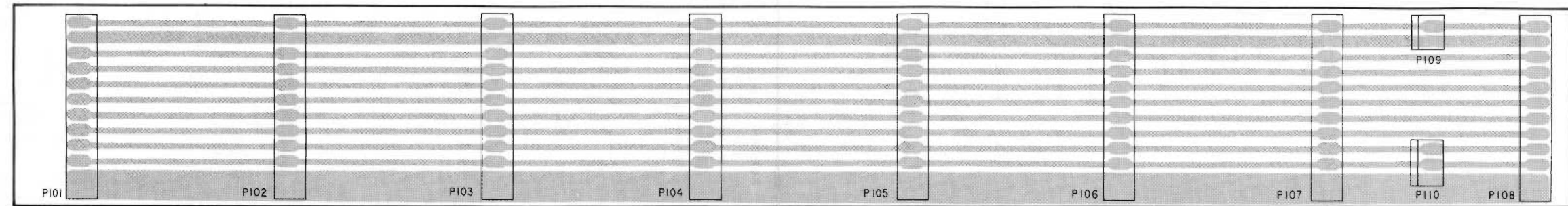
MONITOR PCB ASSY (A)



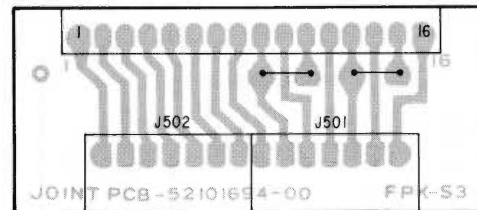
MONITOR PCB ASSY (B)



BUSS PCB ASSY

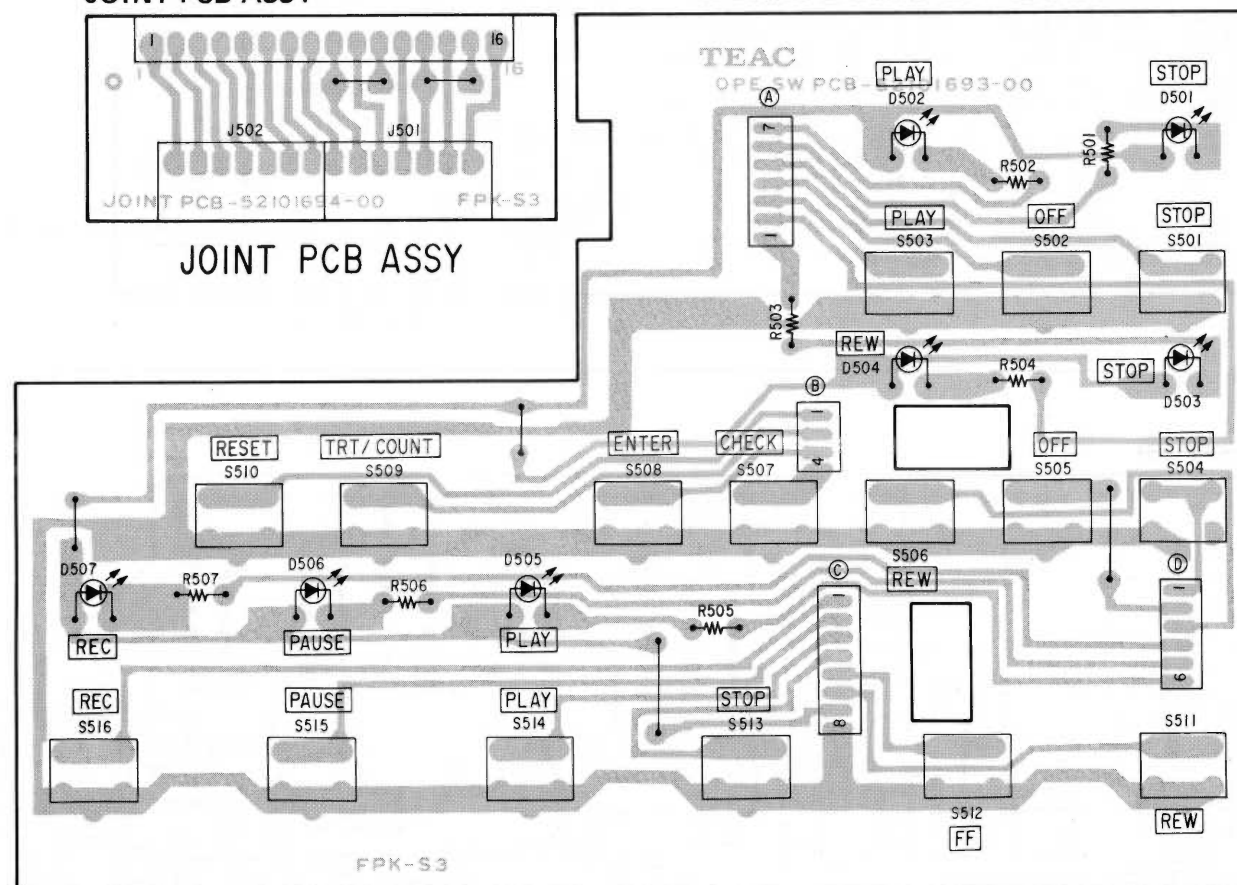


JOINT PCB ASSY

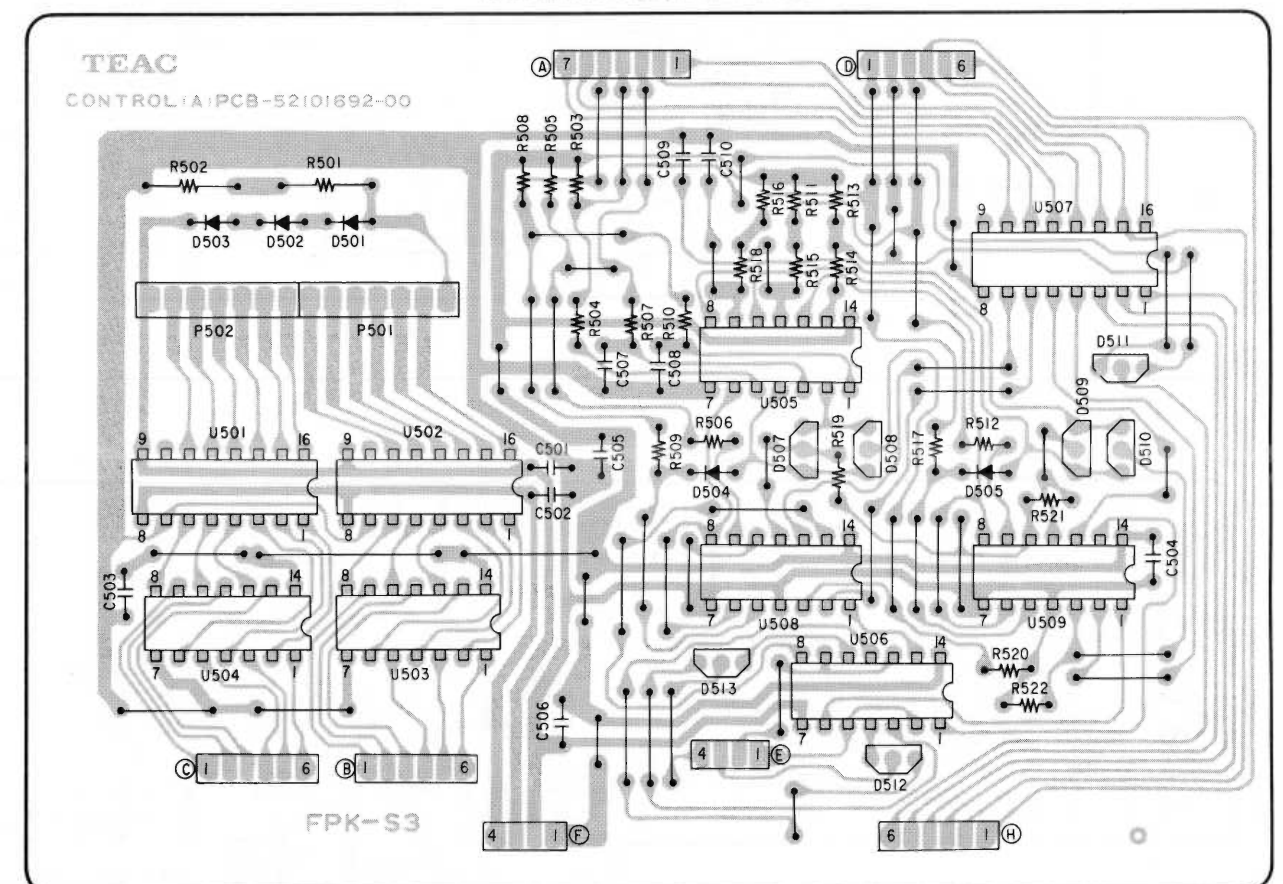


JOINT PCB ASSY

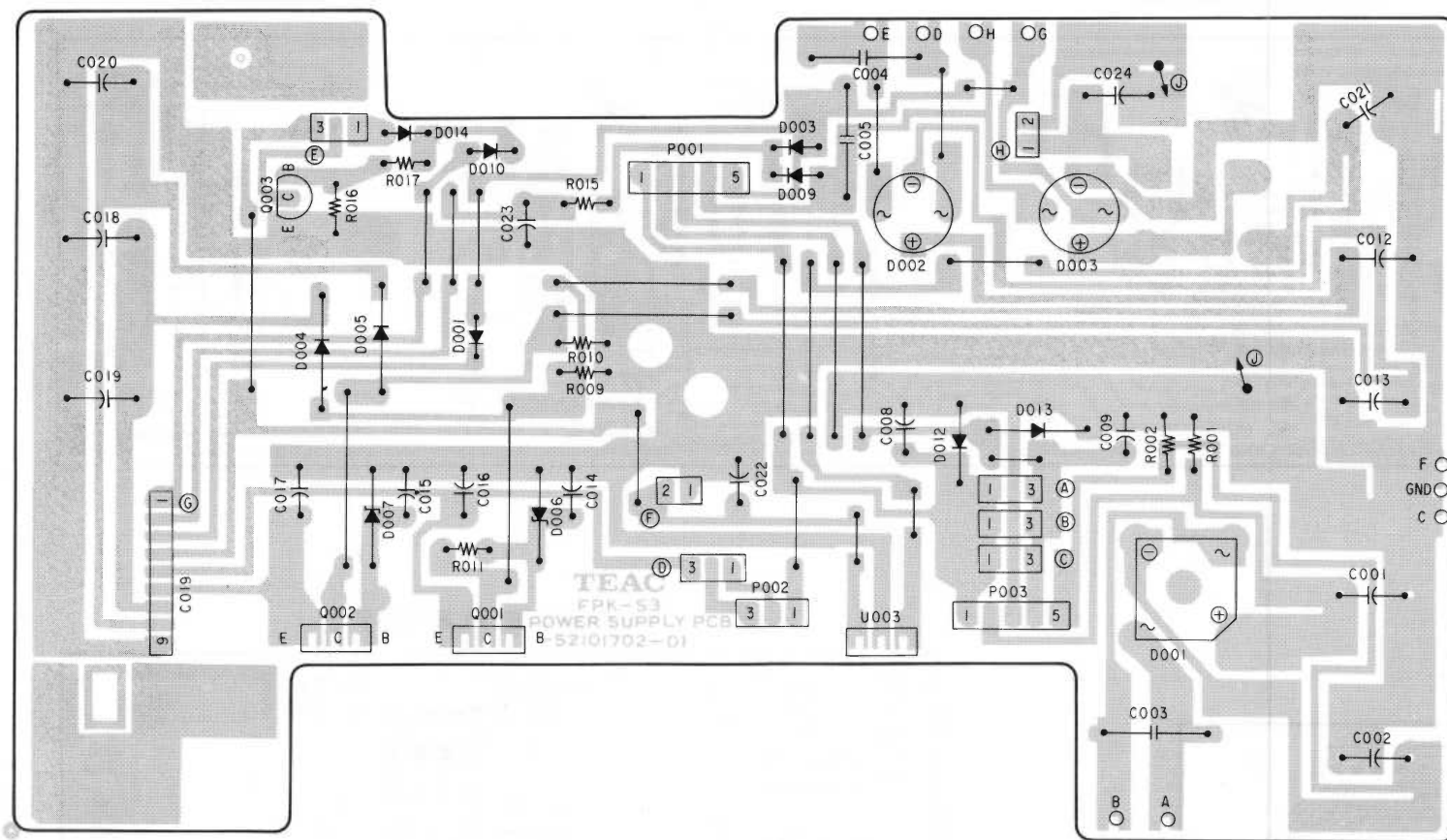
OPERATION SWITCH PCB ASSY



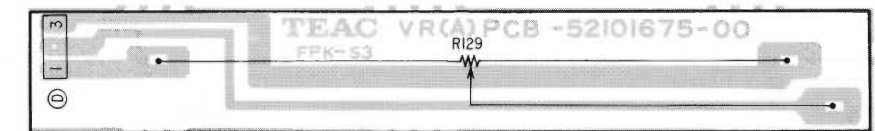
CONTROL (A) PCB ASSY



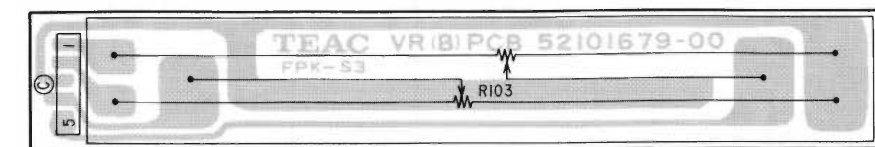
POWER SUPPLY PCB ASSY



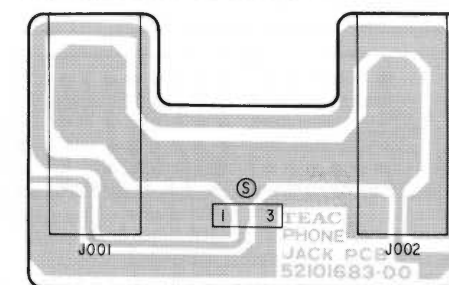
VR (A) PCB ASSY



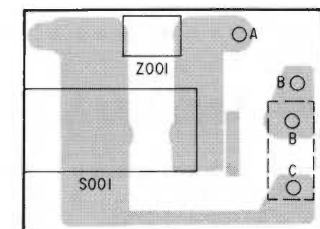
VR (B) PCB ASSY



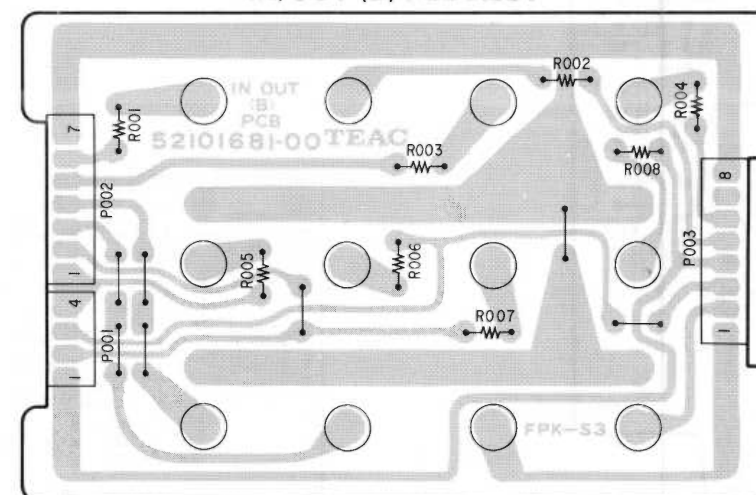
PHONE JACK PCB ASSY



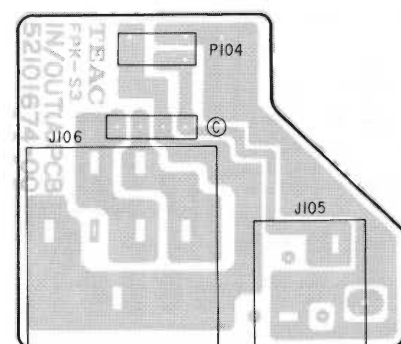
POWER SWITCH PCB ASSY



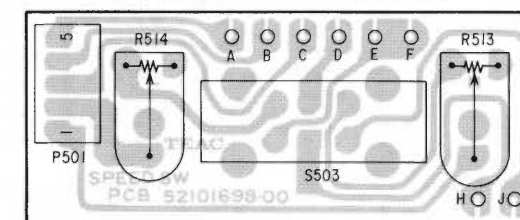
IN/OUT (B) PCB ASSY



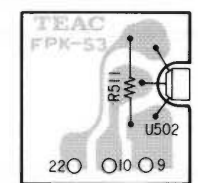
IN/OUT (A) PCB ASSY



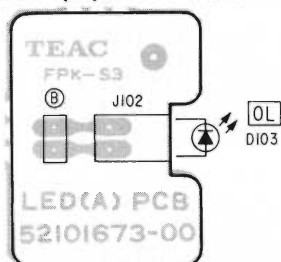
SPEED SWITCH PCB ASSY



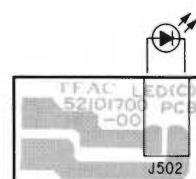
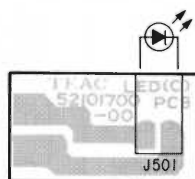
SENSOR PCB ASSY



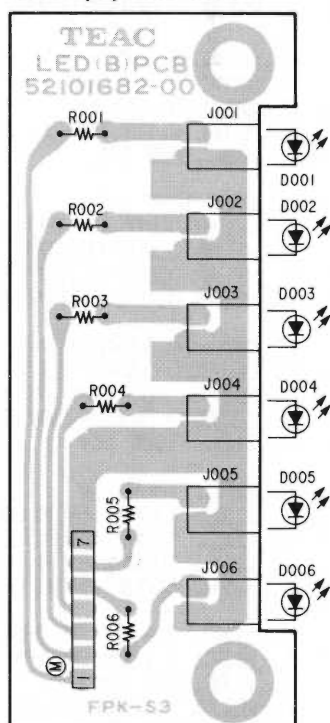
LED (A) PCB ASSY



LED (C) PCB ASSY



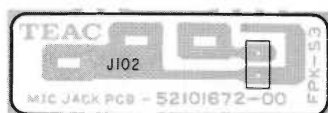
LED (B) PCB ASSY



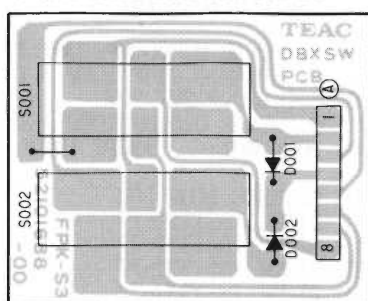
TR PCB ASSY



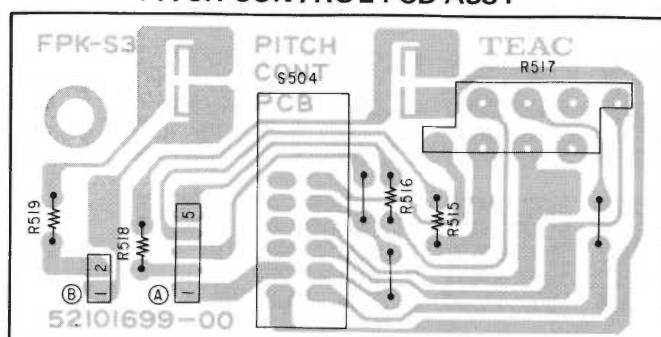
MIC JACK PCB ASSY



dbx SWITCH PCB ASSY



PITCH CONTROL PCB ASSY



R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200170400	R/P PCB ASSY
	*5210170401	R/P PCB
C001-C004	5260161150	C.,ELEC.2.2UF 50V
C101 C201	5263106220	POLYPRO. 220PF 100V J
C301 C401	5263106220	POLYPRO. 220PF 100V J
C102 C202	5260166052	C.,ELEC. 100UF/16V M USM
C302 C402	5260166052	C.,ELEC. 100UF/16V M USM
C103 C203	5260166052	C.,ELEC. 100UF/16V M USM
C303 C403	5260166052	C.,ELEC. 100UF/16V M USM
C105 C205	5260165252	C.,ELEC.47UF/25V M USM VT
C305 C405	5260165252	C.,ELEC.47UF/25V M USM VT
C106 C206	5172204000	C.,CERAMIC 22PF/50V T
C306 C406	5172204000	C.,CERAMIC 22PF/50V T
C307 C407	5171868000	C.,MYLAR 0.033UF 100V J T
C107 C207	5171868000	C.,MYLAR 0.033UF 100V J T
C307 C407	5171868000	C.,MYLAR 0.033UF 100V J T
C108 C208	5260162550	C.,ELEC.10UF 16V
C308 C408	5260162550	C.,ELEC.10UF 16V
C110 C210	5170374000	C.,MYLAR 0.0082UF/100 JT
C310 C410	5170374000	C.,MYLAR 0.0082UF/100 JT
C111 C211	5260162550	C.,ELEC.10UF 16V
C311 C411	5260162550	C.,ELEC.10UF 16V
C112 C212	5172204000	C.,CERAMIC 22PF/50V T
C312 C412	5172204000	C.,CERAMIC 22PF/50V T
C113 C213	5260163452	C.,ELEC. 22UF 25V
C313 C413	5260163452	C.,ELEC. 22UF 25V
C114 C214	5173433000	C.,CERAMIC 0.010UF 50V Z
C314 C414	5173433000	C.,CERAMIC 0.010UF 50V Z
C115 C215	5260160750	C.,ELEC. 1UF50V SM T-N
C315 C415	5260160750	C.,ELEC. 1UF50V SM T-N
C116 C216	5263167923	C.,METAL 0.1UF/50V J VT
C316 C416	5263167923	C.,METAL 0.1UF/50V J VT
C117 C217	5263167923	C.,METAL 0.1UF/50V J VT
C317 C417	5263167923	C.,METAL 0.1UF/50V J VT
C118 C218	5263169523	C.,METAL 0.3UF 50V J VT
C318 C418	5263169523	C.,METAL 0.3UF 50V J VT
C119 C219	5263106120	POLYPRO. 200PF 100V J
C319 C419	5263106120	POLYPRO. 200PF 100V J
C120 C220	5171856000	C.,MYLAR 0.01UF/100V J T
C320 C420	5171856000	C.,MYLAR 0.01UF/100V J T
C122 C222	5171856000	C.,MYLAR 0.01UF/100V J T
C322 C422	5171856000	C.,MYLAR 0.01UF/100V J T
C123 C223	5172212000	C.,CERAMIC 100PF/50V T
C323 C423	5172212000	C.,CERAMIC 100PF/50V T
C124 C224	5172212000	C.,CERAMIC 100PF/50V T
C324 C424	5172212000	C.,CERAMIC 100PF/50V T
C125 C325	5260162050	C.,ELEC. 4.7UF 35V M SM
C325 C425	5260162050	C.,ELEC. 4.7UF 35V M SM
C126 C226	5172208000	C.,CERAMIC 47PF/50V T
C326 C426	5172208000	C.,CERAMIC 47PF/50V T
C127 C227	5260163452	C.,ELEC. 22UF 25V
C327 C427	5260163452	C.,ELEC. 22UF 25V
C128 C228	5260162550	C.,ELEC.10UF 16V

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
C328 C428	5260162550	C.,ELEC.10UF 16V
C129 C229	5260227010	C.,ELEC. 10UF35V K LL VF
C329 C429	5260227010	C.,ELEC. 10UF35V K LL VF
C130 C230	5260160750	C.,ELEC. 1UF50V SM T-N
C330 C430	5260160750	C.,ELEC. 1UF50V SM T-N
C131 C231	5171856000	C.,MYLAR 0.01UF/100V J T
C331 C431	5171856000	C.,MYLAR 0.01UF/100V J T
C132 C232	5263167923	C.,METAL 0.1UF/50V J VT
C332 C432	5263167923	C.,METAL 0.1UF/50V J VT
C133 C233	5172218000	C.,CERAMIC 330PF/50V T
C333 C433	5172218000	C.,CERAMIC 330PF/50V T
C134 C234	5170364000	C.,MYLAR 0.0033UF/100V JT
C334 C434	5170364000	C.,MYLAR 0.0033UF/100V JT
C135 C235	5170364000	C.,MYLAR 0.0033UF/100V JT
C335 C435	5170364000	C.,MYLAR 0.0033UF/100V JT
C136 C236	5263167923	C.,METAL 0.1UF/50V J VT
C336 C436	5263167923	C.,METAL 0.1UF/50V J VT
C137 C237	5263167923	C.,METAL 0.1UF/50V J VT
C337 C437	5263167923	C.,METAL 0.1UF/50V J VT
C139 C239	5260162550	C.,ELEC.10UF 16V
C339 C439	5260162550	C.,ELEC.10UF 16V
C140 C240	5170370000	C.,MYLAR 0.0056UF/100V JT
C340 C440	5170370000	C.,MYLAR 0.0056UF/100V JT
C142 C242	5171858000	C.,MYLAR 0.012UF/100V J T
C342 C442	5171858000	C.,MYLAR 0.012UF/100V J T
C143 C243	5172218000	C.,CERAMIC 330PF/50V T
C343 C443	5172218000	C.,CERAMIC 330PF/50V T
C144 C244	5263168023	C.,METAL 0.12UF 50V J
C344 C444	5263168023	C.,METAL 0.12UF 50V J
C145 C245	5260067050	C.,ELEC. 10UF 16V
C345 C445	5260067050	C.,ELEC. 10UF 16V
C146 C246	5260166052	C.,ELEC. 100UF/16V M USM
C346 C446	5260166052	C.,ELEC. 100UF/16V M USM
C147 C247	5260166052	C.,ELEC. 100UF/16V M USM
C347 C447	5260166052	C.,ELEC. 100UF/16V M USM
C510 C520	5260160750	C.,ELEC. 1UF50V SM T-N
C530 C540	5260160750	C.,ELEC. 1UF50V SM T-N
C610 C620	5260162550	C.,ELEC.10UF 16V
C611 C621	5170372000	C.,MYLAR 0.0068UF/100V JT
C612 C622	5171856000	C.,MYLAR 0.01UF/100V J T
C613 C623	5260161150	C.,ELEC.2.2UF 50V
C614 C624	5171856000	C.,MYLAR 0.01UF/100V J T
C615 C625	5263106620	POLYPRO. 330PF 100V J
C616 C626	5260162550	C.,ELEC.10UF 16V
C630 C640	5260162550	C.,ELEC.10UF 16V
C631 C641	5170372000	C.,MYLAR 0.0068UF/100V JT
C632 C642	5171856000	C.,MYLAR 0.01UF/100V J T
C633 C643	5260161150	C.,ELEC.2.2UF 50V
C634 C644	5171856000	C.,MYLAR 0.01UF/100V J T
C635 C645	5263106620	POLYPRO. 330PF 100V J
C636 C646	5260162550	C.,ELEC.10UF 16V
D101 D201	5224015020	DIODE,1SS133T-77
D301 D401	5224015020	DIODE,1SS133T-77
D103 D203	5224015020	DIODE,1SS133T-77
D303 D403	5224015020	DIODE,1SS133T-77

Parts marked with *require longer delivery time.

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
D104 D204	5224015100	DIODE,MC911
D304 D404	5224015100	DIODE,MC911
D610 D620	5224015020	DIODE,1SS133T-77
D630 D640	5224015020	DIODE,1SS133T-77
K101 K201	5290011500	RELAY,G5A-237P DC12V
K301 K401	5290011500	RELAY,G5A-237P DC12V
L001 L002	5286002100	COIL,CHOKE 1.5MH
L101 L201	5286023100	COIL,TRAP 85KHZ
L301 L401	5286023100	COIL,TRAP 85KHZ
L102 L202	5292804900	FILTER,MPX
L302 L402	5292804900	FILTER,MPX
L103 L203	5286023100	COIL,TRAP 85KHZ
L303 L403	5286023100	COIL,TRAP 85KHZ
L104 L204	5286010200	COIL,CHOKE 36MH
L304 L404	5286010200	COIL,CHOKE 36MH
P001	5336126800	CON.PLUG 8263-0812 WHT
P002	5336127200	CON.PLUG 8263-1212 WHT
P003	5336128200	CON.,PLUG 8263-0211 WHT
P101 P201	5336126500	CON.PLUG 8263-0512 WHT
P301 P401	5336126500	CON.PLUG 8263-0512 WHT
Q101 Q201	5145103000	FET,2SK-68A-M
Q301 Q401	5145103000	FET,2SK-68A-M
Q102 Q202	5145103000	FET,2SK-68A-M
Q302 Q402	5145103000	FET,2SK-68A-M
Q103 Q203	5145103000	FET,2SK-68A-M
Q303 Q403	5145103000	FET,2SK-68A-M
Q106 Q206	5232007300	FET,2SK-364V
Q306 Q406	5232007300	FET,2SK-364V
Q107 Q207	5230775020	TR 2SC2878-B
Q307 Q407	5230775020	TR 2SC2878-B
Q108 Q208	5230775020	TR 2SC2878-B
Q308 Q408	5230775020	TR 2SC2878-B
Q109 Q209	5230775020	TR 2SC2878-B
Q309 Q409	5230775020	TR 2SC2878-B
Q110 Q210	5230775020	TR 2SC2878-B
Q310 Q410	5230775020	TR 2SC2878-B
Q111 Q211	5230775020	TR 2SC2878-B
Q311 Q411	5230775020	TR 2SC2878-B
Q112 Q212	5230775020	TR 2SC2878-B
Q312 Q412	5230775020	TR 2SC2878-B
Q113 Q213	5230775020	TR 2SC2878-B
Q313 Q413	5230775020	TR 2SC2878-B
Q114 Q214	5230775020	TR 2SC2878-B
Q314 Q414	5230775020	TR 2SC2878-B
Q115 Q215	5230775020	TR 2SC2878-B
Q315 Q415	5230775020	TR 2SC2878-B
Q116 Q216	5230780920	SI.TR.2SC2603F
Q316 Q416	5230780920	SI.TR.2SC2603F
Q117 Q217	5230018920	SI.TR.2SA1115F
Q317 Q417	5230018920	SI.TR.2SA1115F
Q118 Q218	5230018920	SI.TR.2SA1115F
Q318 Q418	5230018920	SI.TR.2SA1115F
Q119 Q219	5230775020	TR 2SC2878-B

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
Q319 Q419	5230775020	TR 2SC2878-B
Q120 Q220	5230780920	SI.TR.2SC2603F
Q320 Q420	5230780920	SI.TR.2SC2603F
Q121 Q221	5230780920	SI.TR.2SC2603F
Q321 Q421	5230780920	SI.TR.2SC2603F
Q122 Q222	5230780920	SI.TR.2SC2603F
Q322 Q422	5230780920	SI.TR.2SC2603F
Q123 Q223	5230775020	TR 2SC2878-B
Q323 Q423	5230775020	TR 2SC2878-B
Q510 Q520	5230018920	SI.TR.2SA1115F
Q511 Q521	5230018920	SI.TR.2SA1115F
Q512 Q522	5230018920	SI.TR.2SA1115F
Q513 Q523	5230018920	SI.TR.2SA1115F
Q530 Q540	5230018920	SI.TR.2SA1115F
Q531 Q541	5230018920	SI.TR.2SA1115F
Q532 Q542	5230018920	SI.TR.2SA1115F
Q533 Q543	5230018920	SI.TR.2SA1115F
Q610 Q620	5230780920	SI.TR.2SC2603F
Q611 Q621	5230018920	SI.TR.2SA1115F
Q612 Q622	5230779520	SI.TR.2SC1815GR
Q613 Q623	5230779720	SI.TR.2SC945A KA
Q614 Q624	5230779720	SI.TR.2SC945A KA
Q630 Q640	5230780920	SI.TR.2SC2603F
Q631 Q641	5230018920	SI.TR.2SA1115F
Q632 Q642	5230779520	SI.TR.2SC1815GR
Q633 Q643	5230779720	SI.TR.2SC945A KA
Q634 Q644	5230779720	SI.TR.2SC945A KA
R001-R006	5240029820	R.,CARBON R20 4.7K J
R101 R201	5240025820	R.,CARBON R20 100 J
R301 R401	5240025820	R.,CARBON R20 100 J
R102 R202	5240032620	R.,CARBON R20 68K J
R302 R402	5240032620	R.,CARBON R20 68K J
R103 R203	5240029820	R.,CARBON R20 4.7K J
R303 R403	5240029820	R.,CARBON R20 4.7K J
R104 R204	5240029820	R.,CARBON R20 4.7K J
R304 R404	5240029820	R.,CARBON R20 4.7K J
R105 R205	5240030420	R.,CARBON R20 8.2K J
R305 R405	5240030420	R.,CARBON R20 8.2K J
R106 R206	5183594000	R.,INCONBUSTIBLE 470 1/4W
R306 R406	5183594000	R.,INCONBUSTIBLE 470 1/4W
R107 R207	5183594000	R.,INCONBUSTIBLE 470 1/4W
R307 R407	5183594000	R.,INCONBUSTIBLE 470 1/4W
R108 R208	5240026020	R.,CARBON R20 120 J
R308 R408	5240026020	R.,CARBON R20 120 J
R109 R209	5240032920	R.,CARBON R20 91K J
R309 R409	5240032920	R.,CARBON R20 91K J
R110 R210	5240029120	R.,CARBON R20 2.4K J
R310 R410	5240029120	R.,CARBON R20 2.4K J
R111 R211	5240029120	R.,CARBON R20 2.4K J
R311 R411	5240029120	R.,CARBON R20 2.4K J
R112 R212	5240177800	R.,CARBON ELR25 10M J
R312 R412	5240177800	R.,CARBON ELR25 10M J
R113 R213	5240033220	R.,CARBON R10 120K
R313 R413	5240033220	R.,CARBON R10 120K
R114 R214	5240034020	R.,CARBON R20 270K J

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION			
R314	R414	5240034020	R., CARBON R20	270K	J
R115	R215	5240029220	R., CARBON R20	2.7K	J
R315	R415	5240029220	R., CARBON R20	2.7K	J
R116	R216	5240031820	R., CARBON R20	33K	J
R316	R416	5240031820	R., CARBON R20	33K	J
R118	R218	5240025820	R., CARBON R20	100	J
R318	R418	5240025820	R., CARBON R20	100	J
R119	R219	5240032620	R., CARBON R20	68K	J
R319	R419	5240032620	R., CARBON R20	68K	J
R120	R220	5240030020	R., CARBON R20	5.6K	J
R320	R420	5240030020	R., CARBON R20	5.6K	J
R121	R221	5240028220	R., CARBON R20	1.0K	J
R321	R421	5240028220	R., CARBON R20	1.0K	J
R122	R222	5240032220	R., CARBON R20	47K	J
R322	R422	5240032220	R., CARBON R20	47K	J
R123	R223	5240030620	R., CARBON R10 10K		
R323	R423	5240030620	R., CARBON R10 10K		
R124	R224	5240030620	R., CARBON R10 10K		
R324	R424	5240030620	R., CARBON R10 10K		
R125	R225	5240032220	R., CARBON R20	47K	J
R325	R425	5240032220	R., CARBON R20	47K	J
R126	R226	5240031720	R., CARBON R20	30K	J
R326	R426	5240031720	R., CARBON R20	30K	J
R127	R227	5240033220	R., CARBON R10 120K		
R327	R427	5240033220	R., CARBON R10 120K		
R128	R228	5240030020	R., CARBON R20	5.6K	J
R328	R428	5240030020	R., CARBON R20	5.6K	J
R129	R229	5240032220	R., CARBON R20	47K	J
R329	R429	5240032220	R., CARBON R20	47K	J
R130	R230	5240033020	R., CARBON R20	100K	J
R330	R430	5240033020	R., CARBON R20	100K	J
R131	R231	5240031820	R., CARBON R20	33K	J
R331	R431	5240031820	R., CARBON R20	33K	J
R132	R232	5240030620	R., CARBON R10 10K		
R332	R432	5240030620	R., CARBON R10 10K		
R133	R233	5240032220	R., CARBON R20	47K	J
R333	R433	5240032220	R., CARBON R20	47K	J
R134	R234	5240030620	R., CARBON R10 10K		
R334	R434	5240030620	R., CARBON R10 10K		
R135	R235	5240029620	R., CARBON R20	3.9K	J
R335	R435	5240029620	R., CARBON R20	3.9K	J
R136	R236	5240030620	R., CARBON R10 10K		
R336	R436	5240030620	R., CARBON R10 10K		
R137	R237	5240032220	R., CARBON R20	47K	J
R337	R437	5240032220	R., CARBON R20	47K	J
R138	R238	5240024220	R., CARBON R20	22	J
R338	R438	5240024220	R., CARBON R20	22	J
R139	R239	5240030820	R., CARBON R20	12K	J
R339	R439	5240030820	R., CARBON R20	12K	J
R140	R240	5240024420	R., CARBON R20	27	J
R340	R440	5240024420	R., CARBON R20	27	J
R141	R241	5240033020	R., CARBON R20	100K	J
R341	R441	5240033020	R., CARBON R20	100K	J

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION			
R142	R242	5240031820	R., CARBON R20	33K	J
R342	R442	5240031820	R., CARBON R20	33K	J
R143	R243	5240032220	R., CARBON R20	47K	J
R343	R443	5240032220	R., CARBON R20	47K	J
R144	R244	5240025820	R., CARBON R20	100	J
R344	R444	5240025820	R., CARBON R20	100	J
R145	R245	5240032220	R., CARBON R20	47K	J
R345	R445	5240032220	R., CARBON R20	47K	J
R146	R246	5240032220	R., CARBON R20	47K	J
R346	R446	5240032220	R., CARBON R20	47K	J
R147	R247	5240030620	R., CARBON R10 10K		
R347	R447	5240030620	R., CARBON R10 10K		
R148	R248	5240030820	R., CARBON R20	12K	J
R348	R448	5240030820	R., CARBON R20	12K	J
R149	R249	5240031420	R., CARBON R10 22K		
R349	R449	5240031420	R., CARBON R10 22K		
R150	R250	5240031420	R., CARBON R10 22K		
R350	R450	5240031420	R., CARBON R10 22K		
R151	R251	5240032220	R., CARBON R20	47K	J
R351	R451	5240032220	R., CARBON R20	47K	J
R152	R252	5240033020	R., CARBON R20	100K	J
R352	R452	5240033020	R., CARBON R20	100K	J
R153	R253	5240033020	R., CARBON R20	100K	J
R353	R453	5240033020	R., CARBON R20	100K	J
R154	R254	5240024220	R., CARBON R20	22	J
R354	R454	5240024220	R., CARBON R20	22	J
R155	R255	5240028220	R., CARBON R20	1.0K	J
R355	R455	5240028220	R., CARBON R20	1.0K	J
R156	R256	5240177800	R., CARBON ELR25	10M	J
R356	R456	5240177800	R., CARBON ELR25	10M	J
R157	R257	5240177800	R., CARBON ELR25	10M	J
R357	R457	5240177800	R., CARBON ELR25	10M	J
R158	R258	5240029420	R., CARBON R20	3.3K	J
R358	R458	5240029420	R., CARBON R20	3.3K	J
R159	R259	5240031820	R., CARBON R20	33K	J
R359	R459	5240031820	R., CARBON R20	33K	J
R160	R260	5240032020	R., CARBON R20	39K	J
R360	R460	5240032020	R., CARBON R20	39K	J
R161	R261	5240024220	R., CARBON R20	22	J
R361	R461	5240024220	R., CARBON R20	22	J
R162	R262	5240034020	R., CARBON R20	270K	J
R362	R462	5240034020	R., CARBON R20	270K	J
R163	R263	5240023420	R., CARBON 10 OHM		
R363	R463	5240023420	R., CARBON 10 OHM		
R164	R264	5240035420	R., CARBON R20	1.0M	J
R364	R464	5240035420	R., CARBON R20	1.0M	J
R165	R265	5240035120	R., CARBON R20	750K	J
R365	R465	5240035120	R., CARBON R20	750K	J
R166	R266	5240029820	R., CARBON R20	4.7K	J
R366	R466	5240029820	R., CARBON R20	4.7K	J
R167	R267	5240031820	R., CARBON R20	33K	J
R367	R467	5240031820	R., CARBON R20	33K	J
R168	R268	5240030220	R., CARBON R20	6.8K	J
R368	R468	5240030220	R., CARBON R20	6.8K	J
R169	R269	5240031820	R., CARBON R20	33K	J

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R369 R469	5240031820	R., CARBON R20 33K J
R170 R270	5240032920	R., CARBON R20 91K J
R370 R470	5240032920	R., CARBON R20 91K J
R171 R271	5240029820	R., CARBON R20 4.7K J
R371 R471	5240029820	R., CARBON R20 4.7K J
R172 R272	5240031420	R., CARBON R10 22K
R372 R472	5240031420	R., CARBON R10 22K
R173 R273	5240031420	R., CARBON R10 22K
R373 R473	5240031420	R., CARBON R10 22K
R174 R274	5240030620	R., CARBON R10 10K
R374 R474	5240030620	R., CARBON R10 10K
R175 R275	5240030620	R., CARBON R10 10K
R375 R475	5240030620	R., CARBON R10 10K
R176 R276	5240031420	R., CARBON R10 22K
R376 R476	5240031420	R., CARBON R10 22K
R177 R277	5240031420	R., CARBON R10 22K
R377 R477	5240031420	R., CARBON R10 22K
R178 R278	5240030620	R., CARBON R10 10K
R378 R478	5240030620	R., CARBON R10 10K
R179 R279	5240031420	R., CARBON R10 22K
R379 R479	5240031420	R., CARBON R10 22K
R180 R280	5240031420	R., CARBON R10 22K
R380 R480	5240031420	R., CARBON R10 22K
R181 R281	5240028220	R., CARBON R20 1.0K J
R381 R481	5240028220	R., CARBON R20 1.0K J
R182 R282	5240031420	R., CARBON R10 22K
R382 R482	5240031420	R., CARBON R10 22K
R183 R283	5240029020	R., CARBON R10 2.2K
R383 R483	5240029020	R., CARBON R10 2.2K
R184 R284	5240031420	R., CARBON R10 22K
R384 R484	5240031420	R., CARBON R10 22K
R185 R285	5240025420	R., CARBON R20 68 J
R385 R485	5240025420	R., CARBON R20 68 J
R186 R286	5240028620	R., CARBON R20 1.5K J
R386 R486	5240028620	R., CARBON R20 1.5K J
R187 R287	5240033020	R., CARBON R20 100K J
R387 R487	5240033020	R., CARBON R20 100K J
R188 R288	5240024220	R., CARBON R20 22 J
R388 R488	5240024220	R., CARBON R20 22 J
R189 R289	5240031820	R., CARBON R20 33K J
R389 R489	5240031820	R., CARBON R20 33K J
R190 R290	5240031220	R., CARBON R20 18K J
R390 R490	5240031220	R., CARBON R20 18K J
R191 R291	5240032220	R., CARBON R20 47K J
R391 R491	5240032220	R., CARBON R20 47K J
R192 R292	5240031020	R., CARBON R10 15K
R392 R492	5240031020	R., CARBON R10 15K
R510 R520	5240030020	R., CARBON R20 5.6K J
R511 R521	5240030620	R., CARBON R10 10K
R512 R522	5240030620	R., CARBON R10 10K
R513 R523	5240029820	R., CARBON R20 4.7K J
R514 R524	5240029820	R., CARBON R20 4.7K J
R515 R525	5240030620	R., CARBON R10 10K
R516 R526	5240030020	R., CARBON R20 5.6K J
R517 R527	5240030020	R., CARBON R20 5.6K J

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R518 R528	5240030620	R., CARBON R10 10K
R519 R529	5240031420	R., CARBON R10 22K
R530 R540	5240030020	R., CARBON R20 5.6K J
R531 R541	5240030620	R., CARBON R10 10K
R532 R542	5240030620	R., CARBON R10 10K
R533 R543	5240029820	R., CARBON R20 4.7K J
R534 R544	5240029820	R., CARBON R20 4.7K J
R535 R545	5240030620	R., CARBON R10 10K
R536 R546	5240030020	R., CARBON R20 5.6K J
R537 R547	5240030020	R., CARBON R20 5.6K J
R538 R548	5240030620	R., CARBON R10 10K
R539 R549	5240031420	R., CARBON R10 22K
R610 R620	5240030620	R., CARBON R10 10K
R611 R621	5240031420	R., CARBON R10 22K
R612 R622	5240030620	R., CARBON R10 10K
R613 R623	5240031420	R., CARBON R10 22K
R614 R624	5240029820	R., CARBON R20 4.7K J
R615 R625	5240031420	R., CARBON R10 22K
R616 R626	5240030620	R., CARBON R10 10K
R617 R627	5240030620	R., CARBON R10 10K
R618 R628	5240027020	R., CARBON R20 330 J
R619 R629	5240023220	R., CARBON R20 8.2 J
R630 R640	5240030620	R., CARBON R10 10K
R631 R641	5240031420	R., CARBON R10 22K
R632 R642	5240030620	R., CARBON R10 10K
R633 R643	5240031420	R., CARBON R10 22K
R634 R644	5240029820	R., CARBON R20 4.7K J
R635 R645	5240031420	R., CARBON R10 22K
R636 R646	5240030620	R., CARBON R10 10K
R637 R647	5240030620	R., CARBON R10 10K
R638 R648	5240027020	R., CARBON R20 330 J
R639 R649	5240023220	R., CARBON R20 8.2 J
R711 R721	5280021700	R., TRIMMER 47KB H.
R712 R722	5280021100	R., TRIMMER 4.7KB H.
R713 R723	5280021700	R., TRIMMER 47KB H.
R714 R724	5280021300	R., TRIMMER 10KB H.
R715 R725	5280021700	R., TRIMMER 47KB H.
R716 R726	5280021500	R., TRIMMER 22KB H.
R717 R727	5280021500	R., TRIMMER 22KB H.
R718 R728	5280020700	R., TRIMMER 1KB H.
R719 R729	5280022200	R., TRIMMER 330K H.
R731 R741	5280021700	R., TRIMMER 47KB H.
R732 R742	5280021100	R., TRIMMER 4.7KB H.
R733 R743	5280021700	R., TRIMMER 47KB H.
R734 R744	5280021300	R., TRIMMER 10KB H.
R735 R745	5280021700	R., TRIMMER 47KB H.
R736 R746	5280021500	R., TRIMMER 22KB H.
R737 R747	5280021500	R., TRIMMER 22KB H.
R738 R748	5280020700	R., TRIMMER 1KB H.
R739 R749	5280022200	R., TRIMMER 330K H.
RT11 L041	5143128000	THERMISTOR, S5C-34
T610 T620	5320035000	IN PUT TRANS
T611 T621	5320035100	OUT PUT TRANS
T630 T640	5320035000	IN PUT TRANS
T631 T641	5320035100	OUT PUT TRANS

R/P PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
TP11 L041	5544750000	PIN, COMBINATION
TP12 L042	5544750000	PIN, COMBINATION
TP13 L043	5544750000	PIN, COMBINATION
TP14 L044	5544750000	PIN, COMBINATION
TP15 L045	5336126200	CON. PLUG 8263-0212 WHT
U001	5292204500	MODULE, OSC 85KHZ
U101 U201	5220412500	IC, NJM4562
U301 U401	5220412500	IC, NJM4562
U102 U202	5220414300	IC, NJM4560
U302 U402	5220414300	IC, NJM4560
U103 U203	5220414300	IC, NJM4560
U303 U403	5220414300	IC, NJM4560
U104 U204	5220419400	IC, LC4066B
U304 U404	5220419400	IC, LC4066B
U105 U205	5220414501	IC, UPC1252H2
U305 U405	5220414501	IC, UPC1252H2
U106 U206	5220414601	IC, UPC1253H2
U306 U406	5220414601	IC, UPC1253H2

INPUT AMP PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167100	INPUT AMP PCB ASSY
	*5210167100	INPUT AMP PCB
C101	5170352000	C., MYLAR 0.001UF/100V JT
C103 C104	5260165252	C., ELEC. 47UF/25V M USM VT
C105	5170360000	C., MYLAR 0.0022UF/100V JT
C106	5263106220	POLYPRO. 220PF 100V J
C107	5260165052	C., ELEC. 47UF 10V M USM VT
C108	5260163452	C., ELEC. 22UF 25V
C110	5170358000	C., MYLAR 0.0018UF/100V JT
C111	5170354000	C., MYLAR 0.0012UF/100V JT
C112	5263167323	C., METAL 0.033UF 50V J
C113	5263167123	C., METAL 0.022UF 50V J
C114	5260162550	C., ELEC. 10UF 16V
C115	5260162550	C., ELEC. 10UF 16V
C116	5260163452	C., ELEC. 22UF 25V
C119	5260162550	C., ELEC. 10UF 16V
C120	5263167123	C., METAL 0.022UF 50V J
C122 C123	5260162550	C., ELEC. 10UF 16V
C125 C126	5173433000	C., CERAMIC 0.010UF 50V Z
D101 D102	5224015020	DIODE, 1SS133T-77
J101	5122383000	CONN. SOCKET 3024-12AH
P101	5336126400	CONN. PLUG 263-0412 WH
Q101 Q102	5145103000	FET, 2SK-68A-M
Q103	5230780920	SI. TR. 2SC2603F
R101	5240025820	R., CARBON R20 100 J
R103	5240028220	R., CARBON R20 1.0K J
R104	5240033020	R., CARBON R20 100K J
R105 R106	5240029220	R., CARBON R20 2.7K J
R107	5240026620	R., CARBON R20 220 J
R108	5240029820	R., CARBON R20 4.7K J
R109 R110	5183578000	R., INCOMBUSTIBLE 1/4W 100
R111	5240033020	R., CARBON R20 100K J
R112	5240035420	R., CARBON R20 1.0M J
R113	5282014300	1S1UVR 16, 10KC
R114	5240024520	R., CARBON R20 30 J
R115	5240025820	R., CARBON R20 100 J
R116	5240033820	R., CARBON R10 220K
R117	5240033020	R., CARBON R20 100K J
R119 R120	5240031020	R., CARBON R10 15K
R121 R122	5240030620	R., CARBON R10 10K
R123 R124	5240029720	R., CARBON R20 4.3K J
R125 R126	5240030620	R., CARBON R10 10K
R127 R128	5283505300	2S3UVR 16, 10KB+100KEX2
R131	5240033020	R., CARBON R20 100K J
R132	5240030620	R., CARBON R10 10K
R133	5240031020	R., CARBON R10 15K
R134	5282410500	1S2UVR 16, 5KA+5KC
R135-R138	5240031420	R., CARBON R10 22K
R139 R140	5282014400	1S1UVR 16, 20KA
R142	5240027620	R., CARBON R20 560 J
R143 R144	5240031420	R., CARBON R10 22K
R145	5240033020	R., CARBON R20 100K J
R146	5240031520	R., CARBON R20 24K J
R147	5240031620	R., CARBON R20 27K J
R148	5240030620	R., CARBON R10 10K

Parts marked with *require longer delivery time.

INPUT AMP PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R149	5240030620	R.,CARBON R10 10K
R151	5240032220	R.,CARBON R20 47K J
R152	5240025820	R.,CARBON R20 100 J
S101	5300514200	SWITCH,LEVER SLK2NBC
S102	5300040300	SWITCH,PUSH SUJ50A
U101 U103	5220414300	IC,NJM4560,
U102	5220411100	IC,NJM4560DX

MONITOR PCB ASSY(A)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167700	MONITOR PCB ASSY(A)
	*5210167701	MONITOR PCB(A)
C101 C301	5172208000	C.,CERAMIC 47PF/50V T
C102 C302	5260163452	C.,ELEC. 22UF 25V
C103 C303	5260162550	C.,ELEC.10UF 16V
C104 C304	5172208000	C.,CERAMIC 47PF/50V T
C105 C305	5260163452	C.,ELEC. 22UF 25V
C106 C107	5260165252	C.,ELEC.47UF/25V M USM VT
C108 C109	5173433000	C.,CERAMIC 0.010UF 50V Z
C351 C451	5172208000	C.,CERAMIC 47PF/50V T
C352 C452	5260163452	C.,ELEC. 22UF 25V
C353 C453	5260162550	C.,ELEC.10UF 16V
C354 C454	5172208000	C.,CERAMIC 47PF/50V T
C355 C455	5260163452	C.,ELEC. 22UF 25V
D101	5224015020	DIODE,1SS133T-77
D102 D202	5224015020	DIODE,1SS133T-77
D302 D402	5224015020	DIODE,1SS133T-77
D103 D203	5224015020	DIODE,1SS133T-77
D303 D403	5224015020	DIODE,1SS133T-77
J101	5122383000	CON. SOCKET 3024-12AH
P101	5336128200	CON.,PLUG 8263-0211 WHT
P102	5336126200	CON.,PLUG 8263-0212 WHT
P103	5336128400	CON.,PLUG 8263-0411 WHT
Q101 Q301	5042553000	SI.TR.2SA-733P
Q102 Q302	5230779520	SI.TR.2SC1815GR
Q103	5042553000	SI.TR.2SA-733P
Q104	5230779520	SI.TR.2SC1815GR
R102 R302	5240031420	R.,CARBON R10 22K
R104 R304	5240030620	R.,CARBON R10 10K
R105 R305	5240031620	R.,CARBON R20 27K J
R106 R306	5240033020	R.,CARBON R20 100K J
R108 R308	5283505400	2S3UVR 16, 10KA+5KA.C
R109 R309	5240031420	R.,CARBON R10 22K
R110 R310	5240031420	R.,CARBON R10 22K
R111 R311	5240030620	R.,CARBON R10 10K
R112 R312	5240030620	R.,CARBON R10 10K
R113 R313	5240030620	R.,CARBON R10 10K
R114 R314	5240030620	R.,CARBON R10 10K
R115 R315	5240030620	R.,CARBON R10 10K
R116 R316	5240030620	R.,CARBON R10 10K
R117	5240030620	R.,CARBON R10 10K
R118	5240030620	R.,CARBON R10 10K
R119	5240030620	R.,CARBON R10 10K
R120	5240030620	R.,CARBON R10 10K
R121 R321	5240030820	R.,CARBON R20 12K J
R351 R451	5240031420	R.,CARBON R10 22K
R352 R452	5282014400	1S1UVR 16, 20KA
R353 R453	5240030620	R.,CARBON R10 10K
R354 R454	5240031620	R.,CARBON R20 27K J
R355 R455	5240032220	R.,CARBON R20 47K J
R356 R456	5240025820	R.,CARBON R20 100 J
S101	5300040200	SWITCH,PUSH 2-2 N SUJ12A
S102	5300040400	SWITCH,PUSH SUJ60A
U101 U301	5220414300	IC,NJM4560,
U102	5220419400	IC,LC4066B
U351 U451	5220414300	IC,NJM4560,

Parts marked with *require longer delivery time.

MONITOR PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167801	MONITOR PCB ASSY(B)
	*5210167801	MONITOR PCB(B)
C151 C251	5172208000	C., CERAMIC 47PF/50V T
C152 C252	5260163452	C., ELEC. 22UF 25V
C153 C253	5260162550	C., ELEC. 10UF 16V
C154 C254	5172208000	C., CERAMIC 47PF/50V T
C155 C255	5260163452	C., ELEC. 22UF 25V
C171 C271	5260162550	C., ELEC. 10UF 16V
C172 C272	5260165952	C., ELEC. 100UF/10V M USM
C173 C273	5260165952	C., ELEC. 100UF/10V M USM
C174 C274	5173070000	C., ELEC. SM 470UF/6.3V
C175 C275	5173435000	C., CERAMIC 0.047UF 50V Z
C201 C401	5172208000	C., CERAMIC 47PF/50V T
C202 C402	5260163452	C., ELEC. 22UF 25V
C203 C403	5260162550	C., ELEC. 10UF 16V
C204 C404	5172208000	C., CERAMIC 47PF/50V T
C205 C405	5260163452	C., ELEC. 22UF 25V
C206 C207	5260165252	C., ELEC. 47UF/25V M USM VT
C208 C209	5173433000	C., CERAMIC 0.010UF 50V Z
D201	5224015020	DIODE, 1SS133T-77
J301	5122383000	CON. SOCKET 3024-12AH
P301	5336128500	CON. PLUG 8263-0511 WHT
P302	5336128300	CON. PLUG 8263-0311 WHT
P303	5336128200	CON. PLUG 8263-0211 WHT
P304	5336135200	CON. PLUG 8263-0212 RD
Q201 Q401	5042553000	SI. TR. 2SA-733P 0.25 180
Q202 Q402	5230779520	SI. TR. 2SC1815GR 0.4 80
R151 R251	5240031420	R., CARBON R10 22K
R152 R252	5240029820	R., CARBON R20 4.7K J
R153	5282410600	1S2UVR 16, 10KAX2
R154 R254	5240030820	R., CARBON R20 12K J
R155 R255	5240032420	R., CARBON R20 56K J
R156 R256	5240025820	R., CARBON R20 100 J
R157 R257	5240032220	R., CARBON R20 47K J
R158	5282410600	1S2UVR 16, 10KAX2
R159 R259	5240031620	R., CARBON R20 27K J
R171 R271	5240033020	R., CARBON R20 100K J
R172 R272	5240033020	R., CARBON R20 100K J
R173 R273	5240021020	R., CARBON R20 1.0 J
R174 R274	5240032220	R., CARBON R20 47K J
R202 R402	5240031420	R., CARBON R10 22K
R204 R404	5240030620	R., CARBON R10 10K
R205 R405	5240031620	R., CARBON R20 27K J
R206 R406	5240033020	R., CARBON R20 100K J
R208 R408	5283505400	2S3UVR 16, 10KA+5KA.C
R209 R409	5240031420	R., CARBON R10 22K
R210 R410	5240031420	R., CARBON R10 22K
R211 R411	5240030620	R., CARBON R10 10K
R212 R412	5240030620	R., CARBON R10 10K
R213 R413	5240030620	R., CARBON R10 10K
R214 R414	5240030620	R., CARBON R10 10K
R215 R415	5240030620	R., CARBON R10 10K
R216 R416	5240030620	R., CARBON R10 10K
R221 R421	5240030820	R., CARBON R20 12K J
S201	5300040500	SWITCH, PUSH SUJ70A

MONITOR PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
U151 U251	5220414300	IC, NJM4560
U171 U271	6048649000	IC, NJM386D
U201	5220414300	IC, NJM4560
U202	5220419400	IC, LC4066B
U401	5220414300	IC, NJM4560

BUSS PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168700	BUSS PCB ASSY
	*5210168700	BUSS PCB
P101-P108	5122364000	PLUG, CONNECTOR 3022-12AD
P109	5336135200	CON. PLUG 8263-0212 RD
P110	5336135300	CON. PLUG 8263-0312 RD

OPE SW PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169300	OPE SW PCB ASSY
	*5210169300	OPE SW PCB
	*5800305001	COLLAR, LED B
D501-D504	5225010100	LED, SLP-155B RED
D505	5225010200	LED, SLP-255B GRN
D506 D507	5225010100	LED, SLP-155B RED
R501-R504	5240027220	R., CARBON R20 390 J
R505	5240027020	R., CARBON R20 330 J
R506 R507	5240027220	R., CARBON R20 390 J
S501-S516	5302103100	SWITCH, TACT B3F-1100

Parts marked with *require longer delivery time.

CONTROL PCB(A) ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169200	CONTROL PCB(A) ASSY
	*5210169200	CONTROL PCB(A)
C501-C506	5173433000	C., CERAMIC 0.010UF 50V Z
C507-C510	5173433000	C., CERAMIC 0.010UF 50V Z
D501-D505	5224015020	DIODE, 1SS133T-77
D507-D511	5224015200	DIODE, MC921
D512 D513	5224015100	DIODE, MC911
P501 P502	5122359000	CONNECTOR, M 7P
R501 R502	5183578000	R., INCOMBUSTIBLE 1/4W 100
R503	5240029820	R., CARBON R20 4.7K J
R504	5240030620	R., CARBON R10 10K
R505	5240029820	R., CARBON R20 4.7K J
R506	5240030620	R., CARBON R10 10K
R507	5240030620	R., CARBON R10 10K
R508	5240029820	R., CARBON R20 4.7K J
R509	5240030620	R., CARBON R10 10K
R510	5240030620	R., CARBON R10 10K
R511	5240029820	R., CARBON R20 4.7K J
R512	5240030620	R., CARBON R10 10K
R513	5240029820	R., CARBON R20 4.7K J
R514	5240030620	R., CARBON R10 10K
R515	5240030620	R., CARBON R10 10K
R516	5240029820	R., CARBON R20 4.7K J
R517	5240030620	R., CARBON R10 10K
R518	5240030620	R., CARBON R10 10K
R519	5240033020	R., CARBON R20 100K J
R520	5240033020	R., CARBON R20 100K J
R521	5240033020	R., CARBON R20 100K J
R522	5240033020	R., CARBON R20 100K J
U501 U502	5220038900	IC, LB1294
U503-U505	5220017200	IC, HD14069UBP
U506	5220017400	IC, HD14071BP
U507	6048661000	IC, M54517P
U508 U509	5220016100	IC, HD14013BP,

CONTROL PCB (B) ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200170500	CONTROL PCB B ASSY
	*5210170500	CONT PCB B
C501-C504	5173433000	C., CERAMIC 0.010UF 50V Z
C509	5173433000	C., CERAMIC 0.010UF 50V Z
C510 C512	5260165052	C., ELEC. 47UF 10V M USM VT
C511	5260162550	C., ELEC. 10UF 16V
C513	5263106220	POLYPRO. 220PF 100V J
C514	5263106220	POLYPRO. 220PF 100V J
C515	5260162050	C., ELEC. 4.7UF 35V M SM
C516	5260162050	C., ELEC. 4.7UF 35V M SM
CR50	5347000900	CERAMIC OSC KBR-800H
D501-D507	5224015300	DIODE, MC931
D508	5224015100	DIODE, MC911
D509	5224015200	DIODE, MC921
D510-D514	5224015020	DIODE, 1SS133T-77
D515	5224015020	DIODE, 1SS133T-77
L501	5286002100	COIL, CHOKE 1.5MH
P501	5336135600	CON. PLUG 8263-0612 RD
P502	5336127100	CON. PLUG 8263-1112 WHT
P503	5336135900	CON. PLUG 8263-0912 RD
P504	5336127200	CON. PLUG 8263-1212 WHT
P505	5336127000	CON. PLUG 8263-1012 WHT
P506	5336145400	CON. PLUG 8263-0412 YEW
P507	5336126800	CON. PLUG 8263-0812 WHT
P508	5336126600	CON. PLUG 8263-0612 WHT
P509	5336145600	CON. PLUG 8263-0612 YEW
P510	5336135400	CON. PLUG 8263-0412 RD
P511	5336145400	CON. PLUG 8263-0412 YEW
P512	5336137400	CON. PLUG 8263-0412 BK
P513	5336135400	CON. PLUG 8263-0412 RD
P514	5336126400	CON. PLUG 8263-0412 WHT
Q501	5230018920	SI. TR. 2SA1115F 0.3 200
Q502	5230780920	SI. TR. 2SC2603F 0.3 200
Q503 Q504	5230018920	SI. TR. 2SA1115F 0.3 200
Q505-Q507	5230780920	SI. TR. 2SC2603F 0.3 200
R501-R506	5240028220	R., CARBON R20 1.0K J
R507-R512	5240028220	R., CARBON R20 1.0K J
R513-R516	5240028220	R., CARBON R20 1.0K J
R517	5240030620	R., CARBON R10 10K
R518	5240029820	R., CARBON R20 4.7K J
R519	5240030620	R., CARBON R10 10K
R520 R521	5240030620	R., CARBON R10 10K
R522	5240035420	R., CARBON R20 1.0M J
R523	5240030620	R., CARBON R10 10K
R524	5240033020	R., CARBON R20 100K J
R525	5240030620	R., CARBON R10 10K
R526	5240030620	R., CARBON R10 10K
R527	5240030620	R., CARBON R10 10K
R528	5240030620	R., CARBON R10 10K
R529	5240030020	R., CARBON R20 5.6K J
R530	5240033020	R., CARBON R20 100K J
R531	5240030620	R., CARBON R10 10K
R532	5240030620	R., CARBON R10 10K
R533	5240029820	R., CARBON R20 4.7K J
R534	5240030620	R., CARBON R10 10K

Parts marked with *require longer delivery time.

CONTROL (B) PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R535	5240032820	R., CARBON R20 82K J
R536	5240030620	R., CARBON R10 10K
R537	5240030620	R., CARBON R10 10K
R538-R540	5240030620	R., CARBON R10 10K
R541-R543	5240029820	R., CARBON R20 4.7K J
R544	5240029420	R., CARBON R20 3.3K J
R545	5240026820	R., CARBON R20 270 J
R546	5240027820	R., CARBON R20 680 J
R547	5240029220	R., CARBON R20 2.7K J
R548	5240030020	R., CARBON R20 5.6K J
R549	5280021700	R., TRIMMER 47KB H.
R550	5280021300	R., TRIMMER 10KB H.
R551	5280020900	R., TRIMMER 2.2KB H.
R552	5280020900	R., TRIMMER 2.2KB H.
R553	5240035420	R., CARBON R20 1.0M J
R554	5240030620	R., CARBON R10 10K
R555	5240028220	R., CARBON R20 1.0K J
R556	5240032220	R., CARBON R20 47K J
R557	5240030620	R., CARBON R10 10K
R558	5240030620	R., CARBON R10 10K
R559	5240032220	R., CARBON R20 47K J
R560	5240028220	R., CARBON R20 1.0K J
U501	5220019700	IC, LC7800,
U502	5220806300	IC, LM6402G-1820
U503	5220806400	IC, LM6416E-1821
U504	5220017200	IC, HD14069UBP
U505-U507	6048661000	IC, M54517P
U508 U509	5220017200	IC, HD14069UBP
U510-U513	5242111500	R., ARRAY 10KX6
U514-U517	5242111300	R., ARRAY 10KX4

METER PCB ASSY(A)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168500	METER PCB ASSY(A)
	*5210168500	METER PCB(A)
	*5800385100	SPACER, LED
C001 C002	5260165252	C., ELEC. 4.7UF/25V M USM VT
C101	5260213150	C., ELEC. 22UF 25V M SRA
C102	5260212050	C., ELEC. 4.7UF 35V M SRA
C103 C203	5260160750	C., ELEC. 1UF50V SM T-N
C303 C403	5260160750	C., ELEC. 1UF50V SM T-N
C201 C301	5260163452	C., ELEC. 22UF 25V
C401	5260163452	C., ELEC. 22UF 25V
C202 C302	5260162050	C., ELEC. 4.7UF 35V M SM
C402	5260162050	C., ELEC. 4.7UF 35V M SM
D101 D201	5224015400	DIODE, 1K60
D301 D401	5224015400	DIODE, 1K60
D102 D202	5224015400	DIODE, 1K60
D302 D402	5224015400	DIODE, 1K60
D103 D203	5224015020	DIODE, 1SS133T-77
D303 D403	5224015020	DIODE, 1SS133T-77
D104 D204	5224015020	DIODE, 1SS133T-77
D304 D404	5224015020	DIODE, 1SS133T-77
D105 D205	5225006900	LED, PR3432S RED
D305 D405	5225006900	LED, PR3432S RED
M101 M201	5296006101	METER, VU
M301 M401	5296006101	METER, VU
Q101 Q201	5230779520	SI. TR. 2SC1815GR
Q301 Q401	5230779520	SI. TR. 2SC1815GR
R101 Q201	5240031820	R., CARBON R20 33K J
R301 Q401	5240031820	R., CARBON R20 33K J
R102 R202	5240033020	R., CARBON R20 100K J
R302 R402	5240033020	R., CARBON R20 100K J
R103 R203	5240027420	R., CARBON R20 470 J
R303 R403	5240027420	R., CARBON R20 470 J
R104 R204	5150154000	R., TRIMMER 10KB
R304 R404	5150154000	R., TRIMMER 10KB
R105 R205	5240028820	R., CARBON R20 1.8K J
R305 R405	5240028820	R., CARBON R20 1.8K J
R106 R206	5240028820	R., CARBON R20 1.8K J
R306 R406	5240028820	R., CARBON R20 1.8K J
R107 R207	5240033020	R., CARBON R20 100K J
R307 R407	5240033020	R., CARBON R20 100K J
R108 R208	5240032220	R., CARBON R20 47K J
R308 R408	5240032220	R., CARBON R20 47K J
R109 R209	5240029820	R., CARBON R20 4.7K J
R309 R409	5240029820	R., CARBON R20 4.7K J
R110 R210	5240028220	R., CARBON R20 1.0K J
R310 R410	5240028220	R., CARBON R20 1.0K J
R111 R211	5240029820	R., CARBON R20 4.7K J
R311 R411	5240029820	R., CARBON R20 4.7K J
R112 R212	5240028420	R., CARBON R20 1.2K J
R312 R412	5240028420	R., CARBON R20 1.2K J
R113 R213	5240025220	R., CARBON R20 56 J
R313 R413	5240025220	R., CARBON R20 56 J
U101 U201	5220418800	IC, M5218P
U301 U401	5220418800	IC, M5218P

Parts marked with *require longer delivery time.

METER PCB(B) ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168600	METER PCB(B) ASSY
	*5210168600	METER PCB(B)
C001 C002	5260213050	C.,ELEC. 22UF 16V M SRA
C101 C201	5260211650	C.,ELEC. 3.3UF 35V M SRA
C102 C202	5260212850	C.,ELEC. 22UF 6.3V M SRA
C103 C203	5260212050	C.,ELEC. 4.7UF 35V M SRA
D101 D201	5224015400	DIODE,1K60
D102 D202	5224015400	DIODE,1K60
M101 M201	5296003300	METER,VU
R001 R002	5183558000	R.,INCOMBUSTIBLE F25 15 J
R101 R201	5240033220	R.,CARBON R10 120K
R102 R202	5240033220	R.,CARBON R10 120K
R103 R203	5280091700	R.,TRIMMER 10KB V.METAL
R104 R204	5240027420	R.,CARBON R20 470 J
R105 R205	5240028820	R.,CARBON R20 1.8K J
R106 R206	5240028820	R.,CARBON R20 1.8K J
U101	5220418800	IC,M5218P

DRIVE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169600	DRIVE PCB ASSY
	*5210169600	DRIVE PCB
C501 C502	5173433000	C.,CERAMIC 0.010UF 50V Z
C503 C504	5260166052	C.,ELEC. 100UF/16V M USM
C505-C507	5173433000	C.,CERAMIC 0.010UF 50V Z
D501-D504	5143089000	DIODE,W03C
R501	5240030020	R.,CARBON R20 5.6K J
R502	5240027020	R.,CARBON R20 330 J
R503	5240033420	R.,CARBON R10 150K
R504	5240027020	R.,CARBON R20 330 J
R505	5240029820	R.,CARBON R20 4.7K J
R506	5240027020	R.,CARBON R20 330 J
R507	5240030620	R.,CARBON R10 10K
R508	5240030620	R.,CARBON R10 10K
R509	5240023420	R.,CARBON 10 OHM
R510	5240024220	R.,CARBON R20 22 J
U501	5220418800	IC,M5218P

P.SUPPLY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200170200	P.SUPPLY PCB ASSY [J,US,GE]
	*5200170210	P.SUPPLY PCB ASSY [E,UK,A]
	*5200170220	P.SUPPLY PCB ASSY [C]
	*5210170200	POWER SUPPLY PCB
C001 C002	△5173094000	C.,ELEC. 3300UF 25V (SM)
C003-C005	△5263164900	C.,ME. 0.1UF 250V [E,UK,A]
C008 C009	5260214850	C.,ELEC. 100UF 16V M SRA
C012 C013	△5173089000	C.,ELEC.2200UF 25V SM
C014 C015	5260211250	C.,ELEC. 1.0UF 50V M SRA
C016 C017	5260214850	C.,ELEC. 100UF 16V M SRA
C018	△5173094000	C.,ELEC. 3300UF 25V (SM)
C019	△5173094000	C.,ELEC. 3300UF 25V (SM)
C020	△5173082000	C.,ELEC.1000UF 25V SM
C021	△5173088000	C.,ELEC. 2000UF/16V SNAP
C022	5260214750	C.,ELEC. 100UF 10V M SRA
C023	5260211250	C.,ELEC. 1.0UF 50V M SRA
C024	5173088000	C.,ELEC. 2200UF 16V (SM)
D001	△5228005100	SILICON STACK KBPC102
D002 D003	△5228005000	SILICON STACK W02
D004 D005	5143089000	DIODE,W03C
D006 D007	5224543101	DIODE,ZENER RD12EB2 FR
D008-D011	5224015020	DIODE,1SS133T-77
D012 D013	5143089000	DIODE,W03C
D014	5224015020	DIODE,1SS133T-77
P001	5336139500	CON.PLUG 8263-0511 RD
P002	5336128300	CON.PLUG 8263-0311 WHT
P003	5336128500	CON.PLUG 8263-0511 WHT
Q003	5230780920	SI.TR.2SC2603F
R001 R002	5240030620	R.,CARBON R10 10K
R009 R010	5240030620	R.,CARBON R10 10K
R011 R012	△5183596000	R.,INCOMBUSTIBLE F25 560
R013	△5241181710	R.,INCOM. 1.5 1/4W [C]
R014	△5241216510	R.,INCOMBUSTIBLE 27 1/4W
R015	5240030620	R.,CARBON R10 10K
R016	5240030620	R.,CARBON R10 10K
R017	5240030620	R.,CARBON R10 10K

Parts marked with *require longer delivery time.

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA

[A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

IN/OUT PCB ASSY(A)-1

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167400	IN/OUT PCB ASSY(A)-1
	*5210167400	IN/OUT PCB(A)
J105	5330508900	JACK, RCA 1P BK
J106	5330011400	JACK, YKB21-5005 SINGLE
P104	5336128200	CON., PLUG 8263-0211 WHT

IN/OUT PCB ASSY(A)-2

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167410	IN/OUT PCB ASSY(A)-2
	*5210167400	IN/OUT PCB(A)
J105	5330508900	JACK, RCA 1P BK
J106	5330011400	JACK, YKB21-5005 SINGLE

IN/OUT PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168100	IN/OUT PCB ASSY(B)
	*5210168100	IN/OUT PCB(B)
J001	5330510000	JACK, RCA 12P
P001	5336210400	CONNECTOR, PLUG 5129-4A
P002	5336212700	CONNECTOR, PLUG 5089-7A
P003	5336212800	CONNECTOR, PLUG 5089-8A
R001-P004	5240031420	R., CARBON R10 22K
R005-P008	5240025820	R., CARBON R20 100 J

VR PCB ASSY(A)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167500	VR PCB ASSY(A)
	*5210167500	VR PCB(A)
R129	5284009500	VR, SLIDE 60, 10KA

VR PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167900	VR PCB ASSY(B)
	*5210167900	VR PCB(B)
R103	5284009600	VR, SLIDE 60, 10KX2

PHONE JACK PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168300	PHONE JACK PCB ASSY
	*5210168300	PHONE JACK PCB
J001 J002	5330011800	JACK, PHONE YKB215118

PWR SW PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200170300	PWR SW PCB ASSY [J]
	*5200170310	PWR SW PCB ASSY [US]
	*5200170321	PWR SW PCB ASSY [C]
	*5200170330	PWR SW PCB ASSY [GE]
	*5200170340	PWR SW PCB ASSY [E, UK, A]
	*5210170300	POWER SW PCB
	*5210181000	ISOLATE PCB [E, UK, A]
F001	△5307035100	FUSE, 1A 250V [C]
P001	△5327007200	WRAPPING, TERMINAL 2P
S001	△5300031900	SW., PUSH SPLC1P 1.5MMPCB
Z001	△5052905000	SPARK KILLER [J]
Z001	△5052910000	CR., 0.033+120 [US]
Z001	△5292002600	CR., 0.033+120 125V [C]
Z001	△5292002500	CR., 0.1+120 300VAC [GE]
Z001	△5267702500	C., 4700PF 250VAC [E, UK, A]

SPEED SW PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169800	SPEED SW PCB ASSY
	*5210169800	SPEED SW PCB
P501	5336210500	CONNECTOR PLUG 5129-5A
R513	5280002902	R., TRIMMER 2KB H.
R514	5280002802	R., TRIMMER 1KB H.
S503	5300909200	SW., SLIDE 2-2 N SSB022

SENSOR PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169700	SENSOR PCB ASSY
	*5210169700	SENSOR PCB
R511	5181506000	R., CARBON R25 10K J
U502	5228700100	IC, DN6838

Parts marked with *require longer delivery time.

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA
 [A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

LED PCB ASSY(A)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167300	LED PCB ASSY(A)
	*5210167300	LED PCB(A)
	*5800304901	COLLAR,LED;A
D103	5225006900	LED,PR3432S RED
J103	5122373000	CONNECTOR,SOCKET 3024-2AH

LED PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168200	LED PCB ASSY(B)
	*5210168200	LED PCB(B)
	*5800304901	COLLAR,LED;A
D001-D005	5225006900	LED,PR3432S RED
D006	5225014400	LED,PG3432SY GRN
J001-J006	5122373000	CONNECTOR,SOCKET 3024-2AH
R001-R006	5240027620	R.,CARBON R20 560 J

DBX SW PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200168800	DBX SW PCB ASSY
	*5210168800	DBX SW PCB
D001 D002	5224015020	DIODE,1SS133T-77
S001 S002	5300911800	SWITCH, SLIDE 2-2 N

MIC JACK PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200167200	MIC JACK PCB ASSY
	*5210167200	MIC JACK PCB
J102	5330010800	JACK,MIC 1P

PITCH CONTROL PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169900	PITCH CONTROL PCB ASSY
	*5210169900	PITCH CONT PCB
	*5210170000	LED PCB(C)
	*5800305001	COLLAR, LED B
D505	5225010100	LED,SLP-155B RED
D506	5225010200	LED,SLP-255B GRN
J501 J502	5122373000	CONNECTOR,SOCKET 3024-2AH
R515	5240029020	R.,CARBON R10 2.2K
R516	5240025820	R.,CARBON R20 100 J
R517	5282410700	1S2UVR 16, 1KB+2KB
R518	5240028420	R.,CARBON R20 1.2K J
R519	5240027220	R.,CARBON R20 390 J
S504	5300040600	SWITCH,PUSH W 4-PSF00-C4L

Parts marked with *require longer delivery time.

REMOTE PCB ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
J001	*5200168900	REMOTE PCB ASSY
	*5210168900	REMOTE PCB
	*5554099100	BRACKET, CONN
	*5780102608	SCREW, PAN M2.6X8
	5334010100	SOCKET, 12P CONN

PUNCH IN/OUT PCB ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200169000	PUNCH IN/OUT PCB ASSY
	*5210169000	PUNCH IN/OUT PCB
	*5330010800	JACK, MIC 1P

JOINT PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
J501 J502	*5200169400	JOINT PCB ASSY
	*5210169400	JOINT PCB
	*5312000500	FLUORESCENCE LAMP FG46B5
	5122378000	CONNECTOR, SOCKET 3024-07A

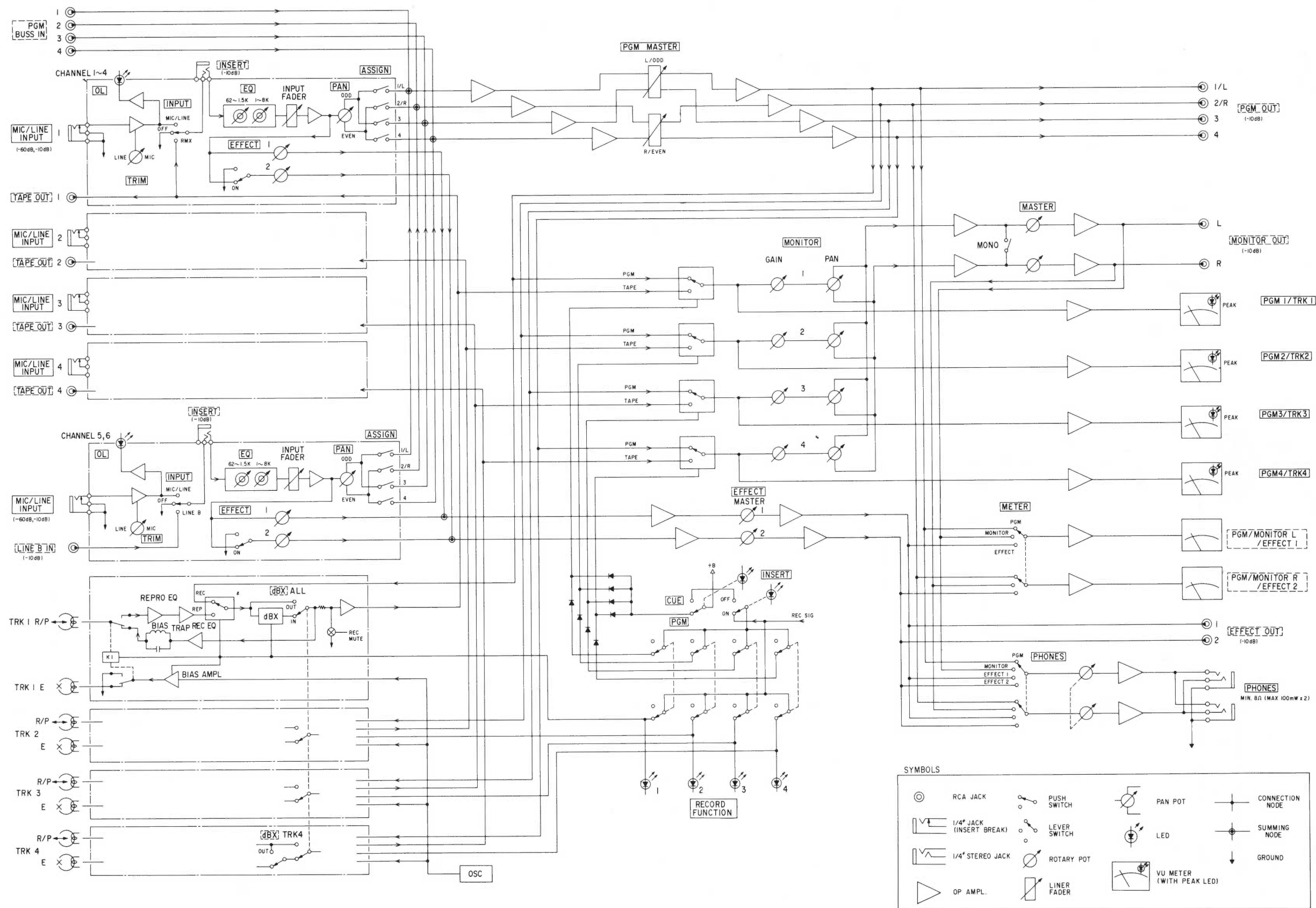
FUSE PCB ASSY (PCB Omitted) [E, UK, A]

REF.NO.	PARTS NO.	DESCRIPTION
F001	*5200079300	FUSE PCB ASSY
	*5210079300	FUSE PCB
	*5142087000	HOLDER, FUSE; PCB
	△5041138000	FUSE, 500MA, 250V
F002	△5041138000	FUSE, 500MA, 250V
F003	△5142185000	FUSE, 630MA
F004	△5142185000	FUSE, 630MA
F005	△5041140000	FUSE, 1A-250V (T)

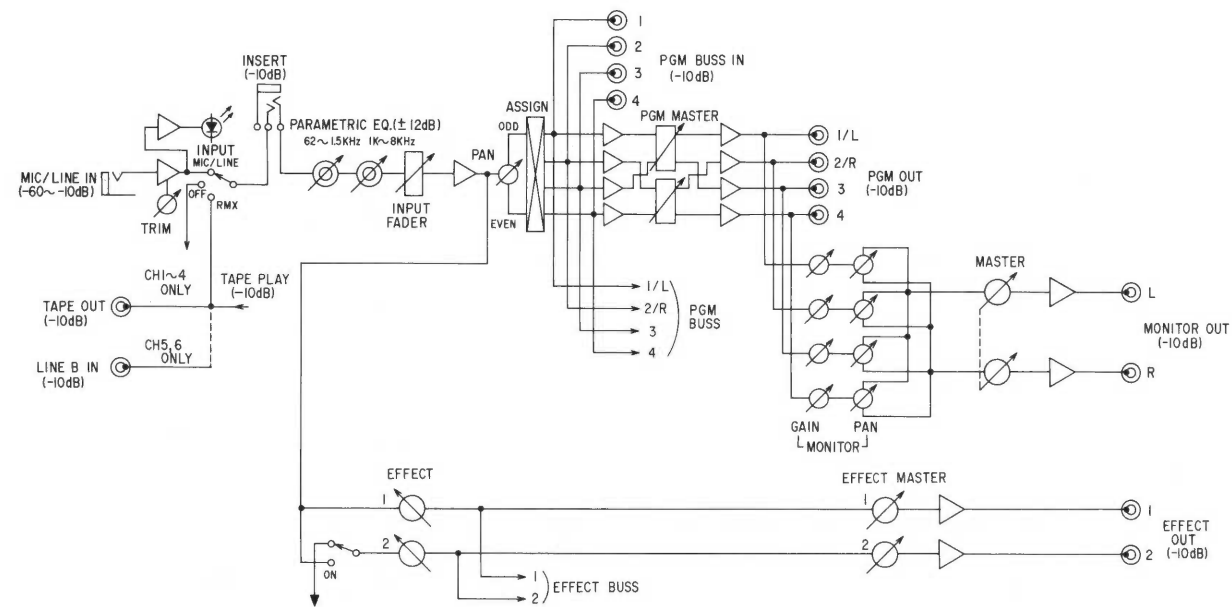
Parts marked with *require longer delivery time.

[US]:U.S.A. [E]:EUROPE [UK]:U.K. [C]:CANADA
 [A]:AUSTRALIA [GE]:GENERAL EXPORT [J]:JAPAN

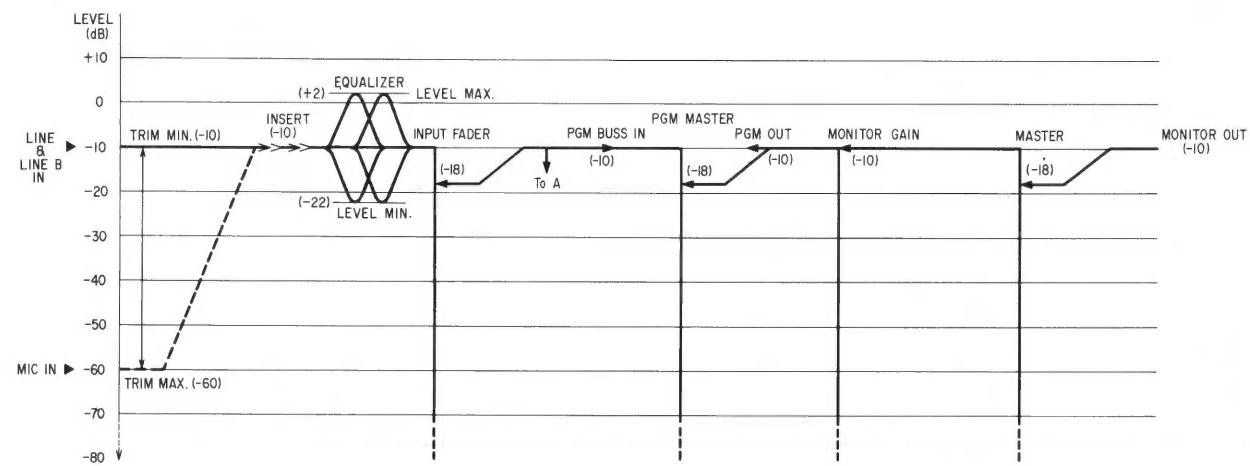
7. BLOCK DIAGRAM



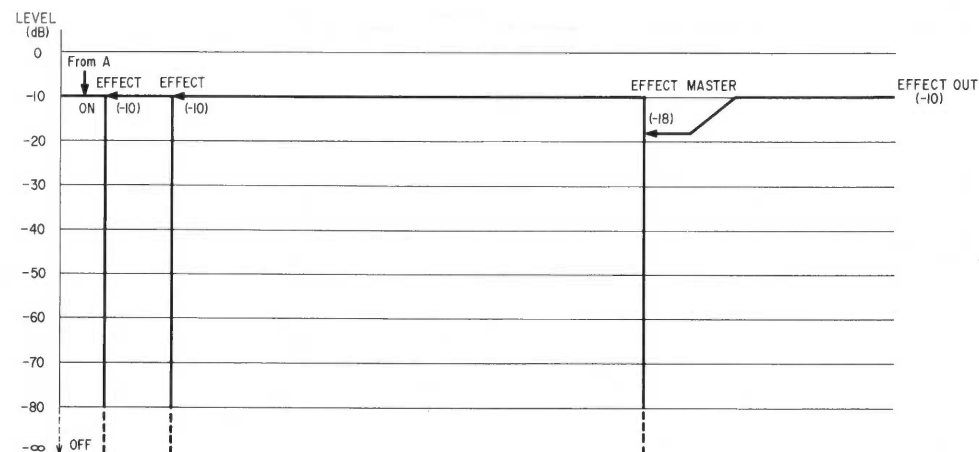
8. LEVEL DIAGRAM



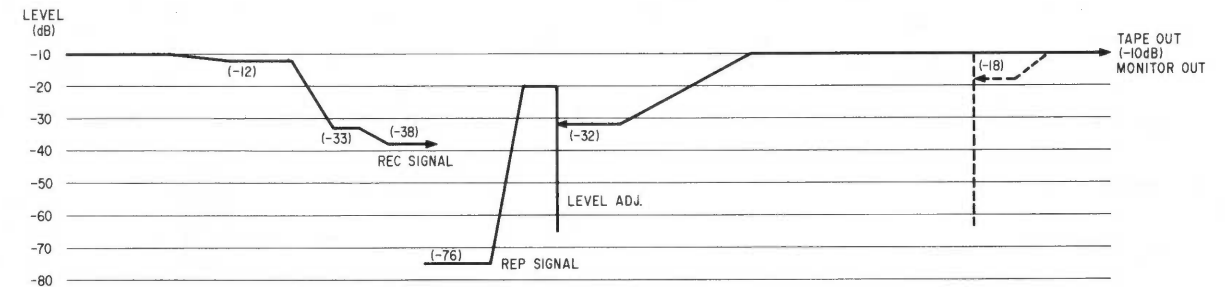
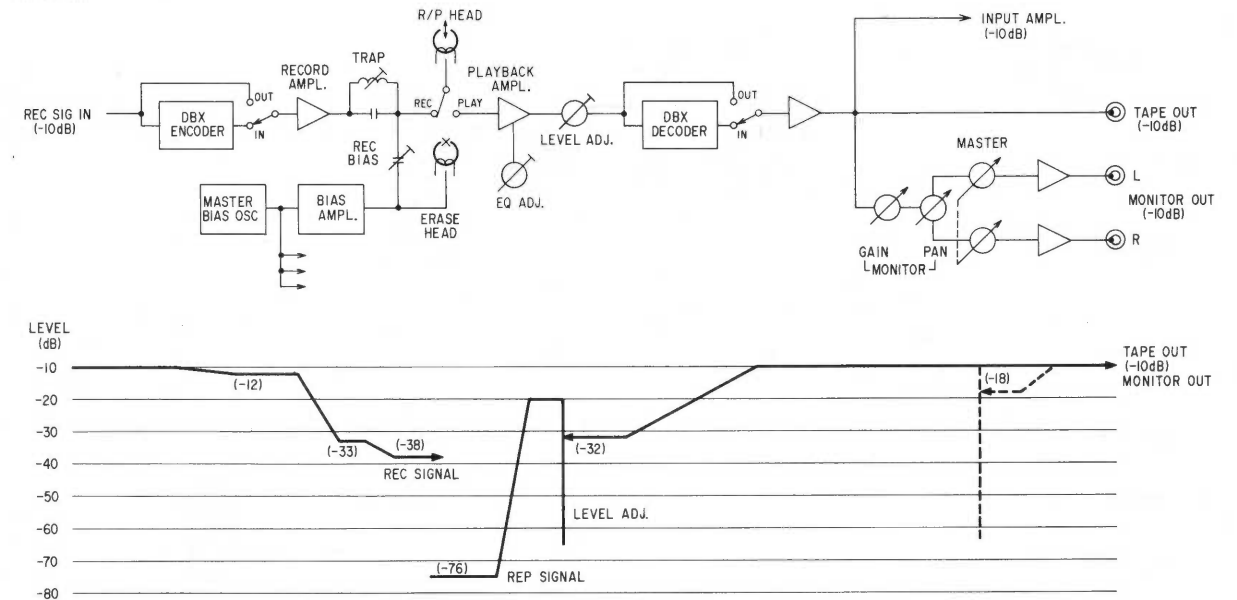
① INPUT / BUSS / MONITOR SECTION



② EFFECT SECTION

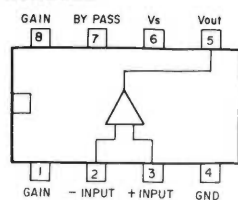
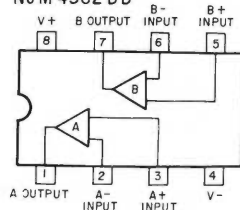


(AT 315Hz)

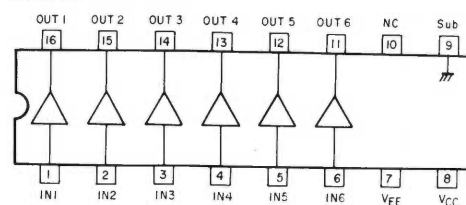


9. IC INTERNAL CIRCUIT

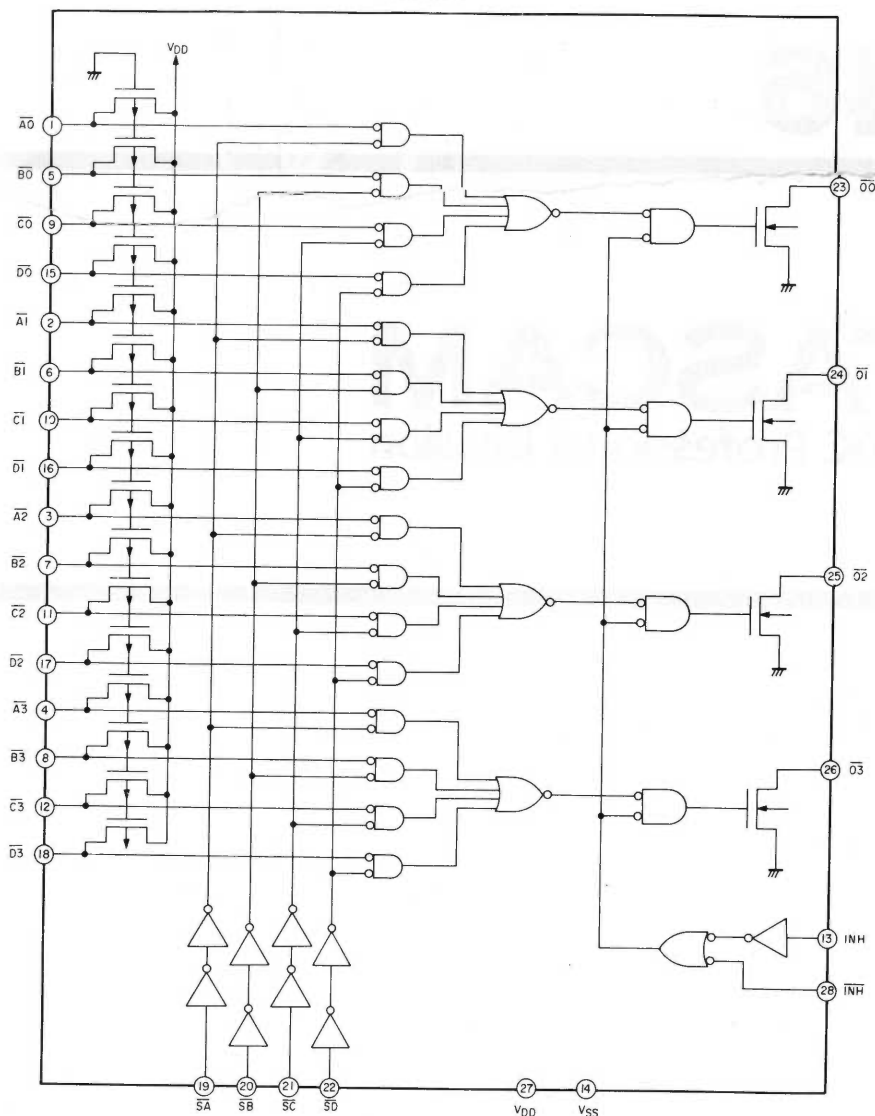
NJM386D

NJM4560D,DX
NJM4562DD

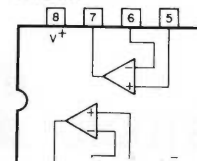
LB1294



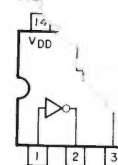
LC7800



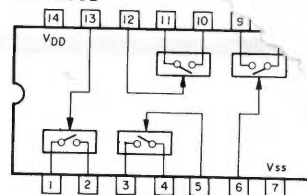
M5218P



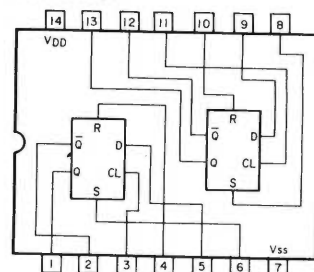
HL



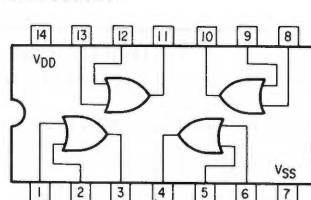
LC4066B



HD14013BP

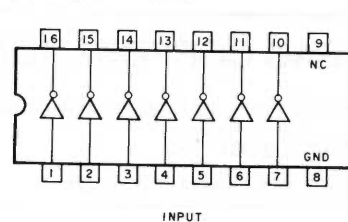


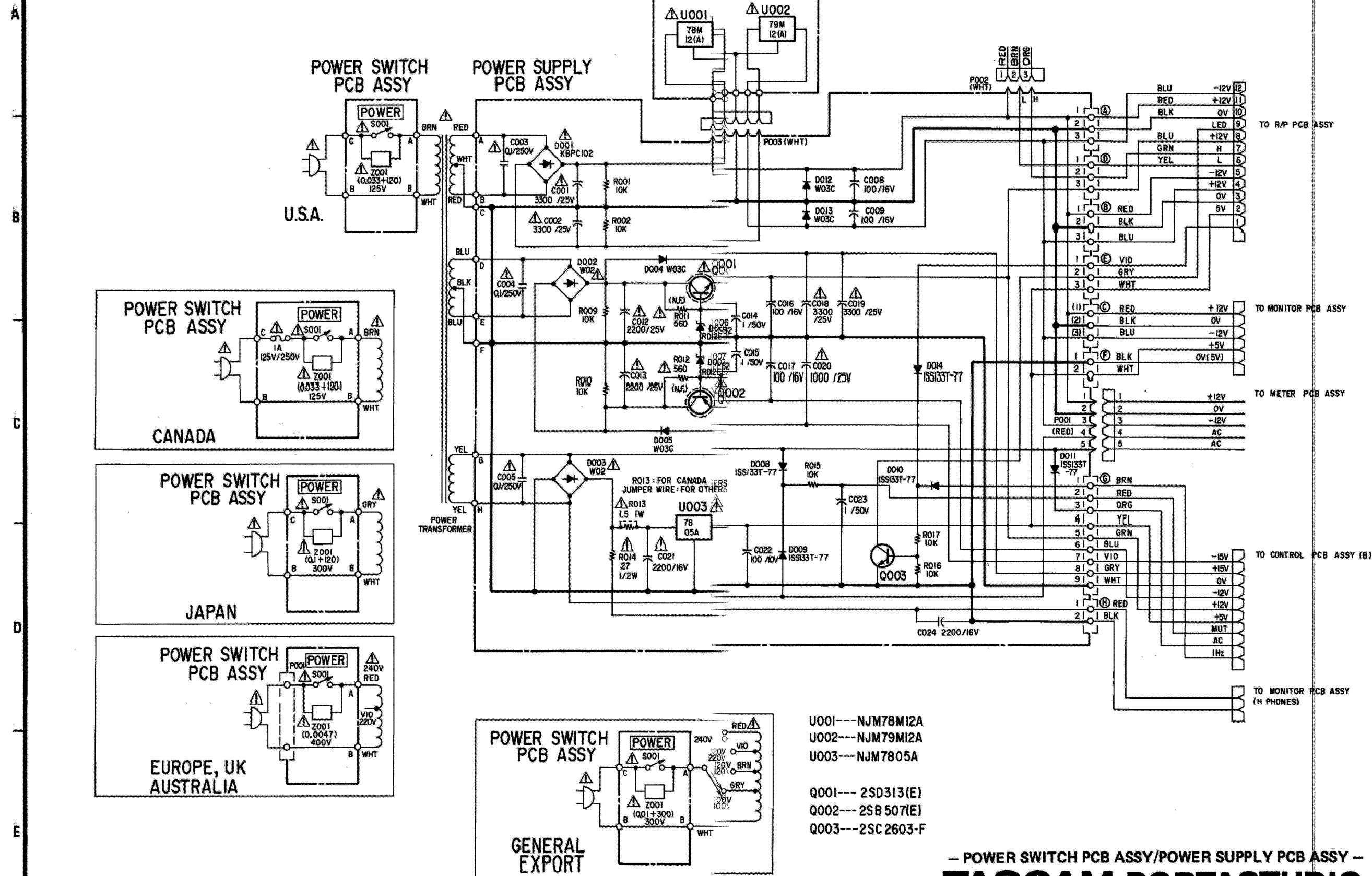
HD14071BP



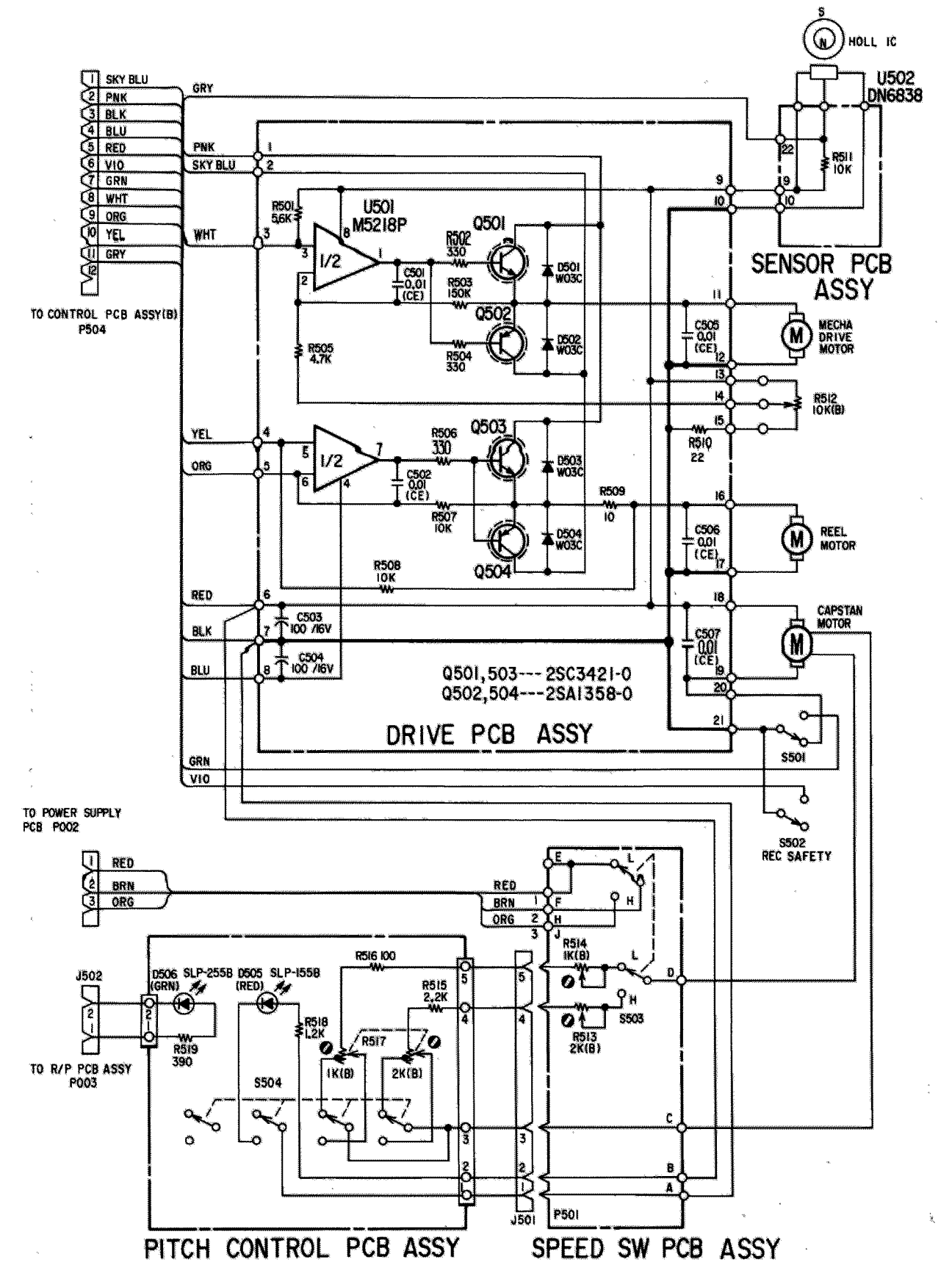
M54517P

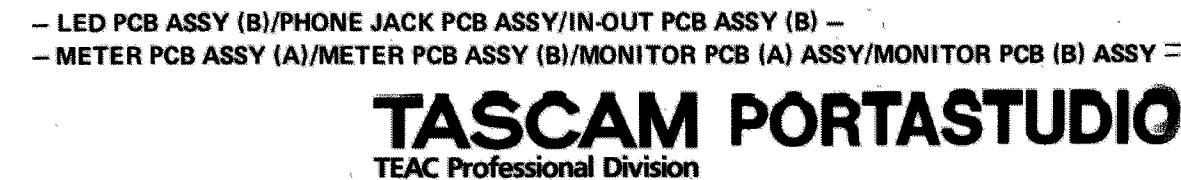
OUTPUT





— POWER SWITCH PCB ASSY/POWER SUPPLY PCB ASSY —

TASCAM PORTASTUDIO
TEAC Professional Division— SPEED SWITCH PCB ASSY/PITCH CONTROL PCB ASSY —
— SENSOR PCB ASSY/DRIVE PCB ASSY —TASCAM PORTASTUDIO
TEAC Professional Division



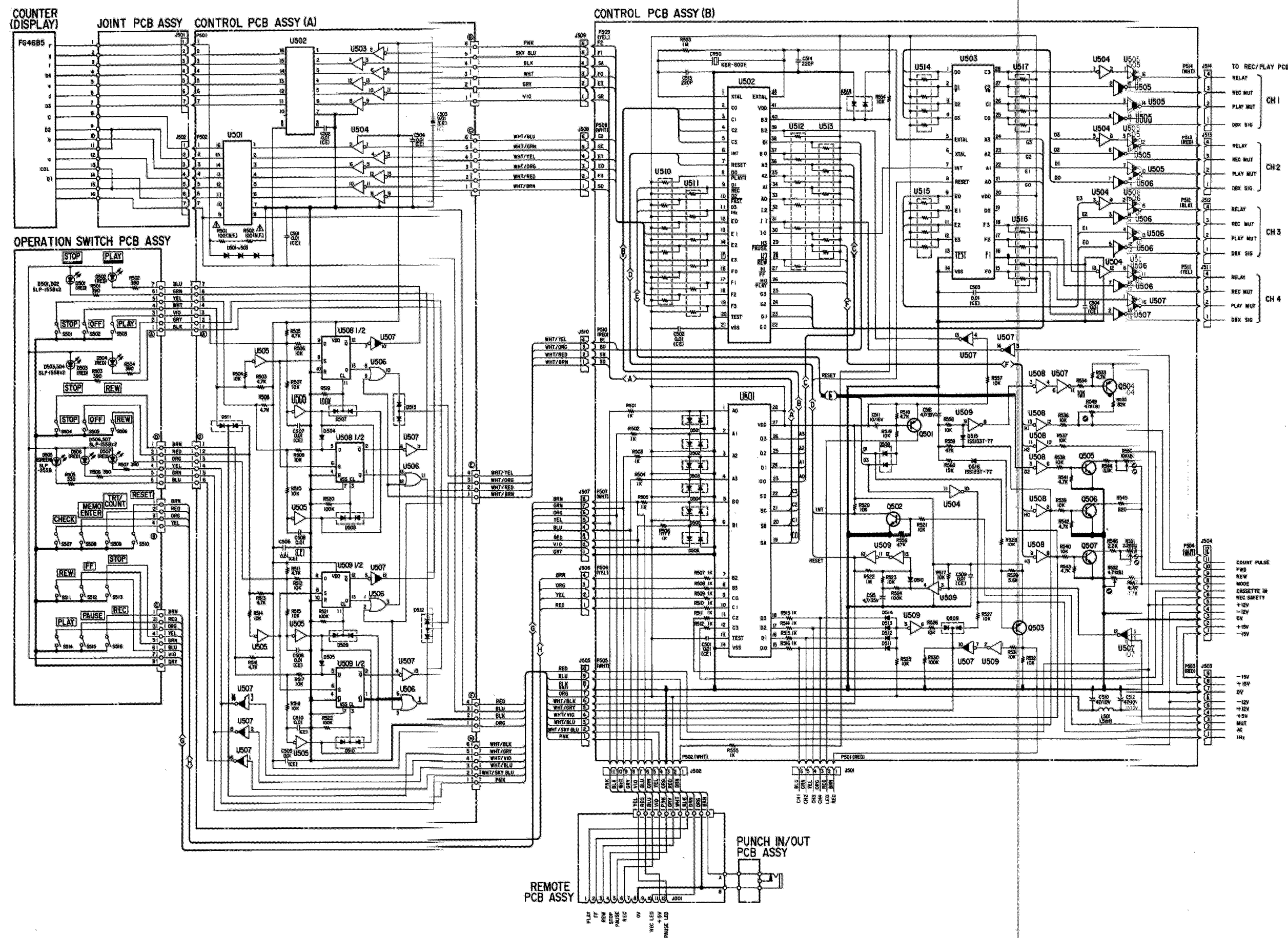
A

B

C

D

E

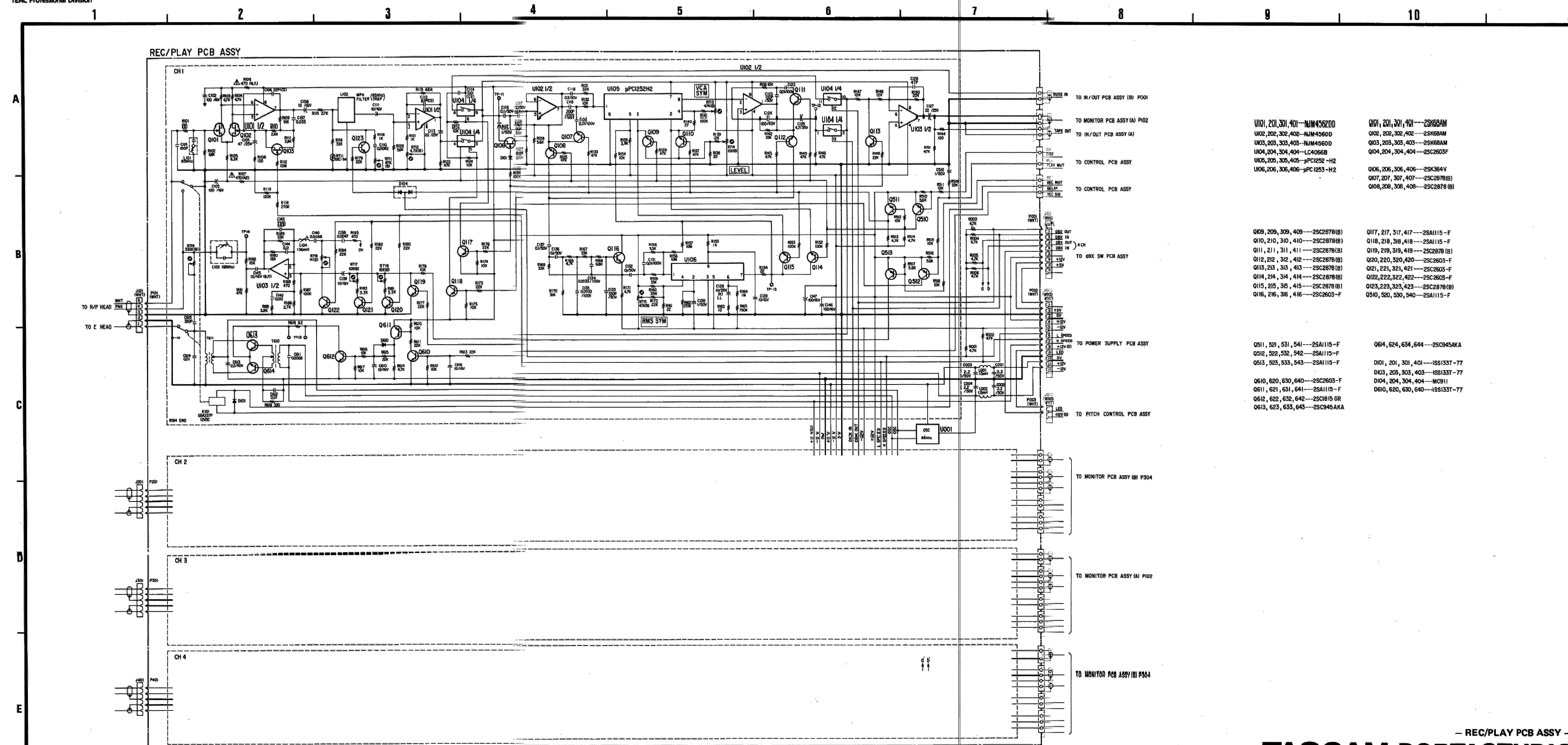


CONTROL PCB ASSY (A)
U501, U502 — LB1294
U503 — HD4069/8P
U504 — HD4071BP
U505 — M54517P
U506, U509 — HD4013BP
U507 — 505 — ISS133T-77
U508 — 511 — MC921
U509 — 513 — MC911

CONTROL PCB ASSY (B)
U501 — LC7800
U502 — LM6402G
U503 — LM6416E
U504, U508 — HD4069/8P
U505 — 507 — M54517P
U506 — 510 — 513 — FRE-6P
U507 — 1821
U508 — 517 — FRE-4P
U509 — 1821 (10K x4)

Q501 — 2SA1115-F
Q502 — 2SC2603-F
Q503, U504 — 2SA1115-F
Q505 — 507 — 2SC2603-F
Q501 — 507 — MC931
Q508 — MC911
Q509 — MC921
Q510 — 516 — ISS133T-77

— JOINT PCB ASSY/CONTROL PCB ASSY (A) —
— CONTROL PCB ASSY (B)/OPERATION SWITCH PCB ASSY —
— REMOTE PCB ASSY/PUNCH IN/OUT PCB ASSY —



U101, 201, 301, 401—NJM4562DD
U102, 202, 302, 402—NJM4560D
U103, 203, 303, 403—NJM4560D
U104, 204, 304, 404—LC4068B
U105, 205, 305, 405—μPC1252-H2
U106, 206, 306, 406—μPC1253-H2

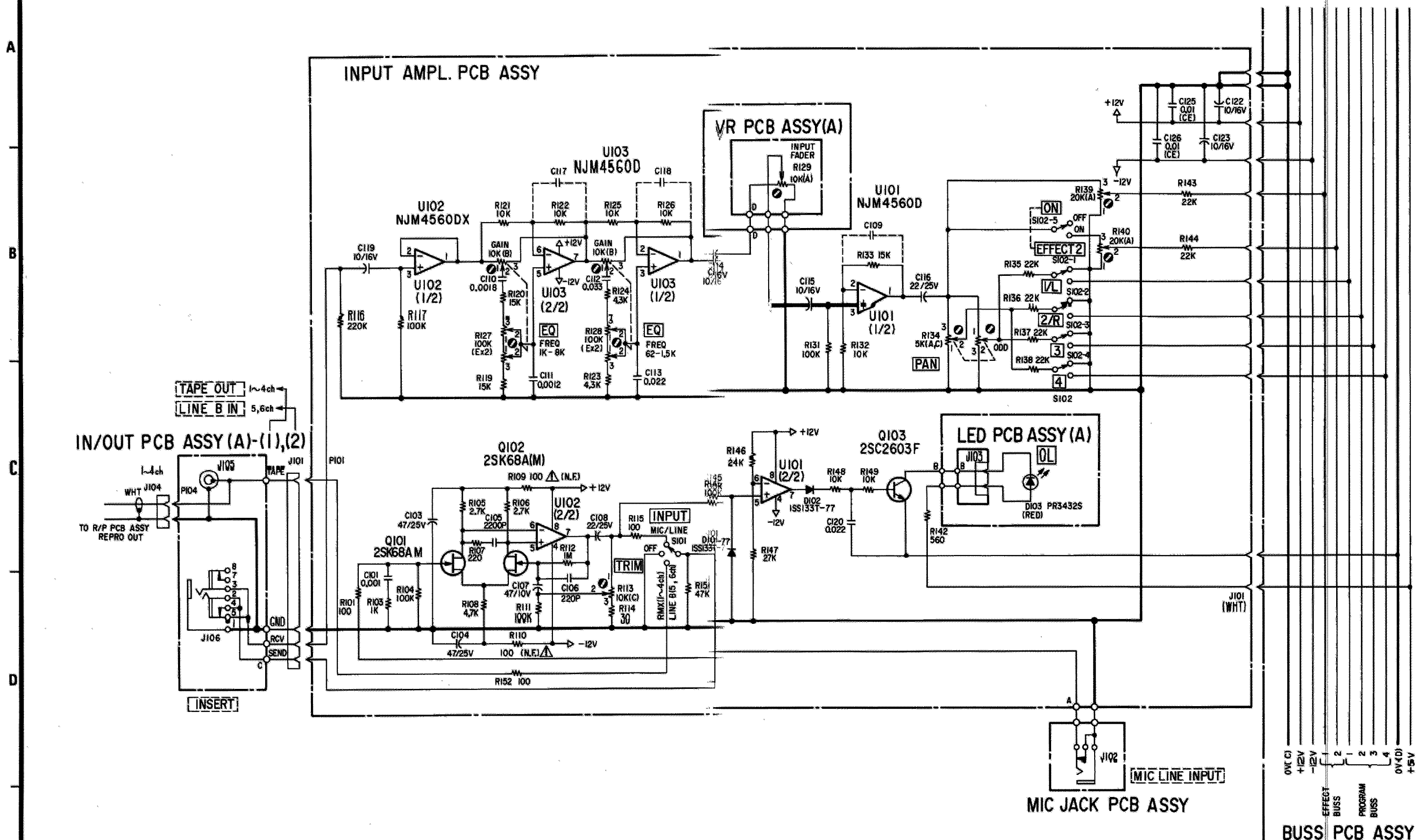
Q101, 201, 301, 401—2SK68AM
Q102, 202, 302, 402—2SK68AM
Q103, 203, 303, 403—2SK68AM
Q104, 204, 304, 404—2SC2603F
Q105, 205, 305, 405—2SK364V
Q106, 206, 306, 406—2SC2878(B)
Q107, 207, 307, 407—2SC2878(B)
Q108, 208, 308, 408—2SC2878(B)

Q109, 209, 309, 409—2SC2878(B)
Q110, 210, 310, 410—2SC2878(B)
Q111, 211, 311, 411—2SC2878(B)
Q112, 212, 312, 412—2SC2878(B)
Q113, 213, 313, 413—2SC2878(B)
Q114, 214, 314, 414—2SC2878(B)
Q115, 215, 315, 415—2SC2878(B)
Q116, 216, 316, 416—2SC2603-F

Q117, 217, 317, 417—2SA1115-F
Q118, 218, 318, 418—2SA1115-F
Q119, 219, 319, 419—2SC2878(B)
Q120, 220, 320, 420—2SC2603-F
Q121, 221, 321, 421—2SC2603-F
Q122, 222, 322, 422—2SC2603-F
Q123, 223, 323, 423—2SC2878(B)
Q124, 224, 324, 424—2SA1115-F

Q511, 521, 631, 541—2SA1115-F
Q512, 522, 632, 542—2SA1115-F
Q513, 523, 633, 543—2SA1115-F
Q610, 620, 630, 640—2SC2603-F
Q611, 621, 631, 641—2SA1115-F
Q612, 622, 632, 642—2SC1815-GR
Q613, 623, 633, 643—2SC945AKA

Q614, 624, 634, 644—2SC945AKA
D101, 201, 301, 401—ISS133T-77
D103, 203, 303, 403—ISS133T-77
D104, 204, 304, 404—MC911
D610, 620, 630, 640—ISS133T-77



SCHEMATIC DIAGRAMS

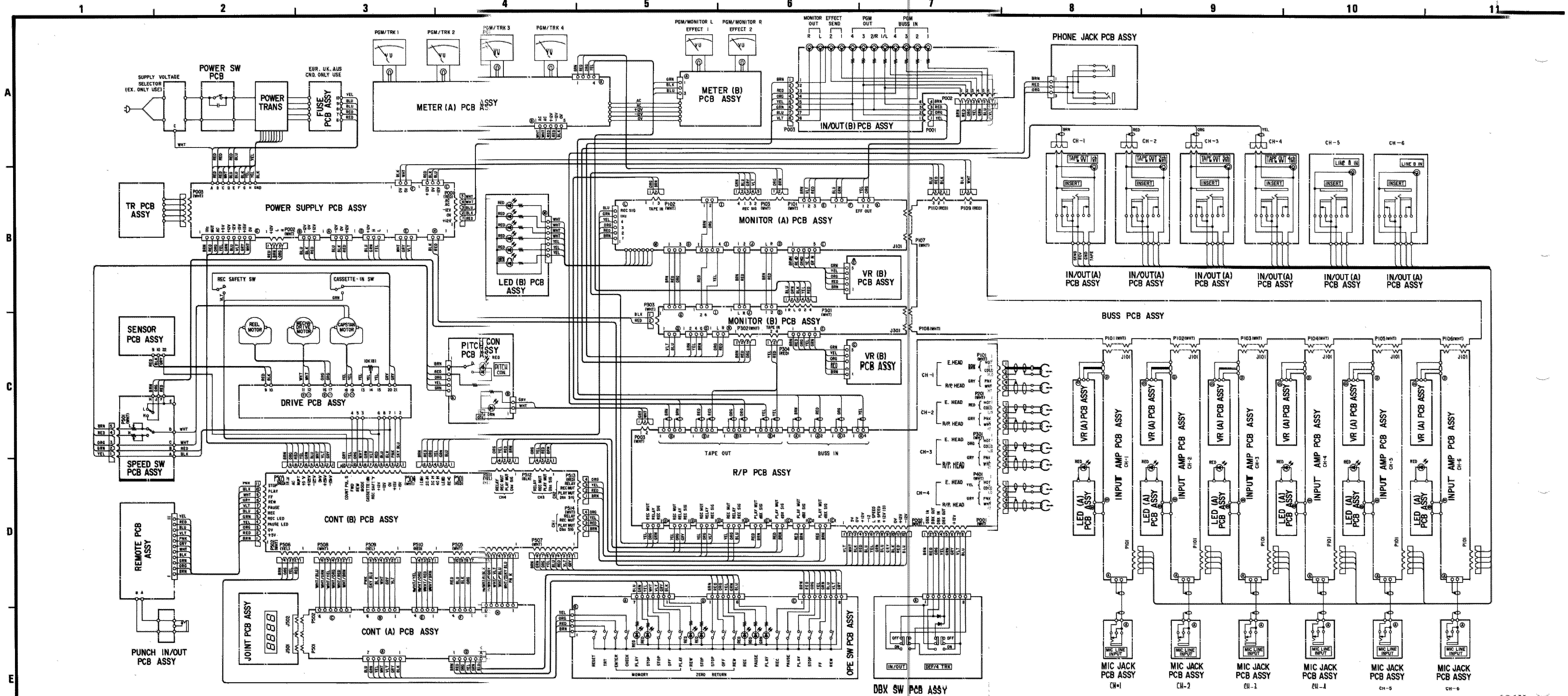
246

PORTASTUDIO

INSTRUCTIONS FOR SERVICE PERSONNEL
BEFORE RETURNING APPLIANCE TO THE CUSTOMER, MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT.

NOTES

1. Resistor values are in ohms (k = kilo-ohms, M = meg-ohms).
2. Capacitor values are in microfarads (p = picofarads).



PORTASTUDIO **246**

TASCAM
TEAC Professional Division

TEAC CORPORATION

MAIN OFFICE: 3-7-3 NAKACHO MUSASHINO TOKYO PHONE (0422) 53-1111
SALES OFFICE: 4-15-30 SHIMORENJAKU MITAKA TOKYO PHONE (0422) 45-7741

TEAC CORPORATION OF AMERICA

7733 TELEGRAPH ROAD MONTEBELLO CALIFORNIA 90640 PHONE (213) 726-0303

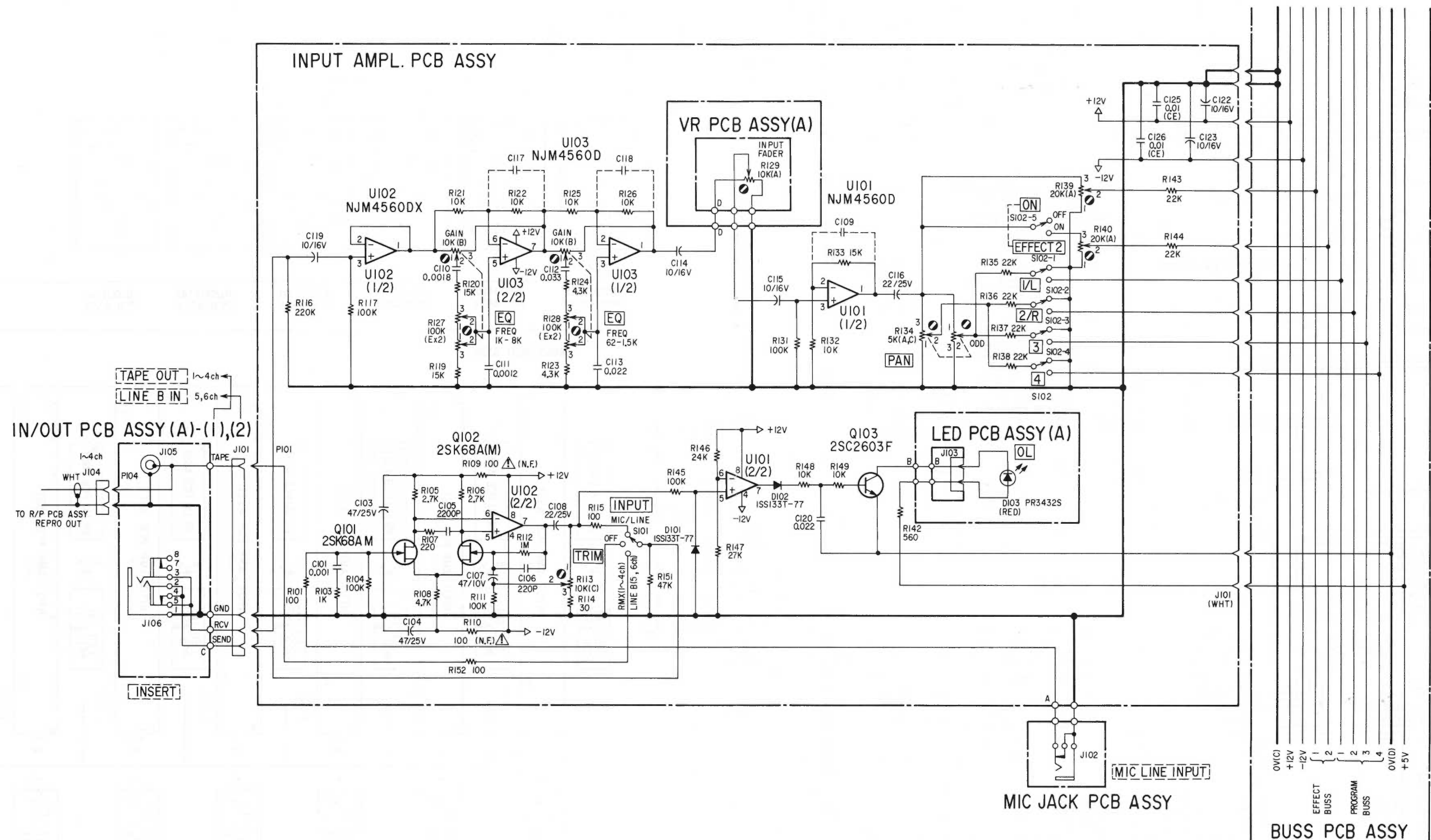
TEAC CANADA LTD.

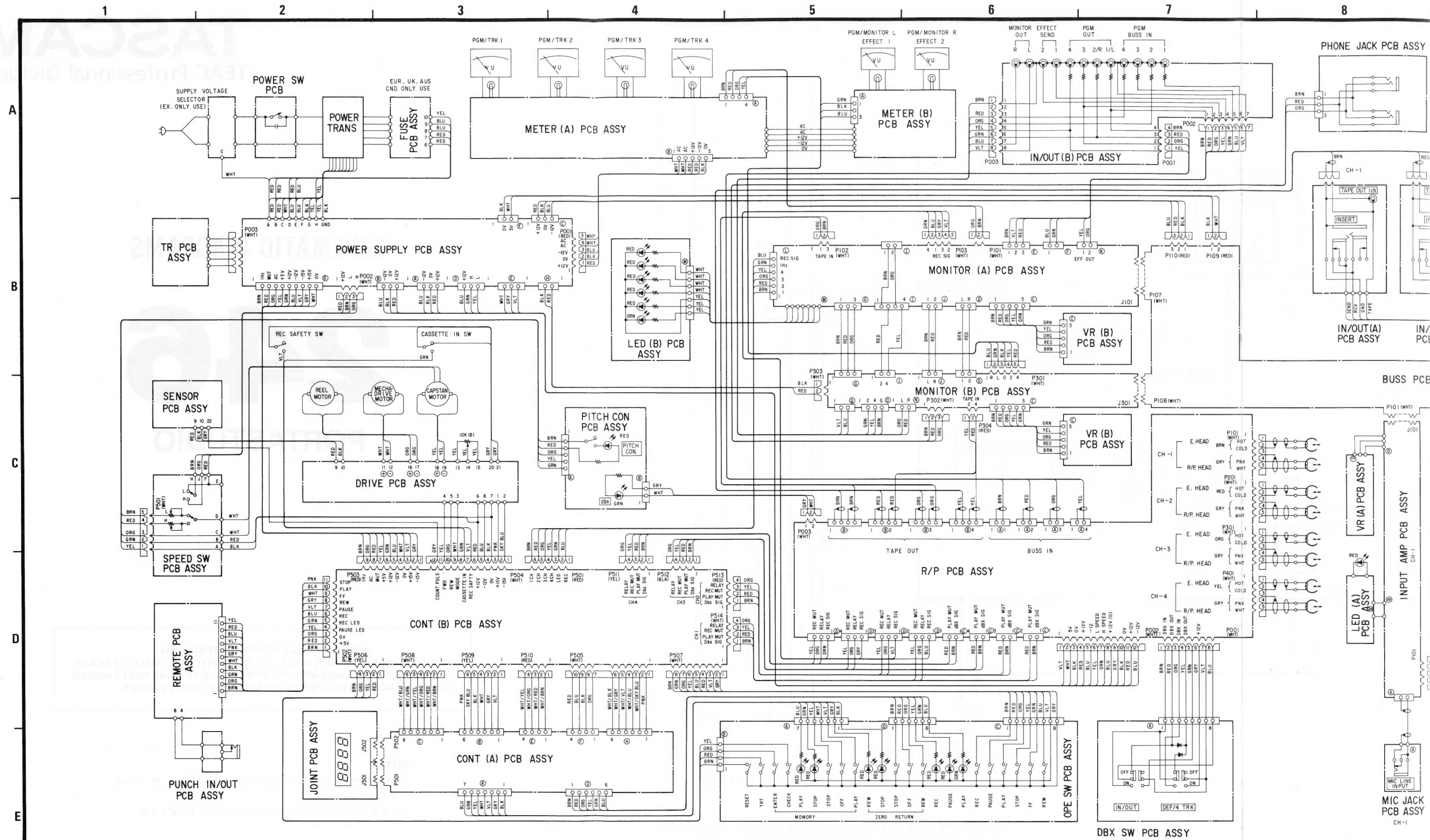
3610 NASHUA DRIVE UNIT 1 & 2 MISSISSAUGA ONTARIO L4V 1L2 PHONE 416-673-3303

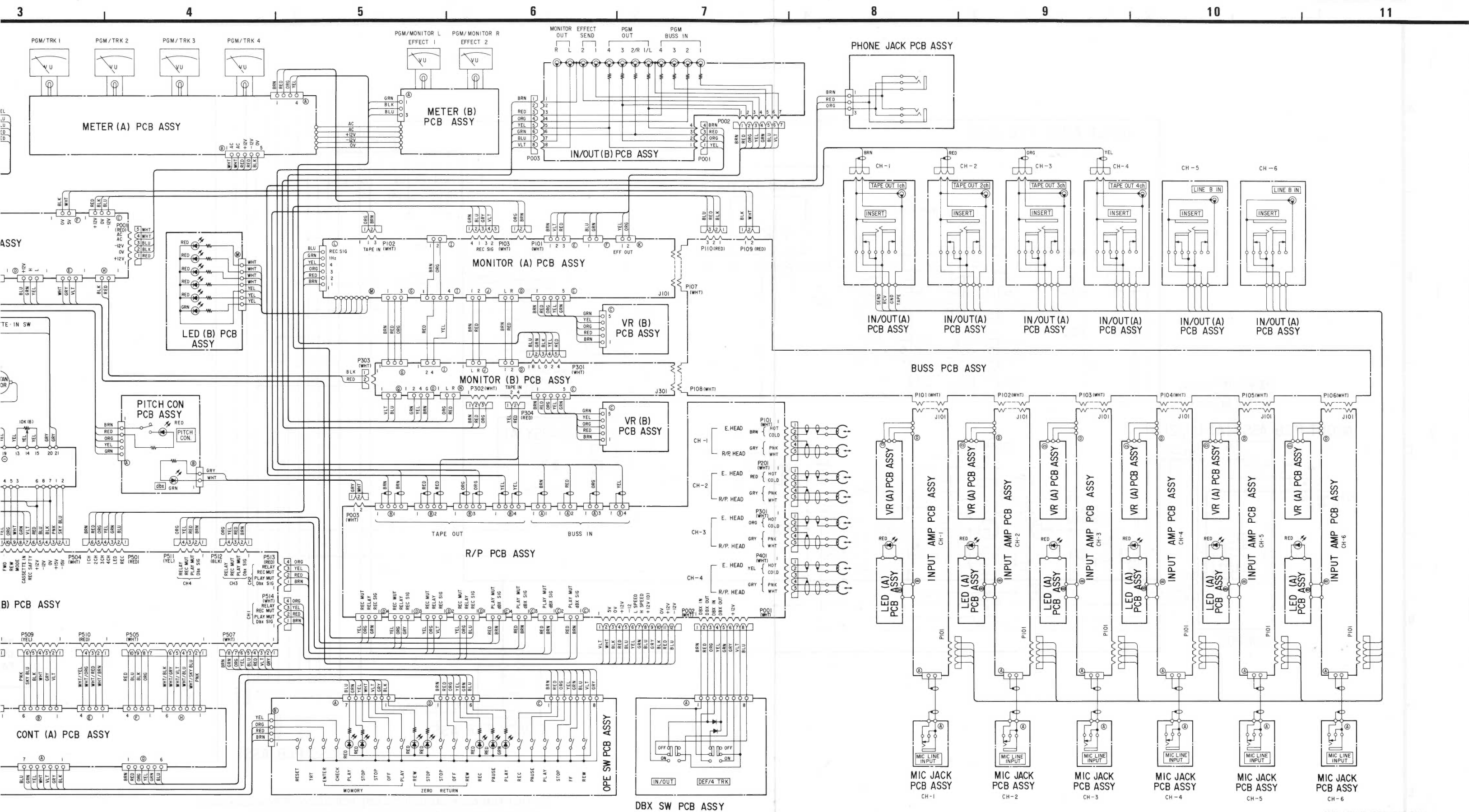
TEAC AUSTRALIA PTY., LTD.

115 WHITEMAN STREET SOUTH MELBOURNE VICTORIA 3205 PHONE 699-6000

A
B
C
D
E



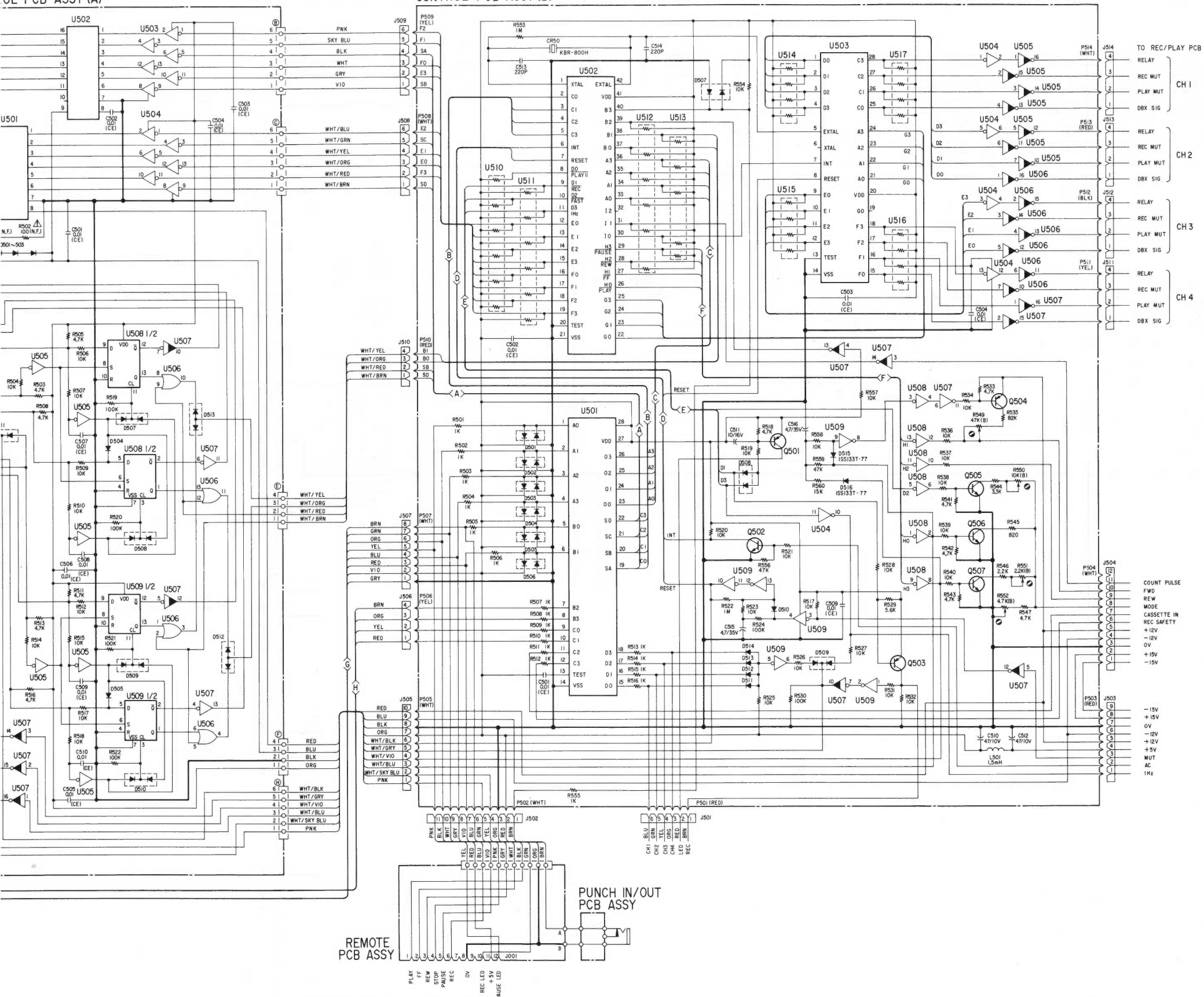




— WIRING DIAGRAM —

TASCAM PORTASTUDIO
TEAC Professional Division

CONTROL PCB ASSY (B)



- | | |
|----------------------|-----------------------|
| Q501-----2SA1115-F | D501~507---MC93I |
| Q502-----2SC2603-F | D508-----MC91I |
| Q503,504---2SA1115-F | D509-----MC92I |
| Q505~507---2SC2603-F | D510~516---ISSI33T-77 |

- JOINT PCB ASSY/CONTROL PCB ASSY (A) –
- CONTROL PCB ASSY (B)/OPERATION SWITCH PCB ASSY –
- REMOTE PCB ASSY/PUNCH IN/OUT PCB ASSY –

TASCAM PORTASTUDIO
TEAC Professional Division

1

2

3

4

5

6

7

8

A

B

C

D

E

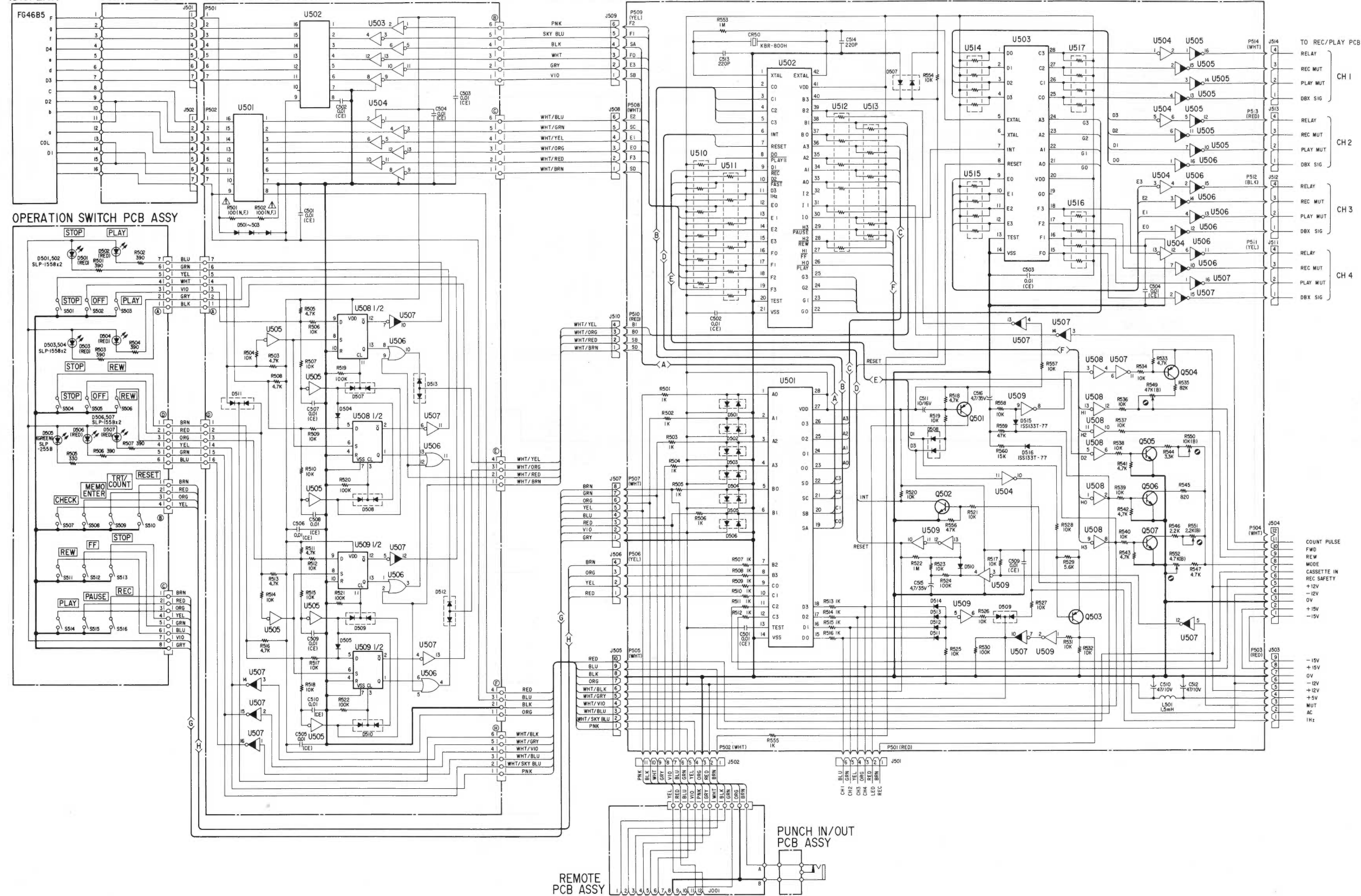
COUNTER
(DISPLAY)

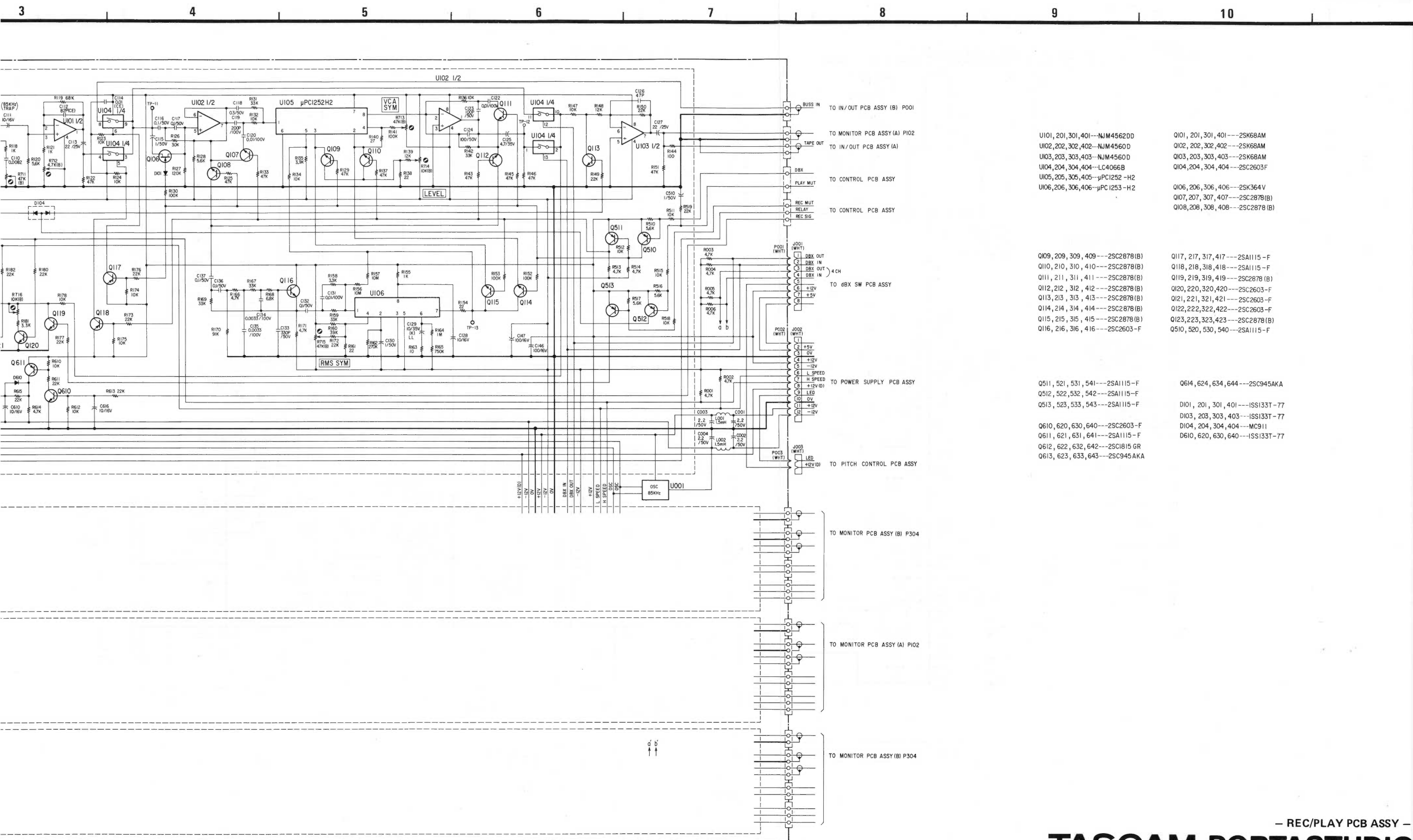
JOINT PCB ASSY

CONTROL PCB ASSY (A)

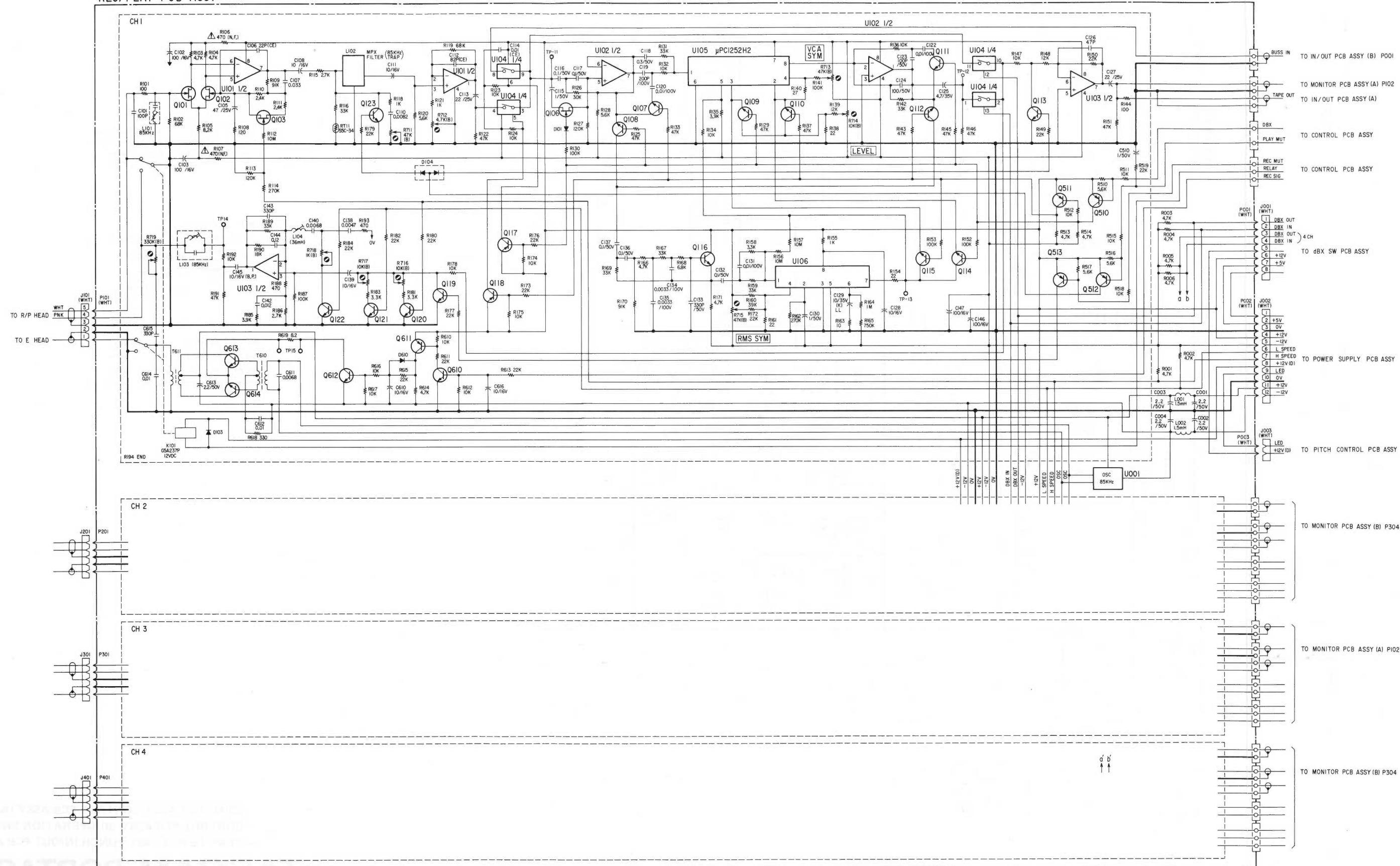
CONTROL PCB ASSY (B)

OPERATION SWITCH PCB ASSY



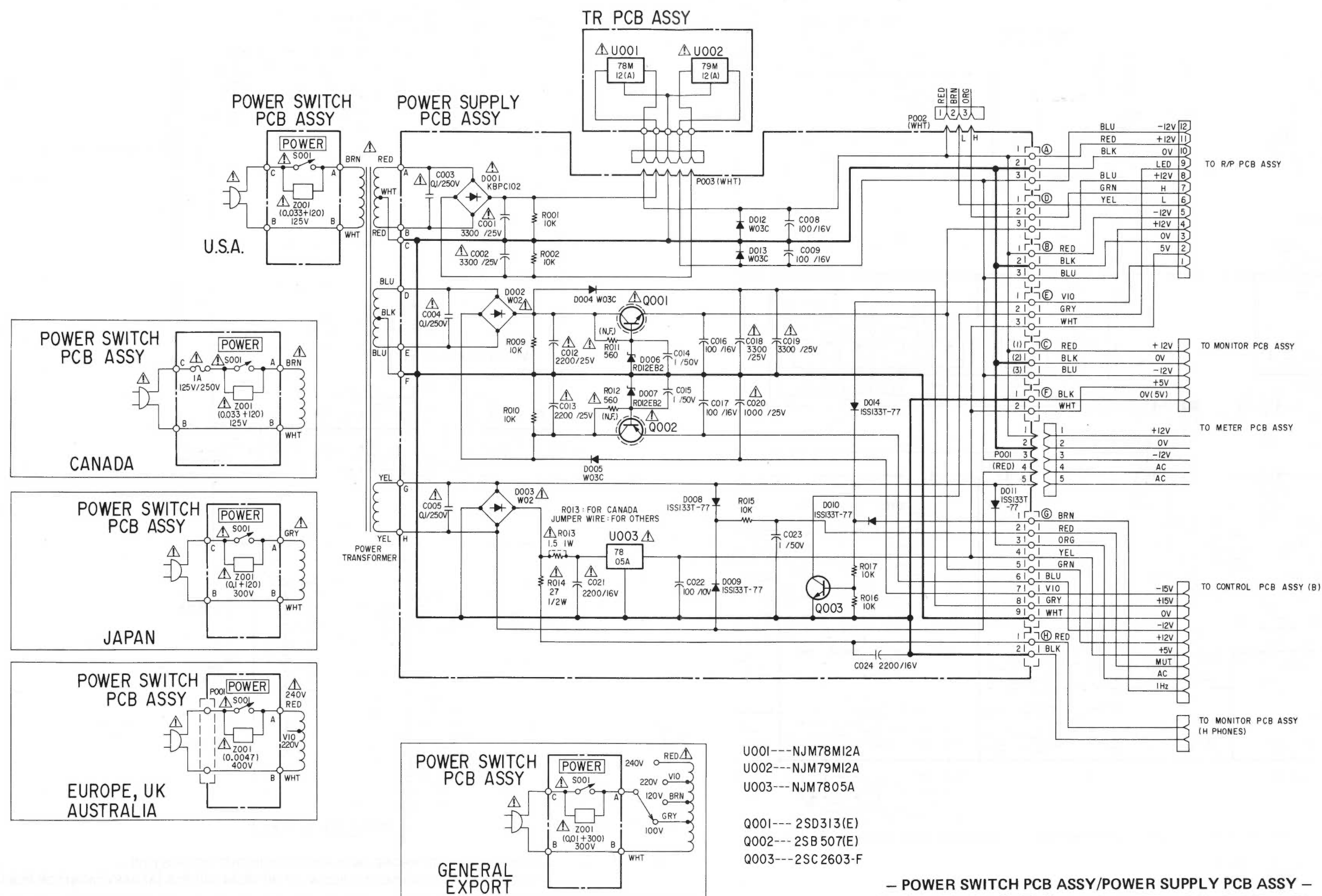


REC/PLAY PCB ASSY





A
B
C
D
E



- U001---NJM78M12A
U002---NJM79M12A
U003---NJM7805A
- Q001---2SD313(E)
Q002---2SB 507(E)
Q003---2SC 2603-F



