TASCAM

TEAC Professional Division

ATR-60-4HS/8

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SECTION IX. MAINTENANCE

9-1. PARTS LOCATION DIAGRAMS

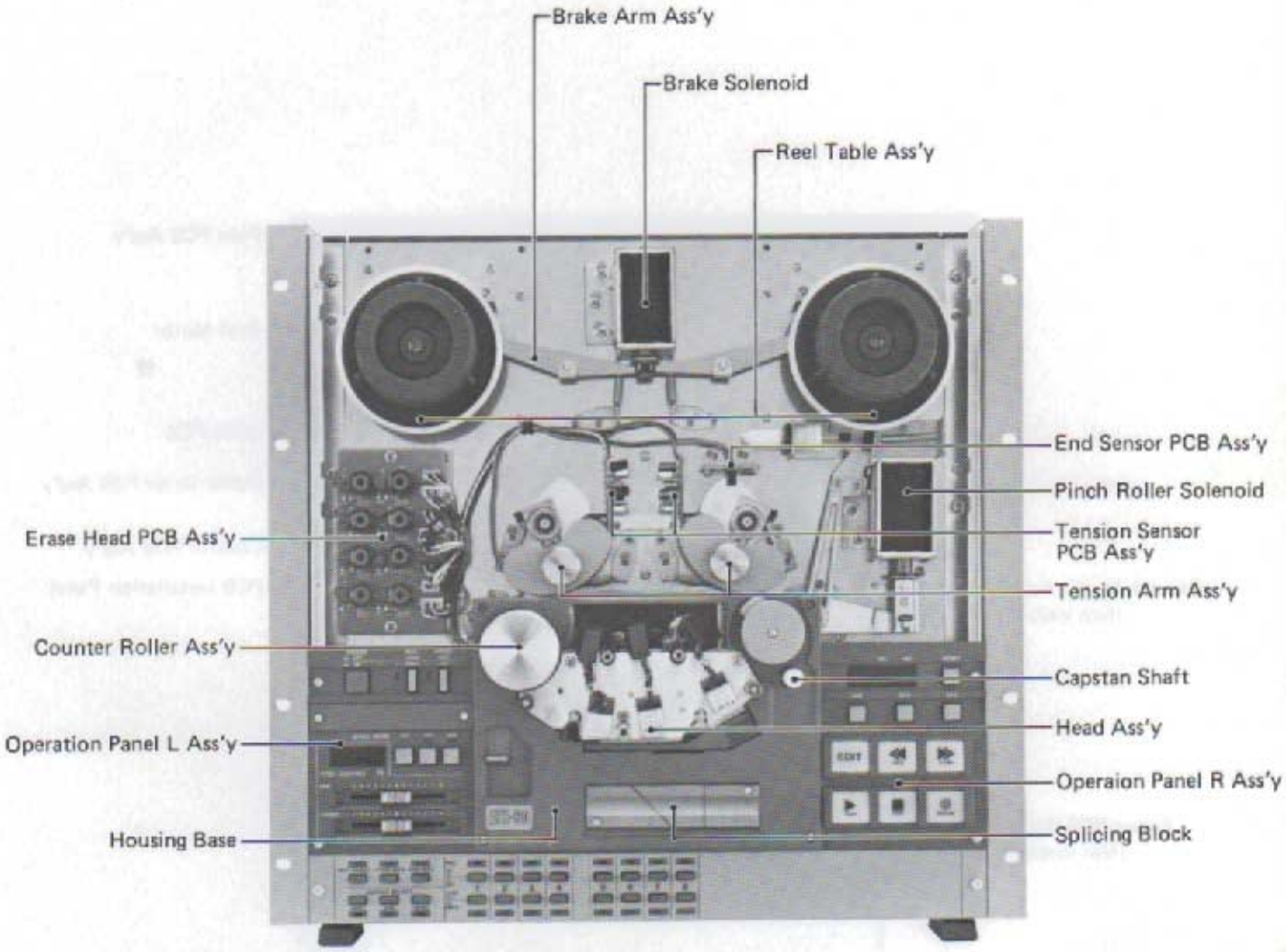


Fig. 9-1-1. Front Parts Location

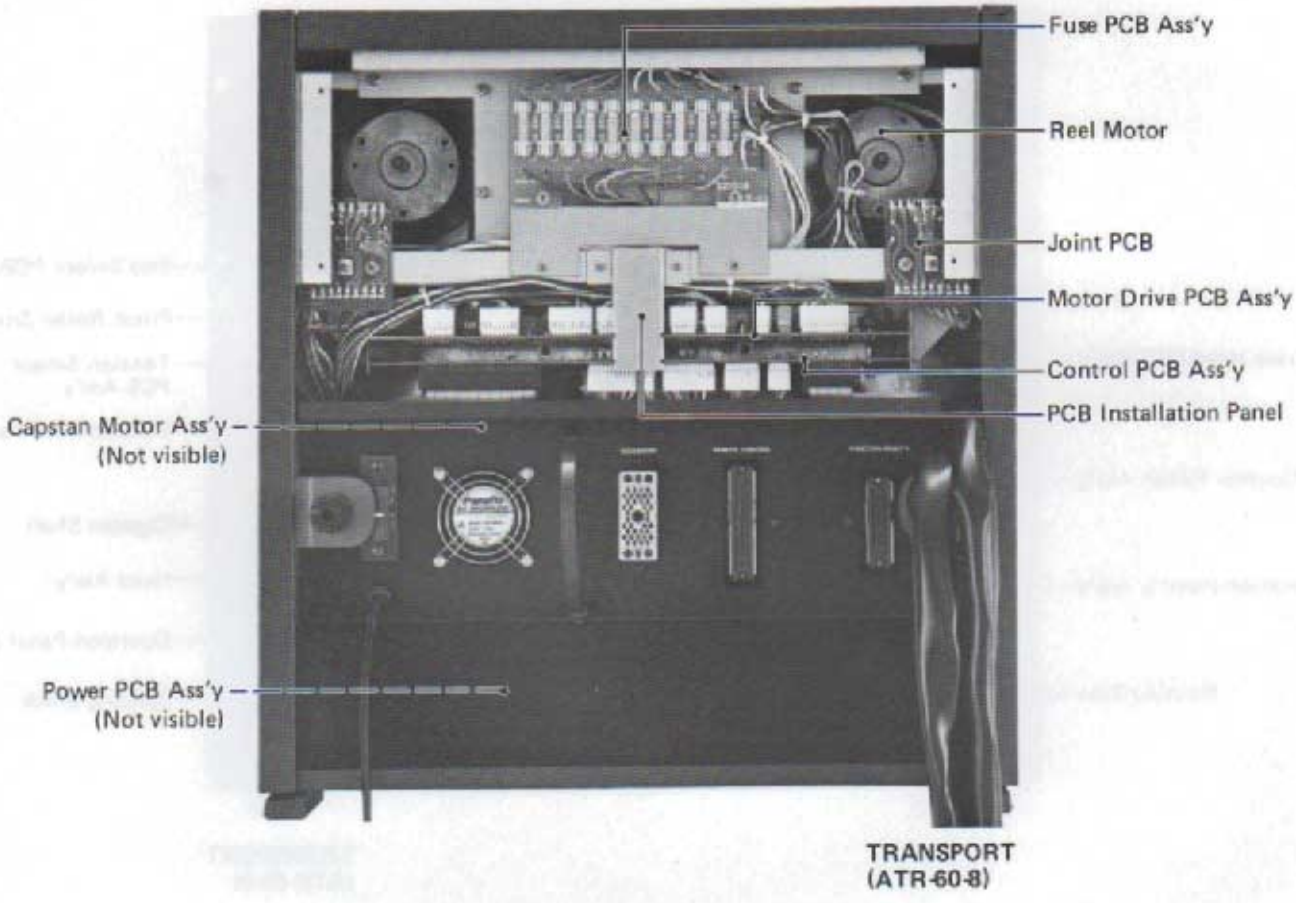


Fig. 9-1-2. Rear Parts Location

9-2. ESSENTIAL TEST EQUIPMENT REQUIRED

Wow & Flutter Meter		Meguro Denpa Sokki K.K., Model MK-669 (JAPAN), or Mincom Division, 3M Co., Model 8155 (U.S.A.)
Audio Oscillator		Hewlett Packard, Model 204C or equivalent
Digital Frequency Counter		Range: 10 Hz ~ 1 MHz; sensitivity; 0.1 Vrms; imp.: > 1 MΩ, < 25 pF
Band-Pass-Filter		1 kHz narrow band pass type
AF Level Meter		Range; -80 dB ~ +40 dB; imp.: > 1 MΩ, < 25 pF (example—HP 400GL)
Distortion Meter		General purpose (1 kHz)
Oscilloscope		General purpose
Attenuator		General purpose
Tools		Spring scale: 0 ~ 8 lbs (0 ~ 4 kg) 0 ~ 2.2 lbs (0 ~ 1 kg) Tentelometer, Model T2-H20-1 or T2-H20-M2 Hex head Allen wrenches, Plastic alignment tool
Cleaning Fluid		TEAC TZ-261 or equivalent
Head Demagnetizer		TEAC E-3 or equivalent
Test Tapes	**-8 Model**	Tape Speed/Wow-Flutter Test Tape TEAC YTT-2104 (for tape speed 15 ips) TEAC YTT-2103 (for tape speed 7-1/2 ips) IEC Equalization TEAC YTT-1144 (for tape speed 15 ips) Reference fluxivity: 250 nWb/m (IEC, CCIR) Time constant: ∞ +35 μsec. TEAC YTT-1143 (for tape speed 7-1/2 ips) Reference fluxivity: 250 nWb/m Time constant: ∞ +70 μsec (IEC, CCIR) Blank Test Tape (Recording) TEAC YTT-8163
	-4S Model	Tape Speed/Wow-Flutter Test Tape TEAC YTT-2165 (for tape speed 30 ips) TEAC YTT-2104 (for tape speed 15 ips) Reproduce Alignment Test Tape TEAC YTT-1165 (for tape speed 30 ips) Reference fluxivity: 320 nWb/m Time constant: ∞ +17.5 μsec (AES) TEAC YTT-1144 (for tape speed 15 ips) Reference fluxivity: 250 nWb/m Time constant: ∞ +35 μsec (IEC, CCIR) Blank Test Tape (Recording) TEAC YTT-8163

With 250 nWb/m reference fluxivity (short circuit), the reproduce output level will be 1.3 dB lower than at 320 nWb/m (open circuit).

9-3. REMOVAL OF THE MAIN PARTS

9-3-1. External Parts

A. Head Housing

The head housing can be removed by simply removing the two screws marked ⓐ in Fig. 9-3-1.

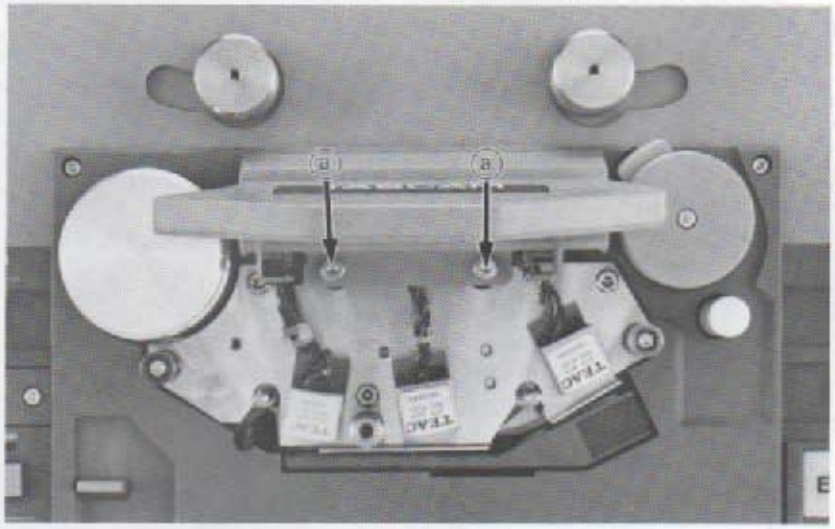


Fig. 9-3-1. Screw Locations for Head Housing Removal

B. Housing Base

1. To remove this base, the head housing and pinch roller should be removed first (this requires the use of a 2.5 mm Allen wrench) and also the head shield must be pulled up. The pinch roller can be removed by removing the retaining screw from the top of the pinch roller.
   (Allen wrench sizes are identified by cross-sectional side-to-side measurement of the end of the wrench)
2. Next, remove the screws ⓐ ⓑ located on the housing base, shown in Fig. 9-3-2.

C. Front Panel Ass'y

1. The front panel ass'y can not be removed without first removing the housing base (see "B. Housing Base" above).
2. Remove the four Allen screws ⓒ from both the left and right sides of the front panel, as shown in Fig. 9-3-2.
3. The front panel ass'y can now be separated from the unit by lifting upwards on it. It is also advisable to remove the reel clamper at this time.

D. Operation Panel R & L Assemblies

1. Remove the housing base before taking off these assemblies.
2. Remove the screws ⓓ to remove the operation panel R ass'y, or the screws ⓔ to remove its L ass'y.

E. Side Panels

As shown in Fig. 9-3-3, loosen the four retaining screws ⓐ from the feet of the deck, then remove the two screws ⓑ and the remaining four screws ⓒ to enable removal of the side panels.

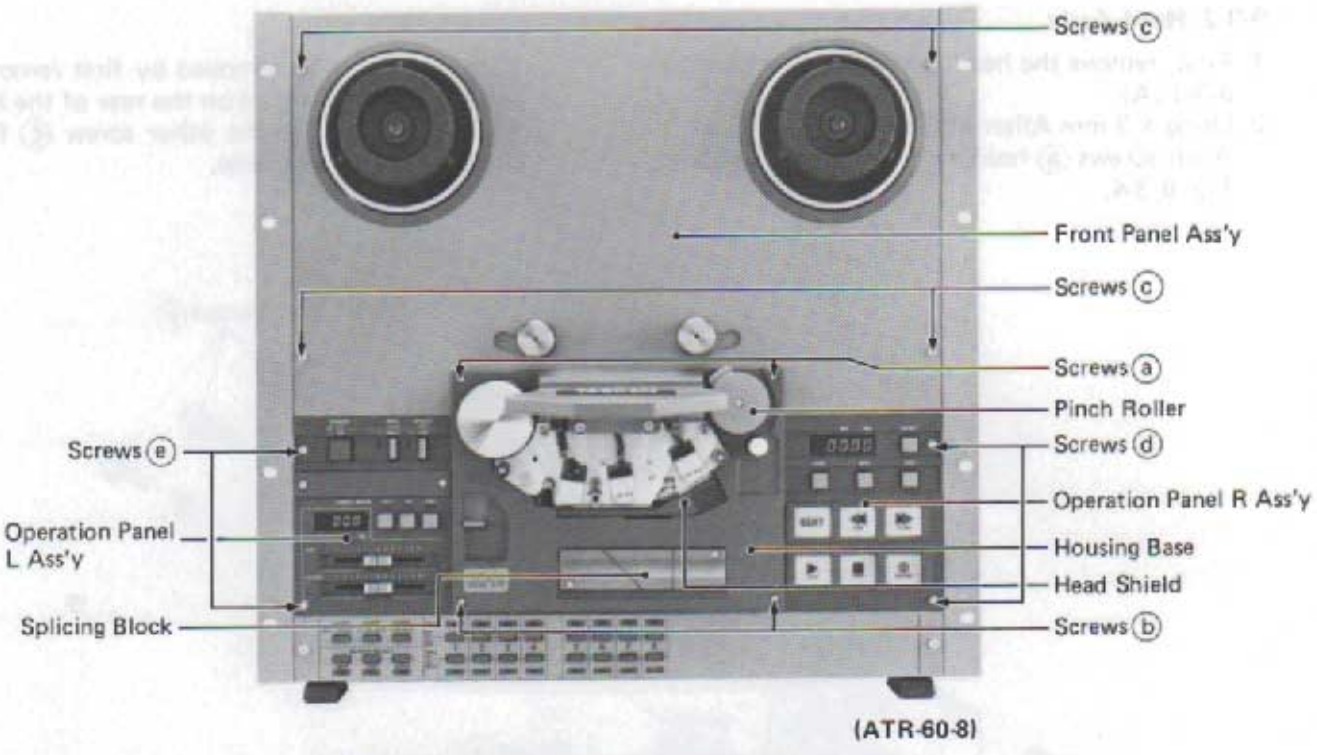


Fig. 9-3-2. Screw Locations for Front Panel Removal

Fig. 9-3-3. Screw Locations for Side Panel Removal

9-3-2. Head Ass'y

1. First, remove the head housing as described in 9-3-1 (A).
2. Using a 3 mm Allen wrench, remove the three Allen screws (a) holding the head as shown in Fig. 9-3-4.
3. Each head can be removed by first removing Allen screw (b) located on the rear of the head and then removing the other screw (c) from the rear of the head base.

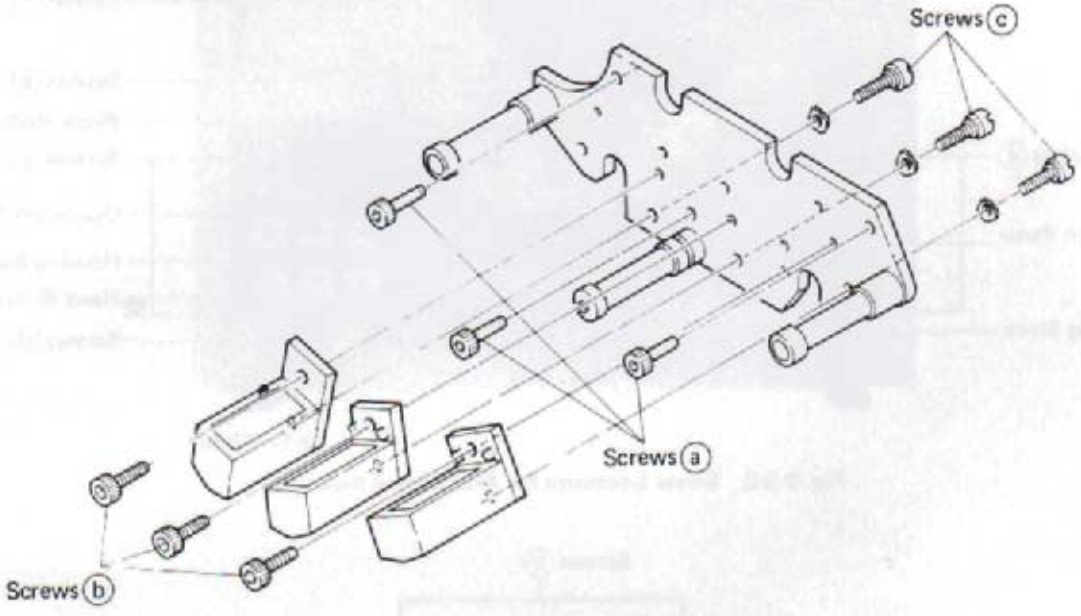


Fig. 9-3-4. Head Ass'y Removal

9-3-3. Reel Motor Ass'y

1. After removing the front panel as described in 9-3-1(C), remove the reel table assembly and as shown in Fig. 9-3-5, remove the three screws holding the reel motor.
2. Finally, undo the wire running to the JOINT PCB with the use of a soldering iron.

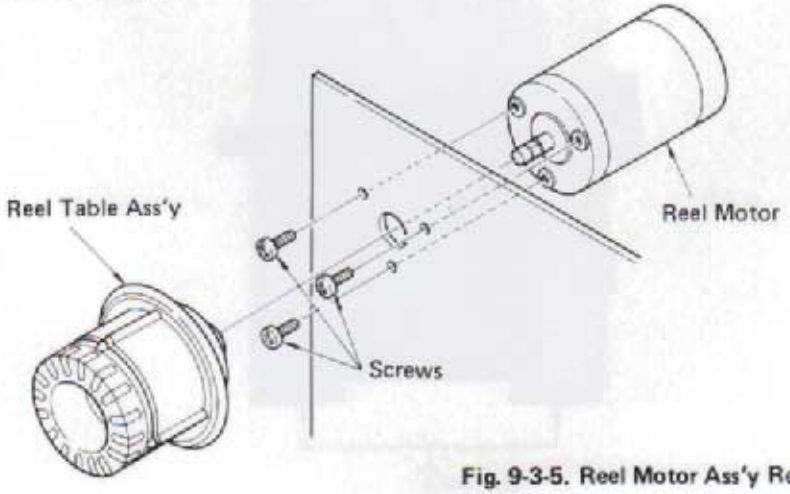


Fig. 9-3-5. Reel Motor Ass'y Removal

9-3-4. Capstan Motor Ass'y

1. Refer to 9-3-1 and remove the head housing, front panel assembly, pinch roller, housing base, operation panel R assembly and rear panel.
2. Remove the three screws (a) that are holding the motor section onto the capstan motor assembly as shown in Fig. 9-3-6. Next, unplug the connector to completely remove the capstan motor assembly.

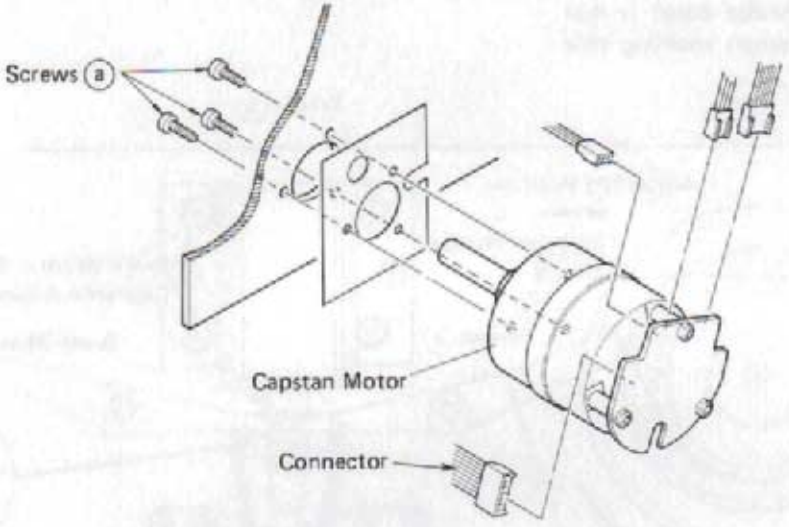


Fig. 9-3-6. Capstan Motor Ass'y Removal

9-3-5. Fuses

All together ten fuses will be visibly noticeable when the rear panel is taken off.

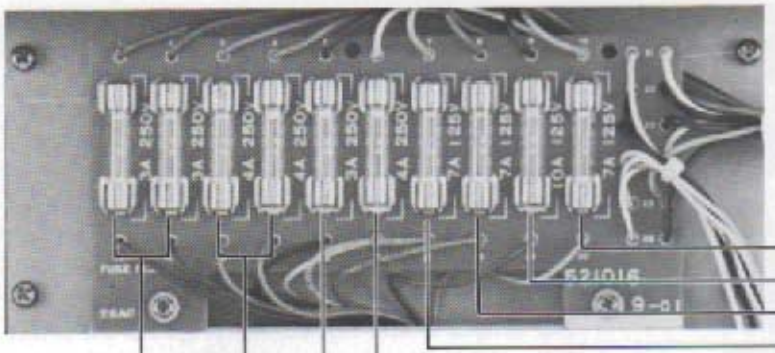


Fig. 9-3-7. Fuse PCB Ass'y

F10 (+11 V Reel Motor, Regulated +5 V)
F9 (+22 V Reel Motor Flash V., Regulated +15 V)
F8 (+12 V Solenoid)
F7 (+24 V, Solenoid Flash V.)
F6 (Regulated +24 V Relay, Capstan Motor)
F5 (AC 6 V Lamp)
F3, F4 (Regulated ±15 V Rec/Rep Amp)
F1, F2 (Regulated ±20 V Balanced Amp)

9-4. TAPE TRANSPORT CHECKS AND ADJUSTMENTS

9-4-1. Brake Mechanism

Note: Be sure that the power is turned off prior to making any adjustments to the brakes.

1. Make sure that the tip (A) of the brake arm assembly does not come into contact with the upper and lower sides of the recessed part of the brake plunger. If contact is noticeable, adjust the screws ⓐ of the hanger until tip (A) retains a centered position between the recessed part of the brake plunger.
   Note: Take care that the brake band is not twisted in any way when making this adjustment.
2. Manually operate the brake plunger to be sure that the brake band is separated from the brake drum. Then turn the left and right reels motors by hand and check that they move freely.
   If the brake band is still making contact with the brake drum at this point, adjust the position of the brake solenoid by loosening screws ⓑ.

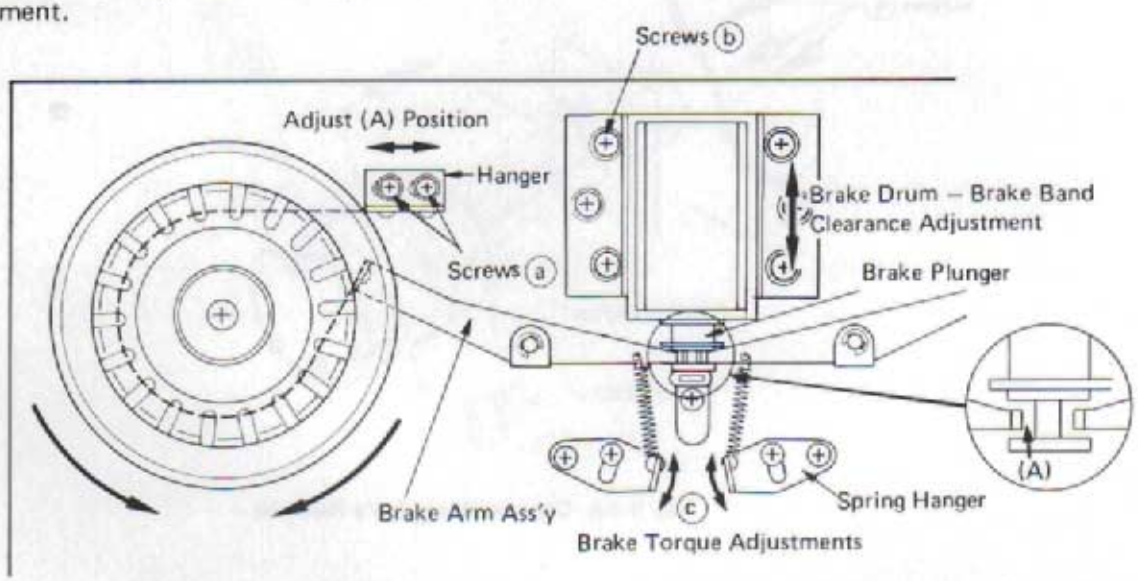


Fig. 9-4-1. Brake Mechanism Adjustments

9-4-2. Brake Torque

Note: Before making any brake adjustments or measurements, make sure the power is off.

1. Mount an empty 10-1/2" reel onto either reel table and attach a spring scale to the reel with a string. See Fig. 9-4-2.
2. Smoothly pull the scale away from the reel under test and note the torque value when the reading on the scale is steady. Reading should be 2,300 – 2,700 g-cm (32 – 37.5 oz-inch) (in Forward direction, the one in which brake goes in effect).
   Torque calculating formulas:
   1. Torque (in g-cm or oz-inch)
      = Force or Weight (in g or oz) x Radius (in cm or inch)
   2. Conversion of g-cm to oz-inch:
      g-cm x 0.0139 = oz-inch
3. If values do not meet specifications, change the hooking position of the spring hanger (reference ⓒ in Fig. 9-4-1) for the corresponding brake requiring adjustment, if, the torque is still not correct, replace the brake felt pad with a new one after cleaning the inner-side of the brake belt with an alcohol cleaning solution, and also check that the brake mechanism is properly aligned as ex-

plained in Section 9-4-1. "Brake Mechanism". If necessary, replace the entire reel table.

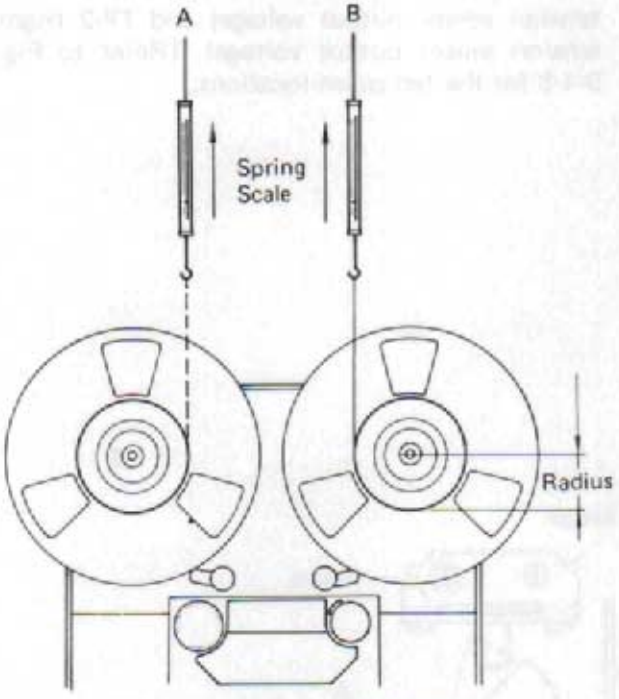


Fig. 9-4-2. Brake Torque Measurement

9-4-3. Pinch Roller Pressure

Note: Pinch roller pressure is supplied by the pinch roller spring arm, and it is most important that the solenoid plunger be fully bottomed before taking pressure measurements.

1. Insert something soft or foldable between the tension arm and the opening on the front panel (A) so that the unit will be operative.
2. Attatch string to the pinch roller shaft and a spring scale to the string, as shown in Fig. 9-4-4.
3. Place the deck in the reproduce mode without threading the tape.
4. Pull the pinch roller away from the capstan shaft (on a plane intersecting the center of the capstan shaft and the pinch roller) until the capstan shaft and the pinch roller are separated.
5. Ease pressure on the scale until the pinch roller just begins to turn. The scale should then read 2.1 ±0.1 kg (4-7/16 lbs to 4-14/16 lbs).
6. If you don't get this reading on the scale, adjust the position of the capstan solenoid by loosening the three screws.

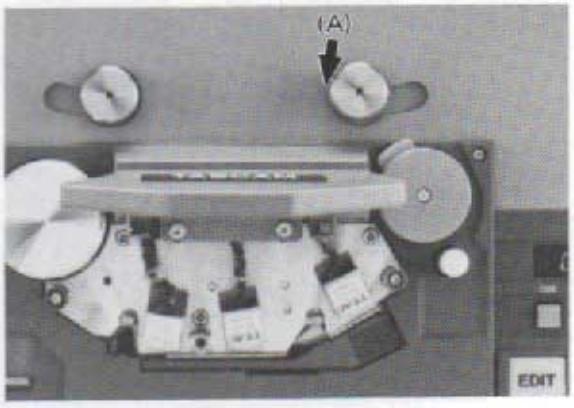


Fig. 9-4-3.
Right Tension Arm

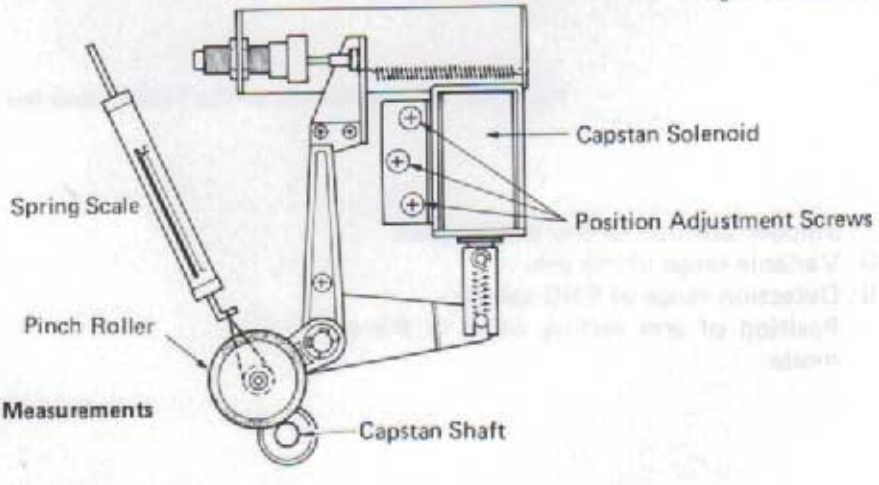


Fig. 9-4-4. Pinch Roller Pressure Measurements and Adjustments

9-4-4. Tape Tension Servo: Tension Arm Positions and Detection Characteristics

The tape tension servo detects and controls the tape tension through either left or right tension sensor assemblies located under the front transport panel and each function exactly the same.
The assembly includes two coils with an aluminum plate inserted between them. The aluminum plate moves as tape tension varies and, accordingly, mutual inductance between the coils varies. This causes the sensor oscillation frequency and output voltage to vary proportionately. The variation of the output voltage is used to detect the movement of the tension arm.

The movement of the tension arm between A – C in Fig. 9-4-5 develops voltage at TP-1 (left tension sensor output voltage) and TP-2 (right tension sensor output voltage). (Refer to Fig. 9-4-8 for the test point locations.)

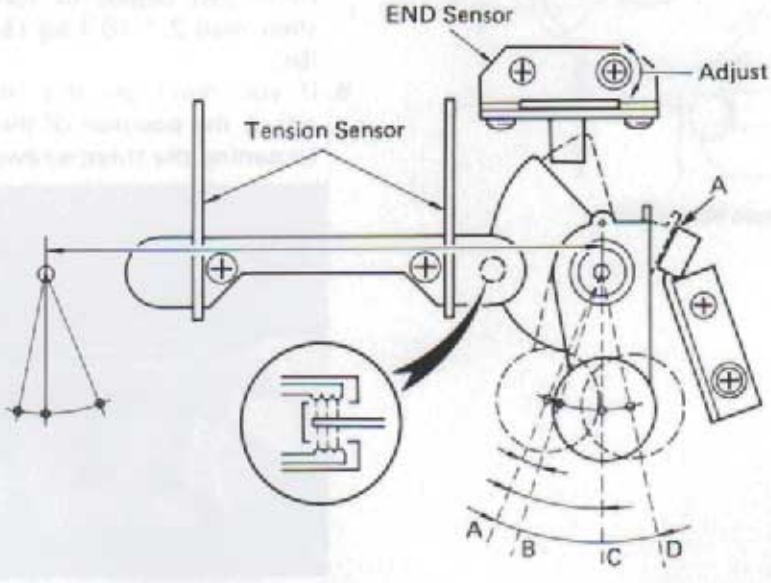


Fig. 9-4-5. Moving Position of The Tension Arm Ass'y

A : Stopper position of the tension arm.
A – D: Variable range of the arm
A – B: Detection range of END sensor
C : Position of arm setting while in the edit mode

A. Position of the tension arms while in the reproduce/edit mode.

1. Remove the front panel assembly as described in 9-3-1 (C).
2. Thread a blank tape onto the deck and wind half of the tape onto the take-up reel so that there is an equal amount of tape on both reels. Then set the deck into the edit mode of operation.
3. With the deck in the edit mode, confirm that both tension arms are near the C position shown in Fig. 9-4-5 – about 22.5° from the free position A.
4. If adjustment of the angle is necessary, adjust by adjusting the trimmer resistor located on the upper part of the Operation Panel L assembly. Refer to Fig. 9-4-6.
   REPRO (T) R38: Right tension arm (Take up reel)
   REPRO (B) R39: Left tension arm (Supply reel)

B. Tape tension while in the edit mode.
   If proper tension arm positions have been obtained as described in A, proceed with the tape tension measurements.
   Thread a blank tape onto the deck in the same manner as described in A (2) and set the deck into the edit mode. Measure the tape tension at both the take-up side and supply reel side with a tension analyzer or a tentelo meter. The measurement should be made at both the supply side and take-up side at points A and B as shown in Fig. 9-4-7.

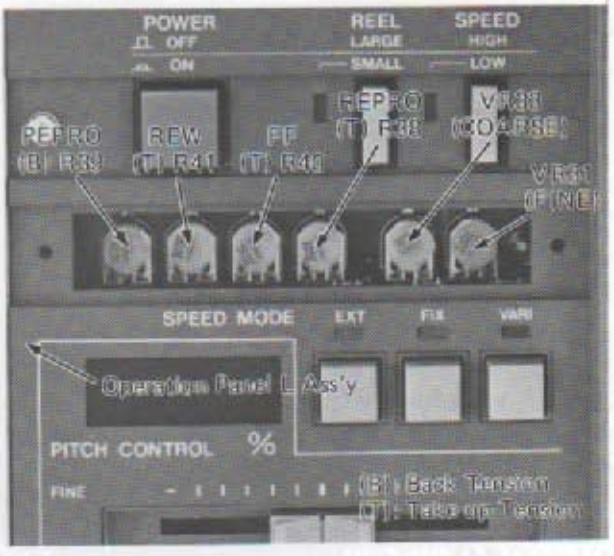


Fig. 9-4-6. Tape Tension Servo and Tape Speed Adjustment Pots

Tension values should be 50 ± 10 g.
If you can't get this reading on your analyzer, adjust the tension strength of the spring by changing the position of the spring hook: Ⓐ and Ⓑ.

Note: As 10-1/2" reels cover more area than 8" reels, we suggest that you use the smaller 8" reels to ensure sufficient working room to get at the A and B points with the tentelometer probes.

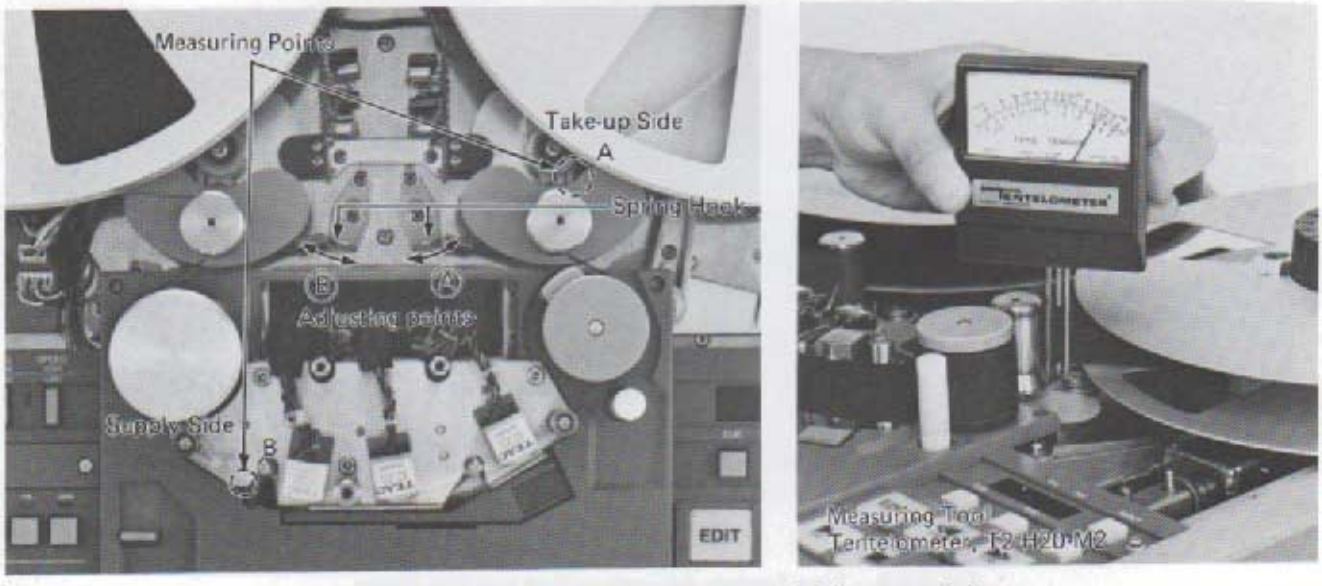


Fig. 9-4-7. Tape Tension Measurement and Adjustment Points

C. Tape tension while in the fast forward and rewind modes.

1. Load a tape and run it in fast forward. Check that the tension arm on the take-up side stabilizes at the C position shown in Fig. 9-4-5. If it does not, correct it by adjusting FF(T), R40 shown in Fig. 9-4-6. Then, run the tape in rewind and check, as in fast forward, that the tension arm on the take-up side stabilizes at C. If it does not, adjust REW(T), R41.

If a tentelometer is used to measure tape tension, run tape in the Spooling mode, then stop the supply reel by hand and read the meter at A (in forward spooling) and B (in reverse spooling) shown in Fig. 9-4-7. The tentelometer should indicate 170 ± 15 g at both points. If values do not meet specifications, adjust FF(T)R40 and REW(T)R41.

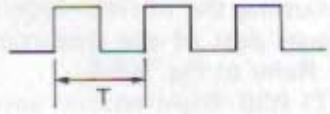
D. Motor Drive Adjustment

This adjustment must be performed when:

* Motor drive PCB assembly has been replaced, or
* Irregular tape speed is observed.

1) Fast-winding "low" speed (40 ips, 100 cm/sec.) – the speed at which the tape runs at approaching the zero/cue points during the RTZ/STC modes.

1. Connect an oscilloscope between TP3 and GND on the Control PCB Ass'y, Fig. 9-4-8.
2. Short-circuit TP1 and GND on the same Control PCB Ass'y. (This allows the tape to run at the "low" speed when F. FWD or REW is engaged.)
3. Thread a blank tape on the recorder/reproducer, fast-wind the tape and stop when the middle portion of the tape is reached.
4. Engage the F. FWD mode and adjust LOW (R151) on the Motor Drive PCB Ass'y so that the square wave cycle time "T" becomes 8 msec.



2) FAST speed adjustment

5. Disconnect the shorting wire from TP1 and GND that was connected in step 1) -2.
6. Run the tape in the F. FWD mode.
7. Adjust FAST (R149) on the Motor Drive PCB Ass'y so that the square wave cycle time "T" becomes 0.9 msec.

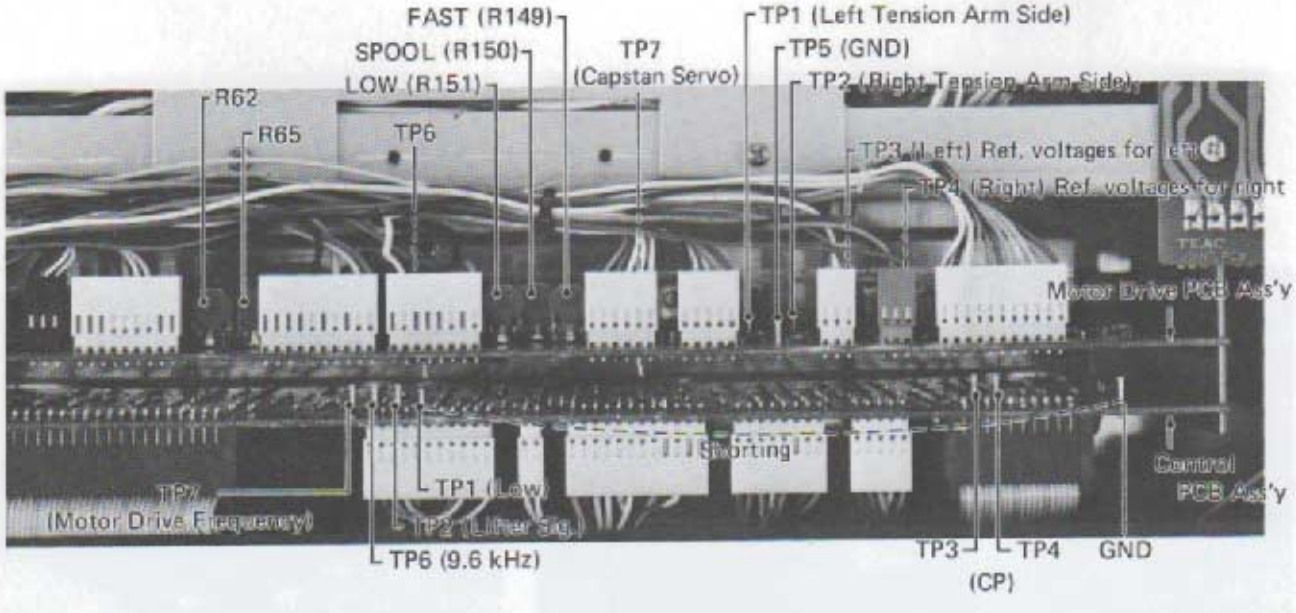


Fig. 9-4-8. Tape Tension Adjustment Pots and Test Points

3) Spooling speed adjustment

8. Run the tape in the spooling mode.
9. Adjust SPOOL (R150) so that the square wave cycle time "T" becomes 3 msec.

9-4-5. Re-installation of the Arm Stopper

Adjust the mounting position of the arm stopper so that it reaches point (a) in Fig. 9-4-9 with tape unloaded (no tension applied to the tension arm: i.e., the right tension arm rests at point A in Fig. 9-4-5.).

9-4-6. Adjustment and Re-installation of the End Sensor Assembly

1. First loosen the adjustment screw on the end sensor assembly, lift the assembly upwards and temporarily secure; this will disable the end sensor.
2. Set the deck into the play mode without loading a tape.
3. Gradually move the end sensor assembly downwards, and tighten the adjustment screw at the point where the end sensor is activated.

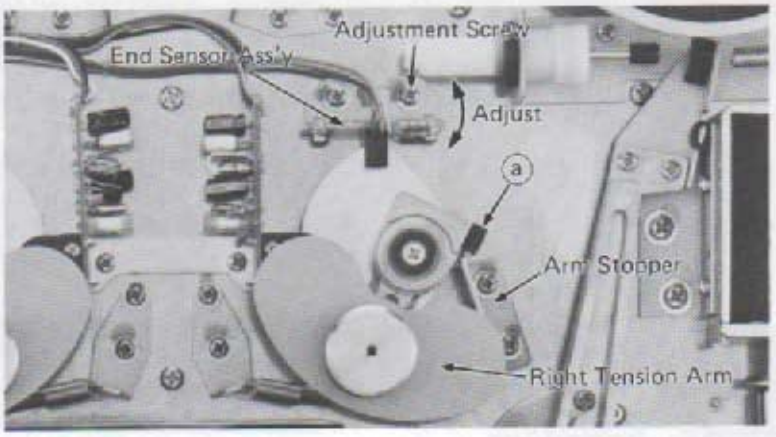


Fig. 9-4-9. Arm Stopper and End Sensor Ass'y Position Adjustments

9-4-7. Adjustment after Replacement of the Speed Sensor Assembly

After replacement of the speed sensor assembly which requires removal and reinstallation of the footage roller, it is necessary to check if the tape runs at stable speeds. Proceed as follows:

1. Connect an oscilloscope (double trace type) to two sets of test points, TP3 and GND, and TP4 and GND, on the Control PCB Ass'y, Fig. 9-4-8.
2. Thread a tape on the recorder/reproducer and run in the Repro mode.
3. Adjust the mounting position of the speed sensor assembly by loosening two mounting screws so that phase shift of the two inputs becomes 90° as shown in Fig. 9-4-10.
4. After adjustment, repeat switching between F. FWD and REW to confirm that the oscilloscope display remains stable.

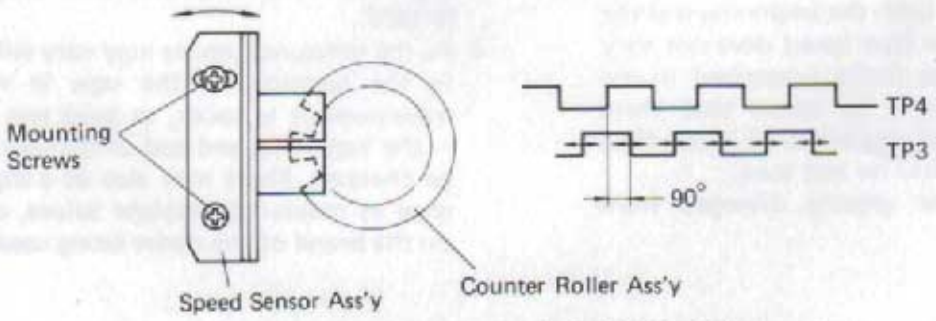


Fig. 9-4-10. Speed Sensor Ass'y Position Adjustment

9-4-8. Reel Table Height

Reel height adjustment is required only if a motor has been replaced or if tape rubs excessively against the reel flanges.
Adjustment is accomplished by loosening the reel set screws and moving the reel table on the motor shaft, so that the distance from the transport base surface to the rubber sheet upper surface should measure 41.3 mm as shown in Fig. 9-4-11. Remove the front panel assembly for access to the set screws in the reel motor shaft. Refer to paragraph 9-3-1(C). The reel table should be adjusted using standard NAB 10-1/2" reels. With a tape located on the machine, position the reel table height for smooth tape travel. Be sure to tighten the set screws after adjustment made.

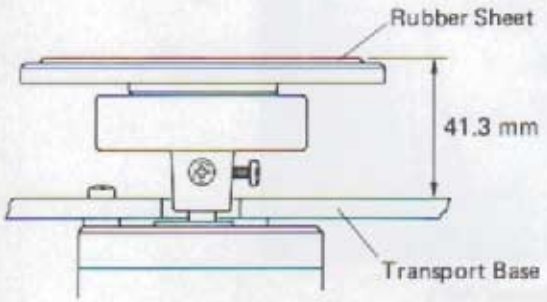


Fig. 9-4-11. Reel Tabel Height

9-4-9. Tape Speed

Tape speed is measured by using Flutter Test Tape which contains a highly accurate, constant 3 kHz tone.

A. "FIX" Tape Speed
1. Connect a digital frequency counter to any OUTPUT, set the SPEED MODE switch on the deck to FIX.
2. Playing the tape at both the beginning and the end, check that the tape speed does not vary any more than the limits prescribed in the specifications. This is to assure that there will not be a total deviation of more than ±0.3 % from the 3000 Hz test tone.
3. If tape speed has greatly diverged from specification, check pinch roller pressure and takeup tension for correct values, and check to see that the tape path is clean.

B. "VARI" Tape Speed
1. Connect a digital frequency counter to any OUTPUT connector, and set the SPEED MODE switch to VARI, and the PITCH CONTROL sliders (FINE and COARSE) to the center position.
2. Play the middle portion of the test tape. Then, with the PITCH CONTROL sliders set fully left and right, take the necessary measurements. The measured results should be approx. 2,550 Hz or less with the PITCH CONTROL sliders set fully left (minimum speed), and 3,450 Hz or more with the PITCH CONTROL sliders set fully right (maximum speed).
3. If the obtained values differ from the above suggested values, adjust as follows:
   a. Set the SPEED MODE switch to VARI and the PITCH CONTROL sliders to the center position.
   b. Connect the frequency counter to TP6 and GND on the Control PCB Ass'y, Fig. 9-4-8. Then, while keeping an eye on the frequency counter, adjust VR33 (COARSE) shown in Fig. 9-4-6 until a 9,600 Hz ± 15 Hz reading is obtained, and then fine-adjust VR31 (FINE) to 9,600 Hz.

9-4-10. Wow and Flutter (Reproduce Method)

1. Connect a wow and flutter meter to any OUTPUT connector on the deck.
   These meters will measure the DIN/IEC/ANSI Peak value or the NAB value, depending on the switch selection on the meter.
2. Playback the appropriate wow and flutter test tape, at nominal "FIX" speed.
3. If the weighted value is to be read, set the wow and flutter meter for "weighted" readings and make sure that it is properly calibrated.
4. As the measured results may vary with respect to the location on the tape at which the measurement is taken, at least two locations — the beginning and end of the tape — should be checked. There may also be a slight difference in measured absolute values, depending on the brand of the meter being used.

Values should be as shown:

TABLE 9-4-1. WOW AND FLUTTER SPECIFICATIONS

(-8 model)

Tape Speed	DIN/IEC/ANSI (peak value)		NAB	
	Weighted	Unweighted	Weighted	Unweighted
HIGH	±0.08 %	±0.12 %	0.04 %	0.07 %
LOW	±0.09 %	±0.14 %	0.06 %	0.08 %

(-4HS model)

Tape Speed	DIN/IEC/ANSI (peak value)		NAB	
	Weighted	Unweighted	Weighted	Unweighted
HIGH	±0.06 %	±0.09 %	0.03 %	0.06 %
LOW	±0.08 %	±0.12 %	0.04 %	0.07 %

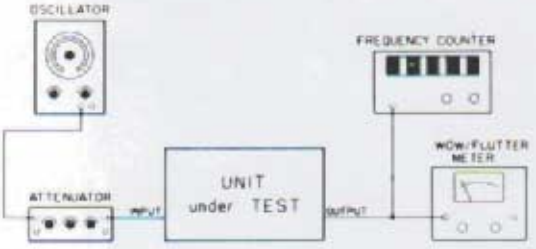
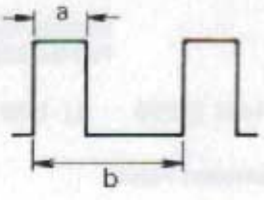


Fig. 9-4-12. Wow and Flutter Measurement Set-Up

9-4-11. Capstan Servo

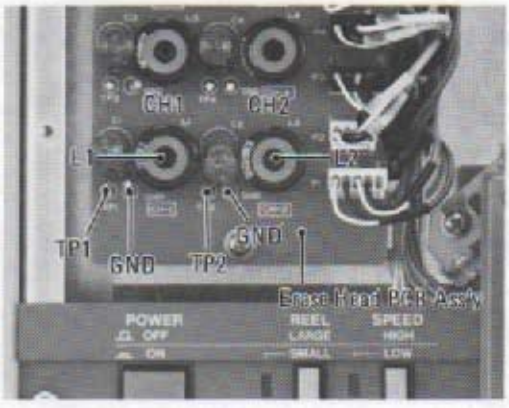
The capstan servo will only require adjustment when the motor drive PCB has been replaced, or when the wow and flutter characteristics have greatly degraded because of the capstan servo itself.

1. Prior to making any adjustments to the capstan servo, connect an oscilloscope between test point TP7 and GND on the Motor Drive PCB Ass'y, Fig. 9-4-8; set R65 and R62 to their center positions and place the deck in play mode with a tape loaded.
2. While the tape is running at the fixed high speed, adjust R62 for an output duty factor of approx. 35 % (a/b) at TP7.



3. Next, with the SPEED MODE switch set to VARI, check that the PLL does not become unlocked when tape speed is changed by moving the PITCH CONTROL sliders fully left and right. If an unlock is detected with the PITCH CONTROL sliders set fully right (maximum), rotate R65 clockwise to lock the loop. If the loop becomes unlocked when the PITCH CONTROL sliders is set fully left (minimum), repeat steps 2 and 3.
4. Repeat steps 2 and 3 for low tape speed.

9-5. RECORD/REPRODUCE AMPLIFIER CHECKS AND ADJUSTMENTS



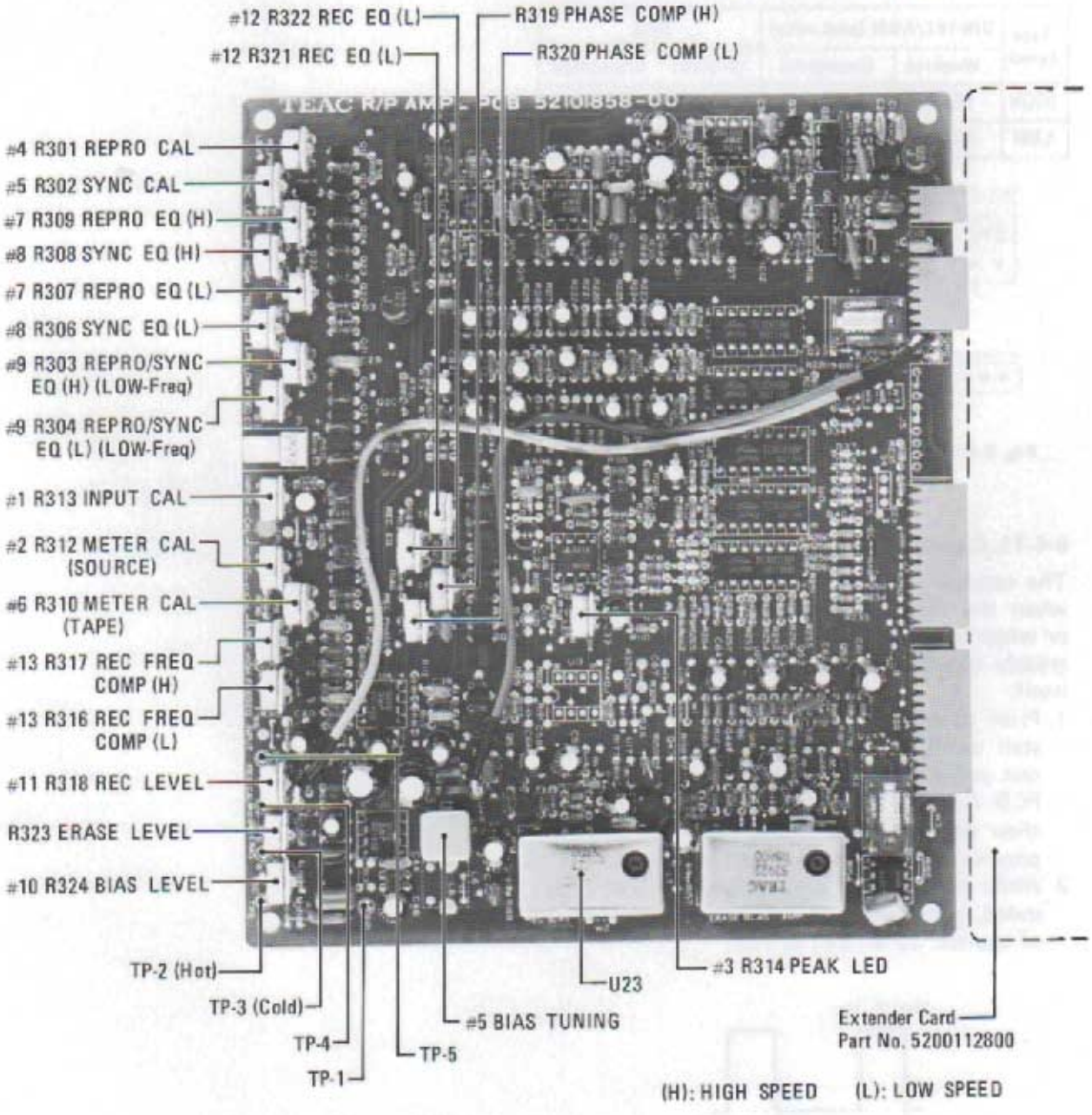


Fig. 9-5-1. Erase Head PCB and Record/Reproduce Amplifier Adjustment Points

TABLE 9-5-1. AMPLIFIER ADJUSTMENT POTS AND CHOKES

TRIM POT NUMBER	REFERENCE NUMBER		FUNCTION
	Tape Speed HIGH	Tape Speed LOW	
#1	R313		INPUT CAL
2	R312		METER CAL (INPUT)
3	R314	–	PEAK LED
4	–	R301	REPRO CAL
5	–	R302	SYNC CAL
6	R310		METER LEVEL (TAPE)
7	R309	R307	REPRO EQ
8	R308	R306	SYNC EQ
9	R303	R304	EQ Compensation (LOW-FREQ)
10	–	R324	BIAS LEVEL
11	–	R318	REC LEVEL
12	R321	R322	REC EQ
13	R317	R316	REC FREQ Compensation
–	L1 (on the Erase Head PCB)		ERASE BIAS TUNING
–	L5		RECORD BIAS TRAP
–	R319	R320	PHASE Compensation
–	R323		Erase level

9-5-1. Before Making any Checks or Adjustments

This section contains the general descriptions and cautions required for the record/reproduce amplifier checks and adjustments.

Before going ahead with any of the electrical performance checks or adjustments, make sure the tape transport mechanism has been completely aligned as mentioned in section 9-4, or at least make sure that the tape path and head contact are aligned correctly as mentioned later.

A. INPUT/OUTPUT

1. INPUT/OUTPUT Level

The nominal level at the XLR-type connectors is +4 dBm (1.23 V). With the -4HS model, the UNCAL switches on the amplifier module should be in the OFF position when performing electrical adjustments.

2. Connections to the Output Connectors

The nominal load impedance at the XLR-type output connectors is 600 ohms.

CAUTION:

Be careful not to short-circuit pin 1 (GND) and pin 2 or pin 3 of the XLR-type output connectors.

Fig. 9-5-2. XLR-type Connector Pin Outs

B. Tape path

The height of the tape guide ② and tension rollers should be so adjusted that the tape travels along the center width of the three heads (Erase, Rec/Sync, and Repro).

Check and adjust as follows:

1. Load a tape and run it in repro mode. Check that the upper edge of the tape is just touching the upper flange of the tape guide ② , and the lower edge of the tape the lower flange of the tape guides ① and ③ (see Fig. 9-5-4).

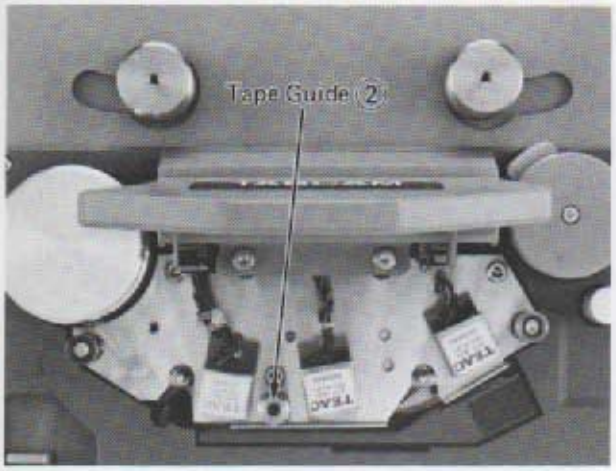


Fig. 9-5-3. Tape Guide Adjustment Point

2. If it does not and curling is observed at:
   a. Tape guide ②
      1. Loosen the screw located in the top center of the tape guide ② .
      2. Rotate the upper flange part of the tape guide ② in or out.
   b. Tape guide ①
      1. Loosen the screw located in the top center of the left tension roller.
      2. – To remove curling of the upper edge of the tape:
         Rotate clockwise the upper flange part of the left tension roller.
         – To remove curling of the lower edge of the tape:
         Rotate counterclockwise the upper flange part of the left tension roller.
   c. Tape guide ③
      1. Loosen the screw located in the top center of the right tension roller.
      2. – To remove curling of the upper edge of the tape:
         Rotate clockwise the upper flange part of the right tension roller.
         – To remove curling of the lower edge of the tape:
         Rotate counterclockwise the upper flange part of the right tension roller.
3. Check the adjustment. If curling persists, repeat necessary adjustments.

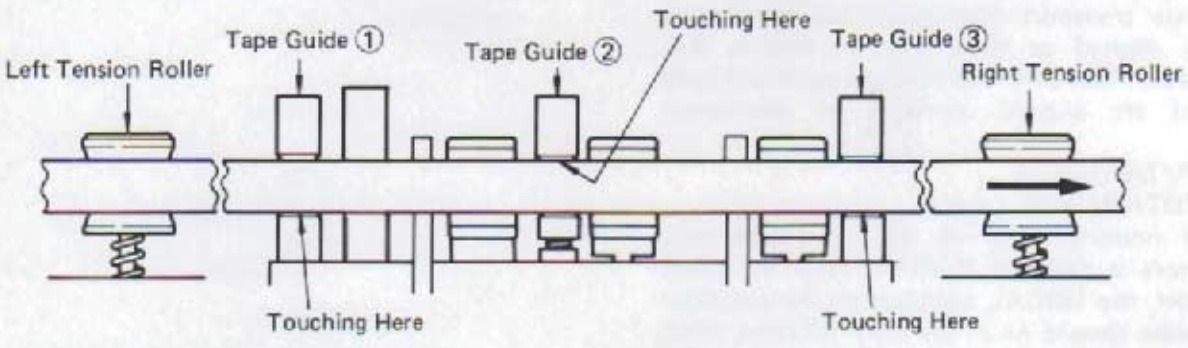


Fig. 9-5-4. Correct Tape Travel

C. Tape-to-head contact

1. Set the OUTPUT SELECT switch to REPRO with the reproduce alignment tape loaded (or use a tape recorded with a constant 16 kHz tone), and put the machine into low speed reproduce mode.
2. While watching the VU meters for any output level variations, increase back tension on the left (supply) reel by slightly applying a finger-tip pressure against the running tape. If the contact area of the head correctly directs the tape in motion, the additional back tension does not affect the meter reading. If a reading on any of the meters increases showing that the tape only comes into full contact with the head when the tape is pressed with a finger, then proceed to next step.
3. Loosen the mounting screw (A) on the reproduce head (see Fig. 9-5-5). Then vary the mounting direction of the head with tape travel for a maximum level reading on each of the VU meters, and fully retighten the screw at that position.
4. Repeat the same procedure for the record/sync head (with OUTPUT SELECT set to SYNC).

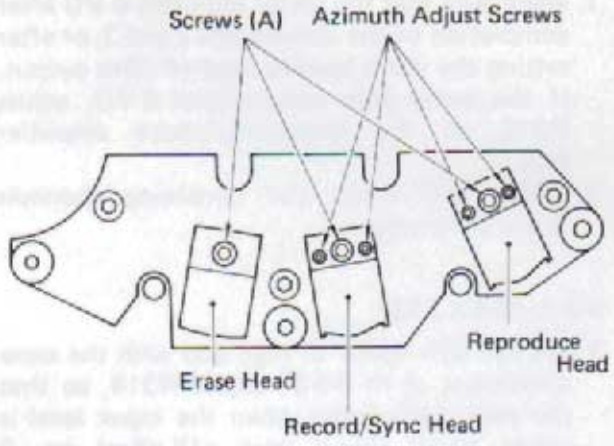


Fig. 9-5-5. Head Adjustment Screws

D. Head azimuth adjustment

1. Connect the CH1 OUTPUT connector of the deck to the vertical input terminal of an oscilloscope.
2. Connect the CH8 OUTPUT (CH4 with-4HS) connector of the deck to the horizontal input terminal of the oscilloscope.
3. Connect an AF level meter to the OUTPUT connectors as shown in Fig. 9-5-6.
4. Switch the OUTPUT SELECT switch to REPRO.
5. Load the reproduce alignment test tape to reproduce at low speed. A scope display showing phase relations between both channels will be obtained as shown in Fig. 9-5-7.
6. Adjust the reproduce head azimuth screw until the scope display shows less than 90 degree out of phase at 10 kHz, with the AF level meter showing approximately maximum value for both channels.
7. Switch the OUTPUT SELECT switch to SYNC, and adjust the record/sync head azimuth screw the same way.

E. Others

* To get at the trim pots for record/reproduce amplifier circuit adjustments, open the meter panel by removing the four set screws, two on each side of the panel. (Refer to Fig. 9-5-8.) With the panel removed, you will see the amplifier boards to which the trim pots are mounted as shown in Fig. 9-5-8. The boards are identical and are exclusively used for their respective channels.
* 0 dBm = 0.755 V (600 ohms)
* The power should always be off when inserting or removing the record/reproduce amplifier PCB assembly.
* Be careful not to touch any trim pots while removing or replacing the record/reproduce PCB assembly.

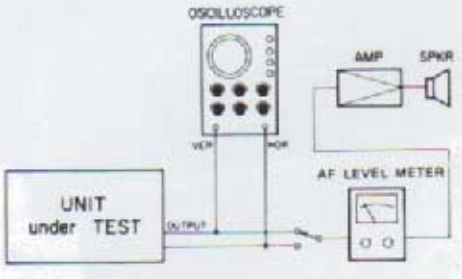


Fig. 9-5-6. Head Azimuth Test Set-Up

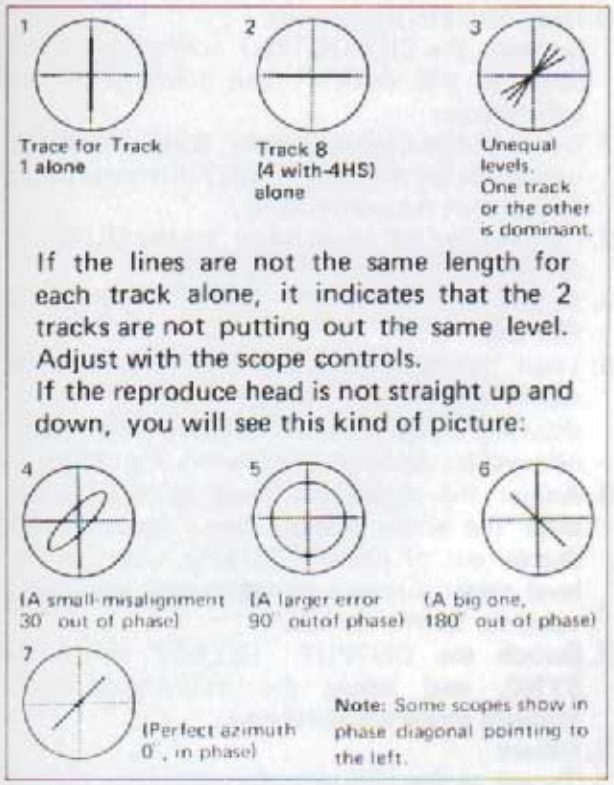


Fig. 9-5-7. Phase Shift

Fig. 9-5-8. Opening the Amplifier Module Front Panel

9-5-2. Input Level Calibration

1. Connect the test equipment to CH1 INPUT and CH1 OUTPUT as shown in Fig. 9-5-9.
2. Apply a 1 kHz, +4 dBm (1.23 V) test signal to the CH1 INPUT connector on the rear panel, and switch the OUTPUT SELECT switch to INPUT.
3. Make sure the AF level meter reads +4 dBm (1.23 V) ouptut. If it doesn't, adjust R313 on the record/reproduce amplifier PCB.
4. Adjust the remaining channels in the same way.

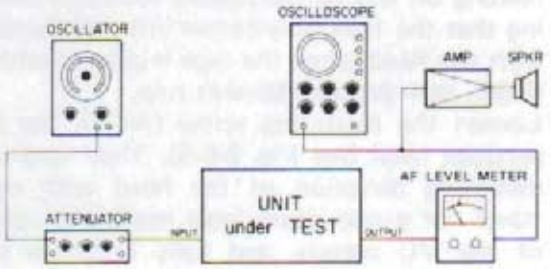


Fig.9-5-9. Level/Frequency Response Measurement Set-up

9-5-3. Meter (Input Signal)

1. Make sure that the meter indicates 0 VU after completion of the above steps 2 and 3, or after setting the input level to read +4 dBm output. If the meter does not indicate 0 VU, adjust R312 on the record/reproduce amplifier PCB.
2. Check and adjust the remaining channels in the same way.

9-5-4. PEAK LED

1. Set the tape speed to high and with the same conditions as in 9-5-2, adjust R314, so that the peak LED lights when the input level is raised 12 dB (input level +16 dBm) on -8 model and 10 dB (input level +14 dBm) on -4HS model, and turns off when reduced 1 dB.
2. Check and adjust the remaining channels in the same way.

9-5-5. Reproduce Level and Meter Calibrations

1. Connect the AF level meter (and oscilloscope) to the CH1 OUTPUT connector on the rear panel.
2. Switch the OUTPUT SELECT switch to REPRO.
3. Load the reproduce alignment test tape for low speed and reproduce the 1 kHz signal. Observe the AF level meter, it should indicate +4 dBm (1.23 V). If not, adjust trim pot R301 on the record/reproduce amplifier PCB.
4. Check that the VU meters read 0VU when the level meter reads +4 dBm. If not, adjust trim pot R310.
5. Switch the OUTPUT SELECT switch to SYNC and reproduce the same tape. Check the AF level meter, it should read +4 dBm. If not, adjust trim pot R302 on the record/reproduce amplifier PCB.
6. Check and adjust the remaining channels in the same way. For reproduce alignment tapes and calibration level, refer to page 9-3.

9-7-6. Reproduce Frequency Response

1. Connect the AF level meter (and oscilloscope) to the OUTPUT CH1 connector.
2. Load the reproduce alignment test tape onto the tape deck and switch OUTPUT SELECT to REPRO.
3. Run the reproduce alignment tape, then check the frequency response while noting the output level.
4. If the AF level meters are not within the specified range, adjust the necessary trim pots by referring to Table 9-5-2 below.

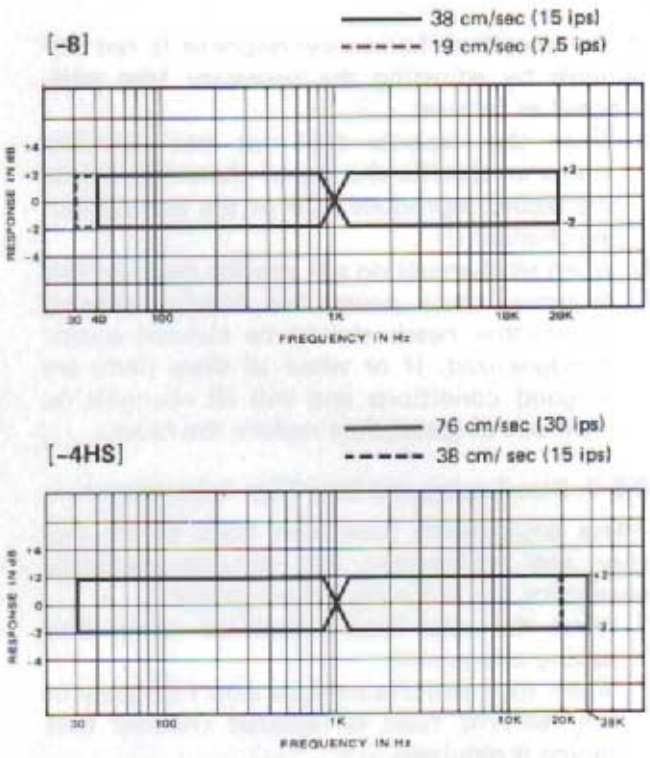


Fig. 9-5-10. Reproduce Frequency Response

5. Switch OUTPUT SELECT to SYNC.
6. Reproduce the same tape and read the output levels in the same manner as before to learn whether the frequency response is within the above specified limits. If it isn't, adjust the necessary trim pots by referring to Table 9-5-2.
7. Adjust the remaining channels in the same way.

TABLE 9-5-2. REPRODUCE FREQUENCY RESPONSE ADJUSTMENT POTS

Trim Pot		Tape Speed	Adjust so that:
REPRO	SYNC		
R309	R308	HIGH	Level at 16–20 kHz becomes the same as at 1 kHz.
R307	R306	LOW	
R303		HIGH	Low frequency response at around 40 Hz meets spec, taking account of the overall record/reproduce frequency response.
R304		LOW	

If the specified frequency response is not obtainable by adjusting the necessary trim pots, proceed as follows:

a. When the response does not meet specifications on specific channel or channels, replace the record/reproduce PCB of the corresponding channel(s).
b. When all channels do not provide the specified response, check power line, head alignment, or whether heads should be cleaned and/or demagnetized. If or when all these items are in good conditions and still all channels remain out of specs, then replace the heads.

9-5-7. Bias Tuning and Bias Trap Adjustments

These adjustments have been made at the factory and realignment will not be necessary except for the following circumstances:

* When the erase head is replaced (Erase Bias tuning is required).
* When the record/reproduce amp PCB ass'y or the rec/sync head is replaced (Record Bias tuning is required).

Use the following procedures to adjust.

Note

* Be sure to use a non-conductive screwdriver (i.e. wood, plastic).
* For bias level measurements, use an AC level meter whose input terminal has a floating capacitance of 100 pF or lower.

A. ERASE BIAS TUNING (L1)

1. Place CH1 REC function switch to ON and set the tape deck into the record mode.
2. Connect a DC voltmeter between TP-2 (Hot) and TP-3 (Cold) on the CH1 record/reproduce amp PCB ass'y. By using an insulated screwdriver, adjust L1 on the Erase Head PCB so that a minimum reading is obtained on the DC meter. The minimum reading should be approximately 200 mV if the bias level trim pot R323 on the record/reproduce amp PCB is set to the middle position.
3. Adjust the remaining channels in the same way.

CAUTION: Be careful not to short-circuit TP-3 and GND.

B. RECORD BIAS TRAP (L5)

1. Connect an AC level meter between TP-1 on CH1 rec/rep amp. and chassis (ground).
2. Place CH1 REC function switch to ON and set the deck into the record mode.
3. Adjust L5 on the CH1 rec/repro amp. PCB ass'y so that a minimum reading is obtained on the level meter.
4. Adjust the remaining channels in the same way.

9-5-8. Bias Level

This adjustment is made while you are recording a tone on the type of tape you'll be using for the session.

1. Connect an AF oscillator to CH1 INPUT connector.
2. Adjust the AF oscillator to apply a 10 kHz, -6 dBm (388 mV, -10 VU) signal to CH1 INPUT connector on the rear panel.
3. Switch the OUTPUT SELECT swtich to REPRO and set CH1 REC function switch to ON.
4. Begin recording channel 1 at low speed. Now adjustments can be made while recording a 10 kHz tone, -10 VU.

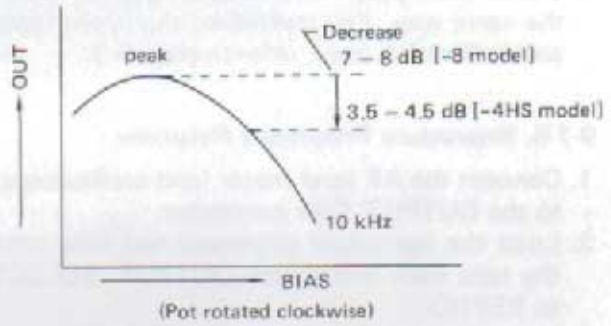


Fig. 9-5-11. Bias Level Adjustment

5. Begin the adjustments by turning trim pot R324 completely counterclockwise. Next, turn the trim pot clockwise and the AF level meter will rise to give peak reading. Slowly continue the clockwise rotation until the reading on the level meter drops 7 – 8 dB on the -8 and 3.5 – 4.5 dB on the -4HS, from the peak reading as shown in Fig. 9-5-11.
6. Repeat the same procedures on the remaining channels.

When the record/reproduce amplifier PCB ass'y or the bias amplifier module U23 is replaced, check that when the bias trim pot R324 is turned fully clockwise the DC voltage between TP-4 (Hot) and TP-5 (Cold) is 250 mV or lower. If not, adjust U23 coil for a minimum voltage. Use an Extender Card (TEAC Part No. 520011280). (CAUTION: NOT SHORT-CIRCUIT TP-5 and GND.)

9-5-9. Recording Level

Recording level adjustments should be done only after the reproduce level and recording bias have been properly set as specified above.

1. Connect the test equipment to the tape deck in the same manner as described in 9-5-8.
2. Apply a 1 kHz, +4 dBm signal to the CH1 INPUT connector.
3. Switch the OUTPUT SELECT switch to REPRO and record the input signal on the specified recording test tape at low speed.
4. Check the AF level meter, it should indicate +4 dBm (1.23 V). If it doesn't, adjust trim pot R318 to obtain a +4 dBm indication. At this time, make sure that the front panel VU meter indicates 0 VU.
5. Switch the OUTPUT SELECT switch to SYNC and record the input signal for a brief period of time. Then, rewind the tape just recorded and reproduce it. Make sure that both the AF level meter and the VU meter indicate +4 dBm and 0 VU, respectively.
6. If it's impossible to obtain a VU meter reading of 0 VU in steps 4 and 5 above, check to see whether the reproduce meter is set as described under 9-5-5.
7. Check and adjust the remaining channels in the same way.

9-5-10. Frequency Response (OVERALL)

After completing the recording level check and adjustments, proceed onto the overall frequency response checks.

1. Connect the test equipment to the tape deck the same as described in 9-5-8 and load a blank test tape onto the tape deck.
2. Turn R316 and R317 to the middle position and set the input level to -10 VU for 76 cm/sec. or 38 cm/sec. of tape speed and -20 VU for 19 cm/sec.
3. Set the OUTPUT SELECT switch to REPRO and the "CH1" REC function switch to ON.
4. Record and reproduce the input signal, then change the frequency and check that the output it still within specifications. If not, adjust REC EQ, R321 (High Speed), R322 (Low Speed) using a frequency higher than 20 kHz.
5. Switch the OUTPUT SELECT switch to SYNC and record the test signals the same as before. When the recording is finished, rewind the tape just recorded and reproduce it. Measure the reproduced output levels at the proper test frequencies, and make sure that the frequency response is within the specified limits shown above.
6. When the frequency response in the lower frequency spectrum is not within the specified limits, adjust trim pot R303 at high speed R304 at low speed. The high-frequency response can be fine-adjusted by using R317 (High Speed) and R316 (Low Speed), taking account of the reproduce frequency response.
7. Adjust the remaining channels in the same way.

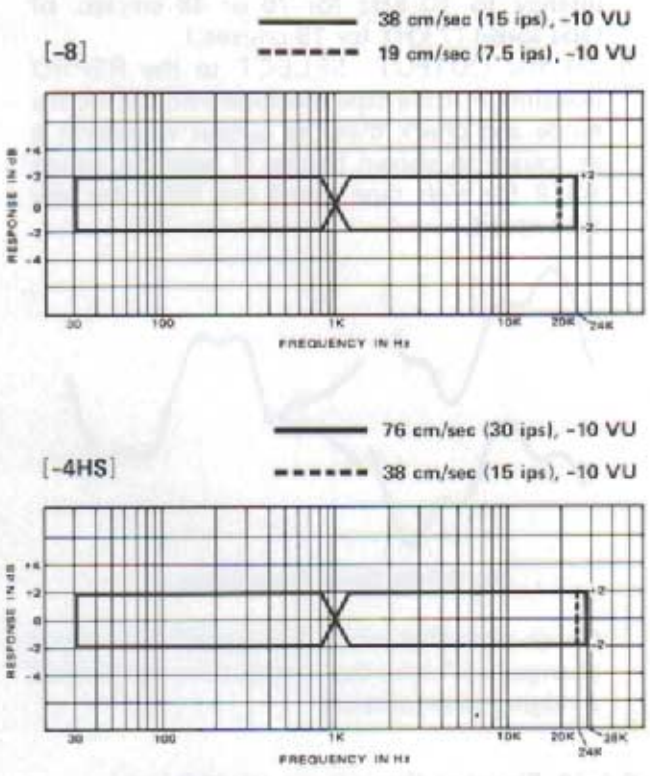


Fig. 9-5-12. Overall Frequency Response

9-5-11. Record/Reproduce Signal Phase Check and Adjustments

1. With the same set-up as in paragraph 9-5-10, connect the oscilloscope to the OUTPUT connector and the scare-wave signal oscillator to the INPUT connector.
2. Set the oscillator to produce a scare-wave signal whose level is 20 dB lower than the nominal level of +4 dBm, and set the fre-

quency to 10 kHz for 76 or 38 cm/sec. of tape speed (7 kHz for 19 cm/sec.).

3. Set the OUTPUT SELECT to the REPRO position. Put the tape machine into the record mode and check that the output waveform is as square as shown below. If need be, adjust R319 for high tape speed and R320 for low tape speed.

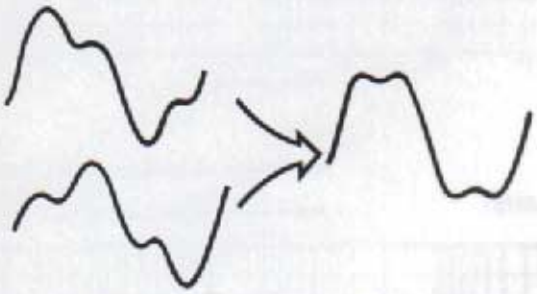


Fig. 9-5-13. Signal Phase Check

Check also that when the input frequency is changed to 1 kHz the output does not present a ridging deterioration.

9-5-12. Signal-to-Noise Ratio (OVERALL)

Before going ahead with any measurements, demagnetize all heads and tape guides.

1. Connect test equipment as in paragraph 9-5-8.
2. Apply a 1 kHz, +4 dBm (1.23 V = 0 VU) input signal to CH1 INPUT connector on the rear panel.
3. Switch the OUTPUT SELECT switch to SYNC and record a short length of the input signal. Then, while still in the recording mode, unplug the AF oscillator connected to the CH1 INPUT connector, and make another length of no-signal recording.
4. Rewind the recording made in step 3 to the beginning and reproduce.
5. While making sure the reproduce output of the previously recorded signal is +4 dBm, raise the sensitivity of the AF level meter and measure the level of the no-signal portion of the tape.
6. Calculate signal-to-noise ratio by comparing the no-signal output level (as read on AF level meter) with the nominal output level of +4 dBm. Ratio should be better than 50 dB.
7. Check the remaining channels in the same way.

If ratio is off spec, proceed as follows:

a. Reassure that the heads are thoroughly demagnetized.
b. Check erasure (refer to 9-5-13).
c. Check bias tuning (refer to 9-5-7).
d. As a final measure, replace the off-spec channel record/reproduce amplifier PCB(s).

9-5-13. Erase Ratio

1. Connect test equipment to the tape deck as shown in Fig. 9-5-14. The filter to be connected should be a 1 kHz bandpass filter.
2. Switch the OUTPUT SELECT switch to SYNC and record a short length of the 1 kHz, +14 dBm (3.88 V) signal on channel 1.
3. Rewind the tape to the beginning of the recorded section and unplug the AF oscillator connected to the CH1 INPUT connector on the rear panel.
4. Perform a no-signal recording over the recording of the 1 kHz signal.
5. Measure the level difference between the 1 kHz signal and the no-signal portions. The difference should be 70 dB or greater.
6. If the level difference is bebow this specification, check TP-1 voltage on the erase head PCB for 50 mV using an AC voltmeter, and adjust R323 on the record/reproduce amp PCB, if necessary. Also adjust, if required, the erase head position by loosening the screw located behind the erase head.
7. Check the remaining channels in the same way.

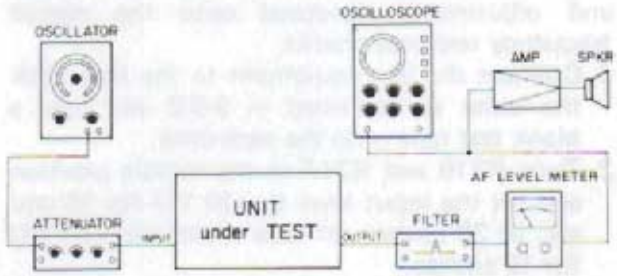


Fig. 9-5-14. Erase Ratio Test Set-Up

9-5-14. Adjacent Channel Crosstalk

1. Connect test equipment as shown in Fig. 9-5-15.
2. While making a no-signal recording on one of the channels, apply a 1 kHz, +4 dBm (1.23 V) test signal to the adjacent channel.
3. Rewind the tape to the beginning of the recording.

4. Reproduce the tape with the OUTPUT SELECT switch set to SYNC. Then, measure the output (signal leakage) of the no-signal recorded channel.
5. Measure the difference between the 1 kHz output level and the no-signal portions. The difference should be 50 dB or greater.

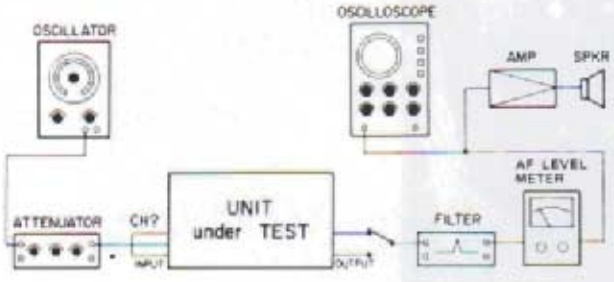


Fig. 9-5-15. Crosstalk Measurement Set-Up

9-5-15. Distortion

1. Connect test equipment as shown in Fig. 9-5-16.

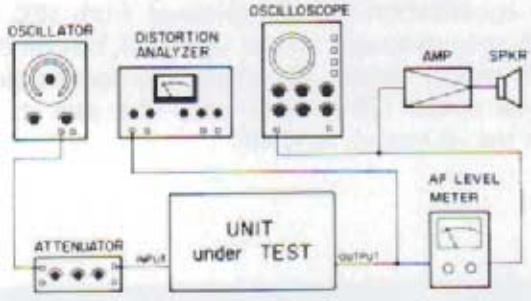


Fig. 9-5-16. Distortion Measurement Set-Up

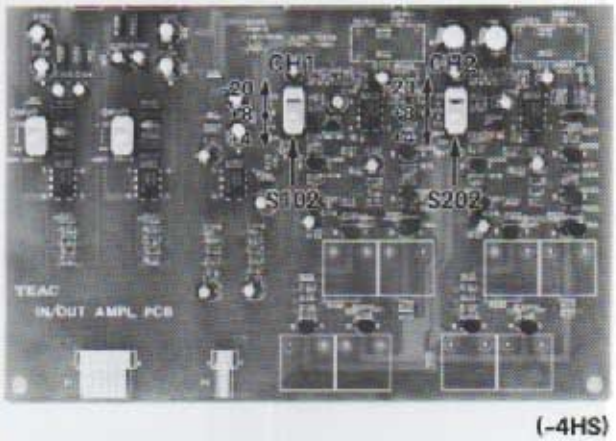
2. Switch the OUTPUT SELECT switch to REPRO.
3. Apply a 1 kHz, +4 dBm (1.23 V) test signal to the INPUT connector and record.
4. Stop the recording and switch the OUTPUT SELECT switch to SYNC.
5. Rewind the tape to its beginning and reproduce. Measure the distortion of the reproduced output with a distortion analyzer connected to the OUTPUT connector.
6. The distortion measured should be less than 0.8 % for a +4 dBm recording. If not, proceed as follows:
   a. Check that the heads are thoroughly demagnetized.
   b. Check bias level setting.
   c. Replace the off-spec channel record/reproduce amplifier PCB(s).
   d. If all else fails, replace the heads.

9-5-16. Headphones (-4HS)

1. Connect an 8-ohm dummy load, a level meter and an oscilloscope to the headphone terminal.
2. Switch the OUTPUT SELECT switch to INPUT and the PHONES selector "CH1" switch on.
3. Connect a 1 kHz, +4 dBm (1.23 V) test signal to the CH-1 INPUT connector.
4. Turn up the headphone volume control until the waveform of the output signal starts to distort; measure the level at this point for a reading of 0.9 V or more.

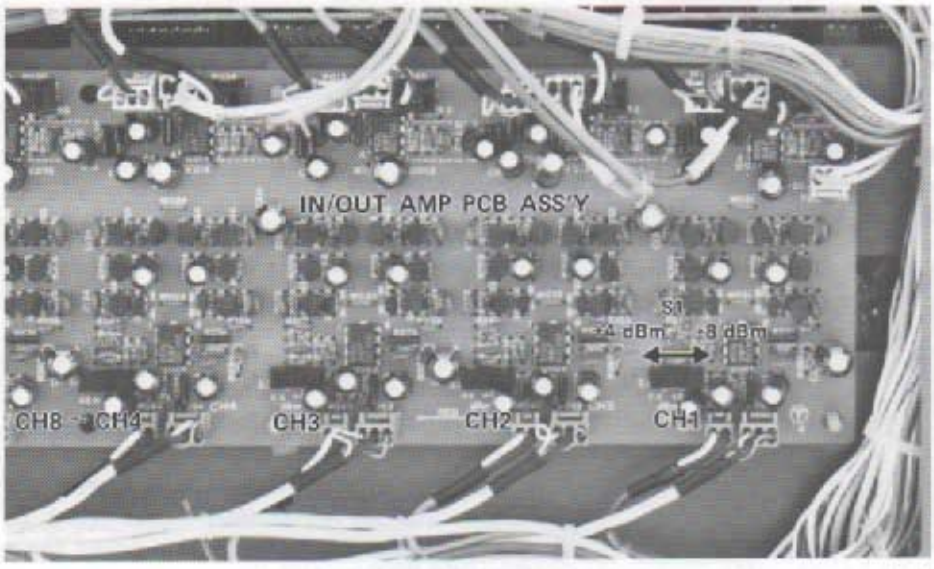
9-5-17. Output Level Switching

The nominal output level at the XLR connectors can be changed from +4 dBm (1.23 V) to +8 dBm (1.95 V). Fig. 9-5-17 shows the output level switches on the Input/Output Amplifier PCB Ass'y. Access is made to the Input/Output Amplifier PCB Ass'y by opening the bottom panel – or, with the -4HS, the front panel – of the amplifier unit. By resetting these switches, the gain of the output amplifier is boosted 4 dB to achieve the nominal output level of +8 dBm (1.95 V).



(-4HS)

Fig. 9-5-17. Output Level Conversion (1 of 2)



(-8)

Fig. 9-5-17. Output Level Conversion (2 of 2)

9-5-18. Record Level and EQ Modifications

Switches S1 and S2 shown in Fig. 9-5-18 are provided on the Mother PCB. Switch S1 sets the reference fluxivity level (record level), and switch S2 the equalization.

On the -8 model, switch S1 switches the record level from 250 nWb/m (short-circuit) to 320 nWb/m (open circuit), while the -4HS model is factory-preset to 320 nWb/m and can be set to 250 nWb/m.

The equalization can be switched from IEC to NAB at both speeds on the -8 model, but on the -4HS model switch S2 affects the equalization at low speed (38 cm/sec) only and sets it, as with the -8 model, to NAB.

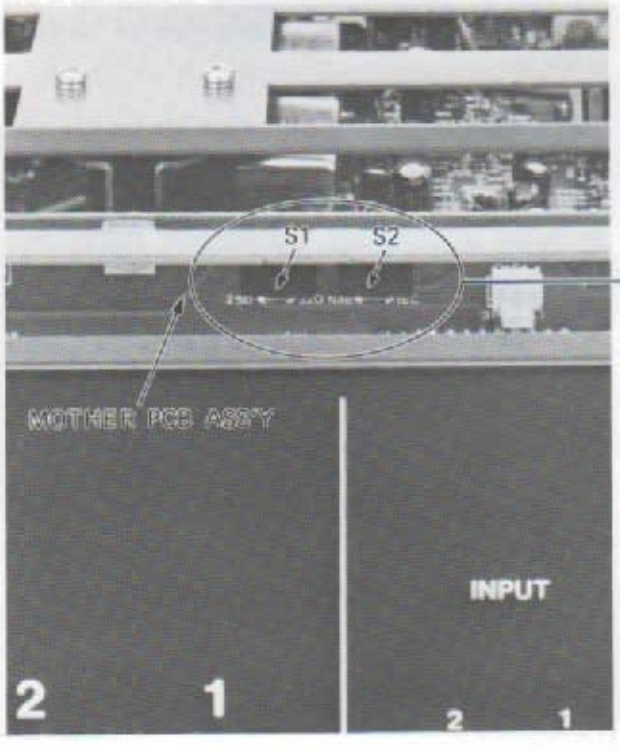


Fig. 9-5-18. Location of Switches S1 and S2

TABLE 9-5-3. CHECKS AND ADJUSTMENTS CHART

ADJUST STEP	WHAT IS IT CALLED	SIGNAL SOURCE AND AMOUNT	WHAT TEST GEAR TO USE	WHAT IS THE RECORDER DOING	POINT TO ADJUST	WHAT READING TO ADJUST FOR
1	Input Level	1 kHz signal at +4 dBm from oscillator connected to INPUT connector.	VTVM connected to OUTPUT connector	Stop mode OUTPUT SELECT at INPUT.	Trim pot #1 R313	+4 dBm (1.23 V) on VTVM
2	Meter (Input)	Same as above	VU Meter	Same as above	Trim pot #2 R312	Adjust to read 0 VU on VU meters.
3	PEAK LED	1 kHz signal at +16 dBm [8] / +14 dBm [-4HS]	PEAK LED	Tape speed at HIGH.	Trim pot #3 R314	Adjust to light PEAK LED.
4	Reproduce Head Alignment	Reproduce alignment test tape for Low speed Refer to page 9-3.	VTVM and oscilloscope with vertical and horizontal inputs connected to OUTPUT CH1 and 8 (4 with-4HS)	Reproduce at Low speed. OUTPUT SELECT at REPRO.	Repro head azimuth adjusting screw.	Maximum output, less than 90° out of phase of Trk 1 & 8 (4 with -4HS) outputs (at 10 kHz).
5	Record/Sync Head Alignment	Same as above	Same as above	Reproduce at Low speed. OUTPUT SELECT at SYNC.	Record/Sync head azimuth adjusting screw.	Same as above
6	Reproduce Level (Repro head)	Reproduce alignment test tape for Low speed. Play reference level signal.	VTVM connected to OUTPUT connector.	Reproduce at Low speed. OUTPUT SELECT at REPRO.	Trim pot #4 R301	+4 dBm (1.23 V) on VTVM.
7	Reproduce Level (Record/SYNC head)	Same as above	Same as above	Reproduce tape at Low speed. OUTPUT SELECT at SYNC.	Trim pot #5 R302	+4 dBm (1.23 V) on VTVM.
8	Meter (Tape)	Play reference level	VU meter	Same as above	Trim pot #6 R310	Adjust to read 0 VU.
9	Reproduce EQ (High frequency) at High speed. (Repro head)	Play 16-20 kHz signal on test tape.	VTVM connected to OUTPUT connector.	Reproduce at High speed. OUTPUT at REPRO.	Trim pot #7 R309	Same reading on VTVM as at 1 kHz signal.
10	Reproduce EQ (High frequency) at High speed. (Record/SYNC head)	Same as above	Same as above	Reproduce at High speed. OUTPUT SELECT at SYNC.	Trim pot #8 R308	Same as above
11	Reproduce EQ (High frequency) at Low speed. (Repro head)	Play 10-20 kHz signal on test tape.	Same as above	Reproduce at Low. OUTPUT SELECT at REPRO.	Trim pot #7 R307	Same as above
12	Reproduce EQ (High frequency) at Low speed. (Record/SYNC head)	Same as above	Same as above	Reproduce at Low. OUTPUT SELECT at SYNC.	Trim pot #8 R306	Same as above
13	Reproduce EQ (Low frequency) at High speed.	Play approx. 40 Hz signal on test tape.	Same as above	Reproduce at High speed. OUTPUT SELECT at REPRO or SYNC.	Trim pot #9 R303	Adjust to meet specs.

ADJUST STEP	WHAT IS IT CALLED	SIGNAL SOURCE AND AMOUNT	WHAT TEST GEAR TO USE	WHAT IS THE RECORDER DOING	POINT TO ADJUST	WHAT READING TO ADJUST FOR
14	Reproduce EQ (Low frequency) at Low speed.	Same as above	Same as above	Reproduce at Low speed. OUTPUT SELECT at REPRO or SYNC.	Trim pot #9 R304	Same as above
15	Bias Trap Adjustment	No input signal	VTVM connected to Bias Trap test point TP-1 and GND.	Record mode, no input signal.	Inductor L5	Adjust inductor for minimum output at Bias Trap test point.
16	Bias Level Adjustment	10 kHz, -6 dBm oscillator signal connected to INPUT connector.	VTVM connected to OUTPUT connector.	Record signal at LOW on type of tape that will be used for actual recording. OUTPUT SELECT at REPRO.	Trim pot #10 R324	While recording adjust trim pot until VTVM indication rises to peak value, then turn pot further clockwise until signal drops off by 7-8 dB (19 cm/sec with -B), 3.5-4.5 dB (38 cm/sec with -4HS).
17	Recording Level	1 kHz signal at +4 dBm (0 VU on VU meters) connected to INPUT connector.	VTVM connected to OUTPUT connector or use VU meters.	Same as above	Trim pot #11 R318	Set for +4 dBm (1.23 V) at OUTPUT connectors or 0 VU on VU meters.
18	Overall Frequency at High speed. (HIGH-FREQ)	20 kHz or higher signal connected to INPUT connector (at -6 dBm).	Same as above	Record on selected tape at High speed. OUTPUT SELECT at REPRO or SYNC.	Trim pot #12 R321 Trim pot #13 R317 for fine-adjust	Check that frequency response matches limits given in Fig. 9-5-12
19	Overall Frequency at Low speed. (HIGH-FREQ)	20 kHz or higher signal connected to INPUT connector (at -16 dBm).	Same as above	Record on selected tape at Low speed. OUTPUT SELECT at REPRO or SYNC.	Trim pot #12 R322 Trim pot #13 R316 for fine-adjust	Same as above
20	Low Frequency at High speed.	40 Hz signal connected to INPUT connectors (at -6 dBm).	Same as above	Record on selected tape at High speed. Other conditions the same as above.	Trim pot #9 R303	Same as above
21	Low Frequency at Low speed.	40 Hz signal connected to INPUT connectors (at -16 dBm).	Same as above	Record on selected tape at Low speed. Other conditions the same as above.	Trim pot #9 R304	Same as above
22	Overall Signal-to-Noise Ratio	No input signal	VTVM connected to OUTPUT connectors.	Record mode at High or Low speed. OUTPUT SELECT at SYNC.		Check for 50 dB or better.
23	Erase	1 kHz signal at +14 dB connected to INPUT connectors. This is +10 VU on meters. Apply signal for short time only.	VTVM and 1 kHz band pass filter connected to OUTPUT.	Record 1 kHz signal, rewind, remove input. Record no-input signal over 1 kHz signal recording. OUTPUT SELECT at SYNC.	Trim pot R323	Check or adjust for 70 dB or greater (through 1 kHz filter). Refer to Item Erase Ratio.

LIST OF EXPLODED VIEWS AND PCB ASS'Y DRAWINGS

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

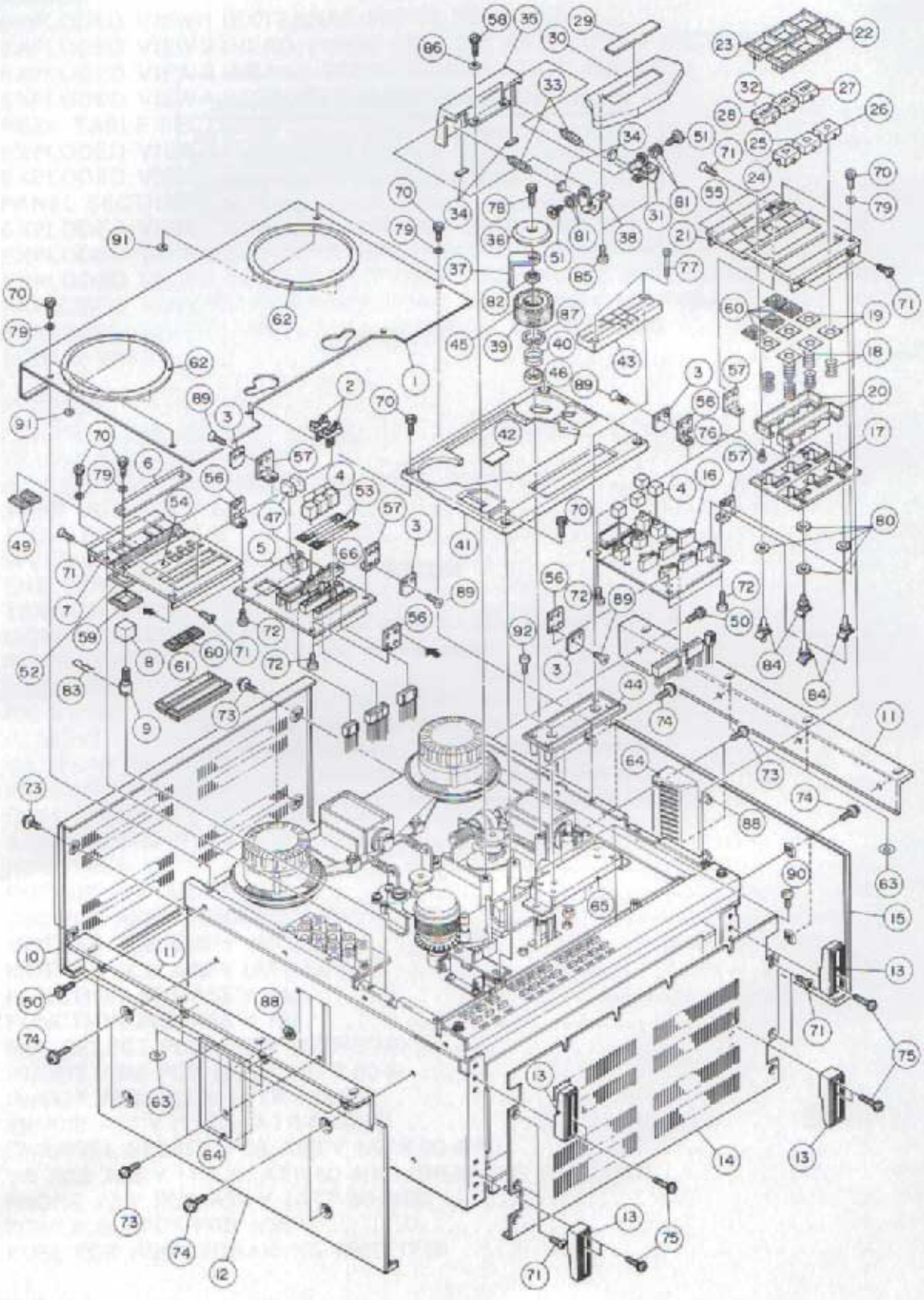
- ★ Parts marked with * require longer delivery time.
- ★ All capacitor values are in microfarads (UF) (PF = picofarads).
- ★ ⚠ Parts marked with this sign are safety critical components. They must always be replaced with identical components — refer to the TEAC Parts List and ensure exact replacement.
- ★ PC boards shown viewed from foil side.

Effective: February. 1986 Q50324

SECTION X. PARTS LISTS

10-1. MECHANICS

10-1-1. Exploded View-1 (External Parts Section)



EXPLODED VIEW-1

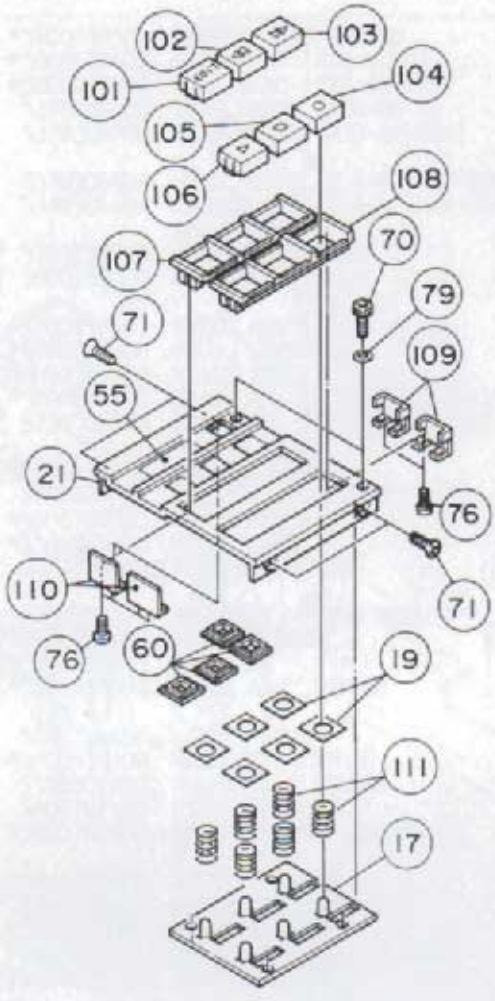
Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
1- 1	*5800656900	PANEL,FRONT	
1- 2	5800341701	KNOB,FADER	
1- 3	*5800687300	STOPPER,PANEL	
1- 4	5800657700	BUTTON,SQUARE	
1- 5	*5200161220	PITCH CONTROL PCB ASSY A	Refet to 10-32/49.
1- 6	*5800658000	COVER	
1- 7	*5800768900	PANEL, CONTROL L	
1- 8	5800173100	BUTTON,POWER	
1- 9	5534713000	LINK,C	
1-10	*5800639900	COVER,TOP	
1-11	*5800639701	ANGLE,RACK MOUNT	
1-12	*5800653301	PANEL, SIDE L	
1-13	*5800288502	FOOT	
1-14	*5800639801	PLATE,BOTTOM	
1-15	*5800653201	PANEL,SIDE R	
1-16	*5200161000	KEY BOARD A PCB ASSY	Refer to 10-28/47.
1-17	*5200161100	KEY BOARD B PCB ASSY	Refer to 10-47.
1-18	5800778200	SPRING, BUTTON	
1-19	5800658201	GUIDE,SPRING	
1-20	*5800778100	HOLDER,ESCUTCHEON	
1-21	*5800658601	PANEL,CONTROL R	
1-22	*5800778500	ESCUTCHEON,BUTTON B	
1-23	*5800778400	ESCUTCHEON,BUTTON A	
1-24	5800778301	BUTTON A	
1-25	5800778601	BUTTON B	
1-26	5800778701	BUTTON C	
1-27	5800778901	BUTTON E	
1-28	5800779001	BUTTON F	
1-29	*5800482300	PLATE,NAME	
1-30	*5800656100	HEAD HOUSING,A	
1-31	*5800656002	ARM R,HOUSING	
1-32	5800778801	BUTTON D	
1-33	5800396800	SPRING,A	
1-34	*5800476300	CUSHION,HOUSING A	
1-35	*5800711900	HEAD HOUSING,C	
1-36	5800758400	CAP,P.ROLLER S	
1-37	5800723801	PROTECTOR S	
1-38	*5800655902	ARM L,HOUSING	
1-39	5800347601	PINCH ROLLER,	
1-40	5800380600	SPG.,PINCH ROLLER	
1-41	*5800656802	BASE,HOUSING	
1-42	*5800731100	PLATE, NAME	
1-43	*5800383501	SPLICING BLOCK	
1-44	*5800382500	BASE,SPLICING	
1-45	5730003900	BEARING,626ZZ	
1-46	5730004200	BEARING,NTN626	
1-47	5800731200	BUTTON,	
1-48		Not used	
1-49	*5800482000	ESCUTCHEON, BUTTON	
1-50	5800509700	SCREW, CAP	
1-51	5800404400	SCREW,SHOULDER B	
1-52	*5800365300	SPACER A	
1-53	*5800609302	SCREEN (A)	
1-54	*5800302200	COVER, COUNTER	
1-55	*5800474900	LENS,COUNTER	

EXPLODED VIEW-1

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
1-56	*5800686200	HOLDER L, PCB	
1-57	*5800686300	HOLDER R, PCB	
1-58	5800509700	SCREW,CAP	
1-59	*5800173000	ESCUTCHEON, POWER SW	
1-60	*5800657800	ESCUTCHEON,B	
1-61	*5800657900	ESCUTCHEON A	
1-62	*5800340300	PROTECTOR, REEL	
1-63	*5800711400	CUSHION	
1-64	*5800344900	HANDLE	
1-65	*5800731001	BRACKET, BASE	
1-66	*5200162100	PITCH CONTROL PCB B ASSY	Refer to 10-49.
1-70	*5781703008	SCREW, CAP M3X8 (NI)	
1-71	*5780203006	SCREW,FLAT C.SUNK M3X6	
1-72	*5780003006	SCREW,BIND M3X6	
1-73	*5780023006	SCREW, BIND M3X6 (BK NI)	
1-74	*5783114006	SCREW,WASHER M4X6 (BK NI)	
1-75	*5783583014	SCREW,WASHER S TI M3X14	
1-76	*5781002008	SCREW,PAN,TAPPING M2X8	
1-77	*5781703030	SCREW,CAP M3X30 NI	
1-78	*5781703012	SCREW, CAP M3X12 (NI)	
1-79	*5785213200	WASHER FIBER 3X5.5X0.25T	
1-80	*5785214100	WASHER FIBER WH 4X8X1T	
1-81	*5785150500	WASHER,WAVE WW-05	
1-82	*5781851000	NUT M1.0	
1-83	*5786360500	SNAP PIN R F5	
1-84	*5787010400	SUPPORT, PCB CBS-4N	
1-85	*5781703006	SCREW, CAP M3X6 (NI)	
1-86	*5785214200	WASHER,FIBER 4X6.5X0.5T	
1-87	*5786131900	RING, C 19F	
1-88	*5781880500	PUSH NUT M3	
1-89	*5783043006	SCREW,PAN S TITE M3X6	
1-90	*5780133008	SCREW,PAN SEMS A M3X8	
1-91	*5781880400	PUSH NUT M2.4	
1-92	*5780003018	SCREW,BIND M3X18	
1-101	5800671300	BUTTON,F	
1-102	5800657300	BUTTON,D	
1-103	5800657400	BUTTON,E	
1-104	5800657200	BUTTON,C	
1-105	5800657100	BUTTON,B	
1-106	5800657000	BUTTON,A	-4HS: Serial No. 90020 and below.
1-107	*5800657502	ESCUTCHEON,BUTTON A	
1-108	*5800657602	ESCUTCHEON,BUTTON B	
1-109	*5800684900	HOLDER, BUTTON A	
1-110	*5800659500	HOLDER, BUTTON	
1-111	5800658400	SPRING,BUTTON	



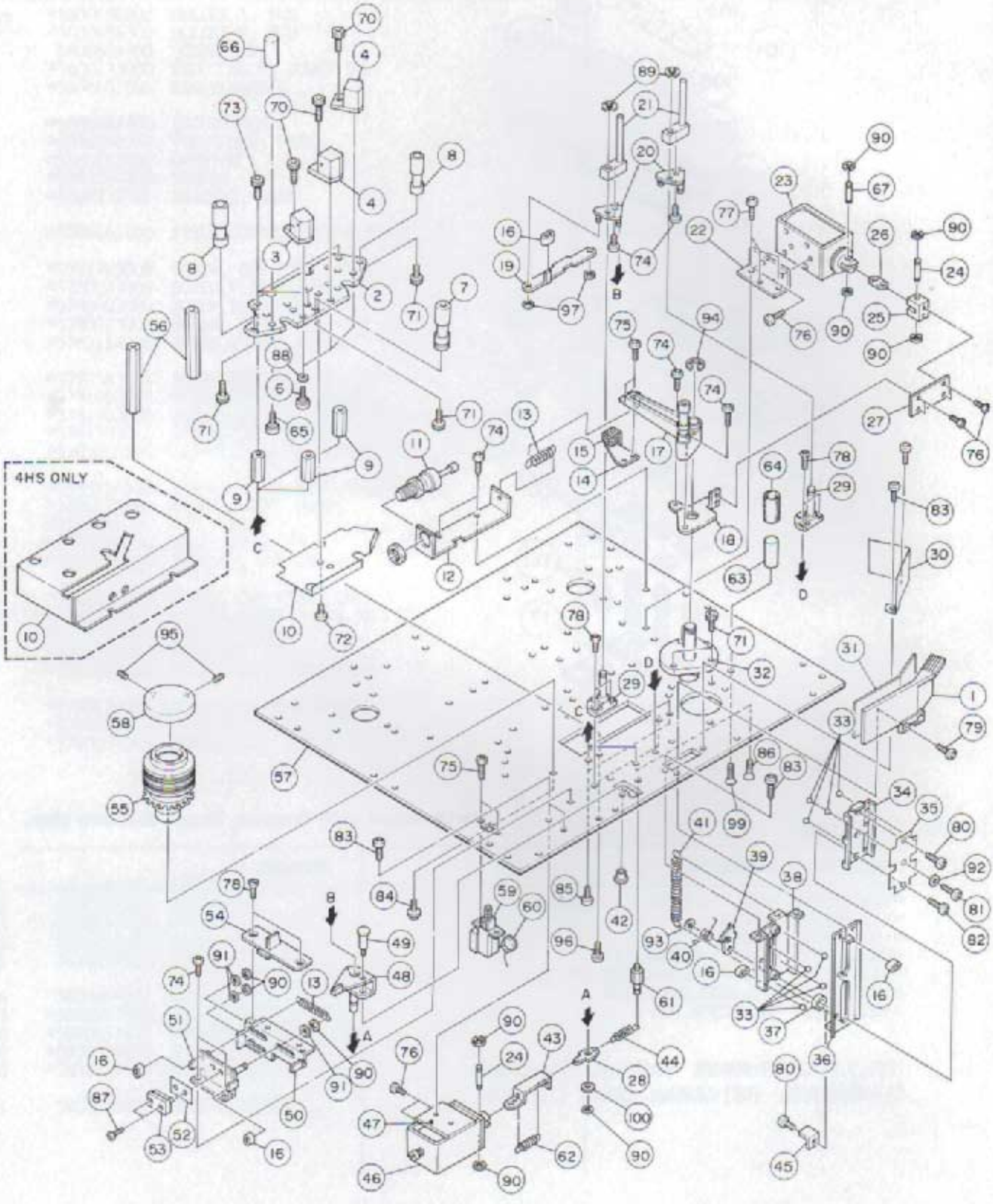
Parts marked with *require longer delivery time.

INCLUDED ACCESSORIES

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
	*5740002800	REEL, 10 INCH RE1013	
	*5534659000	SPACER	
	*5544995000	WASHER	
	*5700079900	OWNER'S MANUAL [J]	
	*5700080000	OWNER'S MANUAL [EXCEPT J]	
	*5200112800	PCB ASSY,EXTENSION	
	*5800505100	PROTECTOR,PCB B	

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

10-1-2. Exploded View-2 (Head, Pinch Roller, and Lifter Sections)



EXPLODED VIEW-2

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
2- 1	*5800638501	COVER, HEAD SHIELD	
2- 2	*5800637402	BASE,HEAD [ATR-60-8]	
	*5800763200	BASE,HEAD [ATR-60-4HS]	
2- 3	5378300200	HEAD,ERASE [ATR-60-8]	
	5378306700	HEAD,ERASE [ATR-60-4HS]	
2- 4	5378306900	HEAD,REC/PLAY 8-8 [ATR-60-8]	
	5378306600	HEAD,REC/PLAY 4-4 [ATR-60-4HS]	
2- 5		Not used	
2- 6	5781733008	BOLT, HEX. M3X8 (SUS)	
2- 7	5800759000	GUIDE ASSY, TAPE 1/2 A	
2- 8	5800758600	GUIDE ASSY, TAPE 1/2 F	
2- 9	*5800337700	STUD, HEAD BASE	
2-10	*5800763300	PLATE,SHIELD [ATR-60-8]	
	*5800804601	PLATE,SHIELD [ATR-60-4HS]	
2-11	5730006100	ABSORBER, SOFT FA-0712C2	
2-12	*5800636100	HOLDER,DAMPER	
2-13	5800674800	SPRING,P.R.RETURN	
2-14	*5800780700	ARM, DAMPER	
2-15	*5534851000	DAMPER,ARM	
2-16	5027569000	RUBBER,CUSHION	
2-17	5800332301	ARM ASSY, PINCH ROLLER	
2-18	*5800780600	ARM, PRESSURE	
2-19	*5800636800	ARM,LINK	
2-20	*5800633600	PLATE ASSY,LIFTER	
2-21	5800724400	LIFTER ASSY	
2-22	*5800636200	BRACKET,SOLENOID	
2-23	5313001800	SOLENOID,P.ROLLER	
2-24	5800781100	PIN, SOLENOID	
2-25	*5800780800	BRACKET, LEAF SPRING	
2-26	*5800780900	JOINT (METAL)	
2-27	5800188600	SPRING,PINCH ROLLER	
2-28	*5800782000	SLIDE BASE,ARM	
2-29	*5800689201	SHAFT, LIFTER ARM ASSY	
2-30	*5800679200	PLATE,SHIELD D	
2-31	*5800637700	PLATE,SHIELD C [ATR-60-8]	
	*5800815200	PLATE,SHIELD G [ATR-60-4HS]	
2-32	*5800687000	SHAFT, ARM ASSY	
2-33	5540056000	STEEL BALL 30	
2-34	*5800635801	RETAINER, BALL	
2-35	*5800635900	PLATE	
2-36	*5800635501	PLATE ASSY, SLIDE A	
2-37	5800680700	SPACER	
2-38	*5800635101	BASE ASSY, SHIELD	
2-39	*5084643200	PLATE,LOCK	
2-40	5800380000	SPRING,LOCK	
2-41	5800674800	SPRING,P.R.RETURN	
2-42	*5800636500	SHAFT,KICK LEVER A	
2-43	*5800781900	BASE, ARM	
2-44	5800782100	SPRING, P RETURN	
2-45	*5800729000	STOPPER	
2-46	5313003400	SOLENOID,DAMP G1564LTT81	
2-47	*5800675301	BRACKET,SOLENOID B	
2-48	*5800781600	LEVER ASSY,KICK	
2-49	*5800636600	SHAFT,KICK LEVER B	
2-50	*5800633901	SLIDER ASSY	

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

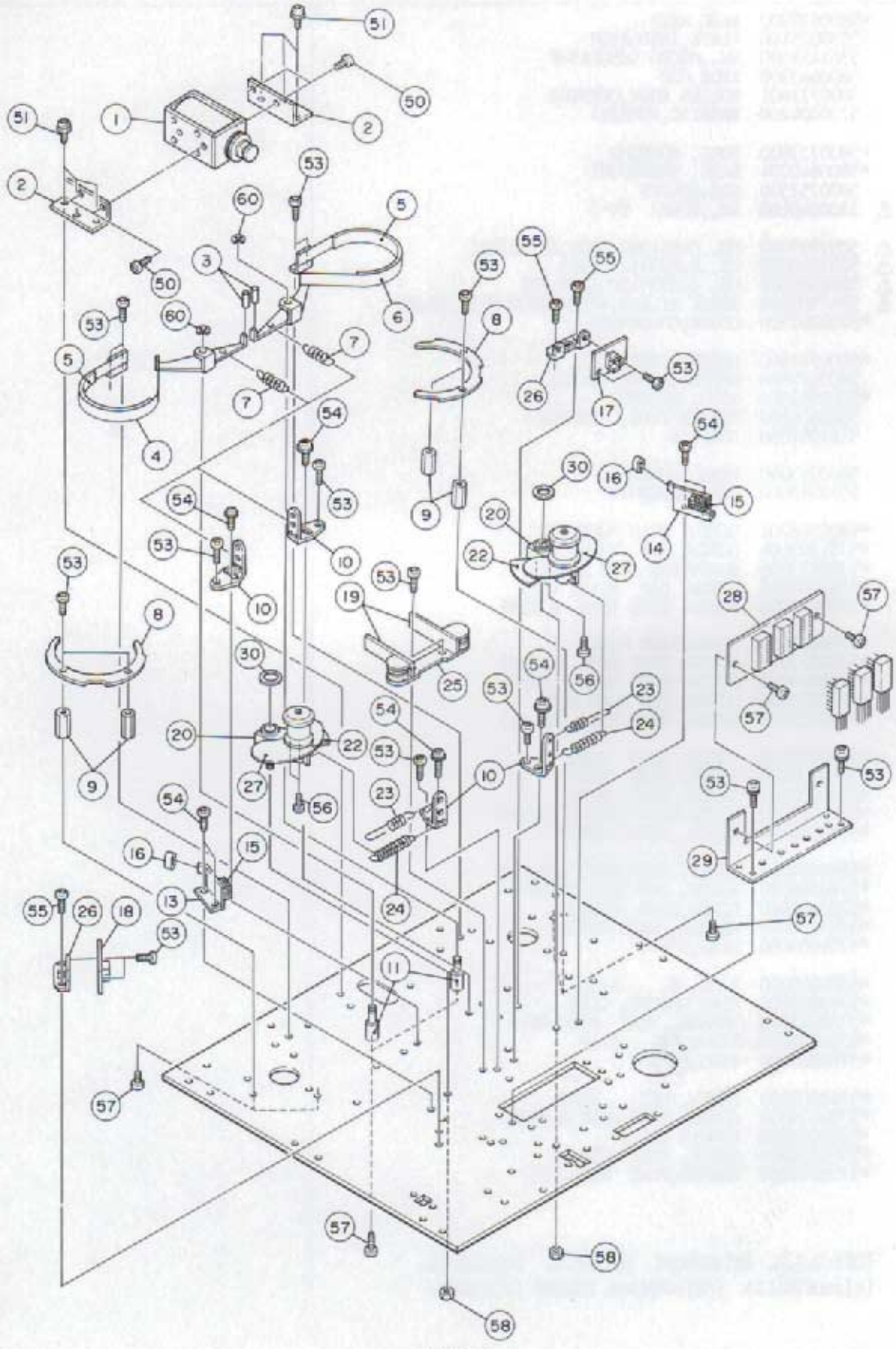
EXPLODED VIEW-2

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
2-51	*5800632900	BASE ASSY	
2-52	*5550025100	PLATE,INSULATOR	
2-53	5301455500	SW.,MICRO SS5GL13-F	
2-54	5800640300	KNOB,CUE	
2-55	5800721601	ROLLER ASSY,COUNTER	
	(5730004200	BEARING,NTN626)	
2-56	*5800723900	POLE, HOUSING	
2-57	*5800640204	BASE, TRANSPORT	
2-58	5800757500	CAP,ROLLER	
2-59	⚠ 5300040100	SW.,POWER TV-5	
2-60	⚠ 5052907000	CR.,0.01+300 400V AC [J,GE]	
	⚠ 5052910000	CR.,0.033+120 [US]	
	⚠ 5292002600	CR, 0.033+120 125V [C]	
	⚠ 5267703800	SPARK KILLER,4700PF400V M [E,UK,A]	
	*5730007500	COVER,CONDENSER	
2-61	*5800781800	HANGER, SPRING	
2-62	5800674600	SPRING,PINCH ROLLER	
2-63	*5800781000	STUD, STOPPER	
2-64	5800354100	RUBBER TUBE, STOPPER	
2-65	5581057000	SHAFT,B	
2-66	5800763000	HEAD, DUMMY	
2-67	5545022000	PIN, SOLENOID	
2-70	*5800348701	SCREW, HEAD MOUNTING	
2-71	*5781703006	SCREW, CAP M3X6 (NI)	
2-72	*5780133006	SCREW,PAN SEMS A M3X6	
2-73	*5781704012	SCREW, CAP M4X12 (NI)	
2-74	*5780033006	SCREW, BIND SEMS A M3X6	
2-75	*5780003006	SCREW,BIND M3X6	
2-76	*5780033005	SCREW, BIND SEMS A M3X5	
2-77	*5780054008	SCREW, BIND SEMS F M4X8	
2-78	*5780203006	SCREW, PAN HEAD M3X6	
2-79	*5780023006	SCREW, BIND M3X6 (BK NI)	
2-80	*5780003004	SCREW, BIND M3X4	
2-81	*5780002003	SCREW, BIND M2X3	
2-82	*5780002004	SCREW, BIND M2X4	
2-83	*5780033010	SCREW,BIND SEMS A M3X10	
2-84	*5780004010	SCREW, BIND M4X10	
2-85	*5780034010	SCREW, BIND SEMS A M4X10	
2-86	*5780204010	SCREW, PAN HEAD M4X10	
2-87	*5780002010	SCREW,BIND M2X10	
2-88	*5785150400	WASHER, WAVE WW-04	
2-89	*5786004000	RING,E E-4	
2-90	*5786003000	RING, E E-3	
2-91	*5785003000	FLAT WASHER, 0.5T	
2-92	*5785012000	WASHER, FLAT M2(0.4T)	
2-93	*5786102400	RING, CS 2.4F	
2-94	*5786007000	RING, E E-7	
2-95	*5782003003	SCREW, HEX. M3X3	
2-96	*5780034008	SCREW, BIND SEMS A M4X8	
2-97	*5786002500	RING,E E-2.5	
2-99	*5780204006	SCREW, FLAT M4X6	
2-100	*5785004000	WASHER,FLAT M4(0.5T)	

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

10-1-3. Exploded View-3 (Brake Tension Mechanism Section)

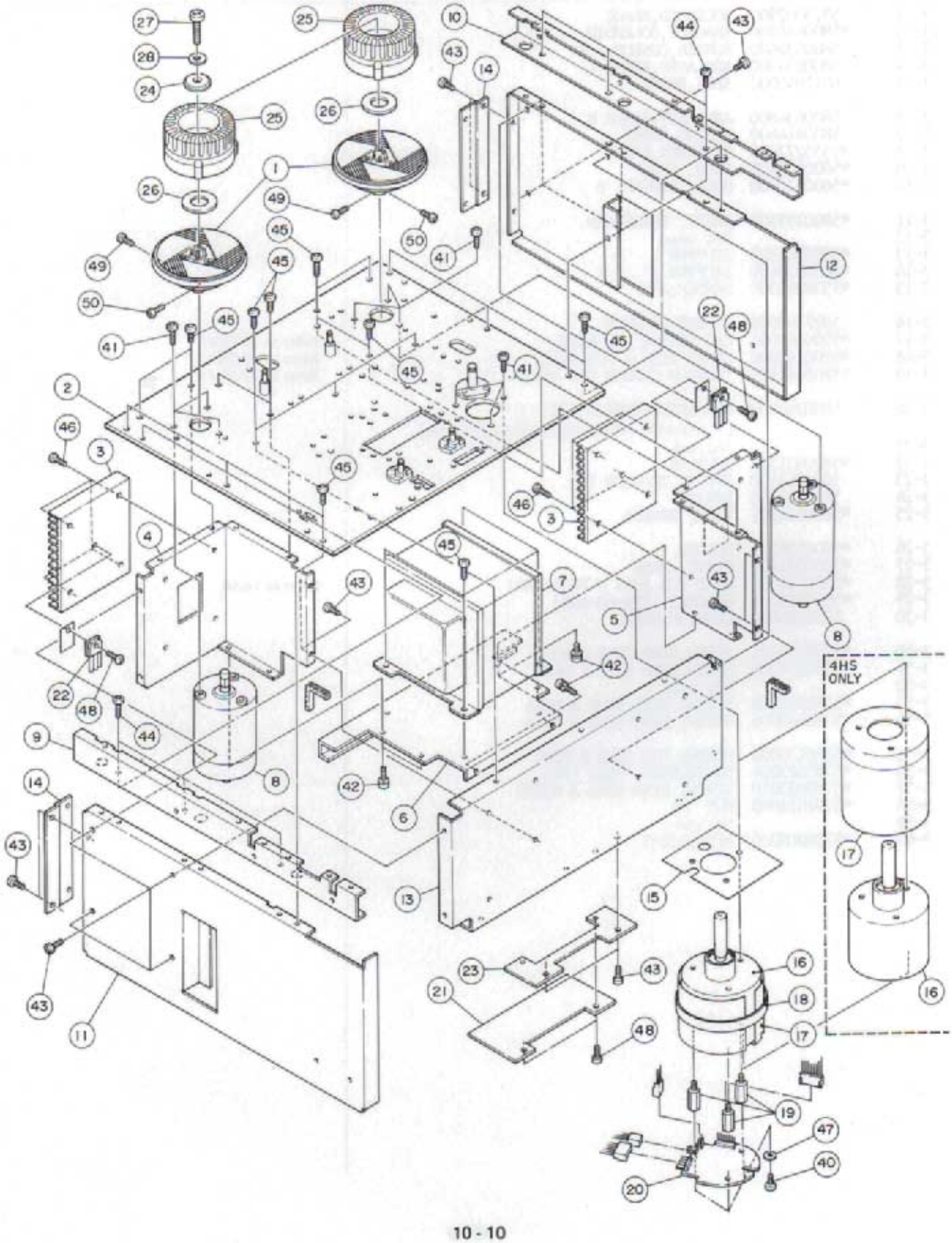


EXPLODED VIEW-3

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
3- 1	5313002900	SOLENOID,BRAKE	
3- 2	*5800636200	BRACKET,SOLENOID	
3- 3	5800532600	RUBBER,CUSHION A	
3- 4	5800634900	ARM ASSY,BRAKE L	
3- 5	6012041000	SHOE,BRAKE	
3- 6	5800634800	ARM ASSY,BRAKE R	
3- 7	5800814600	SPRING,BRAKE	
3- 8	*5555272000	RETAINER,BAND	
3- 9	*5800335401	STUD, BAND	
3-10	*5800670700	HOOK, SPRING B	
3-11	*5800335300	SHAFT, BRAKE ARM	
3-12		Not used	
3-13	*5800336300	STOPPER L	
3-14	*5800336400	STOPPER R	
3-15	*5534851000	DAMPER,ARM	
3-16	5027569000	RUBBER,CUSHION	
3-17	*5200160900	END SENSOR PCB ASSY	Refer to 10-29/47.
3-18	*5200160800	SPEED SENSOR PCB ASSY	Refer to 10-29/47.
3-19	*5200185900	TENSION SENSOR PCB ASSY	Refer to 10-29/47.
3-20	5800760100	ARM ASSY,TENSION 1/2	
		(5730004500 BEARING, WBC5-10ZZA/5K)	
3-21		Not used	
3-22	*5800631502	SHUTTER	
3-23	5800763100	SPRING,TENSION 1/2	
3-24	5800728000	SPRING	
3-25	*5800634201	BASE, SENSOR	
3-26	*5800336201	HOLDER	
3-27	*5800331400	PLATE, MASK	
3-28	*5200111000	HEAD PCB ASSY [ATR-60-4HS]	Refer to 10-54.
3-29	*5800815001	BRACKET [ATR-60-4HS]	
3-30	5800685800	CUSHION,PANEL	
3-50	*5780033005	SCREW,BIND SEMS A M3X5	
3-51	*5780054008	SCREW,BIND SEMS F M4X8	
3-52		Not used	
3-53	*5780033006	SCREW, BIND SEMS A M3X6	
3-54	*5780043006	SCREW, BIND SEMS B M3X6	
3-55	*5780133006	SCREW, PAN SEMS A M3X6	
3-56	*5780012004	SCREW,BIND M2X4 (NI)	
3-57	*5780033010	SCREW, BIND SEMS A M3X10	
3-58	*5781824000	NUT M4	
3-59		Not used	
3-60	*5786003000	RING,E;E-3	

10-1-4. Exploded View-4 (Motor, Transport, and Reel Table Sections)



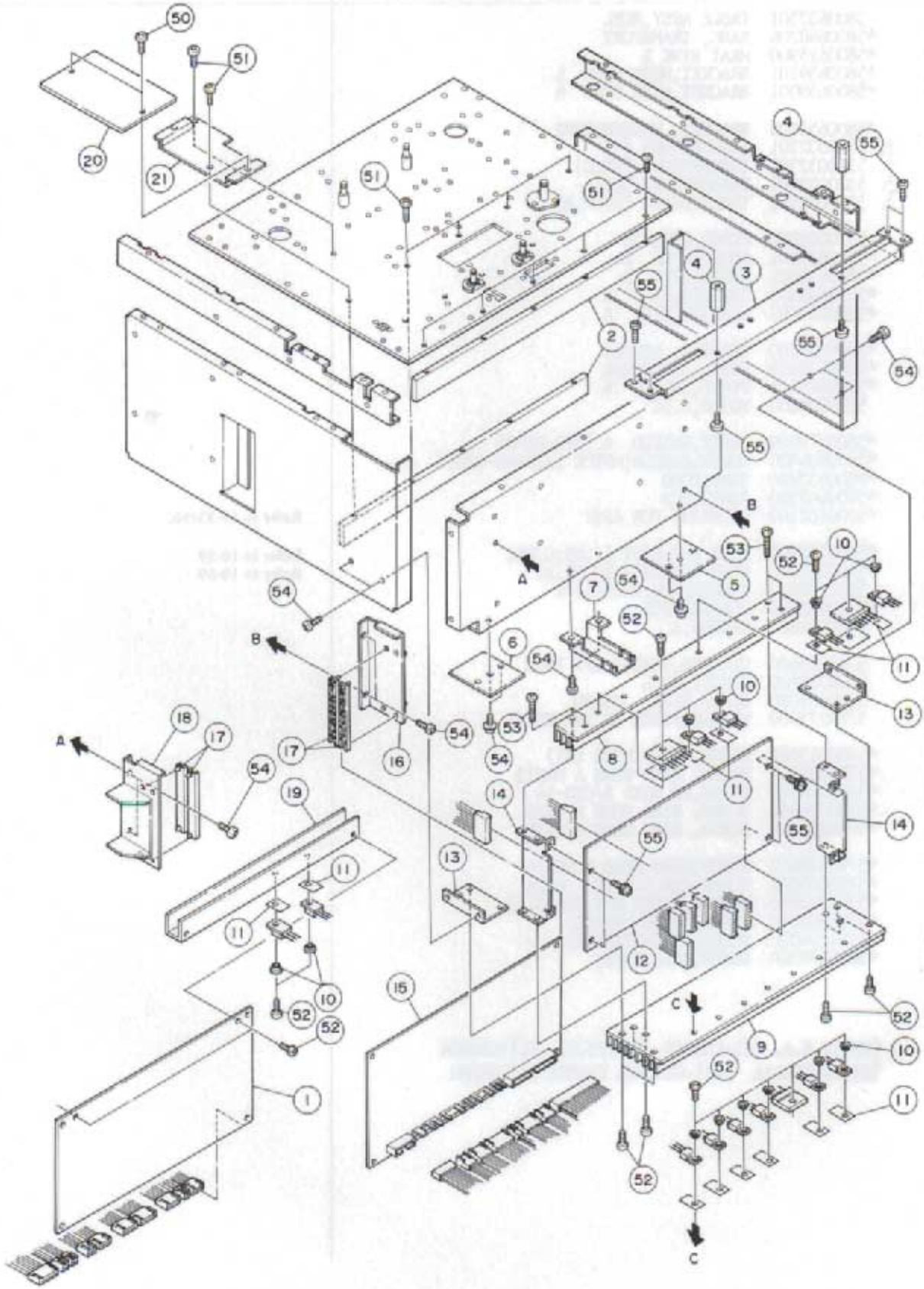
EXPLODED VIEW-4

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
4- 1	5800637501	TABLE ASSY,REEL	
4- 2	*5800640204	BASE, TRANSPORT	
4- 3	*5800525900	HEAT SINK B	
4- 4	*5800639101	BRACKET,HEAT SINK L	
4- 5	*5800639001	BRACKET,HEAT SINK R	
4- 6	*5800653103	BRACKET, TRANSFORMER	
4- 7	⚠ 5320032201	TRANSFORMER [J]	
	⚠ 5320032301	TRANSFORMER [US,C]	
	⚠ 5320032401	TRANSFORMER [GE]	
	⚠ 5320032501	TRANSFORMER [E,UK,A]	
4- 8	5370005300	MOTOR,REEL DC	
4- 9	*5800639601	ANGLE,SIDE L	
4-10	*5800639501	ANGLE,SIDE R	
4-11	*5800639403	CHASSIS,SIDE L	
4-12	*5800639303	CHASSIS,SIDE R	
4-13	*5800639200	CHASSIS, MIDDLE	
4-14	*5800638100	STAY, TOP COVER	
4-15	*5800679101	PLATE,SHIELD B	
4-16	5370006200	MOTOR,C.DC	
4-17	*5800679000	PLATE,SHIELD A [ATR-60-B]	
	*5800804500	COVER,SHIELD;MOTOR [ATR-60-4HS]	
4-18	*5800637800	BAND,CORD	
4-19	*5800660300	STAY, PCB	
4-20	*5200162200	CM DRIVE PCB ASSY	Refer to 10-33/50.
4-21	*5200161900	FUSE PCB ASSY [J,US,C,GE]	Refer to 10-59.
	*5200162000	FUSE PCB ASSY [E,UK,A]	Refer to 10-59.
4-22	5231758800	TRANSISTOR,2SD1047-E	
4-23	*5800652700	HOLDER, PCB	
4-24	5800324901	WASHER,A	
4-25	5740003400	CLAMPER,REEL;D 1/2 INCH	
4-26	5800326600	SPACER,REEL	
4-27	5780005020	SCREW,BIND M5X20	
4-28	5785225000	WASHER,FIBER BK 5X10X0.5T	
4-40	*5780013006	SCREW, BIND M3X6 (NI)	
4-41	*5780034012	SCREW, BIND SEMS A M4X12	
4-42	*5780004006	SCREW,BD M4X6 B/CZN-14	
4-43	*5780034006	SCREW, BIND SEMS A M4X6	
4-44	*5780034008	SCREW, BIND SEMS A M4X8	
4-45	*5780034010	SCREW,BIND SEMS A M4X10	
4-46	*5783003006	SCREW,PAN S TITE M3X6	
4-47	*5785213000	WASHER,FIBER WHT 3X6X0.5T	
4-48	*5780003010	SCREW, BIND M3X10	
4-49	*5781704010	SCREW,CAP;M4X10(NI)	
4-50	*5800678500	SCREW,BALL POINT	

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

10-1-5. Exploded View-5 (Transport Main PCB Section)



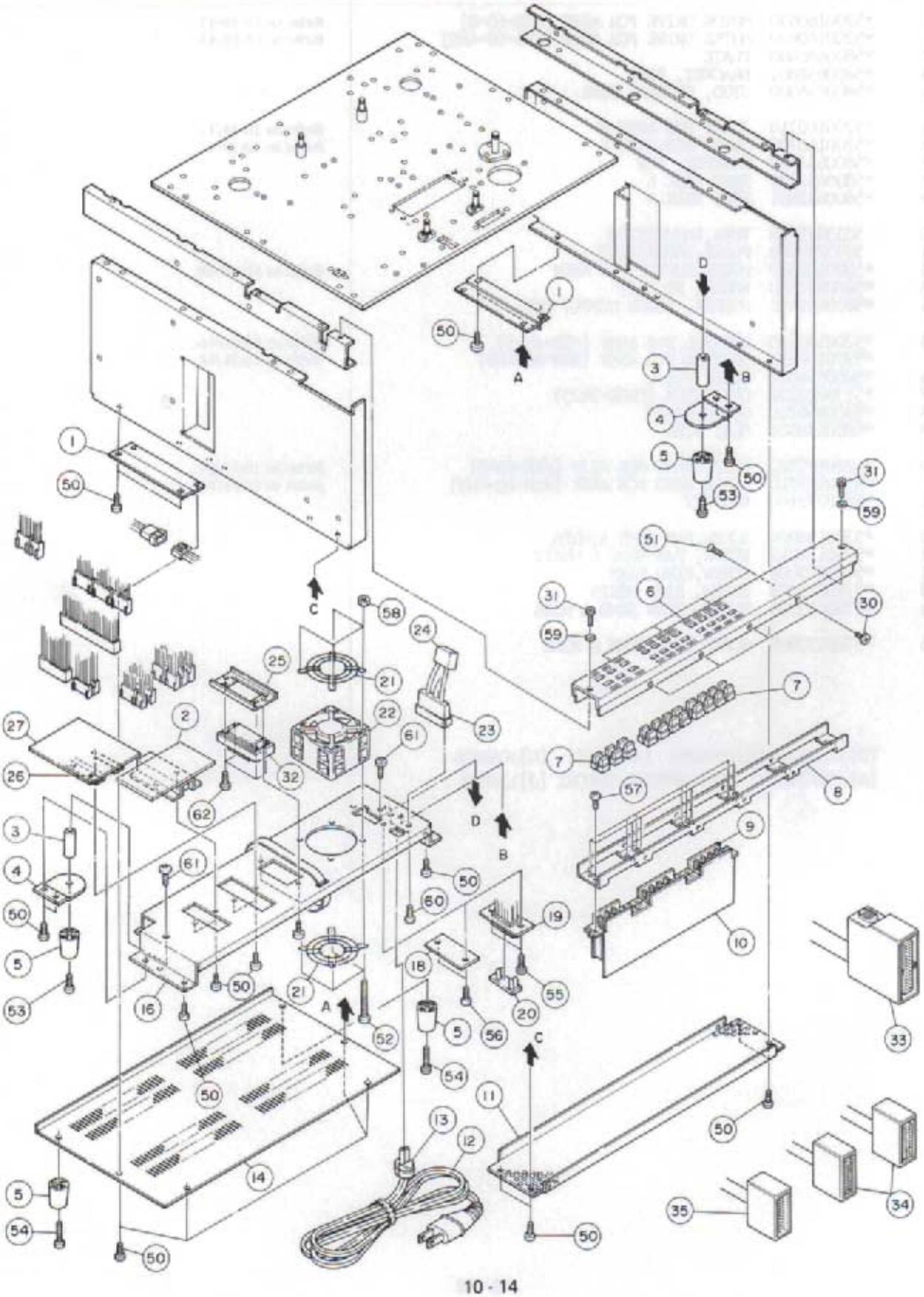
EXPLODED VIEW-5

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
5- 1	*5200160630	MOTOR DRIVE PCB ASSY [ATR-60-8]	Refer to 10-30/47.
	*5200160620	MOTER DRIVE PCB ASSY [ATR-60-4HS]	Refer to 10-30/47.
5- 2	*5800686600	PLATE	
5- 3	*5800658801	BRACKET, BASE	
5- 4	*5800658300	STUD, HOUSING BASE	
5- 5	*5200160710	JOINT PCB ASSY R	Refer to 10-29/47.
5- 6	*5200160700	JOINT PCB ASSY L	Refer to 10-29/47.
5- 7	*5800637900	CLAMPER, PCB	
5- 8	*5800652900	HEAT SINK B	
5- 9	*5800652801	HEAT SINK A	
5-10	5033295000	TUBE,INSURATION	
5-11	5033291000	PLATE,INSURATION	
5-12	*5200160300	POWER SUPPLY PCB ASSY	Refer to 10-44/59.
5-13	*5800652300	ANGLE, PS UNIT	
5-14	*5800652402	HOLDER, POWER SUPPLY PCB	
5-15	*5200160530	CONTROL PCB ASSY [ATR-60-8]	Refer to 10-26/46.
	*5200160520	CONTROL PCB ASSY [ATR-60-4HS]	Refer to 10-26/46.
5-16	*5800656601	GUIDE,PCB L	
5-17	*5730003200	GUIDE,PCB (TROG-3925)	
5-18	*5800656701	GUIDE,PCB R	
5-19	*5800638001	HEAT SINK	
5-20	*5200185720	ERASE HEAD PCB ASSY [ATR-60-8]	Refer to 10-35/54.
	*5200185710	ERASE HEAD PCB ASSY [ATR-60-4HS]	Refer to 10-35/54.
5-21	*5800772100	BRACKET	
5-50	*5780134006	SCREW,PAN SEMS A;M4X6	
5-51	*5780134012	SCREW, PAN SEMS A M4X12	
5-52	*5780003008	SCREW,BIND M3X8	
5-53	*5780003025	SCREW, BIND M3X25	
5-54	*5780033006	SCREW, BIND SEMS A M3X6	
5-55	*5780133008	SCREW, PAN SEMS A M3X8	

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

10-1-6. Exploded View-6 (Rear Panel and Function Panel Sections)



EXPLODED VIEW-6

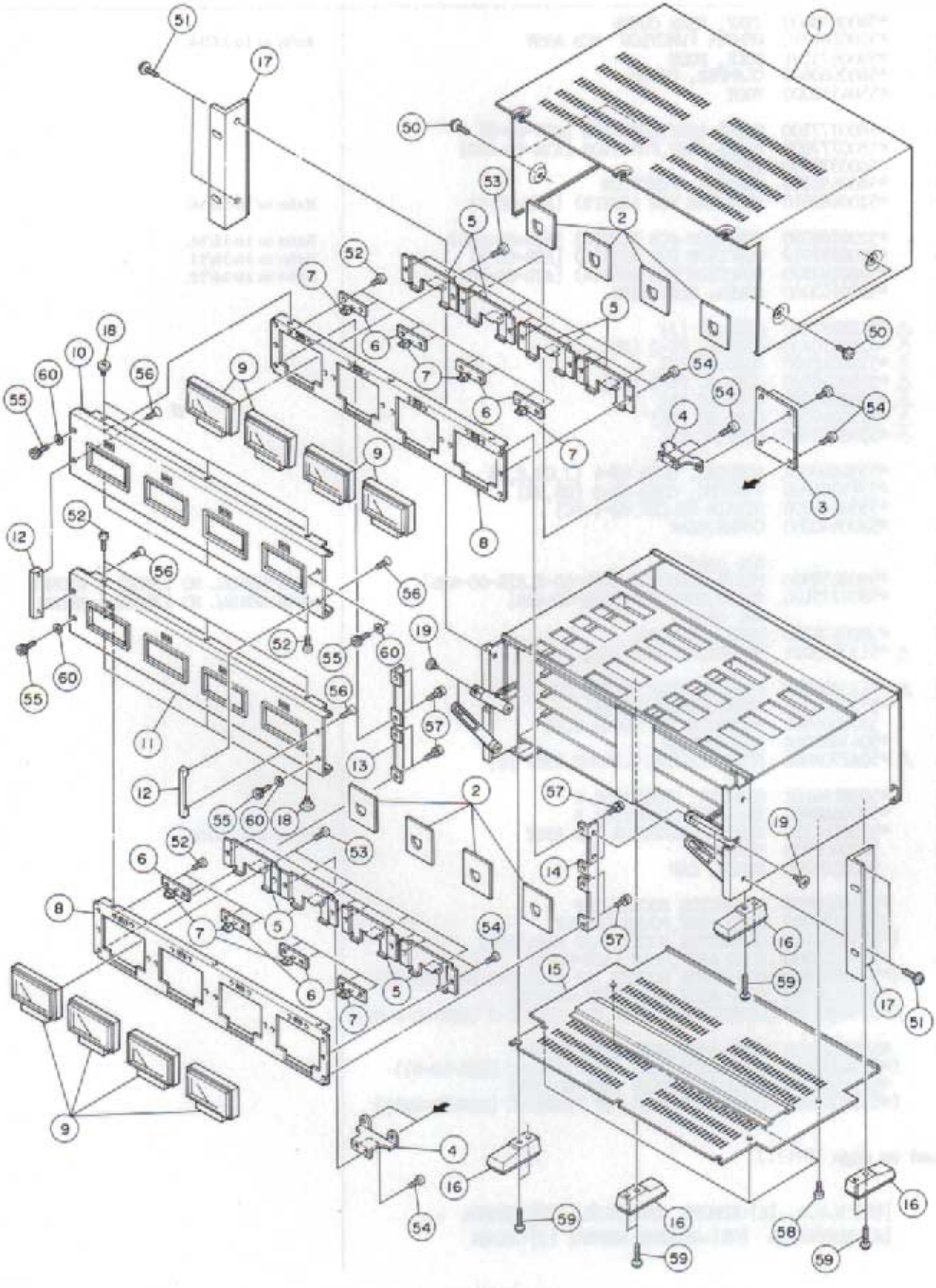
Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
6- 1	*5800638400	STAY, REAR COVER	
6- 2	*5200161710	REMOTE FUNCTION PCB ASSY	Refer to 10-35/54.
6- 3	*5800675101	POLE, FOOT	
6- 4	*5800660600	CLAMPER, CABLE	
6- 5	*5504552000	FOOT	
6- 6	*5800777100	PANEL ASSY,FUNCTION [ATR-60-8]	
	*5800777000	PANEL ASSY,FUNCTION [ATR-60-4HS]	
6- 7	5800378900	BUTTON	
6- 8	*5800656500	CHASSIS, FUNCTION	
6- 9	*5200188010	FUNCTION PCB ASSY(B) [ATR-60-8]	Refer to 10-38/56.
	*5200188000	FUNCTION PCB ASSY(B) [ATR-60-4HS]	Refer to 10-38/56.
6-10	*5200187910	FUNCTION PCB ASSY(A) [ATR-60-8]	Refer to 10-38/55.
	*5200187900	FUNCTION PCB ASSY(A) [ATR-60-4HS]	Refer to 10-38/55.
6-11	*5800653000	COVER, HEAT SINK	
6-12	⚠ *5128027000	CORD,AC [J]	
	⚠ *5350010700	CORD,AC PT-2 [US]	
	⚠ *5350012200	CORD,AC [C]	
	⚠ *5350010800	CORD,AC PT-1 [GE]	
	⚠ *5350008200	CORD,AC [E]	
	⚠ *5128047000	CORD,AC [UK]	
	⚠ *5350008300	CORD,AC [A]	
6-13	*5534660000	BUSHING, CORD 4N-4 [J,GE,E,A]	
	*5317001700	BUSHING, CORD 4N-5 [US,UK]	
	*5534663000	STRAIN RELIEF 6W-1 [C]	
6-14	*5800640000	COVER,REAR	
6-15		Not used	
6-16	*5800638900	PLATE,CONNCTOR [ATR-60-8,ATR-60-4HS]	-4HS:SERIAL NO 170021 & HIGHER
	*5800775100	PLATE,CONNCTOR [ATR-60-4HS]	-4HS:SERIAL NO 170020 & BELOW
6-17		Not used	
6-18	*5800676700	MASK, SELECTOR	
6-19	⚠ *5133015001	SOCKET,VOLTAGE [GE]	
6-20	⚠ *5133014000	PLUG,VOLTAGE SELECT [GE]	
6-21	*5730006300	GUARD,FINGER (A-38)	
6-22	5370005600	MOTOR,DC FAN 0.09 2.16	
6-23	*5043849000	TERMINAL,3P	
6-24	⚠ *5267702600	SPARK KILLER 0.047MF 250V [E]	
6-25	*5800194101	BRACKET, CONNECTOR C	
6-26	*5800640901	BRACKET, CONNECTOR B	
6-27	*5200161320	REMOTE CONNECTOR PCB ASSY	Refer to 10-33/50.
6-30	5800400900	SCREW,	
6-31	5800509700	SCREW, CAP	
6-32	*5334012900	CONNECTOR SOCKET,38P	
6-33	*5355126000	CORD ASSY,POWER SUPPLY	
	(*5334033100	CONNECTOR SOCKET,45P S1645A-C)	
6-34	*5355126300	CORD ASSY,HEAD [ATR-60-8]	
	(*5334035700	CONNECTOR SOCKET,16P S1616G-C [ATR-60-8])	
	*5355126100	CORD ASSY,HEAD [ATR-60-4HS]	
	(*5334035300	CONNECTOR SOCKET,8P S1608G-C [ATR-60-4-HS])	
6-35	*5355126400	CORD ASSY,HEAD [ATR-60-8]	
	(*5334033800	CONNECTOR PLUG,16P P1616G-C [ATR-60-8])	
	*5355126200	CORD ASSY,HEAD [ATR-60-4HS]	
	(*5334033400	CONNECTOR PLUG, 8P P1608G-C [ATR-60-4HS])	

(Continued on page 10-17.)

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

10-1-7. Exploded View-7 (Amplifier Front Mechanism) (ATR-60-8)



EXPLODED VIEW-7 [AIR-60-8]

Parts marked with *require longer delivery time.

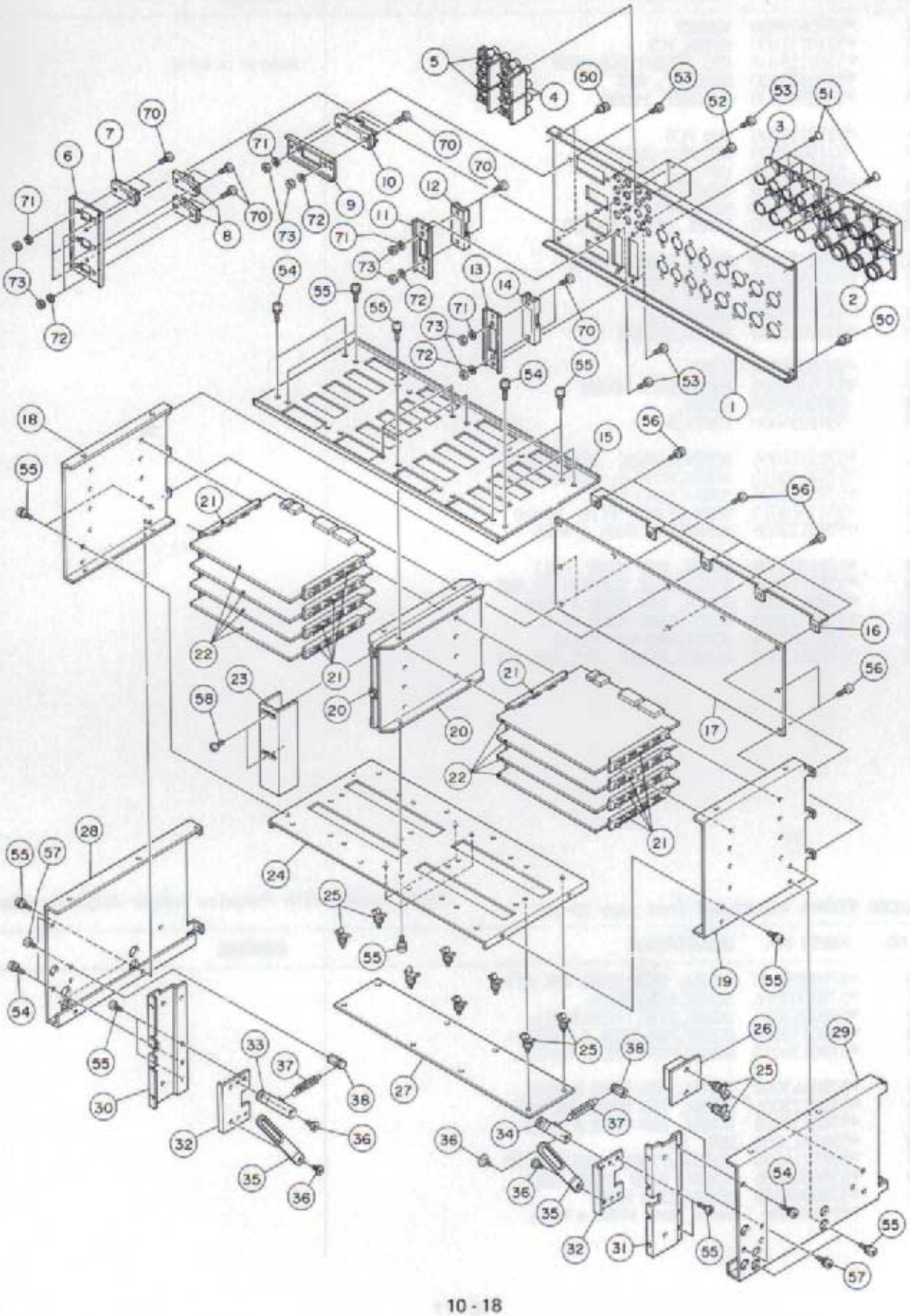
REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
7- 1	*5800655800	BONNET	
7- 2	*5210111600	METER PCB	
7- 3	*5200139100	REC SELECT PCB ASSY	Refer to 10-40/56.
7- 4	*5800772700	BRACKET, PCB	
7- 5	*5800563000	BRACKET, METER	
7- 6	*5210139200	LED PCB	
7- 7	5225012900	LED,SLC-26UR5	
	5225010100	LED,SLP-155B	
7- 8	*5800773300	CHASSIS, AMP	
7- 9	5296006600	METER,VU	
7-10	*5800774500	PANEL ASSY, AMP(U)	
7-11	*5800774600	PANEL ASSY, AMP(L)	
7-12	*5800349700	HANDLE ASSY	
7-13	*5800772900	JOINT (L)	
7-14	*5800773000	JOINT (R)	
7-15	*5800655700	PLATE,BOTTOM	
7-16	*5800288502	FOOT,	
7-17	*5800566000	ANGLE,RACK MOUNT	
7-18	5800400900	SCREW,	
7-19	5581056000	SHAFT,A	
7-50	*5783114006	SCREW,WASHER M4X6(BK NI)	
7-51	*5783144010	SCREW,WASHER M4X10 (NI)	
7-52	*5780003006	SCREW,BIND M3X6	
7-53	*5783013010	SCREW,PAN B TITE M3X10	
7-54	*5780133006	SCREW,PAN SEMS A M3X6	
7-55	*5781703006	SCREW, CAP M3X6 (NI)	
7-56	*5781212606	SCREW,FLAT,TAPPING M2.6X6	
7-57	*5780133006	SCREW, PAN SEMS A M3X6	
7-58	*5780023008	SCREW,BIND M3X8 NI B	
7-59	*5783103014	SCREW,WASHER M3X14	
7-60	*5785213200	WASHER,FIBER 3X5.5X0.25T	

Parts marked with *require longer delivery time.

EXPLODED VIEW-6 (Continued from page 10-15)

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
6-50	*5780023006	SCREW, BIND M3X6 (BK NI)	
6-51	*5780003008	SCREW,BIND M3X8	
6-52	*5780013045	SCREW,BIND M3X45(NI)	
6-53	*5780133010	SCREW,PAN SEMS A M3X10	
6-54	*5780134010	SCREW,PAN SEMS A M4X10	
6-55	*5780143008	SCREW, PAN SEMS B M3X8	
6-56	*5780123006	SCREW, PAN M3X6 (BK NI)	
6-57	*5780133008	SCREW, PAN SEMS A M3X8	
6-58	*5781813000	NUT M3	
6-59	*5785214200	WASHER,FIBER 4X6.5X0.5T	
6-60	*5780013006	SCREW, BIND M3X6 (NI)	
6-61	*5780004008	SCREW,BIND M4X8	
6-62	*5780033006	Screw, BIND SEMS A M3X6	

10-1-8. Exploded View-8 (Amplifier Rear Mechanism) (ATR-60-8)

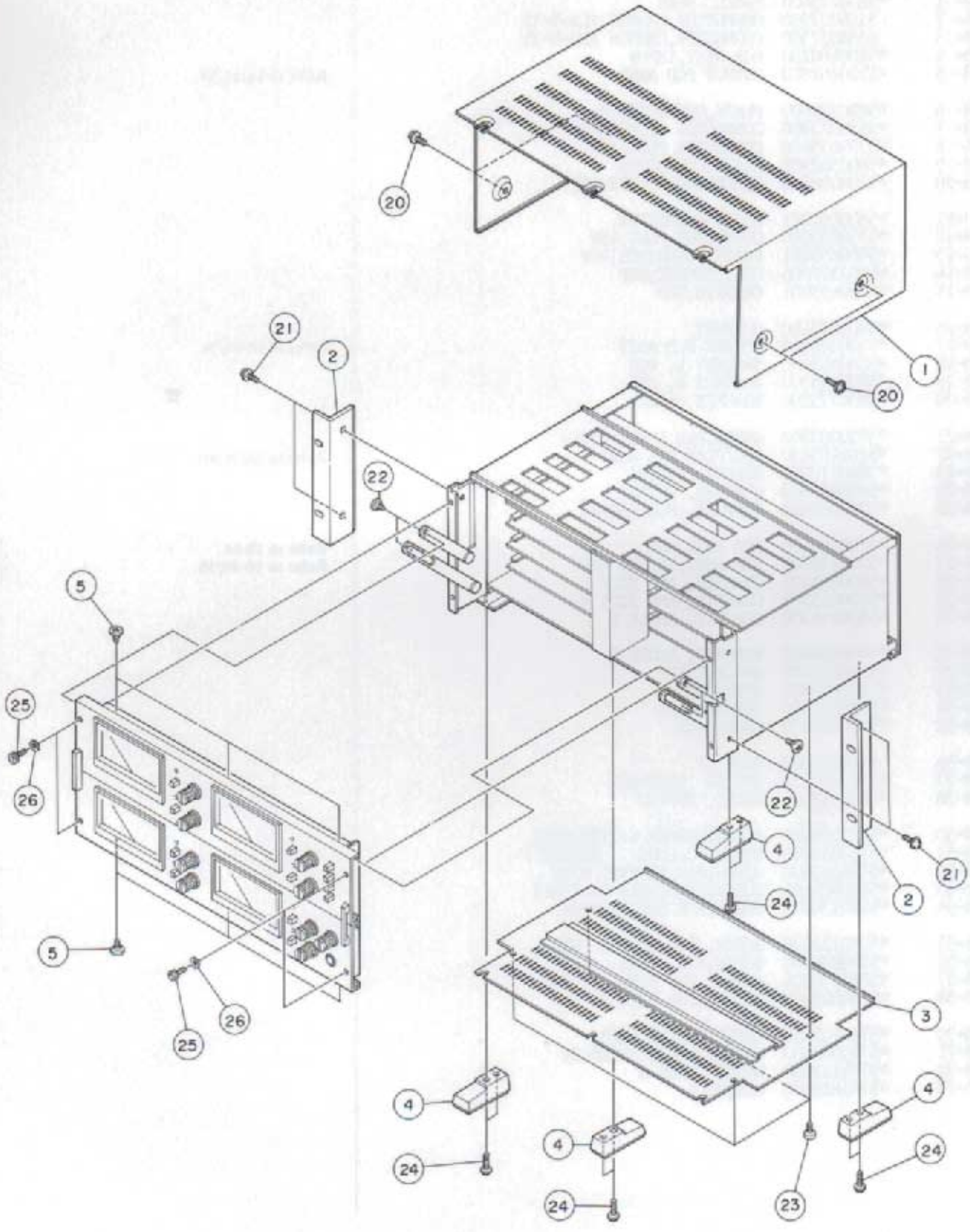


EXPLODED VIEW-8 [ATR-60-8]

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
8- 1	*5800773400	PANEL, REAR	
8- 2	5334027200	CONNECTOR,CANNON XLR-3-32	
8- 3	5334027300	CONNECTOR,CANNON XLR-3-31	
8- 4	*5200160200	PCB ASSY,INPUT	
8- 5	*5200161810	OUTPUT PCB ASSY	Refer to 10-35/54.
8- 6	*5800772600	PLATE,CONNECTOR N	
8- 7	*5334033900	CONNECTOR SOCKET,16P	
8- 8	*5334035600	CONNECTOR PLUG,16P	
8- 9	*5800562901	PLATE,CONNECTOR	
8-10	*5334038500	CONNECTOR SOCKET,45P	
8-11	*5800562901	PLATE,CONNECTOR	
8-12	*5334033000	CONNECTOR PLUG,45P	
8-13	*5800653601	PLATE,CONNECTOR;60P	
8-14	*6052392006	CON.,SOCKET;60P	
8-15	*5800655001	CHASSIS,TOP	
8-16	*5800773100	SUPPORT	
8-17	*5200188110	MOTHER PCB ASSY	Refer to 10-36/54.
8-18	*5800655400	BRACKET L, PCB	
8-19	*5800655500	BRACKET R, PCB	
8-20	*5800773200	BRACKET, RAIL	
8-21	*5730003200	GUIDE,PCB (TRCG-3925)	
8-22	*5200185830	REC/PLAY PCB ASSY	Refer to 10-34/50.
8-23	*5800772400	HOLDER, PCB(N)	
8-24	*5800655300	CHASSIS, BOTTOM	
8-25	*5787010400	SUPPORT, PCB CBS-4N	
8-26	*5200160400	PCB ASSY,OSC	Refer to 10-54.
8-27	*5200128820	PCB ASSY,IN/OUT AMP	Refer to 10-40/56.
8-28	*5800655101	CHASSIS, AMP SIDE L	
8-29	*5800655201	CHASSIS, AMP SIDE R	
8-30	*5800654300	BRACKET, ANGLE L	
8-31	*5800654400	BRACKET, ANGLE R	
8-32	*5800654100	BRACKET,ARM	
8-33	*5800653800	UPPER ARM L	
8-34	*5800653900	UPPER ARM R	
8-35	*5800654000	LOWER ARM	
8-36	5581056000	SHAFT,A	
8-37	*5791603160	SPRING 6031-60	
8-38	*5800677000	SHAFT, SPRING	
8-50	*5783583006	SCREW,WASHER S TITE:M3X6	
8-51	*5783653008	SCREW, C.SUNK M3X8(NI)	
8-52	*5781063008	SCREW,PAN,TAPPING M3X8	
8-53	*5780023006	SCREW,BIND;M3X6 (BLK NI)	
8-54	*5780134008	SCREW,PAN SEMS A M4X8	
8-55	*5780133008	SCREW, PAN SEMS A M3X8	
8-56	*5780003006	SCREW,BIND M3X6	
8-57	*5780133006	SCREW, PAN SEMS A M3X6	
8-58	*5780023008	SCREW,BIND M3X8 NI B	
8-70	*5780102610	SCREW,PAN;M2.6X10	
8-71	*5785002600	WASHER,LOCK2.6X5X0.5T	
8-72	*5785112600	WASHER,LOCK A	
8-73	*5781812600	NUT,M2.6	

10-1-9. Exploded View-9 (Amplifier Front Mechanism) (ATR-60-4HS)

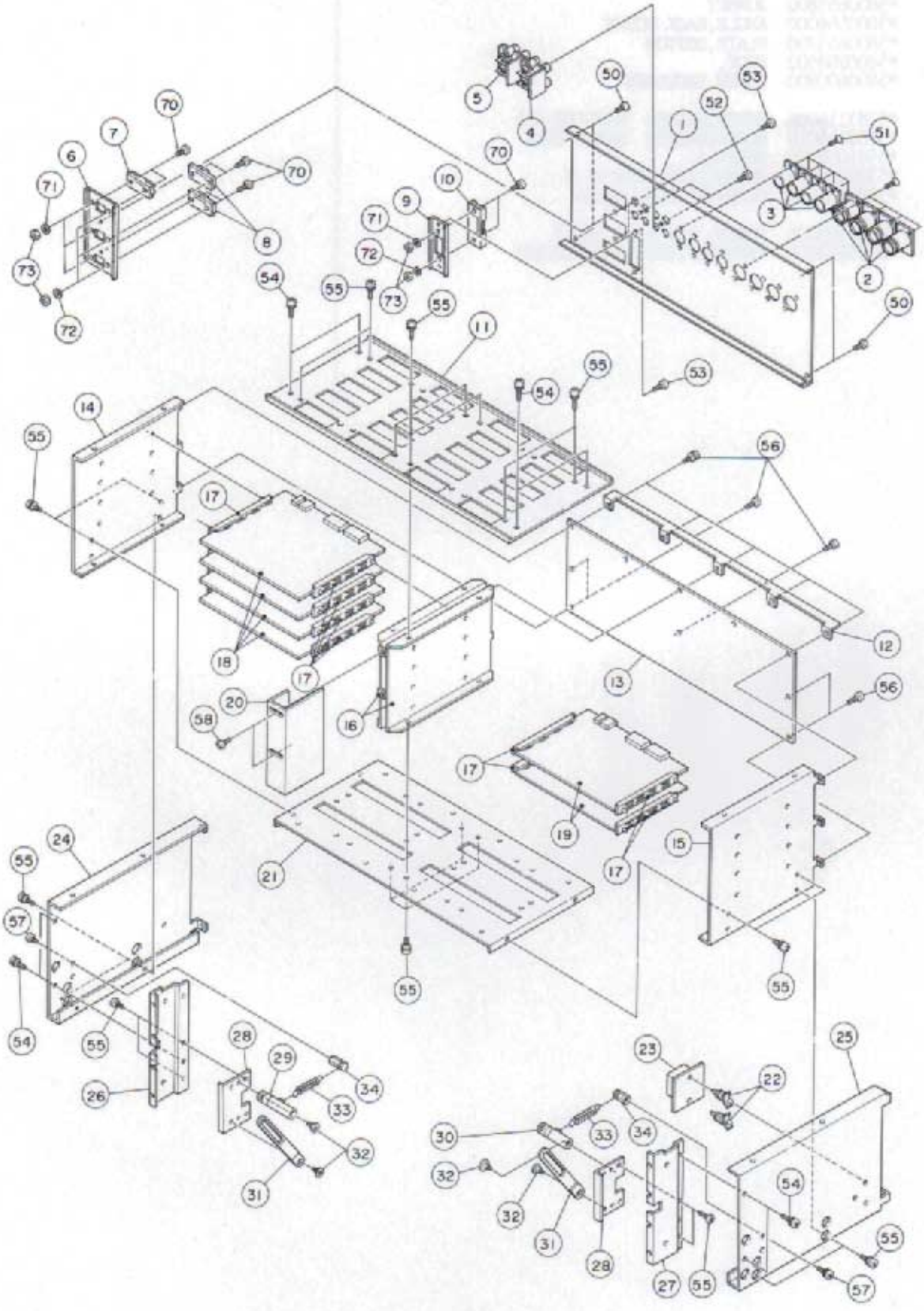


XPLODED VIEW-9 [ATR-60-4HS]

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
9- 1	*5800655800	BONNET	
9- 2	*5800566000	ANGLE,RACK MOUNT	
9- 3	*5800655700	PLATE,BOTTOM	
9- 4	*5800288502	FOOT,	
9- 5	*5800400900	SCREW,SHOULDER	
9-20	*5783114006	SCREW,WASHER M4X6(BK NI)	
9-21	*5783144010	SCREW,WASHER M4X10 (NI)	
9-22	*5581056000	SHAFT,A	
9-23	*5780023008	SCREW,BIND M3X8 NI B	
9-24	*5783103014	SCREW,WASHER M3X14	
9-25	*5781703006	SCREW, CAP M3X6 (NI)	
9-26	*5785213200	WASHER,FIBER 3X5.5XO.25T	

10-1-10. Exploded View-10 (Amplifier Rear Mechanism) (ATR-60-4HS)

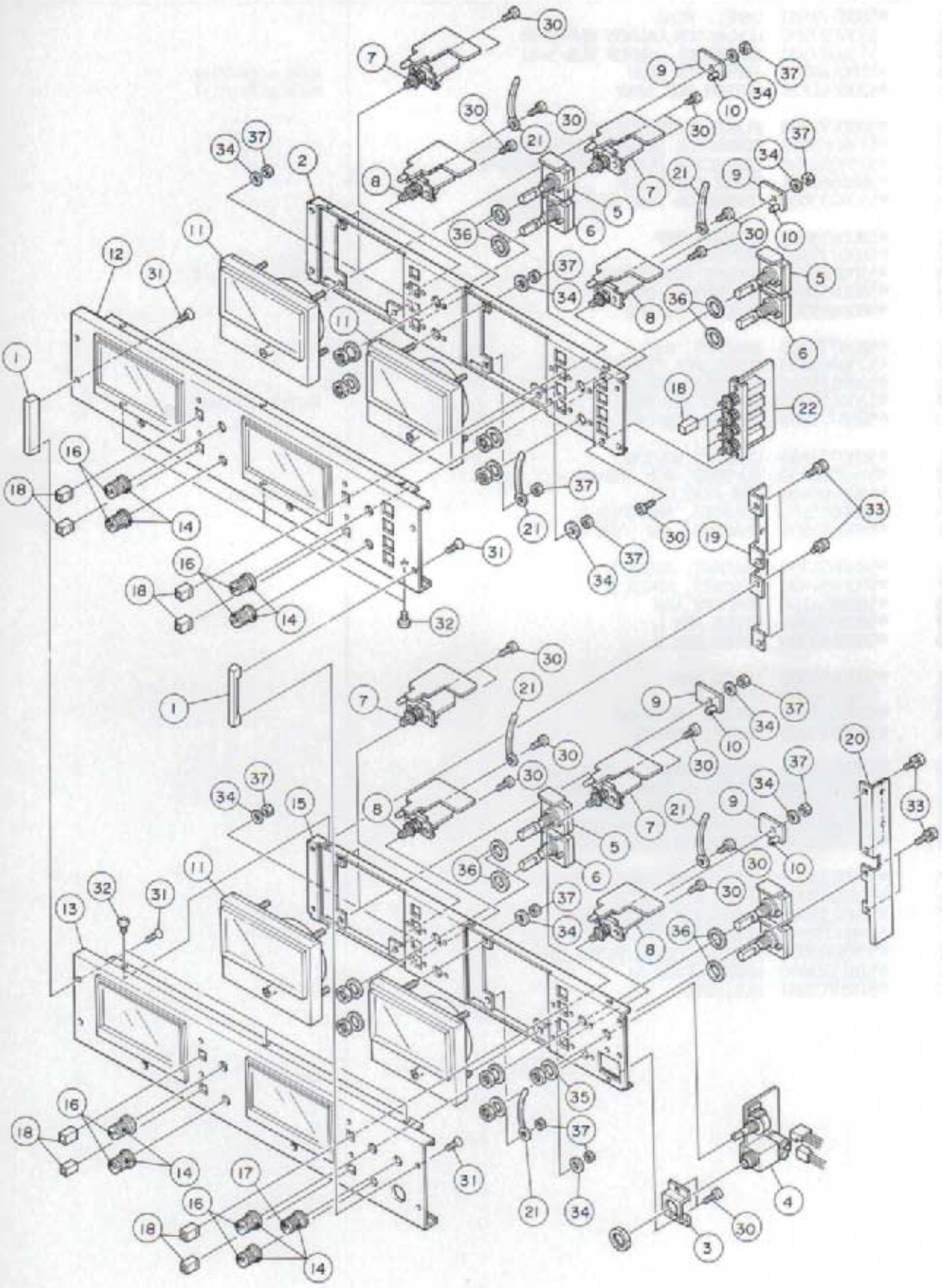


EXPLODED VIEW-10 [ATR-60-4HS]

Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
10- 1	*5800773500	PANEL. REAR	
10- 2	5334027200	CONNECTOR,CANNON XLB-3-32	
10- 3	5334027300	CONNECTOR,CANNON XLB-3-31	
10- 4	*5200160210	INPUT PCB ASSY	Refer to 10-35/54.
10- 5	*5200161810	OUTPUT PCB ASSY	Refer to 10-35/54.
10- 6	*5800772500	PLATE,CONNECTOR M	
10- 7	*5334033500	CONNECTOR SOCKET,08P S1608G-ST	
10- 8	*5334035200	CONNECTOR PLUG, 08P S1608G-ST	
10- 9	*5800562901	PLATE,CONNECTOR	
10-10	*5334033000	CONNECTOR PLUG 45P P1645A-ST	
10-11	*5800655001	CHASSIS,TOP	
10-12	*5800773100	SUPPORT	
10-13	*5200188100	MOTHER PCB ASSY	Refer to 10-36/54.
10-14	*5800655400	BRACKET L, PCB	
10-15	*5800655500	BRACKET R, PCB	
10-16	*5800773200	BRACKET, RAIL	
10-17	*5730003200	GUIDE,PCB (TRCG-3925)	
10-18	*5200185820	REC/PLAY PCB ASSY	
10-19	*5200139000	IN/OUT PCB ASSY	Refer to 10-42/57.
10-20	*5800772300	HOLDER,PCB (M)	
10-21	*5800777200	CHASSIS,BOTTOM	
10-22	*5787010400	SUPPORT, PCB CBS-4N	
10-23	*5200160400	PCB ASSY,OSC	Refer to 10-54.
10-24	*5800655101	CHASSIS, AMP SIDE L	
10-25	*5800655201	CHASSIS, AMP SIDE R	
10-26	*5800654300	BRACKET, ANGLE L	
10-27	*5800654400	BRACKET, ANGLE R	
10-28	*5800654100	BRACKET,ARM	
10-29	*5800653800	UPPER ARM L	
10-30	*5800653900	UPPER ARM R	
10-31	*5800654000	LOWER ARM	
10-32	5581056000	SHAFT,A	
10-33	*5791603160	SPRING 6031-60	
10-34	*5800677000	SHAFT, SPRING	
10-50	*5783583006	SCREW,WASHER S TITE;M3X6	
10-51	*5783653008	SCREW, C.SUNK M3X8(NI)	
10-52	*5781063008	SCREW,PAN,TAPPING M3X8	
10-53	*5780023006	SCREW,BIND;M3X6 (BLK NI)	
10-54	*5780134008	SCREW,PAN SEMS A M4X8	
10-55	*5780133008	SCREW, PAN SEMS A M3X8	
10-56	*5780003006	SCREW,BIND M3X6	
10-57	*5780133006	SCREW,PAN SEMS A M3X6	
10-58	*5780023008	SCREW, BIND M3X8 NI B	
10-71	*5785002600	WASHER,LOCK;2.9X5X0.5T	
10-72	*5785112600	WASHER,LOCK A;	
10-73	*5781812600	NUT,M2.6	

10-1-11. Exploded View-11 (Amplifier Internal Mechanism) (ATR-60-4HS)



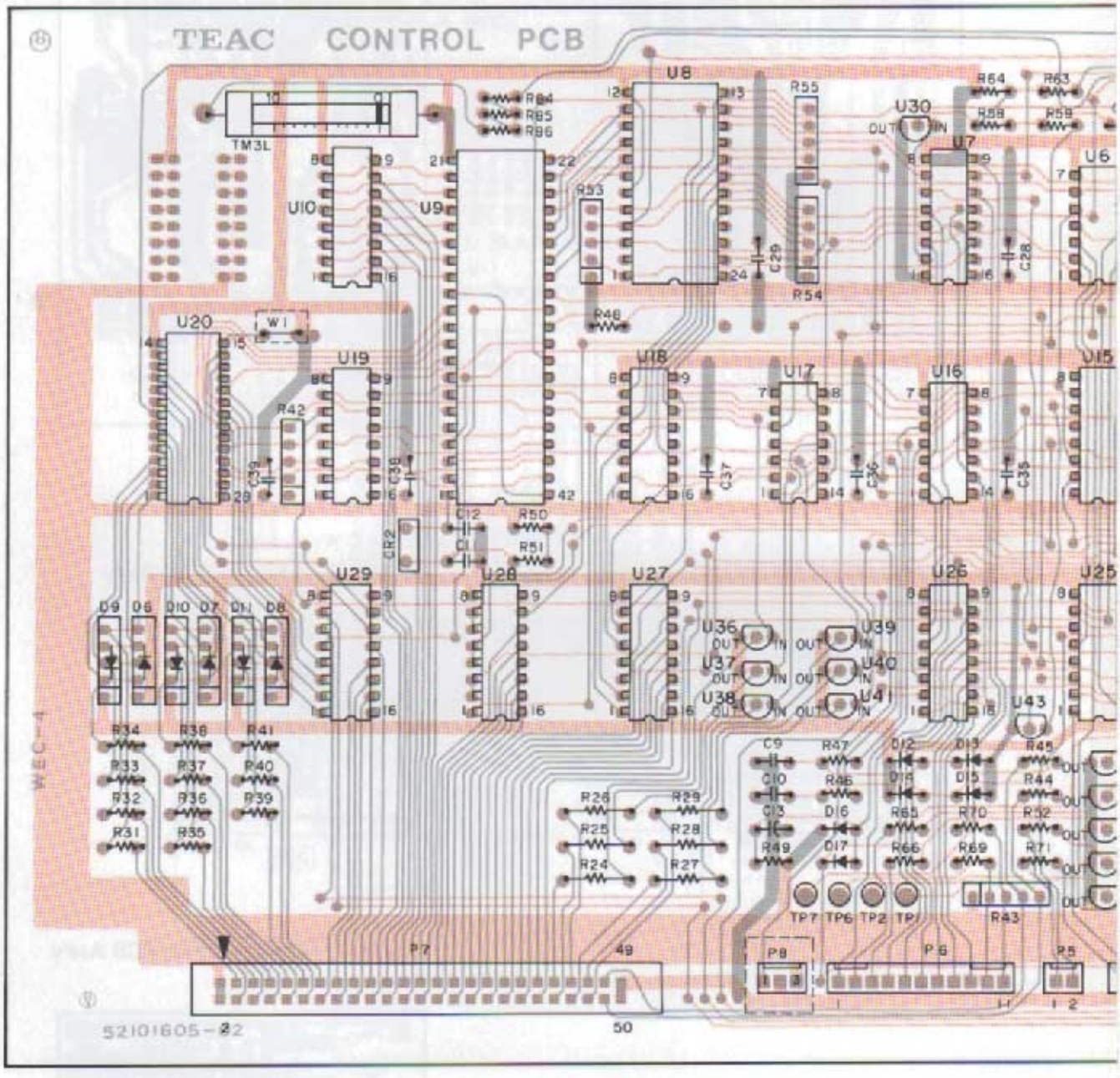
EXPLODED VIEW-11 [ATR-60-4HS]

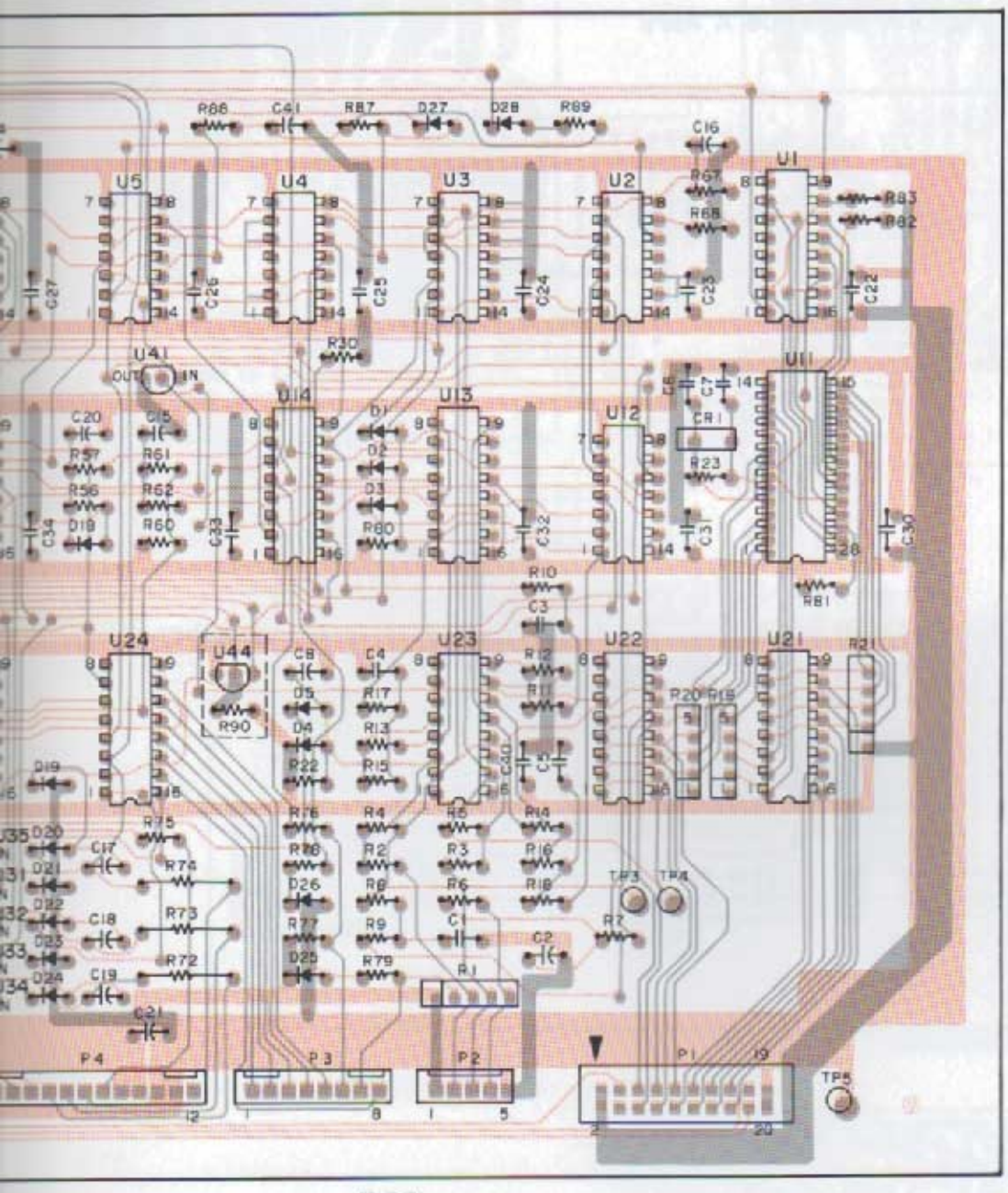
Parts marked with *require longer delivery time.

REF.NO.	PARTS NO.	DESCRIPTION	REMARKS
11- 1	*5800349700	HANDLE	
11- 2	*5800773700	CHASSIS ASSY, AMP (U)	
11- 3	*5800505300	BRACKET BL	
11- 4	*5200128210	PHONE AMP PCB ASSY	Refer to 10-43/58.
11- 5	*5200128610	VR PCB ASSY(1)	Refer to 10-58.
11- 6	*5200129110	VR PCB ASSY(2)	Refer to 10-58.
11- 7	*5200128700	SW(1) PCB ASSY [ATR-60-4HS]	Refer to 10-43/58.
11- 8	*5200129200	SW(2) PCB ASSY [ATR-60-4HS]	Refer to 10-43/58.
11- 9	*5210097600	LED PCB	
11-10	5225006900	LED,PR3432S RED	
11-11	5296006000	VU METER	
11-12	*5800774100	PANEL ASSY, AMP (U)	
11-13	*5800774200	PANEL ASSY, AMP (L)	
11-14	5800679900	KNOB,	
11-15	*5800773800	CHASSIS ASSY,AMP (L)	
11-16	5800680000	CAP,IVORY	
11-17	5800680100	CAP,ORANGE	
11-18	5800429200	BUTTON,PUSH A 388/52NB	
11-19	*5800772900	JOINT (L)	
11-20	*5800772800	JOINT	
11-21	*5786713000	HARNESS CLIP F3	
11-22	*5200188200	REC SELECT PCB ASSY	
11-30	*5783003006	SCREW, PAN S TITE M3X6	
11-31	*5781212606	SCREW,FLAT,TAPPING M2.6X6	
11-32	*5780003006	SCREW,BIND M3X6	
11-33	*5780133006	SCREW, PAN SEMS A M3X6	
11-34	*5785103000	WASHER,SPRING F3	
11-35	*5785027100	WASHER,FLAT 7.5X13X1T	
11-36	*5785008000	WASHER,FLAT M8 (1.2T)	
11-37	*5781813000	NUT M3	

10-2. ELECTRONICS

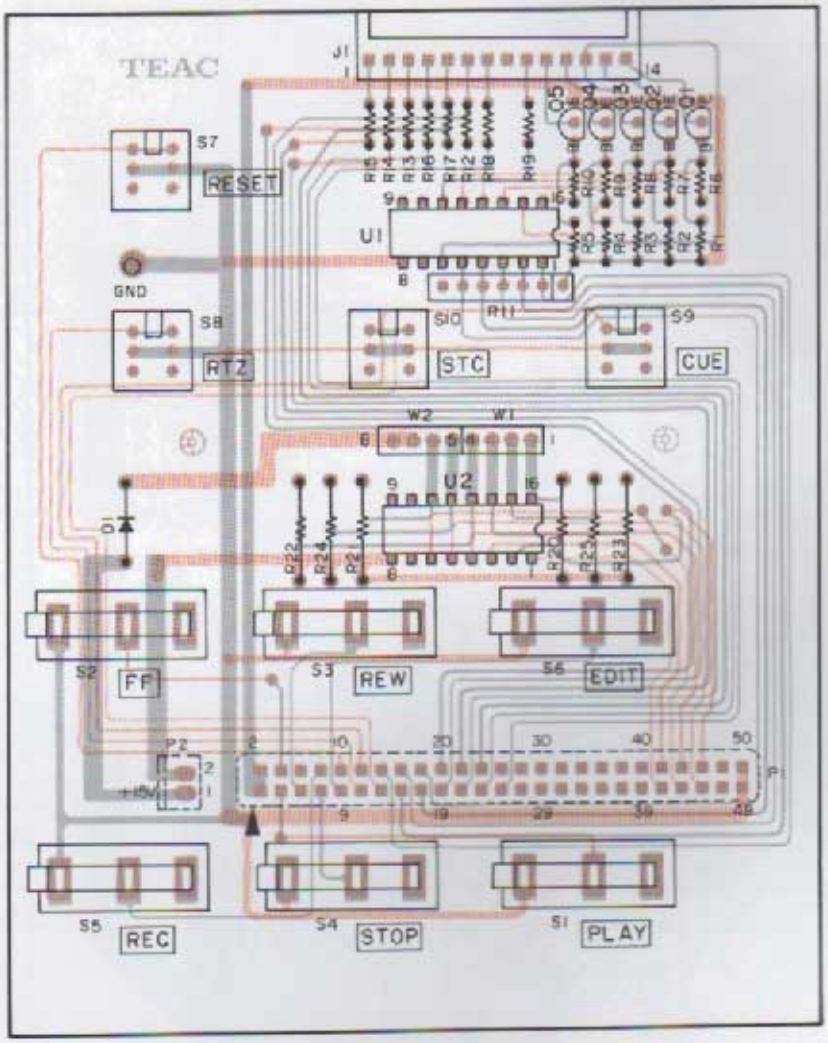
10-2-1. Control PCB Ass'y



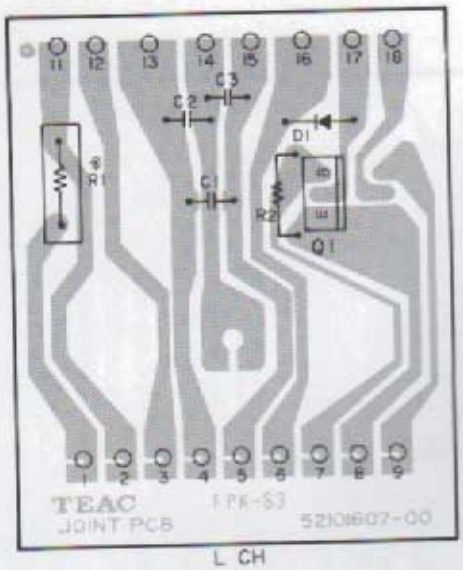

R86
C41
R87
D27
D28
R89
C16
U5
U4
U3
U2
U1
R67
R68
R83
R82
C27
C26
C25
C24
C23
C22
U41
OUT
IN
R30
U14
U13
U12
U11
C20
D15
R57
R61
R56
R62
D18
R60
C34
C33
C32
C31
C30
CR1
R23
R10
R81
C3
U24
U44
U23
U22
U21
R21
C8
C4
D5
R17
D4
R13
R22
R15
R12
R11
C40
C5
R20
R18
D19
R75
C17
D20
D21
D22
D23
D24
C18
C19
C21
R74
R73
R72
R76
R4
R5
R14
R78
R2
R3
R16
D26
R8
R6
R18
R77
R9
C1
C2
R79
R1
R7
TP3
TP4
TP5
P4
P3
P2
P1
19
20
12
8
5

4CH ONLY

10-2-2. Key Board PCB A Ass'y

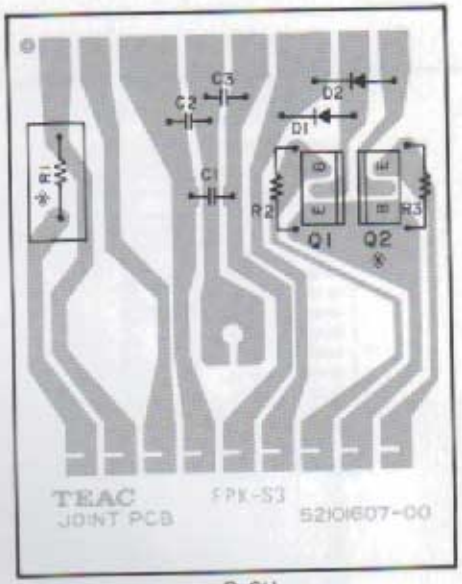


10-2-3. Joint PCB Ass'y L



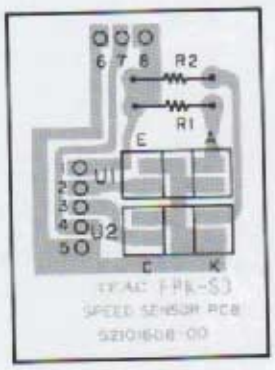
L CH

10-2-4. Joint PCB Ass'y R

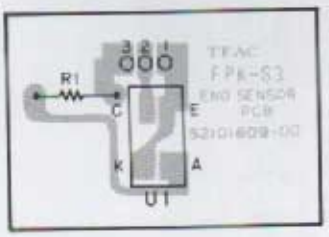


R CH

10-2-5. Speed Sensor PCB Ass'y

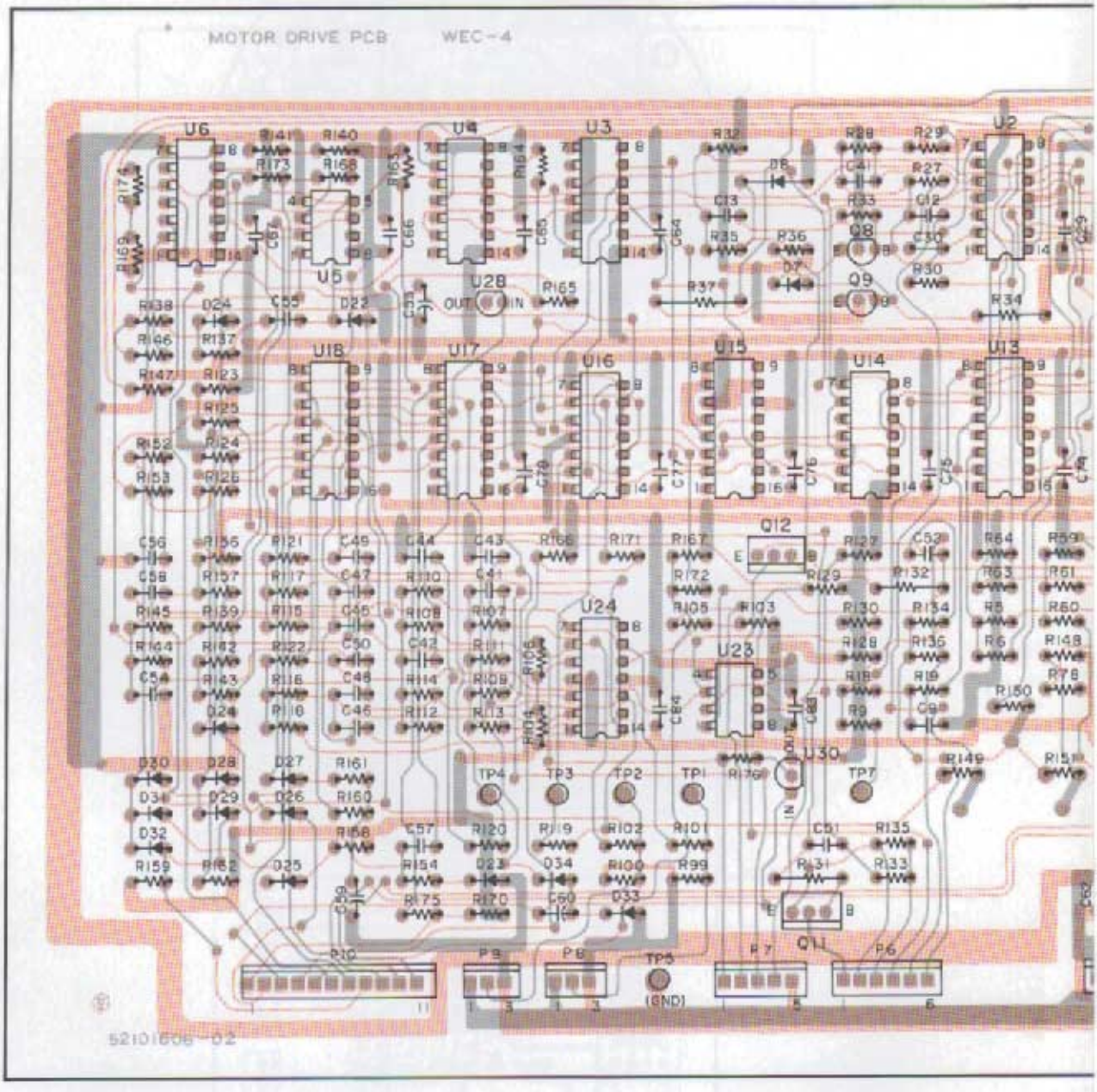


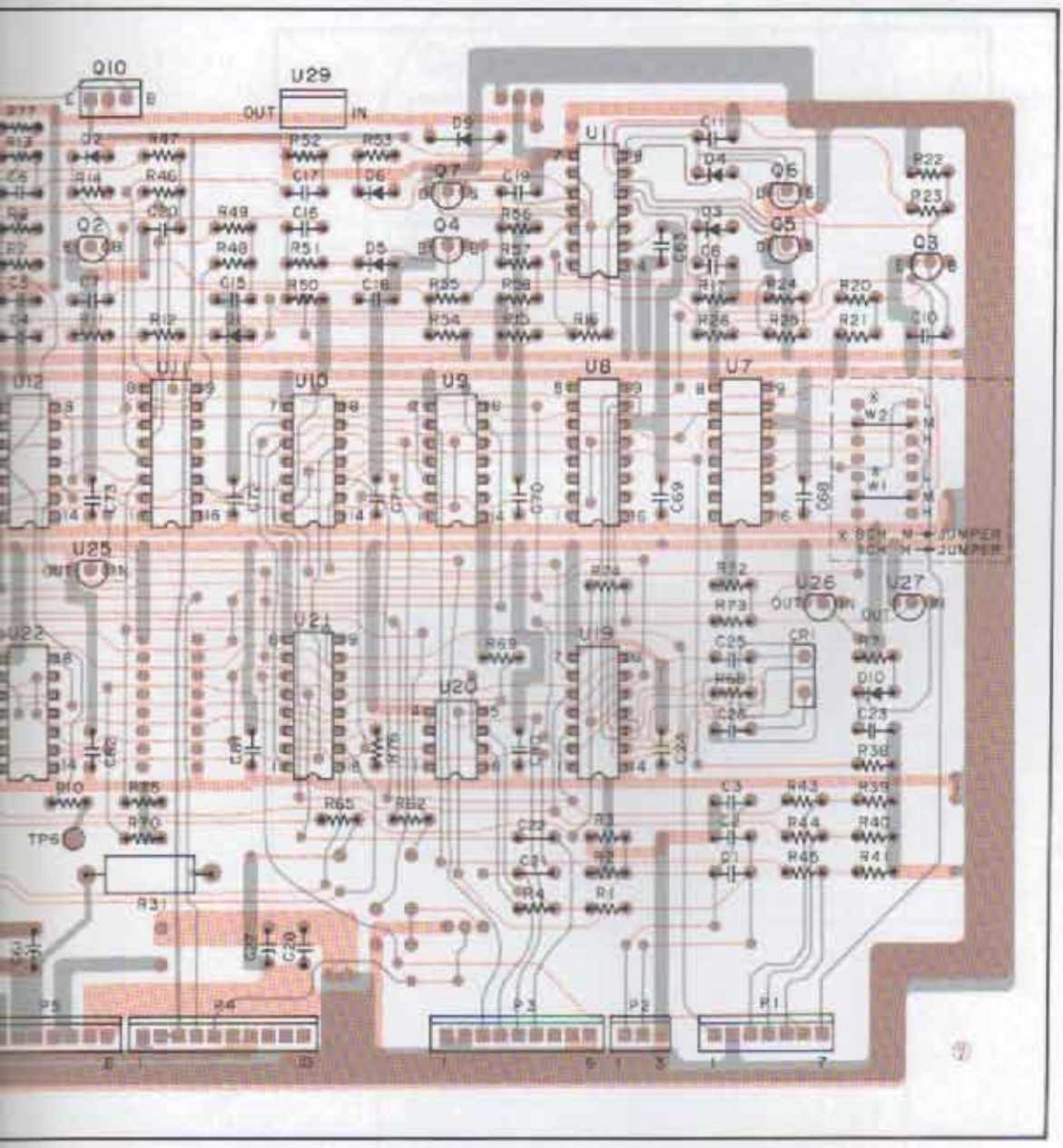
10-2-6. End Sensor PCB Ass'y



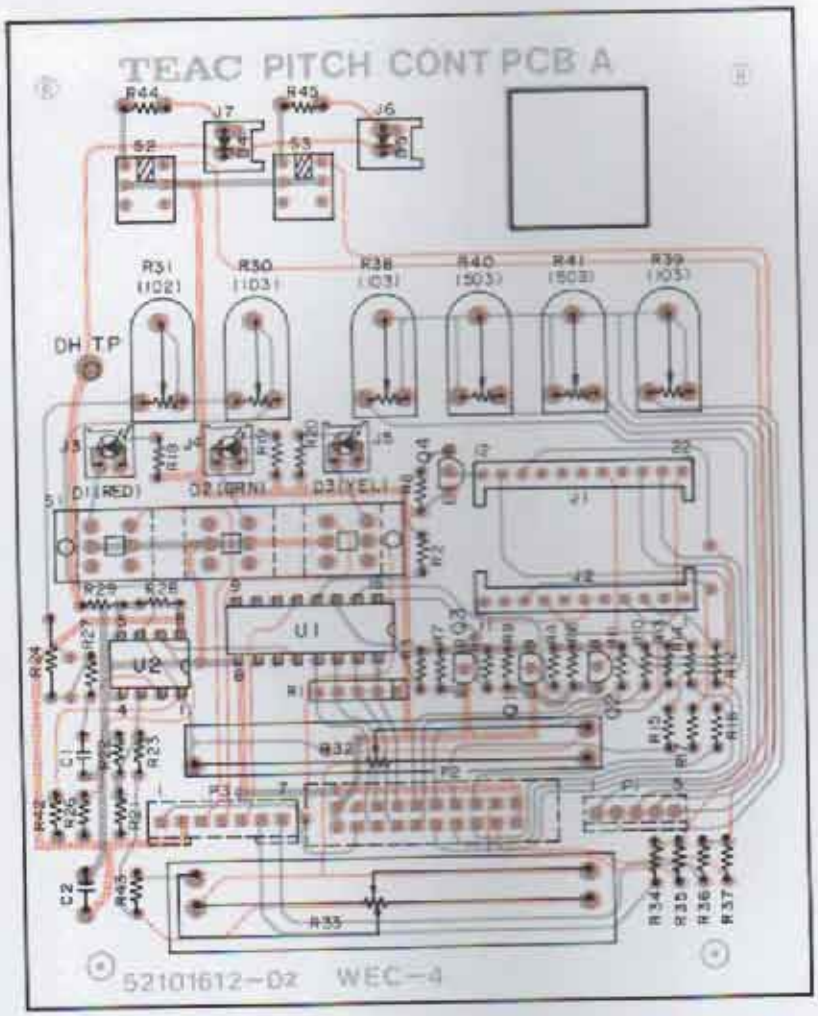
10-2-7. Tension Sensor PCB Ass'y

10-2-8. Motor Drive PCB Ass'y

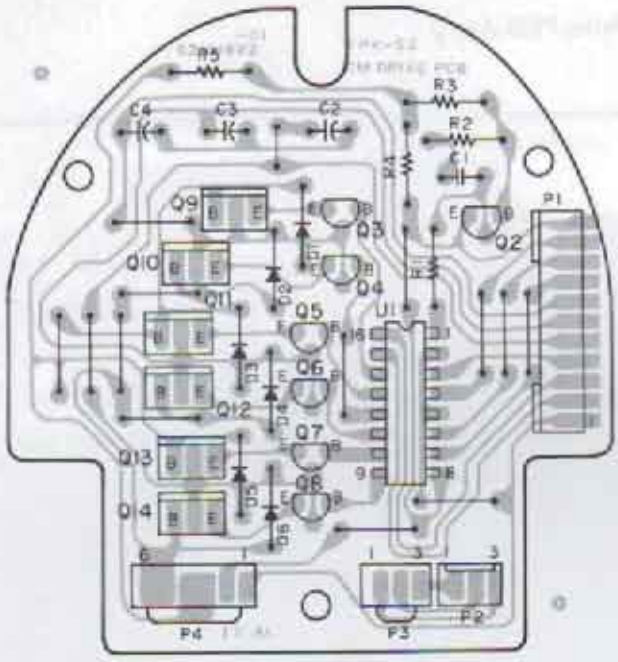



Q10
U29
OUT
IN
U1
Q7
Q4
Q6
Q5
Q3
Q2
Q8
U11
U10
U9
U8
U7
U12
U25
U26
U27
U22
U21
U20
U19
CR1
TP6
P5
P4
P3
P2
P1

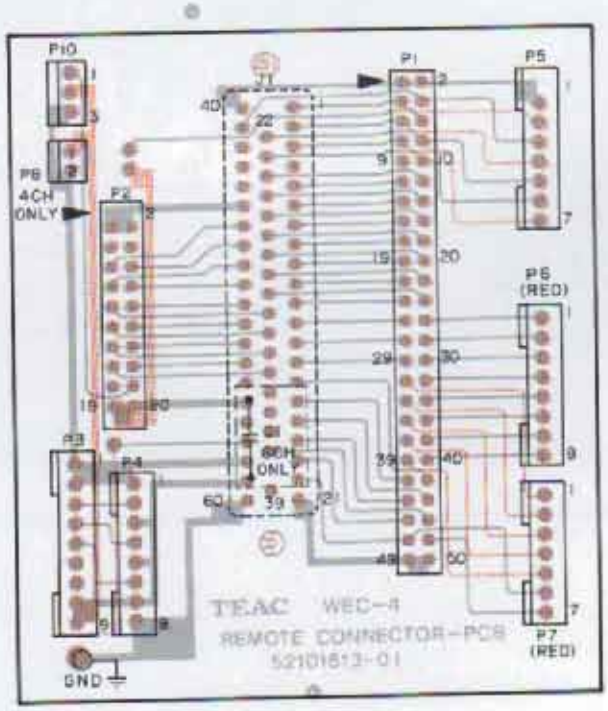
10-2-9. Pitch Control A PCB Ass'y



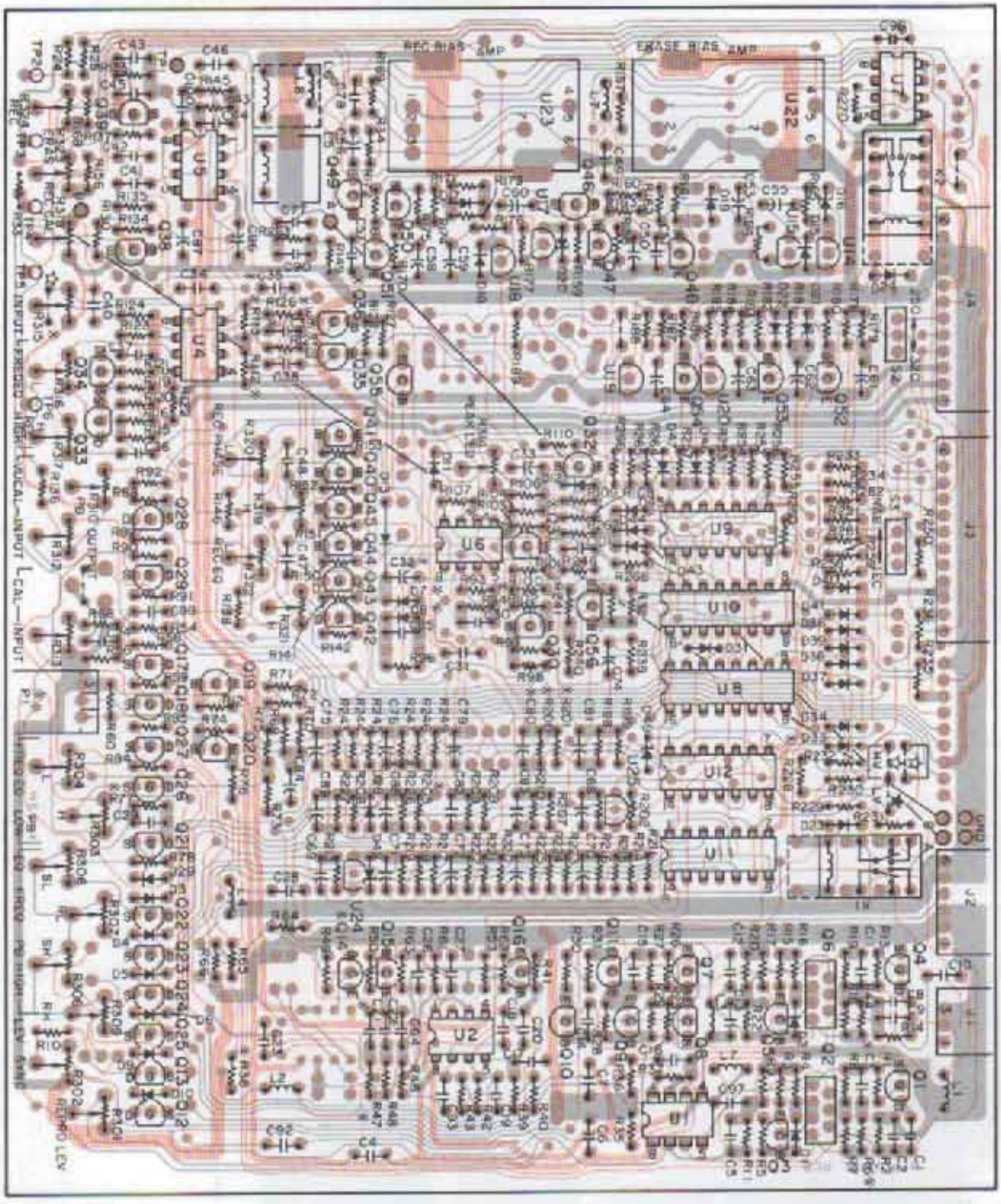
10-2-10. CM Drive PCB Ass'y



10-2-11. Remote Connector PCB Ass'y



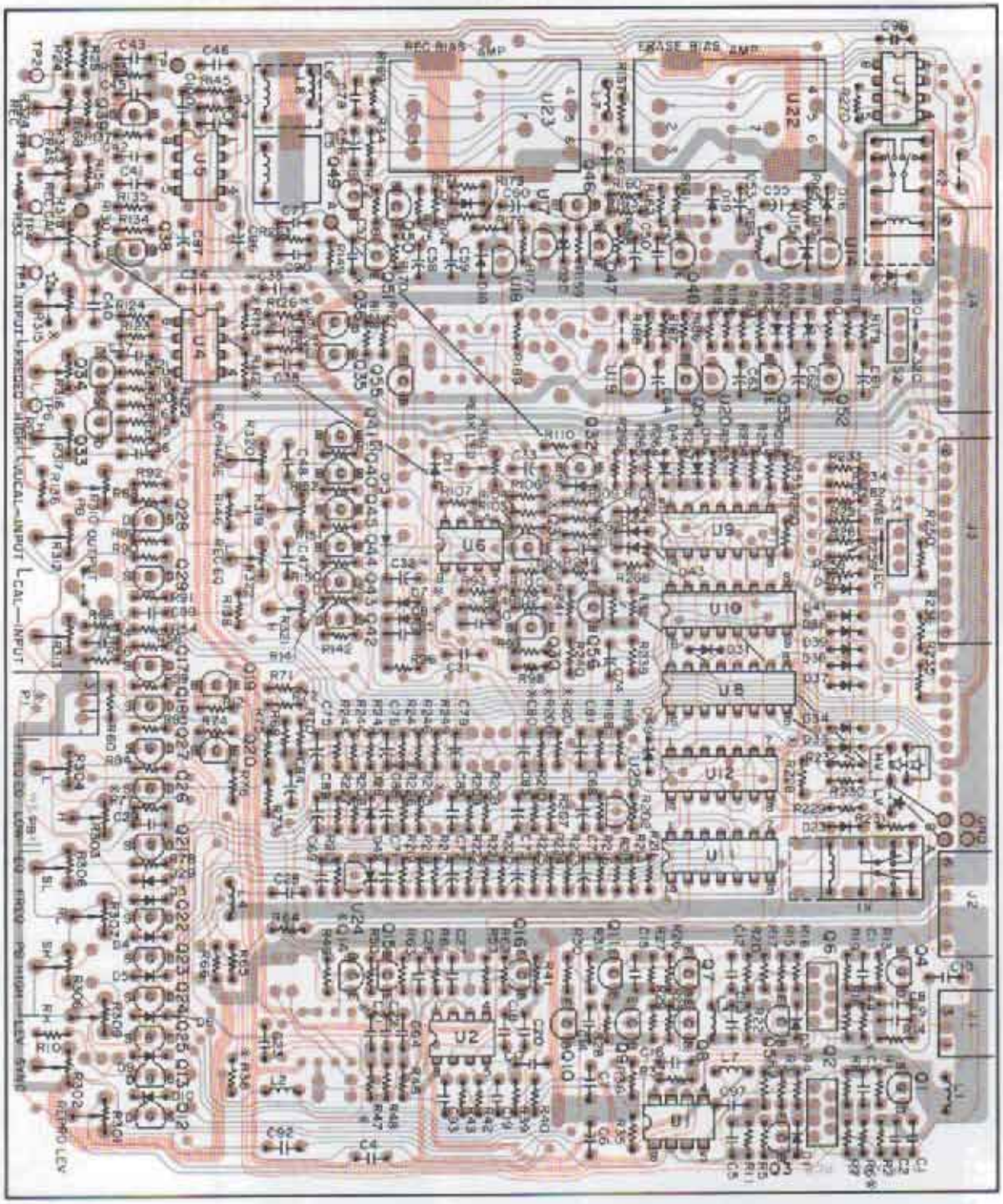
10-2-12. Rec/Play PCB Ass'y



	Q14	Q31	Q36	J7	D8	D33	P1	R310	R4	R36	R42	R77	R100	R101	R102	R105	R112	R205
ATR-60-4HS	—	—	—	JUMPER	—	○	○	○	○	JUMPER	—	—	—	—	—	—	○	—
ATR-60-8	○	○	○	○	○	—	1-2 JUMPER	JUMPER	—	○	○	○	○	○	○	○	—	○

	R113	R126	R200	R201	R226	C3	C21	C32	C35	C39	C60	C68	W6	W7,W8	W9	R49	R120
ATR-60-4HS	○	—	—	—	—	○	—	—	○	—	—	—	○	○	—	—	—
ATR-60-8	JUMPER	○	○	○	○	—	○	○	JUMPER A	○	○	○	—	—	○	○	○

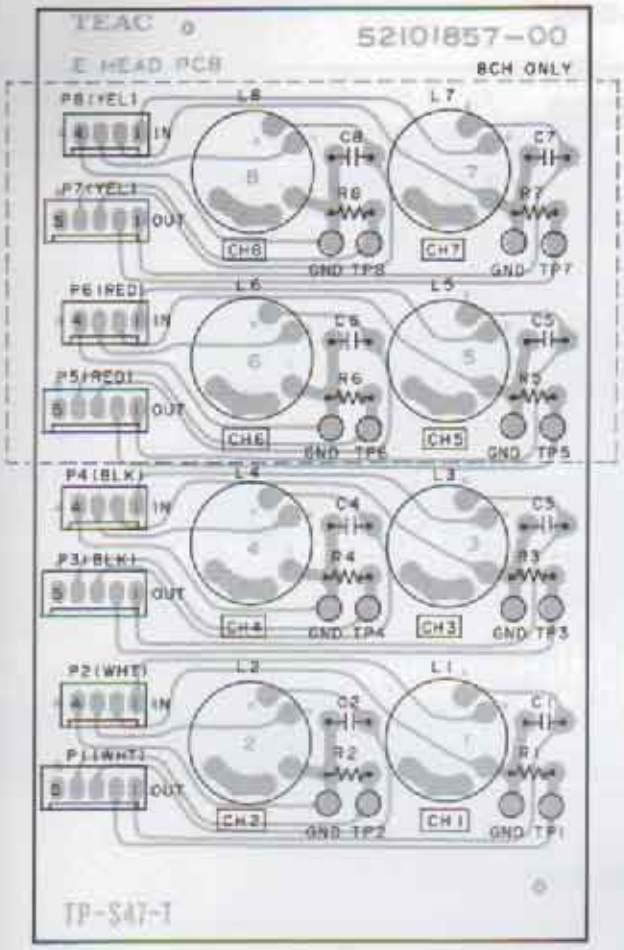
10-2-12. Rec/Play PCB Ass'y



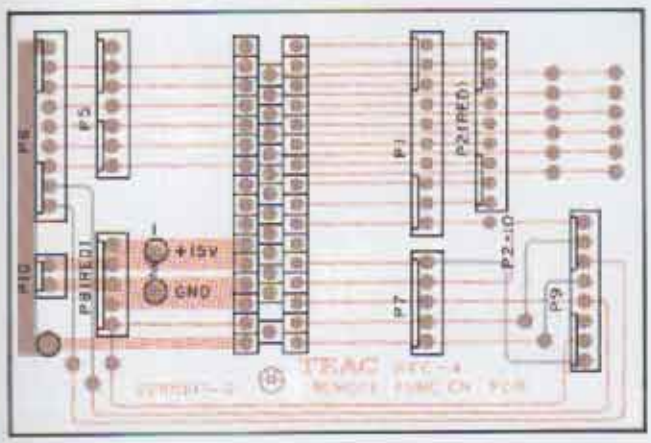
	Q14	Q31	Q36	J7	D8	D33	P1	R310	R6	R36	R42	R77	R100	R101	R102	R105	R112	R205
ATR-60-4HS	—	—	—	JUMPER	—	○	○	○	○	JUMPER	—	—	—	—	—	—	○	—
ATR-60-8	○	○	○	○	○	—	1-2 JUMPER	JUMPER	—	○	○	○	○	○	○	○	—	○

	R113	R126	R200	R201	R226	C5	C21	C32	C35	C39	C80	C88	W6	W7,W8	W9	R49	R126
ATR-60-4HS	○	—	—	—	—	○	—	—	○	—	—	—	○	○	—	—	—
ATR-60-8	JUMPER	○	○	○	○	—	○	○	JUMPER 4	○	○	○	—	—	○	○	○

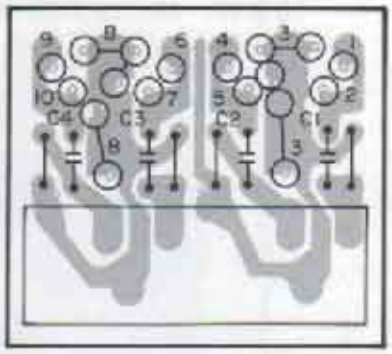
10-2-13. Erase Head PCB Ass'y



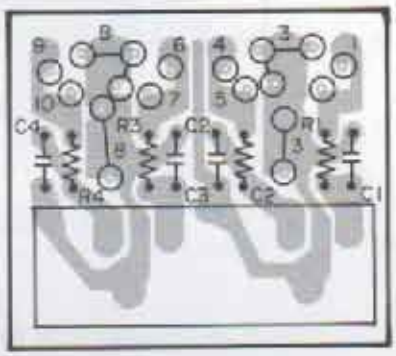
10-2-14. Remote Function PCB Ass'y



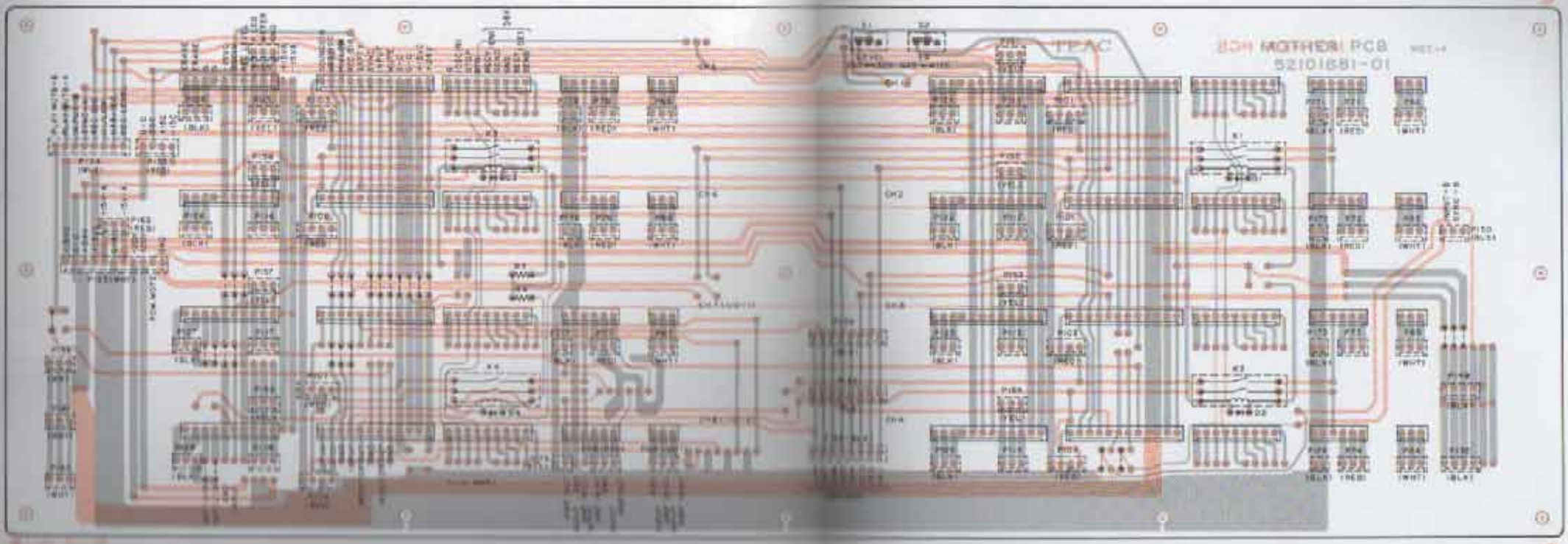
10-2-15. Input PCB Ass'y



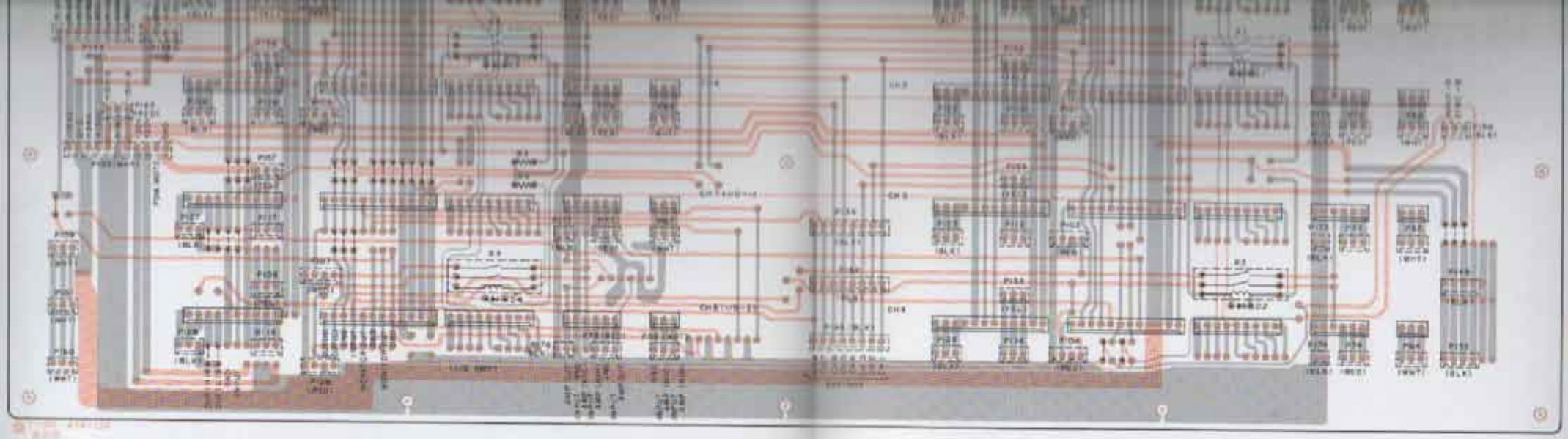
10-2-16. Output PCB Ass'y



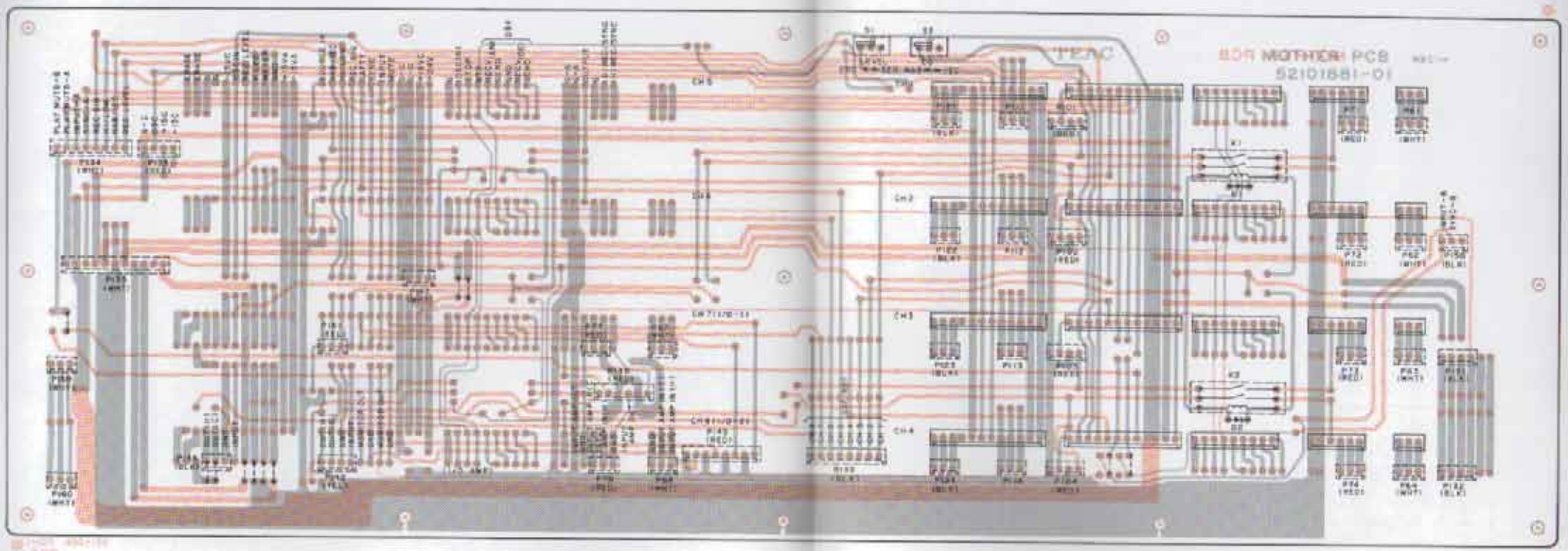
2-17. Mother PCB Ass'y (ATR-60-8)



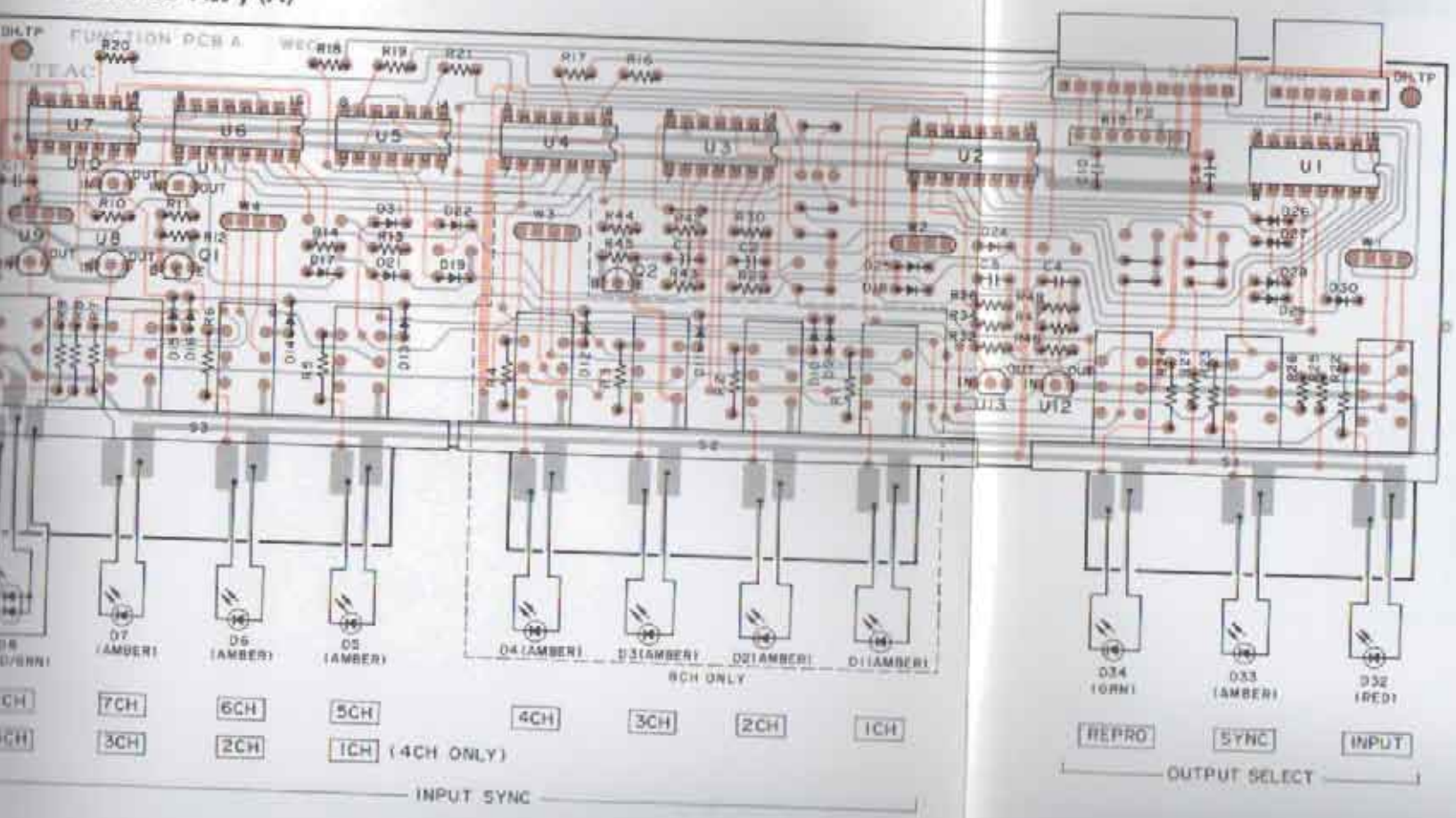
2-18. Mother PCB Ass'y (ATR-60-4HS)



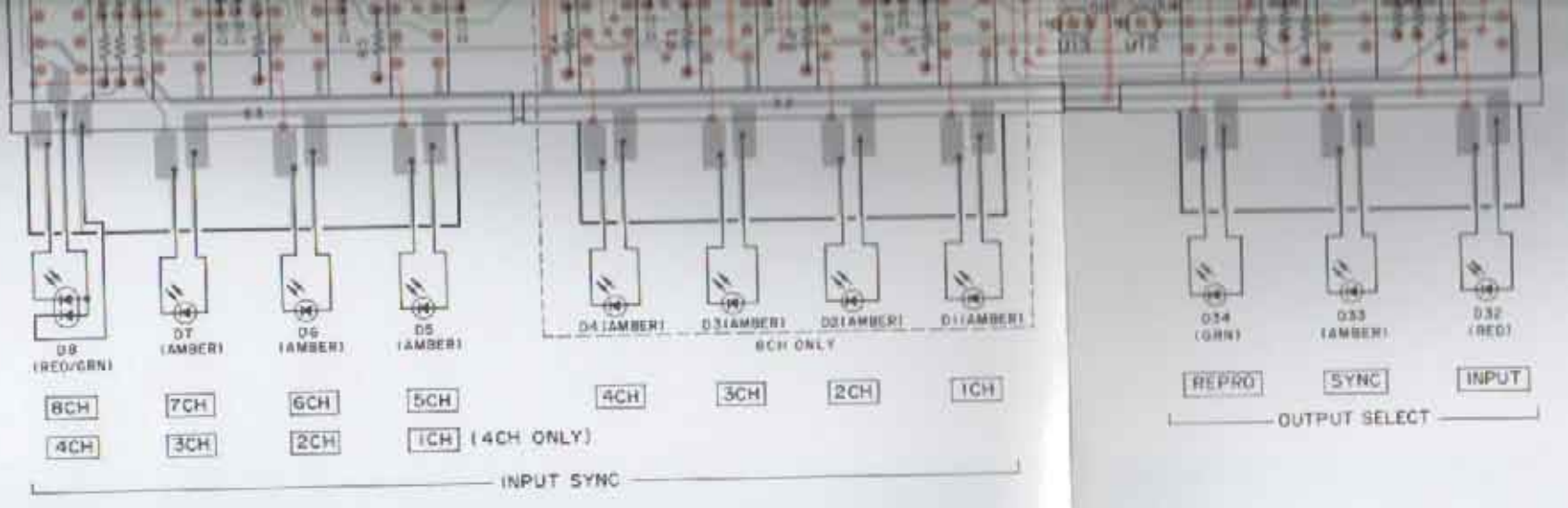
)-2-18. Mother PCB Ass'y (ATR-60-4HS)



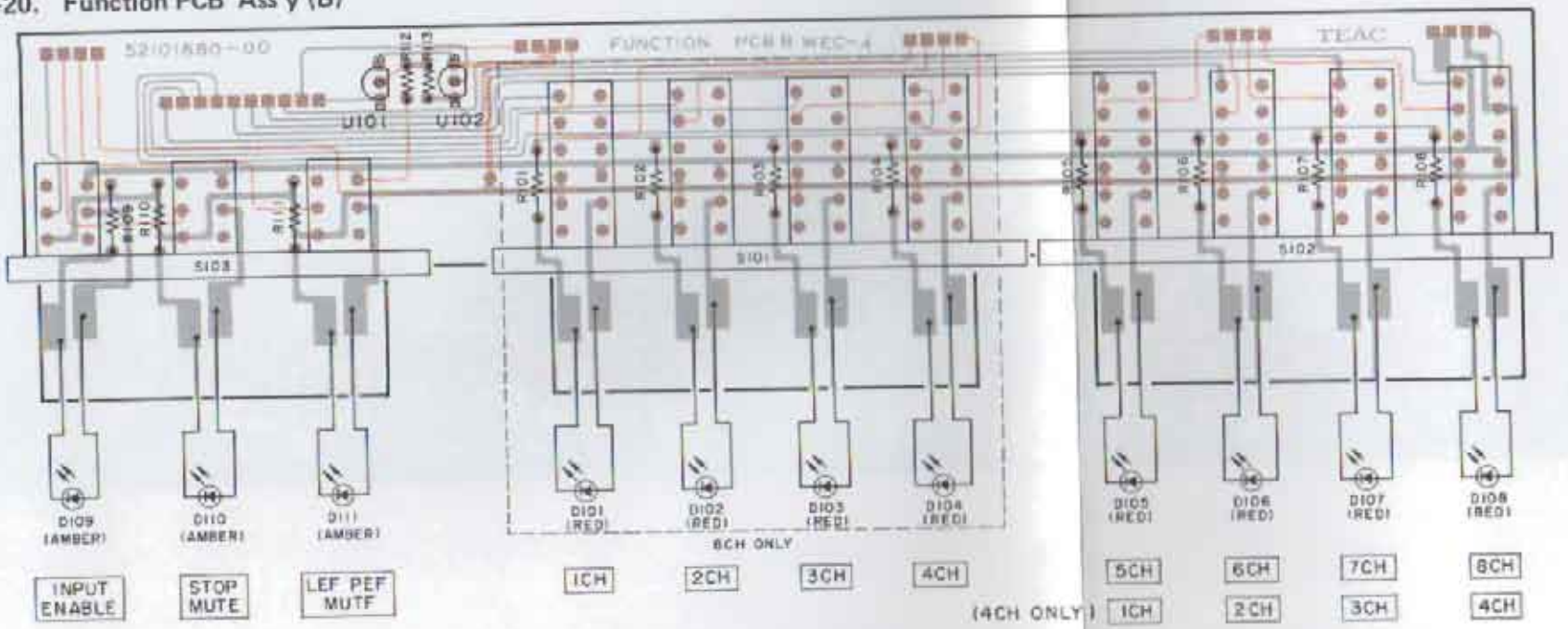
Function PCB Ass'y (A)



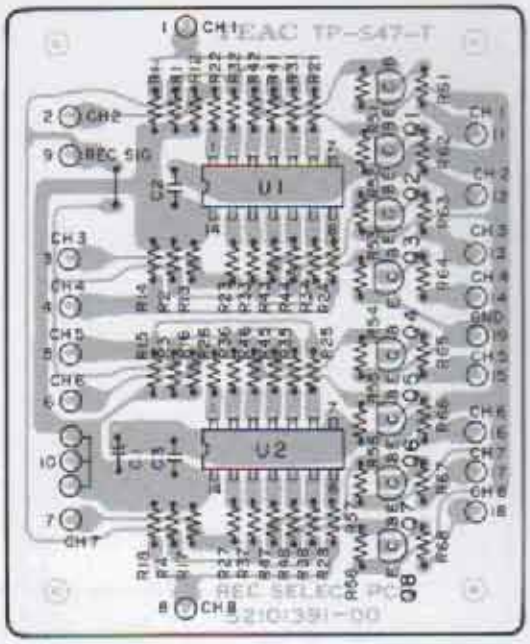
Function PCB Ass'y (B)



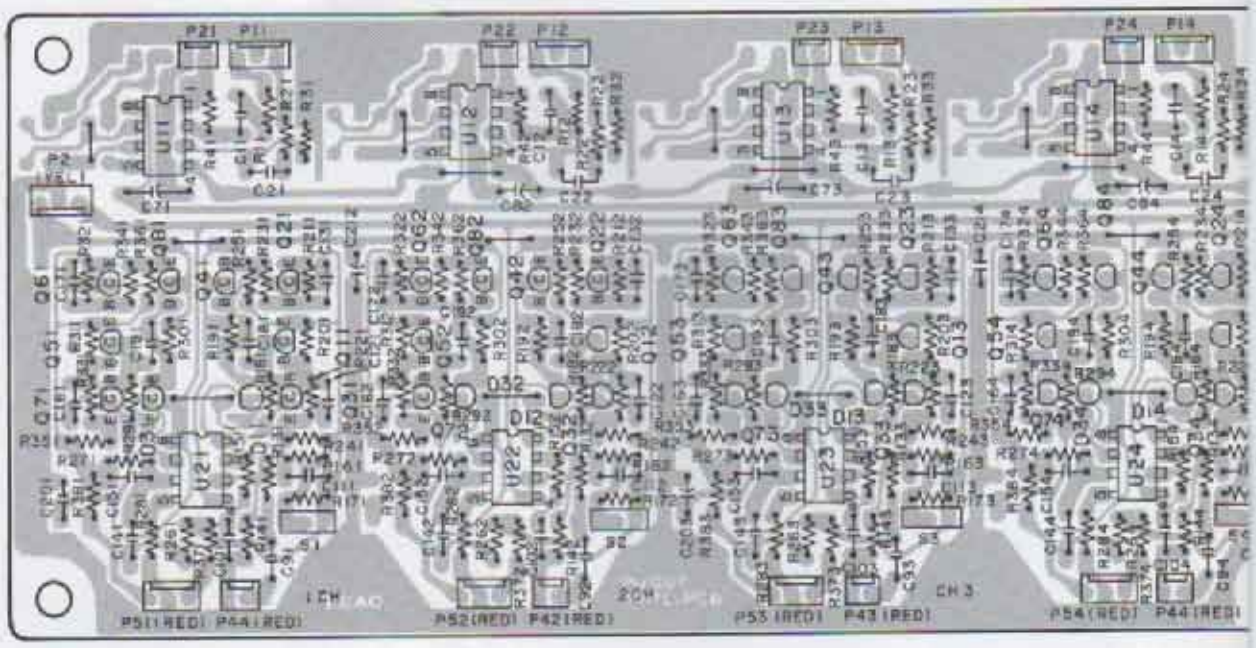
10-2-20. Function PCB Ass'y (B)

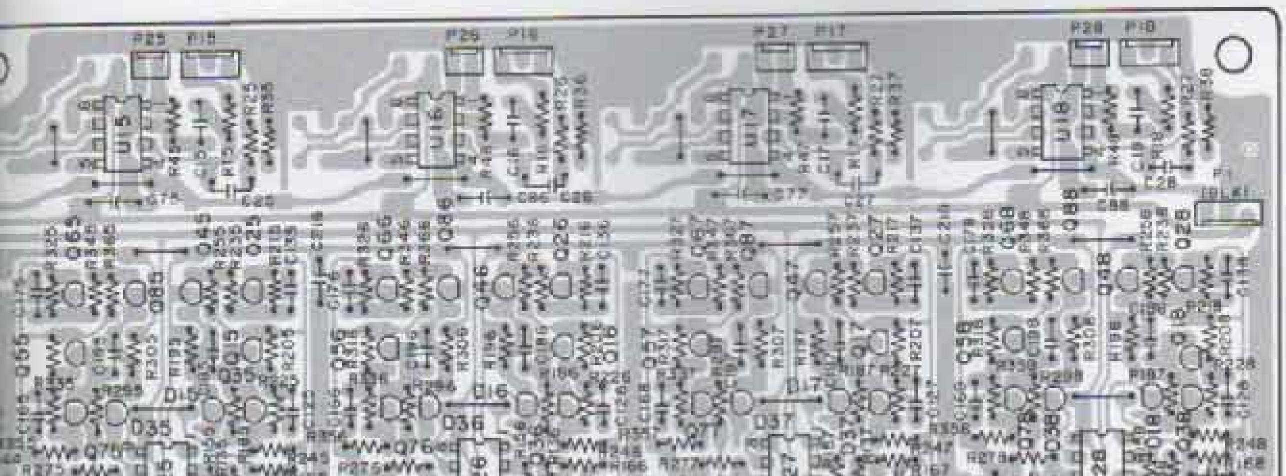


10-2-21. Rec Select PCB Ass'y (ATR-60-8)

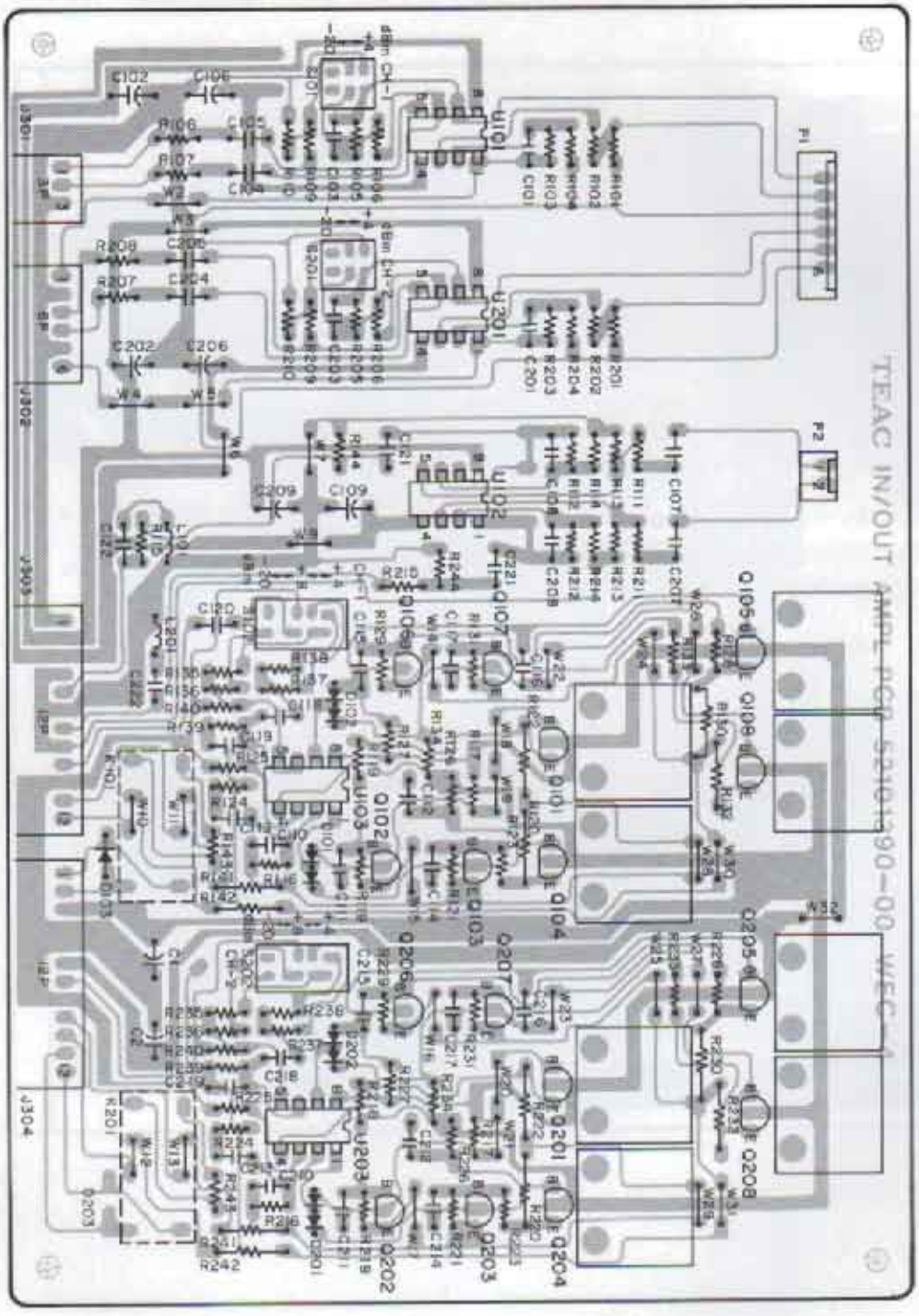


10-2-22. In/Out Amp PCB Ass'y (ATR-60-8)

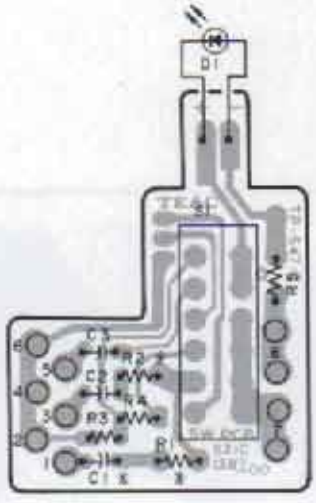



P55 (RED)
P45 (RED)
CH 5
P56 (RED)
P46 (RED)
CH 6
P57 (RED)
P47 (RED)
CH7
P58 (RED)
P48 (RED)
CH8
U15
U16
U17
U18
U25
U26
U27
U28

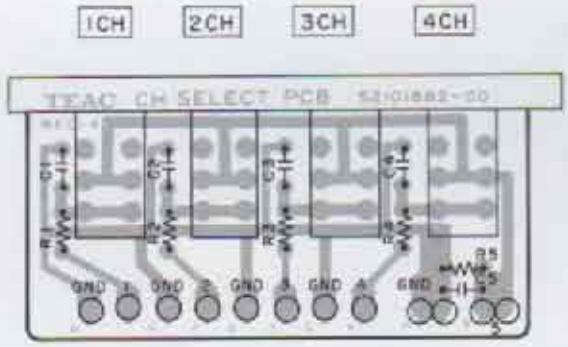
10-2-23. In/Out PCB Ass'y (ATR-60-4HS)



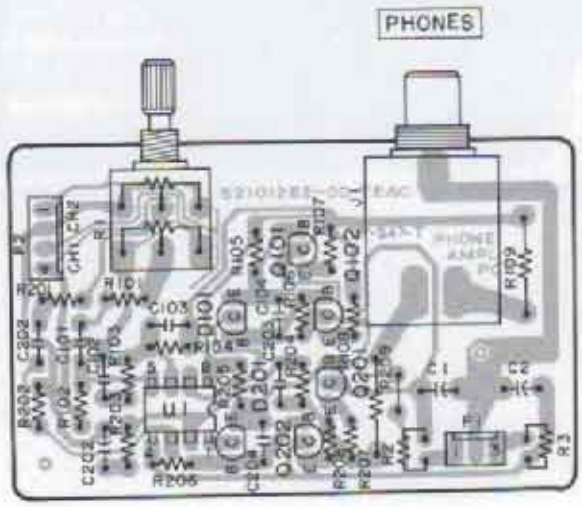
10-2-24. Sw (1) (2) PCB Ass'y (ATR-60-4HS)



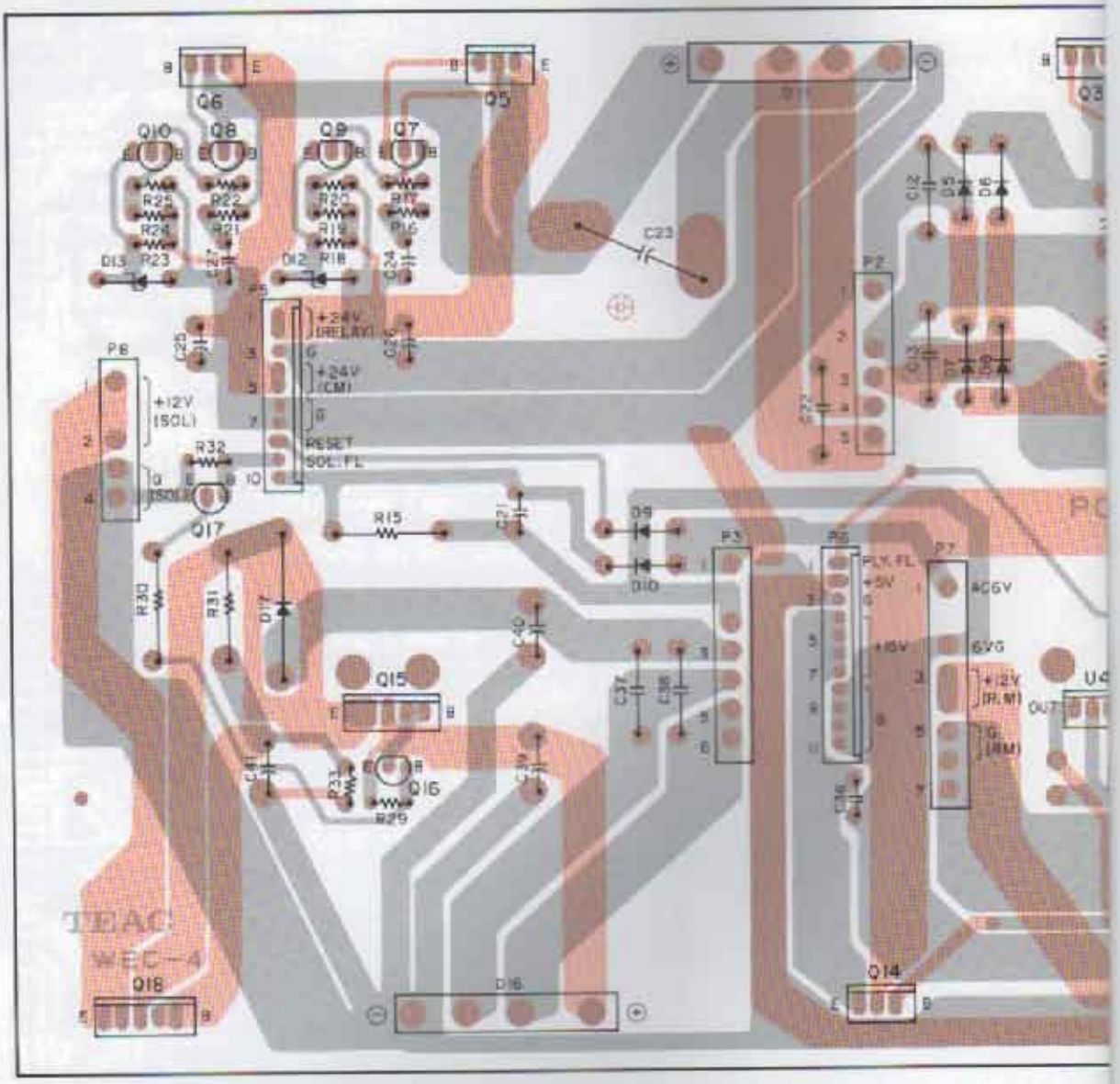
10-2-25. Channel Select PCB Ass'y (ATR-60-4HS)

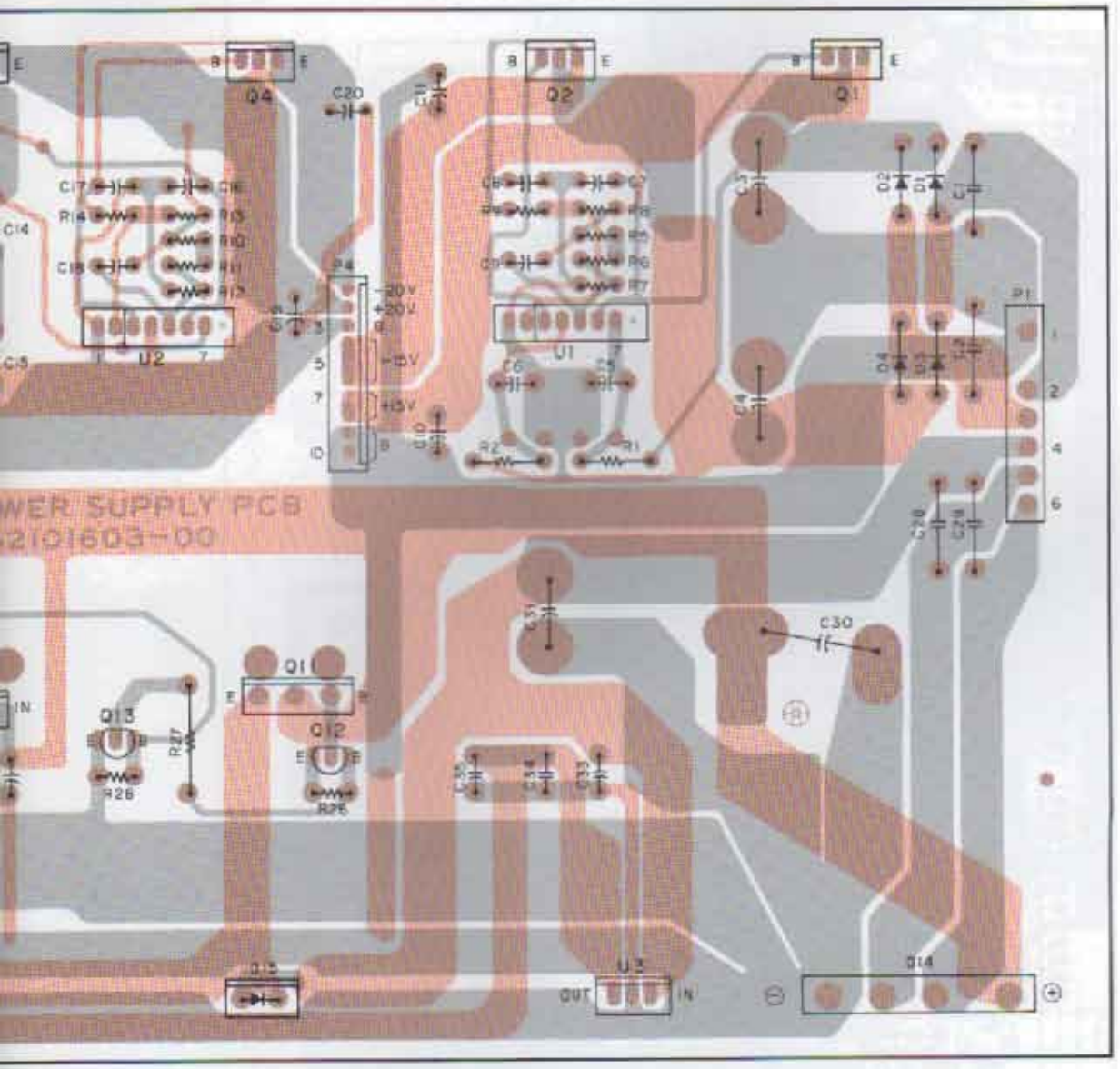


10-2-26. Phone Amp PCB Ass'y (ATR-60-4HS)



10-2-27. Power Supply PCB Ass'y




Q4
Q2
Q1
C20
C17
C16
R14
R15
R16
C18
R17
U2
P4
-20V
+20V
-15V
+15V
U1
C6
C5
R2
R1
P1
WER SUPPLY PCB
2101603-00
C30
Q11
Q13
Q12
R27
R28
R26
C35
C34
C33
D15
U3
OUT
IN
D14

CONTROL PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160530	CONTROL PCB ASSY (ATR-60-8)
	*5200160520	CONTROL PCB ASSY (ATR-60-4HS)
	*5210160502	CONTROL PCB
	*5347002900	TIMER,TMSL
C 1	5054896500	C.,MYLAR 0.0015UF 50V
C 2	5260165952	C.,ELEC.100UF/10V M USM
C 3	5054878500	C.,MYLAR 0.0010UF 100V J
C 4 C5	5054891500	C.,MYLAR 0.0047UF,50V
C 6 C7	5172216000	C.,CERAMIC 220PF/50V T
C 8 C13	5260162050	C.,ELEC. 4.7UF 35V M SM
C 9 C10	5173433000	C.,CERAMIC 0.010UF 50V Z
C11 C12	5172206000	C.,CERAMIC 33PF/50V K VFT
C14	5260164252	C.,ELEC. 33UF 16V M USM (ATR-60-8)
C15	5260165252	C.,ELEC.47UF/25V M USM VT
C16 C20	5260162050	C.,ELEC. 4.7UF 35V M SM
C17 -C19	5260162650	C.,ELEC. 10UF25V M SM VT
C21	5260165252	C.,ELEC.47UF/25V M USM VT
C22 -C40	5173433000	C.,CERAMIC 0.010UF 50V Z
C41	5260162050	C.,ELEC. 4.7UF 35V M SM
CR1	5347000900	CERAMIC OSC KBR-800H
CR2	5347001000	CERAMIC OSC KBR-4.0H
D 1 -D5	5224015010	DIODE,1SS133HV
D 6 -D8	5228009200	DIODE, ARRAY, DAP401
D 9 -D11	5228009100	DIODE, ARRAY, DAN401
D12 -D28	5224015010	DIODE, 1SS133HV
P1	5336213500	CON.,SOCKET 5332-20GS1
P2	5122129000	CONNECTOR,PLUG 5045-05A W
P3	5122132000	CONNECTOR,PLUG 8P
P4	5122136000	CONNECTOR,PLUG 12P W
P5	5122126000	CONNECTOR,PLUG 3P W
P6	5122135000	CONNECTOR,PLUG 5045-11A
P7	5336213900	CON. SOCKET 5332-50GS1
P8	5122127000	CON. PLUG,3P (ATR-60-4HS)
R 1	5242110200	R.,ARRAY 4.7KX4
R 2 R3	5240031420	R.,CARBON R10 22K
R 4 R5	5240035420	R.,CARBON R20 1.0M J FT
R 6	5240027020	R.,CARBON R20 330 J FT
R 7	5240030020	R.,CARBON R20 5.6K J FT
R 8	5240031020	R.,CARBON R10 15K
R 9 -R11	5240030020	R.,CARBON R20 5.6K J FT
R12 -R14	5240035420	R.,CARBON R20 1.0M J FT
R15 R16	5240030020	R.,CARBON R20 5.6K J FT
R17 R18	5240031020	R.,CARBON R10 15K
R19 -R21	5242110200	R.,ARRAY 4.7KX4
R22	5240032220	R.,CARBON R20 47K J FT
R23	5240035420	R.,CARBON R20 1.0M J FT
R24 -R29	5184908000	R.,CARBON R25 100 G FT
R30	5240029820	R.,CARBON R20 4.7K J FT
R31 -R41	5240028220	R.,CARBON R20 1.0K J FT
R42	5242110200	R.,ARRAY 4.7KX4
R43	5242108000	R.,ARRAY 1KX4
R44 R45	5240028220	R.,CARBON R20 1.0K J FT
R46 R47	5240030020	R.,CARBON R20 5.6K J FT
R48	5240030620	R.,CARBON R10 10K
R49	5240032220	R.,CARBON R20 47K J FT
R50 R51	5240028420	R.,CARBON R20 1.2K J FT

CONTROL PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R52	5240030620	R.,CARBON R10 10K
R53 -R55	5242110200	R.,ARRAY 4.7KX4
R56	5240025020	R.,CARBON R20 47 J FT
R57	5240030020	R.,CARBON R20 5.6K J FT
R58	5240028220	R.,CARBON R20 1.0K J FT
R59 R61	5240025820	R.,CARBON 100 OHM R10 T.
R60 R64	5240031820	R.,CARBON R20 33K J FT
R62 R63	5240030020	R.,CARBON R20 5.6K J FT
R65 R66	5240025020	R.,CARBON R20 47 J FT
R67	5240032220	R.,CARBON R20 47K J FT
R68 -R70	5240030020	R.,CARBON R20 5.6K J FT
R71 R75	5240028220	R.,CARBON R20 1.0K J FT
R72 -R74	5180062000	R.,CARBON R50 150 J FR
R76 R78	5240030020	R.,CARBON R20 5.6K J FT
R77	5240029820	R.,CARBON R20 4.7K J FT
R79	5240028220	R.,CARBON R20 1.0K J FT
R80 -R83	5240030620	R.,CARBON R10 10K
R84	5240031220	R.,CARBON R20 18K J FT
R85	5240034420	R.,CARBON R20 390K J FT
R86	5240035420	R.,CARBON R20 1.0M J FT
R87	5240031420	R.,CARBON R10 22K
R88	5240030020	R.,CARBON R20 5.6K J FT
R89	5240028220	R.,CARBON R20 1.0K J FT
R90	5240029820	R.,CARBON R20 4.7K J FT (ATR-60-4HS)
TP1 -TP7	5317002100	CHECK PIN,DH IPS-1136
U 1	5220036400	IC,TC4518BP
U 2	5220020200	IC,TC4030BP
U 3	5220019200	IC,TC4013BP
U 4	5220019100	IC,TC4011BP
U 5 U6	5220019000	IC,TC4001BP
U 7	5220020000	IC,TC4049BP
U 8	5220021800	IC,MB8243
U 9	5220805200	IC,MB8841
U10	6048661000	IC,M54517P
U11	5220805100	IC,LM6416E-391
U12	5220019000	IC,TC4001BP
U13	5220020300	IC,TC4510BP
U14 U15	5220020000	IC,TC4049BP
U16 U17	5220019100	IC,TC4011BP
U18 U19	5220020000	IC,TC4049BP
U20	5220019700	IC,LC7800
U21 U22	6048661000	IC,M54517P
U23	5220020100	IC,TC4050BP
U24 -U29	6048661000	IC,M54517P
U30 -U41	5232251620	TRANSISTOR,DIG. 2SA1346
U42 U43	5232252020	TRANSISTOR,DIG. 2SC3400
U44	5232252020	TRANSISTOR,DIG. 2SC3400 (ATR-60-4HS)

KEY BOARD PCB A ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161000	KEY BOARD PCB A ASSY
	*5210161000	KEY BOARD PCB A
	*5225009600	LED,DISPLAY
	*5317002100	DH CHECK PIN IPS-1136
D1	5143243000	DIODE,ERB12-02G1
J1	5336116400	CONN. SOCKET 3024-14CH
P1	5336213900	CONN. SOCKET 5332-50GS1
P2	5122126000	CONNECTOR,PLUG 3P W
P3	5122366000	PLUG,CONNECTOR 3022-14AD
Q1 -Q5	5230016100	TRANSISTOR,2SA950-Y
R1 -R5	5240032220	R.,CARBON R20 47K J
R6 -R10	5240028220	R.,CARBON R20 1.0K J
R11	5242110400	R.,ARRAY 4.7KX6
R12 -R19	5240025620	R.,CARBON R20 82 J
R20 -R25	5180076000	R.,CARBON R50 560 J
S01 -S06	5301455200	SW.,MICRO SS-5GL13 N
S07 -S10	5300028100	SW.,PUSH SPH122A 2-2
U1 U2	6048661000	IC,M54517P

KEY BOARD PCB B ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161100	KEY BOARD PCB B ASSY
	*5210161100	KEY BOARD PCB B
DS1	5310007100	LAMP,MINI 80MA/14V RED
DS2 -DS5	5310007200	LAMP,80MA/14V YLW
DS6	5310007300	LAMP,80MA/14V GREEN

JOINT PCB ASSY L & JOINT PCB ASSY R

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160700	JOINT PCB ASSY L
	*5200160710	JOINT PCB ASSY R
	*5210160700	JOINT PCB
C1	5260067610	C.,ELEC. 10UF100V M SMBP
C2 C3	5173433000	C.,CERAMIC 0.010UF 50V Z
D1	5143243000	DIODE,ERB12-02G1
D2	5143243000	DIODE,ERB12-02G1 (R only)
Q1	5145087000	TRANSISTOR,2SD-313E
Q2	5145087000	TRANSISTOR,2SD-313E(R only)
R1	5241262100	R.,METAL 0.15 5W
R2	5181490000	R.,CARBON R25 2.2K J
R3	5181490000	R.,CARBON R25 2.2K(R only)

SPEED SENSOR PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160800	SPEED SENSOR PCB ASSY
	*5210160800	SPEED SENSOR PCB
R1 R2	5181462000	R.,CARBON R25 150 J
U1 U2	5228008200	PHOTO INTERRUPTER EE-SJBB

END SENSOR PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160900	END SENSOR PCB ASSY
	*5210160900	END SENSOR PCB
R1	5181462000	R.,CARBON R25 150 J
U1	5228007500	PHOTO INTERRUPTER EE-SJ3W

TENSION SENSOR PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200185900	TENSION SENSOR PCB ASSY
	*6050556000	TENSION SENSOR PCB
C1 C2	5260160750	C.,ELEC. 1UF50V SM T-N
C3	6043571000	C.,POLYSTY. 150PF 50V J
C4	5170352000	C.,MYLAR 0.001UF/100V JT
C5	5054382000	C.,HIGH Q 22PF 50V
C6	5171878000	C.,MYLAR 0.1UF/100V J T
D1	5042517000	DIODE,1S2473VE
L1 L2	5160038000	COIL,DETECTOR
Q1	5145036000	TRANSISTOR,2SC-945LK
R1	5240172000	R.,CARBON ELR25 39K J
R2	5240170400	R.,CARBON ELR25 8.2K J
R3	5240168200	R.,CARBON ELR25 1.0K J

MOTOR DRIVE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160630	MOTOR DRIVE PCB ASSY (ATR-60-8)
	*5200160620	MOTOR DRIVE PCB ASSY (ATR-60-4HS)
	*5210160602	MOTOR DRIVE PCB
C 1	5170352000	C.,MYLAR 0.001UF/100V JT
C 2 C3	5173433000	C.,CERAMIC 0.010UF 50V Z
C 4	5263106420	C.,POLYST.270PF 100V J VT
C 5 C6	5263107220	C.,POLYST.560PF/100V J VT
C 7 C10	5263103720	C.,POLYST. 0.022UF 100V J (ATR-60-8)
C 7 C10	5263102920	C.,POLYST. 0.010UF 100V J (ATR-60-4HS)
C 8 C11	5170364000	C.,MYLAR 0.0033UF 100V J
C 9	5263107220	C.,POLYST.560PF/100V J VT
C12	5263107220	C.,POLYST.560PF/100V J VT
C13	5170352000	C.,MYLAR 0.001UF/100V JT
C14	5170453000	C.,MYLAR 0.15UF 100V J
C15 C16	5263107220	C.,POLYST.560PF/100V J VT
C17	5263106420	C.,POLYST.270PF 100V J VT
C18	5263103720	C.,POLYST. 0.022UF 100V J (ATR-60-8)
C18	5263102920	C.,POLYST. 0.010UF 100V J (ATR-60-4HS)
C19	5170364000	C.,MYLAR 0.0033UF 100V J

MOTOR DRIVE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
C20	5263107220	C.,POLYST.560PF/100V J VT
C23	5171864000	C.,MYLAR 0.022UF/100V J T
C24	5173434000	C.,CERAMIC 0.022UF 50V
C25 C26	5054741000	C.,DIP.MICA 22P,50V
C27	5260165352	C.,ELEC. 47UF 35V M USM
C28	5173433000	C.,CERAMIC 0.010UF 50V Z
C41 C42	5171864000	C.,MYLAR 0.022UF/100V J T
C43 C44	5263167923	C.,METAL 0.1UF/50V J VT
C45 C46	5263168523	C.,METAL 0.33UF 50V J VT
C47 C48	5171856000	C.,MYLAR 0.010UF 100V J
C49 C50	5263167923	C.,METAL 0.1UF/50V J VT
C51 C52	5171856000	C.,MYLAR 0.010UF 100V J
C53	5260162650	C.,ELEC. 10UF25V M SM VT
C54	5263168123	C.,METAL 0.15UF/50V J VT
C55	5170364000	C.,MYLAR 0.0033UF 100V J
C56 C58	5263107220	C.,POLYST.560PF/100V J VT
C57	5263100520	C.,POLYST.0.0010UF 100V J
C59	5260163452	C.,ELEC. 22UF 25V
C60	5260162050	C.,ELEC. 4.7UF 35V M SM
C61	5260165352	C.,ELEC. 47UF 35V M USM
C62 -C84	5173433000	C.,CERAMIC 0.010UF 50V Z
C85	5260160750	C.,ELEC. 1UF50V SM T-N
CR1	5347001600	OSC,CRYSTAL 4.9152MHZ
D 1 -D7	5224015010	DIODE,1SS133HV
D 8 D9	5143243000	DIODE,ERB12-02G1
D10	5224015010	DIODE,1SS133HV
D21 -D34	5224015010	DIODE,1SS133HV
D35	5224015010	DIODE,1SS133HV (ATR-60-4HS)
P 1	5122131000	CONNECTOR,PLUG 5045-07A W
P 2	5122184000	CON. PLUG 5045-03A BK
P 3	5122133000	CONNECTOR,PLUG 5045-09A W
P 4	5122134000	CONNECTOR,PLUG 10P WHITE
P 5	5122132000	CONNECTOR,PLUG 8P
P 6	5122130000	CONNECTOR,PLUG 6P W
P 7	5122129000	CONNECTOR,PLUG 5045-05A W
P 8	5122127000	CONNECTOR,PLUG 3P
P 9	5122300000	CONNECTOR,PLUG 5045-03A R
P10	5122135000	CONNECTOR,PLUG 5045-11A
Q 2 -Q4	5145151000	TRANSISTOR,2SC-1815GR
Q 8	5145150000	TRANSISTOR,2SA-1015GR
Q 9	5230773800	TRANSISTOR,2SC2655-Y
Q10	5231755100	TRANSISTOR,2SD880-Y
Q11 Q12 ⚠	5145077000	TRANSISTOR,2SD-600
Q5 -Q7 ⚠	5145102000	FET,2SK-68A-L 0.
R 1	5240028220	R.,CARBON R20 1.0K J FT
R 2 R3	5240030620	R.,CARBON R10 10K
R 4	5240035420	R.,CARBON R20 1.0M J FT
R 5 R11	5240030620	R.,CARBON R10 10K
R 6	5240033020	R.,CARBON 100K R10 T.
R 7 R8	5240031420	R.,CARBON R10 22K
R 9 R10	5240033020	R.,CARBON 100K R10 T.
R 12 R14	5240028220	R.,CARBON R20 1.0K J FT
R 13 R17	5240030620	R.,CARBON R10 10K
R 15	5240033820	R.,CARBON R10 220K
R 16	5240027820	R.,CARBON R20 680J FT

MOTOR DRIVE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R 18 R19	5240031420	R.,CARBON R10 22K
R 20 R26	5240032220	R.,CARBON R20 47K J FT
R 21 R24	5240030620	R.,CARBON R10 10K
R 22	5240033020	R.,CARBON 100K R10 T.
R 23	5240027820	R.,CARBON R20 680 J FT
R 25 R28	5240033820	R.,CARBON R10 220K
R 27	5240034620	R.,CARBON R20 470K J FT (ATR-60-8)
R 27	5240034820	R.,CARBON R20 560K J FT (ATR-60-4HS)
R 29 R32	5240032220	R.,CARBON R20 47K J FT
R 30	5240032020	R.,CARBON R20 39K J FT
R 31	5184550000	R.,INCOMBUSTIBLE 1/1W J
R 33 R36	5240030620	R.,CARBON R10 10K
R 34	5181482000	R.,CARBON R25 1.0K J FT
R 35	5240029420	R.,CARBON R20 3.3K J FT
R 37	5180050000	R.,CARBON R50 47 J FR
R 38-R41	5240029820	R.,CARBON R20 4.7K J FT
R 42-R45	5240031020	R.,CARBON R10 15K
R 46 R47	5240030620	R.,CARBON R10 10K
R 48 R49	5240031420	R.,CARBON R10 22K
R 50 R52	5240030620	R.,CARBON R10 10K
R 51 R53	5240028220	R.,CARBON R20 1.0K J FT
R 54	5240033820	R.,CARBON R10 220K
R 55	5240027820	R.,CARBON R20 680 J FT
R 56	5240028220	R.,CARBON R20 1.0K J FT
R 57	5240030620	R.,CARBON R10 10K
R 58	5240030420	R.,CARBON 8.2K R10 T.
R 59	5240026620	R.,CARBON R20 220J FT
R 60	5240029020	R.,CARBON R10 2.2K
R 61	5240032420	R.,CARBON R20 56K J FT
R 62	5280132702	R.,TRIMMER 50KB V. METAL
R 63	5240033020	R.,CARBON 100K R10 T.
R 64	5240028220	R.,CARBON R20 1.0K J FT
R 65	5280131602	R.,TRIMMER 2.0KB V METAL
R 68	5240035420	R.,CARBON R20 1.0M J FT
R 69 R70	5240031020	R.,CARBON R10 15K
R 71	5240029820	R.,CARBON R20 4.7K J FT
R 72	5240030620	R.,CARBON R10 10K
R 73	5240031420	R.,CARBON R10 22K
R 74	5240035420	R.,CARBON R20 1.0M J FT
R 75 R78	5240031020	R.,CARBON R10 15K
R 76 R77	5240030620	R.,CARBON R10 10K
R 99 R100	5240032220	R.,CARBON R20 47K J FT
R101 R102	5240033020	R.,CARBON 100K R10 T.
R103 R104	5240031620	R.,CARBON R20 27K J FT
R105 R106	5240029820	R.,CARBON R20 4.7K J FT
R107 R108	5240033620	R.,CARBON R20 180K J FT
R109 R110	5240028220	R.,CARBON R20 1.0K J FT
R111 R112	5240030620	R.,CARBON R10 10K
R113 R114	5240033020	R.,CARBON 100K R10 T.
R115 R116	5240033820	R.,CARBON R10 220K
R117 R118	5240028220	R.,CARBON R20 1.0K J FT
R119-R124	5240033020	R.,CARBON 100K R10 T.
R125-R128	5240031820	R.,CARBON R20 33K J FT

MOTOR DRIVE PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R129 R130	5240032220	R.,CARBON R20 47K J FT
R131 R132	5181482000	R.,CARBON R25 1.0K J FT
R133 R134	5240029020	R.,CARBON R10 2.2K
R135 R136	5240028220	R.,CARBON R20 1.0K J FT
R137	5240032620	R.,CARBON R20 68K J FT
R138	5240030620	R.,CARBON R10 10K
R139 R140	5240033020	R.,CARBON 100K R10 T.
R141	5240032420	R.,CARBON R20 56K J FT
R142	5240032220	R.,CARBON R20 47K J FT
R143	5240029820	R.,CARBON R20 4.7K J FT
R144	5240025820	R.,CARBON 100 OHM R10 T.
R145	5240025020	R.,CARBON R20 47 J FT
R146	5240030620	R.,CARBON R10 10K
R147	5240031820	R.,CARBON R20 33K J FT
R148	5240033020	R.,CARBON 100K R10 T.
R149	5280132702	R.,TRIMMER 50KB V. METAL
R150	5280132902	R.,TRIMMER 100KB V. METAL
R151	5280133002	R.,TRIMMER 200KB H METAL
R152 R153	5240031420	R.,CARBON R10 22K
R154 R157	5240028220	R.,CARBON R20 1.0K J FT
R156	5240030620	R.,CARBON R10 10K
R158 R159	5240029820	R.,CARBON R20 4.7K J FT
R160	5240025820	R.,CARBON 100 OHM R10 T.
R161	5240028220	R.,CARBON R20 1.0K J FT
R162	5240029820	R.,CARBON R20 4.7K J FT
R163	5240031020	R.,CARBON R10 15K
R164	5240033820	R.,CARBON R10 220K
R166-R170	5240029820	R.,CARBON R20 4.7K J FT
R171-R175	5240031020	R.,CARBON R10 15K
R176	5240032220	R.,CARBON R20 47K J FT
TP1 -TP7	5317002100	CHECK PIN, DH IPS-1136
U 1	5220013400	IC,TC4066BP
U 2	6048609000	IC,LM2902N
U 3	5220015800	IC,HD14002BP
U 4	5220019200	IC,TC4013BP
U 5	5220407200	IC,LM2904
U 6	5220013400	IC,TC4066BP
U 7 U8	5220016600	IC,HD14040BP
U 9	5220019100	IC,TC4011BP
U10	5220016300	IC,HD14023BP
U11 U13	5220020000	IC,TC4049BP
U12 U14	5220019000	IC,TC4001BP
U15	5220016400	IC,HD14027BP
U16	5220013400	IC,TC4066BP
U17	5220020000	IC,TC4049BP
U18	6048661000	IC,M54517P
U19	6048937000	IC,MC14069BCP
U20	5220407200	IC,LM2904
U21	6048661000	IC,M54517P
U22	5220019000	IC,TC4001BP
U23	5220407200	IC,LM2904
U24	6048609000	IC,LM2902N
U25 -U27	5232252020	TRANSISTOR,DIG. 2SC3400
U28	5232251620	TRANSISTOR,DIG. 2SA1346
U29	5220415600	IC,NJM7815A
U30	5232252020	TRANSISTOR,DIG. 2SC3400

PITCH CONTROL A PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161220	PITCH CONTROL PCB A ASSY
	*5210161202	PITCH CONTROL PCB A
	*5317002100	DH CHECK PIN IPS-1136
C1	5171156000	C.,POLYSTY. 820PF 125V J
C2	5260165352	C.,ELLEC. 47UF 35V M USM
D1	5225007900	LED,GL-9PR2 RED
D2	5225007100	LED,GL-9NG2 GRN
D3	5225010600	LED,GL-9HY2
D4 D5	5225007900	LED,GL-9PR2 RED
J1 J2	5336116100	CONN. SOCKET 3024-11CH
J3 -J7	5336115200	CONN. SOCKET 3024-02CH
P1	5122129000	CONNECTOR,PLUG 5045-05A W
P2	5336213500	CONN. SOCKET 5332-20GS1
P3	5122131000	CONNECTOR,PLUG 5045-07A W
Q1 -Q4	5230016100	TRANSISTOR,2SA950-Y
R1	5242110200	R.,ARRAY 4.7KX4
R2 -R5	5240028220	R.,CARBON R20 1.0K J
R6 -R9	5240030620	R.,CARBON R10 10K
R10 -R17	5240025620	R.,CARBON R20 82 J
R18	5240027420	R.,CARBON 470 OHM R10 T.
R19 R20	5240026620	R.,CARBON R20 220 J
R21 R22	5240033020	R.,CARBON 100K R10 T.
R23	5240031420	R.,CARBON R10 22K
R24	5241426602	R.,METAL FILM LT 1/8 5.1K
R26	5240030020	R.,CARBON R20 5.6K J
R27	5240031820	R.,CARBON R20 33K J
R28 R29	5240033020	R.,CARBON 100K R10 T.
R30	5150274000	R.,TRIMMER 10KB
R31	5150267000	R.,TRIMMER 1 KB
R32	5284006100	VR,SLIDE 1KB
R33	5284008800	VR,SLIDE 20KB L45
R34 -R37	5240025020	R.,CARBON R20 47 J
R38 R39	5150274000	R.,TRIMMER 10KB
R40 R41	5150279000	R.,TRIMMER 50KB
R42	5240029820	R.,CARBON R20 4.7K J
R43	5240033420	R.,CARBON R10 150K
R44 R45	5240027420	R.,CARBON 470 OHM R10 T.
S1	5300038800	SW.,PUSH 3G. SUZ 2-2
S2 S3	5300025700	SW.,PUSH SPH121A
U1	6048661000	IC,M54517P
U2	5220012500	IC,UPC393C,DIGITAL

PITCH CONTROL PCB B ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200162100	PITCH CONTROL PCB B ASSY
	*5210162100	PITCH CONTROL PCB B
	5225012300	LED,SL-2405-05C
P1 P2	5122363000	CONNECTOR,M 11P
Q2	5145087000	TRANSISTOR,2SD-313E(R only)
R1	5241262100	R.,METAL 0.15 5W
R2	5181490000	R.,CARBON R25 2.2K J
R3	5181490000	R.,CARBON R25 2.2K(R Only)

CM DRIVE PCB ASSY

REF.NO.		PARTS NO.	DESCRIPTION
		*5200162200	CM DRIVE PCB ASSY
		*5210162201	CM DRIVE PCB
C1		5171856000	C.,MYLAR 0.01UF/100V J T
C2	-C3	5260165452	C.,ELEC. 47UF/50V M USM V
D1	-D6	5143243000	DIODE,ERB12-02G1
P1		5122135000	CONNECTOR,PLUG 5045-11A
P2		5122127000	CONNECTOR,PLUG 3P
P3		5122203000	CONNECTOR,PLUG 5046-03A B
P4		5122149000	CONNECTOR,PLUG 5046-06A W
Q2		5145151000	TRANSISTOR,2SC-1815GR
Q3	Q5	5230014000	TRANSISTOR,2SA1020-Y
Q4	Q6	5230773800	TRANSISTOR,2SC2655-Y
Q7		5230014000	TRANSISTOR,2SA1020-Y
Q8		5230773800	TRANSISTOR,2SC2655-Y
Q9	Q11	5230505700	TRANSISTOR,2SB834-Y
Q10	Q12	5231755100	TRANSISTOR,2SD880-Y
Q13		5230505700	TRANSISTOR,2SB834-Y
Q14		5231755100	TRANSISTOR,2SD880-Y
R1		5181524000	R.,CARBON R25 56K
R2		5181502000	R.,CARBON R25 6.8K J
R3		5181506000	R.,CARBON R25 10K J
R4		5181498000	R.,CARBON R25 4.7K J
R5		5181502000	R.,CARBON R25 6.8K J
U1		5220036500	IC,M51724P

REMOTE CONNECTOR PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161320	REMOTE CONNECTOR PCB ASSY
	*5210161301	REMOTE CONNECTOR PCB
J1	5336217700	CON.SOCKET SD-1660A-STA
P1	5336213900	CON. SOCKET 5332-50GS1
P2	5336213500	CON. SOCKET 5332-20GS1
P3	5122133000	CONNECTOR,PLUG 5045-09A W
P4	5122132000	CONNECTOR,PLUG 8P
P5	5122131000	CONNECTOR,PLUG 5045-07A W
P6	5122305000	CONNECTOR,PLUG 5045-08A R
P7	5122304000	CONNECTOR,PLUG 5045-07A R
P10	5122127000	CONNECTOR,PLUG 3P
C1	5173433000	CERAMIC 0.01UF 50V

REC/PLAY PCB ASSY

REF.NO.		PARTS NO.	DESCRIPTION
		*5200185830	REC/PLAY PCB ASSY (ATR-60-8)
		*5200185820	REC/PLAY PCB ASSY (ATR-60-4HS)
		*5210185800	REC/PLAY PCB
C 1		5170358000	C.,MYLAR 0.0018UF 100V J
C 2		5170354000	C.,MYLAR 0.0012UF/100V JT
C 3		5172218000	C.,CERA. 330PF/50V (ATR-60-4HS)
C 4		5260067850	C.,ELEC. 22UF 16V M SMBP
C 5		5170352000	C.,MYLAR 0.001UF/100V JT
C 6		5260164252	C.,ELEC. 33UF 16V M USM
C 7		5260166052	C.,ELEC. 100UF/16V M USM
C 8		5170358000	C.,MYLAR 0.0018UF 100V J
C 9		5263107220	C.,POLYST.560PF/100V J VT
C10		5170352000	C.,MYLAR 0.001UF/100V JT
C11		5172218000	C.,CERAMIC 330PF/50V T
C12	C16	5260067850	C.,ELEC. 22UF 16V M SMBP
C13		5170352000	C.,MYLAR 0.001UF/100V JT
C14	C15	5172204000	C.,CERAMIC 22PF/50V T
C17	C18	5170352000	C.,MYLAR 0.001UF/100V JT
C19	C20	5263167923	C.,METAL 0.1UF/50V J VT
C21		5171857000	C.,MYLAR 0.01UF 100V J (ATR-60-8)
C22		5170372000	C.,MYLAR 0.0068UF/100V JT
C26		5263106820	C.,POLYST. 390PF 100V J
C27		5260067050	C.,ELEC. 10UF 16V
C28		5170352000	C.,MYLAR 0.001UF/100V JT
C29		5171866000	C.,MYLAR 0.027UF 100V J (ATR-60-8)
C29		5171862000	C.,MYLAR 0.018UF 100V J (ATR-60-4HS)
C30		5172216000	C.,CERAMIC 220PF/50V T
C31		5260065850	C.,ELEC. 2.2UF 50V M SMBP
C32		5260165052	C.,ELEC.47UF 10V M USM VT (ATR-60-8)
C33	C35	5260160750	C.,ELEC. 1UF50V SM T-N
C34		5260067050	C.,ELEC. 10UF 16V
C36	C37	5170364000	C.,MYLAR 0.0033UF 100V J
C38		5170372000	C.,MYLAR 0.0068UF/100V JT
C39		5171857000	C.,MYLAR 0.01UF 100V J (ATR-60-8)
C40	C41	5260067050	C.,ELEC. 10UF 16V
C42		5172216000	C.,CERAMIC 220PF/50V T
C43		5263168323	C.,METAL 0.22UF 50V J (ATR-60-4HS)
C44		5170366000	C.,MYLAR 0.0039UF/100V JT (ATR-60-8)
C46		5260067850	C.,ELEC. 22UF 16V M SMBP
C47		5170360000	C.,MYLAR 0.0022UF 100V J
C48		5170372000	C.,MYLAR 0.0068UF/100V JT (ATR-60-8)
C48		5170368000	C.,MYLAR 0.0047UF/100V JT (ATR-60-4HS)
C49		5260164452	C.,ELEC. 33UF 35V M USM
C50	C76	5260160750	C.,ELEC. 1UF50V SM T-N

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
C51 C57	5170352000	C.,MYLAR 0.001UF/100V JT
C53	5260163552	C.,ELEC. 22UF/35V M USM V
C55 C60	5171912000	C.,ELEC.0.22UF 50V M KA
C56	5260164452	C.,ELEC. 33UF 35V M USM
C58	5260160550	C.,ELEC. 0.47UF 50V M SM
C59	5260163552	C.,ELEC. 22UF/35V M USM V
C61	5260165252	C.,ELEC.47UF/25V M USM VT
C62 -C64	5260163452	C.,ELEC. 22UF 25V
C68	5260160550	C.,ELEC. 0.47UF 50V M SM
C69	5260161150	C.,ELEC. 2.2UF 50V
C70 -C73	5260160550	C.,ELEC. 0.47UF 50V M SM
C74	5171912000	C.,ELEC. 0.22UF 50V M KA
C75	5260160550	C.,ELEC. 0.47UF 50V M SM
C77	5263106820	C.,POLYST. 390PF 100V J
C78	5263106020	C.,POLYST. 180PF 100V J (ATR-60-8)
C78	5263106720	C.,POLYST. 360PF 100V J (ATR-60-4HS)
C80	5260160550	C.,ELEC. 0.47UF 50V M SM (ATR-60-8)
C81 -C84	5260160550	C.,ELEC. 0.47UF 50V M SM
C85	5170352000	C.,MYLAR 0.001UF/100V JT
C86 C87	5260166052	C.,ELEC. 100UF/16V M USM
C88	5260160550	C.,ELEC. 0.47UF 50V M SM (ATR-60-8)
C89	5260160550	C.,ELEC. 0.47UF 50V M SM
C90	5170362000	C.,MYLAR 0.0027UF/100V JT
C92	5260067050	C.,ELEC. 10UF 16V
C93	5260066550	C.,ELEC. 4.7UF 35V M SMBP
C94 C97	5263106820	C.,POLYST. 390PF 100V J
C95	5170352000	C.,MYLAR 0.001UF/100V JT
C98	5263167923	C.,METAL 0.1UF/50V J VT
C101	5260160750	C.,ELEC. 1UF/50V
D 1 -D6	5224015010	DIODE,1SS133HV
D 7 D8	5224015400	DIODE,1K60 (ATR-60-8)
D 9 -D12	5224015010	DIODE,1SS133HV
D14 D15	5224015010	DIODE,1SS133HV
D16 D20	5143174000	DIODE,ZENER EQA01-19R
D17 D18	5224015010	DIODE,1SS133HV
D21	5143154000	DIODE,ZENER EQA01-06S
D22 -D24	5224015010	DIODE,1SS133HV
D28 D29	5224015010	DIODE,1SS133HV
D31	5224015010	DIODE,1SS133HV
D33	5224015010	DIODE,1SS133HV (ATR-60-4HS)
D34	5224015010	DIODE,1SS133HV
D36 -D41	5224015010	DIODE,1SS133HV
D43 -D47	5224015010	DIODE,1SS133HV
D48 D49	5143174000	DIODE,ZENER;EQA01-19R
J1	5336164300	CONNECTOR SOCKET
J2	5336164600	CONNECTOR
J3 J4	5336165200	CONNECTOR SOCKET
K1 K2	5290011700	RELAY 24V G5A237P
L1 L4	5286006700	COIL,CHOKE 1.2MH
L2 L7	5286007600	COIL,CHOKE 3.0MH J

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
L3	5286021100	COIL,CHOKE 1200UH M VR
L5	5160044000	COIL,TRAP.3MH
P1	5122146000	CON. PLUG,3P (ATR-60-4HS)
Q 1 Q4	5232005200	FET,2SK246GR
Q 2 Q6	5232008600	FET.,2SK389BL
Q 3 Q5	5145151000	TRANSISTOR,2SC-1815GR
Q 7 Q8	5145149000	TRANSISTOR,2SA-970GR
Q 9 Q10	5145151000	TRANSISTOR,2SC-1815GR
Q11	5145130000	TRANSISTOR,2SA-1015GR
Q12	5232008100	FET 2SJ-103(GR)
Q13 Q17	5232005200	FET,2SK246GR
Q14	5145151000	TRANSISTOR,2SC-1815GR (ATR-60-8)
Q15	5145151000	TRANSISTOR,2SC-1815GR
Q16	5230775000	TRANSISTOR,2SC2878-B
Q18 Q21	5232008100	FET 2SJ-103(GR)
Q19 Q20	5145151000	TRANSISTOR,2SC-1815GR
Q22 -R25	5232005200	FET,2SK246GR
Q26 Q29	5232008100	FET 2SJ-103(GR)
Q27 Q28	5232005200	FET,2SK246GR
Q30 Q32	5145151000	TRANSISTOR,2SC-1815GR
Q31	5145151000	TRANSISTOR,2SC-1815GR (ATR-60-8)
Q33	5232008100	FET 2SJ-103(GR)
Q34	5232005200	FET,2SK246GR
Q35	5145151000	TRANSISTOR,2SC-1815GR
Q36	5145151000	TRANSISTOR,2SC-1815GR (ATR-60-8)
Q38	5145151000	TRANSISTOR,2SC-1815GR
Q39 Q43	5232005200	FET,2SK246GR
Q40 Q41	5145151000	TRANSISTOR,2SC-1815GR
Q42	5232008100	FET 2SJ-103(GR)
Q44 Q45	5145151000	TRANSISTOR,2SC-1815GR
Q46 Q49	5230771000	TRANSISTOR,2SC2274-KE
Q47 Q50	5145151000	TRANSISTOR,2SC-1815GR
Q48 Q51	5230771000	TRANSISTOR,2SC2274-KE
Q52 -Q54	5145151000	TRANSISTOR,2SC-1815GR
Q56	5145151000	TRANSISTOR,2SC-1815GR
R 1	5240177800	R.,CARBON ELR25 10M J VF
R 2	5240030620	R.,CARBON R10 10K
R 3 R4	5240027020	R.,CARBON R20 330 J FT
R 5	5240028620	R.,CARBON R20 1.5K
R 6	5240025420	R.,CARBON R20 68 (ATR-60-4HS)
R 7 R8	5241318200	R.,METAL FILM 1K F
R 9	5240023620	R.,CARBON R20 12 J FT (ATR-60-8)
R 9	5240024220	R.,CARBON R20 22 J FT (ATR-60-4HS)
R 10 R12	5240029820	R.,CARBON R20 4.7K J FT
R 11	5240028620	R.,CARBON R20 1.5K J FT
R 13	5240177800	R.,CARBON ELR25 10M J VF
R 14	5240030620	R.,CARBON R10 10K
R 15 R16	5240027020	R.,CARBON R20 330 J FT
R 17 R22	5240028620	R.,CARBON R20 1.5K J FT

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R 18 R19	5241318200	R.,METAL FILM 1K F
R 20	5240023620	R.,CARBON R20 12 J FT (ATR-60-8)
R 20	5240024220	R.,CARBON R20 22 J FT (ATR-60-4HS)
R 39	5240029620	R.,CARBON R20 3.9K J FT
R 23	5240028020	R.,CARBON 820 OHM R10 T.
R 24 R25	5240028220	R.,CARBON R20 1.0K J FT
R 26 R27	5240030320	R.,CARBON R20 7.5K J FT
R 28	5240028820	R.,CARBON R20 1.8K J FT
R 29	5240029220	R.,CARBON R20 2.7K J FT
R 30 R31	5240024620	R.,CARBON R20 33 J FT
R 32	5240031020	R.,CARBON R10 15K
R 33 R34	5240028220	R.,CARBON R20 1.0K J FT
R 35	5240032220	R.,CARBON R20 47K J FT
R 36	5240028020	R.,CARBON 820 OHM R10 T. (ATR-60-8)
R 36	5240027820	R.,CARBON 680 OHM R10 T. (ATR-60-4HS)
R 37	5240034620	R.,CARBON R20 470K J FT
R 40	5240029220	R.,CARBON R20 2.7K J FT
R 41 R43	5240030620	R.,CARBON R10 10K
R 44	5240025420	R.,CARBON R20 68 FT
R 46	5240029020	R.,CARBON R10 2.2K
R 47	5240029920	R.,CARBON R20 5.1K J FT (ATR-60-8)
R 48	5240029920	R.,CARBON R20 5.1K J FT
R 49	5240029820	R.,CARBON R20 4.7K (ATR-60-8)
R 50	5240029820	R.,CARBON R20 4.7K J FT
R 53	5240029820	R.,CARBON R20 4.7K J FT
R 54	5240030420	R.,CARBON 8.2K R10 T.
R 56	5240032220	R.,CARBON R20 47K J FT
R 58 R59	5240177800	R.,CARBON ELR25 10M J VF
R 60	5240030620	R.,CARBON R10 10K (ATR-60-8)
R 60	5240032220	R.,CARBON R20 47K (ATR-60-4HS)
R 61 R69	5240033020	R.,CARBON 100K R10 T.
R 62	5240028220	R.,CARBON R20 1.0K J FT (ATR-60-8)
R 62	5240026820	R.,CARBON R20 270 J FT (ATR-60-4HS)
R 63	5240029420	R.,CARBON R20 3.3K J FT
R 64	5240027420	R.,CARBON 470 OHM R10 T.
R 65 R66	5240029820	R.,CARBON R20 4.7K J FT
R 68	5240029620	R.,CARBON R20 3.9K J FT
R 70	5240031220	R.,CARBON R20 18K J FT
R 71	5240030620	R.,CARBON R10 10K
R 72	5240029020	R.,CARBON R10 2.2K
R 73	5240031620	R.,CARBON R20 27K J FT
R 74	5240029820	R.,CARBON R20 4.7K J FT
R 75	5240030420	R.,CARBON 8.2K R10 T.
R 76	5240029420	R.,CARBON R20 3.3K J FT
R 77	5240034820	R.,CARBON R20 560K J FT (ATR-60-8)
R 78	5240033420	R.,CARBON R10 150K (ATR-60-8)

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R 78	5240033620	R.,CARBON R20 180K (ATR-60-4HS)
R 84 R85	5240177800	R.,CARBON ELR25 10M J VF
R 88	5240030620	R.,CARBON R10 10K
R 89 R91	5240177800	R.,CARBON ELR25 10M J VF
R 90	5240030620	R.,CARBON R10 10K
R 92 R99	5240033020	R.,CARBON 100K R10 T.
R 93	5240028020	R.,CARBON 820 OHM R10 T.
R 94	5240031020	R.,CARBON R10 15K
R 96	5240029620	R.,CARBON R20 3.9K J FT
R 98	5240031620	R.,CARBON R20 27K J FT
R100	5240031620	R.,CARBON R20 27K J FT (ATR-60-8)
R101	5240033020	R.,CARBON 100K R10 T. (ATR-60-8)
R102	5240034620	R.,CARBON R20 470K J FT
R103	5240032320	R.,CARBON R20 51K J FT (ATR-60-8)
R104	5240031220	R.,CARBON R20 18K J FT
R106 R107	5240032420	R.,CARBON R20 56K J FT
R108	5240030620	R.,CARBON R10 10K
R109	5240028220	R.,CARBON R20 1.0K J FT
R110	5240028420	R.,CARBON R20 1.2K J FT
R112 R113	5240030620	R.,CARBON R10 10K (ATR-60-4HS)
R115	5240033020	R.,CARBON 100K R10 T.
R116	5240031820	R.,CARBON R20 33K J FT
R119	5240030220	R.,CARBON R20 6.8K J FT
R120 R121	5240177800	R.,CARBON ELR25 10M J VF
R122	5240031020	R.,CARBON R10 15K
R123	5240031820	R.,CARBON R20 33K J FT
R124	5240029020	R.,CARBON R10 2.2K
R125	5240029920	R.,CARBON R20 5.1K J FT
R126	5240029920	R.,CARBON R20 5.1K J FT (ATR-60-8)
R127	5240029820	R.,CARBON R20 4.7K J FT
R128	5240029820	R.,CARBON R20 4.7K J FT (ATR-60-8)
R130	5240032220	R.,CARBON R20 47K J FT
R133	5240032820	R.,CARBON R20 82K J FT
R134	5240034020	R.,CARBON R20 270K J FT
R135	5240029820	R.,CARBON R20 4.7K J FT (ATR-60-8)
R135	5240029840	R.,CARBON R20 3.3K J FT (ATR-60-4HS)
R136	5240029820	R.,CARBON R20 4.7K J FT
R137	5240177800	R.,CARBON ELR25 10M J VF
R138	5240028220	R.,CARBON R20 1.0K J FT
R141 R142	5240177800	R.,CARBON ELR25 10M J VF
R143 R145	5240030620	R.,CARBON R10 10K
R146	5240028220	R.,CARBON R20 1.0K J FT
R149	5240033020	R.,CARBON 100K R10 T.
R150-R153	5240029820	R.,CARBON R20 4.7K J FT
R156	5240030620	R.,CARBON R10 10K
R157	5240022820	R.,CARBON R20 5.6 J FT
R158	5240029020	R.,CARBON R10 2.2K (ATR-60-8)
R158	5240030420	R.,CARBON R20 8.2K (ATR-60-4HS)
R159 R160	5240030620	R.,CARBON R10 10K

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R161	5240032220	R.,CARBON R20 47K(ATR-60-8)
R161	5240031420	R.,CARBON R20 22K(ATR-60-4HS)
R162	5240028820	R.,CARBON R20 1.8K(ATR-60-8)
R162	5240029320	R.,CARBON R20 3K (ATR-60-4HS)
R163	5240030620	R.,CARBON R10 10K
R164 R165	5240026620	R.,CARBON R20 220 J FT
R168	5240028020	R.,CARBON 820 OHM R10 T.
R169	5240023620	R.,CARBON R20 12 J FT
R170	5240030420	R.,CARBON 8.2K R10 T.
R171 R175	5240030620	R.,CARBON R10 10K
R172	5240029820	R.,CARBON R20 4.7K J FT
R173	5240031820	R.,CARBON R20 33K J FT
R174	5240028620	R.,CARBON R20 1.5K J FT
R176 R177	5240026620	R.,CARBON R20 220 J FT
R178 R187	5240031020	R.,CARBON R10 15K
R179	5240029020	R.,CARBON R10 2.2K
R180	5240029820	R.,CARBON R20 4.7K J FT
R181	5240026620	R.,CARBON R20 220 J FT
R182 R185	5240031220	R.,CARBON R20 18K J FT
R183 R186	5240030020	R.,CARBON R20 5.6K J FT
R184	5240030420	R.,CARBON 8.2K R10 T.
R188	5240030820	R.,CARBON R20 12K J FT
R189	5240031020	R.,CARBON R10 15K
R198	5240033020	R.,CARBON 100K R10 T.
R199 R202	5240031620	R.,CARBON R20 27K J FT
R200	5240033020	R.,CARBON 100K R10 T. (ATR-60-8)
R201	5240031620	R.,CARBON R20 27K J FT (ATR-60-8)
R204	5240032420	R.,CARBON R20 56K J FT
R205	5240031620	R.,CARBON R20 27K J FT (ATR-60-8)
R206	5240031620	R.,CARBON R20 27K J FT
R207 R208	5240030820	R.,CARBON R20 12K J FT
R209 R210	5240032220	R.,CARBON R20 47K J FT
R211 R214	5240031620	R.,CARBON R20 27K J FT
R213	5240032420	R.,CARBON R20 56K J FT
R215 R216	5240032420	R.,CARBON R20 56K J FT
R217 R220	5240031620	R.,CARBON R20 27K J FT
R218 R219	5240032420	R.,CARBON R20 56K J FT
R221 R222	5240032420	R.,CARBON R20 56K J FT
R223	5240031620	R.,CARBON R20 27K J FT
R224 R225	5240032420	R.,CARBON R20 56K J FT
R226	5240033020	R.,CARBON 100K R10 T. (ATR-60-8)
R227	5240033020	R.,CARBON 100K R10 T.
R228 R229	5240031020	R.,CARBON R10 15K
R230-R232	5240031620	R.,CARBON R20 27K J FT
R233	5240031020	R.,CARBON R10 15K
R234	5240031620	R.,CARBON R20 27K J FT
R239 R242	5240032220	R.,CARBON R20 47K J FT
R240	5240031620	R.,CARBON R20 27K J FT
R241	5240030620	R.,CARBON R10 10K
R243	5240032820	R.,CARBON R20 82K J FT
R244	5240032420	R.,CARBON R20 56K J FT

REC/PLAY PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
R245	5240031620	R.,CARBON R20 27K J FT
R246	5240033020	R.,CARBON R20 100K
R247 R248	5240032420	R.,CARBON R20 56K J FT
R249 R250	5240031620	R.,CARBON R20 27K J FT
R251	5240031020	R.,CARBON R10 15K
R252	5240032220	R.,CARBON R20 47K J FT
R253 R254	5240031020	R.,CARBON R10 15K
R255	5240032220	R.,CARBON R20 47K J FT
R256 R259	5240031020	R.,CARBON R10 15K
R257	5240032420	R.,CARBON R10 56K
R258	5240030620	R.,CARBON R10 10K
R260 R266	5240031020	R.,CARBON R10 15K
R261 R262	5240031620	R.,CARBON R20 27K J FT
R263	5240028420	R.,CARBON R20 1.2K J FT (ATR-60-4HS)
R264	5240031620	R.,CARBON R20 27K J FT
R265	5240030620	R.,CARBON R10 10K
R267	5240029820	R.,CARBON R20 4.7K J
R268	5240031020	R.,CARBON R20 15K J
R301 R302	5280132002	R.,TRIMMER 5.0KB V METAL
R303 R304	5280132902	R.,TRIMMER 100KB V. METAL
R306 R307	5280131802	R.,TRIMMER 3.3KB V METAL (ATR-60-8)
R306 R307	5280132002	R.,TRIMMER 5.0KB V METAL (ATR-60-4HS)
R308 R309	5280131802	R.,TRIMMER 3.3KB V METAL (ATR-60-8)
R308 R309	5280131602	R.,TRIMMER 2.0KB V METAL (ATR-60-4HS)
R310 R312	5280132702	R.,TRIMMER 50KB V. METAL
R313	5280132202	R.,TRIMMER 10KB V METAL
R314	5280133402	R.,TRIMMER 500KB V METAL
R315	5240030620	R.,CARBON R10 10K(ATR-60-4HS)
R316 R317	5280132502	R.,TRIMMER 33KB V METAL
R318	5280132302	R.,TRIMMER 20KB METAL
R319-R324	5280132202	R.,TRIMMER 10KB METAL
TP1 -TP6	5317001200	HEADER PIN F0.7 (ATR-60-8)
U 1 U2	5220416600	IC,NJM2041D-D
U 4 U5	5220416600	IC,NJM2041D-D
U 6 U7	5220418800	IC,M5218P
U 8 U10	5220020000	IC,TC4049BP
U 9	5220019000	IC,TC4001BP
U11 U12	5220019000	IC,TC4001BP
U14 U15	5232252020	TRANSISTOR,DIG. 2SC3400
U17 -U20	5232252020	TRANSISTOR,DIG. 2SC3400
U22	5292205600	AMP MODULE,BIAS E
U23	5292205700	AMP MODULE,BIAS R
U24 U25	5232252020	TRANSISTOR,DIG. 2SC3400

ERASE HEAD PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200185720	ERASE HEAD PCB ASSY (ATR-60-8)
	*5200185710	ERASE HEAD PCB ASSY (ATR-60-4HS)
	*5210185700	ERASE HEAD PCB
	*5317002100	CHECK PIN,DH IPS-1136
C1 -C8	5265074400	C.,POLYST. 2700PF 250V VR (ATR-60-8)
C1 -C4	5265074400	C.,POLYST. 2700PF 250V VR (ATR-60-4HS)
L1 -L8	5286025000	COIL, STEP UP (ATR-60-8)
L1 -L4	5286025000	COIL, STEP UP (ATR-60-4HS)
P1	5336126500	CONNECTOR PLUG, WHT
P2	5336126400	CONNECTOR PLUG, WHT
P3	5336137500	CONNECTOR PLUG 8263-0512
P4	5336137400	CONNECTOR PLUG 8263-0412
P5	5336135500	CONNECTOR PLUG 8263-0512 (ATR-60-8)
P6	5336135400	CONNECTOR PLUG 8263-0412 (ATR-60-8)
P7	5336145500	CONNECTOR PLUG 8263-0512 (ATR-60-8)
P8	5336145400	CONNECTOR PLUG 8263-0412 (ATR-60-8)
R1 -R8	5240023420	R.,CARBON 10 OHM (ATR-60-8)
R1 -R4	5240023420	R.,CARBON 10 OHM (ATR-60-4HS)

HEAD PCB ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200111000	HEAD PCB ASSY
	*5210111000	HEAD PCB
J001-J003	5332015300	SOCKET, IC 16P

REMOTE FUNCTION PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161710	REMOTE FUNCTION PCB ASSY
	*5210161701	REMOTE FUNCTION PCB
J1	5336217600	CON.SOCKET SD-1645A-STA
P 1	5122134000	CONNECTOR,PLUG 10P WHITE
P 2	5122306000	CONNECTOR,PLUG 5045-09A R
P 5	5122131000	CONNECTOR,PLUG 5045-07A W
P 6	5122133000	CONNECTOR PLUG 5045-09P W
P 7	5122129000	CONNECTOR,PLUG 5045-05A W
P 8	5122302000	CONNECTOR,PLUG 5045-05A R
P 9	5122132000	CONNECTOR,PLUG 8P
P10	5122126000	CONNECTOR,PLUG 2P W

INPUT PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160200	INPUT PCB ASSY (ATR-60-8)
	*5200160210	INPUT PCB ASSY (ATR-60-4HS)
	*5210160200	IN/OUT PCB
	5330507200	JACK,PIN 4P
C1 -C4	5260067050	C.,ELEC. 10UF 16V (ATR-60-8)

OUTPUT PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200161810	OUTPUT PCB ASSY
	*5210160200	IN/OUT PCB
	5330507200	JACK,PIN 4P

OSC PCB ASSY (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200160400	OSC PCB ASSY
	*5210160400	OSC PCB
U1	5292201900	OSC UNIT 145KHZ

MOTHER PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
	*5200188110	MOTHER PCB ASSY (ATR-60-8)
	*5200188100	MOTHER PCB ASSY (ATR-60-4HS)
	*5210188101	MOTHER PCB
D1 D2	5224015010	DIODE,1SS133HV
D3 D4	5224015010	DIODE,1SS133HV (ATR-60-8)
K1 K2	5061137000	RELAY REED LAB2L
K3 K4	5061137000	RELAY REED LAB2L (ATR-60-4HS)
P 11-P14	5336166300	CONNECTOR PLUG IL-03P
P 15 P16	5336166300	CONNECTOR PLUG IL-03P (ATR-60-8)
P 17 P18	5336166300	CONNECTOR PLUG IL-03P
P 21-P24	5336166600	CONNECTOR PLUG IL-06P
P 25 P26	5336166600	CONNECTOR PLUG IL-06P (ATR-60-8)
P 27 P28	5336166600	CONNECTOR PLUG IL-06P
P 31-P34	5336167200	CONNECTOR PLUG IL-12P
P 35 P36	5336167200	CONNECTOR PLUG IL-12P (ATR-60-8)
P 37 P38	5336167200	CONNECTOR PLUG IL-12P
P 41-P44	5336167200	CONNECTOR PLUG IL-12P
P 45 P46	5336167200	CONNECTOR PLUG IL-12P (ATR-60-8)
P 47 P48	5336167200	CONNECTOR PLUG IL-12P
P 51-P58	5336166900	CONNECTOR PLUG,IL-09P (ATR-60-8)

MOTHER PCB ASSY

REF.NO.	PARTS NO.	DESCRIPTION
P 61-P64	5336126300	CON. PLUG 8263-0312 WH
P 65 P66	5336126300	CON. PLUG 8263-0312 WH (ATR-60-8)
P 67 P68	5336126300	CON. PLUG 8263-0312 WH
P 71-P74	5336135300	CON. PLUG 8263-0312 RD
P 75 P76	5336135300	CON. PLUG 8263-0312 RD (ATR-60-8)
P 77 P78	5336135300	CON. PLUG 8263-0312 RD
P101-P104	5336135400	CON. PLUG 8263-0412 RD
P105-P108	5336135400	CON. PLUG 8263-0412 RD (ATR-60-8)
P111-P114	5336145300	CON. PLUG 8263-0312 YL
P115-P118	5336145300	CON. PLUG 8263-0312 YL (ATR-60-8)
P121-P124	5336137300	CON. PLUG 8263-0312 BK
P125-P128	5336137300	CON. PLUG 8263-0312 BK (ATR-60-8)
P131	5336137400	CON. PLUG 8263-0412 BK (ATR-60-4HS)
P132	5336137400	CON. PLUG 8263-0412 BK
P133	5336135400	CON. PLUG 8263-0412 RD
P134	5336126800	CON. PLUG 8263-0812 WH
P135	5336127100	CON. PLUG 8263-1112 WH
P136	5336137800	CON. PLUG 8263-0812 BK (ATR-60-8)
P141 P142	5336145300	CON.PLUG 8263-0312 YL (ATR-60-4HS)
P143 P144	5336137300	CON.PLUG 8263-0312 BK (ATR-60-4HS)
P145	5336135800	CON.PLUG 8263-0812 RD (ATR-60-4HS)
P146	5336135600	CON.PLUG 8263-0612 RD (ATR-60-4HS)
P147	5336126300	CON.PLUG 8263-0312 WH (ATR-60-4HS)
P148	5336137400	CON. PLUG 8263-0412 BK (ATR-60-8)
P149	5336137800	CON. PLUG 8263-0812 BK
P150	5336137300	CON. PLUG 8263-0312 BK
P151-P158	5336145300	CON. PLUG 8263-0312 YL (ATR-60-8)
P159 P160	5336126300	CON. PLUG 8263-0312 WH
P161	5336126300	CON. PLUG 8263-0312 WH (ATR-60-8)
P162	5336137800	CON. PLUG 8263-0812 BK (ATR-60-8)
P163	5336135300	CON. PLUG 8263-0312 RD (ATR-60-8)
P171-R178	5336137200	CON. PLUG 8263-0212 BK (ATR-60-8)
R1 R2	5240028420	R.,CARBON R20 1.2K J FT
R3 R4	5240028420	R.,CARBON R20 1.2K J FT (ATR-60-8)
S1 S2	5300908100	SW.,SLIDE 1-2N

FUNCTION PCB ASSY(A)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200187910	FUNCTION PCB ASSY(A) (ATR-60-8)
	*5200187900	FUNCTION PCB ASSY(A) (ATR-60-4HS)
	*5210187900	FUNCTION PCB A
	5300038500	SW.,PUSH 4G SUN 2-2
	5300028000	SW.,PUSH 3GANG SUN341A
	5122154000	CONNECTOR,PLUG 5046-11A W
	5122150000	CONNECTOR,PLUG 5046-07A
C 1 C2	5260160750	C.,ELEC. 1UF50V SM T-N
C 4 C5	5260162650	C.,ELEC. 10UF25V M SM VT
C 9	5260165252	C.,ELEC.47UF/25V M USM VT
C10 C11	5173435000	C.,CERAMIC 0.047UF 50V Z
D 1 -D7	5225011300	LED,SLP445B (ATR-60-8)
D 5 -D7	5225011300	LED,SLP445B (ATR-60-4HS)
D 8	5225014100	LED,GL-9ND2
D 9 -D19	5224015010	DIODE,1SS133HV (ATR-60-8)
D13 -D19	5224015010	DIODE,1SS133HV (ATR-60-4HS)
D21 D22	5224015010	DIODE,1SS133HV
D24 -D31	5224015010	DIODE,1SS133HV
D32	5225010100	LED,SLP-155B RED
D33	5225011300	LED,SLP445B
D34	5225010200	LED,SLP-255B GRN
Q1 Q2	5230771000	TRANSISTOR,2SC2274-KE
R 1 -R7	5181480000	R.,CARBON R25 820 J FT (ATR-60-8)
R 5 -R7	5181480000	R.,CARBON R25 820 J FT (ATR-60-4HS)
R 8 R9	5181488000	R.,CARBON R25 1.8K J FT
R10	5240030620	R.,CARBON R10 10K
R11	5240028820	R.,CARBON R20 1.8K J FT
R12	5240031420	R.,CARBON R10 22K
R13 R14	5240029820	R.,CARBON R20 4.7K J FT
R15	5242110400	R.,ARRAY 4.7KX6
R16 -R21	5240031020	R.,CARBON R10 15K
R22	5181492000	R.,CARBON R25 2.7K J FT
R23 R24	5181480000	R.,CARBON R25 820 J FT
R25	5240030620	R.,CARBON R10 10K
R26 R30	5240031020	R.,CARBON R10 15K
R27	5240029820	R.,CARBON R20 4.7K J FT
R29	5240031020	R.,CARBON R20 47K J
R32	5240032820	R.,CARBON R20 82K J
R34	5240026620	R.,CARBON R20 220K J
R36	5240031020	R.,CARBON R20 15K J
R42	5240032220	R.,CARBON R20 47K J FT
R43 R48	5240031020	R.,CARBON R10 15K
R44	5240029820	R.,CARBON R20 4.7K J FT
R45	5240031420	R.,CARBON R10 22K
R46	5240032620	R.,CARBON R20 68K J FT
R47	5240026620	R.,CARBON R20 220J FT
U 1	6048661000	IC,M54517P
U 2 U6	5220020000	IC,TC4049BP
U 3	5220020200	IC,TC4030BP
U 4 U5	5220019100	IC,TC4011BP
U 7	5220019000	IC,TC4001BP
U 8 U9	5232251620	TRANSISTOR,DIG. 2SA1346
U10 -U13	5232252020	TRANSISTOR,DIG. 2SC3400
U11	5232251620	TRANSISTOR,DIG. 2SA1346

FUNCTION PCB ASSY(B)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200188010	FUNCTION PCB ASSY(B) (ATR-60-8)
	*5200188000	FUNCTION PCB ASSY(B) (ATR-60-4HS)
	*5210188000	FUNCTION PCB B
	5300038600	SW.,PUSH 4G.4-2 SUN
	5300038700	SW.,PUSH 3G.2-2 SUN
	5122153000	CONNECTOR,PLUG 10P
D101-D108	5225010100	LED,SLP-155B RED (ATR-60-8)
D105-D108	5225010100	LED,SLP-155B RED (ATR-60-4HS)
D109-D111	5225011300	LED,SLP445B
R101-R108	5181492000	R.,CARBON R25 2.7K J FT (ATR-60-8)
R105-R108	5181492000	R.,CARBON R25 2.7K J FT (ATR-60-4HS)
R109-R111	5181480000	R.,CARBON R25 820 J FT
R112	5240029820	R.,CARBON R20 4.7K J FT
R113	5240031820	R.,CARBON R20 33K J FT
U101 U102	5232252020	TRANSISTOR,DIG. 2SC3400

REC SELECT PCB ASSY (ATR-60-8)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200139100	REC SELECT PCB ASSY
	*5210139100	REC SELECT PCB
C1	5260165252	C.,ELEC.47UF/25V M USM VT
C2 -C3	5173433000	C.,CERAMIC 0.010UF 50V Z
Q1 -Q8	5145151000	TRANSISTOR,2SC-1815GR
R 1	5240029220	R.,CARBON R20 2.7K J FT
R11 -R18	5240029220	R.,CARBON R20 2.7K J FT
R21 -R28	5240031020	R.,CARBON R10 15K
R31 -R38	5240031020	R.,CARBON R10 15K
R41 -R48	5240030620	R.,CARBON R10 10K
R51 -R58	5240031020	R.,CARBON R10 15K
R61 -R68	5240029820	R.,CARBON R20 4.7K J FT
U1 U2	6048940000	IC,MC14001CP

IN/OUT AMP PCB ASSY (ATR-60-8)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200128820	IN/OUT AMP PCB ASSY
	*5210128801	IN/OUT AMP PCB
C011-C018	5260067050	C.,ELEC. 10UF 16V
C021-C028	5260067050	C.,ELEC. 10UF 16V
C061-C068	5172212000	C.,CERAMIC 100PF/50V T
C071 C073	5260165252	C.,ELEC.47UF/25V M USM VT
C075 C077	5260165252	C.,ELEC.47UF/25V M USM VT
C082 C084	5260165252	C.,ELEC.47UF/25V M USM VT
C086 C088	5260165252	C.,ELEC.47UF/25V M USM VT
C091-C098	5260067050	C.,ELEC. 10UF 16V

IN/OUT AMP PCB ASSY (ATR-60-8)

REF.NO.	PARTS NO.	DESCRIPTION
C101-C108	5260067050	C.,ELEC. 10UF 16V
C111-C118	5172212000	C.,CERAMIC 100PF/50V T
C121-C128	5172204000	C.,CERAMIC 22PF/50V T
C131-C138	5172204000	C.,CERAMIC 22PF/50V T
C141-C148	5260067050	C.,ELEC. 10UF 16V
C151-C158	5172214000	C.,CERAMIC 150PF/50V K
C161-C168	5172204000	C.,CERAMIC 22PF/50V T
C171-C178	5172204000	C.,CERAMIC 22PF/50V T
C181-C188	5260067050	C.,ELEC. 10UF 16V
C191-C198	5260067050	C.,ELEC. 10UF 16V
C201 C203	5260165252	C.,ELEC.47UF/25V M USM VT
C205 C207	5260165252	C.,ELEC.47UF/25V M USM VT
C212 C214	5260165252	C.,ELEC.47UF/25V M USM VT
C216 C218	5260165252	C.,ELEC.47UF/25V M USM VT
C221-C228	5260067050	C.,ELEC. 10UF 16V
D011-D018	5224015300	DIODE,MC931
D031-D038	5224015300	DIODE,MC931
P 1	5122184000	CON. PLUG 5045-03A BK
P 2	5336107300	CON. PLUG 5045-03A YL
P011-P018	5122127000	CONNECTOR,PLUG 3P
P021-P028	5336107300	CON. PLUG 5045-03A YL
P031-P038	5122184000	CON. PLUG 5045-03A BK
P041-P048	5122299000	CONNECTOR,PLUG 5045-02A R
P051-P058	5122300000	CONNECTOR,PLUG 5045-03A R
Q011-Q018	5145151000	TRANSISTOR,2SC-1815GR
Q021-Q028	5145150000	TRANSISTOR,2SA-1015GR
Q031-Q038	5230773800	TRANSISTOR,2SC2655-Y
Q041-Q048	5230014000	TRANSISTOR,2SA1020-Y
Q051-Q058	5145151000	TRANSISTOR,2SC-1815GR
Q061-Q068	5145150000	TRANSISTOR,2SA-1015GR
Q071-Q078	5230773800	TRANSISTOR,2SC2655-Y
Q081-Q088	5230014000	TRANSISTOR,2SA1020-Y
R011-R018	5241319900	R.,METAL FILM RE35 5.1K
R021-R028	5241319900	R.,METAL FILM RE35 5.1K
R031-R038	5241318800	R.,METAL FILM RE35 1.8K
R041-R048	5241318800	R.,METAL FILM RE35 1.8K
R051-R058	5240033620	R.,CARBON R20 180K J FT
R061-R068	5240032620	R.,CARBON R20 68K J FT
R091-R098	5240032420	R.,CARBON R20 56K J FT
R131-R138	5240025820	R.,CARBON 100 OHM R10 T.
R141-R148	5240031420	R.,CARBON R10 22K
R151-R158	5240030620	R.,CARBON R10 10K
R161-R168	5240030620	R.,CARBON R10 10K
R171-R178	5240030820	R.,CARBON R20 12K J FT
R181-R188	5240031020	R.,CARBON R10 15K
R191-R198	5240031020	R.,CARBON R10 15K
R201-R208	5240029820	R.,CARBON R20 4.7K J FT
R211-R218	5240029820	R.,CARBON R20 4.7K J FT
R221-R228	5240028220	R.,CARBON R20 1.0K J FT
R231-R238	5240028220	R.,CARBON R20 1.0K J FT
R241-R248	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R251-R258	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R261-R268	5241320600	R.,METAL FILM 10K F
R271-R278	5241320600	R.,METAL FILM 10K F
R281-R288	5240030620	R.,CARBON R10 10K

IN/OUT AMP PCB ASSY (AIR-60-8)

REF.NO.	PARTS NO.	DESCRIPTION
R291-R298	5240031020	R.,CARBON R10 15K
R301-R308	5240031020	R.,CARBON R10 15K
R311-R318	5240029820	R.,CARBON R20 4.7K J FT
R321-R328	5240029820	R.,CARBON R20 4.7K J FT
R331-R338	5240028220	R.,CARBON R20 1.0K J FT
R341-R348	5240028220	R.,CARBON R20 1.0K J FT
R351-R358	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R361-R368	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R371-R378	5183554000	R.,INCOMB.1/4 10 OHM R25
R381-R388	5183554000	R.,INCOMB.1/4 10 OHM R25
S1 -S8	5300908100	SW.,SLIDE 1-2N
U011-U018	5220416600	IC,NJM2041D-D
U021-U028	5220416600	IC,NJM2041D-D

IN/OUT PCB ASSY (AIR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200139000	IN/OUT PCB ASSY
	*5210139000	IN/OUT PCB
C1 C2	5173055800	C.,ELEC. 220UF/25V USM F
C101 C201	5172218000	C.,CERAMIC 330PF/50V T
C102 C202	5260165252	C.,ELEC.47UF/25V M USM VT
C103 C203	5172206000	C.,CERAMIC 33PF/50V K VFT
C104 C204	5260067050	C.,ELEC. 10UF 16V
C105 C205	5260067050	C.,ELEC. 10UF 16V
C106 C206	5260165252	C.,ELEC.47UF/25V M USM VT
C107 C207	5260067050	C.,ELEC. 10UF 16V
C108 C208	5172206000	C.,CERAMIC 33PF/50V K VFT
C109 C209	5260165252	C.,ELEC.47UF/25V M USM VT
C110 C210	5172206000	C.,CERAMIC 33PF/50V K VFT
C111 C211	5172204000	C.,CERAMIC 22PF/50V T
C112 C212	5260067050	C.,ELEC. 10UF 16V
C113 C213	5260067050	C.,ELEC. 10UF 16V
C114 C214	5172204000	C.,CERAMIC 22PF/50V T
C115 C215	5172204000	C.,CERAMIC 22PF/50V T
C116 C216	5260067050	C.,ELEC. 10UF 16V
C117 C217	5172204000	C.,CERAMIC 22PF/50V T
C118 C218	5260067050	C.,ELEC. 10UF 16V
C119 C219	5172206000	C.,CERAMIC 33PF/50V K VFT
C120 C220	5260067050	C.,ELEC. 10UF 16V
C121 C221	5260067050	C.,ELEC. 10UF 16V
D101 D201	5224015300	DIODE,MC931
D102 D202	5224015300	DIODE,MC931
J1	5336164300	CONN. SOCKET IL-D-03S
J2	5336164600	CONNECTOR,
J3 J4	5336165200	CONN.SOCKET IL-D-12S
P1	5122149000	CONNECTOR,PLUG 5046-06A W
P2	5122145000	CONNECTOR,PLUG 5046-02A W
Q101 Q201	5230773800	TRANSISTOR,2SC2655-Y
Q102 Q202	5145151000	TRANSISTOR,2SC-1815GR
Q103 Q203	5145150000	TRANSISTOR,2SA-1015GR
Q104 Q204	5230014000	TRANSISTOR,2SA1020-Y

IN/OUT PCB ASSY (AIR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
Q105 Q205	5230773800	TRANSISTOR,2SC2655-Y
Q106 Q206	5145151000	TRANSISTOR,2SC-1815GR
Q107 Q207	5145150000	TRANSISTOR,2SA-1015GR
Q108 Q208	5230014000	TRANSISTOR,2SA1020-Y
R101 R201	5240033820	R.,CARBON R10 220K
R102 R202	5240025820	R.,CARBON 100 OHM R10 T.
R103 R203	5240028820	R.,CARBON R20 1.8K J
R104 R204	5240028220	R.,CARBON R20 1.0K J
R105 R205	5241321600	R.,METAL FILM 27K F
R106 R206	5241318800	R.,METAL FILM RE35 1.8K
R107 R207	5241319900	R.,METAL FILM RE35 5.1K
R108 R208	5241319900	R.,METAL FILM RE35 5.1K
R109 R209	5241318800	R.,METAL FILM RE35 1.8K
R110 R210	5241321600	R.,METAL FILM 27K F
R111 R211	5240025820	R.,CARBON 100 OHM R10 T.
R112 R212	5240032220	R.,CARBON R20 47K J
R113 R213	5240032220	R.,CARBON R20 47K J
R114 R214	5240031020	R.,CARBON R10 15K
R115 R215	5240027420	R.,CARBON 470 OHM R10 T.
R116 R216	5241320600	R.,METAL FILM 10K F
R117 R217	5240031020	R.,CARBON R10 15K
R118 R218	5240028220	R.,CARBON R20 1.0K J
R119 R219	5240029820	R.,CARBON R20 4.7K J
R120 R220	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R121 R221	5240029820	R.,CARBON R20 4.7K J
R122 R222	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R123 R223	5240028220	R.,CARBON R20 1.0K J
R124 R224	5241320600	R.,METAL FILM 10K F
R125 R225	5240030620	R.,CARBON R10 10K
R126 R226	5240031020	R.,CARBON R10 15K
R127 R227	5240031020	R.,CARBON R10 15K
R128 R228	5240028220	R.,CARBON R20 1.0K J
R129 R229	5240029820	R.,CARBON R20 4.7K J
R130 R230	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R131 R231	5240029820	R.,CARBON R20 4.7K J
R132 R232	5183546000	R.,INCOMBUSTIBLE F25 4.7J
R133 R233	5240028220	R.,CARBON R20 1.0K J
R134 R234	5240031020	R.,CARBON R10 15K
R135 R235	5240025820	R.,CARBON 100 OHM R10 T.
R136 R236	5240032620	R.,CARBON R20 68K J
R137 R237	5240029820	R.,CARBON R20 4.7K J
R138 R238	5240030620	R.,CARBON R10 10K
R139 R239	5240030620	R.,CARBON R10 10K
R140 R240	5240030620	R.,CARBON R10 10K
R141 R241	5183554000	R.,INCOMB.1/4 10 OHM R25
R142 R242	5183554000	R.,INCOMB.1/4 10 OHM R25
R143 R243	5240032220	R.,CARBON R20 47K J
S101 S201	5300910100	SW.,SLIDE 2-2 N SSS322
S102 S202	5300910300	SW.,SLIDE 2-3 N SSS323
U101 U201	5220416600	IC,NJM2041D-D
U102	5220416600	IC,NJM2041D-D
U103 U203	5220416600	IC,NJM2041D-D

SW(1) PCB ASSY (ATR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200128700	SW(1) PCB ASSY
	*5210128700	SW PCB
C1 -C3	5260162550	C.,ELEC.10UF 16V
D1	5225012800	LED,AA3432F
R1	5240032620	R.,CARBON R20 68K J
R2	5240031420	R.,CARBON R10 22K
R3	5240031020	R.,CARBON R10 15K
R4	5240031820	R.,CARBON R20 33K J
R5	5240028620	R.,CARBON R20 1.5K J
S1	5300034400	SW.,PUSH 4-2 SUN

SW(2) PCB ASSY (ATR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200128700	SW(1) PCB ASSY
	*5200129200	SW(2) PCB ASSY
	*5210128700	SW PCB
C2 C3	5260162550	C.,ELEC.10UF 16V
D1	5225012800	LED,AA3432F
R3	5240029420	R.,CARBON R20 3.3K J
R4	5240030220	R.,CARBON R20 6.8K J
R5	5240028620	R.,CARBON R20 1.5K J
S1	5300034400	SW.,PUSH 4-2 SUN

CHANNEL SELECT PCB ASSY (ATR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200188200	CHANNEL SELECT PCB ASSY
	*5210188200	CHANNEL SELECT PCB
R1 - R4	5240031220	R.,CARBON R20 18K J FT
R5	5240030220	R.,CARBON R20 6.8K J FT
S1	5300042800	SWITCH, PUSH

VR PCB ASSY(1) (ATR-60-4HS) (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200128610	VR PCB ASSY(1)
	*5210128600	VR PCB
R101	5282015700	1S1U VR 50KA

VR PCB ASSY(2) (ATR-60-4HS) (PCB Omitted)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200129110	VR PCB ASSY(2)
	*5210128600	VR PCB
R101	5282015600	1S1U VR 10KA

PHONE AMP PCB ASSY (ATR-60-4HS)

REF.NO.	PARTS NO.	DESCRIPTION
	*5200128210	PHONE AMP PCB ASSY
	*5210128200	PHONE AMP PCB
C 1 C2	5173063000	C.,ELEC. 330UF 16V (SM)
C101 C201	5260160750	C.,ELEC. 1MF50V SM T-N
C102 C202	5260163252	C.,ELEC. 22UF 10V M USM
C103 C203	5172209000	C.,CERAMIC 56PF 50V K
C104 C204	5260067050	C.,ELEC. 10MF 16V
D101 D102	5224015300	DIODE,MC931
J1	5124046000	JACK,HEADPHONE
P1	5122127000	CONNECTOR,PLUG 3P
P2	5122128000	CONNECTOR,PLUG 4P
Q101 Q201	5230073800	TRANSISTOR,2SC2655-Y
Q102 Q202	5230014000	TRANSISTOR,2SA1020-Y
R 1	5282411400	1S2U VR 50KAX2
R 2 R3	5184217000	R.,INCOMBUSTIBLE 4.7 OHM
R101 R201	5240030620	R.,CARBON R10 10K
R102 R202	5240033020	R.,CARBON 100K R10 T.
R103 R203	5240028620	R.,CARBON R20 1.5K J FT
R104 R204	5240033020	R.,CARBON 100K R10 T.
R105 R205	5240030820	R.,CARBON R20 12K J FT
R106 R206	5240030820	R.,CARBON R20 12K J FT
R107 R207	5240022220	R.,CARBON R20 3.3 J FT
R108 R208	5240022220	R.,CARBON R20 3.3 J FT
R109 R209	5185676000	R.,INCOMBUSTIBLE F50 33 J
U1	5220411600	IC,TLA558P

POWER SUPPLY PCB ASSY

REF.NO.			PARTS NO.	DESCRIPTION
			*5200160300	POWER SUPPLY PCB ASSY
			*5210160300	POWER SUPPLY PCB
C1	C2	⚠	5263164500	C.,POLYST 0.047UF 250V
C3	C4	⚠	5262001500	C.,ELEC. 4700UF35V
C5	C6	⚠	5173047800	C.,ELEC 100UF/35V USM F
C7	C8		5260160550	C.,ELEC. 0.47UF 50V M SM
C9	-C11		5260165252	C.,ELEC.47UF/25V M USM VT
C12	C13	⚠	5263164500	C.,POLYST 0.047UF 250V
C14	C15	⚠	5173090000	C.,ELEC. 2200UF/35V SM VF
C16	C17		5260160550	C.,ELEC. 0.47UF 50V M SM
C18			5260166152	C.,ELEC. 100UF 25V
C19	C20		5260165252	C.,ELEC.47UF/25V M USM VT
C21		⚠	5260166852	C.,ELEC. 220UF 10V M USM
C22		⚠	5263164500	C.,POLYST 0.047UF 250V
C23		⚠	5262001600	C.,ELEC. 4700UF50V
C24	C27		5173047800	C.,ELEC 100UF/35V USM F
C25	C26		5173056800	C.,ELEC.220UF 35V USM F
C28	C29		5263164500	C.,POLYST 0.047UF 250V
C30			5262006600	C.,ELEC. 6800UF 35V(LISN)
C31			5262006500	C.,ELEC. 6800UF 25V(VNSN)
C32	C33		5172882000	C.,ELEC. 1.0UF 50V (SM)
C34	C36		5054928500	C.,MYLAR 0.10UF 100V J
C35			5173071000	C.,ELEC.SM 470UF/10V SNAP
C37	C38	⚠	5263164500	C.,POLYST 0.047UF 250V
C39		⚠	5260271810	C.,ELEC. 2200UF 50V M SME
C40		⚠	5173094000	C.,ELEC. 3300UF 25V (SM)
C41		⚠	5173090000	C.,ELEC. 2200UF/35V SM VF
D1	-D10	⚠	5143243000	DIODE,ERB12-02G1
D11		⚠	5228010000	SILICON STACK,D5SB20
D12	D13		5143154000	DIODE,ZENER EQA01-06S
D14			5228010000	SILICON STACK,D5SB20
D15			5224016300	DIODE,D5S4M
D16			5228010000	SILICON STACK,D5SB20
D17			5224014700	DIODE,S3V20H
P1			5336172600	CONNECTOR,PLUG 5275-06A
P2			5336172500	CONNECTOR,PLUG 5275-05A
P3			5336172600	CONNECTOR,PLUG 5275-06A
P4	P5		5122134000	CONNECTOR,PLUG 10P WHITE
P6			5122135000	CONNECTOR,PLUG 5045-11A
P7			5336172700	CONNECTOR,PLUG 5275-07A
P8			5336172400	CONNECTOR PLUG,5275-04A
Q1	Q3	⚠	5145087000	TRANSISTOR,2SD-313E
Q2	Q4	⚠	5145129000	TRANSISTOR,2SB-507
Q5	Q6	⚠	5145087000	TRANSISTOR,2SD-313E
Q7	Q8		5230771000	TRANSISTOR,2SC2274-KE
Q9	Q10		5145151000	TRANSISTOR,2SC-1815GR
Q11		⚠	5145165000	TRANSISTOR,2SD-716O
Q12	Q16		5230016000	TRANSISTOR,2SA950 O
Q13	Q17		5230771000	TRANSISTOR,2SC2274-KE
Q14	Q15	⚠	5145087000	TRANSISTOR,2SD-313E
Q18		⚠	5145087000	TRANSISTOR,2SD-313E
R1	R2	⚠	5184237000	R.,INCOMBUSTIBLE 33 OHM
R5			5240031420	R.,CARBON R10 22K
R6			5240029020	R.,CARBON R10 2.2K
R7	R12		5240029420	R.,CARBON R20 3.3K J

POWER SUPPLY PCB ASSY

REF.NO.			PARTS NO.	DESCRIPTION
R8	R9		5240031020	R.,CARBON R10 15K
R10			5240031820	R.,CARBON R20 33K J
R11			5240027220	R.,CARBON R20 390 J
R13	R14		5240031020	R.,CARBON R10 15K
R15		⚠	5184755000	R.,FILM 100 1W
R16			5240030220	R.,CARBON R20 6.8K J
R17	R22		5240030620	R.,CARBON R10 10K
R18	R23		5240029620	R.,CARBON R20 3.9K J
R19	R24		5240031220	R.,CARBON R20 18K J
R20	R21		5240030220	R.,CARBON R20 6.8K J
R25			5240030220	R.,CARBON R20 6.8K J
R26	R29		5240029420	R.,CARBON R20 3.3K J
R27		⚠	5184763000	R.,FILM 220 1W
R28	R32		5240032220	R.,CARBON R20 47K J
R30		⚠	5184763000	R.,FILM 220 1W
R31		⚠	5184688000	R.,METAL 15/1W RNX1
R33			5240029020	R.,CARBON R10 2.2K
U1	U2		5220416400	IC,M5230L,
U3		⚠	5220415100	IC,NJM7805A
U4			5220415600	IC,NJM7815A

FUSE PCB ASSY [J,US,C,GE] (PCB Omitted)

REF.NO.			PARTS NO.	DESCRIPTION
			*5200161900	FUSE PCB ASSY
			*5210161901	FUSE PCB
			*5041237000	HOLDER,FUSE PCB
F 1	F2	⚠	5307004300	FUSE,3A-250V UL
F 3	F4	⚠	5307004400	FUSE,4A-250V UL
F 5		⚠	5307004300	FUSE,3A-250V UL
F 6		⚠	5307004400	FUSE,4A-250V UL
F 7	F8	⚠	5307004700	FUSE,7A-125V UL
F 9		⚠	5307004900	FUSE,10A-250V UL
F10		⚠	5307004700	FUSE,7A-125V UL

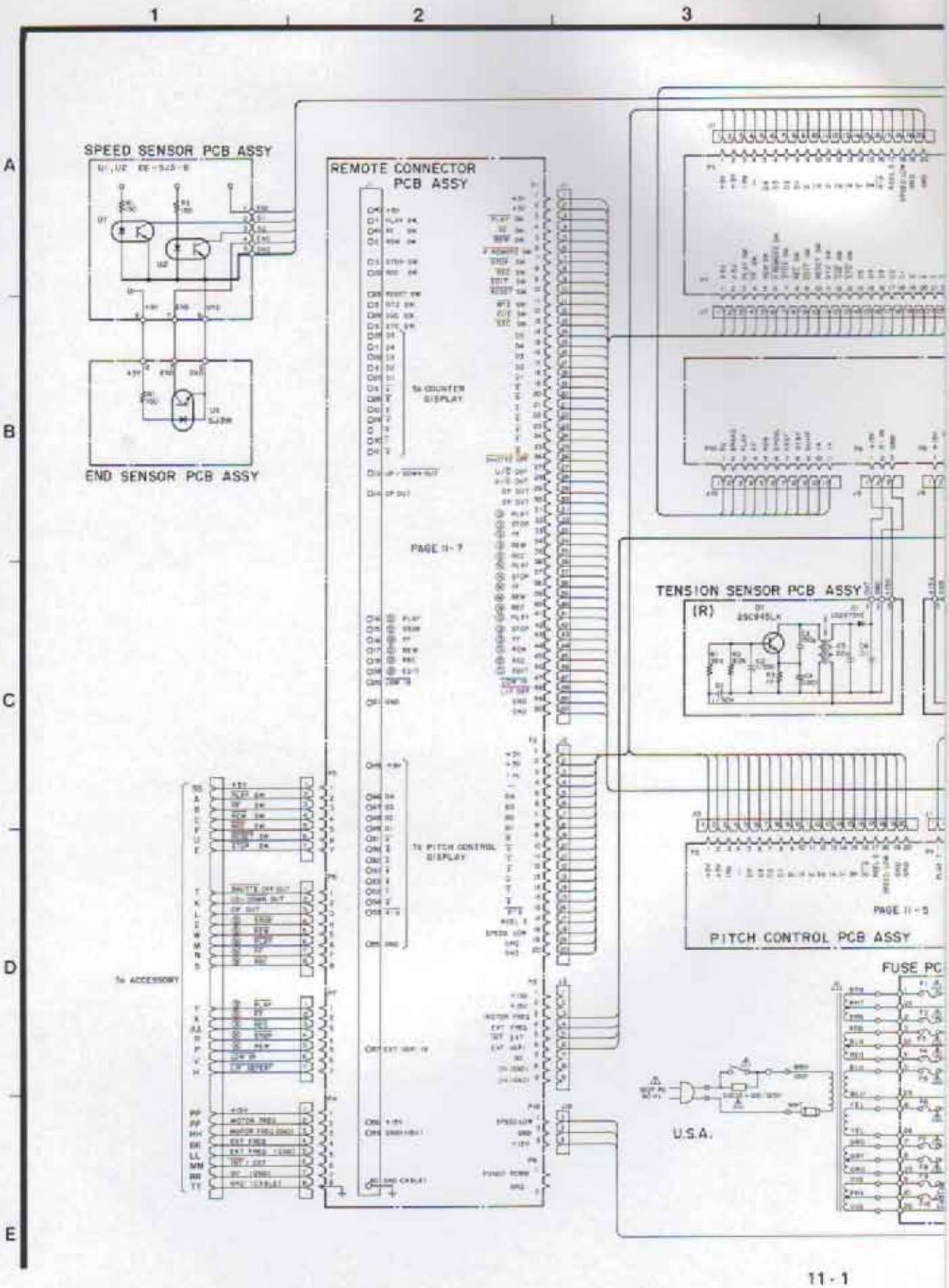
FUSE PCB ASSY [E,UK,A] (PCB Omitted)

REF.NO.			PARTS NO.	DESCRIPTION
			*5200162000	FUSE PCB ASSY
			*5210162000	FUSE PCB
			*5332014200	HOLDER,FUSE
F 1	F2	⚠	5142190000	FUSE,2.5A-250V (T)
F 3	F4	⚠	5142191000	FUSE,3.15A-250V T;MINI
F 5		⚠	5142190000	FUSE,2.5A-250V (T)
F 6		⚠	5142191000	FUSE,3.15A-250V T;MINI
F 7	F8	⚠	5142193000	FUSE,5A-250V SLOW B.
F 9		⚠	5142194000	FUSE,6.3A-250V SLOW B EUR
F10		⚠	5142193000	FUSE,5A-250V SLOW B.

LIST OF SCHEMATICS

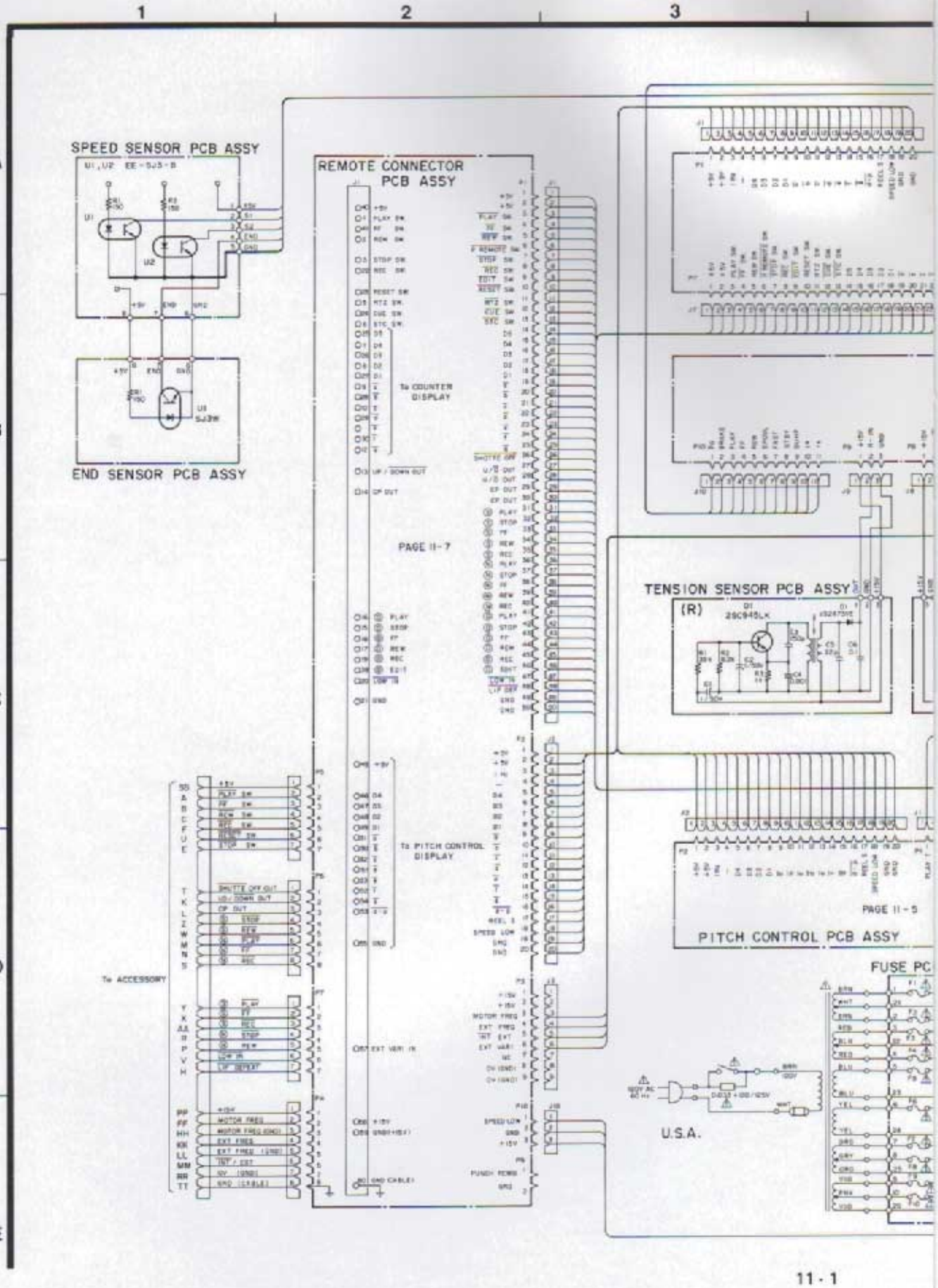
SECTION XI. SCHEMATICS

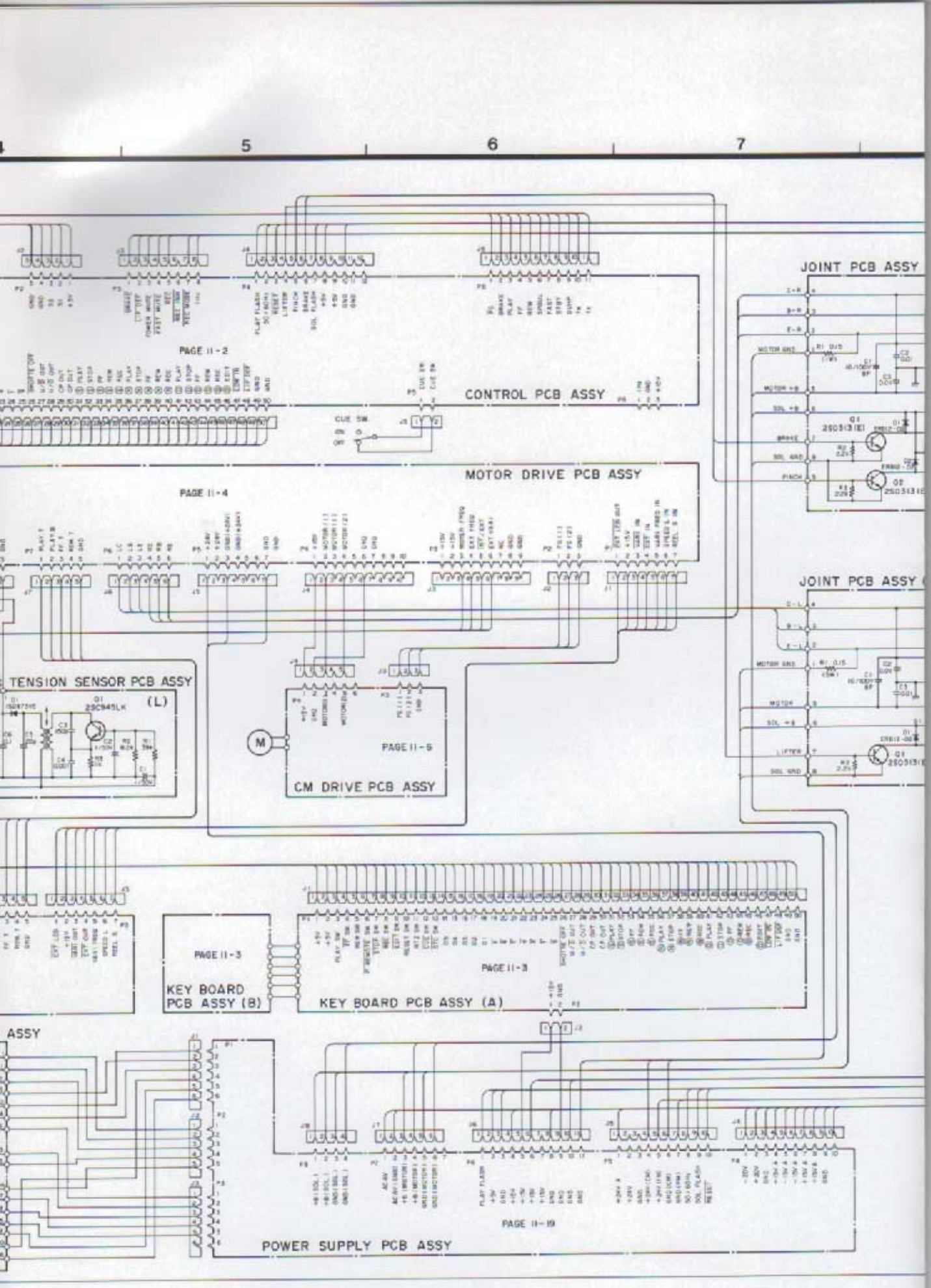
11-1. WIRING DIAGRAM (CONTROL)

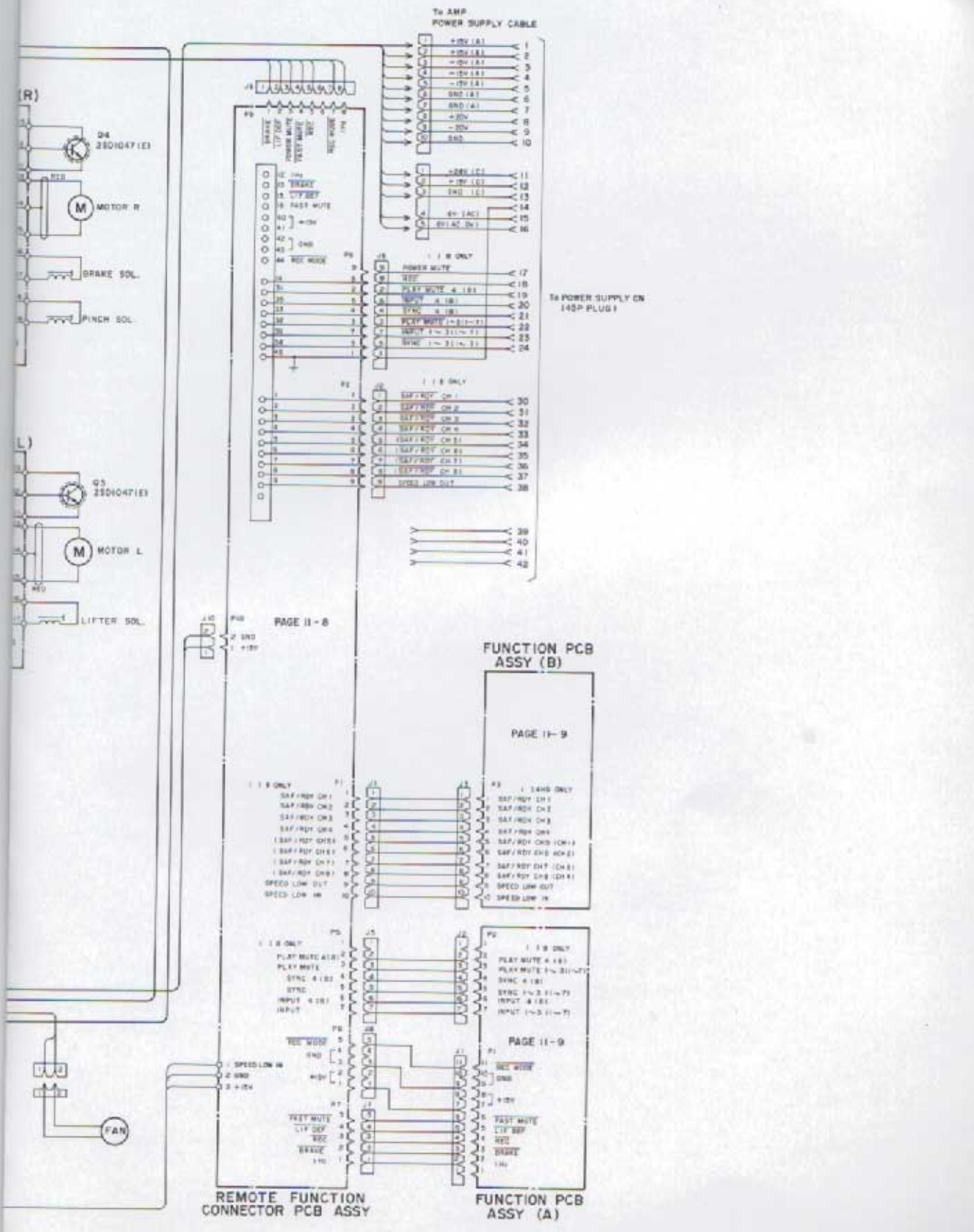


SECTION XI. SCHEMATICS

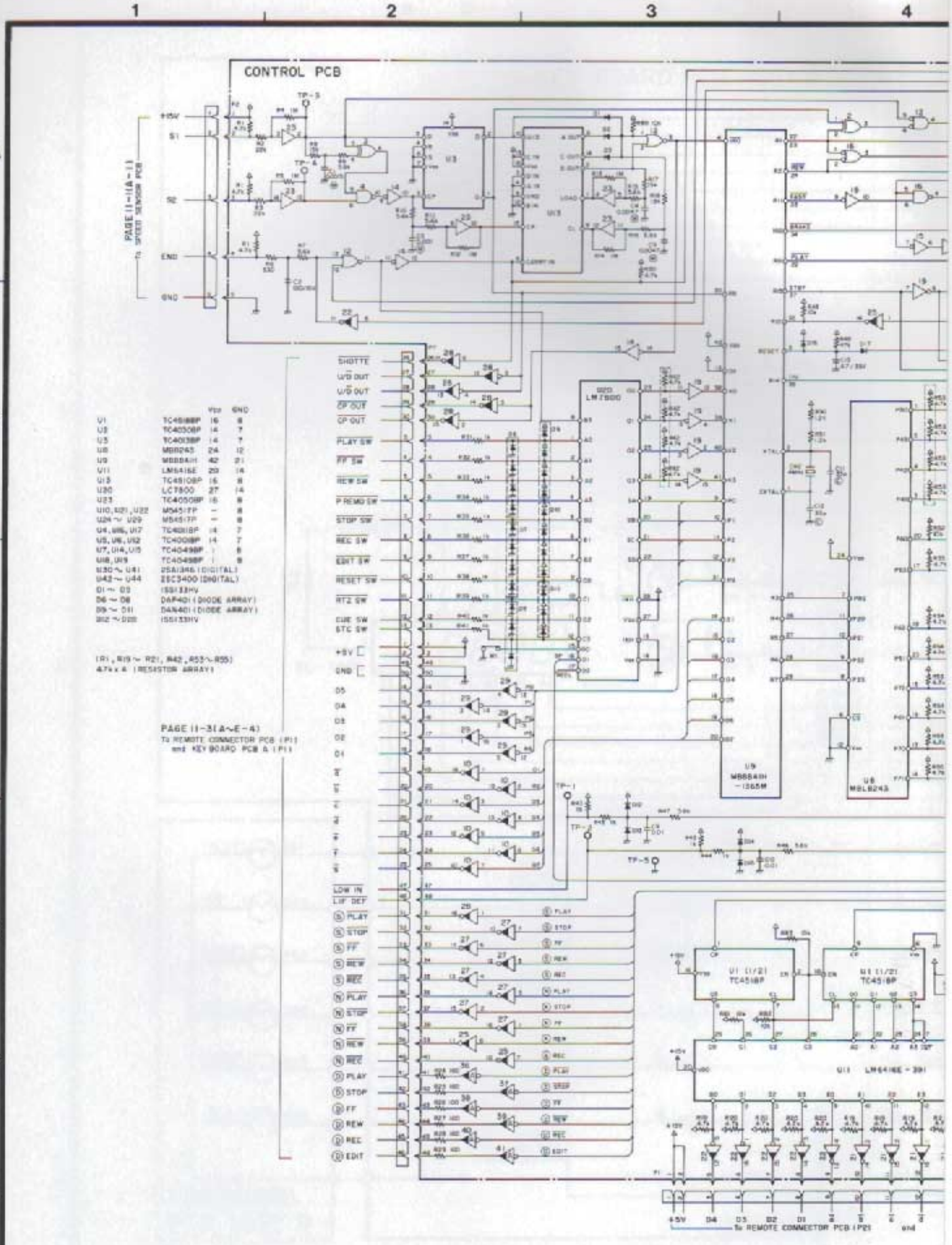
11-1. WIRING DIAGRAM (CONTROL)




4
5
6
7
JOINT PCB ASSY
PAGE II-2
CONTROL PCB ASSY
CUE SW.
MOTOR DRIVE PCB ASSY
PAGE II-4
JOINT PCB ASSY
TENSION SENSOR PCB ASSY
(L)
2SC945LK
PAGE II-5
CM DRIVE PCB ASSY
PAGE II-3
KEY BOARD
PCB ASSY (B)
PAGE II-3
KEY BOARD PCB ASSY (A)
PAGE II-19
POWER SUPPLY PCB ASSY

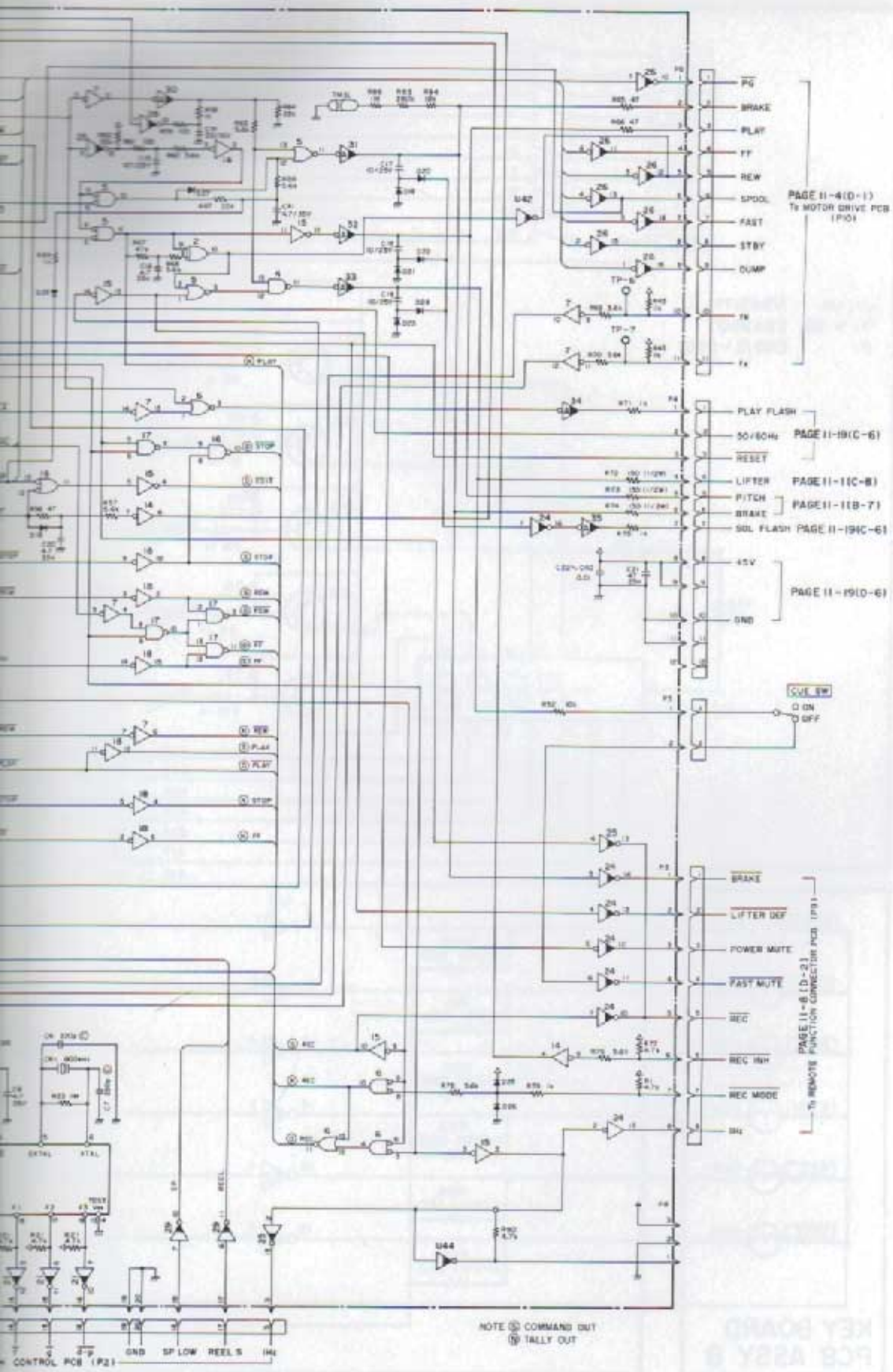

To AMP
POWER SUPPLY CABLE
(R)
Q4
2SD1047(E)
MOTOR R
BRAKE SOL.
PINCH SOL.
(L)
Q5
2SD1047(E)
MOTOR L
LIFTER SOL.
FAN
To POWER SUPPLY CN
(45P PLUG)
PAGE II-8
FUNCTION PCB
ASSY (B)
PAGE II-9
PAGE II-9
REMOTE FUNCTION
CONNECTOR PCB ASSY
FUNCTION PCB
ASSY (A)

11-2. CONTROL PCB ASS'Y

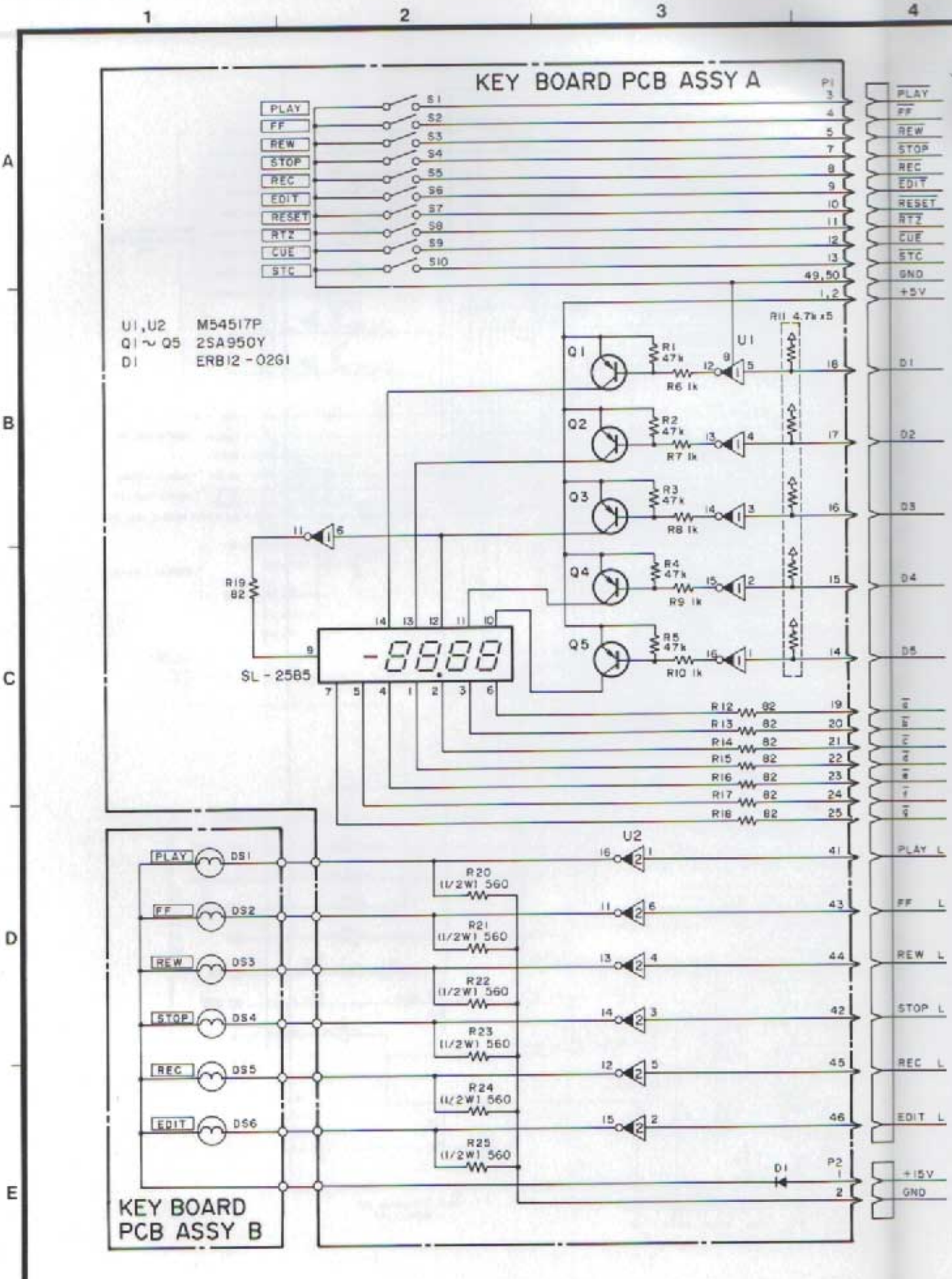


		Vcc	GND
U1	TC4518BP	16	8
U3	TC4050BP	14	7
U5	TC4013BP	14	7
U8	M66243	24	12
U9	M88844H	42	21
U11	LM6416E	20	14
U13	TC4510BP	16	8
U20	LC7500	27	14
U23	TC4050BP	16	8
U10, U21, U22	M5451FP	–	8
U24 ~ U29	M5451FP	–	8
U4, U6, U17	TC4011BP	14	7
U5, U6, U12	TC4001BP	14	7
U7, U14, U15	TC4049BP	1	8
U18, U19	TC4049BF	1	8
U30 ~ U41	2SA1346 (DIGITAL)		
U42 ~ U44	2SC3400 (DIGITAL)		
D1 ~ D3	1SS133HV		
D6 ~ D8	DAP401 (DIODE ARRAY)		
D9 ~ D11	DAN401 (DIODE ARRAY)		
D12 ~ D20	1SS133HV		

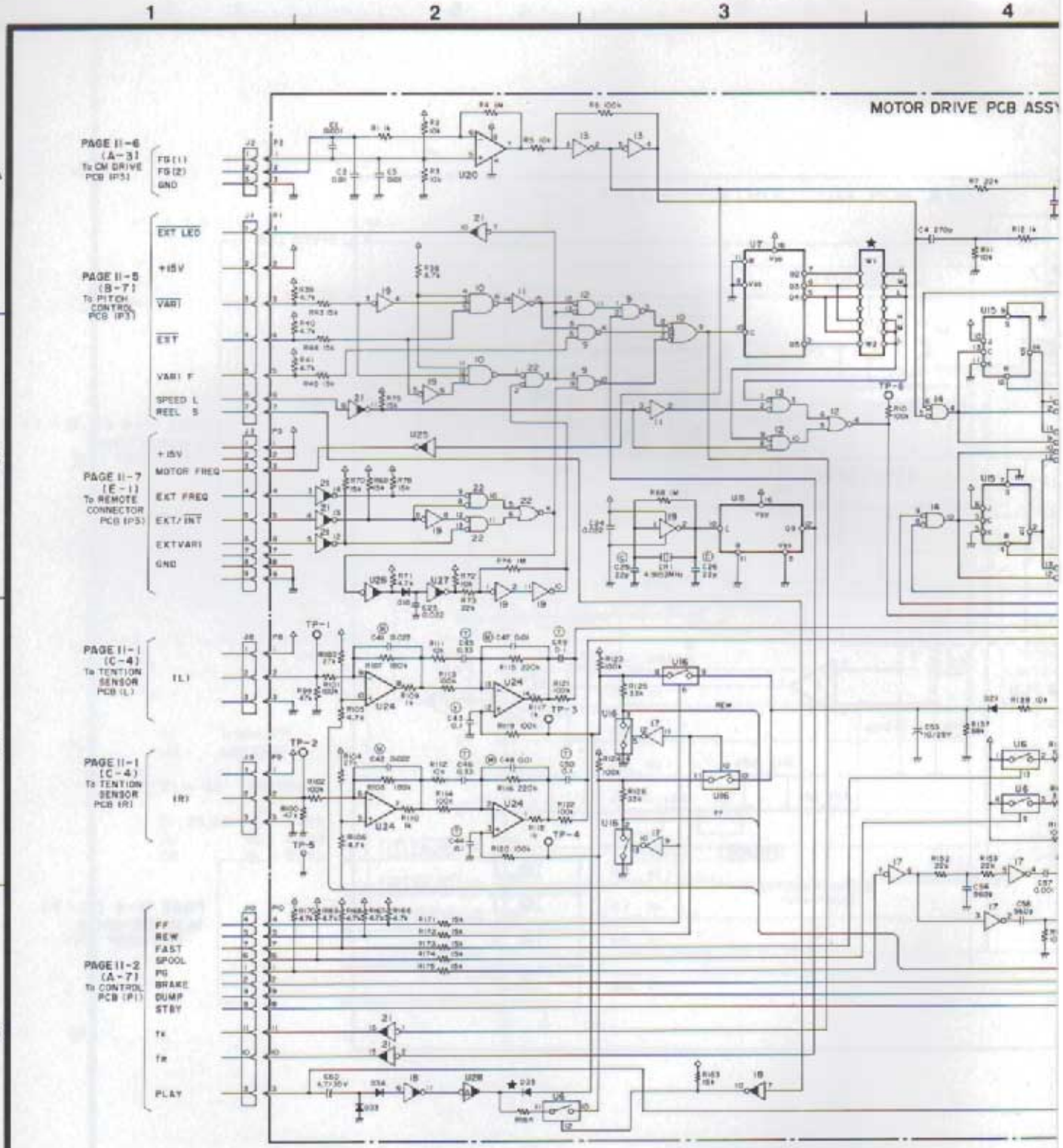
(R1, R19 ~ R21, R42, R53 ~ R55)
47kx4 (RESISTOR ARRAY)


PG
BRAKE
PLAY
FF
REW
SPOOL
FAST
STBY
DUMP
TP-6
TP-7
TH
TX
PAGE II-4(D-1)
To MOTOR DRIVE PCB (P10)
PLAY FLASH
50/60Hz
RESET
LIFTER
PITCH
BRAKE
SOL FLASH
PAGE II-19(C-6)
PAGE II-11(C-8)
PAGE II-11(B-7)
PAGE II-19(C-6)
+5V
GND
PAGE II-19(D-6)
CUE SW
ON
OFF
BRAKE
LIFTER DEF
POWER MUTE
FAST MUTE
REC
REC INH
REC MODE
SHU
PAGE II-8 (D-2)
To REMOTE FUNCTION CONNECTION PCB (P9)
U42
U44
NOTE S COMMAND OUT
N TALLY OUT
CONTROL PCB (P2)
GND
SP LOW
REEL S
INH

11-3. KEY BOARD PCB ASS'Y



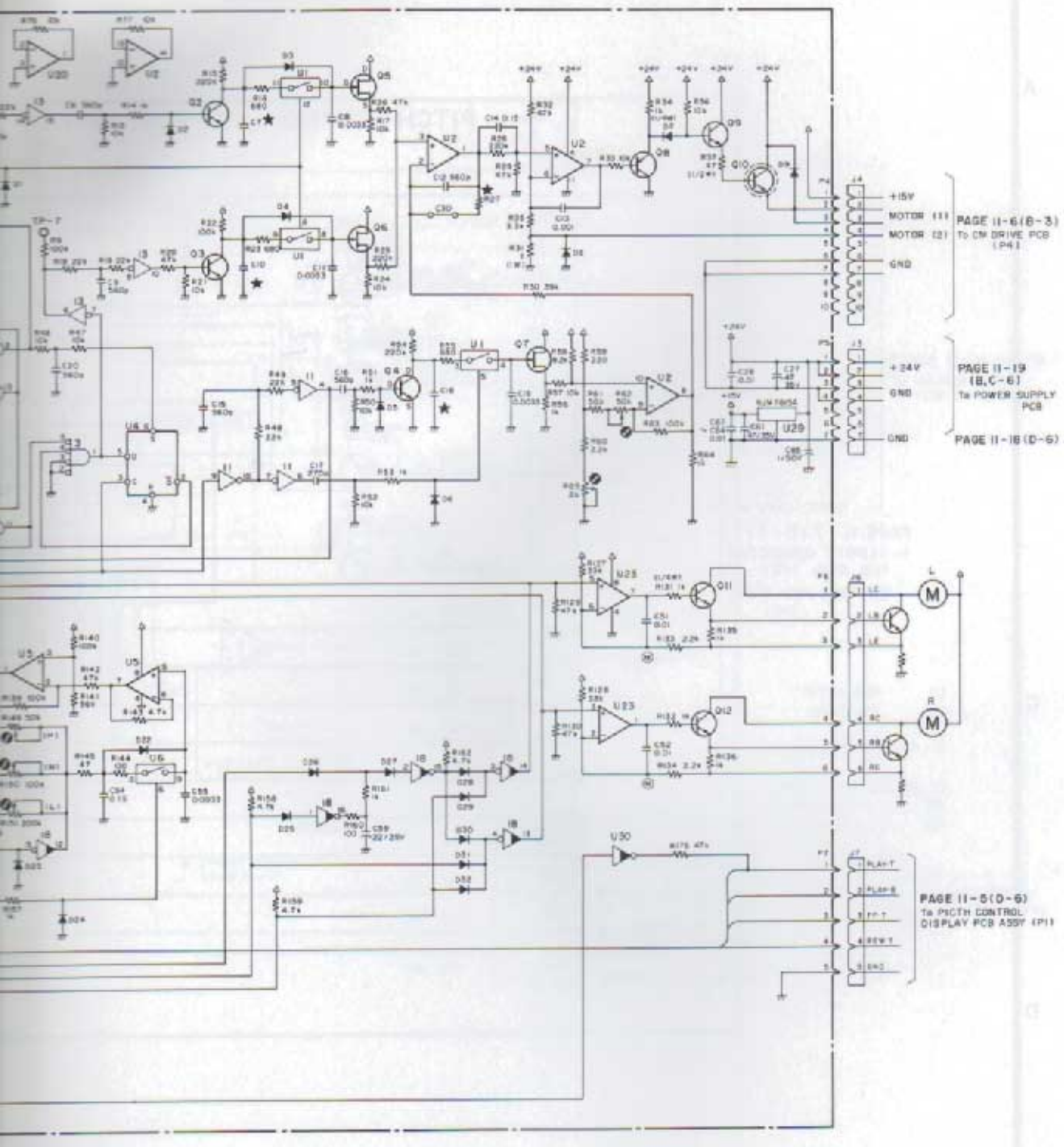
11-4. MOTOR DRIVE PCB ASS'Y



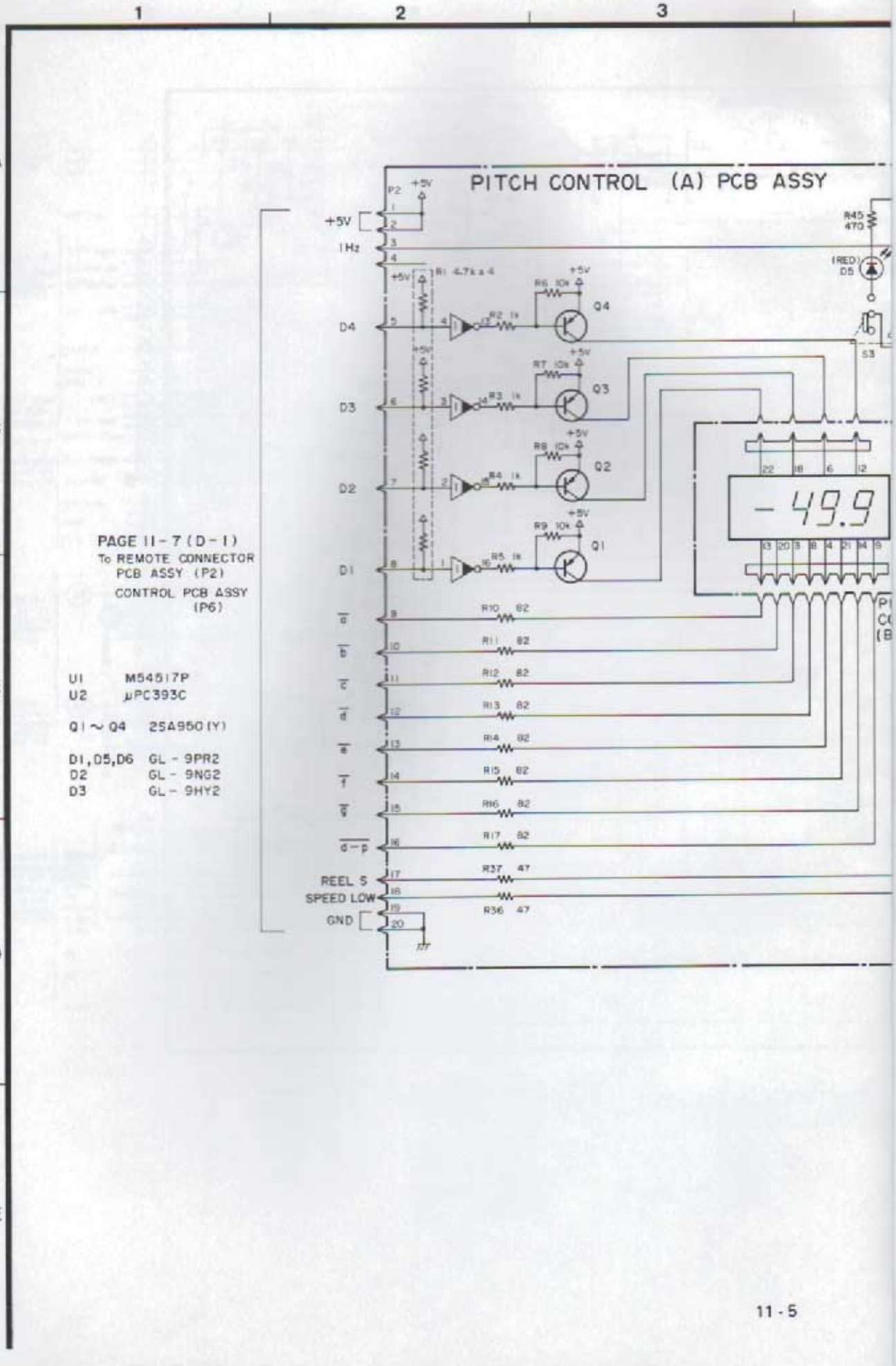
		Vpp	GND
U1	TC4066BP	14	7
U2	LM2902N	4	11
U3	HD14002BP	14	7
U4	TC4013BP	14	7
U5, U23	LM2904N	8	4
U6, U16	TC4066BP	14	7
U7, U8	HD14040BP	16	8
U9	TC4011BP	14	7
U10	HD14023BP	14	7

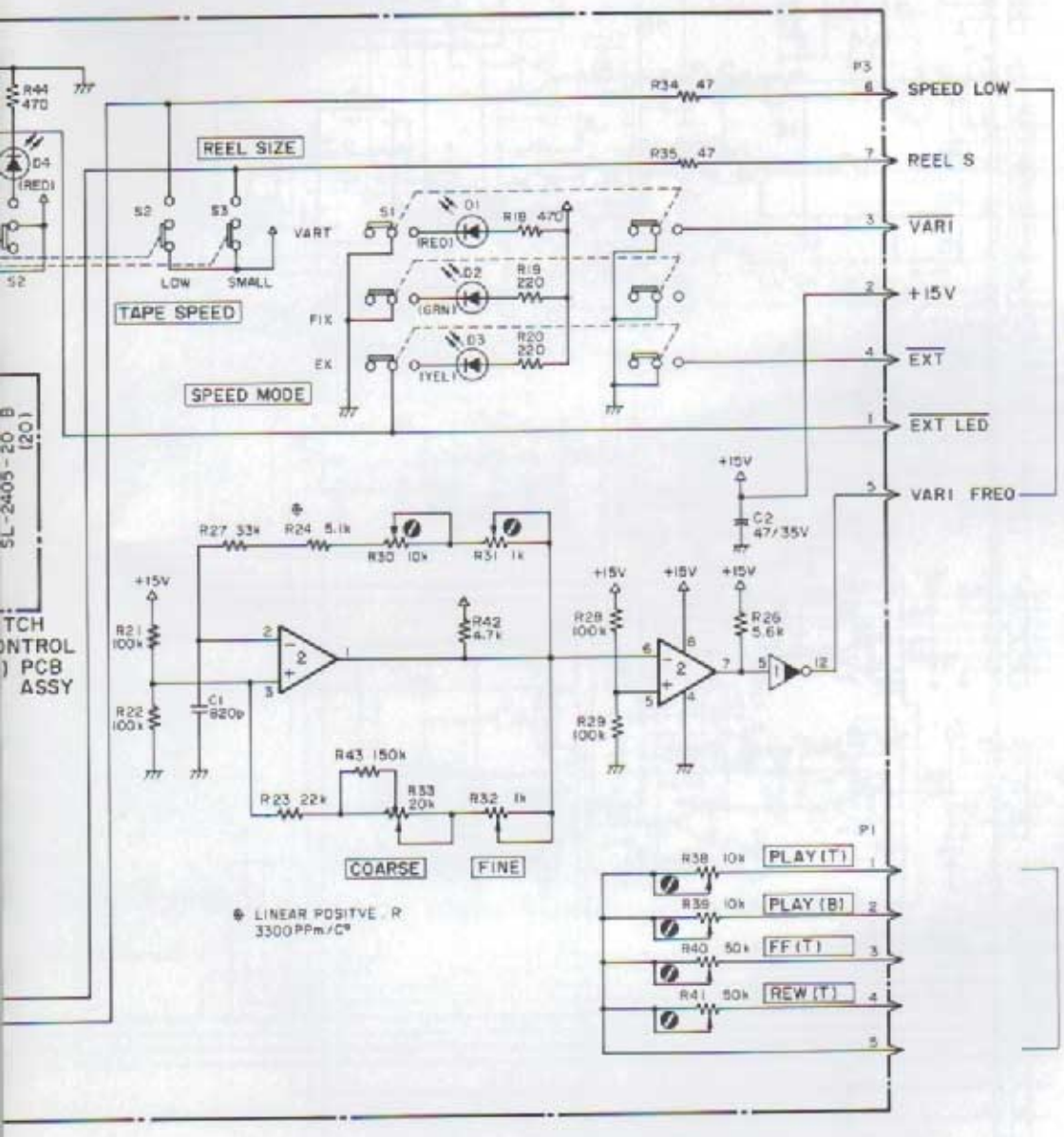
		Vpp	GND
U11, U13	TC4049BP	1	8
U12, U14, U22	TC4001BP	14	7
U15	HD14027BP	16	8
U17	TC4049BP	1	8
U18	M54517P	–	8
U19	MC14069	14	7
U20	LM2904N	8	4
U21	M54517P	–	8
U24	LM2902N	4	–
U25, U26, U27	2SC3400		
U28	2SA1346		
U29	NJM78L5A		
U30	2SC3400		

Q2 ~ Q4	2SC1815 (GR)
Q5 ~ Q7	2SK68AL, FET
Q8	2SA1015 (GR)
Q9	2SC2655 (Y)
Q10	2SD880 (Y)
Q11, Q12	2SD600
D1 ~ D7	1SS133HV
D8, D9	FRB12-020
D10	1SS133HV
D21 ~ D34	1SS133HV
D35	1SS133HV


+15V
MOTOR (1)
MOTOR (2)
GND
PAGE II-6 (B-3)
To CM DRIVE PCB (P4)
+24V
GND
GND
PAGE II-19 (B,C-6)
To POWER SUPPLY PCB
PAGE II-18 (D-6)
PLAY-T
PLAY-R
FF-T
REW-T
END
PAGE II-5 (D-6)
To PSCTH CONTROL DISPLAY PCB ASSY (P1)

11-5. PITCH CONTROL A PCB ASS'Y AND PITCH CONTROL B PCB ASS'Y

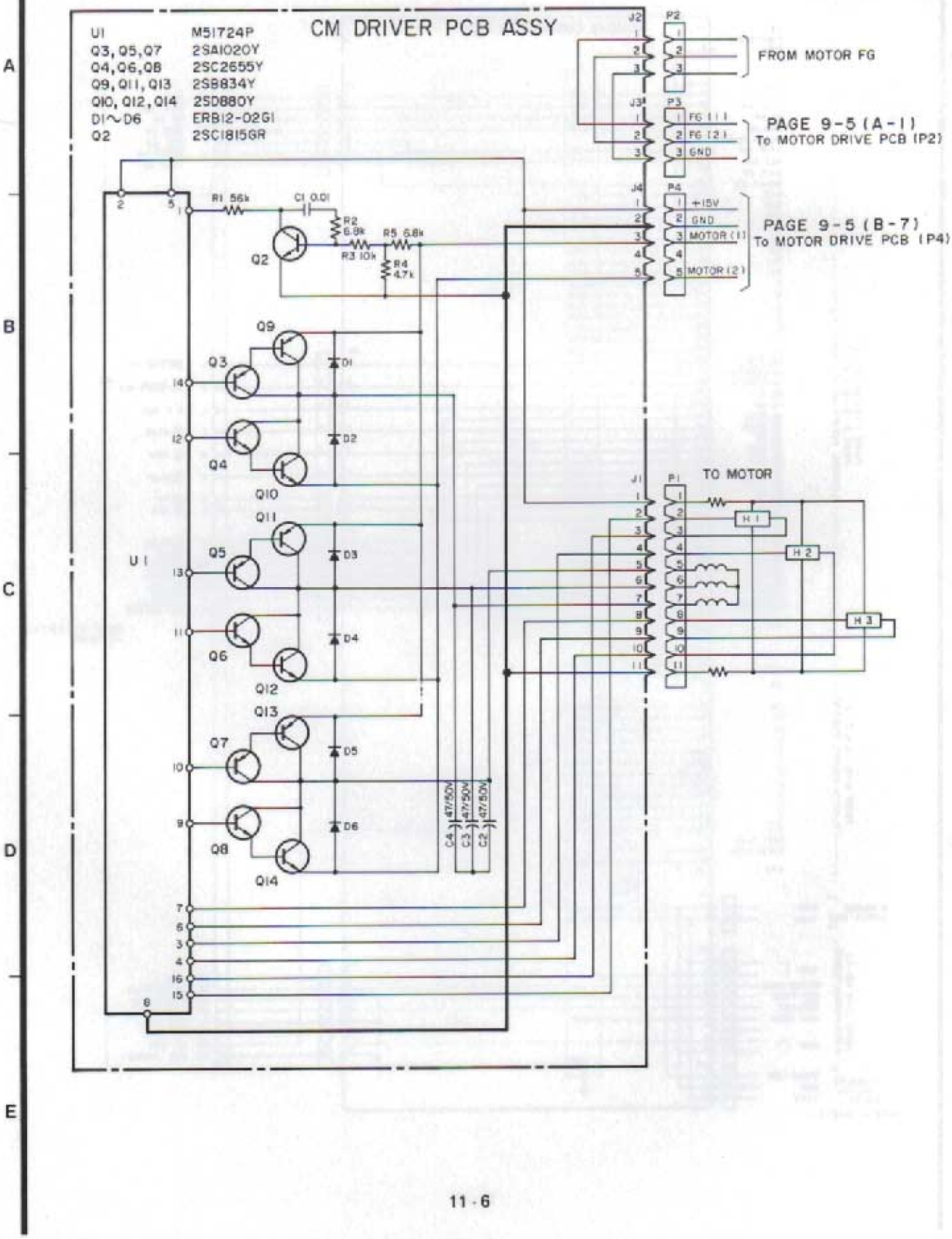




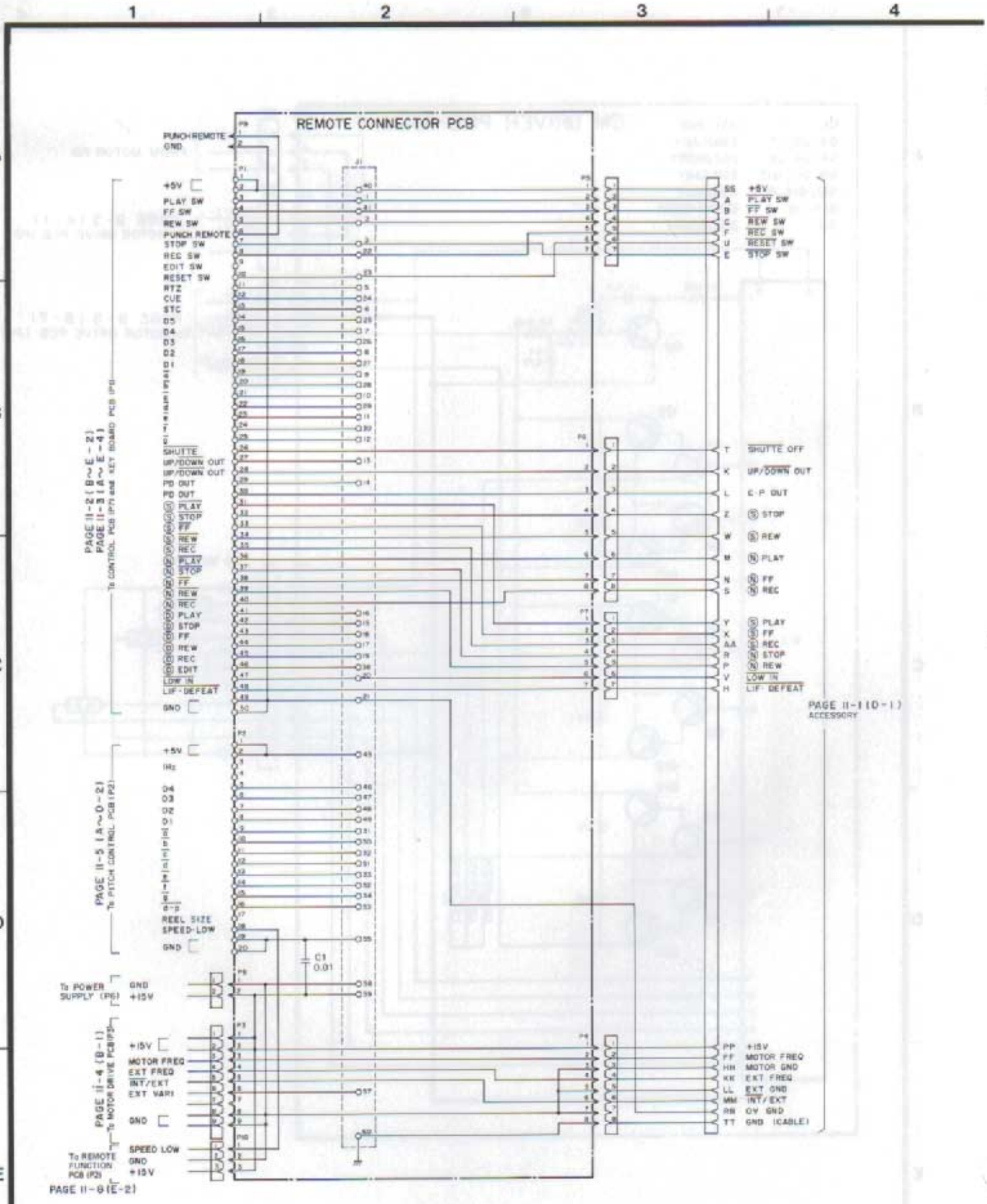
PAGE II-4 (A,B-1)
To MOTOR DRIVE
PCB ASSY (P1)

PAGE II-4 (D-7)
To MOTOR DRIVE
PCB ASSY (P7)

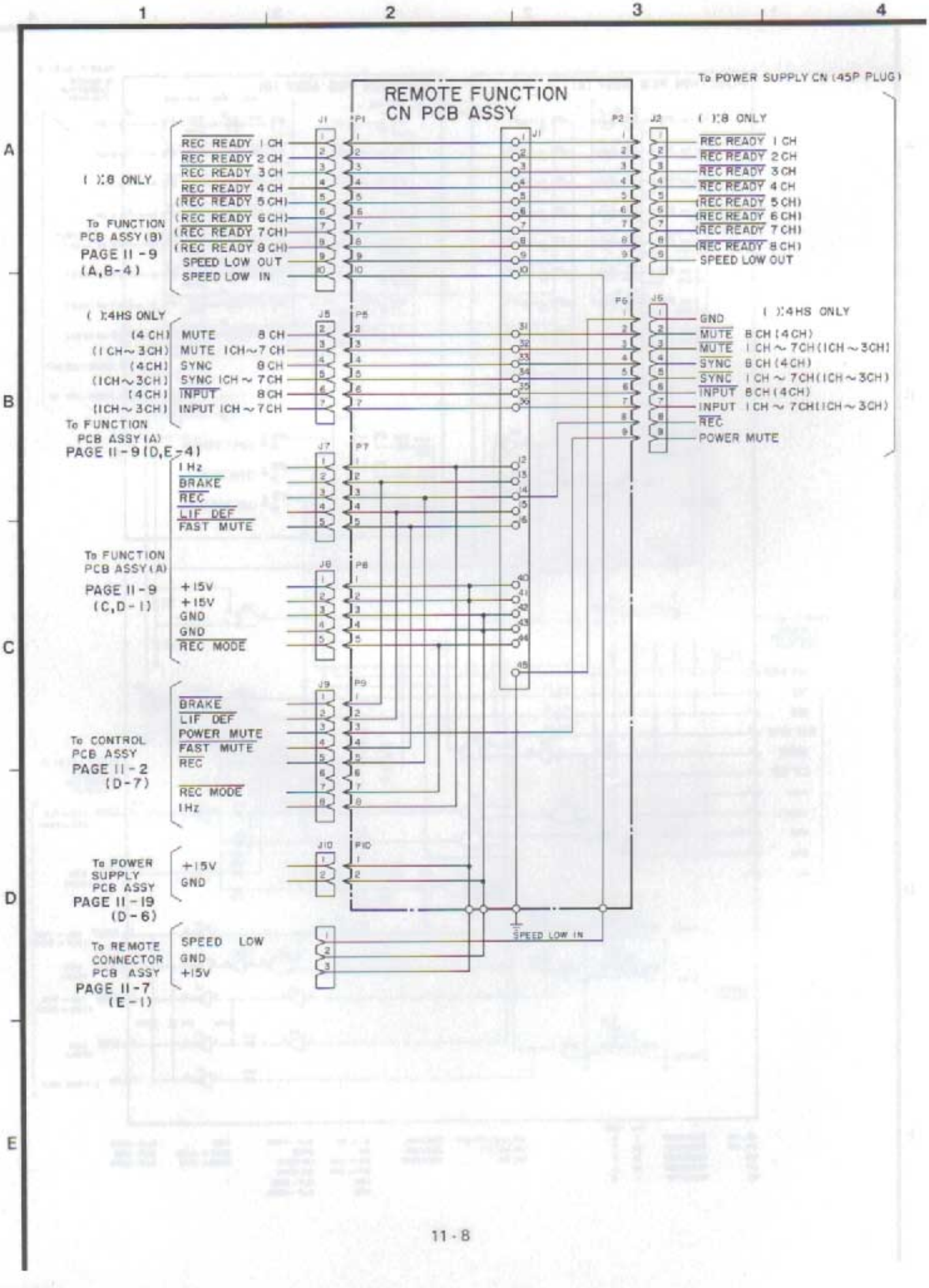
11-6. CAPSTAN MOTOR DRIVE PCB ASS'Y



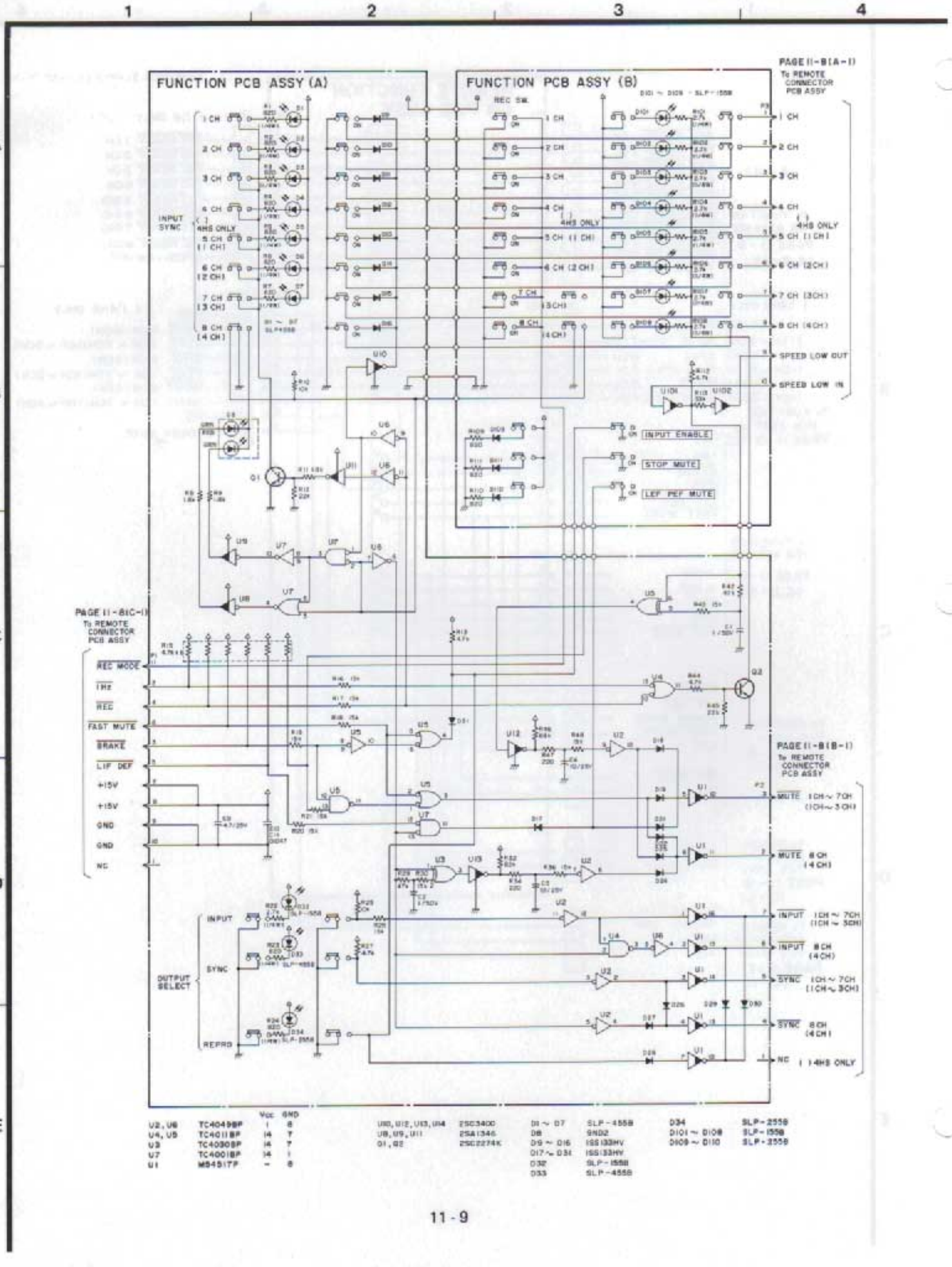
11-7. REMOTE CONNECTOR PCB ASS'Y



11-8. REMOTE FUNCTION CONNECTOR PCB ASS'Y



11-9. FUNCTION PCB ASS'Y



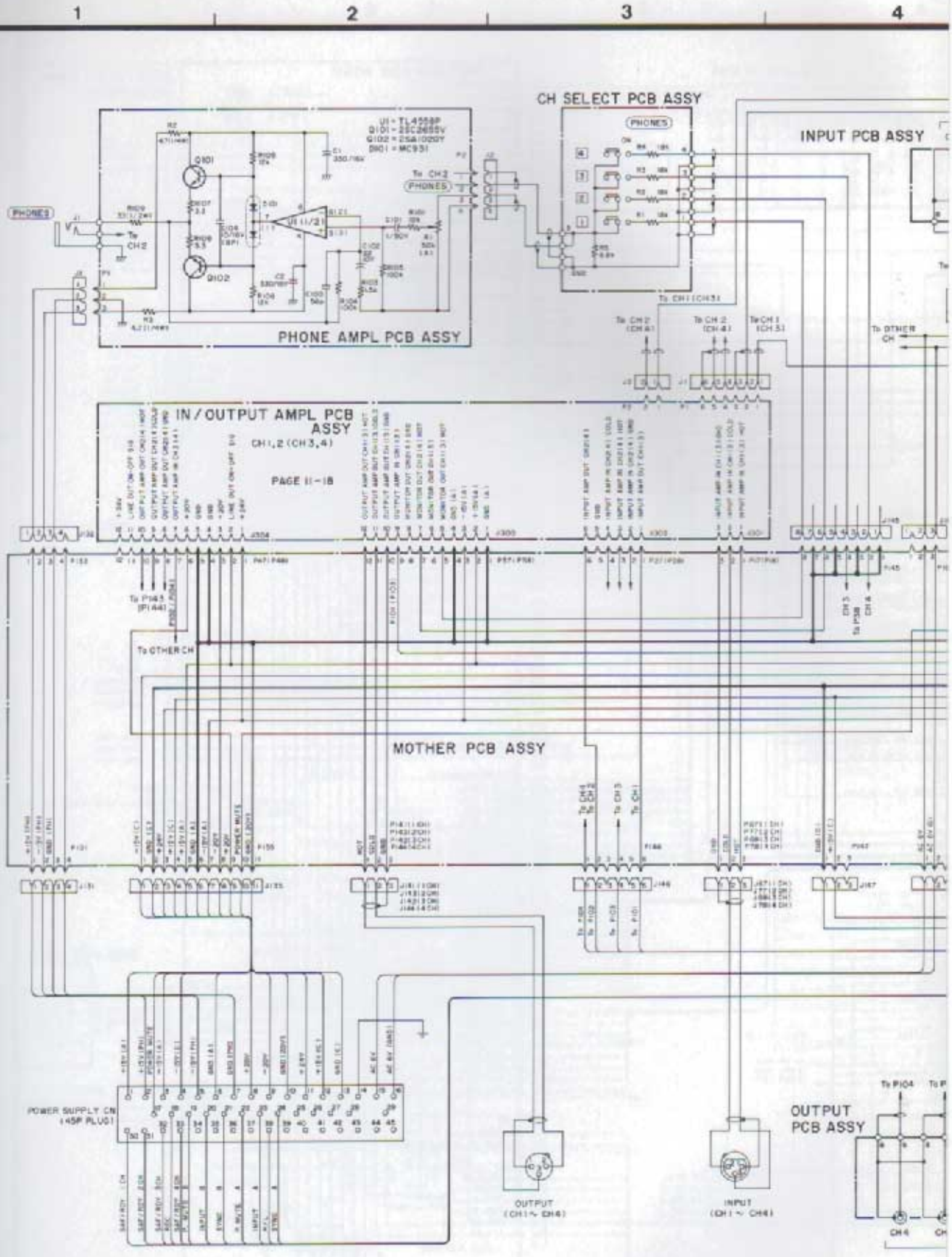
		Vcc	GND
U2, U6	TC4049BP	1	8
U4, U5	TC4011BP	14	7
U3	TC4030BP	14	7
U7	TC4001BP	14	1
U1	MB4517P	-	8

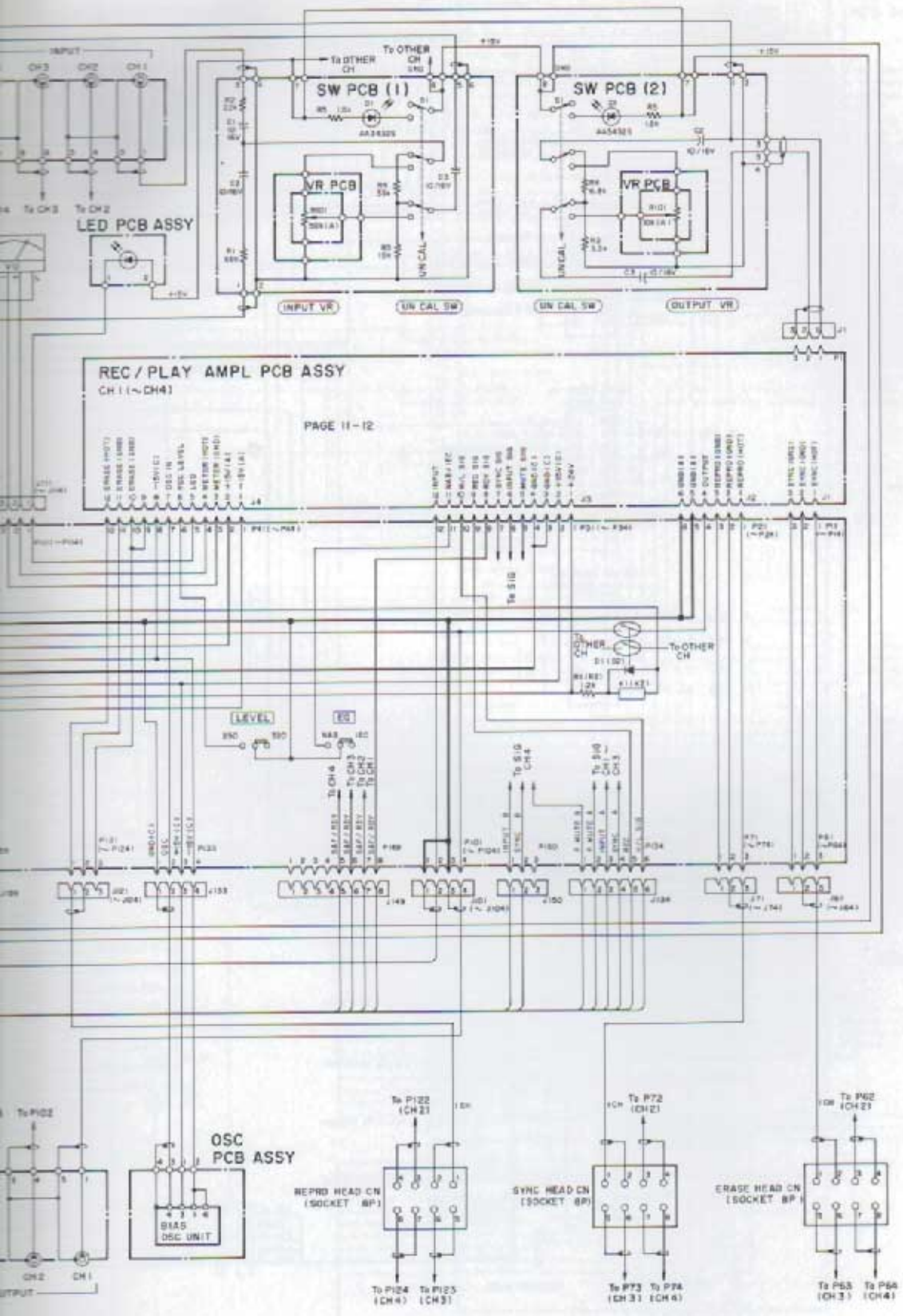
U10, U12, U13, U14	2SC3400
U8, U9, U11	2SA1346
Q1, Q2	2SC2274K

D1 ~ D7	SLP-4558
D8	SND2
D9 ~ D16	ISS133HV
D17 ~ D31	ISS133HY
D32	SLP-1558
D33	SLP-4558

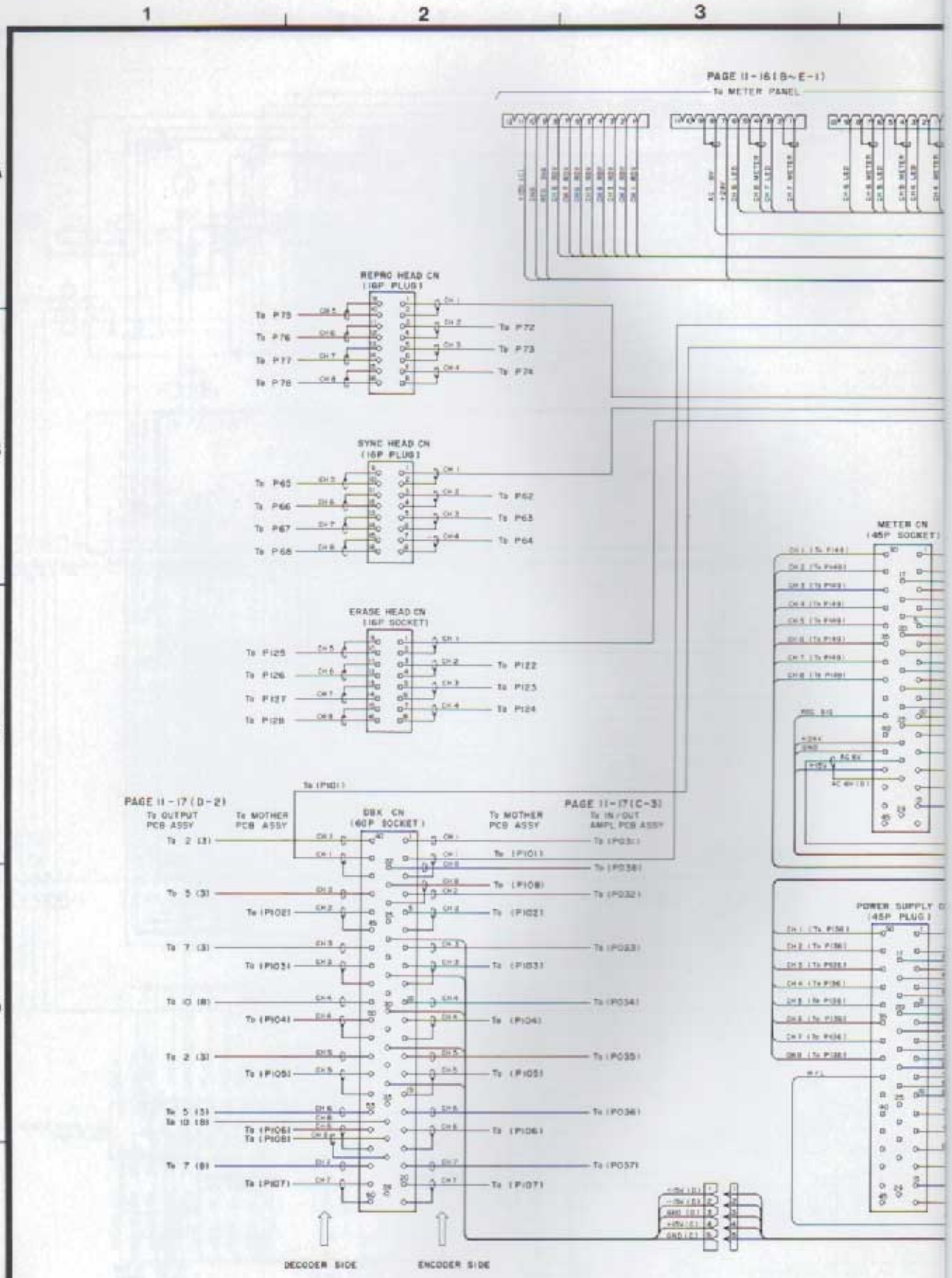
D34	SLP-2558
D101 ~ D108	SLP-1558
D109 ~ D110	SLP-2558

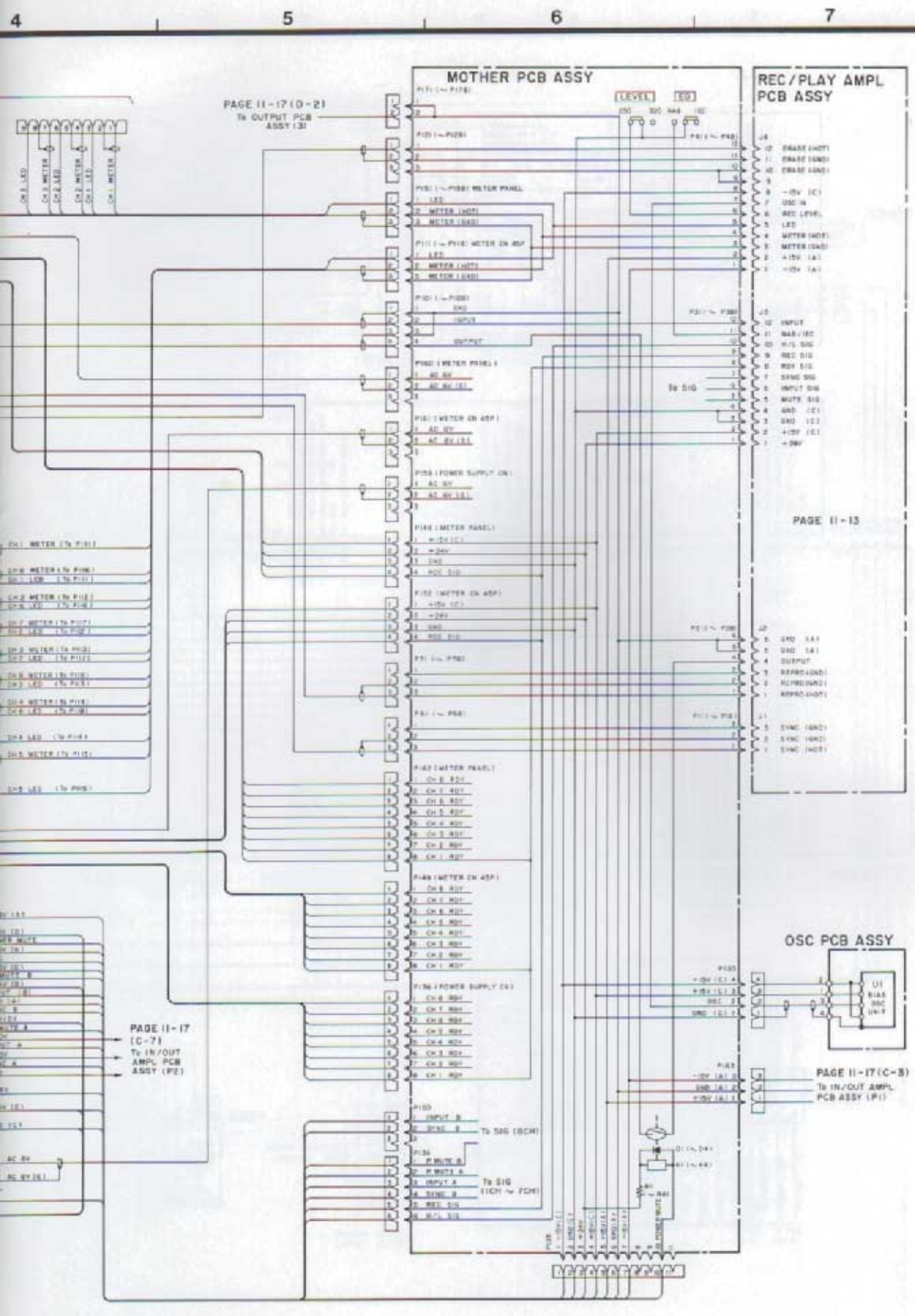
11-10. WIRING DIAGRAM (AMPLIFIER) (ATR-60-4HS)



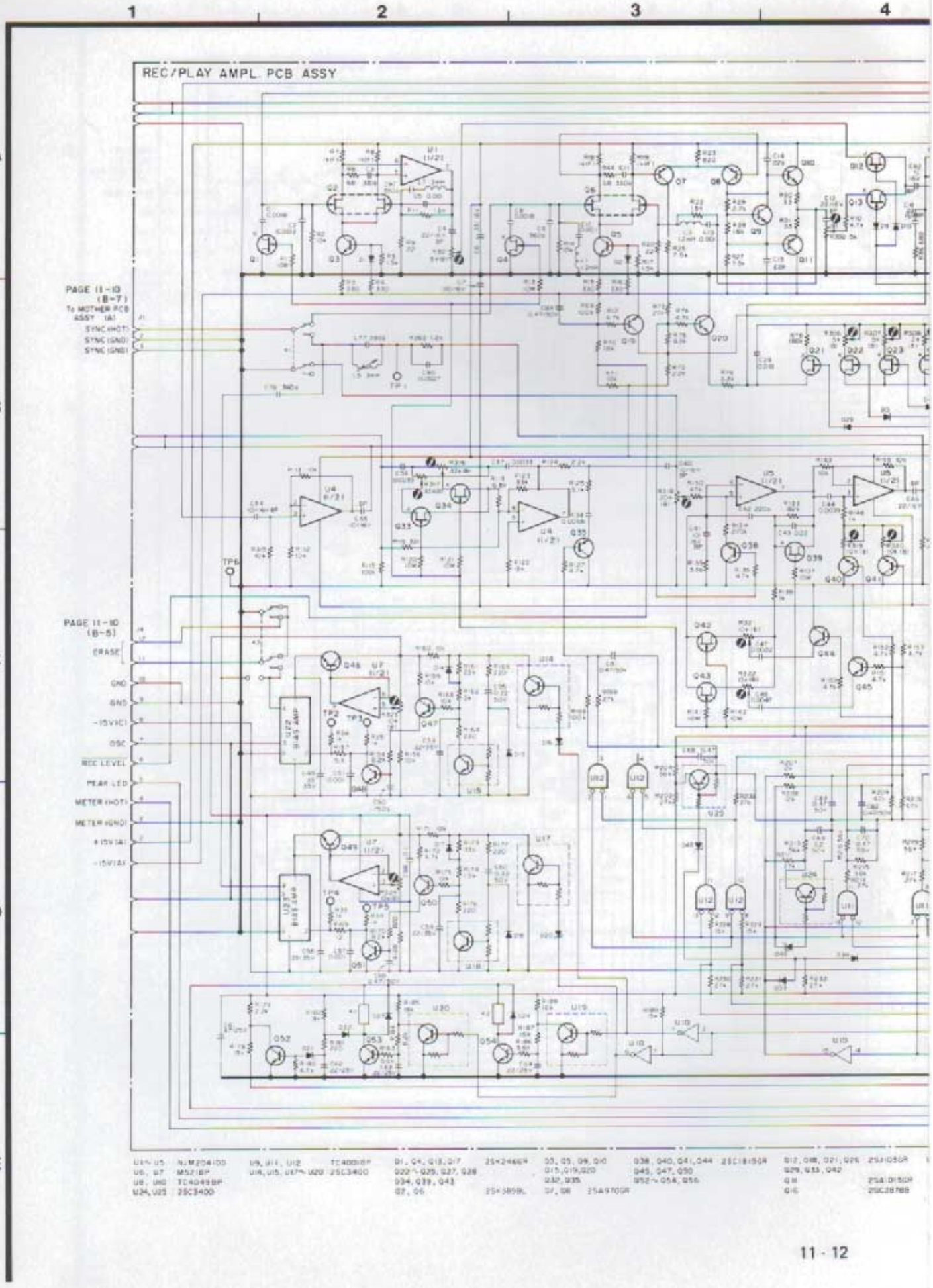

SW PCB (1)
SW PCB (2)
VR PCB
VR PCB
LED PCB ASSY
REC / PLAY AMPL PCB ASSY
CH 1 (~CH4)
PAGE 11-12
INPUT VR
UN CAL SW
UN CAL SW
OUTPUT VR
To OTHER CH
LEVEL
EQ
OSC PCB ASSY
BIAS OSC UNIT
REPRO HEAD CN (SOCKET 8P)
SYNC HEAD CN (SOCKET 8P)
ERASE HEAD CN (SOCKET 8P)

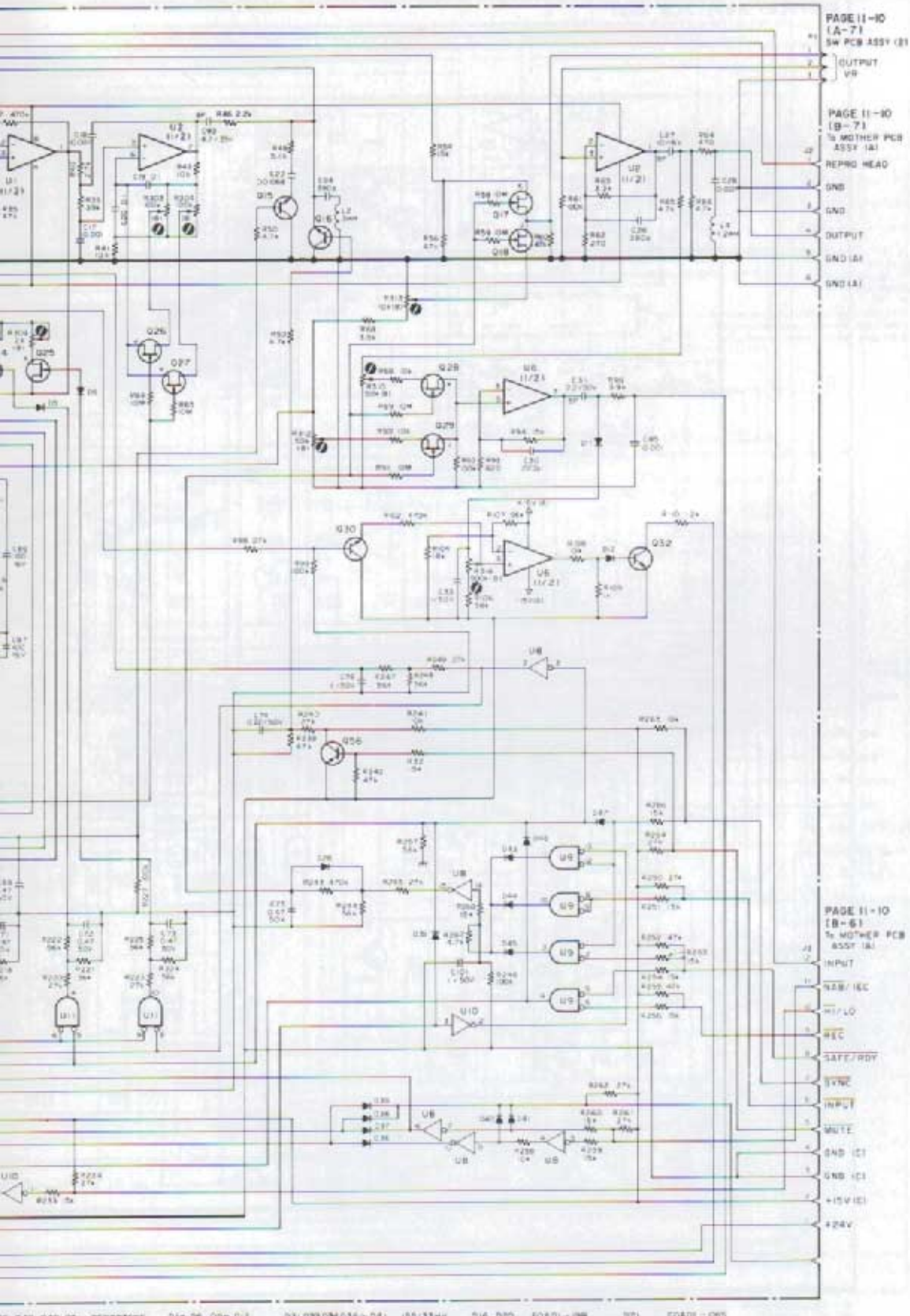
11-11. WIRING DIAGRAM (AMPLIFIER) (ATR-60-8)



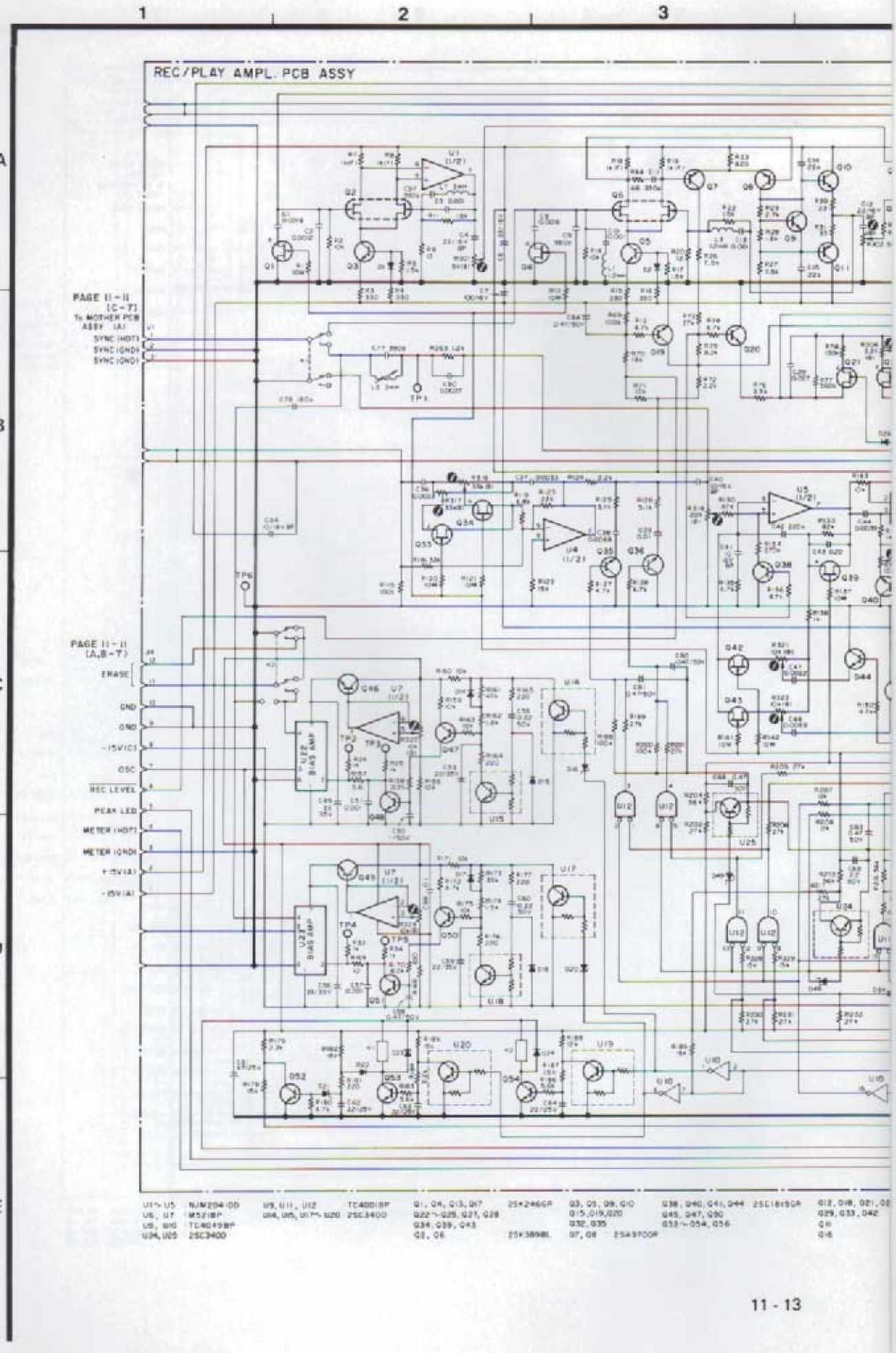

4
5
6
7
MOTHER PCB ASSY
REC / PLAY AMPL PCB ASSY
OSC PCB ASSY
PAGE II-17 (D-2)
To OUTPUT PCB ASSY (3)
PAGE II-13
PAGE II-17 (C-7)
To IN/OUT AMPL PCB ASSY (P2)
PAGE II-17 (C-8)
To IN/OUT AMPL PCB ASSY (P1)
To SIG
To SIG (1CH ~ 7CH)
To SIG (8CH)

11-12. REC/PLAY AMPLIFIER PCB ASS'Y (ATR-60-4HS)

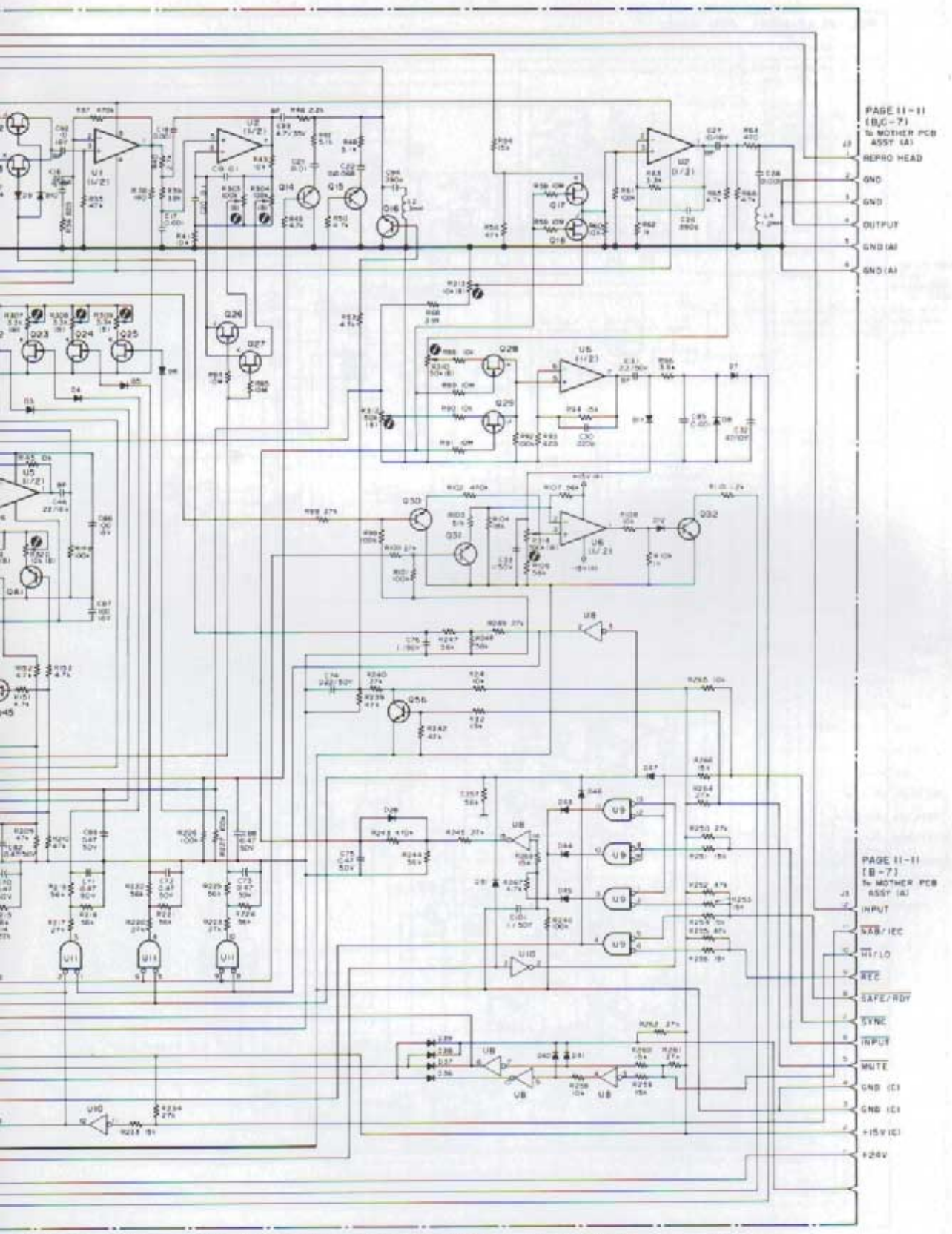



PAGE 11-10 (A-7)
SW PCB ASSY (2)
OUTPUT
VR
PAGE 11-10 (B-7)
To MOTHER PCB ASSY (A)
REPRO HEAD
GND
GND
OUTPUT
GND (A)
GND (A)
PAGE 11-10 (B-6)
To MOTHER PCB ASSY (A)
INPUT
REC
SYNC
MUTE
GND (C)
GND (C)
+15V (C)
+24V

11-13. REC/PLAY AMPLIFIER PCB ASS'Y (ATR-60-8)

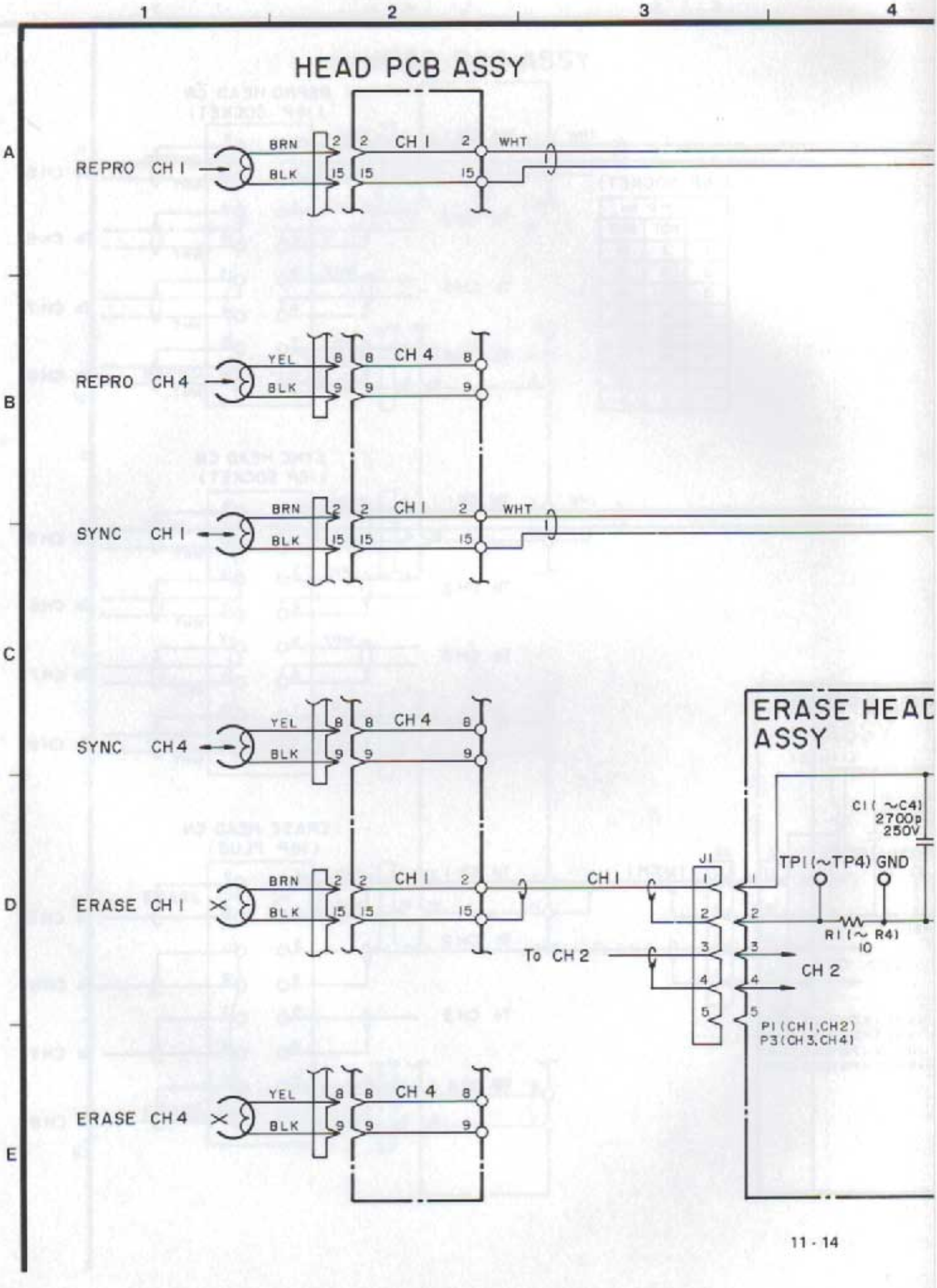


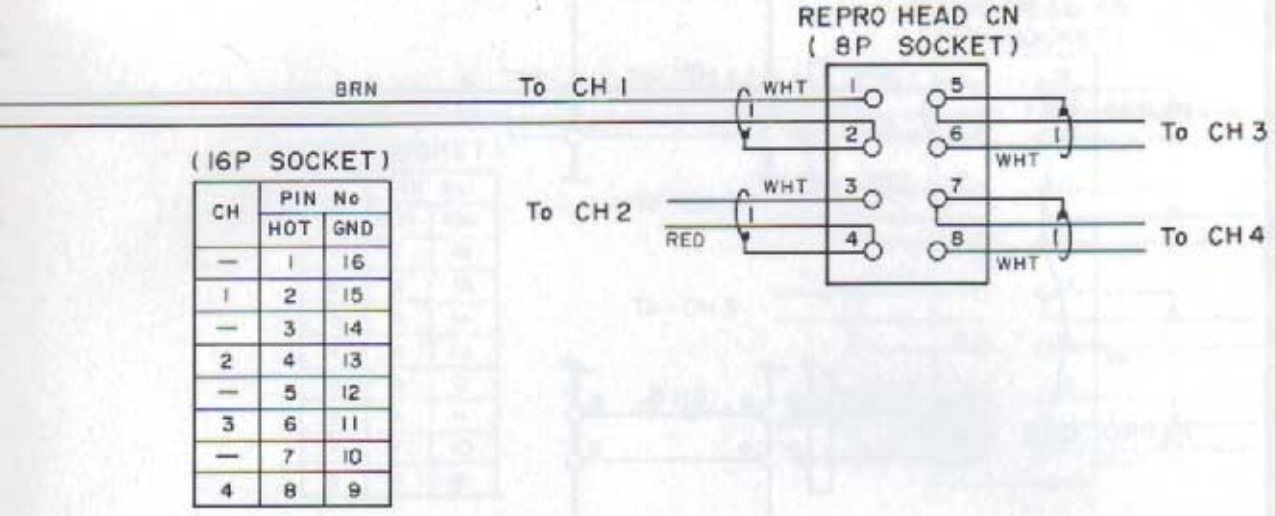
U1~U5	NJM2068D	U9, U11, U12	TC4001BP	Q1, Q4, Q13, Q17	2SK246GR	Q3, Q5, Q9, Q10	Q38, Q40, Q41, Q44	2SC1815GR	Q12, Q18, Q21, Q2
U6, U7	M5218P	U14, U15, U17~U20	2SC3400	Q22~Q25, Q27, Q28		Q15, Q19, Q20	Q45, Q47, Q50		Q29, Q33, Q42
U8, U10	TC4049BP			Q34, Q39, Q43		Q32, Q35	Q53~Q54, Q56		Q31
U24, U25	2SC3400			Q2, Q6	2SK389BL	Q7, Q8	2SA970GR		Q16



2SJ103GR Q46, Q48, Q49, Q51 2SC2274KE D1~D6, D9~D12 D31, D33, D34, D36~D41 1SS133HV D16, D20 EQA01-09R D21 EQA01-06S
2SA1015GR D14, D15, D17, D18 D43~D47 D48, D49
2SC2878B D22~D24, D28, D29

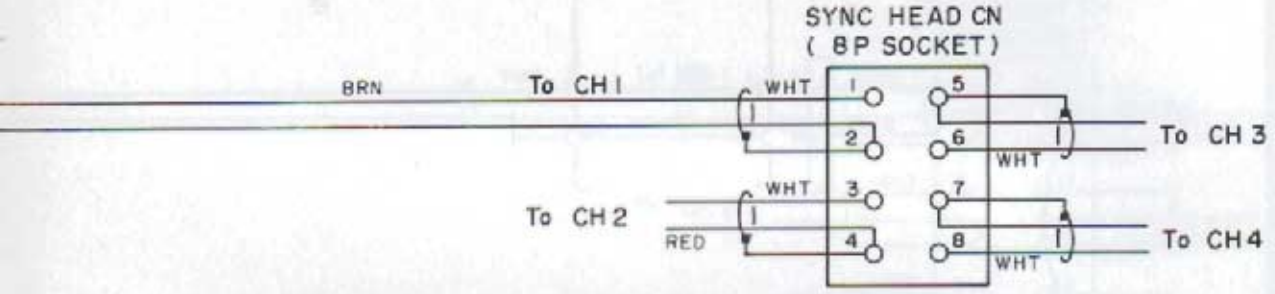
11-14. WIRING DIAGRAM (HEAD ASS'Y, ERASE HEAD PCB ASS'Y) (ATR-60-4HS)

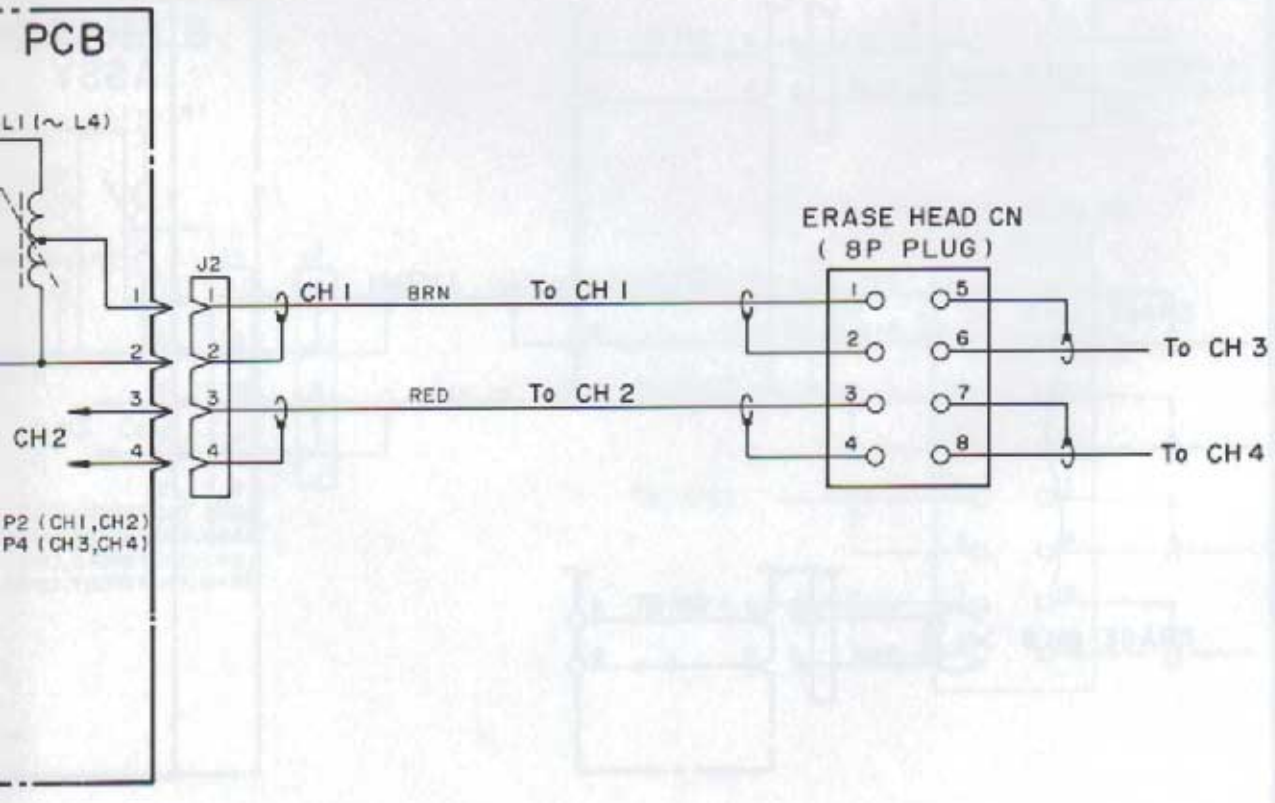




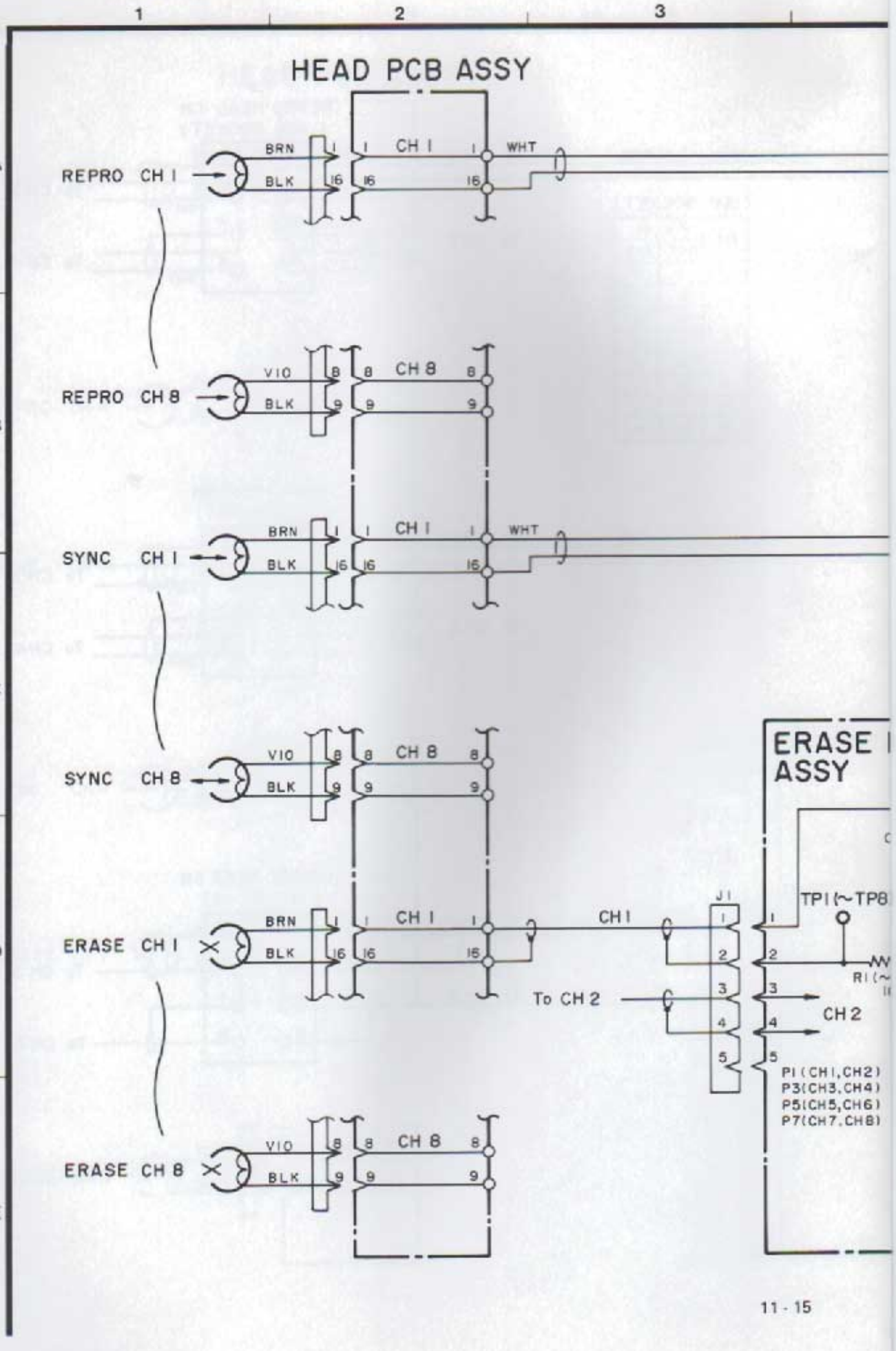
(16P SOCKET)

CH	PIN No	
	HOT	GND
—	1	16
1	2	15
—	3	14
2	4	13
—	5	12
3	6	11
—	7	10
4	8	9



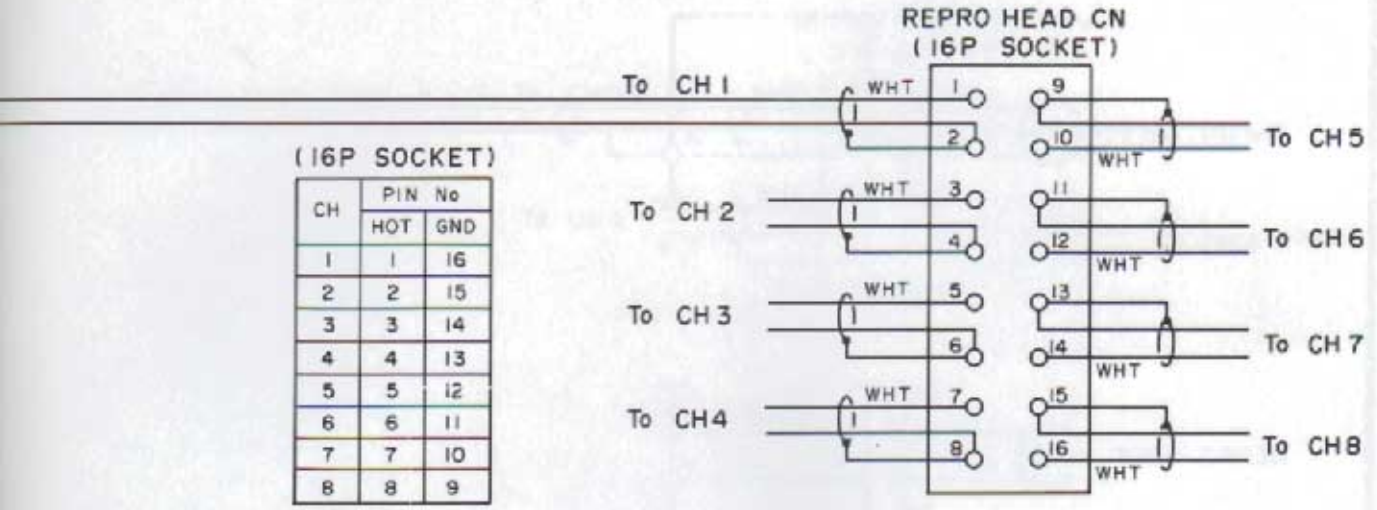


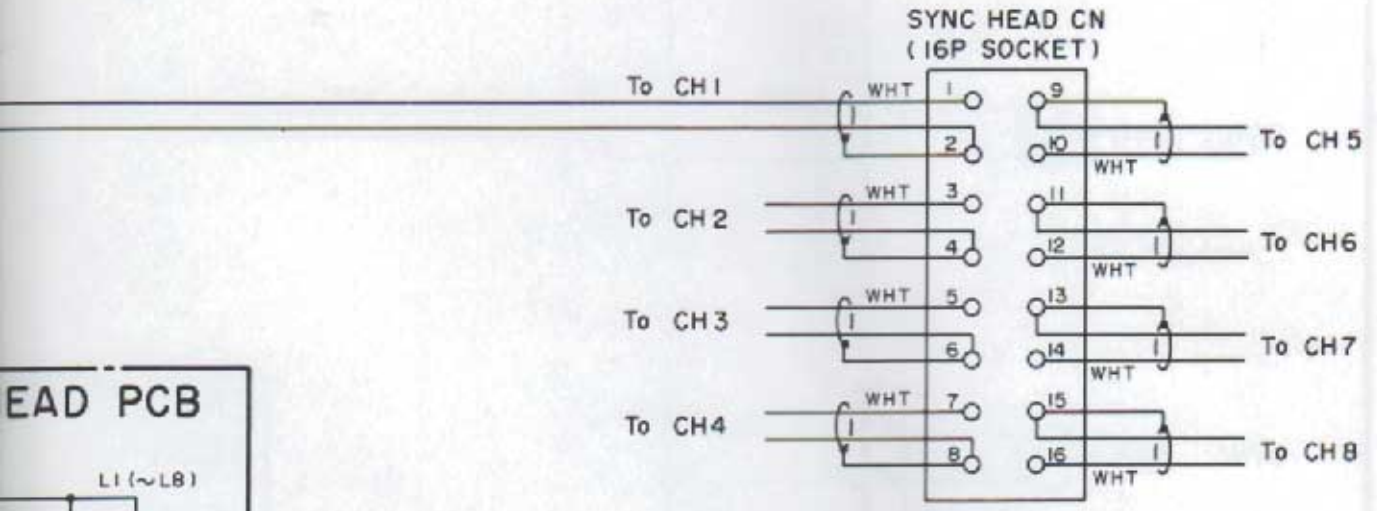
11-15. WIRING DIAGRAM (HEAD ASS'Y, ERASE HEAD PCB ASS'Y) (ATR-60-8)

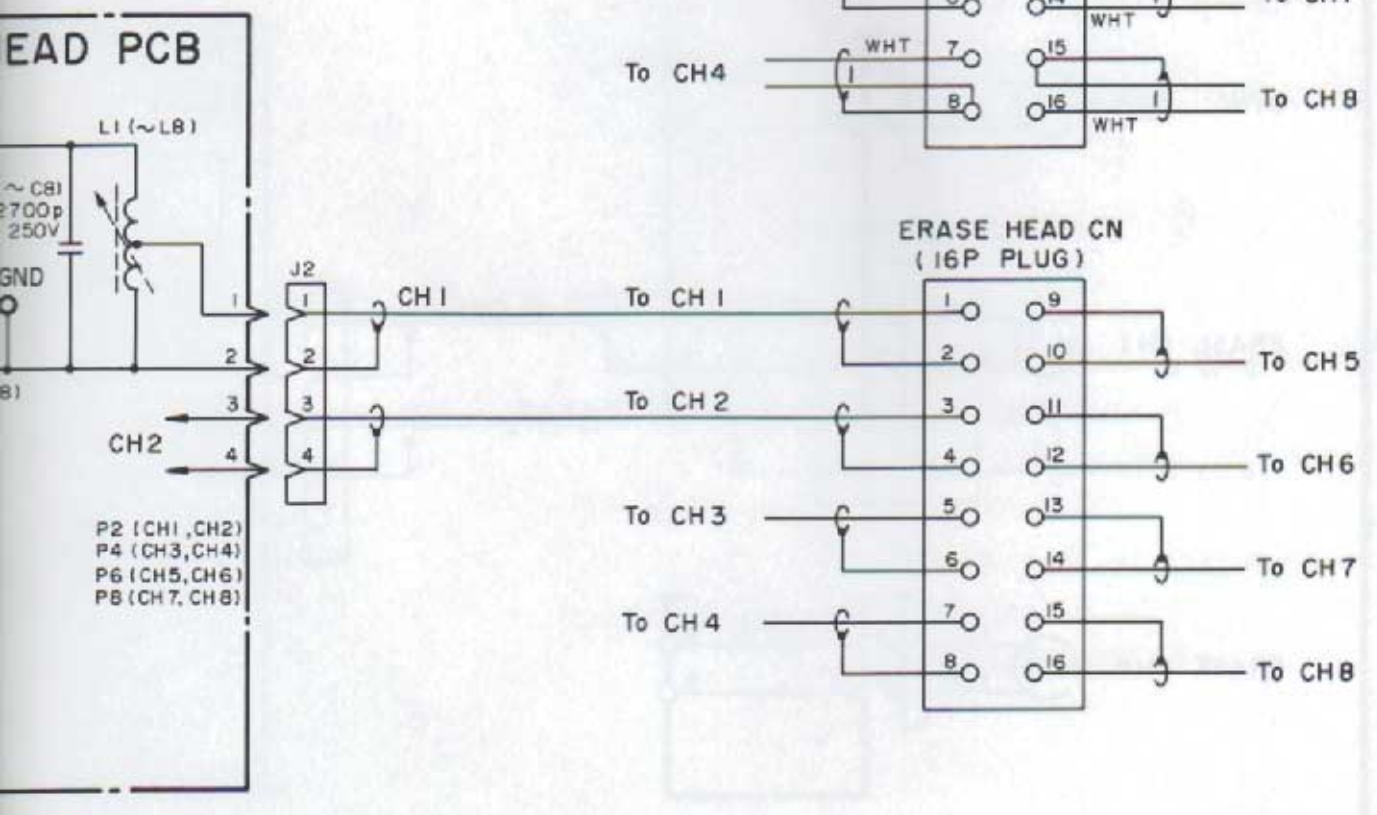


(16P SOCKET)

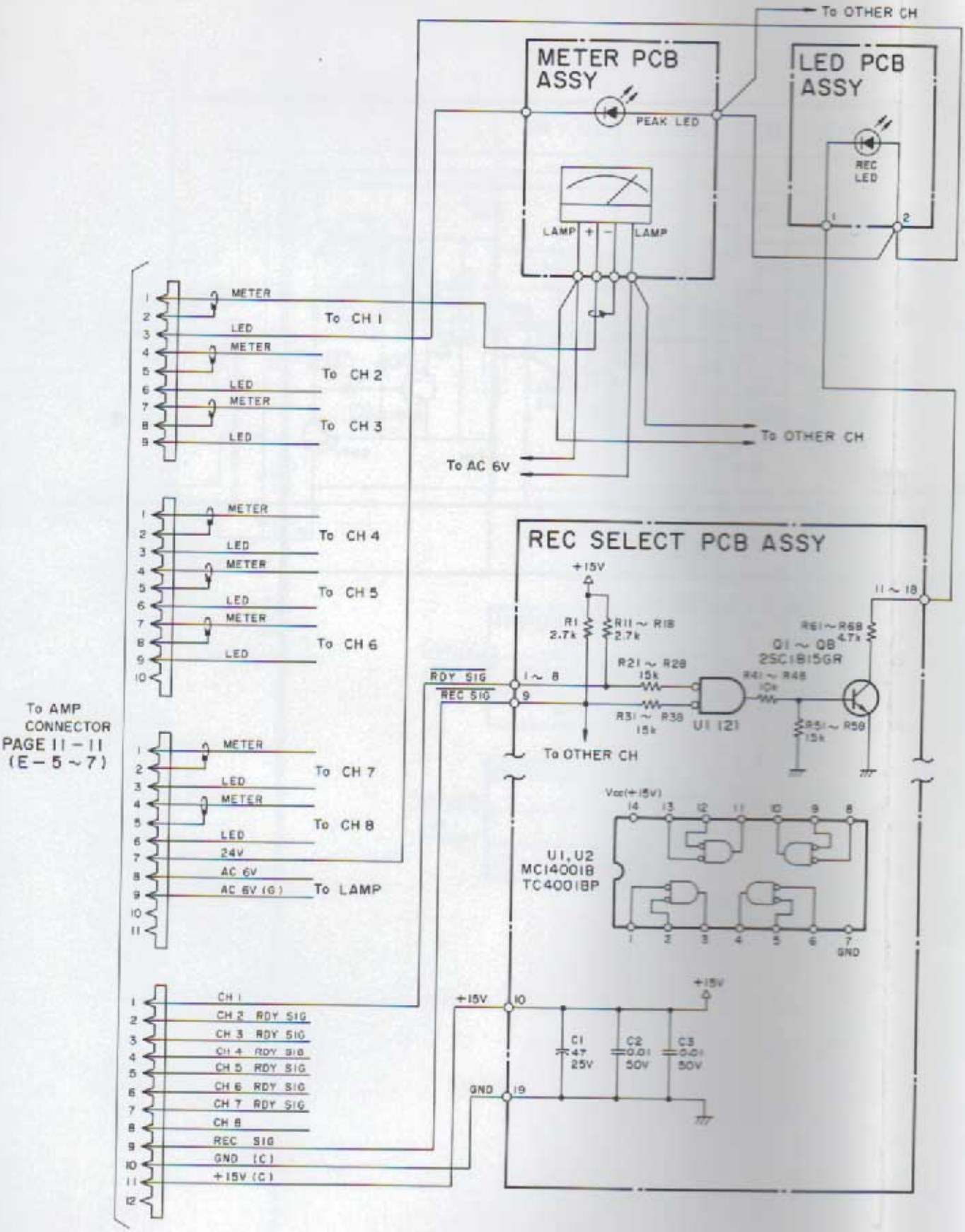
CH	PIN No	
	HOT	GND
1	1	16
2	2	15
3	3	14
4	4	13
5	5	12
6	6	11
7	7	10
8	8	9



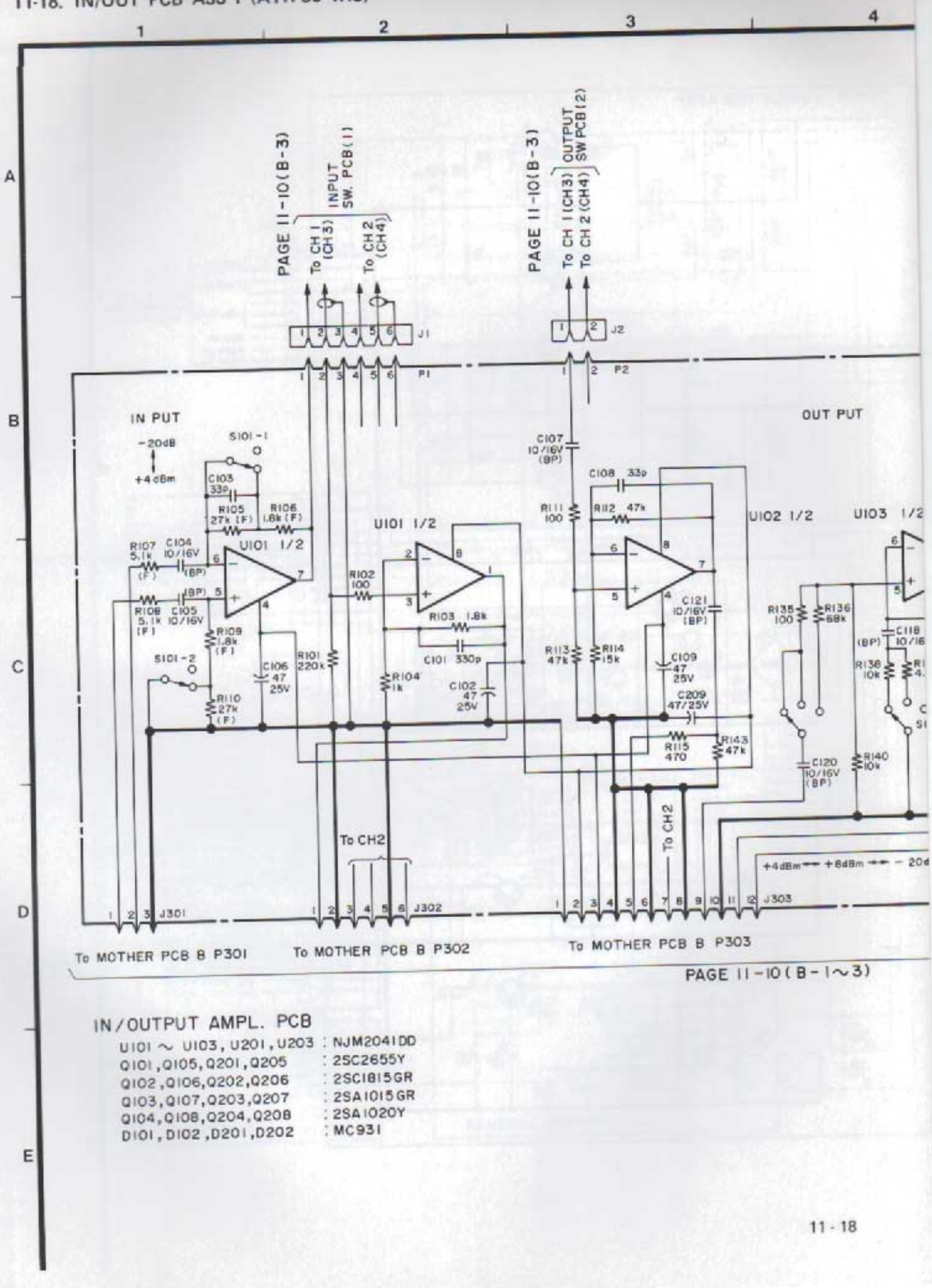




11-16. WIRING DIAGRAM (REC SELECT PCB ASS'Y, METER PCB ASS'Y) (ATR-60-8)

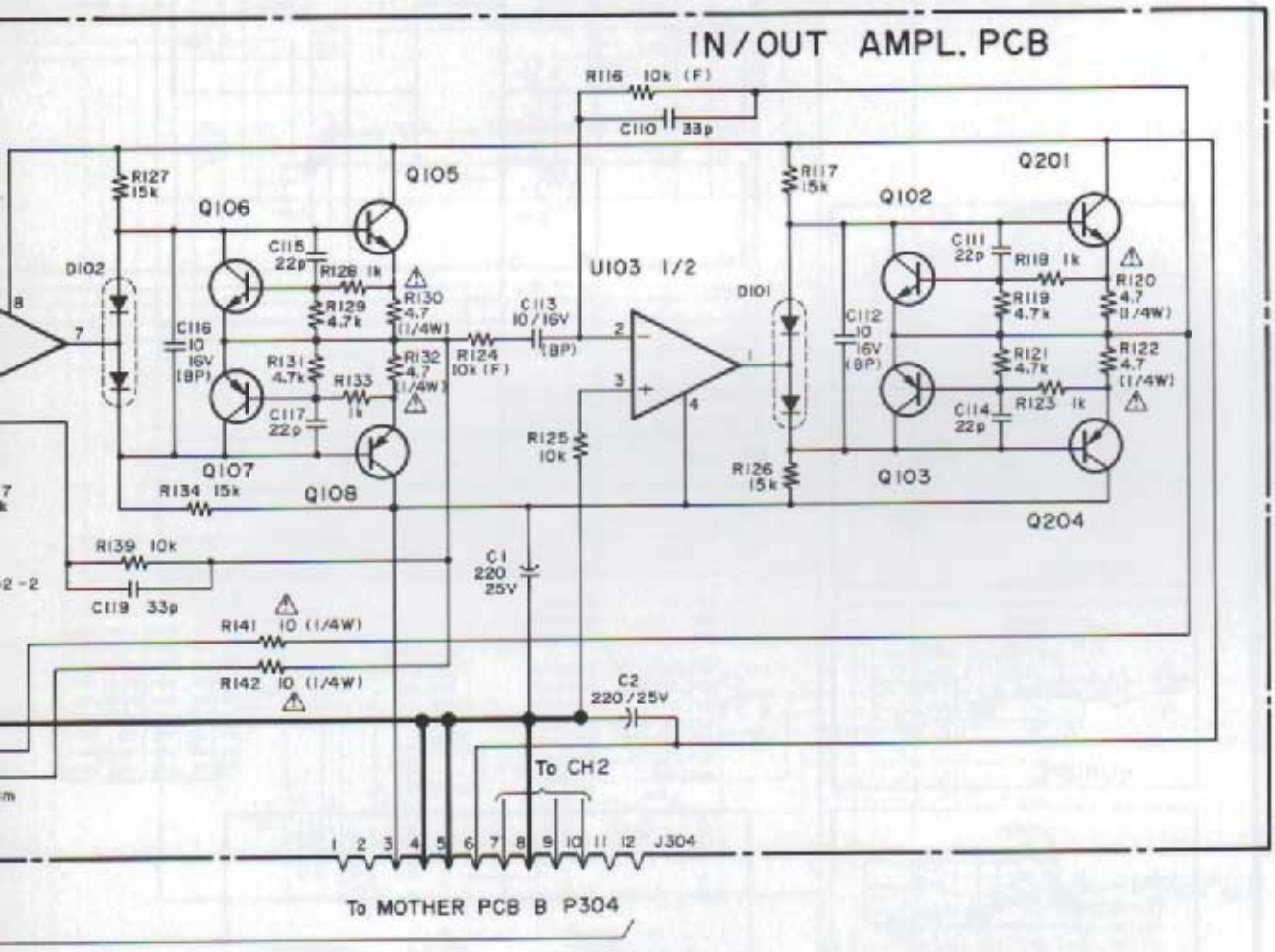


11-18. IN/OUT PCB ASS'Y (ATR-60-4HS)

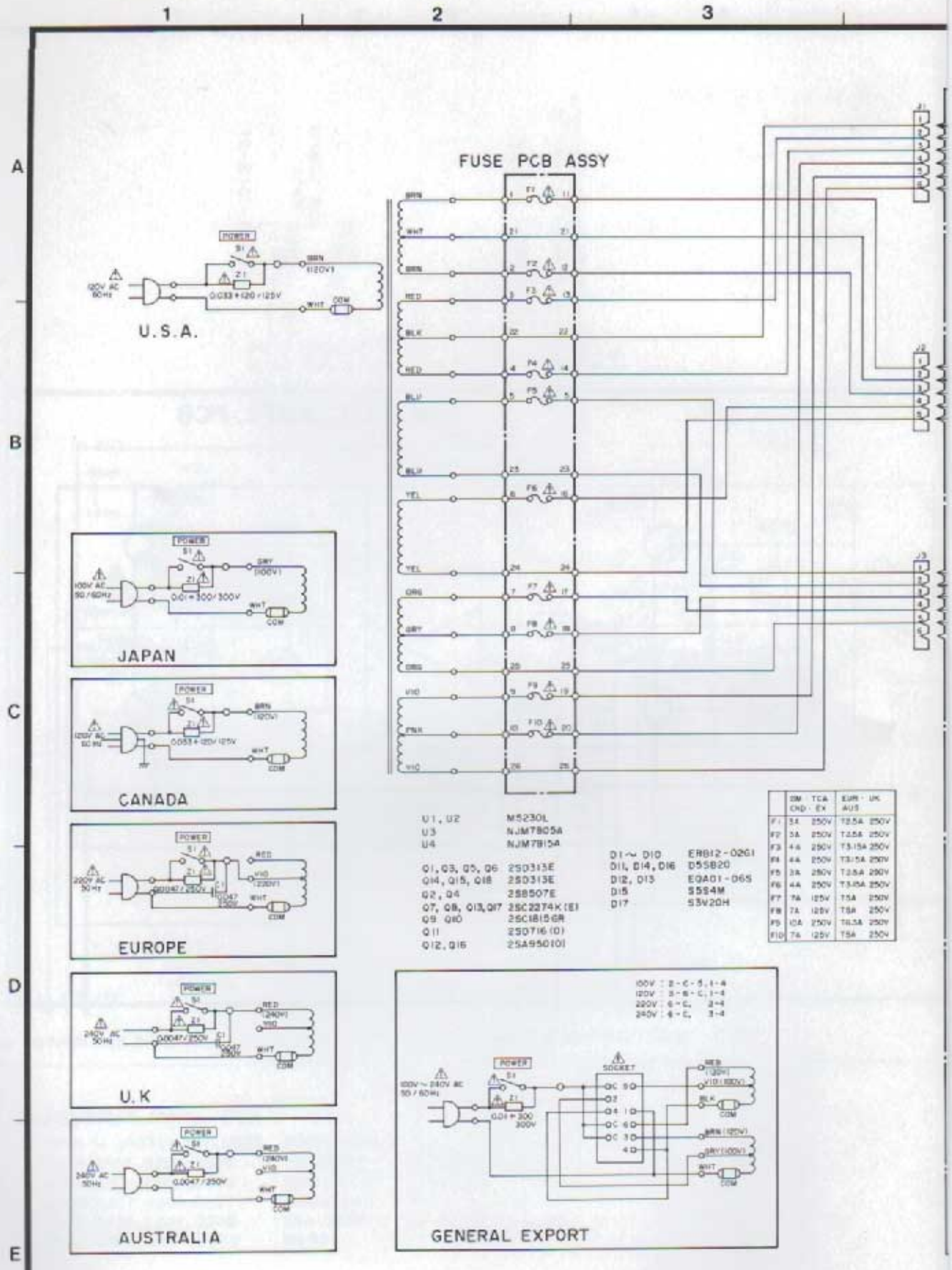


IN/OUTPUT AMPL. PCB

U101 ~ U103, U201, U203	: NJM2041DD
Q101, Q105, Q201, Q205	: 2SC2655Y
Q102, Q106, Q202, Q206	: 2SC1815GR
Q103, Q107, Q203, Q207	: 2SA1015GR
Q104, Q108, Q204, Q208	: 2SA1020Y
D101, D102, D201, D202	: MC931


IN/OUT AMPL. PCB
R116 10k (F)
C110 33p
R127 15k
Q106
Q105
C115 22p
R128 1k
R129 4.7k
R130 4.7 (1/4W)
D102
C116 10 16V (BP)
R131 4.7k
R133 1k
R132 4.7 (1/4W)
C117 22p
Q107
R134 15k
Q108
C113 10/16V (BP)
R124 10k (F)
U103 1/2
R125 10k
D101
R126 15k
R117 15k
Q102
Q201
C111 22p
R118 1k
R119 4.7k
R120 4.7 (1/4W)
C112 10 16V (BP)
R121 4.7k
R122 4.7 (1/4W)
C114 22p
R123 1k
Q103
Q204
R139 10k
C119 33p
C1 220 25V
R141 10 (1/4W)
R142 10 (1/4W)
C2 220/25V
To CH2
1 2 3 4 5 6 7 8 9 10 11 12 J304
To MOTHER PCB B P304

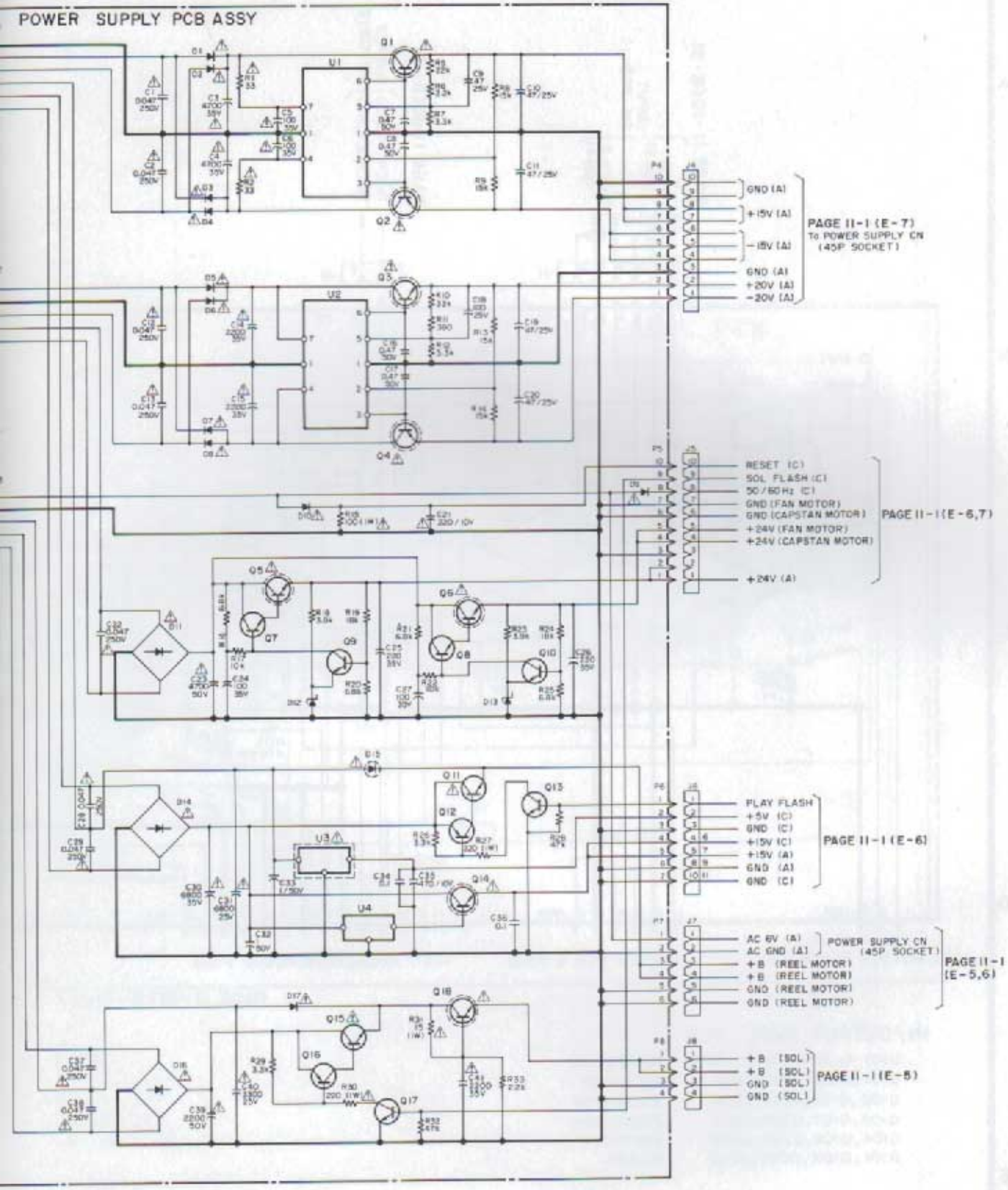
11-19. POWER SUPPLY PCB ASS'Y



U1, U2	M5230L
U3	NJM7805A
U4	NJM7815A
Q1, Q3, Q5, Q6	2SD313E
Q14, Q15, Q18	2SD313E
Q2, Q4	2SB507E
Q7, Q8, Q13, Q17	2SC2274K (E)
Q9 Q10	2SC1815GR
Q11	2SD716 (D)
Q12, Q16	2SA950 (O)

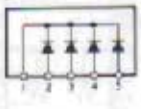
D1 ~ D10	ERB12-02G1
D11, D14, D16	D5SB20
D12, D13	EQA01-06S
D15	S5S4M
D17	S3V20H

	DM · TCA CND · EX	EUR · UK AUS
F1	5A 250V	T2.5A 250V
F2	3A 250V	T4.5A 250V
F3	4A 250V	T3.15A 250V
F4	4A 250V	T3.15A 250V
F5	3A 250V	T2.5A 250V
F6	4A 250V	T3.15A 250V
F7	7A 125V	T5A 250V
F8	7A 125V	T5A 250V
F9	10A 250V	T6.3A 250V
F10	7A 125V	T5A 250V

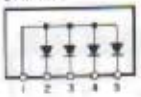

POWER SUPPLY PCB ASSY
GND (A)
+15V (A)
-15V (A)
GND (A)
+20V (A)
-20V (A)
PAGE II-1 (E-7)
To POWER SUPPLY CN (45P SOCKET)
RESET (C)
SOL FLASH (C)
50/60Hz (C)
GND (FAN MOTOR)
GND (CAPSTAN MOTOR)
+24V (FAN MOTOR)
+24V (CAPSTAN MOTOR)
+24V (A)
PAGE II-1 (E-6,7)
PLAY FLASH
+5V (C)
GND (C)
+15V (C)
+15V (A)
GND (A)
GND (C)
PAGE II-1 (E-6)
AC 6V (A)
AC GND (A)
POWER SUPPLY CN (45P SOCKET)
+B (REEL MOTOR)
+B (REEL MOTOR)
GND (REEL MOTOR)
GND (REEL MOTOR)
PAGE II-1 (E-5,6)
+B (SOL)
+B (SOL)
GND (SOL)
GND (SOL)
PAGE II-1 (E-5)

11-20. IC INTERNAL BLOCK DIAGRAMS

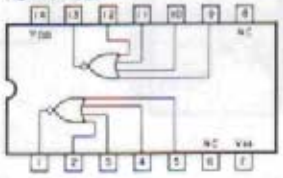
DAN401



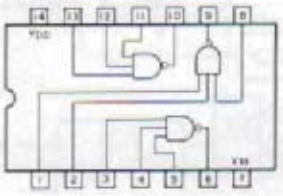
DAP401



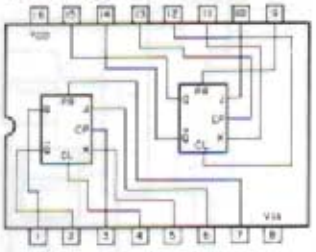
HD140028P



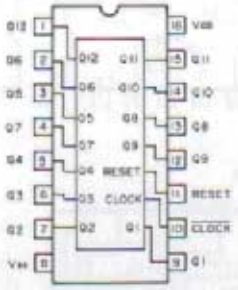
HD14023BP



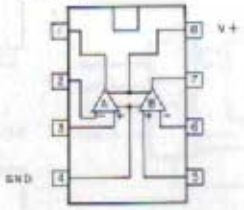
HD14027BP



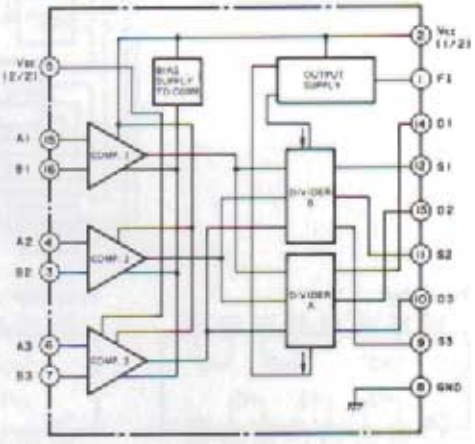
HD14040BP



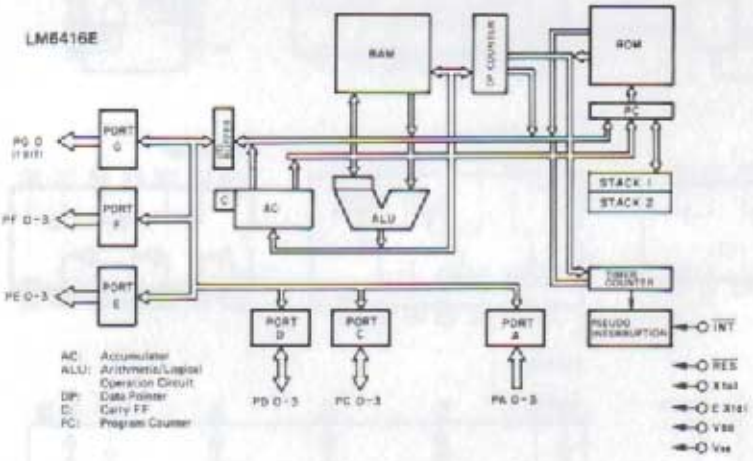
LM2904N



M51724P

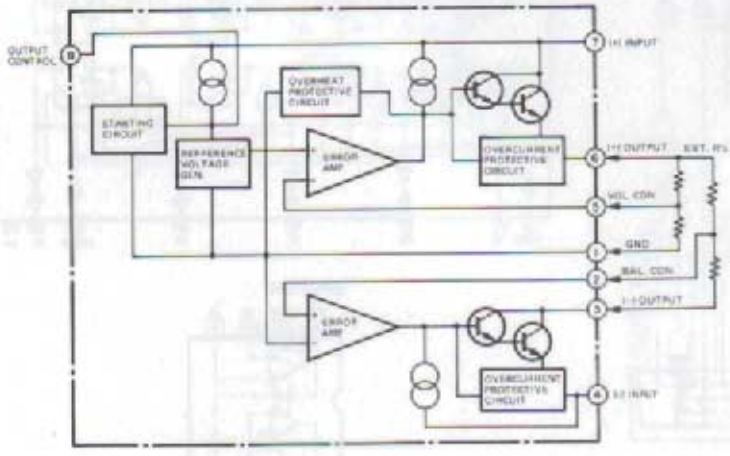


LM6416E

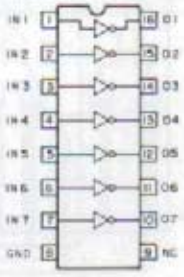


M5218P

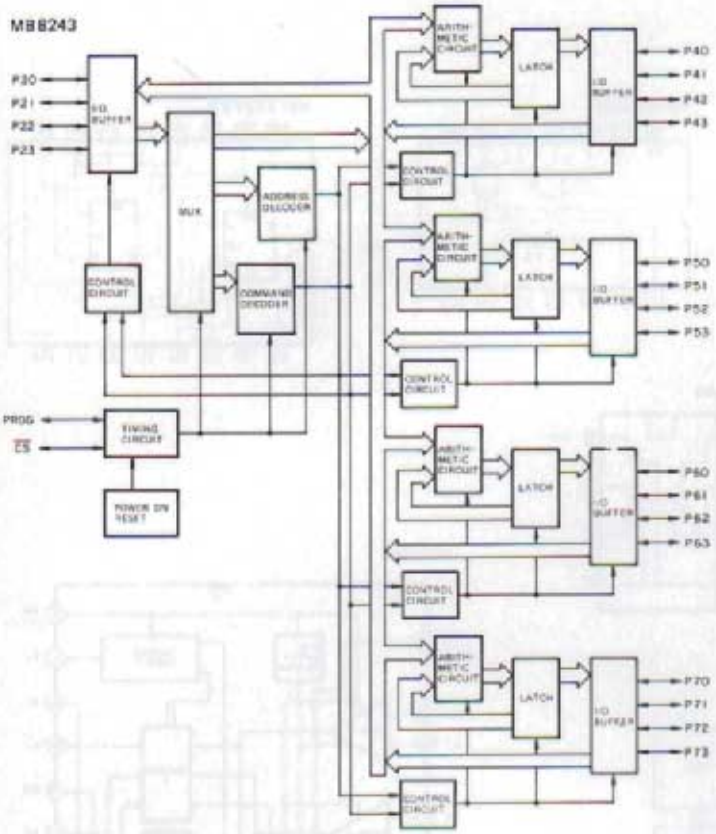
M5230LA



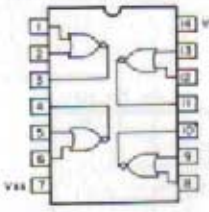
M54517P



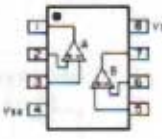
M88243



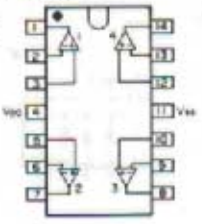
MC14001B



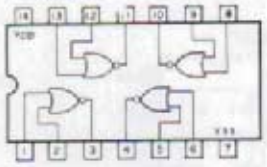
NJM2041DD



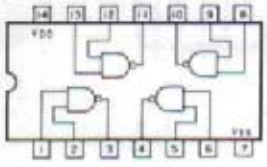
NJM2902



TC4001BP



TC4011BP



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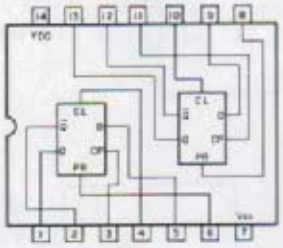

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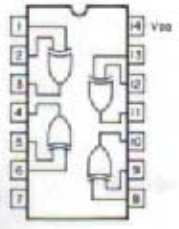

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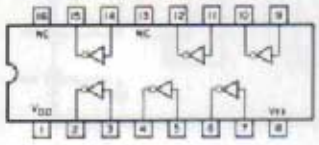

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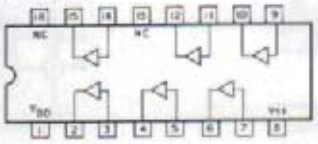

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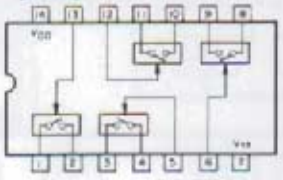

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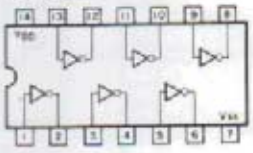

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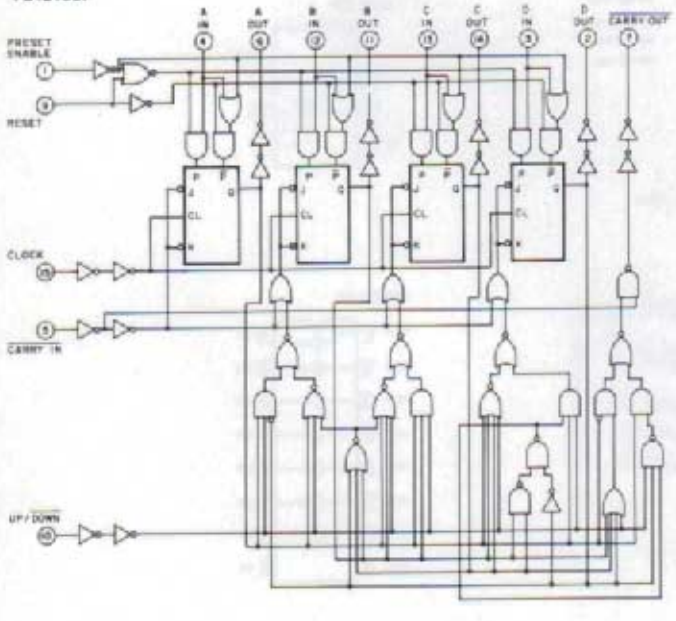

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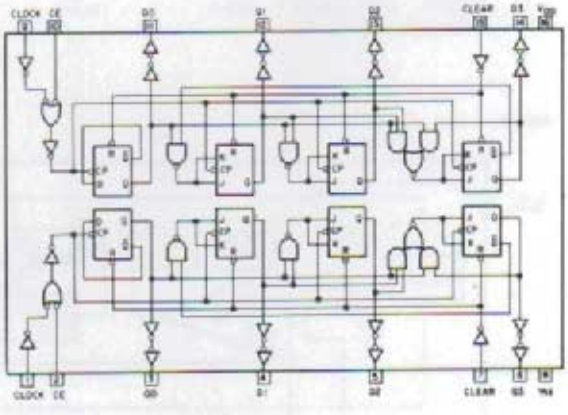

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