AMPEX

AUDIO-VIDEO
SYSTEMS DIVISION

ATR-700

RECORDER/REPRODUCER

OPERATION AND MAINTENANCE

CATALOG NO. 4890410-02
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ATR-700

RECORDER/REPRODUCER

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OPERATION AND MAINTENANCE

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AUDIO-VIDEO SYSTEMS DIVISION

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ATR-700 Recorder/Reproducer

SECTION 1

GENERAL INFORMATION

This manual contains general information, installation, operation, theory of operation, and maintenance information for the ATR-700 Recorder/Reproducer, Ampex Part No. 4010270-4010275. (See Table 1-1 for configuration/part number information.) Parts lists and schematics are also included in the last section of this manual.

The first section of this manual contains general description and specifications for the ATR-700.

1-1. DESCRIPTION

The ATR-700 is a highly reliable, professional audio magnetic tape recorder/reproducer designed for use with 1/4-inch tape and 5, 7, or 10-1/2-inch reels. It is available in six versions; all are switchable between NAB and IEC equalization. Each unit offers two selectable speeds; 7-1/2 and 15 in/s in the high-speed models, and 3-3/4 and 7-1/2 in/s in the low-speed models.

The ATR-700 is available in three different head configurations; full track, two track, and quarter track with either one or two channel capability. All units include two channels of electronics, allowing easy conversion of full-track units to two track or quarter track operation. Table 1-1 shows the configurations of the six available versions.

The electronics of the ATR-700 feature IC logic control for error-free operation. Motion sensing logic allows changing from fast forward or rewind mode to reproduce mode smoothly and without tape spillage or damage. Reproduce mode begins shortly after the motion sensing circuitry determines that tape motion has stopped. No preset or automatic delays are necessary. The direct drive dc servo capstan motor provides positive tape control unhampered by belts that could introduce wow and flutter or tape speed variations.

The standard ATR-700 utilizes three heads: an erase head, a record head, and a reproduce head. A space is reserved on the right side of the head assembly for installation of a fourth head (a second reproduce head), which may be ordered as an option. Changing a head assembly is a simple operation and requires only minor adjustments. Two-channel versions feature the synchronous reproduce mode which makes it possible to switch the record head of either channel to the reproduce mode for monitoring that channel. Thus, channels recorded at different times are in perfect synchronization.

The two-channel ATR-700 has a built-in "four-in/two-out" mixer (two-in/one-out for each channel). Four microphones, four line inputs, or two microphones and two line inputs can be mixed down to two channels. For full-track models, two inputs can be mixed down to one channel. MIC ATT switches on the rear connector panel allow selection of 20 dB of microphone input attenuation. In addition, the three-position RECORD LEVEL switch selects three levels of attenuation to the signal (input or tape) fed to the vu meters, LINE OUT jacks, and headphones. This allows easy calibration changes to accommodate either conventional or high-energy tapes.

A digital tape counter allows direct reading of the elapsed time in minutes and seconds when the higher tape speed is selected. (For lower tape-speed operation, the reading must be multiplied by two for actual elapsed time.)

Tape editing is greatly simplified in the ATR-700. Pressing the EDIT button during reproduce mode disables the takeup motor and allows dumping of unwanted tape from the supply reel. The EDIT button also causes the tape lifter to be retracted to allow manual cueing in stop mode. A VARI-SPEED control can be used to vary tape speed by

Table 1-1. ATR-700 Versions

AMPEX PART NUMBER	NUMBER OF CHANNELS	TAPE SPEEDS (IN/S)	HEAD CONFIGURATION	SYNCHRONOUS REPRODUCE MODE
4010270	1	3-3/4 and 7-1/2	Full Track	No
4010271	1	7-1/2 and 15	Full Track	No
4010272	2	3-3/4 and 7-1/2	Two Track	Yes
4010273	2	7-1/2 and 15	Two Track	Yes
4010274	2	3-3/4 and 7-1/2	Quarter Track	Yes
4010275	2	7-1/2 and 15	Quarter Track	Yes

±5% in order to compensate for tonal variations of instruments recorded at different times.

Other important features of the ATR-700 include: a rewind-stop MEMORY switch; full remote control capability (using the optional remote control box); quick-lock reel holddown knobs; a flip-open head housing to facilitate editing and head maintenance; a cue mode; a pause mode, to prepare for record or reproduce operation; and a universal power transformer which allows the ATR-700 to accept 100, 120, 220, or 240-Vac input at a frequency of either 50 or 60 Hz.

1-2. SPECIFICATIONS

Table 1-2 gives specifications and performance characteristics for the ATR-700 Recorder/Reproducer. These specifications are subject to change without prior notice. Table 1-3 gives accessories and options available with the ATR-700.

Figure 1-1 shows ATR-700 external dimensions.

Table 1-2. ATR-700 Specifications

Tape Transport	
Tape recommended:	Ampex No. 456 (Grand Master) and No. 406, or equivalent.
Tape width:	1/4 inch.
Reel sizes:	5, 7, 10 1/2 inch per ANSI and NAB standards.
Reel hub size selector:	2 positions: LARGE or SMALL reel hubs.
Tape speed:	Switchable two speed: 3-3/4 and 7-1/2 in/s or 7-1/2 and 15-in/s. Adjustable pitch range ±5%. Not field convertible between models.
Tape speed accuracy:	Within ±0.3% at both speeds.
Wow and flutter:	0.08% Wrms at 7-1/2 and 15 in/s. 0.12% Wrms at 3-3/4 in/s. Weighting is NAB measured by the reproduce method.

Table 1-2. ATR-700 Specifications (Continued)

Tape Transport (Continued)

Shuttle time:	Approximately 90 seconds for 1200-foot reel in either direction.
Tape drive system:	Three-motor direct-drive.
Capstan motor:	DC servo motor, direct drive.
Head configuration:	3 heads for erase, record, and reproduce in 1-track 1-channel (has basic 2-channel electronics), 2-track 2-channel, or 1/4-track 2-channel. In addition to above, space is provided for a fourth head.
Tape timer (with rewind-stop memory):	Indicates in minutes and seconds to a maximum of 99 minutes and 59 seconds; indications are for the higher speed (7-1/2 or 15-in/s). Accuracy is within ±10% max error.
Manually defeatable tape lifter:	Lever type for cueing.
Motion sensing:	Circuit to detect complete stop of tape before going into the play mode when PLAY button is pushed during fast-forward or rewind. Delay time from stop to next motion is 0.7 ±0.3 second.
Operating position:	Vertical or horizontal.
Mounting:	Can be installed in standard 19-inch rack (uses vertical rack mount adaptor, included).
Transport controls:	FAST FWD, FAST RWD, STOP, RECORD, EDIT, LIFT DEFEAT, PLAY, PAUSE, VARI SPEED, REEL hub size.
Remote controls:	FAST FWD, FAST RWD, STOP, PLAY, RECORD, PAUSE.
Safety standard approval:	UL/CSA

Electronics:

Line output:	+4 dBm, 600 ohms, balanced. (Can be set up for +8 dBm)
Maximum line input:	+24 dBm.
Line input:	−10 dB (0 dB = 0.775V), 100K, unbalanced.
Mic input:	−70 dB (0 dB = 0.775V), 600 ohms, balanced with switchable −20 dB attenuator.
Maximum mic input (attenuator off):	−30 dB (0 dB = 0.775V)
Input connector:	Cannon XLR-3-31

Table 1-2. ATR-700 Specifications (Continued)

Electronics (Continued):

Output connector:	Cannon XLR-3-32.
Equalization:	NAB or IEC, switchable on rear panel.
Record/reproduce frequency response:	15 in/s: 40 Hz to 100 Hz ±3 dB and 100 Hz to 18 kHz ±2 dB 7-1/2 in/s: 40 Hz to 100 Hz +3, −2 dB and 100 Hz to 15 kHz ±2 dB. 3-3/4 in/s: 40 Hz to 7.5 kHz, ±2 dB.
Distortion (THD), maximum (using 456 tape)	NAB equalization, 15 in/s. 0.3% at 400 Hz, 185 nWb/m. 4.0% at 15 dB above 185 nWb/m.
Eq/Bias/Level:	Separately switchable for different tapes.

SWITCH POSITION	REC. EQ.	REC. BIAS	REC. LEVEL
3	3M250	3M250	(+6 dB) 456*/3M250
2	406*	456/406*	(+3 dB) 406*
1	456/641*	641*	[185 nWb/m (0 dB)] 641*

*Ampex tape

Erasure:	70 dB at 400 Hz, +10 dB reference.
Signal-to-Noise ratio (overall, "A" weighted):	NAB equalization referred to 6 dB above 185 nWb/m. 1/4 track = 55 dB. 2 track = 60 dB. IEC equalization referred to 320 nWb/m. 2 track = 58 dB.
Frequency response for synchronous reproduce:	100 Hz-12 kHz, ±4 dB at 15 in/s. 100 Hz-8 kHz, ±4 dB at 7-1/2 in/s
Synchronous Reproduce signal-to-noise (overall "A" weighted)	NAB equalization referred to 6 dB above 185 nWb/m. 1/4 track = 40 dB. 2 track = 45 dB.
Headphone output:	10K ohms minimum load, unbalanced, standard 3-conductor stereo phone jack = 0.8 volt ±2 dB.

Table 1-2. ATR-700 Specifications (Continued)

Electronics (Continued):	
Record level calibration, 0 vu =:	0 dB referenced to 185 nWb/m of tape flux. Position 1 — 0 dB. Position 2 — +3 dB. Position 3 — +6 dB.
Dimensions:	21-5/8 inches (54.8 cm) high X 17-3/8 inches (44.0 cm) wide X 10-1/6 inches (25.4 cm) deep
Weight:	Approximately 62 lbs (28 kg).
Power requirements:	100/120/220/240V ±10% 50/60 Hz switchable 150 watts.
Environmental:	
Operating temperature:	+5°C (+41°F) to 40°C (+104°F).
Operating humidity:	80% maximum, non-condensing.

All performance tests made with Ampex No. 456 (Grand Master) tape.

Table 1-3. Accessories and Options with Ampex Part Number

STANDARD EQUIPMENT	OPTIONS
2 NAB reel holddown knobs, Part No. 809-137 3-to 2-pin AC power adapter, Part No. 809-134 Rack-mount adapter with hardware, Part No. 809-135 1 Accessory mating connector (unwired) Part No. 809-326 4 Cannon XLR connectors (unwired) 2 Input, Part No. 145-009 2 Output, Part No. 143-125 10-1/2 inch takeup reel (Ampex aluminum NAB: Part No. 4690003-01) 1 Operation and Maintenance manual Catalog No. 4890410 Module extender board, Part No. 809-193	Portable case, Part No. 4010286 Transport remote control, Part No. 4010269 Auxiliary Head Kit, Part No. 1418947-01 (1/4-Track Head) or 1418947-02 (2-Track Head)

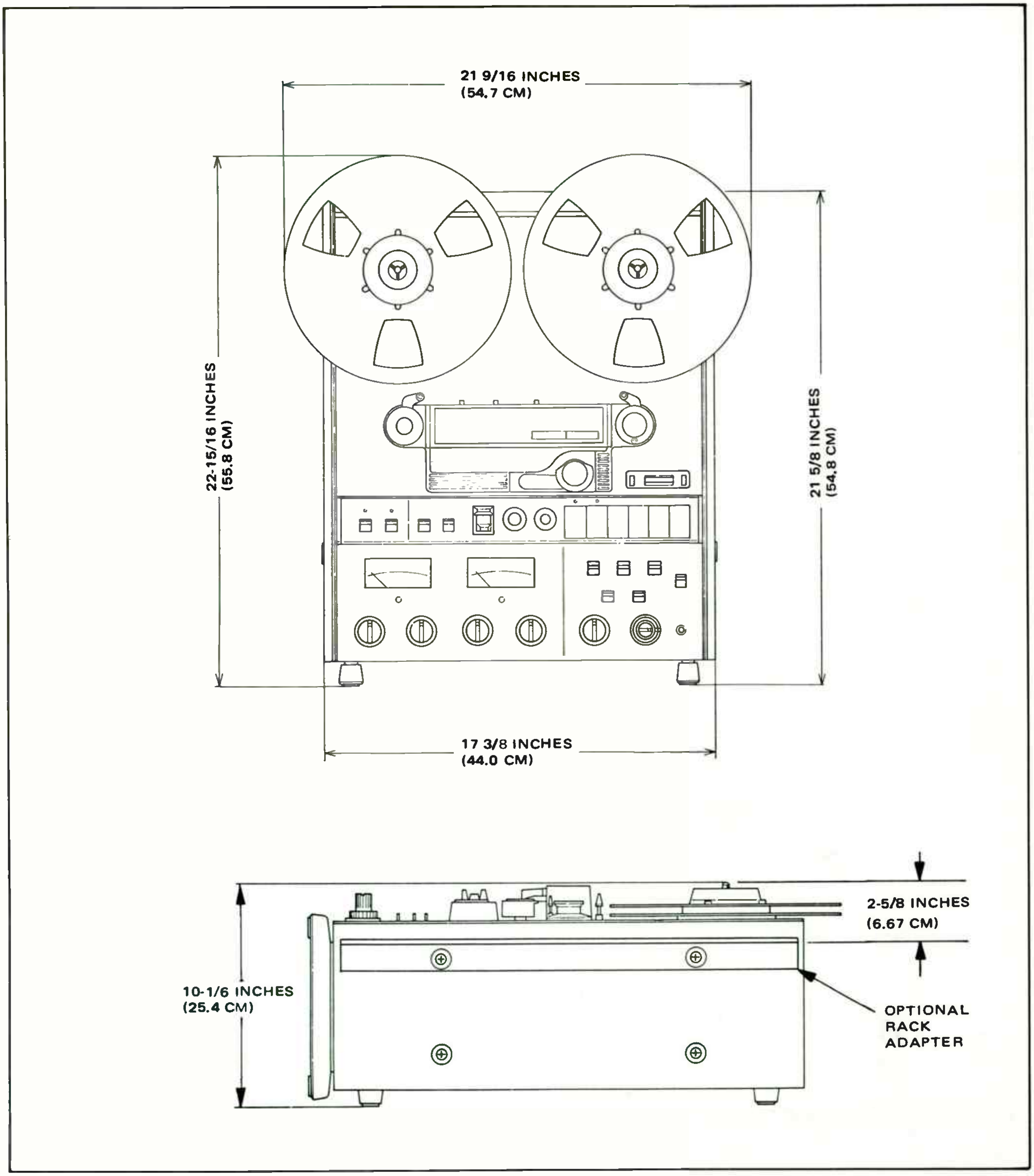


Figure 1-1. ATR-700 External Dimensions

SECTION 2
INSTALLATION

This section of the manual provides information on unpacking, site selection, rack mounting, power and frequency conversions, initial connections, and verification procedure prior to operation of the ATR-700.

2-1. UNPACKING AND INSPECTION

The ATR-700 is shipped from the factory in a specially designed, double packing carton to prevent damage in transit. During unpacking, exercise care to avoid damage to the carton or accessories. After opening the inner carton (see Figure 2-1), remove rack mounting adapters and box containing empty reel from the top of the ATR-700. With side packing panels still in place, lift the recorder/reproducer deck from the box.

CAUTION

THE ATR-700 WEIGHS APPROXIMATELY 62 LB (28 KG). USE PROPER LIFTING PROCEDURE.

Remove accessories which are located at the bottom of the box.

2-2. INSTALLATION SITE

The ATR-700 can be operated in an upright (vertical) position, standing on the factory-installed feet (see Figure 2-2); on its back in a horizontal position; or mounted in a standard 19-inch rack using the supplied rack adapters (see *Rack Mounting* procedure, paragraph 2-3). The recorder/reproducer operates on ac line power and must be within approximately six feet of an appropriate power source. A 3-pin ac cord with 2-pin adapter is supplied.

CAUTION

MAKE SURE THAT THE ACTUAL INPUT VOLTAGE AND FREQUENCY FROM THE POWER SOURCE MATCHES THAT SPECIFIED ON THE LABEL AFFIXED TO THE ATR-700. IF IT DOES NOT MATCH, REFER TO VOLTAGE AND FREQUENCY CONVERSION PROCEDURES BELOW.

The ATR-700 may be operated in most areas, but to ensure protection of tapes, prolong useful operating life, and maintain reliable performance, the following environmental limitations should be observed:

- Nominal temperature range should be 5° C to 30° C (41° F to 86° F). Direct sunlight or close proximity to heating devices will raise the internal temperature of the recorder/reproducer, which may cause damage to some components. Low temperatures may cause lubricants to thicken, which may result in sluggish operation and place an overload on the drive motor mechanism.

- As with any precision machine with moving parts, the ATR-700 should be covered when not in use. Excessive dust may result in bearing or tape head wear.

- Avoid high humidity and salt air. Excessive humidity can shorten equipment life due to corrosion or possible fungus growth on printed wiring assemblies (PWAs). When near the ocean, covering the recorder/reproducer immediately after use should prevent salt air from corroding metal surfaces, such as bearings and internal connections.

- Avoid extreme line voltage fluctuation. Line voltage fluctuations must be no more than ±10% of the power requirement. If line

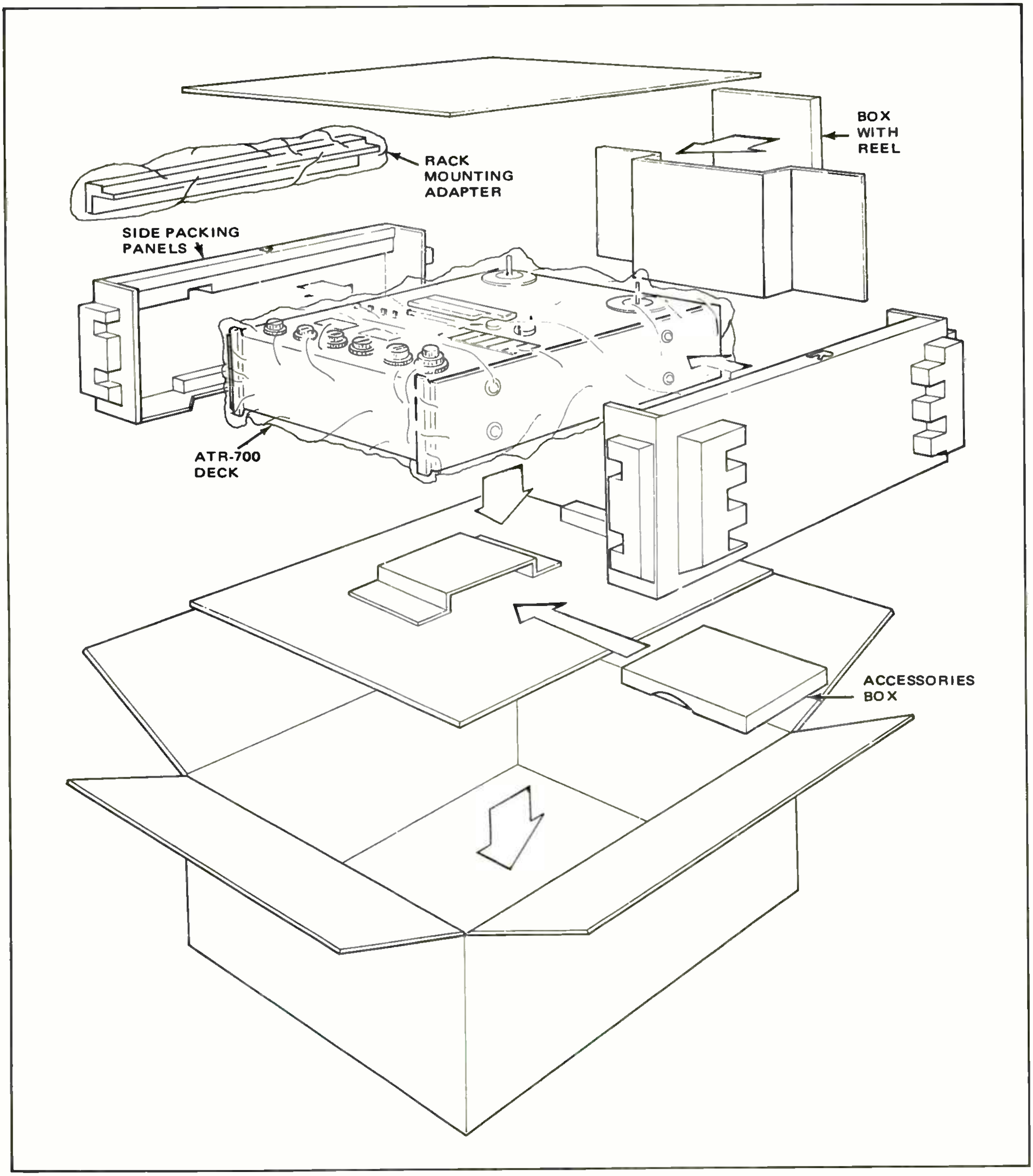


Figure 2-1. Unpacking the ATR-700

Figure 2-2. ATR-700 in Upright Position

voltage fluctuation exceeds this limit, an input voltage regulator must be used.

2-3. RACK MOUNTING

To install the ATR-700 in a standard, 19-inch rack, refer to Figure 2-3 and proceed as follows:

1. Remove side panels of the recorder/reproducer by removing four Phillips screws and washers on each side.
2. Remove two spacer screws toward the front of each side.
3. Install adapters to sides of deck with two screws per side (see Figure 2-3), included in box with accessories.
4. Remove two screws and washers from underside of each foot and remove two feet from the bottom of the unit.
5. On the rear of the machine, remove the two screws and washers and the two small plastic feet (see Figure 2-4) which hold the bottom panel in place. Remove the bottom panel from the deck to allow easier access for adjustments.
6. Mount the deck (with adapters) in the 19-inch rack, using four screws on each side.

2-4. AC VOLTAGE AND FREQUENCY CONVERSION

The ATR-700 is equipped to operate on any of four input voltages (100, 120, 220 or 240 Vac ±10%), and at either 50 or 60 Hz frequency. If the input voltage specified on the recorder/reproducer differs from the line voltage at the installation site, change the line voltage selection on the ATR-700 as follows:

1. Make sure that the ac power cord is unplugged from the power outlet.

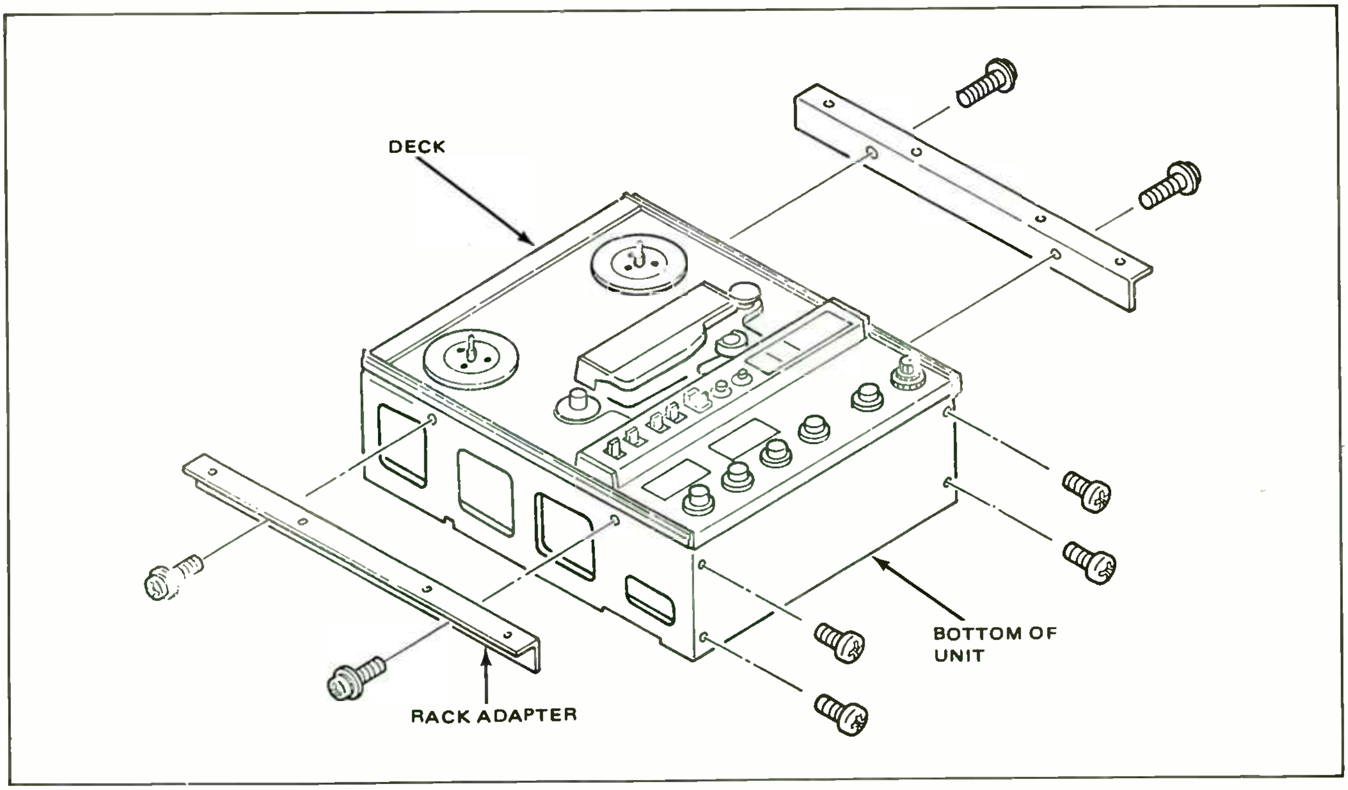


Figure 2-3. Rack Adapter Installation

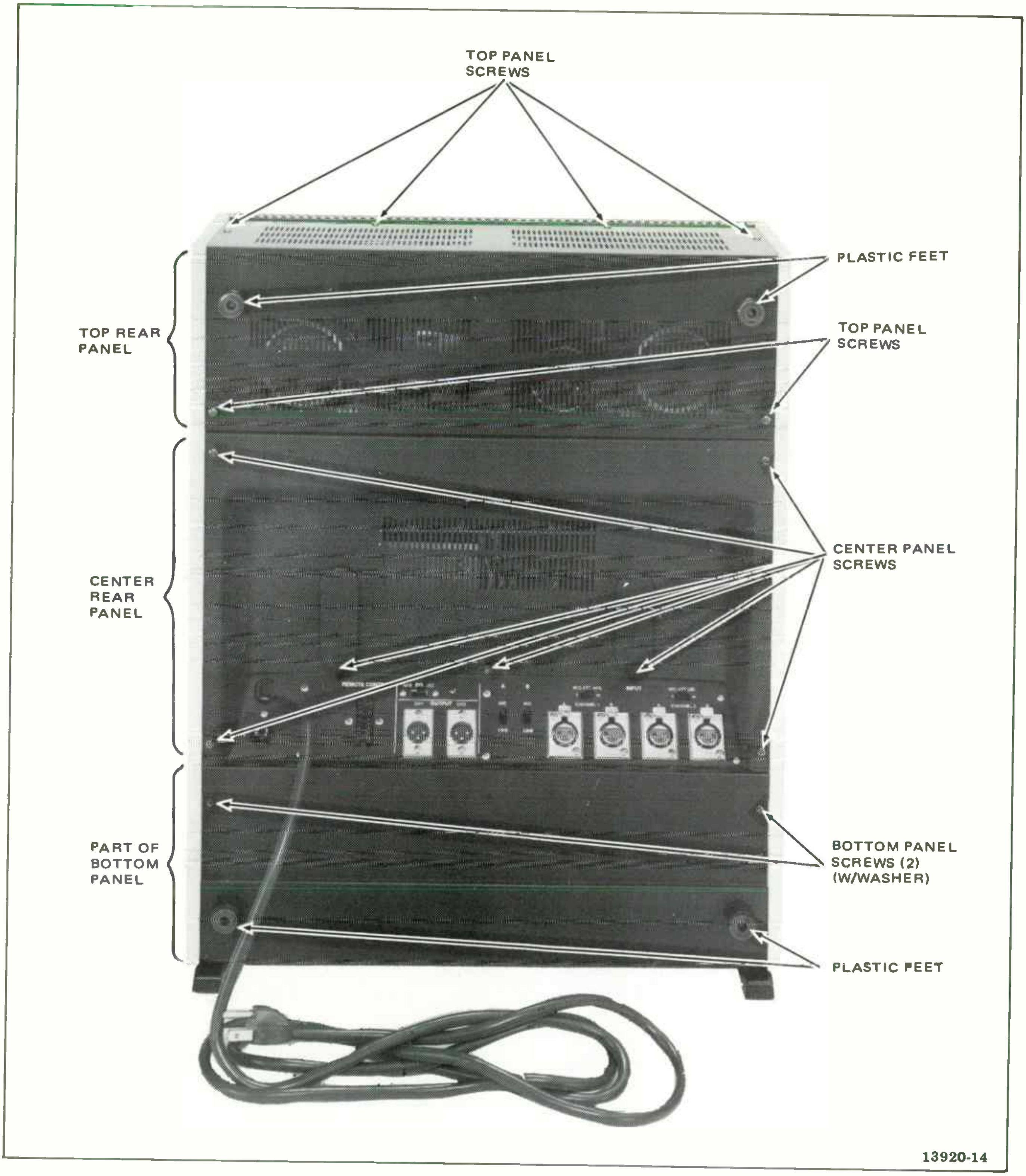


Figure 2-4. Screw Locations for Panel Removal

2. Remove the rear center panel from the deck by removing two screws on each side and three screws below the ac cord holder (see Figure 2-4).

3. Remove the rear top panel by removing two screws and two plastic feet from the rear of the deck and four screws from the top of the deck (Figure 2-4).

4. Locate the voltage selector plug just to the left of the supply reel motor as viewed from the rear of the deck (see Figure 2-5). Pull out to remove plug, and reinsert it so that the required voltage is indicated in the cut-out section of the plug (see Figure 2-6).

CAUTION

WHEN VOLTAGE SETTING IS CHANGED, BE SURE TO INSTALL A NEW FUSE OF MATCHING VOLTAGE AND CURRENT IN FUSE HOLDER SHOWN IN FIGURE 2-5.

5. Locate the frequency conversion switch just below the supply reel motor (Figure 2-5) and check that the selected frequency (50 or 60 Hz) matches the frequency of the power line at the installation site. If not, change the switch setting (shown in Figure 2-7) to correspond to the input line frequency.

6. Replace rear top and rear center panels using screws and plastic feet removed in steps 2 and 3 above.

2-5. INITIAL CONNECTIONS

Input and output connections are made on the rear connector panel of the ATR-700 (see Figures 2-8 and 2-9). Also located on the rear connector panel are a REMOTE CONTROL connection and an equalization selector switch. The REMOTE CONTROL connection makes it possible to connect a remote control unit (optional accessory available from Ampex) to provide remote control of all functions of operating control pushbuttons. The NAB/IEC EQualization switch enables selection of either the NAB or the IEC equalization curve.

2-6. Input Connections

NOTE

For full track recording, only channel 1 inputs are used. Do not connect channel 2 inputs.

Four LINE, four MIC, or two LINE and two MIC inputs can be connected to the ATR-700. Two Cannon XLR-3-12C connectors are supplied for use in both MIC and LINE connections. Set MIC/LINE selector switch (Figure 2-8) to match inputs being used. Each MIC/LINE switch controls two input channels; one switch controls both A inputs, and the other controls both B inputs. This ensures that each channel will have the same combination of MIC and LINE inputs.

When MIC/LINE selector switch is set for MIC inputs, the MIC ATT switches (Figure 2-8) can be set for 20 dB of attenuation of MIC signals to prevent over-driving of MIC amplifiers. Note that one MIC ATT switch controls both inputs on channel 1 and the other switch controls both inputs on channel 2.

Refer to Table 2-1 for input specifications and settings.

2-7. Output Connections

Cannon XLR-3-11C connectors (supplied) must be used for output connectors. Standard output level (185 nWb/m) is +4 dBm (with RECORD LEVEL switch, item 3 in Table 3-2, in position 1 and OUTPUT level control, item 6 in Table 3-2, at "snap" preset position). Output impedance is 600 ohms balanced.

2-8. VERIFICATION OF CONNECTIONS

After initial connections are made, perform the following procedure to confirm that connections have been made correctly and recorder/reproducer is in proper working order.

1. Reconfirm that the power plug is connected to the proper voltage and frequency source.

2. Set POWER switch (item 1, Table 3-1) to the ON position.

3. Check that vu meter lamps light.

4. Apply input signals as desired.

5. Set MONITOR switches (item 4, Table 3-2) to INPUT.

6. Alternately raise CHANNEL 1 and CHANNEL 2 record input level controls and MASTER RECORD level control, noting vu meter indications to confirm that each control is operating correctly.

7. Use headphones or speaker to monitor output signal and, if necessary, individually raise channel 1 and channel 2 OUTPUT level control (item 6, Table 3-2) to confirm that output signal is going to the correct channel.

NOTE

Individual adjustment is accomplished by turning one knob while holding the other.

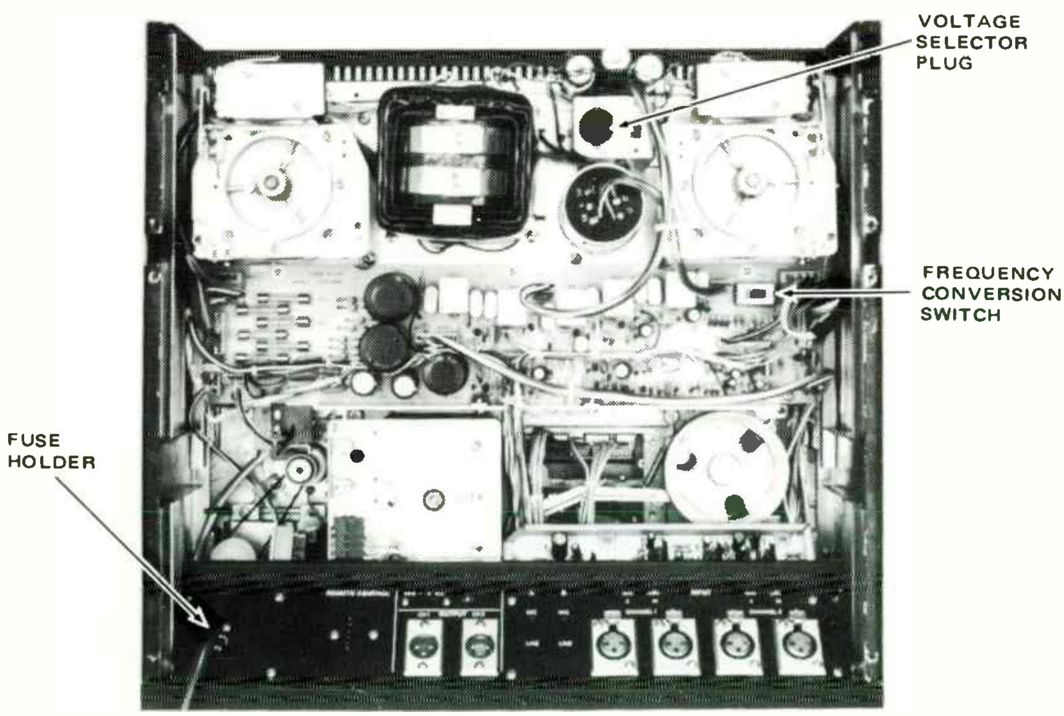


Figure 2-5. Voltage and Frequency Conversion

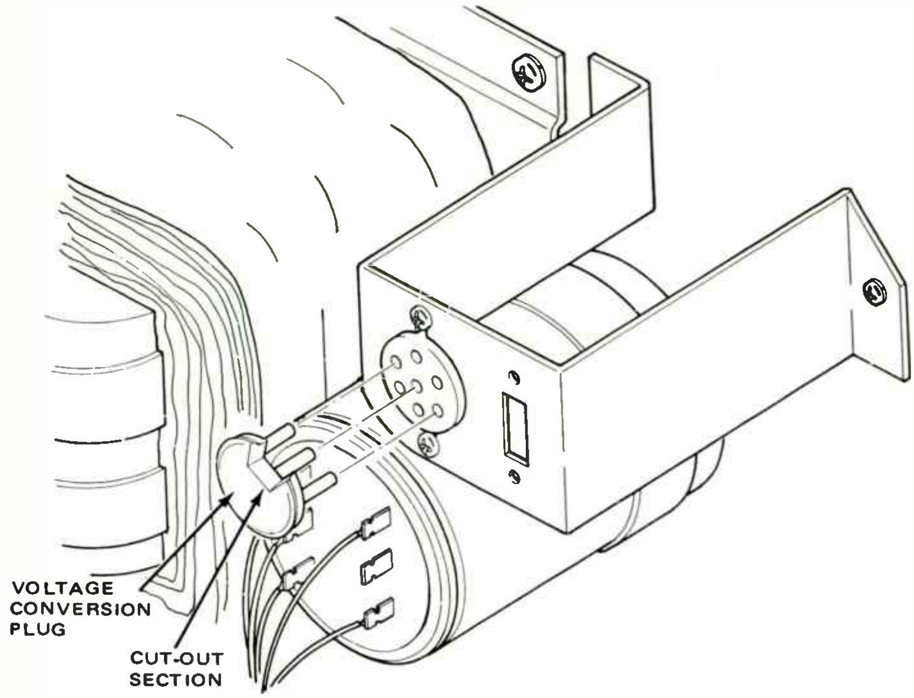


Figure 2-6. Voltage Conversion Plug

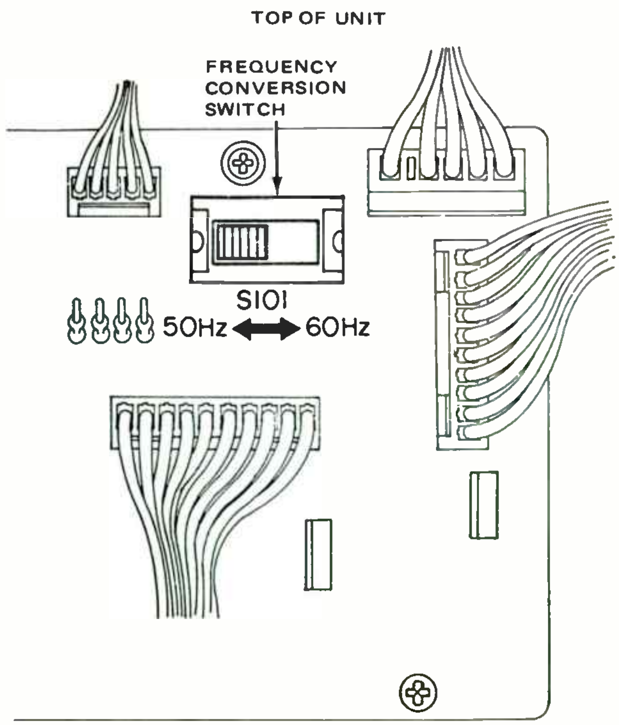


Figure 2-7. 50 Hz/60 Hz Frequency Conversion Switch

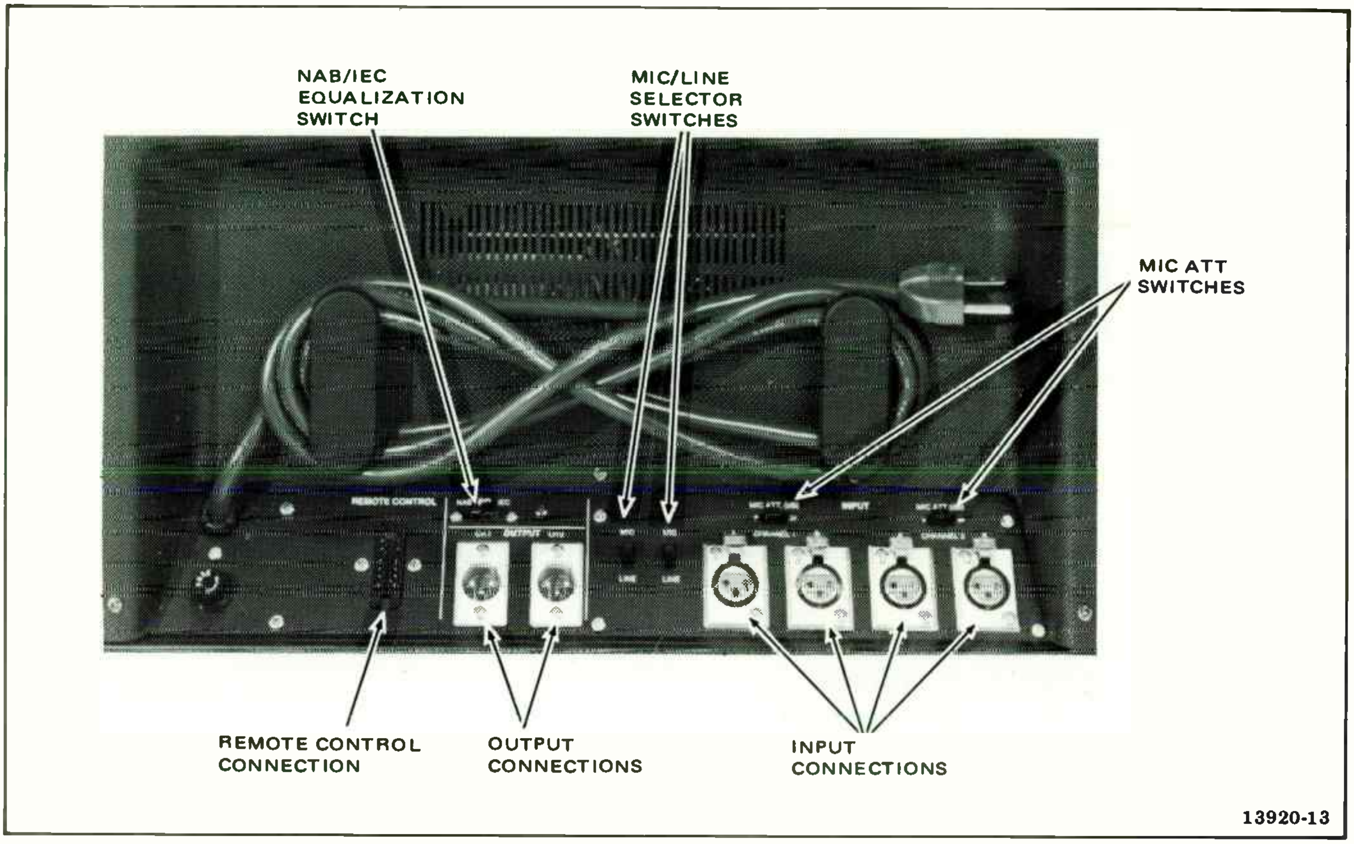


Figure 2-8. Rear Connector Panel

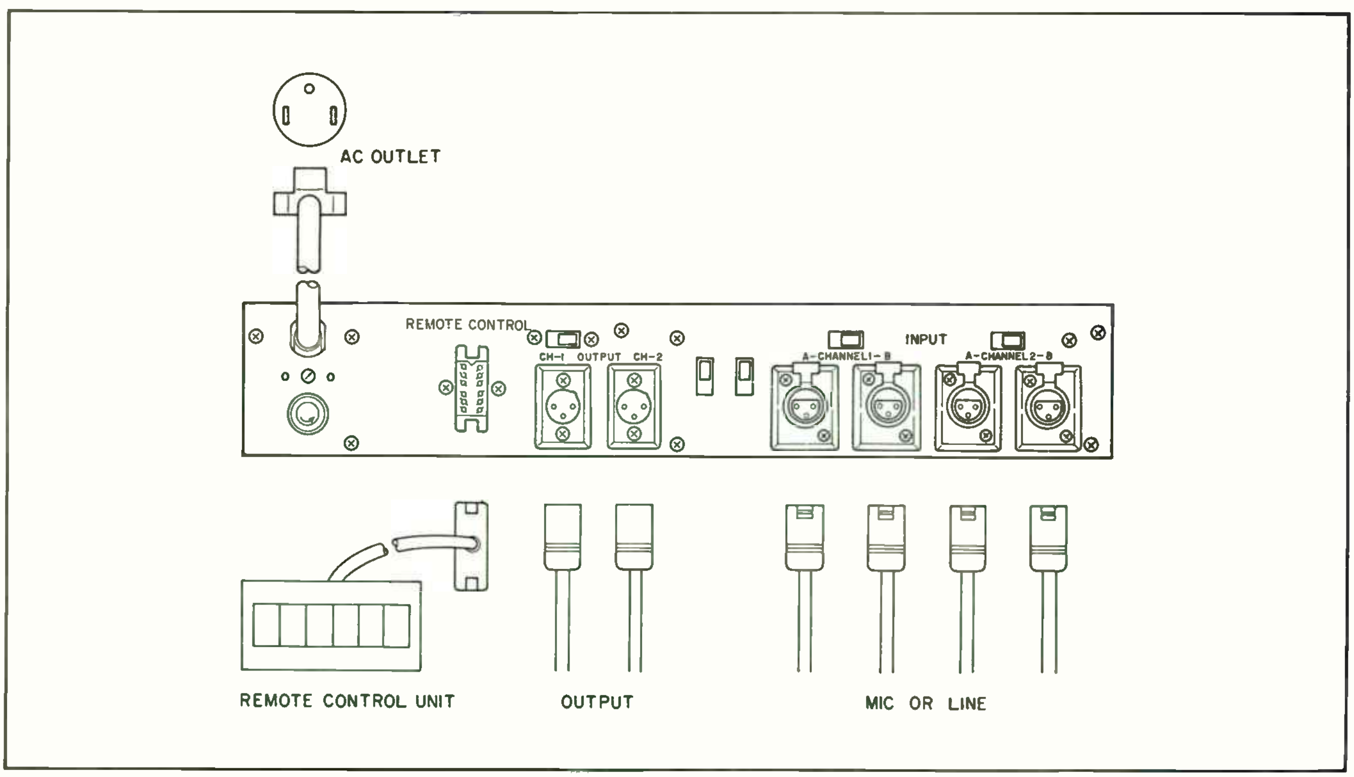


Figure 2-9. Rear Connector Panel — Initial Connections

Table 2-1. Input Connections

INPUT	MINIMUM INPUT LEVEL	INPUT IMPEDANCE	MIC/LINE SWITCH SETTING	MIC ATT SWITCH SETTING
Microphone	−70 dB*	600 Ohms balanced	MIC	0
	−50 dB	600 Ohms balanced	MIC	20 dB
Line	−10 dB*	100K unbalanced	LINE	N/A
*0 dB = 0.775V				

2-9. OPTIONAL MODIFICATION FOR LINE OUTPUT METERING

The ATR-700 is wired for record level metering. To modify the machine so that the vu meters monitor line output level, perform the following steps.

1. Refer to paragraph 5-9 and remove rear center and bottom panels and swing out rear connector panel to gain access to PWA connectors.
2. Use labels on bottom of the machine and/or Figure 5-20 to locate METER/STB and OUT PHONE PWAs. (As viewed from the rear of the machine, these boards are the third from the right and the sixth from the right, respectively.)
3. Disconnect the blue wire from pin 2 of the METER/STB PWA connector.
4. Disconnect the white/blue wire from pin 13 of the METER/STB PWA connector.
5. Insulate the ends of the blue and white/blue wires.
6. Fold the wires back into their own harness and secure in place with tie-wraps or lacing cord.
7. Connect a length of yellow wire (AWG No. 22) from pin 13 of the METER/STB PWA connector to pin 13 of the OUT PHONE PWA connector.
8. Connect a length of orange wire (AWG No. 22) from pin 2 of the METER/STB PWA connector to pin 2 of the OUT PHONE PWA connector.
9. Route the orange and yellow wires and secure them to the harness in the machine.
10. Replace panels removed in step 1.

SECTION 3

OPERATION

This section of the manual provides locations and functions of ATR-700 controls and indicators, pre-operational procedures, and operating procedures for the various modes of operation.

3-1. CONTROLS AND INDICATORS

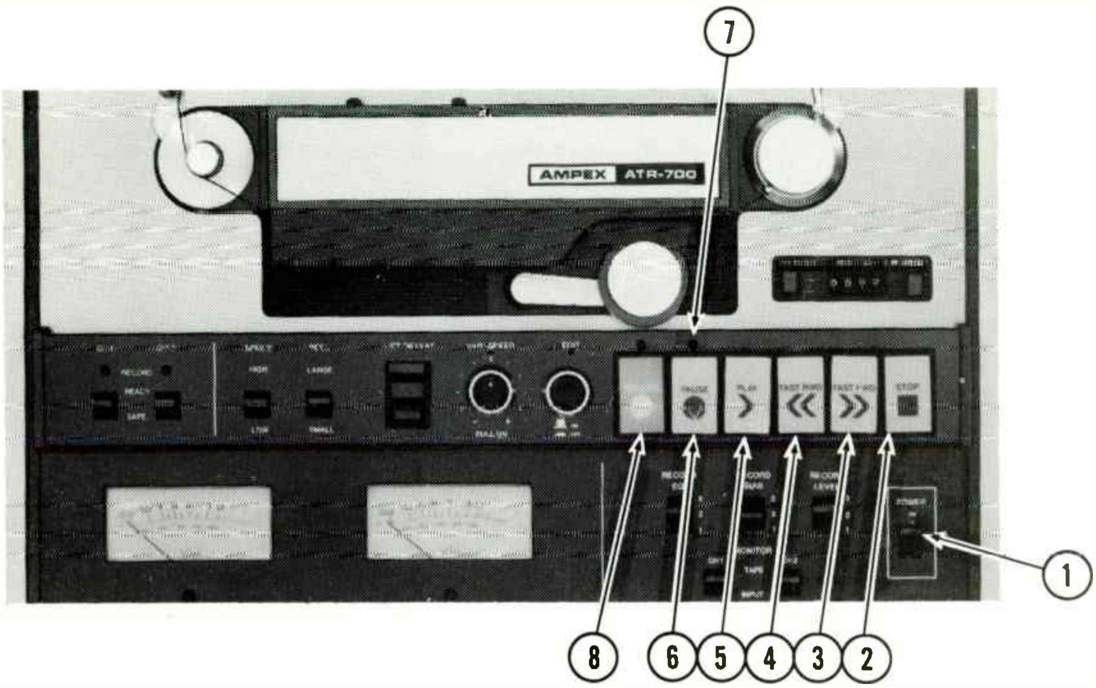
Locations and functions of the controls and indicators are given in Tables 3-1 through 3-3. Table 3-1 lists the controls used in basic operation. Table 3-2 lists controls used for regulating input and output levels. Table 3-3 describes the tape counter controls and those on the head housing. Controls on the head housing may or may not be operational, depending on the configuration of the ATR-700.

Table 3-1. Operating Controls

T3

NUMBER	NAME	FUNCTION
1	POWER ON toggle switch	Used to switch on power to the unit. When switched on, the vu meters light and the capstan motor

Table 3-1. Operating Controls (Continued)



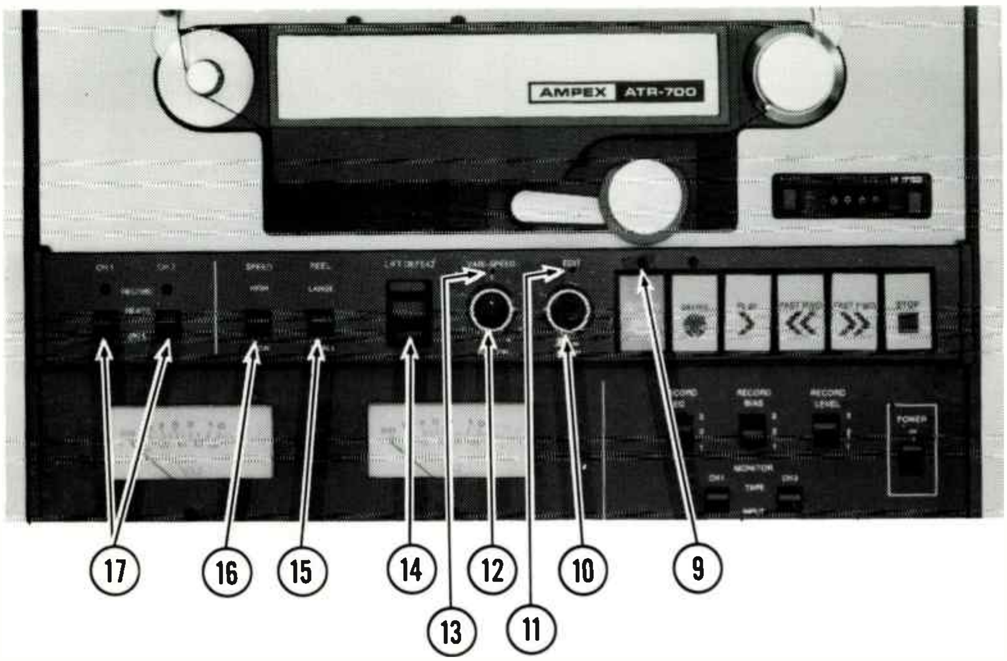
T3

NUMBER	NAME	FUNCTION
1 (Continued)		begins turning. When initially switched on, the Pause lamp (item 7) flashes on and off to indicate unit is in standby mode; unit will not operate until Pause lamp stops flashing.
2	STOP pushbutton	Used to stop any mode that is in operation.
3	FAST FWD pushbutton	Used to select fast forward mode. Tape moves at high speed from left to right.
4	FAST RWD pushbutton	Used to select fast rewind mode. Tape moves at high speed from right to left. During this mode, if the MEMORY switch (Table 3-3, item 5) is ON, the stop will be actuated when the digital counter passes 00 00. This makes it possible to return to the beginning of a section of tape selected by resetting the digital counter.
5	PLAY pushbutton	Used to select play mode. Tape moves from left to right at the speed selected by the SPEED selector switch (item 16). Used with RECORD button to enable record mode.

Table 3-1. Operating Controls (Continued)

NUMBER	NAME	FUNCTION
5 (Continued)		When pressed during fast forward or rewind operation, the motion sensing circuitry will be activated. The Pause lamp will flash until the tape comes to a complete stop; then, after approximately one second, the play mode will begin.
6	PAUSE pushbutton	Pressing the PAUSE button causes three things to happen: the pinch roller moves closer to the capstan than in stop mode; the tape lifters retract; and the red Pause indicator lamp lights. *Serial numbers 8200 and below:* Pressing the PAUSE button during record or play mode puts the recorder into a standby mode. To resume record mode, press RECORD and PLAY buttons simultaneously. To resume play mode, press PLAY button. *Serial numbers higher than 8200:* The pause mode is entered by pressing the PAUSE button, and exited by pressing either the PAUSE button or the STOP button. Pause mode can be entered only from record, play, or stop mode and, when pause mode is exited, the recorder returns to the mode last selected. The purpose of the PAUSE button is to allow 1) stopping and starting tape motion in record mode without switching the bias off and on; 2) quicker starts in play mode; and 3) cueing, since the tape lifters are retracted and the mute is released when the recorder is in pause mode.
7	Pause Indicator lamp	Flashes when unit is first turned on or when motion sensing circuitry is activated. Unit will not operate until lamp stops flashing. Lights to indicate unit is in a standby mode (PAUSE button has been pressed). Indicator goes out when another mode is entered.
8	RECORD pushbutton	Press simultaneously with PLAY pushbutton to initiate record mode. To begin recording, at least one channel's READY/SAFE switch (item 15) must be in the READY position and, on two-or quarter-track models, the SYNC/REPRO switch (Table 3-3, item 1) must be in the REPRO position. An insert is possible by keeping the PLAY button depressed, then pressing RECORD button at exact spot insert is desired.

Table 3-1. Operating Controls (Continued)

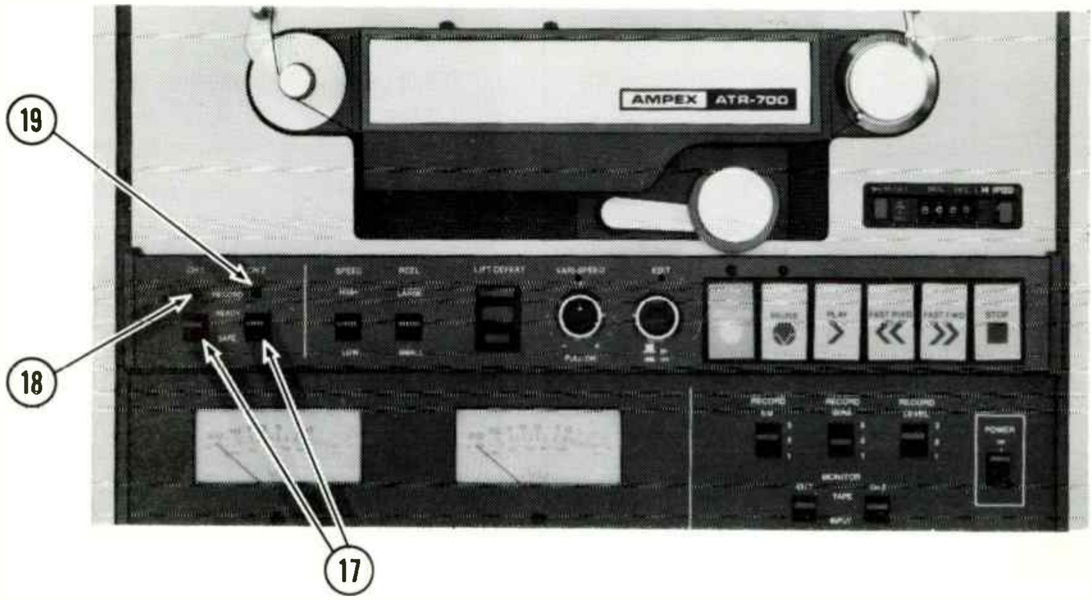


NUMBER	NAME	FUNCTION
9	RECORD Indicator lamp	Lights when unit is in record mode.
10	EDIT ON/OFF pushbutton	Used for editing purposes. Normal position is OFF (depressed) position. Release to activate edit function (ON). When EDIT button is ON, the pinch roller moves close to the capstan, the tape lifters are retracted allowing the tape to contact the heads, and the takeup (right) reel motor is disabled. Reproduce muting is disabled to allow manual cueing by turning the reels manually. When PLAY button is pressed, the pinch roller will be engaged and the transport will begin driving tape. The tape signal can be monitored as the tape passes over the reproduce head. Since the takeup reel motor is deactivated, the tape will be "dumped" as it passes the pinch roller and capstan until the EDIT button is depressed. To stop dumping, press STOP or EDIT button. Press STOP to release the pinch roller and stop the tape; then press PLAY to continue editing. Pressing the EDIT button to OFF causes the shut-off arm to automatically shut off power to the transport until the tape is reloaded or the shut-off arm is held toward the right

Table 3-1. Operating Controls (Continued)

NUMBER	NAME	FUNCTION
10 (Continued)		(outer) side of the transport. The shut-off arm will *not* shut off the transport while the EDIT button is raised (ON). NOTE **If the EDIT button is ON, fast forward and rewind modes will not operate. Never release the EDIT button to ON during fast forward or rewind modes.**
11	Edit Indicator lamp	Lights to indicate unit is in edit mode.
12	VARI-SPEED control	Used to vary the speed of the capstan motor ±5%. Pull the knob out (PULL ON) and turn it to the left (–) to lower the motor speed and pitch of the reproduced signal, or to the right (+) to increase the motor speed and pitch. This feature can be used to compensate for tonal variations or to produce creative effects. For normal record and reproduce operation, be sure to keep this knob depressed.
13	Vari-Speed Indicator Lamp	Lights when VARI-SPEED knob is pulled out.
14	LIFT DEFEAT lever	Push up to retract tape lifter on the right side of the heads to allow the tape to contact the reproduce head during fast forward or rewind operation for monitoring the signal on the tape.
15	REEL Hub LARGE/SMALL selector switch	Set to LARGE for large hub reels and to SMALL for small hub reels to ensure the proper tape tension and motor torque for the hub size of the reel being used.
16	SPEED HIGH/LOW selector switch	Allows selection of one or two tape speeds during record and reproduce modes. On high-speed models of the ATR-700, the choice is between 15 in/s (HIGH) and 7-1/2 in/s (LOW). On low-speed models, the choice is between 7-1/2 in/s (HIGH) and 3-3/4 in/s (LOW). During reproduce operation, the speed selected should normally match the speed at which the tape was recorded. During record operation, the operator may choose the lower speed for economy or the higher speed for better frequency response.
17	CH 1 and CH 2 RECORD READY/SAFE switches	When set to the READY position, enables recording on the selected channel(s) if the following two conditions are met. 1. SYNC/REPRO switch(es) (in two or quarter track models) for the respective channel(s) are in REPRO position.

Table 3-1. Operating Controls (Continued)



T3

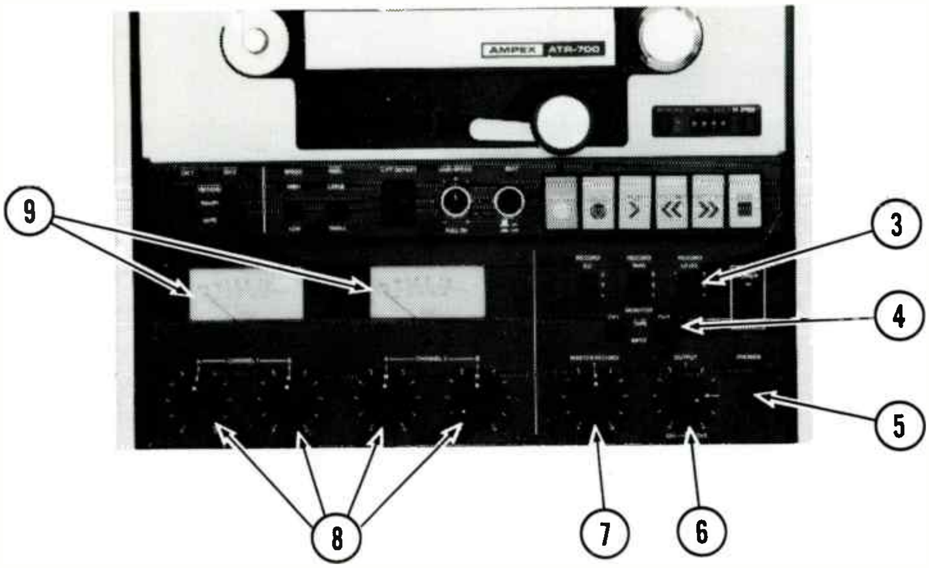
NUMBER	NAME	FUNCTION
17 (Continued)		2. RECORD and PLAY buttons are pressed simultaneously. When set to SAFE, prohibits recording on that channel. To prevent accidental recording or erasure, keep switches in SAFE position until ready to record. CAUTION DO NOT CHANGE POSITIONS OF THESE SWITCHES WHILE RECORDING OR THE HEADS WILL BECOME MAGNETIZED.
18	CH 1 RECORD Indicator lamp	Lights to indicate record mode is in effect on channel 1.
19	CH 2 RECORD Indicator lamp	Lights to indicate record mode is in effect on channel 2.

Table 3-2. Input and Output Controls

T3

NUMBER	NAME	FUNCTION
1	RECORD EQualization selector switch	Three-position switch used to match record equalization to type of tape being used in order to get optimum flat frequency response, wide dynamic range, and best signal-to-noise ratio. See chart below for proper switch setting for representative tapes.
2	RECORD BIAS selector switch	Three-position switch used to match bias signal to type of tape being used. The bias signal on the ATR-700 is a high-frequency ac signal that is recorded together with the input signal. The amount of bias signal affects the signal-to-noise ratio, distortion, and frequency response of the tape and the recorder. See chart below for proper switch setting for representative tapes.
3	RECORD LEVEL selector switch	Three-position switch that selects level of attenuation of the signal (either input or tape) fed to the vu meters, LINE OUT jacks, and headphones. This allows monitoring of high-level record signals during recording, and high-level signals off the tape during reproduce mode. The record level setting directly affects the amount of discernible hiss noise and the amount of distortion on the tapes. If the recording level is set too low, hiss will

Table 3-2. Input and Output Controls (Continued)



T3

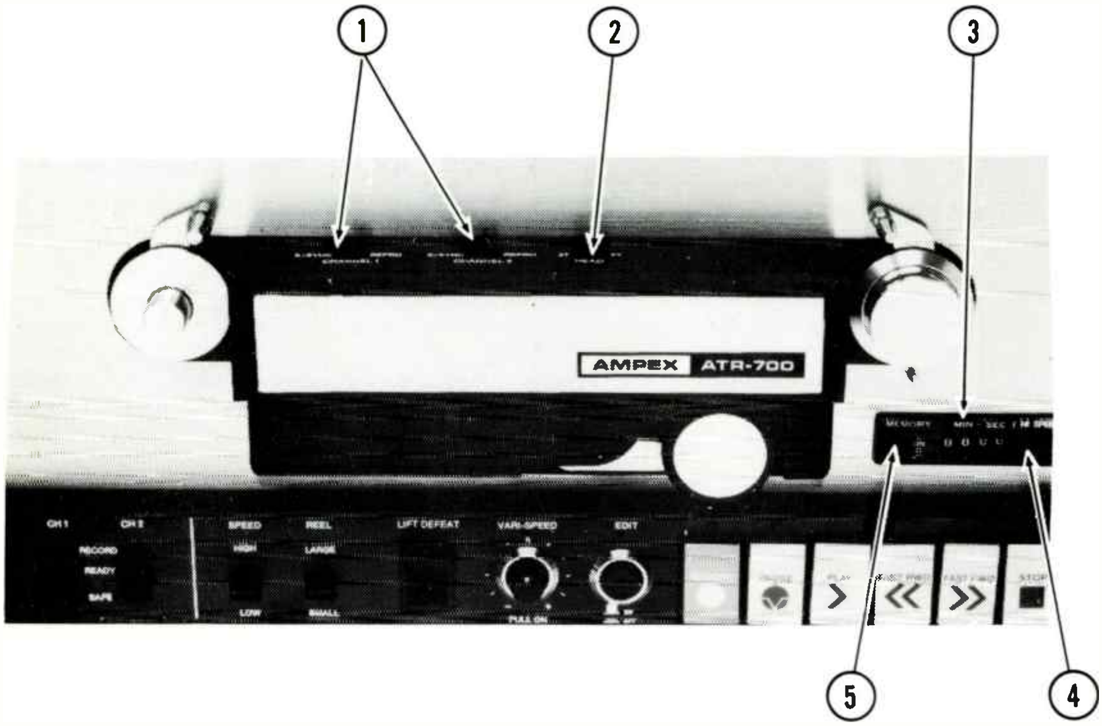
NUMBER	NAME	FUNCTION
3 (Continued)		become noticeable. If the recording level is too high, the recording will be distorted. When reproducing a tape, set to level that tape was recorded at, if known. The chart below indicates the proper record reference level for different tapes when the signal is recorded at 0 vu on the vu meter. Thus, position 1 setting gives a 0-vu reference reading for standard 185 nWb/m level; position 2 gives a 0-vu reading for 260 nWb/m level (+3 dB); position 3 gives a 0-vu reading for 370 nWb/m level (+6 dB).

Tape	RECORD EQ Switch Setting	RECORD BIAS Switch Setting	RECORD LEVEL Switch Setting	Reference Level (0 VU)
Ampex 456	1	2	3	370 nWb/m (+6 dB)
Ampex 406	2	2	2	260 nWb/m (+3 dB)
Ampex 631, 641, 651	1	1	1	185 nWb/m (0 dB)
3M No. 250	3	3	3	370 nWb/m (+6 dB)

Table 3-2. Input and Output Controls (Continued)

NUMBER	NAME	FUNCTION
4	CH 1 and CH 2 MONITOR TAPE/INPUT selector switches	Used to determine which signal, input or tape, is fed to vu meters, output jacks, and headphone jack. Set to INPUT for initial record level setting prior to recording. During recording, switching back and forth between INPUT and TAPE allows A/B comparison of input signal vs off-the-tape signal. Set to TAPE position during reproduce operation.
5	PHONES jack	Used to connect stereo headphones. Designed for 10K ohms minimum load, unbalanced standard 3-conductor stereo headphone plug. When using headphones, control output volume with OUTPUT level control (item 6) and RECORD LEVEL selector switch (item 3).
6	CH 1/CH 2 OUTPUT level control	Dual-concentric control that allows individual or simultaneous adjustment of both output channels. Individual adjustment is accomplished by turning one knob while holding the other. Control has a Memory Marker Guide Ring for preset reference and a separate "snap-stop" at the 3 o'clock (preset) point for channel 1. The controls must be at the preset point for proper calibration (+4 dBm at 0 vu).
7	MASTER RECORD level knob	Allows single-knob control of all MIC and LINE inputs. Knob has Memory Marker Guide Ring with "snap-stop" at user preset reference level.
8	CHANNEL 1 A/B and CHANNEL 2 A/B Record input level controls	Four knobs, two for each channel, that allow individual control of all MIC and LINE inputs. Memory Guide Rings with "snap-stop" allow accurate return to user preset reference levels. For mixing, use with MIC/LINE selector switches on rear connector panel (Figure 2-9) to balance inputs, and MASTER RECORD level control (item 7) to control recording level of all channels.
9	VU meters	Indicate input and tape signal levels for associated channel. Whether measured signal is TAPE or INPUT is determined by setting of MONITOR switch (item 4). For full-track operation, only the left vu meter is used.

Table 3-3. Head Housing and Tape Counter Controls



T5

NUMBER	NAME	FUNCTION
1	CHANNEL 1 and CHANNEL 2 SYNC/REPRO (Synchronous Reproduce) switches	Included only in two-track and quarter-track models. Put in REPRO position for normal two-track or quarter-track recording. However, since reproduce heads are "downstream" from record heads, there is a delay between the time that the signal is recorded and the time that it is reproduced. This delay, dependent on spacing between the heads and the tape speed, is as follows: 15-in/s speed — 0.1 second 7-1/2 in/s speed — 0.2 second 3-3/4-in/s speed — 0.4 second In SYNC position, the record head of the selected channel is used as a reproduce monitor head. This allows monitoring the signal on the tape on one channel while recording on the other channel to get perfect synchronization between channels. NOTE **The record and reproduce heads are designed for optimum operation for their specific functions. Therefore, when the record head is used for monitoring**

Table 3-3. Head Housing and Tape Counter Controls (Continued)

NUMBER	NAME	FUNCTION
1 (Continued)		**in synchronous reproduce operation, the reproduced signal will not have the quality of the actual recorded signal. Use SYNC position for monitoring to obtain synchonization of signals. Use REPRO position for evaluation of the quality of the recorded signal.** When one channel is in SYNC position, recording on that channel is inhibited. When both switches are in SYNC position and RECORD and PLAY buttons are pressed, the record indicators will *not* light but the unit will enter reproduce mode.
2	HEAD 2T/4T selector switch	Used *only* on models where optional fourth head has been installed. Used to select fourth head 2T (two track) or 4T (quarter track).
3	Digital Counter	Gives elapsed time indication in minutes and seconds during record or reproduce mode up to a maximum of 99 MIN and 59 SEC. When SPEED select switch is set to HIGH, read time directly on digital counter display. When SPEED switch is set to LOW, multiply indicated minutes and seconds by two to find actual elapsed time.
4	Counter Reset button	Depress to reset digital counter to 00 00 to use any point on the tape as a starting location for time reference.
5	Rewind Stop MEMORY switch	Depress prior to entering rewind mode to automatically stop the tape when the digital counter passes 00 00. This makes it possible to return to the beginning of a section of tape, selected by resetting the digital counter. NOTE **When using 10-1/2-inch reels, the inertia of the larger reels may carry the tape slightly past the 00 00 point on the digital counter.**

3-2. PRE-OPERATING PROCEDURES

Before proceeding to operate the ATR-700, verify that the following conditions have been met:

1. The voltage and frequency of the power source match the requirements of the unit. If not, refer to *AC Voltage and Frequency Conversion,* paragraph 2-4.

2. Refer to *Verification of Connections,* paragraph 2-8, and confirm that all input and output signals are properly connected.

3. Be sure that both reels to be used (supply and takeup) are the same size and made of the same material.

If these conditions are satisfied, proceed with reel installation for appropriate size reels.

3-3. Reel Installation

3-4. Small Hub Reels. When using reels with small hubs, install the reels as follows:

1. Rotate the outer section of the reel-table spindle (see Figure 3-1) fully counterclockwise until the three driving keys in the center section line up with the three driving keys in the inner section.

2. Place the full reel of tape on the supply (left) reel table by matching the center hole of the reel over the spindle and pushing the reel against the reel table.

3. Secure the reel to the spindle by turning the outer section of the spindle clockwise until the three holding keys in the center section press firmly against the surface of the reel hub between the slots around the center hole.

4. Repeat this procedure for the takeup reel (empty right reel).

5. Be sure that both reels are firmly mounted before threading and driving tape.

6. Set the REEL hub size selector switch (Table 3-1) to SMALL.

3-5. Large Hub Reels. Before installing large hub (NAB) reels on the ATR-700, the reel holddown knobs (supplied) must be mounted on the reel spindles. When plastic reels are to be used, refer first to the *Holddown Knob Spacer Removal* procedure, paragraph 3-6. When metal reels are to be used, proceed as follows:

1. Line up driving keys in reel-table spindles as in step 1 in paragraph 3-4. Then mount the reel holddown knobs on the reel spindles by lining up the driving keys in the spindles with the notches in the center of the holddown knobs.

2. Secure holddown knob by turning spindle shaft fully clockwise until holding keys press firmly against the holddown knob.

3. Turn the outer section of the holddown knob fully counterclockwise to line up the three detents in the inner section with the three detents in the outer section (see Figure 3-2).

4. Line up the three notches in the center of the (full) supply reel with the three detents in the holddown knob on the supply reel table.

5. Push the reel against the reel table and turn the outer section of the holddown knob fully clockwise until the three detents in the outer section of the knob press firmly against the surface of the reel.

6. Repeat this procedure for the (empty) takeup reel.

7. Before starting tape movement, confirm that the reels are firmly secured to the reel holddown knobs and the holddown knobs are firmly secured to reel spindles.

8. Set the REEL hub size selector switch (Table 3-1) to LARGE.

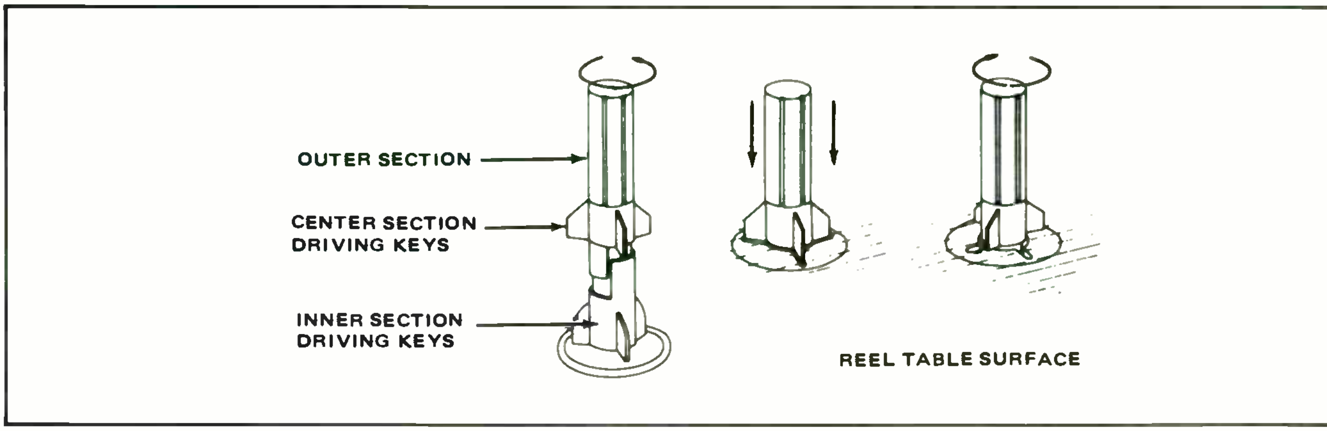


Figure 3-1. Reel Table Spindle

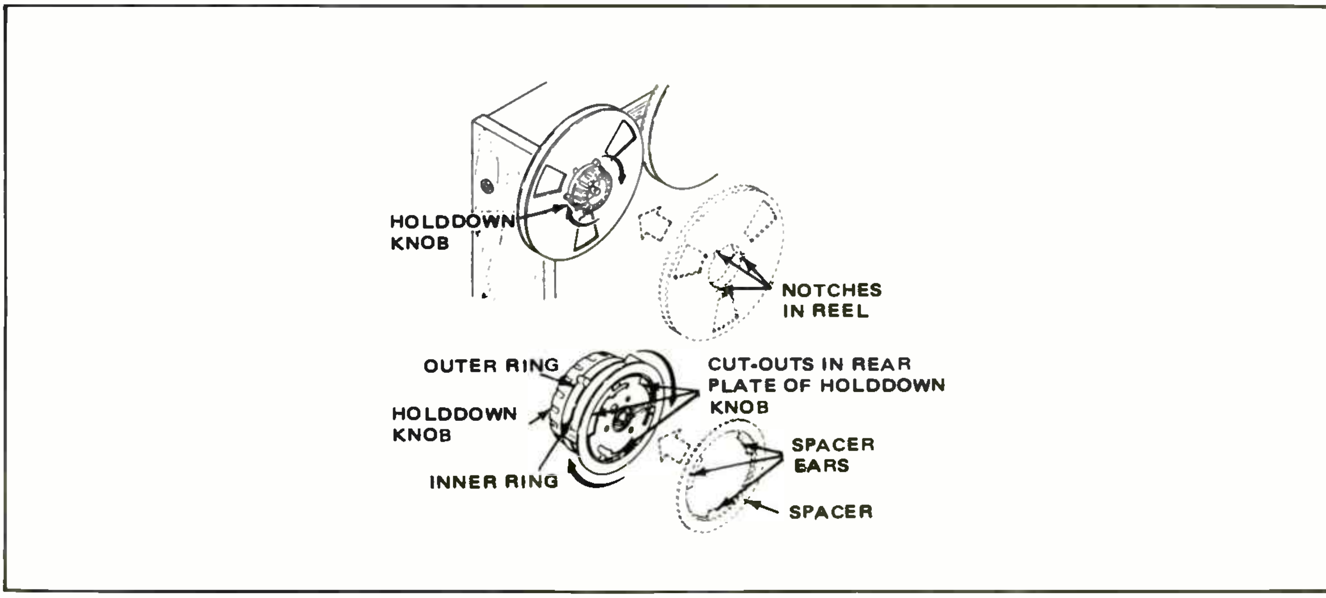


Figure 3-2. Large Hub Reel Installation

NOTE

To remove the reel from the holddown knob, turn the outer section of the knob counterclockwise and use both hands to carefully pull the reel off of the knob.

3-6. *Holddown knob Spacer Removal.* Each large hub reel holddown knob includes a special spacer, on the surface facing the reel table, that must be used when the ATR-700 is operating with NAB standard large hub metal reels. When using large hub standard plastic reels, this spacer must be removed before mounting the holddown knob on the machine.

Refer to Figure 3-2 and remove the spacer as follows:

1. Hold the spacer by the outside edge and turn the holddown knob until the ears of the spacer match the cutouts at the back side of the knob.

2. Lift spacer off of the knob.

3. Store the spacer in a safe place for future use with metal reels. Then follow the procedure for installing large hub reels.

3-7. Threading the Tape

1. Place a full reel of tape on the supply (left) reel table and an empty reel on the takeup (right) reel table. Secure the reels as explained above under appropriate *Reel Installation* procedure.

2. Refer to Figure 3-3 and carefully unwind approximately 30 inches of tape from the supply reel and thread it in the following sequence: around the inside of the left tension arm; under the impedance roller; under the head housing; between the pinch roller and the capstan shaft; under the drive roller (between the roller and the lower guide section of the shut-off arm); left around the top section of the shut-off arm; and around the right side of the takeup reel.

3. Secure the end of the tape to the takeup reel by holding the tape end in the reel slot while rotating the reel counterclockwise several turns. Continue rotating takeup reel until tape is no longer loose. Correct tape tension for operation will pull both (left and right) tension arms slightly to the outside.

3-8. OPERATING PROCEDURES

For normal recording and reproducing, Table 3-4 may be used as a quick reference for proper switch settings. These settings are also included in the procedures below.

3-9. Recording

1. Turn POWER switch to ON (see Table 3-1).

2. Load and thread a blank tape as described in paragraph 3-7.

3. Verify that REEL hub size selector switch is set to SMALL for small size hubs or LARGE for large hubs.

4. Set SPEED selector switch to desired tape speed. On high-speed models, HIGH is 15 in/s and LOW is 7-1/2 in/s. On low-speed models, HIGH is 7-1/2 in/s and LOW is 3-3/4 in/s.

5. Set the Digital Counter to 00 00 by pressing the Counter Reset button (Table 3-3).

6. Confirm that EDIT pushbutton is in the off (depressed) position.

7. Confirm that VARI-SPEED control is in the off (depressed) position.

8. For two-channel recording, set both RECORD READY/SAFE switches to READY. For one-channel recording, set only the READY/SAFE switch of the channel to be recorded to READY.

9. Set the RECORD EQ, RECORD BIAS, and RECORD LEVEL switches to appropriate positions for kind of tape being used (see chart in Table 3-2).

10. Set the EQualization switch on the rear panel (Figure 2-9) to match NAB or IEC equalization curve, as necessary.

11. If using two channels, set both MONITOR switches to INPUT. If using one channel, set the MONITOR switch of channel 1 to INPUT.

12. On two- and quarter-track machines, set the synchronous reproduce switches on top of the head housing to the REPRO position (Table 3-3).

13. On rear connector panel, connect input signal(s) to the desired channel(s).

14. Set the MIC/LINE switch on the rear panel to match the input source.

15. Set the MASTER RECORD level knob to approximately the 2 o'clock position (Table 3-2).

16. Set the CHANNEL 1 A/B and CHANNEL 2 A/B recording level controls (Table 3-2) for 0 vu recording level.

17. Set the CH 1/CH 2 OUTPUT level control to the "click" (preset) position.

18. To monitor input signal, plug in headphones (not supplied) to the PHONES jack.

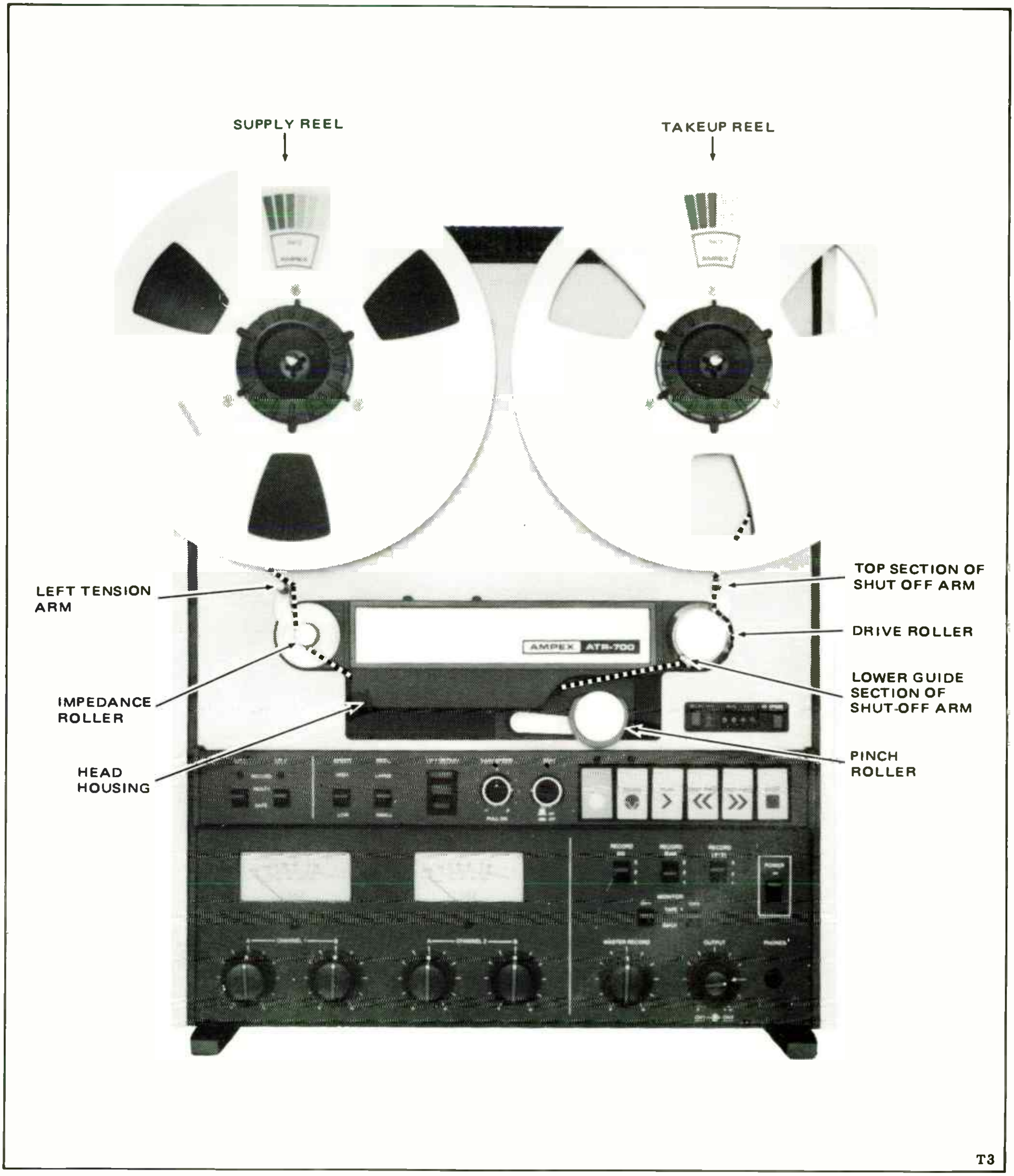


Figure 3-3. Tape Threading Path

Table 3-4. Switch Settings for Normal Record and Reproduce Operation

SWITCH/CONTROL	REFERENCE	NORMAL RECORD	NORMAL REPRODUCE
POWER	Table 3-1	ON	ON
SPEED selector	Table 3-1	As desired On high-speed models: HIGH = 15 in/s, LOW = 7-1/2 in/s On low-speed models: HIGH = 7-1/2 in/s, LOW = 3-3/4 in/s	To speed tape was re-corded at
REEL hub size selector	Table 3-1	To match reel hub size used Large hub reels – LARGE Small hub reels – SMALL	To match reel hub used Large hub – LARGE Small hub – SMALL
EDIT	Table 3-1	OFF (depressed)	OFF (depressed)
VARI-SPEED	Table 3-1	OFF (depressed)	OFF (depressed)
RECORD READY/SAFE (for appropriate channel)	Table 3-1	READY	SAFE
MONITOR (for appropriate channel)	Table 3-1	INPUT	TAPE
RECORD LEVEL	Table 3-2	According to kind of tape used (see chart, Table 3-2)	To match level recorded at, if known
RECORD BIAS	Table 3-2	According to kind of tape used (see chart, Table 3-2)	Not applicable
RECORD EQualization	Table 3-2	According to kind of tape used (see chart, Table 3-2)	Not applicable
MIC/LINE	Figure 2-9	To match input	Not applicable
NAB/IEC Equalization	Figure 2-9	To match desired curve	To match previous recording
SYNC/REPRO if operative (for appropriate channel)	Table 3-3	REPRO	REPRO
MIC ATT	Figure 2-9	0 dB unless mic input level is too high	Not applicable
OUTPUT level control (for appropriate channel)	Table 3-2	Click position (preset)	Click position (preset)

Table 3-4. Switch Settings for Normal Record and Reproduce Operation (Continued)

SWITCH/CONTROL	REFERENCE	NORMAL RECORD	NORMAL REPRODUCE
MASTER RECORD knob	Table 3-2	2 o'clock position	0 (minimum)
Record input level controls (CHANNEL 1 A/B and CHANNEL 2 A/B)	Table 3-2	For 0 vu level indication on peaks in program amplitude	0 (minimum)

19. Start recording by simultaneously pressing the RECORD and PLAY buttons. Record indicator above RECORD button and record indicator lamp(s) for appropriate channel(s) will light to indicate recording is in process.

20. To compare the off-the-tape signal to the input signal, change MONITOR switch(es) to the TAPE position.

21. When recording is complete, press the STOP button to stop the tape and release record mode.

3-10. Synchronous Reproduce Recording. Two-channel versions of the ATR-700 feature two synchronous reproduce (SYNC/REPRO) switches, located on the top of the head housing (see Table 3-3). These switches enable the user to change the record head of either channel into a reproduce head for monitoring a recorded track to use as a sync reference while recording a new track. This allows recording the new track in perfect synchronization with the monitored track. Follow the procedure below to record new input on channel 2 in synchronization with that previously recorded on channel 1. (Reverse channel 1 and channel 2 settings if channel 2 was the previously recorded channel.)

1. Thread the pre-recorded tape on the machine.

2. Set the SYNC/REPRO switch for channel 1 to SYNC.

3. Set the SYNC/REPRO switch for channel 2 REPRO.

4. Set the CH 1 MONITOR switch to TAPE and the CH 2 MONITOR switch to INPUT.

5. Set the CH 1 RECORD READY/SAFE switch to SAFE and the CH 2 RECORD READY/SAFE switch to READY.

6. Follow the basic recording procedure given in paragraph 3-9. In this case, the record indicators will indicate that channel 2 is being recorded.

3-11. MIC Recording. Up to four microphone inputs can be connected to the ATR-700 at one time for recording. Proceed as follows to record from the microphone inputs:

1. Connect microphone(s) to connectors on the rear connector panel (Figure 2-9).

2. Set the appropriate MIC/LINE selector switch(es) to MIC. If microphones are connected to an A and a B input, both switches must be in the MIC position. If microphones are connected only to A inputs, only the A switch must be in the MIC position; if microphones are connected only to B inputs, only the B switch must be in the MIC position.

3. Set the MASTER RECORD control to the 2 o'clock position (approximately).

4. Adjust the input level controls for the desired recording level. If the input is too high, set the MIC ATT switch(es) on the rear panel (Figure 2-9) to the 20-dB position. Note

that each MIC ATT switch controls both microphones on one channel.

5. Follow the normal recording procedure given in paragraph 3-9.

3-12. MIC-LINE Mixing. Microphone and line input mixing on the ATR-700 can be done on one channel, using one MIC and one LINE input, or on both channels, using two MIC and two LINE inputs. Proceed as follows:

1. Connect the desired inputs on the rear connector panel. For two inputs, connect MIC and LINE inputs to the same channel. For four inputs, connect one MIC and one LINE to each channel. Be sure that both MIC inputs are connected to the same source (A or B).
2. Set MIC/LINE selector switches appropriately; i.e., if both MIC inputs are connected to the A source, set the A switch to MIC and the B switch to LINE.
3. Adjust the input level controls for the desired recording level and balance between channels.
4. Follow the normal recording procedure.

3-13. LINE-LINE Mixing. The purpose of LINE-LINE mixing is to mix down four inputs to two channels or two inputs to one channel, or to mix to add special effects. Proceed as follows:

1. Connect the inputs, two or four, to the rear connector panel.
2. Set both MIC/LINE selector switches (A and B) on the rear panel to LINE.
3. Use the input level controls and the MASTER RECORD level knob to balance the input and set the record levels.
4. Follow the normal recording procedure.

3-14. Reproducing

Use the following procedure to play back a prerecorded tape. Refer to Tables 3-1 and 3-2 if necessary, for locations of controls. Table 3-4 provides a quick reference for proper switch settings.

1. Turn POWER switch to ON position.
2. Thread the prerecorded tape as explained in paragraph 3-7.
3. Verify that the REEL size selector switch is set to SMALL for small hub reels, or LARGE for large hub reels.
4. Set the SPEED selector switch to match the speed at which the tape was recorded. On high-speed models, HIGH is 15 in/s and LOW is 7-1/2 in/s. On low-speed models, HIGH is 7-1/2 in/s and LOW is 3-3/4 in/s.
5. Confirm that the EDIT pushbutton is in the off position (depressed).
6. Confirm that the VARI-SPEED control is in the off position (depressed).
7. Set both RECORD READY/SAFE switches to SAFE.
8. Set both MONITOR switches to TAPE.
9. Set the RECORD LEVEL switch to the position used during recording, if known. The chart in Table 3-2, indicating proper setting for recording on various tapes, may be helpful.
10. Set the MASTER RECORD level knob and the input controls (CHANNEL 1 A/B and CHANNEL 2 A/B) to 0 (minimum).
11. Set the OUTPUT control to the click (preset) position.
12. Depress the PLAY button to begin reproduce mode.
13. Connect headphones to the PHONES jack to monitor output signal.
14. Depress STOP button to stop the tape.

3-15. Editing

Editing in general refers to the process used to change a recorded tape by cutting out unwanted sections, inserting new sections, or rearranging sections of the tape. The process includes "cueing" and "splicing". Cueing means locating a section or spot on the tape by listening to the sound on the tape until the beginning (or end) of the section to be edited is reached. High-speed cueing is done by pushing up on the LIFT DEFEAT lever (Table 3-1), which retracts the right tape lifter and causes the tape to contact the reproduce head during fast forward or rewind mode. Manual cueing is done by turning the tape reels by hand to move the tape across the reproduce head. (Note: For manual cueing, the unit must be in either pause or edit mode so that tape lifters are retracted and muting is disabled.) The ATR-700 edit function also makes it possible to monitor the tape as it is being pulled across the reproduce head at normal speed in the reproduce mode before being "dumped."

The cutting and joining of sections of tape is called splicing. The tools needed for splicing are:

- a pair of non-magnetic or demagnetized scissors or a special cutting block
- a non-solvent type of marking pencil
- a roll of splicing tape for joining the ends of the tape

The following procedure is just one of many possible tape editing procedures that can be accomplished on the ATR-700.

1. Load the prerecorded tape to be edited on the machine.

CAUTION

PRIOR TO HIGH-SPEED CUEING, BE SURE TO REDUCE THE VOLUME LEVEL TO PREVENT AN EXCESSIVELY LOUD SIGNAL FROM OVERDRIVING THE AMPLIFIER OR INTERNAL CIRCUITRY.

2. With the MONITOR switches at the TAPE position, select fast forward (FAST FWD) mode and push up on the LIFT DEFEAT lever to make it possible to listen to the tape sound.

NOTE

High-speed cueing can also be done in fast rewind (FAST RWD) mode.

3. Continue monitoring the tape (using headphones) and locate the section to be edited. Then press the STOP button. The tape will stop with the desired section close to the reproduce head.
4. Release the EDIT button to the ON position. This causes the tape lifters to retract, the pinch roller to move close to (but not touching) the capstan shaft, and the takeup (right) reel motor to be disabled, and the red LED over the EDIT button to light.
5. While monitoring the tape, rotate the reels by hand in either direction to cause the tape to move back and forth across the reproduce head until the exact location on the tape is heard. The monitored sound will come from the tape that is directly under the reproduce head gap.
6. Use the marking pencil to mark this spot on the tape.
7. Turn both tape reels by hand counterclockwise until the marked spot on the tape is just to the right of the capstan shaft and pinch roller.
8. Use the demagnetized scissors to cut the tape at the marked point.
9. Depress the PLAY button. The pinch roller will move against the capstan shaft and the tape will be pulled forward. Since the takeup reel motor is disabled, the tape will "dump" until the EDIT button is depressed.
10. Listen to the tape to determine when the last of the unwanted section of tape passes the reproduce head. Again mark the spot with the marking pencil. Then depress the EDIT button to OFF and cut the tape at the marked point.

11. Use the splicing tape to splice the two cut ends of the tape together.

12. Repeat the entire procedure as many times as necessary. The cut-out sections of tape can be discarded or inserted in another location or in another tape, as desired.

3-16. Erasing

Recording with no input signal in effect erases the tape. However, when it is desired to erase a complete tape, a bulk eraser should be used as it will normally do a more thorough erasure. To erase segments of a tape, or to erase one channel of a two-channel recording, proceed as follows:

1. Load the tape to be erased onto the machine and cue to the spot where erasure should begin.

2. Set the MASTER RECORD level knob to 0 (minimum).

3. Set the recording level control(s) for the channel(s) to be erased (CHANNEL 1 A/B and/or CHANNEL 2 A/B) to 0.

4. Set the RECORD READY/SAFE switch(es) for the channel(s) to be erased to the READY position.

5. Set the synchronous reproduce (SYNC/REPRO) switch(es) for the channel(s) to be erased to the REPRO position.

6. Simultaneously press the RECORD and PLAY buttons.

7. When the segment to be erased is completed, press the STOP button.

SECTION 4
THEORY OF OPERATION

This section contains theory of operation for the ATR-700 Recorder/Reproducer. The section is divided into two main subheadings: Tape Transport Theory and Signal System Theory. Partial schematics of assemblies are included with their descriptions.

4-1. TAPE TRANSPORT THEORY

4-2. Sequence of Operation for Each Mode

Figure 4-1 is a schematic of the control unit and the key switchboard. Figure 4-2 is a schematic of the power supply. Refer to these two figures in the following operational mode descriptions. Table 4-1 lists the sequence of signals generated for each mode and Figure 4-3 is a timing diagram for the various modes.

4-3. Play Mode. When the PLAY button is depressed, IC11-6, IC10-4, and IC5-13 (Figure 4-1) go high, causing several things to occur. The brake solenoids are energized, releasing the brakes; the capstan solenoids are energized to engage the pinch roller; REC MUTING and REPRO muting are released; and the reel motors have power applied to them.

The reel motors are activated as follows: When the PLAY button is depressed, the play signal turns on Q120 and Q121 (Figure 4-2) and energizes K103 and K104. Capacitor C124 operates to hold K103 energized for approximately 0.1 second, during which time 100 volts is supplied to the takeup (right) reel motor for initial startup. Then K103 de-energizes and the takeup motor operates on 57 volts, supplied through the path of K104, R181, and K103.

The supply (left) reel motor operates on 57 volts supplied through K104, R182, and K101. Takeup torque is adjusted by R181; back tension by R182.

When IC4, terminal 3 or 5, receives a low signal, the play mode is released and then reset. This reset signal is generated by any of the following modes: stop, fast forward, or fast rewind. As shown in Figure 4-1, a noise filter, such as that formed by R53 and C43, is provided for each flip-flop.

4-4. Fast Forward Mode. When the FAST FWD button is depressed, IC8-10 and IC11-6 go high. Relay K103 (Figure 4-2) is energized and, at the same time, K102 is energized for a short time. Energizing K102 opens the supply reel motor drive circuit temporarily to make back tension zero, and reduces the load on the 100-volt supply to help increase tape speed. In fast forward mode, the 100 volts is applied directly to the takeup reel motor to produce takeup torque. At the same time, R183 is bypassed. The supply reel motor provides back tension. As in play mode, the high on IC51-3 releases repro muting and energizes the brake solenoids, releasing the brakes.

When a low level input is connected to pin 10 or 9 of IC4 (Figure 4-1), the input flip-flop will be reset and the fast forward mode will be released. The reset signal for fast rewind mode is sent to pin 10 of IC4; the reset signal for play, edit, or stop modes is sent to pin 9 of IC4. When the EDIT pushbutton is released (on), the fast forward mode cannot be selected.

4-5. Fast Rewind Mode. The logic control operation of fast rewind mode is basically the same as that for fast forward mode. When the FAST RWD button is depressed, IC10-2 and IC11-6 go high, energizing the reel motors and releasing repro muting and the brake solenoids. Also the Rewind Stop unit goes into standby. For fast rewind, the left and right reel motors operate in the exact opposite manner as during fast forward mode. The high on IC10-2 energizes K101 and, at the same time, K102 is energized for a short time.

4-6. Record Mode. When the RECORD and PLAY buttons are pressed simultaneously, the resulting signals are ANDed to IC5-1 (Figure 4-1). The REC FF is set, a Record Enable signal (high) from IC10-6 is sent to switchboard A pin 2, and the record signal circuits are energized.

The Record Defeat signal is present when either of the following conditions exist:

- RECORD mode switches for channel 1 (S753) and channel 2 (S754) are both in the SAFE position (see Figure 4-4 for switchboard A schematic).

- Head select switches for channel 1 (S701) and channel 2 (S702) are both in SYNC position (head assembly schematic is Figure 4-17).

4-7. Pause Mode. Each time the PAUSE button is pressed, the output of IC4-12 goes from high to low, or low to high, alternately. When IC4-12 is low, IC11-6 goes low, IC10-4 goes low, IC5-13 goes high, brake solenoid no. 1 goes OFF, capstan solenoid no. 2 goes ON, and pause mode is entered.

To release pause mode, press the PAUSE button once more; press STOP, FAST FWD, or FAST RWD buttons; or set the EDIT switch to ON.

During fast forward, fast rewind, or edit modes, IC10-10 goes low to reset the PAUSE flip-flops and, because of this, the pause mode cannot be entered.

4-8. Stop Mode. Pressing the STOP button sends a signal which resets each of the following flip-flops: play, fast forward, fast rewind, pause, and record. C41 (Figure 4-1) works the same as the STOP button; it holds IC2-10 low from the time power is applied until the circuits stabilize.

When the STOP button is depressed during fast forward or fast rewind modes, the pause lamp flashes until the tape comes to a stop.

4-9. Reel Hub Size Selection

Refer to switchboard A schematic, Figure 4-4. When the REEL hub size selector switch (S752) is set to the SMALL position, the following events occur:

1. The base of Q119 is grounded through S752b. This disables the tape acceleration circuit. Tape acceleration time is short when a small reel is used. Therefore, K102, which supplies acceleration voltage during fast forward and rewind modes, is not needed.

2. Relay K105a is energized through S752a. Energizing K105 decreases the voltage to the reel motor by 10 volts. In this way, the takeup torque and back tension are decreased for each mode.

4-10. Power Line Frequency Selection (50 Hz/60 Hz)

Refer to Figure 4-2. The frequency selector switch controls MP capacitor C182. Switch S101 changes the capacitance value to 7.0 μF or 60 Hz, or 7.0 + 1.5 μF or 50 Hz. Capacitor C182 is sub-wired and provides current phase correction to give maximum efficiency.

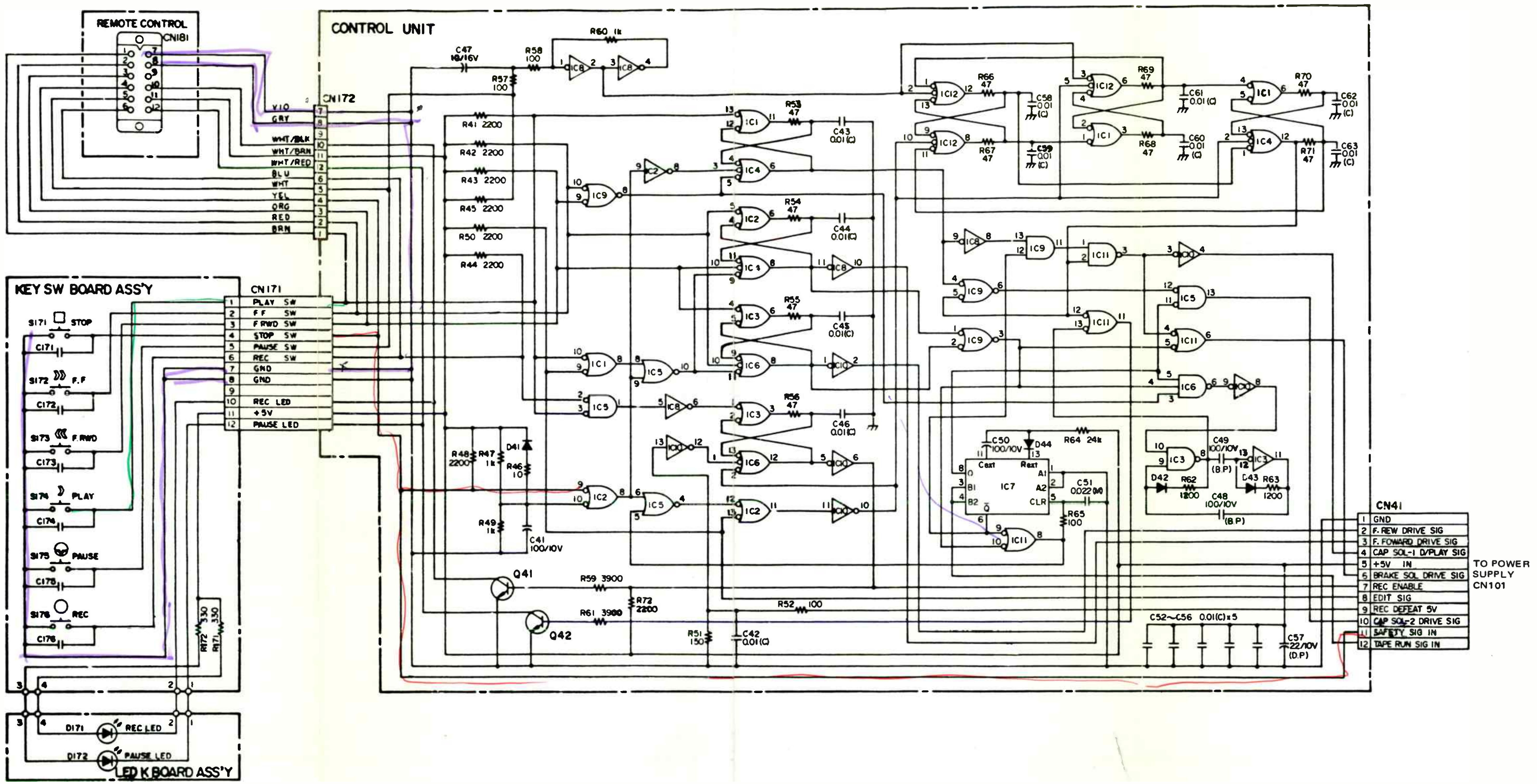


Figure 4-1.
Control Unit Schematic

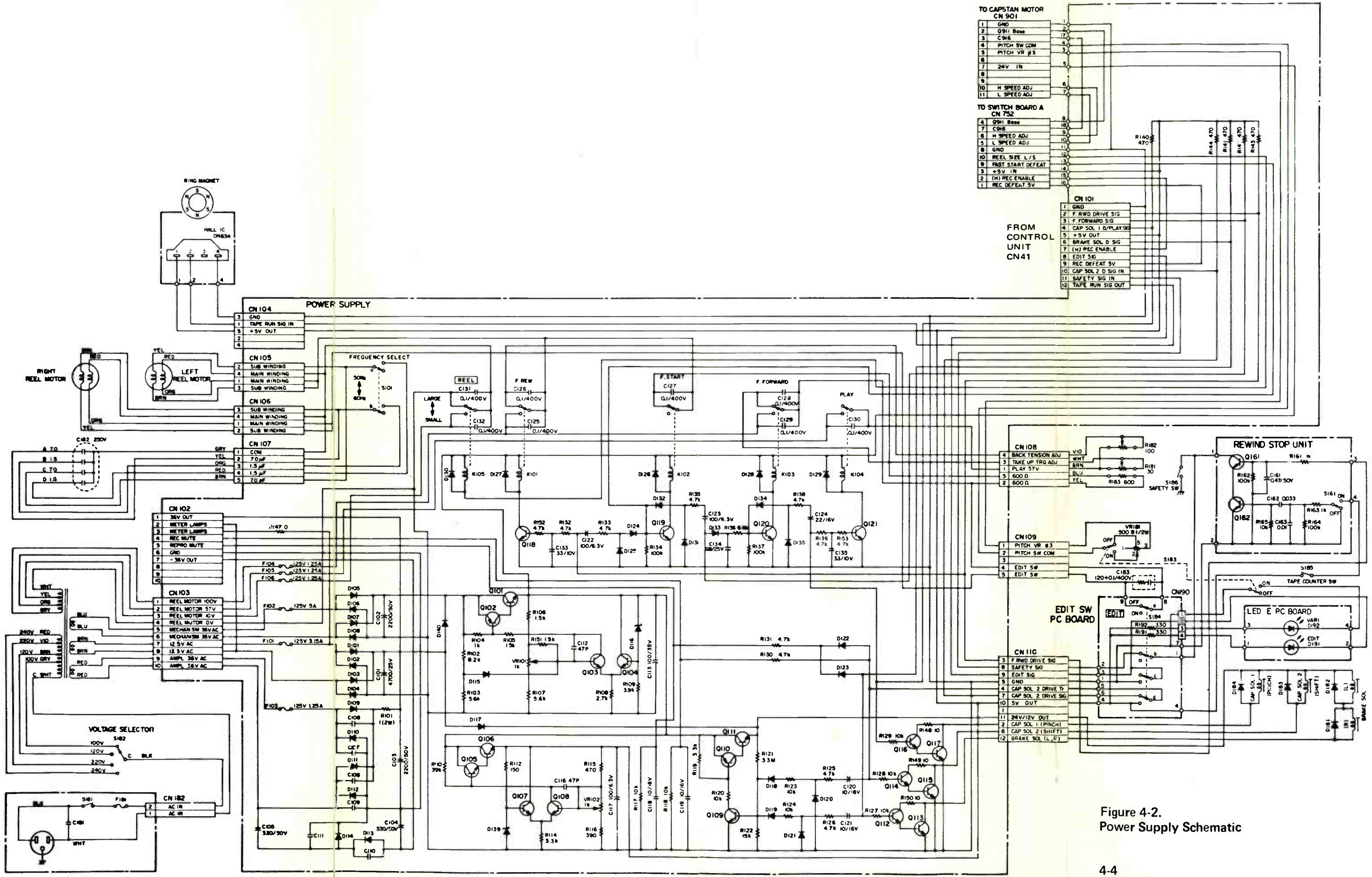


Figure 4-2.
Power Supply Schematic

Table 4-1. Sequence of Output Signals in Control Unit

OPERATING MODE	SEQUENCE	OPERATING SECTION/CONDITION
PLAY	IC10-4 — Q116/Q117 Q121 — K104 IC5-13 — Q114/Q115 Q511/Q509/Q510 (Mix Line Amplifier) Q259/Q260/Q261 (Repro Line Amplifier) IC11-6 — Q112/Q113	Capstan Solenoid 1 (Pinch) Reel Motors Capstan Solenoid 2 (Shift) Record Muting Released Repro Muting Released Brake Solenoids
FAST FORWARD	IC8-10 — Q120 — K103 IC11-6 — Q112/Q113 Q259/Q260/Q261 (Repro Line Amplifier)	Reel Motors Brake Solenoids Repro Muting Released
FAST REWIND	IC10-2 — Q118 — K101 Q161 IC11-6 — Q112/Q113 Q259/Q260/Q261 (Repro Line Amplifier)	Reel Motors Rewind Stop Unit Standby Brake Solenoids Repro Muting Released
RECORD	IC10-4 — Q116/Q117 Q121 — K104 IC5-13 — Q114/Q115 Q511/Q509/Q510 (Mix Line Amplifier) Q259/Q260/Q261 (Repro Line Amplifier) IC11-6 — Q112/Q113 IC10-6 — Q41 — D171 Q753 Q553 K551	Capstan Solenoid (Pinch) Reel Motors Capstan Solenoid 2 (Shift) Record Muting Released Repro Muting Released Brake Solenoids Record LED Record LED (CH-1/CH-2) Bias Oscillator Record Head Muting Released
PAUSE	IC5-13 — Q114/Q115 Q511/Q509/Q510 (Mix Line Amplifier) Q259/Q260/Q261 (Repro Line Amplifier) IC11-11 — Q42 — D172	Capstan Solenoid 2 (Shift) Record Muting Released Repro Muting Released Pause LED

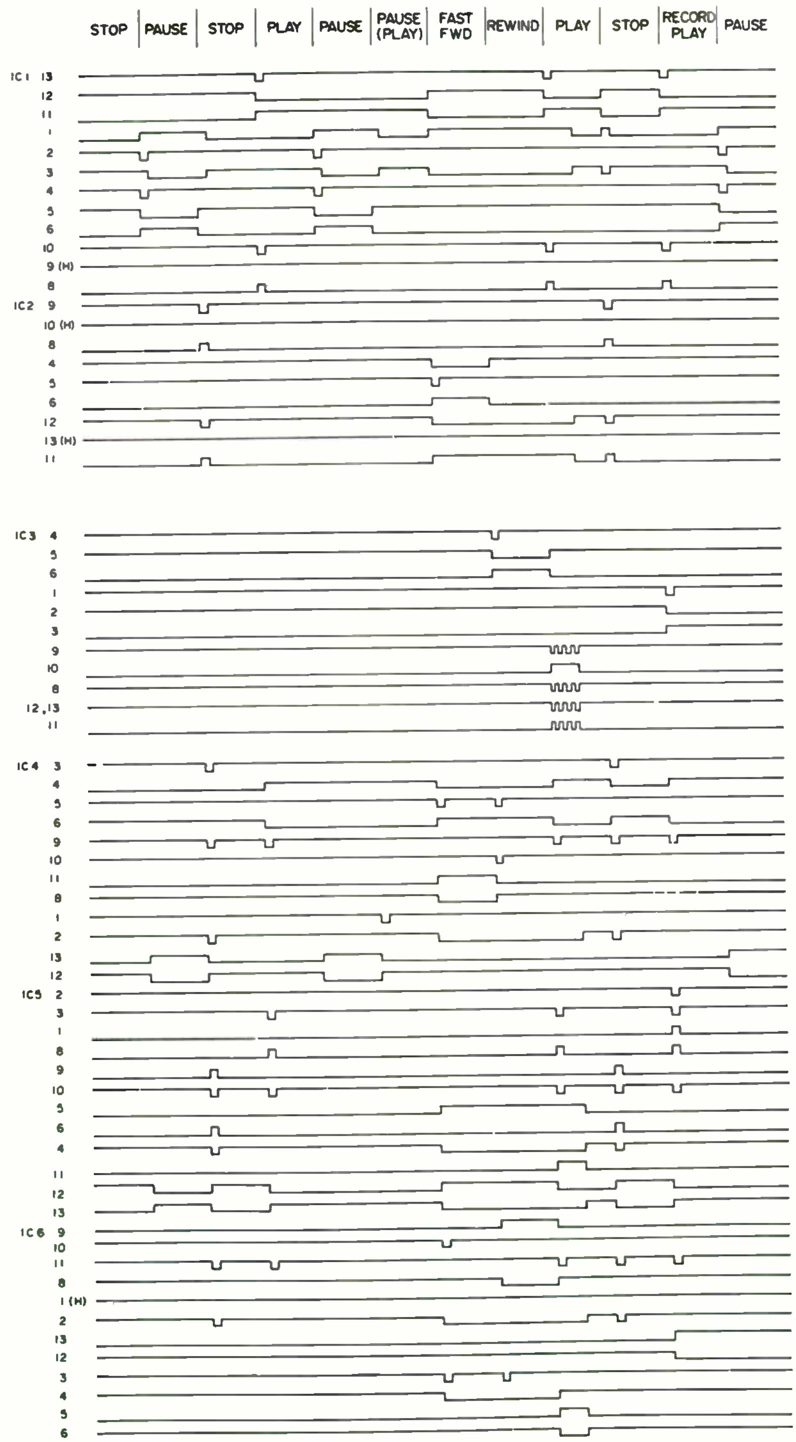


Figure 4-3. Timing Diagram (Sheet 1 of 2)

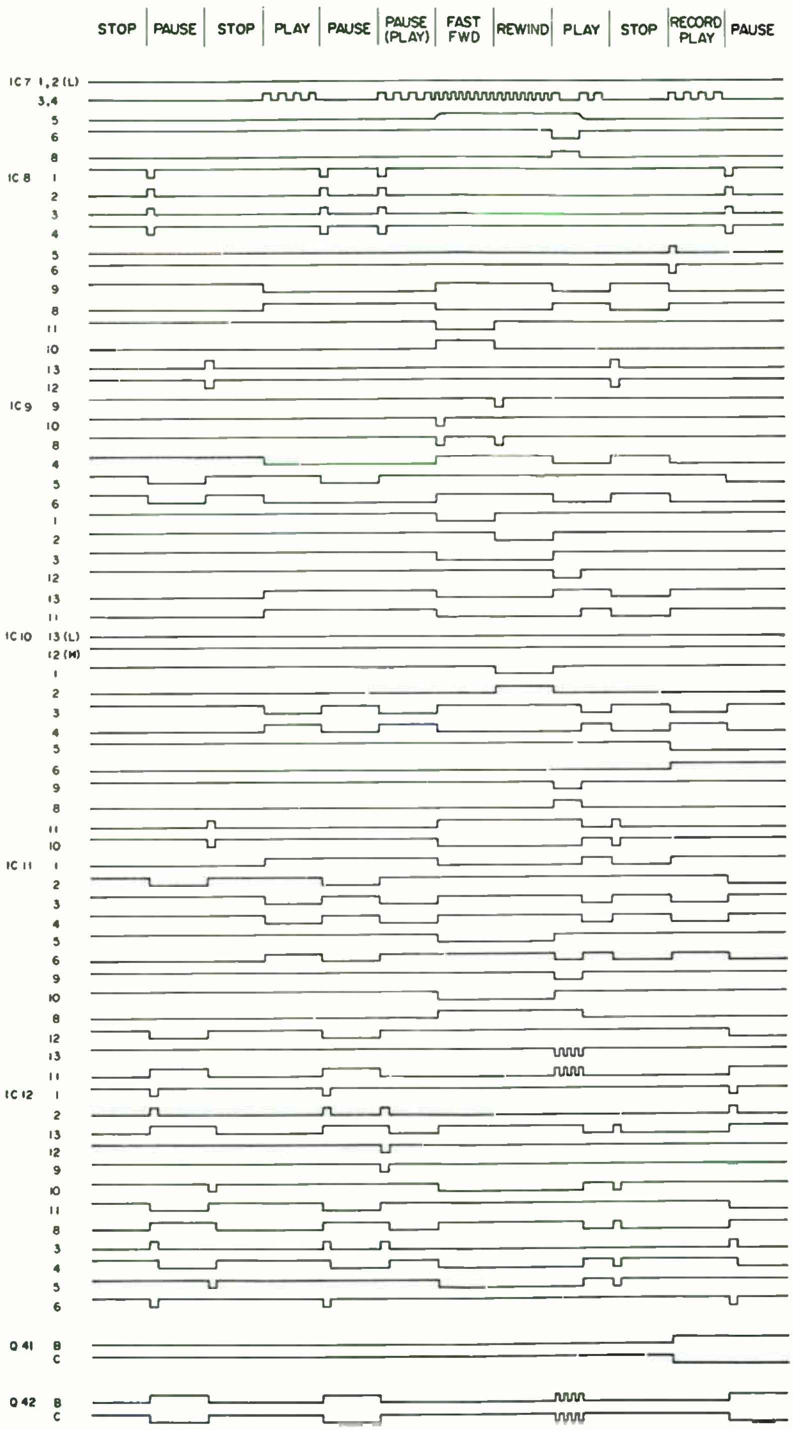


Figure 4-3. Timing Diagram (Sheet 2 of 2)

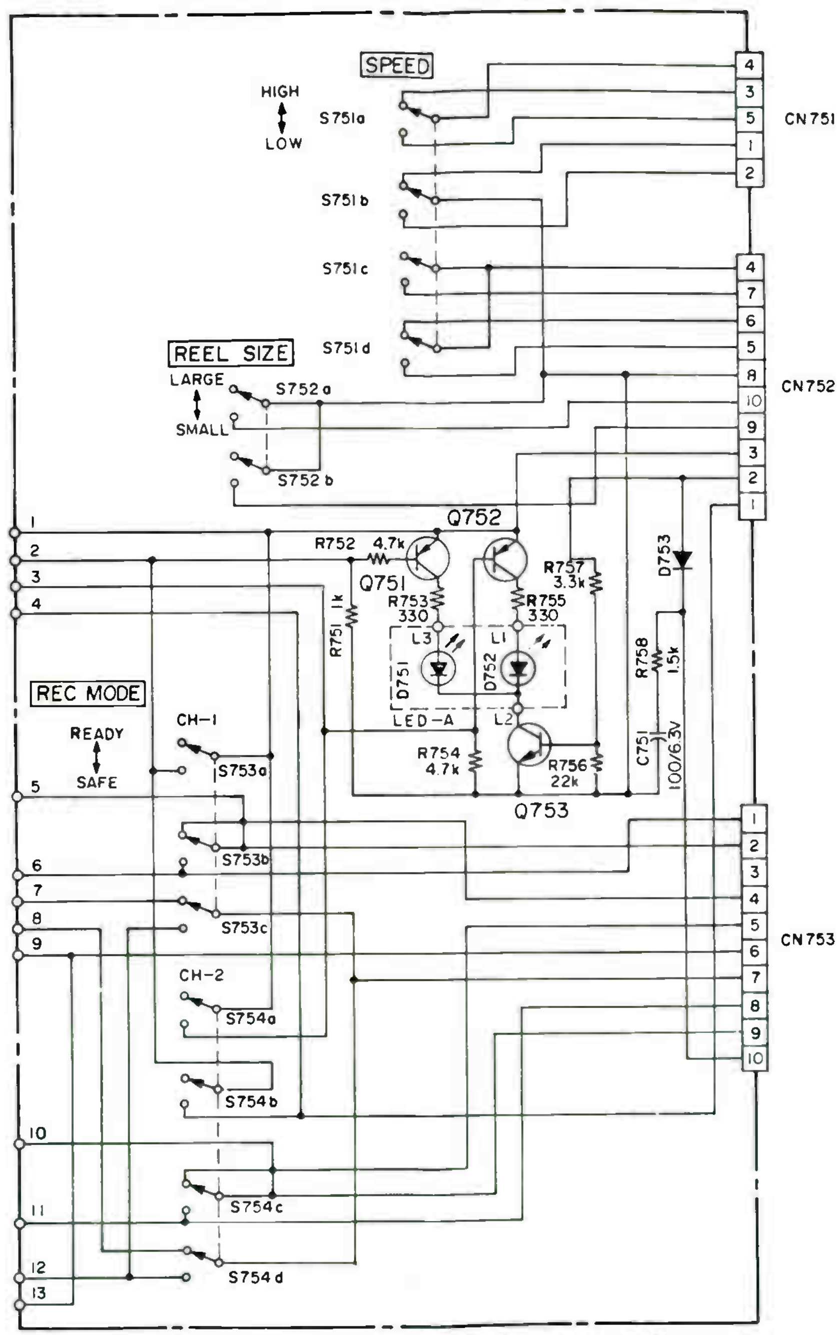


Figure 4-4. Switchboard A Schematic

4-11. Solenoid Drive Circuit

The capstan solenoid no. 1 drive signal and the play signal are received from the control unit through R129, Q116, and Q117 (Figure 4-2). When Q116 and Q117 are turned on, capstan solenoid no. 1 is energized. In the same manner, the capstan solenoid no. 2 drive signal through R128, Q114, and Q115 energizes capstan solenoid no. 2; and the brake solenoid drive signal through R127, Q112, and Q113 energizes the left and right brake solenoids.

During normal operation, the solenoid drive power is 14 Vdc supplied through D117. To energize solenoids from the de-energized condition, the circuit made up of Q109, Q110, and Q111 provides 24 Vdc boost power. This operates in the capstan solenoid no. 2 drive circuit as follows:

The capstan solenoid no. 2 (shift solenoid) drive signal is fed to R128, Q114, and Q115. Transistors Q114 and Q115 turn on to provide drive to capstan solenoid no 2. At the same time, the capstan solenoid no. 2 signal is also fed to C120, R125, R123, and D118, turning on Q109. When Q109 turns on, Q110 and Q111 also turn on, and 24-Vdc solenoid power is supplied. After a short time, C120 charges and blocks the signal to the base of Q109, which causes Q109, Q110, and Q111 to cut off, removing the 24-Vdc supply voltage. After this, the 14 Vdc through D117 is used to hold the solenoids energized. Resistor R121 connected to Q109 through Q111 provides positive feedback, which allows Q109 through Q111 to be turned on and off.

The capstan solenoid no. 1 drive circuit does not control the 24-Vdc switching supply. This is because capstan solenoid no. 1 (the pinch roller solenoid) is never operated independently. Capstan solenoid no. 1 operates only in the following two cases:

1. From stop mode to reproduce or record mode. In this case, capstan solenoid no. 1, capstan solenoid no. 2, and the (right and left) brake solenoids are all energized at the same time.
2. From pause mode to reproduce or record mode. In pause mode, capstan solenoid no. 2 is already energized; thus, only capstan solenoid no. 1 and the brake solenoids are energized at this time.

Therefore, it is only necessary for the 24-Vdc power voltage to be controlled by the capstan solenoid no. 2 and brake drive signals.

4-12. Rewind Stop Unit

Refer to Figure 4-2. The rewind stop unit, controlled by the rewind-stop MEMORY switch, automatically stops the tape while in rewind mode when the digital counter passes 00 00. The output signal at pin 1 of the rewind stop circuit is fed back to the control unit and has the same effect as pushing the STOP button. The input signal at pin 3 is the fast rewind drive signal of approximately 5 Vdc during fast rewind mode, which comes from the control unit.

The tape counter switch S185 is closed when the digital tape counter reads 00 00. During fast rewind mode, the fast rewind drive signal is applied to the base of Q161 putting it in the ready or standy-by mode. When the MEMORY switch, S161, is on and tape is being rewound, S185 will close when the digital counter reaches 00 00. Then 5 Vdc will be applied through R163 and C162, turning on Q162. Both Q161 and Q162 are now on. If the EDIT switch is off, pin 1 will to to ground potential and the control unit will go to stop mode. The base current of Q162 will charge C162, and Q162 will be cut off. At the same time, Q161 is also cut off and the stop signal is released.

4-13. EDIT Switch

Refer to Figure 4-2. When the EDIT switch is on, it performs the following functions:

1. Switch S184a opens the takeup (right) reel motor circuit, disabling the takeup reel motor.
2. S184b opens the safety switch circuit and the rewind stop circuit.
3. S184c grounds out the control unit signal and, at the same time, causes the edit LED to light. This ground holds the fast forward, fast

rewind, and pause flip-flops in the reset state. Therefore, when the EDIT switch is on, fast forward, fast rewind, and pause modes cannot be selected.

4. Switch S184d applies 5 Vdc to the capstan solenoid no. 2 drive transistors on the power supply PWA to hold the transistors on. As a result, during edit mode, capstan solenoid no. 2 (the shift solenoid) is held in the on (energized) position.

4-14. SIGNAL SYSTEM THEORY

The following paragraphs explain signal flow and levels for the ATR-700 amplifier system. Figure 4-5 is a simplified block diagram of the signal system and Figure 4-6 illustrates signal levels at different stages of amplification. Three modes of operation are discussed; reproduce, synchronous reproduce, and record. Amplifier operation is identical for channel 1 and channel 2; therefore, an operational description of only one channel is given.

4-15. Reproduce Operation

4-16. Reproduce Equalizer Amplifier. Refer to schematic, Figure 4-7. The reproduce signal is fed from the head assembly to FET switch Q201 of the reproduce equalizer amplifier. Table 4-2 shows the conditions of each transistor in the reproduce equalizer amplifier for each tape speed and type of equalization.

FET switch Q201 is used to determine the amount of negative feedback. When the FET switch is on, its resistance can be assumed to be approximately 370 ohms; when the switch is off, its resistance can be assumed to be infinity. The on/off resistance ratio (R_{off}/R_{on}) is very large and provides an ideal switch. The "on" offset voltage can be disregarded.

Transistor Q201 is the low-frequency time constant FET switch. FET Q201 is *off* for 15 and 7-1/2-in/s tape speeds in IEC standard; and *on* for 3-3/4-in/s tape speed in IEC standard and 15, 7-1/2, and 3-3/4-in/s tape speeds in NAB standard.

Transistors Q203, Q205, Q207, and Q209 are high-frequency time constant selection FETs. When any of these FETs are on, the time constant selection is as shown in Table 4-2. The potentiometers (VR201, 203, 205, and 207) are used to determine the high-frequency region time constant to correct for differences in the high-frequency characteristics of the reproduce head.

Resistor R207 and capacitor C203 form a low-pass filter to remove the unwanted frequency band (below 10 Hz).

Transistors Q211 and Q212 are used to prevent "click noises" during speed changes. Capacitors C213 and C214 work to make the operation of Q211 and Q212 fast when going from on to off, and slow when going from off to on. For high-speed operation at NAB equalization, Q211 and Q209 are on; Q212 and Q207 are off. Consequently, the amplifier feedback circuit is through VR207 only. If the speed is changed from high to low (that is, Q211 is cut off and, at the same time, Q207 is turned on), Q212 will remain off and Q209 will be on. Then the amplifier feedback circuit will be formed by VR205 and VR207 in parallel. Feedback will increase and the gain will decrease, and the introduction of click noises will be suppressed. After that, Q212 will turn on slowly and Q209 will cut off, smoothly making the transition from VR207 to VR205.

The equalized reproduce signal from the reproduce equalizer amplifier is fed through the repro level cal control to the reproduce line amplifier.

4-17. Reproduce Line Amplifier. Refer to schematic, Figure 4-8. The reproduce line amplifier performs the following functions:

1. During record mode, it serves to attenuate the included bias signal that is fed into the reproduce head.

2. During reproduce mode, it amplifies the equalized reproduce signal from the reproduce equalizer amplifier to −8 dB (0 dB = 0.775 volt).

3. In synchronous reproduce mode, since the input level of the sync mode signal is approximately 10 dB lower than normal reproduce signal, it changes the amplifier gain.

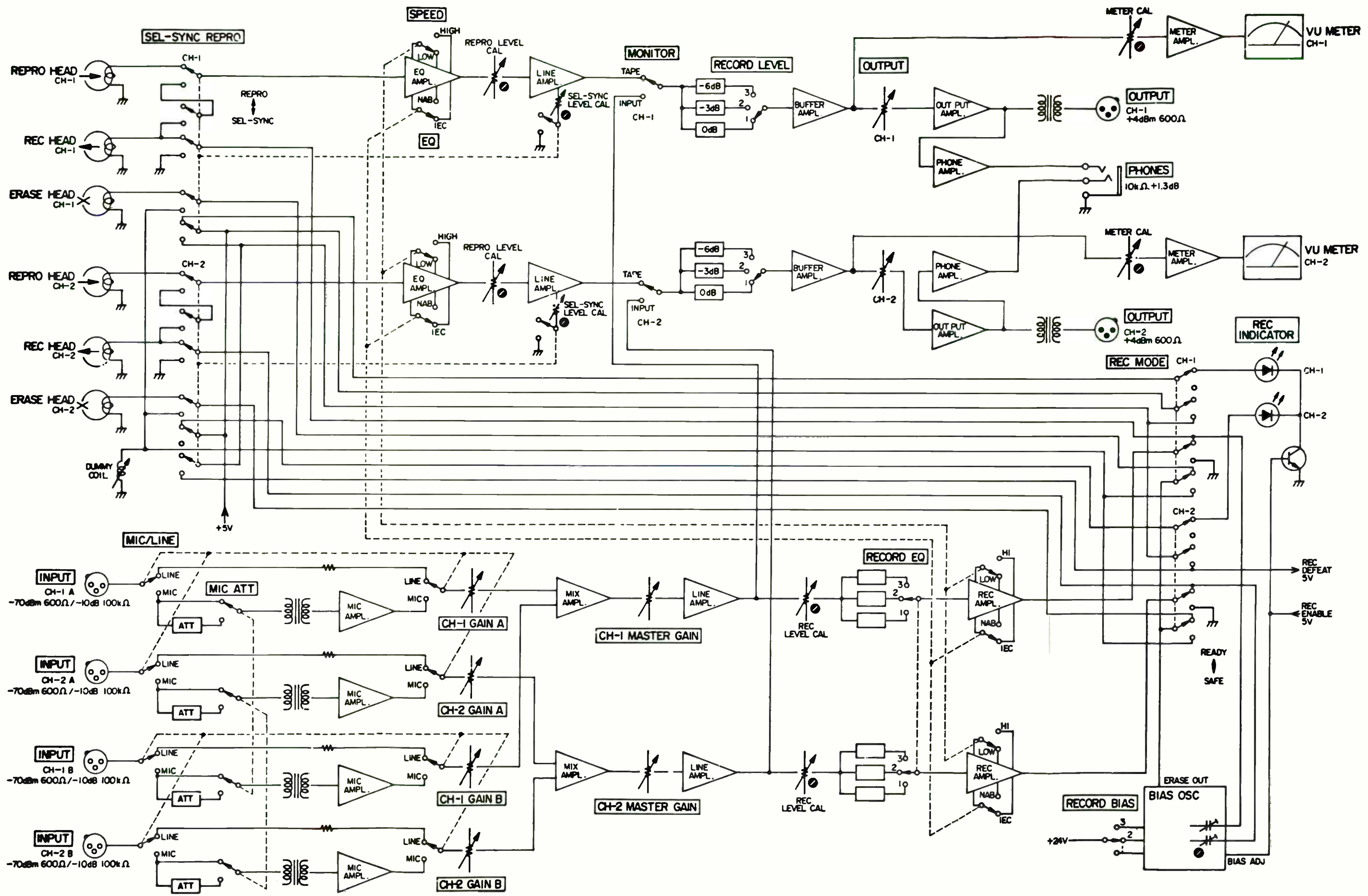


Figure 4-5.
Signal System Block Diagram

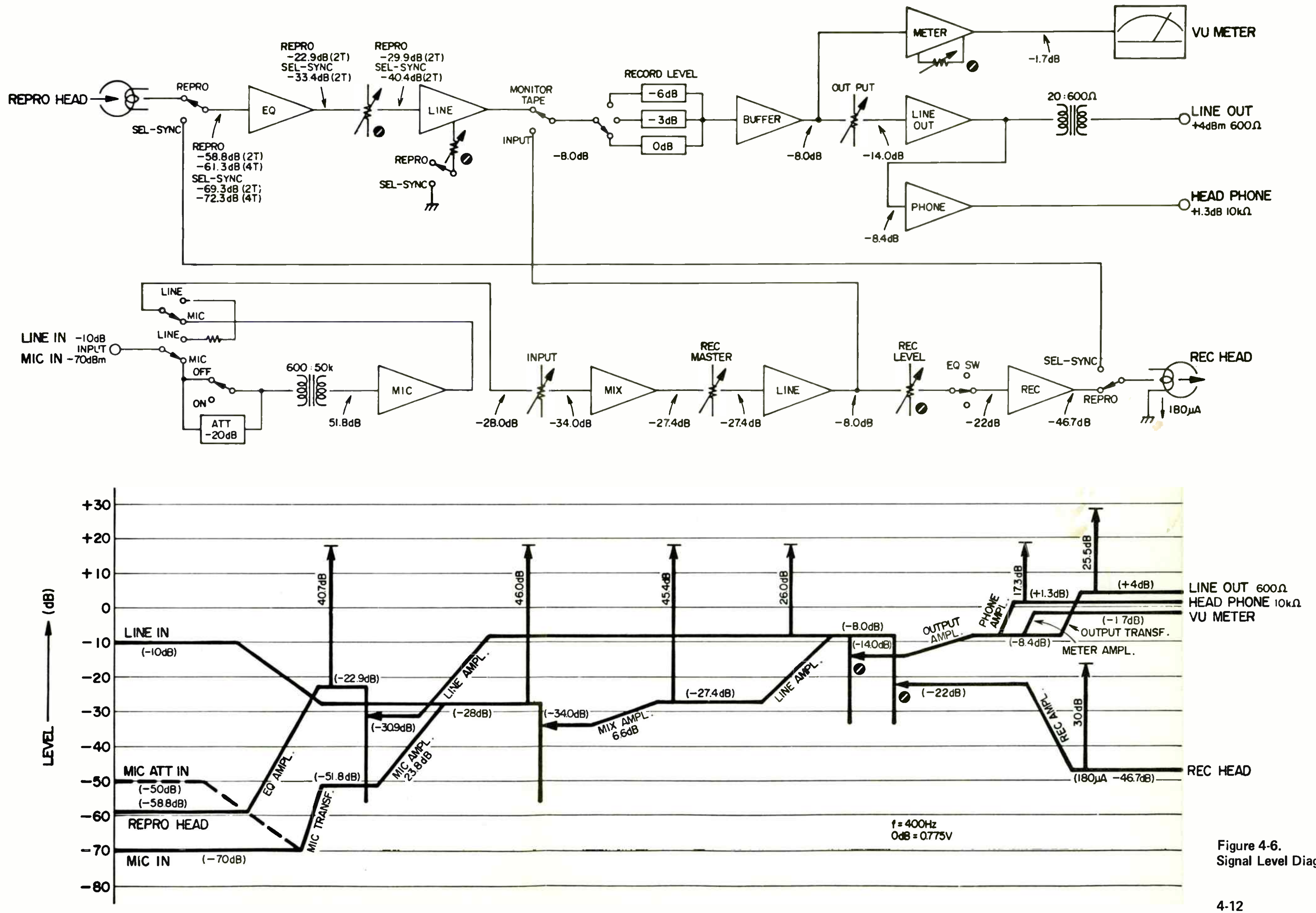


Figure 4-6.
Signal Level Diagram

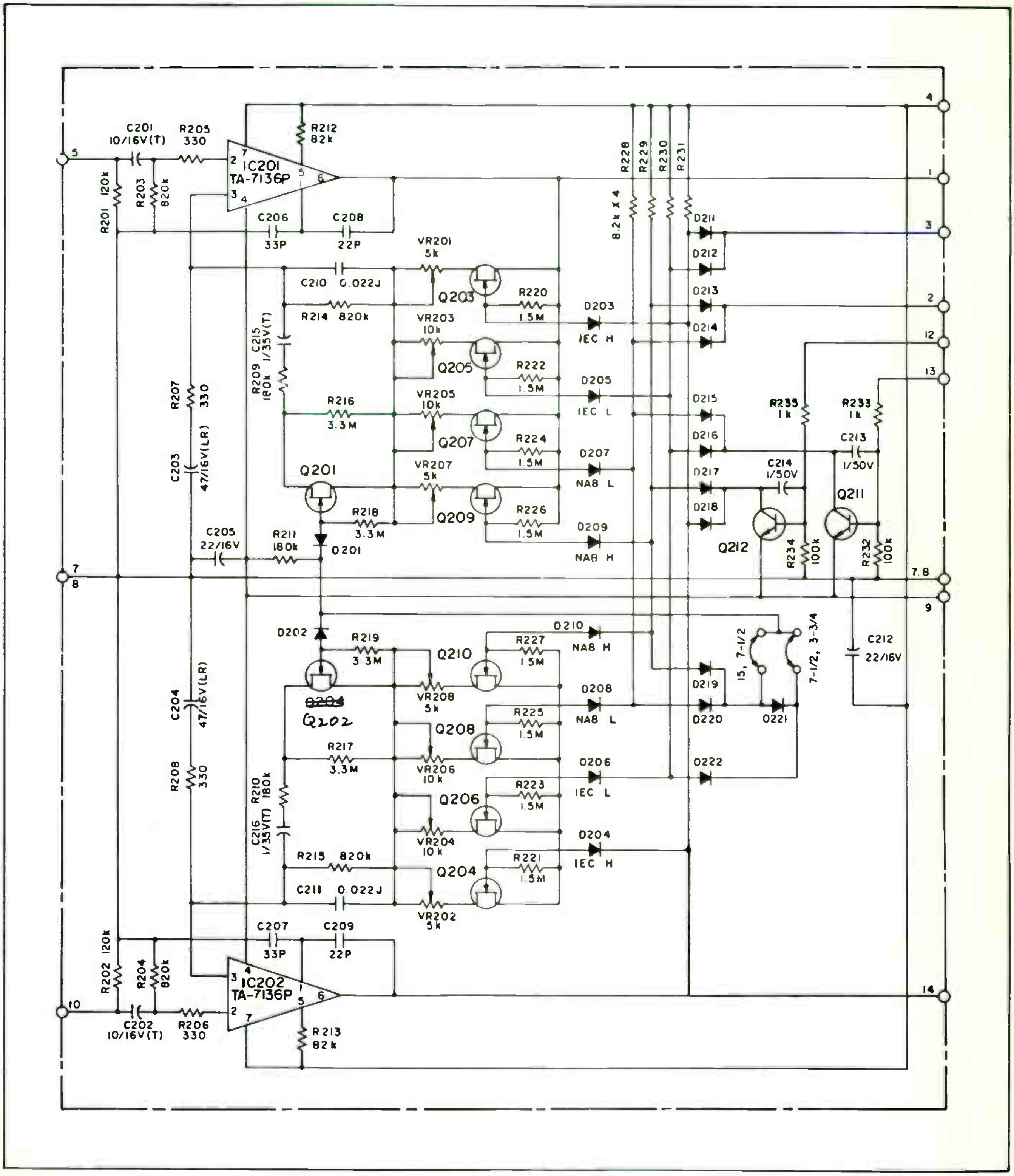


Figure 4-7. Reproduce Equalizer Amplifier Schematic

Table 4-2. State of Reproduce/Equalizer Amplifier Transistors for Various Tape Speeds and Equalization Curves

TAPE SPEED	EQUALIZATION		Q201 ~~Q210~~ (Q202)*	Q203 (Q204)*	Q207 (Q206)*	Q207 (Q208)*	Q209 (Q210)*	Q211	Q212
High Speed Models (7-1/2–15 in/s)	NAB	H(15 in/s)	ON	OFF	OFF	OFF	ON	ON	OFF
	NAB	L(7-1/2 in/s)	ON	OFF	OFF	ON	OFF	OFF	ON
	IEC	H(15 in/s)	OFF	ON	OFF	OFF	OFF	ON	OFF
	IEC	L(7-1/2 in/s)	OFF	OFF	ON	OFF	OFF	OFF	ON
Low-Speed Models (3-3/4–7-1/2 in/s)	NAB	H(7-1/2 in/s)	ON	OFF	OFF	OFF	ON	ON	OFF
	NAB	L(3-3/4 in/s)	ON	OFF	OFF	ON	OFF	OFF	ON
	IEC	H(7-1/2 in/s)	OFF	ON	OFF	OFF	OFF	ON	OFF
	IEC	L(3-3/4 in/s)	ON	OFF	ON	OFF	OFF	OFF	ON

*Transistor numbers inside ( ) refer to channel 2 circuitry.

4. In non-reproduce modes, it supplies a muting function to suppress noise.

Transistors Q251 and Q253 form the amplifier, with a gain of 21.9 dB at 400 Hz. Inductor L251 and capacitor C254, included in the feedback circuit of the amplifier, form a parallel bias trap. When the resonant frequency of the parallel circuit is adjusted to the bias oscillator resonant frequency, the feedback increases and the amplifier gain decreases.

Transistor Q255 is the amplifier gain switching circuit for the synchronous reproduce mode. The synchronous reproduce mode uses the record head for reproduce monitoring. Since the reproduce sensitivity of the record head is different from that of the reproduce head, VR253 is used to adjust for this difference. Resistors R271 and R273, capacitors C260 and C262, and transistor Q257 comprise a low-pass filter with a 12-dB-per-octave gain slope. The cut-off output frequency is 36.5 Hz.

Transistors Q259 and Q260 form the muting circuit. For stop and pause modes, terminal 9 is connected through a 10K resistor on the power supply PWA to ground. Therefore, Q250 and Q260 are on. The output signal terminal of Q260 is connected to ground and the signal is muted. During play, record/play, fast rewind, fast forward and edit play modes, the muting inhibit signal passes through D122 and D123 on the power supply PWA to terminal 9. At this time, Q259 and Q260 are cut off and muting is inhibited.

During record mode, the reproduce line amplifier output signal depends on the recorded signal level as selected by the RECORD LEVEL switch. (There are three steps of fixed attenuation: 6 dB, 3 dB and 0 dB.) The reproduce line amplifier output signal is then fed to the buffer amplifier in switchboard B.

4-18. Buffer Amplifier. The output of the buffer amplifier (Q801 and Q802 on switchboard B) is divided and fed to two lines. One goes to the vu meter amplifier and on to the vu meters. The other goes to the output level control and on to the line output amplifier. The output of the line amplifier is then fed to the line out terminals through an output matching transformer, and to the phones output jack through the phone amplifier. (Figure 4-16 is the schematic of switchboards B and C.)

When playing back a tape that was recorded at the standard level of 185 nWb/m, the standard output

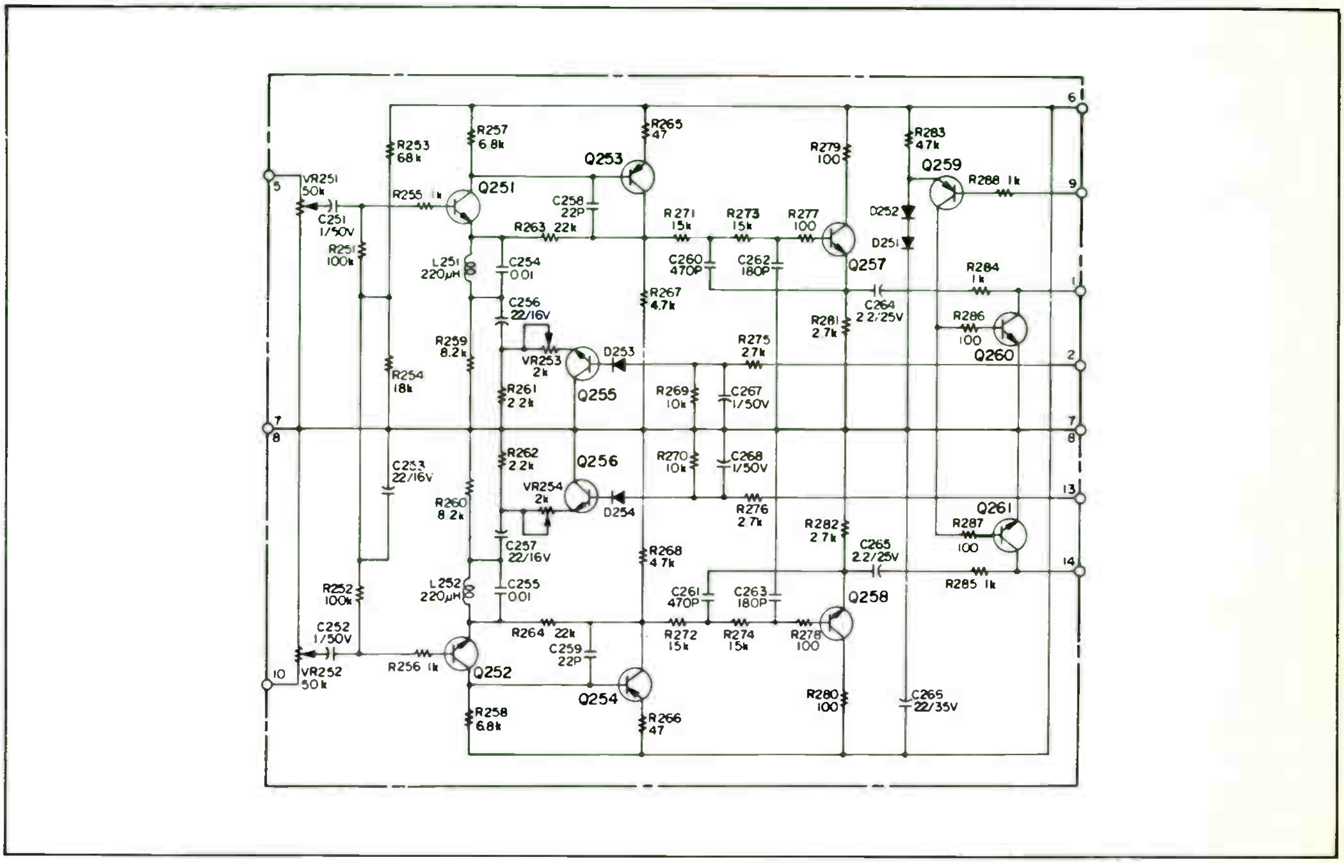


Figure 4-8. Reproduce Line Amplifier Schematic

level at the line out terminals will be +4 dBm/600 ohms. The phones output will be approximately 1 volt. VU meters will indicate 0 vu.

4-19. **Line Output/Phone Amplifier.** Refer to schematic, Figure 4-9. This PWA contains two amplifiers. Transistors Q303, Q305, and Q307 make up a single-end, push-pull type output amplifier. The output has a standard output of +4 dBm. To obtain 25 dB of headroom, a 20 to 600-ohm transformer is used (see Figure 4-10). Transistors Q309 and Q311 make up the phone output amplifier, which is designed to be used with 10K impedance headphones.

4-20. Synchronous Reproduce Operation

The synchronous reproduce mode signal sequence is nearly the same as that for normal reproduce mode. The only differences are that the record head is used for playback, and the gain of the reproduce line amplifier is increased to compensate for the lower level signal from the record head. Both of these changes are accomplished by changing the SYNC/REPRO switch on the head assembly to the SYNC position.

4-21. Record Operation

4-22. **Input Selector.** Refer to schematic, Figure 4-11. The input selector PWA takes care of four input selection functions: mic/line switching, mic amplifier, mic transformer, and MIC ATT selection. The input selector switches are ganged to change channel 1A and channel 2A together, and channel 1B and channel 2B together. The MIC ATT selector changes channel 1A and 1B together, and channel 2A and channel 2B together. The following explanation is for channel 1A only.

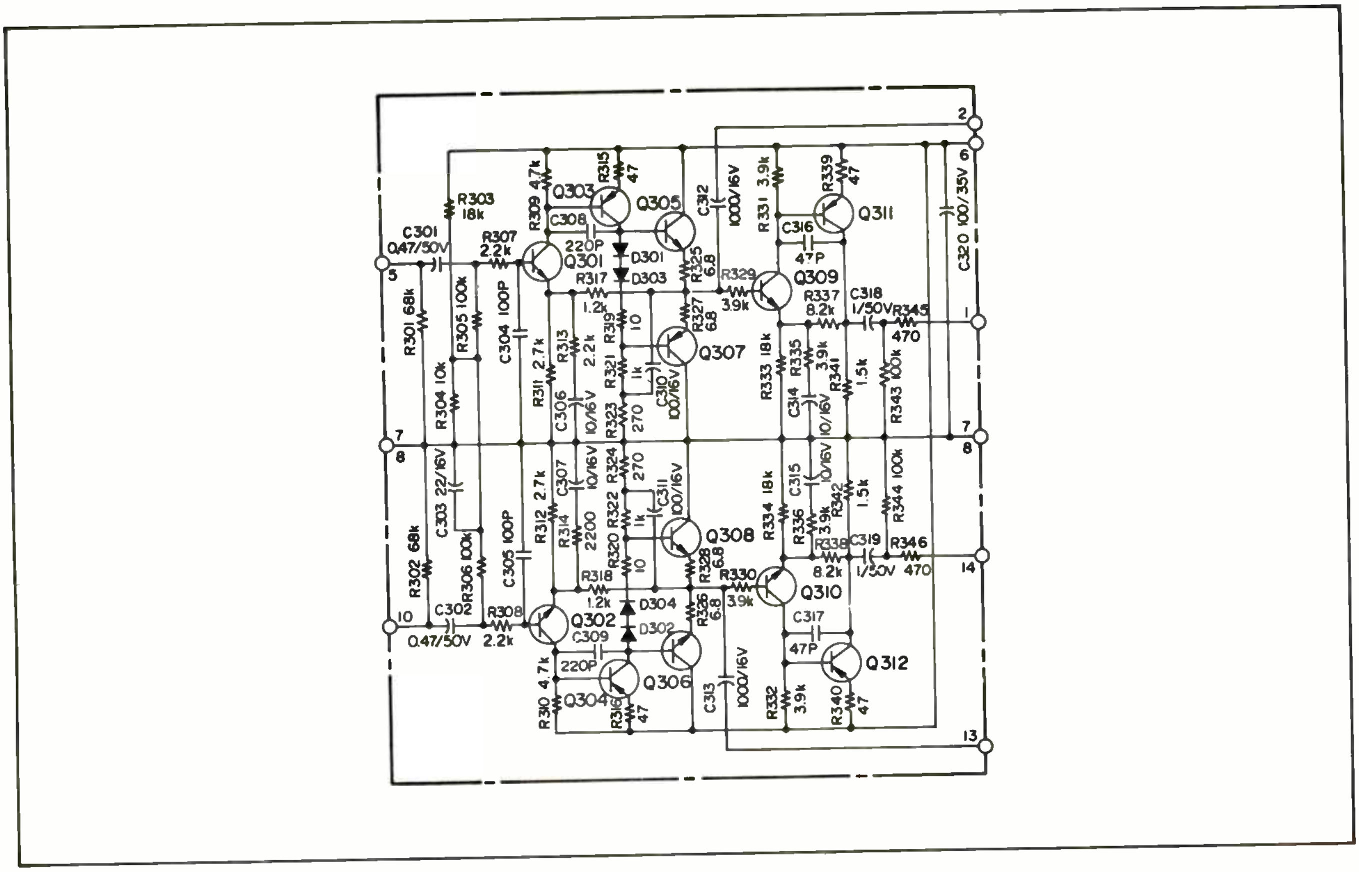


Figure 4-9. Output/Phone Amplifier Schematic

Switch S401 is the MIC/LINE selector switch; S403 is the MIC ATT switch. With the MIC ATT switch at the 0-dB setting, the permissible microphone input level is from –24 dBm to the specified level of –70 dBm, a range of 46 dB. By setting the MIC ATT switch to the 20-dB position, an input signal of –4 dBm can be used, which gives a range of 66 dB from the specified microphone input level of –70 dBm. The mic transformer converts the balanced MIC input to the unbalanced input of the amplifier and steps up the signal level by approximately 18.2 dB. The output of the transformer is amplified in IC401 and then fed through S401a to VR701. Potentiometer VR701 is the input level control (channel gain control) which controls the level to the mix amplifier.

For a line input, the signal passes through R401 and R402 and is reduced to the same level as the output of the microphone amplifier. The amount of decrease is approximately 18 dB. The signal then passes through S401a to VR701 to the mix amplifier input.

4-23. Mix Line Amplifier. Refer to schematic, Figure 4-12. The mix line amplifier PWA includes the following three circuits:

1. A mixer which mixes the A and B input for each channel,
2. An amplifier which increases the signal from the MASTER RECORD gain control to –8 dB (0 dB = .775V), and
3. A muting circuit which prevents any signal from passing through the line amplifier during any mode except record mode.

The mixer output is decreased by the MASTER RECORD gain control as it is fed to the line

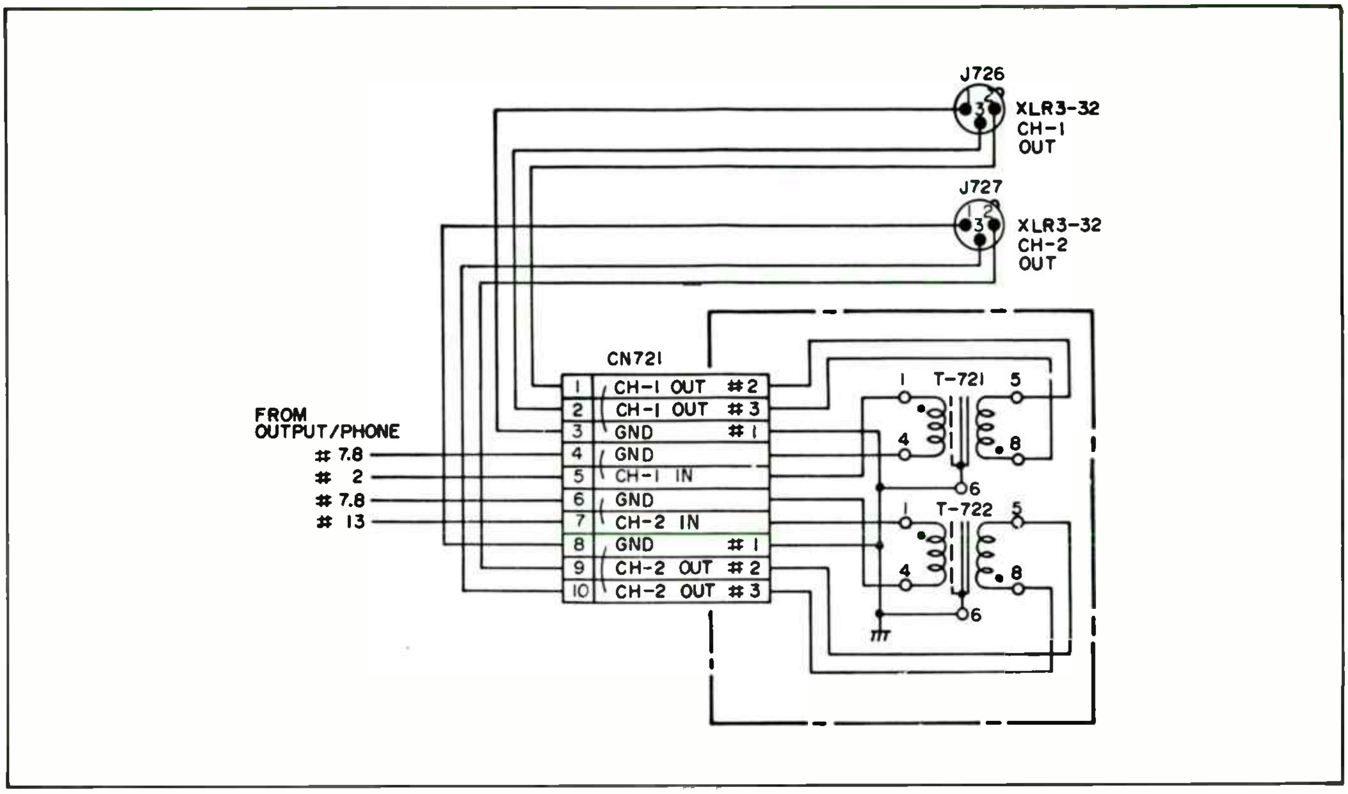


Figure 4-10. Output Transformer PWA Schematic

amplifier. Transistors Q505 and Q507 comprise the amplifier circuit, which has a gain of approximately 19.4 dB.

Transistors Q509 and Q511 form the muting circuit of the line amplifier. This circuit works to prevent the signal from going to the next circuit, the record amplifier, during any mode except record mode. The muting circuit prevents the possibility of recording with no bias.

4-24. Record Amplifier. Refer to schematic, Figure 4-13. The record amplifier is made up of the following two circuits:

1. The record frequency equalization circuit, and
2. An output circuit to provide sufficient record current range for current to the record head.

The record amplifier is required to have the following capabilities.

1. It should supply the established head current regardless of the impedance of the head.
2. The record current at the high frequency region should be the proper value to prevent head losses due to excess head current.
3. At low frequencies, the frequency response should comply with the applicable NAB and/or IEC standard record equalization curve.

The record head impedance rises at a 6-dB-per-octave rate with an increase in frequency. If the drive voltage is held at the rated voltage, the record head current will decrease at the 6-dB-per-octave rate as the frequency increases. Therefore, some method must be utilized to maintain the head current at the rated current. In the ATR-700, the standard output circuit is changed by replacing the collector resistor with a transistor, used to maintain the proper load to achieve the rated current. The output impedance of the circuit is 14K ohms for all frequency ranges. This output impedance-to-head-impedance relationship makes it possible to maintain the rated drive current.

However, even though this method ensures that recording is done at near the rated drive current, the retained magnetism on the tape becomes weaker as the frequency rises. Therefore, high-frequency equalization is necessary. This equalization is accomplished by the series LC circuit at the emitter of Q611, which acts as a peaking circuit for high-frequency loss compensation. For high-speed operation, Q615 is turned on; for low-speed operation, Q613 is turned on. The collector and emitter of Q613 and Q615 are cross-connected to reduce click noise caused by the transistor offset voltages.

The record amplifier is controlled by a feedback circuit to an FET switching network, as selected by the feedback amplifier. The input signal from this amplifier complies with NAB and IEC characteristics for each speed for standard record equalization. The equalized signal is combined with the output of the bias oscillator and fed to the record head. When the RECORD LEVEL switch is set to position 1 and the vu meter level set to 0 VU, the tape will be recorded at the 185-nWb/m level.

The record amplifier is modified by the equalization amplifier inputs to provide the proper equalization for high and low speeds and for IEC and NAB equalization curves. The conditions of the transistors for each speed and equalization curve are shown in Table 4-3. Note that the 3-3/4-in/s NAB and IEC characteristics are the same. Thus, there is no need to have a different compensation circuit for differences in the specification.

Since the ATR-700 has a high-speed model (15 and 7-1/2 in/s) and a low-speed model (7-1/2 and 3-3/4 in/s), Q601, Q605, and Q607 act as a control for changes in signals. This can be accomplished by inserting jumper wires at RS609, RS610, and RS611 on the record amplifier printed wiring assembly. Resistor R673 and capacitor C627 form a low-pass filter in the record amplifier. Capacitor C629 and inductor L603 form a bias trap.

4-25. Bias Oscillator. Refer to schematic, Figure 4-14. The bias oscillator is a push-pull oscillator with low distortion output. Bias frequency is 100 kHz.

In modes other than record mode, Q553 is cut off and no operating power is supplied to the oscillator. During record mode, the +5-volt Record Enable signal is applied to Q553, turning it on. When Q553 turns on, operating power is applied to the oscillator and it begins oscillating. At the same time, relay K551 is energized, which removes the ground to the record head and bias oscillator output. The contact of K551 is normally closed, during all modes except record, which grounds out the record head and prevents no-bias recording. The amount of bias is controlled by changing the supply voltage to the oscillator.

4-26. Meter Amplifier/Stabilizer. Refer to schematic, Figure 4-15. The meter amplifier is a simple grounded emitter amplifier. The stabilizer functions to supply a stabilized voltage to each amplifier. The supply voltages to the reproduce equalizer amplifier are +12.6 volts and −13.8 volts. The other amplifiers require +24 volts.

Transistors Q356 to Q359 form the +24-volt stabilizer. The specified voltage across D351 and the voltage drop across the divider network of VR353, R370, and R371 are compared by Q357, and that output voltage is added to the voltage across Q359 and Q358 to provide the stabilized output voltage.

Transistor Q353 is the stabilizer for the +12.6-volt supply. The stabilized +24 volts is applied to the voltage divider, R367 and R368, to get 13.2 volts. That voltage is current-amplifier by Q353. The base-to-emitter drop (0.6 volt) across Q353 decreases the voltage to +12.6 volts. Transistors Q354 and Q355, using the −13.8V from the stabilizer, form a tracking regulator.

4-27. Switchboard A. Refer to schematic, Figure 4-4. Switchboard A PWA carries the following switch functions:

- Channel 1 RECORD mode switch

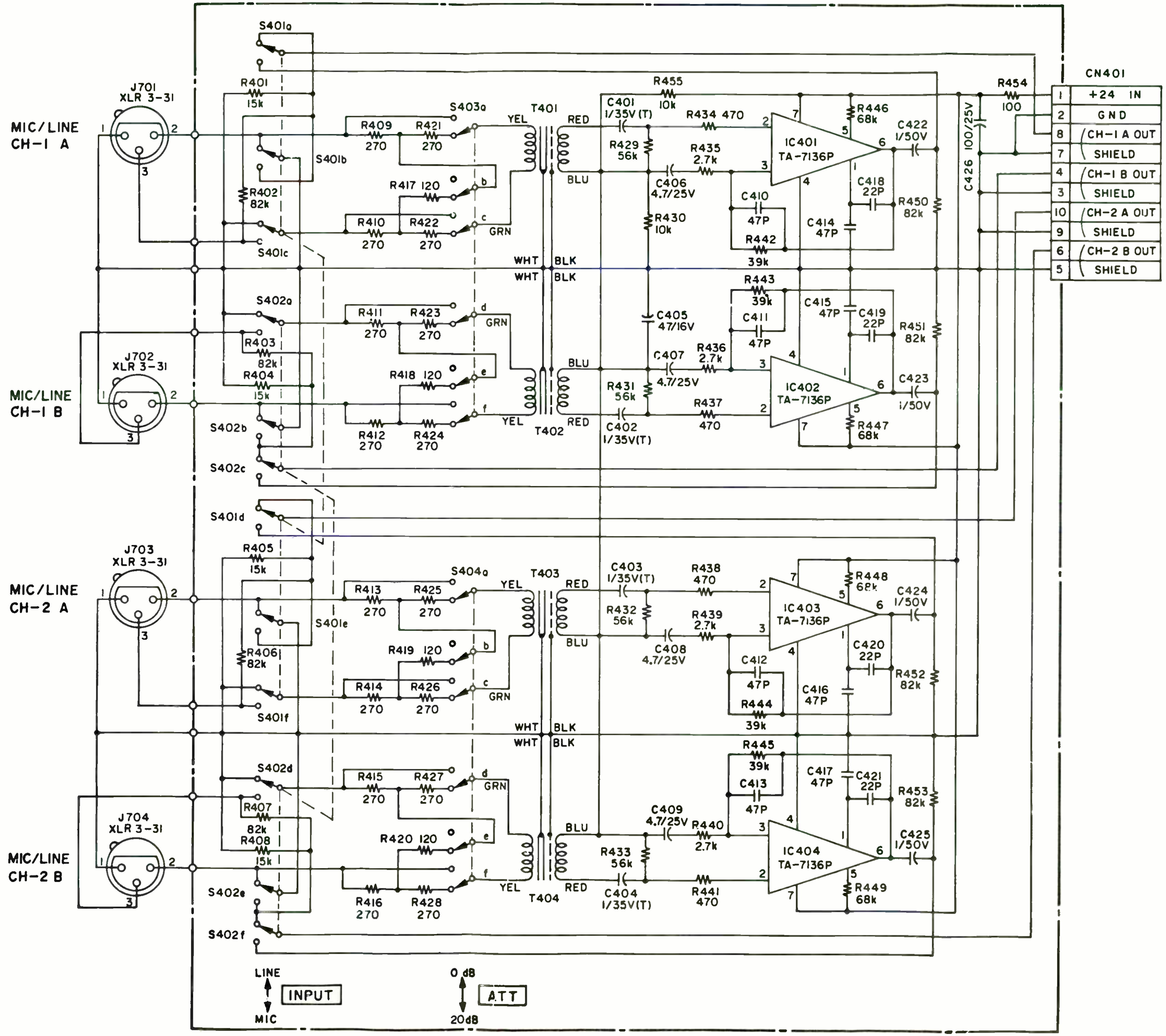


Figure 4-11.
Input Selector PWA Schematic

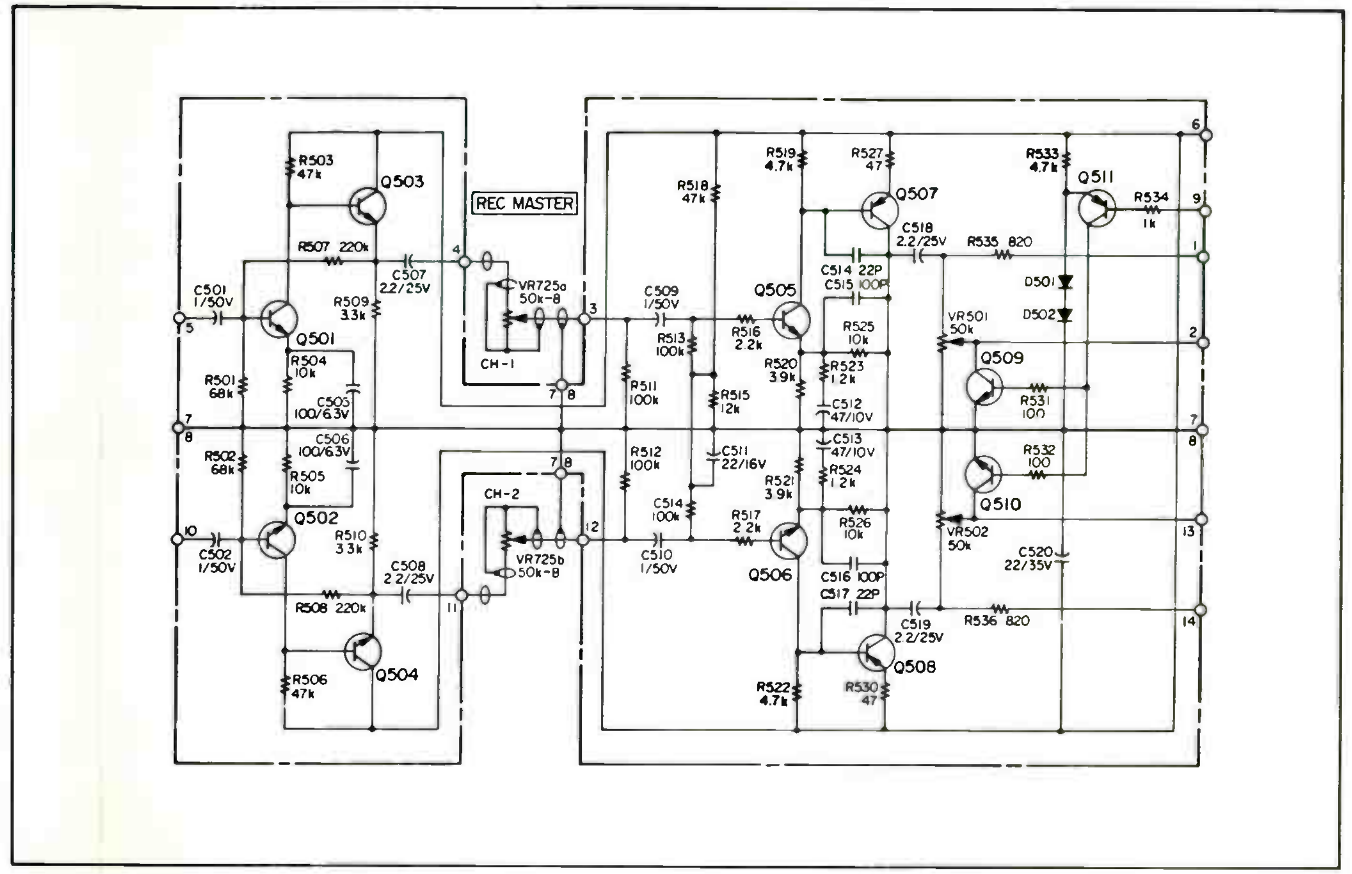


Figure 4-12. Mix Line Amplifier Schematic

- Channel 2 RECORD mode switch
- REEL hub size switch
- Tape SPEED switch

REEL hub size switch details are given in paragraph 4-9. Tape SPEED switch details are given in paragraphs 4-16 and 4-24. The RECORD mode switch has the following effects when in the SAFE position:

1. Switches S753b (channel 1) and/or S754c (channel 2) ground out the record head and record amplifier to prevent recording on specified channel.

2. Switches S753c and S754d inhibit erase current from flowing through the erase head. The erase head is cut off from the bias oscillator. At the same time, to keep the load on the bias oscillator constant, a dummy coil is connected to replace the erase head.

3. Switches S753a and A754a cut off Q751 and Q752, respectively, which inhibits the record LEDs from illuminating.

4. When both the channel 1 and channel 2 switches are in the SAFE position, a Record Defeat signal is sent from the control PWA. Then, even if the RECORD and PLAY buttons are pressed, the record mode cannot be selected. Also, while recording, if both channel 1 and channel 2 switches are changed to the SAFE position, the record mode will be cancelled.

Diode D753, capacitor C751, and resistor R758 are wired to function as follows: Pin 2 of plug CN752 has a high potential (+5 volts) during

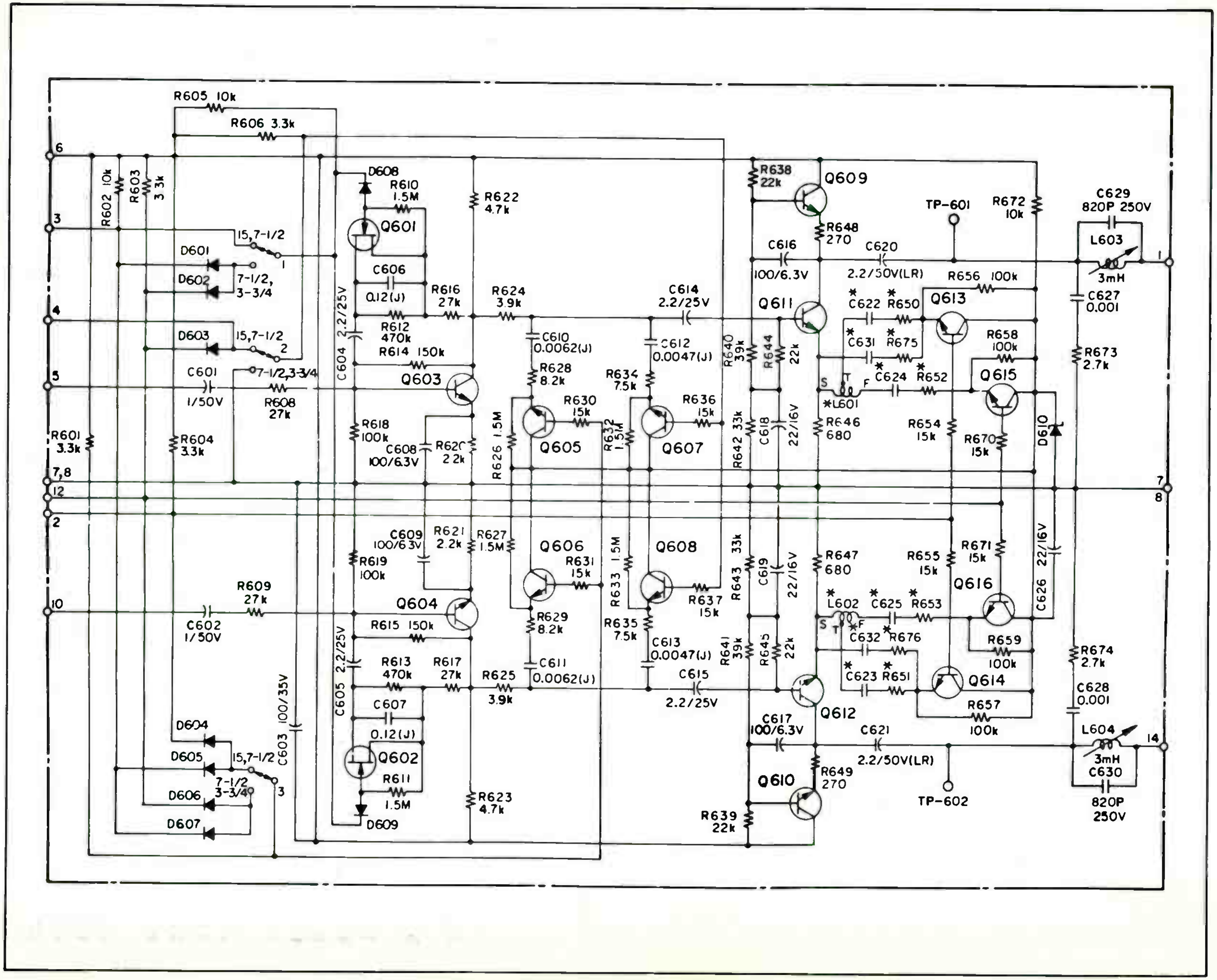


Figure 4-13. Record Amplifier Schematic

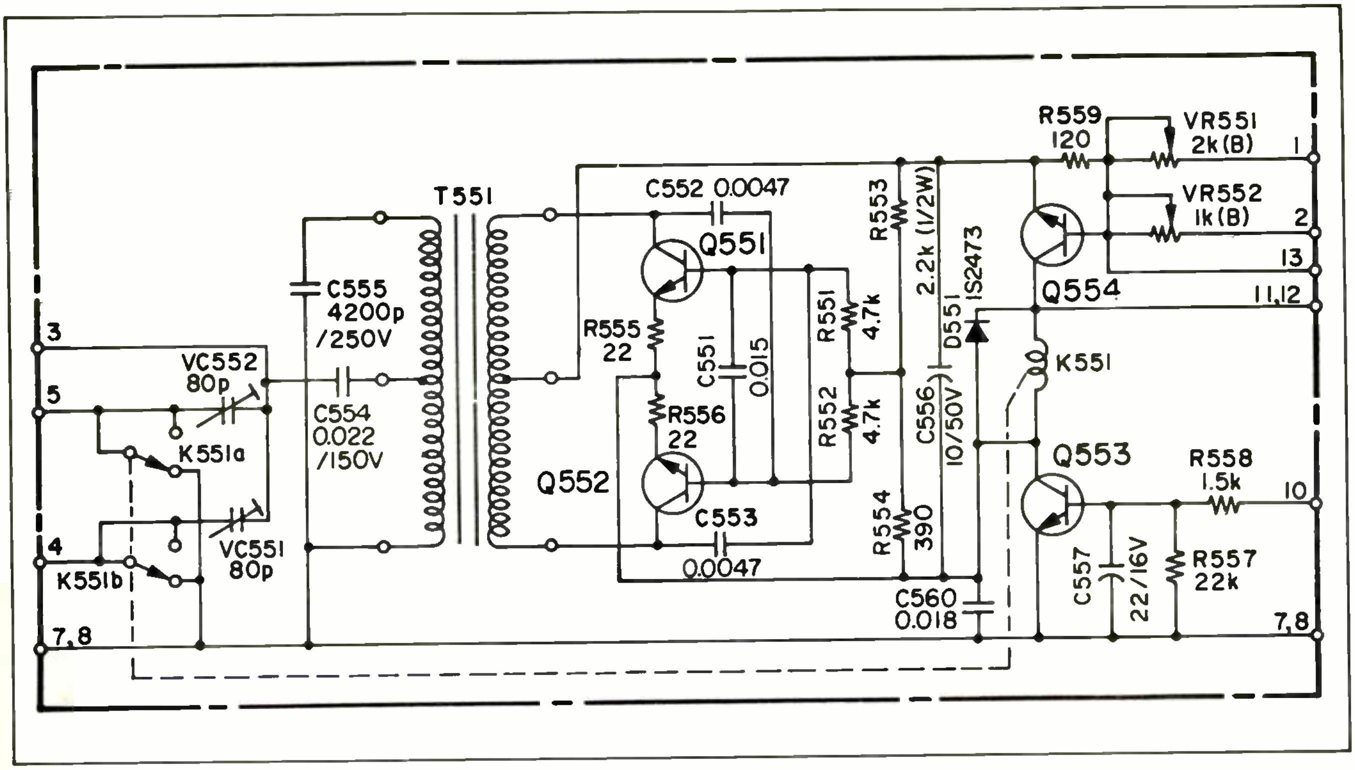


Figure 4-14. Bias Oscillator Schematic

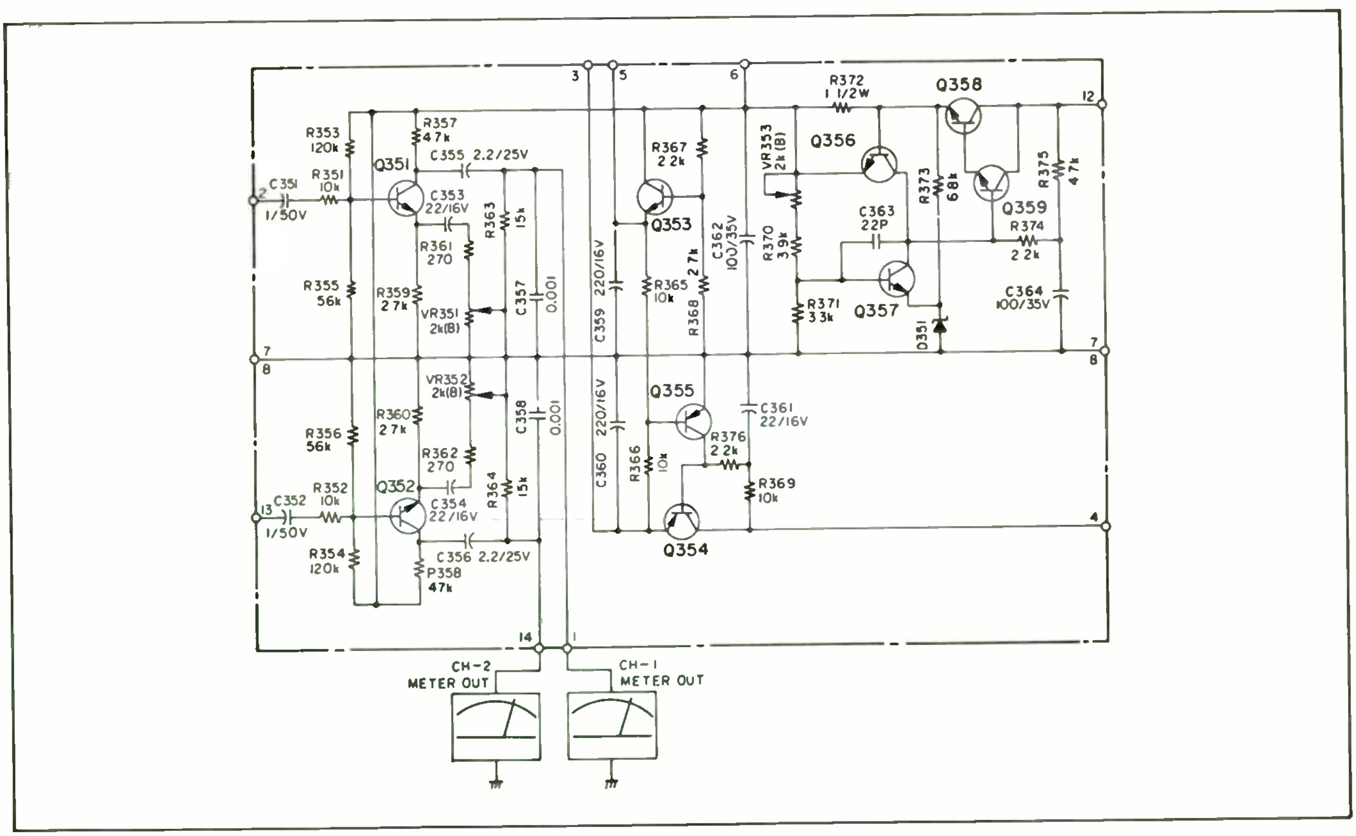


Figure 4-15. Meter Amplifier/Stabilizer Schematic

Table 4-3. State of Transistors in Record Amplifier for Various Speeds and Equalization Curves

TAPE SPEED	EQUALIZATION		Q601 (602)	Q605 (606)	Q607 (608)	Q613 (614)	Q615 (616)
High-Speed Models (15, 7-1/2 in/s)	NAB	H(15 in/s)	OFF	OFF	ON	OFF	ON
	NAB	L(7-1/2 in/s)	OFF	OFF	OFF	ON	OFF
	IEC	H(15 in/s)	ON	OFF	OFF	OFF	ON
	IEC	L(7-1/2 in/s)	ON	ON	OFF	ON	OFF
Low-Speed Models (7-1/2, 3-3/4 ins)	NAB	H(7-1/2 in/s)	OFF	OFF	OFF	OFF	ON
	NAB	L(3-3/4 in/s)	OFF	OFF	OFF	ON	OFF
	IEC	H(7-1/2 in/s)	ON	ON	OFF	OFF	ON
	IEC	L(3-3/4 in/s)	OFF	OFF	OFF	ON	OFF

record mode, which will make Q753 go on. At the same time, the bias oscillator will be oscillating. During repeated stop and record operations, if the bias oscillator is cut off at the same time that the stop command is given, the tape reel inertia may carry the tape past the erase head and there would be a small section of tape that is not erased. To prevent this, C750 is charged. Then the bias oscillator will continue for a short time after the stop command is given and all moving tape will be erased.

4-28. Switchboard B. Refer to schematic, Figure 4-16. Switchboard B PWA carries the following switch functions:

1. MONITOR switch – The reproduce signal or the record input signal can be selected for monitoring.

2. RECORD LEVEL switch – This switch is used to prevent overscale reading on the vu meters during high-level recording or when playing back a high-level recorded tape. It is used to reduce monitor output level. Attenuation levels for each switch position are: (1) 0 dB, (2) 3 dB, and (3) 6 dB.

3. Buffer amplifier – The buffer amplifier splits the monitor signal between the meter amplifier and the output/phone amplifier. The buffer amplifier is an emitter follower type, one-stage amplifier.

4. RECORD BIAS switch – This switch is used to select the record bias level for the type of tape being used. It selects the power voltage to be supplied to the bias oscillator.

5. RECORD EQualization switch – This switch selects the high-frequency response equalization to match the type of tape being used during recording. It also selects the high-frequency RC equalization circuit to be connected in parallel to the record amplifier.

4-29. Head Select PWA. See schematic, Figure 4-17. Since the ATR-700 has a synchronous reproduce mode, the head select PWA is used to perform the head switching function and the necessary signals for head switching. During synchronous reproduce mode, the record head is switched to a reproduce function as follows:

1. The reproduce head is disconnected from the reproduce amplifier, and the record head is connected to the reproduce amplifier. This is accomplished by switches S701a, S701b, and S701d; or S702a, S702b, and S702d for channels 1 or 2, respectively.

2. The record amplifier bias output is connected to ground through S701c or S702c.

3. To prevent possible erasure, the erase head is disconnected and a dummy coil is connected through S701e or S702e.

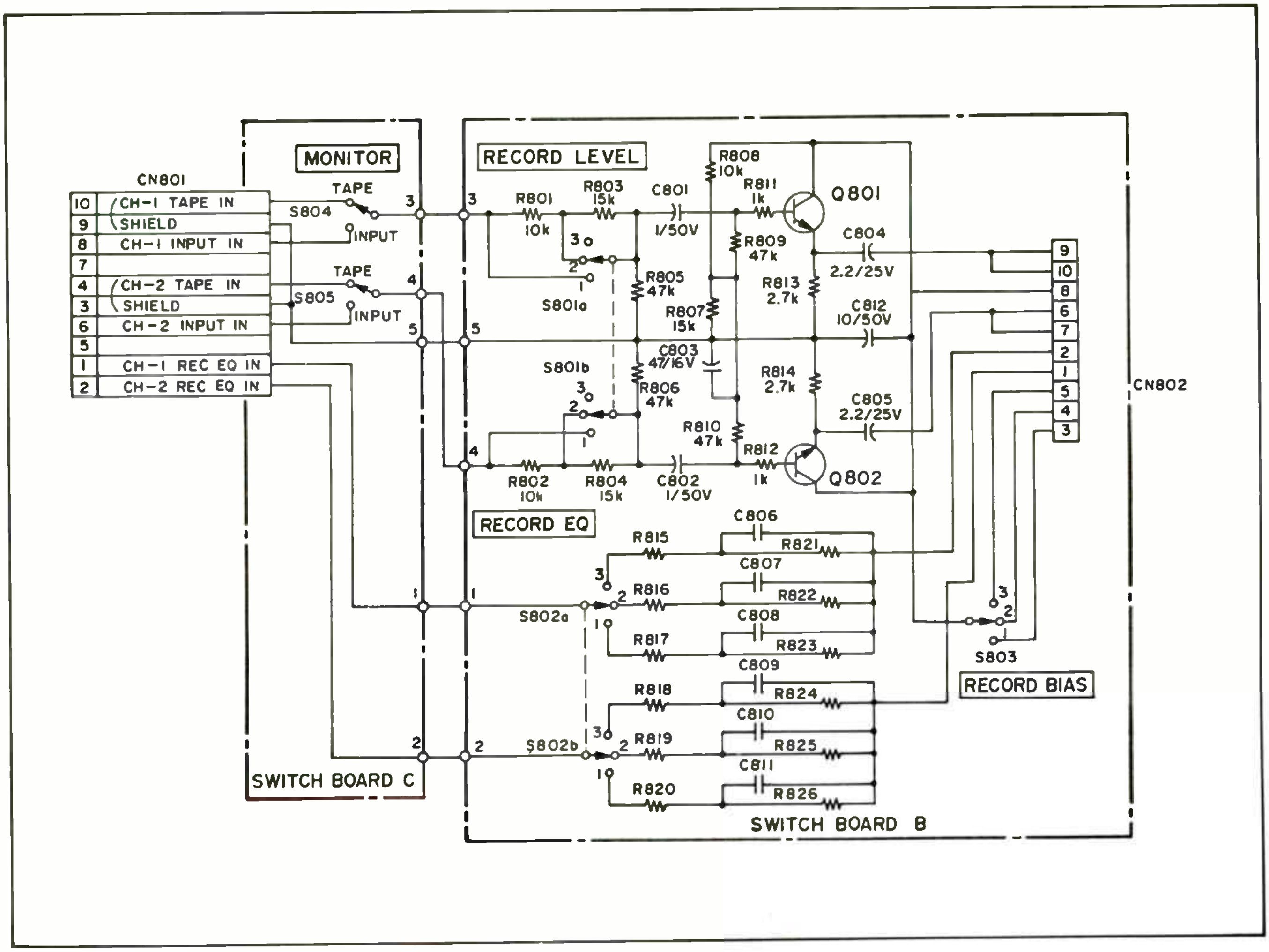


Figure 4-16. Switchboard B, C Schematic

4. Since the reproduce output voltage from the record head is about 12 dB lower than the reproduce voltage from the reproduce head, the reproduce amplifier gain has to be increased by this same amount. This gain change is achieved in the reproduce line amplifier. A +5-volt gain change signal is sent to the reproduce line amplifier through S701g or S702h.

5. Since recording is not possible on the channel in the synchronous reproduce mode, the record LED for that channel is extinguished by sending a +5-volt signal to Q751 or Q752 through S701f or S702f.

6. If both channel 1 and channel 2 switches (S701 and S702) are in synchronous reproduce position, a Record Defeat +5-volt signal is sent via S701f and S702g to the control circuit to inhibit the record mode.

The record head also has a longer gap than the reproduce head, which causes the gap loss to increase when the record head is used for reproduce. This causes losses in the high-frequency region. A capacitor (C701 or C702) is inserted in parallel with the head circuit to form a parallel resonant circuit to compensate for these losses. Resistors R701 and R702 provide "damping" action to prevent the resonant Q from getting too high.

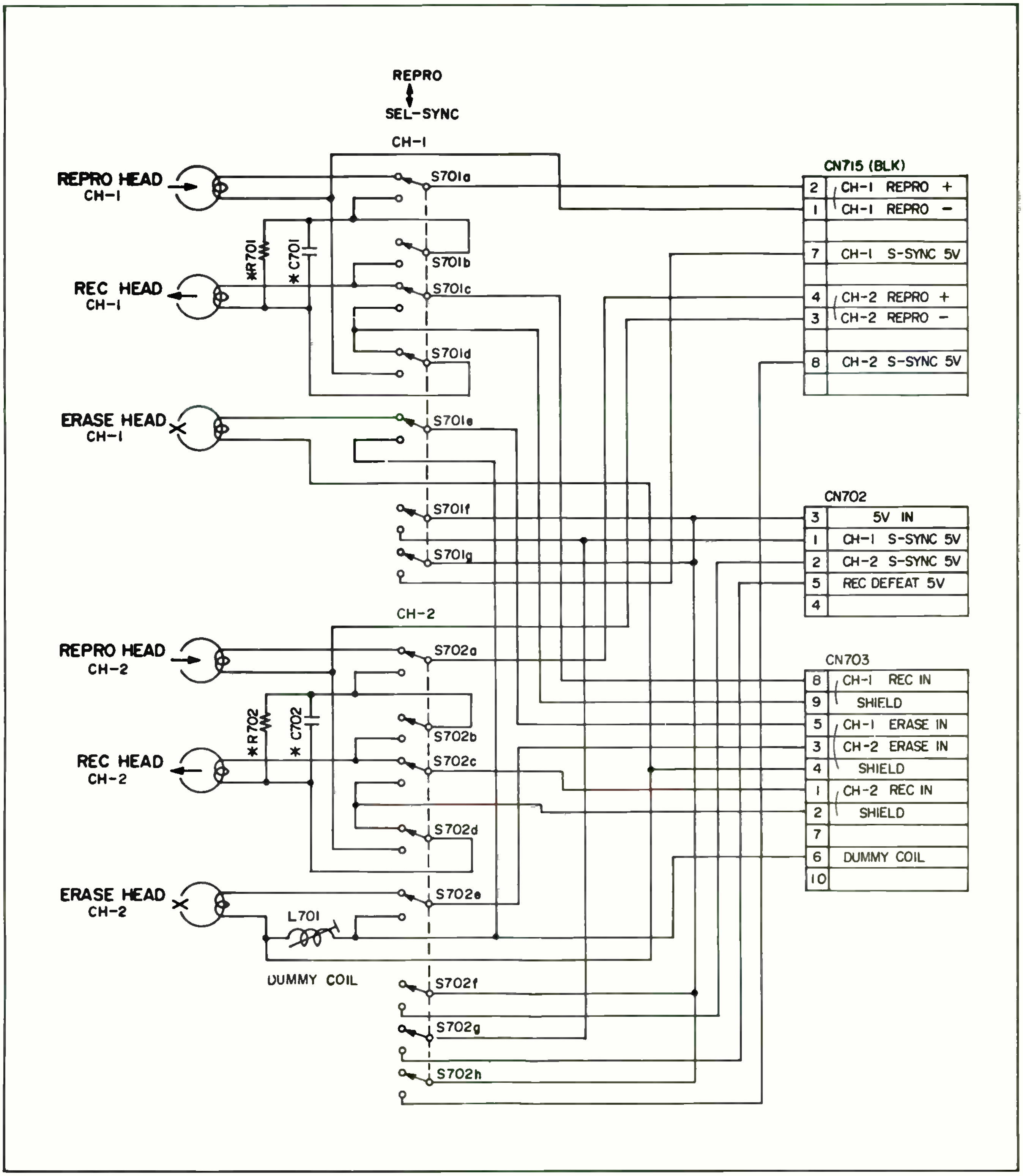


Figure 4-17. Head Assembly Schematic

SECTION 5
MAINTENANCE

This section provides preventive and corrective maintenance information on the ATR-700, along with check and adjustment procedures. The sections on *Cleaning, Demagnetizing,* and *Lubrication* include all preventive maintenance necessary on the ATR-700. Adjustments are located with the appropriate test procedures, grouped under *Electro-Mechanical Checks and Adjustments, Performance Tests,* and *Electrical Checks and Adjustments.* Information on part removal and replacement is found under the heading, *Replacement of Parts.* A Troubleshooting Flow Chart is included at the rear of this section as an aid in corrective maintenance.

5-1. TEST EQUIPMENT

Table 5-1 lists required test equipment and suggested types. Test equipment with equivalent or better specifications can be substituted for type suggested in the table.

Table 5-1. Test Equipment and Material

EQUIPMENT/MATERIAL	SUGGESTED TYPE*
Mechanical:	
Empty Reel	10-1/2-Inch (NAB) (Supplied)
Spring Scale	0-5 lb. Chatillon, Catalog 719-5 0-1 lb. Chatillon, Cat. 516-1
30-Inch String	Any
Head Cleaner	Ampex Part No. 4010823
Head Demagnetizer	Ampex Part No. 4010820
Isopropyl Alcohol	Any
Locking Paint	Glyptol
Lubrication Oil	Ampex Part No. 4010825 Esso No. Teresso 47 Socony No. Mobiloil DTE MED
Electrical:	
Oscillator	Hewlett Packard Model 204C or 209D
VTVM	Hewlett Packard Model 400D
Attenuator	Daven Model T-693
Oscilloscope	Tektronix 453
Distortion Meter	Hewlett Packard Model 302A

Table 5-1. Test Equipment and Material (Continued)

EQUIPMENT/MATERIAL	SUGGESTED TYPE*
Electrical (Continued):	
Wow and Flutter Meter	Micon B8100 or 8100W
Frequency Counter	Hewlett Packard Model 5221A
Wave Analyzer	General Radio 1900-A
Ampex Test Tapes	See Table 5-3
Blank Tape	Ampex No. 456 Ampex No. 406 Ampex No. 641 3M No. 250

*Or equivalent.

5-2. CLEANING

All components in the tape path should be cleaned at least once for every eight hours of use to remove accumulations of oxide deposited by the tape and dust or debris picked up from the air. Excess accumulation of oxide and debris can result in poor high frequency response and/or dropouts in the tape signal. In extreme cases, the tape deck may not record or reproduce at all. Since some types of tape oxide are not easily visible with the naked eye, regular cleaning schedules should be established rather than relying on observation to determine when cleaning is necessary.

Flip up the head housing and clean the heads and tape path as follows:

CAUTION

DO NOT ALLOW HEAD CLEANER TO COME IN CONTACT WITH OTHER COMPONENTS IN THE TAPE PATH.

1. Use Ampex head cleaner (part no. 4010823) to clean heads *only*. Use a cotton applicator or soft cloth moistened in the head cleaner and rub lightly over the heads.

2. Use isopropyl alcohol (or equivalent) to clean other parts which normally come into contact with the tape, such as the tension arms, impedance roller, tape guides, and capstan shaft.

5-3. DEMAGNETIZING

After long periods of use, the heads and other components in the tape path may become permanently magnetized. This residual magnetism, although normally very weak, can cause noise to be introduced on the tapes or can otherwise degrade the performance of the deck. To avoid this, tape path components should be demagnetized periodically (every 40 hours), using Ampex head demagnetizer (or equivalent) as follows:

1. Turn equipment power off and remove any recorded tape near the tape deck (tape could be partially erased by the demagnetizer).

2. Cover the demagnetizer with pressure-sensitive tape to prevent scratching the heads.

3. Hold the demagnetizer at least three feet from the recorder and connect it to a 110-120 Vac power source.

4. Lift the recorder head housing and slowly move the demagnetizer toward component to be demagnetized.

5. Lightly touch the two demagnetizer tips simultaneously to the surface of the component.

6. Holding the tips perfectly parallel to the component, move the demagnetizer slowly back and forth across the part several times.

7. Repeat this procedure for each head, capstan shaft, and guide post (all metal parts that come into contact with the tape).

8. Slowly draw the demagnetizer away from the recorder to a distance of at least three feet; then, disconnect the demagnetizer.

5-4. LUBRICATION

The ATR-700 employs oilless metal bearings throughout, and frequent lubrication is not required under normal operating conditions. At intervals of approximately one year, the following points may be lubricated lightly to prolong the useful operating life of your deck: pinch roller, capstan shaft, and digital counter roller. Lubricate only the indicated parts and be careful not to spill or apply oil to any other part, especially belt and driving surfaces or parts that contact the tape. If any oil is spilled or splashed, be sure to clean up the oil with isopropyl alcohol or equivalent.

5-5. Pinch Roller

1. Lift the head housing and unscrew the shiny cap on the pinch roller (see Figure 5-1) by turning it counterclockwise with your fingers.

2. Remove the pinch roller cap, pinch roller cover, small washer and pinch roller.

3. Apply a light coating of oil to the shaft extending from the pinch roller arm.

4. Replace the pinch roller, small washer, pinch roller cover and cap, and secure by turning the pinch roller cap clockwise.

5-6. Capstan Shaft

1. Locate the capstan shaft under the head housing and apply one or two drops of oil to the capstan shaft bearing.

2. Apply power to the recorder, hold the right tension arm toward the right side of the

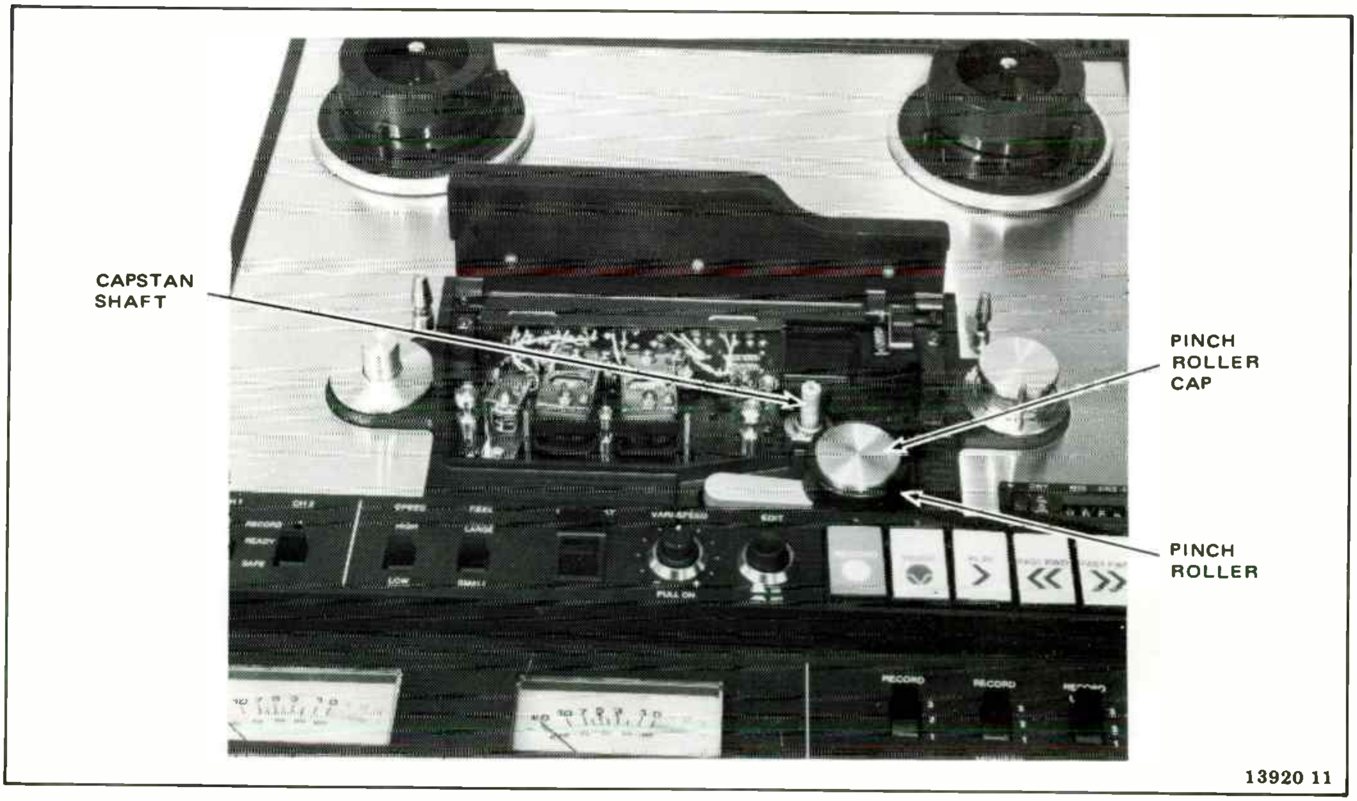


Figure 5-1. Lubrication Points

deck, and press the PLAY button to engage the pinch roller and capstan shaft.

3. After about 30 seconds, press the STOP button and use isopropyl alcohol to clean any excess oil off of the pinch roller and capstan shaft.

5-7. Digital Counter Roller

1. Remove the rear center panel from the ATR-700 by removing two screws on each side and three screws at the bottom of the ac power cord holder (see Figure 2-4).

2. Locate the digital counter roller below the takeup motor (see Figure 5-2) and apply one or two drops of light oil as shown in Figure 5-3.

3. Thread a tape on the recorder, turn on power, and run in play mode for a short time to allow the oil to penetrate into the roller; then clean off any excess oil with isopropyl alcohol. Be especially careful not to get any oil on the belt.

4. Replace rear center panel removed in step 1.

5-8. ELECTRO-MECHANICAL CHECKS AND ADJUSTMENTS

5-9. Panel Removal

In most of the following procedures, if adjustment is necessary, it must be performed through the rear of the machine with the rear top, center, and bottom panels removed and the rear connector panel lifted out of the way. If necessary, refer to Figure 2-4 for screw locations and remove panels as follows:

- Top panel: Remove two screws and two plastic feet from the rear of the deck and four screws from the top of the deck.

- Center panel: Remove two screws on each side and three screws below the ac cord holder.

- Bottom panel: Remove two screws and washers from underside of each foot and remove the two feet from the bottom of the unit. On the rear of the machine, remove the two screws and washers and the two small plastic feet that hold the panel in place.

Figure 5-2. Digital Counter Roller Location

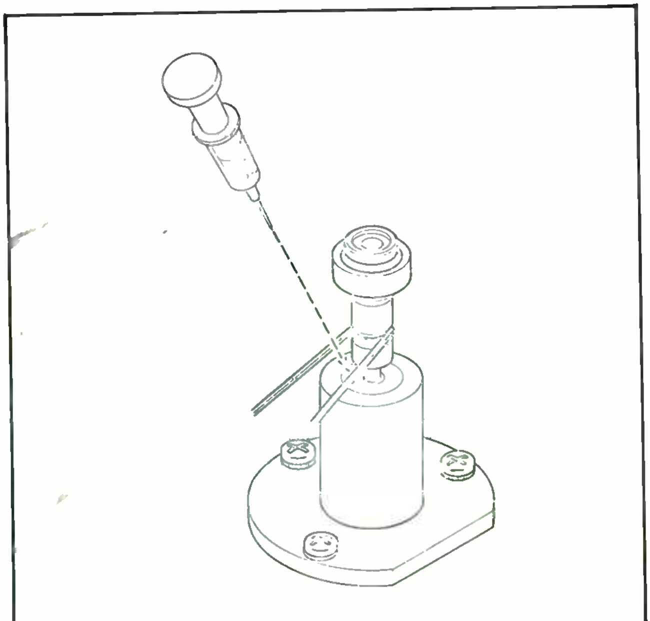


Figure 5-3. Digital Counter Roller Lubrication

- Side panels (if necessary): Remove four Philips screws and washers on each side.
- Rear connector panel: Do not remove, but swing out for easy access to components. Remove four screws shown in Figure 5-4. Take hold of top of panel and gently swing out.

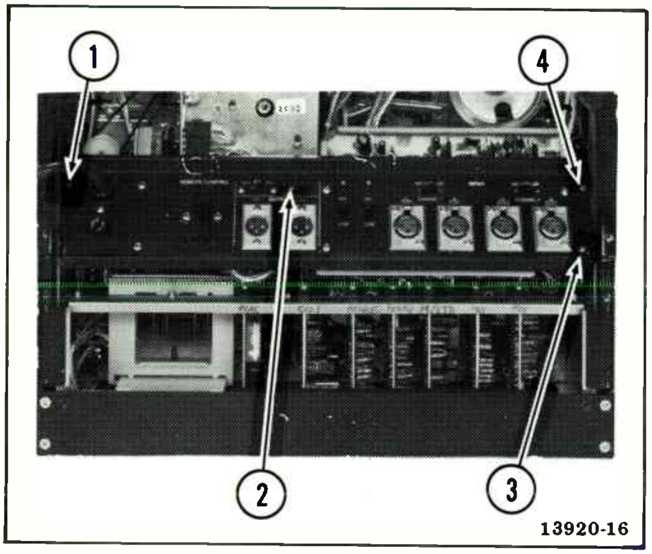


Figure 5-4. Connector Panel Screws

5-10. Capstan Shaft Tolerance Adjustment

1. On the front of the machine, lift the head housing and rotate the capstan shaft by hand to check that the capstan motor turns freely and without binding.
2. If the capstan shaft is binding, locate the capstan motor assembly on the rear of the recorder/reproducer (see Figure 5-5). Loosen the locknut on the adjustment screw.
3. Turn the adjustment screw (clockwise and/or counterclockwise) until the capstan shaft turns freely.
4. Tighten the locknut and secure the adjustment with locking paint (see Table 5-1).

5-11. Coarse Head Adjustment

Proper head alignment is very important in the ATR-700 as it affects frequency response and tracking during both play and record modes. The tape must contact each head so that the gap is centered in the tape contact area, and the tape must contact the top and bottom of the head equally. Perform the check and adjustments below and then use proper test tapes to align heads electrically. (Refer to paragraph 5-30.)

Check tape wrap and head zenith as follows:

1. Lift the head housing and use a black grease pencil or crayon to lightly cover the face of each head.
2. Thread a blank tape on the machine and run the recorder/reproducer in play mode at the higher tape speed for approximately ten seconds.
3. Lift the tape from the heads and examine the coating on each head.
   a. The area cleaned by the tape should extend an equal distance from each side of the head gap (in the center of the head). This checks tape wrap. If adjustment is needed, refer to step 4.
   b. Check that the area cleaned by the tape is equally clean at top and bottom of contact area. If not, refer to step 5 for adjustment.
4. To adjust tape wrap, refer to Figure 5-6 and proceed as follows:
   a. Head height: Adjust height and tilt screws until the head core for track 1 (inner core) is even with the inner edge of the tape. (See Figure 5-7 for exact tape positioning.)
   b. Azimuth: Adjust azimuth screw so that the gap of the head is perpendicular to tape travel.
5. To adjust head zenith (tilt), use height and tilt adjustment screws shown in Figure 5-6 until head surface is parallel to tape guide surface.
6. Proceed to *Electrical Adjustments* section, paragraph 5-30, to complete head alignment.

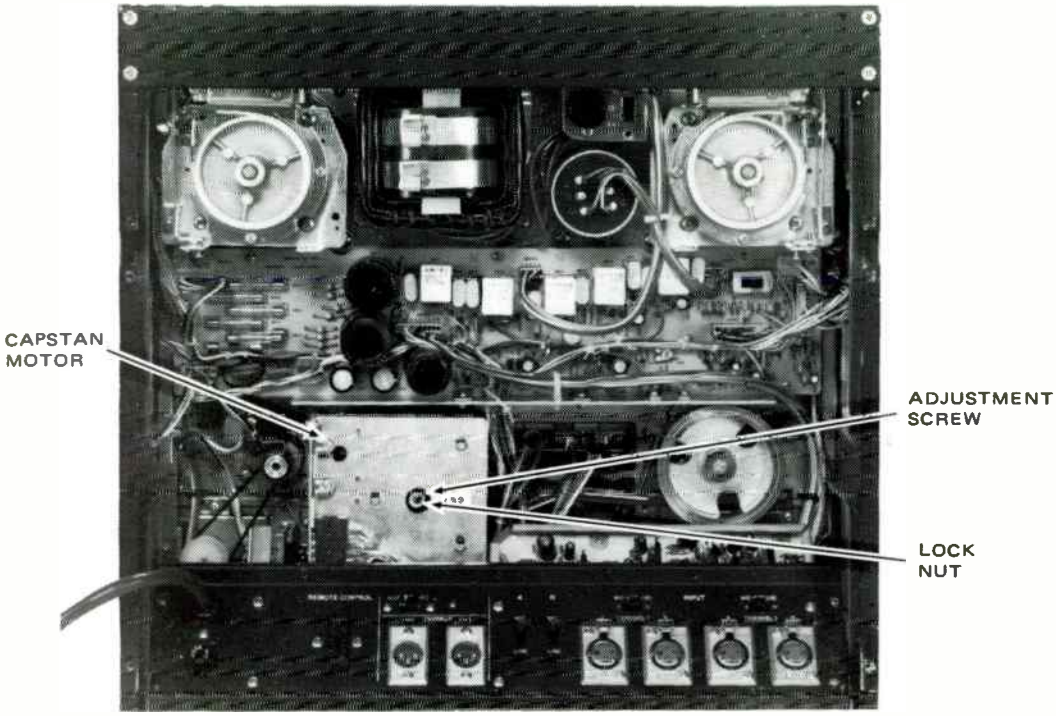


Figure 5-5. Capstan Shaft Tolerance Adjustment

5-12. Pinch Roller Pressure Check and Adjustment

Pinch roller pressure is supplied by the pinch roller solenoid no. 1. Pressure measurement must be taken while the machine is in play mode so that the solenoid plunger is fully bottomed. Proceed as follows:

1. Turn on power switch.

2. Load a blank tape on the recorder/reproducer or block the shut-off arm (right tension arm) in the "on" position (toward the right side of the deck).

3. Lift the head housing and remove the pinch roller cap and protective cover (with washer) by turning the cap counterclockwise.

4. Install a screw in the pinch roller shaft and connect a 0 to 5 lb spring scale using a piece of string approximately 30 inches long as shown in Figure 5-8.

5. Press the PLAY button, hold the spring scale as shown in the figure, and slowly pull against the pinch roller.

6. Pull slowly and note the reading on the spring scale at the moment that the pinch roller stops turning (loses contact with the capstan shaft). The spring scale should indicate 67 ±7 oz (1900 ±200g).

7. If adjustment is necessary, turn power off, and set machine on its side. If center and bottom rear panels are still on the deck, remove them and set connector panel aside as explained in paragraph 5-9.

8. Adjust pinch roller pressure as follows:

   a. From the rear of the deck, use a long Philips screwdriver to loosen the three

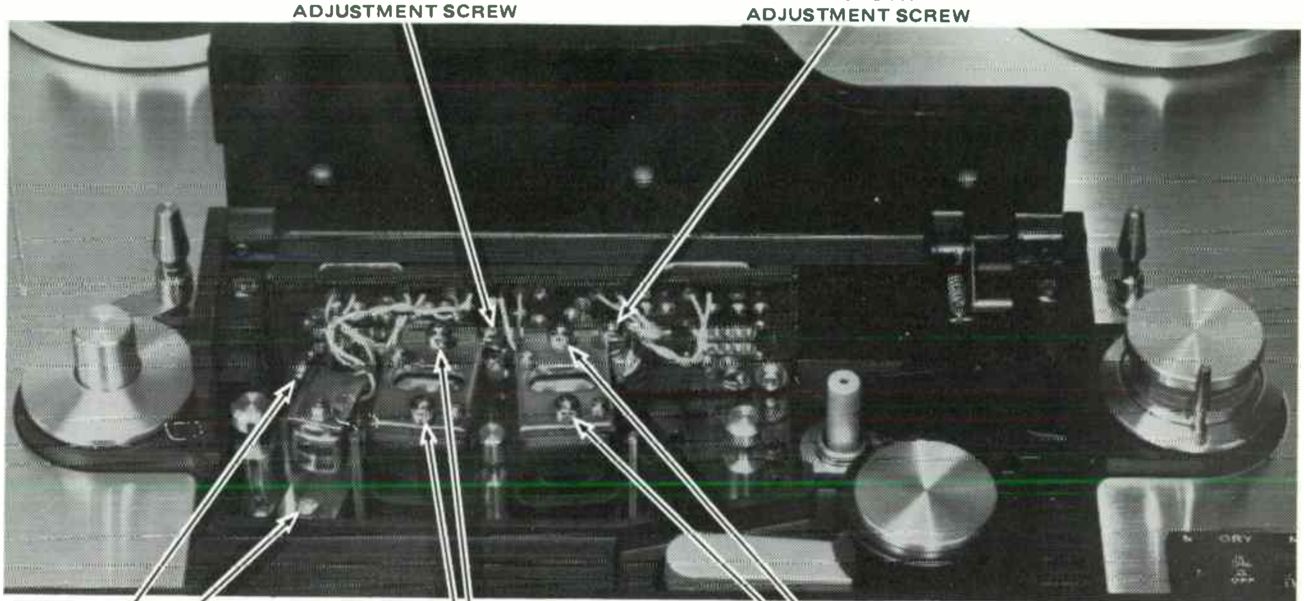


Figure 5-6. Head Alignment

mounting screws in the pinch roller solenoid as shown in Figure 5-9.

b. Through the bottom of the deck, use a long Philips screwdriver to loosen the screw beneath the solenoid, shown in Figure 5-10.

c. Move the solenoid up (screw in) to decrease the pressure, or down (screw out) to increase the pressure. Adjust this screw until it contacts the solenoid mounting screw as shown in Figure 5-11.

d. Tighten all screws.

e. Turn on power and repeat steps 5 and 6. If pressure is within specifications, proceed to step 8f. If spring scale indication is not within specifications, repeat steps 8a through 8d.

f. Turn on power, block shut-off arm to the on position, and run the machine in play mode for a few minutes. Confirm that the solenoid plunger fully bottoms in the solenoid after the solenoid has warmed up.

5-13. Tension Measurements and Adjustments

Table 5-2 summarizes correct play and fast forward tension readings. All measurements must be made with the shut-off arm (right tension arm) in the "on" position (toward the right side of the deck).

5-14. Back Tension (Play Mode). Measure and adjust back tension as follows:

1. Load an empty 10-1/2 inch large-hub (NAB) reel on the supply (left) reel table.
2. Turn power on and set the REEL hub selector to SMALL.
3. Connect a piece of string approximately 30 inches long to the reel hub and wind several turns of string counterclockwise around the reel hub. Attach a spring scale (0 to 1 lb) to the end of the string.

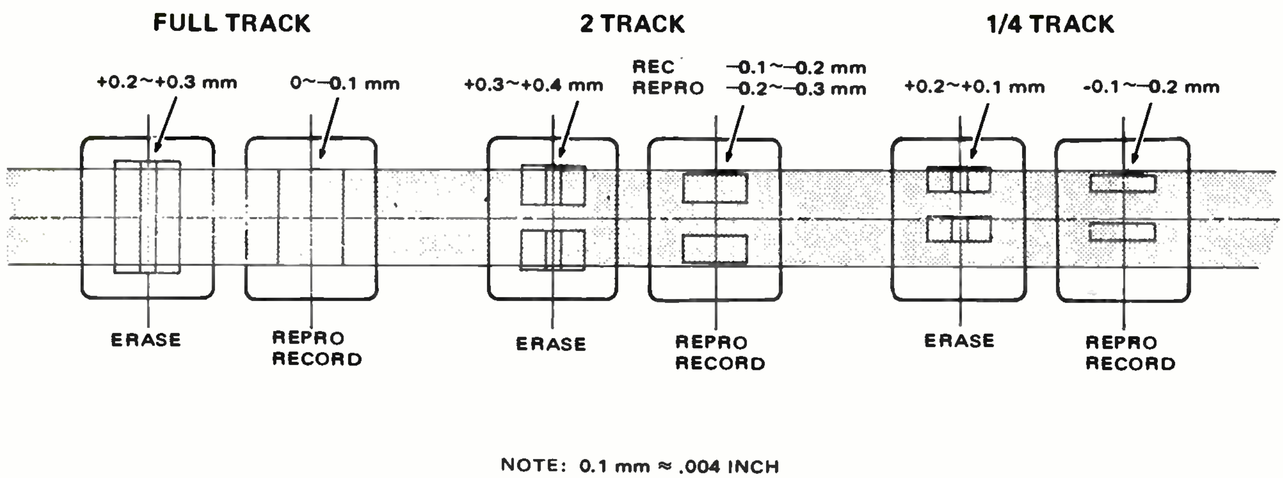


Figure 5-7. Tape Positioning for Head Alignment

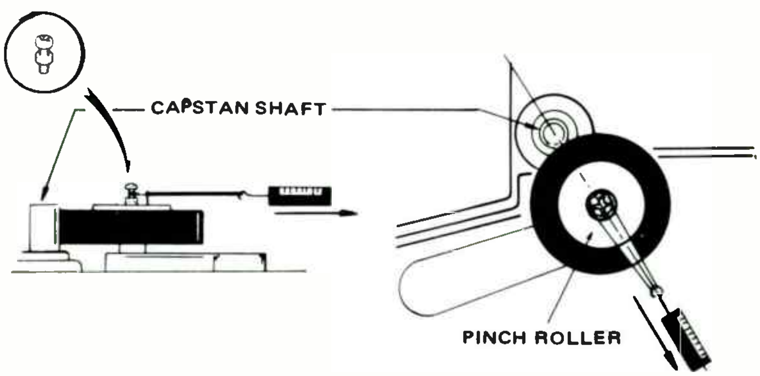


Figure 5-8. Pinch Roller Pressure Measurement

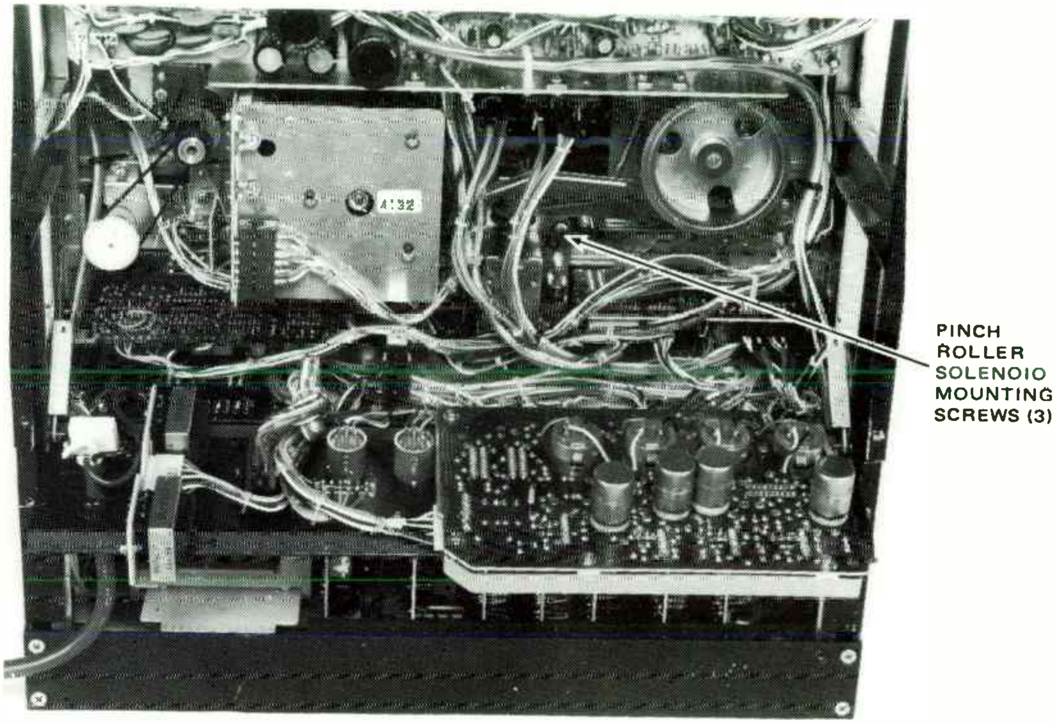


Figure 5-9. Pinch Roller Solenoid Mounting Screws Location

4. Pull on the scale slightly to remove slack in the string, and then press the PLAY button.
5. Refer to Figure 5-12 and, with a steady, smooth motion, pull the spring scale away from the reel against the motor torque as shown in the figure.
6. Note the force indication on the spring scale; then press the STOP button. Reading should be ≈2.5 oz (75 grams).
7. If reading is not correct, turn power off and adjust as follows:
   a. If top rear panel is still on the machine, remove as described in paragraph 5-9.
   b. On the top of the machine, refer to Figure 5-13 and locate resistor R182. Loosen screw and adjust in direction indicated in Figure 5-13 to increase or decrease tension.
   c. Turn power on and again measure back tension. If not ≈2.5 oz (75g), turn power off and repeat 7b until correct.
8. With power on, set REEL hub size selector to LARGE, and repeat steps 3 through 6.

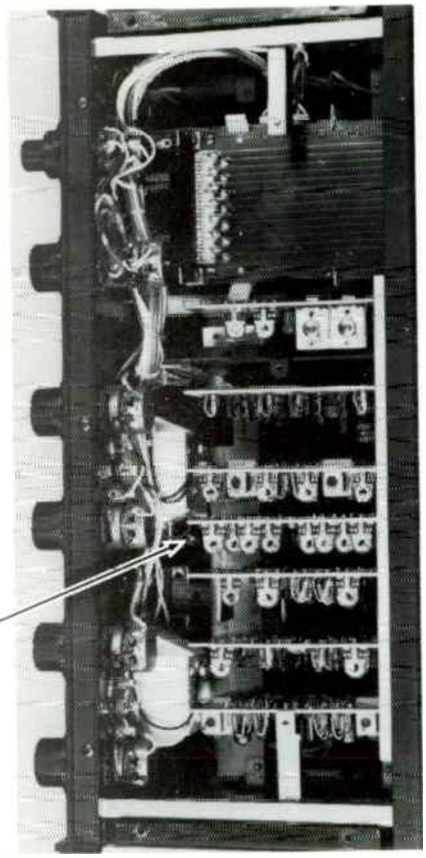


Figure 5-10. Pinch Roller Adjustment Screw Location

Correct reading should now be 4.0 ±1.5 oz (110 ±50g).

9. If tension is not within these limits, turn power off and again adjust R182 as in step 7 until both readings are as close to specifications as possible.

10. Remove scale, string, and reel from supply table.

5-15. Takeup Tension (Play Mode). Measure and adjust takeup tension as follows:

1. Load an empty large hub (NAB) reel on the takeup (right) reel table.

2. Turn power on and set REEL hub size selector to SMALL.

3. Connect string (30 inches long) to the reel hub and wind several turns of string clockwise around the reel hub. Attach spring scale (0-1 lb) to the end of the string.

4. Pull on the scale slightly to remove slack in the string. Then press the PLAY button.

5. Allow the rotation of the reel to draw the scale toward the reel hub. Then hold back on the spring scale with enough force to get a reading of the motor force on the spring scale (see Figure 5-12).

6. Note the reading on the scale; then press the STOP button. Reading should be ≈3 oz (87.5g).

7. If reading is not correct, turn power off and adjust as follows:

   a. If top panel is still on the machine, remove as explained in paragraph 5-9.

   b. On the top of the machine, refer to Figure 5-13 and locate resistor R181. Loosen screw and adjust R181 in direction indicated to increase or decrease tension as necessary. Tighten screw.

   c. Turn power on and again measure takeup tension. If not ≈3 oz (87.5g), turn power off and repeat 7b until correct.

8. With power on, set REEL hub size selector to LARGE and repeat steps 3 through 6. Reading should now be 5.0 ±1.5 oz (135 ±50g).

9. If tension is not within these limits, turn power off and again adjust R181 as in step 7 until both readings are as close to specifications as possible.

10. Remove scale, string, and reel from takeup table.

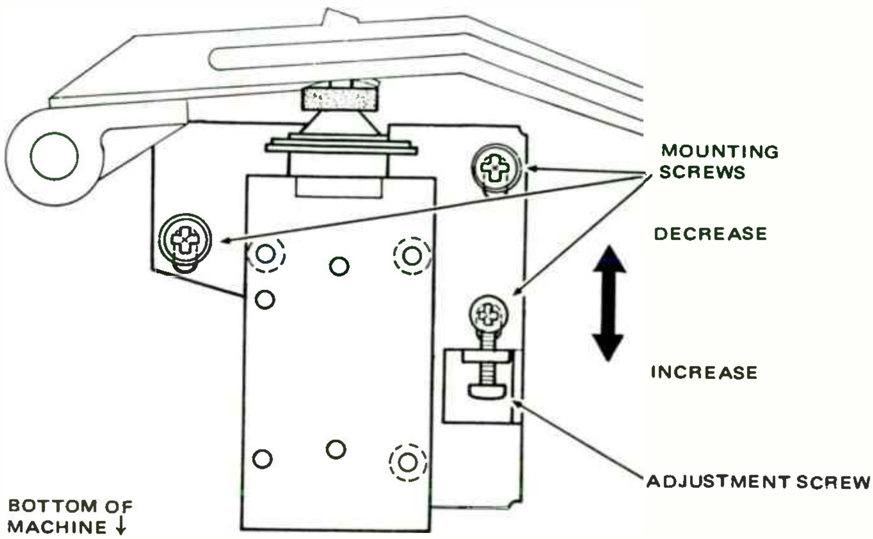


Figure 5-11. Pinch Roller Pressure Adjustment

Table 5-2. Tension Measurements

REEL HUB SELECTOR SETTING	REEL TABLE USED	MEASUREMENT	PROPER SPECIFICATION (APPROXIMATE)
SMALL	Supply	Back Tension (Play)	2.5 oz (75g)
LARGE	Supply	Back Tension (Play)	4.0 ±1.5 oz (110 ±50g)
SMALL	Takeup	Takeup Tension (Play)	3 oz (87.5g)
LARGE	Takeup	Takeup Tension (Play)	5.0 ±1.5 oz (135 ±50g)
SMALL	Supply	* Fast Winding Back Tension	0.5 oz (20g)
LARGE	Supply	* Fast Winding Back Tension	1 oz (30g)
SMALL	Takeup	* Fast Winding Takeup Tension	14 oz (400g) or greater
LARGE	Takeup	* Fast Winding Takeup Tension	16.5 oz (475g) or greater

*Specifications for takeup and back tension are the same for fast forward and fast rewind modes.

5-16. Fast Winding Back Tension. Measure back tension in fast forward (or fast rewind) mode as follows:

1. Load an empty large hub (NAB) reel on the supply reel table.
2. Turn power on and set REEL hub size selector to SMALL.
3. Connect 30-inch string to the reel hub and wind counterclockwise several times around the reel hub.
4. Attach spring scale (0-1 lb) to end of string and pull slightly to remove slack (see Figure 5-12A).

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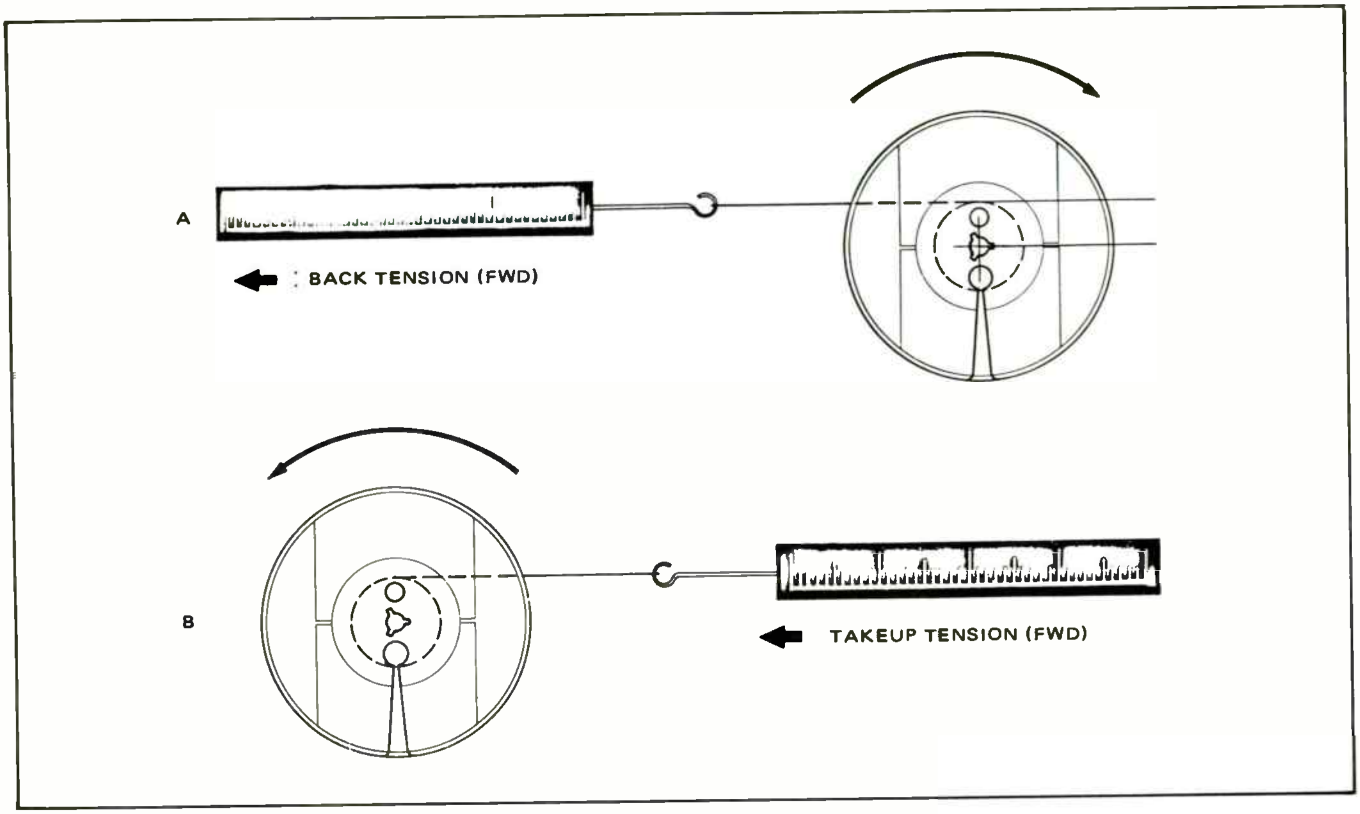

Figure 5-12. Tension Measurement

5. Press FAST FWD (or FAST RWD) button and pull on the spring scale until the reel begins to turn. Take a reading from the scale, then press the STOP button. Tension should be 0.5 oz (20g).

6. Change REEL selector to LARGE and repeat steps 3 through 5. Reading should now be 1 oz (30g).

7. Remove string and scale from supply table.

5-17. Fast Winding Takeup Tension. Measure fast winding takeup tension in fast forward (or fast rewind) modes as follows:

1. Load empty large hub reel on the takeup reel table.

2. Turn power on and set REEL hub size selector to SMALL.

3. Connect string to reel hub and wind clockwise several times around the reel hub (Figure 5-12B).

4. Attach 0-5 lb spring scale to the string and pull slightly to remove slack.

5. Press FAST FWD (or FAST RWD) button and slowly allow the rotation of the reel to pull the spring scale toward the reel. As the spring scale moves toward the reel, note the scale when the reading becomes steady. Then press STOP. Reading should be 14 oz (400g) or greater.

6. Change REEL hub size selector to LARGE and repeat steps 3 through 5. Reading should now be 16.5 oz (475g) or greater.

7. Remove string and scale.

5-18. Brake Torque Measurement and Adjustment

Measure and adjust brake torque as follows:

1. Load an empty large hub (NAB) reel on either reel table.

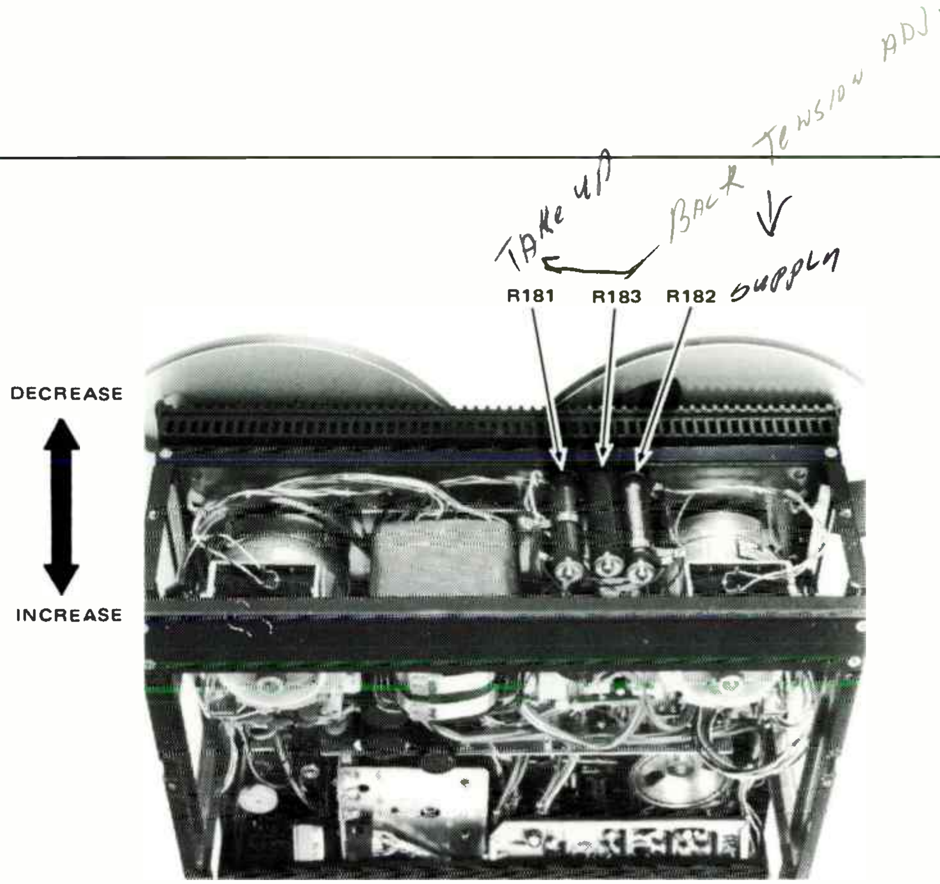

Figure 5-13. Tension Adjustment Resistors

2. Wind a 30-inch string counterclockwise around the reel and attach a 0-5 lb spring scale to the end of the string.
3. With power off or machine in STOP, pull the spring scale in the direction indicated in Figure 5-14A and read the indication on the scale. Reading should be 16 ±1.5 oz (450 ±50g).
4. Next wind the string clockwise around the reel and pull the spring scale as in Figure 5-14B. Scale should now read 7 ±1.5 oz (200 ±50g). Repeat the check again winding string counterclockwise.
5. If values do not meet specifications, adjust brake torque as follows:
   a. If still on machine, remove top and center rear panels as explained in paragraph 5-9.
   b. Through the back of the deck, locate brake assembly for reel being measured (supply or takeup), refer to Figure 5-15, and loosen screw 3 and screw 4. (The figure shows supply reel assembly but equivalent screws on takeup motor are easily identifiable.)
   c. Adjust screw 5 (Figure 5-15) up to tighten (increase tension), or down to loosen (decrease tension). Then tighten screws 3 and 4 and recheck brake torque.
   d. Repeat steps b and c until brake torque is within specifications.
6. Transfer the empty reel to the other reel table and check brake tension as in steps 2 through 4. If adjustment is necessary, perform step 5.
7. Remove string and scale.

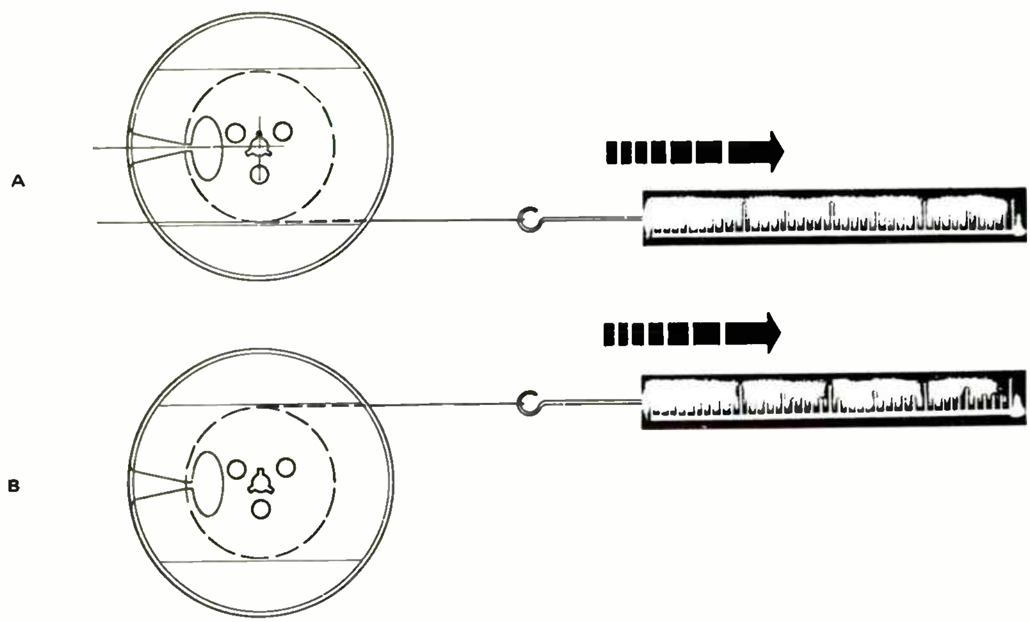

Figure 5-14. Brake Torque Measurement

5-19. Brake Band and Drum Clearance Adjustment

1. If center and top rear panels are still on the deck, remove as explained in paragraph 5-9.

2. Refer to Figure 5-15, turn on power, depress PLAY button, and visually check that the brake band does not contact the brake drum. Check both right and left brake assemblies.

NOTE

In order for reel motors to turn when PLAY button is pressed, a tape must be threaded on the machine *or* the shut-off arm (right tension arm) must be blocked to the "on" position (toward the right side of the deck).

3. If brake band touches brake drum, turn off power, loosen screws 1 and 2 in Figure 5-15 and move the solenoid until the brake band and drum do not make contact. Keep the solenoid stroke as short as possible.

4. Tighten screws, apply power, and recheck clearance while in PLAY.

5. If adjustment has been made, recheck brake torque as in paragraph 5-18.

5-20. PERFORMANCE TESTS

This section provides a condensed procedure for checking the overall condition of the ATR-700. Perform these tests at regular intervals to ensure that the recorder/reproducer is operating in accordance with specifications; following repairs to equipment that may affect performance; and whenever the equipment appears to be malfunctioning. The performance tests check tape speed and flutter, head alignment, reproduce frequency

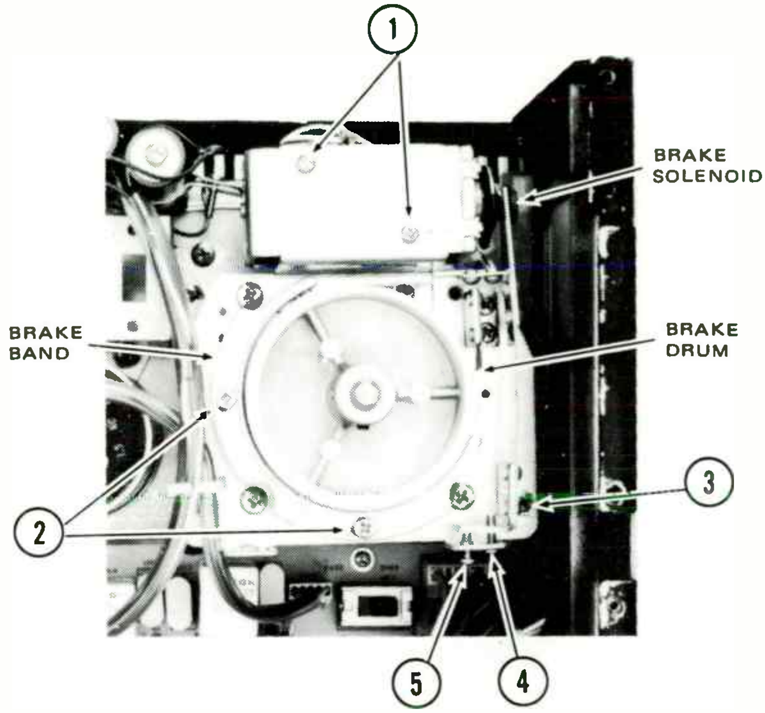

Figure 5-15. Brake Assembly

response, reproduce signal-to-noise ratio, overall frequency response, and overall signal-to-noise ratio. For more detailed procedures, or for adjustment instructions, see *Electrical Checks and Adjustments,* paragraph 5-27.

5-21. Test Equipment

Test equipment required is listed in Table 5-1 along with suggested models. Test tapes needed for these tests are given in Table 5-3. These test tapes are precisely recorded in an Ampex laboratory and must be correctly handled to retain their accuracy. The following requirements especially should be observed:

1. Clean and demagnetize heads and tape path prior to loading test tapes. Cleaning and demagnetizing procedures are given in paragraphs 5-2 and 5-3.
2. Never store test tapes in areas where there are temperature or humidity extremes.
3. Remove test tapes from equipment only after a normal play run, never after a fast winding mode.

CAUTION

TAKE CARE NOT TO INITIATE RECORD MODE WHEN TEST TAPES ARE LOADED ON THE MACHINE, OR THE TAPE WILL BE ERASED.

After extensive use of test tapes, the level of high frequency tones may drop as much as 2 dB and flutter indications may rise, even though actual flutter on the recorder remains unchanged. Flutter increase is caused by demagnetization of the recorded signal from repeated runs, tape deformation due to tape tension and changes in temperature or humidity, and increased dropouts resulting from tape wear.

Thread the test tape in the normal threading path from supply to takeup turntable. During alignment

Table 5-3. Ampex Test Tapes

TEST	TAPE SPEED	SIGNAL/EQUALIZATION	AMPEX PART NUMBER
Tape Speed and Flutter	3-3/4 in/s 7-1/2 in/s 15 in/s	3,000 Hz signal 3,000 Hz signal 3,000 Hz signal	31336-01 31326-01 31316-01
Level	7-1/2 in/s 15 in/s	700 Hz signal 700 Hz signal	31325-01 31315-01
Alignment	3-3/4 in/s 7-1/2 in/s 7-1/2 in/s 15 in/s 15 in/s	NAB/IEC NAB IEC NAB IEC	4690037-01 31321-01 4690014-01 31311-01 31313-01

procedures, the rewind and fast forward modes may be used as necessary. After alignment, wind the tape completely on the takeup reel, interchange reels, thread the tape, and place the recorder/reproducer in reproduce mode to wind the tape back to its original reel.

All tones on 15-in/s standard alignment tapes are recorded at operating level. On slower speed tapes, all tones are recorded 10 dB below operating level, except for the last tone.

5-22. Tape Speed and Wow and Flutter Test

Flutter meters are sensitive to amplitude modulation that results from poor head-to-tape contact or from signal dropouts. Therefore, it is important that the heads be cleaned before making flutter tests. The following procedure applies to the use of a Micon (Bahr) Model 8100 flutter meter. If a different meter is used, follow the instructions of the manufacturer.

Proceed as follows:

1. Disconnect all equipment interconnections except the ac power plug.

2. Refer to Table 5-3 and determine the appropriate test tape to use for tape speed being checked. Thread the tape on the machine with the tape on the takeup reel table. Rewind the tape to the reel on the supply table. (This allows the test tape to be stored without rewinding.)

3. Connect a frequency counter and the wow and flutter meter to the output connectors.

4. Set the flutter meter controls as follows:

   a. Demod Input Select to line of 100 MV –5V.

   b. Meter Select to Demod.

   c. Weighting control to NAB Unweighted.

   d. % Full Scale Selector to 0.1 for 7-1/2 in/s and 15 in/s or to 0.3 for 3-3/4 in/s.

5. Set SPEED selector to match tape speed being checked. Set SIZE selector to match hub size of reel being used. Set SYNC/REPRO switch to REPRO and MONITOR switch to TAPE.

6. Put the recorder/reproducer in play mode. The Normal lamp on the flutter meter should light, indicating that the reproduce output is at the correct level for the meter.

7. Check on the frequency counter that the deck output is 3,000 Hz ±9 Hz.

8. Check that the flutter meter reads: 0.08% Wrms or less for 7-1/2 in/s and 15 in/s; 0.12% Wrms or less for 3-3/4 in/s.

9. Allow the test tape to completely unwind from the supply reel.

10. Label test tape reel "Rewind Before Using" and store in safe place.

5-23. Reproduce Signal-to-Noise Ratio

1. Connect the output connectors of the deck through an "A" weighted filter (see Figure 5-16) to a vtvm, and terminate in 600-ohm load.

2. Set the RECORD LEVEL switch to position 1 and the OUTPUT level control to the click (preset) position.

3. Hold the right tension arm to the "on" position (far right) and press the PLAY button.

4. Measure the output levels on both channels and calculate signal-to-noise ratio by the formula signal-to-noise (as measured on vtvm) +4 dBm (standard output level) + 4 dB (for filter loss). The signal-to-noise ratio should be 55 dB or greater on quarter-track models and 60 dB or greater on two-track and full-track models.

5-24. Reproduce Frequency Response

Reproduce frequency response is checked using a standard alignment tape that matches the tape speed and equalization curve being checked (see Table 5-3). When using a standard alignment tape, recorded the full width of the tape, to check a recorder/reproducer with heads less than the full width of the tape (i.e., 2-track and 1/4-track models), the response readings below 700 Hz are invalid. This is a result of the low-frequency fringing effect of the reproduce head. The reproduce head will pick up additional flux beyond the track width of the head as the frequency decreases. Therefore, a full-track standard alignment tape will show a rising response as the frequency decreases. Do *not* readjust the low-frequency equalization to attempt to correct flat response from the standard tape. When reproducing a tape made on a recorder with the same track width, there will be no fringing since there is no flux recorded beyond the track width of the head.

Proceed as follows:

1. Thread the recorder/reproducer with the standard alignment tape that matches the tape speed and equalization curve being checked.

2. Connect the output connector of channel 1 to a vtvm.

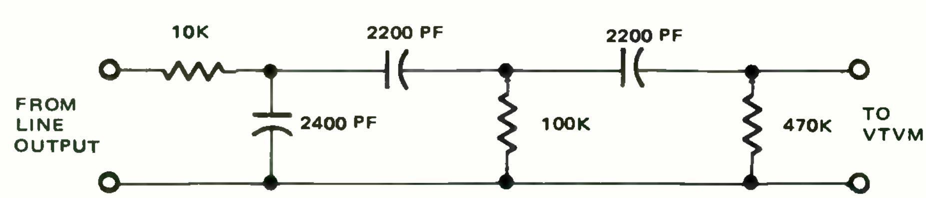

Figure 5-16. ASA "A" Weighted Filter

3. Set MONITOR switches to TAPE and SYNC/REPRO switches to REPRO.

4. Press the PLAY pushbutton to put the machine in normal play mode.

5. Measure the output signal and check that the frequency range is within the following limits:

3-3/4 in/s	40 Hz to 7.5 kHz ±2 dB
7-1/2 in/s	40 Hz to 100 Hz +3, −2 dB 100 Hz to 15 kHz ±2 dB
15 in/s	40 Hz to 100 Hz ±3 dB 100 Hz to 18 kHz ±2 dB

6. On two-track and quarter-track models, set the synchronous reproduce switches to SYNC and again measure the output signal. The range should now be as follows:

7-1/2 in/s	100 Hz to 8 kHz ±4 dB
15 in/s	100 Hz to 12 kHz ±2 dB

7. On two-channel machines, connect the vtvm to the channel 2 output connector and repeat steps 3 through 5.

5-25. Overall Frequency Response

Normally the overall frequency response check is run for both speeds of the deck with the RECORD BIAS, RECORD EQ, and RECORD LEVEL switches checked at positions 1, 2, and 3, and for both NAB and IEC equalization settings. However, if the desired recording speed, type of tape to be used, and equalization curve is predetermined and constant, it is only necessary to check the specific configuration which will be used.

Proceed as follows:

1. Refer to Table 5-4 and select one of the blank tapes listed, and load it onto the machine. Set the RECORD EQ, RECORD BIAS, and RECORD LEVEL switches as indicated in the table.

2. Set the SPEED selector switch and the EQualization switch (on the rear connector panel) to the desired tape speed and equalization.

3. Refer to Figure 5-17 and connect an oscillator through an attenuator to the input connectors to set the input level to −10 dBm. Connect a vtvm to the output connector of channel 1.

4. Turn on power and depress RECORD and PLAY buttons simultaneously to begin recording.

5. Refer to the chart below and sweep the frequency of the input oscillator across the range of frequencies for the speed being checked. Measure the output level on the vtvm and check that the level falls within the frequency response limits indicated.

TAPE SPEED	FREQUENCY RESPONSE LIMITS
3-3/4 in/s	40 Hz to 7.5 kHz ±2 dB
7-1/2 in/s	40 Hz to 100 Hz +3, −2 dB 100 Hz to 15 kHz ±2 dB
15 in/s	40 Hz to 100 Hz ±3 dB 100 Hz to 15 kHz ±2 dB

6. On two-track and quarter-track models, connect the vtvm to the output connector of channel 2 and repeat steps 4 and 5.

7. If recorder/reproducer will be used with other types of tape, speeds and/or equalization settings, change SPEED and/or EQ setting(s), load the appropriate tape, and repeat steps 4 and 5.

5-26. Overall Signal-to-Noise Ratio

1. Disconnect all input signals from the input connectors. Connect channel 1 output connector through an A-weighted filter to a vtvm. (See Figure 5-16 for schematic of filter.)

2. Load an Ampex No. 456 blank tape on the recorder/reproducer.

3. Make the following switch settings:

   RECORD EQ switch to position 1;

   RECORD BIAS switch to position 2;

   RECORD LEVEL switch to position 3;

   CHANNEL 1 and CHANNEL 2 A/B input controls to minimum;

Table 5-4. RECORD Switch Settings for Four Types of Tape

TYPE OF TAPE	RECORD EQ	RECORD BIAS	RECORD LEVEL
Ampex No. 456	1	2	3
Ampex No. 641	1	1	1
Ampex No. 406	2	2	2
3M No. 250	3	3	3

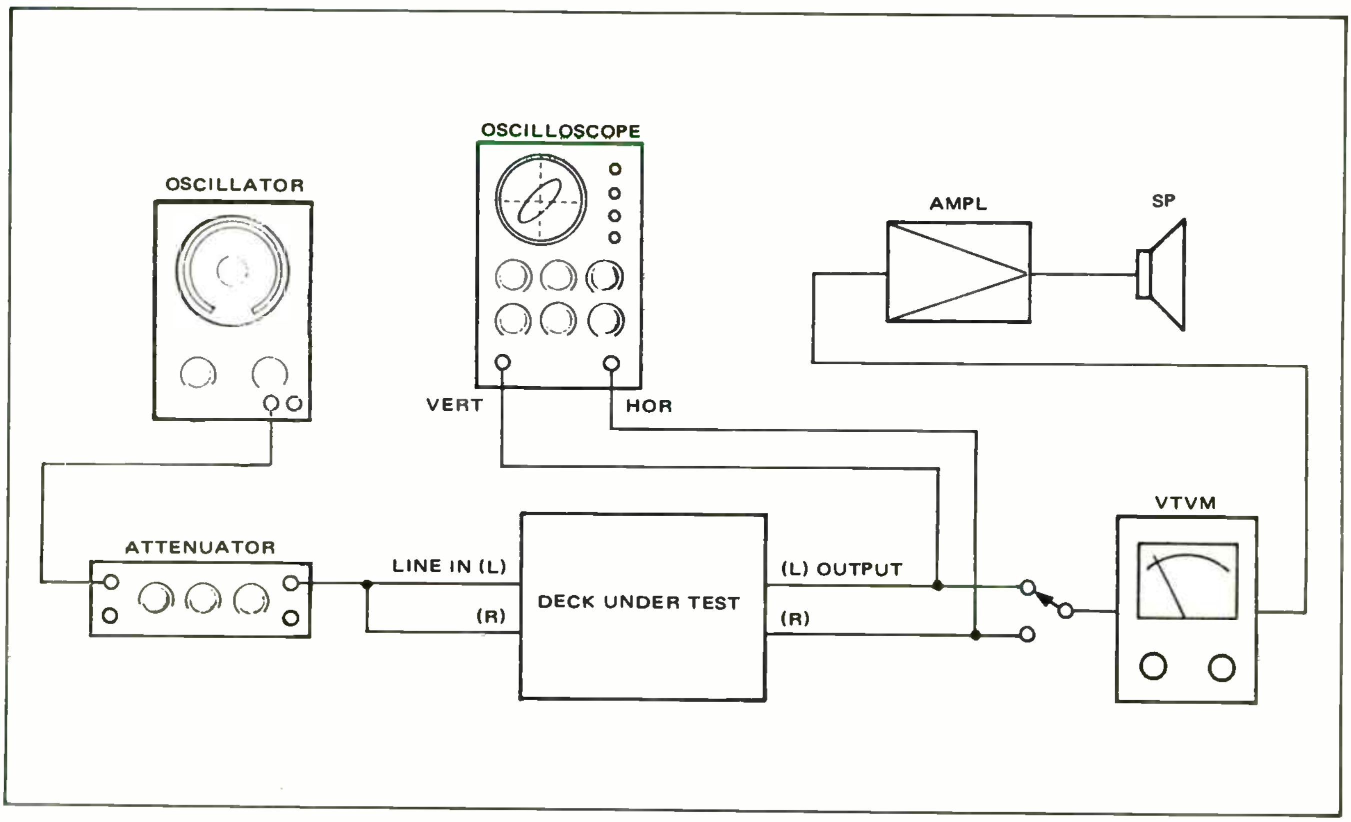

Figure 5-17. Test Connections

MASTER RECORD control to minimum;

SPEED switch to HIGH;

MONITOR switch to TAPE;

READY/SAFE switch of channel being tested to READY;

Digital Counter to 00 00 for a reference point.

4. Simultaneously press PLAY and RECORD buttons to begin recording. Record for approximately 30 seconds, then rewind tape to the 00 00 point and set the READY/SAFE switch back to SAFE.

5. Press the PLAY button and read the output level on the vtvm. Calculate signal-to-noise ratio as follows: S/N = output level (as read

on the vtvm) + 4 dBm (standard output) level + 4 dB (filter loss). Ratio should be 55 dB or greater for quarter-track models and 60 dB or greater for two-track and full-track models.

6. Repeat procedure with output connector of channel 2 connected to vtvm.

5-27. ELECTRICAL CHECKS AND ADJUSTMENTS

Electro-Mechanical Checks and Adjustments (paragraph 5-8) and *Cleaning* and *Demagnetizing* procedures (paragraphs 5-2 and 5-3) should be performed prior to performing electrical adjustments. In addition, the following points should be observed.

- Full-track models require check and adjustment of channel 1 only. On two- and quarter-track models, perform each check (and adjustment when necessary) for channel 1 first; then repeat the procedure for channel 2.

- Switches and functions not specifically indicated in procedures should be left in the "off" or non-functioning position.

- Procedures are written for NAB test tape. Set NAB/IEC EQualization switch on the rear connector panel to NAB unless otherwise indicated.

Refer to Figure 5-17 when making required test connections. Table 5-3 gives Ampex part numbers for test tapes required for these procedures. Blank tapes are listed in Table 5-1, along with other necessary test equipment.

5-28. DC Voltage Adjustment

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Check and adjust dc voltage as follows:

1. Turn off power switch.

2. Through the rear of the deck, unplug Control Board Connector CN101 (Figure 5-18) and Capstan Motor Connector CN901 (Figure 5-19).

3. Turn power switch on.

4. Refer to Figure 5-18 and connect vtvm between TP101 (+) and TPE (PWA ground).

5. Adjust VR101 for 24 Vdc ±0.5V (see Table 5-5).

6. Connect vtvm between TP102 (+), *or* pin 5 of Hall IC, and TPE (ground).

7. Adjust VR102 for 5 ±0.1 Vdc (see Table 5-5).

8. Turn off power and install connectors CN101 and CN901.

Table 5-5. DC Voltage Test Points and Adjustments

TEST POINT	ADJUSTMENT	VOLTAGE
TP101	VR101	24 Vdc ±0.5V
TP102 (or pin 5 of Hall IC)	VR102	5 Vdc ±0.1V

5-29. Tape Speed Adjustment

1. Refer to Table 5-3 and load the appropriate test tape for the tape speed being tested onto the machine.

2. Make the following switch settings:

   VARI-SPEED switch to off;

   SIZE selector to match size of reel hub being used;

   SPEED switch to match speed being checked (HIGH or LOW);

   OUTPUT control to click (preset) position (3 o'clock);

   MONITOR switch to TAPE.

3. Connect a frequency counter to the output jack on the rear connector panel.

4. Depress the PLAY button to begin reproduce mode and check that the frequency reading

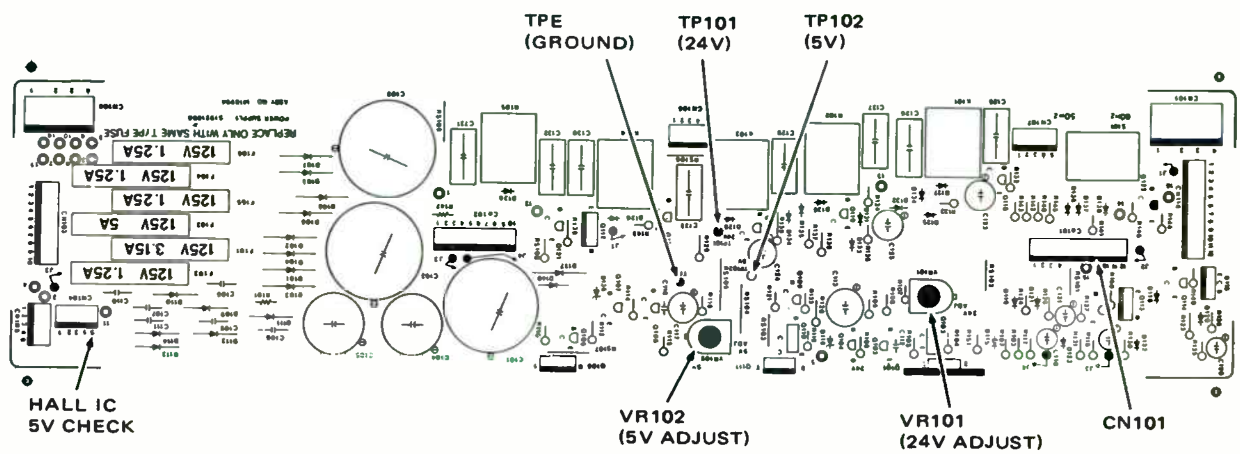


Figure 5-18. DC Voltage Adjustment, Power Supply PWA

is 3,000 Hz +9, −0 Hz. If the reading does not meet specifications, perform the following:

a. Locate the speed adjustment resistors on the capstan motor (see Figure 5-19).

b. Adjust VR901 for HIGH speed or VR902 for LOW speed. Refer to the figure for direction of adjustment to increase or decrease frequency.

5. Load the test tape for the other tape speed, change the setting of the SPEED switch, and repeat step 4.

5-30. Reproduce Head Alignment

Before performing the reproduce head alignment procedure that follows, perform the *Coarse Head Adjustment*, paragraph 5-11.

1. Refer to Figure 5-17 and connect a vtvm to the output connector. Also connect an oscilloscope with the channel 1 output connected to the horizontal input of the scope and the channel 2 output connected to the vertical input of the scope.

NOTE

Oscilloscope connections are only valid for two-track and quarter-track models.

2. Refer to Table 5-3 and select the alignment tape for the speed and equalization curve to be checked. Set SPEED selector switch and EQualization switch appropriately.

3. Load the tape on the recorder/reproducer and apply power.

4. With the synchronous reproduce switches (two-channel models only) in the REPRO position, play the 10-kHz signal on the tape. Adjust the aximuth of the reproduce head, using adjustment screws shown in Figure 5-6, for maximum output as seen on the vtvm.

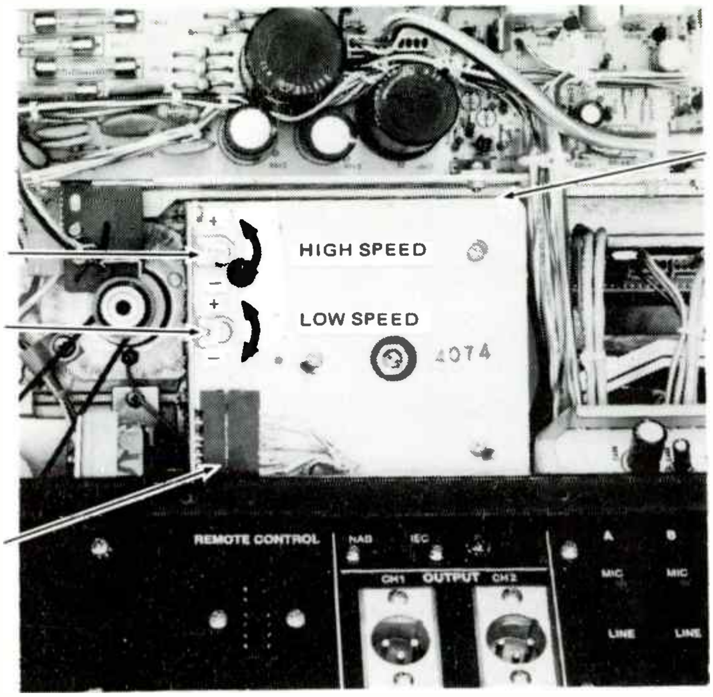


Figure 5-19. Tape Speed Adjustments

5. Play the 5-kHz signal on the tape and readjust azimuth slightly for less than 45° of phase difference between the two channels as seen on the oscilloscope.

6. Set the synchronous reproduce switches (two-channel models) to the SYNC position and repeat steps 4 and 5, adjusting the azimuth of the record head.

7. Reset synchronous reproduce switches to the REPRO position.

5-31. Reproduce Output Level Setting

The reproduce output level setting is done at the highest speed of the recorder/reproducer, 15 in/s for the high-speed model or 7-1/2 in/s for the low-speed model.

1. Connect recorder/reproducer to vtvm as shown in Figure 5-17, terminating output with a 600-ohm load.

NOTE

Since adjustments are made through the bottom of the recorder with a test tape playing, the deck must be on its back for the following steps. To avoid damage to connectors, use blocks or other supports to prop deck up.

2. Load the appropriate Ampex test tape, part no. 31315-01 for 15 in/s or 31325-01 for 7-1/2 in/s. Turn on power.

3. Make the following switch settings:

   SPEED selector switch to HIGH;

   MONITOR switches to TAPE;

   RECORD LEVEL switch to position 1;

   RECORD mode switches to SAFE;

   Synchronous reproduce switch(es) to REPRO;

CH 1 and CH 2 OUTPUT control to the click (preset) position;

and CHANNEL 1 and CHANNEL 2 A/B controls to the 0 position.

4. Play the test tape and check that the vtvm reads +4 dBm ±1 dB at both right and left channel outputs. If not, refer to Figure 5-20 for adjustment locations and adjust VR251 (for channel 1) and/or VR252 (for channel 2).

5. Stop the tape. Set synchronous reproduce switch(es) to SYNC and again play the tape.

6. Check for +4 dBm ±1 dB at both channel outputs. If necessary, adjust VR253 (for channel 1) and/or VR254 (for channel 2). Return switch(es) to the REPRO position.

5-32. VU Meter Setting

1. Set up recorder/reproducer as in steps 1 through 3 under paragraph 5-31.

2. Play the test tape and check that reading on vu meter is 0 vu ±1 vu. If not, adjust VR351 for channel 1 or VR352 for channel 2.

3. Set RECORD LEVEL switch to position 2 and check that vu meters read −3 vu ±1 vu.

4. Set RECORD LEVEL switch to position 3 and check that vu meters read −6 vu ±1 vu.

5. Adjust VR351 and/or VR352 to get the best vu reading for all three positions of the RECORD LEVEL switch.

5-33. Frequency Response

Frequency response is measured using a standard alignment tape that is recorded the full width of the tape. Thus, on two-track and quarter-track models, the response readings below 700 Hz are invalid. Do *not* attempt to correct flat response from the standard tape at low frequency. See information in paragraph 5-24 for further explanation.

1. Load the appropriate alignment tape corresponding to tape speed and type of equalization being checked. Refer to Table 5-3.

2. Connect vtvm to output connector and terminate with a 600-ohm load.

NOTE

Since adjustments are made through the bottom of the recorder with a test tape playing, the deck must be on its back for the following steps. To prevent damage to connectors, use blocks or other supports to prop deck up.

3. Make the following switch settings:

SPEED — as desired;

REEL hub size to match the reel being used;

MONITOR switch to TAPE;

OUTPUT control to click (preset) position;

CHANNEL 1 and CHANNEL 2 A/B controls to 0;

Synchronous reproduce switches to REPRO;

Equalization switch to match equalization curve being checked.

4. Turn on power; play the tape, and check that the limits for each frequency are as shown in Table 5-6. If limits are exceeded, adjust potentiometer indicated in Table 5-7 for appropriate speed and equalization. Refer to Figure 5-20 for locations of potentiometers.

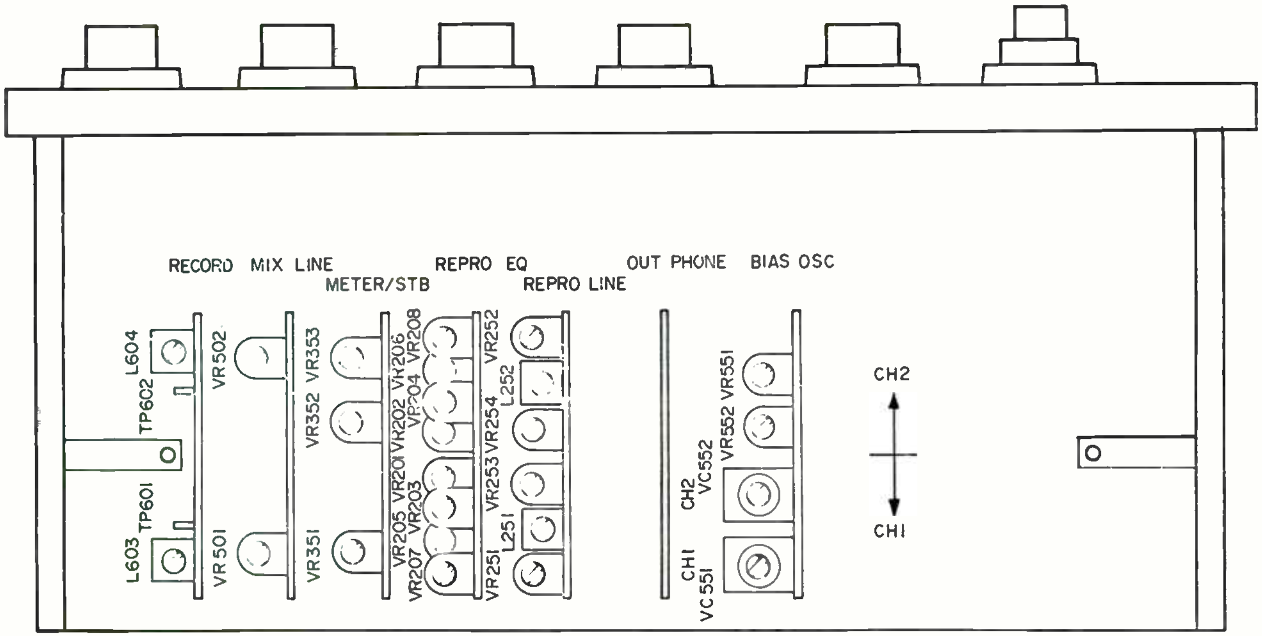
5. Set the synchronous reproduce switches to SYNC and repeat step 4. After check and adjustment, return setting to REPRO.

6. If deck being tested has a four-track head (optional item), set the 2T/4T head switch to 4T and repeat step 4.

7. After checking frequency response for both channels, load alignment tape for other speed and repeat steps 4 through 6. Then repeat for other equalization curve.

5-34. Reproduce Signal-to-Noise Ratio

1. Connect an A-weighted filter (Figure 5-16) between the output connector and the vtvm.



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RECORD	L603/604	BIAS TRAP
MIX LINE	VR501/502	RECORD LEVEL
METER /STB	VR351/352	METER LEVEL
	VR353	24V ADJ.
REPRO EQ	VR201/202	IEC HIGH SPEED EQ
	VR203/204	IEC LOW SPEED EQ
	VR205/206	NAB LOW SPEED EQ
	VR207/208	NAB HIGH SPEED EQ

REPRO LINE	VR251/252	REPRO LEVEL
	VR253/254	SEL-SYNC LEVEL
	L251/252	BIAS TRAP
BIAS OSC	VR551/552	BIAS 1/2
	VC551/552	BIAS ADJ.
HEAD SELECT (HEAD Assy)	L701	

Figure 5-20. Locations of Electrical Adjustments

Table 5-6. Frequency Response Limits

SYNCHRONOUS/REPRODUCE SWITCH SETTING	TAPE SPEED	EQUALIZATION	FREQUENCY
REPRO	3-3/4 in/s	NAB & IEC	40 Hz to 7.5 kHz ±2 dB
REPRO	7-1/2 in/s	NAB & IEC	40 Hz to 100 Hz +3, −2 dB 100 Hz to 15 kHz ±2 dB
REPRO	15 in/s	NAB & IEC	40 Hz to 100 Hz ±3 dB 100 Hz to 18 kHz ±2 dB
SYNC	7-1/2 in/s	NAB & IEC	100 Hz to 8 kHz ±4 dB
SYNC	15 in/s	NAB & IEC	100 Hz to 12 kHz ±4 dB

Table 5-7. Frequency Response Adjustment Potentiometers

TAPE SPEED SETTING	EQUALIZATION SETTING	ADJUSTMENT POTENTIOMETER	
		CH 1	CH 2
HIGH	NAB	VR207	VR208
LOW	NAB	VR205	VR206
HIGH	IEC	VR201	VR202
LOW	IEC	VR203	VR204

2. Load any blank tape in the normal manner except thread the tape so that it does not pass between the pinch roller and the capstan shaft. This will allow no tape movement.

3. Make the following switch settings:

   MONITOR switch to TAPE;

   EQualization switch to NAB;

   OUTPUT controls to the click (preset) position;

   RECORD LEVEL switch to position 1;

   SPEED switch to HIGH;

   and synchronous reproduce switch(es) to REPRO.

4. Put the deck in play mode and read the noise level on the vtvm. Determine signal-to-noise ratio by comparing this output noise level with the standard output level of +4 dBm.

   Signal-to-noise ratio equals noise level (as read on the vtvm) + 4 dBm (standard output level) +4 dB (for loss through the filter). For quarter-track models, signal-to-noise ratio should be 55 dB or more; for two-track and full-track models, it should be 60 dB or more.

5. Set synchronous reproduce switches to SYNC and repeat step 4. For quarter-track models, signal-to-noise ratio should be 40 dB or more; for two-track and full-track models, it should be 45 dB or greater.

6. Upon completion of tests, return synchronous reproduce switches to the REPRO position.

5-35. Headphones Output Level

1. Make connection from PHONES jack on front of the recorder/reproducer to the vtvm. Attach a 10K-ohm load.

2. Load Ampex test tape 31325-01 on the deck.

3. Make the following switch settings:

   SPEED switch to 7-1/2 in/s (HIGH on low-speed models or LOW on high-speed models);

   MONITOR switch to TAPE;

   OUTPUT controls to the click (preset) position.

4. Put the recorder/reproducer in play mode and check that the output level as seen on the vtvm is 0.8 volt ±2 dB.

   NOTE

   The vu meters will indicate 0 vu at this time.

5-36. Monitor Performance Checks

5-37. LINE Input Level Check. Check monitor performance with a line input as follows:

1. Make the following switch settings:

   MIC/LINE switch (on rear connector panel) to LINE;

   MONITOR switch to INPUT;

   CHANNEL 1 and CHANNEL 2 A/B input controls to maximum (fully clockwise);

   MASTER RECORD control to maximum (fully clockwise);

   RECORD LEVEL switch to position 1.

2. Using the oscillator and attenuator, connect a 400-Hz, −16 dB signal to the INPUT connectors CHANNEL 1A and CHANNEL 1B.

3. Note the reading on the vu meter. Level should be 0 vu ±1 vu.

4. Switch the RECORD LEVEL switch to position 2 and change the level of the input signal to −13 dB. Again check that the vu meter reads 0 vu ±1 vu.

5. Set the RECORD LEVEL switch to position 3 and change the level of the input signal to −10 dB. The vu meter should again read 0 vu ±1 vu.

6. Connect the input signal to CHANNEL 2A and CHANNEL 2B. Set the signal level to −16 dB and the RECORD LEVEL switch to position 1. Check that the vu meter again reads 0 vu ±1 vu.

7. Repeat steps 4 and 5 with the input signal connected to the channel 2 inputs.

5-38. MIC Input Level Check. Check monitor performance with a MIC input as follows:

1. Make the following switch settings:

   MIC/LINE switch to MIC;

   MONITOR switch to INPUT;

   MASTER RECORD control to maximum;

   RECORD LEVEL switch to position 1;

   MIC ATT switches to 0.

2. Connect a 400-Hz, −76-dB level signal to CHANNEL 1A and CHANNEL 1B input connectors.

3. With CHANNEL 1A input control in the maximum position and CHANNEL 1B input control in the minimum position, verify that the vu meter reads 0 vu ±1 vu.

4. Set CHANNEL 1A input control to minimum and CHANNEL 1B input control to maximum and again verify that the vu meter reads 0 vu ±1 vu.

5. Change the level of the input signal to −56 dB and set the MIC ATT switches to 20 dB and repeat steps 3 and 4.

6. Connect the input signal to CHANNEL 2A and CHANNEL 2B input connectors, set the MIC ATT switches to 0, and change the input signal to −76 dB.

7. Repeat steps 3 through 5 for channel 2 inputs, using the CHANNEL 2A and CHANNEL 2B input controls. After the test, reset MIC/LINE switches to LINE and MIC ATT switches to 0.

5-39. Record Adjustments

Refer to Figure 5-20 for test point and adjustment locations.

NOTE

Since the following adjustments are made through the bottom of the deck with a tape playing, the recorder must be on its back. For paragraphs 5-41 through 5-43, connections are made to output and/or input jacks on the rear connector panel. To avoid damage to connectors, use blocks or other supports to prop deck.

5-40. Bias Trap Adjustment (Record). Adjust record bias trap as follows:

1. Load a blank 3M No. 250 tape on the recorder/reproducer.
2. Make the following switch settings:

   RECORD BIAS to position 3;

   RECORD EQ to position 3;

   RECORD LEVEL to position 1;

   CHANNEL 1 and CHANNEL 2 A/B controls to minimum;

   MASTER RECORD control to minimum;

   RECORD READY/SAFE switches to READY.
3. For channel 1 measurement, connect a vtvm to test point TP601 and ground.
4. Simultaneously press RECORD and PLAY buttons to initiate record mode.
5. Adjust L603 for minimum reading on the vtvm.
6. For two-track and quarter-track models, to adjust channel 2, connect vtvm to TP602 and ground and repeat steps 4 and 5, adjusting L604 to achieve minimum reading.

5-41. Bias Trap Adjustment (Reproduce). Adjust reproduce bias trap as follows.

1. With same conditions as in steps 1 and 2 in paragraph 5-40, and the MONITOR switch in the TAPE position, connect vtvm to channel 1 OUTPUT connector. Load the output with a 600-ohm load.
2. Simultaneously press PLAY and RECORD buttons to initiate record mode.
3. Adjust L251 for minimum output level.
4. Connect vtvm to channel 2 OUTPUT connector and repeat steps 2 and 3, adjusting L252.

5-42. Bias Setting Adjustment (Position 3). The following procedure to adjust bias setting for position 3 setting *must* be performed *after* the bias trap adjustments. Proceed as follows:

1. With the same conditions as in paragraph 5-41, make the following switch settings:

   MONITOR switch to TAPE;

   SPEED switch to HIGH;

   RECORD LEVEL to position 1;

   CHANNEL 1 and CHANNEL 2 A/B controls to maximum;

   MASTER RECORD control to maximum;

   OUTPUT control to the click (preset) position.
2. Using oscillator and attenuator, connect a 7-kHz, −16-dB signal to the CHANNEL 1A and CHANNEL 2A input jacks.
3. Simultaneously press PLAY and RECORD to initiate record mode.
4. Reduce CHANNEL 1 and CHANNEL 2 controls so that the vu meters read −6 vu.
5. Turn VC551 (for channel 1) or VC552 (for channel 2) fully counterclockwise. Then adjust slowly clockwise until the level on the vtvm rises to a peak at 7 kHz; continue rotating in a clockwise direction until reading decreases by 2 dB from the peak level. Adjust for both channels.

5-43. Record Level Set. Set record level as follows:

1. With the same conditions as in paragraph 5-42, change the input signal to 400 Hz, −10 dB and connect this signal to the CHANNEL 1A and CHANNEL 2A input connectors.
2. Press the PLAY and RECORD buttons simultaneously to initiate record mode.
3. With the MONITOR switch set to INPUT, adjust CHANNEL 1 and CHANNEL 2 controls for 0 vu on the vu meters.
4. Set the MONITOR switch to the TAPE position and adjust VR501 (for channel 1) and then VR502 (for channel 2) to get a reading on the vtvm of +4 dBm at the output connectors.

5-44. Frequency Response Adjustments

Refer to Figure 5-20 for adjustment locations.

NOTE

Since the adjustments for paragraphs 5-45 through 5-47 are made through the bottom of the recorder with a tape playing, the deck must be on its back. To avoid damage to connectors to rear panel, use blocks or other supports to elevate deck.

5-45. Bias Setting at Position 3. Perform the following procedure to adjust frequency response with RECORD BIAS set at position 3. Test must be performed at both speeds of the unit.

1. Connect oscillator and attenuator to input connectors and a vtvm to the output connectors of the recorder/reproducer.
2. Load a blank 3M No. 250 tape on the recorder/reproducer.
3. Make the following switch settings:

   SPEED switch to HIGH;
   EQualization switch to NAB or IEC (whichever desired);
   RECORD BIAS to position 3;
   RECORD EQ switch to position 3;
   RECORD LEVEL switch to position 1;
   READY/SAFE switch to READY.
4. With the input signal set for −10 dB, set the MONITOR switch to INPUT and adjust input so vtvm reads at a convenient point on the scale.
5. Set MONITOR switch to TAPE and simultaneously press the PLAY and RECORD buttons to put the unit into the record mode.
6. Sweep the signal frequency over the specific range for the speed being checked:

   3-3/4 in/s – 40 Hz to 7.5 kHz;
   7-1/2 in/s – 40 Hz to 15 kHz;
   15 in/s – 40 Hz to 18 kHz.
7. Watch the vtvm and check that the frequency response is within tolerance of the specified frequency range (see Table 5-6). If necessary, adjust VC551 (for channel 1) or VC552 (for channel 2).
8. Set the SPEED switch to LOW and repeat steps 5 through 7.

5-46. Bias Setting at Position 2. Adjust frequency response as follows:

1. With the same connections as in paragraph 5-45, load an Ampex No. 456 test tape on the deck.
2. Make the following switch settings:

   SPEED to HIGH;
   RECORD BIAS to position 2;
   RECORD EQ to position 1;
   RECORD LEVEL to position 1;

   All other settings remain the same.

   NOTE

   In the following step, do not adjust VC551 or VC552.
3. Perform steps 4 through 8 under paragraph 5-45, adjusting VR552, if necessary.
4. Load an Ampex No. 406 tape on the deck and set the RECORD EQ switch to position 2.

   NOTE

   In the following step, do not adjust VC551 or VC552.
5. Again repeat steps 4 through 8 of paragraph 5-45 to confirm that output meets specifications. However, there is no adjustment.

5-47. Bias Setting at Position 1. Adjust frequency response as follows:

1. With the same connections as above, load an Ampex No. 641 tape on the deck.
2. Make the following switch settings:

   RECORD BIAS switch to position 1;
   RECORD EQ switch to position 1;
   RECORD LEVEL switch to position 1;
   SPEED switch to HIGH.

NOTE

In the following step, do not adjust VC551 or VC552.

3. Perform steps 4 through 8 under paragraph 5-45, adjusting VR551, if necessary, to get the specified frequency response.

5-48. Dummy Coil Adjustment. On two-track and quarter-track models *only*, use dummy coil to adjust frequency response as follows:

1. With Ampex No. 641 tape still on the recorder, and settings the same as in paragraph 5-47, set the RECORD READY/SAFE switch for channel 2 to the SAFE position and the SPEED switch to HIGH.
2. Repeat steps 4 through 8 under paragraph 5-45, but *DO NOT* touch VC551, VC552, VR551, or VR552. If adjustment is necessary, proceed as follows:

   a. Refer to paragraph 5-21, step 1, for removal of head housing cover.

   b. Adjust L701 dummy coil on the head assembly (see Figure 5-21) to get specified response. Note that there will be an output on channel 1 only.

5-49. Overall Signal-to-Noise Ratio

1. Connect an A weighted filter (Figure 5-16) between the output connectors and the vtvm.
2. Load a blank Ampex No. 456 tape on the recorder/reproducer.
3. Make the following switch settings:

   RECORD BIAS switch to position 2;
   SPEED selector switch to HIGH;
   MASTER RECORD to minimum (fully counterclockwise);
   CHANNEL 1 and CHANNEL 2 A/B controls to minimum (fully counterclockwise);
   READY/SAFE switches to READY;
   Digital Counter to 00 00 for a reference point.

   All other switches remain as previously set.
4. Disconnect the input signal.
5. Press RECORD and PLAY buttons simultaneously to initiate record mode.
6. Record for approximately 30 seconds; then press STOP button followed by FAST RWD to rewind tape to the beginning of the "no signal" recording (00 00 on Digital Counter).
7. Press PLAY button and read the output level on the vtvm. Determine signal-to-noise ratio by the formula: Signal-to-noise ratio = noise (as read on vtvm) +4 dBm (standard output

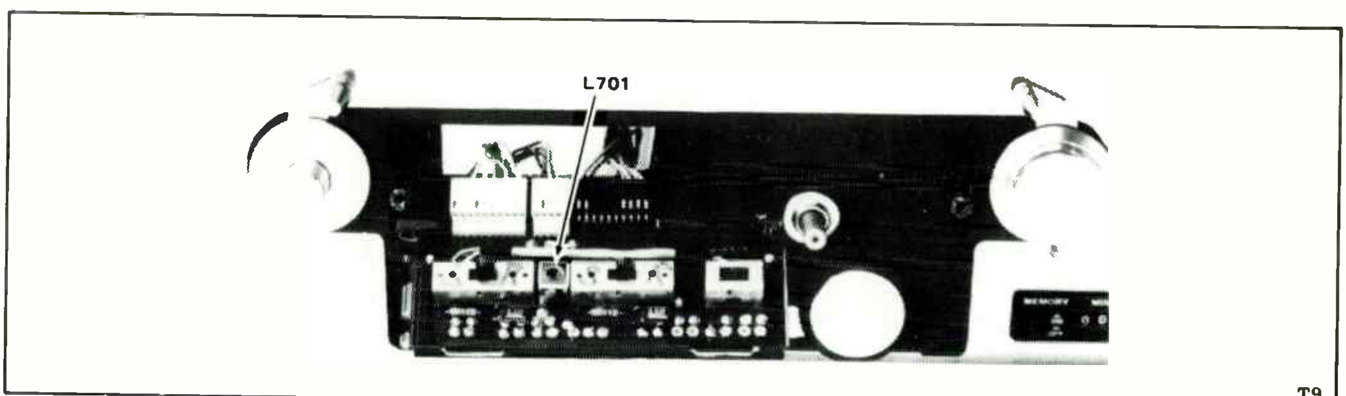


Figure 5-21. L701 Dummy Coil

level) +4 dB (for filter loss). This ratio should be 55 dB or greater for quarter-track models and 60 dB or greater for two-track and full-track models.

5-50. Distortion Check

1. Connect a distortion meter to the output connectors of the recorder/reproducer.
2. Load a blank Ampex No. 456 tape on the machine.
3. Make the following switch settings:

   RECORD BIAS switch to position 2;
   RECORD EQ switch to position 1;
   OUTPUT control to the click position;
   READY/SAFE switches to READY;
   MONITOR switch to INPUT;
   MASTER RECORD control to maximum.

4. Connect a 400-Hz, −10 dBm signal from the oscillator and attenuator to the input connectors.
5. Adjust CHANNEL 1 and CHANNEL 2 A/B input controls for 0 vu on the vu meters.
6. Simultaneously press PLAY and RECORD to record the input signal for several seconds. Then rewind the tape to the beginning of the recording.
7. Set the MONITOR switch(es) to TAPE and play the tape.
8. Read the output on the distortion meter. Third harmonic distortion should be 0.3% or less.

5-51. Erasure

1. Load a blank Ampex No. 456 tape on the recorder/reproducer. Reset the Digital Counter to 00 00.
2. Make the following switch settings:

   Both RECORD READY/SAFE switches to READY;
   CHANNEL 1 and CHANNEL 2 A/B input controls to maximum;
   MASTER RECORD control to maximum.

3. Set the oscillator and attenuator to apply a 400-Hz, −6 dB level signal to the input connectors. Connect a vtvm to the output connectors.
4. Simultaneously press PLAY and RECORD to begin recording.
5. While recording, monitor the tape signal at the output connectors by reading the vtvm to ensure that the output level is +10 dB. If necessary, adjust the signal from the oscillator to get the +10 dB level at the output connectors. Record this signal for a minute or two.
6. Press STOP button. Then rewind the tape to about half way through the recorded portion of the tape. Again press STOP.
7. Remove the input signal; set the CHANNEL 1 and CHANNEL 2 A/B input controls to minimum and the MASTER RECORD control to minimum.
8. Again press PLAY and RECORD simultaneously and erase tape by recording through the previously-recorded section with no input signal.
9. Rewind the tape all the way back to the 00 00 location.
10. Connect a wave analyzer to the output connector. Press PLAY button and compare the level on the vtvm from the original 400-Hz signal recording with the level from the "no signal" recording. The level difference should be 70 dB or greater.
11. If level difference is below this specification, check erase head for proper alignment as explained under paragraph 5-11. Also check filter loss and tuning for possible problem.

5-52. Crosstalk

This check is applicable only on two-channel (two-track or quarter-track) models.

NOTE

The tape used for this test should be bulk erased prior to performing the test, as any residual signal may affect the measurement.

1. Thread a blank tape on the recorder/reproducer.

2. Make the following switch settings:

   READY/SAFE switch for channel 2 to the SAFE position;

   READY/SAFE switch for channel 1 to the READY position;

   CHANNEL 1 A/B input control to maximum;

   MASTER RECORD control for channel 1 to maximum;

   RECORD BIAS, RECORD EQ, and RECORD LEVEL switches to match the type of tape being used.

3. Using an oscillator and attenuator, as in previous tests, apply a 1-kHz, −10-dBm signal to the input connector for channel 1.

4. Press RECORD and PLAY buttons simultaneously to begin recording on channel 1. Record for a short while, then rewind the tape to the beginning of this recording.

5. Adjust the CHANNEL 1 control for 0 vu on the vu meter.

6. Connect a wave analyzer to the output connector.

7. Play the tape back (through the wave analyzer). First measure the output of channel 1 to get a level reference. Then measure the output of channel 2. The difference between the two channels should be 50 dB or greater on two-track models and 55 dB or greater on quarter-track models.

5-53. REPLACEMENT OF PARTS

CAUTION

BE SURE TO UNPLUG POWER CORD FROM AC OUTLET PRIOR TO REMOVING OR REPLACING ANY PARTS.

5-54. Head Assembly and Head Replacement

All three (or four, when optional head is ordered as an accessory) heads make up the head assembly. To replace an individual head, it is necessary to first remove the whole head assembly from the recorder/reproducer, and then remove the individual head from the head assembly. Remove and replace head and head assembly as follows:

1. Remove head housing by removing one screw and washer from each side (see Figure 5-22); then gently remove housing.

2. With rear center panel removed, reach through the rear of the machine and remove the three connectors mounted on the rear of the head assembly (shown in Figure 5-23).

3. Remove four mounting screws that hold head assembly on the front of the deck (Figure 5-22). Take care that two upper screws do not drop into machine.

4. Lift off head assembly.

5. To remove shield case from head, refer to Figure 5-24 and loosen A screws from the rear plate of the head assembly. Then remove two small B screws from the top of the head and slide off shield case C.

6. To replace a single head, a nut driver is required. Remove the two D nuts (shown in Figure 5-24) on the defective head through the access hole provided. This releases the head from the mounting plate.

7. After replacing head, reassemble head assembly in reverse order of disassembly. Be sure to replace shield case and tighten A screws on the rear of the head assembly plate, and attach head assembly connectors through the rear of the machine. Replace head housing using screws and washers removed in step *1*.

8. After head assembly is replaced, perform head alignment procedures. First perform *Coarse Head Adjustment,* paragraph 5-11; then perform *Head Reproduce Alignment* procedure, paragraph 5-30.

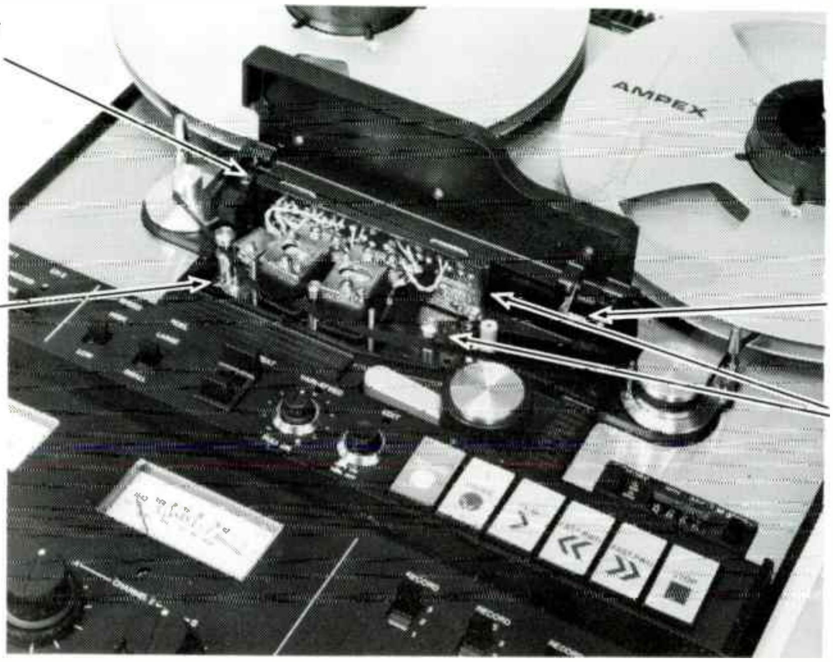


Figure 5-22. Head Assembly Removal

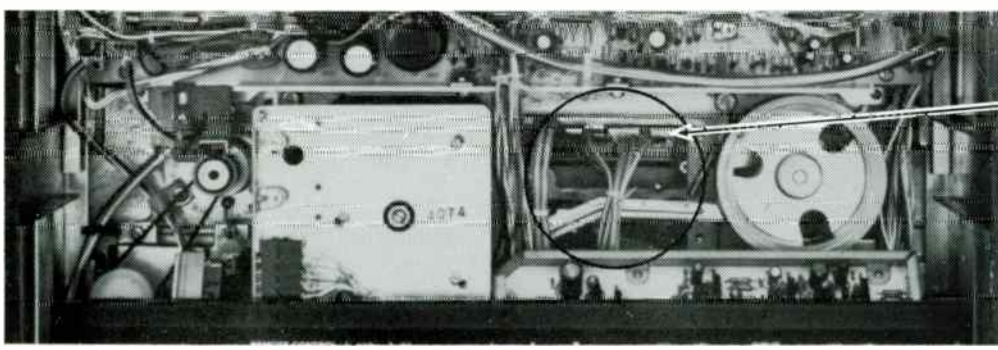


Figure 5-23. Head Assembly Connectors

5-55. Capstan Motor Replacement

1. Ensure that ac cord is unplugged from the power source, rear panels are removed from the recorder/reproducer, and rear connector panel has been moved aside.
2. On capstan motor assembly, unplug connector CN901 (see Figure 5-19).
3. Refer to Figure 5-25 and unscrew the three A screws that hold the capstan motor.

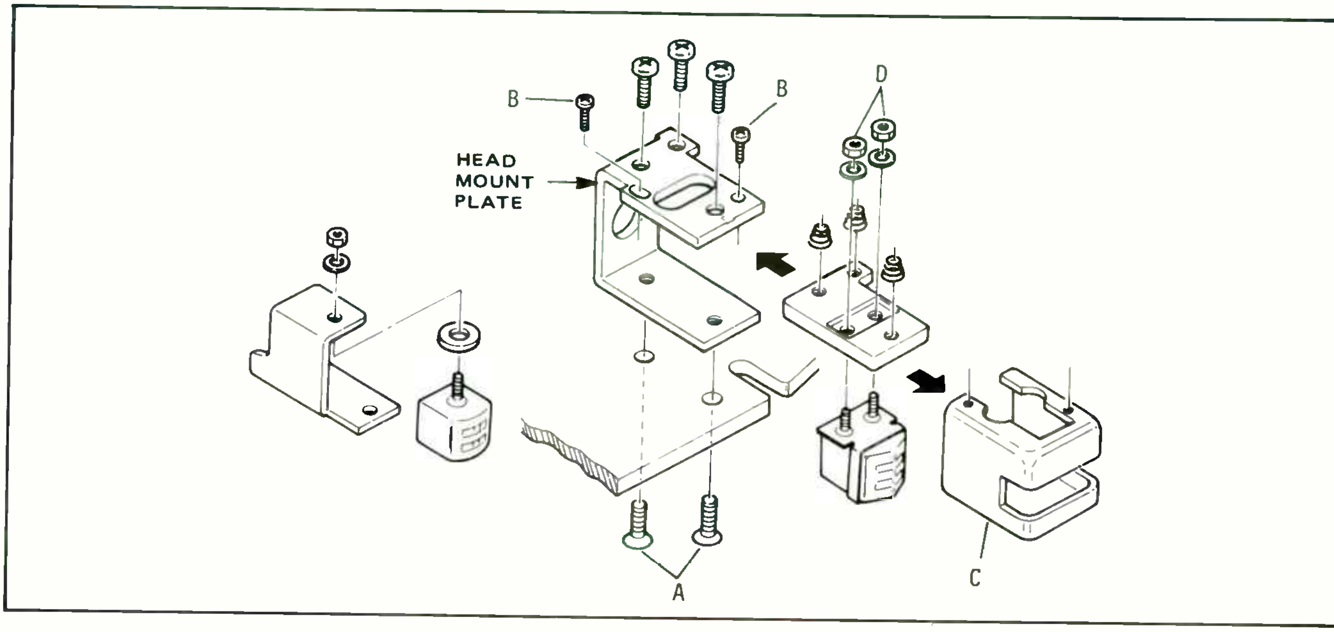


Figure 5-24. Head Disassembly

4. Gently pull out the capstan motor. Use care not to lose the dust cap on the capstan shaft on the front of the deck.

5. Install replacement capstan motor assembly in reverse order.

5-56. Replacement Capstan Motor with Different Speed. Two types of capstan motors are available; the high-speed model and the low-speed model. After installing a capstan motor assembly of different speed than the original, proceed as follows:

1. If replacing low-speed model with a high-speed model, proceed to step 2. If replacing a high-speed motor assembly with a low-speed motor assembly, the diameter of the capstan shaft on the new assembly will be smaller than the diameter of the capstan shaft of the high-speed motor assembly. Therefore, it is necessary to reposition the pinch roller solenoid on the mounting bracket to its lowermost position. Proceed as follows:

   a. Loosen the three mounting screws shown in Figure 5-9 and, if necessary, the adjustment screw (Figure 5-10).

   b. Push the solenoid toward the bottom of the deck (toward the PWAs) as far as it will go.

   c. Retighten all screws and proceed to step 2.

2. Perform the check and adjustment for pinch roller pressure, paragraph 5-12.

3. On the reproduce PWA, connect jumper resistor RS207 to the high or low position to match the speed of the new motor assembly.

4. Perform the *Tape Speed Adjustment*, paragraph 5-29.

5. Perform the Wow and Flutter check, paragraph 5-22.

6. Refer to *Frequency Response* procedure, paragraph 5-33, to recheck equalization for new speeds selected, and readjust if necessary.

5-57. Reel Table Replacement and Height Adjustment

1. Refer to Figure 5-26 and remove three screws from the front of the reel table. Pull off reel table.

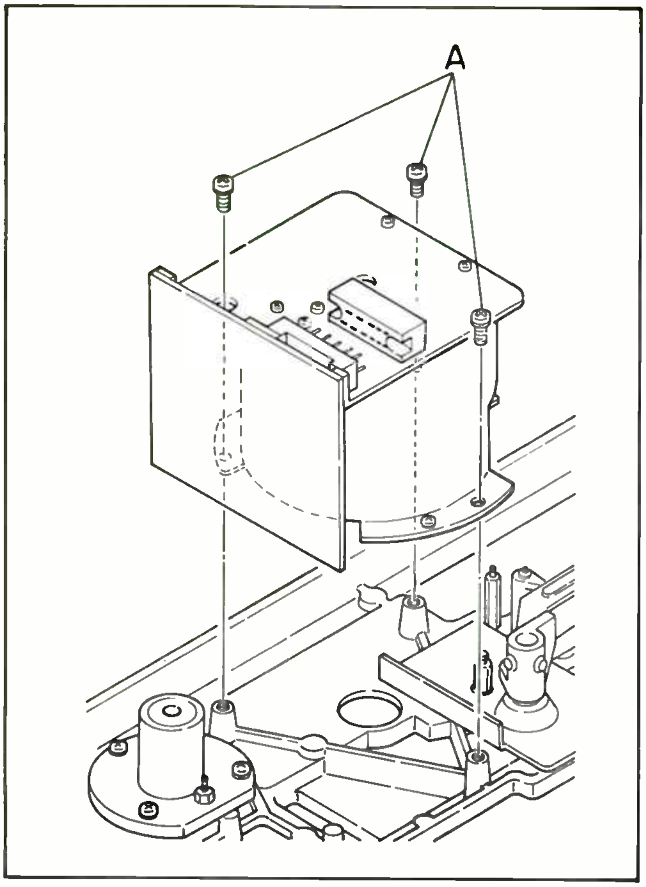


Figure 5-25. Capstan Motor Removal

2. Replace reel table using three screws removed in step 1.

3. Load a reel of tape on the machine to check height adjustment.

4. Turn on power and place machine in play mode. If tape rubs on either flange of the reel during tape movement, the reel height must be adjusted as follows:

   a. Turn off power and remove applicable (left or right) side of panel if necessary.

   b. Refer to Figure 5-27, reach screwdriver through side of machine, and loosen the two Allen setscrews shown in the figure.

   c. Move the reel table in or out to adjust height.

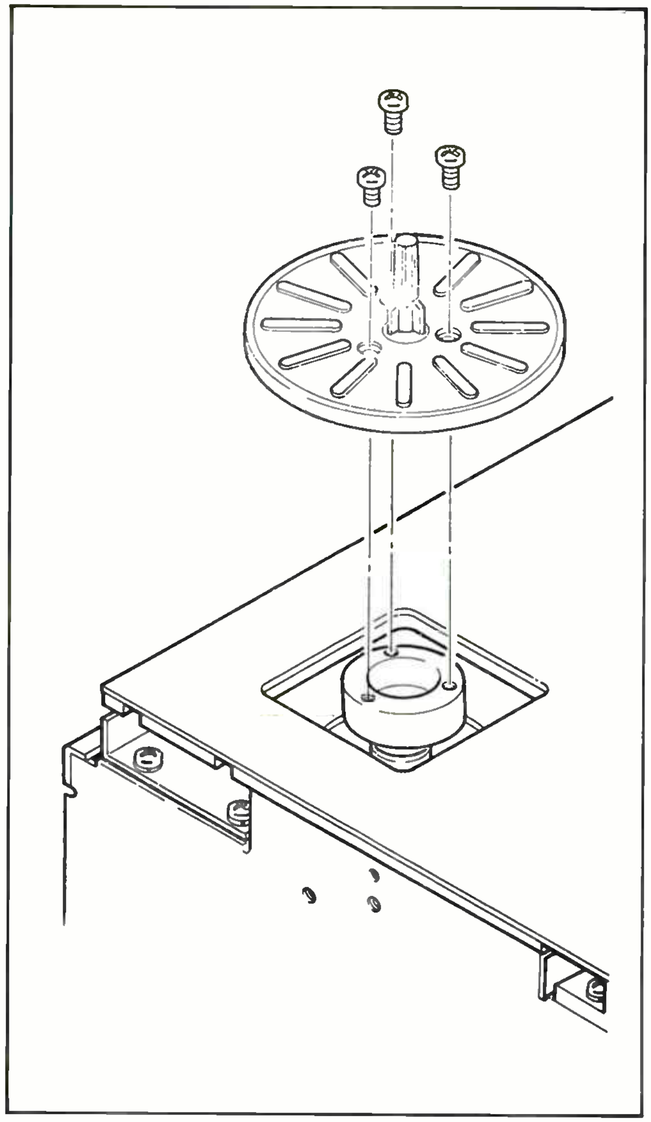


Figure 5-26. Reel Table Removal

   d. Tighten setscrews and run the tape to check the adjustment.

5-58. Reel Motor Replacement

1. Remove reel table as described in paragraph 5-57.

2. Through the front access hole under the reel table, remove the four screws holding the reel motor assembly. Screws are marked A in Figure 5-28.

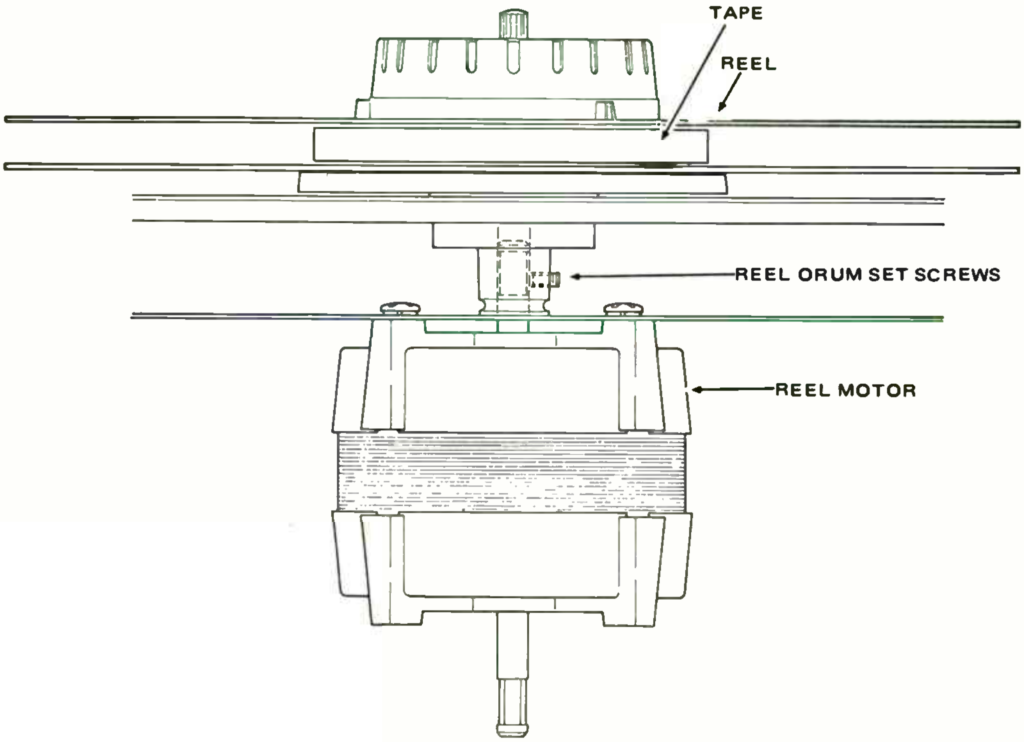


Figure 5-27. Reel Height Adjustment

3. Unplug reel motor connector (CN106 on takeup reel or CN105 on supply reel).

4. Unsolder the two wires connected to the brake solenoid. Note the colors of the wires for later resoldering to the replacement motor assembly brake solenoid.

5. Remove reel motor assembly with brake solenoid and replace with new assembly.

6. Install new reel motor assembly in reverse order of removal.

7. Perform brake torque check, paragraph 5-18.

5-59. TROUBLESHOOTING

Figure 5-29 is a troubleshooting flow chart for the ATR-700, included as an aid in corrective maintenance.

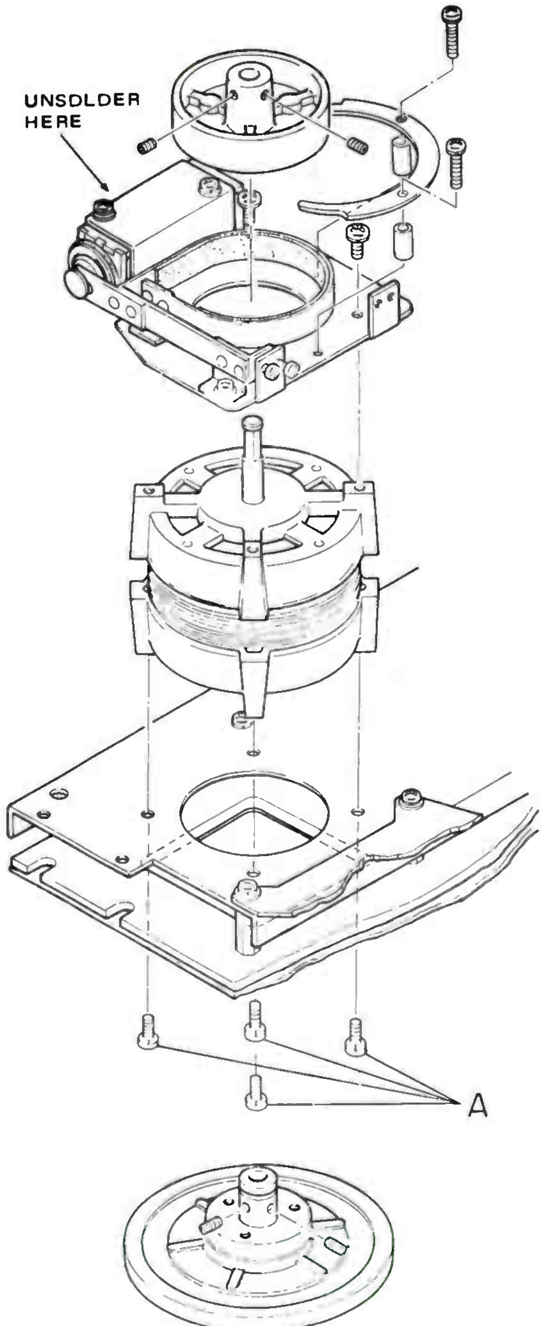


Figure 5-28. Reel Motor Assembly Removal

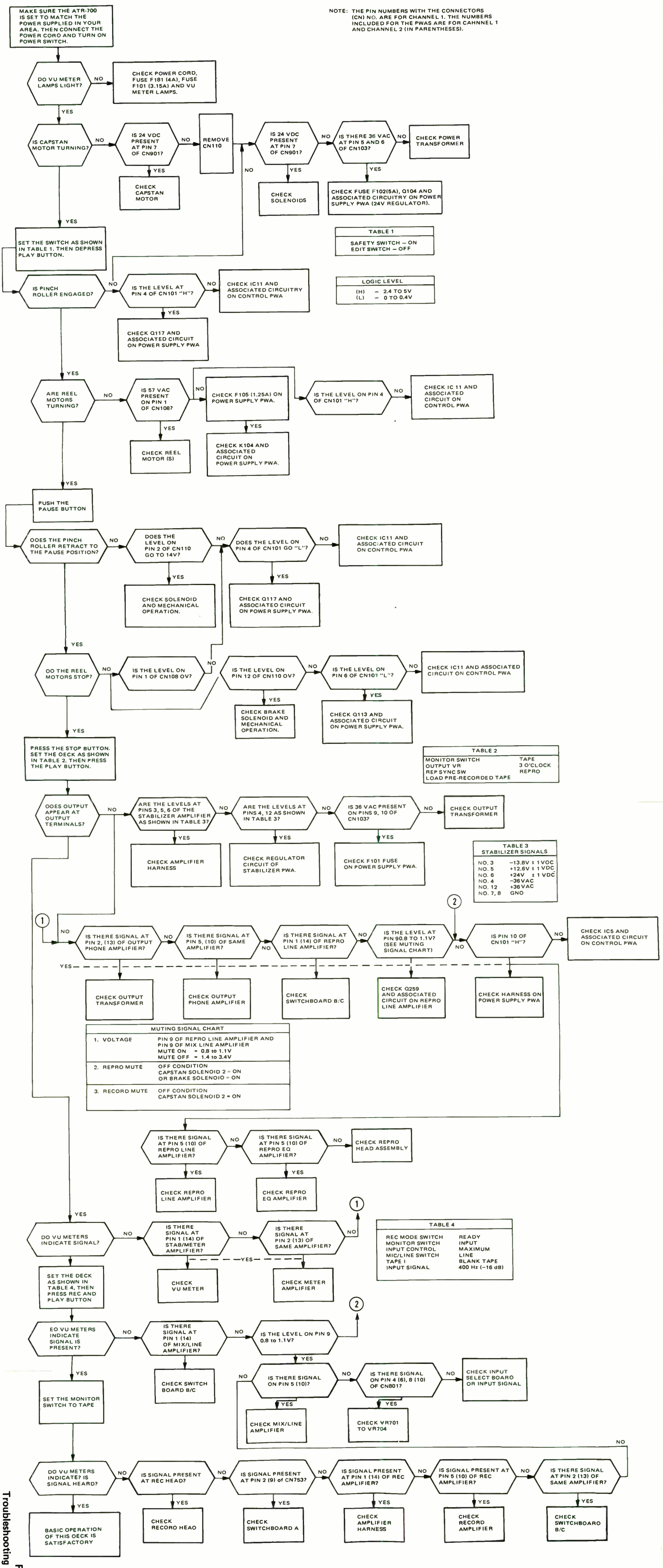


Figure 5-29. Troubleshooting Flow Chart

SECTION 6

PARTS LISTS AND SCHEMATICS

This section of the manual provides parts lists, assembly drawings and schematic diagrams for the ATR-700 Recorder/Reproducer.

NOTE

In Section 6, reference to 4-track configuration applies to 1/4 track versions.

LIST OF ASSEMBLIES AND SCHEMATICS

LIST OF ASSEMBLIES AND SCHEMATICS (Continued)

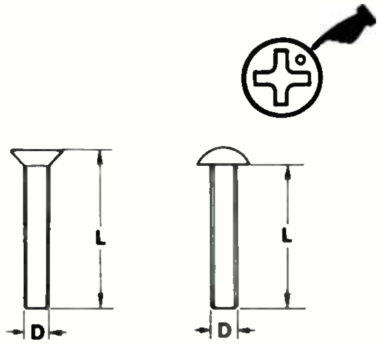
METRIC HARDWARE CODING LIST

All screws conform to International Standards Organization (ISO) standards, and have cross-recessed heads, unless otherwise noted. ISO screws have the head inscribed with a point as in the figure below.

FOR EXAMPLE:

B M3 x 6

- 6 — Length in mm (L)
- M3 — Diameter in mm (D)
- B — Type of Head



	Code	Full Name	Type
MACHINE SCREW	R	Round Head Screw	
	P	Pan Head Screw	
	T	Stove Head Screw (Truss)	
	B	Binding Head Screw	
	F	Flat Countersunk Head Screw	
	O	Oval Countersunk Head Screw	
WOOD SCREW	RW	Round Head Wood Screw	
	FW	Flat Countersunk Wood Screw	
	OW	Oval Countersunk Wood Screw	
SEMS SCREW	BSA	Binding Head SEMS Screw(A Type)	
	BSB	Binding Head SEMS Screw(B Type)	
	BSF	Binding Head SEMS Screw(F Type)	
	PSA	Pan Head SEMS Screw(A Type)	
	PSB	Pan Head SEMS Screw(B Type)	

	Code	Full Name	Type
TAPPING SCREW	BTA	Binding Head Tapping Screw(A Type)	
	BTB	Binding Head Tapping Screw(B Type)	
	RTA	Round Head Tapping Screw(A Type)	
	RTB	Round Head Tapping Screw(B Type)	
SETSCREW	SF	Hex Socket Setscrew(Flat Point)	
	SC	Hex Socket Setscrew(Cup Point)	
	SS	Slotted Socket Setscrew(Flat Point)	
WASHER	E	E-Ring (Retaining Washer)	
	W	Flat Washer(Plain)	
	SW	Lock Washer(Spring)	
	LWI	Lock Washer (Internal Teeth)	
	LWE	Lock Washer (External Teeth)	
	TW	Trim Washer (Countersunk)	
NUT	N	Hex Nut	

T-310

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418950-01		CENTER BASE SECTION, 4 TRACK, 3-1/2-7 IN/S	
	1418950-02		CENTER BASE SECTION, 2 TRACK, 3-1/2-7 IN/S	
	1418950-03		CENTER BASE SECTION, FULL TRACK, 3-1/2-7 IN/S	
	1418950-04		CENTER BASE SECTION, 4 TRACK, 7-1/2-15 IN/S	
	1418950-05		CENTER BASE SECTION, 2 TRACK, 7-1/2-15IN/S	
	1418950-06		CENTER BASE SECTION, FULL TRACK, 7-1/2-15 IN/S	
1	809-180		NAMEPLATE	A5052P T=2
2	809-179		HOUSING, HEAD	ADC-12
3			SCREW, P	M2X4 (BLK)
4			WASHER, POLY	3ϕX5ϕX0.25T
5			SCREW, B	M3X10 (BLK)
6	809-183		PLUG, DUMMY, RUBBER	
7	809-178		HOUSING, BASE	ADC-12
8			SCREW, B	M4X6
9	809-181		CUSHION, RUBBER	
10	809-182		SPRING, CLICK	SWPA
11			SCREW, B	M3X6 (BLK)
12	809-066		STUD, HEAD HOUSING	
13	809-317		ANTI SPOILER	
14			SCREW, B	M3X6 (BLK)
15	809-321		PLATE SPOILER	
16	809-095		CAP A	
17	809-094		LEFT ASSEMBLY, TENSION ARM	
18			SCREW, P	M2X4
19			WASHER, SPRING	2ϕ
20	809-138		BRACKET, HEAD SELECT	
21	809-144		COVER, SW, 4T, 2T	
22	809-318		HEAD SELECT PWA, 4T	
22	809-319		HEAD SELECT PWA, 2T	
22	809-320		HEAD SELECT PWA, FT	
23	1418998-01		HEAD ASSY, 4T	
23	1418997-01		HEAD ASSY, 2T	
23	1418996-01		HEAD ASSY, FT	
24	809-120		PLATE, ERASE HEAD	
25	809-131		HEAD, ERASE, 4T-2CH	
25	809-130		HEAD, ERASE, 2T-2CH	
25	809-132		HEAD, ERASE, FT	
26			WASHER	2ϕ
27			NUT	M2
28	809-133		SPACER, ERASE HEAD	
29	809-128		HEAD, RECORD, 4T-2CH	
29	809-127		HEAD, RECORD, 2T-2CH	
29	809-129		HEAD, RECORD, FT	
30			WASHER	2ϕ
31			NUT	M2
32	809-117		PLATE, HEAD	
33	809-118		SPRING, HEAD E	
34			SCREW, B	M3X11 (NI)
35	809-125		HEAD, REPRODUCE, 4T-2CH	
35	809-124		HEAD, REPRODUCE, 2T-2CH	
35	809-126		HEAD, REPRODUCE, FT	
36	809-116		BRACKET, HEAD PLATE	
37	809-119		SHIELD, HEAD	
38			SCREW, B	M2X5 (NI)
39			SCREW, B	M3X10 (NI)
40	809 121		SPRING, HEAD ADJ	

SHEET 1 OF 4

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
41	809-122		TAPE GUIDE, B	10ϕ
42	809-123		TAPE GUIDE, C	3ϕ
43			SCREW, F	M3X6
44			SCREW, B	M3X6 (NI)
45	809-115		PLATE, HEAD BASE	
46			SCREW, B	M4X6 (BLK)
47	809-102		DRIVE ROLLER ASSY	
48			WASHER, POLY	5ϕX8ϕX0.5T
49	809-104		RING, TENSION ARM ASSY	
51	809-103		TENSION ARM R ASSY	
52			SCREW, P	M2X6 (NI)
53			WASHER, SPRING	2ϕ
54			SCREW, PSA	M4X10
55	809-106		PULLEY DRIVE ROLLER ASSY, 3-1/2-7 IN/S	
55	809-105		PULLEY DRIVE ROLLER ASSY, 7-1/2-15 IN/S	
56			SCREW, SC	M3X4
57	809-108		PULLEY DRIVE ROLLER L	
57	809-107		PULLEY DRIVE ROLLER R	
58	809-109		MAGNET	
59	809-110		O-RING	
60	809-322		HOUSING, CONNECTOR, 10P	MOLEX 5051-10 (BLK)
61	809-009		HOUSING, CONNECTOR, 5P	MOLEX 5051-5
62	809-021		HOUSING, CONNECTOR, 10P	MOLEX 5051-10
63	809-065		BASE, CENTER MOUNTING	ADC-12
64			SCREW, PSA	M4X10
65	809-093		IMPEDANCE ROLLER ASSY	
66	809-100		SPACER, IMPEDANCE	
67			SCREW, PSA	M4X10
68			WASHER	4ϕX15ϕX1T
69			LUG	4ϕ
70			SCREW, B	M4X25
71	809-101		HOOK, SPRING T	
72			E RING	2ϕ
73	809-098		RING, DAMPER	
74	809-096		ARM, DAMPER	
75	809-097		STOPPER	
76			WASHER, SPRING	2ϕ
77			SCREW, P	M2X4
78	809-099		IMPEDANCE WHEEL	
79			SCREW, SC	M4X6
80			SCREW, PSB	M3X6
81	809-010		TERMINAL, CONNECTOR	MOLEX 2759-TL
82	809-312		BELT, COUNTER, 3 1/2-7 INS	
82	809-038		BELT, COUNTER, 7 1/2-15 INS	
83	1418989-01		REWIND STOP UNIT PWA	
84	809-150		SWITCH, PUSH	
85	809-151		BUTTON, SWITCH	
86			SCREW, PSA	M3X6
87	809-111		BRACKET, COUNTER	
88			SCREW, BSA	M3X6
89			CLIP, HARNESS	3ϕ
90	809-112		COUNTER, INDEX	
91			SCREW, PSA	M3X6
92	809-114		DIRECT DRIVE CAPSTAN MOTOR ASSEMBLY, LOW, 3-3/4 - 7-1/2 INS	

SHEET 2 OF 4

ASSEMBLY NO: 1418950 TITLE: CENTER BASE SECTION

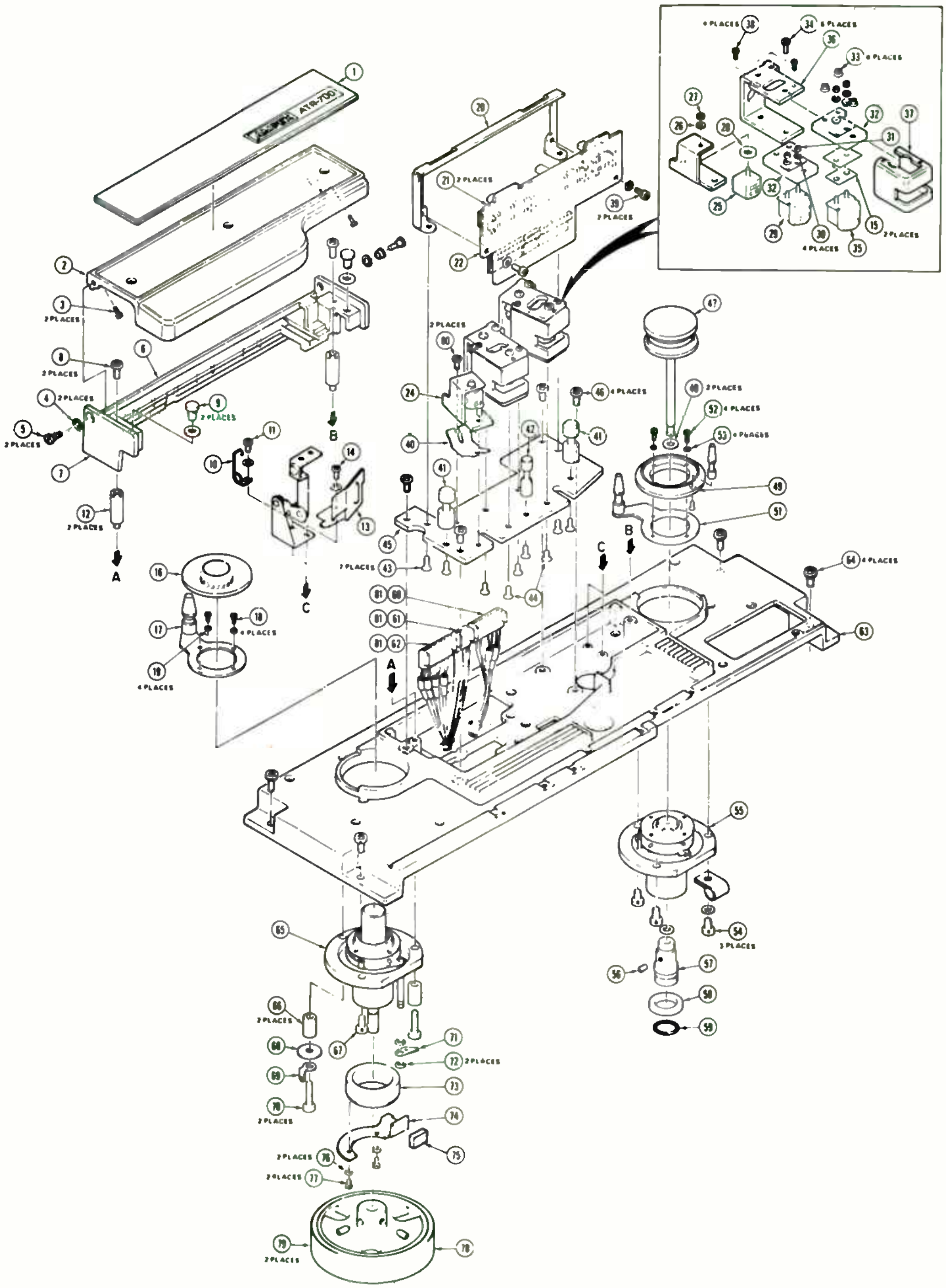
ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
92	809-113		DIRECT DRIVE CAPSTAN MOTOR ASSEMBLY HIGH, 7 1/2-15 INS	
94			SCREW, B	M4X12
95			WASHER, LWE	4φ
96	809-158		CONNECTOR, HOUSING, 11 PIN	
97	809-077		ARM, ACTUATING	
98	809-076		SPRING, PRESSURE	
99			SCREW, PSA	M3X8
100	809-075		ARM, SOLENOID	
101			SCREW, SC	M4X6
102	809-092		SPRING, TENSION	
103			WASHER, POLY	8φX12φX0.5t
104	809-086		SPRING, LIFTER	
105	809-071		SPACER, 3X7	
106			SCREW, PSA	M3X6
107	809-078		SPRING, PINCH ROLLER	
108	809-083		LINK, SOLENOID	
109	809-088		SOLENOID, PLUNGER B	
110	809-089		PIN, PLUNGER	
111			E RING	3φ
112			SCREW, PSB	M3X8
113			SCREW, PSA	M3X6
114	809-031		DIODE	V06E
115	809-079		SOLENOID	
116	809-082		DAMPER, SOLENOID	
117			SCREW, PSA	M3X6
118			SCREW, PSB	M3X6
119	809-080		PLATE, CUE SOLENOID	
120	809-081		LINK, CUE	
121	809-313		SPRING, CUE RETURN	
122	809-091		LEVER, CUE	
123	809-084		SPRING, LINK	
124	809-070		SPACER, 3 X 3	
125			LUG	3φ
126			SCREW, PSA	M3X6
127	809-085		ARM, TAPE LIFTER A	
128	809-087		ARM, TAPE LIFTER B	
129			WASHER, POLY	4φX6.5φX0.5t
130			E RING	3φ
131	809-090		ARM, CUE	
132	809-067		HOOK STUD A	
133	809-072		SHIELD, MOTOR, PB	
134			SCREW, PSB	M3X6
135	809-069		STUD, B	
136	809-068		STUD, A	
137			SCREW, F	M2.6X6
138	1418985-01		SWITCH BOARD A PWA	
139	809-314		BRACKET, SW BOARD	
140	809-315		LED ASSEMBLY A	
141			WASHER	3φX6φX0.5t
142	809-041		BRACKET, SWITCH A	
143	809-176		KNOB, LEVER SW (ABS)	
144	809-043		PANEL, CONTROL	
145	809-044		END CAP (ABS)	
146	809-042		DAMPER, CUE	
147			SCREW, B	M4X8

SHEET 3 OF 4

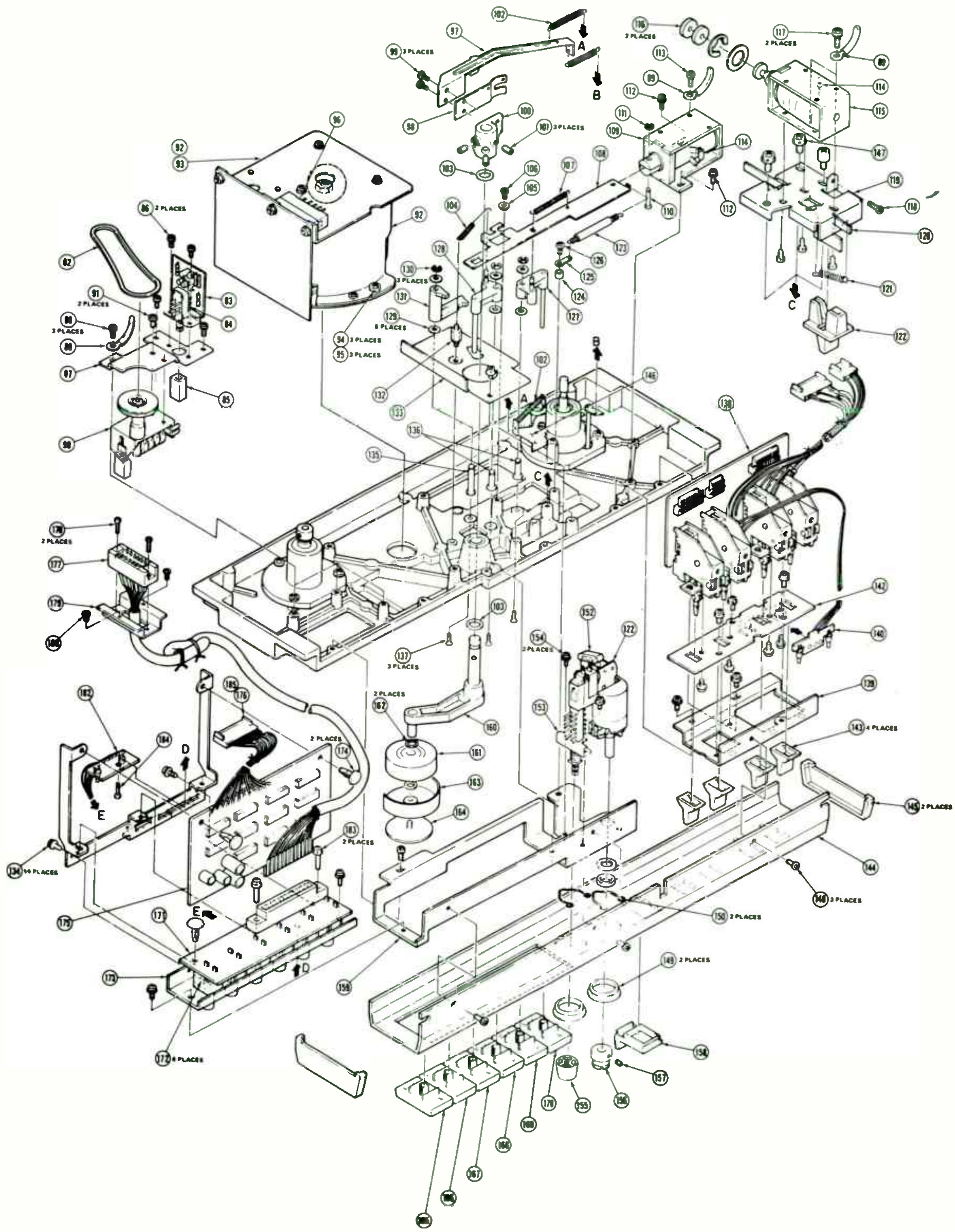
ASSEMBLY NO: 1418950 TITLE: CENTER BASE SECTION

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	OESCRIPTION	JEOEC NO. OR MFR. PART NO.
148			SCREW, B	M3X6
149	809-045		ESCUTCHEON B	
150	809-046		RING, RETAINING, ESCUTCHEON	
151	809-148		SWITCH, VARIABLE RESISTOR, 500 OHM	
152	809-149		SPARK KILLER, 0.1 MFD+120 OHM	
153	809-147	S184	SWITCH, MINI, DOUBLE-PUSH	
154			SCREW, PSA	M3X6
155	809-048		PUSHBUTTON (EDIT)	
156	809-049		PITCH CON KNOB	
157			SCREW, SC	M3X6
158	809-047		LEVER, HOOK CUE	
159	809-335		BRACKET, KEY BOARD	
160	809-073		ARM PINCH ROLLER	
161	809-074		ROLLER, PINCH	
162			WASHER, POLY	6ϕX9.5ϕX0.5t
163	809-050		COVER, PINCH ROLLER	
164	809-051		CAP, PINCH ROLLER	
165	809-165		PUSHBUTTON ASSEMBLY, REC	
166	809-166		PUSHBUTTON ASSEMBLY, PAUSE	
167	809-167		PUSHBUTTON ASSEMBLY, PLAY	
168	809-168		PUSHBUTTON ASSEMBLY, F. RWD	
169	809-169		PUSHBUTTON ASSEMBLY, F. FWD	
170	809-170		PUSHBUTTON ASSEMBLY, STOP	
171	1418993-01		KEY SWITCH PWA	
172	809-164	S171-S176	SWITCH, KEY	
173	809-163		BRACKET, KEY SWITCH	
174	809-039		CLAMPER, NYLON	
175	1418990-01		CONTROL UNIT PWA	
176	809-146	CN101	HOUSING, CONNECTOR, 12P	MOLEX 5051-12
177	809-174		CONNECTOR, 12P	M2.6X8 (Ni)
178			SCREW, P	
179	809-173		PLATE, CONNECTOR, 12P	
180			SCREW, B	M3X6 (Ni)
181	809-172		BRACKET, LED	
182	809-316		LED ASSEMBLY K	
183			SCREW, B	M3X12
184			SCREW, B	M2.6X6 (BLK)
185	809-010		TERMINAL, CONNECTOR	MOLEX 2759-TL

SHEET 4 OF 4



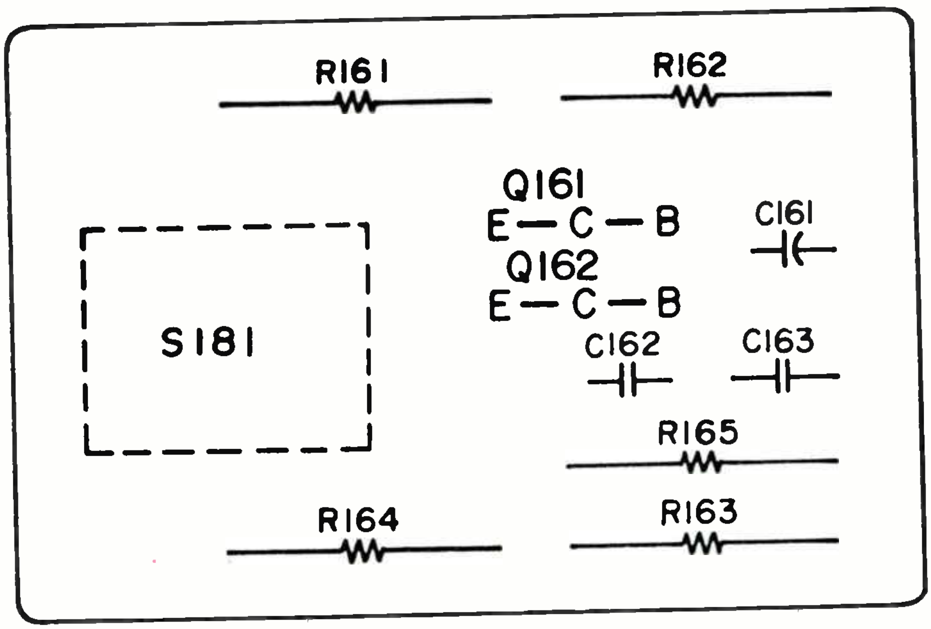
Assembly No. 1418950. Center Base Section (Sheet 1 of 2)

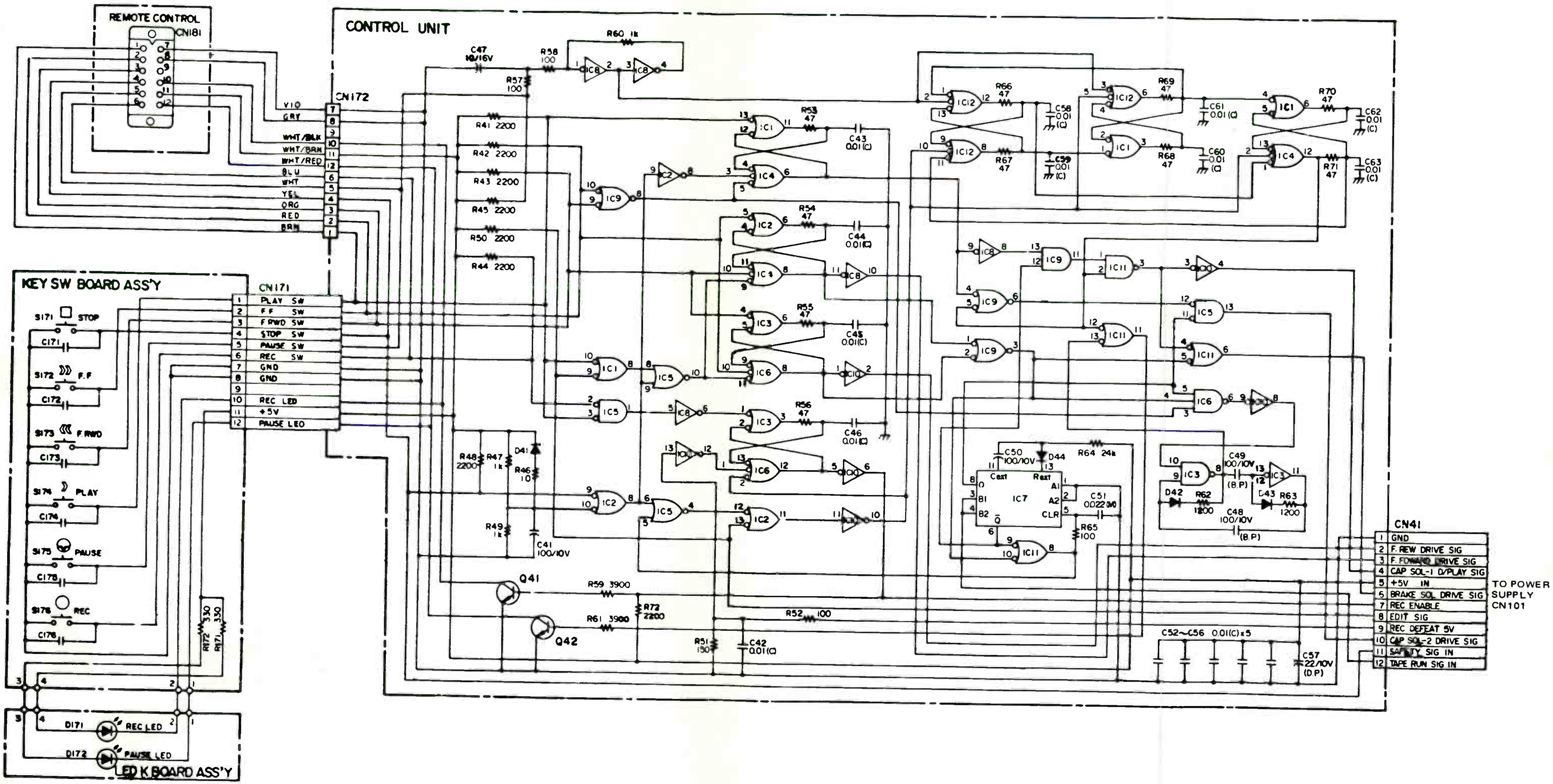


Assembly No. 1418950. Center Base Section (Sheet 2 of 2)

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418989-01		REWIND STOP UNIT PWA (NHA 1418950)	
1	809-303	Q161,162	TRANSISTOR	
2	066-665	R161,163	RESISTOR, CARBON, 1K, 1/4W, 5%	
3	066-849	R162,R164	RESISTOR, CARBON, 100K, 1/4W, 5%	
4	066-830	R165	RESISTOR, CARBON, 10K, 1/4W, 5%	
5	809-281	C161	CAPACITOR, ELEC, 0.47 MFD, 50V	
6	809-279	C162	CAPACITOR, MYLAR, 0.033 MFD, 50V, 10%	
7	809-274	C163	CAPACITOR, CERAMIC, 0.01 MFD, 50V	
8	809-150	S181	SWITCH, PUSH	
9	1418967		SCHEMATIC	

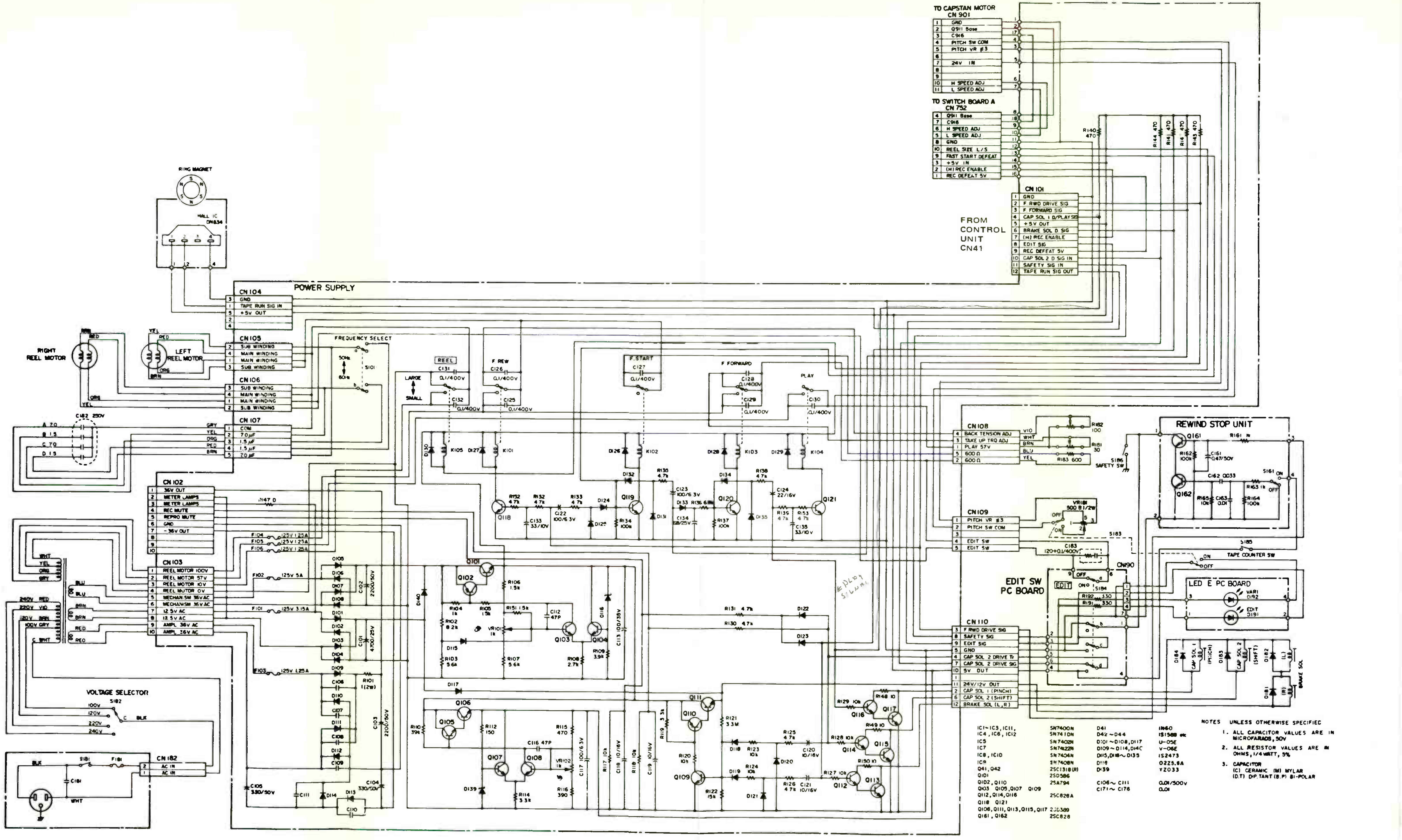
SHEET 1 OF 1





Schematic No. 1418946 Control Unit, Power Supply, Rewind Stop Unit, and Hall IC PWAs (Sheet 1 of 2)

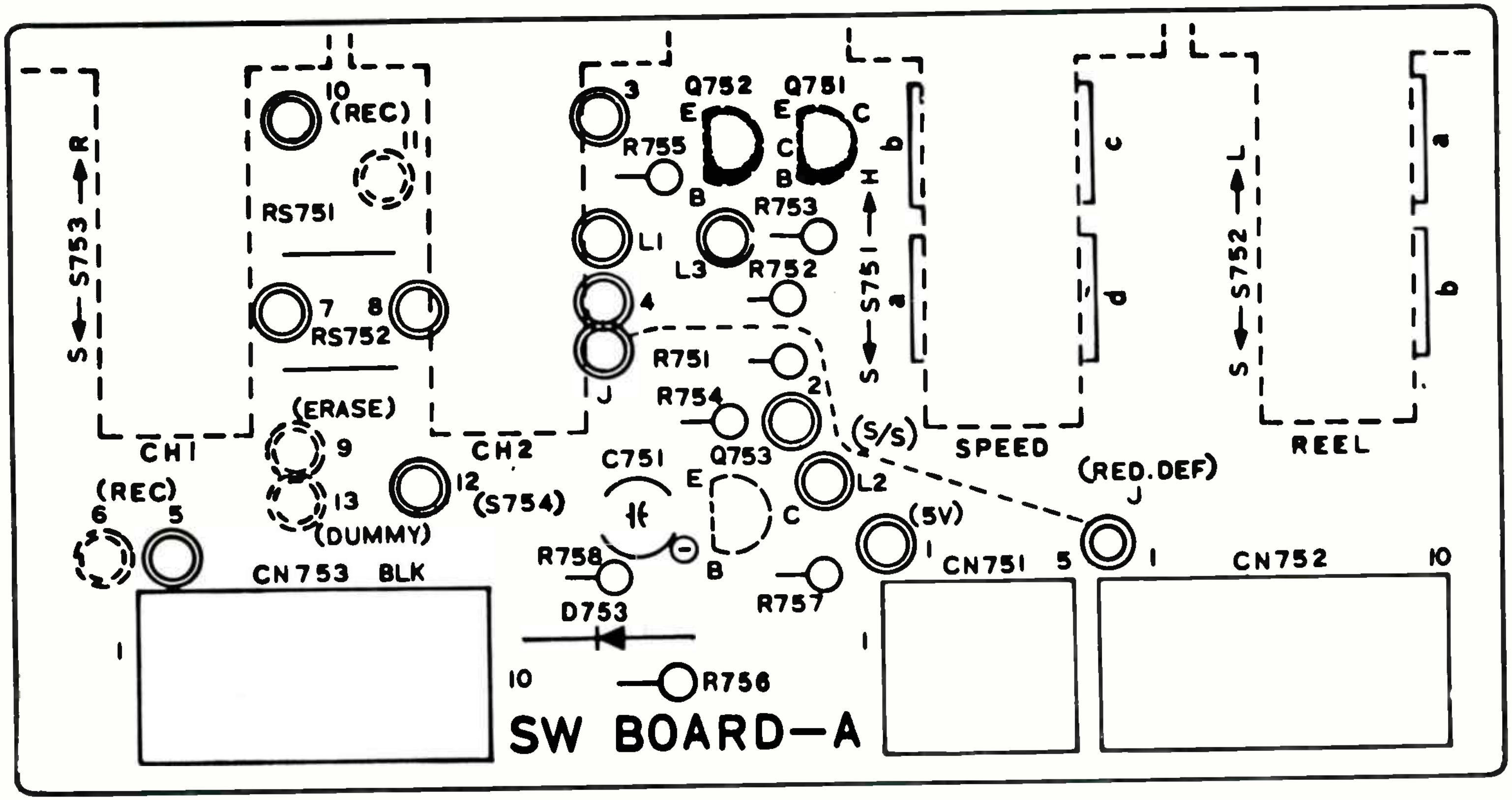
AMPEX 4890410-02



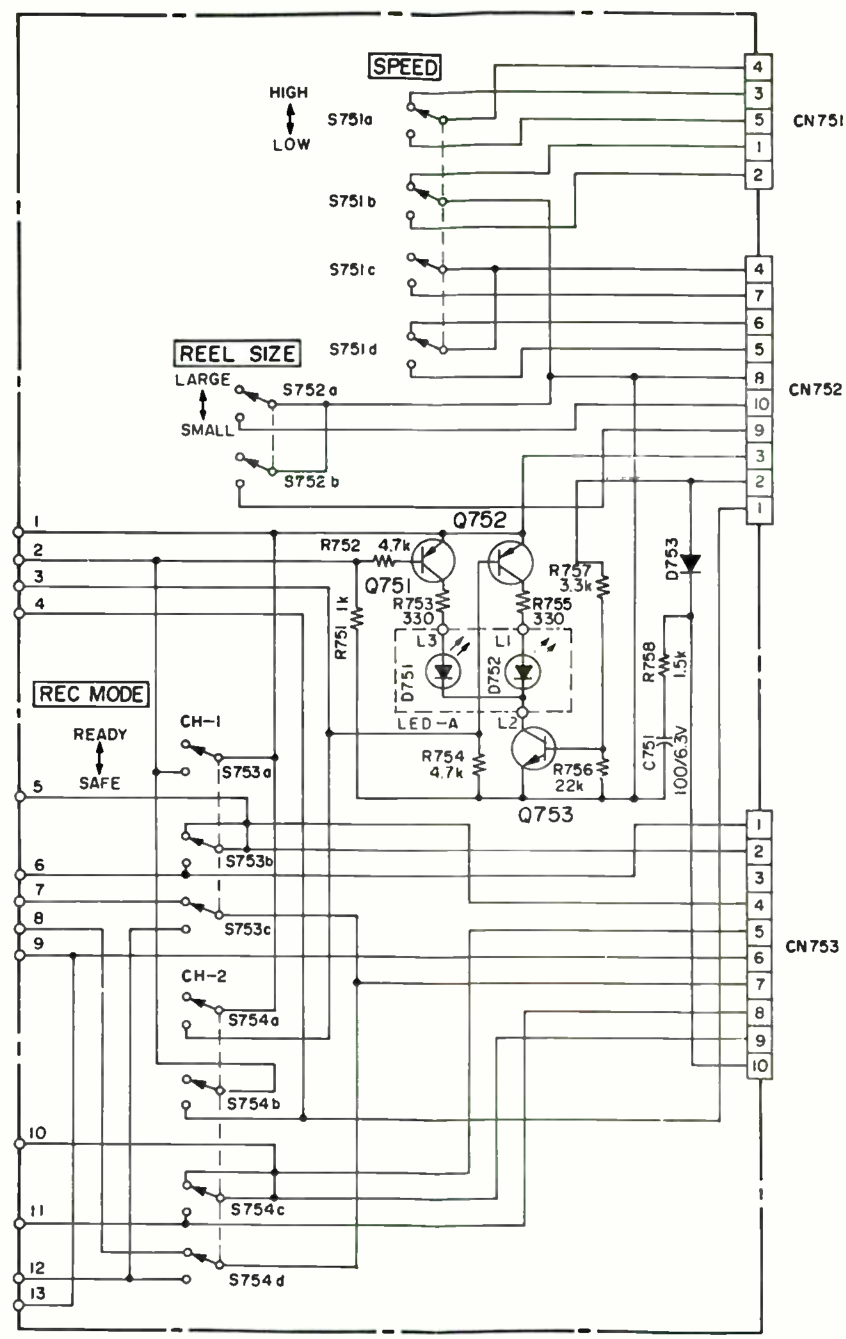
Schematic No. 1418946 Control Unit, Power Supply, Rewind Stop Unit, and Hall IC PWAs (Sheet 2 of 2)

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418944-01		SWITCH BOARD A PWA (NHA 1418950)	
1	809-233	Q751,Q752	TRANSISTOR	2SA842
2	809-303	Q753	TRANSISTOR	2SC828
3	809-331	D751,D752	DIODE, LED, (LOCATED ON LED BOARD)	STANLAY GRD4-203SRD
4	805-663	D753	DIODE	1S2473
5	066-665	R751	RESISTOR, CARBON, 1K, 1/4W, 5%	
6	066-668	R752,R754	RESISTOR, CARBON, 4.7K. 1/4W. 5%	
7	066-838	R753,R755	RESISTOR, CARBON, 330 OHM, 1/4W, 5%	
8	066-712	R756	RESISTOR, CARBON, 22K, 1/4W, 5%	
9	066-720	R757	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
10	066-824	R758	RESISTOR, CARBON, 1.5K, 1/4W, 5%	
11	809-241	C751	CAPACITOR, ELEC, 100 MFD, 6.3V	
12	809-175	S751-S754	SWITCH, LEVER 4–2	ALPS SLK-042
13	809-010		CONNECTOR TERMINAL	MOLEX 2759-TL
14	809-143	CN751P	CONNECTOR, WAFER, 5P	MOLEX 5046-5
15	809-142	CN752P	CONNECTOR, WAFER, 10P	MOLEX 5046-10
16	809-141	CN753P	CONNECTOR, WAFER, 10P (BLK)	MOLEX 5046-10 (BLK)
17	809-315		LED ASSEMBLY A	
19	1418968		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418944 Switch Board A PWA



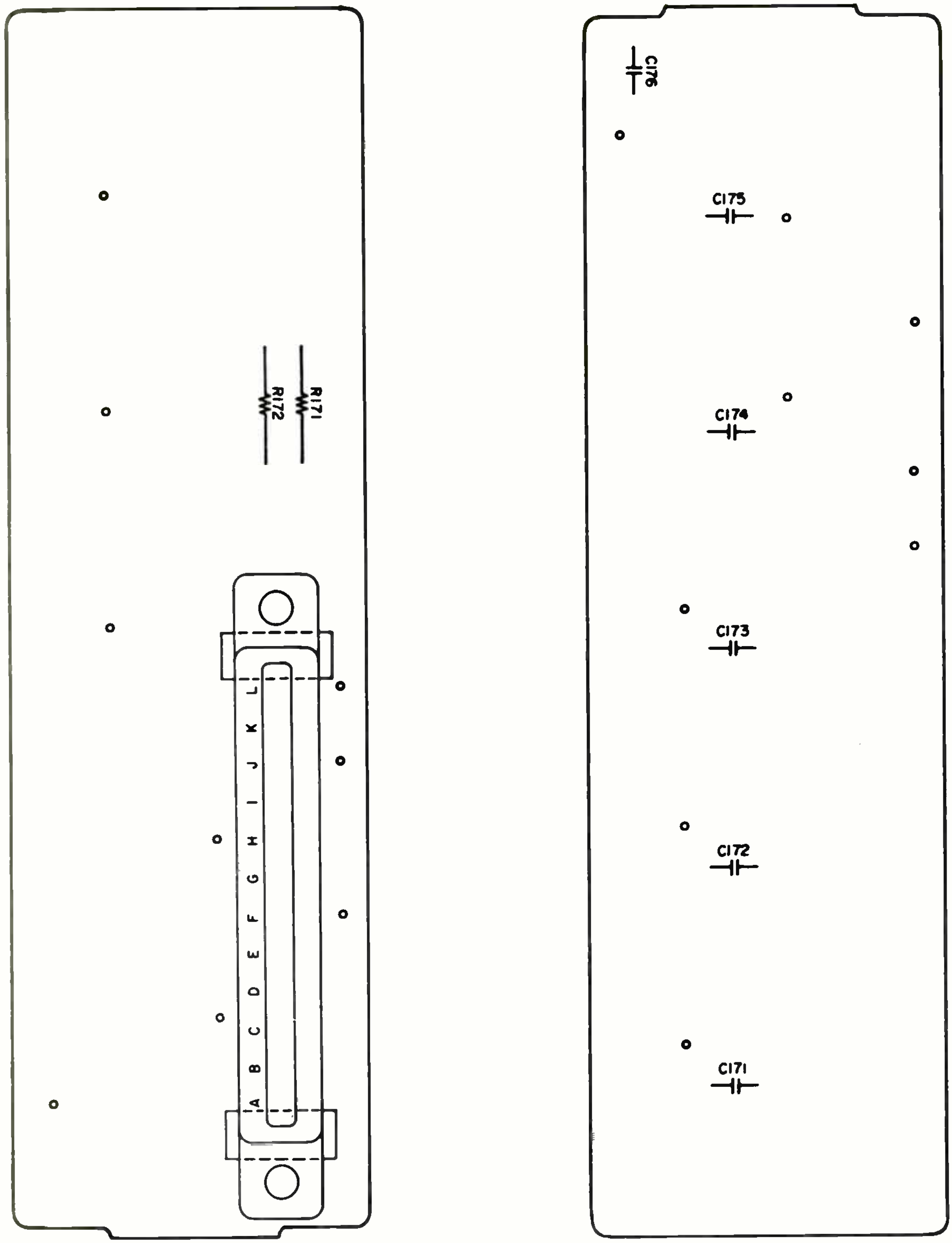
D751, D752	GD4-203SRD
Q751, Q752	2SA842 (GR, BL)
Q753	2SC828 (Q, R, S)

NOTES
1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 5(
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT

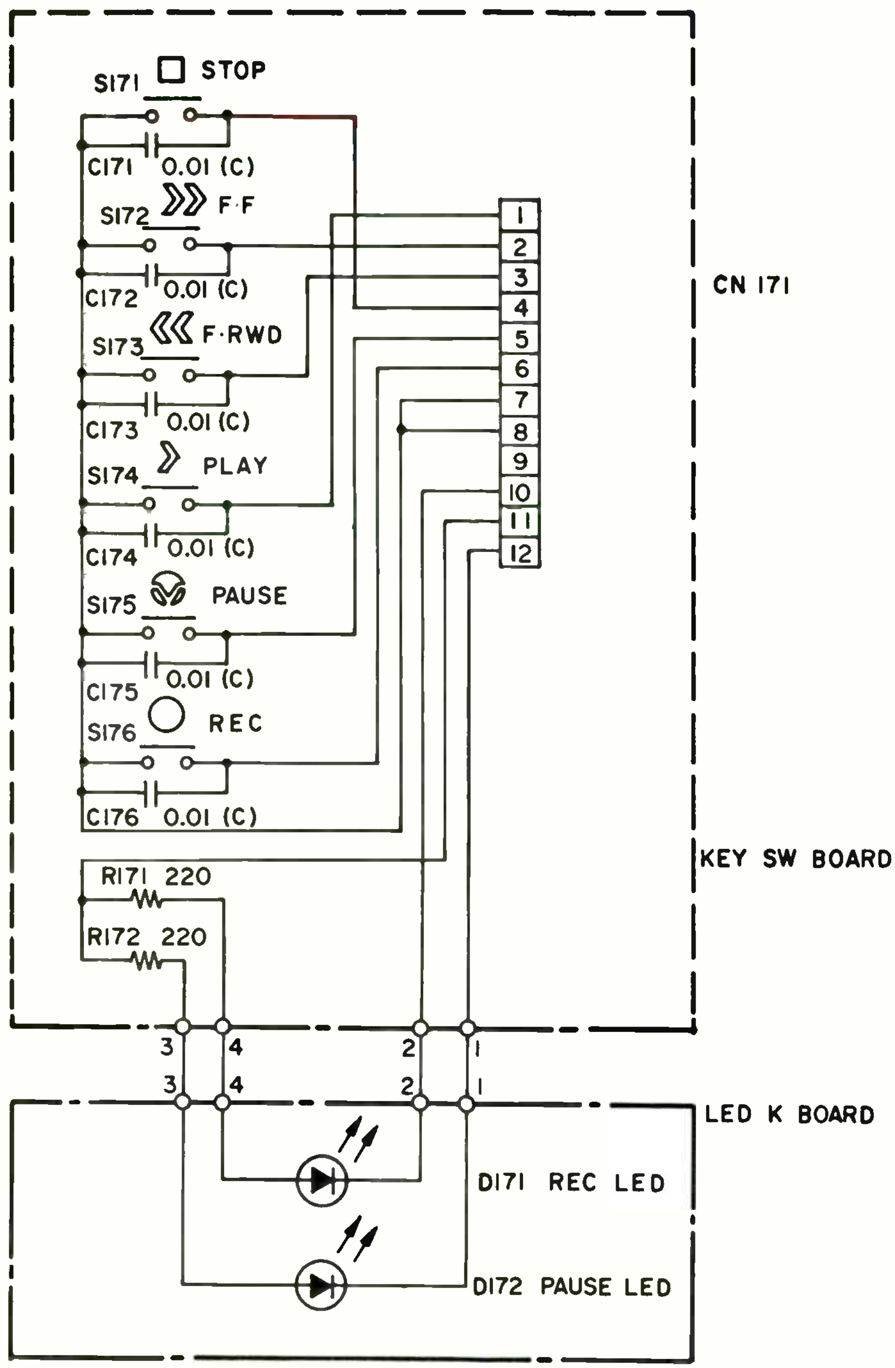
Schematic No. 1418968. Switch Board A

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418945-01		KEY SWITCH PWA (NHA 1418950)	
1	809-331	D171,172	DIODE, LED	STANLAY GRD4-203 SRD
2	066-838	R171,172	RESISTOR, CARBON, 330 OHM, 1/4W, 5%	
3	809-274	C171-176	CAPACITOR, CERAMIC, 0.01 MFD, 50V	
4	809-164	S171-176	SWITCH, KEY	MITSUMI KBH-801F
5	809-316		BOARD, P.C., LED	
6	809-171	CN171J	CONNECTOR, 12P	MITSUMI 452-12-20-162H
7	1418962		SCHEMATIC	
8	809-334		SPRING, PUSH, LED	

SHEET 1 OF 1



Assembly No. 1418945   Key Switch PWA



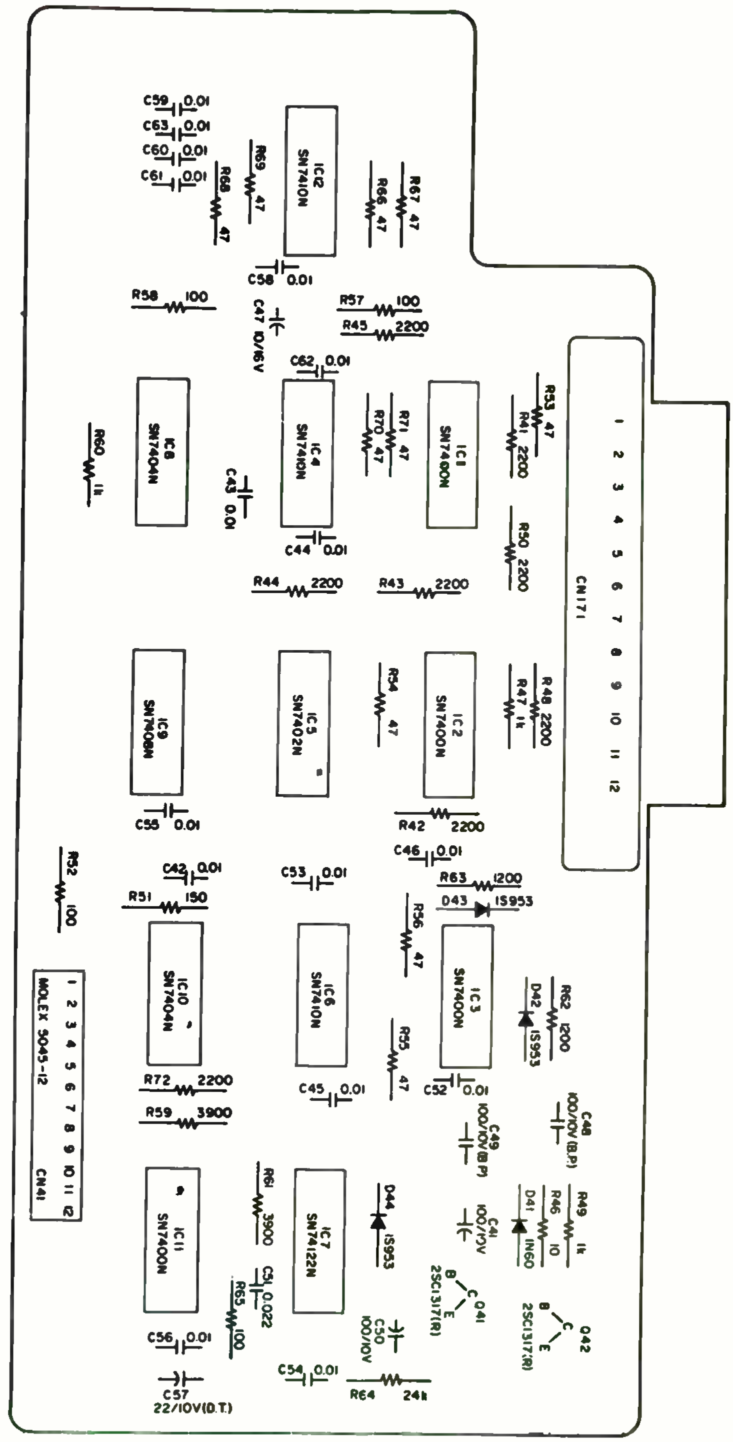
NOTES

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

Schematic No. 1418962. Key Switch

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418941-01		CONTROL UNIT PWA (NHA 1418950)	
1	806-354	IC 1-3,11	INTEGRATED CIRCUIT	SN7400
2	586-109	IC45	INTEGRATED CIRCUIT	SN7402
3	586-076	IC4,6,12	INTEGRATED CIRCUIT	SN7410
4	586-911	IC7	INTEGRATED CIRCUIT	SN74122
6	586-326	IC8-10	INTEGRATED CIRCUIT	SN7404
8	809-235	Q41,42	TRANSISTOR	2SS 1317(R)
9	806-352	D41	DIODE	1N60
10	809-228	D42-44	DIODE	1S 953
12	066-810	R46	RESISTOR, CARBON, 10 OHM, 1/4W, 5%	
13	066-665	R47,49,60	RESISTOR, CARBON, 1K, 1/4W, 5%	
14	066-813	R51	RESISTOR, CARBON, 150 OHM, 1/4W, 5%	
15	066-812	R52,57,58,65	RESISTOR, CARBON, 100 OHM, 1/4W, 5%	
16	066-827	R59,61	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
18	066-715	R62,63	RESISTOR, CARBON, 1.2K, 1/4W, 5%	
19	066-845	R64	RESISTOR, CARBON, 24K, 1/4W, 5%	
21	809-244	C41,50	CAPACITOR, ELEC, 100 MFD, 10V	
23	809-245	C48,49	CAPACITOR, ELEC, 100 MFD, 10V	
25	809-277	C51	CAPACITOR, MYLAR, 0.022 MFD, 50V, 10%	
26	809-274	C42-46, 52-56	CAPACITOR, CERAMIC, 0.01 MFD, 50V	
27	809-286	C57	CAPACITOR, TANT, 22 MFD, 16V	
30	1418946		SCHEMATIC	
31	066-938	R53-56, 66-71	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
32	066-689	R41-45, 48-50	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
33	809-246	C47	CAPACITOR, CHEMICAL, 10 MFD, 16V	
34	586-759	IC9	INTEGRATED CIRCUIT	SN7408
35	809-146	CN41	HOUSING, CONNECTOR	MOLEX 5051-12
36	809-339		WAFER, CONNECTOR, REF CN41	MOLEX 5045-12
37	809-340	CN172	CONNECTOR, 12P	

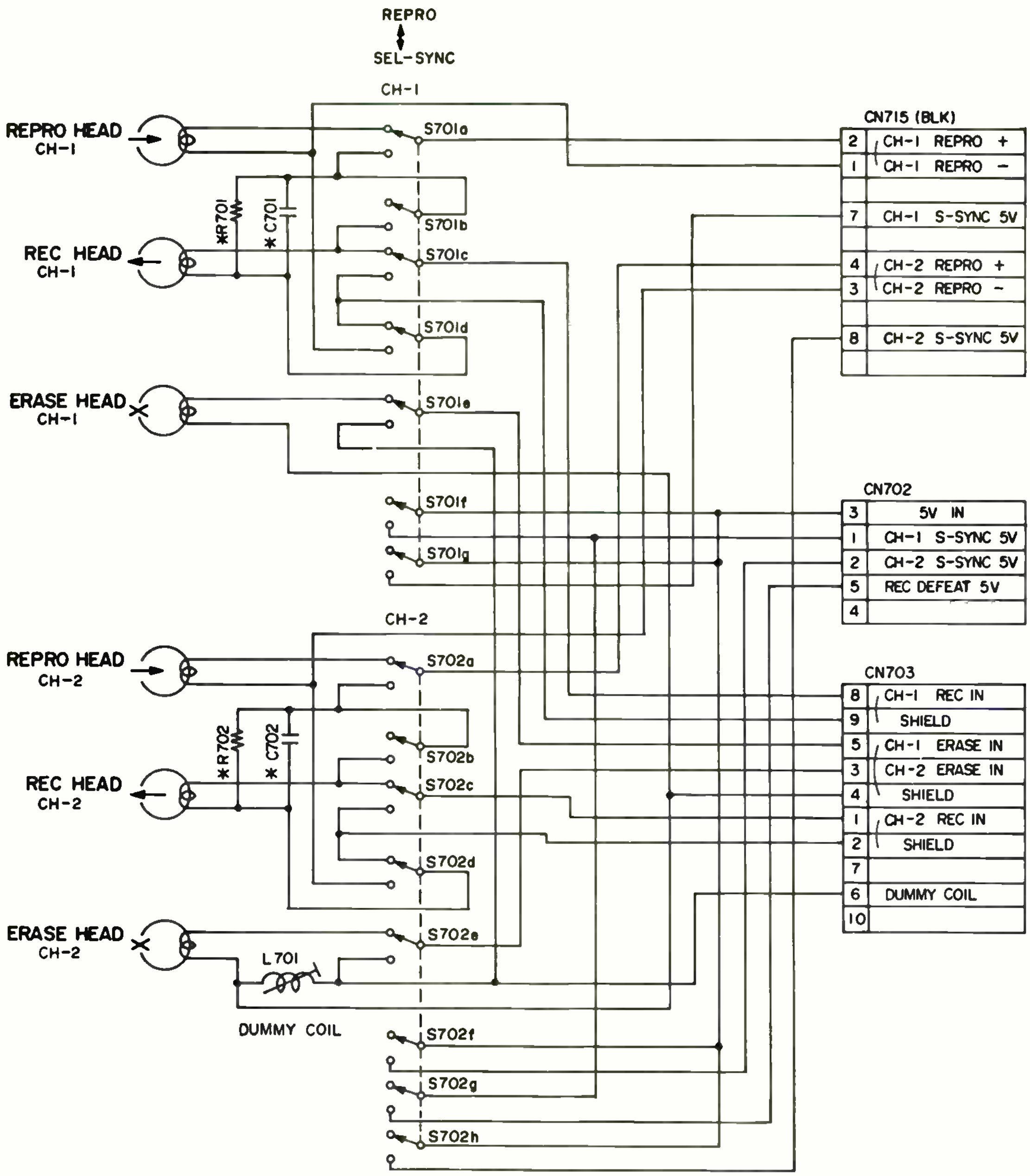
SHEET 1 OF 1



Assembly No. 1418941 Control Unit PWA

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418992-01		HEAD SELECT PWA, 4 TRACK	
	1418992-02		HEAD SELECT PWA, 2 TRACK	
	1418992-03		HEAD SELECT PWA, FULL TRACK	
1	066-665	R701,702	RESISTOR, CARBON, 1K, 1/4W, 5%, 2 TRACK – HI	
2	066-689	R701,702	RESISTOR, CARBON, 2.2K, 1/4W, 5%, 4 TRACK – LO	
3	809-276	C701,702	CAPACITOR, MYLAR, 0.018 MFD, 50V, 5% – 2T HI – 4T LO, 2 AND 4 TRACK	
4	809-140	L701	COIL, DUMMY, 3 MH, 2 AND 4 TRACK	
5	809-139	S701,702	SWITCH, SLIDE, 8P-2, 2 AND 4 TRACK	ALPS SSP-082(NS)
6	809-141	CN701P	CONNECTOR, WAFER (BLK)	MOLEX 5046-10 (BLK)
7	809-143	CN702	CONNECTOR, WAFER	MOLEX 5046-5
8	809-142	CN703	CONNECTOR, WAFER	MOLEX 5046-10
9	1418960		SCHEMATIC, 4 TRACK/2 TRACK	
10	1418959		SCHEMATIC, FULL TRACK	
11	066-824	R701,702	RESISTOR, CARBON, 1.5K, 5%, 4 TRACK – HI	
12	809-275	C701,702	CAPACITOR, MYLAR, 0.015 MFD, 50V, 5%, 4 TRACK – HI	
13	809-277	C701,702	CAPACITOR, MYLAR, 0.022 MFD, 50V, 5%, 2 TRACK – LO	

SHEET 1 OF 1

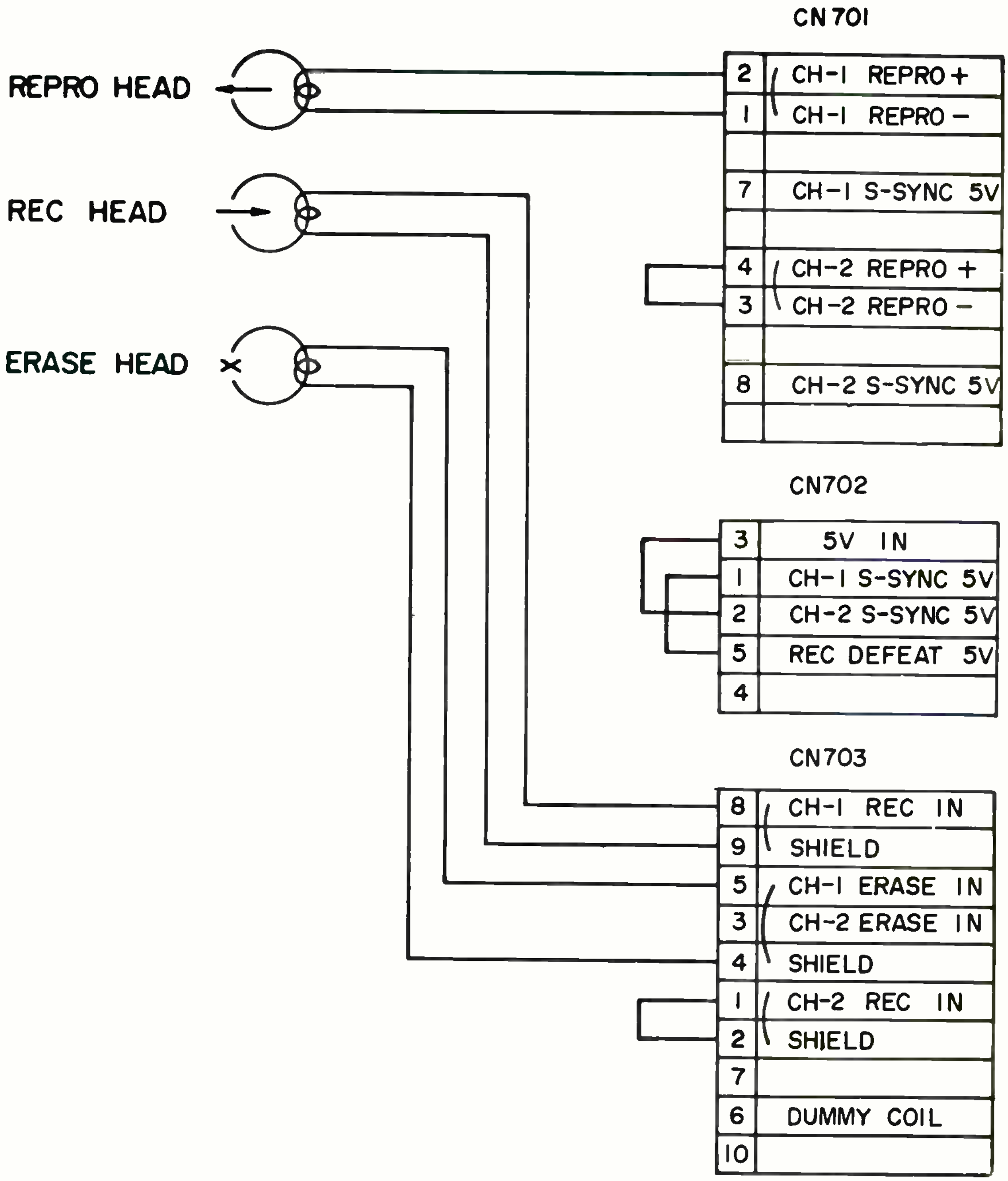


SPEED / *	HIGH SPEED MODEL		LOW SPEED MODEL	
	2T	4T	2T	4T
R701,R702	1k	1.5K	2.2K	1K
C701, C702	0.018	.015	.022	0.018

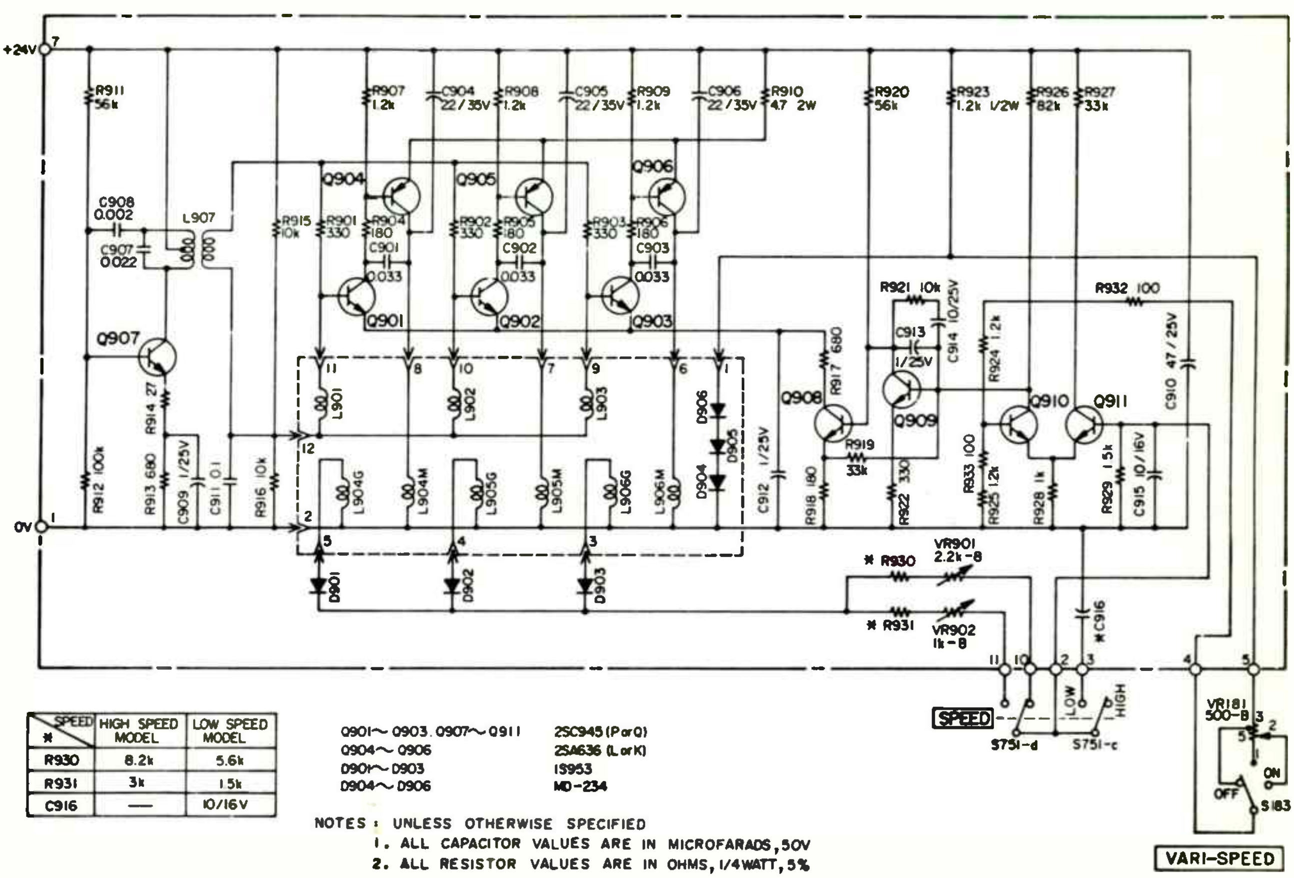
NOTES

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

Schematic No. 1418960. Head Select PWA, 4 Track/2 Track



Schematic No. 1418959. Head Select PWA, Full Track



SPEED / *	HIGH SPEED MODEL	LOW SPEED MODEL
R930	8.2k	5.6k
R931	3k	1.5k
C916	—	10/16V

Q901~Q903, Q907~Q911 2SC945 (P or Q)
Q904~Q906 2SA636 (L or K)
D901~D903 1S953
D904~D906 MD-234

NOTES : UNLESS OTHERWISE SPECIFIED
1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4WATT, 5%

Schematic No. 1418958. Capstan Motor

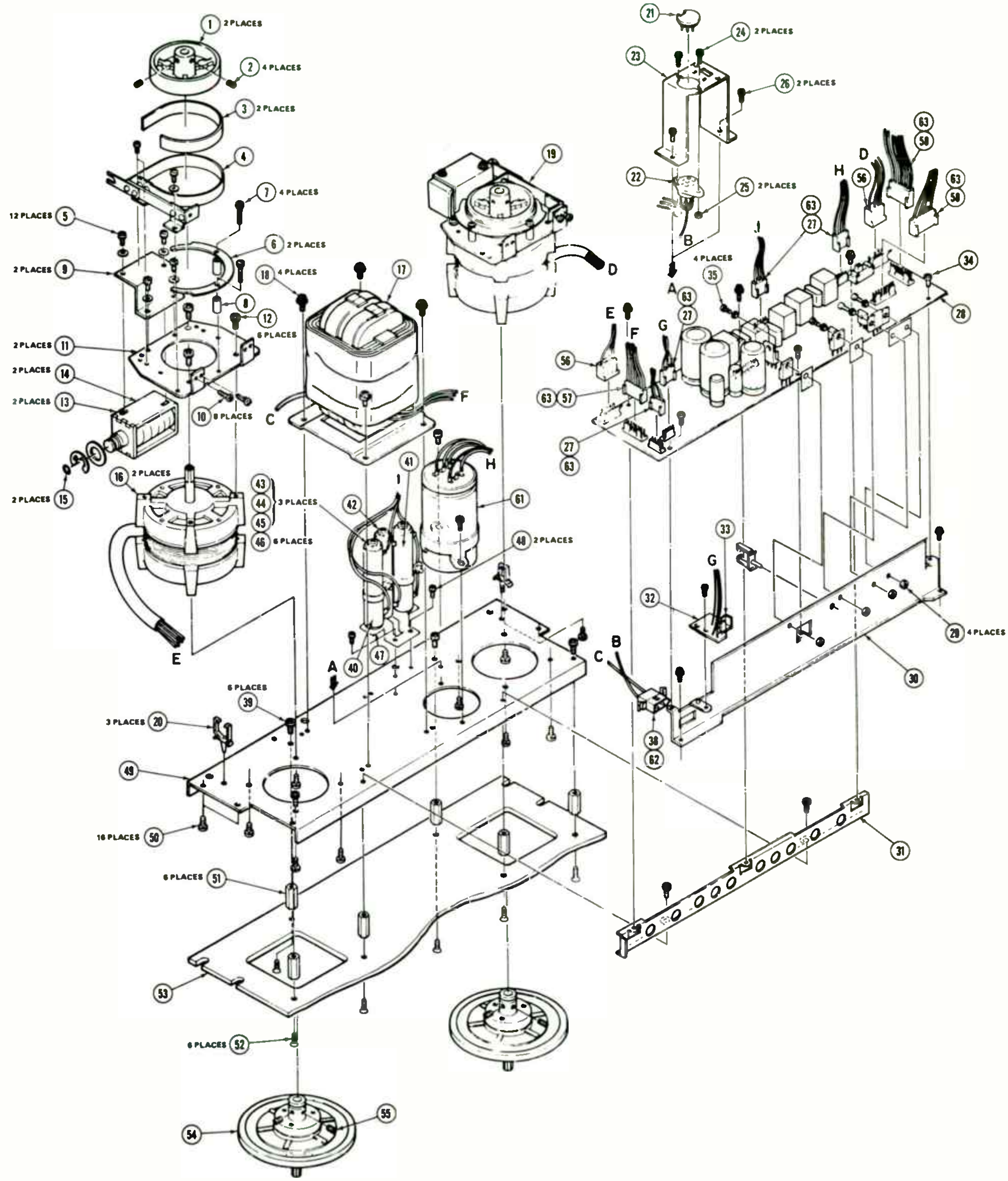
ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418951-01		LOWER MAIN CHASSIS	
1	809-033		DRUM BRAKE	
2			SCREW, SF	M4X6
3	809-027		BRAKE, FELT	
4	809-025		BRAKE BAND ASSEMBLY R	
5			SCREW, PSA	M3X6
6	809-028		RETAINER, BRAKE SHAPING	
7			SCREW, B	M3X20
8	809-029		SPACER, BRAKE RETAINER	
9	809-023		PLATE, SOLENOID	
10			SCREW, PSB	M3X6
11	809-022		PLATE, BRAKE P	
12			SCREW, PSA	M4X8
13	809-030		BRAKE, SOLENOID, LOW NOISE	
14	809-031		DIODE	
15	809-032		O-RING, P-4	
16	809-007		REEL MOTOR ASSEMBLY	
17	809-011		TRANSFORMER, POWER, 100/120/220/240V	
18			SCREW, PSB	M4X10
19	809-024		BRAKE BAND ASSEMBLY L	
20	809-026		CLIP, CABLE, 175, NYLON	
21	809-013		PLUG, VOLT SELECTOR	
22	809-014		SOCKET, VOLT SELECTOR, 100/120/220/240V	
23	809-012		BRACKET, SELECTOR	
24			SCREW, B	M3X10
25			NUT	M3
26			SCREW, PSA	M3X6
27	809-009		HOUSING, CONNECTOR, NYLON	MOLEX 5051-5
28	1418994-01		POWER SUPPLY UNIT PWA	
29			NUT	M3
30	809-155		BRACKET, POWER UNIT B	
31	809-154		BRACKET, POWER UNIT A	
32	1418999-01		HALL IC ASSEMBLY	
34			SCREW, PSB	M3X8
35			SCREW, RTB	M3X8
38	809-015		HOUSING, CONNECTOR, NYLON	MOLEX 1545-P
39			SCREW, PSB	M4X10
40	809-018		RESISTOR, WIRE WOUND, 30 OHM, 30H	
41	809-019		RESISTOR, WIRE WOUND, 100 OHM, 30H	
42	809-020		RESISTOR, WIRE WOUND, 600 OHM, 30H	
43			SCREW, P	M4X85
44			WASHER	4ϕX15ϕX1t
45			WASHER, SPRING	4ϕ
46			WASHER, BAKELITE	4ϕX16ϕ1t
47	809-017		PLATE, RESISTOR	
48			SCREW, PSA	M3X6
49	809-005		CHASSIS, REEL MOTOR R	
50			SCREW, PSA	M4X10
51	809-004		STANDOFF, REEL MOTOR, BSBM	
52			SCREW, F	M4X12
53	809-003		PANEL, CHASSIS	
54	809-034		REEL TABLE ASSEMBLY	
55			SCREW, SC	M4X6
56	809-311		HOUSING, CONNECTOR, 4P	MOLEX 2390-V4
57	809-021		HOUSING, CONNECTOR, 10P	MOLEX 5051-10

SHEET 1 OF 2

ASSEMBLY NO: 1418951 TITLE: LOWER MAIN CHASSIS

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
58	809-146		HOUSING, CONNECTOR, 12P	MOLEX 5051-12
60			SCREW, PSA	
61	809-008		CAPACITOR, 7 MFD-1.5 MFD X 2, 250V	
62	809-016		TERMINAL, CONNECTOR	MOLEX 1381-TL
63	809-010		TERMINAL, CONNECTOR	MOLEX 2759-TL

SHEET 2 OF 2



Assembly No. 1418951. Lower Main Chassis

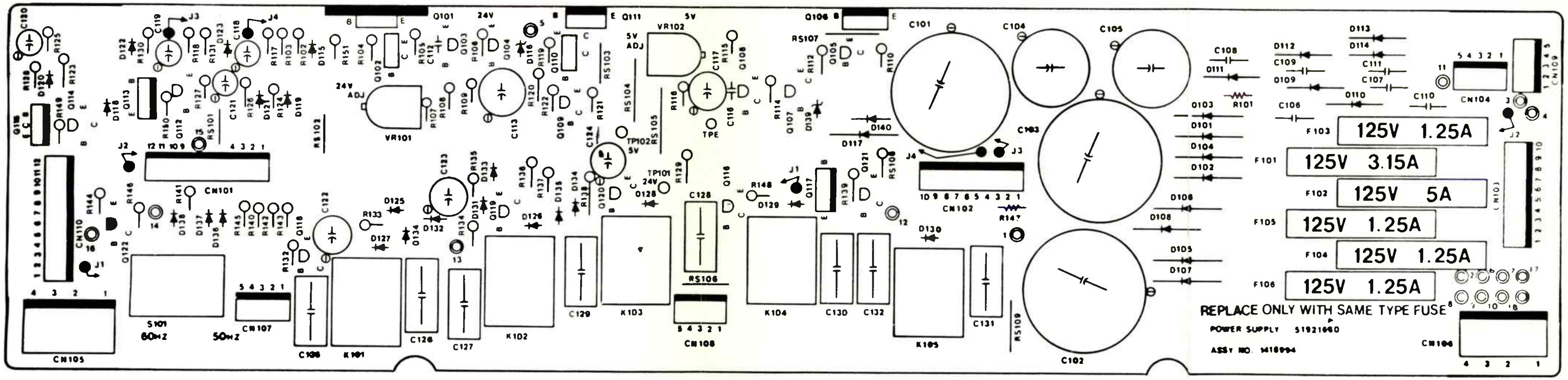
ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418943-01		POWER SUPPLY UNIT PWA (NHA 1418951)	
1	809-234	Q101	TRANSISTOR	
2	809-232	Q102	TRANSISTOR	
3	809-239	Q103-105	TRANSISTOR	
4	805-683	Q106	TRANSISTOR	
5	809-239	Q107-109	TRANSISTOR	
6	809-232	Q110	TRANSISTOR	
7	805-683	Q111	TRANSISTOR	
8	809-239	Q112	TRANSISTOR	
9	805-683	Q113	TRANSISTOR	
10	809-239	Q114	TRANSISTOR	
11	805-683	Q115	TRANSISTOR	
12	809-239	Q116	TRANSISTOR	
13	805-683	Q117	TRANSISTOR	
14	809-239	Q118-121	TRANSISTOR	
16	809-226	D101-108	DIODE	
17	809-031	D109-114	DIODE	
18	806-663	D115	DIODE	
19	809-225	D116	DIODE, ZENER	
20	809-226	D117	DIODE	
21	806-663	D118-135	DIODE	
22	809-330	D139	DIODE, ZENER	
23	809-031	D140	DIODE	
24	809-156	K101-105	RELAY	OMRON LC1-C-JT
25	059-561	R101	RESISTOR, WIRE WOUND, 1 OHM, 2W, 10%	
26	066-669	R102	RESISTOR, CARBON, 8.2K, 1/4W, 5%	
27	066-718	R103	RESISTOR, CARBON, 5.6K, 1/4W, 5%	
28	066-665	R104	RESISTOR, CARBON, 1K, 1/4W, 5%	
29	066-824	R105,106	RESISTOR, CARBON, 1.5K, 1/4W, 5%	
30	066-718	R107	RESISTOR, CARBON, 5.6K, 1/4W, 5%	
31	066-666	R108	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
32	066-827	R109	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
33	066-860	R110	RESISTOR, CARBON, 39K, 1/4W, 5%	
34	066-813	R112	RESISTOR, CARBON, 150 OHM, 1/4W, 5%	
35	066-720	R114	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
36	066-818	R115	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
37	066-816	R116	RESISTOR, CARBON, 390 OHM, 1/4W, 5%	
38	066-830	R117,118	RESISTOR, CARBON, 10K, 1/4W, 5%	
39	066-720	R119	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
40	066-830	R120	RESISTOR, CARBON, 10K, 1/4W, 5%	
41	076-015	R121	RESISTOR, CARBON, 3.3M, 1/4W, 5%	
42	066-856	R122	RESISTOR, CARBON, 15K, 1/4W, 5%	
43	066-830	R123,124	RESISTOR, CARBON, 10K, 1/4W, 5%	
44	066-668	R125,126	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
45	066-830	R127-129	RESISTOR, CARBON, 10K, 1/4W, 5%	
46	066-668	R130-133	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
47	066-849	R134	RESISTOR, CARBON, 100K, 1/4W, 5%	
48	066-668	R135	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
49	066-829	R136	RESISTOR, CARBON, 6.8K, 1/4W, 5%	
50	066-849	R137	RESISTOR, CARBON, 100K, 1/4W, 5%	
51	066-668	R138,139	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
52	066-818	R140-144	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
55	066-810	R148-150	RESISTOR, CARBON, 10 OHM, 1/4W, 5%	

SHEET 1 OF 2

ASSEMBLY NO. 1418943 TITLE: POWER SUPPLY UNIT PWA

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
56	066-824	R151	RESISTOR, CARBON, 1.5K, 1/4W, 5%	
57	066-668	R152, 153	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
58	809-258	C101	CAPACITOR, ELEC, 4700 MFD, 25V	
59	809-287	C102,103	CAPACITOR, ELEC, 2200 MFD, 50V	
60	809-288	C104,105	CAPACITOR, ELEC, 3300 MFD, 50V	
61	809-292	C106-111	CAPACITOR, CERAMIC, 0.01 MFD, 500V	
62	809-264	C112	CAPACITOR, MICA, 47 PFD, 50V, 5%	
63	809-261	C113	CAPACITOR, ELEC, 100 MFD, 35V	
64	809-264	C116	CAPACITOR, MICA, 47 PFD, 50V, 5%	
65	809-241	C117	CAPACITOR, ELEC, 100 MFD, 6.3V	
66	809-246	C118-121	CAPACITOR, ELEC, 10 MFD, 16V	
67	809-241	C122,123	CAPACITOR, ELEC, 100 MFD, 6.3V	
68	809-327	C124	CAPACITOR, ELEC, 22 MFD, 16V	
69	809-291	C125-132	CAPACITOR, METALIZED MYLAR, 0.1 MFD, 400V, 20%	
70	809-328	C133, C135	CAPACITOR, TANT, 33 MFD, 10V	
71	809-329	C134	CAPACITOR, TANT, 6.8 MFD, 25V	
72	809-157	VR101,102	RESISTOR, VARIABLE, 1K	
73	809-145	S101	SWITCH, SLIDE	
74	809-294	F101	FUSE, 125V/3.15A	
75	809-295	F102	FUSE, 125V/5A	
76	809-293	F103-106	FUSE, 125V/1.25A	
77	809-161	CN101	CONNECTOR, WAFER, 12P	MOLEX 5045-12A
78	809-162	CN102,103	CONNECTOR, WAFER, 10P	MOLEX 5045-10A
79	809-160	CN104	CONNECTOR, WAFER, 5P	MOLEX 5045-5A
80	809-159	CN105,106	CONNECTOR, WAFER, 4P	MOLEX 4291-4A
81	809-160	CN107-109	CONNECTOR, WAFER, 5P	MOLEX 5045-5A
82	809-161	CN110	CONNECTOR, WAFER, 12P	MOLEX 5045-12A
83	809-010		TERMINAL, CONNECTOR, REF CN 101	MOLEX 2759-TL
84	1418946		SCHEMATIC	
85	809-146	CN 101	HOUSING, CONNECTOR, 12P	MOLEX 5051-12

SHEET 2 OF 2

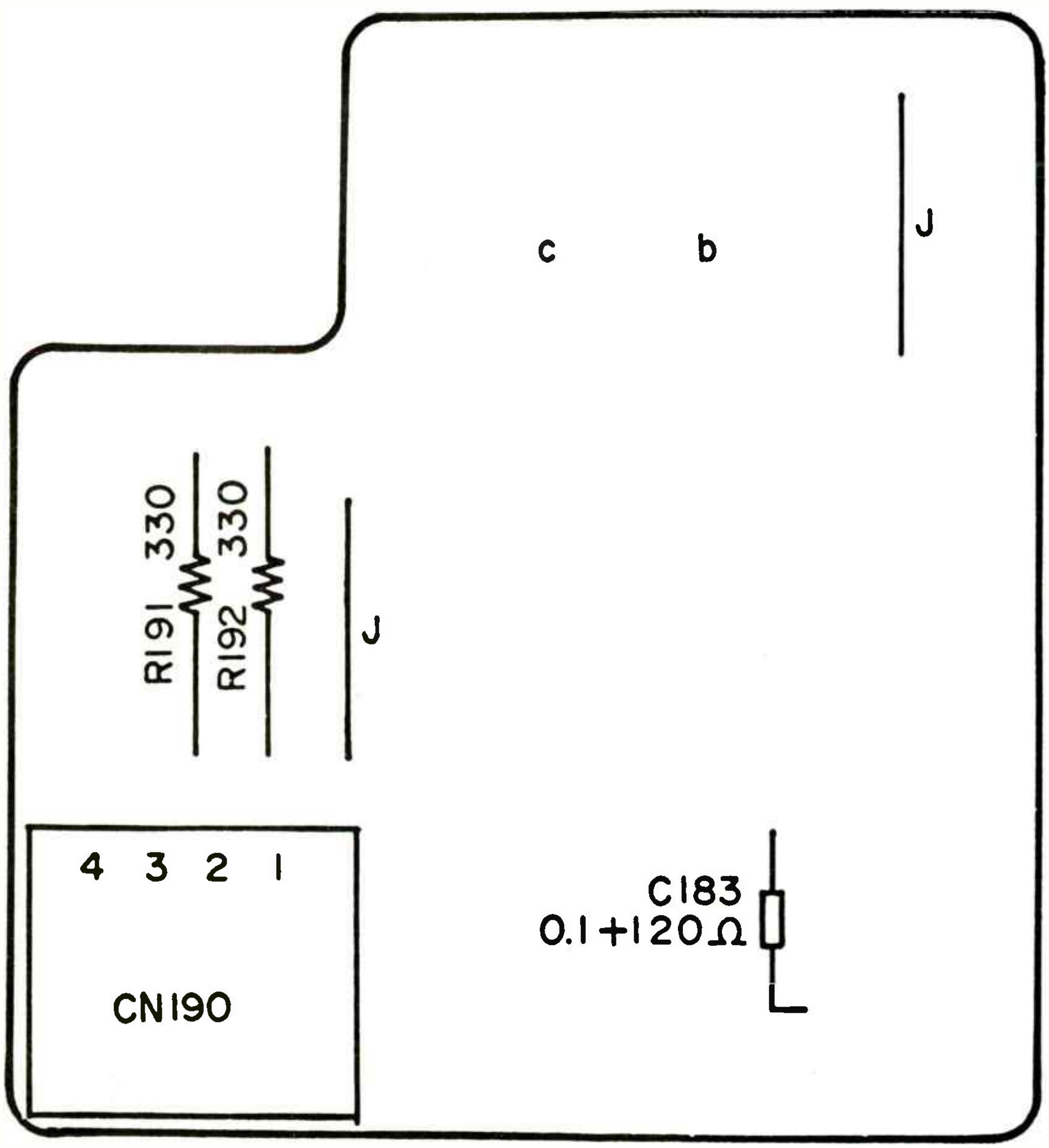


Assembly No. 1418943
Power Supply Unit PWA

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418999-01		HALL INTEGRATED CIRCUIT ASSEMBLY (NHA 1418951)	
1	809-231		INTEGRATED CIRCUIT	

SHEET 1 OF 1

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418942-01		EDIT SWITCH PWA	
1	066-838	R191,192	RESISTOR, CARBON, 330 OHM, 1/4W	
2	809-336		WAFER, CONNECTOR, REF CN190	5046-4
3	809-337	CN190	HOUSING, CONNECTOR	5051-4
4	809-338		TERMINAL, CONNECTOR	2759
5	1418938-01	C183	CAPACITOR-RESISTOR CIRCUIT, 120 OHM/ 0.1 UF, 400V	



SHEET 1 OF 1

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418939-01		LED E PWA	
1	809-331	D191,192	DIODE, LIGHT EMITTING	

SHEET 1 OF 1

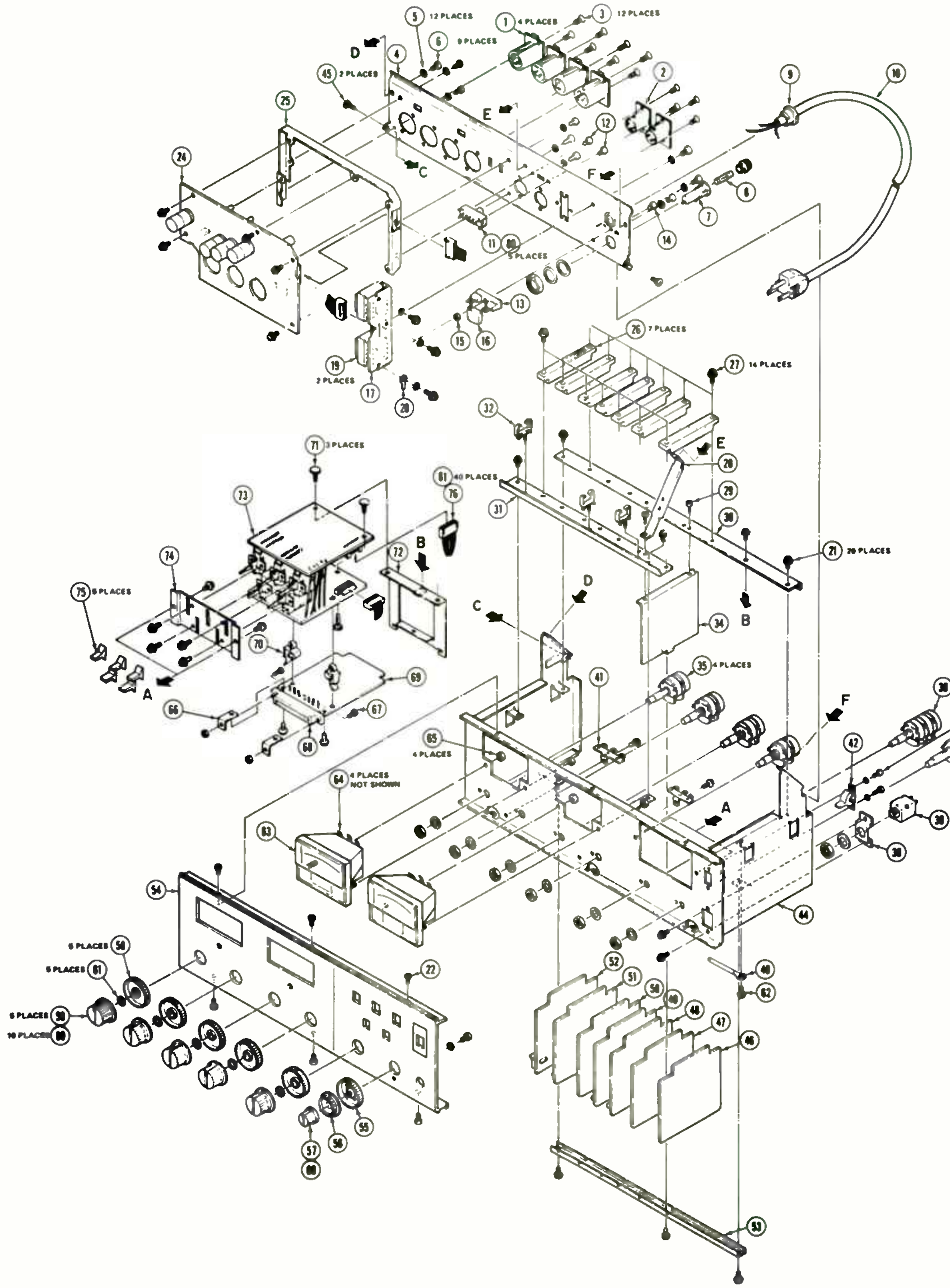
ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418952-01		AMPLIFIER SECTION	
1	146-998		CONNECTOR, INPUT, XLR 3-31	
2	147-999		CONNECTOR, OUTPUT, XLR 3-32	
3			SCREW, O	M2.6X6 (Ni)
4	809-200		PANEL, REAR CONNECT	
5			WASHER, LWE	3ϕ
6			SCREW, B	M3X6 (BLK)
7	809-201		FUSEHOLDER	
8	070-019		FUSE, 2A-250V	
9	809-323		CLAMPER, CORD	HEYCO SR-5P-4
10	809-202		CORD, AC, 3P	
11	809-205	S721	SWITCH, SLIDE, L-12, NON SHORT	
12			SCREW, B	M2.6X4 (NI)
13	809-203		TERMINAL STRIP, 2P	
14			SCREW, B	M3X10 (NI)
15			NUT	M3
16	809-204		CAPACITOR, POLY, 0.0047 MFD/250V	
17	1418987-01		OUTPUT TRANSISTOR BOARD ASSEMBLY	
18	809-207		BRACKET, TRANSISTOR BOARD	
19	809-206	T721,722	TRANSFORMER, OUTPUT	
20			LUG	3ϕ
21			SCREW, PSB	M3X6
22			SCREW, B	M3X6 (NI)
24	1418986-01		INPUT SELECT PWA	
25	809-208		BRACKET, INPUT BOARD	
26	809-190		CONNECTOR, 14P	
27			SCREW, PSB	M3X12
28	809-324		PLATE, PANEL REINFORCING	
29			SCREW, RTB	M3X8
30	809-304		ANGLE, LONG	
31	809-305		ANGLE, SHORT	
32	809-306		CLIP, CABLE, 047, NYLON	
34	809-307		PLATE, SHIELD	
35	809-185	VR721-724	RESISTOR, VARIABLE, 100K, (SINGLE)	
36	809-186	VR725	RESISTOR, VARIABLE, 50K, (DOUBLE)	
37	809-187	VR726	RESISTOR, VARIABLE, 50K	
38	809-189		JACK, HEAD PHONE, 3P	
39	809-188		BRACKET, HEAD PHONE	
40			CLIP, HARNESS	3ϕ
41	809-184		TERMINAL, 1L-2P	
42	809-192		SWITCH, POWER	C&K 7101-J2-ZQE
43			SCREW, P	M2X6
44	809-191		CHASSIS ASSEMBLY, AMPLIFIER	
45	809-308		SCREW, HINGE	
46	1418979-01		BIAS OSCILLATOR PWA	
47	1418984-01		OUTPUT PHONE AMPLIFIER PWA	
48	1418983-01		REPRODUCE LINE AMPLIFIER PWA	
49	1418981-01		REPRODUCE EQUALIZER AMPLIFIER PWA	
50	1418980-01		METER AMPLIFIER/STABILIZER PWA	
51	1418976-01		MIX-LINE AMPLIFIER PWA	
52	1418977-01		RECORD AMPLIFIER PWA	
53	809-194		HOLDER, PCB	
54	809-195		PANEL, TRIM, AMPLIFIER	
55	809-198		MEMORY MARKER B	
56	809-177		KNOB, LOWER	

SHEET 1 OF 2

ASSEMBLY NO: 1418952 TITLE: AMPLIFIER SECTION

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
57	809-199		KNOB, SMALL, B20-B	
58	809-196		MEMORY MARKER, SMALL	
59	809-197		KNOB, B30-B	M4X6
60			SCREW, SC	
61			WASHER, POLY, 6 X 10 X 0.25T	
62			SCREW, B	M3X4
63	4140024-01		VU METER	
64			LAMP, 14V, 80 MA	
65			NUT	
66	809-309		BRACKET, EXTENDER BOARD	M3X12
67			SCREW, PSB	14P
68	809-190		CONNECTOR, 14P	
69	809-193		EXTENDER BOARD ASSEMBLY	
70	809-213		HOLDER, PCB	
71	809-039		CLAMPER	
72	809-214		BRACKET, SW BOARD	
73	1418991-01		LEVER SWITCH BOARD PWA, B	
74	809-212		BRACKET, LEVER SWITCH	
75	809-176		KNOB, LEVER SWITCH	
76	809-021		HOUSING, CONNECTOR, 10P	MOLEX 5051-10
80	809-144		COVER SWITCH	
81	809-010		TERMINAL, CONNECTOR	MOLEX 2759-TL

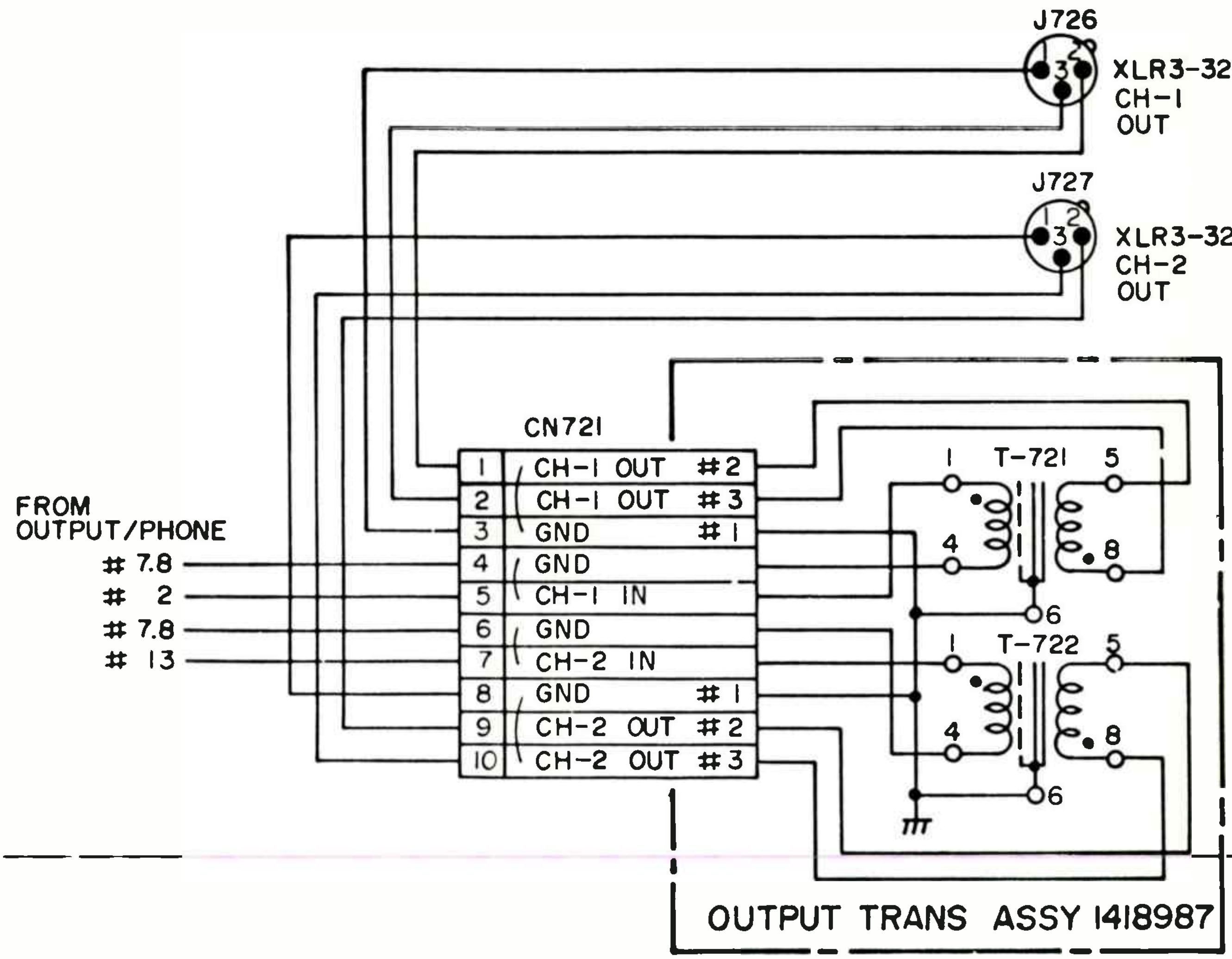
SHEET 2 OF 2



Assembly No. 1418952. Amplifier Section

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418987-01		OUTPUT TRANSFORMER PWA (NHA 1418952)	
1	809-206	T721,T722	TRANSFORMER, OUTPUT	
2	809-162	CN721	CONNECTOR, WAFER	MOLEX 5045-10A
3	809-010		CONNECTOR, TERMINAL	MOLEX 2759-TL
4	1418961		SCHEMATIC	

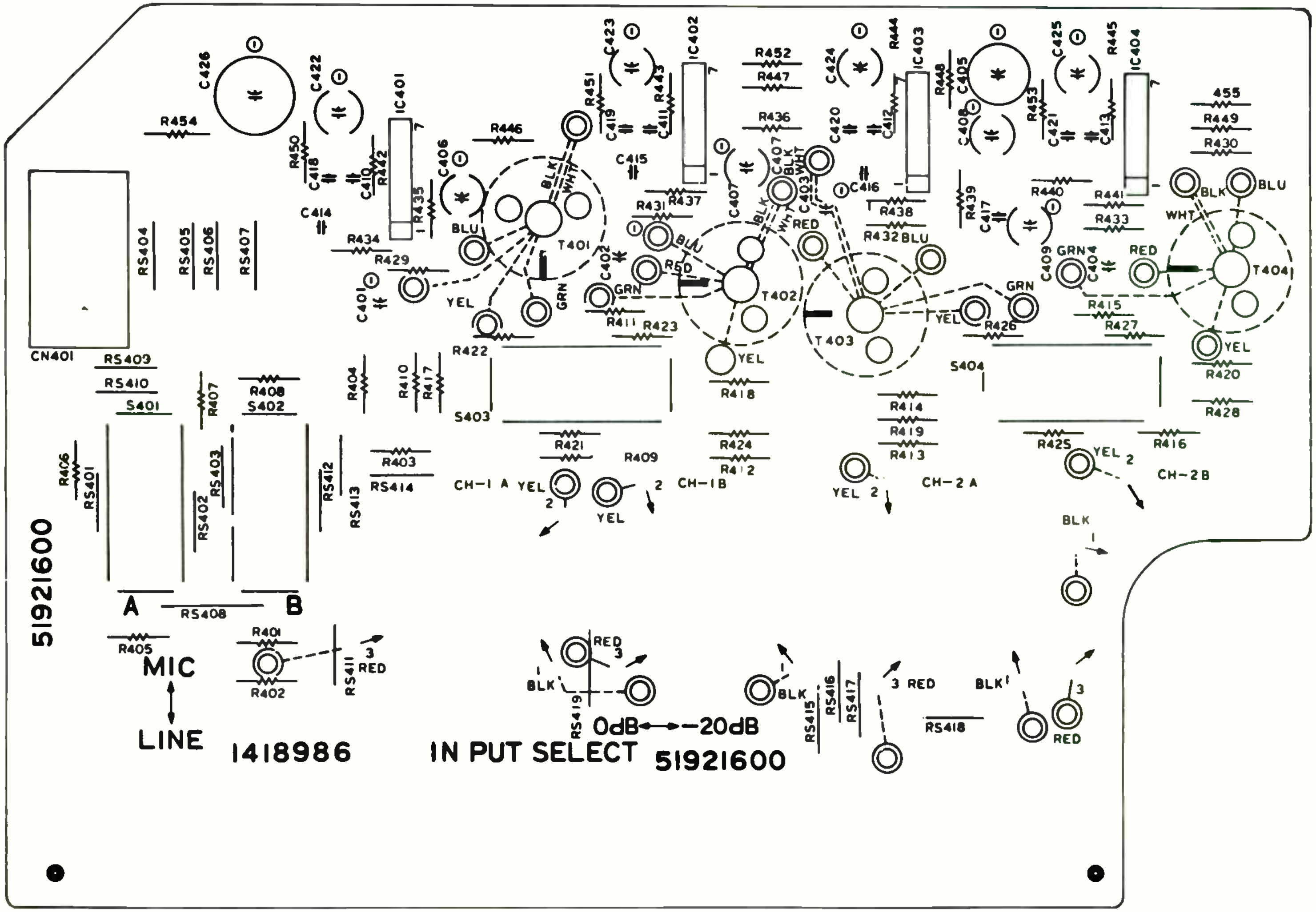
SHEET 1 OF 1



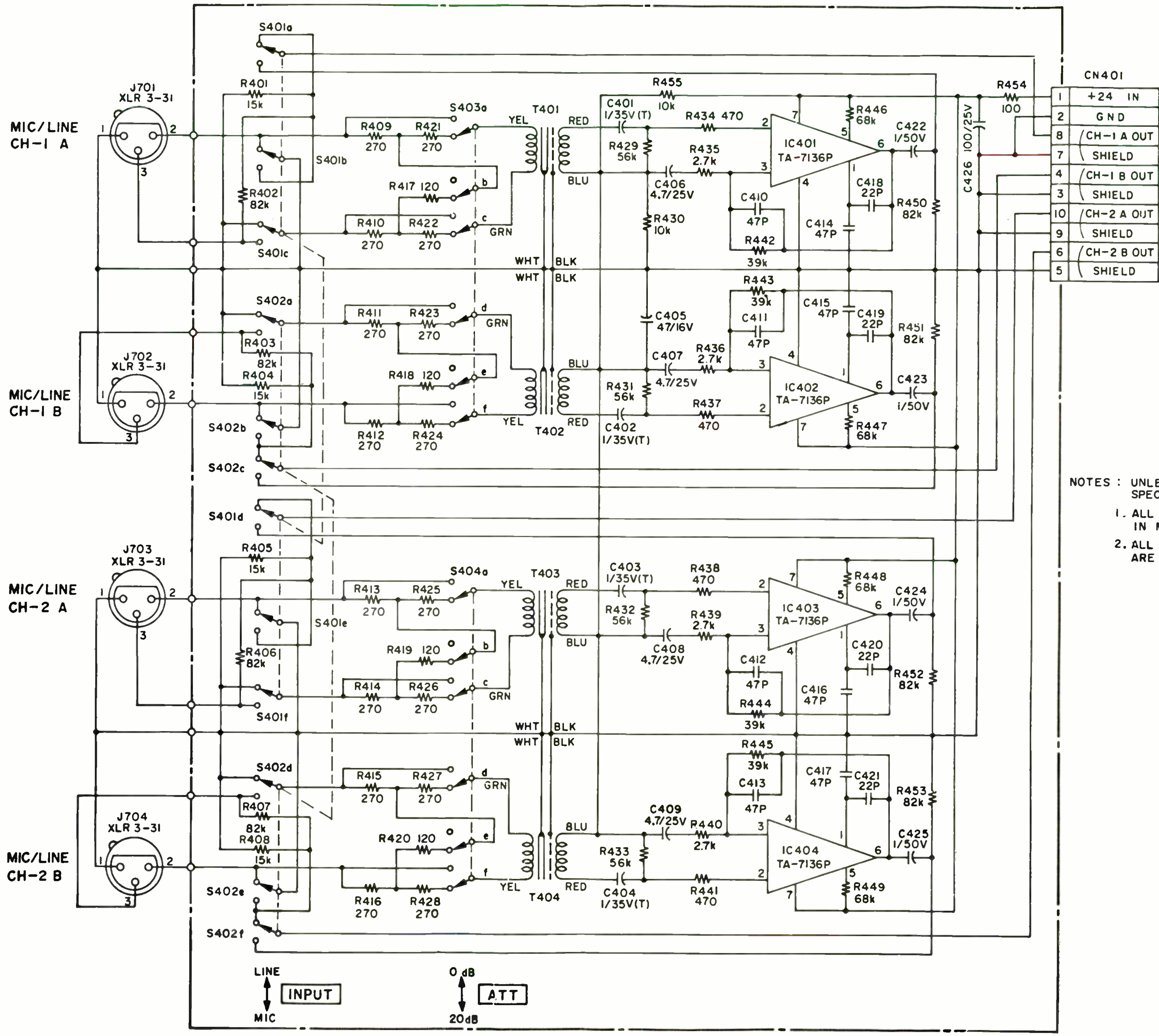
Schematic No. 1418961. Output Transformer PWA

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418986-01		INPUT SELECT PWA	
1	809-302	IC401-404	INTEGRATED CIRCUIT	TA-7136P
2	066-856	R401	RESISTOR, CARBON, 15K, 1/4W, 5%	
3	066-912	R402,403	RESISTOR, CARBON, 82K, 1/4W, 5%	
4	066-856	R404,405	RESISTOR, CARBON, 15K, 1/4W, 5%	
5	066-912	R406,407	RESISTOR, CARBON, 82K, 1/4W, 5%	
6	066-856	R408	RESISTOR, CARBON, 15K, 1/4W, 5%	
7	066-814	R409-416	RESISTOR, CARBON, 270 OHM, 1/4W, 5%	
8	066-661	R417-420	RESISTOR, CARBON, 120 OHM, 1/4W, 5%	
9	066-814	R421-428	RESISTOR, CARBON, 270 OHM, 1/4W, 5%	
10	066-833	R429	RESISTOR, CARBON, 56K, 1/4W, 5%	
11	066-830	R430	RESISTOR, CARBON, 10K, 1/4W, 5%	
12	066-833	R431-433	RESISTOR, CARBON, 56K, 1/4W, 5%	
13	066-818	R434	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
14	066-666	R435,436	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
15	066-818	R437,438	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
16	066-666	R439,440	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
17	066-818	R441	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
18	066-860	R442-445	RESISTOR, CARBON, 39K, 1/4W, 5%	
19	076-009	R446-449	RESISTOR, CARBON, 68K, 1/4W, 5%	
20	066-912	R450-453	RESISTOR, CARBON, 82K, 1/4W, 5%	
21	066-812	R454	RESISTOR, CARBON, 100 OHM, 1/4W, 5%	
22	066-830	R455	RESISTOR, CARBON, 10K, 1/4W, 5%	
23	809-259	C401-404	CAPACITOR, TANT, 1 MFD, 35V	
24	809-250	C405	CAPACITOR, ELEC, 47 MFD, 16V	
25	809-256	C406-409	CAPACITOR, ELEC, 4.7 MFD, 25V	
26	809-264	C410-417	CAPACITOR, MICA, 47 PFD, 50V, 10%	
27	809-262	C418-421	CAPACITOR, MICA, 22 PFD, 50V, 10%	
28	809-282	C422-425	CAPACITOR, ELEC, 1 MFD, 50V	
29	809-257	C426	CAPACITOR, ELEC, 100 MFD, 25V	
30	809-209	T401-404	TRANSFORMER, MIC	
31	809-210	S401-404	SWITCH, SLIDE, L=12	ALPS SSP-062
32	809-142	CN401	CONNECTOR, WAFER, 10P	MOLEX 5046-10
33	1418966		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418986. Input Select PWA



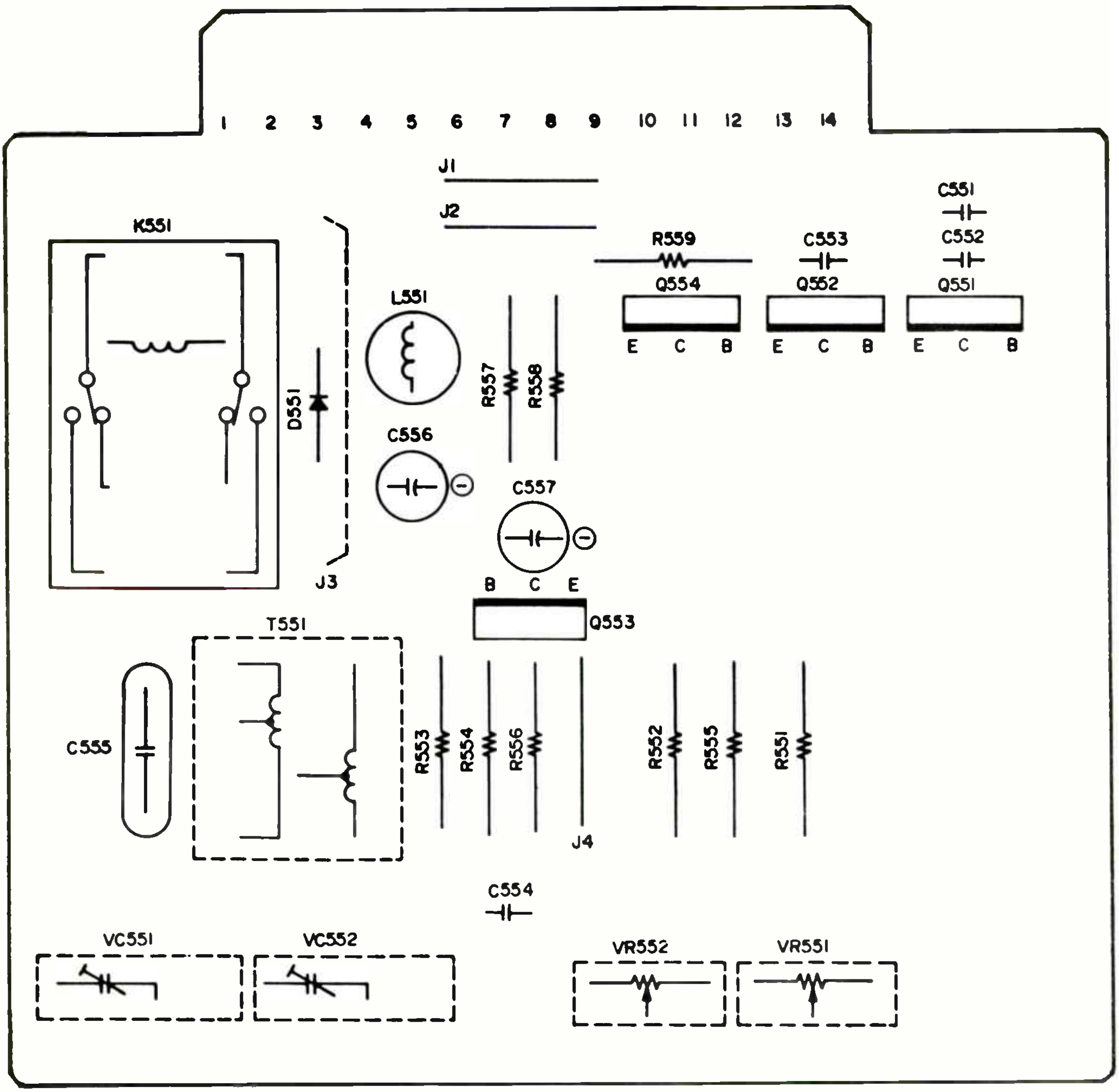
NOTES : UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4WATT, 5%

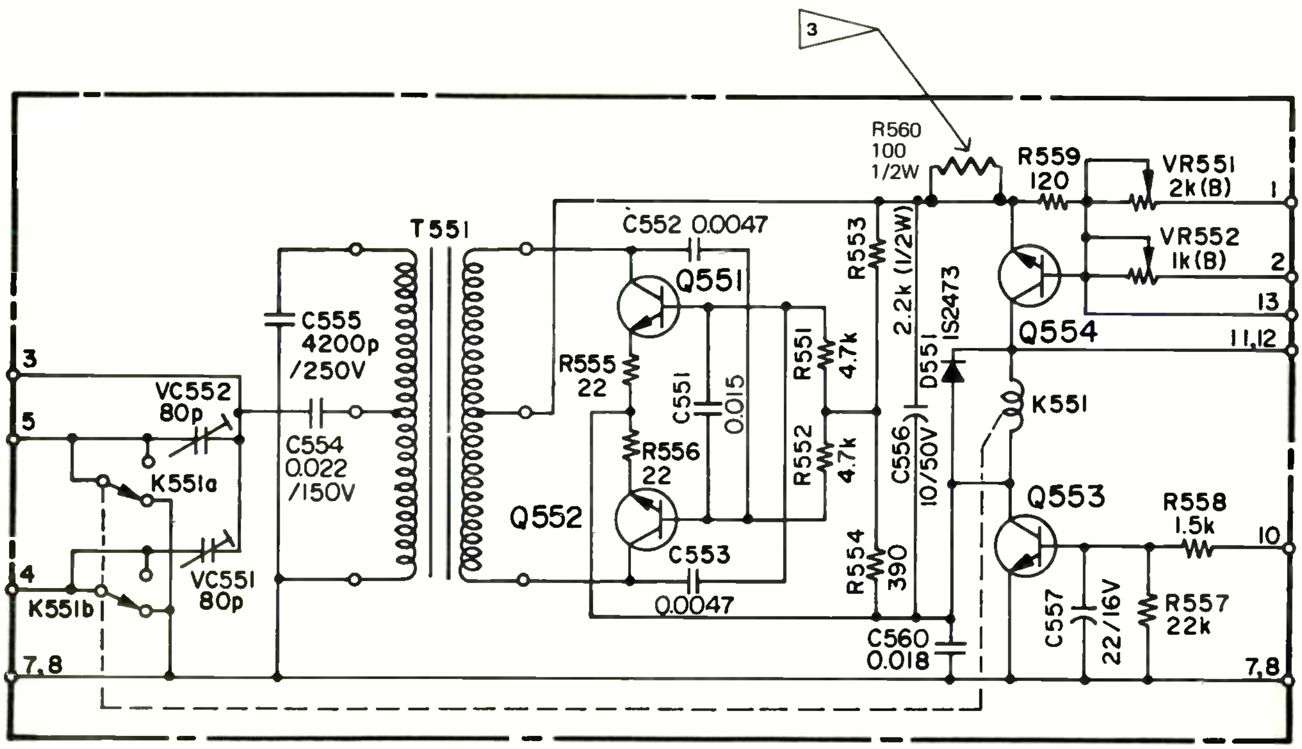
Schematic No. 1418966.
Input Select

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418979-01		BIAS OSCILLATOR PWA	
	1418979-02		BIAS OSCILLATOR PWA, (4 TRACK) (NHA 1418952)	
1	809-240	Q551-554	TRANSISTOR	2SC1567
2	805-663	D551	DIODE	1S2473
3	809-223	K551	RELAY, DC24V/1740	OMRON LZN2-1
4	066-668	R551,552	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
5	062-165	R553	RESISTOR, CARBON, 2.2K, 1/2W, 5%	
6	066-816	R554	RESISTOR, CARBON, 390 OHM, 1/4W, 5%	
7	066-660	R555,556	RESISTOR, CARBON, 22 OHM, 1/4W, 5%	
8	066-712	R557	RESISTOR, CARBON, 22K, 1/4W, 5%	
9	066-824	R558	RESISTOR, CARBON, 1.5K, 1/4W, 5%	
10	066-661	R559	RESISTOR, CARBON, 120 OHM, 1/4W, 5%	
11	809-275	C551	CAPACITOR, MYLAR, 0.015 MFD, 50V, 5%	
12	809-271	C552,553	CAPACITOR, MYLAR, 0.0047 MFD, 50V, 5%	
13	809-289	C554	CAPACITOR, MYLAR, 0.033 MFD, 15V, 5%	
14	809-290	C555	CAPACITOR, MICA, 4200 PFD, 250V, 5%	
15	809-285	C556	CAPACITOR, ELEC, 10 MFD, 50V	
16	809-242	C557	CAPACITOR, ELEC, 22 MFD, 10V	
17	809-276	C560	CAPACITOR, MYLAR, 0.018 MFD, 50V, 5%	
18	809-297	VR551	RESISTOR, SEMI FIXED, 2K	
19	809-296	VR552	RESISTOR, SEMI FIXED, 1K	
20	809-220	VC551,552	CAPACITOR TRIMMER, 80 PFD MAX.	
21	809-221	T551	TRANSFORMER, OSC	
22	1418970		SCHEMATIC	
23	041-003	R560	RESISTOR, CARBON, 100 OHM, 1/2W, 5% (4 TRACK)	

SHEET 1 OF 1



Assembly No. 1418979. Bias Oscillator PWA



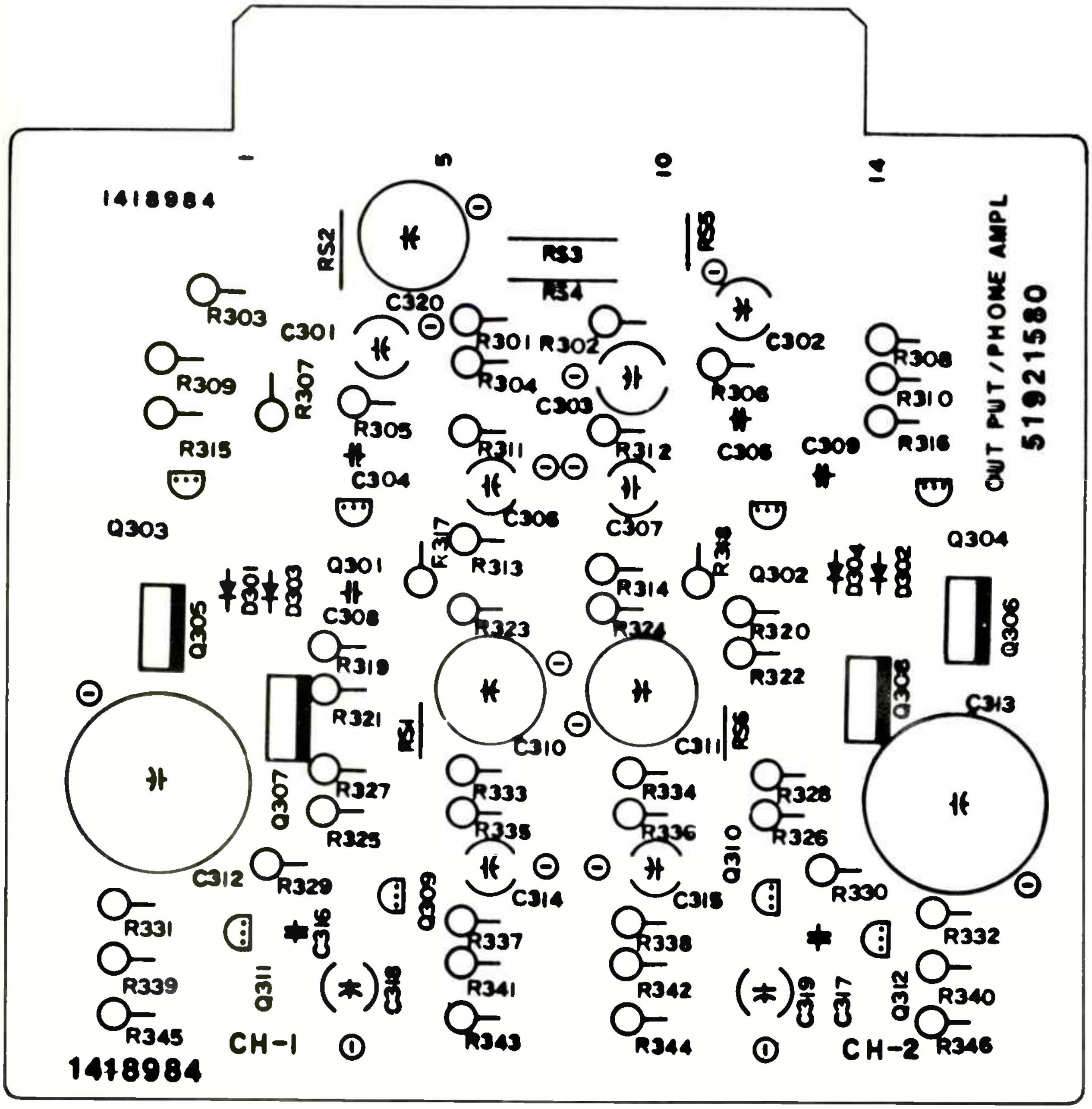
Q551~Q554 2SC1567 (Q,R,S)

NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL CAPACITOR VALUES ARE IN MICROFARADS,50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4W, 5%
3 R560 USED ON 4 TRACK VERSIONS ONLY.
JUMPER USED ON ALL OTHER VERSIONS.

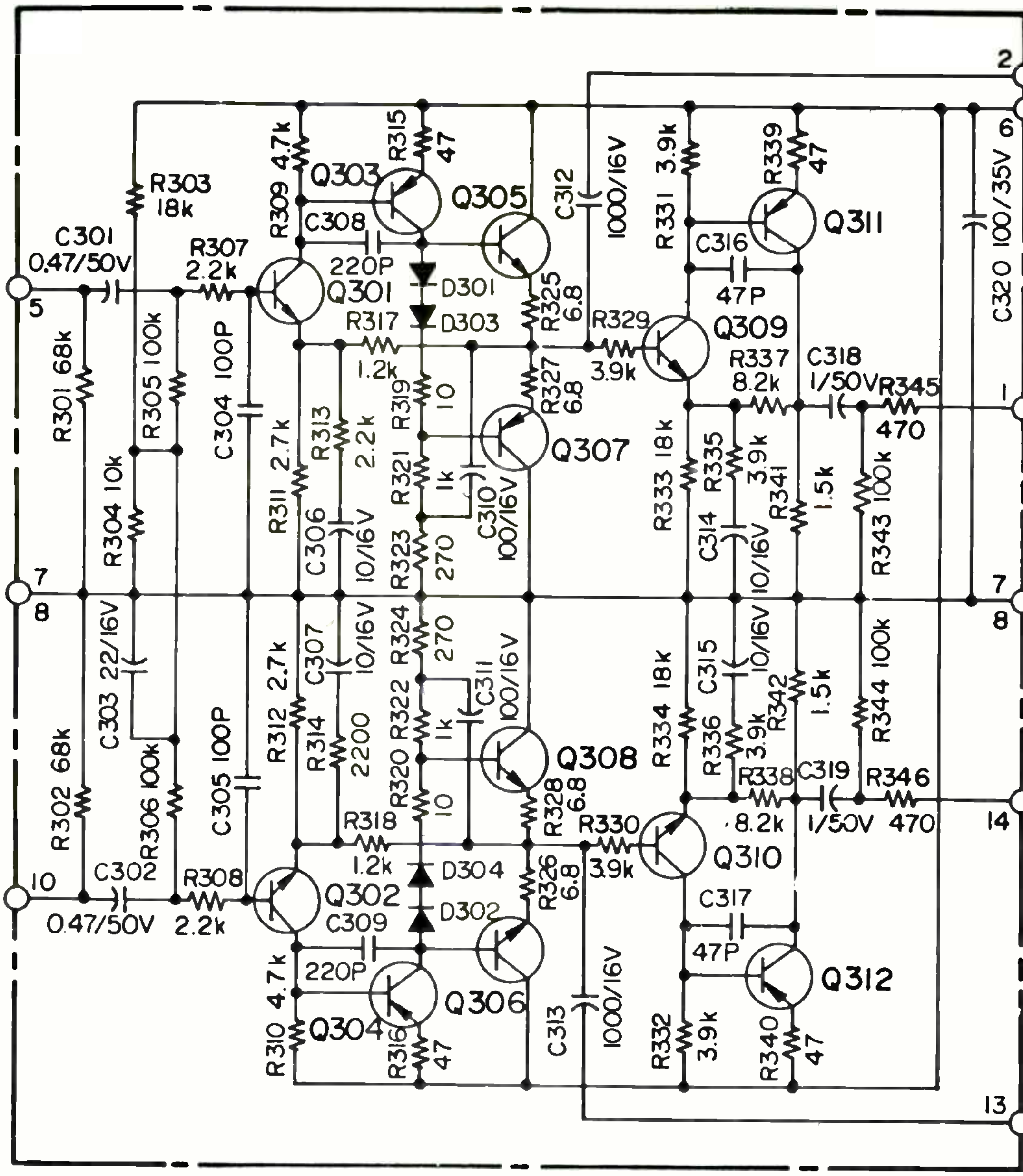
Schematic No. 1418970. Bias Oscillator

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418984-01		OUTPUT/PHONE AMPLIFIER PWA (NHA 1418952)	
1	809-236	Q301,302	TRANSISTOR	
2	809-233	Q303,304	TRANSISTOR	
3	809-240	Q305,306	TRANSISTOR	
4	809-232	Q307,308	TRANSISTOR	
5	809-236	Q309,310	TRANSISTOR	
6	809-233	Q311,312	TRANSISTOR	
7	805-663	D301-304	DIODE	
8	076-009	R301,302	RESISTOR, CARBON, 68K, 1/4W, 5%	
9	066-832	R303	RESISTOR, CARBON, 18K, 1/4W, 5%	
10	066-830	R304	RESISTOR, CARBON, 10K, 1/4W, 5%	
11	066-849	R305,306	RESISTOR, CARBON, 100K, 1/4W, 5%	
12	066-689	R307,308	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
13	066-668	R309,310	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
14	066-666	R311,312	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
15	066-689	R313,314	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
16	066-938	R315,316	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
17	066-715	R317,318	RESISTOR, CARBON, 1.2K, 1/4W, 5%	
18	066-810	R319,320	RESISTOR, CARBON, 10 OHM, 1/4W, 5%	
19	066-665	R321,322	RESISTOR, CARBON, 1K, 1/4W, 5%	
20	066-814	R323,324	RESISTOR, CARBON, 270 OHM, 1/4W, 5%	
21	076-031	R325-328	RESISTOR, CARBON, 6.8 OHM, 1/4W, 5%	
22	066-827	R329-332	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
23	066-814	R333,334	RESISTOR, CARBON, 18K, 1/4W, 5%	
24	066-827	R335,336	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
25	066-669	R337,338	RESISTOR, CARBON, 8.2K, 1/4W, 5%	
26	066-938	R339,340	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
27	066-824	R341,342	RESISTOR, CARBON, 1.5K, 1/4W, 5%	
28	066-849	R343,344	RESISTOR, CARBON, 100K, 1/4W, 5%	
29	066-818	R345,346	RESISTOR, CARBON, 470 OHM, 1/4W, 5%	
30	809-281	C301,302	CAPACITOR, ELEC, 0.47 MFD, 50V	
31	809-249	C303	CAPACITOR, ELEC, 22 MFD, 16V	
32	809-265	C304,305	CAPACITOR, MICA, 100 PFD, 50V, 10%	
33	809-246	C306,307	CAPACITOR, ELEC, 10 MFD, 16V	
34	809-267	C308,309	CAPACITOR, MICA, 220 PFD, 50V, 10%	
35	809-252	C310,311	CAPACITOR, ELEC, 100 MFD, 16V	
36	809-254	C312,313	CAPACITOR, ELEC, 1000 MFD, 16V	
37	809-246	C314,315	CAPACITOR, ELEC, 10 MFD, 16V	
38	809-264	C316,317	CAPACITOR, ELEC, 47 PFD, 16V	
39	809-282	C318,319	CAPACITOR, ELEC, 1 MFD, 50V	
40	809-261	C320	CAPACITOR, ELEC, 100 MFD, 35V	
41	1418957		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418984. Output/Phone Amplifier PWA



Q301,302,309,310	2SC1000	(BL,GR)
Q303,304,311,312	2SA842	(BL,GR)
Q305,306	2SC1567	(P,Q,R)
Q307, 308	2SA794	(P,Q,R)
D301 ~ 304	1S2473	

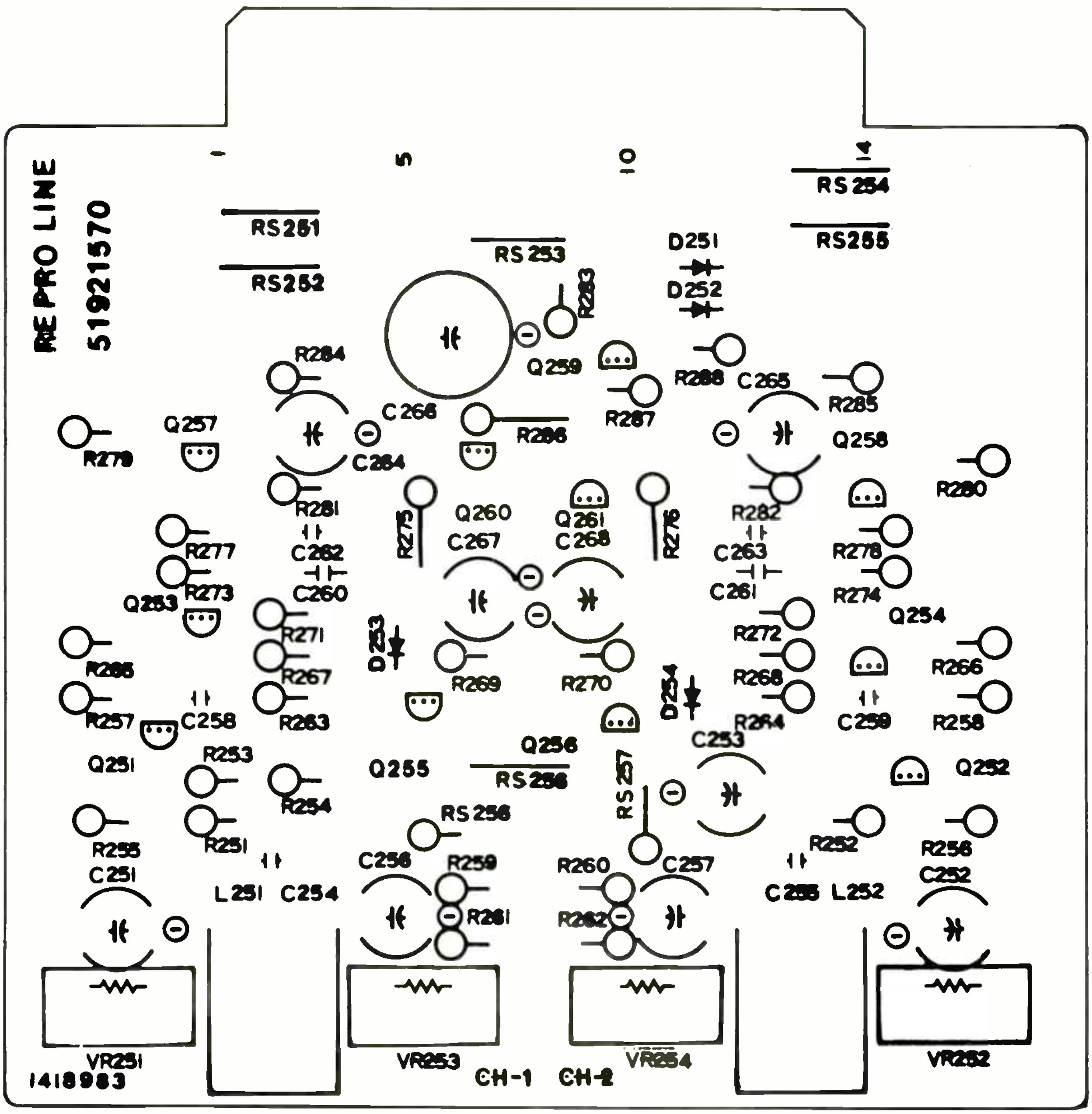
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

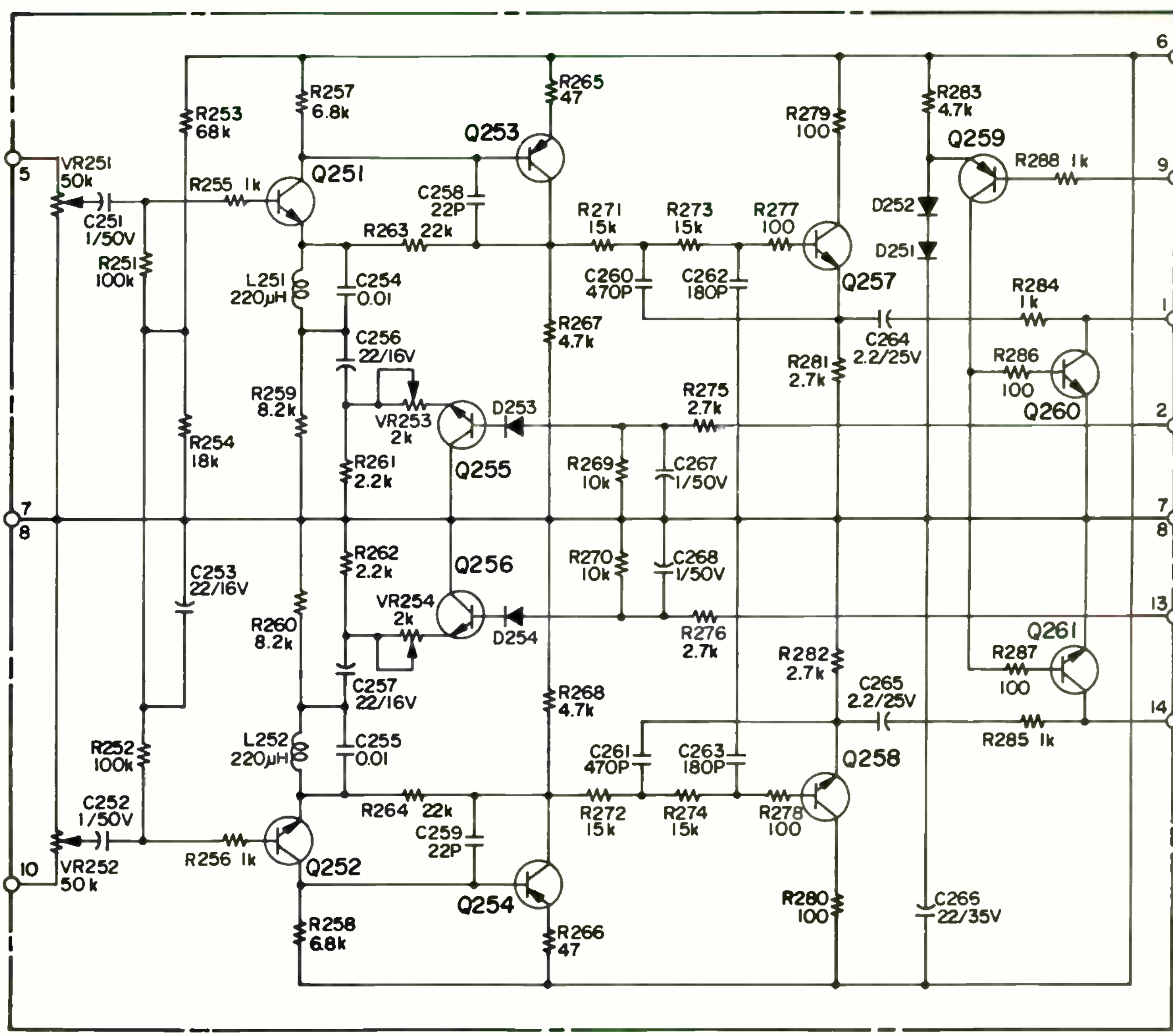
Schematic No. 1418957. Output/Phone

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418983-01		REPRODUCE LINE AMPLIFIER PWA (NHA 1418952)	
1	809-236	Q251,252	TRANSISTOR	2SC1000
2	809-233	Q253,254	TRANSISTOR	2SA842
3	809-303	Q255,256	TRANSISTOR	2SC828
4	809-236	Q257,258	TRANSISTOR	2SC1000
5	809-233	Q259	TRANSISTOR	2SA842
6	809-236	Q260,261	TRANSISTOR	2SC1000
7	805-663	D251-254	DIODE	1S2473
8	066-849	R251,252	RESISTOR, CARBON, 100K, 1/4W, 5%	
9	076-009	R253	RESISTOR, CARBON, 68K, 1/4W, 5%	
10	066-832	R254	RESISTOR, CARBON, 18K, 1/4W, 5%	
11	066-665	R255,256	RESISTOR, CARBON, 1K, 1/4W, 5%	
12	066-829	R257,258	RESISTOR, CARBON, 6.8K, 1/4W, 5%	
13	066-669	R259,260	RESISTOR, CARBON, 8.2K, 1/4W, 5%	
14	066-689	R261, 262	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
15	066-712	R263,264	RESISTOR, CARBON, 22K, 1/4W, 5%	
16	066-938	R265,266	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
17	066-668	R267,268	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
18	066-830	R269,270	RESISTOR, CARBON, 10K, 1/4W, 5%	
19	066-856	R271-274	RESISTOR, CARBON, 15K, 1/4W, 5%	
20	066-666	R275,276	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
21	066-812	R277-280	RESISTOR, CARBON, 100 OHM, 1/4W, 5%	
22	066-666	R281,282	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
23	066-668	R283	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
24	066-665	R284,285	RESISTOR, CARBON, 1K, 1/4W, 5%	
25	066-812	R286,287	RESISTOR, CARBON, 100 OHM, 1/4W, 5%	
26	066-665	R288	RESISTOR, CARBON, 1K, 1/4W, 5%	
27	809-282	C251,252	CAPACITOR, ELEC, 1 MFD, 50V	
28	809-249	C253	CAPACITOR, ELEC, 22 MFD, 16V	
29	809-273	C254,255	CAPACITOR, MYLAR, 0.01 MFD, 50V, 5%	
30	809-249	C256,257	CAPACITOR, ELEC, 22 MFD, 16V	
31	809-262	C258,259	CAPACITOR, MICA, 22 PFD, 50V, 10%	
32	809-268	C260,261	CAPACITOR, MICA, 470 PFD, 50V, 10%	
33	809-266	C262,263	CAPACITOR, MICA, 180 PFD, 50V, 10%	
34	809-255	C264,265	CAPACITOR, ELEC, 2.2 MFD, 25V	
36	809-260	C266	CAPACITOR, ELEC, 22 MFD, 35V	
36	809-282	C267,268	CAPACITOR, ELEC, 1 MFD, 50V	
37	809-300	VR251,252	RESISTOR, SEMI FIXED, 50K	
38	809-297	VR253,254	RESISTOR, SEMI FIXED, 2K	
39	809-219	L251,252	INDUCTOR	
40	1418965		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418983. Reproduce Line Amplifier PWA



D251, D252	1S2473
Q251, Q252, Q257, Q258, Q260, Q261	2SC1000 (GR, BL)
Q253, Q254, Q259	2SA842 (GR, BL)
Q255, Q256	2SC828 (Q, R, S)

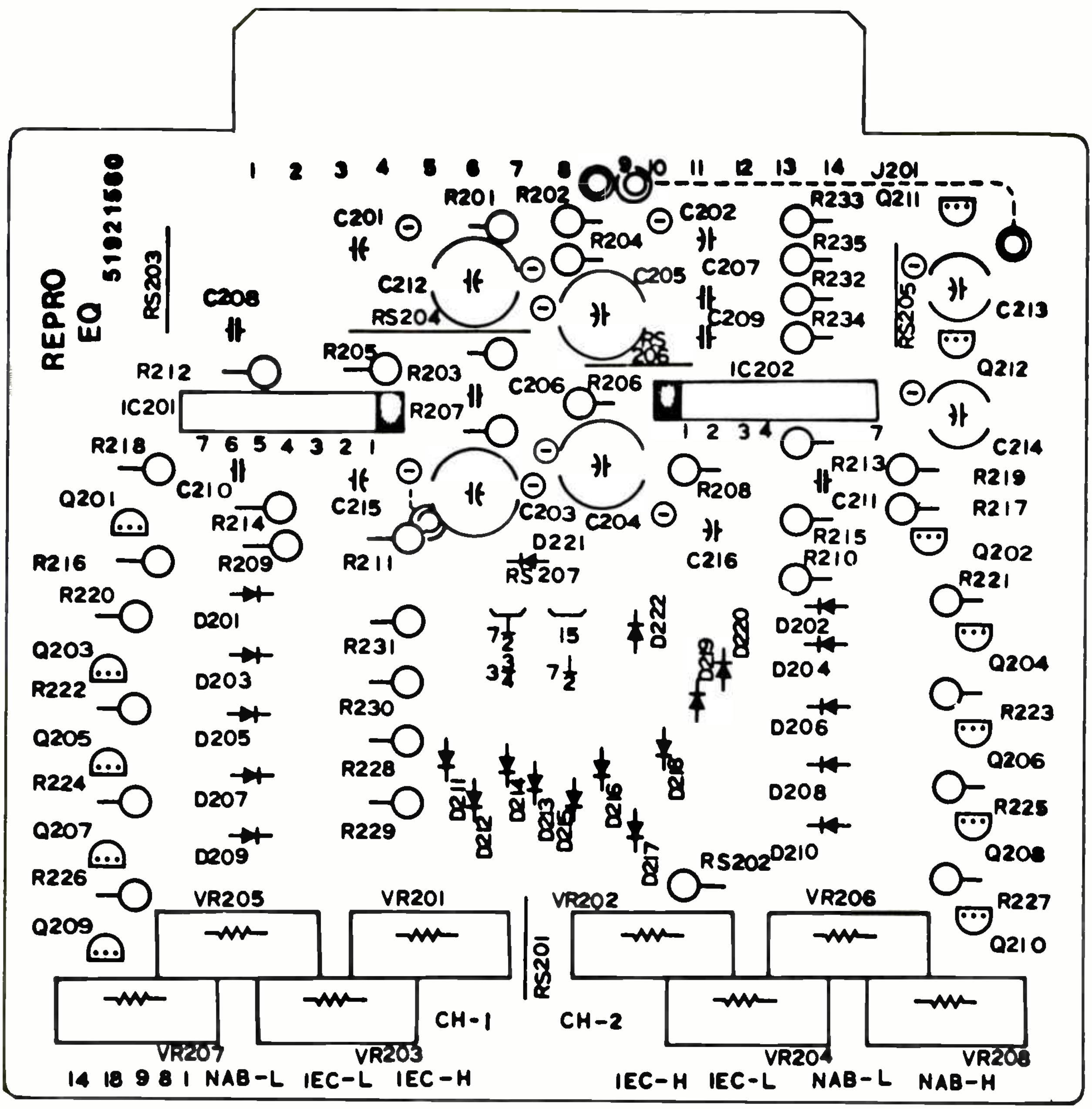
NOTES : UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4WATT, 5%

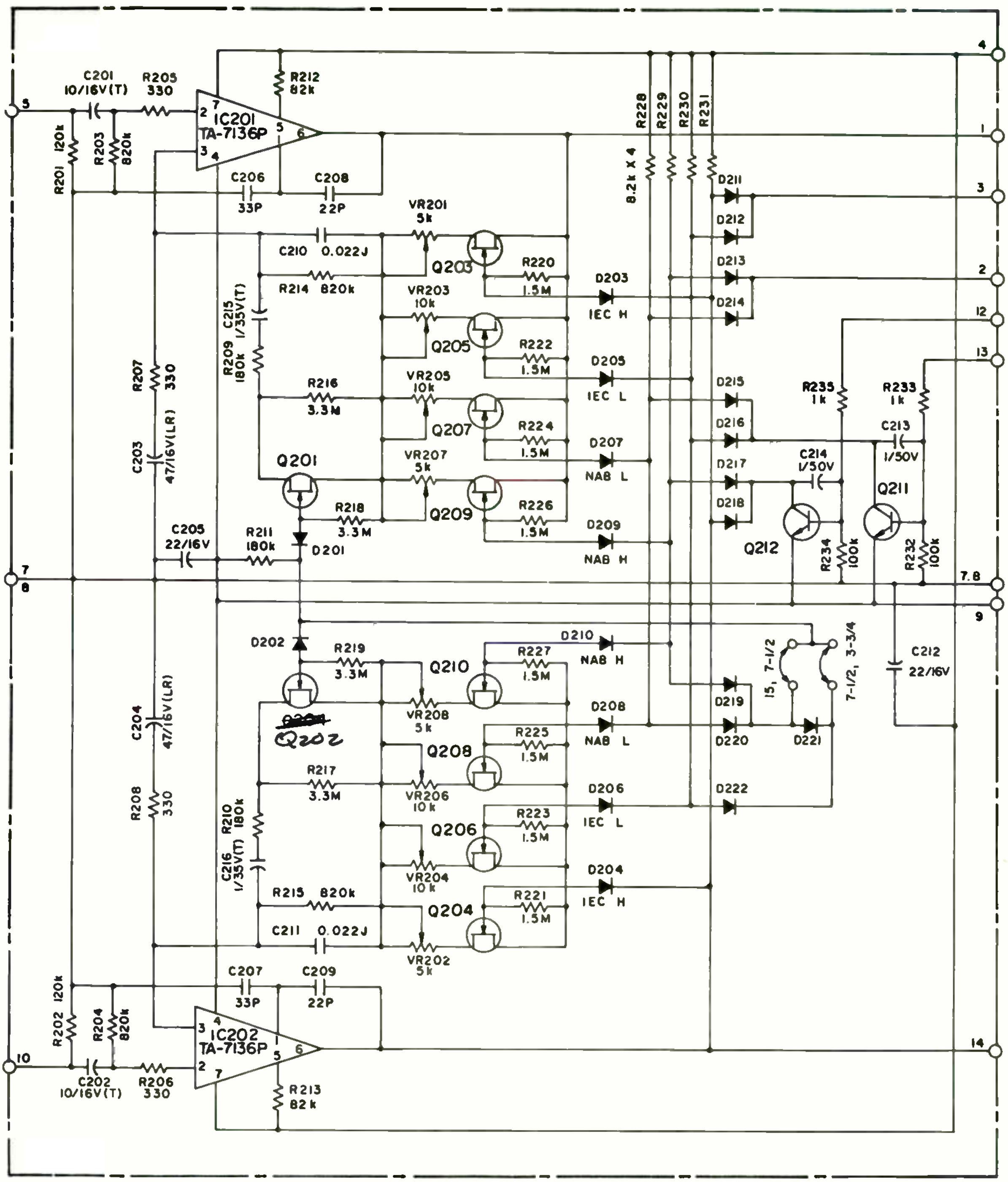
Schematic No. 1418965. Reproduce Line Amplifier

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418981-01		REPRODUCE EQUALIZER AMPLIFIER PWA (NHA 1418952)	
2	809-302	IC201,202	INTEGRATED CIRCUIT	TA7136P
3	809-237	Q201-210	TRANSISTOR, FET	2SK30A
4	809-239	Q211,212	TRANSISTOR	2SC828A
5	805-663	D201-222	DIODE	1S2473
6	066-868	R201,202	RESISTOR, CARBON, 120K, 1/4W, 5%	
7	076-056	R203,204	RESISTOR, CARBON, 820K, 1/4W, 5%	
8	066-838	R205-208	RESISTOR, CARBON, 330 OHM, 1/4W, 5%	
9	076-011	R209-211	RESISTOR, CARBON, 180K, 1/4W, 5%	
10	066-912	R212, 213	RESISTOR, CARBON, 82K, 1/4W, 5%	
11	076-056	R214,215	RESISTOR, CARBON, 820K, 1/4W, 5%	
12	076-015	R216-219	RESISTOR, CARBON, 3.3M, 1/4W, 5%	
13	076-014	R220-227	RESISTOR, CARBON, 1.5M, 1/4W, 5%	
14	066-669	R228-231	RESISTOR, CARBON, 8.2K, 1/4W, 5%	
15	066-849	R232	RESISTOR, CARBON, 100K, 1/4W, 5%	
16	066-665	R233	RESISTOR, CARBON, 1K, 1/4W, 5%	
17	066-849	R234	RESISTOR, CARBON, 100K, 1/4W, 5%	
18	066-665	R235	RESISTOR, CARBON, 1K, 1/4W, 5%	
19	809-247	C201,202	CAPACITOR, TANT, 10 MFD, 16V	
20	809-251	C203,204	CAPACITOR, ELEC, 47 MFD, 16V	
21	809-249	C205	CAPACITOR, ELEC, 22 MFD, 16V	
22	809-263	C206,207	CAPACITOR, MICA, 33 PFD, 50V , 10%	
23	809-262	C208,209	CAPACITOR, MICA, 22 PFD, 50V, 10%	
24	809-278	C210,C211	CAPACITOR, MYLAR, 0.022 MFD, 50V, 5%	
25	809-249	C212	CAPACITOR, ELEC., 22 MFD, 16V	
26	809-282	C213,214	CAPACITOR, ELEC., 1 MFD, 50V	
27	809-259	C215,216	CAPACITOR, TANT, 1 MFD, 35V	
28	809-298	VR201,202	RESISTOR, SEMI FIXED, 5K	
29	809-299	VR203-206	RESISTOR, SEMI FIXED, 10K	
30	809-298	VR207,208	RESISTOR, SEMI FIXED, 5K	
31	1418972		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418981. Reproduce Equalizer Amplifier PWA



Q201～210	2SK30A (Y,GR)
Q211, 212	2SC828A(Q,R,S)
D201～222	1S2473

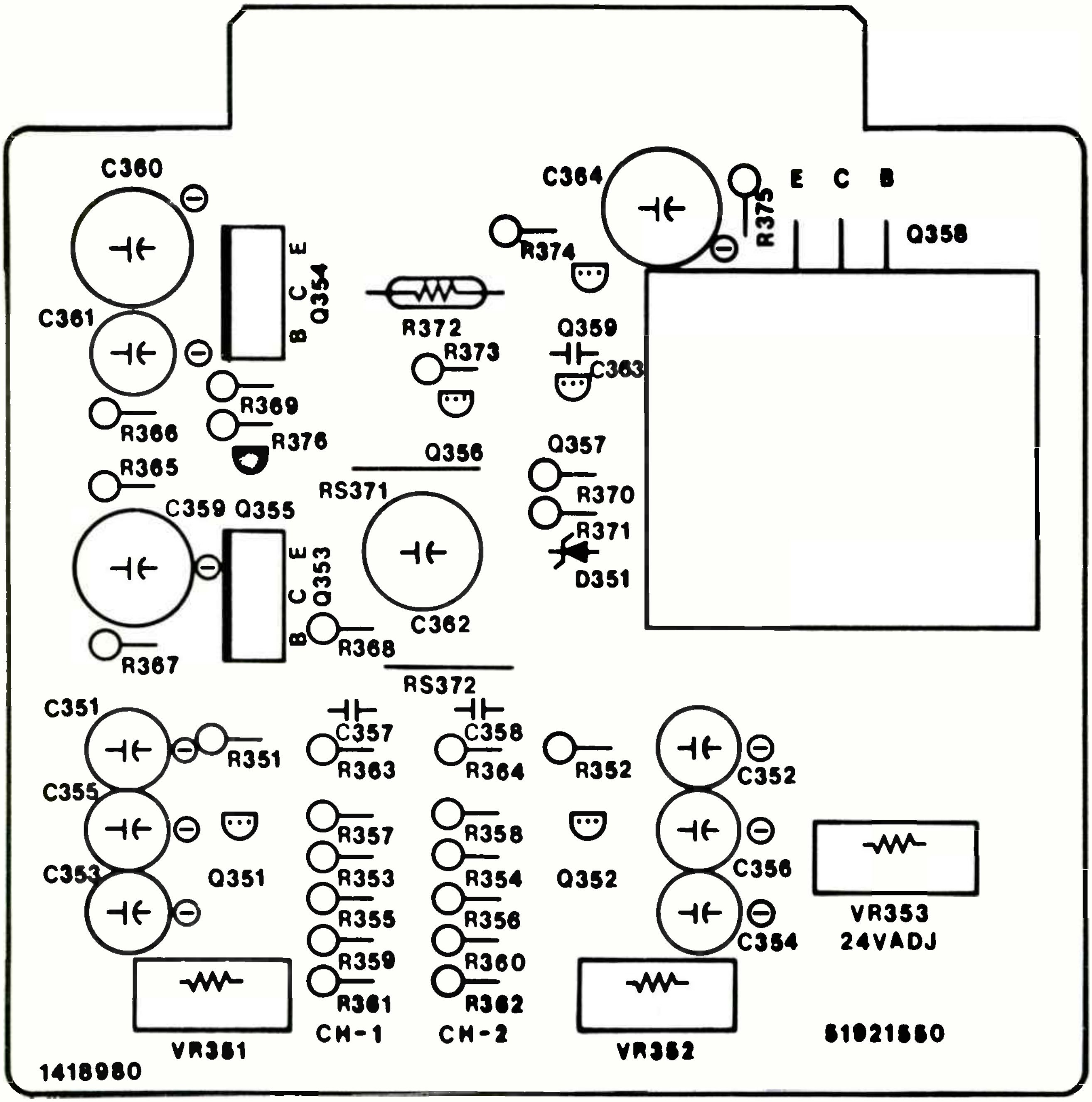
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4WATT, 5%

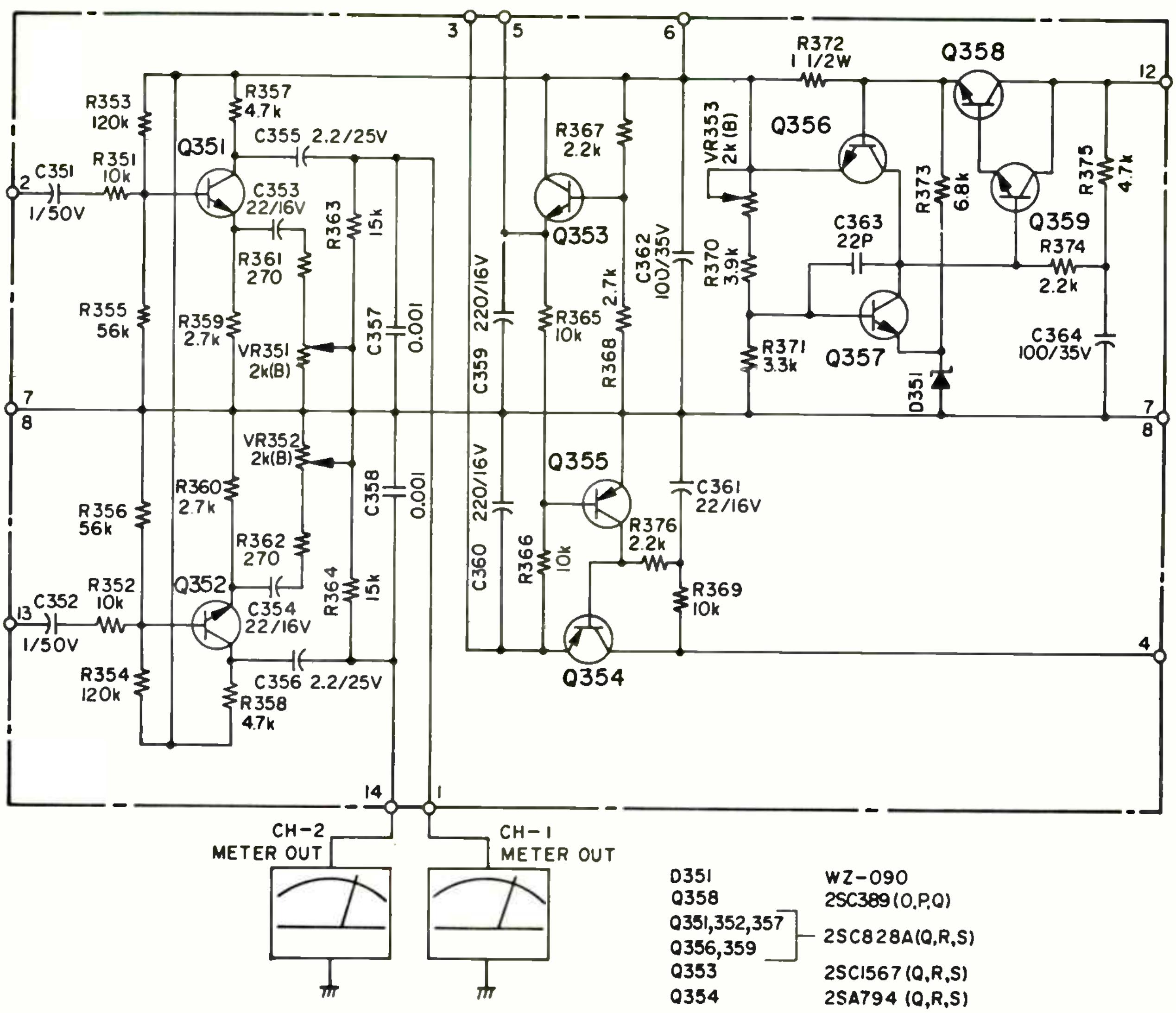
Schematic No. 1418972. Reproduce Equalizer Amplifier

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418980-01		METER AMPLIFIER/STABLILZER PWA (NHA 1418952)	
1	809-239	Q351,Q352	TRANSISTOR	2SC828A
2	809-240	Q353	TRANSISTOR	2SC1567
3	809-232	Q354	TRANSISTOR	2SA794
4	809-233	Q355	TRANSISTOR	2SA842
5	809-239	Q356,Q357	TRANSISTOR	2SC828A
6	809-238	Q358	TRANSISTOR	2SD389P
7	809-239	Q359	TRANSISTOR	2SC828A
8	809-229	D351	DIODE, ZENER	WZ090
9	066-830	R351,352	RESISTOR, CARBON, 10K, 1/4W, 5%	
10	066-868	R353,354	RESISTOR, CARBON, 120K, 1/4W, 5%	
11	066-833	R355,356	RESISTOR, CARBON, 56K, 1/4W, 5%	
12	066-668	R357,358	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
13	066-666	R359,360	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
14	066-814	R361,362	RESISTOR, CARBON, 270 OHM, 1/4W, 5%	
15	066-856	R363,364	RESISTOR, CARBON, 15K, 1/4W, 5%	
16	066-830	R365,366	RESISTOR, CARBON, 10K, 1/4W, 5%	
17	066-689	R367	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
18	066-666	R368	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
19	066-830	R369	RESISTOR, CARBON, 10K, 1/4W, 5%	
20	066-827	R370	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
21	066-720	R371	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
22	062-282	R372	RESISTOR, CARBON, 1 OHM, 1/2W, 5%	
23	066-829	R373	RESISTOR, CARBON, 6.8K, 1/4W, 5%	
24	066-689	R374	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
25	066-668	R375	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
26	066-689	R376	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
27	809-282	C351, 352	CAPACITOR, ELEC., 1 MFD, 50V	
28	809-249	C353,354	CAPACITOR, ELEC., 22 MFD, 16V	
29	809-255	C355,356	CAPACITOR, ELEC., 2.2 MFD, 25V	
30	809-270	C357,358	CAPACITOR, MYLAR, 0.001 MFD, 50V, 10%	
31	809-253	C359,360	CAPACITOR, ELEC., 220 MFD, 16V	
32	809-249	C361	CAPACITOR, ELEC,, 22 MFD, 16V	
33	809-261	C362	CAPACITOR, ELEC., 100 MFD, 35V	
34	809-262	C363	CAPACITOR, MICA, 22 PFD, 50V, 10%	
35	809-261	C364	CAPACITOR, ELEC, 100 MFD, 35V	
36	809-297	VR351-VR353	RESISTOR, SEMI FIXED, 2K	
37	809-218		HEATSINK	
38			PLATE, INSTALLATION	
39	1418971		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418980. Meter Amplifier/Stabilizer PWA



D351	WZ-090
Q358	2SC389 (O,P,Q)
Q351,352,357 / Q356,359	2SC828A(Q,R,S)
Q353	2SC1567 (Q,R,S)
Q354	2SA794 (Q,R,S)
Q355	2SA842 (GR,BL)

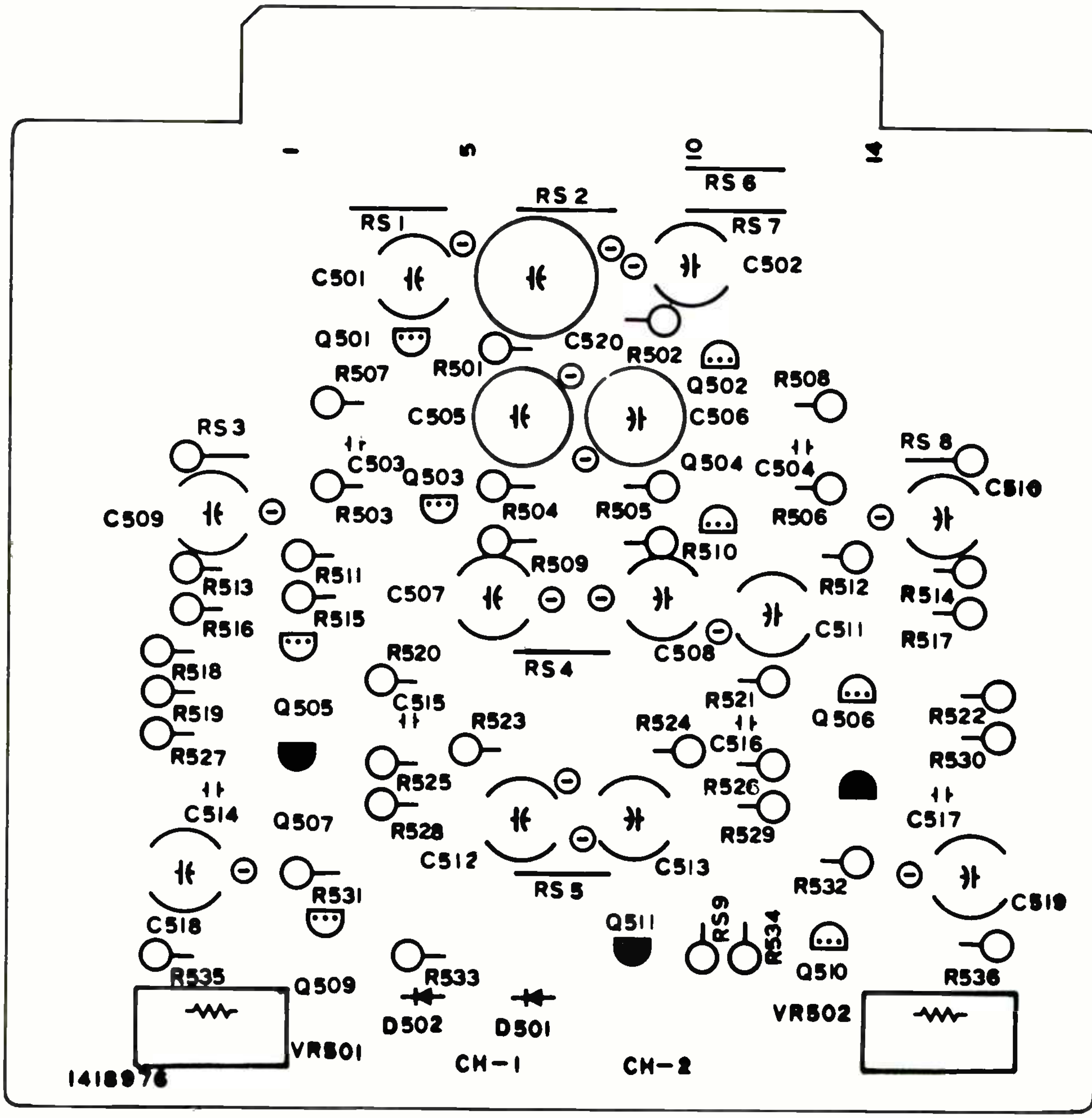
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

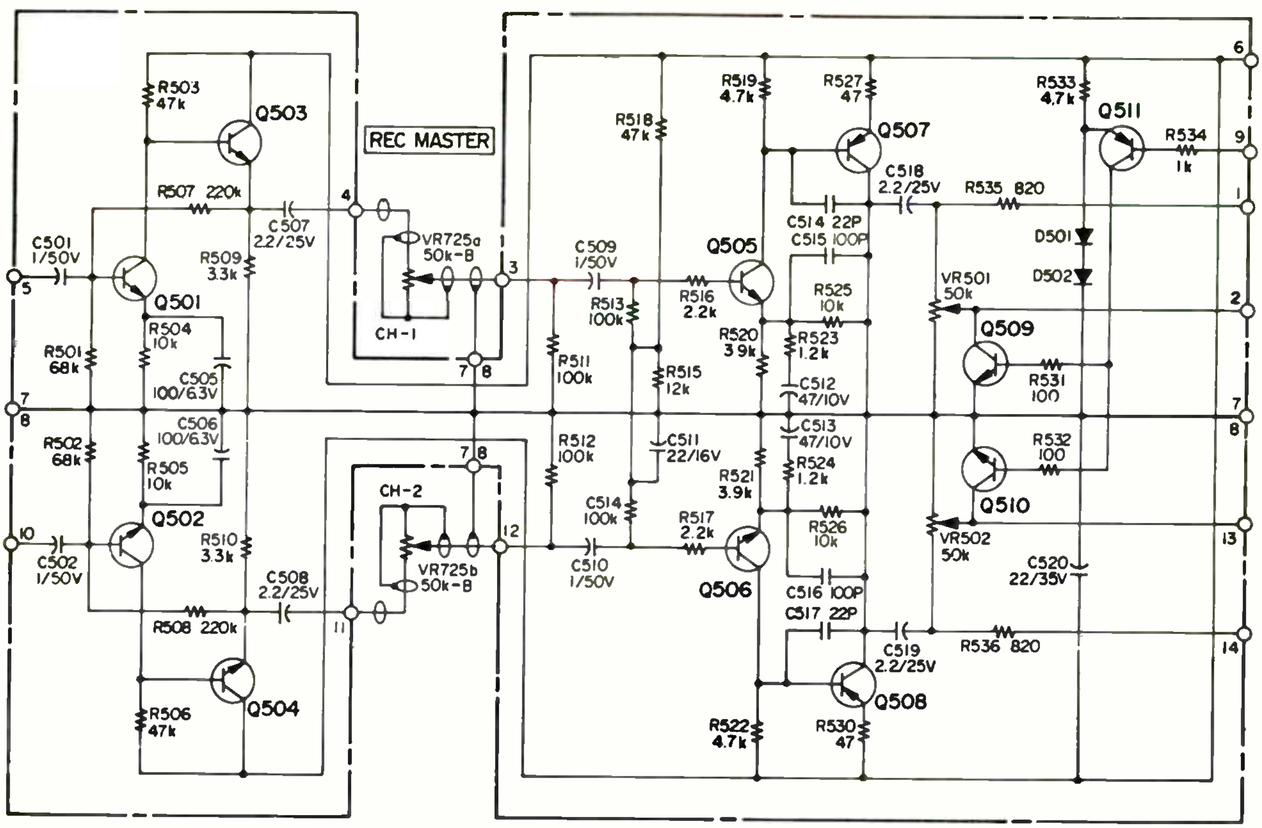
Schematic No. 1418971. Meter Amplifier/Stabilizer

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418976-01		MIX-LINE AMPLIFIER PWA (NHA 1418952)	
1	809-236	Q501-506	TRANSISTOR	2SC1000
2	809-233	Q507,508	TRANSISTOR	2SA842
3	809-236	Q509,510	TRANSISTOR	2SC1000
4	809-233	Q511	TRANSISTOR	2SA842
5	805-663	D501,502	DIODE	1S2473
6	076-009	R501,502	RESISTOR, CARBON, 68K, 1/4W, 5%	
7	066-717	R503	RESISTOR, CARBON, 47K, 1/4W, 5%	
8	066-830	R504,505	RESISTOR, CARBON, 10K, 1/4W, 5%	
9	066-717	R506	RESISTOR, CARBON, 47K, 1/4W, 5%	
10	066-913	R507,508	RESISTOR, CARBON, 220K, 1/4W, 5%	
11	066-720	R509,510	RESISTOR, CARBON, 3.3K 1/4W, 5%	
12	066-849	R511-514	RESISTOR, CARBON, 100K, 1/4W, 5%	
13	066-865	R515	RESISTOR, CARBON, 12K, 1/4W, 5%	
14	066-689	R516, 517	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
15	066-717	R518	RESISTOR, CARBON, 47K, 1/4W, 5%	
16	066-668	R519	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
17	066-827	R520,521	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
18	066-668	R522	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
19	066-715	R523,524	RESISTOR, CARBON, 1.2K, 1/4W, 5%	
20	066-830	R525,526	RESISTOR, CARBON, 10K, 1/4W, 5%	
21	066-938	R527	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
22	066-666	R528,529	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
23	066-938	R530	RESISTOR, CARBON, 47 OHM, 1/4W, 5%	
24	066-812	R531,532	RESISTOR, CARBON, 100 OHM, 1/4W, 5%	
25	066-668	R533	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
26	066-665	R534	RESISTOR, CARBON, 1K, 1/4W, 5%	
27	066-821	R535,536	RESISTOR, CARBON, 820 OHM, 1/4W, 5%	
28	809-282	C501,502	CAPACITOR, ELEC, 1 MFD, 50V	
29	809-241	C505,506	CAPACITOR, ELEC, 100 MFD, 6.3V	
30	809-255	C507,508	CAPACITOR, ELEC, 2.2 MFD, 25V	
31	809-282	C509,510	CAPACITOR, ELEC, 1 MFD, 50V	
32	809-249	C511	CAPACITOR, ELEC, 22 MFD, 16V	
33	809-243	C512,513	CAPACITOR, ELEC, 47 MFD, 10V	
34	809-262	C514	CAPACITOR, MICA, 22 PFD, 50V, 10%	
35	809-265	C515,516	CAPACITOR, MICA, 100 PFD, 50V, 10%	
36	809-262	C517	CAPACITOR, MICA, 22 PFD, 50V, 10%	
37	809-255	C518,519	CAPACITOR, ELEC, 2.2 MFD, 25V	
38	809-260	C520	CAPACITOR, ELEC, 22 MFD, 35V	
39	809-300	VR501,502	RESISTOR, SEMI FIXED, 50K	
40	1418963		SCHEMATIC	

SHEET 1 OF 1



Assembly No. 1418976. Mix-Line Amplifier PWA



Q501～Q506, Q509, Q510	2SC1000 (GR, BL)
Q507, Q508, Q511	2SA842 (GR, BL)
D501, D502	1S2473

NOTES : UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4WATT, 5%

Schematic No. 1418963. Mix-Line Amplifier

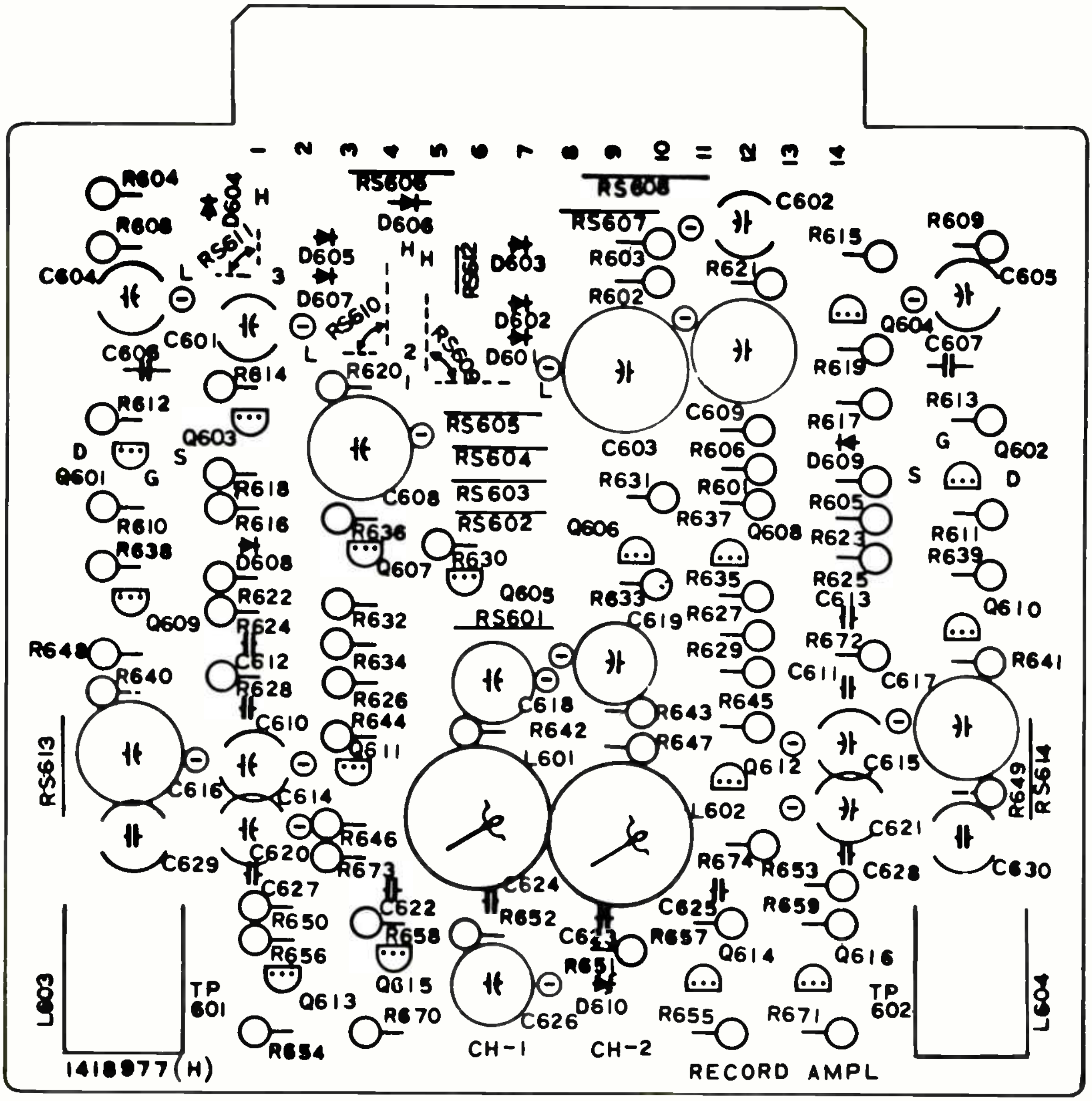
ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418977-01 1418977-02		RECORD AMPLIFIER PWA, 3-3/4 - 7-1/2 IPS RECORD AMPLIFIER PWA, 7-1/2 - 15 IPS (NHA 1418952)	
1	809-237	Q601,602	TRANSISTOR, FET	2SK30A
2	809-236	Q603,604	TRANSISTOR	2SC1000
3	809-303	Q605-608	TRANSISTOR	2SC828
4	809-236	Q609-612	TRANSISTOR	2SC1000
5	809-303	Q613-616	TRANSISTOR	2SC828
6	805-663	D601-609	DIODE	1S2473
7	809-225	D610	DIODE ZENER	02Z5.6A
8	066-720	R601	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
9	066-830	R602	RESISTOR, CARBON, 10K, 1/4W, 5%	
10	066-720	R603,604	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
11	066-830	R605	RESISTOR, CARBON, 10K, 1/4W, 5%	
12	066-720	R606	RESISTOR, CARBON, 3.3K, 1/4W, 5%	
13	066-830	R608,609	RESISTOR, CARBON, 10K, 1/4W, 5%	
14	076-014	R610,611	RESISTOR, CARBON, 1.5M, 1/4W, 5%	
15	066-652	R612,613	RESISTOR, CARBON, 470K, 1/4W, 5%	
16	066-974	R614,615	RESISTOR, CARBON, 150K, 1/4W, 5%	
17	066-866	R616,617	RESISTOR, CARBON, 27K, 1/4W, 5%	
18	066-849	R618,619	RESISTOR, CARBON, 100K, 1/4W, 5%	
19	066-689	R620,621	RESISTOR, CARBON, 2.2K, 1/4W, 5%	
20	066-668	R622,623	RESISTOR, CARBON, 4.7K, 1/4W, 5%	
21	066-827	R624,625	RESISTOR, CARBON, 3.9K, 1/4W, 5%	
22	076-014	R626,627	RESISTOR, CARBON, 1.5M, 1/4W, 5%	
23	066-669	R628, 629	RESISTOR, CARBON, 8.2K, 1/4W, 5%	
24	066-856	R630,631	RESISTOR, CARBON, 15K, 1/4W, 5%	
25	076-014	R632,633	RESISTOR, CARBON, 1.5M, 1/4W, 5%	
26	066-711	R634,635	RESISTOR, CARBON, 7.5K, 1/4W, 5%	
27	066-856	R636,637	RESISTOR, CARBON, 15K, 1/4W, 5%	
28	066-712	R638,639	RESISTOR, CARBON, 22K, 1/4W, 5%	
29	066-860	R640,641	RESISTOR, CARBON, 39K, 1/4W, 5%	
30	066-847	R642,643	RESISTOR, CARBON, 33K, 1/4W, 5%	
31	066-712	R644,645	RESISTOR, CARBON, 22K, 1/4W, 5%	
32	066-840	R646,647	RESISTOR, CARBON, 680 OHM, 1/4W, 5%	
33	066-814	R648,649	RESISTOR, CARBON, 270 OHM, 1/4W, 5%	
34	066-812	R650,651	RESISTOR, CARBON, 100 OHM, 1/4W, 5% (3-3/4 - 7-1/2 IPS)	
35	076-004	R650,651	RESISTOR, CARBON, 180 OHM, 1/4W, 5% (7-1/2 -15 IPS)	
36	076-004	R652,653	RESISTOR, CARBON, 180 OHM, 1/4W, 5% (3-3/4 - 7-1/2 IPS)	
37	066-818	R652,653	RESISTOR, CARBON, 470 OHM,1/4W, 5% (7-1/2 - 15 IPS)	
38	066-856	R654,655	RESISTOR, CARBON, 15K, 1/4W, 5%	
39	066-849	R656-659	RESISTOR, CARBON, 100K, 1/4W, 5%	
40	066-856	R670,671	RESISTOR, CARBON, 15K, 1/4W, 5%	
41	066-830	R672	RESISTOR, CARBON, 10K, 1/4W, 5%	
42	066-666	R673,674	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
43	066-675	R675,676	RESISTOR, CARBON, 1.8K, 1/4W, 5% (7-1/2 - 15 IPS)	
44	809-282	C601,602	CAPACITOR, ELEC, 1 MFD, 50V	
45	809-261	C603	CAPACITOR, ELEC, 100 MFD, 35V	
46	809-255	C604,605	CAPACITOR, ELEC, 2.2 MFD, 25V	
47	809-280	C606,607	CAPACITOR, MYLAR, 0.12 MFD, 50V, 5%	
48	809-241	C608,609	CAPACITOR, ELEC. 100 MFD, 6.3V	
49	809-272	C610,611	CAPACITOR, MYLAR, 0.0062 MFD, 50V, 5%	
50	809-271	C612,613	CAPACITOR, MYLAR, 0.0047 MFD, 50V, 5%	

SHEET 1 OF 2

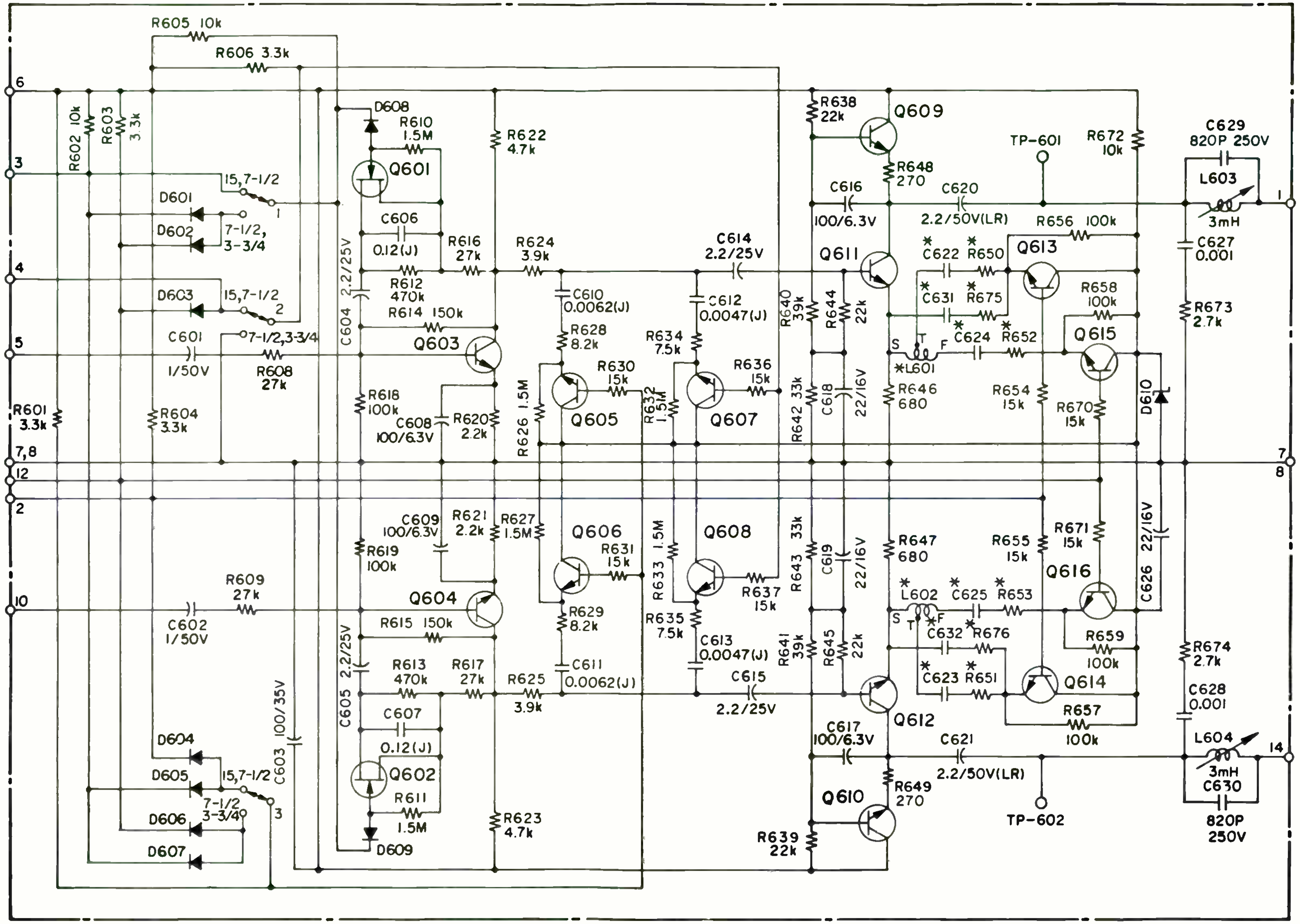
ASSEMBLY NO. 1418977 TITLE: RECORD AMPLIFIER PWA

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
51	809-255	C614,615	CAPACITOR, ELEC, 2.2 MFD, 25V	
52	809-241	C616,617	CAPACITOR, ELEC, 100 MFD, 6.3V	
53	809-249	C618,619	CAPACITOR, ELEC, 22 MFD, 16V	
54	809-284	C620,621	CAPACITOR, ELEC, 2.2 MFD, 50V	
55	809-325	C622,623	CAPACITOR, MYLAR, 0.039 MFD, 50V, 5% (3-3/4 - 7-1/2 IPS)	
56	809-276	C622,623	CAPACITOR, MYLAR, 0.018 MFD, 50V, 5% (7-1/2 - 15 IPS)	
57	809-275	C624,625	CAPACITOR, MYLAR, 0.015 MFD, 50V, 5% (3-3/4 - 7-1/2 IPS)	
58	809-271	C624,625	CAPACITOR, MYLAR, 0.0047 MFD, 50V, 5% (7-1/2 - 15 IPS)	
59	809-249	C626	CAPACITOR, ELEC, 22 MFD, 16V	
60	809-270	C627,628	CAPACITOR, MYLAR, 0.001 MFD, 50V, 10%	
61	809-269	C629,630	CAPACITOR, STHYLOR, 820 PFD, 250V	
62	809-278	C631,632	CAPACITOR, MYLAR, 0.022 MFD, 50V, 5% (7-1/2 - 15 IPS)	
63	809-216	L601,602	COIL, RECORD EQ, 1.5/2.4 MH (3-3/4 - 7-1/2 IPS)	
64	809-215	L601,602	COIL, RECORD EQ, 2.4/4.2 MH (7-1/2 - 15 IPS)	
65	809-217	L603,604	TRAP, 3 MH	
66	1418964		SCHEMATIC	

SHEET 2 OF 2



Assembly No. 1418977. Record Amplifier PWA



NOTE

D601～D609	1S1588
D610	02Z5.6A
Q601, 602	2SK30A
Q603, 604 Q609, 610 Q611, 612	2SC1000
Q605, 606 Q607, 608 Q613, 614 Q615, 616	2SC828

* / SPEED	HIGH SPEED MODEL	LOW SPEED MODEL
L601 . 602	2.4/4.2mH	1.5/2.4mH
R650 . 651	180	100
R652 . 653	470	180
R675 . 676	1.8k	——
C622 . 623	0.018	0.039
C624 . 625	0.0047	0.015
C631 . 632	0.022	

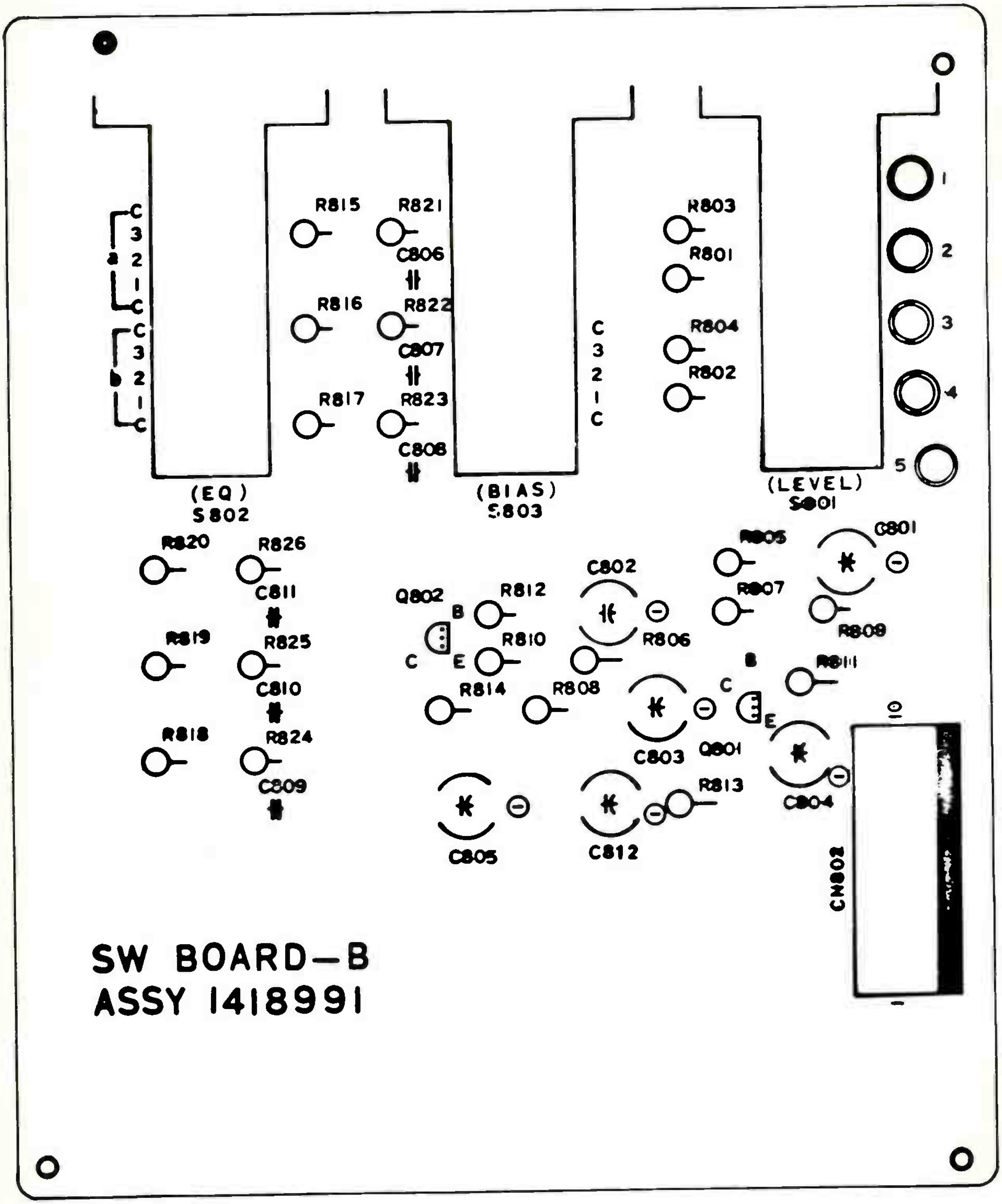
NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

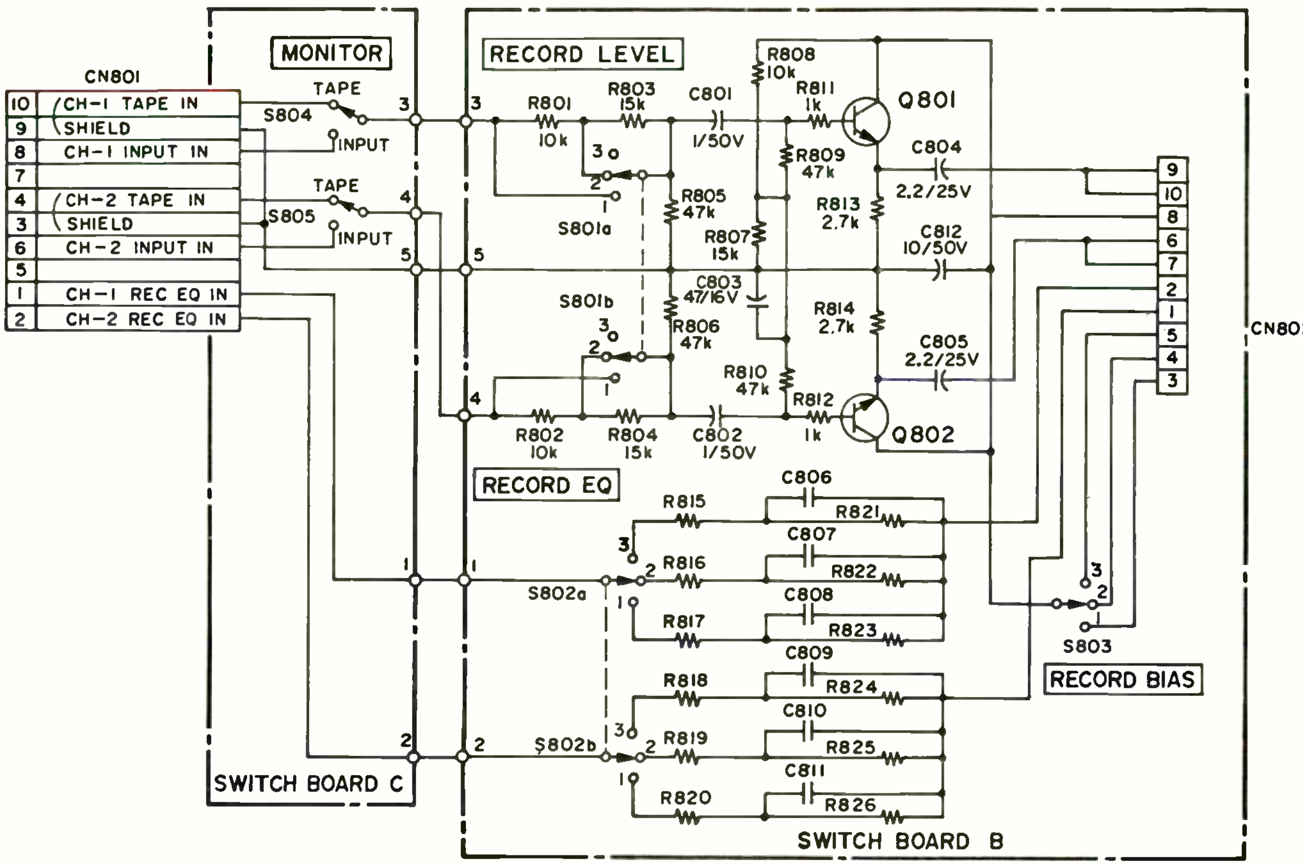
Schematic No. 1418964.
Record Amplifier

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418991-01 1418991-02		LEVER SWITCH BOARD PWA B 3-3/4 - 7-1/2 INCHES LEVER SWITCH BOARD PWA 8, 7-1/2 - 15 INCHES (NHA 1418952)	
1	809-236	Q801,802	TRANSISTOR	
2	066-830	R801,802,808	RESISTOR, CARBON, 10K, 1/4W, 5%	
3	066-856	R803,804,807	RESISTOR, CARBON, 15K, 1/4W, 5%	
4	066-717	R805,806,809,810	RESISTOR, CARBON, 47K, 1/4W, 5%	
8	066-665	R811,812	RESISTOR, CARBON, 1K, 1/4W, 5%	
9	066-666	R813,814	RESISTOR, CARBON, 2.7K, 1/4W, 5%	
10	066-666	R815,817,818,820	RESISTOR, CARBON, 2.7K, 1/4W, 5% 3-3/4 - 7-1/2 INCHES ONLY	
12	066-668	R817,820	RESISTOR, CARBON, 4.7K, 1/4W, 5%, 7-1/2 - 15 INCHES ONLY	
16	066-720	R821,824	RESISTOR, CARBON, 3.3K, 1/4W, 5%. 3-3/4 - 7-1/2 INCHES ONLY	
17	066-669	R822,825	RESISTOR, CARBON, 8.2K, 1/4W, 5%, 3-3/4 - 7-1/2 INCHES ONLY	
18	066-829	R823,826	RESISTOR, CARBON, 6.8K, 1/4W, 5%, 3-3/4 - 7-1/2 INCHES ONLY	
22	809-282	C801,802	CAPACITOR, ELEC, 1 MFD, 50V	
23	809-250	C803	CAPACITOR, ELEC, 47 MFD, 16V	
24	809-255	C804,C805	CAPACITOR, ELEC, 2.2 MFD, 25V	
25	809-278	C806,809	CAPACITOR, MYLAR, 0.022 MFD, 50V, 3-3/4 - 7-1/2 INS ONLY	
26	809-310	C807,812	CAPACITOR, MYLAR, 0.0068 MFD, 50V, 5% 3-3/4 - 7-1/2 INCHES ONLY	
27	809-276	C808,811	CAPACITOR, MYLAR, 0.018 MFD, 50V, 5%, 3-3/4 - 7-1/2 INCHES ONLY	
31	809-285	C812	CAPACITOR, ELEC, 10 MFD, 50V	
32	809-211	S801-S803	SWITCH, LEVER	
33	809-162		CONNECTOR, WAFER, 10P	MOLEX 5045-10A

SHEET 1 OF 1



Assembly No. 1418991. Lever Switch Board PWA B



Q801,Q802 2SC1000 (GR, BL)

NOTES

1. ALL CAPACITOR VALUES ARE IN MICROFARADS, 50V
2. ALL RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 5%

	Low Speed Model	High Speed Model
R815,818	2.7k	0
R816,819	0	0
R817,820	2.7k	4.7k
R821,824	3.3k	———
R822,825	8.2k	———
R823,826	6.8k	———
C806,809	0.022	———
C807,810	0.0068	———
C808,811	0.018	———

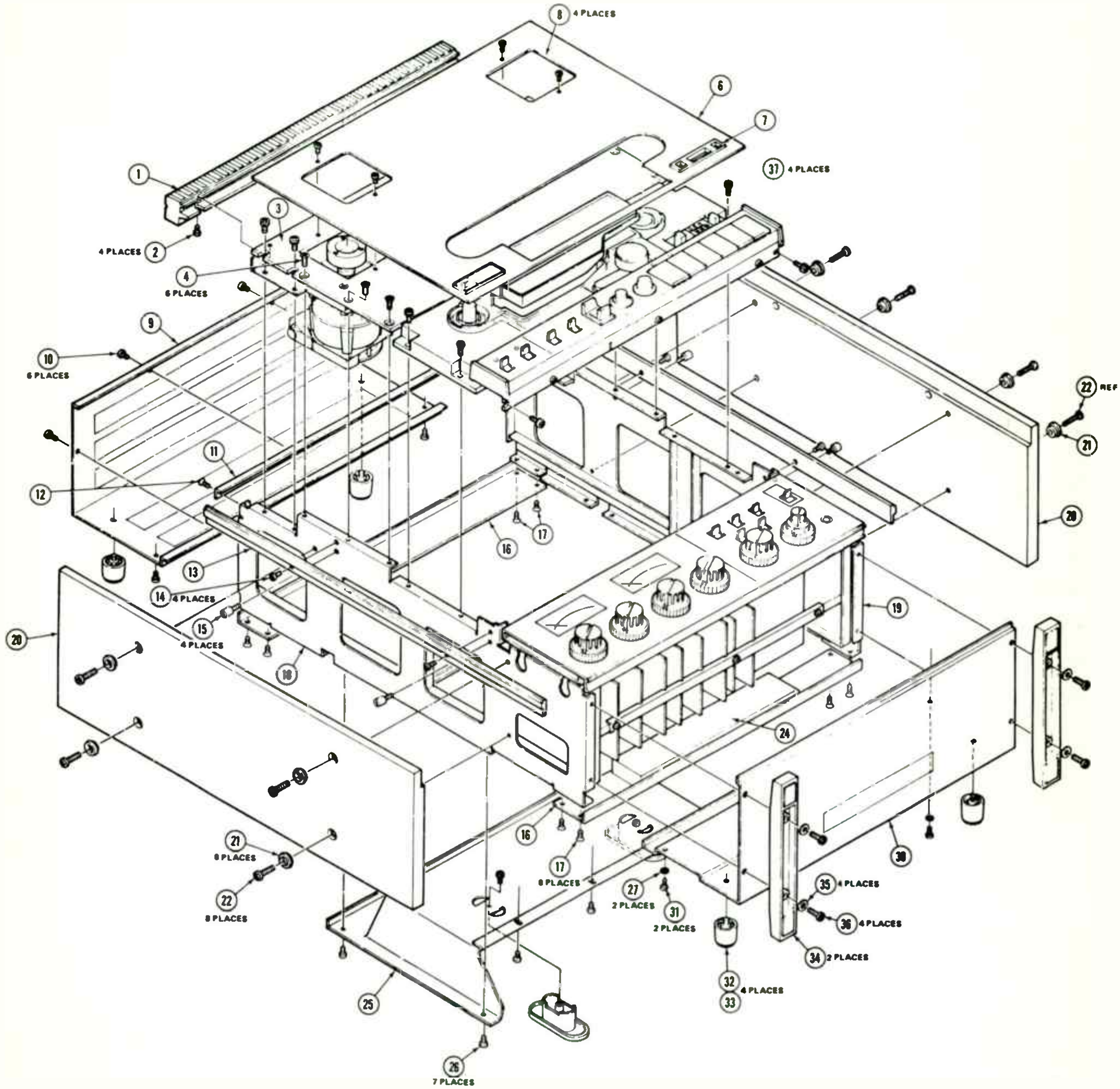
Schematic No. 1418969. Lever Switch Board

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418974-01		LEVER SWITCH BOARD PWA C (NHA 1418952)	
1	809-210	S804,S805	SWITCH, LEVER	
2	809-142	CN801	CONNECTOR, WAFER, 10P	MOLEX 5046-10

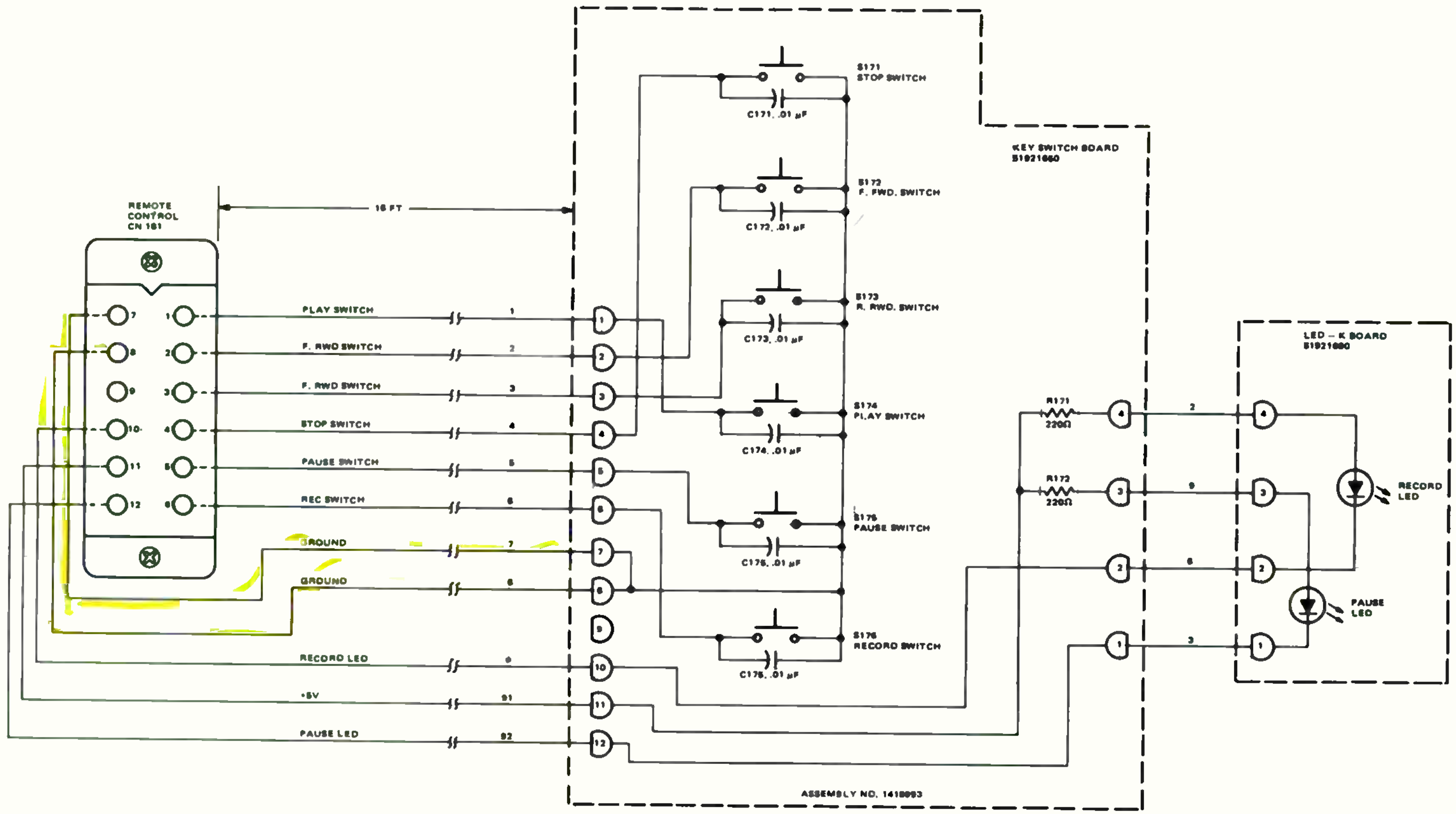
SHEET 1 OF 1

ITEM NO.	AMPEX PART NO.	REFERENCE NUMBER	DESCRIPTION	JEDEC NO. OR MFR. PART NO.
	1418953-01		TRIM AND CABINET ASSEMBLY	
1	809-059		AIR VENT	
2			SCREW, B	M3X6
3	809-003		PANEL, CHASSIS	
4			SCREW, F	M4X12
6	809-035		PANEL, TRIM	
7	809-036		COVER, COUNTER	•
8			SCREW, B	M3X6 (M2.6 HEAD)
9	809-060		COVER, TOP	
10			SCREW, B	M3X6 (BLK)
11	809-040		ANGLE, FRONT	
12			SCREW, F	M4X8
13	809-056		SASH, TRIM, SIDE	
14			SCREW, PSA	M3X6
15	809-055		SCREW, GUIDE	
16	809-052		ANGLE, COVER	
17			SCREW, F	M4X8
18	809-002		PANEL ASSY, SIDE L	
19	809-001		PANEL ASSY, SIDE R	
20	809-332		SIDE, BOARD, WOODEN	
21	809-333		WASHER, TRIM	
22			SCREW, B	M4X20 (NI)
23	809-054		PLATE, PC BOARD	
24	809-053		CUSHION, PC BOARD	
25	809-061		COVER ASSY, REAR A	
26			SCREW, B	M3X6 (BLK)
27			WASHER, LOCK, EXTERNAL TEETH	3ϕ
30	809-062		COVER, BOTTOM	
31			SCREW, B	M3X6 (BLK)
32	809-063		MOUNTING FOOT, SMALL	
33			SCREW, B	M3X18
34	809-064		MOUNTING FOOT, LARGE	
35			WASHER, FLAT	4ϕ
36			SCREW, B	M4X15 (NI)
37			SCREW, PSA	M4X10

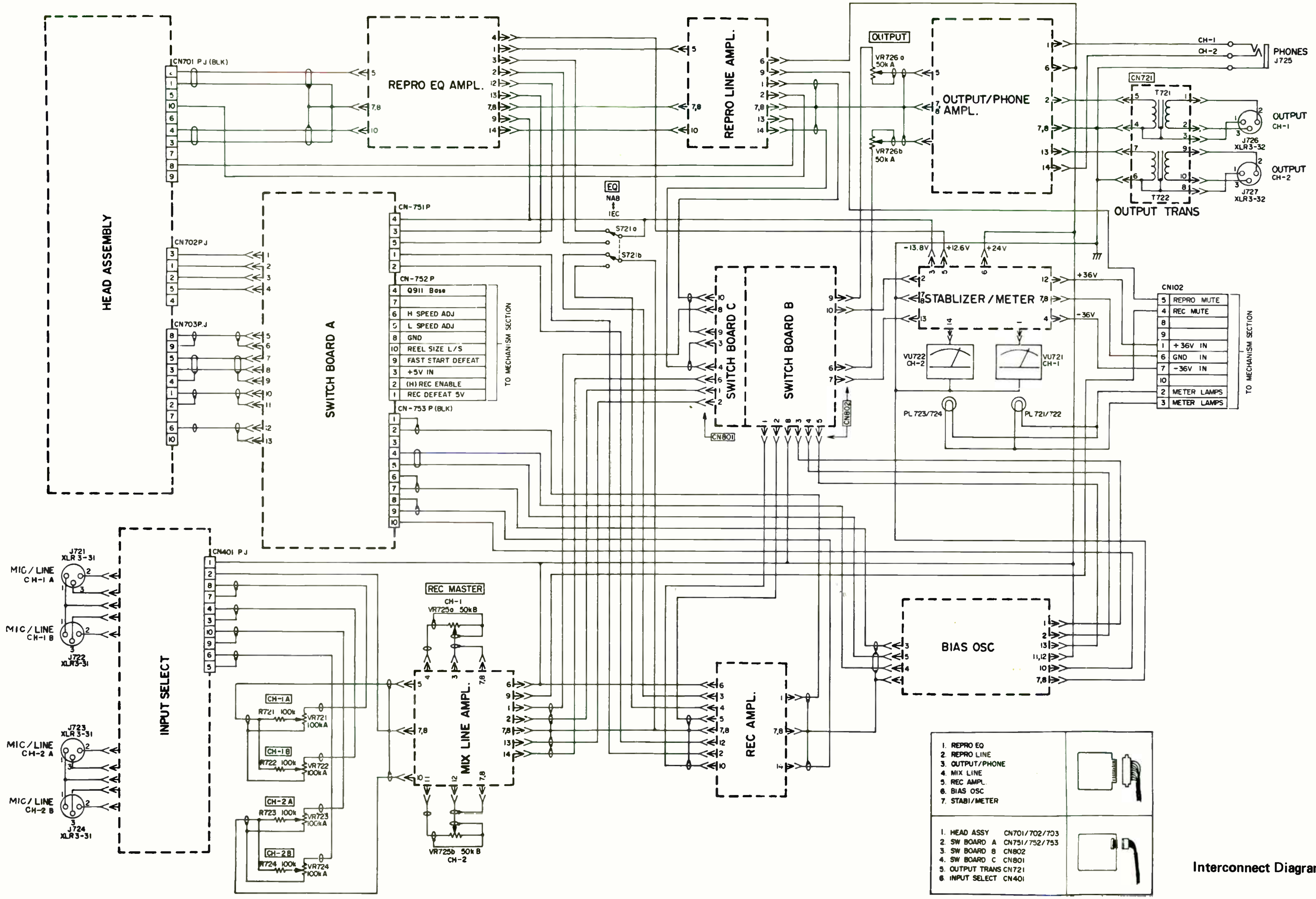
SHEET 1 OF 1



Assembly No. 1418953. Trim and Cabinet Assembly



Schematic No. 1418949 Remote Control Assembly



Interconnect Diagram No. 1418948.
ATR-700

AMPEX

AUDIO-VIDEO
SYSTEMS DIVISION

CATALOG NO. 4890410-02
ISSUED: OCTOBER 1977

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