

INSTRUCTION MANUAL

SPOTMASTER SERIES 5500A
CARTRIDGE MACHINES

15 JUNE 1981 IM No. 597-5501

BROADCAST ELECTRONICS, INC.



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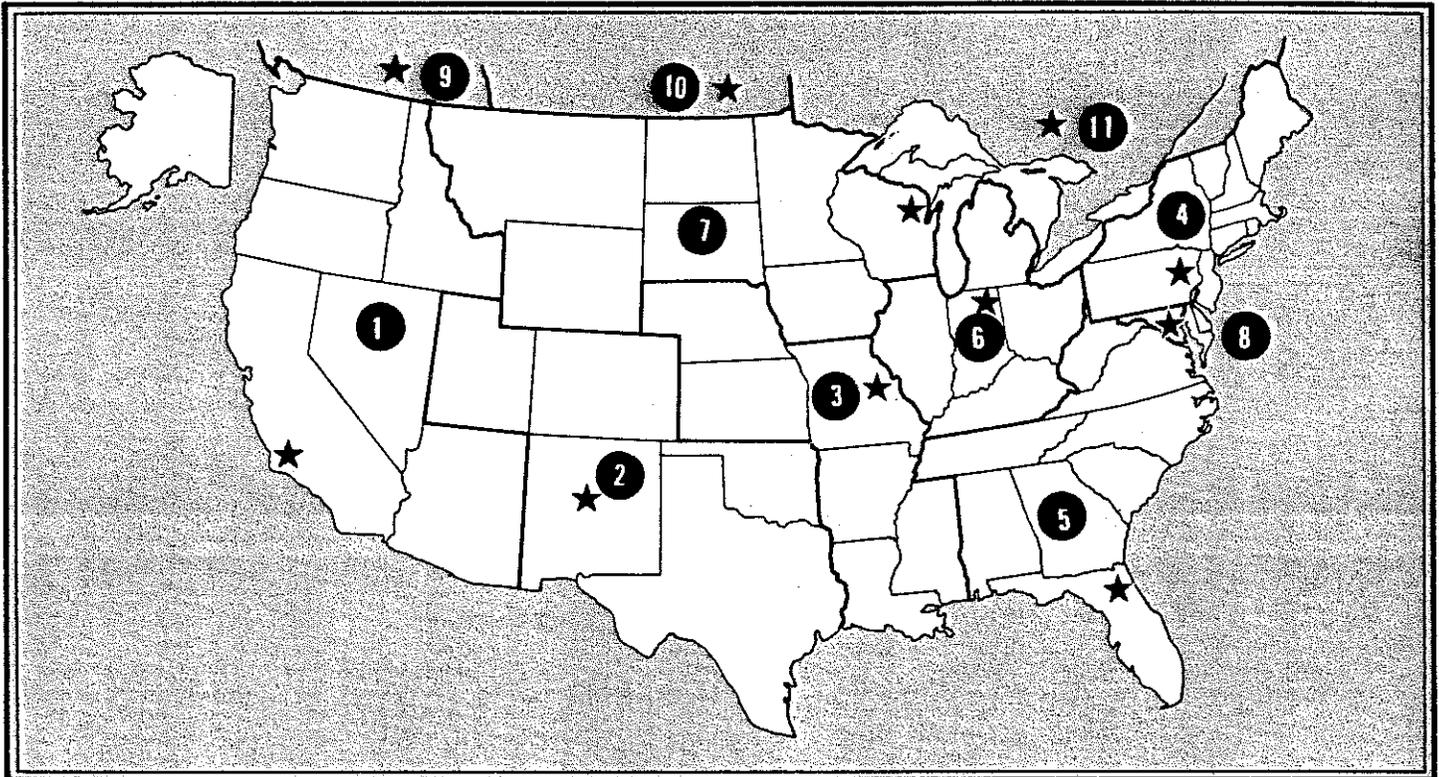
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TECHNICAL MANUAL

SPOTMASTER SERIES 5500A
CARTRIDGE MACHINES

597-5501

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SECTION I

GENERAL INFORMATION

1.1 INTRODUCTION

1.2 This section contains a general description of the Spotmaster 5500 Audio Cartridge Machine and equipment specifications.

1.3 EQUIPMENT DESCRIPTION

1.4 The Spotmaster Model 5500 is a five-deck professional audio cartridge machine designed for either monaural or stereophonic broadcast applications (see Figure 1-1). All five cartridge ports of the 5500 accept NAB size A cartridges and all decks on the standard machines provide audio and 1 kHz cue tone play back capability. The four upper decks (No. 1 through No. 4) are plug-in types which may be removed from the machine for adjustment or maintenance. The lower deck (No. 5) is fixed in the machine and will accept an optional recording accessory, providing both play back and record capability on this single transport (see Figure 1-2). Secondary (150 Hz) and tertiary (8 kHz) record and play back options are available. All cue tone facilities are equipped with tone sensing circuits and output logic circuits isolated by relay contacts. Full frequency range analog cue channel output signals are available as outputs from the machines.

1.5 The machine front panel hinges at the bottom and folds down for easy access to the plug-in decks and to other machine internal components. The hysteresis synchronous drive motor mounts on the lower side of the bottom deck. The rotor shaft of the motor extends vertically upward through slots in each of the five transport decks to provide direct drive to each deck.

1.6 The 5500 uses the Phase LOK III head mounting bracket. This bracket permits completely independent head adjustments for height, zenith, and azimuth which allows precise adjustment of phasing for stereophonic operation. All solenoids are air damped and utilize low voltage, solid-state switching to ensure silent, vibration free operation and low heat dissipation coupled with reliable service.

1.7 A tapered right side cartridge guide ensures the inserted cartridge is accurately channeled into the proper play or record position. The cartridge is held in the correct position by a beryllium-copper upper clamp, providing positive locking action. The lower ferromagnetic head shield is inset into the deck to present a continuously flat lower surface for accurate cartridge seating.

1.8 Electronics in the 5500 employ transistor and integrated circuit components. The audio amplifier design accommodates a wide dynamic operating range without introducing signal distortion. Field effect transistor switching circuits process audio from the started decks of the machine only. All non-started decks are muted. Audio, cue, and control circuits are constructed on plug-in printed circuit boards.

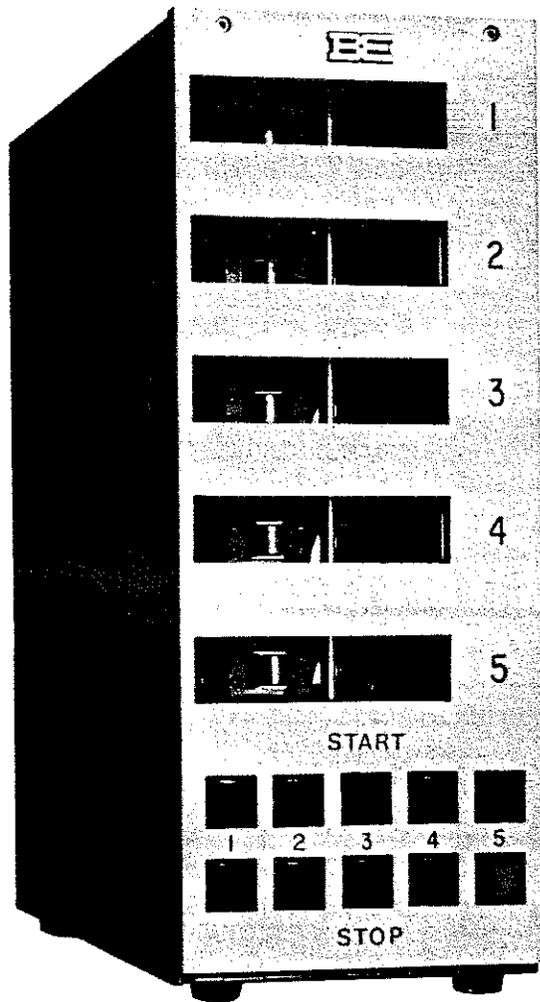


FIGURE 1-1
SPOTMASTER 5500

<u>DESCRIPTION</u>	<u>MODEL NO.</u>	<u>PART NO.</u>
Monaural Playback with 1kHz Tone	5501	906-5501
Monaural Playback with All Cue Tones	5502	906-5502
Stereophonic Playback with 1kHz Tone	5503	906-5503
Stereophonic Playback with All Cue Tones	5504	906-5504



FIGURE 1-2
SPOTMASTER 5500 COMPANION RECORDER

1.9 All front panel controls are removable with the optional Spotmaster Remote Control Panel. Front and rear internal panel connections are made through ribbon cable wiring. Light emitting diode indicators on the rear of the control circuit boards provide visual status indications of key control functions for ease in servicing. Five connectors (one per deck) provide external connections to the audio and remote control circuits.

1.10 Each deck of the 5500 provides a full "cue-audio" output at the machine rear connectors which, with proper coding and decoding, may be used for program logging in automated broadcast systems or for other program identification applications. The optional Spotmaster Audio Switcher can be automatically controlled by logic pulses from the 5500. This configuration will provide an audio output from the last deck started while muting all other decks, running or stopped. The switcher can control all audio signals of up to three 5500 cartridge machines. Refer to Table 1-1 for a list of optional accessories.

1.11 EQUIPMENT SPECIFICATIONS

1.12 Refer to Table 1-2 for electrical specifications of the 5500 Audio Cartridge Machine. Physical characteristics are presented by Table 1-3.

Table 1-1 Options And Accessories

MODEL	PART NUMBER	DESCRIPTION
5309A	906-5309A	Monaural Recorder. Allows full monaural record/playback capability from deck 5. Includes 1 kHz cue tone record.
5301A	906-5301A	Stereo Recorder. Allows full stereophonic record/playback capability from deck 5. Includes 1 kHz cue tone record.
SW5E	904-5001	Audio Switcher. Provides a single audio output from the last deck started, muting all other decks. SW5E accepts five inputs. Up to three switchers may be tied together, providing a single output from three 5500 machines.
----	906-5305	Mixer for single balanced output, Monaural.
----	906-5505	Mixer for single balanced output, Stereophonic.
----	906-5311	Secondary (150 Hz) and Tertiary (8 kHz) cue tones for monaural and stereophonic recorders.
----	906-5306	Rack mount bracket for one to three units.
----	906-5507	Rack mount filler panel (1/3).
----	906-1806	Printed circuit board extender card.
R-25015	906-0040	Head Demagnetizer, 117 Vac, 50/60 Hz.
BE-903	832-9032	Cleaning fluid for heads and transport.
----	----	Test tapes for frequency response and alignment.

Table 1-2 Electrical Specifications

PARAMETER	SPECIFICATIONS
PRIMARY POWER REQUIREMENTS	105 to 125 Vac or 210 to 230 Vac, 60 Hz, 120 Watts Maximum Optional: 210 to 230 Vac, 50 Hz, 120 Watts Maximum
AUDIO: FREQUENCY RESPONSE	+2 dB from 50 Hz to 15 kHz, exclusive of head contour effects
EQUALIZATION	NAB, IEC, OR CCIR, as ordered
DISTORTION	2% or less, record to playback at 160 n Wb/m (1 kHz)
NOISE	(Measured without tape movement) Monophonic: 62 dB or better below reference of 400 Hz at 3% THD (54 dB below 160 n Wb/m at 1 kHz Stereophonic: 60 dB or better below reference of 400 Hz at 3% THS (52 dB below 160 n Wb/m at 1 kHz)
CROSSTALK	50 dB or better (limited by magnetic heads)
AUDIO OUTPUT	Maximum adjustable level +8 dBm from 160 n Wb/m at 1 kHz. 600 ohm transformer, balanced. (May be connected for 150 ohm transformer, balanced).
PEAK OUTPUT LEVEL	+20 dBm before clipping
CUE TONES: STANDARD OPTIONAL	1000 Hz Stop 150 Hz (Cue I) and 800 Hz (Cue II) (Full Cue Channel Output is Standard)

Table 1-3 Physical Specifications

PARAMETER	SPECIFICATIONS
TRANSPORT DECKS: QUANTITY SIZE	Five NAB Size "A" Cartridges
TRANSPORT MECHANISM	Direct Drive Capstan
MOTOR TYPE	Hysteresis Synchronous
TAPE SPEED ACCURACY	7.5 in/s (19.05 cm/s) 0.10% or better (at 7.5 in/s)
WOW AND FLUTTER	0.15% Peak Weighted, 0.2% RMS Unweighted
CUEING ACCURACY	0.1 Second, Maximum
AMBIENT OPERATING TEMPERATURE	32°F to 132°F (0°C to 55°C)
EXTERNAL CONNECTIONS	25 pin connector for each deck. Mating plugs furnished.
MOUNTING: STANDARD OPTIONAL	Desk Top 19 inch (48.26 cm) EIA rack, maximum of three units per rack width.
DIMENSIONS	14.75 inches high x 5.75 inches wide x 17 inches deep (37.5 cm x 14.6 cm x 43.2 cm)
WEIGHT, UNPACKED	52 pounds (23.6 kg)

SECTION 2

FUNCTIONAL DESCRIPTION

2.1 General

The SPOTMASTER 5500 system consists of the following main components:

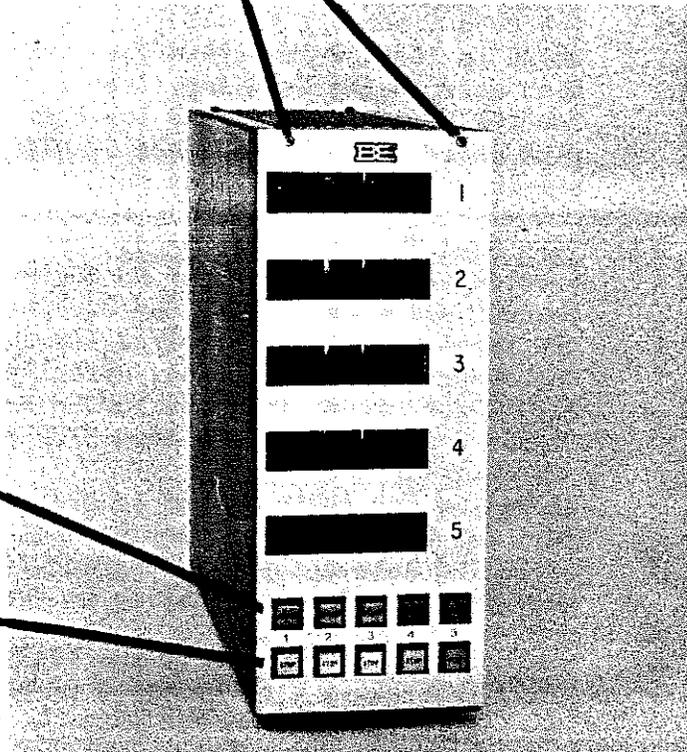
- (1) Tape Transport System. Five independently controlled cartridge decks, one fixed and four plug-ins, are directly driven from the drive-shaft of a synchronous hysteresis motor. These decks are held in proper alignment with the motor drive-shaft and capstan pressure roller by the main chassis system and the front panel.
- (2) Control PC Boards. One plug-in electronic Control PC Board is used for each transport deck. These boards plug into a mother board which is located immediately behind the deck assemblies and which also accepts the Head Amplifier PC boards described below. Each control board contains the logic circuitry for tape transport control plus optional 150Hz and 8kHz Cue-Tone Amplifiers with associated tone sensing circuits and relay output logic.
- (3) Tape Head Amplifier PC Boards, one per deck. Monaural machines provide two amplifiers per PC Board; one for the program-audio channel and a second for the cue channel. Stereo units provide the three amplifiers required for the Left, the Right, and the Cue channels. In addition, circuitry on this board generates a STOP logic signal from the 1000Hz End-of-Program tone which is used on the Control Board for tape STOP action.

An analog Cue-Audio output is available from the cue amplifier. This full cue-channel signal may be used in broadcast and other operations, including Automation for program identification or logging if appropriate coded information is recorded on the cue track.
- (4) Front Panel Controls: STOP and START pushbuttons, tape READY and START indicators (incorporated in STOP and START pushbuttons, respectively). Note: The power on switch is located on the rear panel.
- (5) Mother Board Assembly. The Mother Board provides plug-in receptacles for the Head Amplifier and Control PC boards and is wired to establish basic interconnections between these two boards, the Power Supply PC board, the transport deck solenoid and microswitch, and the machine input/output terminals.
- (6) Rear Panel Assembly. Five 25-pin connectors are mounted on the 5500 rear-panel, providing output connections for audio, tone, control, and indicator signals. When the optional Record Amplifier is used, this unit connects to a receptacle on the 5500 rear-panel.

Front Panel Release
Screws

START PUSHBUTTON AND
INDICATOR: Lights
when deck is started/
running

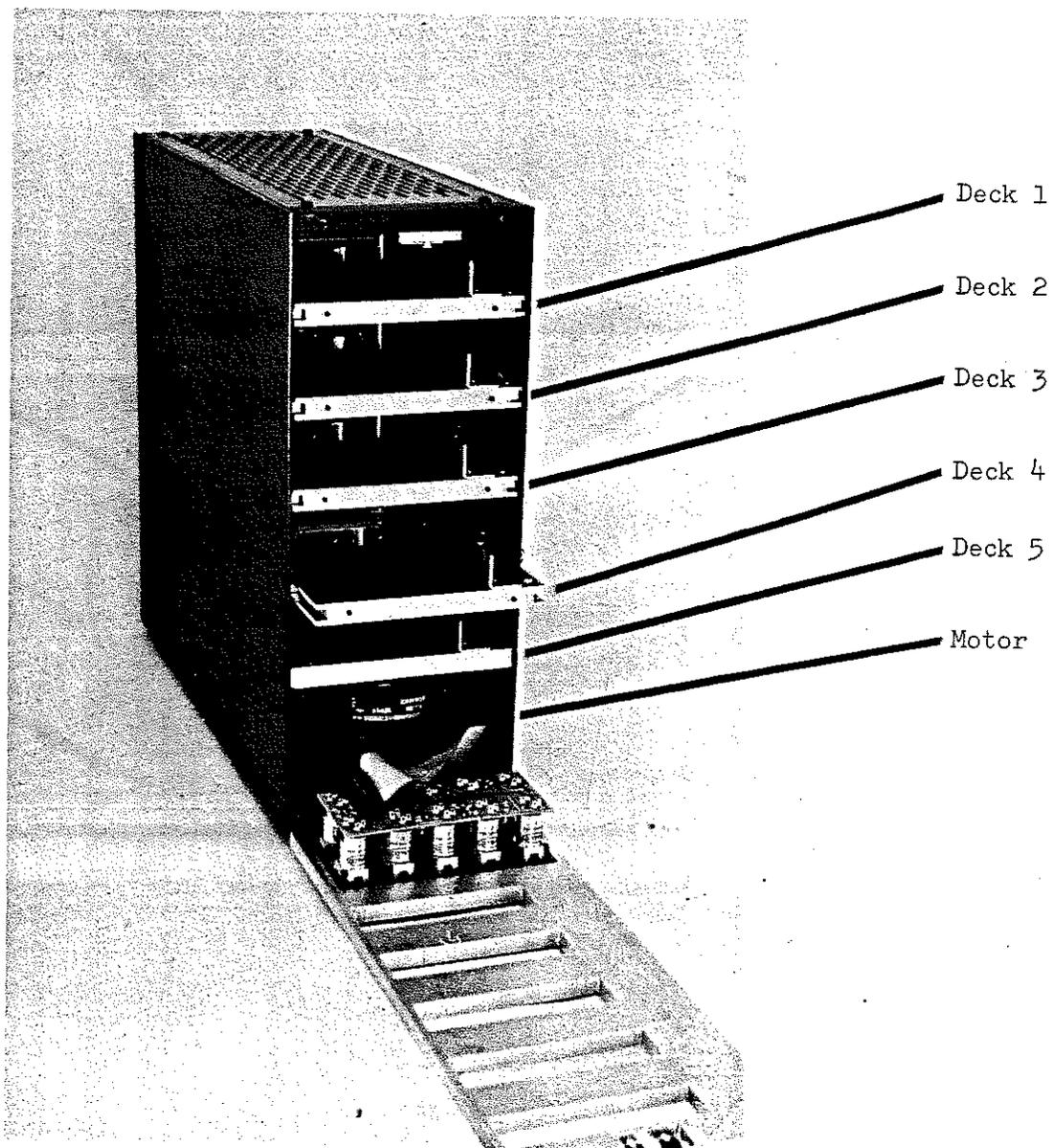
STOP PUSHBUTTON AND
INDICATOR: Lights
when deck is loaded
and cart is not running



2.2

FIGURE 2-1

SPOTMASTER 5500, Front View



2.3

FIGURE 2-2

Front Panel hinges open for easy removal of plug-in decks.

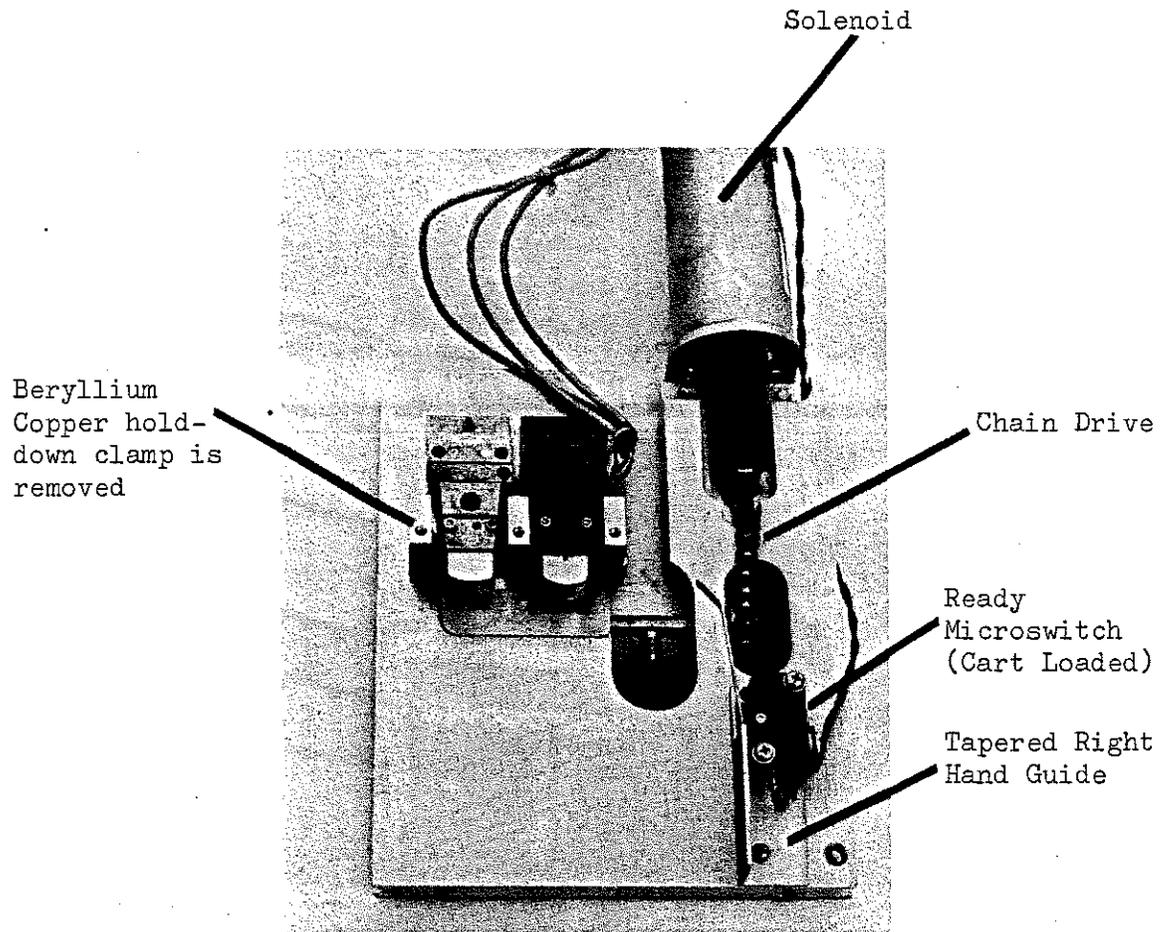
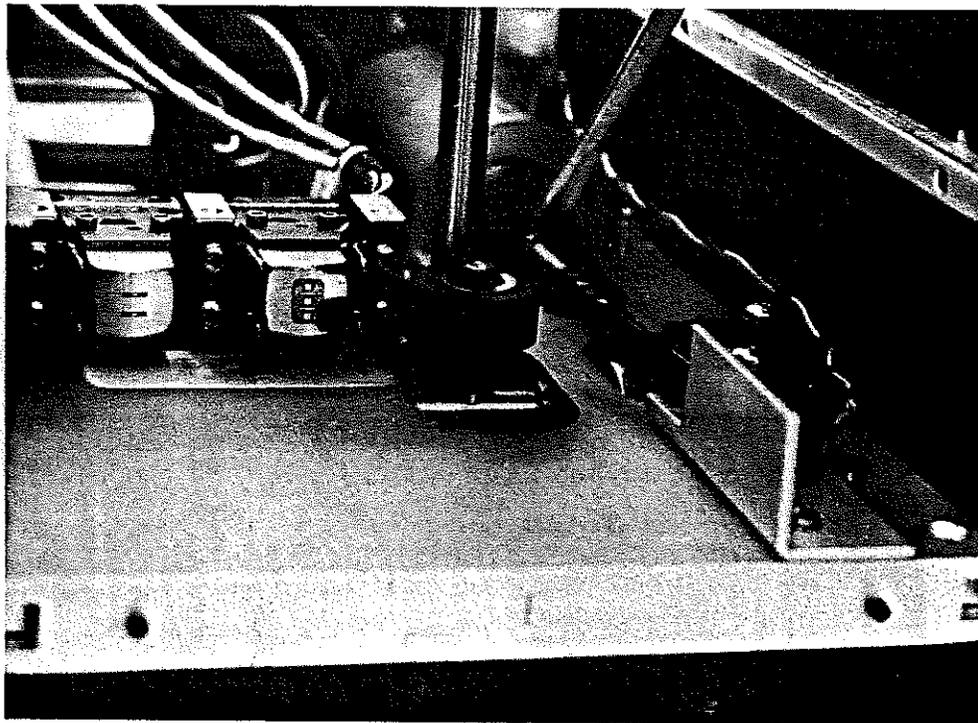


FIGURE 2-3

2.4

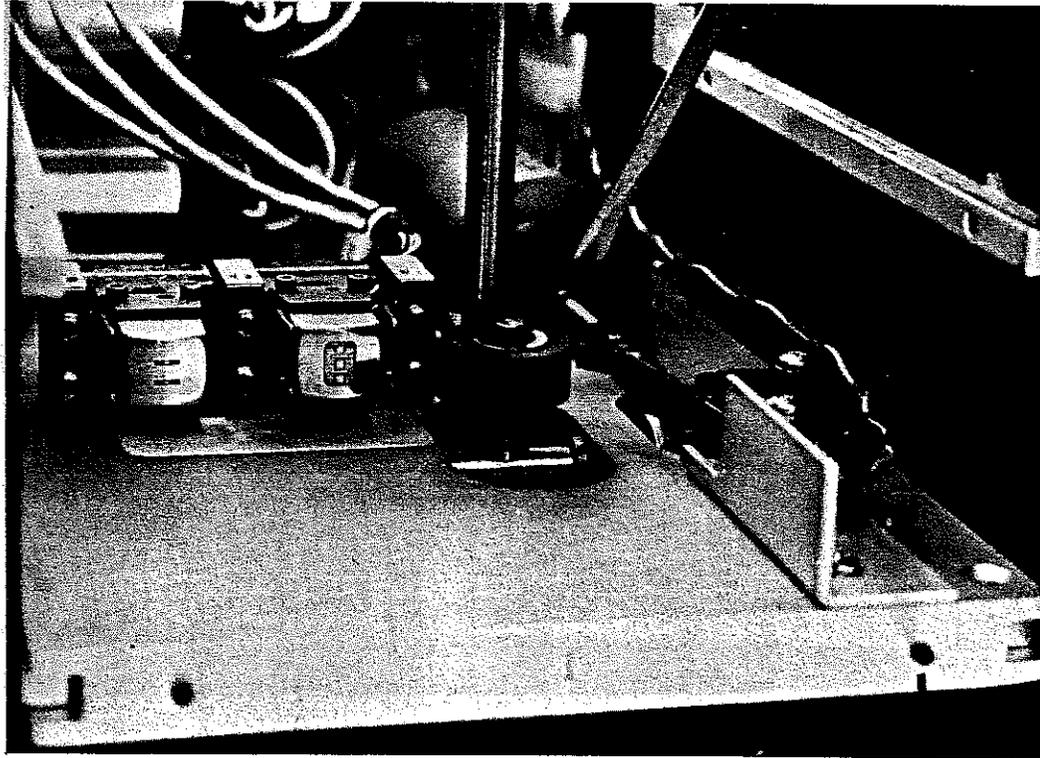
Transport Deck removed from 5500 showing: Dual Head Assemblies, START/PLAY Solenoid and Chain Drive to Pressure Roller, READY (cartridge loaded) Microswitch, retracted Pressure Roller, tapered.



2.5

FIGURE 2-4

Close-up of Head Assemblies and Tape Capstan Drive. The head on the left is a "Dummy", located in the Record-Head position. This dummy is required to maintain proper tape-to-head orientation in playback only machines, particularly in Stereo systems. The pressure roller is in the START or play position. See Section 5 for proper adjustment of the Deck Positioning Screw which insures that constant top-to-bottom pressure is maintained between the Pressure Roller and drive shaft, a necessary condition for a properly operating tape transport. Note the downward taper of the right hand guide which channels the cartridge into accurate position. The Beryllium copper clamp which holds the cartridge in place has been removed for this photo.

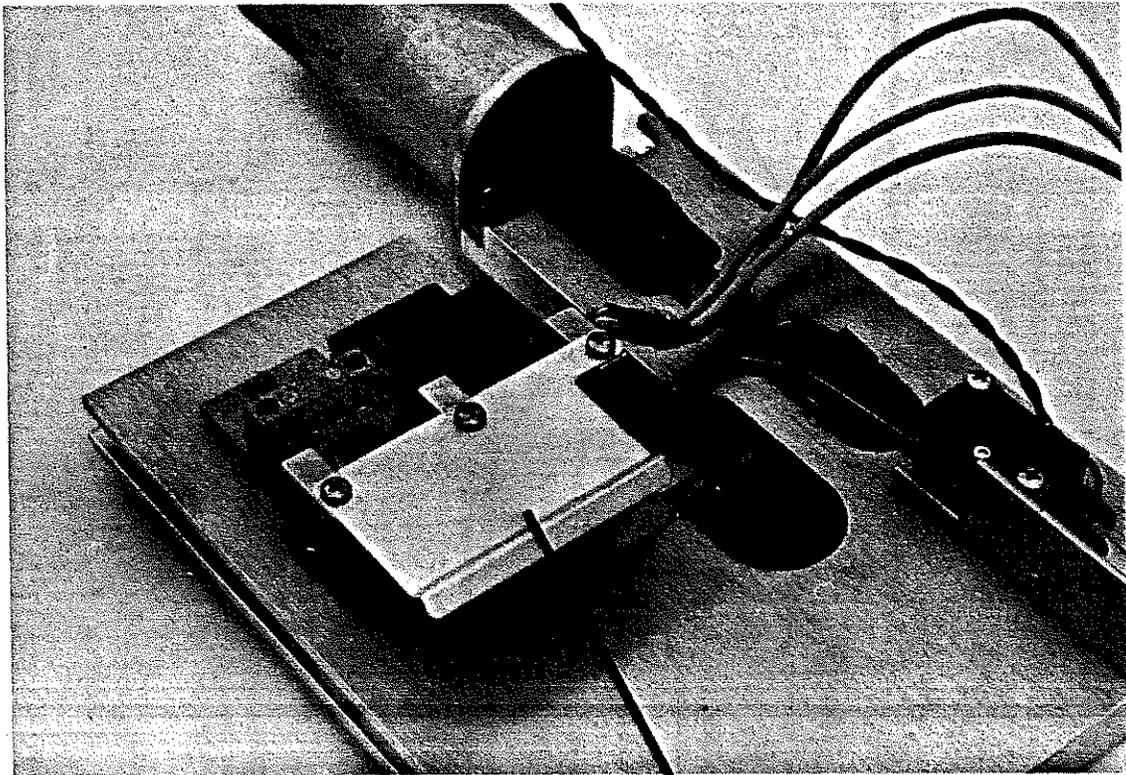


Locking Screw

2.6

FIGURE 2-5

Tape Guides: In a properly adjusted machine, pinch-roller pressure is even from top-to-bottom of the roller/tape/drive shaft contact area and tape flow is directed lightly against the upper three guide edges.



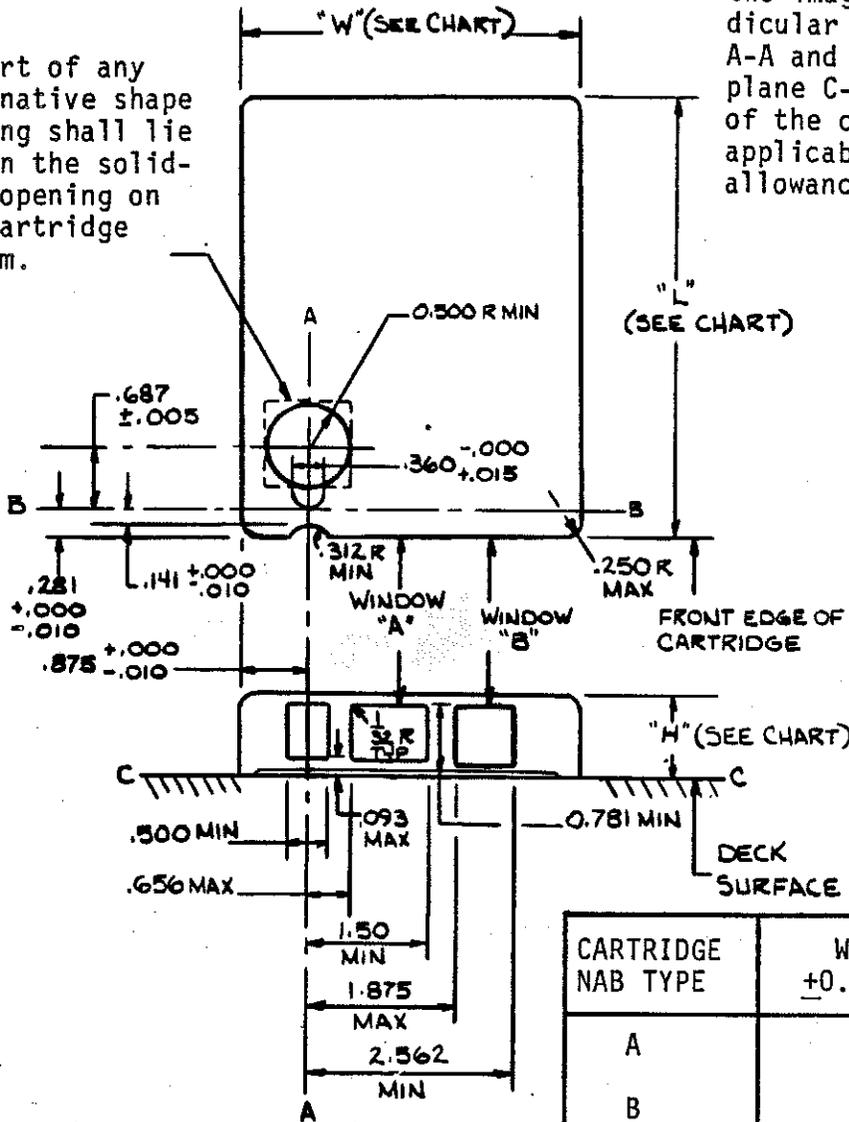
2.7

FIGURE 3-6

A Beryllium Copper Clamp holds the cartridge in place.

All important operating dimensions (in inches) are referenced from two imaginary mutually perpendicular vertical planes marked A-A and B-B, and a third horizontal plane C-C, representing the deck surface of the cartridge tape player. Where applicable, dimensions include draft allowances.

No part of any alternative shape opening shall lie within the solid-line opening on the cartridge bottom.



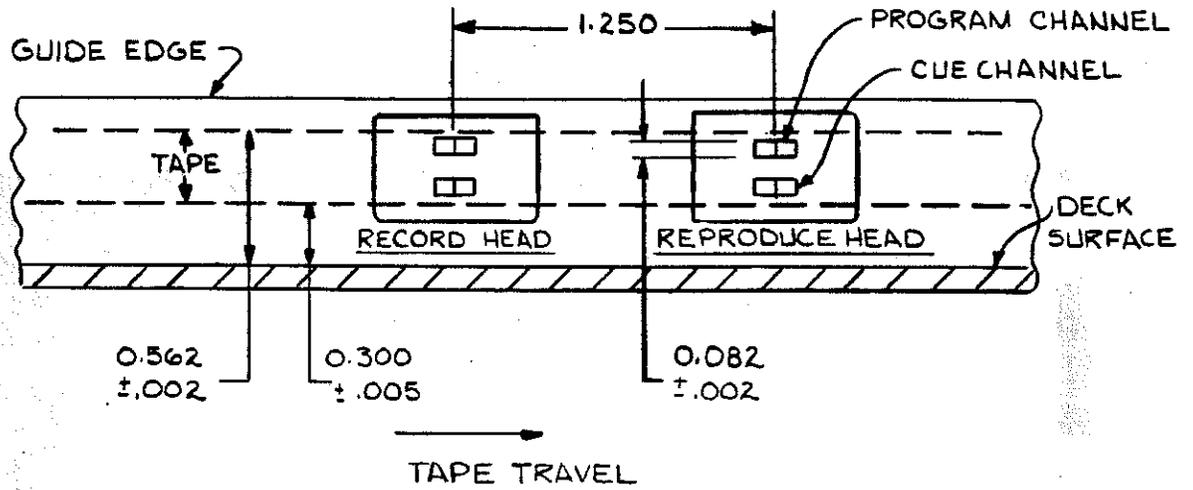
CARTRIDGE NAB TYPE	WIDTH ±0.015625	LENGTH MAXIMUM	HEIGHT MAXIMUM
A	4"	5.25	0.9375"
B	6"	7"	0.9375"
C	7.625	8.5	0.9375"

2.8

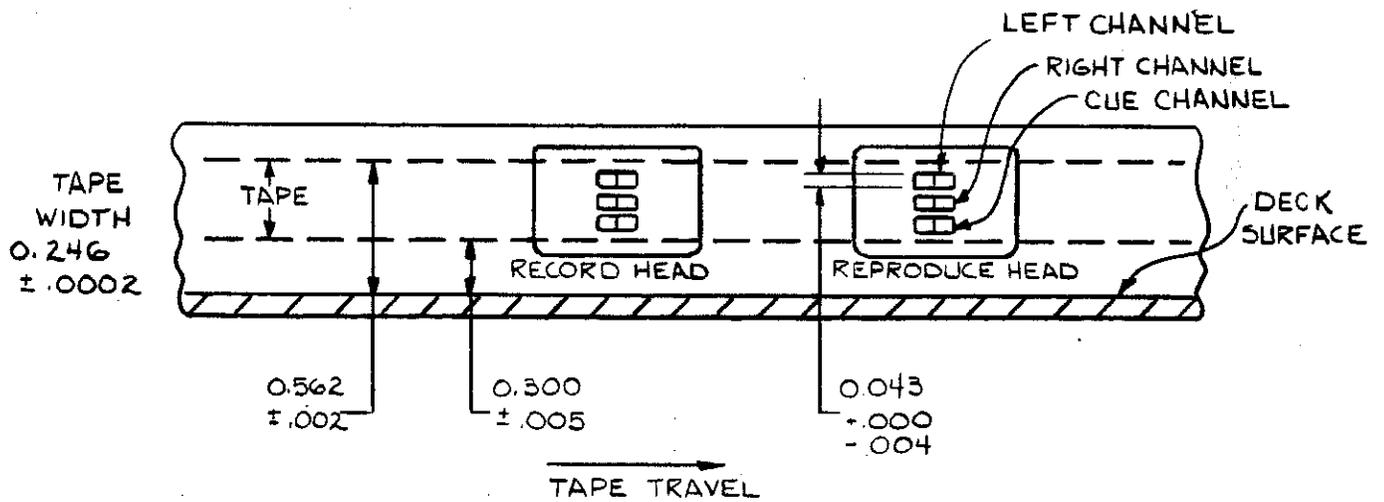
NAB CARTRIDGE DIMENSION STANDARDS

FIGURE 2-7

MONOPHONIC STANDARD



STEREOPHONIC STANDARD

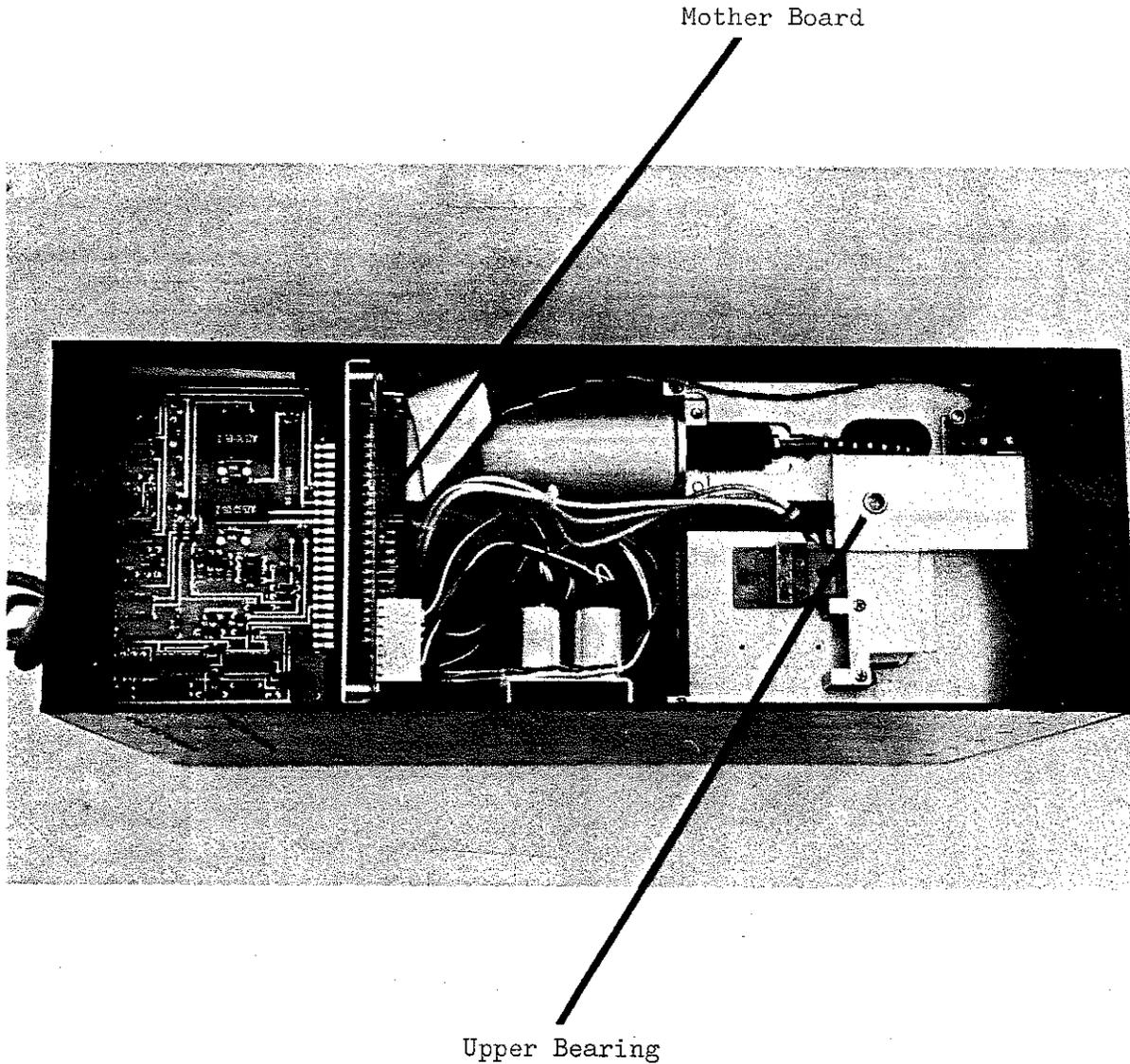


2.9

NAB TAPE HEAD DIMENSION STANDARDS

FIGURE 2-8

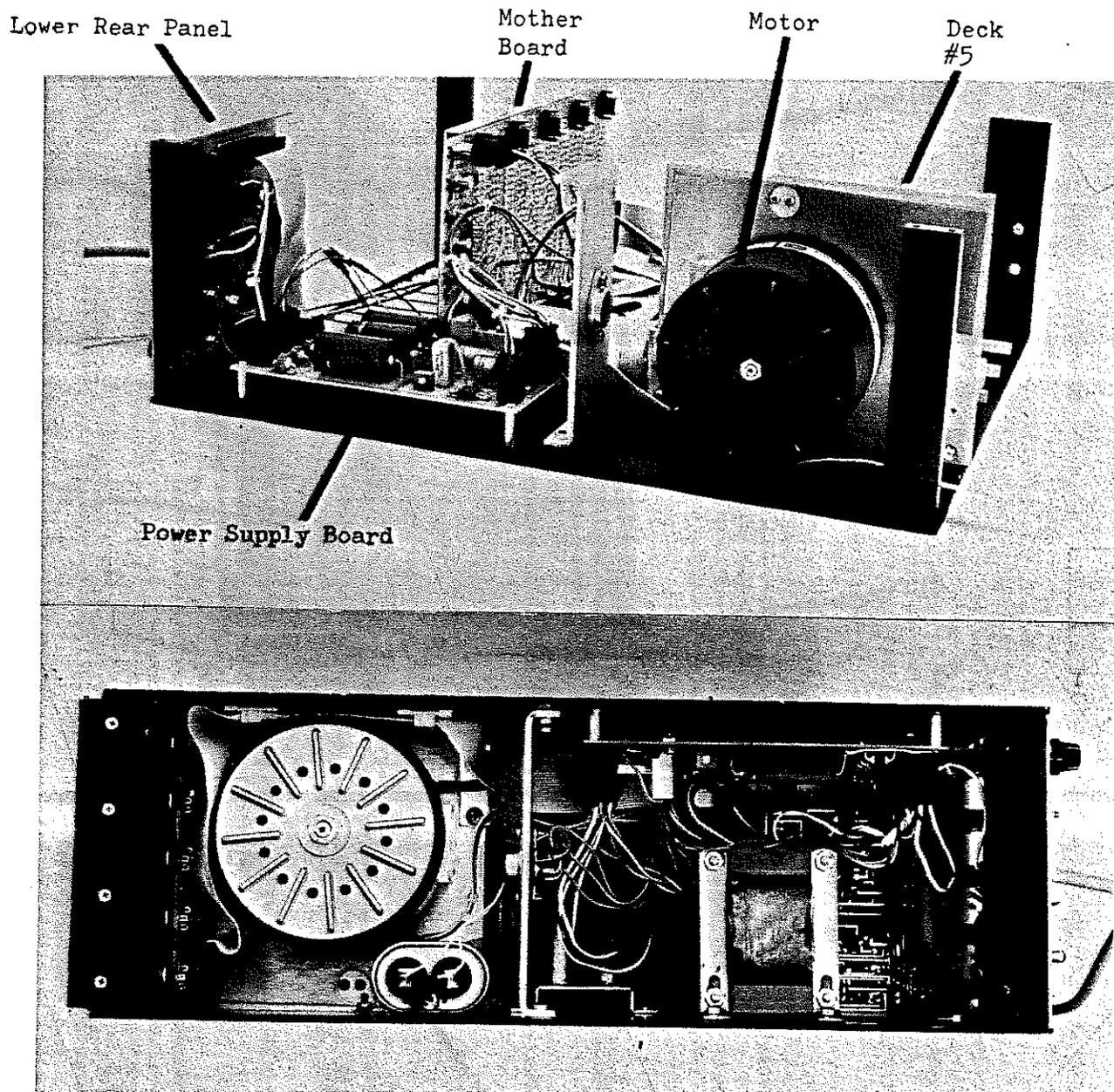
Electronic System:



2.10

FIGURE 2-9

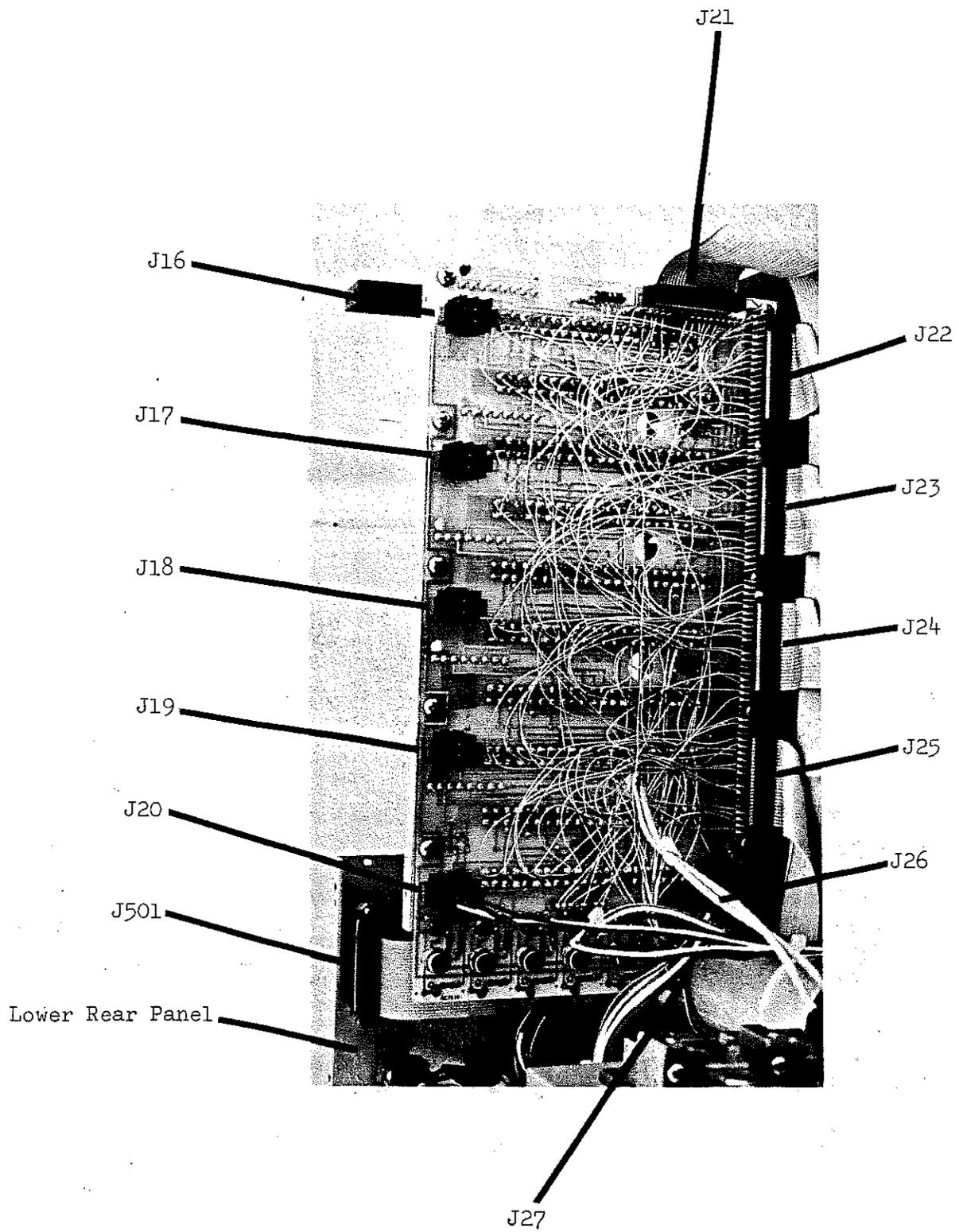
Top view of Spotmaster 5500, cover removed, showing deckplate assembly and uppermost PC board. Ten removable PC boards plug into the rear section of the machine, five head amplifier boards and five transport control boards. PC board interconnections and solenoid drive transistors are located on the Mother Board, shown in the photo. The deck-plate end stops and upper drive shaft bearing are also indicated.



2.11

FIGURE 2-10
MODEL 5500, BOTTOM SECTION

A hysteresis, synchronous motor provides direct capstan drive for the Series 5500. The motor is attached directly to the underside of the bottom tape deck with the capstan shaft extending upward, through the deck surfaces. Rear panel connections are made via ribbon cable.



2.12

FIGURE 2-11
MOTHER BOARD ASSEMBLY

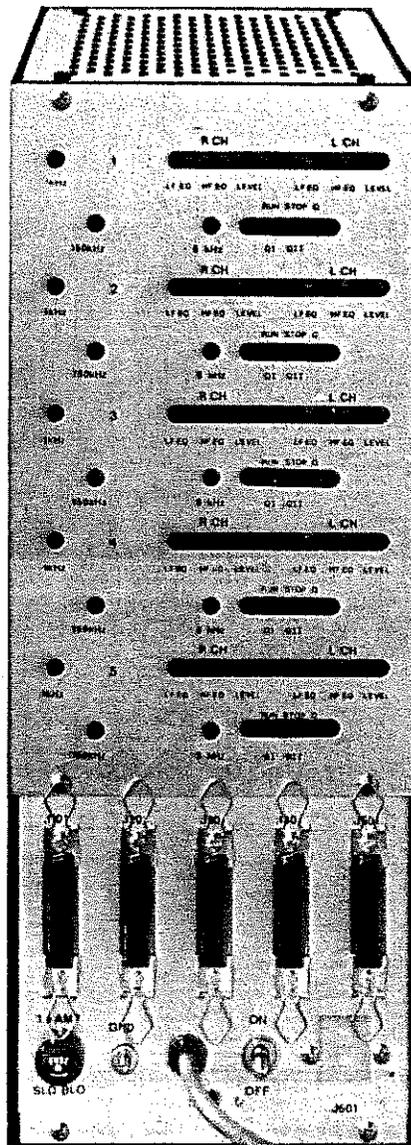


FIGURE 2-12

2.13
REAR VIEW

SECTION III THEORY OF OPERATION

3.1 Electronics, General Description

3.2 Figure 3-1 is a Functional Block Diagram of the Model 5500 electronic system, stereo version, showing: (1) the Tape Heads, Head Amplifier PC Board for a single deck, (2) the hysteresis synchronous motor, (3) the regulated Power Supplies, (4) the tape transport Solenoid Drivers, and (5) Cue output logic.

3.3 The Left-Channel Head Amplifier consists of an integrated circuit operational amplifier, U1, with adjustable high and low frequency compensation, an FET switching circuit (Q5) which mutes the audio from all decks not started, driver/output amplifiers U2/Q1/Q2, and transformer T1 which provides a balanced audio output. The Right Channel amplifier is identical to the Left. Individual level controls are provided for each amplifier channel.

3.4 The Cue Channel Amplifier, also located on the Head Amplifier PC board, is a broad-band audio channel which passes the full range of NAB tones, up to and including the 8kHz tertiary signal. Two op-amp stages, U5A and B, amplify the head output voltage and provide a low impedance Cue-audio output signal, U5B terminal 7, which is routed to the machine rear-panel output connector for external use and to the control logic PCB for 150Hz and 8kHz decoding. The external signal may be used for program identification or data logging if this type of coded information has been recorded on the Cue-track.

3.5 U6A on the Head Amplifier board is an active 1000Hz band-pass filter which selects the End-of-Program tone from the Cue audio, amplifies this signal, and drives rectifier CR7. The output of CR7 is integrated by U6B, providing a logic STOP signal for the Control Board which stops tape motion when the 1kHz tone is detected. R38 provides level control of the Cue signal.

3.6 The Control PC Board accepts START and STOP signals from the machine front panel or remote control unit, along with the End-of-Program logic signal from the (1kHz) cue track, processes these signals via CMOS logic to control tape motion via the transport solenoid/pressure-roller assembly, and generates indicator logic signals which show that the tape deck is in either the READY (cartridge loaded and cued) or START mode (tape running). Solenoid driving transistors are located on the Mother Board.

3.7 Additionally, the Control PC Board provides amplifying, detecting, and logic output circuitry for the 150Hz and 8kHz cue-tone signals, generating Cue-I and Cue-II logic signals to control external machine functions as required in automated control systems and other system applications.

3.8 Tape Head Amplifier Details

3.9 Each tape deck requires one tape head amplifier circuit board. The stereophonic head amplifier has three audio channels (left channel, right channel, and 1 kHz cue tone channel). The monaural head amplifier has two audio channels, the program audio channel (left stereophonic channel) and the 1 kHz channel. Stereophonic capability is accomplished by replacement of each two channel monaural circuit board with a three channel stereophonic board and installation of the required stereophonic head assemblies. As operational of the left and right stereophonic channels are both identical to operation of the monaural program audio channel, the following text will describe operation of the stereophonic left channel and the 1 kHz cue channel only. Refer to the drawings provided in Section 5 as necessary.

3.10 Audio from the tape head (left channel) is applied through coupling capacitor C10 to the non-inverting input (terminal 3) of operational amplifier U1. This single stage high-gain linear amplifier drives FET mute switch Q1. The output of U1 (terminal 6) is also fed back to its inverting input (terminal 2) to provide both high-frequency and low-frequency compensation. Frequency adjustments are made with R3 (low end) and R2 (high end).

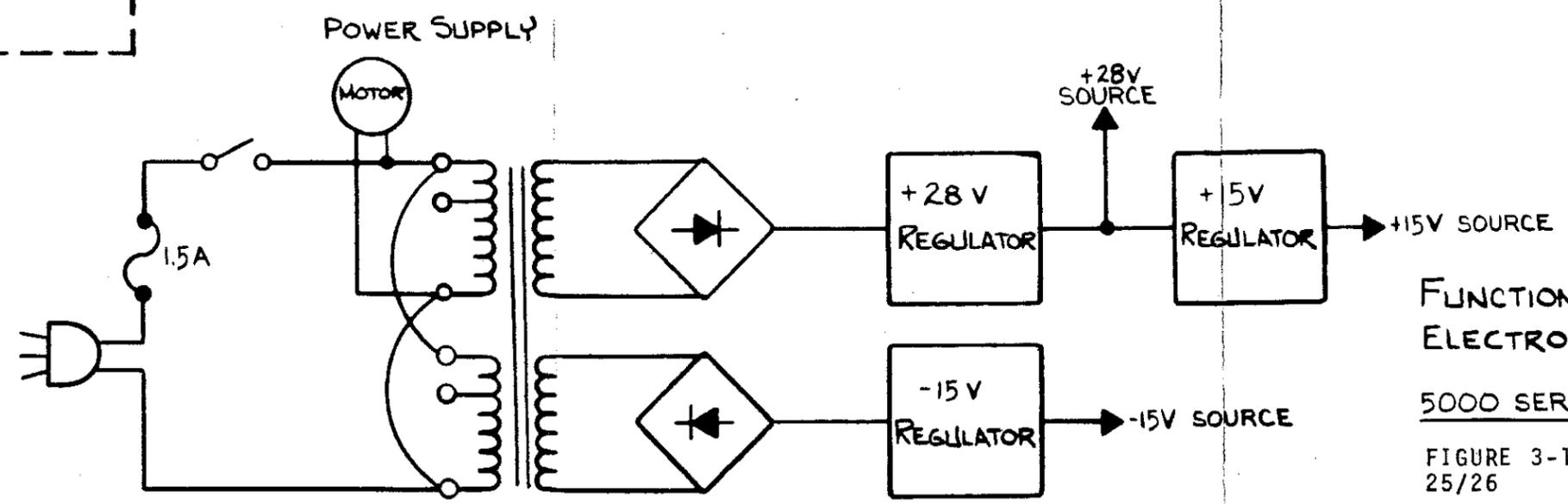
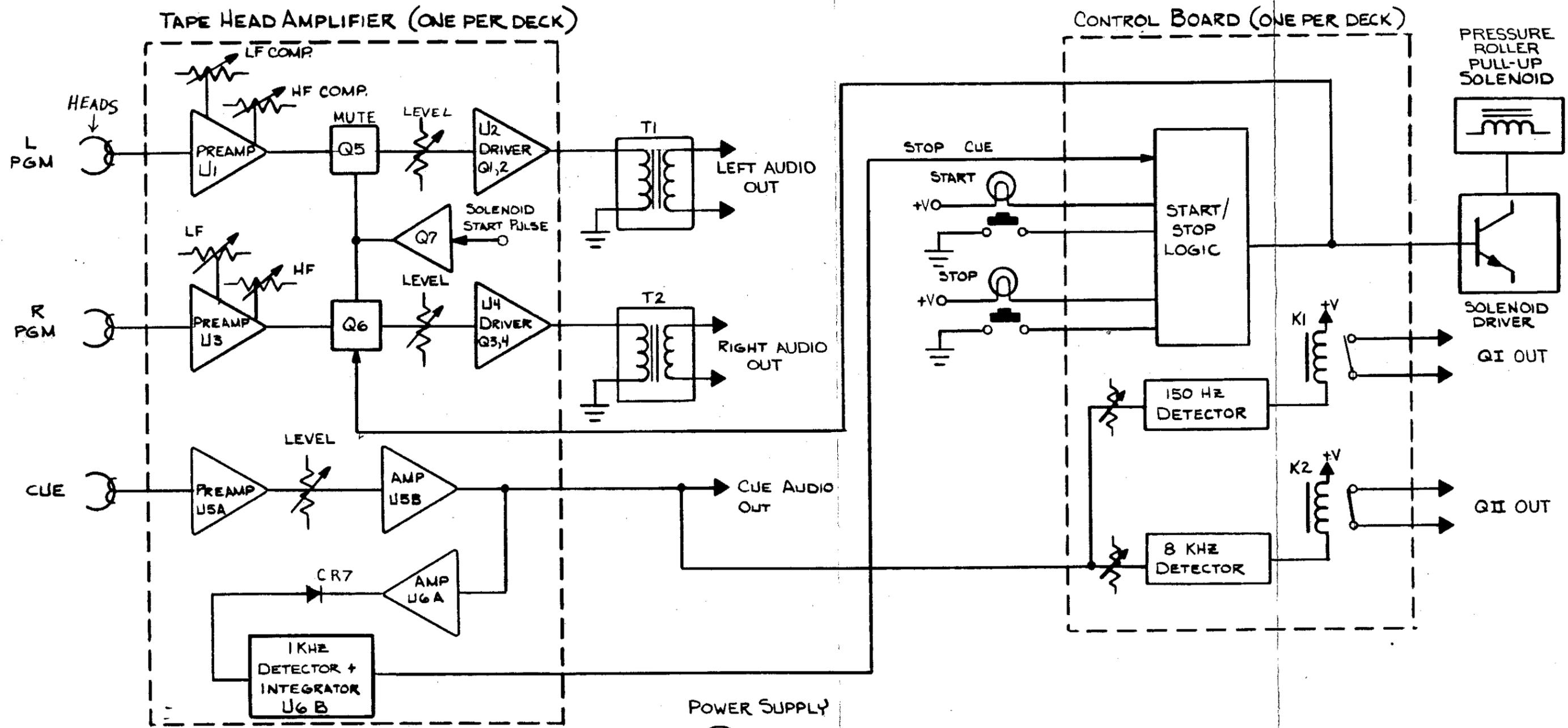
3.11 Controlled by the solenoid drive signal generated on the logic control circuit board, FET Q1 passes audio only when the associated deck transport tape is running. When the transport is in the START mode, the solenoid drive logic level is applied to the base of controlling transistor, Q11, and biases the base positive. This causes Q11 to conduct, driving its collector to a near-ground potential and turning on Q1 and Q8.

3.12 After application to potentiometer R1 for level control, the audio is routed to the non-inverting input (terminal 3) of operational amplifier U4 which drives complimentary transistor output stages Q2 and Q4. The ratio of R11 and R13 fixes the gain of the stage, while C12 establishes frequency compensation. Temperature stabilizing diodes CR1 and CR2 shift the bias of drivers Q4 and Q2 with temperature changes to maintain stable operation over a wide range of ambient temperature. Q3 and Q5 are current limiting transistors which prevent output transistor damage if the output terminals become shorted.

3.13 To provide a balanced-line output for each audio signal, the left and right channel output-driver stages are dc coupled to individual transformers on the rear panel circuit board.

3.14 Cue Amplifier Circuit Details

3.15 The cue amplifier channel provides a flat frequency response to the full range of cue tones. The circuit consists of an equalized preamplifier (U3A), level control potentiometer R50, and output amplifier U5B.



FUNCTIONAL DIAGRAM,
ELECTRONICS

5000 SERIES A

FIGURE 3-1
25/26

This cue-channel is routed as follows:

- (1) via terminal 4 to the output connector on the rear of the machine and
- (2) to two pole active band-pass filter U6A which is tuned to 1 kHz.

3.16 U6A extracts the 1kHz tone from the cue-signal and applies the tone to CR6. Application of the negative dc output from CR6 to terminal 6 of integrator U6B provides a positive output drive when the 1kHz tone is present at the rectifier input. This logic output is routed to the control circuit board and stops the tape transport when a 1kHz tone is sensed in the corresponding cue channel.

3.17 Control Circuit Board Details

3.18 One control circuit board is required for each deck of the 5500 cartridge machine. Refer to the drawings in section 5 for the following discussion. Each schematic diagram shows the logic status of the control circuit board under initial conditions, that is, no cartridge loaded into the transport deck. The "0" or "1" figures shown at the various integrated circuit terminals indicate the logic status of that particular point under this static condition.

3.19 Standard circuitry on the control circuit board provides:

- (1) START and STOP action for the associated tape transport deck
- (2) logic signals that activate front panel status lights
- (3) START and STOP verify signals
- (4) (optional) sensing and control logic for the secondary and tertiary cue tones.

3.20 The control circuit responds to the START and STOP switches, the READY micro-switch, and the 1kHz tone intergrator on the head amplifier.

3.21 When a cartridge is loaded, the inserted cartridge opens the READY micro switch. The control circuit then lights the LED on the rear of the board and the READY light in the STOP pushbutton on the front panel. Diode CR8 permits the same two indicator lights to display the presence of a Cue II tone by lighting both to full brightness when the Cue II tone is present. Diode CR4 provides isolation, while zener CR3 limits the dc voltage to the indicators to 20 volts. Q2 provides a STOP/VERIFY current sink to the rear panel connectors for use in applications requiring external status sensing (automation). The remaining other logic elements remain unchanged when a cartridge is loaded.

3.22 When the START pushbutton of a loaded deck is depressed, the logic status of U1A and U1B changes, causing the deactivation of all STOP/READY indicators and the STOP/VERIFY output current sink. Integrated circuits U1C, U2C, and U2D also undergo logic changes activating the solenoid, the START/VERIFY signal, the START LED, and and the front panel START indicator.

3.23 U2C and U1D combine in a circuit that presets the cue-STOP. When a cartridge is started, U1D is set up to stop the tape motion when a decoded 1kHz signal is detected by U1D (at terminal 12). R1 and C1 delay U1D for about 3 seconds after the deck starts to insure that a previous stop cue-tone will not stop a newly started cartridge. At the end of the recorded message, the 1kHz tone will trigger a CUE/STOP signal in the control circuit, stopping the tape.

3.24 Alternately, depressing the front-panel STOP pushbutton will also stop the running tape, but will trigger a STOP/VERIFY signal. While a tape is running, pushing the STOP switch changes the logic state of U2A, which stops the tape and turns on all STOP indicator lights. This also provides a STOP/VERIFY signal to the output connector for external status sensing.

3.25 Separate controls allow level adjustment of each of the three individual cue tones as required. The three tones are level adjusted by:

- (1) Primary (1kHz) cue level (R50),
- (2) Secondary (8kHz) cue level (R25), and
- (3) Tertiary (150Hz) cue level (R24).

3.26 Power Supply

3.27 The 5500A power supply consists of a dual secondary power transformer, a positive 28 Vdc regulator, and a bipolar 15 volt source comprising a -15 Vdc regulator and a +15 Vdc regulator (refer to the power supply schematic diagram in Section 5).

3.28 The +28 Vdc pass transistor is located off the power supply circuit board and is controlled by regulator U1. The 28 Vdc level is adjustable with potentiometer R21.

3.29 Transistors Q1 and Q2 are the +15 Vdc regulators and are controlled by zener diodes CR9 and CR10, respectively. The +15 volt regulator is supplied from the +28 Vdc regulated source and the -15 volt regulator is supplied from a separate supply obtained from the power transformer.

3.30 The bipolar supply configuration provides low crosstalk in the head amplifier, high noise immunity in the control logic, and permits the use of dc coupling in the head preamplifiers and output amplifier stages.

SECTION 4

INSTALLATION AND OPERATION

4.1 Installation

Rack Mounting: The standard 5500 machine is packaged for table top mounting, however, a full complement of accessories is available from Broadcast Electronics for rack mounting the units. Three 5500's may be mounted side-by-side in a standard EIA rack. Single and dual unit rack mounting packages are also available. Rack space required is 10 rack units (17.5 inches) for up to three units. Blank filler panels are available for filling unused areas.

The top and bottom covers of the 5500 are vented to allow a free flow of air through the machine from bottom to top. Do not restrict these vents. Do not place objects on the top of the machine that will restrict the air flow.

4.2 AC Power. The standard 5500 operates on 60Hz AC power at either 105 to 225 VAC or 210 to 230 VAC single phase, via internal strapping of the power transformer primary. Units for 50Hz operation over the same voltage ranges are optionally available. Operating voltage requirements for each machine are indicated on the rear panel identification plate. Power consumption is 120 watts.

4.3 External Connections. Except for the interconnections between the 5500 and its companion recorder, all input, output, remote control, and other connections between the 5500 and external equipment are made via five, one for each deck, 25 pin connectors located on the rear panel of the machine, J101, J201, J301, J401 and J501. A 6-pin Jones connector, also on the 5500 rear panel, interconnects the unit with the optional recorder for deck No. 5.

When the 5500 leaves the factory, the audio output transformers are connected for 600 ohms balanced output. If unbalanced operation is desired, connect the audio output terminal marked (Fig. 4-1) to the shield of the interconnecting audio cable.

To ensure proper grounding and to prevent the formation of ground loops, the shield should be connected only to the console or remote end of the cable, in most cases. If ground loops persist with this arrangement, try moving the ground connection to the mid-section of the cable or to the other end.

A special rear panel ground terminal is provided on the 5500. Connect this terminal to system ground via an appropriately heavy copper conductor or grounding strip.

4.4 Recorder Interconnections. Interconnecting cables between the 5500 and the recorder are supplied with the recorder option. See Dwg. No. 906-5117 in the Recorder manual for inter cabling details. Note that Deck 5 connector mates with the recorder plug and that external control connections to this deck are made via a 24 pin Cinch connector on the recorder. Audio connections are made to the 25 pin cinch recorder connector/plug that connects the recorder and J501. Details of the recorder are covered in the recorder manual.

Switcher. The SW5E muting switcher and its inter-connection with the 5500 are described in the SW5E instruction manual.

4.5 Operation

1. Turn the machine power ON via the rear-panel toggle switch. This action energizes the motor and starts the capstan drive shaft turning.

2. Load a pre-recorded cartridge into one of the deck-ports. The STOP switch light corresponding to that deck will turn ON, indicating that the deck is in the READY mode.

3. Momentarily press the START pushbutton for the loaded deck. The cartridge will play, the START pushbutton will light, the STOP pushbutton will turn OFF, and the deck-side light for the playing deck will turn ON. The tape will continue to run until either the STOP button is pressed or until a stop cue-tone is sensed.

When the cartridge stops, the START light will turn OFF and the STOP light will illuminate. Removing the cartridge from the deck turns the STOP light off.

SECTION 5

MAINTENANCE AND ALIGNMENT

5.1 General Maintenance Information:

Warning: Always disconnect the main AC power from the machine before removing the covers, the decks, printed circuit boards, or other components. Caution: Be certain that the large electrolytic capacitors on the power supply section and the motor capacitor on the main chassis are fully discharged before attempting maintenance inside the unit. Do Not remove or insert PC boards while power is supplied to the machine; turn the unit off or disconnect the main power cord first.

Component Location and Identification. Locations of circuit components are shown in the pictorial diagram accompanying the schematic drawings and parts lists. Resistance values are indicated by the standard color code, and in some cases have an additional color band to indicate military reliability standards. Unfortunately, all manufacturers are not consistent in coding capacitor values and several systems will be encountered. For an explanation of the various coding systems for capacitors, diodes, and other components, consult the ITT "Reference Data for Radio Engineers" or a similar reference.

When replacing components, check the parts list and schematic to determine if exact replacement is required. In some cases, component types and/or values are critical. Incorrect substitutions in some cases may result in improper performance of the equipment.

Removing components from plated-through holes in printed boards may be more difficult than from standard boards because of solder "wicking" effects. Use only sufficient heat and tension to remove the components. It may be easier in some cases to cut the component from the top side of the board and remove the leads separately.

Care should be exercised in replacing integrated circuits, as the pins are quite delicate. All IC's should be oriented so that the notch on one end of the IC is aligned with the notch in the socket. To insert an in-line IC, place one row of pins lightly in the socket and use a straight edge to push the other row of pins into alignment with the socket, then press firmly on the IC to seat it properly. Do Not attempt to remove an IC with the fingers - use an IC puller or a soldering aid to lightly pry the IC from the socket.

In replacing defective "soldered-in" IC's, first cut the IC from the pins on the component side of the board and then carefully remove the pins and clean individual holes before attempting to insert a replacement. In soldering the pins of the replacement units, heat and solder should be applied quickly, but sufficiently, to avoid overheating the IC.

DO NOT USE EXCESSIVE HEAT ON PC BOARDS AND COMPONENTS. USE A LOW HEAT SOLDERING IRON, NOT EXCEEDING 30 WATTS. USE ONLY A FINE GAUGE (NO.20), ROSIN CORE SOLDER.

5.2 Test Equipment

List of Test and Maintenance Equipment:

Multimeter: 20,000 ohms/volt or better, Simpson Model 260 or equivalent.

Oscilloscope: (any general purpose)

PC Board Extender: Broadcast Electronics, Stock No. 919-1806.

Tape Guide Adjustment Block: Broadcast Electronics, Stock No. 836-0004.

Set of Allen Wrenches: Supplied with machine.

Head Demagnetizer: Broadcast Electronics Model R-2015 (Stock No. 820-0040).

Cleaning Fluid: Broadcast Electronics BE-903.

Test Tapes: Available from Broadcast Electronics.

Set of Standard Electronics Hand Tools.

WARNING: DISCONNECT THE MAIN AC POWER FROM THE MACHINE BEFORE REMOVING COVERS OR BEFORE OPENING FRONT PANEL.

5.3 Deck Access and Removal

1. Remove the grilled upper machine cover held on by four phillips head screws, one near each corner. This provides access to the upper deck, Deck No. 1.

2. Free the front panel to swivel down on its hinged bottom edge by removing the two allen screws located near the top edge of the panel. Swing the front panel down, placing a small object under the near edge of the panel to prevent the START/STOP switches from bearing on the work bench. A small roll of electrical tape, for example, is usually handy for this purpose.

3. Decks No. 1 thru 4 are free to travel forward when the front-panel is opened. However, the length of travel is restricted by the head leads and by the solenoid and READY micro-switch connections. Deck-plates may be pulled forward for several inches for access to lower decks and other elements of the machine. However, for complete removal of the deck-plate, the head leads should be disconnected from the Head Amplifier PC board and the solenoid microswitch connector should be removed from the mother board.

5.4 Cleaning Procedures

General. Use a soft cloth moistened with ammonia to clean finger-prints and other marks from the machine chassis and other surfaces. Remove dust from the interior with a soft brush.

Heads. Use BE-903 cleaning solution available from Broadcast Electronics. Clean heads, pressure rollers, tape path, guides and capstan at least once per day, more frequently if necessary, to remove accumulated oxide.

PC Board Connectors. Routine cleaning of printed circuit boards and connectors is not necessary; however, if visual inspection of the contacts, intermittent machine performance, or other machine performance symptoms indicate that the contacts may be dirty, they should be sprayed with an aerosol contact cleaner. Rubbing lightly with a soft pencil eraser will remove difficult spots. Exercising the connectors by inserting and removing the PC board several times, but not excessively, is effective, also. Do not use abrasive cleaners.

PC Boards. PC Boards should be carefully inspected and cleaned before returning them to service after a maintenance or repair operation. This procedure is particularly necessary if soldering work has been performed on the board.

Clean solder flux from the board with isopropyl alcohol. Flux left on the board may cause electrical noise in the system. Finger prints and other contaminants should also be removed. Inspect the board for solder "bridges" and other possible defects before returning it to service.

5.5 Routine Maintenance.

Cartridge Maintenance. An inserted cartridge is part of the machine system; before placing a cartridge in service, check it for cleanliness, for mechanical defects and for worn tape. Do not make adjustments on the machine when using defective cartridges.

Clean cartridges with a mild detergent, giving special attention to the teflon washer and the center post. These elements should turn freely to prevent undue tension requirements on the tape. Check the pressure pads to see that they are aligned squarely with the tape.

A damaged or deformed cartridge shell can distort the tape path, adversely affecting frequency response and phasing. Check for loose corner posts, a frequent cause of distorted tape path.

Tape should be inspected for signs of damage or wear. A shiny oxide surface indicates a worn tape. Replace it. Use only graphite lubricated tape; Silicon lubricated tapes cannot stand up to the demanding requirements of tape cartridge operations.

Head and Transport Elements. Clean the heads, pressure roller, and other elements of the tape path at least daily, more often if the machine is under heavy usage. A dirty head can cause serious distortion of the audio signal. Use BE-903 cleaning fluid or isopropyl alcohol.

Demagnetize the heads frequently, about once a week. Use a SPOTMASTER or equivalent degausser, following the directions supplied with the unit.

Cartridge Clamps and Guides. An inserted cartridge is directed into the proper play or record position via the tapered right-hand cartridge guide, and held in proper position by the high tensile-strength beryllium upper clamp.

5.6 Tape Guide Adjustment

Use the SPOTMASTER Tape Guide Adjustment Block to adjust the three tape guide brackets that are attached to the tape head assemblies (See Fig. 5-4). Clean the guide block and deck-plate, slightly loosen the Phillips head screws

holding the guide brackets, and slide the guide adjustment block along the deck-plate until the protruding edge of the block just fits the upper tape-guide prong. Holding the block and the tape guide in this position, tighten the two Phillips head screws. Repeat this operation for the remaining two tape guides. While this adjustment is not required on a daily or even a weekly basis, a routine check of this parameter with the guide block is rather simple insurance of a properly adjusted tape guide.

Head Positioning Adjustments (Playback). Because of the unique arrangement of the Phase-Lok III head bracket, the only adjustment normally required for head positioning is the azimuth control. Height and zenith adjustments are usually not required unless a head replacement is being made, and this procedure is described under the Head Replacement section. However, a quick check of proper head height position may be made with the Tape Guide adjustment block. Clean the deck plate surface in front of the head assembly area and the bottom surface of the adjustment block, place the block on the deck as shown in Fig. 5-4, slide the block into the area of the head pole-pieces, and note the position of the pole-pieces with respect to the protruding end of the block. If the head height is correctly adjusted, the protruding section of the block will evenly align with the pole pieces. Also, the zenith adjustment should be checked as indicated in the Zenith Adjustment section. Do not adjust these parameters, however, unless the checking indications show that adjustments are required.

5.7 Azimuth Adjustment.

Before making azimuth adjustments, clean the head assembly, the tape path, and the pressure roller. Check the pressure roller adjustment to see that it contacts the capstan drive-shaft in a position parallel to the shaft, as described under section 5.16 of this manual. Using the tape guide adjustment block, check the tape guides on the head assemblies for proper positioning. The Azimuth adjustment screw is shown in Figure 5-1, on the next page.

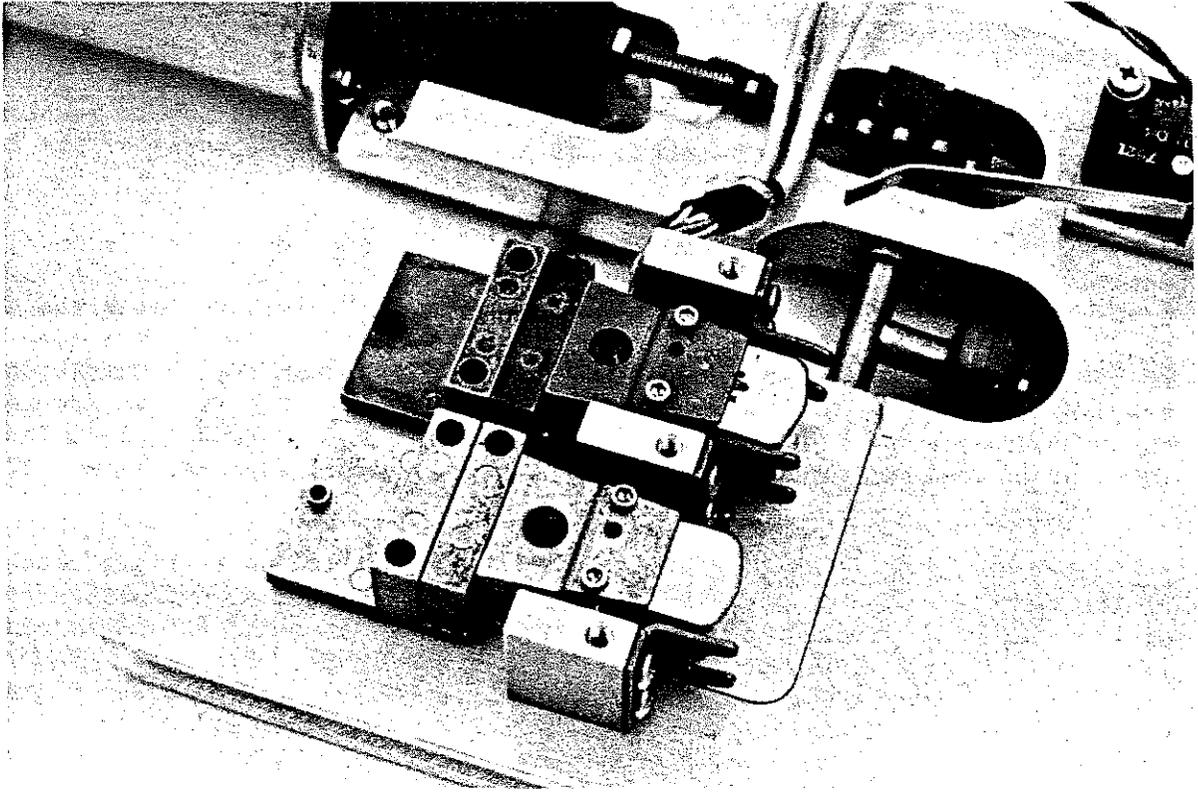


FIGURE 5-1
HEAD ADJUSTMENT SCREWS

Insert a test cartridge* into the port of the deck under adjustment, start the cartridge, and observe the machine audio output on a VU meter while listening to the audio on a speaker system. Follow the adjustment instructions given on the test tape, setting the Azimuth control for maximum output level at 15kHz. The 1/16 inch Allen wrench required for this adjustment is supplied with the machine. Remove and re-insert the test cartridge in the machine. Check and adjust the phase response as indicated in the paragraph below.

*Standard NAB alignment tapes are available from Broadcast Electronics.

5.8 Stereo Phase Response. Before making this adjustment, set playback Equalization as outlined in Section 5.18 of this manual.

The Azimuth adjustment should be completed as outlined in the section above, and then trimmed to equalize the phase or delay responses of the Left and Right channels as follows:

Connect the Left channel audio output of the machine to the Vertical deflection channel of an oscilloscope and the Right channel output to the scope Horizontal channel, as shown in Figure 5-2. (Note: To check the phase response difference of the oscilloscope H and V channels, apply the same signal to the H and V channels and note the resultant Lissajous figure displayed on the scope. Matched phase response characteristics between the two channels of the oscilloscope will be indicated by an approximate straight line on the scope face, at an angle of 45 degrees if the H and V channels produce equal deflection amplitudes).

With the Left channel of the machine connected to the Vertical channel of the oscilloscope and the Right channel to the Horizontal deflection channel of the scope, play back the test tape and note the shape of the Lissajous figures displayed on the scope at both 400Hz and 15kHz. See figure 5-2 for an indication of the relative phase relationships between the Left and Right channels for a given Lissajous pattern. Since an Azimuth adjustment could produce a phase difference of 360 degrees at 15kHz, a serious phase error that would not be detectable with the 15kHz tone alone, a mid-frequency tone in the range of 400Hz or so is required to complete the indication.

Trim the Azimuth adjustment for best phase response (minimum phase angle) at both the 400Hz and the 15kHz frequencies. Remove and reinsert the cartridge and perform the phasing test several times, readjusting for minimum phase difference, if necessary.

5.9 Solenoid Replacement

Remove the affected deck from the machine as required, either Deck 1, 2, 3 or 4. Deck 5 is not removable. (1) Disconnect the two solenoid leads from the plug-in connector housing. (2) Free the cable from the deck by unthreading it through the openings in the deck. (3) Turn the deck bottom side up, locate the junction of the solenoid chain and the solenoid tension spring. Uncouple the spring from the chain and allow the chain to fall through the opening in the deck to the top side. (4) Leave the deck bottom side up and remove the two large screws that hold the solenoid mounting bracket and solenoid assembly to the deck. Carefully remove the solenoid plunger and chain assembly from the deck. (5) Remove the plunger from the solenoid. (6) Note the chain and screw assembly which holds the chain to the plunger. Unscrew the plunger from this assembly. (7) Screw the new plunger to the chain assembly and insert this plunger into the solenoid. Mount the new solenoid and mounting bracket to the deck plate with the two screws previously removed. Turn the deck over, bringing top side up. The plunger should move freely within the solenoid. (8) Thread the chain through the opening in the deck in its previous position, so that the small pin emanating from the pressure roller drive shaft assembly threads through the eighth link opening in the chain. Hold the chain and pressure roller assembly in this position and invert the deck. Maintain slight tension on the chain and recouple the solenoid tension spring to the last link in the chain. Be sure that the end of the spring is completely inserted through the eyelet in the chain. Check the mounting bracket retaining screws for tightness. Turn the deck plate top side up. Check the plunger for free movement within the solenoid for the full extent of its travel. Note that nearly full solenoid plunger action brings the pressure roller to a vertical position and that the guide pin in the pressure roller shaft is in the eighth link opening of the chain. (9) Insert the terminated leads from the new solenoid into the connector housing. (10) The solenoid chain retaining screw which connects the chain to the plunger must now be adjusted according to Section 5.17 of this manual. Return the deck to the machine; be sure that the deck is inserted into its proper position in the machine. Transport decks are numbered on the front edge. They should always be returned to their assigned position in the machine.

5.10 Solenoid Speed Adjustment

The rate at which the solenoid plunger is pulled in or released is controlled by the Solenoid Speed Adjustment, a spring-loaded screw located on the rear end plate of the solenoid cylinder. The rate of air passage through the pressure release valve is also determined by the setting of this adjustment, establishing the level of acoustical noise generated by solenoid action. This adjustment is set at the factory for a moderate balance between solenoid operating rate and noise level, and generally does not need readjustment. If desired, however, it may be reset to suit the individual installation. The procedure is as follows:

Remove AC power from the machine, open the front panel and slide the deck partially forward to gain access to the adjustment screw (applies to decks one through four). Deck five is accessible by removing the bottom machine cover). Turn the screw about 1/4 turn clockwise or counter-clockwise as required. Clockwise rotation of the screw will increase solenoid action time and counter-clockwise motion will reduce this time. Noise will increase with faster solenoid action. Replace the deck, apply power to the machine, and test operate the solenoid with a cartridge in the machine. Readjust if necessary. After final adjustment is reached, secure the decks with the

front panel, check for proper engagement between pressure roller and capstan drive-shaft (Section 5-16) and restore the machine to operating condition.

5.11 Solenoid Chain Replacement

Replacement of solenoid chain is best made by removing the deck from the machine. In the case of Deck 5, however, Decks 1 thru 4 should be removed and the bottom plate should be taken off to provide access to the parts concerned. With the appropriate deck freed from the machine, observe the end of the chain that joins the solenoid adjustment screw to the plunger. One side of the link at this junction will contain a long U shaped locking bracket which holds the master link of the chain in place. Remove this locking bracket and the master link and remove the chain from the adjustment screw. Turning the deck plate over, remove the solenoid tension spring from the other end of the chain. Note the difference between the two ends of the chain just removed. Attach the tension spring to the new chain at the proper end as noted above. Place the free end of the chain through the hole in the deck plate and attach it to the free end of the solenoid adjustment screw with the master link and U-bracket. Make sure that the pin that penetrates the chain for pressure roller drive is located at the eighth opening of the chain from the adjustment screw. Full accuation of the solenoid when this pin is in the proper position brings the pressure roller slightly past a vertical position. Replace the deck in the machine and check the alignment of the pressure roller with the capstan drive shaft and adjust, if necessary, as outlined in Section 5.16. Set the solenoid plunger adjustment as outlined in Section 5.17. Replace machine covers, AC power and restore the system to normal operation.

5.12 Head Replacement

To replace a tape head on Decks No. 1 thru 4, remove the affected deck from the machine. If No. 5 deck head is to be replaced, access to this head may be gained by removing decks 1 thru 4 from the machine and taking off the machine top cover. Follow the procedure listed below (see figures 3-6 and 5-1 for component locations).

1. Remove the beryllium-copper cartridge clamp.
2. Remove the two tape-head holding screws, remove the head assembly from its mounting bracket, and unplug the leads at the rear of the head.
3. Replace the head-lead plugs onto the new head unit according to the connections schedule (Drawing No. 906-5109).
4. Seat the new head in the head mounting clamp and dress the leads neatly between the two head assemblies as shown in Figure 5-1. Holding the head firmly against the clamp backstops and laterally centered in the clamp, tighten the clamp holding screws with moderate pressure. Check the head to see that it is firmly held in the clamp.

Before replacing the cartridge clamp, check for proper head HEIGHT positioning as indicated below.

5. Clean the deck plate area in front of the head and the bottom surface of the Tape Guide Adjustment Block. Place the block on the deck plate and carefully slide it towards the head pole pieces. Note the height of the pole pieces relative to the protruding end of the block.

If the pole pieces are accurately aligned with the protruding section of the block, that is if the top of the upper pole piece is even with the top edge of the protruding portion of the block and the bottom edge of the lower pole is even with the bottom edge of the block, the head height is correct and adjustment is not required. Proceed to ZENITH adjustment, step 2 below. If not, perform step 1.

5.13 Height and Zenith Adjustment.

1. Height adjustment. Set the front height adjustment screw to bring the top edge of the upper pole piece even with the top edge of the protruding section of the block.
2. Zenith adjustment. Using a machinists square, set the Zenith adjustment screw to bring the surface of the pole pieces perpendicular to the upper deck surface. Check for proper height. If further height adjustments are required, set the front and back (zenith) screws by equal increments to bring head height into proper adjustment while holding the proper zenith adjustment. Make a final check of both height and zenith.
3. Replace the cartridge clamp, return the deck to the machine, replace machine covers, and restore machine to operating condition.
4. Perform the AZIMUTH adjustment as outlined in Section 5.7.

The machine is now ready for service.

5.14 Pressure Roller Replacement

The removal and replacement of pressure rollers in Decks 1 thru 5, are identical. However, final procedure for adjustment of the interface between the pressure roller surface and the capstan drive shaft surface is the same for Decks 1 thru 4 but different for Deck 5. This alignment procedure is outlined in Section 5.16, under Tape Transport Adjustment. That is, the deck end stops must be set to allow the deck plate to seat into the machine the exact distance required to bring the pressure roller surface parallel to the capstan drive shaft surface when these two elements are brought into physical contact. This procedure is described in Section 5.16. To replace the pressure roller, however, use a small pair of needle nose pliers to remove the E ring from the top of the pressure roller, being careful to hold onto both the metal washer and the nylon washer which fit on the shaft. Remove these elements and the roller from the pressure roller shaft. Place the metal washer, the new roller, and the nylon washer on the shaft, in that order. Then seat the E ring on the end of the shaft. Adjust the transport alignment according to Section 5.16.

5.15 Power Transformer Replacement

Disconnect the AC power cord, turn the 5500 bottom side up, remove the bottom plate, and unplug the power transformer from the power supply PC board. Remove the four screws that hold the transformer to the side panel of the machine. Remove lower two screws first, top two screws last. The transformer will fall free of the machine. Install the replacement transformer and connector assembly. Note that the transformer is mounted so that the leads are towards the top of the machine. Replace the connector and restore the bottom cover to the machine.

5.16 Motor Replacement and Transport Alignment

NOTE: CARE MUST BE USED IN HANDLING AND STORING MOTORS TO AVOID DAMAGE TO THE BEARINGS. STORE SPARE MOTORS IN THE ORIGINAL PACKING MATERIAL AND HANDLE THE MOTOR BY THE CASE, NEVER BY THE SHAFT. PROTECT THE MOTOR FROM SHARP BLOWS AND ROUGH HANDLING.

To remove the motor, disconnect the AC power, open the front panel, and remove Decks 1 thru 4. Remove the top and bottom covers of the machine and place the unit on its right side. Unplug the motor connector and remove the two white leads that connect to the motor capacitor. Note the two large Phillips head screws on the top side of the deck that hold the motor mounting block to the deck. While holding the motor with one hand, remove these two screws from the deck. Gently remove the motor, taking extra precaution to avoid damage to the drive shaft as it comes through the opening in deck No. 5. Remount the replacement motor with the two screws previously removed.

Alignment of the motor and the capstan drive shaft involves positioning these two elements so that the pressure roller will make even contact from top to bottom along the surface area contacting the drive shaft. This insures an even distribution of pressure between the roller and the shaft as tape is fed through by the capstan. Improper alignment will direct the tape in either an upward or downward direction, resulting in improper tape flow past the RECORD/PLAYBACK heads. Align deck No. 5 before returning decks 1 thru 4 to the machine. Turn the 5500 to its normal operating position, open the front panel, unplug the ribbon connection and let the front swing free. Lightly loosen the two motor mounting screws and the two Allen screws which hold the upper bearing in position. These four screws should be just loose enough to permit the motor and the shaft assembly to move freely in the machine as a single unit.

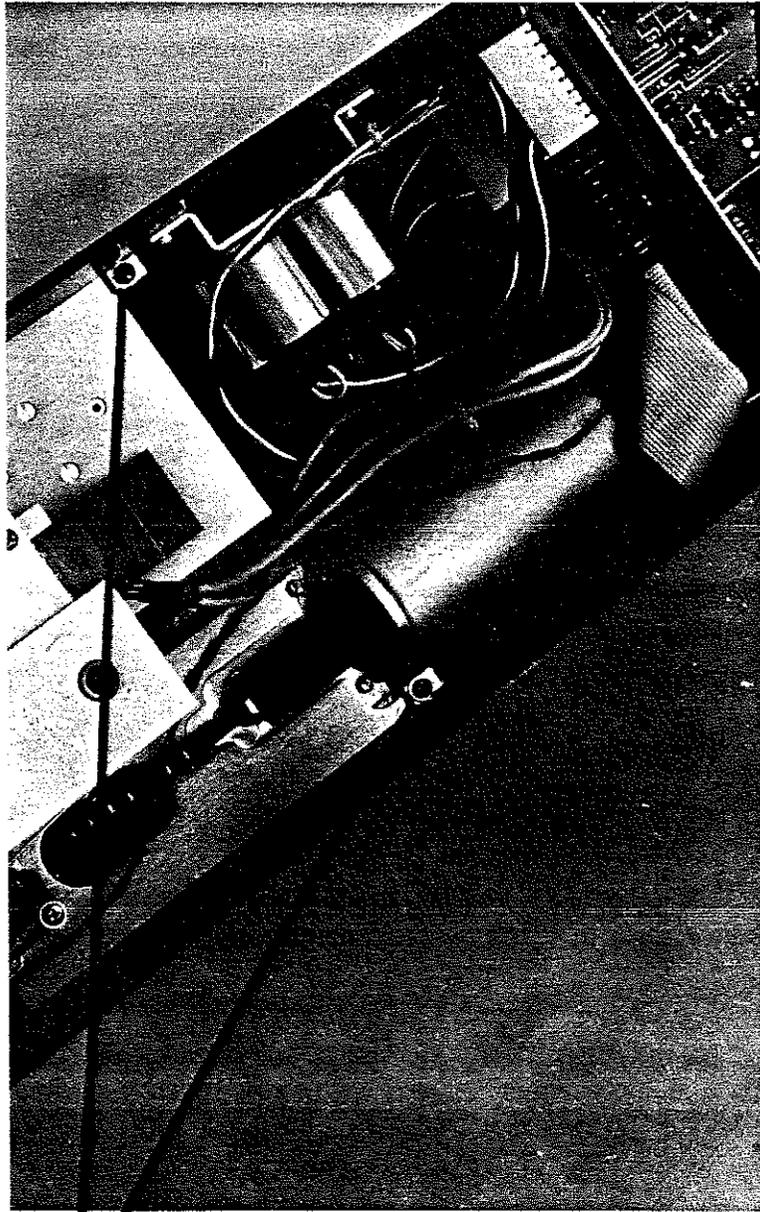
When the system is properly adjusted, the surface of the pressure roller will be parallel to the capstan shaft when these two elements are brought into contact by the solenoid. This condition can best be seen when shining a light into the machine in the area of the solenoid chain and observing the spacing between the pressure roller surface and the drive shaft as the solenoid is brought into play position. A lamp placed on top of the machine over the solenoid chain assembly is very adequate for this adjustment.

Start the deck while holding the READY switch, which will bring the pressure roller into contact with the drive shaft. Note the air gap between the roller and the shaft as these two elements come into contact. Look for parallelism as the gap closes. Support the weight of the motor and slide the motor drive shaft assembly fore and aft until these surfaces are parallel at the point of closure. Tighten the two screws and again check for parallelism at point of contact. This completes adjustment for Deck No. 5.

Replace Deck 4 and proceed with alignment of this element. Note the two end-stops on the rear end of the mounting bars that hold the deck in the machine. These stops bear against the deck plate when it is inserted into the machine and hold this deck in proper fore and aft position for correct alignment of the pressure roller with respect to the capstan drive shaft. Again, the roller surface should be parallel to the capstan shaft when they make contact.

Insert the deck into the machine and fasten the holding screw. Start the deck. This will bring the pressure roller into contact with the capstan. If contact is not made with these two surfaces in a parallel relationship as in Deck No. 5 adjustments, the end stops require adjustment. Adjust the two stops together, either fore or aft as required, to bring the pressure roller and capstan drive shaft into a parallel condition when the deck is in the full back position. Make sure that both end stops are acting as deck travel stops, bearing against the bulkhead plate when the deck is in the final position in the machine. Hold the deck plate firmly in position and recheck the pressure roller and drive shaft for parallelism. Note the two small Allen screws on the front edge of the deck plate. These should be adjusted to bear firmly on the closed front plate, preventing any fore and aft motion of the deck plate during machine operation. Make a final check of this adjustment on Decks 1, 2, 3, and 4 after all decks have been restored to the machine with proper end-stop positions.

Replace and adjust Deck No's 3, 2, and 1 according to the procedure outlined for Deck No. 4. This completes Motor Replacement and Transport Alignment. However, solenoid travel for each deck should be adjusted as outlined in Section 5-17 before putting the machine into operation.



Deck Positioning
Screws

FIGURE 5-3
REAR EDGE, TRANSPORT DECK SHOWING
DECK POSITIONING, SCREWS AND LOCKING SCREW ASSEMBLY

5.17 SOLENOID PLUNGER ADJUSTMENT

Solenoid plunger travel is determined by the adjustment screw which links the plunger to the solenoid chain. The pressure roller against the capstan drive shaft just prior to the plunger limit of travel.

With no cartridge in the machine hold the READY microswitch open and depress the START switch for the deck to be adjusted. The solenoid will pull the pressure roller into the drive shaft. Turn the plunger clockwise in half-turn increments while alternately depressing the START switch until the plunger hitting "bottom" is heard with solenoid action. Now turn the plunger counterclockwise one-half turn beyond the point that the noise disappears and tighten the lock nut snugly against the end of the plunger.

5.18 UPPER MOTOR SHAFT BEARING REPLACEMENT

If the upper motor shaft bearing is replaced in the field, the new bearing must be secured in place on the motor shaft with an adhesive such as Loctite Brand 85-21 Bearing Mount/B Adhesive-Sealant (P/N 700-0026).

CAUTION

ENSURE THE SEALANT IS APPLIED TO THE MOTOR SHAFT/BEARING AREA ONLY AND DOES NOT ENTER THE BALL BEARING RACE.

5.19 PROCEDURE

- A. Cover the bearing face.
- B. Apply a portion of a single drop of the bearing sealant to the motor shaft just above the bearing. Capillary action will allow even distribution of the sealant.
- C. Allow the sealant to dry.

5.20 ELECTRONIC ADJUSTMENT

CAUTION

BEFORE ADJUSTING THE SYSTEM ELECTRONICS, CLEAN THE HEADS. ENSURE THAT THE HEADS ARE DEMAGNETIZED AND PROPERLY ALIGNED.

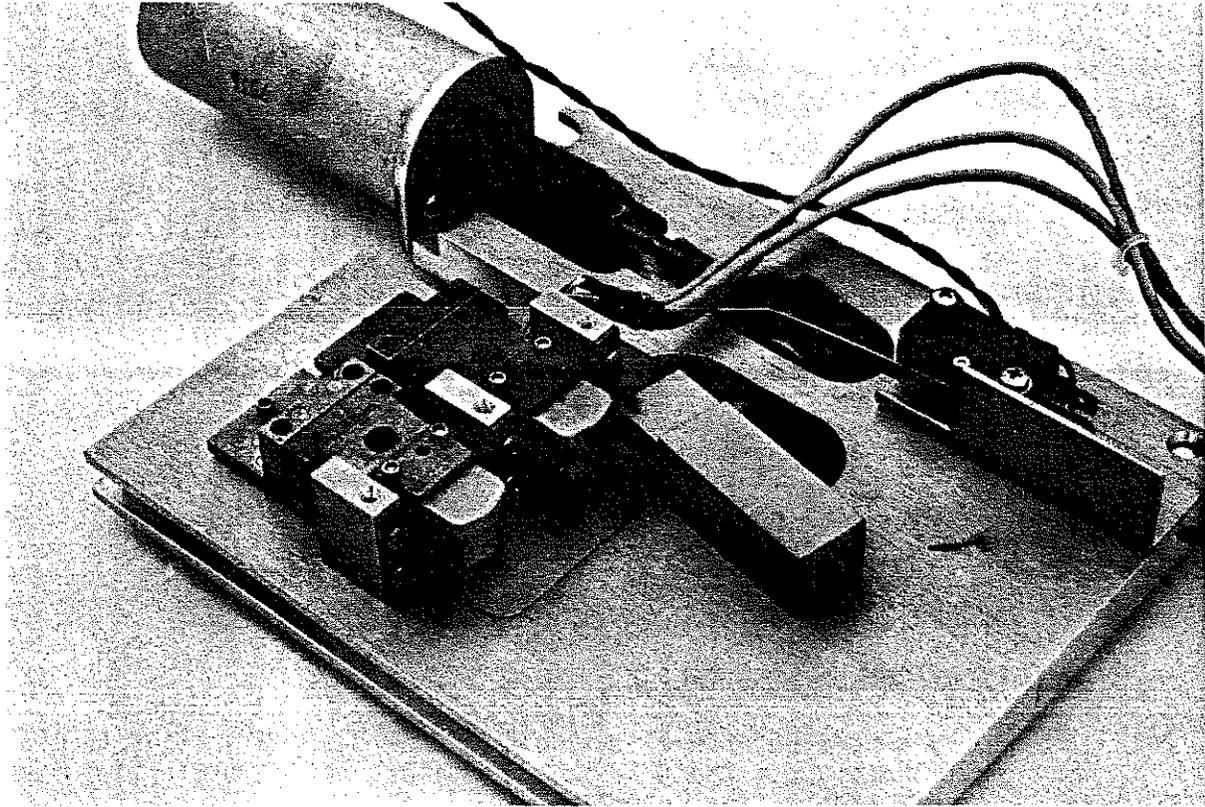


FIGURE 5-4
TAPE GUIDE ADJUSTMENT

NOTE

THE 5500 IS AVAILABLE FOR OPERATION ON EITHER NAB, IEC, OR CCIR STANDARDS. USE A TEST TAPE RECORDED TO THE APPROPRIATE STANDARDS FOR THE ADJUSTMENTS DESCRIBED BELOW. FOLLOW THE INSTRUCTIONS RECORDED ON THE TEST TAPE.

Output Level. Two output level controls are available on the stereo version of the 5500, the Left channel and the Right channel. Play back the section of the test tape corresponding to the Operating Reference Level and adjust the L LEVEL and the R LEVEL controls on the Head Amplifier PC Board for the desired output level. On mono versions of the machine, only the left channel is used.

Equalization. Reproduce the Frequency Response series of tones from the test tape. Adjust the LF control(s) to bring the level of the 50Hz tone to within -1 to 0dB of the reference tone level. Adjust the HF control to bring the 12kHz tone to the same level as the reference tone.

Cue Sensitivity. The cue tone sensors are adjusted to trip at a point 6dB below the NAB standard level.

5.21 REPLACEMENT PARTS

5.22 The following parts list provides a description and part number for all electrical and selected mechanical components in the 5500A series cartridge machines. All parts are indexed by assembly number and listed by schematic diagram component reference designator when available (see Table 5-1).

Table 5-1. Replacement Parts List Index

TABLE	DESCRIPTION	PART NUMBER
5-2	Chassis Mounted Components	906-5501A/ -5502A/ -5503A/ -5504A
5-3	Tape Head Amplifier Printed Circuit Board	914-1830
5-4	Control Printed Circuit Board Assembly, (no Cue Tones)	914-1831
5-5	Control Printed Circuit Board Assembly, (with Cue Tones)	914-1841
5-6	Tape Head Amplifier Printed Circuit Board Assembly, Stereophonic	914-1840

Table 5-2. Chassis Mounted Components
906-5501A/5502A/-5503A/-5504A (sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
-----	Connector, Female, 4-Pin, AMP	418-0240	7
-----	Connector, Female, 2-Pin AMP	418-0701	1
-----	Connector, Housing, 12-Pin AMP	418-1271	1
-----	Connector, Housing, 8-Pin	418-3224	5
-----	Contact Pins, AMP	417-0053	20
-----	Connector, Female, 25-Pin	418-3221	5
-----	Connector, Pins, Female, Molex	417-0221	55
-----	Connector, Header, Dual 13-Pin	417-2600	1
-----	Connector, Header, Receptacle, Ribbon Cable, 26-Pin	418-2600	7
-----	Connector, Male, 25-Pin AMP	418-3219	5
-----	Connector, Pins	418-3225	20
-----	Connector, Female, 6-Pin, AMP	418-0670	3
-----	Socket, Transistor, TO-3	417-0298	1
-----	Insulator, TO-3	418-0010	1
-----	Transistor, Power, 2N3055, TO-3, NPN, Silicon	219-3055	1
-----	Motor, 117V AC, 60 Hz, 7.5 IPS	382-1511	1
-----	Capacitor, Motor Start, 0.95 uF, 300 VAC	029-1075	1
-----	Transformer: Power Dual Primary: 105-123 Vac, 50/60 Hz Secondary: 28 V at 2.5 Amperes 22V at 0.3 Amperes	376-7660	1
-----	Head, 2 track, Monaural, Model LMP	252-0017	5
-----	Head, Dummy	407-0001	5
-----	Terminal, Crimp, Tape Head Disconnect	417-0160	30
-----	Bearing, Ball	442-0006	1
-----	Fuse Holder, 3 AG	415-2012	1
-----	Fuse, 1.5 Ampere, Slow-Blow, 3 AG	334-0150	1
-----	Switch, Toggle, SPST, 3 Ampere, 250 Vac	348-8280	1
-----	Transformer, Audio Output, 600 ohm 1:1	371-0005	1
-----	Capacitor, Electrolytic, 4.7 uF $\pm 10\%$, 35 V Tantalum	064-4763	5
-----	Resistor, 1 k Ohm $\pm 5\%$, 1/4 W	100-1043	10
-----	Switch Cap, Green	343-0018	5

Table 5-2. Cha-sis Mounted Components
 906-5501A/-5502A/-5503A/5504A (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
-----	Switch, Momentary, Push-Button, SPST	343-1206	10
-----	Switch, Cap, Red	343-0013	5
-----	Lamp, Subminiature, 28 V, 0.040 Ampere	321-0327	10
-----	Rubber Foot	403-2194	4
-----	Front Panel Control Printed Circuit Board Assem.	914-1807	1
-----	Audio Output Transformer Cable Assembly	906-5131	1
-----	Deck Assembly	906-0000	1
-----	Slide Out Deck Assembly	906-5110	4
-----	Mother Board Back Plane	914-1830	5
-----	Control Circuit Board (no Cue Tones)	914-1831	5
	<u>ALTERNATE PARTS FOR 906-5502A MACHINE ONLY</u>		
-----	Control Circuit Board (with Cue Tones)	914-1841	5
	<u>ALTERNATE PARTS FOR 906-5503A MACHINE ONLY</u>		
-----	Terminal, Crimp, Tape Head Disconnect	417-0160	15
-----	Head, 4 Track Stereo, Model LSP	253-0014	5
-----	Tape Head Amplifier Circuit Board, Stereophonic	914-1840	5
	<u>ALTERNATE PARTS FOR 906-5504A MACHINE ONLY</u>		
-----	Terminal, Crimp, Tape Head Disconnect	417-0160	30
-----	Head, 4 Track Stereo, Model LSP	253-0014	5
-----	Tape Head Amplifier Circuit Board, Stereophonic	914-1840	5
-----	Control Circuit Board (with Cue Tones)	914-1841	5

Recommended Spare Parts List - 830-0077

REF. DES.	DESCRIPTION	PART NO.	QTY.
-----	Diode, Zener, 1N4739, 9.1 V \pm 10%, 1 W	200-0009	1
-----	Diode, Silicon, 1N4005, 600V, 1A	203-4005	1
-----	Diode, 1N4148, Silicon, 75 V	203-4148	10
-----	Transistor, Silicon, PNP, 1 W	211-0052	1
-----	Transistor, Small Signal, NPN, TO-18 Case	211-5816	6
-----	JFET, 2N5462, P-Channel, 40 V	212-5462	3
-----	Transistor, TIP 32A, PNP	218-0032	1
-----	Transistor, TIP 31A, PNP	219-0031	1
-----	Transistor, 2N3055, NPN, Silicon, TO-3 Case	219-3055	2
-----	Integrated Circuit, Quad 2 Input, NAND Gate CMOS Family, 14-Pin DIP	221-7400	5
-----	Integrated Circuit, Quad 2 Input, AND Gate, CMOS Family, 14-Pin DIP	221-7408	5
-----	Integrated Circuit, High Performance, Opera- tional Amplifier, 8-Pin DIP	221-7480	5
-----	Voltage Regulator, 5 V, TO-220 Case	227-7805	1
-----	Integrated Circuit, Dual Operational Amplifier, 8-Pin DIP	221-4558	4
-----	Head, LMP, 2 track, (Mono) Long-Life	252-0017	1
-----	Lamp, Subminiature, 28 V, 0.04A	321-0327	5
-----	Switch, Pushbutton, SPST, 5-100 mA	343-0012	1
-----	Pinch Roller Kit	830-0014	3
-----	Bearing, 0.315 ID, 0.860 O.D., 0.25 inches wide	442-0006	1
-----	Diode, 1N4744, Zener, 15 V, 1 W	200-0015	1
-----	Transistor, Small Signal, PNP, 2N5817, TO-18 Case	210-5817	1
-----	Bridge Rectifier, Full Wave, 4A, 50-200 V	239-0003	1
-----	Fuse, 1.5A, 3AG, Slow-Blow	334-0150	2

Table 5-3. Tape Head Amplifier Printed Circuit Board Assembly
 Monaural 914-1830 (Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
C1	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C2	Capacitor, Electrolytic, 22 uF $\pm 10\%$, 20V, Tantalum	063-2273	1
C3	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C4	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C5, C6	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C7	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C8	Capacitor, Electrolytic, 33 uF $\pm 10\%$, 35V, Tantalum	024-3335	1
C9, C10	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C11, C12	Capacitor, Disc Ceramic, 10 pF $\pm 5\%$, 1 kV, NPO	001-1014	2
C13	Capacitor, Electrolytic, 4.7 uF $\pm 10\%$, 35V, Tantalum	064-4763	1
C27	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	1
C28	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C29, C30	Capacitor, Electrolytic, 4.7 uF $\pm 10\%$, 35V, Tantalum	064-4763	2
C31	Capacitor, 0.0047 uF, 200V	032-4733	1
C32, C33	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	2
C34	Capacitor, Mylar Film, 0.001 uF $\pm 10\%$, 100V	030-1033	1
C35	Capacitor, Mylar Film, 0.01 uF, 100V	030-1053	1
C36, C37	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2

Table 5-3. Tape Head Amplifier Printed Circuit Board Assembly
Monaural 914-1830 (Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
CR1, CR2, CR5	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	3
Q1	Field Effect Transistor, Junction Type, P-Channel, 2N5462	212-5462	1
Q2, Q3	Transistor, PNP, Small Signal, Silicon, GES 5817	210-5817	2
Q4, Q5 Q11	Transistor, NPN, Small Signal, Silicon, GES 5816	211-5816	3
R1	Potentiometer, 10 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-1054	1
R2	Potentiometer, 50 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-5054	1
R3	Potentiometer, 1 Megohm $\pm 10\%$, 1/2 W, Single Turn	178-1074	1
R7	Resistor, 150 k ohm $\pm 5\%$, 1/4 W	100-1563	1
R8	Resistor, 330 ohm $\pm 5\%$, 1/4 W	100-3333	1
R9	Resistor, 270 k ohm $\pm 5\%$, 1/4 W	100-2763	1
R10	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	1
R11	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R12, R13	Resistor, 120 k ohm $\pm 5\%$, 1/4 W	100-1263	2
R14	Resistor, 1 Megohm $\pm 5\%$, 1/4 W	100-1073	1
R15	Resistor, 560 k ohm $\pm 5\%$, 1/4 W	100-5663	1
R16	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R17	Resistor, 3.9 k ohm $\pm 5\%$, 1/4 W	100-3943	1
R18, R19	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	2
R29	Resistor, 22 k ohm $\pm 5\%$, 1/4 W	100-2253	1
R34	Resistor, 270 k ohm $\pm 5\%$, 1/4 W	100-2763	1

Table 5-3. Tape Head Amplifier Printed Circuit Board Assembly
 Monaural 914-1830 (Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
R35	Resistor, 820 ohm $\pm 5\%$, 1/4 W	100-8233	1
R36	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	1
R37, R38	Resistor, 2.2 k ohm $\pm 5\%$, 1/4 W	100-2243	2
R39	Resistor, 27 k ohm $\pm 5\%$, 1/4 W	100-2753	1
R40	Resistor, 56 k ohm $\pm 5\%$, 1/4 W	100-5653	1
R41	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R42	Resistor, 220 k ohm $\pm 5\%$, 1/4 W	100-2263	1
R43	Resistor, 82 k ohm $\pm 5\%$, 1/4 W	100-8253	1
R44	Resistor, 10 k ohm $\pm 5\%$, 1/4 W	100-1053	1
R45	Resistor, 330 k ohm $\pm 5\%$, 1/4 W	100-3363	1
R46	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R47	Resistor, 3.9 k ohm $\pm 5\%$, 1/4 W	100-3943	1
R48	Resistor, 56 k ohm $\pm 5\%$, 1/4 W	100-5653	1
R49	Resistor, 120 k ohm $\pm 5\%$, 1/4 W	100-1263	1
R50	Potentiometer, 2 k ohm $\pm 10\%$, 1/2 W, Single Turn, In-Line Pins	178-2044	1
U1	Integrated Circuit, High Performance Operational Amplifier, uA748, 8 Pin DIP	221-7480	1
U3	Integrated Circuit, Dual Operational Amplifier, MC 4558 PI, 8 Pin DIP	221-4558	1
U4	Integrated Circuit, High Performance Operational Amplifier, uA748, 8 Pin DIP	221-7480	1
U6	Integrated Circuit, Dual Operational Amplifier, MC 4558 PI, 8 Pin DIP	221-4558	1

Table 5-3. Tape Head Amplifier Printed Circuit Board Assembly
 Monaural 914-1830 (Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
XU1, XU3, XU4, XU6	Socket, 8 Pin DIP	417-0800	4
----	Pin, Amplifier Disconnect, AMP	418-0161	6
----	Printed Circuit Board	C-524-1840	1

Table 5-4. Control Printed Circuit Board Assembly
(No Cue Tones) 914-1831 (Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
C1	Capacitor, Electrolytic, 4.7 uF +10%, 35V, Tantalum	064-4763	1
C2	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C3, C4	Capacitor, Disc Ceramic, 0.01 uF, 25V	000-1044	2
C5	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C6	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1
C7	Capacitor, Mylar, 0.022 uF, 200V	031-2243	1
C8	Capacitor, Disc Ceramic, 0.005 uF, 50V	000-5034	1
CR1, CR2	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	2
CR3	Diode, Silicon, Zener, 1N4739, 9.1V +10%, 1W	200-0009	1
CR4	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	1
CR5	Diode, Silicon, Zener, 1N4739, 9.1V +10%, 1 W	200-0009	1
I1, I2, I3	Diode, Light Emitting, 5082-4487, 20 mA at 1.6V, Clear Lens	323-7344	3
Q1, Q2	Transistor, Silicon, NPN, GES 5816	211-5816	3
R1	Resistor, 1 Megohm +5%, 1/4 W	100-1073	1
R2 thru R5	Resistor, 10 k ohm +5%, 1/4 W	100-1053	4
R6	Resistor, 33 k ohm +5%, 1/4 W	100-3353	1
R7 thru R11	Resistor, 4.7 k ohm +5%, 1/4 W	100-4743	5
U1	Integrated Circuit, MM 74C00 N, Quad 2-Input NAND Gate, CMOS, 14 Pin DIP	221-7400	1

Table 5-4. Control Printed Circuit Board Assembly
 (No Cue Tones) 914-1831 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
U2	Integrated Circuit, 74C08, Quad 2-Input AND Gate, CMOS, 14 Pin DIP	221-7408	1
XU1, XU2	Socket, Integrated Circuit, 14 Pin DIP	417-1400	2
----	Printed Circuit Board	C-514-1841	1

Table 5-5. Control Printed Circuit Board Assembly
(With Cue Tones) 914-1841 (Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
C1	Capacitor, Electrolytic, 4.7 uF +10%, 35V, Tantalum	064-4763	1
C2	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C3, C4	Capacitor, Disc Ceramic, 0.01 uF, 25V	000-1044	2
C5	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C6	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1
C7	Capacitor, Mylar, 0.022 uF, 100V	031-2234	1
C8	Capacitor, Disc Ceramic, 0.005 uF, 50V	000-5034	1
C9	Capacitor, Mica, 500 pF, 500V	041-5023	1
C10, C11	Capacitor, Silvered Mica, 1000 pF, 500V, Radial Leads	041-1032	2
C12	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1
C13, C14	Capacitor, Disc Ceramic, 0.01 uF, 25V	000-1044	2
C15	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1
C16	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C17	Capacitor, 0.01 uF, 100V	030-1043	1
C18, C19	Capacitor, Ceramic, 0.047 uF, 100V	030-4743A	2
C20	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C21	Capacitor, Disc Ceramic, 0.01 uF, 25V	000-1044	1
C22	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1

Table 5-5. Control Printed Circuit Board Assembly
(With Cue Tones) 914-1841 (Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
CR1, CR2	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	2
CR3	Diode, Silicon, Zener, 1N4739, 9.1V <u>+10%</u> , 1 W	200-0009	1
CR4	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	1
CR5	Diode, Silicon, Zener, 1N4739, 9.1V <u>+10%</u> , 1 W	200-0009	1
CR6	Diode, Small Signal, Silicon, 1N4148, 100 V, 10 mA	203-4148	1
CR7	Diode, Silicon, Zener, 1N4739, 9.1V <u>+10%</u> , 1 W	200-0009	1
CR8 thru CR11	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	4
CR12	Diode, Silicon, Zener, 1N4739, 9.1V <u>+10%</u> , 10 mA	200-0009	1
CR13	Diode, Small Signal, Silicon, 1N4148, 100 V, 10 mA	203-4148	1
I1, I2, I3	Diode, Light Emitting, 5082-4487, 20 mA at 1.6V, Clear Lens	323-7344	3
K1, K2	Relay, Printed Circuit Mount: Coil: 24V Contacts: SPDT, 24V at 2 Amperes	270-0024	2
Q1 thru Q4	Transistor, Silicon, NPN, GES 5816	211-5816	4
R1	Resistor, 1 Megohm <u>+5%</u> , 1/4 W	100-1073	1
R2 thru R5	Resistor, 10 k ohm <u>+5%</u> , 1/4 W	100-1053	4
R6	Resistor, 33 k ohm <u>+5%</u> , 1/4 W	100-3353	1
R7 thru R11	Resistor, 4.7 k ohm <u>+5%</u> , 1/4 W	100-4743	5
R12	Resistor, 5.1 k ohm <u>+5%</u> , 1/4 W	100-5143	1

Table 5-5. Control Printed Circuit Board Assembly
(With Cue Tones) 914-1841 (Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
R13, R14	Resistor, 39 k ohm $\pm 5\%$, 1/4 W	100-3953	2
R15	Resistor, 2.2 k ohm $\pm 5\%$, 1/4 W	100-2243	1
R16	Resistor, 510 k ohm $\pm 5\%$, 1/4 W	100-5163	1
R17	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R18	Resistor, 2.2 k ohm $\pm 5\%$, 1/4 W	100-2243	1
R19, R20	Resistor, 56 k ohm $\pm 5\%$, 1/4 W	100-5653	2
R21	Resistor, 510 k Ohm $\pm 5\%$, 1/4 W	100-5163	1
R22, R23	Resistor, 3.3 k ohm $\pm 5\%$, 1/4 W	100-3343	2
R24, R25	Potentiometer, 1-Turn, In-Line Pins, 2 k ohm $\pm 10\%$, 1/2 W	178-2044	2
R26	Resistor, 8.2 k ohm $\pm 5\%$, 1/4 W	100-8243	1
U1	Integrated Circuit, MM 74C00 N, Quad 2-Input NAND Gate, CMOS, 14 Pin DIP	221-7400	1
U2	Integrated Circuit, 74C08, Quad 2-Input AND Gate, CMOS, 14 Pin DIP	221-7408	1
U3, U4	Integrated Circuit, MC 4558 PI, Dual Operational Amplifier, 8 Pin DIP	221-4558	2
XU1, XU2	Socket, Integrated Circuit, 14 Pin DIP	417-1400	2
XU3, XU4	Socket, Integrated Circuit, 8 Pin DIP	417-0800	2
----	Printed Circuit Board	C-417-1400	1

Table 5-6. Tape Head Amplifier Assembly Printed Circuit Board Assembly
(914-1840) (Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
C1	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C2	Capacitor, Electrolytic, 22 uF $\pm 10\%$, 20V, Tantalum	063-2273	1
C3	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C4	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C5, C6	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C7	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C8	Capacitor, Electrolytic, 33 uF $\pm 10\%$, 35V, Tantalum	064-3373	1
C9, C10	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C11, C12	Capacitor, Disc Ceramic, 10 pF $\pm 10\%$, 1 kV, NPO	001-1014	2
C13	Capacitor, Electrolytic, 4.7 uF $\pm 10\%$, 35V, Tantalum	064-4763	1
C14	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C15	Capacitor, Electrolytic, 22 uF $\pm 10\%$, 20V, Tantalum	063-2273	1
C16	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C17	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C18, C19	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C20	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C21	Capacitor, Electrolytic, 33 uF $\pm 10\%$, 35V, Tantalum	024-3335	1
C22, C23	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2

Table 5-6. Tape Head Amplifier Assembly Printed Circuit Board Assembly
(914-1840) (Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
C24, C25	Capacitor, Disc Ceramic, 10 pF +10%, 1 kV, NPO	001-1014	2
C26	Capacitor, Electrolytic, 4.7 uF +10%, 35V, Tantalum	064-4763	1
C27	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	1
C28	Capacitor, Mica, 150 pF +5%, 500V	040-1522	1
C29, C30	Capacitor, Electrolytic, 4.7 uF +10%, 35V, Tantalum	064-4763	2
C31	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C32, C33	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	2
C34	Capacitor, Mylar Film, 0.001 uF +10%, 100V	030-1033	1
C35	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	1
C36, C37	Capacitor, Electrolytic, 1.0 uF +10%, 35V, Tantalum	064-1063	2
CR1 thru CR5	Diode, Small Signal, Silicon, 1N4148, 100V, 10 mA	203-4148	5
Q1	Field Effect Transistor, Junction Type, P-Channel, 2N5462	212-5462	1
Q2, Q3	Transistor, PNP, Small Signal, Silicon, GES 5817	210-5817	2
Q4, Q5	Transistor, NPN, Small Signal, Silicon, GES 5816	211-5816	2
Q6, Q7	Transistor, PNP, Small Signal, Silicon, GES 5817	210-5817	2
Q8	Field Effect Transistor, Junction Type, P-Channel, 2N5462	212-5462	1
Q9 thru Q11	Transistor, NPN, Small Signal, Silicon, GES 5816	211-5816	3

Table 5-6. Tape Head Amplifier Assembly Printed Circuit Board Assembly
(914-1840) (Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
R1	Potentiometer, 10 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-1054	1
R2	Potentiometer, 50 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-5054	1
R3	Potentiometer, 1 Megohm, $\pm 10\%$, 1/2 W. Single Turn	178-1074	1
R4	Potentiometer, 10 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-1054	1
R5	Potentiometer, 50 k ohm $\pm 10\%$, 1/2 W, Single Turn	178-5054	1
R6	Potentiometer, 1 Megohm, $\pm 10\%$, 1/2 W, Single Turn	178-1074	1
R7	Resistor, 150 k ohm $\pm 5\%$, 1/4 W	100-1563	1
R8	Resistor, 330 ohm $\pm 5\%$, 1/4 W	100-3333	1
R9	Resistor, 270 k ohm $\pm 5\%$, 1/4 W	100-2763	1
R10	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	1
R11	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R12, R13	Resistor, 120 k ohm $\pm 5\%$, 1/4 W	100-1263	2
R14	Resistor, 1 Megohm $\pm 5\%$, 1/4 W	100-1073	1
R15	Resistor, 560 k ohm $\pm 5\%$, 1/4 W	100-5663	1
R16	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R17	Resistor, 3.9 k ohm $\pm 5\%$, 1/4 W	100-3943	1
R18, R19	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	2
R20	Resistor, 150 k ohm $\pm 5\%$, 1/4 W	100-1563	1
R21	Resistor, 330 ohm $\pm 5\%$, 1/4 W	100-3333	1
R22	Resistor, 270 k ohm $\pm 5\%$, 1/4 W	100-2763	1

Table 5-6. Tape Head Amplifier Assembly Printed Circuit Board Assembly
(914-1840) (Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
R23	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	1
R24	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R25, R26	Resistor, 120 k ohm $\pm 5\%$, 1/4 W	100-1263	2
R27, R28	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	2
R29	Resistor, 22 k ohm $\pm 5\%$, 1/4 W	100-2253	1
R30	Resistor, 1 Megohm $\pm 5\%$, 1/4 W	100-1073	1
R31	Resistor, 560 k ohm $\pm 5\%$, 1/4 W	100-5663	1
R32	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R33	Resistor, 3.9 k ohm $\pm 5\%$, 1/4 W	100-3943	1
R34	Resistor, 270 k ohm $\pm 5\%$, 1/4 W	100-2763	1
R35	Resistor, 820 ohm $\pm 5\%$, 1/4 W	100-8233	1
R36	Resistor, 10 ohm $\pm 5\%$, 1/4 W	100-1023	1
R37, R38	Resistor, 2.2 k ohm $\pm 5\%$, 1/4 W	100-2243	2
R39	Resistor, 27 k ohm $\pm 5\%$, 1/4 W	100-2752	1
R40	Resistor, 56 k ohm $\pm 5\%$, 1/4 W	100-5653	1
R41	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R42	Resistor, 220 k $\pm 5\%$, 1/4 W	100-2263	1
R43	Resistor, 82 k ohm $\pm 5\%$, 1/4 W	100-8253	1
R44	Resistor, 10 k ohm $\pm 5\%$, 1/4 W	100-1053	1
R45	Resistor, 330 k ohm $\pm 5\%$, 1/4 W	100-3362	1
R46	Resistor, 4.7 k ohm $\pm 5\%$, 1/4 W	100-4743	1
R47	Resistor, 3.9 k ohm $\pm 5\%$, 1/4 W	100-3943	1
R48	Resistor, 56 k ohm $\pm 5\%$, 1/4 W	100-5653	1

Table 5-6. Tape Head Amplifier Assembly Printed Circuit Board Assembly
(914-1840) (Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QUANTITY
R49	Resistor, 120 k ohm $\pm 5\%$, 1/4 W	100-1263	1
R50	Potentiometer, 2 k ohm $\pm 10\%$, 1/2 W, Single Turn, In-Line Pins	178-2044	1
U1, U2	Integrated Circuit, High Performance Operational Amplifier, uA748, 8 Pin DIP	221-7480	2
U3	Integrated Circuit, Dual Operational Amplifier, MC 4558 PI, 8 Pin DIP	221-4558	1
U4, U5	Integrated Circuit, High Performance Operational Amplifier, uA748, 8 Pin DIP	221-7480	2
U6	Integrated Circuit, Dual Operational Amplifier, MC 4558 PI, 8 Pin DIP	221-4558	1
XU1 thru XU6	Socket, 8 Pin DIP	417-0800	6
----	Pin, Amplifier Disconnect, AMP	418-0161	9
----	Printed Circuit Board	C-524-1840	1

SECTION VI
DRAWINGS

6.1 INTRODUCTION

6.2 This section provides schematic diagrams and wire lists as indexed below.

<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
6-1	Tape Head Amplifier Schematic Diagram	C906-1840
6-2	Control Circuit Schematic Diagram	C906-1841
6-3	Tape Head Connection Diagram	A906-5109
6-4	Power Supply Schematic Diagram	C906-5116
6-5	Back Plane/Motherboard Schematic Diagram	D906-5119
6-6	Front Panel Switch Assembly Schematic Diagram	C906-5115
6-7	Motor Assembly Schematic Diagram	A906-5104
6-8	Audio Output Transformer Assembly Schematic Diagram	B906-5131
6-9	Remote Plug Wiring Schematic Diagram	B906-5117
6-10	Tape Head Amplifier Assembly (Monaural)	C914-1830
6-11	Tape Head Amplifier Assembly (Stereophonic)	C914-1840
6-12	Control Circuit Assembly (Without Cue Tones)	C914-1831
6-13	Control Circuit Assembly (With Cue Tones)	C914-1841
6-14	Power Supply Assembly	C914-1809
6-15	Back Plane/Motherboard Assembly	C914-1808
6-16	Front Panel Switch Assembly	C914-1807
6-17	Fixed Deck Assembly	D906-3122
6-18	Slide-out Deck Assembly	D906-5110

<u>TABLE</u>	<u>TITLE</u>	<u>NUMBER</u>
6-1	Motherboard/Back Plane Wire List	A906-5132

Table 6-1. Back Plane/Motherboard Wire List - A-906-5132
(Sheet 1 of 5)

WIRE NO.	SIGNAL DESCRIPTION	FROM	TO
1	DECK 1 - SST IND	J2-16	J26-17
2	DECK 1 - STP IND	J2-17	J26-10
3	DECK 1 - STT SW	J2-19	J26-18
4	DECK 1 - STP SW	J2-22	J26-11
5	DECK 1 - SOL/DR	J1-22	X-1
6	DECK 1 - SOL/SIG	J2-18	X-2
7	DECK 2 - SOL/SIG	J4-18	X-4
8	DECK 2 - SOL/DR	J3-22	X-7
9	DECK 2 - STT IND	J4-16	J26-3
10	DECK 2 - STP Ind	J4-17	J26-25
11	DECK 2 - STT SW	J4-19	J26-2
12	DECK 2 - STP SW	J4-22	J26-13
13	DECK 3 - STP SW	J6-22	J26-12
14	DECK 3 - STT IND	J6-16	J26-1
15	DECK 3 - STP IND	J6-17	J26-24
16	DECK 3 - STT SW	J6-19	J26-14
17	DECK 4 - STT IND	J8-16	J26-5
18	DECK 4 - STP IND	J8-17	J26-23
19	DECK 4 - STT SW	J8-19	J26-4
20	DECK 4 - STP SW	J8-22	J26-22
21	DECK 5 - STT IND	J10-16	J26-26
22	DECK 5 - STP IND	J10-17	J26-21
23	DECK 5 - STT SW	J10-19	J26-6

Table 6-1. Back Plane/Motherboard Wire List - A-906-5132
(Sheet 2 of 5)

WIRE NO.	SIGNAL DESCRIPTION	FROM	TO
24	DECK 5 - STP SW	J10-22	J26-20
25	DECK 1 - Q AUD	J1-4	J2-14
26	DECK 1 - Q AUD HI TO 'R"	J1-4	J1-12
27	DECK 2 - Q AUD	J3-4	J4-14
28	DECK 3 - Q AUD	J5-4	J6-14
29	DECK 4 - Q AUD	J7-4	J8-14
30	DECK 5 - Q AUD	J9-4	J10-14
31	DECK 1 - +28V	J1-9	J2-9
32	DECK 3 - SOL/SIG	J6-18	X-8
33	DECK 4 - SOL/SIG	J8-18	X-6
34	DECK 1 - STP VER	Z-1	J2-6
35	DECK 2 - STP VER	Y-2	J4-6
36	DECK 3 - STP VER	Y-22	J6-6
37	DECK 4 - STP VER	Y-42	J8-6
38	DECK 5 - STP VER	Y-62	J10-6
39	DECK 1 - STT VER	Z-2	J2-4
40	DECK 2 - STT VER	Y-3	J4-4
41	DECK 3 - STT VER	Y-23	J6-4
42	DECK 4 - STT VER	Y-43	J8-4
43	DECK 5 - STT VER	Y-63	J10-4
44	DECK 1 - STT SW	Z-4	J2-19
45	DECK 1 - STP SW	Z-5	J2-22
46	DECK 1 - STT IND	Z-6	J2-16

Table 6-1. Back Plane/Motherboard Wire List - A-906-5132
(Sheet 3 of 5)

WIRE NO.	SIGNAL DESCRIPTION	FROM	TO
47	DECK 1 - STP IND	Z-7	J2-17
48	DECK 2 - STT SW	Y-5	J4-19
49	DECK 2 - STP SW	Y-6	J4-22
50	DECK 2 - STT IND	Y-7	J4-16
51	DECK 2 - STP IND	Y-8	J4-17
52	DECK 3 - STT SW	Y-25	J6-19
53	DECK 3 - STP SW	Y-26	J6-22
54	DECK 3 - STT IND	Y-27	J6-16
55	DECK 3 - STP IND	Y-28	J6-17
56	DECK 4 - STT SW	Y-45	J8-19
57	DECK 4 - STP SW	Y-46	J8-22
58	DECK 4 - STT IND	Y-47	J8-16
59	DECK 4 - STP IND	Y-48	J8-17
60	DECK 5 - STT SW	Y-65	J10-19
61	DECK 5 - STP SW	Y-66	J10-22
62	DECK 5 - STT IND	Y-67	J10-16
63	DECK 5 - STP IND	Y-68	J10-17
64	DECK 2 - L/AUD HI	Y-9	J3-12
65	DECK 2 - L/AUD LO	Y-10	J3-9
66	DECK 2 - R/AUD HI	Y-12	J3-10
67	DECK 2 - R/AUD LO	Y-13	J3-11
68	DECK 2 - QII	Y-16	J4-8
69	DECK 2 - QI	Y-17	J4-2

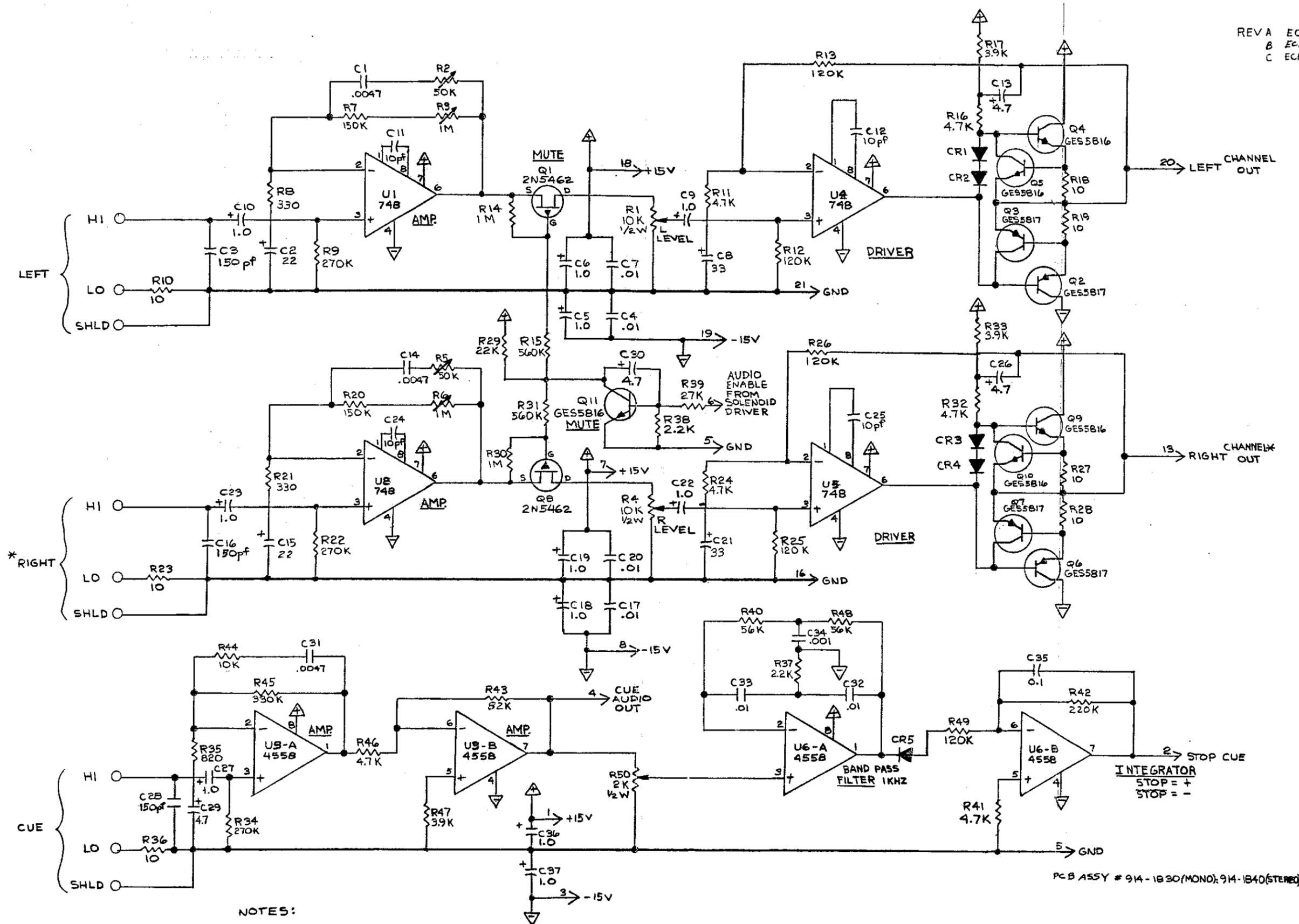
Table 6-1. Back Plane/Motherboard Wire List - A-906-5132
(Sheet 4 of 5)

WIRE NO.	SIGNAL DESCRIPTION	FROM	TO
70	DECK 2 - QI	Y-18	J4-3
71	DECK 2 - QII	Y-19	J4-13
72	DECK 3 - L/AUD HI	Y-29	J5-12
73	DECK 3 - L/AUD LO	Y-30	J5-9
74	DECK 3 - R/AUD HI	Y-32	J5-10
75	DECK 3 - R/AUD LO	Y-33	J5-11
76	DECK 3 - QII	Y-36	J6-8
77	DECK 3 - QI	Y-37	J6-2
78	DECK 3 - QI	Y-38	J6-3
79	DECK 3 - QII	Y-39	J6-13
80	DECK 4 - L/AUD HI	Y-49	J7-12
81	DECK 4 - L/AUD LO	Y-50	J7-9
82	DECK 4 - R/AUD HI	Y-52	J7-10
83	DECK 4 - R/AUD LO	Y-53	J7-11
84	DECK 4 - QII	Y-56	J8-8
85	DECK 4 - QI	Y-57	J8-2
86	DECK 4 - QI	Y-58	J8-3
87	DECK 4 - QII	Y-59	J8-13
88	DECK 5 - L/AUD HI	Y-69	J9-12
89	DECK 5 - L/AUD LO	Y-70	J9-9
90	DECK 5 - R/AUD HI	Y-72	J9-10
91	DECK 5 - R/AUD LO	Y-73	J9-11
92	DECK 5 - QII	Y-76	J10-8

Table 6-1. Back Plane/Motherboard Wire List - A-906-5132
(Sheet 5 of 5)

WIRE NO.	SIGNAL DESCRIPTION	FROM	TO
93	DECK 5 - QI	Y-77	J10-2
94	DECK 5 - QI	Y-78	J10-3
95	DECK 5 - QII	Y-79	J10-13
96	DECK 1 - R/AUD HI	Z-11	J1-14
97	DECK 1 - R/AUD LO	Z-12	J1-15
98	DECK 1 - Q AUD HI	Z-13	J1-11
99	NOT USED	---	---
100	DECK 1 - QII	Z-15	J2-8
101	DECK 1 - QI	Z-16	J2-2
102	DECK 1 - QI	Z-17	J2-3
103	DECK 1 - QII	Z-18	J2-13
104	DECK 1 - +28V	Z-19	J1-10

REV A ECN 1647 3-14-79 BS
 B ECN 1832 12-5-77 JH
 C ECN 2582 3-3-81 LA



PCB ASSY # 914-1830(MONO), 914-1840(STEREO)

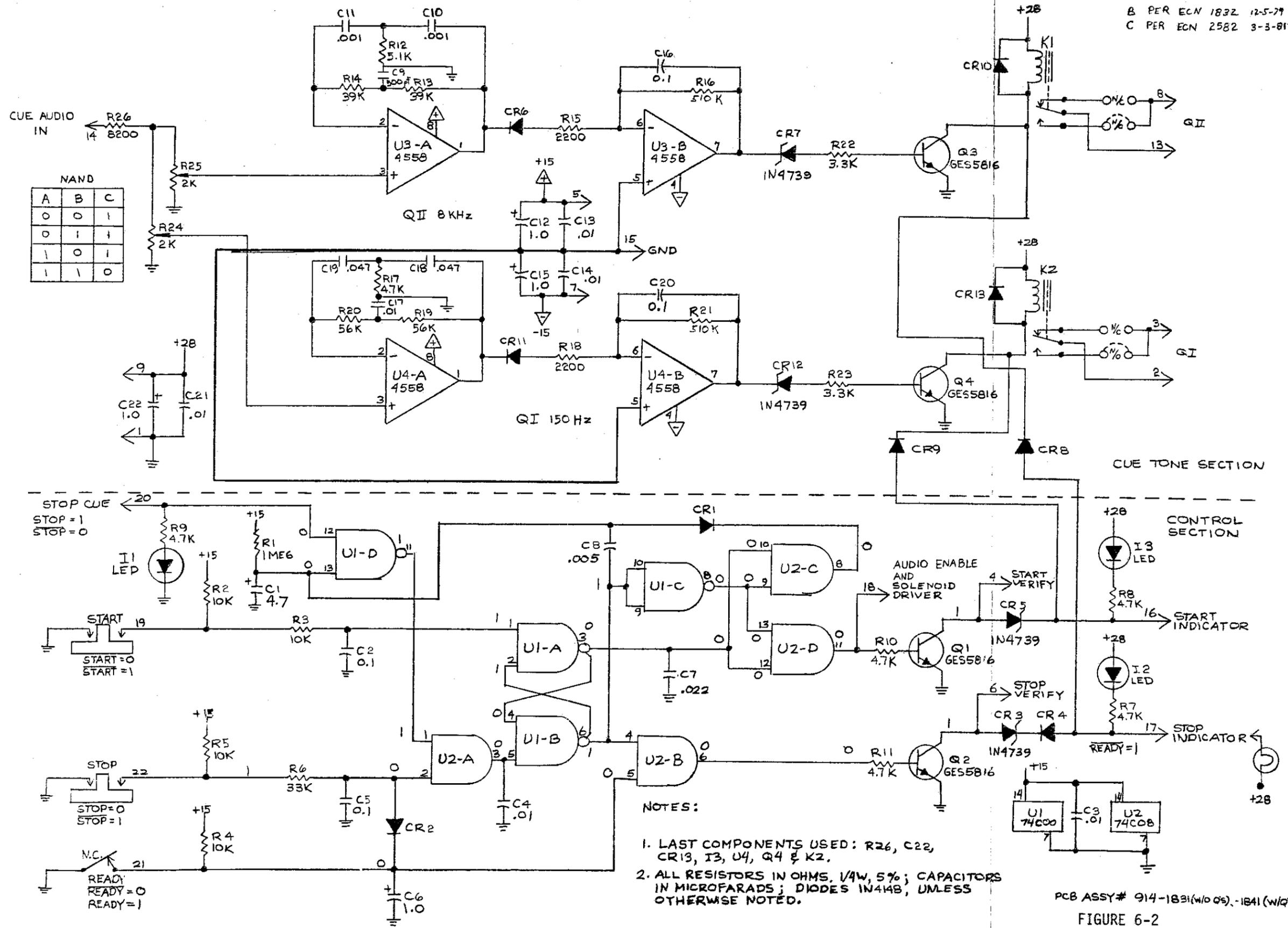
NOTES:

1. LAST COMPONENTS USED: R50, C37, U6, CR5 & Q11.
2. * - RIGHT CHANNEL USED ON STEREO UNITS ONLY.
3. RESISTORS IN OHMS, 1/4W, 5%; CAPACITORS IN MICROFARADS; DIODES, 1N4148, UNLESS OTHERWISE NOTED.

FIGURE 6-1

Tape Head Amplifier Schematic Diagram
 C906-1840

B PER ECN 1832 12-5-79 JMB
 C PER ECN 2582 3-3-81 LA



- NOTES:
1. LAST COMPONENTS USED: R26, C22, CR13, I3, U4, Q4 & K2.
 2. ALL RESISTORS IN OHMS, 1/4W, 5%; CAPACITORS IN MICROFARADS; DIODES IN4148, UNLESS OTHERWISE NOTED.

PCB ASSY# 914-1831(w/o Qs), -1841 (w/Qs)

FIGURE 6-2

Control Circuit Schematic Diagram
 C906-1841

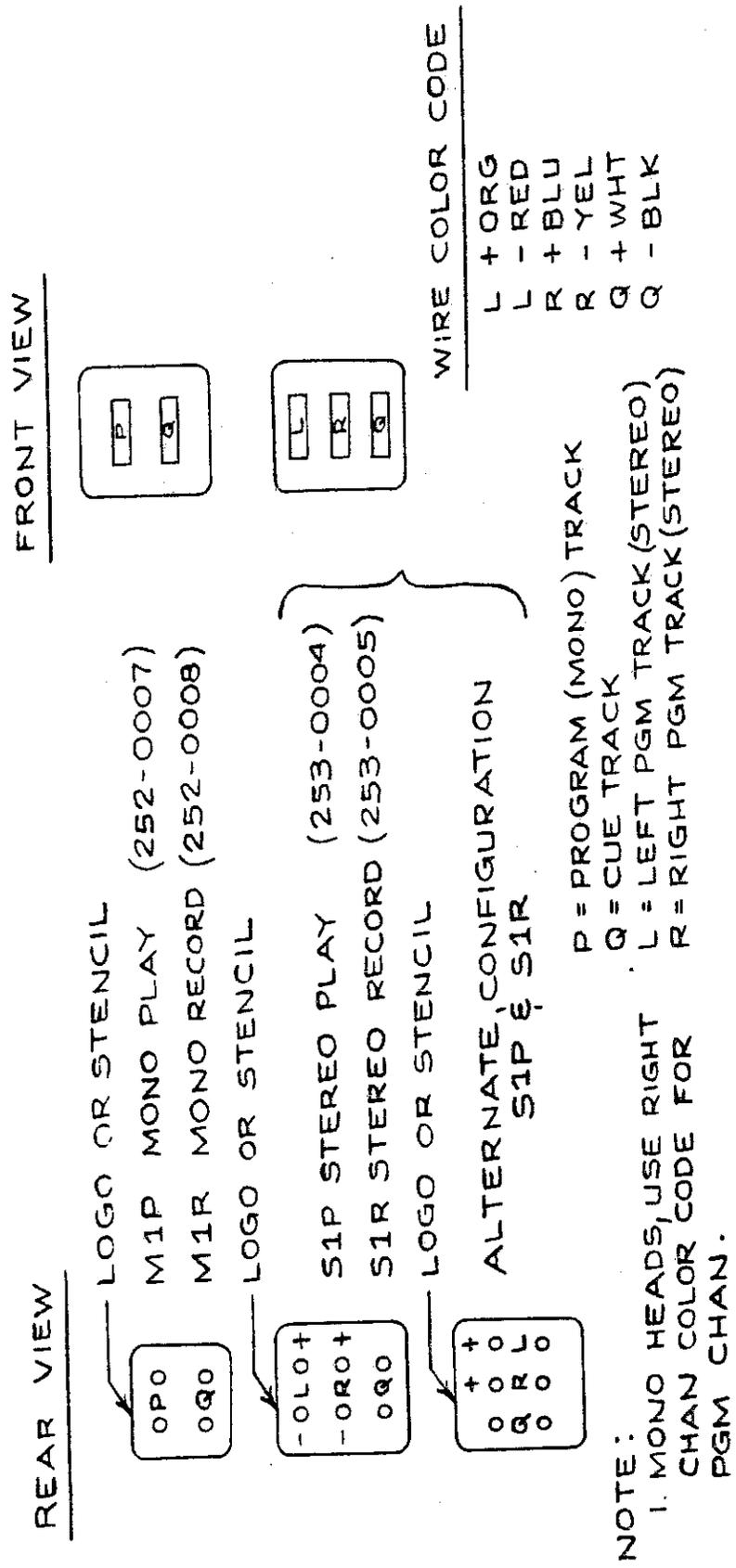
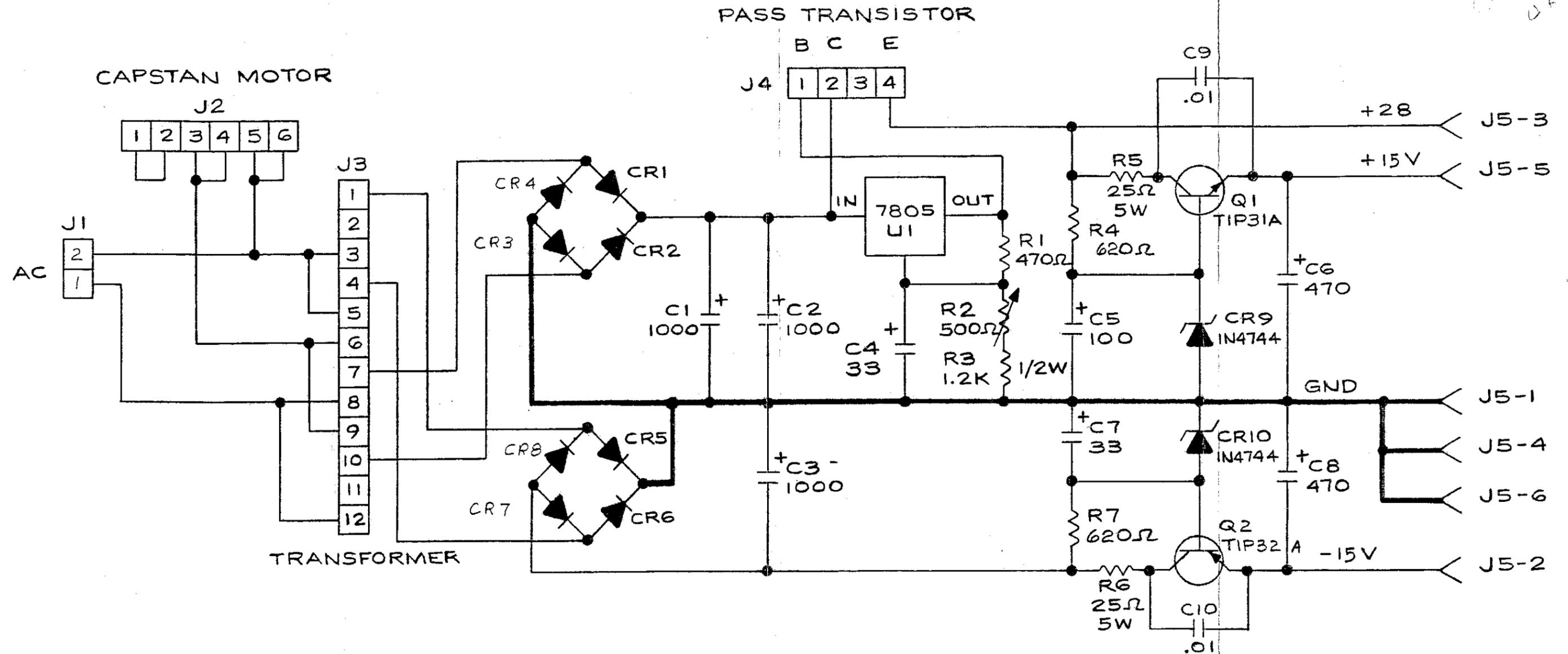


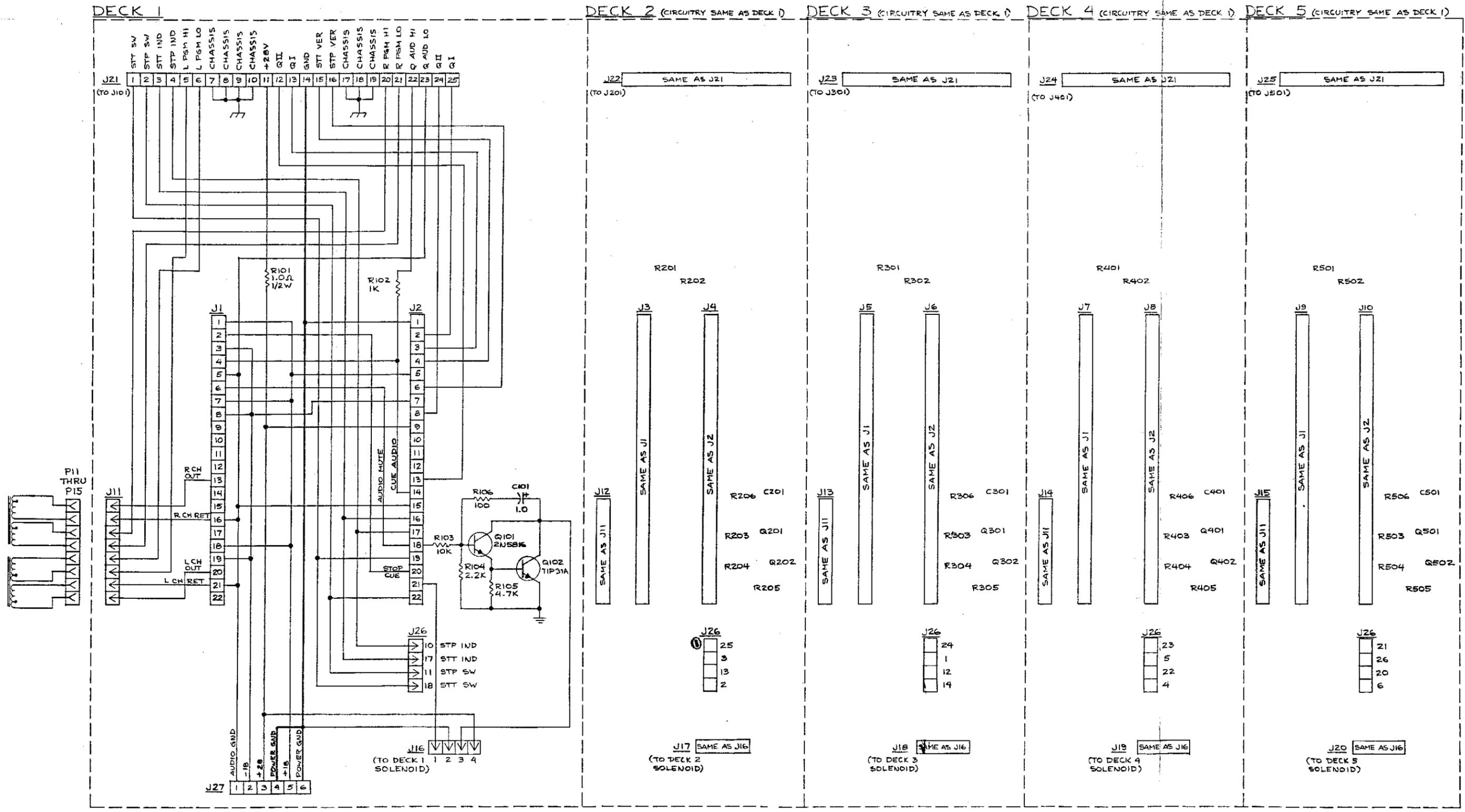
FIGURE 6-3
Tape Head Connection Diagram
A906-5109

Change per FCN 4681
4681
D
4681



NOTES:

1. RESISTORS IN OHMS, 1/4W, 5%, CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
2. LAST COMPONENTS USED: J5, Q2, C8, R7, CR10 & U1
3. CR1 THRU 4 MR751, CR5 THRU 8 IN4005

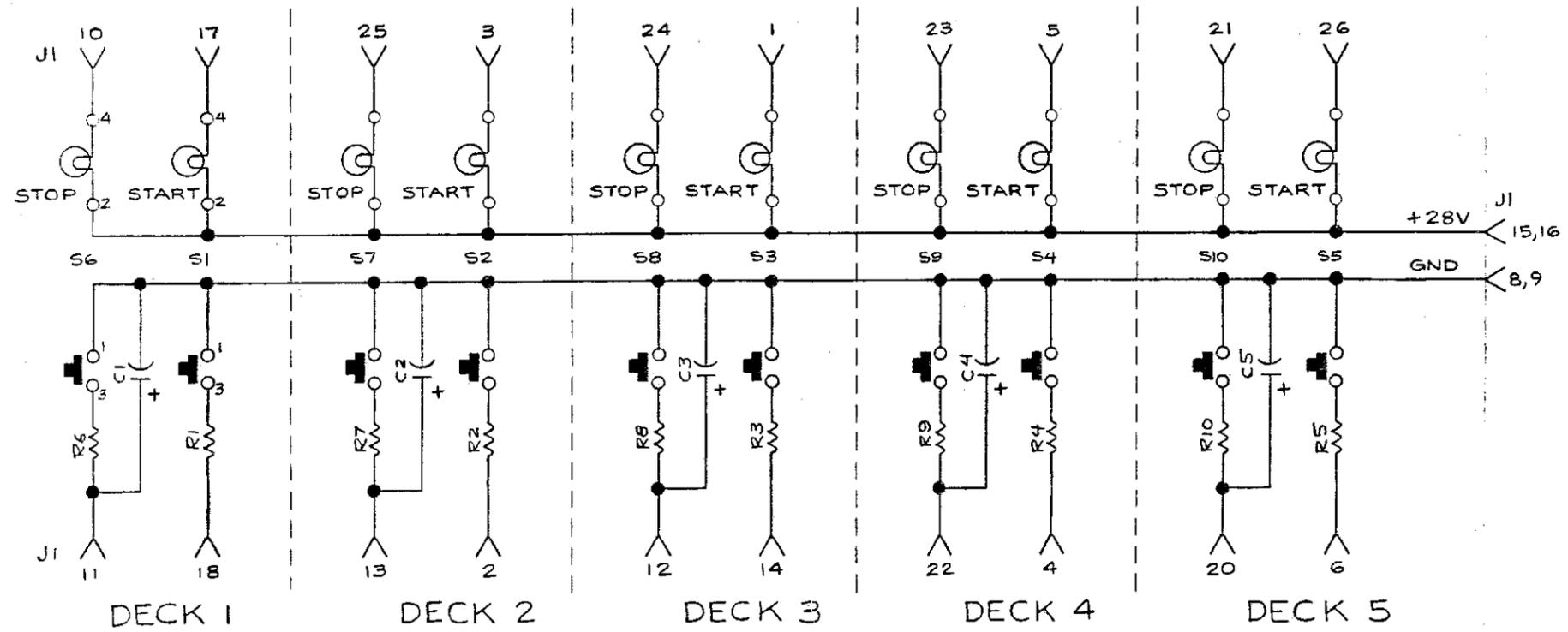


NOTES:

1. RESISTORS IN OHMS, 1/4W CAPACITORS IN MICROFARADS UNLESS OTHERWISE NOTED.
2. THIS DIAGRAM SHOWS SIGNAL ROUTING ONLY. REFER TO WIRE LIST A-906-5132 FOR DETAILED WIRING.

SEE P.C. ASSY DWG # C-914-180B

FIGURE 6-5
 Back Plane/Motherboard Schematic Diagram
 D906-5119

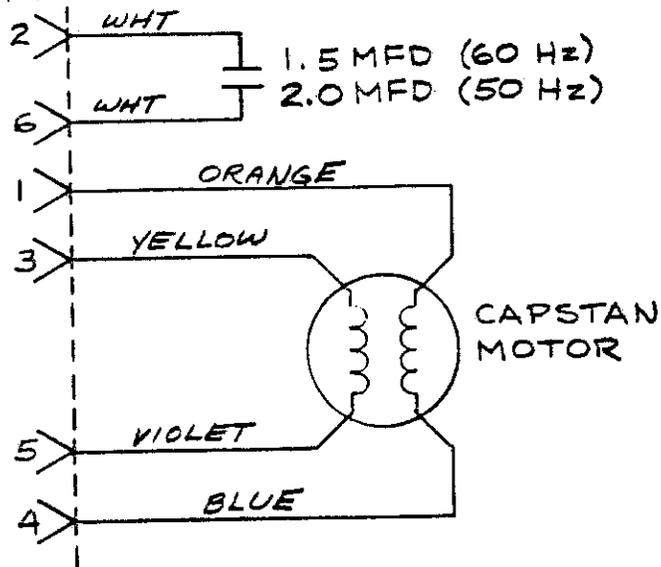


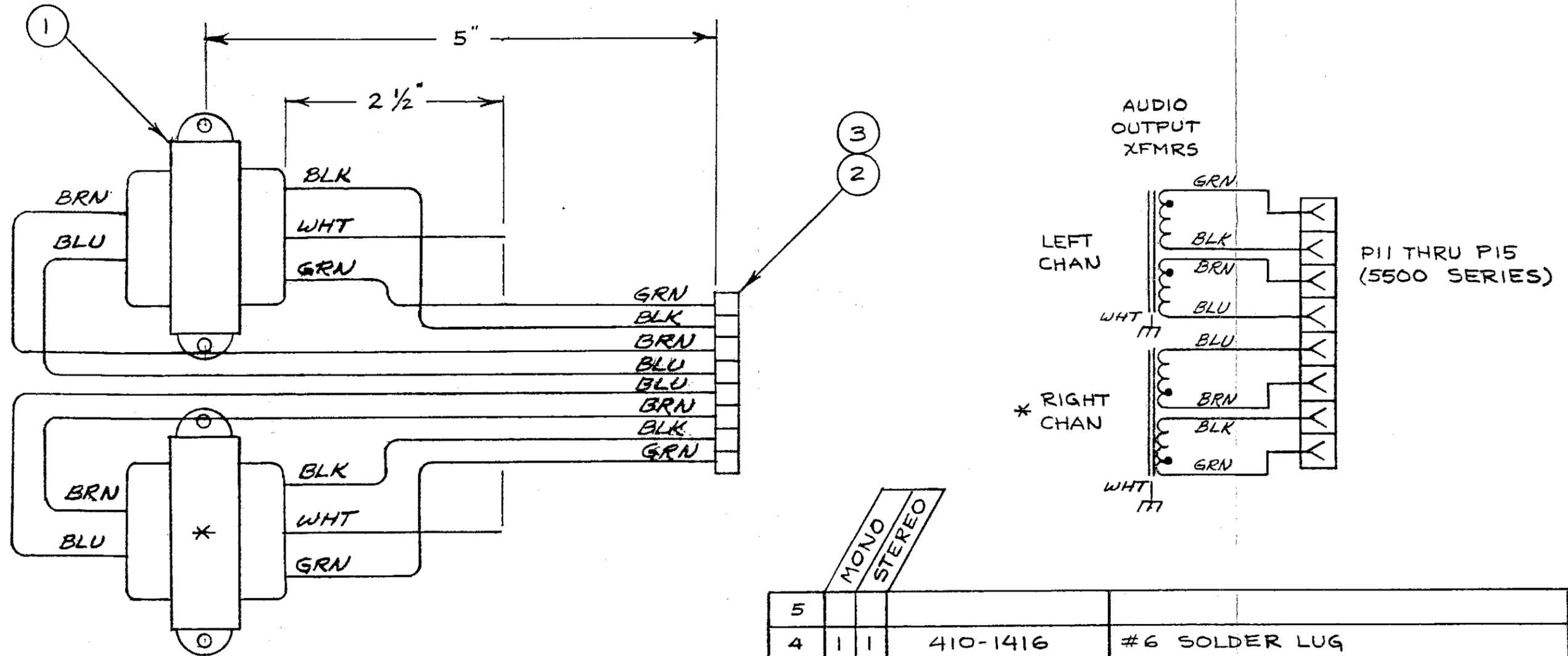
NOTES:

1. ALL RESISTORS, 1K Ω , 1/4W, 5%.
2. ALL CAPACITORS 4.7 μ f, 35V, TANTALUM.

SEE P.C. ASSY DWG # C-914-1807

6-PIN
AMP PLUG
(PART NO. 695-0670V)





NOTES:

1. * ITEM NOT USED IN MONO UNITS.
2. ITEM 4 NOT SHOWN ON DWG. ITEM 4 TO BE INSTALLED ON XFMR MOUNTING SCREW. SOLDER WHITE GROUND WIRE(S) TO ITEM 4.

ITEM	QTY	RQD	PART NUMBER	DESCRIPTION	NOTE
5					
4	1	1	410-1416	#6 SOLDER LUG	2
3	4	8	418-3225	CONNECTOR PIN	
2	1	1	418-3224	CONNECTOR HOUSING, 8-POS (P11 THRU P15)	
1	1	2	371-0005	AUDIO OUTPUT XFMR (365 W-1)	
X	1	1	906-5131	CABLE ASSY	
LIST OF MATERIAL					

REMOTE PLUG
P101, P201, P301, P401, P501



REAR VIEW

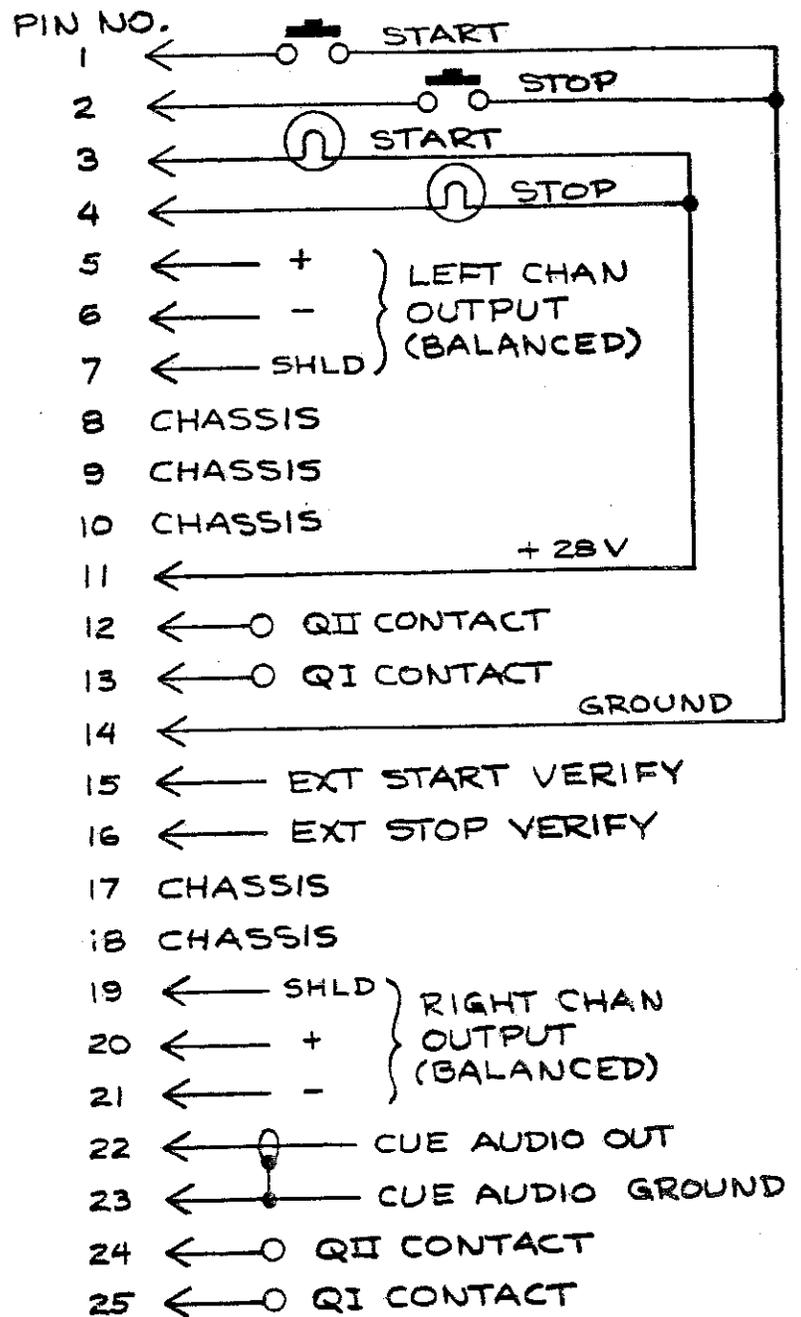


FIGURE 6-9

Remote Plug Wiring Schematic Diagram
B906-5117

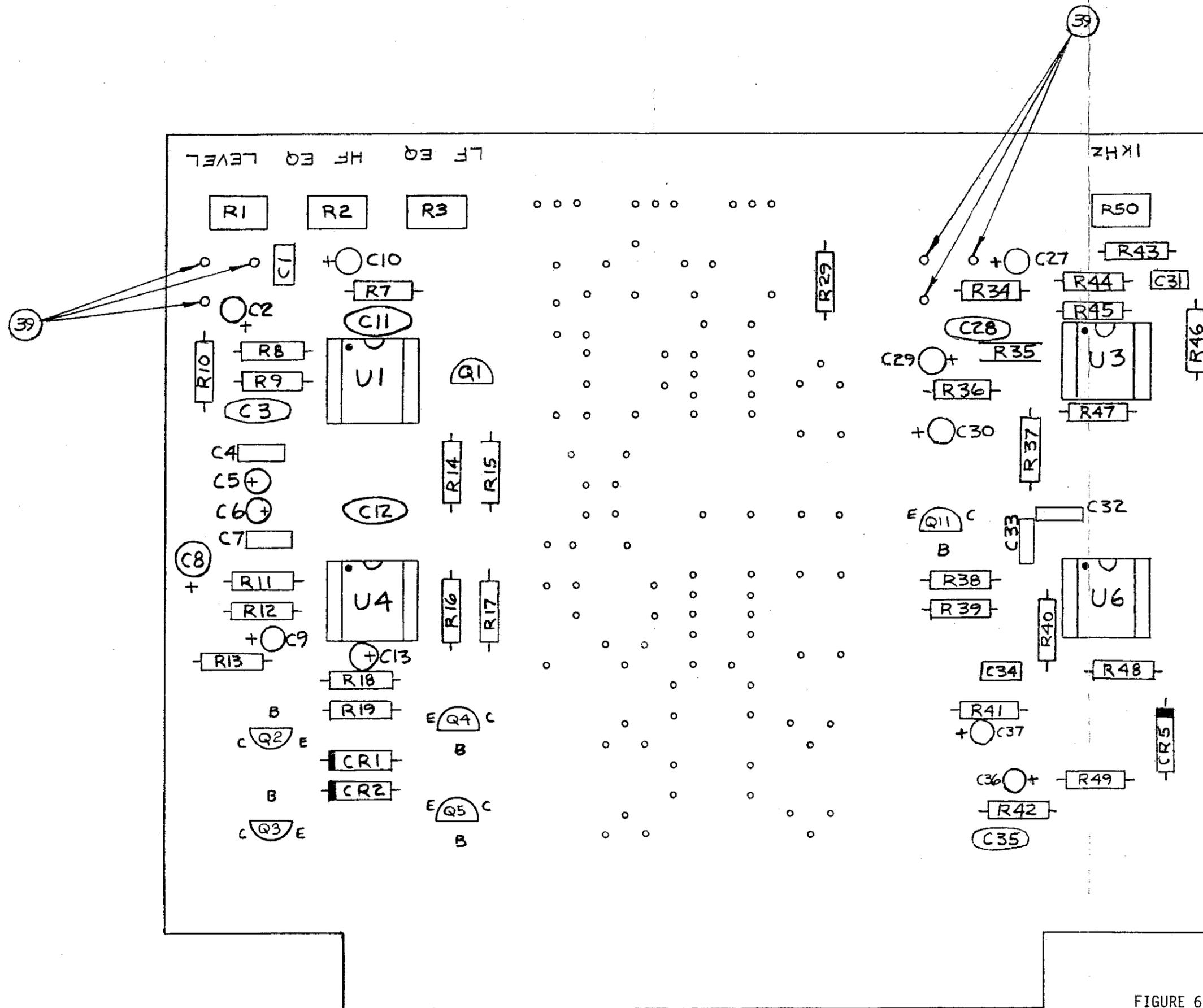
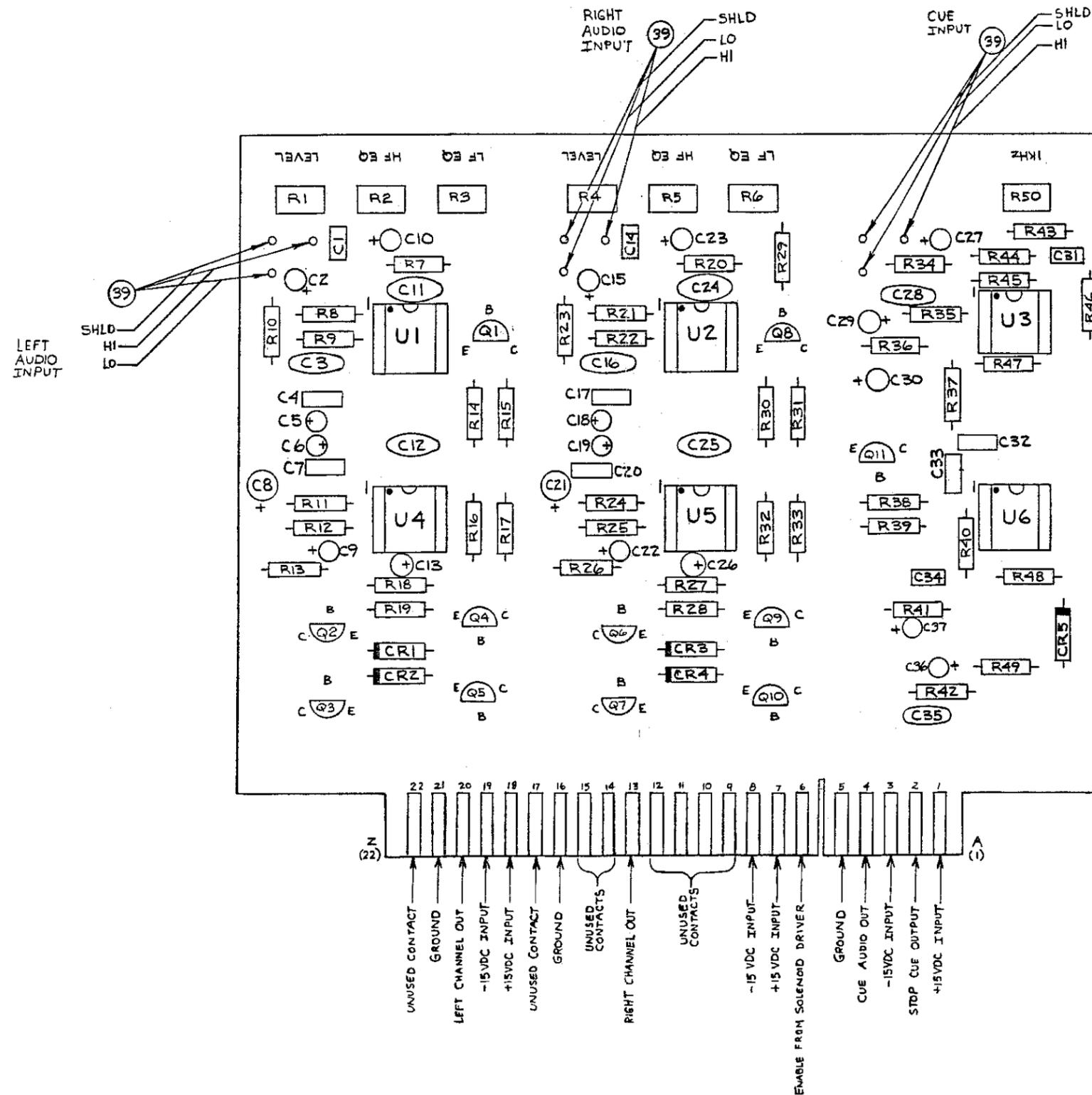


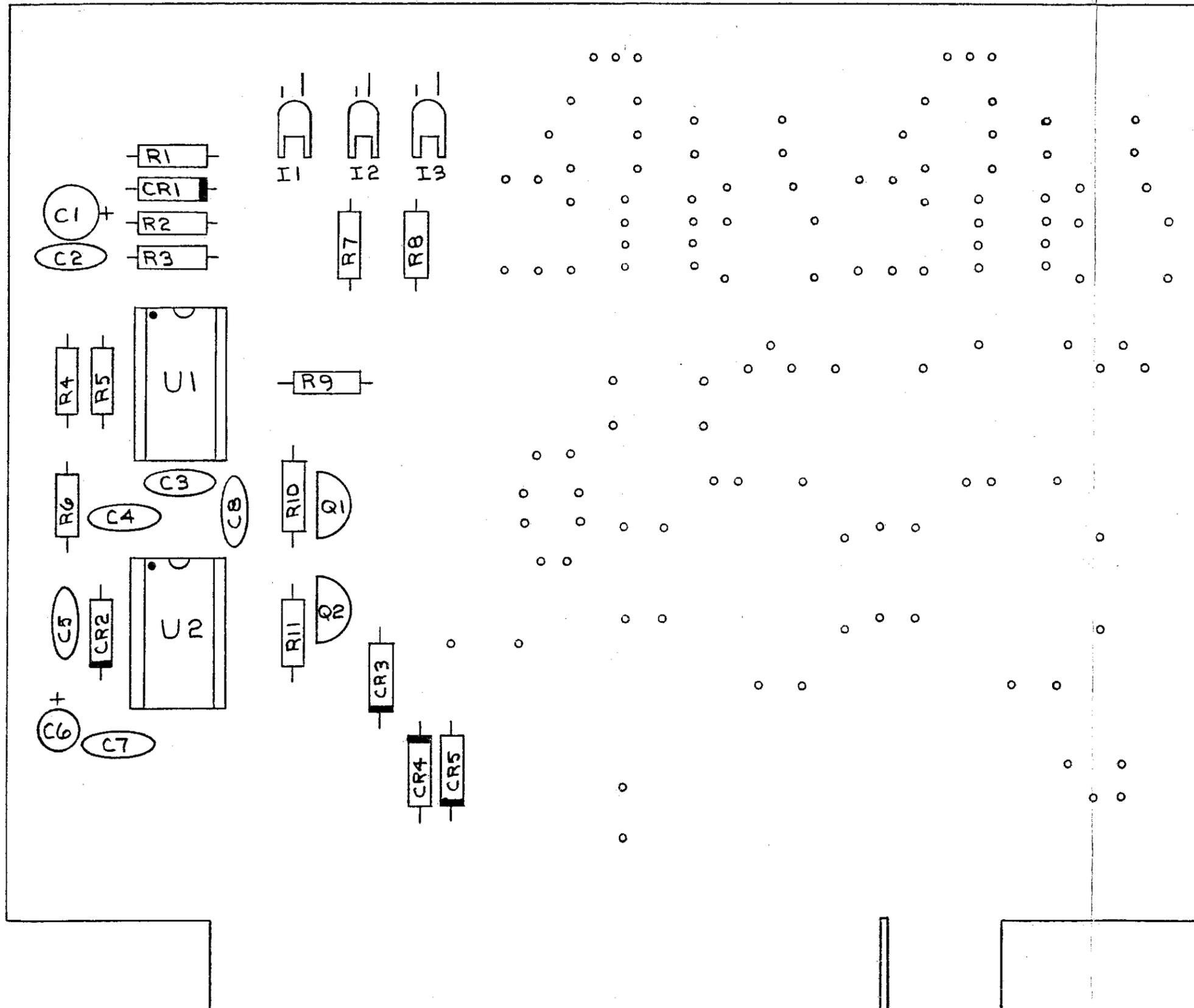
FIGURE 6-10
Tape Head Amplifier Assembly (Monaural)
C914-1830

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN 252B	LA	3-3-81

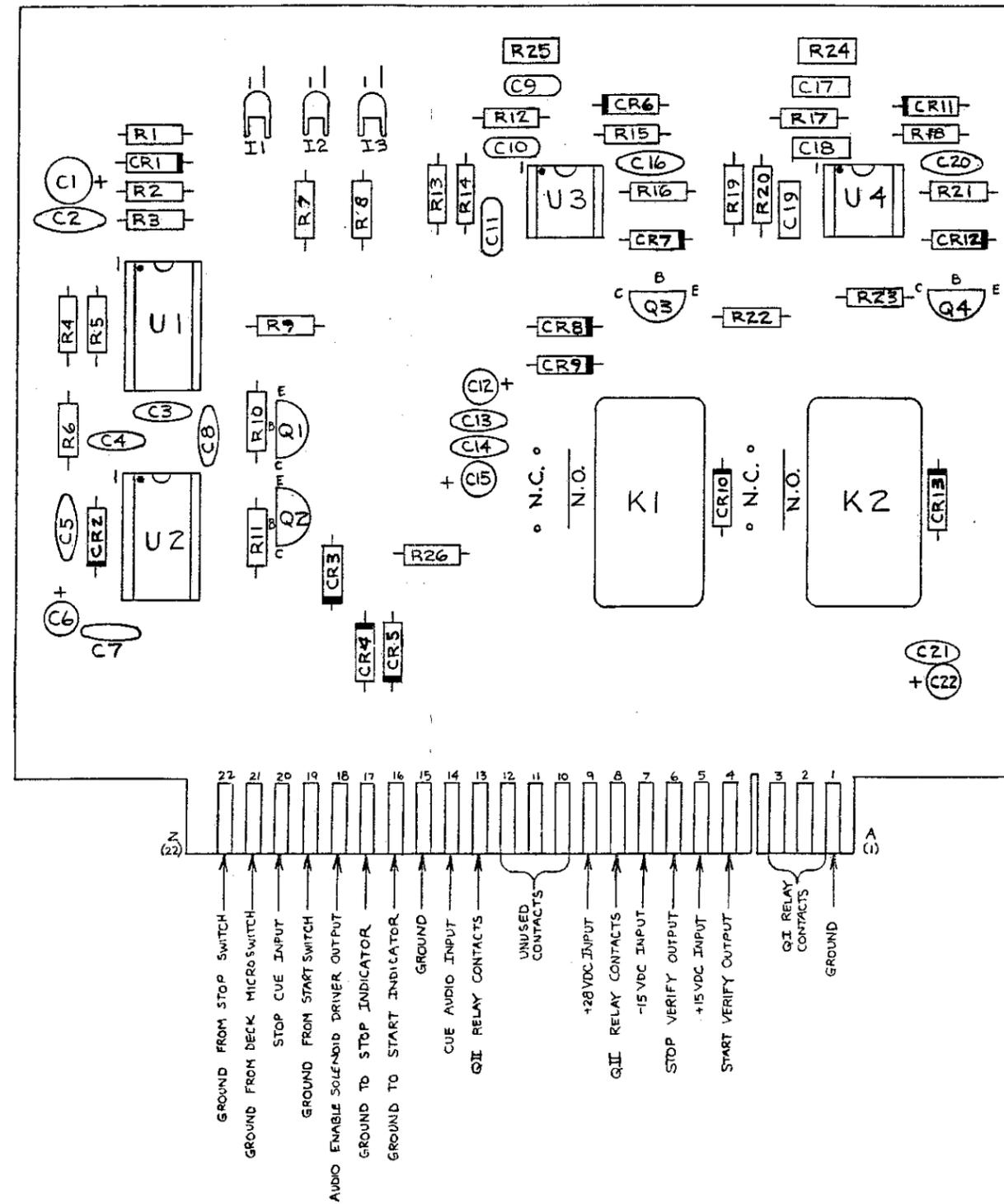


SEE B/M NO. 914-1840

FIGURE 6-11
Tape Head Amplifier Assembly (Stereophonic)
C914-1840

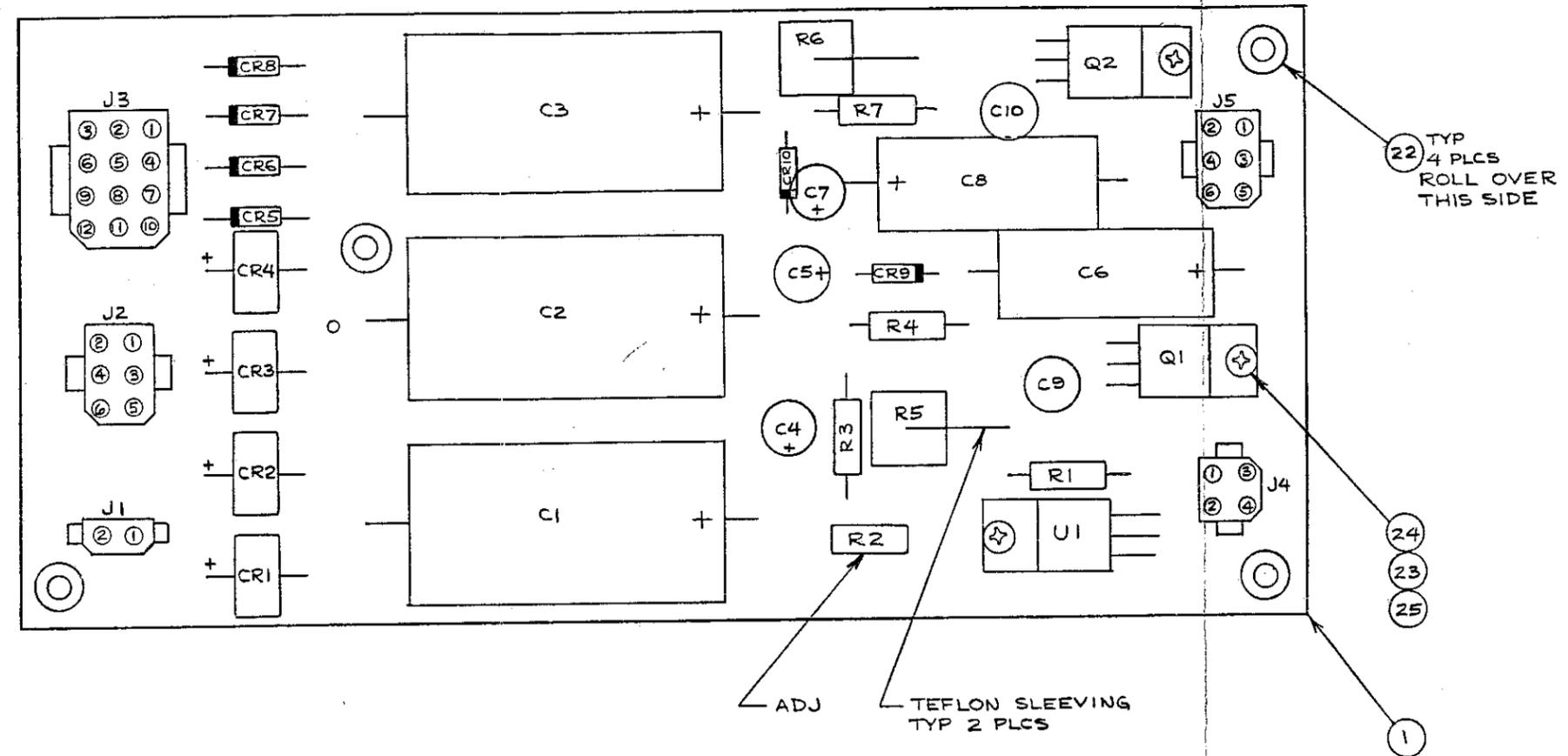


REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN 2582	LA	3-3-81



SEE B/M NO. 914-1841

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECN 731	3/5/76	<i>[Signature]</i>
B	ECN 1228	4-8-78	MH
C	ECN 1594	1-18-79	MH
D	ECN 2633	3-31-81	DRF



SEE SCHEMATIC No. C906-5116
 SEE B/M No. 914-1809

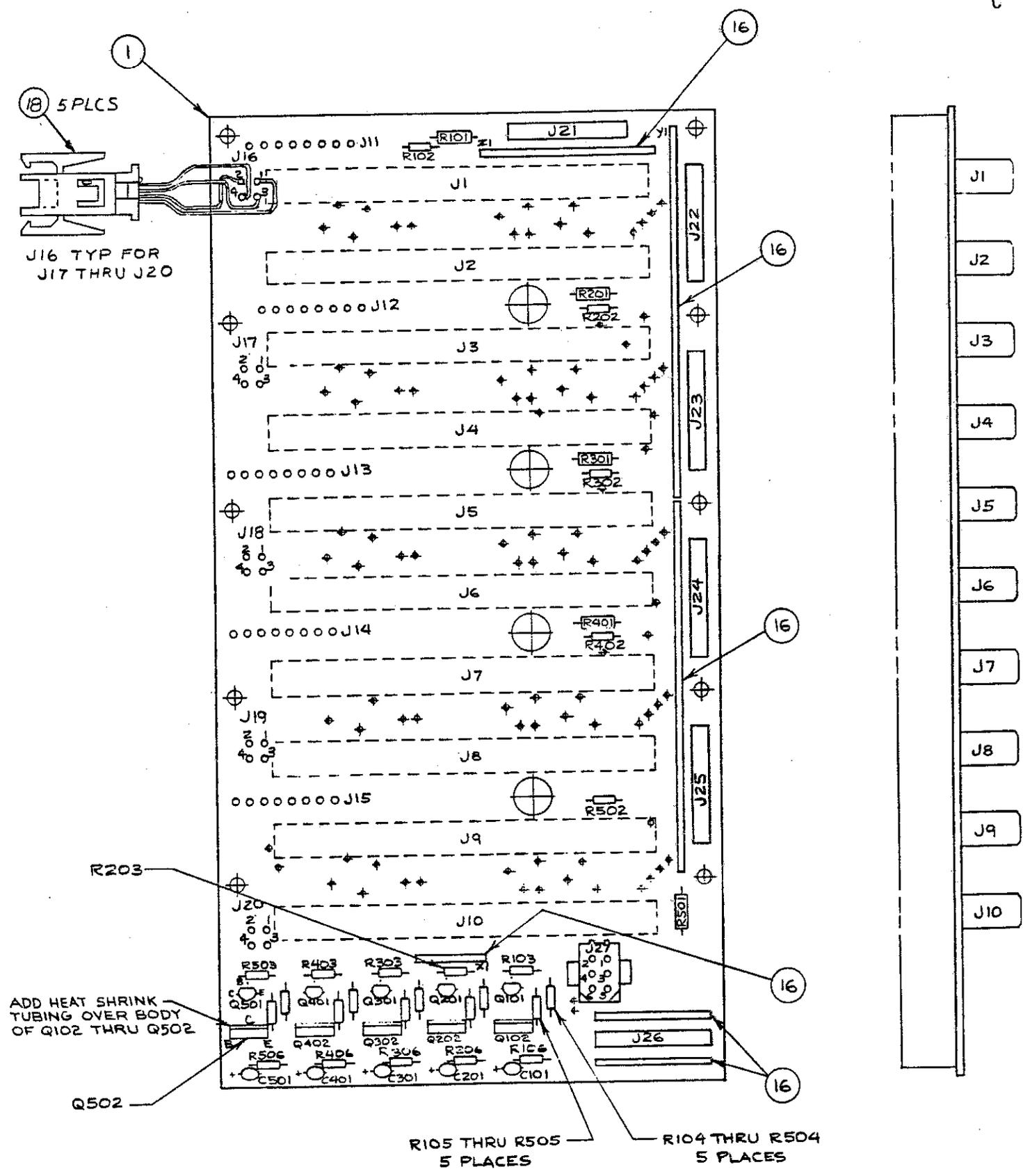
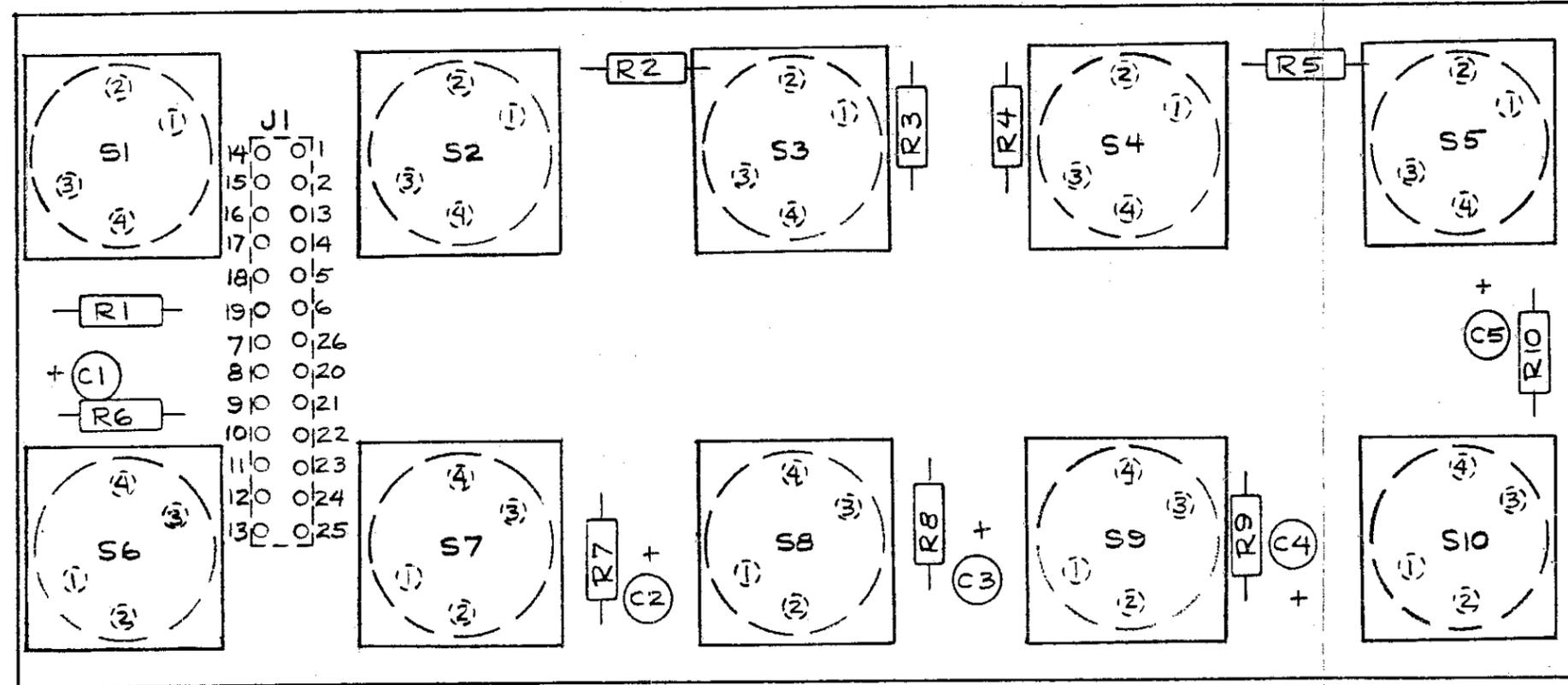


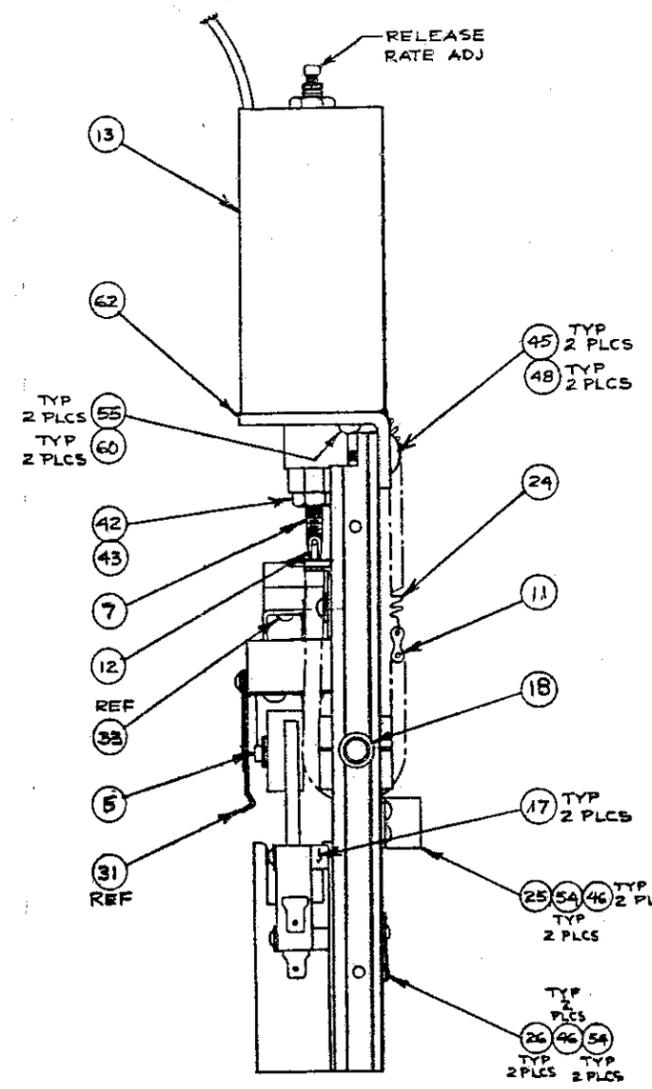
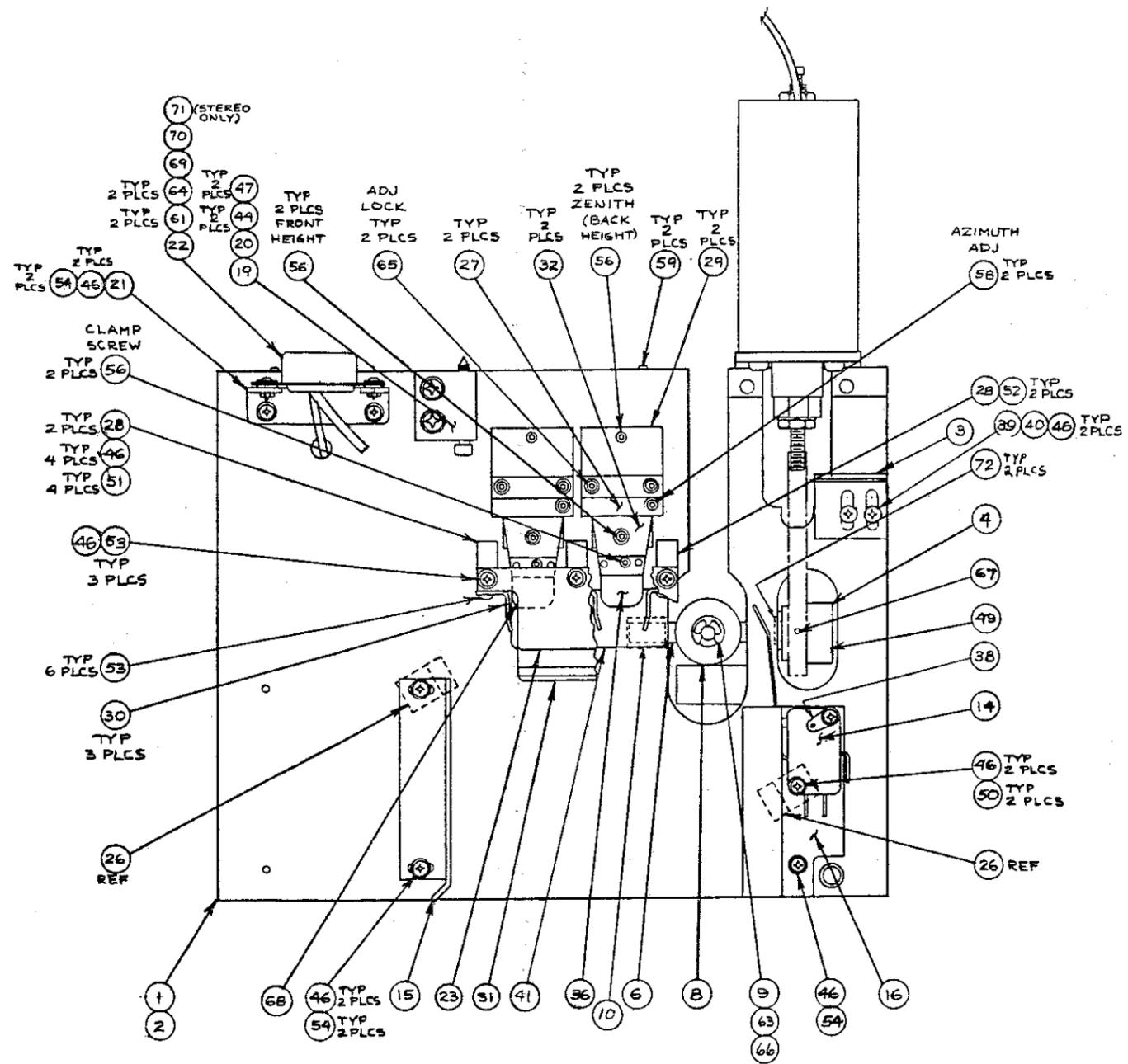
FIGURE 6-15
 Back Plane/Motherboard Assembly
 C914-1808

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN 2453	12-4-80	MM

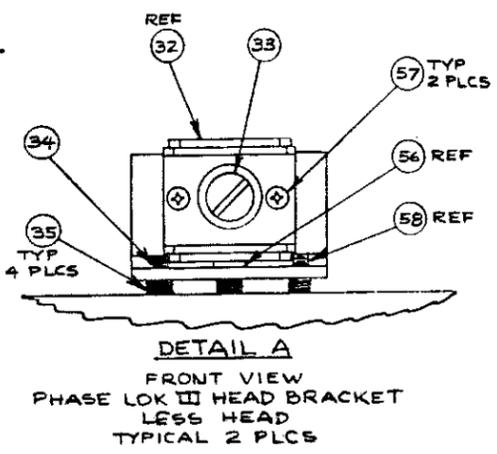


IO	REF	C-906-5115	SCHEMATIC	
9				
8				
7				
6				
5	1	417-2600	CONNECTOR, HEADER, DUAL, 13-POS (J1)	
4	5	064-4763	4.7 MFD/35V TANT CAPACITOR (C1 THRU C5)	
3	10	100-1043	1K Ω, 1/4W, 5% RESISTOR (R1 THRU R10)	
2	10	343-1206	SWITCH, ILLUMINATED (S1 THRU S10)	
1	1	514-1807	PC BOARD	
ITEM	QTY REQD	PART NUMBER	DESCRIPTION	NOTE

LIST OF MATERIAL



- NOTES:
- PART NO. 906-5110-1, DECK ASSY FOR MODEL 5300 (DECKS 1 & 2).
PART NO. 906-5110-2, DECK ASSY FOR MODEL 5500 (DECKS 1 TO 4).
 - USED ON 906-5110-1 ONLY.
 - USED ON 906-5110-2 ONLY.
 - SEE DETAIL 'A' FOR FRONT VIEW OF HEAD BRACKET.



ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE	ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
59	7			PHMS #4-40 X 1/4		19	1		420-0037	SCREW, ANCHOR BLOCK	2
53	9			PHMS #4-40 X 3/16		18	1		442-1171	BRONZE BUSHING	
52	2			FHMS #4-40 X 5/8		17	2		441-9223	SPACER, 1/4" OD, X 1/4" LONG	
51	4			PHMS #4-40 X 5/8		16	1		A-452-0031	GUIDE, RIGHT	
50	2			PHMS #4-40 X 7/8		15	1		A-452-0030	GUIDE, LEFT	
49	2			SOCKET HEAD CAP SCREW #4-40 X 1/2		14	1		346-6100	MICRO SWITCH	
48	2			PHMS #10-32 X 1/2		13	1		289-2566	AIR-DAMPED SOLENOID	
47	2			PHMS #8-32 X 5/8	2	12	1		449-0036	CHAIN LINK	
46	12			L/W #4		11	1		449-0035	CHAIN	
45	2			L/W #10		10	1		442-1000	BRONZE BUSHING	
44	2			L/W #8		9	1		454-3318	E-RING	
43	1			L/W #10, EXT TEETH		8	1		404-0001	PRESSURE ROLLER	
42	1			HEX NUT #10		7	1		A-459-0083	SCREW, MODIFIED	
41	1		A-471-0116	DECK INSERT		6	1		A-459-0082	SHAFT, ROLLER MOUNT	
40	2			FW #4		5	1		A-459-0081	ROLLER SHAFT	
39	2			PHMS #4-40 X 7/8 LG		4	1		A-459-0164	CHAIN MOUNTING CLAMP	
38	1		410-1411	SPADE LUG #4		3	1		A-449-0020	STOP-SOLENOID	
37						2	1		C-491-5000	DECK PLATE (MODEL 5300)	2
36	1		252-0017	HEAD, LSR (MONO, PLAYBACK)		1	1		C-491-5001	DECK PLATE (MODEL 5500)	3
36	1		253-0014	HEAD, LSP (STEREO, PLAYBACK)						SLIDE OUT DECK ASSY (5000 SERIES)	1
35	8		430-0047	SPRING, PHASE LOK III	4						
34	2		430-0120	SPRING	4						
33	2		A-420-1400	SHOULDER SCREW	4						
32	2		B-452-0034	CLAMP, HEAD							
31	1		B-452-0033	SPRING, CARTRIDGE							
30	3		B-452-0032	TAPE GUIDE							
29	2		B-459-0092	BASE PLATE							
28	3		B-459-0091	MOUNTING BLOCK, TAPE GUIDE							
27	2		B-459-0090	PIVOT BLOCK							
26	2		402-6251	CABLE CLAMP	2						
25											
24	1		B-452-0045	SPRING							
23	1		A-471-0157	SHIELD							
22	1		417-1420	CONNECTOR, SOCKET, 14-PIN	2						
21	1		A-470-0015	MOUNTING BRACKET	2						
20	1		A-459-0151	MOUNTING BLOCK	2						
19	1										
18	1										
17	2										
16	1										
15	1										
14	1										
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4	1										
3	1										
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1	1										

REF	C-906-5138	WIRING DIAGRAM			
77	2	423-1009	FIBER WASHER		
71	1	906-5111-6	HEAD LEAD CABLE ASSY (STEREO ONLY)		
70	1	906-5111-5	HEAD LEAD CABLE ASSY		
69	1	906-5111-4	HEAD LEAD CABLE ASSY		
68	1	407-0001	HEAD, DUMMY		
67	1	425-0005	ROLL PIN		
66	1	523-0009	WASHER, NYLATRON, 1/16 x 3/16 x .015		
65	2		SOCKET HEAD SET SCREW #4-40 X 1/4		
64	2		HEX NUT #2-56	2	9
63	1	523-0008	WASHER, NYLON, 3/16 x 3/16 x .010		8
62	1	B-471-0122	SOLENOID BRACKET		7
61	2		PHMS #2-56 X 3/16	2	6
60	2		L/W #6		5
59	2		SOCKET HEAD SET SCREW #6-32 X 1/4	4	1
58	2		SOCKET HEAD CAP SCREW #2-56 X 1/4	3	1
57	2		PHMS #2-56 X 1/4	4	2
56	6		SOCKET HEAD CAP SCREW #2-56 X 1/2	1	1
55	2		PHMS #6-32 X 1/4		

PRODUCT WARRANTY

LIMITED ONE YEAR

While this warranty gives you specific legal rights, which terminate one (1) year (6 months on turntable motors) from the date of shipment, you may also have other rights which vary from state to state.

Broadcast Electronics, Inc. ("BE"), 4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305, hereby warrants cartridge machines, consoles, transmitters and other new Equipment manufactured by BE against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of one (1) year (6 months for turntable motors) from the date of shipment. Other manufacturers' Equipment, if any, shall carry only such manufacturers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. BE's sole responsibility with respect to any Equipment or parts not conforming to this warranty is to replace such equipment or parts upon the return thereof F.O.B. BE's factory or authorized repair depot within the period aforesaid.

In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the services of the Equipment due to its being serviced pursuant to this warranty. The terms of the foregoing warranty shall be null and void if the Equipment has been altered or repaired without specific written authorization of BE, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in BE's product literature or instruction manual which accompany the Equipment purchased. BE shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of BE.

BE shall not be liable to the original user for any and all incidental or consequential damages for breach of either expressed or implied warranties. However, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. All express and implied warranties shall terminate at the conclusion of the period set forth herein.

Except as set forth herein, and except as to title, there are no warranties, or any affirmations of fact or promises by BE, with reference to the Equipment, or to merchantability, fitness for a particular application, signal coverage, infringement, or otherwise, which extend beyond the description of the Equipment in BE's product literature or instruction manual which accompany the Equipment. Any card which is enclosed with the Equipment will be used by BE for survey purposes only.

BROADCAST ELECTRONICS, INC.
4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305