

INSTRUCTION MANUAL

SERIES 5400 SERIES 5500 TAPE CARTRIDGE MACHINES

APRIL, 1985

IM NO. 597-0094

BROADCAST ELECTRONICS, INC.



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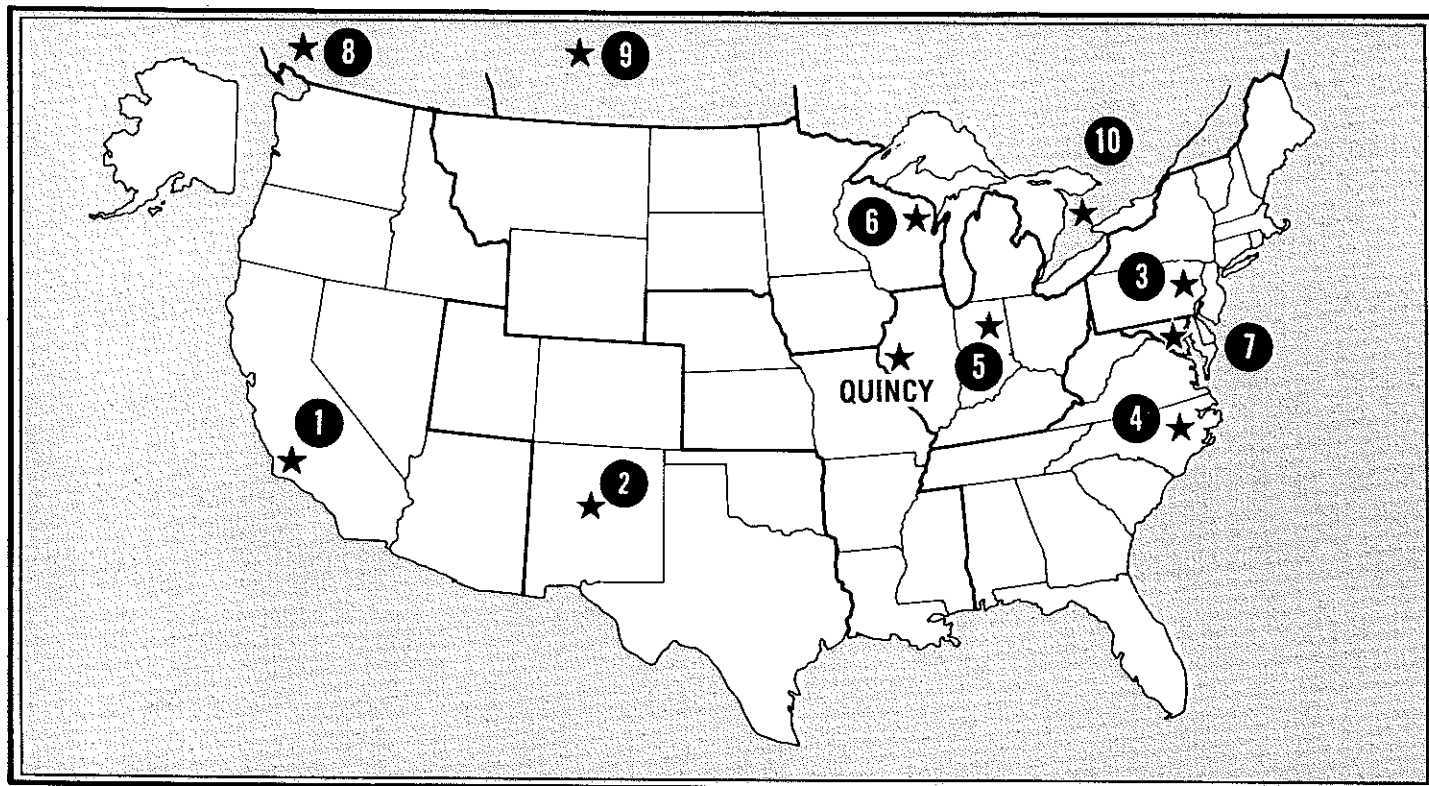
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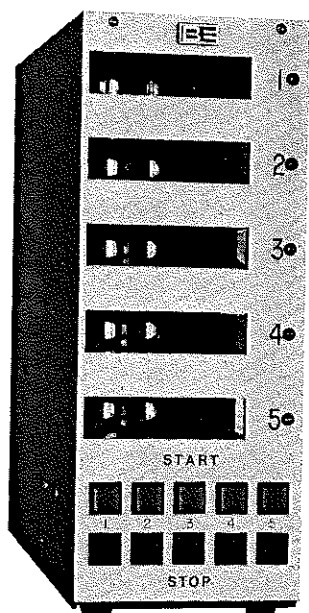
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TECHNICAL MANUAL
597-0094
BROADCAST ELECTRONICS
5400
AND
5500B
CARTRIDGE MACHINES



5500B



5400

<u>MODEL</u>	<u>STOCK NUMBER</u>	<u>MODEL</u>	<u>STOCK NUMBER</u>
5501B MONO PLAYBACK	900-5501	5401 MONO PLAYBACK	900-5401
5502B MONO PLAYBACK WITH CUE TONES	900-5502	5402 MONO PLAYBACK WITH CUE TONES	900-5402
5503B STEREO PLAYBACK	900-5503	5403 STEREO PLAYBACK	900-5403
5504B STEREO PLAYBACK WITH CUE TONES	900-5504	5504 STEREO PLAYBACK WITH CUE TONES	900-5404

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SECTION I

GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. This section contains a general description of the Broadcast Electronics 5400 and 5500B Audio Cartridge Machines, equipment identification, options, accessories, and equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

1-4. MODEL IDENTIFICATION.

1-5. 5400 AUDIO CARTRIDGE MACHINE. The model 5400 audio cartridge machine is a three-deck professional unit available in mono or stereo. Each of the three decks accept NAB size AA cartridges. Each deck provides full playback features. The bottom deck accepts an optional record amplifier accessory that provides full record capabilities.

1-6. 5500B AUDIO CARTRIDGE MACHINE. The model 5500B audio cartridge machine is a five-deck professional unit available in mono or stereo. Each of the five decks accept NAB size A and AA cartridges. Each deck provides full playback features. The bottom deck accepts an optional record amplifier accessory that provides full record capabilities.

1-7. ELECTRONIC DESCRIPTION.

1-8. NAB primary cue tone (1kHz) circuitry is included as standard equipment for each playback deck. This cue tone is used to stop and re-cue the tape at the beginning of the message. Secondary (150 Hz) and tertiary (8 kHz) cue tone sensing logic is available in a single optional package. The optional companion recorder for the bottom deck can be used to record the full range of cue tones. Each deck provides a 1kHz cue audio output signal at the machine rear connectors. If the secondary and tertiary cue options are installed, the 150 Hz and 8 kHz cue audio signals will also be available at the rear panel connectors. The cue sensitivity adjustment controls for each deck are also located on the unit's rear panel.

1-9. The machine front panel hinges at the bottom and folds down for easy access to the plug-in decks and other internal components. 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.

1-10. The Phase Lok IV head mounting bracket, used in the 5400 and 5500B, permits independent head adjustments for height, zenith, and azimuth. A reliable, low-voltage, air-damped solenoid provides smooth solid-state switching. Other features include a direct-drive hysteresis-synchronous motor, FET muting, rear panel LED status lights, and run indicator lights next to each deck that signal the deck is in use.

1-11. PHYSICAL.

1-12. The upper decks of the cartridge machines are plug-in units which are easily removed. The bottom deck is permanently mounted to the machine sidewalls and is rigidly fixed to a machined aluminum bulkhead plate. This bulkhead extends vertically from the bottom deck to the top of the machine, and maintains proper alignment of the decks, proper capstan positioning, and provides a rigid mechanical mainframe for the unit.

1-13. SPECIFICATIONS.

1-14. Refer to Table 1-1 for electrical and physical specifications related to the operation of the 5400 and 5500B cartridge machines.

1-15. OPTIONS AND ACCESSORIES.

1-16. Refer to Table 1-2 for options and accessories available for the 5400 and 5500B cartridge machines.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS
(Sheet 1 of 2)

PARAMETER	MODEL NO.	DESCRIPTION
NUMBER OF TRANSPORT DECKS	5400 5500B	Three. Five.
TRANSPORT DECK SIZE	5400 5500B	NAB AA size cartridges. NAB A and AA size cartridges.
TRANSPORT TYPE	ALL MODELS	Direct Drive Capstan.
MOTOR	ALL MODELS	Hysteresis synchronous.
TAPE SPEED	ALL MODELS	
STANDARD		7.5 in/sec (19.05 cm/s) $\pm 0.1\%$.
OPTIONAL		3.75 in/sec (9.53 cm/s).
WOW AND FLUTTER	ALL MODELS	0.15% DIN. weighted at 7.5 in/sec.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS
(Sheet 2 of 2)

PARAMETER	MODEL NO.	DESCRIPTION
NOISE: HUM AND NOISE MONOPHONIC STEREOPHONIC SQUELCH	ALL MODELS	-54 dB below 185 nWb/m at 700 Hz. -52 dB below 185 nWb/m at 700 Hz. -70 dB or better.
DISTORTION	ALL MODELS	2% or less record-to-playback at 185 nWb/m at 700 Hz.
EQUALIZATION: STANDARD OPTIONAL	ALL MODELS	1964 NAB Standard. I.E.C. or CCIR.
FREQUENCY RESPONSE	ALL MODELS	±2 dB from 50 Hz to 15 kHz, exclusive of head contour effect.
CROSSTALK	ALL MODELS	-50 dB or better, program-to-program or cue-to-program at 1kHz.
AUDIO OUTPUT	ALL MODELS	Continuously variable from -20 dBm to +10 dBm, 600 Ohms transformer balanced.
PEAK OUTPUT LEVEL	ALL MODELS	+20 dBm before clipping.
CUE TONES: STANDARD OPTIONAL	ALL MODELS	1000 Hz, Stop. 150 Hz and 8000 Hz. External cue-track and audio outputs are standard.
AMBIENT OPERATING TEMPERATURE	ALL MODELS	0° to 55°C (32° to 132°F).
POWER REQUIREMENTS: STANDARD OPTIONAL	ALL MODELS	105V to 125V at 60 Hz. 105 to 125V at 50 Hz or 210 to 240V at 50 or 60 Hz.

TABLE 1-1. ELECTRICAL AND PHYSICAL SPECIFICATIONS
(Sheet 3 of 3)

PARAMETER	MODEL NO.	DESCRIPTION
MOUNTING: STANDARD OPTIONAL	ALL MODELS	Table Top. Rack Mount Available, 19 inch (48.3 cm) Wide EIA Rack Shelf, 3 units per rack width.
DIMENSIONS: * Allow an additional 3 inches for rear panel connectors and 3/8 inch for rubber feet.	5400	10.625 inches High X 5.75 inches Wide X 17 inches Deep *(27 cm X 14.6 cm X 43.2 cm).
	5500B	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	5400	42 pounds (19 kg) packed.
	5500B	52 pounds (23.6 kg) packed.

TABLE 1-2. OPTIONS AND ACCESSORIES
(Sheet 1 of 2)

OPTIONS AND ACCESSORIES	STOCK NUMBER	MODEL
<p>MONO RECORDER: For 5400 For 5500B</p> <p>Brings bottom deck up to full Mono Record/Playback capability. Includes 1kHz cue tone (Manual No. 597-5351).</p>	<p>906-5409 906-5309A</p>	
<p>STEREO RECORDER: For 5400 For 5500B</p> <p>Brings bottom deck up to full Stereo Record/Playback capability. Includes 1kHz cue tone (Manual No. 597-5351).</p>	<p>906-5410 906-5310A</p>	
<p>AUDIO SWITCHER: Provides a single audio output from the last deck started, muting all other decks. Up to three switchers may be tied together, providing a single output from three units (Manual No. 597-5350).</p>	<p>904-5000 904-5001</p>	<p>SW5E (For 5400) SW5F (For 5500B)</p>
<p>REMOTE CONTROL UNITS.</p> <p>FOR 5500B: Provides START switch/indicators for up to 5 units for use when the equipment is installed at a location other than the operating position.</p> <p>FOR 5400: Provides all front panel controls and indicators for use when the equipment is installed at a location other than the operating position (Manual 597-5302).</p> <p>Remote control panel for standard 5400 cartridge machine.</p> <p>Remote control panel for 5400 cartridge machine with companion Record Amplifier.</p>	<p>906-3016 927-0047 927-0048</p>	<p>RC3000 RC5300</p>
<p>Secondary (150 Hz) and Tertiary (8 kHz) Cue Trips for Monaural Recorder.</p>	<p>906-5411A 906-5311A</p>	<p>5400 5500</p>
<p>Secondary (150 Hz) and Tertiary (8 kHz) Cue Trips for Stereophonic Recorder.</p>	<p>906-5411B 906-5311B</p>	<p>5400 5500</p>

TABLE 1-2. OPTIONS AND ACCESSORIES
(Sheet 2 of 2)

OPTIONS AND ACCESSORIES	STOCK NUMBER	MODEL
Rack Mount for 1 to 3 Units		
For 5400	906-5406	
For 5500B	906-5506	
Rack Filler Panel, 1/3 Width		
For 5400	900-5408	
For 5500B	906-5507	
Assembly, Cartridge Rack, 10 Slot		
For 5400	900-5407	
Assembly, Cartridge Rack, 4 Slot		
For 5400	900-5405	
Extender, Circuit Board	919-1806	
Cut-Away Test Cartridge	710-0132	
Tape Head, Tape Guide, and Motor Alignment Gauge	836-0009-1	
Test Tapes for Frequency Response and Alignment	AVAILABLE ON REQUEST	

SECTION II INSTALLATION

2-1. UNPACKING.

2-2. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the cartridge machine. Inspect it to determine if any damage was incurred during shipping. All shipping materials should be retained until it is positively determined that the machine sustained no damage. Claims for damaged equipment must be filed immediately.

2-3. A set of three hex wrenches and three 25-Pin rear panel connectors for the 5400 or five 25-Pin rear panel connectors for the 5500B are included with the machine. If the contents are incomplete, or if the unit is damaged, notify both the carrier and Broadcast Electronics, Inc.

2-4. INSTALLATION.

2-5. MOUNTING.

CAUTION

THE TOP AND BOTTOM COVERS OF THE UNIT ARE VENTED TO ALLOW FREE AIR FLOW THROUGH THE MACHINE. DO NOT COVER THESE VENTS.

CAUTION

2-6. The standard 5400 or 5500B is packaged for table top mounting; however, a full compliment of accessories are available from Broadcast Electronics for rack mounting. Up to three units may be mounted side-by-side in a EIA rack shelf. Rack space required is:

5400 - 19 inches Wide X 12.22 inches High X 16.875 inches Deep (48.3 cm X 31 cm X 42.8 cm).

5500B - 19 inches Wide X 17.47 inches High X 16.875 inches Deep (48.3 cm X 44.4 cm X 42.8 cm).

NOTE

INSTALLATION PROCEDURES FOR THE 5400 AND THE 5500B CARTRIDGE MACHINES ARE NEARLY IDENTICAL. FOR EASE IN EXPLANATION, 5400 CARTRIDGE MACHINE INSTALLATION WILL BE DESCRIBED. IF DIFFERENCES BETWEEN THE INSTALLATION PROCEDURES FOR THE 5400 AND THE 5500B CARTRIDGE MACHINE EXIST, THE 5500B INFORMATION WILL APPEAR IN PARENTHESES.

NOTE

NOTE

NOTE

2-7. EXTERNAL CONNECTIONS.

2-8. J101, J201, J301 (J401 and J501), 25-Pin connectors located on the rear panel of the cartridge machine are responsible for all input, output, remote control, and other connections between the unit and external equipment. The exception is J401 (J601), a 6-Pin connector, which, along with J301 (J501), interconnects the unit with the optional companion record amplifier. Terminal connection for the deck connectors are shown on drawing B906-5107 in Section VII of this manual. All external mating connectors are supplied with the machine.

2-9. To ensure proper grounding and to prevent the formation of ground loops, the shields should be connected only to the console or remote end of a cable. If ground loops persist with this arrangement, try moving the ground connection to the mid-point of the cable or to the other end of the cable. A special rear panel ground terminal is provided on the cartridge machines. Connect this terminal to the system ground with a heavy copper conductor.

2-10. AC POWER.

2-11. The standard 5400/5500B operates on 60 Hz power at either 105 to 125V ac or 210 to 230V ac, through internal strapping of the power transformer primary. Units for 50 Hz operation for the same voltage ranges are optionally available. Operating voltage requirements are indicated on the rear panel identification plate of each machine.

2-12. AUDIO LEVEL ADJUSTMENT.

2-13. Adjust the audio level as required in the overall system. Refer to paragraph 5-58 for the adjustment procedure.

2-14. OPTIONAL EQUIPMENT INSTALLATION.

2-15. The following paragraphs provide information on the installation of available options for the 5400 and 5500B cartridge machines.

2-16. RECORDER OPTION. The recorder amplifier functions in conjunction with the bottom deck of the 5400 or 5500B. A record head assembly takes the place of the dummy head on the bottom deck. The 25-pin plug P301 (P501), on the recorder remote cable plugs into the bottom deck connector J301 (J501), of the cartridge machine. A connection between the record-head cable and J401 (J601) is required. Installation procedures are further explained in the recorder manual (P/N 597-5351).

2-17. OPTIONAL START SEQUENCING. Machines equipped with secondary and tertiary cue tones can be wired to sequentially start the tape decks in any order.

2-18. The following installation procedures are typical. Any number of sequencing combinations are possible through wiring of the rear panel connectors.

2-19. 5400 Start Sequencing. The following connections in conjunction with the 150 Hz cue tone will sequence the decks so that deck 1 will start deck 2, deck 2 will start deck 3, deck 3 will, in turn, start deck 1 (refer to Figure 2-1 as required).

1. Connect J101 pins 10 and 25.
2. Connect J101 pin 13 to J201 pin 1.
3. Connect J201 pins 10 and 25.
4. Connect J201 pin 13 to J301 pin 1.
5. Connect J301 pins 10 and 25.
6. Finally, connect J301 pin 13 to J101 pin 1.

2-20. 5500B Start Sequencing. The following connections in conjunction with the 150 Hz cue tone will sequence the decks so that deck 1 will start deck 2, deck 2 will start deck 3, deck 3 will start deck 4, deck 4 will start deck 5, and deck 5 will, in turn, start deck 1 (refer to Figure 2-1 as required).

1. Connect J101 pins 10 and 25.
2. Connect J101 pin 13 to J201 pin 1.
3. Connect J201 pins 10 and 25.
4. Connect J201 pin 13 to J301 pin 1.
5. Connect J301 pins 10 and 25.
6. Connect J301 pin 13 to J401 pin 1.
7. Connect J401 pins 10 and 25.
8. Connect J401 pin 13 to J501 pin 1.
9. Connect J501 pins 10 and 25.
10. Finally, connect J501 pin 13 to J101 pin 1.

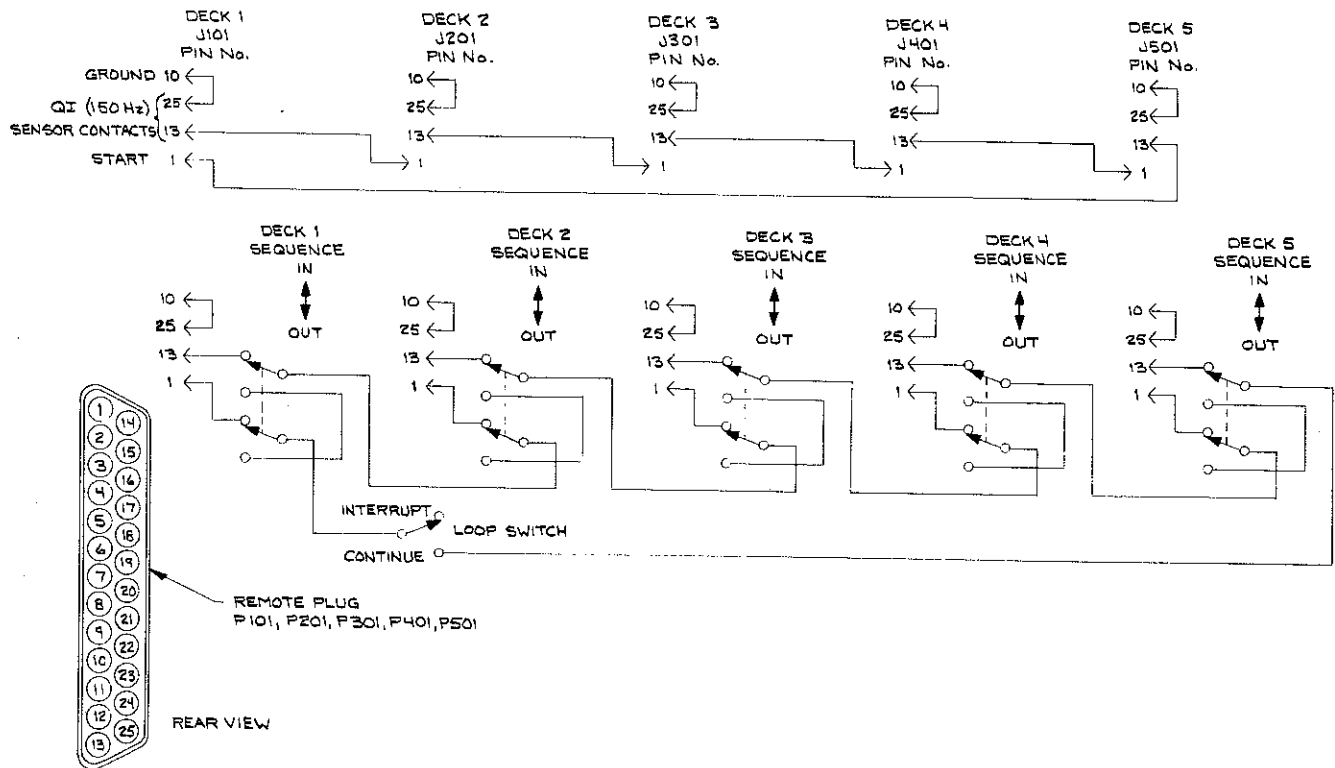
2-21. REMOTE CONTROL INTERCONNECTIONS. Drawing B906-5117 in Section VII provides wiring information for remote control.

2-22. AUDIO SWITCHER. The interconnections between the SW5E muting switcher and the 5400 and between the SW5F and the 5500B are described in the switcher instruction manual (597-5350).

NOTE

NOTE

DECKS 4 AND 5 ON 5500B ONLY. TO COMPLETE SEQUENCE FOR 5400 CARTRIDGE MACHINES, CONNECT PIN 13 OF J301 TO PIN 1 OF J101.



597-5502-2

FIGURE 2-1. START SEQUENCING

SECTION III

OPERATION

3-1. INTRODUCTION.

3-2. This section contains procedures to be followed for proper operation of 5400 and 5500B cartridge machines.

3-3. OPERATION.

3-4. Turn the machine on by operating the rear panel ON/OFF switch to ON. This will apply power to the internal circuitry and energize the motor.

3-5. Load a pre-recorded cartridge into one of the decks. The STOP switch/indicator for that deck will illuminate, indicating that the deck is now loaded.

3-6. Momentarily depress the START switch/indicator for the loaded deck. The START switch/indicator will illuminate, the STOP switch/indicator will go out, tape movement will begin, and the corresponding deck run indicator light will illuminate. The tape will continue to run until either the STOP switch/indicator is pressed or a stop cue tone is sensed.

3-7. When the cartridge stops, the START light and the deck run indicator light will both go out and the STOP switch/indicator will illuminate. When the cartridge is removed from the deck, the STOP light will go out.

3-8. If the unit is equipped with the QI and QII options, the STOP switch/indicator will illuminate whenever a QII (8 kHz) cue tone is detected but the machine will not stop. The indicator will remain illuminated for the duration of the tone. When a QI (150 Hz) cue tone is detected, both the START switch/indicator and the deck run indicator light will become brighter for the duration of the tone.

SECTION IV THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section contains the theory of operation for 5400 and 5500B cartridge machines. Two levels of discussion are provided. The first part is a general description of the main system components, and the second part provides a detailed functional description of the electronic components.

4-3. GENERAL DESCRIPTION.

4-4. MAIN COMPONENTS.

4-5. FRONT PANEL CONTROLS. The START and STOP switch/indicators and the deck indicator lights are all positioned on the machine front panel (see Figure 4-1).

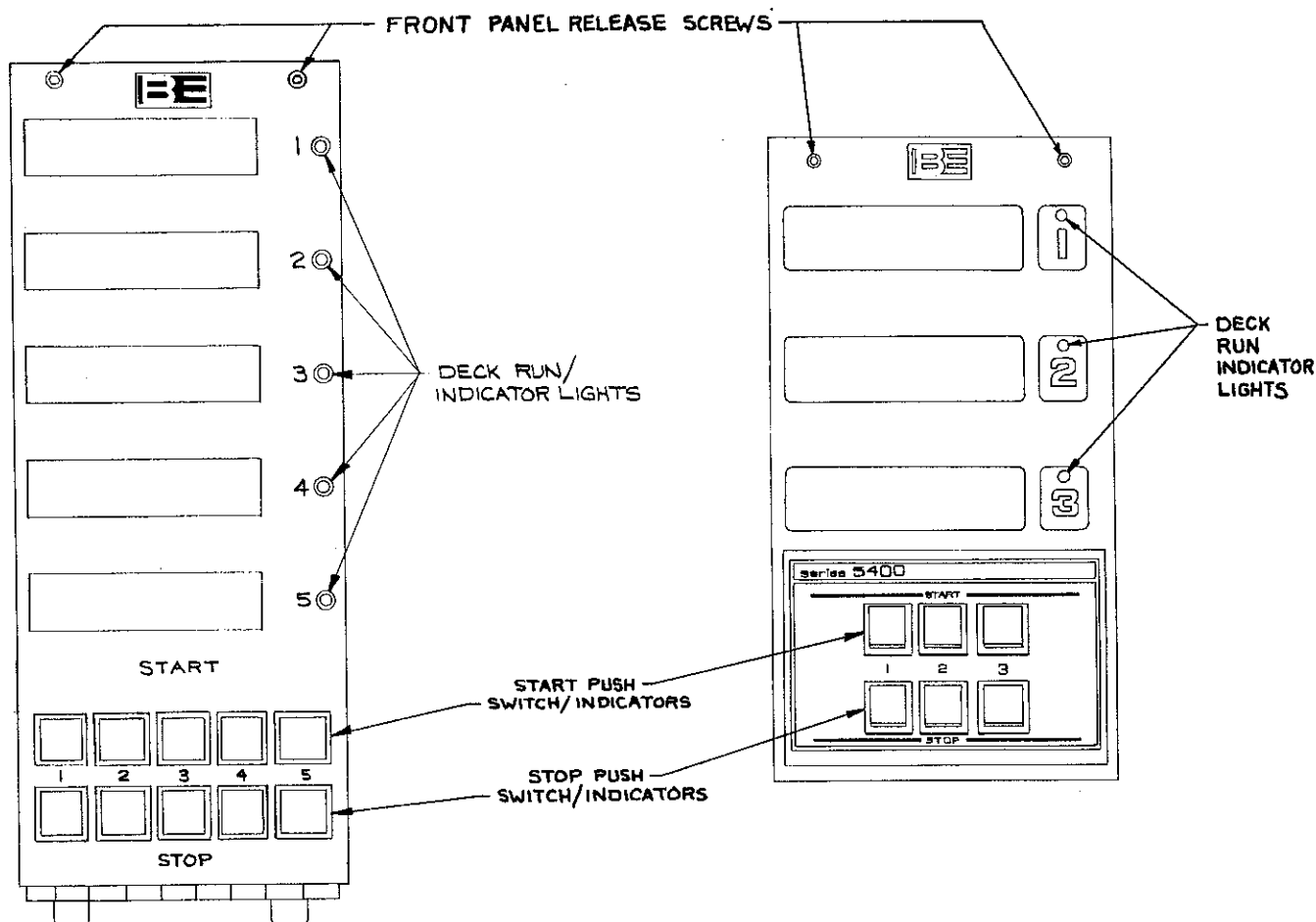
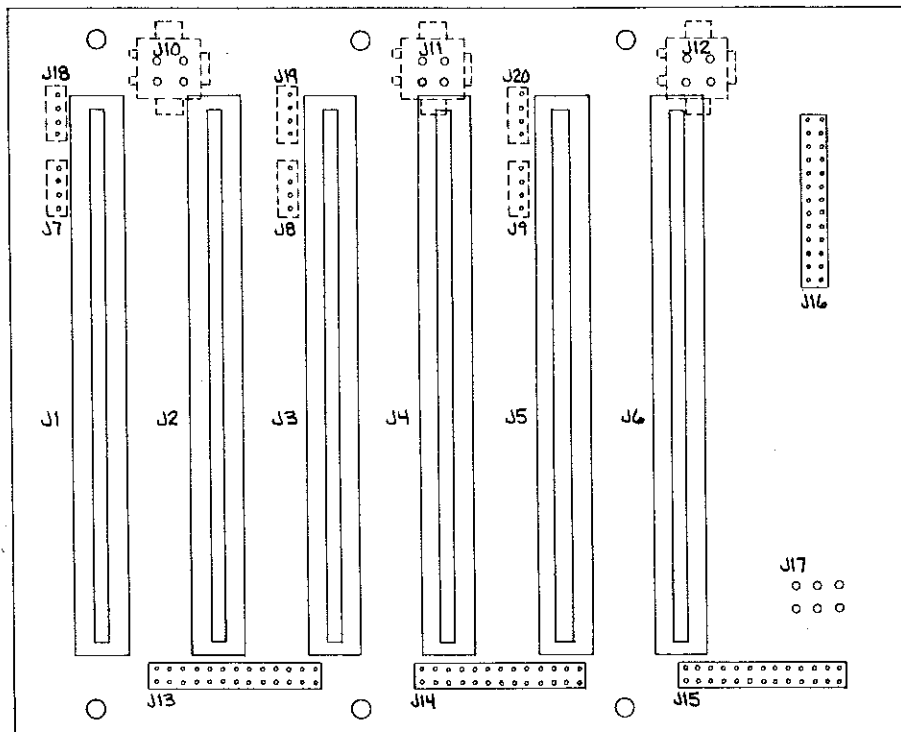


FIGURE 4-1. FRONT VIEW, PARTS LOCATION

597-0094-3

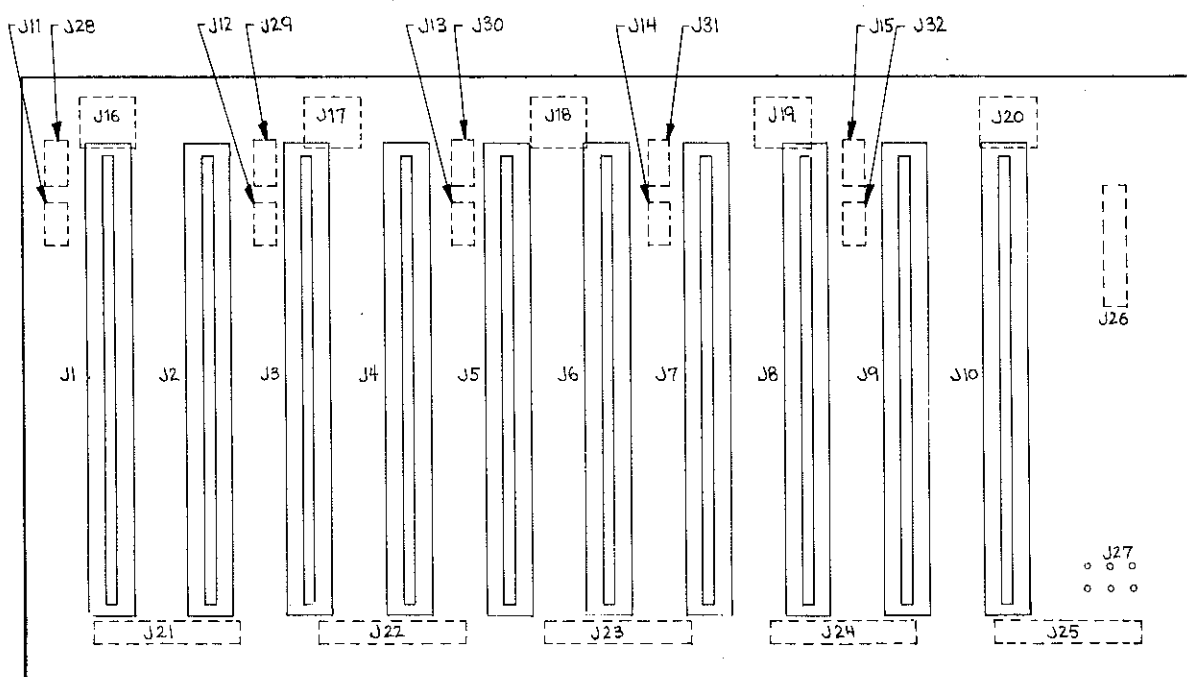
4-6. MOTHERBOARD ASSEMBLY. This assembly is located immediately behind the bulkhead plate. The motherboard (refer to Figure 4-2) provides plug-in receptacles for the tape head amplifier and control circuit boards and provides the basic interconnections between these two circuit boards, the power supply circuit board, the solenoid drivers, and the machine's input and output terminals.



597-0094-6

FIGURE 4-2A. 5400 MOTHERBOARD CONNECTORS

J1, J3, J5	For Tape Head Amplifier Circuit Boards.
J2, J4, J6	For Control Circuit Boards.
J7, J8, J9	To Audio Output Transformers (Right Channel Audio).
J10, J11, J12	To Deck Solenoid and Ready Microswitch.
J13, J14, J15	To Rear Panel Connectors.
J16	To Front Panel Switch Circuit Board.
J17	To Power Supply Circuit Board.
J18, J19, J20	To Audio Output Transformers (Left Channel Audio).



597-5502-5

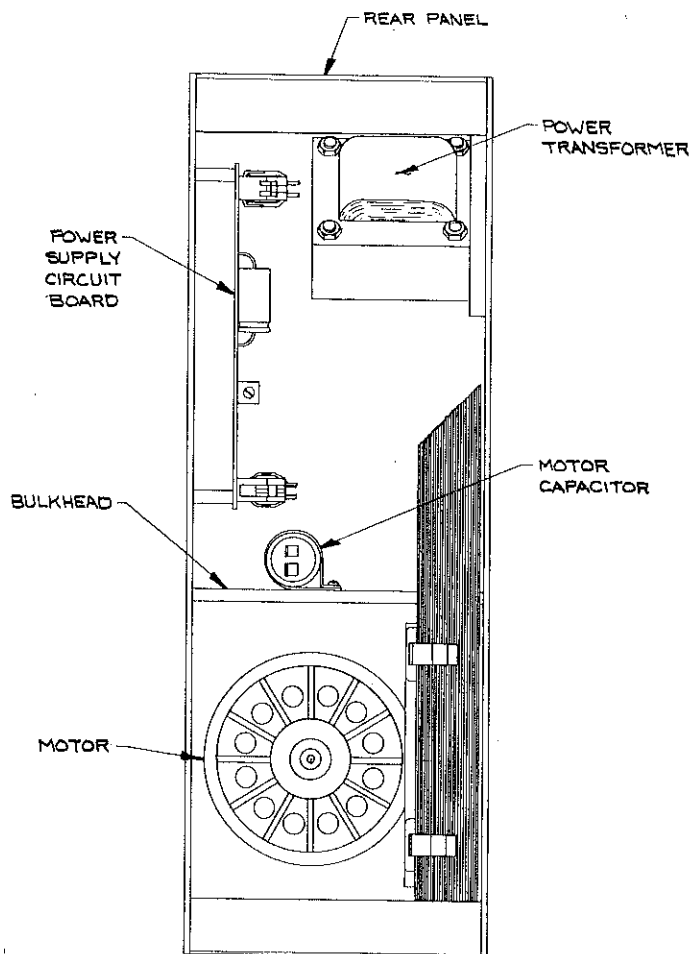
FIGURE 4-2B. 5500B MOTHERBOARD

Rear Side Facing Bulkhead

- J1, J3, J5,
J7, J9: For Tape Head Amplifier Circuit Boards.
- J2, J4, J6,
J8, J10: For Control Circuit Boards.
- J11 THRU
J15: To Audio Output Transformers (Right Channel Audio).
- J16 THRU
J20: To Solenoid and Ready Microswitch.
- J21 THRU
J25: To Rear Panel Connectors.
- J26: To Front Panel Switch Circuit Board.
- J27: To Power Supply Circuit Board.
- J28 THRU
J32: To Audio Output Transformers (Left Channel Audio).

4-7. TAPE TRANSPORT SYSTEM. Three (five) independently controlled decks are directly driven by the driveshaft of a hysteresis synchronous motor (see Figure 4-3). These decks are held in proper alignment with the motor driveshaft and the capstan pressure roller by an aluminum bulkhead plate which vertically extends the length of the machine. The driveshaft upper bearing is anchored to the top of the bulkhead plate.

4-8. TAPE HEAD AMPLIFIER CIRCUIT BOARDS. Three (five) tape head amplifier circuit boards, one per deck, plug into the motherboard. Monoaural machines provide two amplifiers per circuit board: one amplifier for the program audio channel and the other for the cue channel. Stereo units provide three amplifiers as required for the left, right, and cue channels. In addition, circuitry on this board generates a stop logic pulse from the 1kHz end-of-program tone which is used on the control board for tape stop action.



597-5502-4

FIGURE 4-3. BOTTOM VIEW, COVER REMOVED

4-9. Program Channel. Refer to Figure 4-4 for the following description. The left and right channel program amplifiers are identical. These channels consist of four basic parts. The first part is an integrated circuit preamplifier with adjustable high and low frequency compensation. Then, an FET switching circuit mutes the audio from all decks not started. Individual level controls are located between the audio muting circuits and the output drivers. Lastly, a transformer provides a balanced audio output.

4-10. Cue Channel. The cue channel amplifier is located on the tape head amplifier circuit board (see Figure 4-4). This is a broad-band audio channel which passes the full range of NAB tones, up to and including an 8 kHz tertiary signal. The preamplifier stage amplifies the head output voltage and provides a low impedance cue-audio output signal. A signal is routed from the preamplifier stage to the machine rear panel output connector for external use and to the control logic circuit board for 150 Hz and 8 kHz decoding. The external signal may be used in broadcast and other operations including automation, program identification, and logging if appropriate coded information is recorded on the cue track.

4-11. The 1kHz detector/integrator is an active band-pass filter which sends and amplifies the end-of-program tone. It applies a logic pulse to the control circuit board which stops tape motion when the 1kHz tone is detected.

4-12. CONTROL CIRCUIT BOARDS. One plug-in control circuit board is used for each transport deck and plugs into the motherboard. Each control circuit board contains the logic circuitry for tape transport control plus optional 150 Hz and 8 kHz cue tone amplifiers with associated tone sensing circuits and relay output logic.

4-13. Control Board. Refer to Figure 4-4 for the following description. The control board accepts start and stop signals from the machine front panel switches or remote control unit. It also accepts the end of program logic pulse from the 1kHz cue track. These signals control tape motion with the transport solenoid/pressure roller assembly, and generate indicator light logic signals that show whether the tape deck is in the ready mode (cartridge loaded and cued) or the start mode (tape running).

4-14. Additionally, the control board provides amplifying, detecting, and logic output circuitry for the 150 Hz and 8 kHz cue tones. These tones, defined in NAB standards as secondary (150 Hz) and tertiary (8 kHz) cue tones, differ from the primary cue tone (1kHz stop tone) in that the secondary and tertiary tones are used only to control associated devices in the overall system.

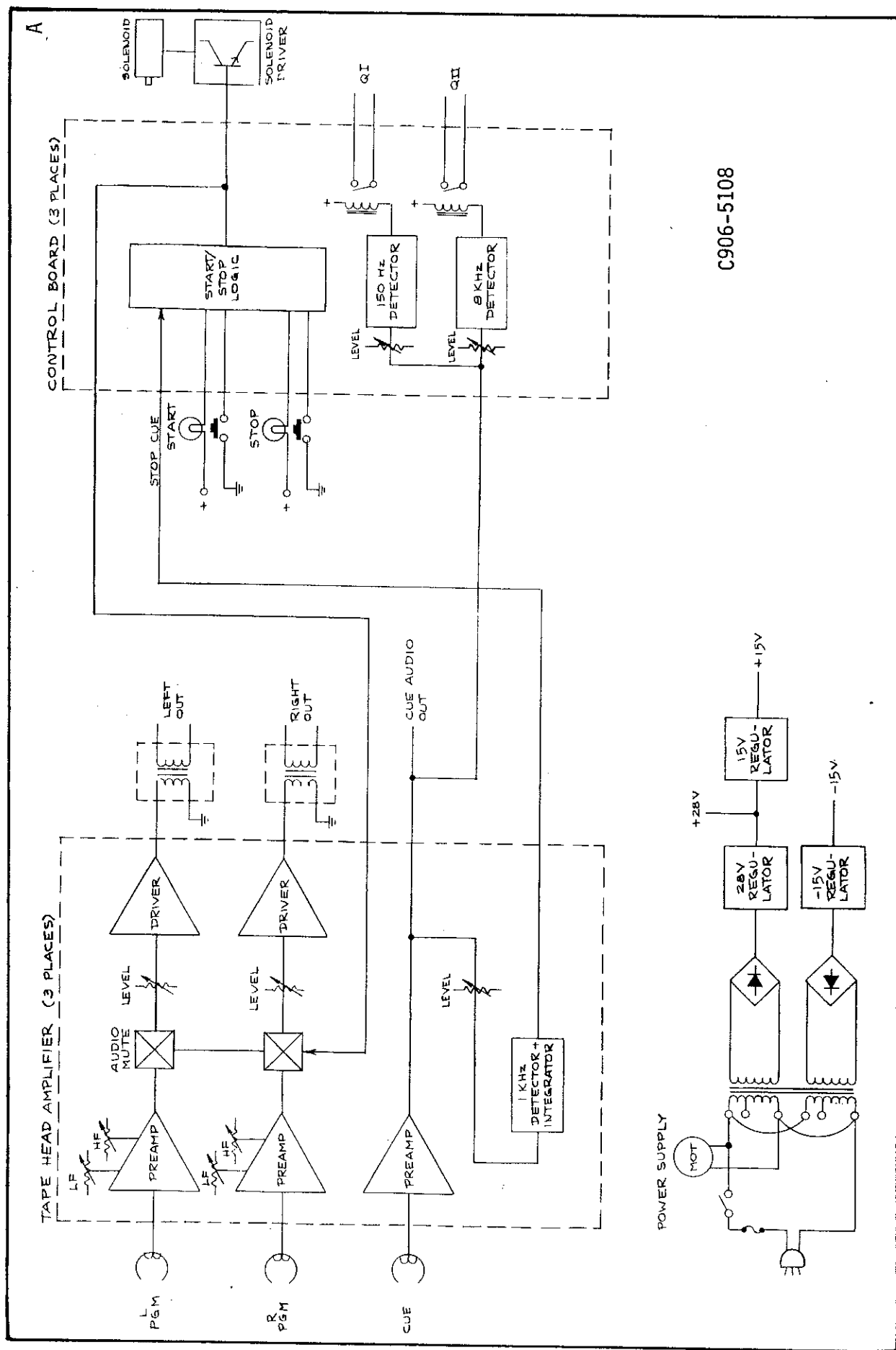
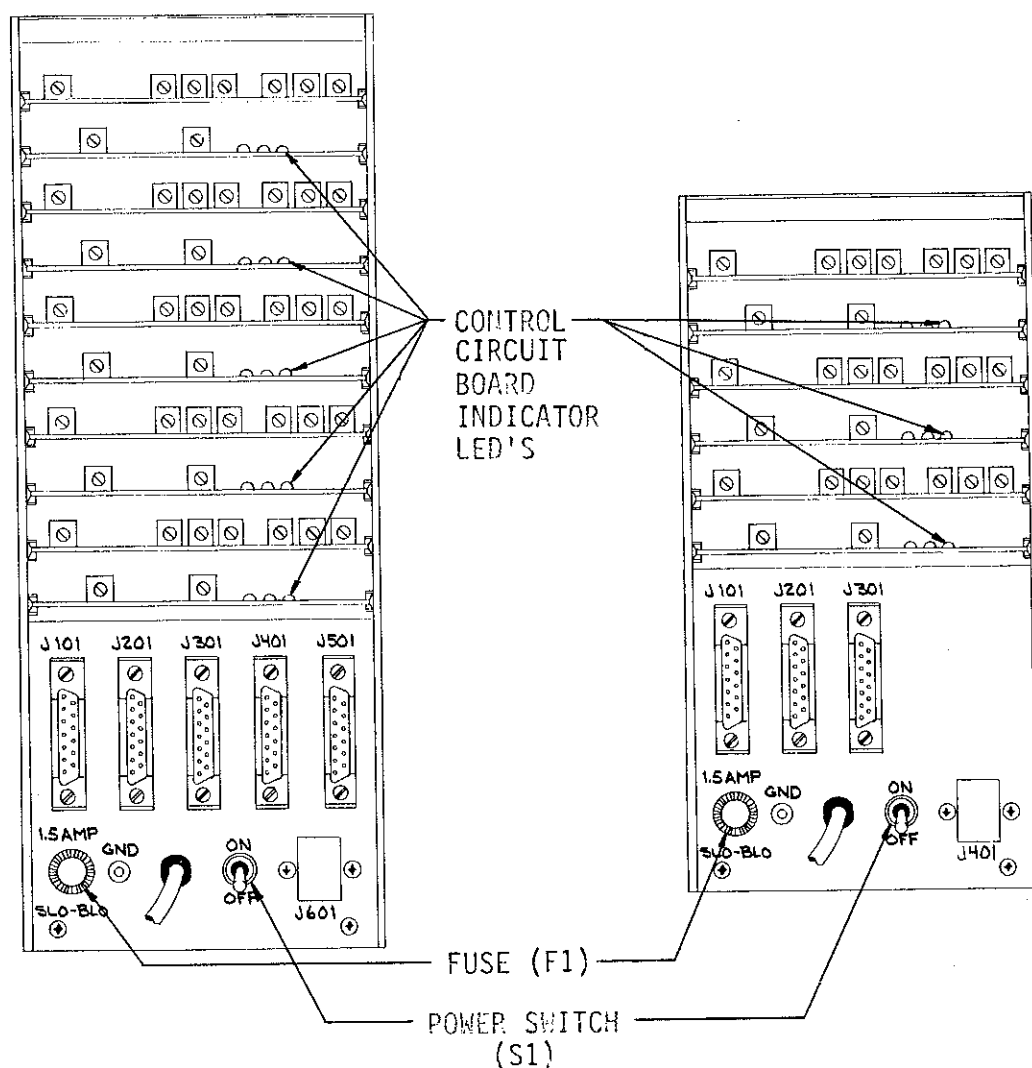


FIGURE 4-4. FUNCTIONAL BLOCK DIAGRAM

4-15. For example, the secondary tone is defined as the end-of-message cue and is generally used to automatically activate another device. Thus, a series of events could be started and sequentially produced by depressing a single switch. The tertiary cue tone is defined as an auxiliary tone and is normally used to activate other devices (e.g. slide changer) at any time during reproduction of program material.

4-16. REAR PANEL ASSEMBLY. Three (five) 25-pin connectors are mounted on the machine rear panel, providing output connections for audio, tone and control signals. When the optional record amplifier is used with the bottom deck, this unit connects to receptacle J401 (J601) on the rear panel. The power ON/OFF switch is also located on the rear panel (refer to Figure 4-5).



597-0094-15

FIGURE 4-5. REAR VIEW, COVER PLATE REMOVED

4-17. POWER SUPPLY. The 5400/5500B operates from a primary input potential of 105 to 125V ac (refer to Figure 4-4). Primary ac is applied to the power transformer through a fuse which provides overload protection, and the rear panel power switch which allows ON/OFF control. Primary jumpers allow use of both 115 or 230 volt ac input potentials. The motor is connected to the primary of the power transformer through connectors on the power supply circuit board.

4-18. The secondary windings of the power transformer produce two ac potentials which are regulated and rectified into two dc sources. One secondary is full-wave rectified and regulated into a positive 28 volt source which is re-regulated into a positive 15 volt source. The remaining secondary is full-wave rectified and regulated into a negative 15 volt source.

4-19. DETAILED THEORY OF OPERATION.

4-20. TAPE HEAD AMPLIFIER CIRCUIT BOARD.

4-21. Refer to schematic 906-1840 for the following description. Each deck of the cartridge machine requires one tape head amplifier board. The schematic shows three audio amplifier channels. The left program channel, the right program channel, and the cue channel are all used in the stereophonic version of the 5400/5500B. The monophonic version has only the left program channel and the cue channel. Stereo capability in a mono unit is accomplished by replacing the two channel circuit boards with three channel stereo versions, and by installing the necessary stereo head assemblies.

4-22. LEFT AND RIGHT PROGRAM CHANNELS. The two program channels are similar in operation. For ease in explanation, the left channel will be described with right channel information appearing in parentheses.

4-23. Audio from the tape head is applied through coupling capacitor C10 (C23) to the non-inverting input of operational amplifier U1 (U2). This single-stage amplifier drives FET muting switch Q1 (Q8). The output of U1 (U2) terminal 6 is also fed back to its inverting input to provide both high-frequency and low-frequency compensation. Adjustments are made with R3 (R6), low end, and R2 (R5), high end.

4-24. FET Q1 (Q8) is controlled by the solenoid drive signal which is generated on the logic control board. Q1 (Q8) passes audio only when the associated deck transport is operational. When the transport is in the start mode, the solenoid drive signal is applied to the base of transistor Q11 which pulls the base positive. This causes Q11 to conduct, drawing its collector to near-ground potential and turning Q1 (Q8) on.

4-25. Audio, after being applied to R1 (R4) for level control, is routed to the non-inverting input of operational amplifier U4 (U5) which drives complimentary transistor output stage Q2 and Q4 (Q6 and Q9). The ratio of R11 and R13 (R24 and R26) fixes the gain of the stage, while C12 (C25) establishes frequency compensation. Temperature stabilizing elements, diodes CR1 and CR2 (CR3 and CR4), shift the bias on drivers Q2 and Q4 (Q6 and Q9) with temperature changes.

4-26. Q3 and Q5 (Q7 and Q10) sense excessive current in R18 and R19 (R27 and R28). If excessive current flows through those resistors, Q3 and Q5 (Q7 and Q10) limit current flow through Q2 and Q4 (Q6 and Q9).

4-27. CUE CHANNEL. The cue amplifier channel provides a flat response to the full range of cue tones. The amplifier channel consists of equalized preamplifier U3A and output amplifier U3B. The cue audio is routed via pin 4 of the circuit board to the output connector on the rear of the machine and to R50, the gain control for the 1kHz filter.

4-28. Cue audio from level control R50 is applied to 1kHz band-pass filter U6A. The band-pass filter assures only the 1kHz cue tone will be processed to stop the machine. The output of U6A is rectified by diode CR5 and applied to integrator detector U6B.

4-29. When the machine is running, the output of U6B will be negative. When a cue tone is processed, the output of U6B will rise to a positive level to halt the machine.

4-30. CONTROL CIRCUIT BOARD.

4-31. The control circuit board is shown in schematic 906-1841 in Section VII. Standard circuitry on this board provides:

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

4-32. The control board responds to the START and STOP push switches, the deck ready microswitch, and the 1kHz tone integrator on the head amplifier circuit board.

4-33. The schematic shows the logic status of the control board under initial conditions, that is, the deck not loaded with a cartridge. The zero and one figures at the integrated circuit terminals indicate the logic status during the deck unload condition. Loading a cartridge, pushing the START and STOP switches, or sensing of a 1kHz stop tone will change the logic states.

4-34. When a cartridge is loaded, the inserted cartridge will open the deck ready microswitch. The current path through the deck ready microswitch and pull-up resistor R4 will be interrupted when the switch is opened. A ONE state will then be input to U2B pin 5. A ONE state is already input to U2B pin 4 from U1B of the control flip-flop. With these input conditions, U2B will output a ONE state to enable Q2.

4-35. Current flow through Q2 and CR4 will illuminate the rear panel STOP indicator (I2) and the front panel STOP switch/indicator. Diode CR4 isolates the ready circuitry from the 8 kHz cue channel and zener diode CR3 limits the dc voltage on the STOP indicators to 20 Volts. A stop verify signal to the rear panel connectors is provided by Q2 for use in applications requiring external status sensing such as automation systems. Other logic elements remain unchanged when a cartridge is loaded.

4-36. When the START switch of a loaded deck is depressed, the logic status of the control flip-flop will change states. U1A will go HIGH which forces U1B LOW. When U1B goes HIGH, U2B will deenergize Q2 and the STOP indicators will go out.

4-37. The HIGH from U1A and the HIGH from U1C will enable the start driver (U2D) which enables Q1. Current flow through Q1 will illuminate the rear panel RUN indicator (I3) and the front panel START switch/indicator. Zener diode CR5 limits the dc voltage on the START indicators to 20 Volts. A start verify signal to the rear panel connectors is provided by Q1 for use in applications requiring external status sensing such as an automation system.

4-38. An output from start driver U2D disables the audio mute circuitry and energizes the solenoid drivers. The machine will now be operational.

4-39. U2C and U1D combine in a circuit that pre-sets the cue and stop circuitry. When a cartridge is started, U1D is set up to stop the tape motion when a decoded stop tone is detected and illuminate the rear panel Q indicator (I1). R1 and C1 delay U1D for about three seconds after the deck starts to insure that a previous stop cue tone will not stop the newly started cartridge. At the end of the recorded message, the 1kHz tone will trigger a cue/stop signal to stop the tape.

4-40. Depressing a front panel STOP switch will also stop the tape. While a tape is in use, pushing the STOP switch changes the logic inputs U2A, which stops the tape.

4-41. OPTIONAL CUE CIRCUITRY. Audio from the cue channel of the tape head amplifier board is fed through 8 kHz (Q11) level control R25 to 8 kHz band-pass filter U3A. This filter assures only the 8 kHz tone will be processed to activate auxiliary equipment. The output of U3A is rectified by diode CR6 and applied to integrator U3B.

4-42. When the machine is in operation, the output of U3B is negative. When an 8 kHz cue tone is processed, the output rises to a positive level. This activates Q3, triggers relay K1, and illuminates the QII/STOP rear panel indicator. Whenever a QII (8 kHz) cue tone is detected, the STOP switch/indicator, on the front panel, will illuminate for the duration of the tone. Diode CR8 isolates the QII relay from the stop circuit.

4-43. Audio fed through 150 Hz (QI) level control R24 is passed to band-pass filter U4A, which assures only the 150 Hz tone is processed to activate another part of the automation system. The output of U4A is rectified by CR11 and applied to integrator U4B.

4-44. When the machine is in operation, the output of U4B is negative. When a 150 Hz cue tone is processed, the output rises to a positive level. This activates Q4, triggers relay K2, and illuminates the QI/RUN rear panel indicator. Whenever a QI (150 Hz) cue tone is detected, the front panel START switch/indicator and the rear panel QI/RUN indicator will more brightly illuminate for the duration of the tone. Diode CR9 isolates the QI relay from the start circuit.

4-45. POWER SUPPLY.

4-46. Schematic diagram D906-5116 shows the power supply for the cartridge machines. Refer to it as needed for the following description.

4-47. AC power is applied to the cartridge machine through fuse F1 and ON/OFF switch S1. The fuse provides overload protection and the switch provides control of the ac power. The ac voltage is applied to the power supply circuit board through P1/J1. The power transformer is connected to the power supply through P3/J3. The motor operates from 110 volts ac and derives its voltage from across one primary winding of the power transformer.

4-48. One secondary is rectified into a +43 volt dc source and the remaining secondary is rectified into a -32 volt dc source.

4-49. The positive voltage is filtered and regulated into a +28 volt dc source by U1 and the pass transistor located on the machine chassis. The +28V dc source is adjustable by means of potentiometer R2. The +28 volt source is re-regulated into a +15 volt source by Q1 and CR9. The negative voltage is filtered and regulated into a -15 volt dc source by Q2 and CR10.

4-50. The +28 volt source powers the front panel and optional remote control start and stop switch/indicators, control deck logic output circuits, and the solenoid drivers. The ± 15 volt dc sources power head amplifiers and control circuit circuitry.

SECTION V MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides general maintenance information, mechanical and electrical adjustment procedures, and component replacement procedures for 5400/5500B cartridge machines.

5-3. FIRST LEVEL MAINTENANCE.

5-4. First level maintenance consists of routine cleaning and preventive maintenance procedures which help to maintain high performance from the unit.

WARNING

DISCONNECT POWER PRIOR TO SERVICING

5-5. Use a soft cloth moistened with a mild household cleaner to clean fingerprints and marks from the machine chassis and other surfaces. Remove dust from the interior with a soft brush.

WARNING

MOST SOLVENTS WHICH WILL REMOVE TAPE RESIDUE ARE VOLATILE AND TOXIC BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA, AWAY FROM FLAME, CIGARETTES, OR HOT SOLDERING IRONS.

WARNING

WARNING

WARNING

OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-6. HEADS.

5-7. At least once a day, heads, pressure roller tape path, guides, and capstan should be cleaned with a suitable cleaning solution to remove accumulated oxide. Demagnetize the heads and other ferrous material in the tape path frequently, about once a week. Use an appropriate degausser, following the directions supplied with the unit. Use care not to scratch the heads during this operation.

5-8. CARTRIDGE TAPES.

5-9. As an inserted cartridge is part of the machine system, a defective cartridge will have adverse affects on machine performance. Before placing a cartridge in service, check the cartridge for cleanliness, mechanical defects, and tape wear. The appendix provides additional information on tape and cartridge maintenance.

5-10. CIRCUIT BOARDS AND CONNECTORS.

5-11. Routine cleaning of circuit boards and connectors is not necessary; however, if visual inspection of the contacts or intermittent machine performance indicates that the contacts may be dirty, the contacts should be cleaned with an aerosol contact cleaner.

5-12. SECOND LEVEL MAINTENANCE.

<u>NOTE</u>	MAINTENANCE PROCEDURES FOR THE 5400 AND THE 5500B CARTRIDGE MACHINES ARE NEARLY IDENTICAL.
<u>NOTE</u>	FOR EASE IN EXPLANATION, 5400 CARTRIDGE MACHINE MAINTENANCE WILL BE DESCRIBED. IF
<u>NOTE</u>	DIFFERENCES BETWEEN THE MAINTENANCE PROCEDURES FOR THE 5400 AND THE 5500B CARTRIDGE MACHINE
<u>NOTE</u>	EXIST, THE 5500B INFORMATION WILL APPEAR IN PARENTHESES.

5-13. Second level maintenance consists of procedures required to restore the unit to proper operation after a fault has occurred.

<u>WARNING</u>	DISCONNECT POWER BEFORE ATTEMPTING ANY MAINTENANCE PROCEDURE.
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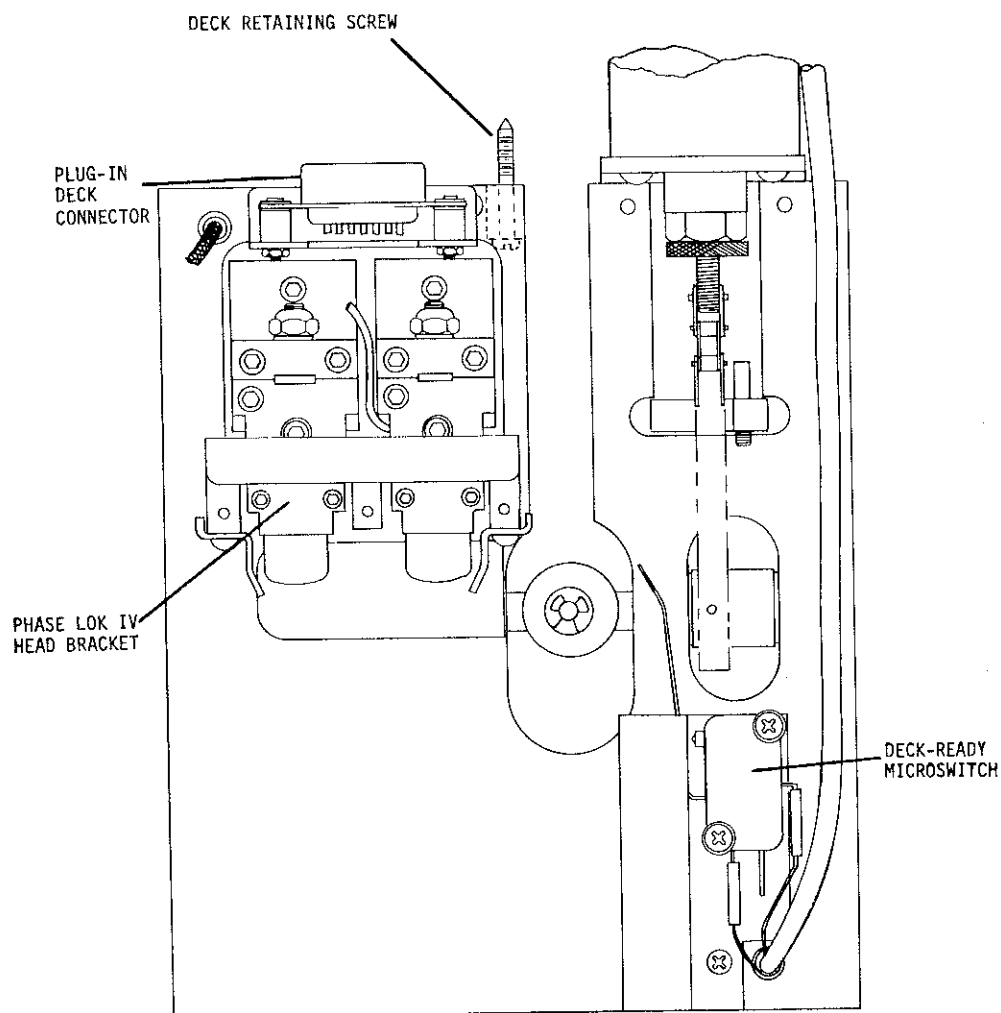
5-14. DECK ACCESS AND REMOVAL.

5-15. Remove the three-sided machine cover which is held on by six Phillips screws, three on each side of the machine. (Remove the grilled upper machine cover which is held on by four Phillips head screws, one near each cover). This provides access to the top deck.

5-16. To remove a deck, first free the front panel to swing down on its hinged bottom edge by removing the two hex head screws located near the top edge of the front panel (refer to Figure 4-1). Swing the front panel down, placing a soft object under the lower part of the panel. This will help prevent damage to any of the front panel switches while it rests on the workbench.

5-17. The top two (four) decks are removed by first freeing the deck retaining screw (see Figure 5-1), located beneath the deck just to the left of the capstan shaft, which holds the deck to the bulkhead plate. Loosen the screw and remove the deck by carefully pulling the deck forward. Ease the deck out, applying even pressure to both sides to prevent binding of the edges and possible cable or wiring damage.

5-18. When replacing a deck, be certain that the rear deck connector is properly inserted into the plug on the bulkhead and that the retaining screw is securely tightened.



597-5502-7

FIGURE 5-1. TAPE TRANSPORT DECK

5-19. MECHANICAL ADJUSTMENTS.

5-20. Specific instructions are provided for the following mechanical adjustments:

- A. Pressure Roller/Motor Alignment
- B. Solenoid Plunger
- C. Tape Guide Adjustment
- D. Head Adjustments
 - 1. Head Adjustment
 - 2. Zenith
 - 3. Height
 - 4. Azimuth
 - 5. Stereo Phasing
- E. Solenoid Speed

5-21. **PRESSURE ROLLER ALIGNMENT.** Pressure roller alignment involves positioning the motor so that the pressure roller makes even contact with the capstan driveshaft, from top to bottom along the roller surface. This assures even pressure distribution between the pressure roller and the shaft as the tape is fed past the capstan. Improper alignment will direct or skew the tape in either an upward or downward direction, resulting in improper tape flow past the heads.

5-22. Two procedures are provided for the alignment. The first procedure is the recommended procedure requiring the use of a motor alignment gauge (BE P/N 836-0009-1). The second procedure is an alternate method of alignment to be used when an alignment gauge is not available.

5-23. Motor Alignment. To gain access to the bottom deck, remove the top decks (refer to paragraph 5-14). To adjust the pressure roller proceed as follows:

A. Recommended Procedure

1. Manually raise the pressure roller of deck 3 (5) above deck level by pushing in the solenoid plunger.
2. Remove the E-ring from the top of the pressure roller (refer to Figure 5-2).
3. Remove and retain the pressure roller and the nylon washers.
4. Set the alignment gauge on the pressure roller shaft (refer to Figure 5-5) so that the gauge rests on the deck surface.
5. Loosen the Phillips screws which hold the upper bearing support in place (refer to Figure 5-9).
6. Loosen the two large Phillips head motor mounting screws on the bottom deck just enough to permit the motor and shaft to move fore and aft as a single unit.
7. Move the motor assembly as required so that the gauge face is parallel to the motor shaft and contacts the shaft from top to bottom.

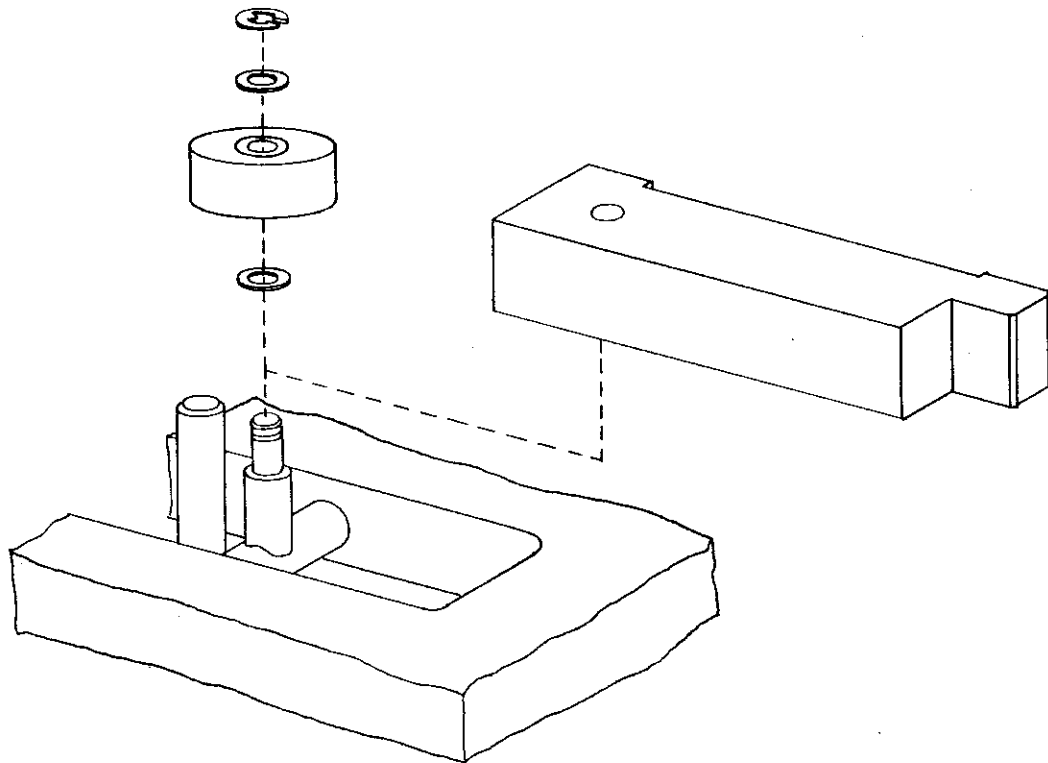
NOTE

APPLY NO SIDE TORQUE WHEN TIGHTENING THE BEARING SUPPORT MOUNTING SCREWS. HOLD THE BEARING SUPPORT LIGHTLY IN PLACE WITH THUMB AND FORE-FINGER AND TIGHTEN THE SCREWS SLOWLY AND ALTERNATE BETWEEN THE TWO SCREWS SO THAT THE MOUNTING IS NOT MOVED WHILE BEING SECURED.

NOTE

NOTE

8. Tighten the motor mounting screws followed by the bearing support screws. Check for proper alignment and repeat the procedure until proper alignment is obtained.
9. Remove the alignment gauge and place the first washer, the pressure roller, the second nylon washer, and the E-ring on the shaft, in that order.
10. Check the alignment of decks 2 and 1 (4, 3, 2, and 1), in that order, making any necessary adjustments.



597-0094-16

FIGURE 5-2. MOTOR ALIGNMENT

B. Alternate Procedure

NOTE

MOTOR SUPPORT SCREWS SHOULD BE LOOSENED JUST ENOUGH TO PERMIT THE MOTOR AND SHAFT ASSEMBLY TO MOVE FORE AND AFT AS A SINGLE UNIT.

NOTE

1. Loosen the two Phillips head motor mounting screws on the bottom deck and the two upper bearing support screws (refer to Figure 5-9).

2. Manually start the deck by holding the ready micro-switch (refer to Figure 5-4).
3. Check for parallelism as the pressure roller comes into contact with the shaft (refer to Figure 5-3).
4. Slide the motor driveshaft assembly fore or aft until the pressure roller is parallel to the capstan shaft and slightly indented by the shaft.

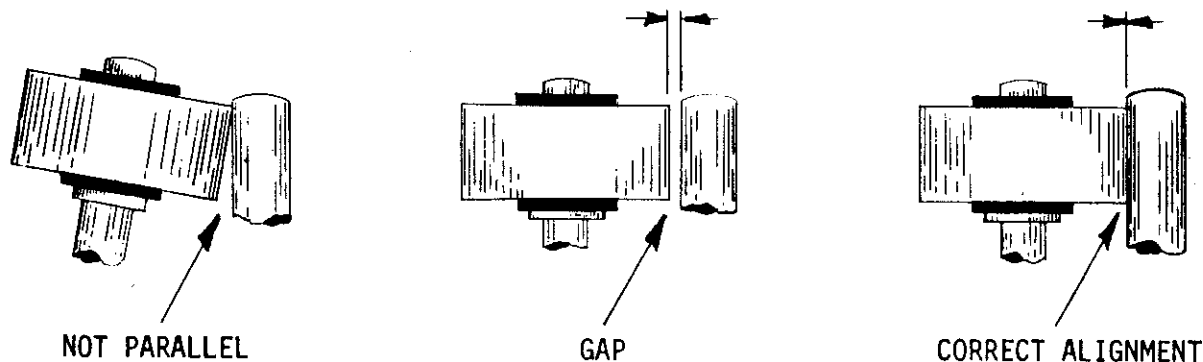
NOTE

NOTE

NOTE

APPLY NO SIDE TORQUE WHEN TIGHTENING THE UPPER SCREWS. TIGHTEN THE SCREWS SLOWLY AND ALTERNATE BETWEEN THE TWO SCREWS SO THAT THE MOUNTING IS NOT MOVED WHILE BEING SECURED. ANY SIDE LOAD ON THE MOTOR SHAFT COULD SHORTEN THE LIFE OF THE TOP BEARING AND THE MOTOR BEARINGS.

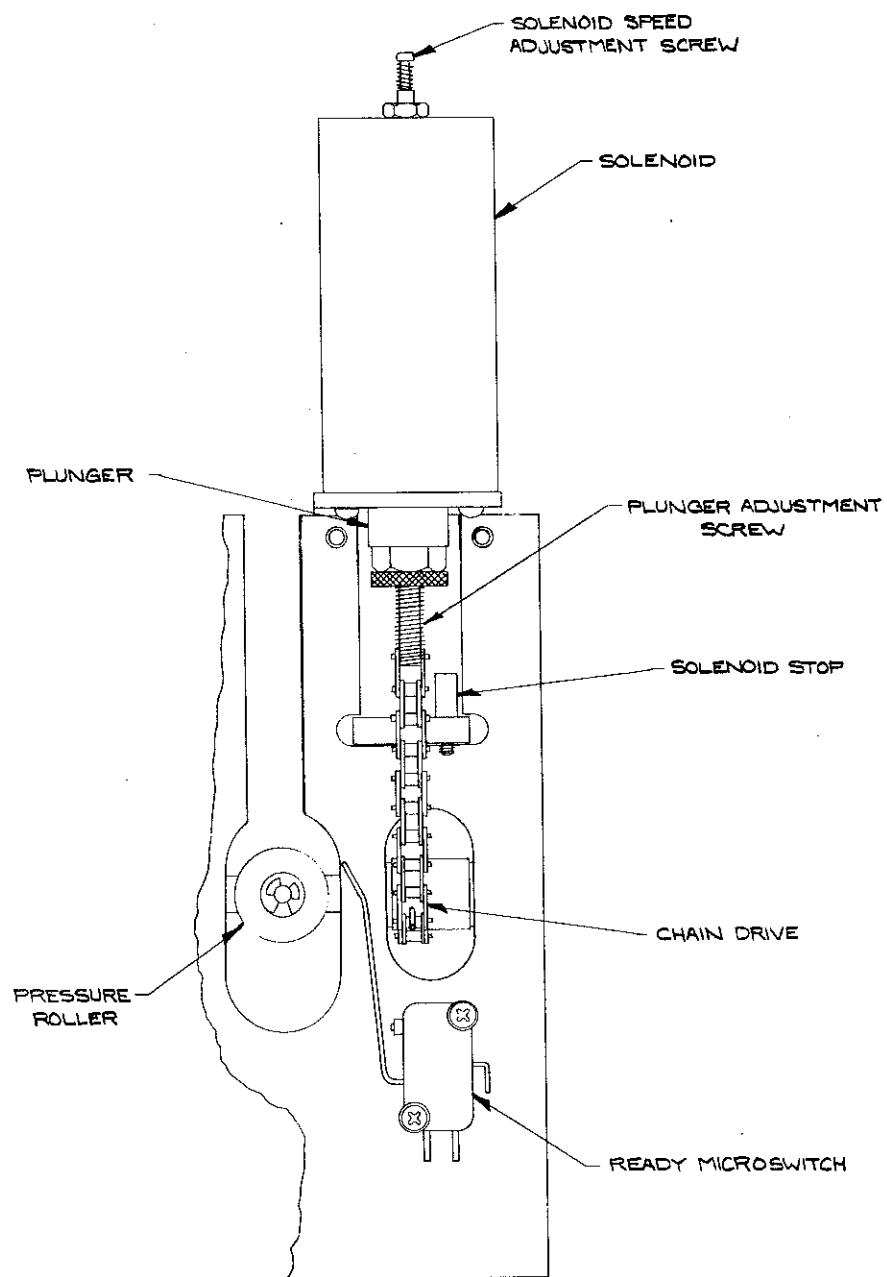
5. Tighten the two lower screws followed by the two upper screws.
6. Check for proper alignment of decks 2 and 1 (4, 3, 2 and 1) and repeat the procedure until the proper alignment is obtained.



597-5502-8

FIGURE 5-3. PRESSURE ROLLER PARALLELISM

5-24. SOLENOID PLUNGER TRAVEL. Solenoid plunger travel is determined by the plunger adjustment screw which links the plunger to the solenoid chain (refer to Figure 5-4). It is set to bring the pressure roller against the capstan driveshaft just prior to the plunger reaching the limit of its travel.



597-5502-9

FIGURE 5-4. SOLENOID ADJUSTMENT

NOTE

THE PRESSURE ROLLER/MOTOR ALIGNMENT PROCEDURE
MUST BE COMPLETED PRIOR TO ADJUSTMENT OF THE
SOLENOID PLUNGER.

NOTE

5-25. Remove the top cover and necessary decks. Turn the machine on. With no cartridge in the machine, hold the ready microswitch open and depress the START switch/indicator. The solenoid will pull the pressure roller onto the driveshaft. Loosen the locknut at the end of the plunger.

5-26. Turn the plunger clockwise in one-half turn increments while alternately depressing the START switch/indicator until an audible noise, the plunger hitting bottom, is heard with the solenoid action.

5-27. Turn the plunger counterclockwise for approximately one-half turn beyond the point where the noise has disappeared and tighten the locknut tightly against the end of the plunger.

5-28. HEAD ADJUSTMENTS. Tape head alignment requires setting the tape guide height, tracking height, head zenith, head azimuth, and phasing (for stereo machines). Because of the unique construction of the Phase Lok IV head bracket, generally only the azimuth adjustment will be required until a head has been replaced.

5-29. Required Equipment. The following equipment is required to align the tape heads:

- A. Head and Tape Guide Adjustment Block (BE P/N 836-0009-1).
- B. Hex Wrenches: supplied with machine.
- C. Oscilloscope: any general purpose model.
- D. Cut-Away Test Cartridge: A cut-away cartridge is a tape cartridge with part of the case cut away to allow observation of the tape path (BE P/N 710-0132).
- E. High Frequency Azimuth Alignment Tape (BE P/N 808-0055).
- F. No. 1 Phillips Screwdriver, 4 inches (10.16 cm) long.

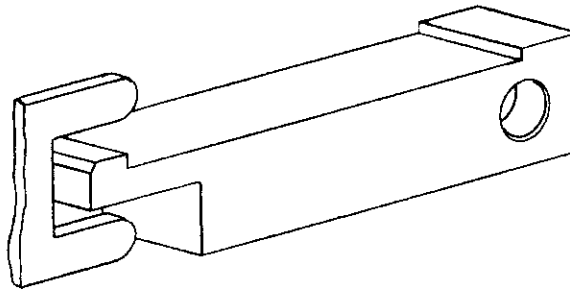
5-30. Procedure. To adjust tape guide height, tracking height, head zenith, head azimuth, and phasing proceed as follows:

5-31. Refer to Figure 5-5A and check the tape guide height using the head and tape guide adjustment block. The inside edge of each upper tape guide must just touch the T portion of the block.

A

TAPE GUIDE ADJUSTMENT

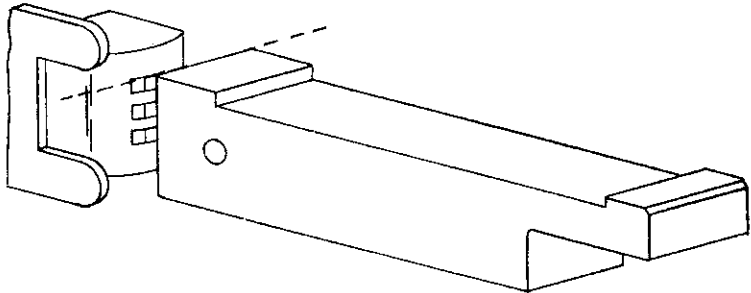
TAPE GUIDE SHOULD TOUCH
"T" OF BLOCK.



B

HEAD HEIGHT ADJUSTMENT

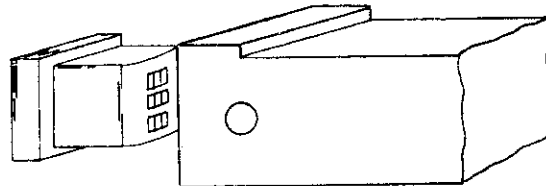
TOP HEAD POLE PIECE SHOULD
BE SAME HEIGHT AS BLOCK.



C

ZENITH ADJUSTMENT

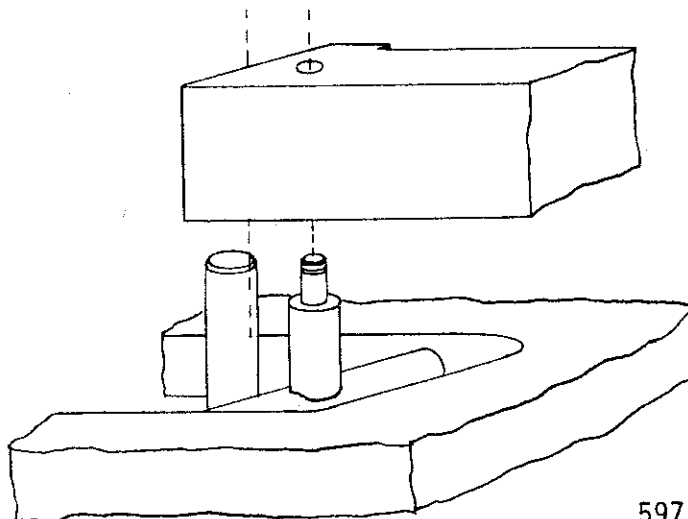
HEAD FACE SHOULD
BE AT RIGHT ANGLE
TO DECK.



D

MOTOR ADJUSTMENT

BLOCK FACE SHOULD BUTT
UP AGAINST MOTOR SHAFT
MAKING EVEN CONTACT FROM
TOP TO BOTTOM.



597-5502-10

FIGURE 5-5. HEAD, TAPE GUIDE, AND MOTOR ADJUSTMENT

5-32. . If necessary, each tape guide can be moved independently as required for alignment by loosening the two tape guide adjustment screws (see Figure 5-6).

5-33. Refer to Figure 5-5B and check the tape head height using the head and tape guide adjustment block. The upper pole piece of the head must be even with the top surface of the gauge.

5-34. Inspect the tracking height visually with a cut-away test cartridge. Operate the deck and observe the tape as it passes across the heads. The tape must just cover the top and bottom of the head pole pieces (see Figure 5-7).

5-35. If adjustment is required, loosen the two lock screws for the head that is to be adjusted. Refer to Figure 5-6 for location of the screws. Turn both the front and rear zenith/height adjustment screws as required. Both screws must be turned equal amounts to retain the zenith adjustment.

5-36. Refer to Figure 5-5C and check the head zenith (perpendicularity of head) using the head and tape guide adjustment block or machinists square. The front surface of the head must be perpendicular to the deck surface.

5-37. If adjustment is required, loosen the two lock screws for the head that is to be adjusted and turn the front and/or rear zenith/height adjustment screws as required (see Figure 5-6).

5-38. Readjust the head height and zenith until no further improvement can be obtained. Secure the two lock screws for the head that was adjusted.

5-39. Operate the deck and verify the adjustments using a cut-away test cartridge. The tape should just cover the top and bottom head pole pieces.

NOTE

DEMAGNETIZE HEADS AND SURROUNDING FERROUS PARTS BEFORE AND AFTER MAKING AZIMUTH AND/OR PHASING ADJUSTMENTS.

NOTE

5-40. Connect an oscilloscope to the deck outputs (refer to drawing 906-5117 in Section VII): the left channel audio output to the vertical deflection channel of the oscilloscope and the right channel output to the horizontal deflection channel.

5-41. Turn the machine on and play the high frequency azimuth alignment tape while monitoring the output with the oscilloscope.

5-42. Adjust the azimuth adjustment screw (see Figure 5-6) of the playback head for maximum output level at 15 kHz. Remove and reinsert the cartridge to verify adjustments.

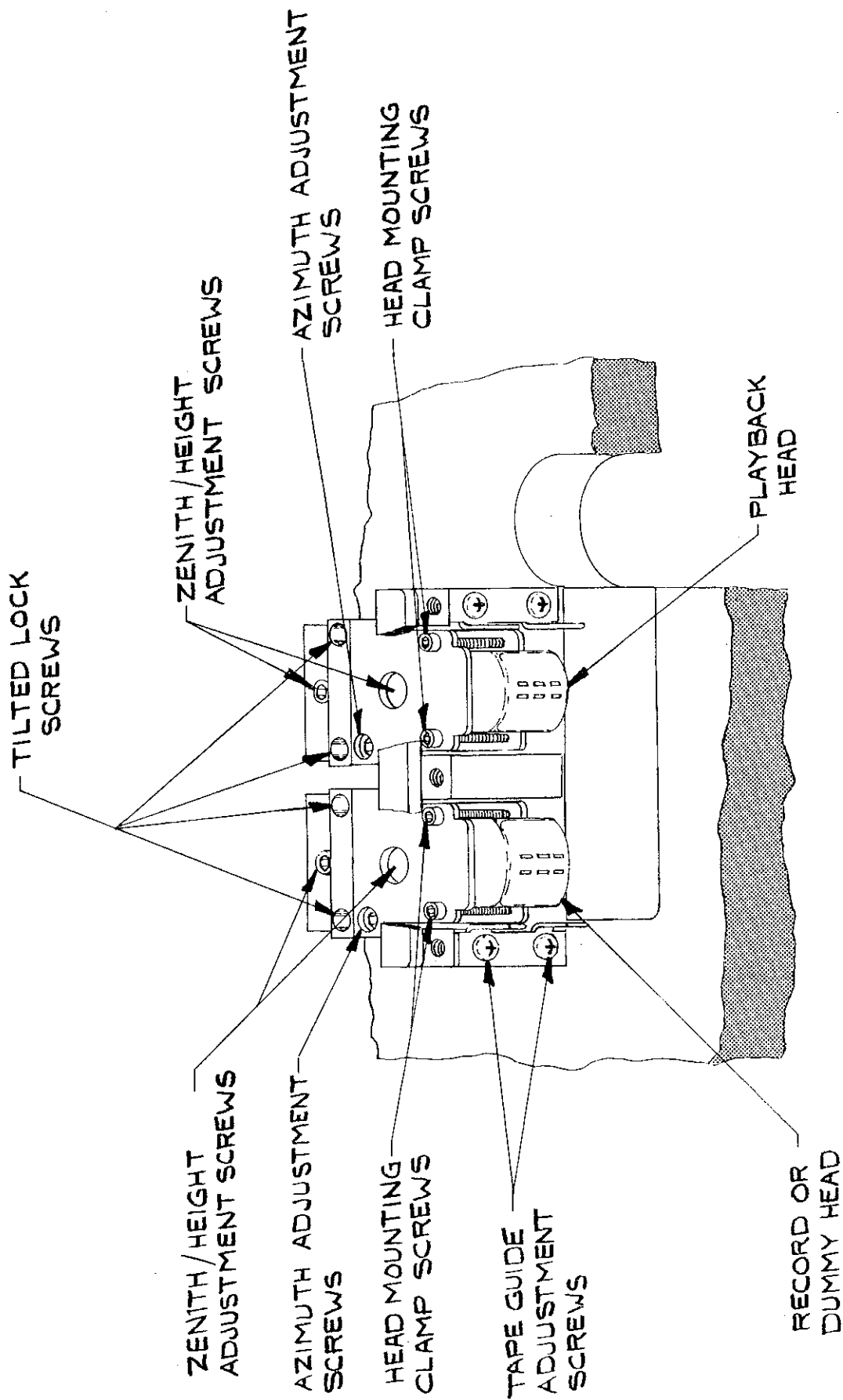
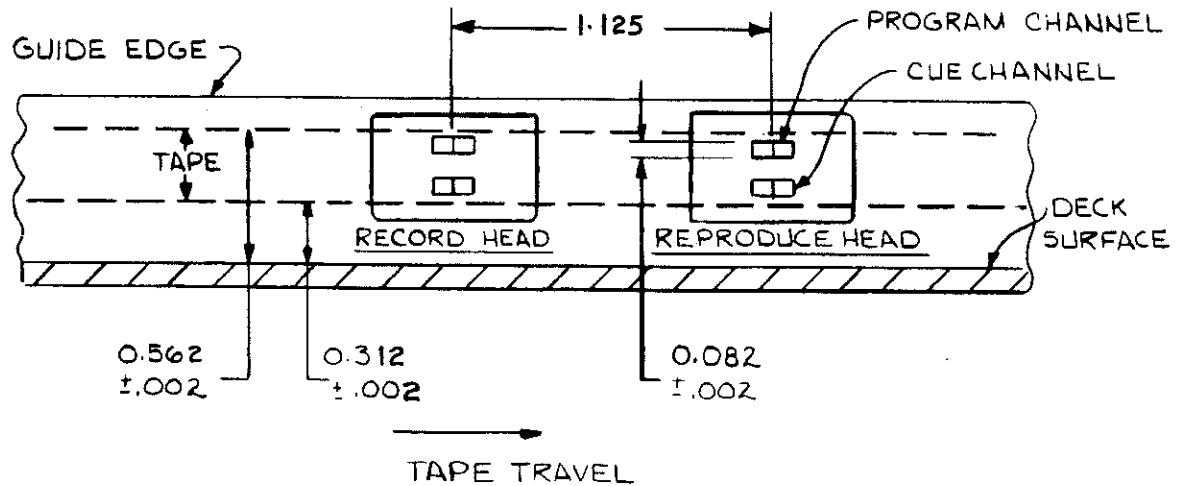


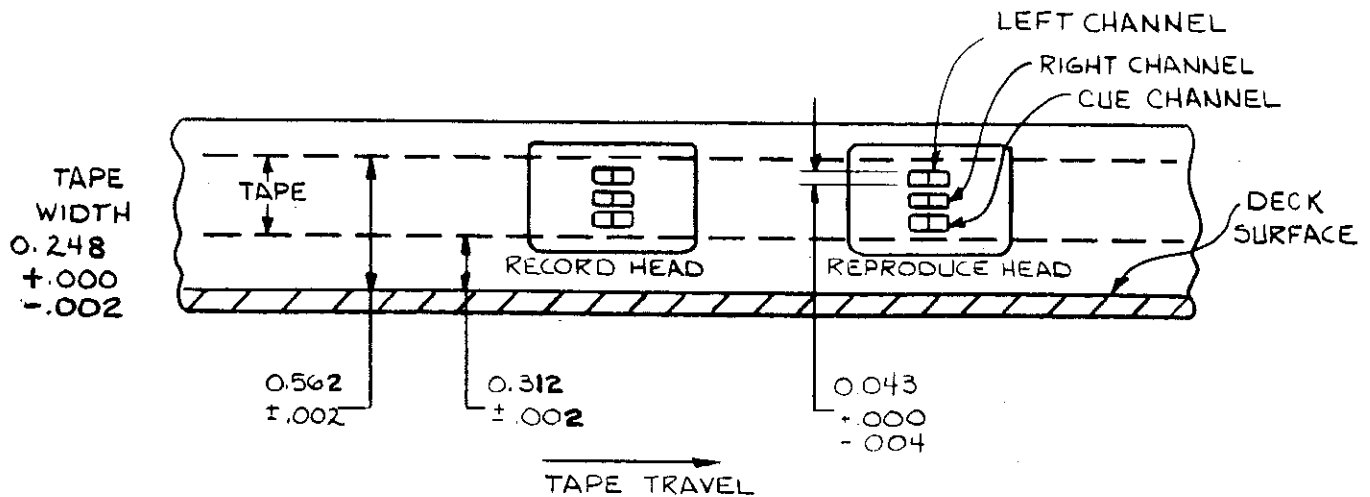
FIGURE 5-6. HEAD ADJUSTMENT SCREWS

597-5502-11

MONOPHONIC STANDARD



STEREOPHONIC STANDARD



597-5502-12

FIGURE 5-7. TAPE TRACKING HEIGHT

NOTE

BEFORE MAKING STEREO PHASE ADJUSTMENT, SET
PLAYBACK EQUALIZATION AS OUTLINED IN PAR-
AGRAPHS 5-52 THROUGH 5-57.

NOTE

5-43. For stereo machines, complete the azimuth adjustment as outlined above, and then trim it to equalize the phase or delay the responses of the left and right channels.

NOTE

CHECK THE PHASE RESPONSE DIFFERENCE OF THE
OSCILLOSCOPE HORIZONTAL AND VERTICAL CHANNELS
BY APPLYING THE SAME SIGNAL TO BOTH CHANNELS.
NOTE THE RESULTANT LISSAJOUS FIGURE DISPLAYED
ON THE SCOPE. MATCHED PHASE RESPONSE CHARAC-
TERISTICS BETWEEN THE TWO CHANNELS WILL BE
INDICATED BY AN APPROXIMATE STRAIGHT LINE ON
THE SCOPE FACE, AT AN ANGLE OF 45 DEGREES IF
THE HORIZONTAL AND VERTICAL CHANNELS PRODUCE
EQUAL DEFLECTION AMPLITUDES.

NOTE

NOTE

NOTE

NOTE

5-44. With the outputs connected to the scope, play the test tape. Since an azimuth adjustment at 15 kHz alone could produce a phase error of 360 degrees, a mid-frequency tone adjustment, in the 400 Hz range, is required to complete the procedure.

5-45. Trim the azimuth adjustment screw for the best phase response (minimum phase angle and longest line) at both the 15 kHz and 400 Hz frequencies.

5-46. When all adjustments are complete, remove the test equipment, tighten the adjustment locks, and demagnetize the heads and surrounding parts before returning the deck to service.

5-47. 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 (see Figure 5-4). The rate of air passage through the pressure release valve is also determined by the setting of this screw, establishing the level of noise generated by solenoid action. This adjustment is factory set 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 individual needs.

5-48. To adjust the solenoid of the top or middle deck remove ac power, open the front panel, and release the deck to be adjusted. Slide the deck partially forward to gain access to the adjustment screw. The bottom deck solenoid is accessible by removing the bottom machine cover. Turn the adjustment screw about 1/4 turn clockwise to increase solenoid action time. Turn the screw 1/4 turn counterclockwise to reduce time. Noise increases with the speed of the solenoid.

5-49. Replace the deck, apply power to the machine, and test operate the solenoid with a cartridge in the machine. Readjust if necessary. After the final adjustment has been determined, secure the deck with its retaining screw and check for proper pressure roller alignment (refer to paragraph 5-21).

5-50. ELECTRICAL ADJUSTMENT.

5-51. All electrical adjustments are accessible from the rear of the machine. Specific adjustment procedures are provided for the following controls:

- A. Equalization
- B. Output Level
- C. Cue Sensitivity

5-52. EQUALIZATION. Equalization must be adjusted prior to the stereo phase adjustment.

5-53. Required Equipment. The following equipment is required for this adjustment:

- A. Reproduce Alignment Test Tape (BE P/N 808-0004).
- B. No. 2 Phillips Screwdriver, 4 inches (10.16 cm) long.
- C. Miniature Flat-Tip Screwdriver, 1/8 inch (0.125 cm) tip.

5-54. Procedure. To adjust equalization proceed as follows.

5-55. Reproduce the frequency response series of tones from the test tape.

5-56. Adjust the LF EQ control(s) until the level of the 50 Hz tone is within -1 to 0 dB of the reference tone level.

5-57. Adjust the HF EQ control(s) until the 12 kHz tone is the same level as the reference tone.

5-58. OUTPUT LEVEL. This adjustment should be made after the equalization adjustment.

5-59. Required Equipment. Refer to paragraph 5-53.

5-60. Procedure. To adjust output level proceed as follows:

5-61. Two output level controls per deck are available on the stereo version of the 5400/5500B: the L CH LEVEL and the R CH LEVEL. On monaural versions of the cartridge machine, only the L CH LEVEL is used.

5-62. Play the section of the test tape corresponding to the operating reference level.

5-63. Adjust R4 (R CH LEVEL) and/or R1 (L CH LEVEL) controls on the head amplifier circuit board for the desired output level.

5-64. CUE SENSITIVITY. The cue tone sensors are adjusted to operate at a level of 6 dB below the NAB standard level. This allows for variations in tone level caused by tape wear.

5-65. Cue sensitivity may be adjusted with the use of an NAB cue/logging test tape (ordering information available on request) by playing the tape and adjusting the appropriate cue control.

5-66. MECHANICAL PARTS REPLACEMENT.

5-67. Specific instructions are provided for the following:

- A. Pressure Roller Replacement
- B. Head Replacement
- C. Upper Motor Shaft Bearing Replacement
- D. Motor Replacement

WARNING

DISCONNECT POWER PRIOR TO ANY SERVICING.

5-68. PRESSURE ROLLER REPLACEMENT. The removal and replacement procedure of the pressure rollers in all decks is identical.

5-69. Manually raise the pressure roller above deck level by pushing in the solenoid plunger. Use a small pair of needle-nose pliers to remove the E-ring from the top of the pressure roller.

5-70. Using care not to lose the nylon washers which fit on the shaft, remove these elements and the roller from the shaft.

5-71. Before replacing the new roller, adjust the pressure roller alignment as described in paragraph 5-21.

5-72. Place a washer, the new roller, and the final washer on the shaft, in that order. Then, seat the E-ring on the end of the shaft. When the E-ring is seated properly, it will snap onto the shaft.

5-73. HEAD REPLACEMENT. Replacement of a head on any of the top decks requires removal of the deck from the unit. To replace a head on the bottom deck, access is gained by removing the machine top cover and the top two (four) decks. Following this, proceed as indicated below.

5-74. Remove the upper cartridge clamp and the tape guides surrounding the head.

5-75. Loosen the two head mounting clamp screws (refer to Figure 5-6), withdraw the head from the clamp, and disconnect the leads.

MODEL LMP MONO PLAY (252-0017)



MODEL LSP STEREO PLAY (253-0014)



P= PROGRAM TRACK (MONO)
 Q= CUE TRACK
 L= LEFT PROGRAM TRACK (STEREO)
 R= RIGHT PROGRAM TRACK (STEREO)

597-5502-13

FIGURE 5-8. TAPE HEAD CONNECTIONS AND CONFIGURATIONS

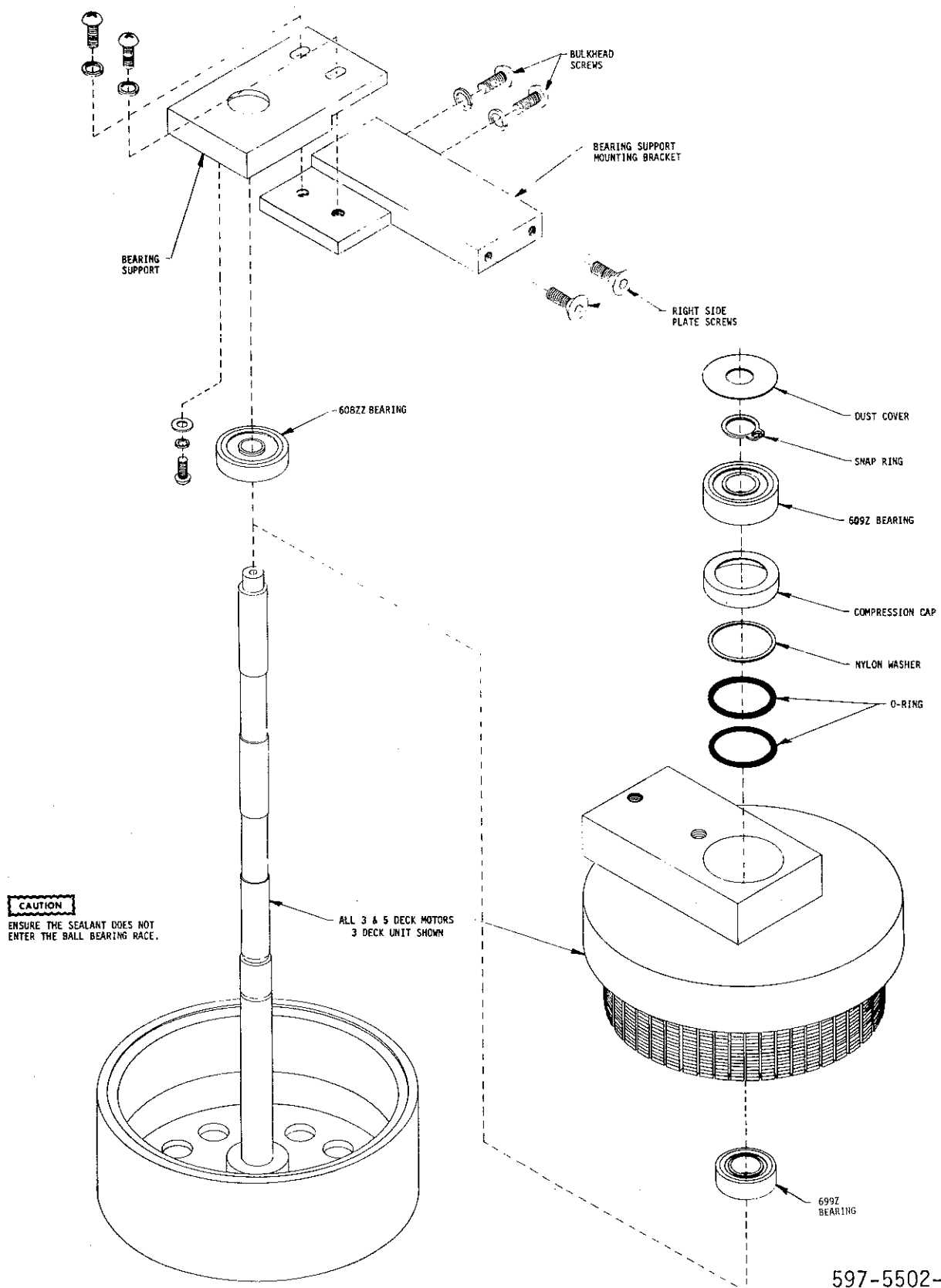
5-76. Plug the leads into the replacement head (see Figure 5-8) and seat the new head in the mounting clamp.

5-77. Holding the head laterally centered and firmly against the clamp backstops, tighten the clamp screws with moderate pressure.

5-78. Reconnect ac power. Complete head adjustments as described in paragraph 5-28.

5-79. Replace cartridge clamp. Return the deck(s) to the unit and replace the top cover.

5-80. UPPER MOTOR SHAFT BEARING REPLACEMENT. Refer to Figure 5-9 as required for the following procedure.



597-5502-14

FIGURE 5-9. MOTOR BEARINGS

5-81. Remove the two No. 8 flat head screws holding the bearing support mounting bracket to the right side panel, and remove the two Phillips head screws holding the bracket to the bulkhead. Remove the complete bearing and mounting assembly from the top of the motor shaft.

5-82. Remove the small Phillips head screw from the underside of the bearing support. Use a two prong bearing puller to remove the defective bearing. Insert the new bearing and replace the screw.

5-83. Re-attach the bearing support mounting bracket, tightening and aligning the right side panel screws first. Replace the bulkhead screws.

5-84. Apply power to the unit. Place the bearing support on the capstan. With your thumb and forefinger, lightly hold the bearing in place, allowing the bearing to stabilize and align itself. While holding the bearing support, slowly and alternately tighten the two mounting block screws. Apply no side torque when tightening the screws.

5-85. Check the pressure roller alignment of the top decks per paragraph 5-21.

5-86. MOTOR REPLACEMENT. To remove the motor, disconnect the ac power, open the front panel, and remove the top decks. Remove the top and bottom covers and place the unit on its left side.

CAUTION

CAUTION

CAUTION

CARE MUST BE USED IN HANDLING AND STORING MOTORS TO AVOID DAMAGING 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.

5-87. Unplug the motor connector (P2) from the power supply circuit board and remove the two white leads that connect to the motor capacitor.

CAUTION

THE UPPER MOTOR SHAFT BEARING MUST BE REPLACED WHENEVER IT IS REMOVED.

5-88. Remove the two Phillips head screws connecting the bearing support to the mounting bracket to free the bearing assembly (refer to Figure 5-9). Remove the bearing support assembly from the top of the capstan.

5-89. Locate the two large Phillips head screws on the top side of the bottom deck (behind the motor shaft) that holds the motor mounting block to the deck. While holding the motor in one hand, remove these two screws from the deck. Gently remove the motor, taking extra care to avoid damage to the drive shaft as it is removed. Carefully insert the new motor and loosely secure the mounting block screws on the bottom deck.

5-90. Manually raise the pressure roller of the bottom deck by pushing in the solenoid plunger. Remove the E-ring from the top of the pressure roller (refer to Figure 5-2). Remove and retain the pressure roller and the nylon washers. Set the alignment gauge on the shaft (BE P/N 836-0009-1).

NOTE

MOTOR MOUNTING BLOCK SCREWS SHOULD BE LOOSENE
JUST ENOUGH TO PERMIT THE MOTOR AND THE SHAFT
ASSEMBLY TO MOVE FORE AND AFT AS A SINGLE UNIT.

NOTE

5-91. Move the motor assembly as required until the face of the alignment gauge is parallel to the motor shaft and makes even contact with the capstan driveshaft, from top to bottom along the gauge surface. Alternately tighten the two motor mounting block screws. Re-check for proper alignment and repeat the procedure as required until the proper alignment is achieved. Remove the alignment gauge and place a washer, the roller, the second washer, and the E-ring on the shaft.

5-92. Replace the upper motor shaft bearing as described in paragraph 5-81.

5-93. Check the alignment of decks 2 and 1 (4, 3, 2, and 1) making any necessary adjustments to the motor until all decks are properly aligned.

5-94. ELECTRICAL PARTS REPLACEMENT.

5-95. The circuit boards used in the cartridge machines are double-sided boards with plated through-holes. Because of the plated through-holes, solder fills the holes by capillary action. These conditions require that defective components be removed carefully to avoid damage to the board.

5-96. On all circuit boards, the adhesion of the copper trace to the board fails at almost the same temperature as solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small iron with steady pressure is required for circuit board repairs.

5-97. To remove a component from a board such as the type used in the 5400 or 5500B cartridge machines, cut the leads from the body of the defective component while the device is still soldered to the board.

5-98. Grip each component lead, one at a time, with long nose pliers. Turn the board over and touch the soldering iron to the lead at the solder connection. When the solder begins to melt, push the lead through the back side of the board and cut off the clinched end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared of solder by carefully re-heating with a low wattage iron and removing the residual solder with a soldering vacuum tool.

5-99. Install the new component and apply solder from the bottom side of the board. If no damage has been done to the plated through-holes, soldering of the top side is not required.

WARNING

MOST SOLVENTS WHICH WILL REMOVE ROSIN FLUX ARE VOLATILE AND TOXIC BY THEIR NATURE AND SHOULD BE USED ONLY IN SMALL AMOUNTS IN A WELL VENTILATED AREA, AWAY FROM FLAME, CIGARETTES, OR HOT SOLDERING IRONS.

WARNING

WARNING

WARNING

OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-100. After soldering, remove residual flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective. Solvents are available from electronic supply houses which are useful.

5-101. The board should be checked to ensure the flux has been removed and not just smeared about. Rosin flux is not normally corrosive, but it will absorb enough moisture in time to become conductive and cause problems.

5-102. INTEGRATED CIRCUITS. Extra care should be exercised with integrated circuits. All integrated circuits must be oriented so that its notch matches the notch on the socket for replacement. Do not attempt to remove an integrated circuit with your fingers. Use a circuit puller to lightly pry the circuit from its socket.

SECTION VI

PARTS LIST

6-1. INTRODUCTION.

6-2. This section provides descriptions and part numbers of parts and assemblies required for maintenance of Broadcast Electronics 5400 and 5500B Cartridge Machines. Each table entry in this section is indexed by the reference designators of the applicable schematic diagram.

6-3. Table 6-1 indexes all tables listing assemblies and sub-assemblies having replacement parts, the table number listing the parts, and the page number of the applicable table.

NOTE BASIC PARTS THAT ARE COMMON TO ALL MODELS OR
NOTE ALL VERSIONS OF A CIRCUIT BOARD ASSEMBLY ARE
NOTE LISTED AT THE BEGINNING OF A PARTS TABLE.
NOTE PARTS UNIQUE TO A PARTICULAR MODEL OR VERSION
NOTE OF THAT CIRCUIT BOARD ASSEMBLY ARE LISTED
 UNDER A SPECIAL HEADING WHICH FOLLOWS THE
 BASIC PART IN THE SAME TABLE.

TABLE 6-1. REPLACEABLE PARTS LIST INDEX
 (Sheet 1 of 2)

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-2	5400 FINAL ASSEMBLY	900-5401-000	6-2
		900-5402-000	
		900-5403-000	
		900-5404-000	
		900-5404-000	
6-3	5500B FINAL ASSEMBLY	900-5501-000	6-5
		900-5502-000	
		900-5503-000	
		900-5504-000	
6-4	DECK PARTS	950-0027	6-9
		906-5500	
6-5	5400 MOTHERBOARD BACK PLANE ASSEMBLY	910-0091	6-9

TABLE 6-1. REPLACEMENT PART LIST INDEX
(Sheet 2 of 2)

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-6	5500B MOTHERBOARD BACK PLANE ASSEMBLY	914-1808	6-10
6-7	POWER SUPPLY CIRCUIT BOARD ASSEMBLY	914-1809	6-10
6-8	5400 FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY	910-0035	6-11
6-9	5500B FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY	914-1807	6-12
6-10	AUDIO OUTPUT TRANSFORMER ASSEMBLY	950-0077	6-12
6-11	CONTROL CIRCUIT BOARD ASSEMBLY	914-1831 914-1841	6-12
6-12	TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY	914-1830 914-1840	6-14

TABLE 6-2. 5400 FINAL ASSEMBLY - 900-5401-000, 900-5402-000,
900-5403-000, 900-5404-000 (Sheet 1 of 4)

REF. NO.	DESCRIPTION	PART NO.	QTY.
B1 (60 Hz)	Motor, Synchronous, 60 Hz, 450 RPM at 7 oz-in/min, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 24W, Model: NAH-1603B6C3L	382-1311-1	1
B1 (50 Hz)	Motor, Synchronous, 50 Hz, 500 RPM at 10 oz-in/min, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 25W, Model: NAH-1202A5C3L	382-1371-1	Alt- ternate
C1 (60 Hz)	Capacitor, Motor Start, 0.95 μ F, 300V ac, 60 Hz	029-1075	1
C1 (50 Hz)	Capacitor, Motor Start, 1.4 μ F, 250V ac, 50 Hz	029-1463	1
DS1 THRU DS6	Lamp, Wedge-base, No. 85, 28V @ 0.04 Ampere (START/STOP Indicators)	321-0085	6
F1	Fuse, 1.5 Ampere, AGC, Slow-Blow (For use with 60 Hz motor)	334-0150	1
F1	Fuse, 3/4 Ampere, AGC, Slow-Blow (For use with 50 Hz motor)	334-0075	Alt- ternate
P1	Plug, 2-Pin (Fuse to Power Supply)	418-0701	1
P1	Plug, 14-Pin (Bulkhead-Deck Connector)	418-1410	3
P2	Plug, 6-Pin (To Power Supply from Motor)	418-0670	1
P3	Plug, 12-Pin (Power Transformer to Power Supply Circuit Board)	418-1271	1
P4,P10, P11,P12	Plug, 4-Pin (To Power Supply from Bass transistor)	418-0240	4
P17	Plug, 6-Pin (From Motherboard to Power Supply)	418-0670	1
P101,P201, P301	Plug, 25-Pin (Rear Panel Remote Connectors)	418-3219	3

TABLE 6-2. 5400 FINAL ASSEMBLY - 900-5401-000, 900-5402-000,
900-5403-000, 900-5404-000 (Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
S1	Switch, Toggle, SPST, 3 Ampere, 250V ac (ON/OFF Power Switch)	348-8280	1
S1 THRU S6	Switch, Illuminated, Momentary Contact, SPDT, Push (STOP/START Switch/Indicators)	340-0015	6
T1	Transformer, Power Dual Primary: 105 - 123V ac, 50/60 Hz Secondary: 28V @ 2.5 Amperes 22V @ 0.3 Amperes	376-7660	1
XF1	Fuse Holder, AGC	415-2012	1
----	Transistor, 2N3055, Silicon, NPN, TO-3 Case	219-3055	1
----	Bearing, Ball, 608ZZ (Upper Shaft) OD = 0.8661 inches, ID = 0.315 inches, HT = 0.275 inches	442-1020	1
----	Bearing, Ball, 609Z (Upper Motor) OD = 0.9348 inches, ID = 0.355 inches, HT = 0.275 inches	442-0609	1
----	Bearing, Ball, 699Z (Lower Motor) OD = 0.7873 inches, ID = 0.355 inches, HT = 0.2346 inches	442-1023	1
----	Head, Dummy	407-0001	3
----	Bearing Support	459-0044	1
----	Bearing Support Mounting Bracket	470-0257	1
----	Guide, Cartridge, Left	459-0094	3
----	Spring, Cartridge Guide, Left	430-0006	3
----	Foot, Rubber	403-2194	4
----	Socket, Transistor	417-0298	1
----	Insulator, Transistor, Mica	418-0010	1
----	Switch Cap, Green (START Switches)	340-0019	3
----	Switch Cap, Yellow (STOP Switches)	340-0014	3
----	Deck Parts (Table 6-4)	950-0027	---
----	Motherboard Back Plane Circuit Board Assembly (Table 6-5)	910-0091	1
----	Power Supply Circuit Board Assembly (Table 6-7)	914-1809	1
----	Front Panel Switch Circuit Board Assembly (Table 6-8)	910-0035	1
----	Front Panel Run Lights and Leads Plug, 6-Pin, P/N 417-6002-006 Plug Cover, 6-Pin, P/N 417-6001-006 LED, Green Diffused, 2.1V, 20 mA, P/N 320-0009 Blank Circuit Board, P/N 510-0084	910-0084	---
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	3
----	Front Panel Motherboard Cable Assembly P1, Plug, 26-Pin, P/N 418-2600 Ribbon Cable, 26-Conductor, P/N 600-0026	906-5134	1
----	Deck 1 Cable Assembly (Motherboard to Rear Panel) P13, Plug, 26-Pin Ribbon, P/N 418-2600 J101, Receptacle, 25-Pin, P/N 418-3221 Ribbon Cable, 26-Conductor, 1.75 feet, P/N 600-0026	906-5133-1	1

TABLE 6-2. 5400 FINAL ASSEMBLY - 900-5401-000, 900-5402-000,
900-5403-000, 900-5404-000 (Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Deck 2 Cable Assembly (Motherboard to Rear Panel) P14, Plug, 26-Pin Ribbon, P/N 418-2600 J201, Receptacle, 25-Pin, P/N 418-3221 Ribbon Cable, 26-Conductor, 1.6 feet, P/N 600-0026	906-5133-2	1
----	Deck 3 Cable Assembly (Motherboard to Rear Panel) P15, Plug, 26-Pin Ribbon, P/N 418-2600 J301, Receptacle, 25-Pin, P/N 418-3221 Ribbon Cable, 26-Conductor, 1.5 feet, P/N 600-0026	906-5133-3	1
----	Tape Head Leads With Connectors, L. Audio, 5.5 Inches Long (14 cm)	940-0007	3
----	Tape Head Leads With Connectors, L. Audio, 16.5 Inches Long (42 cm)	940-0004	3
----	Tape Head Leads With Connectors, Cue, 5.5 Inches Long (14 cm)	940-0008	3
----	Tape Head Leads With Connectors, Cue, 16.5 Inches Long (42 cm)	940-0005	3
<u>ADDITIONAL PARTS FOR MODEL 5401 UNITS</u>			
----	Head, Playback, 2-Channel Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per channel	252-0017	3
----	Control Circuit Board Assembly W/O Cues (Table 6-11)	914-1831	3
----	Tape Head Amplifier Circuit Board Assembly Mono (Table 6-12)	914-1830	3
<u>ADDITIONAL PARTS FOR MODEL 5402 UNITS</u>			
----	Head, Playback, 2-Channel Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per channel	252-0017	3
----	Control Circuit Board Assembly W/Cues (Table 6-11)	914-1841	3
----	Tape Head Amplifier Circuit Board Assembly Mono (Table 6-12)	914-1830	3
<u>ADDITIONAL PARTS FOR MODEL 5403 UNITS</u>			
----	Head, Playback, 3-Channel Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per channel	253-0014	3

TABLE 6-2. 5400 FINAL ASSEMBLY - 900-5401-000, 900-5402-000,
900-5403-000, 900-5404-000 (Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	3
----	Control Circuit Board Assembly W/O Cues (Table 6-11)	914-1831	3
----	Tape Head Amplifier Circuit Board Assembly Stereo (Table 6-12)	914-1840	3
----	Tape Head Leads With Connectors, R. Audio, 5.5 Inches Long (14 cm)	940-0009	3
----	Tape Head Leads With Connectors, R. Audio, 16.5 Inches Long (42 cm)	940-0006	3
ADDITIONAL PARTS FOR MODEL 5404 UNITS			
----	Head, Playback, 3-Channel Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per channel	253-0014	3
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	3
----	Control Circuit Board Assembly W/Cues (Table 6-11)	914-1841	3
----	Tape Head Amplifier Circuit Board Assembly Stereo (Table 6-12)	914-1840	3
----	Tape Head Leads With Connectors, R. Audio, 5.5 Inches Long (14 cm)	940-0009	3
----	Tape Head Leads With Connectors, R. Audio, 16.5 Inches Long (42 cm)	940-0006	3

TABLE 6-3. 5500B FINAL ASSEMBLY - 900-5501-000, 900-5502-000,
900-5503-000, 900-5504-000 (Sheet 1 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
ALL MODELS			
B1 (60 Hz)	Motor, Synchronous, 60 Hz, 450 RPM at 7 oz-in/ min, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 24W, Model: NAH-1603B6C5L	382-1511-1	1
B1 (50 Hz)	Motor, Synchronous, 50 Hz, 375 RPM at 10 oz-in/ min, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 25W, Model: NAH-1202A5C5L	382-1571-1	1
C1 (60 Hz)	Capacitor, Motor Start, 0.95 μ F, 300V ac, 60 Hz	029-1075	1
C1 (50 Hz)	Capacitor, Motor Start, 1.4 μ F, 250V ac, 50 Hz	029-1463	1
DS1 THRU DS10	Lamp, No. 327, Incandescent, Subminiature, 28V, 0.040 Ampere, (for STOP/START Switches)	321-0327	10
DS11 THRU DS15	LED, Green Diffused, 2.3V, 20 mA (Deck run lights)	323-9224	5

TABLE 6-3. 5500B FINAL ASSEMBLY - 900-5501-000, 900-5502-000,
900-5503-000, 900-5504-000 (Sheet 2 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
F1	Fuse, 1.5 Ampere, Slow-Blow, AGC	334-0150	1
P1	Plug, 2-Pin (Fuse to Power Supply)	418-0701	1
P1	Plug, 14-Pin (Bulkhead-Deck Connector)	418-1410	5
P2	Plug, 6-Pin (to Power Supply from Motor)	418-0670	1
P3	Plug, 12-Pin (Power Transformer to Power Supply Circuit Board)	418-1271	1
P4	Plug, 4-Pin (to Power Supply from Pass Transistor)	418-0240	1
P16 THRU P20	Plug, 4-Pin (to Motherboard from Deck Solenoid)	418-0240	5
P27	Plug, 6-Pin (to Power Supply from Motherboard)	418-0670	1
P101,P201, P301,P401, P501	Plug, 25-Pin (Rear Panel Connectors)	418-3219	5
S1	Switch, Toggle, SPST, 3 Ampere, 250V ac (ON/OFF Power Switch)	348-8280	1
S1 THRU S10	Switch with Bezel, Illuminated, Normally Open, Momentary Contact, SPST, Push (STOP and START Switch/Indicator)	343-1206	10
T1	Transformer, Power Dual Primary: 105-123V ac, 50/60 Hz Secondary: 28V @ 2.5 Amperes 22V @ 0.3 Ampere	376-7660	1
XF1	Fuse Holder, AGC	415-2012	1
----	Transistor, 2N3055, Silicon, NPN, TO-3 Case	219-3055	1
----	Bearing, Ball, 608ZZ (Upper Shaft) OD = 0.8661 inches, ID = 0.315 inches, HT = 0.275 inches	442-1020	1
----	Bearing, Ball, 609Z (Upper Motor) OD = 0.9348 inches, ID = 0.355 inches, HT = 0.275 inches	442-0609	1
----	Bearing, Ball, 699Z (Lower Motor) OD = 0.7873 inches, ID = 0.355 inches, HT = 0.2346 inches	442-1023	1
----	Head, Dummy	407-0001	5
----	Bearing Block	459-0153-1	1
----	Bracket, Bearing Support Mounting	470-0236	1
----	Guide, Cartridge, Left	459-0094	5
----	Spring, Cartridge Guide, Left	430-0006	5
----	Foot, Rubber	403-2194	4
----	Card Guide, Circuit Board	409-0020	20
----	Socket, Transistor	417-0298	1
----	Insulator, Transistor, Mica	418-0010	1
----	Switch Cap, Green (START Switches)	343-0018	5
----	Switch Cap, Red (STOP Switches)	343-0013	5
----	Deck Parts (Table 6-4)	906-5500	---
----	Motherboard Backplane Circuit Board Assembly (Table 6-6)	914-1808	1
----	Power Supply Circuit Board Assembly (Table 6-7)	914-1809	1

TABLE 6-3. 5500B FINAL ASSEMBLY - 900-5501-000, 900-5502-000,
900-5503-000, 900-5504-000 (Sheet 3 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Front Panel Switch Circuit Board Assembly (Table 6-9)	914-1807	1
----	Front Panel Run Light Cable Assembly -P2, Plug, 6-Pin, P/N 417-6002-006 -Cover, 6-Pin Plug, P/N 417-6001-006	940-0010	1
----	Front Panel Motherboard Cable Assembly -P1, Plug, 26-Pin, P/N 418-2600 -Ribbon Cable, 26 Conductor, P/N 600-0026	906-5134	1
----	Deck 1 Cable Assembly (Motherboard to Rear Panel) -P21, Plug, 26-Pin Ribbon, P/N 418-2600 -J101, Receptacle, 25-Pin, P/N 418-3221 -Ribbon Cable, 26 Conductor, 1.75 feet, P/N 600-0026	906-5133-1	1
----	Deck 2 Cable Assembly (Motherboard to Rear Panel) -P22, Plug, 26-Pin Ribbon, P/N 418-2600 -J201, Receptacle, 25-Pin, P/N 418-3221 -Ribbon Cable, 26 Conductor, 1.6 feet, P/N 600-0026	906-5133-2	1
----	Deck 3 Cable Assembly (Motherboard to Rear Panel) -P23, Plug, 26-Pin Ribbon, P/N 418-2600 J301, Receptacle, 25-Pin, P/N 418-3221 -Ribbon Cable, 26 Conductor, 1.5 feet, P/N 600-0026	906-5133-3	1
----	Deck 4 Cable Assembly (Motherboard to Rear Panel) -P24, Plug, 26-Pin Ribbon, P/N 418-2600 -J401, Receptacle, 25-Pin, P/N 418-3221 -Ribbon Cable, 26 Conductor, 1.4 feet, P/N 600-0026	906-5133-4	1
----	Deck 5 Cable Assembly (Motherboard to Rear Panel) -P25, Plug, 26-Pin Ribbon, P/N 418-2600 -J501, Receptacle, 25-Pin, P/N 418-3221 -Ribbon Cable, 26 Conductor, 1.3 feet, P/N 600-0026	906-5133-5	1
----	Tape Head Leads with Connectors, L. Audio, 5.5 Inches Long (14 cm)	940-0007	5
----	Tape Head Leads with Connectors, L. Audio, 16.5 Inches Long (42 cm)	940-0004	5
----	Tape Head Leads with Connectors, Cue, 5.5 Inches Long (14 cm)	940-0008	5
----	Tape Head Leads with Connectors, Cue, 16.5 Inches Long (42 cm)	940-0005	5
<u>ADDITIONAL PARTS FOR MODEL 5501B UNITS</u>			
L1	Head, Playback, 2-Channel Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0017	5

TABLE 6-3. 5500B FINAL ASSEMBLY - 900-5501-000, 900-5502-000,
900-5503-000, 900-5504-000 (Sheet 4 of 4)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	5
----	Control Circuit Board Assembly (Table 6-11)	914-1831	5
----	Tape Head Amplifier Circuit Board Assembly (Table 6-12)	914-1830	5
ADDITIONAL PARTS FOR MODEL 5502B UNITS			
L1	Head, Playback, 2-Channel Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0017	5
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	5
----	Control Circuit Board Assembly (Table 6-11)	914-1841	5
----	Tape Head Amplifier Circuit Board Assembly (Table 6-12)	914-1830	5
ADDITIONAL PARTS FOR MODEL 5503B UNITS			
L1	Head, Playback, 3-Channel Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per Channel	253-0014	5
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	10
----	Control Circuit Board Assembly (Table 6-11)	914-1831	5
----	Tape Head Amplifier Circuit Board Assembly (Table 6-12)	914-1840	5
----	Tape Head Leads with Connectors, R. Audio, 5.5 Inches Long (14 cm)	940-0009	5
----	Tape Head Leads with Connectors, R. Audio, 16.5 Inches Long (42 cm)	940-0006	5
ADDITIONAL PARTS FOR MODEL 5504B UNITS			
L1	Head, Playback, 3-Channel Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per Channel	253-0014	5
----	Audio Output Transformer Assembly (Table 6-10)	950-0077	10
----	Control Circuit Board Assembly (Table 6-11)	914-1841	5
----	Tape Head Amplifier Circuit Board Assembly (Table 6-12)	914-1840	5
----	Tape Head Leads with Connectors, R. Audio, 5.5 Inches Long (14 cm)	940-0009	5
----	Tape Head Leads with Connectors, R. Audio, 16.5 Inches Long (42 cm)	940-0006	5

TABLE 6-4. DECK PARTS - 950-0027, 906-5500

REF. DES.	DESCRIPTION	PART NO.	QTY.
J1	Receptacle, 14-Pin (Deck-Bulkhead Connector)	417-1420	3/5
S1	Microswitch, SPDT, 125V ac, 1/2 Ampere	346-6100	3/5
----	Solenoid Assembly	950-0026	3/5
	Solenoid, Air Damped, 24V, 11W, 52 Ohms, 1.5 Inch (3.81 cm) Diameter, P/N 289-2566		
----	Pins, Connector (For Solenoid Leads)	417-0036	2
----	Pinch Roller Assembly	404-0001	3/5
----	Cartridge Guide, Right	452-0031	3/5
----	Tape Guide	452-0001	6/10
----	Solenoid Stop, Rubber	459-0158	3/5

**** REFER TO DECK ASSEMBLY DRAWING FOR MECHANICAL PARTS ****

TABLE 6-5. 5400 MOTHERBOARD BACKPLANE ASSEMBLY - 910-0091

REF. DES.	DESCRIPTION	PART NO.	QTY.
C101,C201, C301	Capacitor, Electrolytic, 1 uF, 35V, Tantalum	064-1063	3
J1 THRU J6	Receptacle, Card Edge, 22-Pin (Circuit Board Plug-in)	417-2300	6
J7 THRU J9	Receptacle, Locking Header, 4-Pin (to Audio Transformers)	417-6000- 004	3
J10 THRU J12	Receptacle, 4-Pin (to Deck Solenoid)	418-0255	3
J13 THRU J16	Receptacle, Header, 26-Pin (3 to Rear Panel Connectors and 1 to Front Panel Circuit Board)	417-2600	4
J17	Receptacle	----	1
	Housing, 6-Pin (to Power Supply)	418-0670	1
	Pins, Receptacle	417-0053	6
J18 THRU J20	Receptacle, Locking Header, 4-Pin (to Audio Transformers)	417-6000- 004	3
Q101,Q201, Q301	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	3
Q102,Q202, Q302	Transistor, TIP-31A, Silicon, NPN, TO-220 AB Case	219-0031	3
R101,R201, R301	Resistor, 1 Ohm $\pm 5\%$, 1/2W	110-1013	3
R102,R202, R302	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	3
R103,R203, R303	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R104,R204, R304	Resistor, 2.2 k $\pm 5\%$, 1/4W	100-2243	3
R105,R205, R305	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	3
R106,R206, R306	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	3
----	Blank Circuit Board	510-0091	1

TABLE 6-6. 5500B MOTHERBOARD BACKPLANE ASSEMBLY - 914-1808

REF. DES.	DESCRIPTION	PART NO.	QTY.
C101, C201, C301, C401, C501	Capacitor, Electrolytic, 1 uF, 35V, Tantalum	064-1063	5
J1 THRU J10	Receptacle, Card Edge, 22-Pin (Circuit Board Plug-in)	417-2302	10
J11 THRU J15	Receptacle, Locking Header, 4-Pin	417-6000- 004	5
J16 THRU J20	Receptacle, 4-Pin (to Deck Solenoid)	418-0255	5
J21 THRU J26	Receptacle, Header, 26-Pin (to Rear Panel Connectors (5) and to Front Panel Switch Circuit Board (1))	417-2600	6
J28 THRU J32	Receptacle, Locking Header, 4-Pin	417-6000- 004	5
Q101, Q201, Q301, Q401, Q501	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	5
Q102, Q202, Q302, Q402, Q502	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	5
R101, R201, R301, R401, R501	Resistor, 1 Ohm $\pm 5\%$, 1/2W	110-1013	5
R102, R202, R302, R402, R502	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	5
R103, R203, R303, R403, R503	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	5
R104, R204, R304, R404, R504	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	5
R105, R205, R305, R405, R505	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	5
R106, R206, R306, R406, R506	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	5
----	Blank Circuit Board	514-1808	1

TABLE 6-7. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 914-1809
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 1000 uF, 50V	014-1094	3
C4	Capacitor, Electrolytic, 33 uF, 35V	024-3335	1
C5	Capacitor, Electrolytic, 100 uF, 25V	023-1083	1

TABLE 6-7. POWER SUPPLY CIRCUIT BOARD ASSEMBLY - 914-1809
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C6	Capacitor, Electrolytic, 470 uF, 25V	013-4783	1
C7	Capacitor, Electrolytic, 33 uF, 35V	024-3335	1
C8	Capacitor, Electrolytic, 470 uF, 25V	013-4783	1
C9,C10	Capacitor, Ceramic Disc, 0.01 uF, 25V	000-1044	2
CR1 THRU CR4	Diode, MR751, Silicon, 100V @ 6 Amperes	202-0751	4
CR5 THRU CR8	Diode, 1N4005, Rectifier, Silicon, 600V @ 1 Ampere	203-4005	4
CR9,CR10	Diode, Zener, 1N4744A, 15V, 1W	200-0015	2
J1	Connector, 2-Pin (to ac fuse)	417-0700	1
J2	Connector, 6-Pin (to Motor)	417-0677	1
J3	Connector, 12-Pin (to Power Transformer)	417-1276	1
J4	Connector, 4-Pin (to Power Transistor)	418-0255	1
J5	Connector, 6-Pin (to Motherboard)	417-0677	1
Q1	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q2	Transistor, TIP-32A, Silicon, PNP, TO-220AB Case	218-0032	1
R1	Resistor, 470 Ohm $\pm 5\%$, 1/2W	110-4733	1
R2	Potentiometer, 500 Ohm, 1/2W	178-5030	1
R3	Resistor, 1.5 k Ohm $\pm 5\%$, 1/2W	110-1543	1
R4	Resistor, 620 Ohm $\pm 5\%$, 1/2W	110-6233	1
R5,R6	Resistor, 25 Ohm $\pm 5\%$, 5W, W/W	132-2523	2
R7	Resistor, 620 Ohm $\pm 5\%$, 1/2W	110-6233	1
U1	Integrated Circuit, MC7805, Positive 5 Volt Regulator, TO-220 Case	227-7805	1
----	Blank Circuit Board	514-1809	1

TABLE 6-8. 5400 FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY - 910-0035

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C3	Capacitor, Electrolytic, 4.7 uF, 35V	024-4753	3
J1	Receptacle, 26-Pin	417-2600	1
R1	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R2	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	1
R3,R4	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	2
R5	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	1
R6,R7	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	2
R8	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	1
R9	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
----	Receptacle, 6-Pin	417-6000- 006	1
----	Blank Circuit Board	510-0035	1

TABLE 6-9. 5500B FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY - 914-1807

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1 THRU C5	Capacitor, Electrolytic, 4.7 uF, 35V, Tantalum	064-4763	5
J1	Receptacle, 26-Pin	417-2600	1
J2	Receptacle, 6-Pin	417-6000-006	1
R1 THRU R10	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	10
R11 THRU R15	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	5
----	Blank Circuit Board	514-1807	1

TABLE 6-10. AUDIO OUTPUT TRANSFORMER ASSEMBLY - 950-0077

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Transformer, Audio Output, 600 Ohm, 1:1, 30 Hz to 20 kHz ± 2 dB, +15 dBm	371-0009	1
----	Plug, 4-Pin (to Motherboard)	417-6002-004	1
----	Cover, Plug	417-6001-004	1

TABLE 6-11. CONTROL CIRCUIT BOARD ASSEMBLY - 914-1831/-1841
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 4.7 uF, 35V	024-4753	1
C2	Capacitor, Mylar Film, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C3,C4	Capacitor, Ceramic Disc, 0.01 uF $\pm 20\%$, 25V	000-1044	2
C5	Capacitor, Mylar Film, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C6	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	1
C7	Capacitor, Mylar Film, 0.022 uF, 200V	031-2243	1
C8	Capacitor, Ceramic Disc, 0.005 uF, 50V	000-5034	1
CR1,CR2	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	2
CR3	Diode, 1N4739, Zener, Silicon, 9.1V $\pm 10\%$, 1W	200-0009	1
CR4	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
CR5	Diode, 1N4739, Zener, Silicon, 9.1V $\pm 10\%$, 1W	200-0009	1

TABLE 6-11. CONTROL CIRCUIT BOARD ASSEMBLY - 914-1831/-1841
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
I1 THRU I3	Diode, HP5802-4487, Light Emitting, 20 mA @ 1.6V Clear	323-7344	3
Q1,Q2	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
R1	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R2 THRU R5	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	4
R6	Resistor, 33 k Ohm $\pm 5\%$, 1/4W	100-3353	1
R7 THRU R11	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	5
U1	Integrated Circuit, 74C00, Quad 2-Input NAND, CMOS, 14-Pin DIP	221-7400	1
U2	Integrated Circuit, 74C08, Quad 2-Input AND, CMOS, 14-Pin DIP	221-7408	1
XU1,XU2	Socket, 14-Pin DIP	417-1400	2
----	Blank Circuit Board	514-1841	1

ADDITIONAL PARTS FOR UNITS WITH CUE TONES
ONLY - 914-1841

C9	Capacitor, Mica, 500 pF, 500V	041-5023	1
C10,C11	Capacitor, Mica, 1000 pF $\pm 5\%$, 500V	041-1032	2
C12	Capacitor, Electrolytic, 1.0 μ F $\pm 10\%$, 35V, Tantalum	064-1063	1
C13,C14	Capacitor, Ceramic, 0.01 μ F, 25V	000-1044	2
C15	Capacitor, Electrolytic, 1.0 μ F, $\pm 10\%$, 35V, Tantalum	064-1063	1
C16	Capacitor, Mylar, 0.1 μ F $\pm 10\%$, 100V	030-1053	1
C17	Capacitor, Mylar, 0.01 μ F, 100V	030-1043	1
C18,C19	Capacitor, Poly Film, 0.047 μ F $\pm 5\%$, 100V	030-4743	2
C20	Capacitor, Mylar, 0.1 μ F $\pm 10\%$, 100V	030-1053	1
C21	Capacitor, Ceramic, 0.01 μ F, 25V	000-1044	1
C22	Capacitor, Electrolytic, 1.0 μ F $\pm 10\%$, 35V, Tantalum	064-1063	1
CR6	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
CR7	Diode, Zener, 1N4739, Silicon, 9.1V $\pm 10\%$, 1W	200-0009	1
CR8 THRU CR11	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	4
CR12	Diode, Zener, 1N4739, Silicon, 9.1V $\pm 10\%$, 1W	200-0009	1
CR13	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
K1,K2	Relay, Circuit Board Mount Coil: 24V Contact: SPDT, 24V @ 2 Amperes	270-0024	2
Q3,Q4	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
R12	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R13,R14	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	2
R15	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	1
R16	Resistor, 510 k Ohm $\pm 5\%$, 1/4W	100-5163	1

TABLE 6-11. CONTROL CIRCUIT BOARD ASSEMBLY - 914-1831/-1841
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R17	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R18	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	1
R19,R20	Resistor, 56 k Ohm $\pm 5\%$, 1/4W	100-5653	2
R21	Resistor, 510 k Ohm $\pm 5\%$, 1/4W	100-5163	1
R22,R23	Resistor, 3.3 k Ohm $\pm 5\%$, 1/4W	100-3343	2
R24,R25	Potentiometer, 2 k Ohm $\pm 10\%$, 1/2W	178-2044	2
R26	Resistor, 8.2 k Ohm $\pm 5\%$, 1/4W	100-8243	1
U3,U4	Integrated Circuit, MC4558PI, Dual Operational Amplifier, 8-Pin DIP	221-4558	2
XU3,XU4	Socket, 8-Pin DIP	417-0800	2

TABLE 6-12. TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY - 914-1830/-1840
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Ceramic Disc, 0.0047 μ F $\pm 10\%$, 200V	032-4733	1
C2	Capacitor, Electrolytic, 22 μ F $\pm 10\%$, 20V, Tantalum	063-2273	1
C4	Capacitor, Mylar Film, 0.01 μ F, 100V	030-2043	1
C5,C6	Capacitor, Electrolytic, 1 μ F $\pm 10\%$, 35V	064-1063	2
C7	Capacitor, Mylar Film, 0.01 μ F, 100V	030-1043	1
C8	Capacitor, Electrolytic, 33 μ F, 35V	024-3335	1
C9,C10	Capacitor, Electrolytic, 1.0 μ F $\pm 10\%$, 35V, Tantalum	064-1063	2
C11,C12	Capacitor, Ceramic Disc, 10 pF $\pm 10\%$, 1kV	001-1014	2
C13	Capacitor, Electrolytic, 4.7 μ F $\pm 10\%$, 35V, Tantalum	064-4763	1
C27	Capacitor, Electrolytic, 1.0 μ F $\pm 10\%$, 35V, Tantalum	064-1063	1
C29,C30	Capacitor, Electrolytic, 4.7 μ F, 35V	024-4753	2
C31	Capacitor, Ceramic, 0.0047 μ F $\pm 10\%$, 200V	032-4733	1
C32,C33	Capacitor, Mylar Film, 0.01 μ F, 100V	030-1043	2
C34	Capacitor, Mica, 500 pF, 500V	041-5023	1
C35	Capacitor, Mylar Film, 0.1 μ F $\pm 10\%$, 100V	030-1053	1
C36,C37	Capacitor, Electrolytic, 1.0 μ F $\pm 10\%$, 35V, Tantalum	064-1063	2
CR1,CR2, CR5	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	3
Q1	Transistor, 2N5462, P-Channel JFET, TO-92 Case	212-5462	1
Q2,Q3	Transistor, GES5817, Silicon, PNP, TO-92 Case	210-5817	2
Q4,Q5,Q11	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	3

TABLE 6-12. TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY - 914-1830/-1840
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R1	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	1
R2	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R3	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R7	Resistor, 150 k Ohm $\pm 5\%$, 1/4W	100-1563	1
R8	Resistor, 330 Ohm $\pm 5\%$, 1/4W	100-3333	1
R9	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R10	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R11	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R12,R13	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	2
R14	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R15	Resistor, 560 k Ohm $\pm 5\%$, 1/4W	100-5663	1
R16	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R17	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	1
R18,R19	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	2
R29	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R34	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R35	Resistor, 820 Ohm $\pm 5\%$, 1/4W	100-8233	1
R36	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R37,R38	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	2
R39	Resistor, 27 k Ohm $\pm 5\%$, 1/4W	100-2753	1
R40	Resistor, 56 k Ohm $\pm 5\%$, 1/4W	100-5653	1
R41	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R42	Resistor, 220 k Ohm $\pm 5\%$, 1/4W	100-2263	1
R43	Resistor, 82 k Ohm $\pm 5\%$, 1/4W	100-8253	1
R44	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R45	Resistor, 330 k Ohm $\pm 5\%$, 1/4W	100-3363	1
R46	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R47	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	1
R48	Resistor, 56 k Ohm $\pm 5\%$, 1/4W	100-5653	1
R49	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R50	Potentiometer, 2 k Ohm $\pm 10\%$, 1/2W	178-2044	1
U1	Integrated Circuit, uA748, High Performance Operational Amplifier, 8-Pin DIP	221-7480	1
U3	Integrated Circuit, MC4558PI, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
U4	Integrated Circuit, uA748, High Performance Operational Amplifier, 8-Pin DIP	221-7480	1
U6	Integrated Circuit, MC4558PI, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
XU1,XU3, XU4,XU6	Socket, 8-Pin DIP	417-0800	4
----	Pin, Amplifier Disconnect	418-0161	6
----	Blank Circuit Board	514-1840	1

TABLE 6-12. TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY - 914-1830/-1840
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR MONOPHONIC ASSEMBLIES 914-1830			
C3,C28	Capacitor, Mica, 150 pF, 50V	040-1522	2
ADDITIONAL PARTS FOR STEREOPHONIC ASSEMBLIES - 914-1840			
C3	Capacitor, Mica, 100 pF, 500V	040-1022	1
C14	Capacitor, Ceramic, 0.0047 uF $\pm 10\%$, 200V	032-4733	1
C15	Capacitor, Electrolytic, 22 uF $\pm 10\%$, 20V, Tantalum	063-2273	1
C16	Capacitor, Mica, 100 pF $\pm 5\%$, 500V	040-1022	1
C17	Capacitor, Mylar, 0.01 uF, 100V	030-1043	1
C18,C19	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C20	Capacitor, Mylar, 0.01 uF, 100V	030-1043	1
C21	Capacitor, Electrolytic, 33 uF, 35V	024-3335	1
C22,C23	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	2
C24,C25	Capacitor, Ceramic, 10 pF $\pm 10\%$, 1kV	001-1014	2
C26	Capacitor, Electrolytic, 4.7 uF $\pm 10\%$, 35V, Tantalum	064-4763	1
C28	Capacitor, Mica, 100 pF, 500V	040-1022	1
CR3,CR4	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	2
Q6,Q7	Transistor, GES5817, Silicon, PNP, TO-92 Case	210-5817	2
Q8	Transistor, 2N5462, P-Channel, JFET, TO-92 Case	212-5462	1
Q9,Q10	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
R4	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	1
R5	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R6	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R20	Resistor, 150 k Ohm $\pm 5\%$, 1/4W	100-1563	1
R21	Resistor, 330 Ohm $\pm 5\%$, 1/4W	100-3333	1
R22	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R23	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R24	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R25,R26	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	2
R27,R28	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	2
R30	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R31	Resistor, 560 k Ohm $\pm 5\%$, 1/4W	100-5663	1
R32	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R33	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	1
U2,U5	Integrated Circuit, uA748, High Performance Operational Amplifier, 8-Pin DIP	221-7480	2
XU2,XU5	Socket, 8-Pin DIP	417-0800	2

SECTION VII

DRAWINGS

7-1. INTRODUCTION.

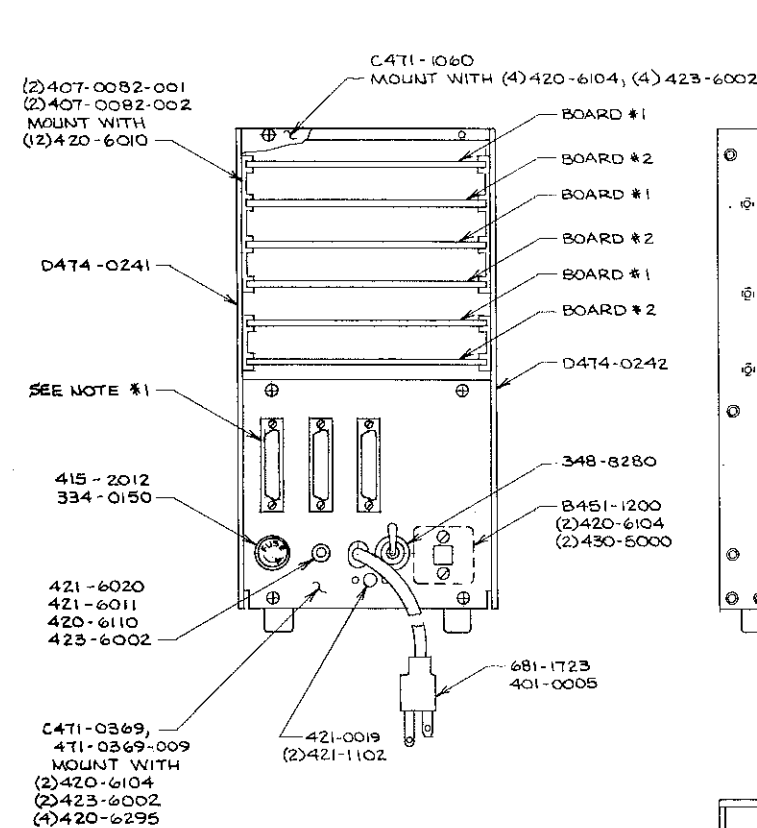
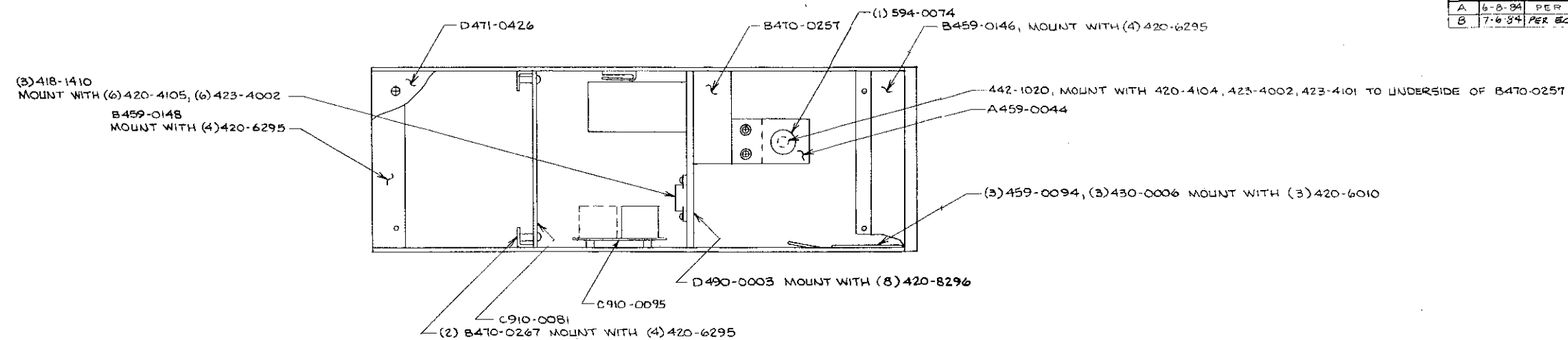
7-2. This section provides assembly drawings, schematic diagrams, and wiring diagrams as indexed below.

NOTE THE ASSEMBLY DRAWINGS AND SCHEMATICS IN THIS
NOTE SECTION REFLECT THE MOST COMPLEX VERSION
NOTE AVAILABLE. LESS COMPLEX VERSIONS OF THE
 MACHINE OR ITS COMPONENTS ARE COVERED BY
 THESE TOP LEVEL DRAWINGS.

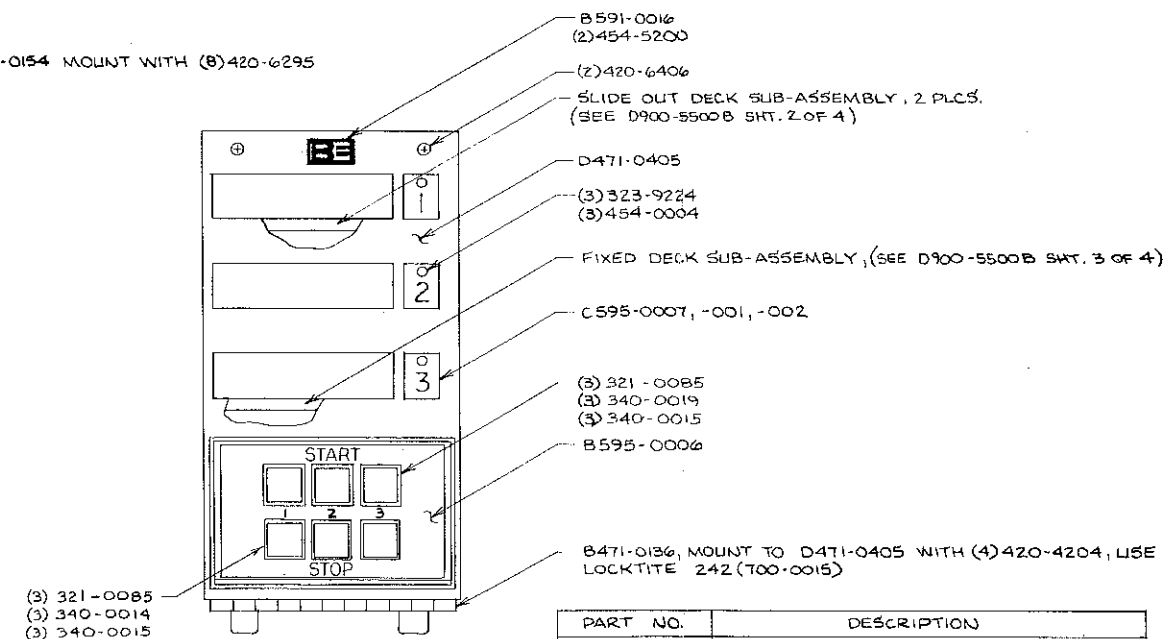
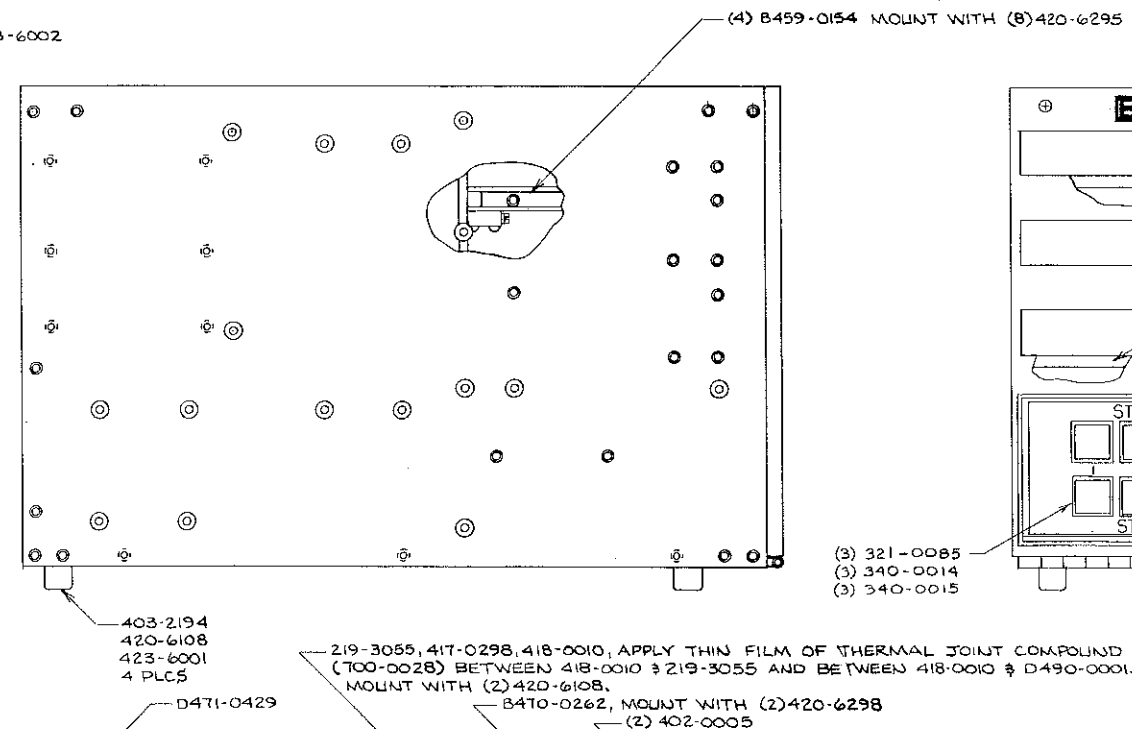
<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
7-1	FINAL ASSEMBLY DRAWING, 5400	D900-5401-000, 900-5402-000, 900-5403-000, 900-5404-000
7-2	FINAL ASSEMBLY DRAWING, 5500B	D900-5501-000, 900-5502-000, 900-5503-000, 900-5504-000
7-3	REMOTE CONNECTOR WIRING DIAGRAM	B906-5117
7-4	5400 MOTHERBOARD BACK PLANE SCHEMATIC DIAGRAM	SD910-0091
7-5	5400 MOTHERBOARD BACK PLANE ASSEMBLY DRAWING	AC910-0091
7-6	5500B MOTHERBOARD BACK PLANE SCHEMATIC DIAGRAM	D906-5119
7-7	5500B MOTHERBOARD BACK PLANE ASSEMBLY DRAWING	D914-1808
7-8	POWER SUPPLY CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-5116
7-9	POWER SUPPLY CIRCUIT BOARD ASSEMBLY DRAWING	C914-1809
7-10	5400 FRONT PANEL SWITCH CIRCUIT BOARD SCHEMATIC DIAGRAM	SC910-0035
7-11	5400 FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY DRAWING	AC910-0035
7-12	5500B FRONT PANEL SWITCH CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-5115

<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
7-13	5500B FRONT PANEL SWITCH CIRCUIT BOARD ASSEMBLY DRAWING	C914-1807
7-14	AUDIO OUTPUT TRANSFORMER ASSEMBLY DRAWING/ SCHEMATIC DIAGRAM	B906-5131
7-15	CONTROL CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-1841
7-16	CONTROL CIRCUIT BOARD ASSEMBLY DRAWING	C914-1841
7-17	TAPE HEAD AMPLIFIER CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-1840
7-18	TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY DRAWING	C914-1840
7-19	MOTOR ASSEMBLY SCHEMATIC DIAGRAM	A906-5104
7-20	POWER TRANSFORMER WIRING DIAGRAM	B906-3136
7-21	DECK SCHEMATIC	B906-5500

REVISIONS					DFTSMN	ENGR	ECN
REV	DATE	DESCRIPTION	BY	CHKD			
A	6-8-84	PER ECN # 5157 (SHT 1)			MH	RA	5157
B	7-6-84	PER ECN 5157A (SHT 1)			DJP	RA	5157A



PART NO.	BOARD #1	BOARD #2
900-5401-000	C914-1830	C914-1831
900-5402-010	C914-1830	C914-1841
900-5403-000	C914-1840	C914-1831
900-5404-000	C914-1840	C914-1841

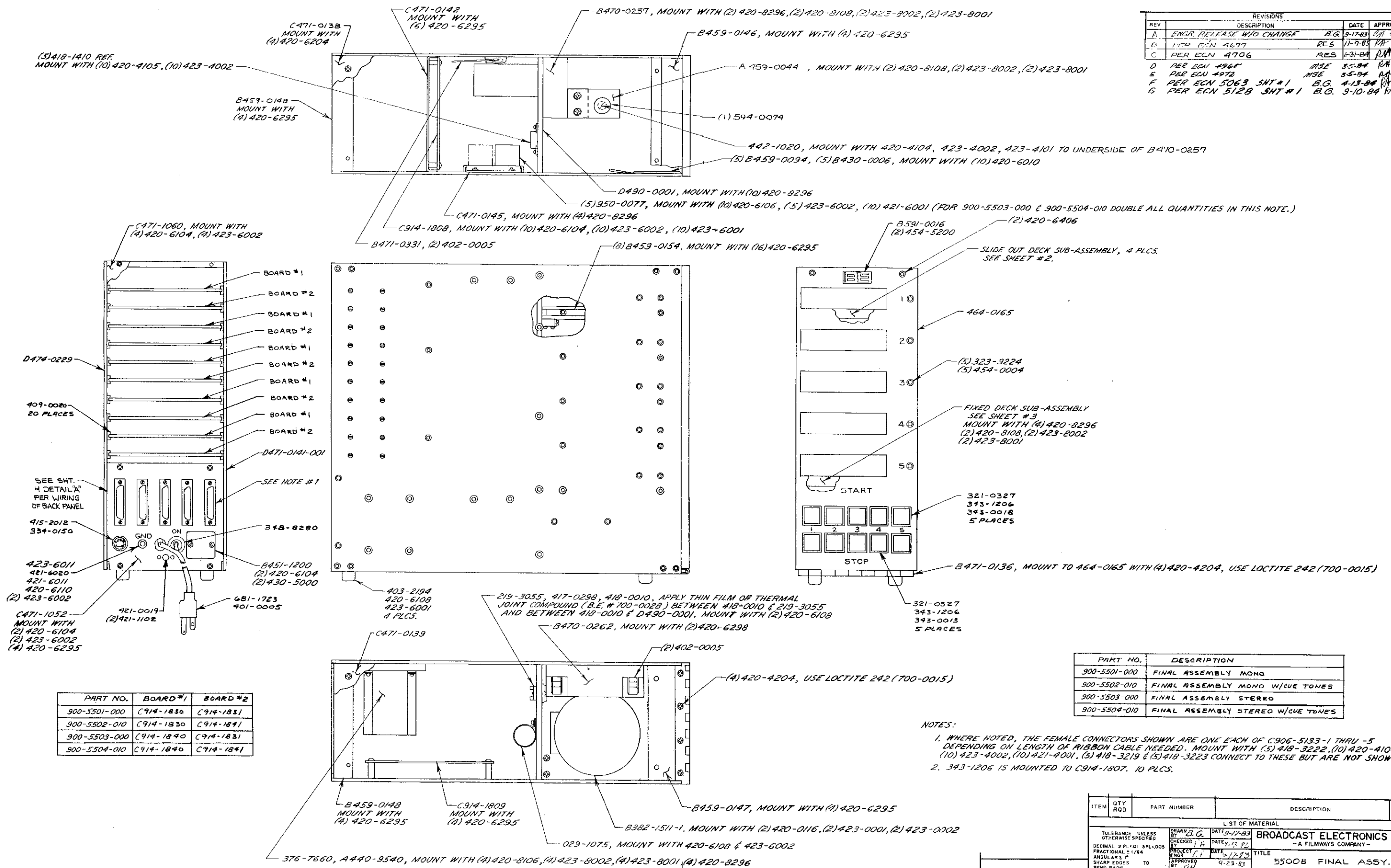


PART NO.	DESCRIPTION
900-5401-000	FINAL ASSEMBLY MONO
900-5402-010	FINAL ASSEMBLY MONO W/CUE TONES
900-5403-000	FINAL ASSEMBLY STEREO
900-5404-000	FINAL ASSEMBLY STEREO W/CUE TONES

- NOTES:
- WHERE NOTED, THE FEMALE CONNECTORS SHOWN ARE ONE EACH OF C906-5133-1 THRU 3 DEPENDING ON LENGTH OF RIBBON CABLE NEEDED. MOUNT WITH (3) 418-3222, (6) 420-4104, (6) 423-4002, (6) 421-4001. (3) 418-3219 & (3) 418-3223 CONNECT TO THESE BUT ARE NOT SHOWN.
 - 340-0015 IS MOUNTED TO C910-0035. 6 PLCS.

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TOLERANCE (DECIMAL) U.S. .X ± .030 .XX ± .015 ANGLES ± 1°		TITLE 5400, FINAL ASSEMBLY		
TYPE A		DWG. NO. 900-5401-000, 900-5402-000, 900-5403-000, 900-5404-000 MODEL 5400 SCALE 1/2 SHEET 1 OF 1		

REVISIONS				
REV	DESCRIPTION	DATE	APPROVED	
A	ENGR RELEASE W/O CHANGE	B.G. 9-17-83	RM 4-7-85	
B	1/2" PER ECN 4677	RES	11-7-83 RM	
C	PER ECN 4706	RES	1-31-84 RM	
D	PER ECN 4961	MISE	5-5-84 RM	
E	PER ECN 4972	MISE	5-5-84 RM	
F	PER ECN 5063 SHT #1	B.G.	4-13-84 RM	
G	PER ECN 5128 SHT #1	B.G.	9-10-84 RM	

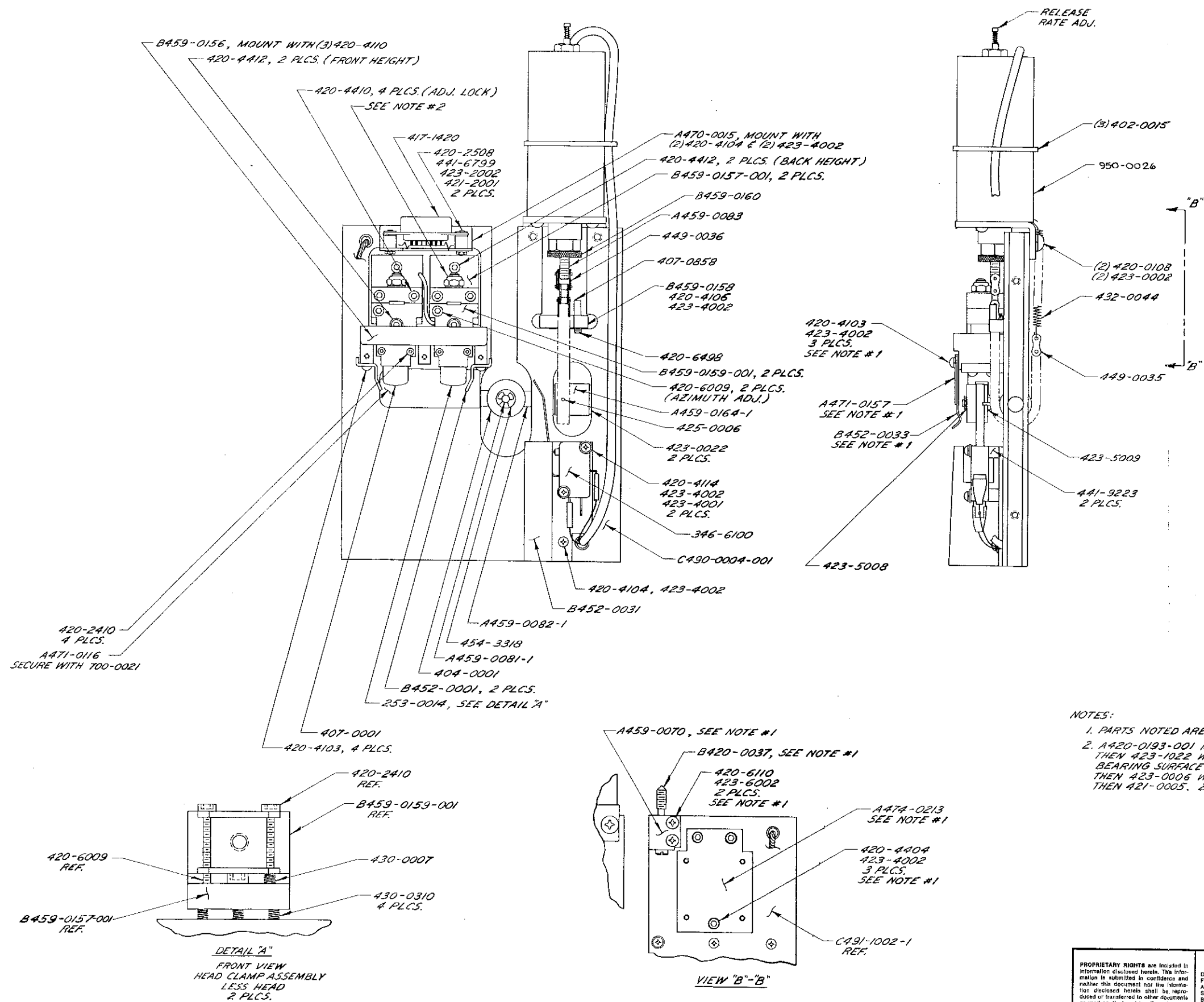


PART NO.	DESCRIPTION
900-5501-000	FINAL ASSEMBLY MONO
900-5502-010	FINAL ASSEMBLY MONO W/CUE TONES
900-5503-000	FINAL ASSEMBLY STEREO
900-5504-010	FINAL ASSEMBLY STEREO W/CUE TONES

NOTES:

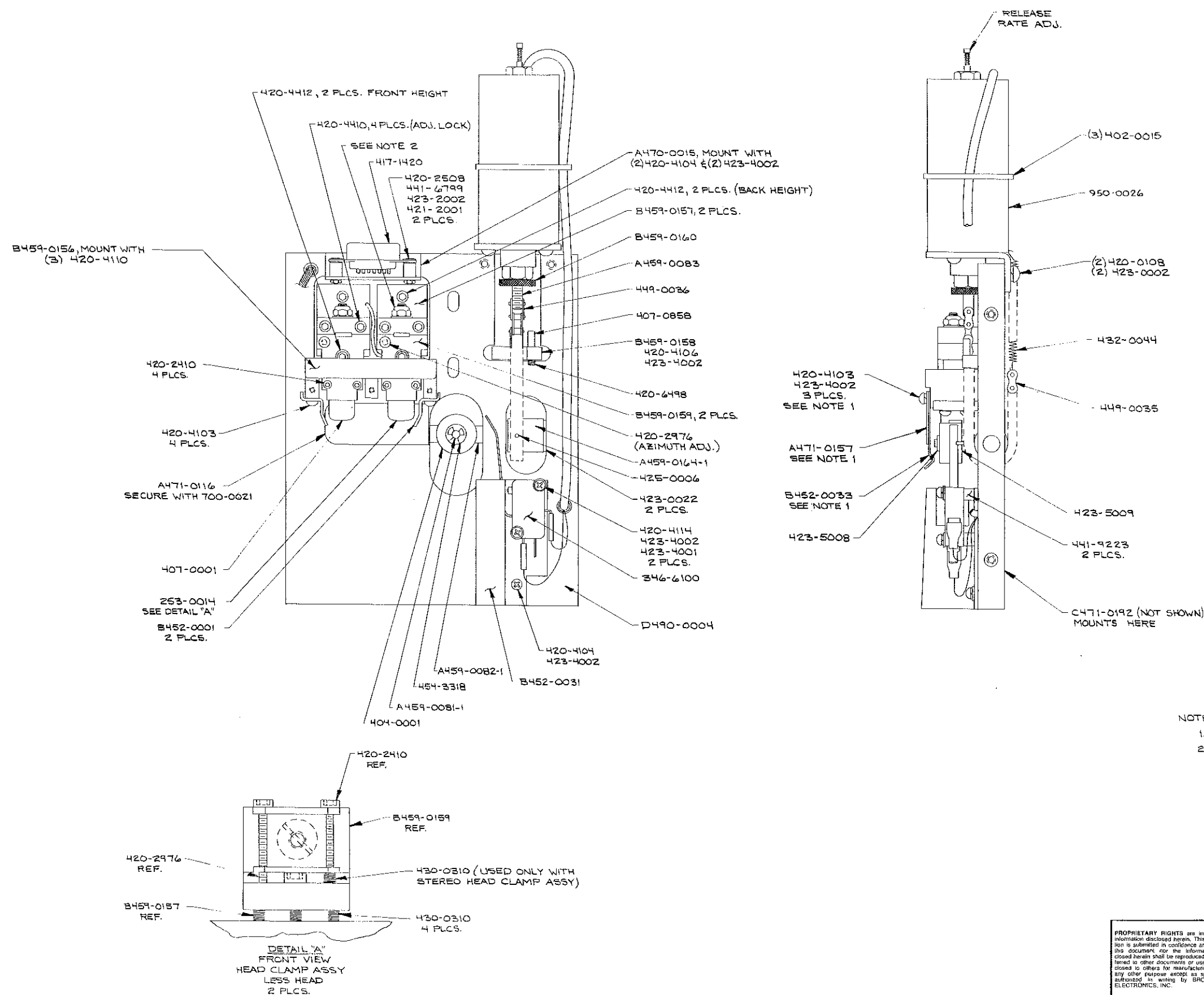
1. WHERE NOTED, THE FEMALE CONNECTORS SHOWN ARE ONE EACH OF C906-5133-1 THRU -5
DEPENDING ON LENGTH OF RIBBON CABLE NEEDED. MOUNT WITH (5) 418-3222, (10) 420-4104,
(10) 423-4002, (10) 421-4001, (5) 418-3219 & (5) 418-3223 CONNECT TO THESE BUT ARE NOT SHOWN.
2. 343-1206 IS MOUNTED TO C914-1807. 10 PLCS.

ITEM	QTY REQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED		DRAWN BY <i>B.G.</i>	DATE <i>9-17-83</i>	BROADCAST ELECTRONICS INC. — A FILMWAYS COMPANY —
DECIMAL 2 PL. 01. 005		CHECKED BY <i>H</i>	DATE <i>4.22.83</i>	
FRACTIONAL 1/64		PROJECT ENGR <i>1</i>	DATE <i>4.27.83</i>	
ANGULAR 1°		APPROVED BY <i>1</i>	DATE <i>4-23-83</i>	
SHARP EDGES TO			TITLE 5500B FINAL ASSY.	
BEND RADIUS			D TOWNG NO. 900-5501-000, 900-5502-010 REV A 900-5503-000, 900-5504-010 5	
FILLET RADIUS			5500B SERIES SCALE 1/2 SHEET 1 OF 4	
MATERIAL		TREATMENT OR FINISH		



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--	--	---	--	---	--	--	--

		REVISIONS			
REV	DATE	DESCRIPTION	DFTSMN	ENGR	ECN
A	9-17-83	ENGINEERING RELEASE W/O CHANGE	B.G.	RA	
B	11-7-83	SEE ECN	RES	RA	4677
C	1-31-84	ECN 4706	RES	RA	
D	3-5-84	PER ECN 4960	MSE	RA	
E	3-5-84	PER ECN 4972	MSE	RA	

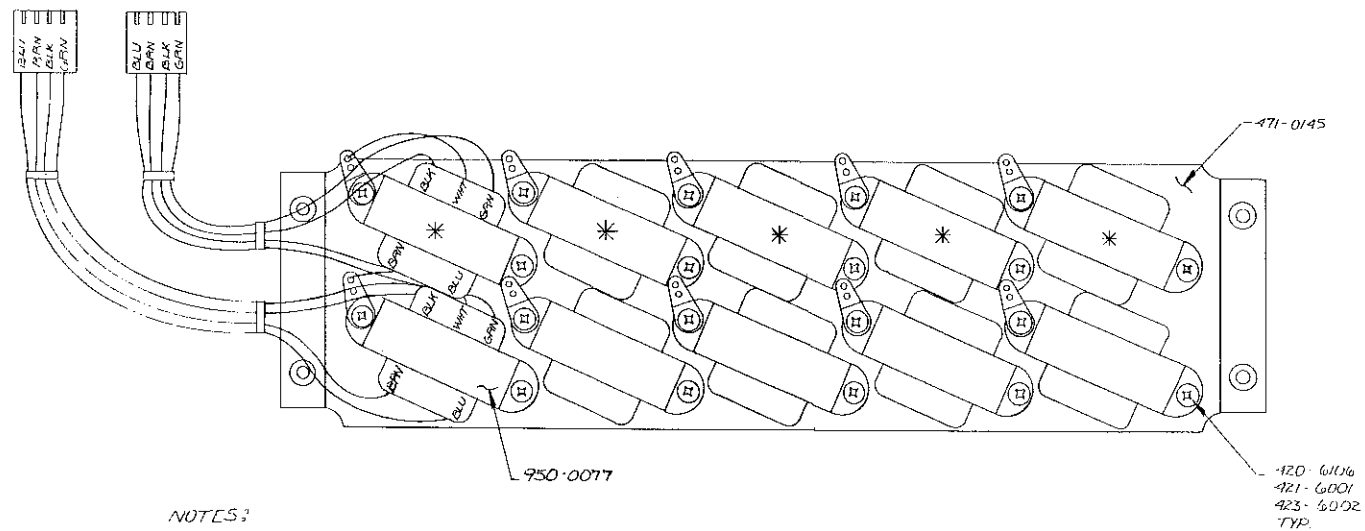


NOTES:

1. PARTS NOTED ARE SHOWN ONLY IN ONE VIEW TO IMPROVE CLARITY.
2. A420-0193-001 MOUNTS IN B459-0159-001 USING 700-0015. LOCKTITE 242) THEN 423-1022 WITH 700-0109 (LUBRIFLATE) ON BOTH SIDES AND ON BEARING SURFACE OF A420-0193-001. THEN B459-0157-001. THEN 423-0006 WITH 700-0109 (LUBRIFLATE) ON BOTH SIDES. THEN 421-0005. 2 PLCS.

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TOLERANCE (DECIMAL) U.S.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		CHKD RA 9-17-83	FINISH —	
MFG.		PROJ. ENGR. 9-17-83	NEXT ASSY.	TITLE 5500 FINAL ASSY FIXED DECK
MODEL 5500B		SCALE 1/1	SHEET 3 OF 4	TYPE SIZE DWG. NO. 900-5501-000, 900-5502-010, 900-5503-000, 900-5504-010

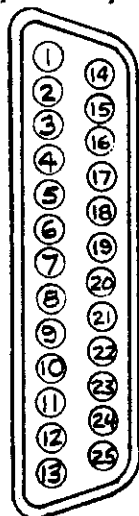
REVISIONS			DFTSMN	ENGR	ECN
REV	DATE	DESCRIPTION			
A	10-15-75	REVISED FROM PREVIOUS EDITION WITHOUT CHANGES	JEF	RA	
B	1-17-76	REPLACES # 46777	RES	RA	



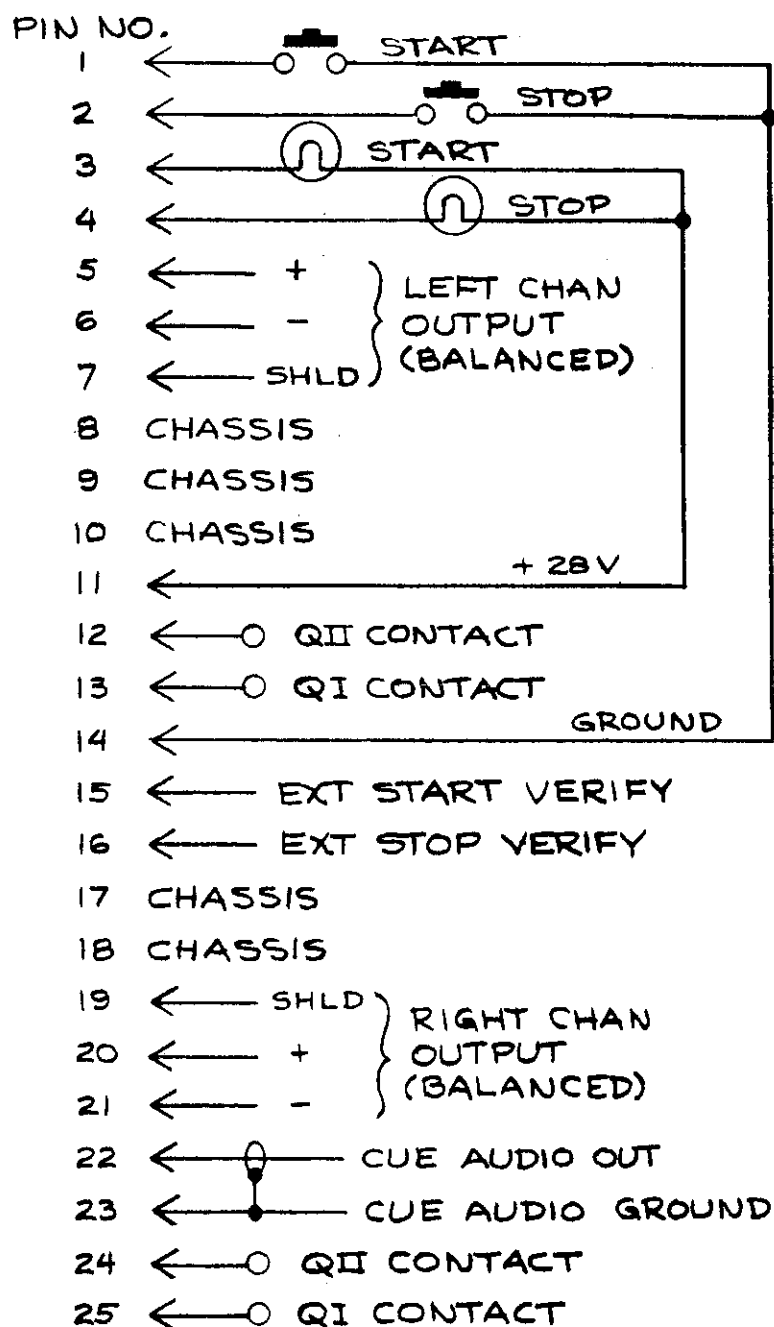
- NOTES:
- * ITEM NOT USED IN MONO UNITS.
 - TYPICAL CONNECTOR HOUSING WIRING, 10 PLACES
WHT WIRES GO TO SHIELD LUG, AS SHOWN.

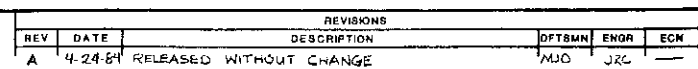
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		CHKD RA		
		ME RA	FINISH	
		PROJ ENGR. RA		
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		MFG.	NEXT ASSY.	TITLE 5500B FINAL ASSEMBLY TYPE SIZE DWG. NO. 900-5501-000 900-5502-000 A D 900-5503-000 900-5504-010 B MODEL 5500B SERIES SCALE 1/1 SHEET 1 OF 1

REMOTE PLUG
P101, P201, P301, P401, P501


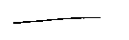


REAR VIEW

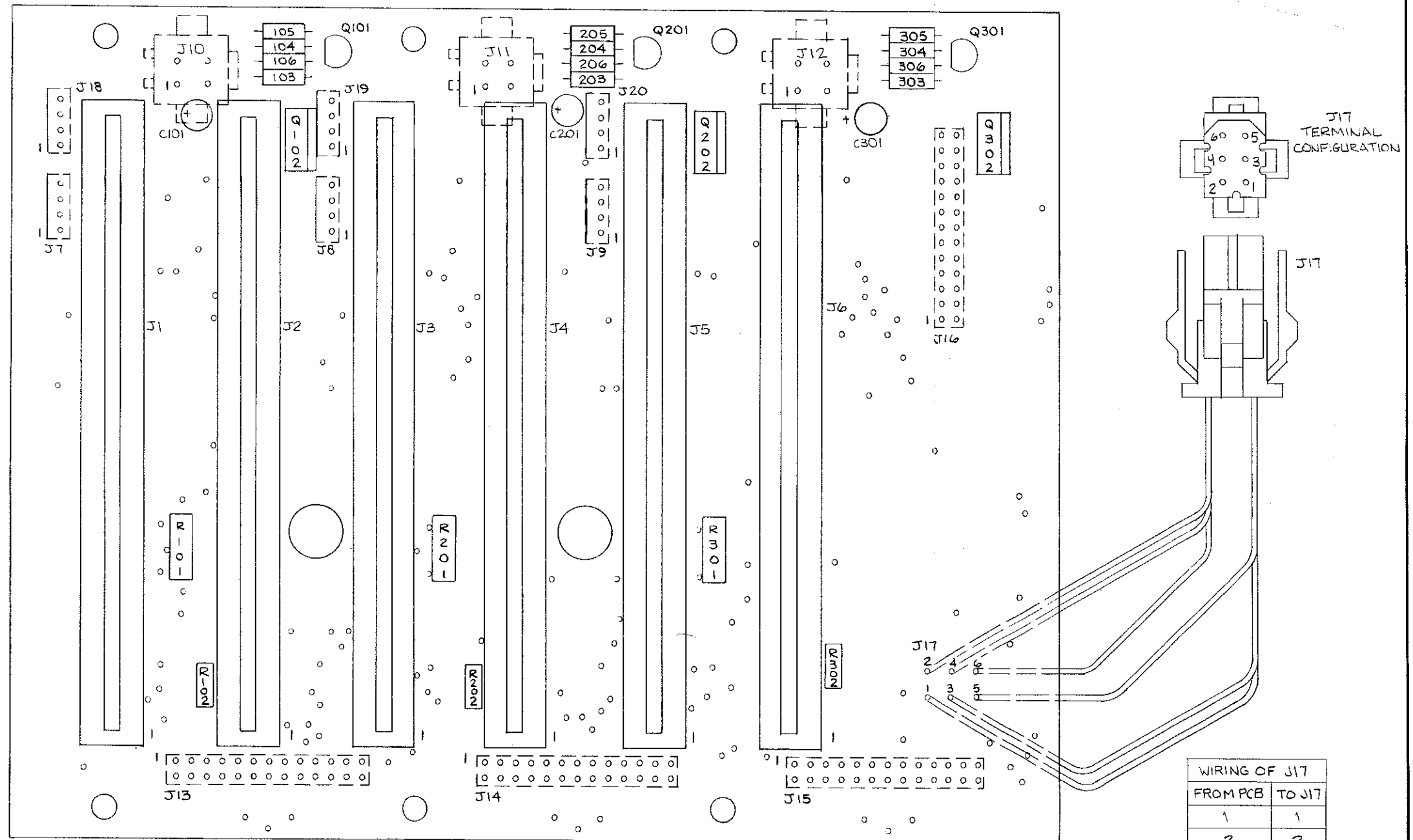




SEE B/M 910-0091

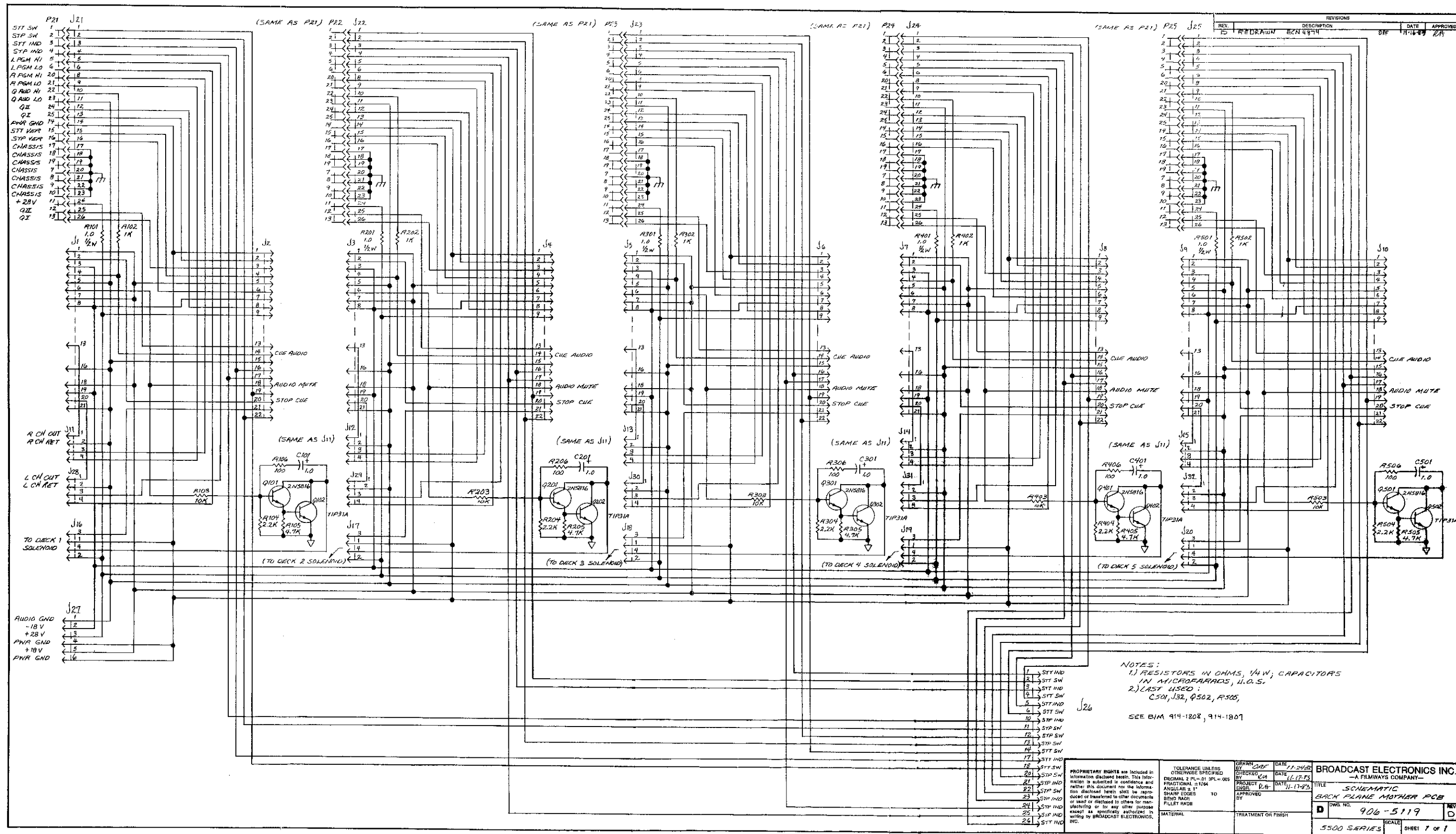
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	CHKD WH 5-24-84 ME RAT 5-24-84	FINISH 
TOLERANCE (DECIMAL) U.O.S. .xx ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	PROJ. ENGR. DRK	TITLE SCHEMATIC BACK PLANE MOTHER PCB
MFG.	NEXT ASSY.	TYPE S SIZE D DWG. NO. 910-0091 REV A
MODEL 5400 SERIES SCALE — SHEET 1 OF 1		

REVISIONS				
REV	DATE	DESCRIPTION	DFTSMN	ENGR
A	4-24-84	RELEASED WITHOUT CHANGE	MJO	JRC
B	11-13-84	CHGD WIRES TO J17 FROM COLORS TO No. WIRE	JAH	JRC
				5419



SEE SCHEMATIC # 910-0091
SEE B/M # 910-0091

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TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°		TITLE PCB ASSEMBLY BACK PLANE MOTHER PCB (5400 SERIES) TYPE SIZE A C DWG. NO. 910-0091		SHEET 1 OF 1 SCALE 2/1 REV B

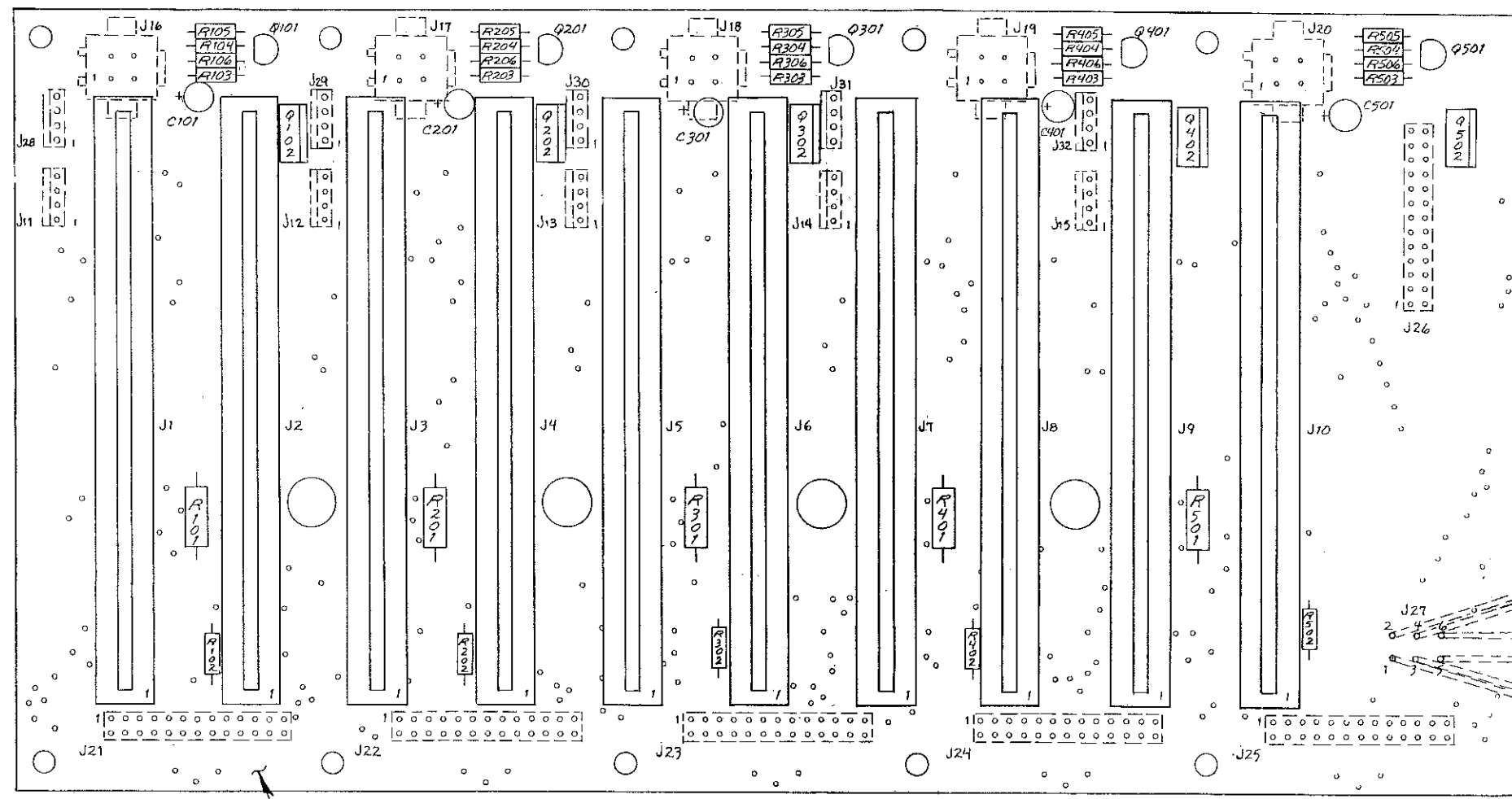


NOTES:
1) RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, 11.0.S.
2) LAST USED: C501, J32, Q502, R505,
SEE B1M 914-1808, 914-1807

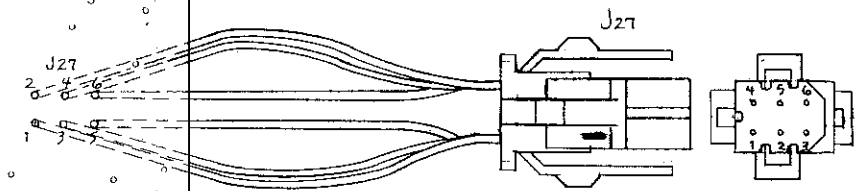
BROADCAST ELECTRONICS INC. —A FILMWAYS COMPANY—	
TITLE: SCHEMATIC BACK PLANE MOTHER PCB	
DWG. NO. 906-5119	REV. D
5500 SERIES	SHEET 7 OF 1

DESIGNER: J26	CHECKED: J26	DATE: 11-24-68
PROJECT: B1M	DATE: 11-17-68	APPROVED: J26
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL = 01 3 PL = 005 FRACTIONAL 1/16 1/8 1/4 1/2 1 ANGULAR ± 1° SHARP EDGES BEND RADI FILLET RADI		
MATERIAL: TREATMENT OR FINISH:		

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
D	PER ECN #4874	07F 7-13-83	RA
E	PER ECN 5020	MSE 4-19-84	JRC



PCB BLANK
#0514-1808

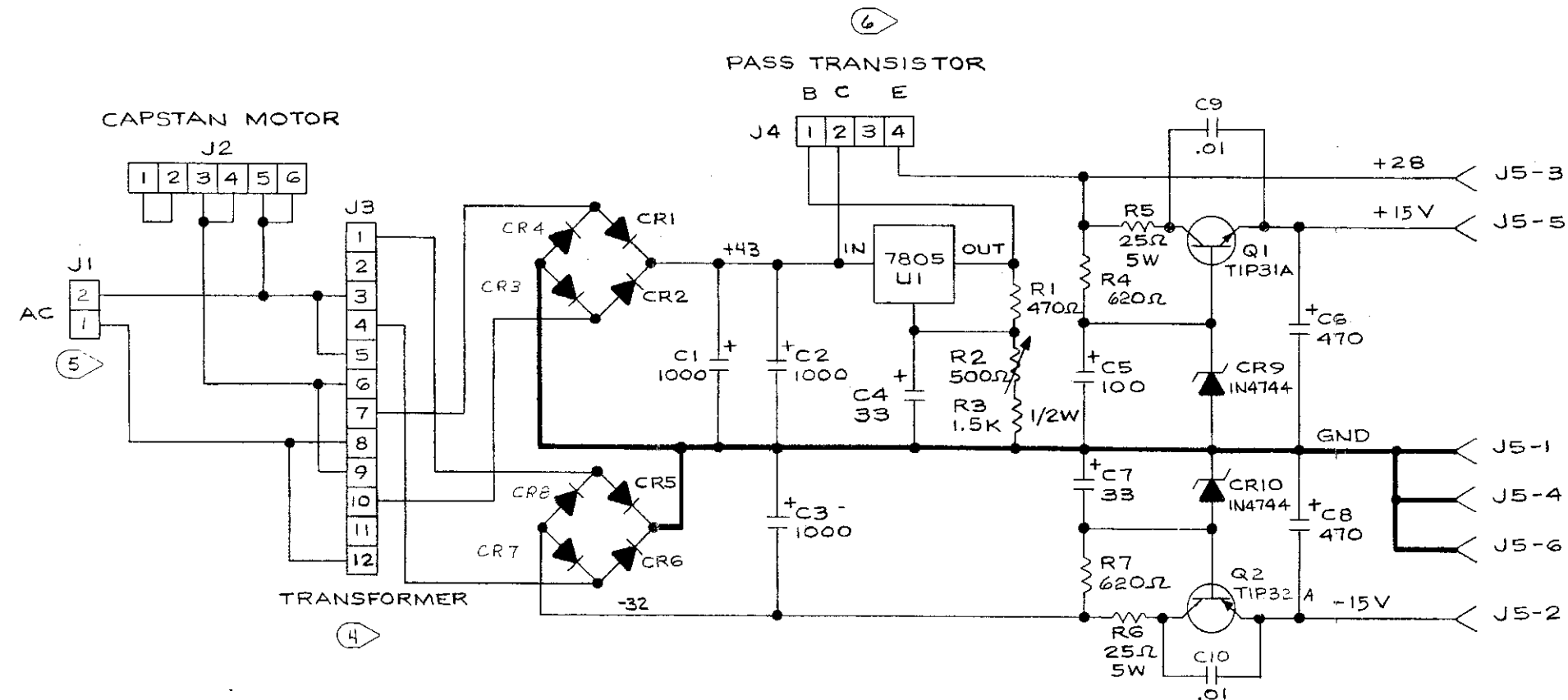


- NOTES:
- 1) CUT WIRE 6" LONG & NUMBER 1 THRU 6.
 - 2) STRIP ONE END .25" & THE OTHER END .20".
 - 3) INSTALL PINS #417-0053 ON .20" STRIPPED END, (6 PLCS)
 - 4) PLUG CONNECTOR WIRE #1-1, #2-2, #3-3, #4-4, #5-5, #6-6.
 - 5) SOLDER WIRES TO PCB WIRE #1-1, #2-2, #3-3, #4-4, #5-5, #6-6.

SEE SCHEMATIC #0906-5119
SEE B/M #914-1808

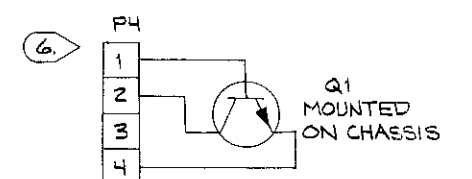
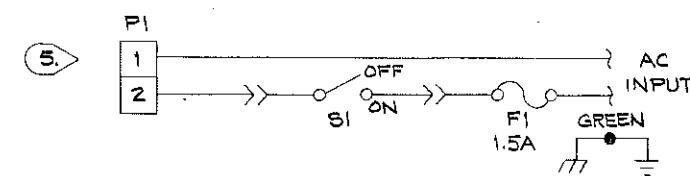
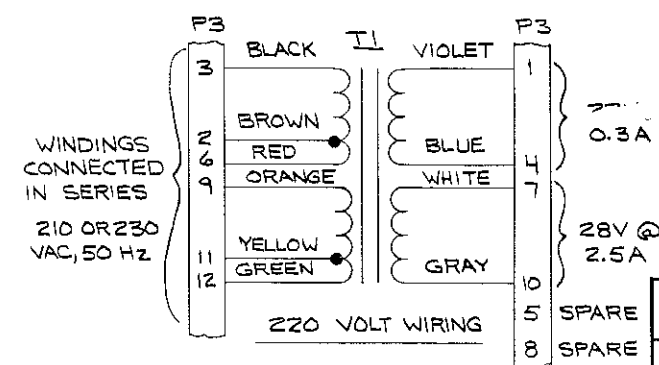
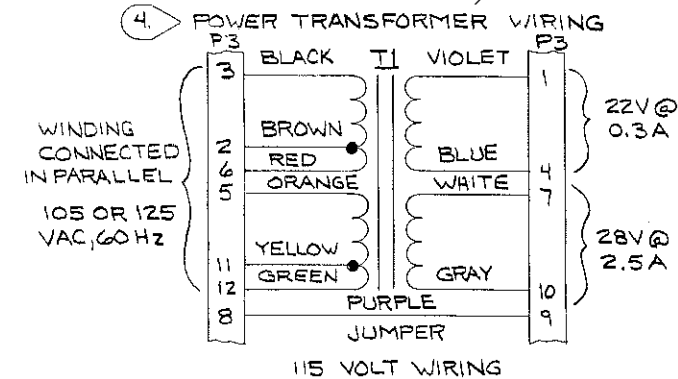
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MATERIAL:		TREATMENT OR FINISH:		SCALE: 2/1		SHEET 1 of 1	

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECN 719	2/17/76	JAH
B	ECN 1594	1/18/79	MH
C	UPDATED	10-12-79	JH
D	ECN 1973	3-21-80	JH
E	ECN 4681	10-24-83	JLJ
F	ECN 5641	3-12-85	JRC



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
4. POWER TRANSFORMER WIRING

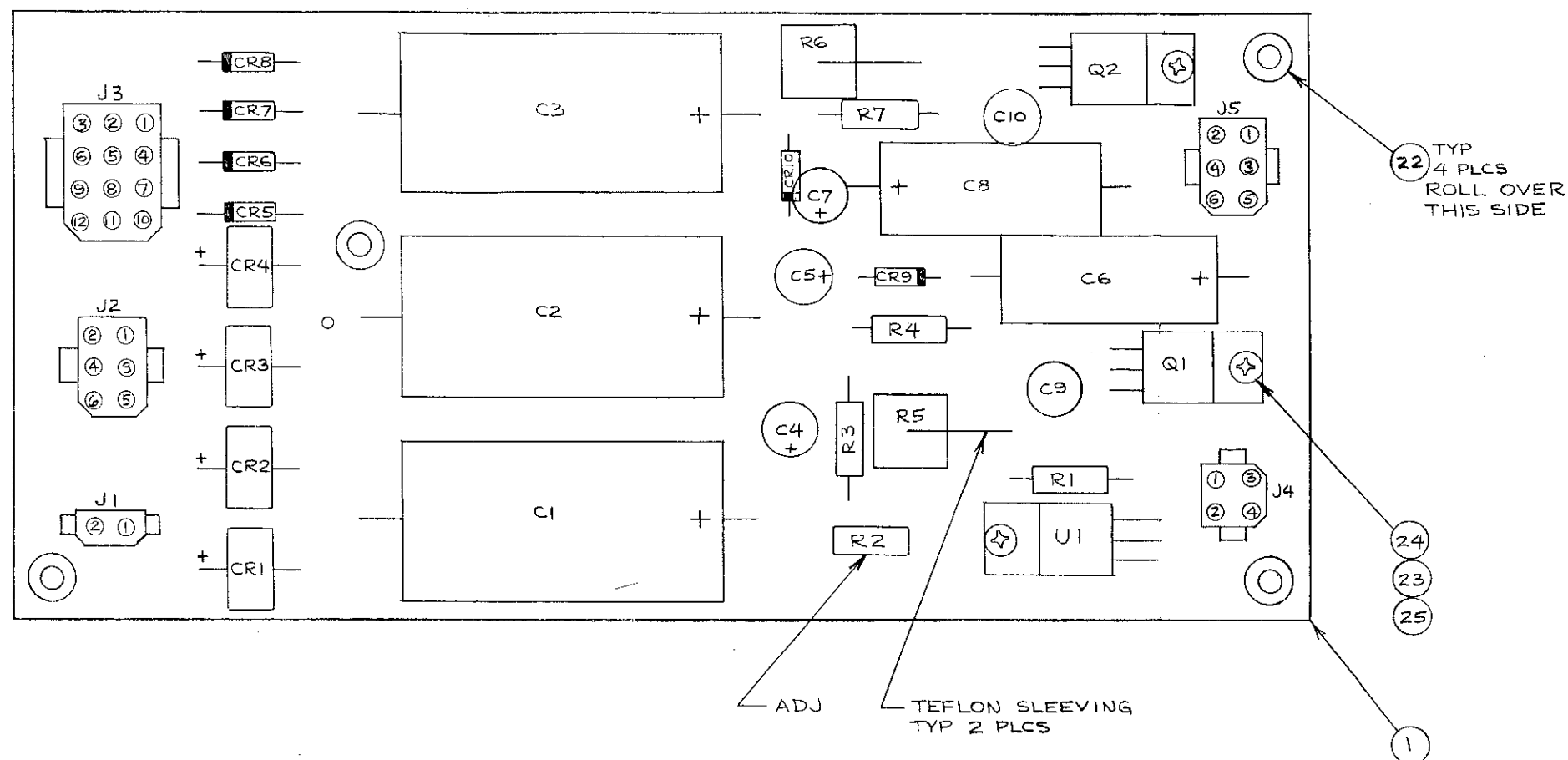


SEE P C ASSY DWG # C-914-1809

ITEM	QTY	RQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED					
DECIMAL 2 PL=01 3 PL=005					
FRACTIONAL 1/64					
ANGULAR ± 1°					
SHARP EDGES TO					
BEND RADIUS					
FILLET RADIUS					
MATERIAL					
TREATMENT OR FINISH					
BROADCAST ELECTRONICS INC.					
- A FILMWAYS COMPANY -					
TITLE 5 DECK (SCHEMATIC)					
POWER SUPPLY BD.					
C DWG NO. 906-5116					
5000 SERIES					
SHEET 1 OF 1					

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECN 731	3/5/76	MSB
B	ECN 1228	4-8-78	MH
C	ECN 1594	1-18-79	MH
D	ECN 2633	3-31-81	ORF
E	ECN 5641	3-12-85	JRC



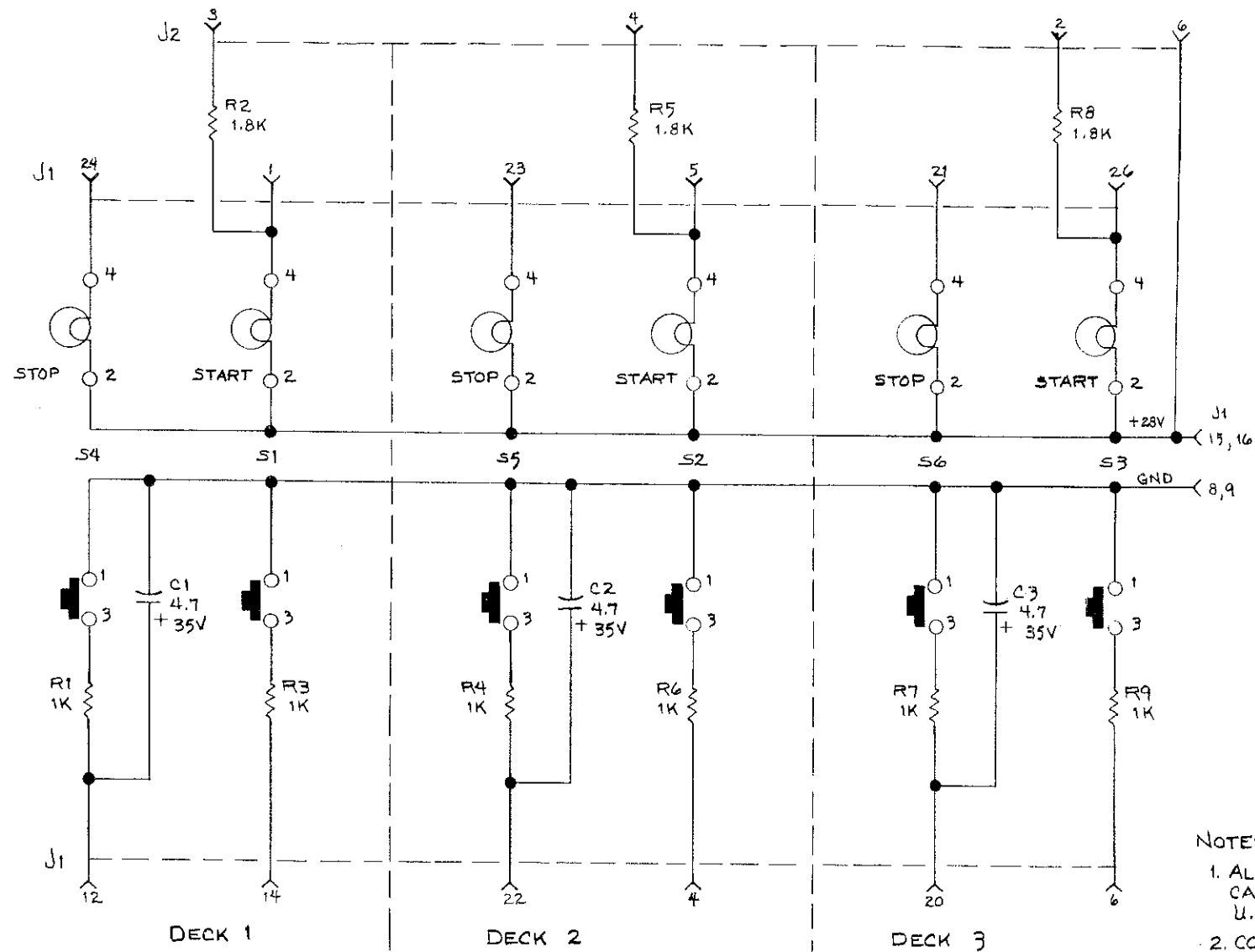
SEE SCHEMATIC NO. C 906-5116
SEE B/M NO. 914-1809

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PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL±.01 3 PL±.005 FRACTIONAL ± 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADIUS FILLET RADIUS	DRAWN BY	MSB	DATE	2/17/76	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - TITLE ASSEMBLY POWER SUPPLY P C B D DWG NO. 914-1809 5500 SERIES
	CHECKED BY	MSB	DATE	2-23-76	
	PROJECT ENGR		DATE		
	APPROVED BY				
MATERIAL	TREATMENT OR FINISH				SCALE 2/1
					SHEET 1 OF 1

REV
E

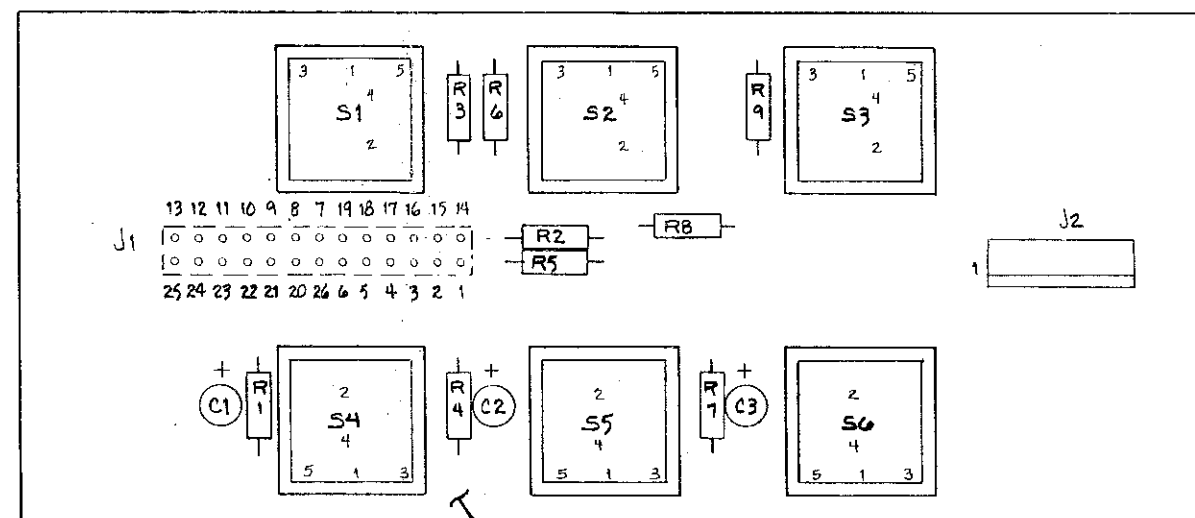
REVISIONS				
REV	DATE	DESCRIPTION	DFTSMN	ENGR
A	4-24-84	RELEASED WITHOUT CHANGE	MJO	JEL
B	6-7-84	HOOK UP OF CONNECTORS CHGD.	MJO	JEL
			ECN	
			5157	



- NOTES:
1. ALL RESISTORS IN OHMS, 1/4W 5%, CAPACITORS IN MICROFARADS, U.O.S.
 2. COMPONENTS LAST USED: C3, J2, R9, S6

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		CHKD MH 5-24-84			
		ME RA 5-24-84		FINISH	
		PROJ. ENGR. JRC 5-24-84			
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		MFG.		NEXT ASSY.	
BROADCAST ELECTRONICS, INC. 4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST					
TITLE SCHEMATIC FRONT PANEL SWITCH BOARD					
TYPE S		SIZE C		DWG. NO. 910-0035	
MODEL 5400 SERIES		SCALE NTS		SHEET 1 OF 1	

REVISIONS			OFTSMN	ENGR	ECN
REV	DATE	DESCRIPTION			
A	4-24-84	RELEASED WITHOUT CHANGE	MJO	JRC	
B	6-7-84	SWITCHES REPLACED & J1 PIN OUT CHGO	MJO	JRC	5157
C	7-11-84	SWITCHES RECONNECTED	MJO	JRC	5217

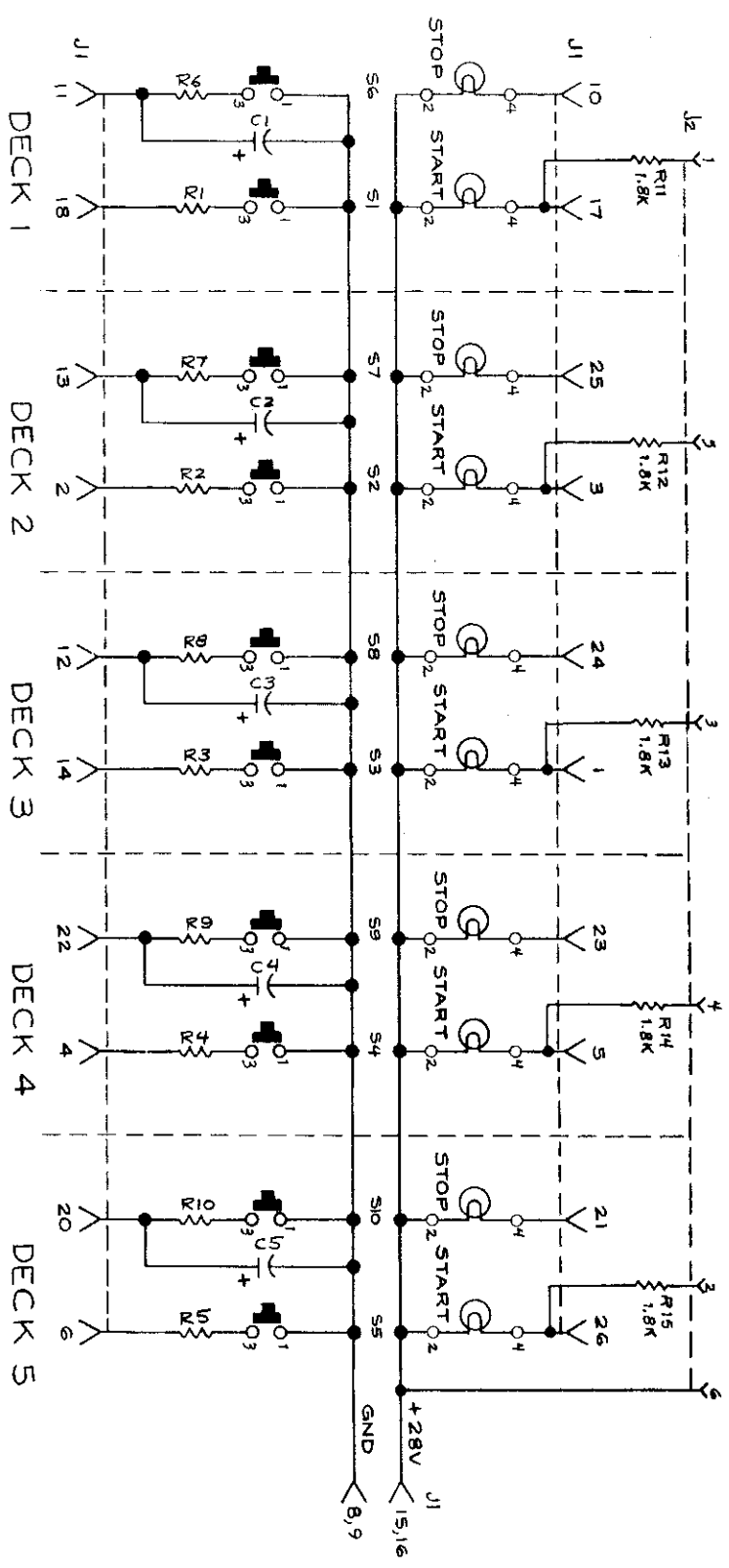


MC510-0035
PCB BLANK

SEE SCHEMATIC # SC910-0035
SEE B/M # 910-0035

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		CHKD MH 5-24-84					
		ME RA 5-24-84	FINISH				
		PROJ. ENGR. JRC					
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		MFG.	NEXT ASSY.	TITLE PCB ASSEMBLY FRONT PANEL SWITCH BOARD			
				TYPE A	SIZE C	DWG. NO. 910-0035	REV C
				MODEL 5400 SERIES	SCALE 2/1	SHEET 1 OF 1	

REVISIONS		DATE	APPROVED
REV	DESCRIPTION		
1	PER ECN # 4975	DATE	APPROVED
		7-19-63	SK



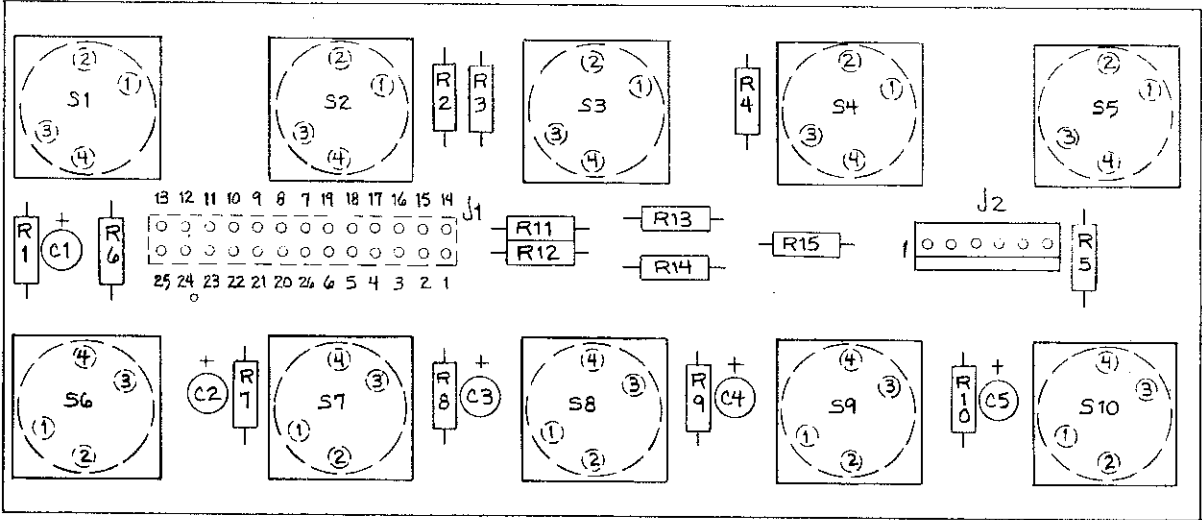
- NOTES:
1. ALL RESISTORS, 1K Ω , 1/4W, 5%.
 2. ALL CAPACITORS 4.7 μ f, 35V, TANTALUM.
 3. LAST COMPONENTS USED: C5, J2, R15, 4 S10

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

ITEM		QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED					
ORIGINAL 2 PL + 01 3 PL + 006					
FRACTIONAL 1/16					
ANGULAR .1"					
SHARP EDGES TO					
BEND RADIUS					
Fillet .031"					
MATERIAL					
TREATMENT OR FINISH					
5500 SERIES					
SCALE					
SHEET 1 OF 1					

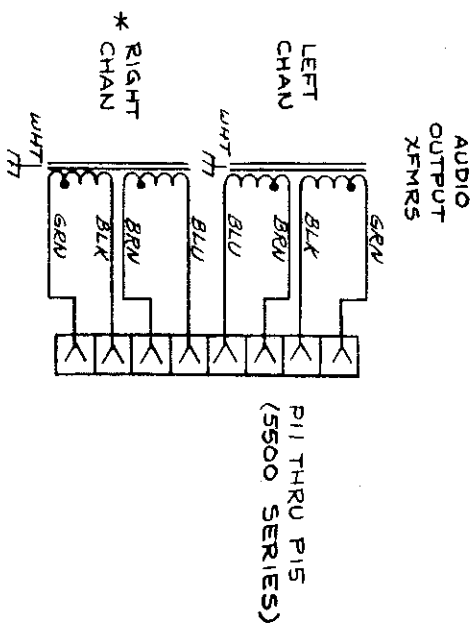
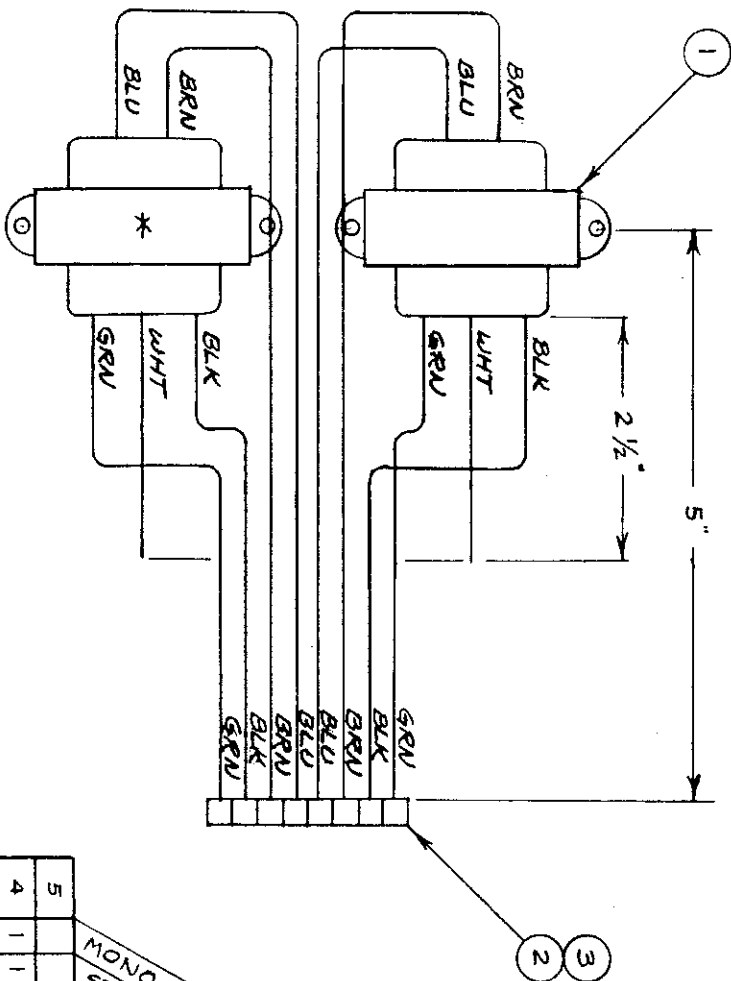
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REVISIONS				
REV	DATE	DESCRIPTION	DFTSMN	ENGR
1	1-26-84	OWG REDRAWN & UPDATED	ORF	JRC
				4380



SEE SCHEMATIC #SC906-5115
SEE B/M #914-1807

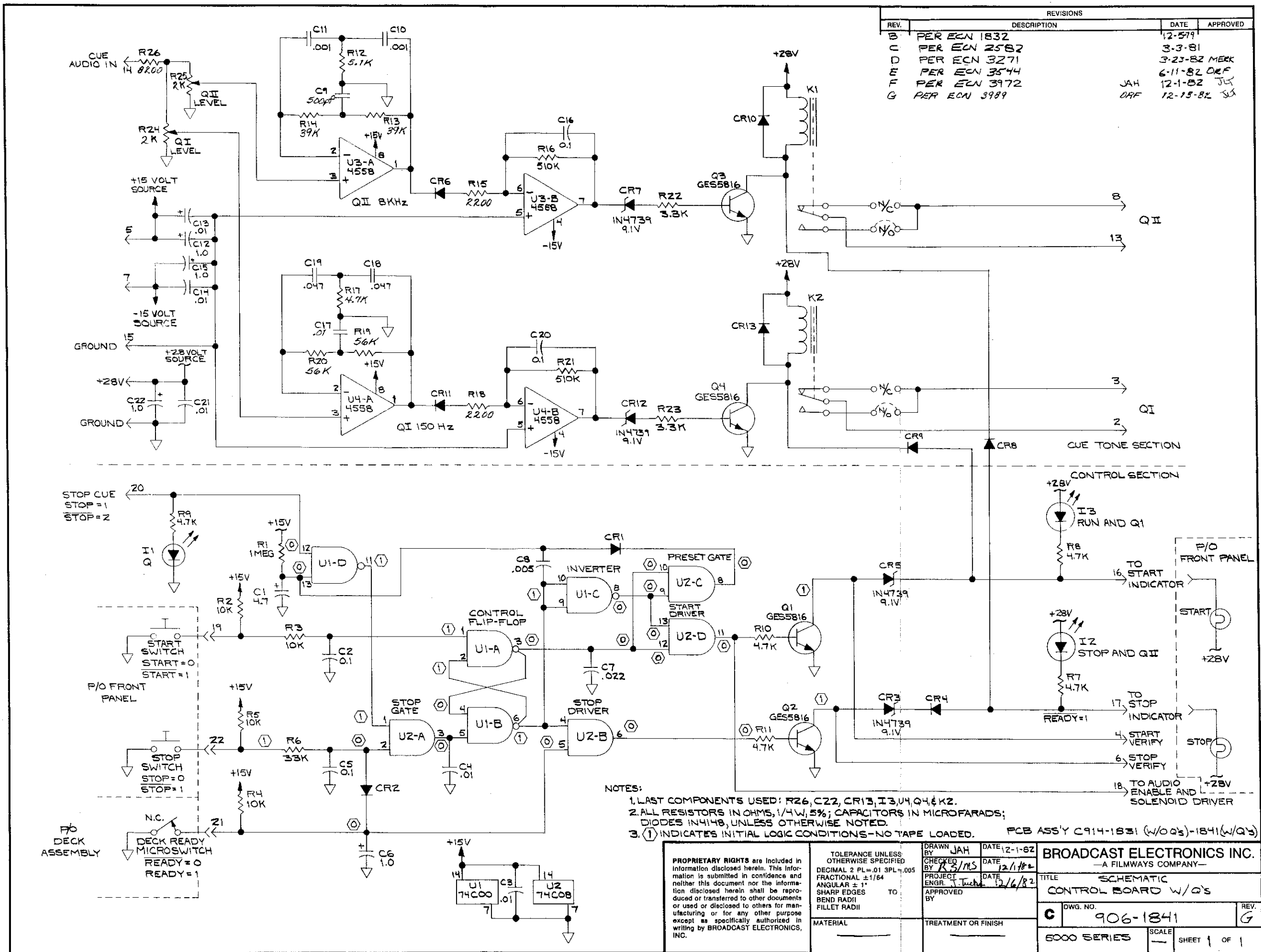
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	CHKD.			
	ME	PRODUCT USED ON 5500 SERIES	TITLE PCB ASSEMBLY	SHEET 1 OF 1
	EE	FINISH	FRONT PANEL CONTROL BD.	SCALE 2/1
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°	PROJ. ENGR. JRC DFTG. SUPVR. M/H 4-25-84 MFG.	TYPE A	SIZE C	DWG. NO. 914-1807



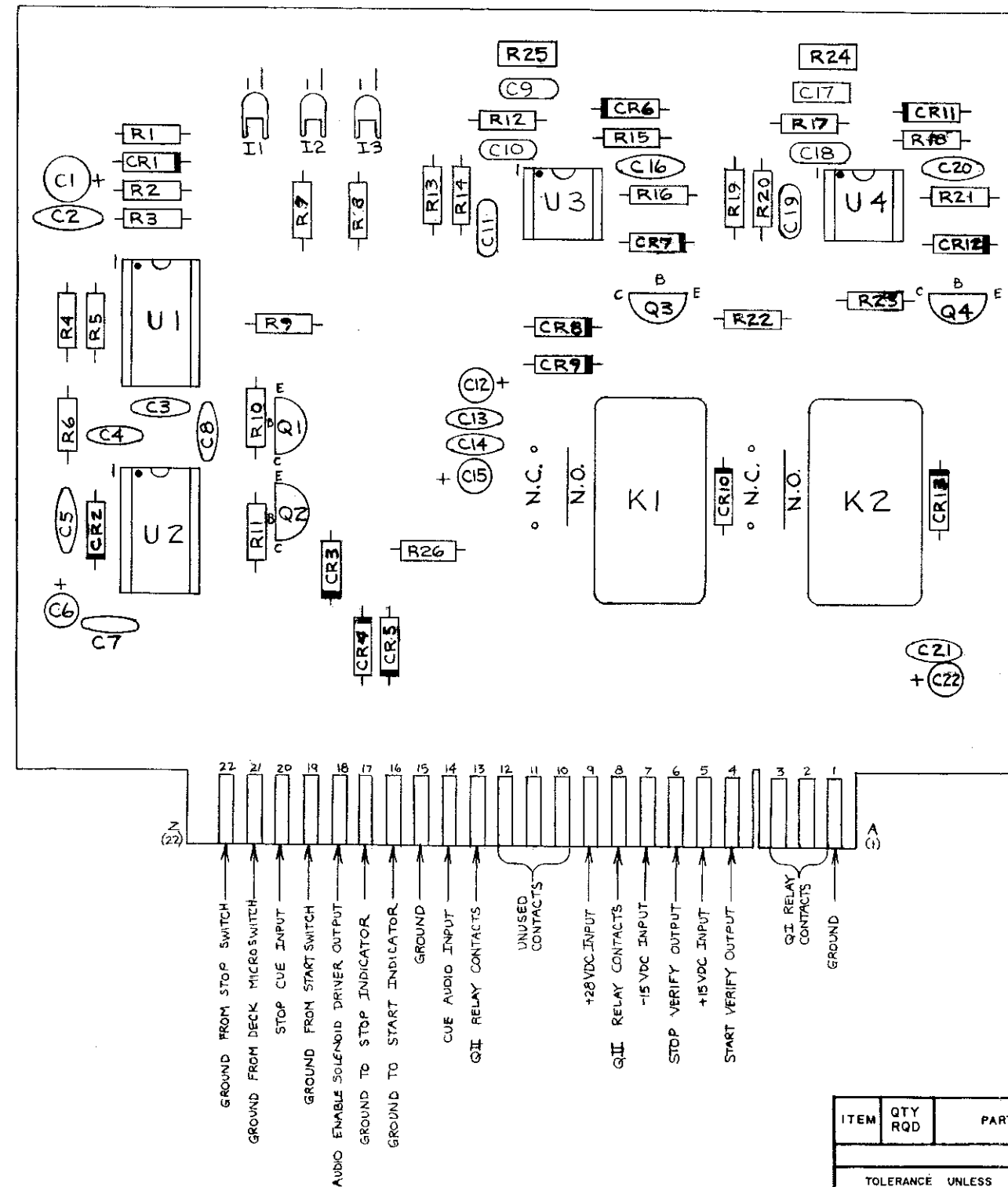
NOTES:

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.

MONO		STEREO			
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE	
5	1	410-1416	#6 SOLDER LUG	2	
4	1	418-3225	CONNECTOR PIN		
3	4	418-3224	CONNECTOR HOUSING, 8-POS (P1 THRU P15)		
2	1	371-0005	AUDIO OUTPUT XFMR (365 W-1)		
1	1	906-5131	CABLE ASSY		
LIST OF MATERIAL					

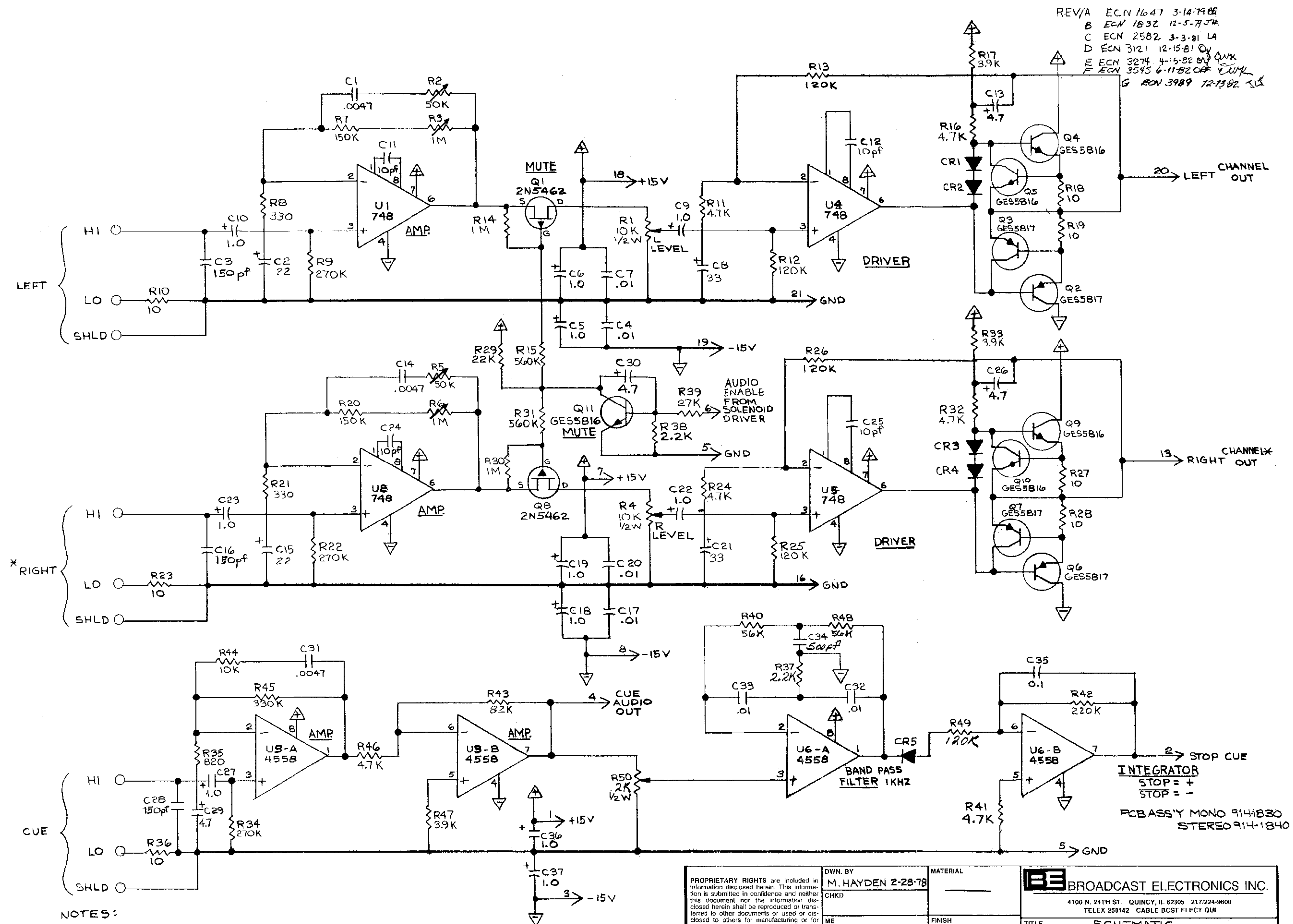



REVISIONS				
REV	DESCRIPTION	DATE	APPROVED	
A	PER ECN 2582	3-3-81	LA	
B	PER ECN 3271	3-23-82	MARK JC	
C	SEE ECN 3538	6/11/82	KAT	
D	ECN 3544	6/11/82	CLK	ORF
E	PER ECN 3651	7-15-82	CLK	MARK
F	PER ECN 3989	12-15-82	CLK	ORF



SEE B/M NO. 914-1841

ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED			DRAWN BY CLORR DATE 12-12-77	
DECIMAL 2 PL ± 0.1 3 PL ± 0.005			CHECKED BY DATE	
FRACTIONAL ± 1/64			PROJECT DATE	
ANGULAR ± 1°			APPROVED BY	
SHARP EDGES TO			TREATMENT OR FINISH	
BEND RADII			MATERIAL	
FILLET RADII			5000 SERIES	
FOR THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. PERSONNEL AND CUSTOMERS ALL RIGHTS RESERVED			TITLE ASS'Y.- CUE TONE DETECTOR CONTROL PCB	
			DWG NO. 914-1841	
			SHEET 1 OF 1	



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	CHKD	_____				
	ME	FINISH _____				
	PROJ. ENGR.	_____				
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	MFG.	NEXT ASSY. _____		TITLE SCHEMATIC STEREO / MONO TAPE HEAD AMP		
				TYPE S C	SIZE DWG. NO. 906-1840	REV G
				MODEL 5000 SERIES	SCALE —	SHEET 1 OF 1

SECTION VIII
APPENDIX

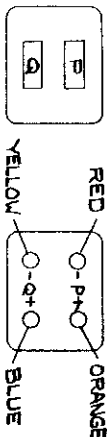
8-1. INTRODUCTION.

8-2. This appendix lists data applicable to the operation and use of the Broadcast Electronics 5400 and 5500B Cartridge Machines. The following information is contained in this section:

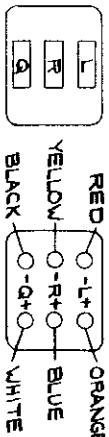
A. The NAB Tape Cartridge and Its Maintenance.

MONO PLAY
HEAD

FRONT VIEW REAR VIEW

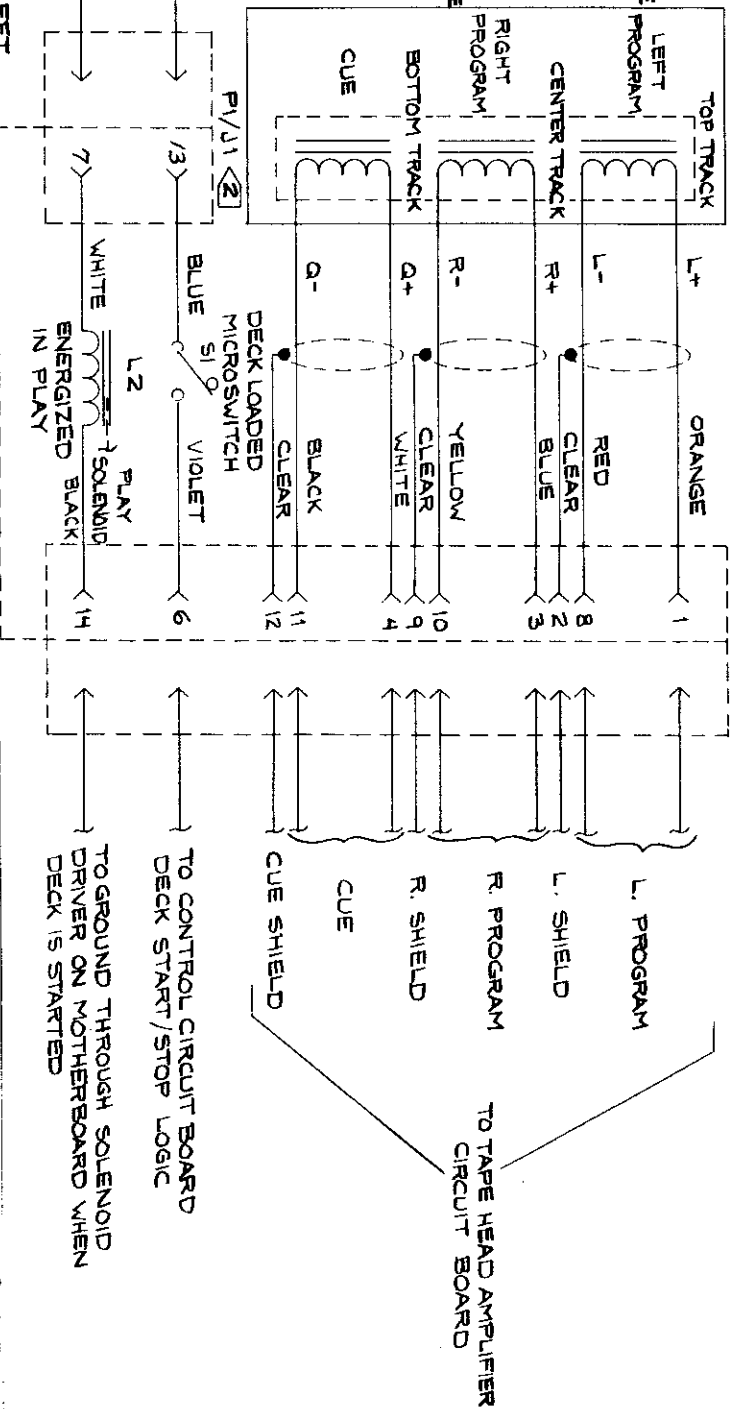


STEREO PLAY
HEAD



P = PROGRAM (MONO) TRACK
Q = CUE TRACK
L = LEFT PROGRAM TRACK (STEREO)
R = RIGHT PROGRAM TRACK (STEREO)

L¹
TAPE HEAD 1



- NOTES
- STEREO HEAD SHOWN LEFT CHANNEL ONLY USED ON MONO PLAY UNITS
 - DECK CONNECTORS ON 5300B TOP DECK: J7
MIDDLE DECK: J8
BOTTOM DECK: J9

- SEE B/M 906-5300 FOR 5300B OR B/M 906-5300 FOR 5300B OR B/M 950-0027 FOR 5400
- REFER TO RC 940-5300 (MONO) OR RC 940-5301 (STEREO) FOR HEAD AND BULKHEAD CABLING

REVISIONS		
REV	DESCRIPTION	DATE
A	ENGINEERING RELEASE	JAH 11-28-83

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TOLERANCE UNLESS OTHERWISE SPECIFIED	
DECIMAL 2 PL ± .01 3PL ± .005	TO
FRACTIONAL ± 1/64	SHARP EDGES
ANGULAR ± 1°	BEND RADIUS
FILLET RADIUS	

BROADCAST ELECTRONICS INC.	
DATE	11-28-83
BY	JAH
CHECKED	JS
DATE	11-28-83
PROJECT	1/A
DATE	11-28-83
ENGR	1/A
APPROVED	
TITLE	5000 SERIES CARTRIDGE MACHINE DECK SCHEMATIC
DWG. NO.	906-5500
SCALE	1 OF 1
SHEET	1 OF 1

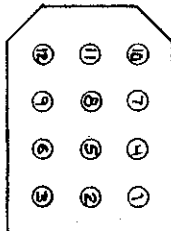
REV. B PER ECN # 4813 RES 12-29-83 JNC

TO GROUND THROUGH SOLENOID DRIVER ON MOTHERBOARD WHEN DECK IS STARTED

TO CONTROL CIRCUIT BOARD DECK START/STOP LOGIC

TO TAPE HEAD AMPLIFIER CIRCUIT BOARD

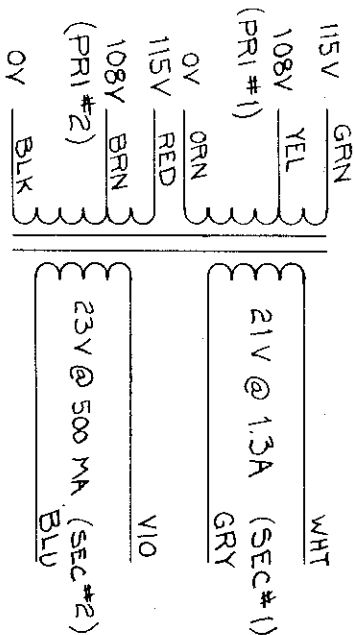
MATING SIDE OF TRANSFORMER PLUG
 SOCKET PART NO. 418-1271
 PINS PART NO. 417-0053



POWER TRANSFORMER (376-7656 & 376-7660 WIRING

PIN	120V	110V	240V	220V
1	VIO	VIO	VIO	VIO
2	BRN	RED	BRN	RED
3	BLK	BLK	BLK	BLK
4	BLU	BLU	BLU	BLU
5	ORN	ORN	(OPEN)	(OPEN)
6	RED	BRN	RED	BRN
7	WHT	WHT	WHT	WHT
8	JUMPER	JUMPER	(OPEN)	(OPEN)
9	JUMPER	JUMPER	ORN	ORN
10	GRY	GRY	GRY	GRY
11	YEL	GRN	YEL	GRN
12	GRN	YEL	GRN	YEL

REV	DESCRIPTION	DATE	APPROVED
A	110V WAS 105V; 220V WAS 210V	6/27/76	
B	ECN 739 (DWG # WAS 906-3100)	3/30/76	
C	ECN 3024	JAN 10/21/81	
D	ECN 3898	JAN 10/28/82 SK	
E	ECN 4089	JAN 2/14/83 SK	
F	ECN 4869	RES 1-31-84 MH	



REF.	QTY	PART NUMBER	DESCRIPTION	NOTE
REF. 1	1	376-7656	FM 600 SERIES AGC LIMITER AMP (120/240V)	
REF. 1	1	376-7656	3000 SERIES CART. MACH. PWR XMFR	
REF. 1	1	376-7660	5000 SERIES CART. MACH. PWR XMFR	
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE

LIST OF MATERIAL

TOLERANCE UNLESS OTHERWISE SPECIFIED
 DECIMAL 2 PL-DI 3 PL-005
 FRACTIONAL 3/164
 ANGULAR ± 1°
 SHARP EDGES
 BEND RADIUS
 FILLET RADIUS

DATE 7/28/76
 BY PROJECT
 APPROVED BY

TITLE
 POWER XMR WIRING

DWG NO. 906-3136

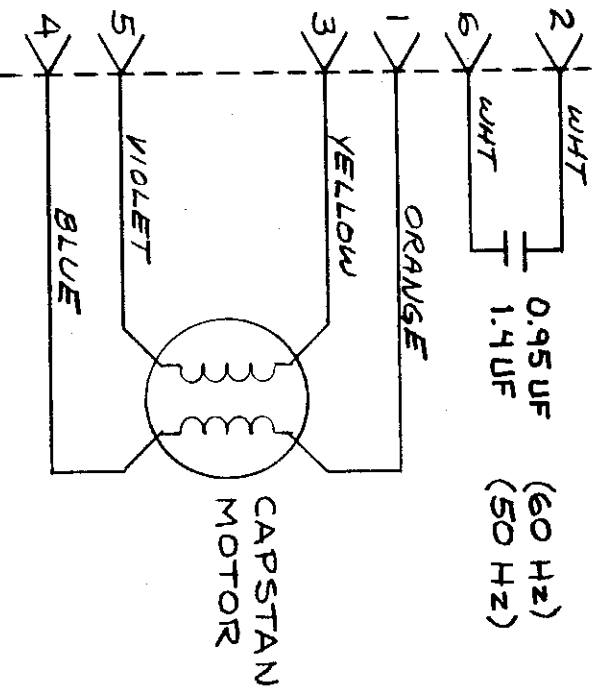
SCALE 1" = 1"

SHEET 1 OF 1

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED

6-PIN AMP PLUG



ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
------	-----	-----	-------------	-------------	------

LIST OF MATERIAL

TOLERANCE UNLESS OTHERWISE SPECIFIED
DECIMAL 2 PL=01 3 PL=.005
FRACTIONAL $\pm 1/64$
ANGULAR $\pm 1^\circ$
SHARP EDGES
BEND RADIUS
FILLET RADIUS

DRAWN *MSD* DATE 9/22/75
BY *MSD*
CHECKED *MSD* DATE 10/31/75
PROJECT *MSD* DATE 11/1/75
APPROVED
BY *MSD* 11/6/75

TITLE
BROADCAST ELECTRONICS INC.
- A FILMWAYS COMPANY -
SCHEMATIC
MOTOR ASSEMBLY

DWG NO. 906-5104
REV A

5000 SERIES
SCALE FULL
SHEET 1 OF 1

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BROADCAST ELECTRONICS, INC.

The NAB Tape Cartridge and Its Maintenance

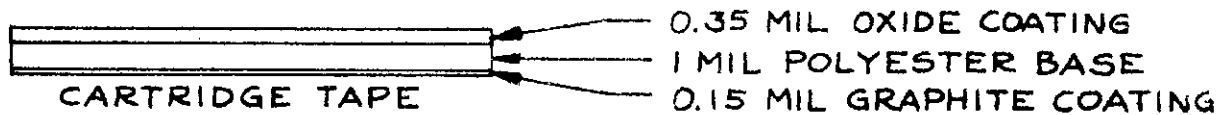
TABLE OF CONTENTS	PAGE NO.
The NAB Tape Cartridge	1
Cartridge Maintenance Tips	7
Cartridge Recording Procedure	10
Cartridges in Stereophonic Systems	11

THE NAB TAPE CARTRIDGE

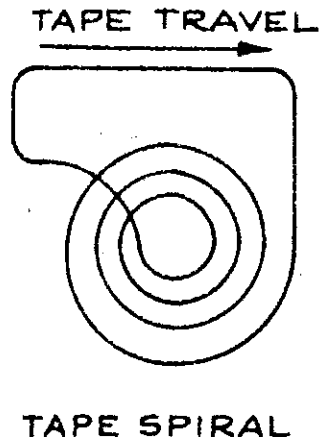
The National Association of Broadcasters (NAB) defines a cartridge as "a plastic or metal enclosure containing an endless loop of lubricated tape, wound on a rotatable hub in such a fashion as to allow continuous motion." Cartridges from the various manufacturers differ slightly in details, but all cartridges usable in NAB standardized systems fit the preceding definition.

THE TAPE

Cartridge tape consists of a synthetic base material approximately 1 mil (0.001 inch) thick. One side of the base is coated with ferric oxide particles for magnetic recording. The other surface is coated with a graphite layer. The total thickness of the tape is approximately 1.5 mils (0.0015 inch). The tape is 0.248 (+0/-0.002) inches wide.



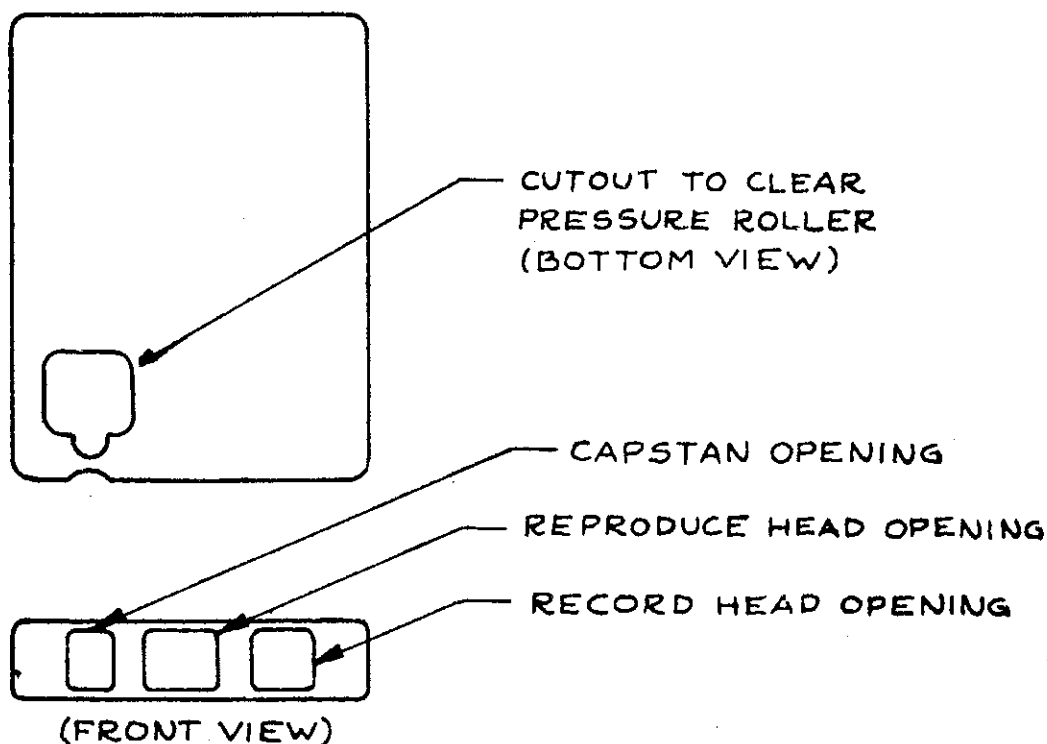
The endless loop is formed by wrapping the tape with the oxide side out into a spiral. The two ends are spliced together so that as the tape is pulled from the center, it passes across the tape heads and winds back onto the outside of the tape spiral.



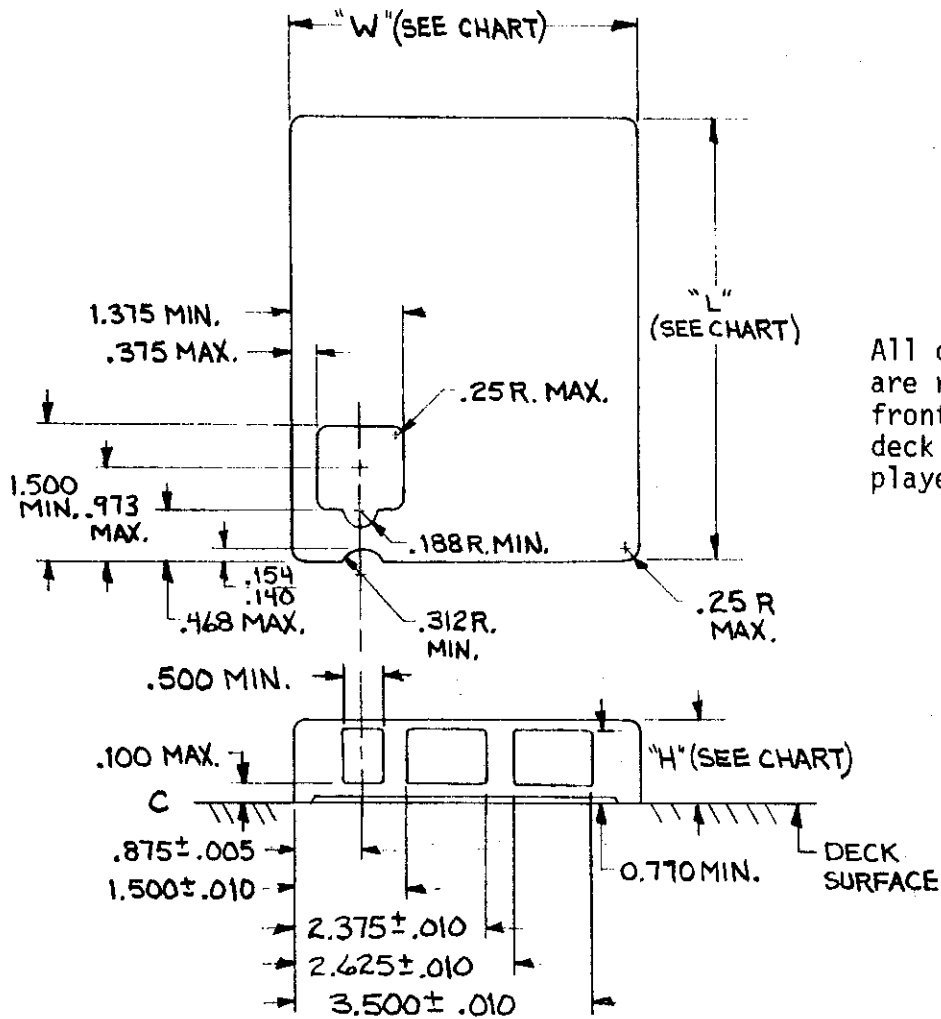
THE SHELL

The shell holds the tape and other parts. There are three standard sizes of shells: A (Broadcast Electronics 300 series), B (600 series), and C (1200 series). Assuming 1.5 mil tape, the type A cartridge can be loaded with up to 395 feet of tape, the B with up to 650 feet, and the C with up to 1250 feet.

There are three openings across the front of the cartridge that allow the heads and capstan to penetrate the shell and contact the tape. In addition, there is an opening in the bottom for the pressure roller to rotate through the cartridge behind the tape. Unlike some cartridges used in consumer entertainment systems, the pressure roller (pinch roller or capstan idler) is part of the cartridge player and not the cartridge.



NAB tape cartridge dimension standards are presented in Figure 1 and NAB tape head dimension standards are presented in Figure 2.

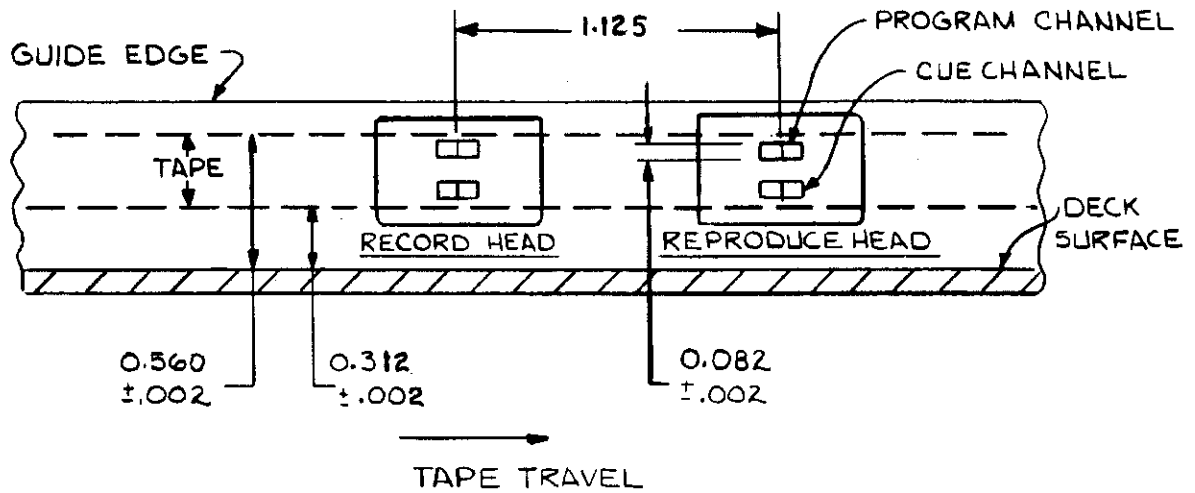


All dimensions are in inches and are referenced from the side and front of the cartridge and the deck surface of the cartridge tape player.

CARTRIDGE NAB TYPE	WIDTH ±0.015625	LENGTH MAXIMUM	HEIGHT MAXIMUM
A,AA	4"	5.25"	0.9375" FOR A 0.895" FOR AA
B,BB	6"	7"	0.9375" FOR B 0.895" FOR BB
C,CC	7.625"	8.5"	0.9375" FOR C 0.895" FOR CC

FIGURE 1. NAB CARTRIDGE DIMENSION STANDARDS

MONOPHONIC STANDARD



STEREOPHONIC STANDARD

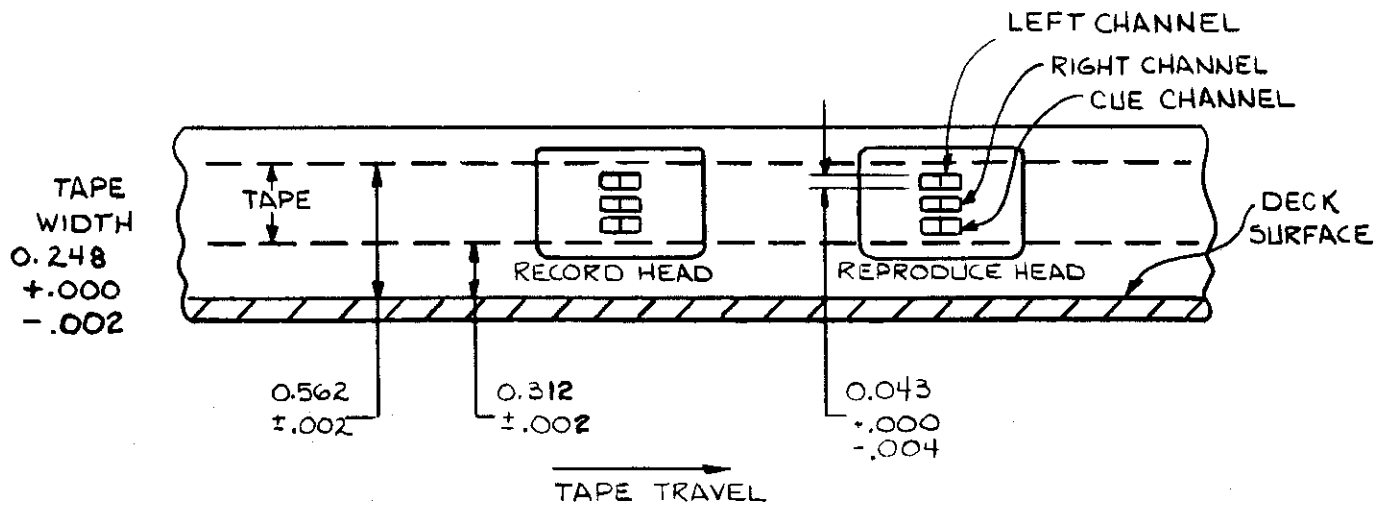
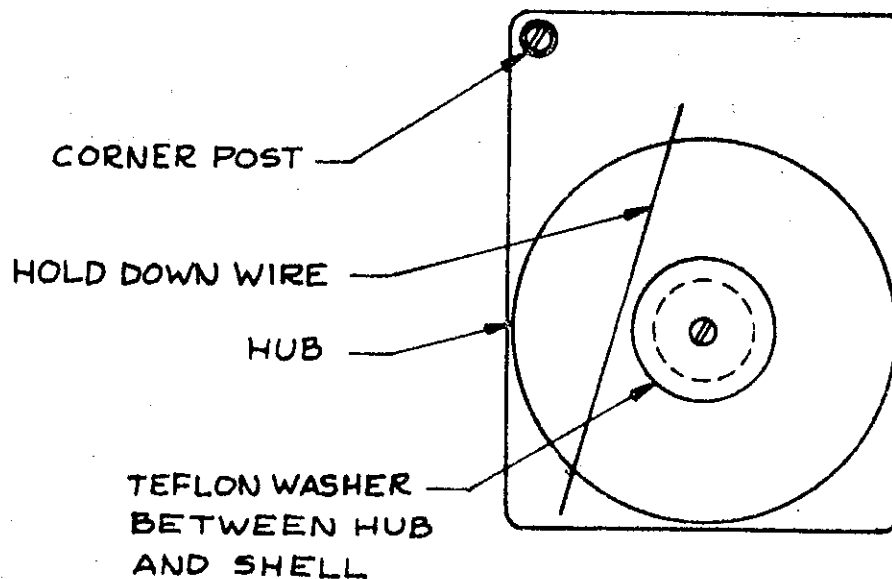


Figure 2. NAB TAPE HEAD DIMENSION STANDARDS

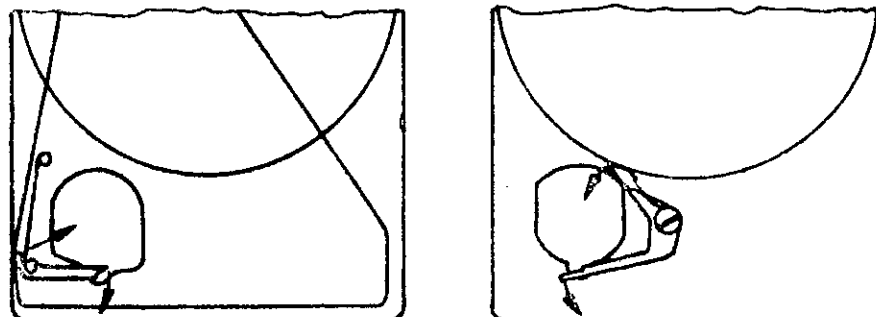
TAPE HUB, TEFLON WASHER, AND CENTER POST

The tape hub stores the tape which is not passing by the cartridge openings. The hub is free to rotate around the center post. To allow free rotation, a teflon washer is used between the hub and the shell. Some means must be provided to keep the tape flat on the hub. A separate cover may fit over the hub, the top may be molded so that the clearance between the hub and the shell is just greater than the tape width, or a hold-down wire may be placed so that it passes above one side of the hub.



CLUTCH SPRING OR HUB BRAKE (SPRING ACTION DEVICE)

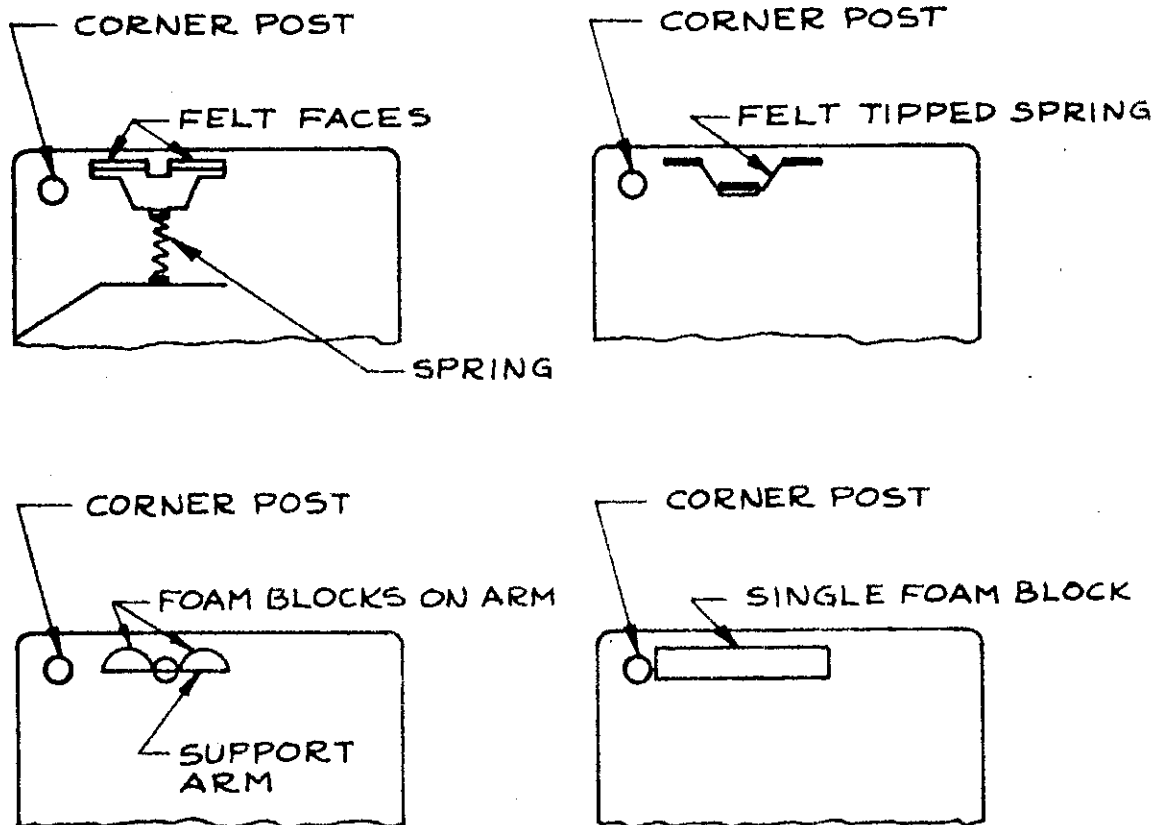
The clutch spring or hub brake keeps the tape from moving when the cartridge is not in place in a machine. This is done either by applying a brake to the hub or by pressing the tape against the shell. The clutch or brake is released by the shaft of the pressure roller when the roller is in the vertical position.



PRESSURE PADS

The pressure pads ensure the tape remains in contact with the heads. A foam plastic is the most commonly used material for the pressure pads. The compression of the foam provides pressure to wrap the tape slightly around the heads. Felt is less frequently used. To provide pressure on the tape, the felt is mounted on a phosphor bronze arm or a spring-loaded plastic block.

The foam may be a single block mounted behind the two openings for the record and reproduce heads and held in place by ridges cast into the shell. Alternately, the foam may be in two separate pieces fastened to a metal or plastic arm. A third type mounts the foam on a spring-loaded plastic block. To ensure smooth tape travel, teflon is usually applied to the face of the foam.



TAPE GUIDANCE

Primary control of the tape as it moves across the heads is maintained by external guides in the head bracket. Guidance is provided within the cartridge to keep the tape traveling the same path. This is generally accomplished with tabs and grooves molded into the shell. Of primary importance is the corner post which must straighten the tape before it passes across the front openings of the shell. This post may be molded into the shell or a separate piece glued into a dimple in the shell.

CARTRIDGE MAINTENANCE TIPS

The cartridge is the second half of the tape cartridge system. The cartridge needs regular care just like the cartridge recorder or reproducer. The service department of Broadcast Electronics has developed over the years a rule of thumb for trouble-shooting: Check the cartridge before adjusting the machine.

TAPE

For maximum performance, the tape must be in good condition. The tape in cartridges wears rapidly, particularly in short length cartridges (70 seconds or less) and cartridges that are used frequently. The tape should be inspected regularly and frequently for obvious signs of wear.

Cartridges should be rewound or replaced when the oxide side of the tape is shiny. Likewise the tape should be discarded if it is wrinkled, or contaminated with fingerprints, grease, or dirt. Less obvious are drop-outs or areas where the iron oxide particles have come loose from the base of the tape. Drop-outs may not be visible, but will show up as a loss of audio signal.

If possible only one type of tape should be used in a single installation. Different brands, and even different types of the same brand of tape require different bias recording levels for optimum response.

When rewinding cartridges use only a graphite lubricated tape. Silicone lubricated tapes cannot stand up to the rugged service in a cartridge.

Every cartridge tape must have one splice, but multiple splices can cause problems. If the top tape ends overlap at the splice or do not meet squarely, the audio may dropout. In addition, a poor splice will catch on the cartridge or the hub. After a splice has been in use for some time, the tape tension may pull the two ends of the tape apart, slightly opening the splice.

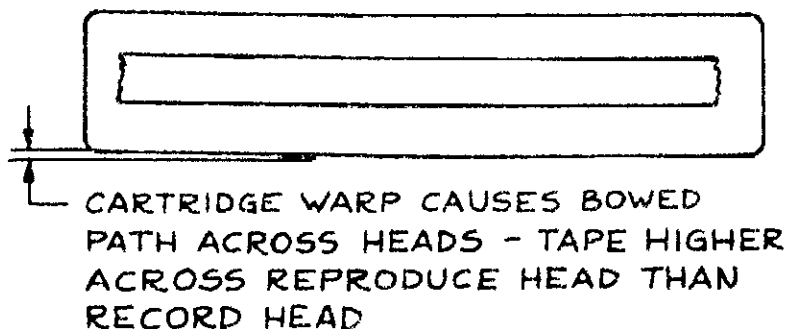
Proper tape tension is most critical. If the tension is too great, the tape will wear rapidly as it is squeezed against the hub, the pressure pads, the corner post, and the tape on the hub. If the tension is too light, the tape will not be pulled back into the hub.

The NAB specifies that tape tension at the capstan should not exceed 3 ounces. Cartridges over 70 seconds in length tend to have too little tension, while those less than 70 seconds tend to have too much. When running, a properly wound cartridge moves tape freely with no reluctance to wind onto the hub. To increase the tension in a cartridge, open up the splice and gently pull on the tape as it wraps onto the hub. To decrease the tension, open up the splice and gently pull out several loops from the center of the hub. Trim off the excess and resplice the tape.

THE SHELL

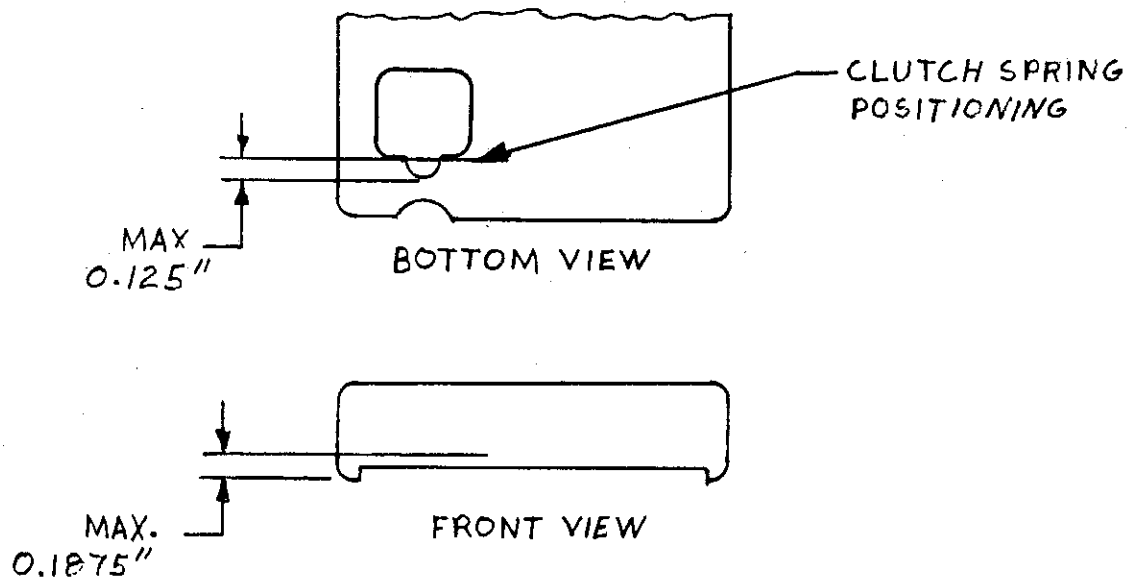
A deformed shell can adversely affect frequency response by distorting the tape path. In particular, a warped cartridge may cause the tape to traverse the head openings in an arc or bowed path rather than a straight line. Sometimes an ill-fitting top can spread the sides of the cartridge enough to cause this same bowing. Check suspect cartridges on a flat surface.

Periodically the cartridge center post should be cleaned. Gummy deposits on the post increase tape tension by not allowing the tape hub to turn freely. Equally important to free movement of the hub is the washer. This washer should always be in place underneath the tape hub, between the hub and the shell. This washer is easily misplaced when the cartridge is opened and the hub removed.



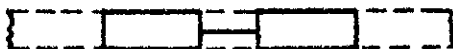
CLUTCH SPRING OR HUB BRAKE

The clutch spring or hub brake should completely release when the pressure roller is in the vertical position. This allows the hub, and the tape, to move freely. An improperly adjusted clutch spring or defective hub brake may prevent the roller from engaging or disengaging. The clutch should be parallel to the bottom of the shell and no more than 0.1875 inch above the surface of the tape deck. The clutch must not protrude more than 0.125 inch into the opening for the pressure roller. Less than 8 ounces should be required to release the clutch.

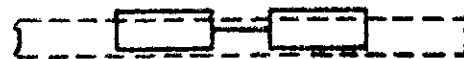


PRESSURE PADS

The pressure pads must wrap the tape around the face of the heads. The pressure applied must be uniform across the tape as it is in contact with the head. Periodically check the pads to see that they are lined up squarely with the tape. If one portion of the tape is not in contact with the pads, that portion of the tape will make poor contact with the head. This may show up as poor frequency response from an individual cartridge.



PROPER ALIGNMENT



PADS TOO HIGH



PADS SKEWED

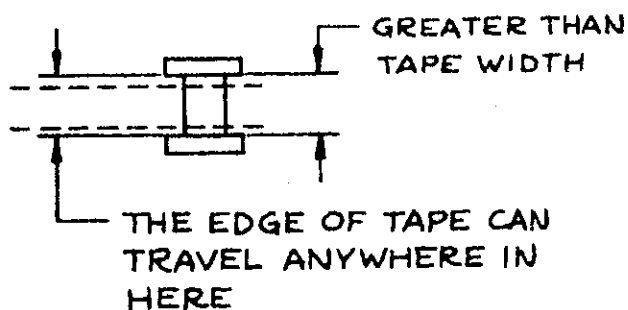


PADS TOO LOW

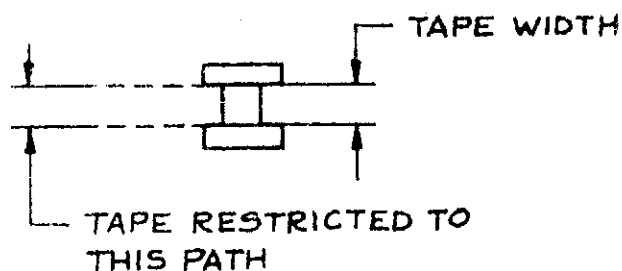
THE TAPE PATH

The most frequent cause of distortion of the tape path in the cartridge is a loose corner post. The post should always be glued down so that there is 0.250 inch between the shoulder of the post and the shell. If the post is high, the tape will not run straight across the heads. A loose post frequently causes muffled-sounding audio when the cartridge unit starts.

LOOSE CORNER POST



PROPER CORNER POST



The hold-down wire used in many cartridges is important in maintaining proper tape travel. This wire keeps the tape flat on the hub as tape is pulled from the center and returned to the outside. The wire must not exert any pressure on the stored tape or the tape may wrinkle and jam. If a cartridge is dropped this hold-down wire may unseat.

CARTRIDGE STORAGE

The cartridges should be stored away from direct sunlight, or heat from electronic equipment, radiators, etc. Ideal conditions are a temperature of 70° and a relative humidity of 50%. The cartridges storage area should be as free from dust as possible.

CARTRIDGE RECORDING PROCEDURE

The following procedure is particularly important when recording cartridges. When the cartridge is first inserted into the machine, put the tape in motion in playback for several seconds. This allows the tape to seat properly in the tape guides and across the heads.

Stop the tape. Do not remove the cartridge after the initial run-in. Ensure the tape splice is positioned in an unrecorded portion of the tape between the end and the beginning of the program material.

The tape may now be recorded with satisfactory results.

CARTRIDGES IN STEREOPHONIC SYSTEMS

MAINTENANCE

Rigorous maintenance is a must for cartridges used in a stereophonic system, since any distortion of the tape path can cause phase differences between the program material on the two tracks. When the program material is mixed, phase differences cause degradation of the frequency response.

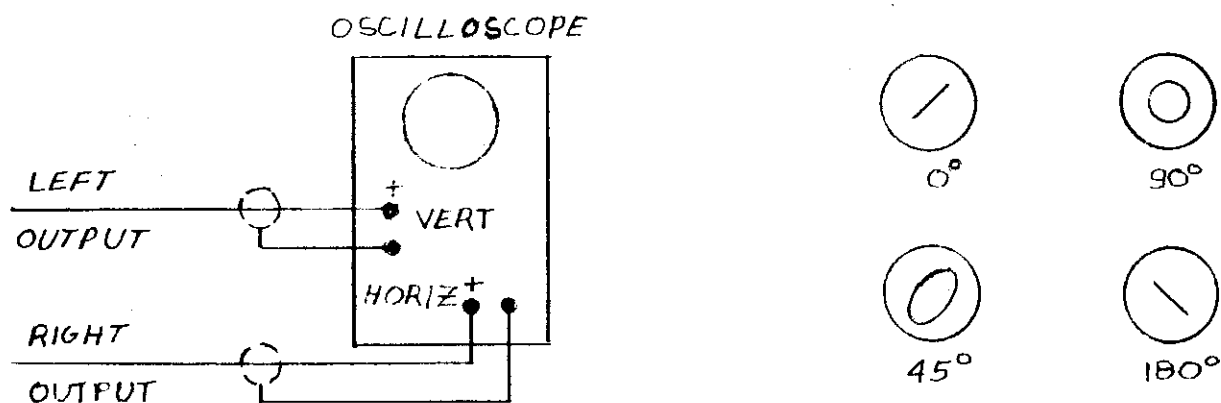
The most important characteristic of a cartridge for stereophonic use is the ability to consistently maintain the identical tape path each time the cartridge is inserted in the player. This allows reliable recording and subsequent accurate reproduction.

Cartridges used in a stereophonic system should initially be selected for phase repeatability using the phasing test outlined below. This test should be repeated on a regular basis throughout the life of the cartridge. A cartridge which fails this test should be discarded.

To provide better guidance within the cartridge, several manufacturers have introduced cartridges with an adjustable corner post. The post is threaded into the shell so that the precise post height may be maintained. These and other cartridges designed to improve performance should be considered for use in a stereophonic system.

STEREO PHASING TEST

Connect the output of a record/playback unit to an oscilloscope as shown. Connect an audio signal generator to both inputs of the recorder. While recording observe the phase of the reproduced signals. Remove and re-insert the cartridge several times. Cartridges which exhibit poor phase repeatability or stability should be discarded. Do not test only for the higher frequencies, but check selected frequencies across the audio band.



PRODUCT WARRANTY

LIMITED TWO YEAR

While this warranty gives Purchaser specific legal rights, which terminate two (2) years (one year on cartridge and blower motors) from the date of shipment, Purchaser may also have other rights which vary state to state.

Broadcast Electronics, Inc. ("Seller") hereby warrants cartridge machines, consoles, and other new Equipment manufactured by Seller against any defects in material or workmanship at the time of delivery thereof, that develop under normal use within a period of two (2) years (one year for cartridge and blower motors) from the date of shipment, as such term is defined herein. Other manufacturer's and suppliers' Equipment and services, if any, including electronic tubes, solid state devices, transmission line, antennas, towers, related equipment and installation and erection services, shall carry only such manufacturer's or suppliers' standard warranty. This warranty extends to the original user and any subsequent purchaser during the warranty period. Seller'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. Seller'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 Purchaser 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 Seller, or if Equipment is operated under environmental conditions or circumstances other than those specifically described in Seller's product literature or instruction manual which accompany the Equipment. Seller shall not be liable for any expense of any nature whatsoever incurred by the original user without prior written consent of Seller.

Seller shall not be liable to Purchaser 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 Purchaser. All express and implied warranties shall terminate at the conclusion of the period set forth herein. Any card which is enclosed with the equipment will be used by Seller for survey purposes only.

If the Equipment is described as used, it is sold as is and where is. If the contract covers equipment not owned by Seller at this date, it is sold subject to Seller's acquisition of possession and title.

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