

INSTRUCTION MANUAL

SERIES 5300B TAPE CARTRIDGE MACHINE

February, 1987

IM No. 597-5301

BROADCAST ELECTRONICS, INC.



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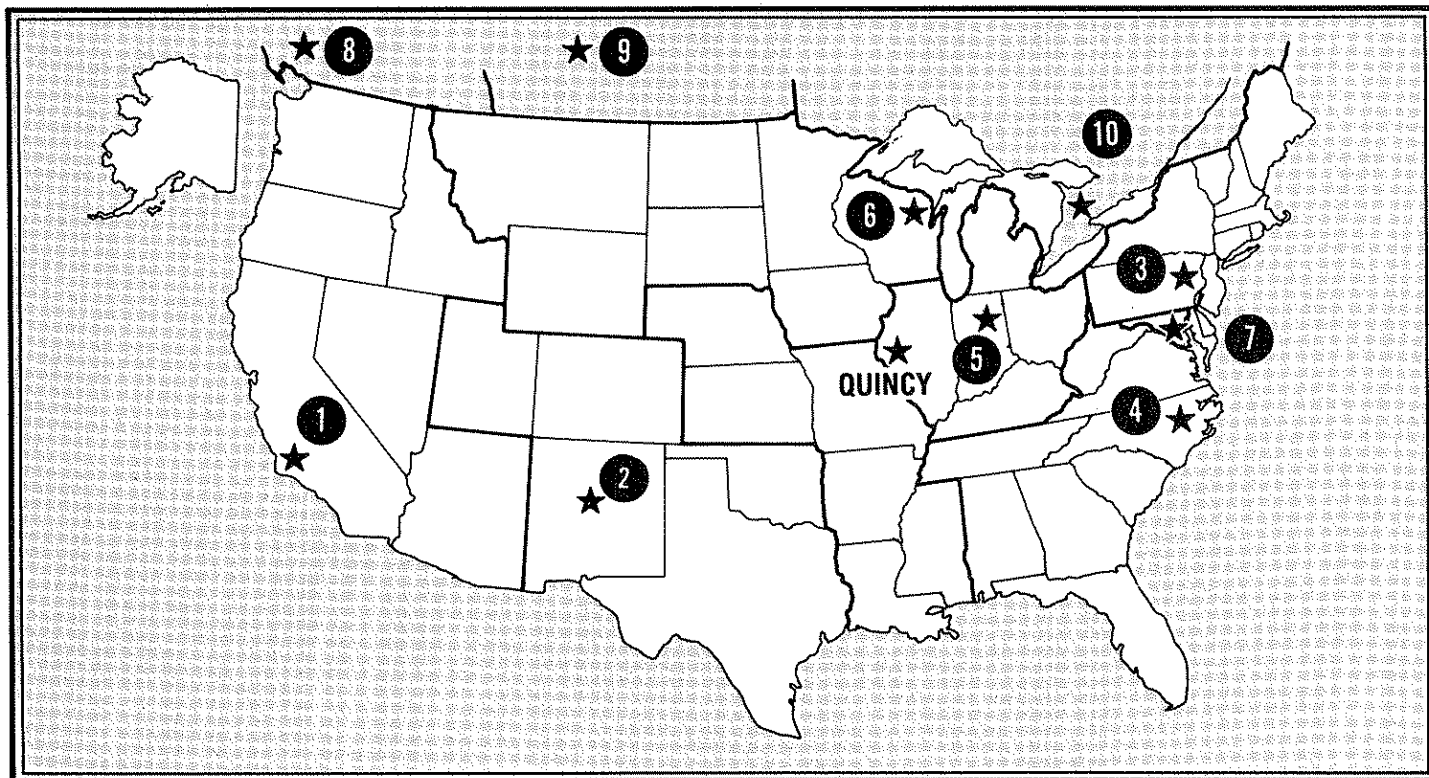
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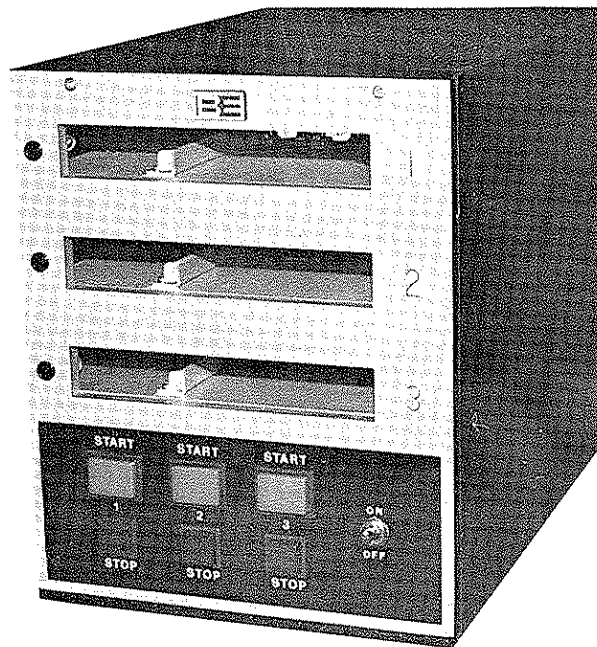
TECHNICAL MANUAL

597-5301

BROADCAST ELECTRONICS

5300B

CARTRIDGE MACHINE



597-5301-1

MODEL

5301B - Mono Playback with 1kHz Tone
5302B - Mono Playback with all Cue Tones
5303B - Stereo Playback with 1kHz Tone
5304B - Stereo Playback with all Cue Tones

STOCK NUMBER

906-5301B
906-5302B
906-5303B
906-5304B

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SECTION I

GENERAL INFORMATION

1-1. EQUIPMENT DESCRIPTION.

1-2. The Broadcast Electronics Model 5300B Audio Cartridge Machine is a three-deck professional unit designed for either monaural or stereo broadcast applications. Each of the three decks of the 5300B accepts NAB size A, AA, B, or BB cartridges by appropriate positioning of the left side cartridge guide, found on each deck of the machine. Each of the three decks provides full playback features. The bottom deck accepts an optional record amplifier accessory that provides full record capabilities.

1-3. ELECTRONIC DESCRIPTION.

1-4. 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.

1-5. The machine's front panel hinges at the bottom and folds down for easy access to the plug-in decks and other internal components (see Figure 1-1).

1-6. The Phase Lok IV head mounting bracket, used in the 5300B, 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.

1-7. PHYSICAL.

1-8. The upper two decks of the 5300B 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.

1-9. SPECIFICATIONS.

1-10. Refer to Table 1-1 for electrical and physical specifications related to the operation of the 5300B cartridge machine.

1-11. OPTIONS AND ACCESSORIES.

1-12. Refer to Table 1-2 for options and accessories available for the 5300B cartridge machine.

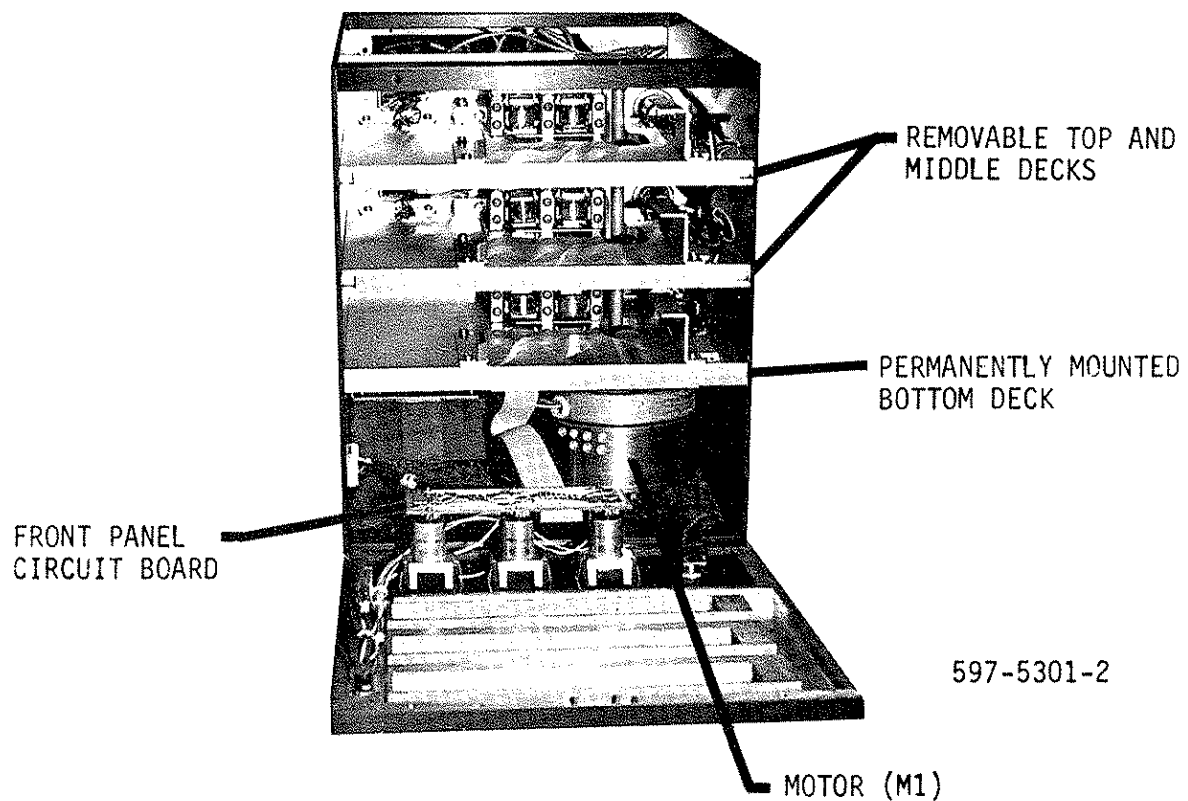


FIGURE 1-1. FRONT VIEW: PANEL OPEN

Table 1-1. SPECIFICATIONS
(Sheet 1 of 2)

PARAMETER	SPECIFICATIONS
NUMBER OF TRANSPORT DECKS	Three
TRANSPORT DECK SIZE	Adjustable for NAB A, AA, B, or BB size cartridges.
TRANSPORT TYPE	Direct Drive Capstan.
MOTOR	Hysteresis synchronous.
TAPE SPEED	7.5 ips (19.05 cm/s) $\pm 0.1\%$
TAPE START/STOP TIME	0.1 second maximum
WOW AND FLUTTER	0.15% peak weighted, 0.2% RMS unweighted.
NOISE:	
MONOPHONIC	54 dB below 185 nWb/m at 700 Hz.
STEREOPHONIC	52 dB below 185 nWb/m at 700 Hz.
DISTORTION	2% or less record-to-playback at 185 nWb/m at 700 Hz.
EQUALIZATION	NAB, IEC, CCIR as specified.
FREQUENCY RESPONSE	± 2 dB from 50 Hz to 15 kHz exclusive of head contour effect.
CROSSTALK	-50 dB or better at 1 kHz.
AUDIO OUTPUT (Selectable)	Maximum adjustable level +8 dBm from 185 nWb/m at 700 Hz, transformer balanced, 600 Ohm or 150 Ohm impedance.
PEAK OUTPUT LEVEL	+20 dBm before clipping.
CUE TONES:	
STANDARD	1000 Hz Stop.
OPTIONAL	150 Hz and 8000 Hz. External cue-track audio outputs are standard.

Table 1-1. Specifications
(Sheet 2 of 2)

PARAMETER	SPECIFICATIONS
AMBIENT OPERATING TEMPERATURE	0° to 55°C (32° to 132°F).
POWER REQUIREMENTS:	
STANDARD	105 to 125V or 210 to 230V at 60 Hz.
OPTIONAL	105 to 125V or 210 to 230V at 50 Hz. 120 Watts maximum.
MOUNTING:	
STANDARD	Table Top
OPTIONAL	19 inch (48.3 cm) EIA Rack, 2 units per rack width.
DIMENSIONS:	
HEIGHT	10.625 inches (27 cm).
WIDTH	8.625 inches (22 cm).
DEPTH	13.375 inches (34 cm).
WEIGHT	42 pounds (19 kg) packed.

Table 1-2. Options and Accessories

OPTIONS AND ACCESSORIES	STOCK NUMBER	MODEL
<p>MONO RECORDER: Brings bottom deck up to full Record/Playback capability. Includes 1kHz cue tone (Manual No. 597-5351).</p>	906-5309	5309
<p>STEREO RECORDER: Brings bottom deck up to full Stereo Record/Playback capability. Includes 1kHz cue tone (Manual No. 597-5351).</p>	906-5310	5310
<p>AUDIO SWITCHER: Provides a single audio output from the last deck started, muting all other decks. SW5E accepts three inputs and up to three switchers may be tied together, providing a single output from three 5300B units (Manual No. 597-5350).</p>	904-5000	SW5E
<p>REMOTE CONTROL UNITS: Provides all front panel controls and indicators for use when the equipment is installed at a location other than the operating position (Manual No. 597-5302).</p>		RC5300
Remote Control Panel for Standard 5300 Cartridge Machine.	927-0047	
Remote Control Panel for 5300 Cartridge Machine with Companion Record Amplifier.	927-0048	
Secondary (150 Hz) and Tertiary (8 kHz) Cue Trips for Monaural Recorder.	906-5311A	
Secondary (150 Hz) and Tertiary (8 kHz) Cue Trips for Stereophonic Recorder.	906-5311B	
Rack Mount Bracket, One Unit	906-5306	
Rack Mount Bracket, Two Units	906-5307	
220V/50 Hz Power Source Conversion	906-5308	
Extender, Circuit Board	919-1806	

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 5300B cart-ridge 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 Allen wrenches and three 24-Pin rear panel connectors 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 5300B is packaged for table top mounting; however, a full complement of accessories are available from Broadcast Electronics for rack mounting. Two units may be mounted side-by-side in a standard EIA rack. A single unit rack mounting package is also available. Rack space required is 10.5 inches H X 19 inches W (26.7 X 48.3 cm).

2-7. EXTERNAL CONNECTIONS.

2-8. Connectors J101, J201, and J301 on the rear panel of the 5300B, are responsible for all input, output, remote control, and other connections between the unit and external equipment. The exception is J401, a 6-Pin connector, which, along with J301, interconnects the unit with the optional companion recorder. Terminal connections 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. The 5300B is shipped from the factory with the audio output transformers connected for a 600 Ohm balanced output. The transformers may be connected for 150 Ohms (refer to drawing D906-5100 in Section VII).

2-10. 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 5300B. Connect this terminal to the system ground with a heavy copper conductor.

2-11. CARTRIDGE SIZE ADJUSTMENT.

2-12. The 5300B cartridge machine will accept NAB size A, AA, B, or BB cartridges. The left side cartridge guide must be adjusted to fit securely against the cartridge to be used.

2-13. AC POWER.

2-14. The standard 5300B operates on 60 Hz ac 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.

2-15. AUDIO LEVEL ADJUSTMENT.

2-16. Adjust the audio level as required in the overall system. Refer to Section V for the adjustment procedure.

2-17. OPTIONAL EQUIPMENT INSTALLATION.

2-18. The following paragraphs provide information on the installation of available options for the 5300B.

2-19. RECORDER OPTION. The recorder functions in conjunction with the bottom deck of the 5300B. A record-head assembly takes the place of the dummy head on the bottom deck. The 24-Pin plug (P301) on the recorder remote cable plugs into the bottom deck connector (J301) of the 5300B. A connection between the record-head cable and J401 is required. Installation procedures are further explained in the recorder manual (597-5351).

2-20. OPTIONAL START SEQUENCING. Machines equipped with secondary and tertiary cue tones can be wired to sequentially start the tape decks in any order.

2-21. The following connections in conjunction with the 150 Hz cue tone will sequence the decks so that the top deck will start the middle deck and the middle deck will, in turn, start the bottom deck (refer to drawing B906-5315 in Section VII as required).

1. Connect J101 pins 1 and 2
2. Connect J101 pin 3 to J201 pin 7
3. Connect J201 pin 1 and 2
4. Connect J201 pin 3 to J301 pin 7
5. Connect J301 pins 1 and 2
6. Finally, connect J301 pin 3 to J101 pin 7

2-22. The preceeding installation procedure given is typical. Any number of sequencing combinations are possible through wiring of the rear panel connectors.

2-23. REMOTE CONTROL INTERCONNECTIONS. Drawing B906-5107 in Section VII provides wiring information for remote control. Refer to manual 597-5302 for additional information.

2-24. AUDIO SWITCHER. The interconnections between the SW5E muting switcher and the 5300B are described in the SW5E instruction manual (597-5350).

SECTION III

OPERATION

3-1. INTRODUCTION.

3-2. This section contains procedures to be followed for proper operation of the 5300B cartridge machine.

3-3. OPERATION.

3-4. Turn the machine on by operating the front 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 the 5300B cartridge machine. 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 power ON/OFF switch, the START and STOP switch/indicators, and the deck indicator lights are all positioned on the machine front panel (see Figure 4-1).

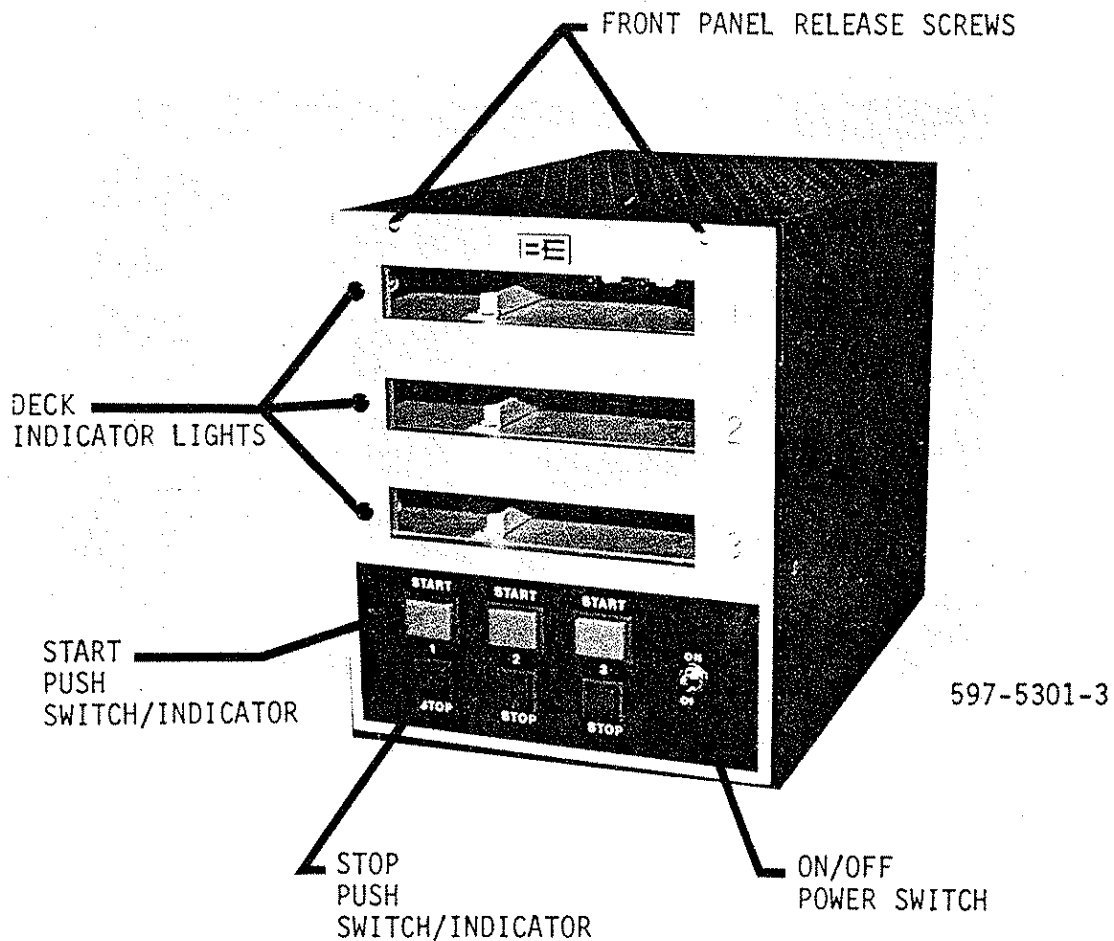


FIGURE 4-1. FRONT VIEW, PARTS LOCATION

4-6. TAPE TRANSPORT SYSTEM. Three independently controlled decks are directly driven by the driveshaft of a hysteresis synchronous motor (see Figure 4-2). 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 drive-shaft upper bearing is anchored to the top of the bulkhead plate.

4-7. MOTHERBOARD ASSEMBLY. This assembly is located immediately behind the bulkhead plate. It comprises the motherboard (see Figure 4-3), most internal machine connectors, the solenoid drivers, and the system dc power supply.

4-8. TAPE HEAD AMPLIFIER CIRCUIT BOARDS. Three tape head amplifier circuit boards, one per deck, plug into the motherboard. Monaural 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.

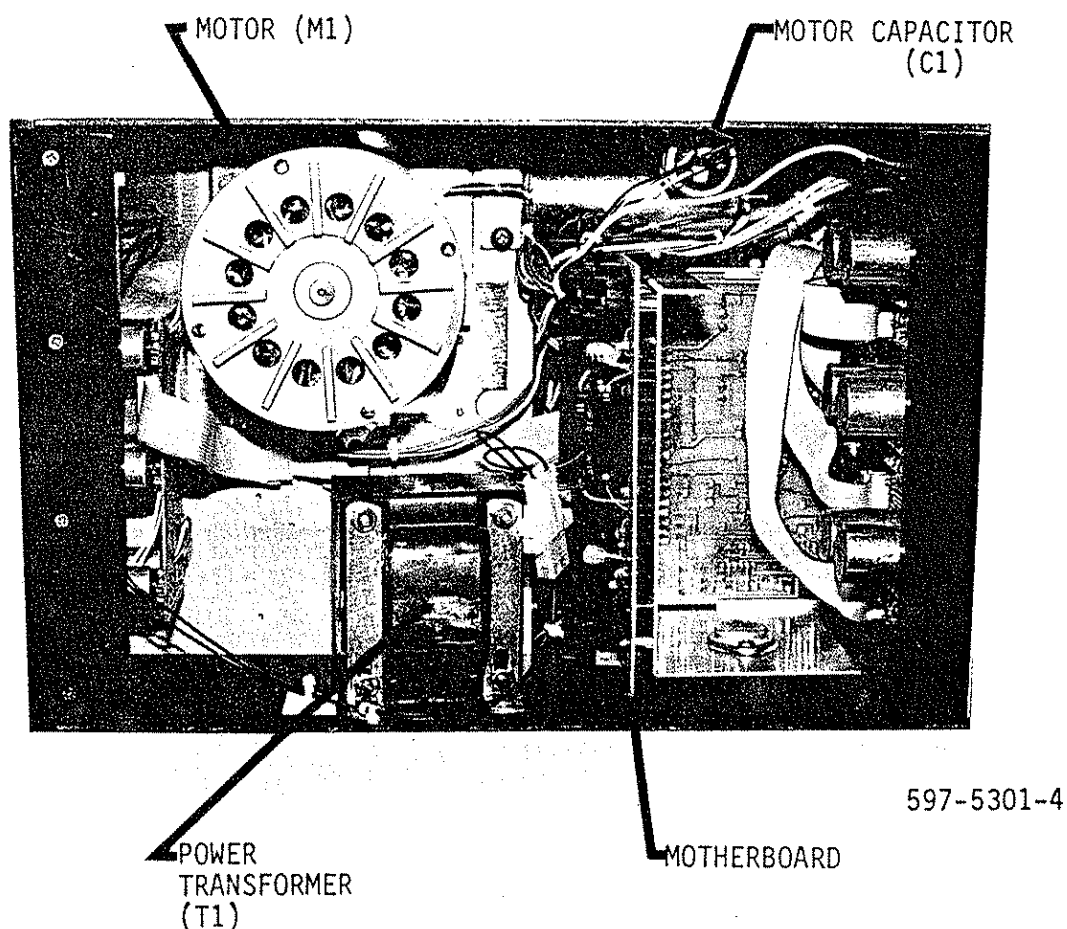
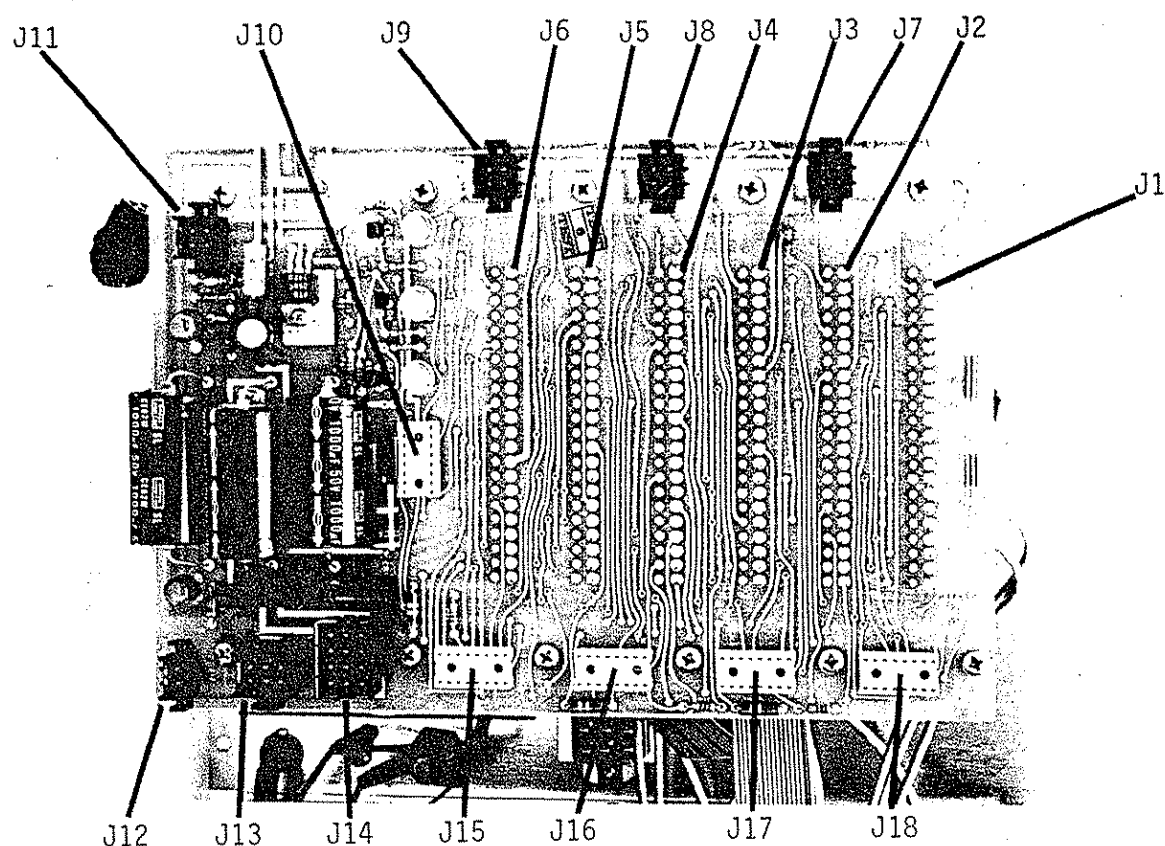


FIGURE 4-2. BOTTOM VIEW, COVER REMOVED



597-5301-5

FIGURE 4-3. MOTHERBOARD

Rear Side Facing Bulkhead

- J1, J3, J5: For Head Amplifier Circuit Boards; Decks 1, 2, 3
- J2, J4, J6: For Control Circuit Boards; Decks 1, 2, 3
- J7, J8, J9: To Solenoid and Ready Switch; Decks 1, 2, 3
- J10: To Front Panel Controls
- J11: To Power Regulator
- J12: To AC Line Voltage Input
- J13: To Drive Motor
- J14: To Power Transformer
- J15, J16,
J17, J18: To Rear Panel Output Connectors

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.

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.

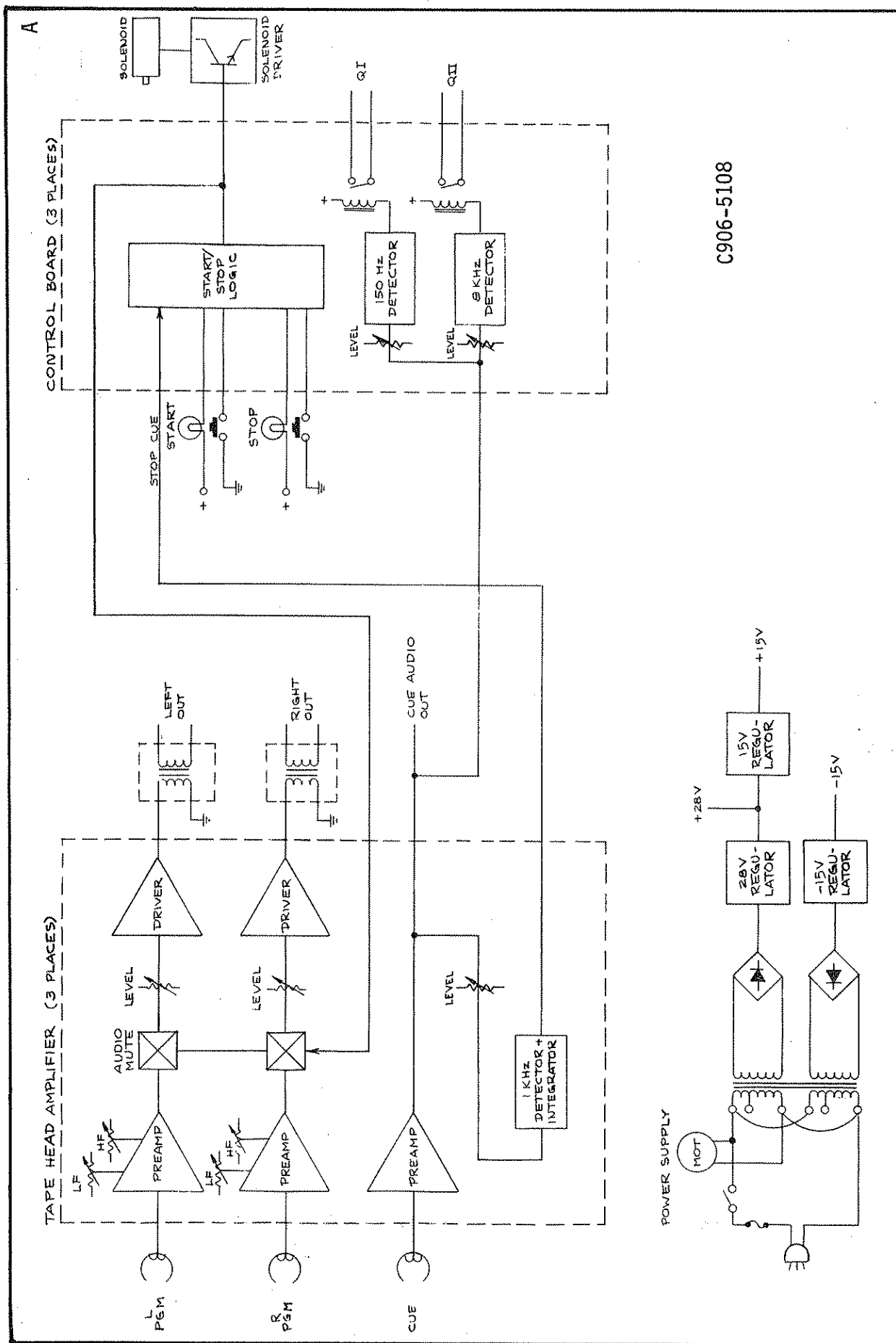


FIGURE 4-4. FUNCTIONAL BLOCK DIAGRAM

4-16. REAR PANEL ASSEMBLY. Three 24-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 on the rear panel (see Figure 4-5).

4-17. POWER SUPPLY. The 5300B 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 front 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 across one winding of the power transformer through connectors on the motherboard/power supply.

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.

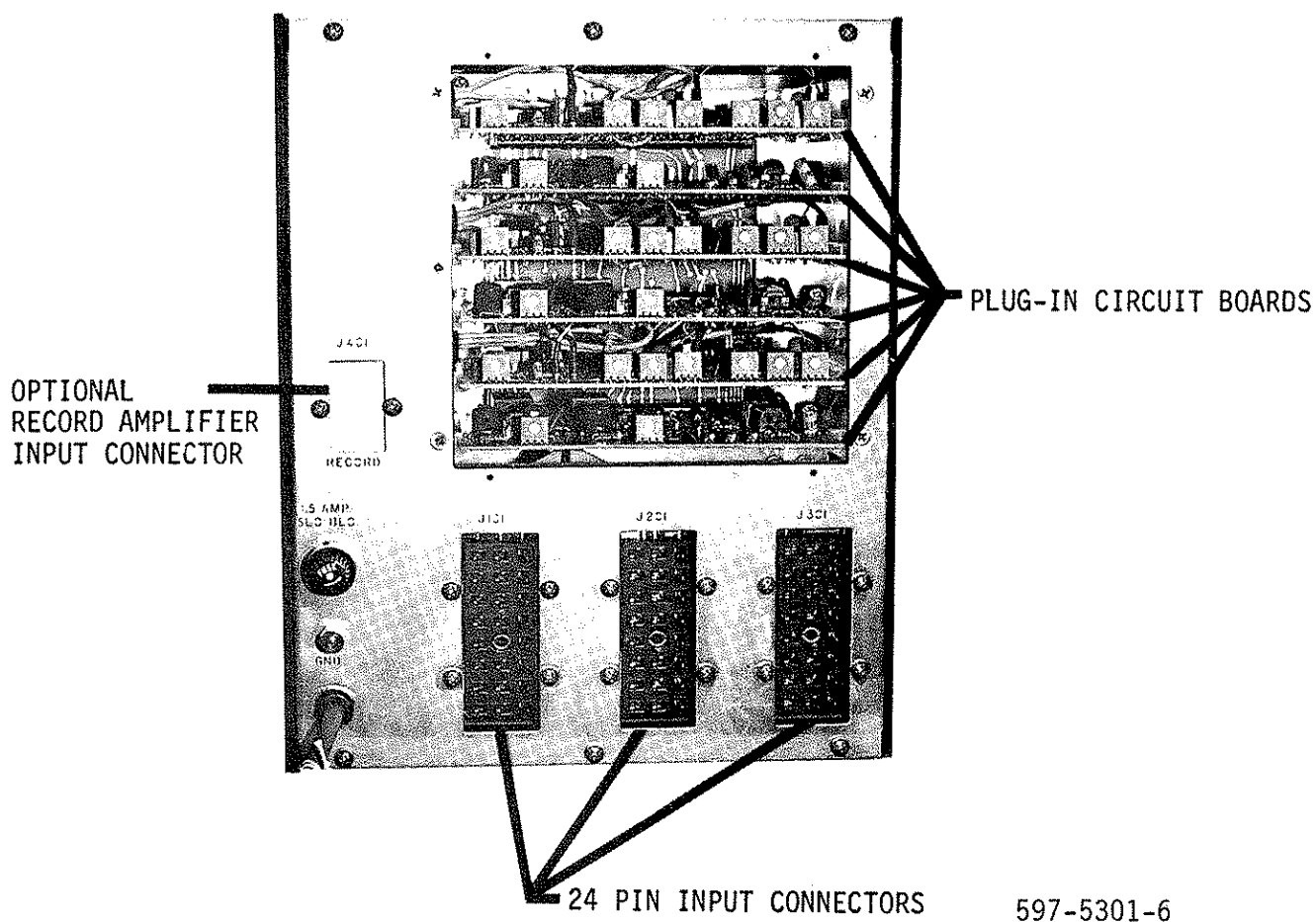


FIGURE 4-5. REAR VIEW, COVER PLATE REMOVED

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 5300B 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 5300B. 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 of 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 opens 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 which enables 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 (QII) 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 D906-5106 shows the power supply for the 5300B cartridge machine. 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 primary ac power. The ac voltage is applied to the primary of transformer T1 through P12/J12 and P14/J14. Jumpering on P14 allows use of the transformer on a wide range of supply voltages. 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 bridge-rectified into a +43 volt source and the remaining secondary is bridge-rectified into a -32 volt source.

4-49. The positive voltage is filtered and regulated into a +30 volt source by U1 and Q1. Potentiometer R21 provides a means to adjust the +30 volt source. The +30 volt source is re-regulated into a +15 volt source by Q7 and CR3. The negative voltage is filtered and regulated into a -15 volt source by Q8 and CR4.

4-50. The +30 volt source powers the front panel and optional remote control START/STOP switch/indicators, control deck logic output circuits, and the solenoid drivers (on the motherboard). 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 5300B 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.

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

WARNING

DISCONNECT POWER BEFORE ATTEMPTING ANY
MAINTENANCE PROCEDURE.

5-14. DECK ACCESS AND REMOVAL.

5-15. Remove the grilled upper machine cover which is held on by four Phillips head screws, one near each corner. 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 Allen 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 and middle decks are removed by first freeing the deck retaining screw, see Figure 5-1, which holds it 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.

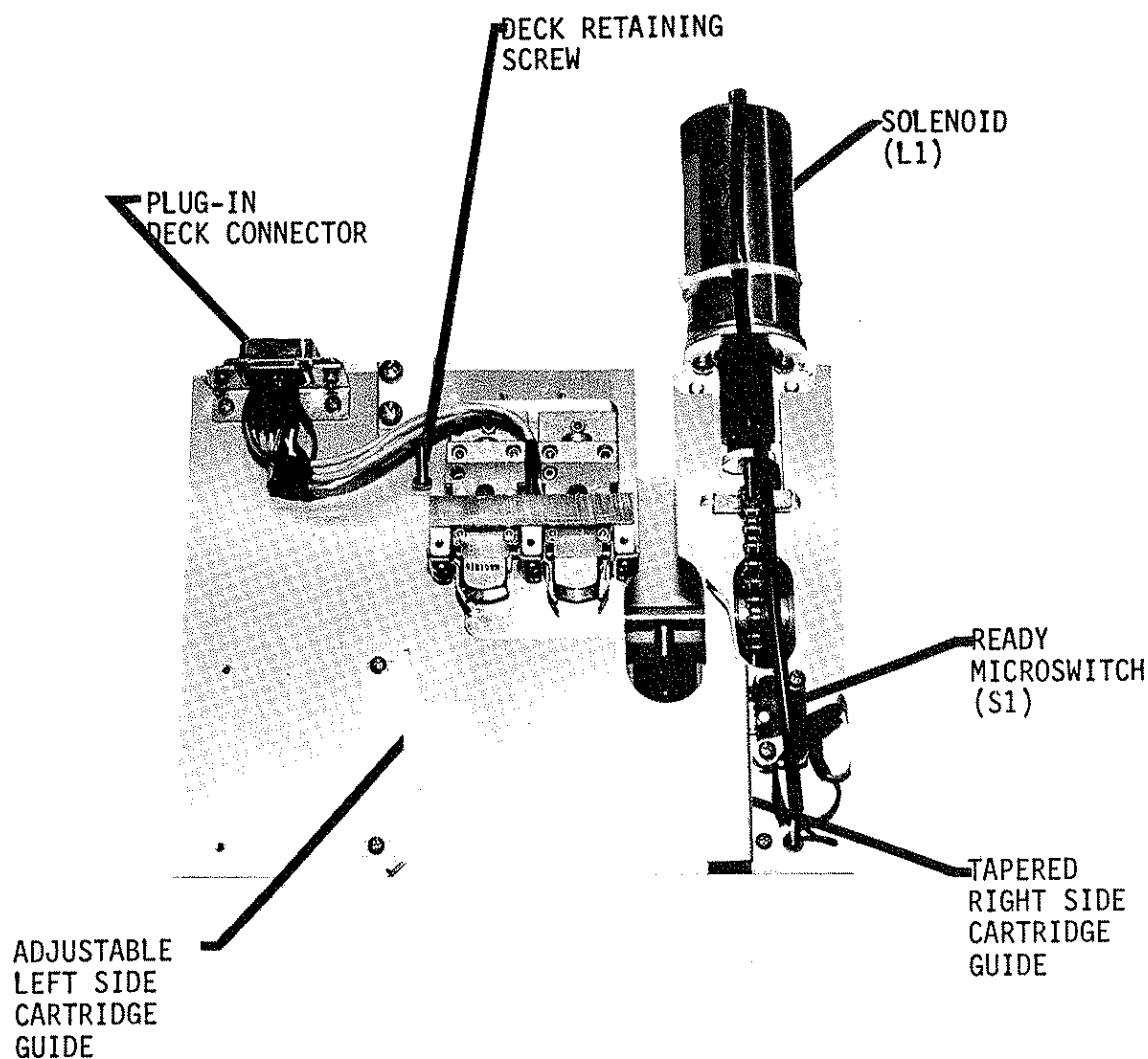
NOTE

WHEN REPLACING A DECK IN THE MACHINE, BE SURE
THAT THE DECK IS INSERTED INTO ITS PROPER
POSITION IN THE MACHINE. TRANSPORT DECKS ARE
NUMBERED ON THE FRONT EDGE. ALWAYS RETURN
DECK 1 TO THE TOP POSITION AND DECK 2 TO THE
MIDDLE DECK POSITION.

NOTE

NOTE

5-18. MECHANICAL ADJUSTMENTS.



597-5301-7

FIGURE 5-1. TAPE TRANSPORT DECK

5-19. Specific instructions are provided for the following mechanical adjustments:

- A. Pressure Roller Alignments
 - 1. Motor Alignment, Bottom Deck
 - 2. Deck Alignment, Top and Middle Decks
- 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

5-20. PRESSURE ROLLER ALIGNMENTS. Pressure roller alignment involves positioning the motor and decks 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.

5-21. Two procedures are provided for each alignment. The first procedure is the recommended procedure requiring the use of an 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.

5-22. Motor Alignment, Bottom Deck. To gain access to the bottom deck, remove the top two 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 above deck level by pushing in the solenoid plunger.
2. Remove the E-ring from the top of the pressure roller.
3. Remove and retain the nylon washer, pressure roller, and metal washer from the shaft.
4. Set the alignment gauge on the pressure roller shaft (refer to Figure 5-4) so that the gauge rests on the deck surface.

NOTE

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

NOTE

5. Adjust the motor assembly as follows:

- a. Loosen the two Phillips head motor mounting screws on the deck.
- b. Loosen the Phillips head screws which holds the upper bearing support in place (refer to Figure 5-9).
- c. Move the motor assembly until the capstan and the gauge are in contact from top to bottom.

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.

NOTE

NOTE

6. Tighten the two lower screws followed by the two upper screws.
7. Check for proper alignment and repeat the procedure until proper alignment is obtained.
8. Remove alignment gauge and place the metal washer, the roller, the nylon washer, and the E-ring on the shaft, in that order.

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 microswitch (refer to Figure 5-3).
3. Check for parallelism as the pressure roller comes into contact with the shaft (refer to Figure 5-2).
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.

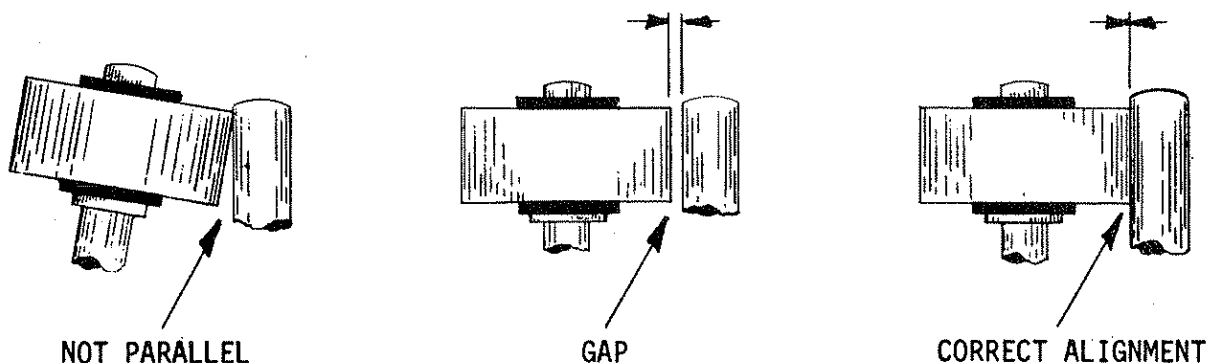
NOTE

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.

NOTE

NOTE

5. Tighten the two lower screws followed by the two upper screws.



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FIGURE 5-2. PRESSURE ROLLER PARALLELISM

6. Check for proper alignment and repeat the procedure until the proper alignment is obtained.

NOTE

PERFORM MOTOR ALIGNMENT BEFORE THE DECK ALIGNMENT.

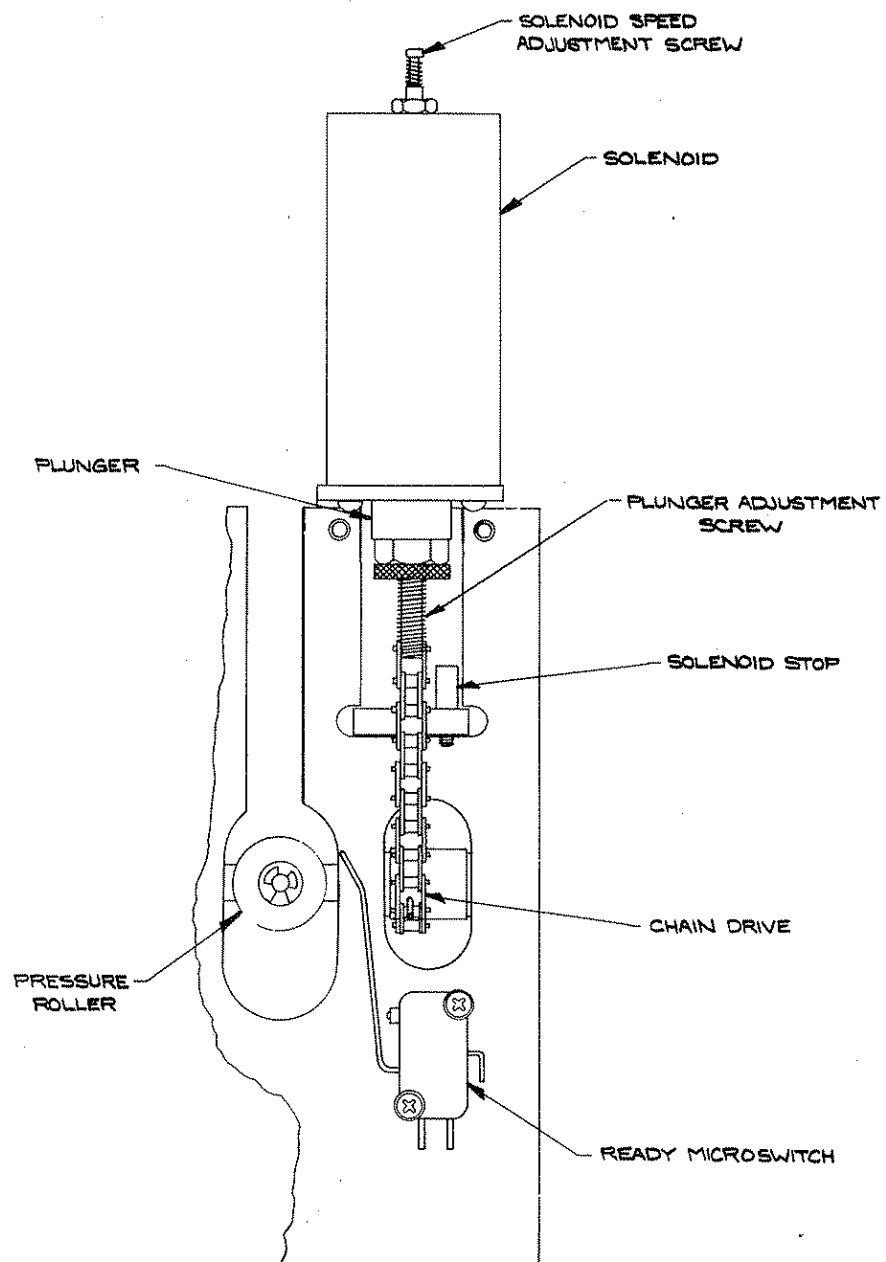
5-23. Deck Alignment, Top and Middle Decks. Locate the two deck positioning screws on the rear edge of the deck. These screws bear against the bulkhead determining the deck penetration and holding the deck in the proper position for correct pressure roller alignment. To perform the deck alignment, insert the middle deck into the machine, fasten the retaining screw, and proceed as follows:

A. Recommended Procedure

1. Manually raise the pressure roller of the middle deck above deck level by pushing in the solenoid plunger.
2. Remove the E-ring from the top of the pressure roller.
3. Remove and retain the nylon washer, pressure roller, and metal washer from the shaft.
4. Set the alignment gauge on the pressure roller shaft (refer to Figure 5-4) so that the gauge rests on the deck surface.
5. Check for correct capstan-gauge alignment (refer to paragraph 5-20).
6. Adjust the deck positioning screws as follows:
 - a. Remove the deck from the machine.
 - b. Adjust the two deck positioning screws together, either in or out as required.
 - c. Replace the deck and fasten the retaining screw.
7. Repeat step 6 until the proper alignment is obtained.
8. Remove the alignment gauge and place the metal washer, the roller, the nylon washer, and the E-ring on the shaft, in that order.
9. Repeat the procedure for the top deck.
10. Adjust solenoid plunger travel for each deck before returning the machine to service (refer to paragraph 5-24).

B. Alternate Procedure

1. Manually start the middle deck by holding the ready microswitch (refer to Figure 5-3).



597-5502-9

FIGURE 5-3. SOLENOID ADJUSTMENT

2. Check for parallelism as the pressure roller comes into contact with the shaft (refer to Figure 5-2).
3. Adjust the deck positioning screws as follows:
 - a. Remove the deck from the machine.
 - b. Adjust the two deck positioning screws together, either in or out as required.
 - c. Replace the deck and fasten the retaining screw.
4. Repeat step 3 until the proper alignment is obtained.
5. Repeat the procedure for the top deck.
6. Adjust solenoid plunger travel for each deck before returning the unit to service.

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 5-3). It is set to bring the pressure roller against the capstan driveshaft just prior to the plunger reaching the limit of its travel.

NOTE

THE PRESSURE ROLLER/MOTOR ALIGNMENT, BOTTOM DECK ADJUSTMENT 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. Allen Wrenches: supplied with machine.
- C. Oscilloscope: any general purpose model.
- D. Cut-Away Test Cartridge (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 5-4A 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.

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

5-33. Refer to Figure 5-4B 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 5-6).

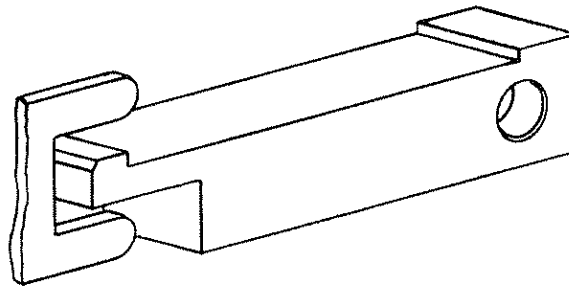
5-35. If adjustment is required, loosen the two lock screws for the head that is to be adjusted. Refer to Figure 5-7 for location of the screws. Turn both the front and rear zenith/height adjustment screws as required. Both screws must be turned equal amounts to retain the zenith adjustment.

5-36. Refer to Figure 5-4C 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.

A

TAPE GUIDE ADJUSTMENT

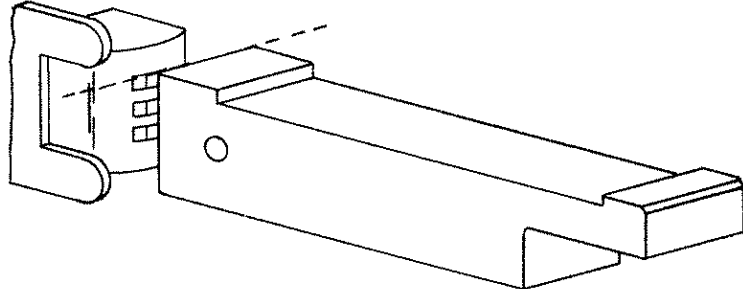
TAPE GUIDE SHOULD TOUCH
"T" OF BLOCK.



B

HEAD HEIGHT ADJUSTMENT

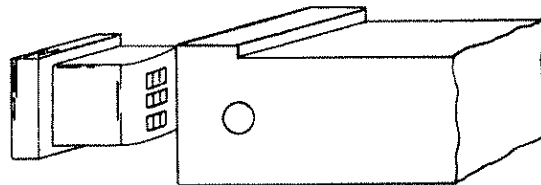
TOP HEAD POLE PIECE SHOULD
BE SAME HEIGHT AS BLOCK.



C

ZENITH ADJUSTMENT

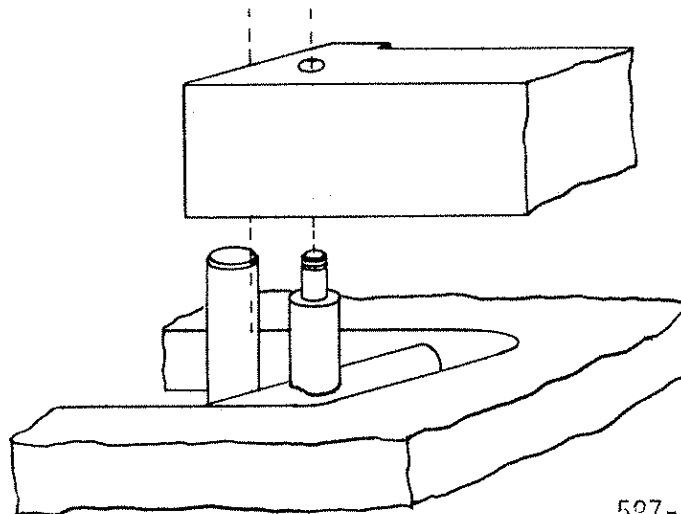
HEAD FACE SHOULD
BE AT RIGHT ANGLE
TO DECK.



D

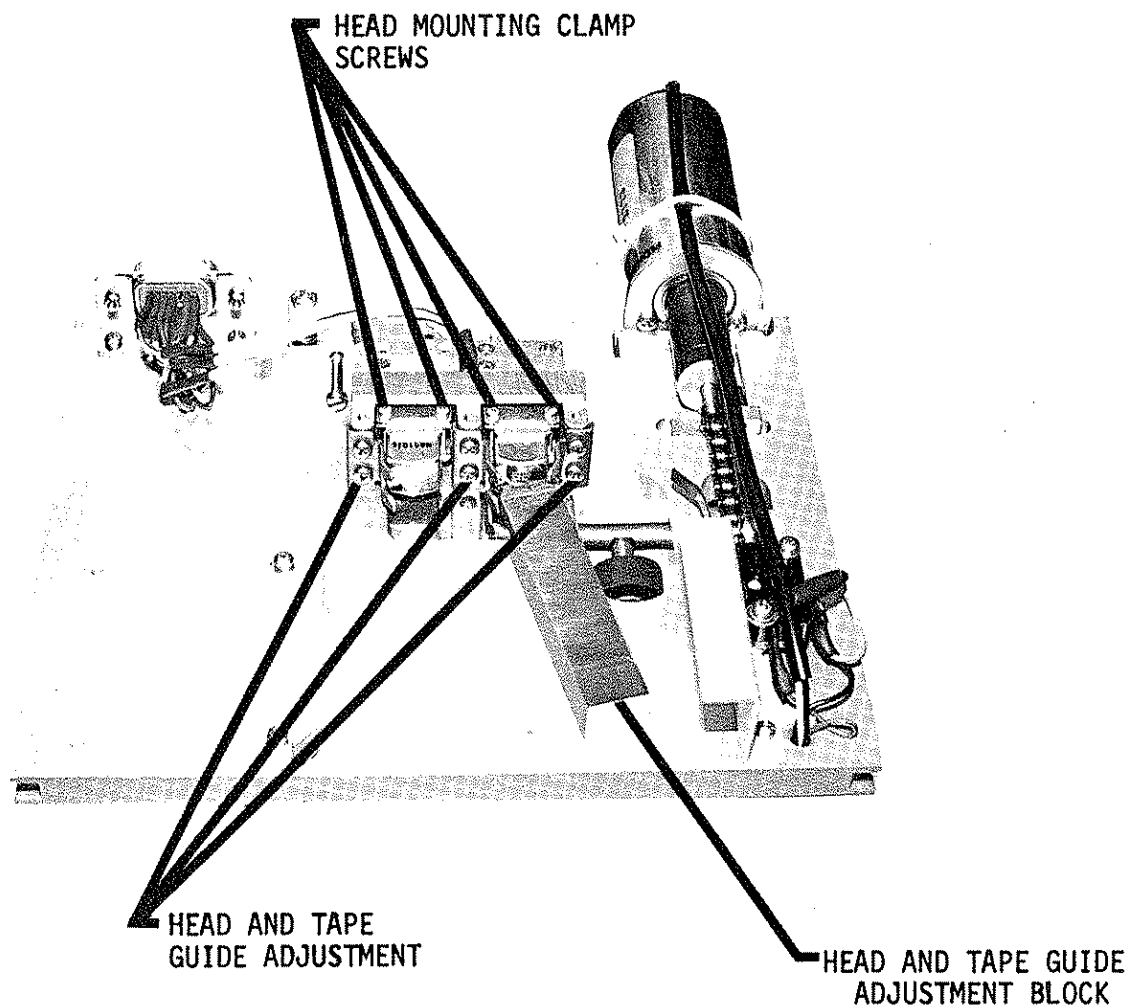
MOTOR ADJUSTMENT

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



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FIGURE 5-4 HEAD, TAPE GUIDE, AND MOTOR ADJUSTMENT

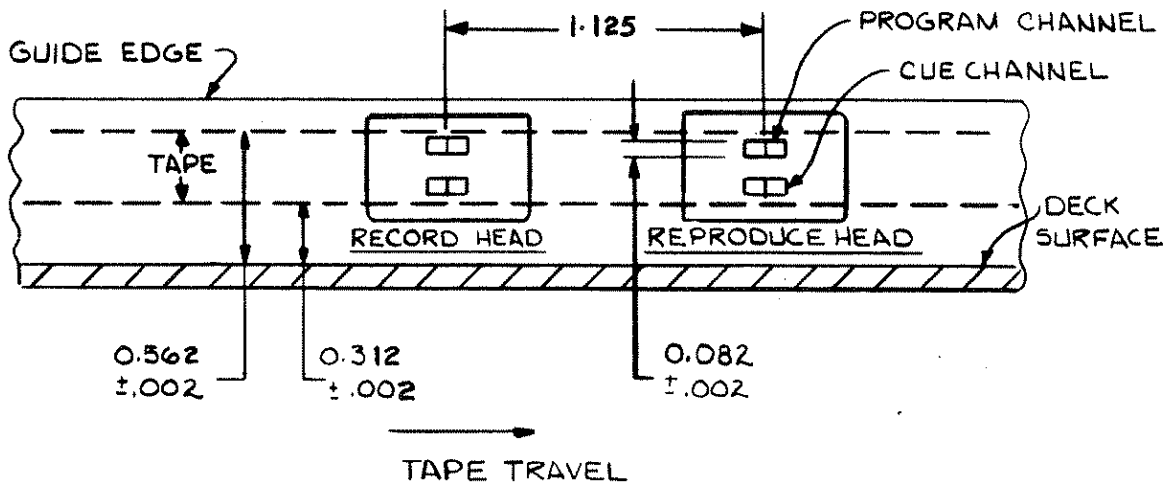


The head on the left is a "dummy" (in the record head position). It maintains proper tape-to-head orientation in playback only machines, particularly in stereo systems.

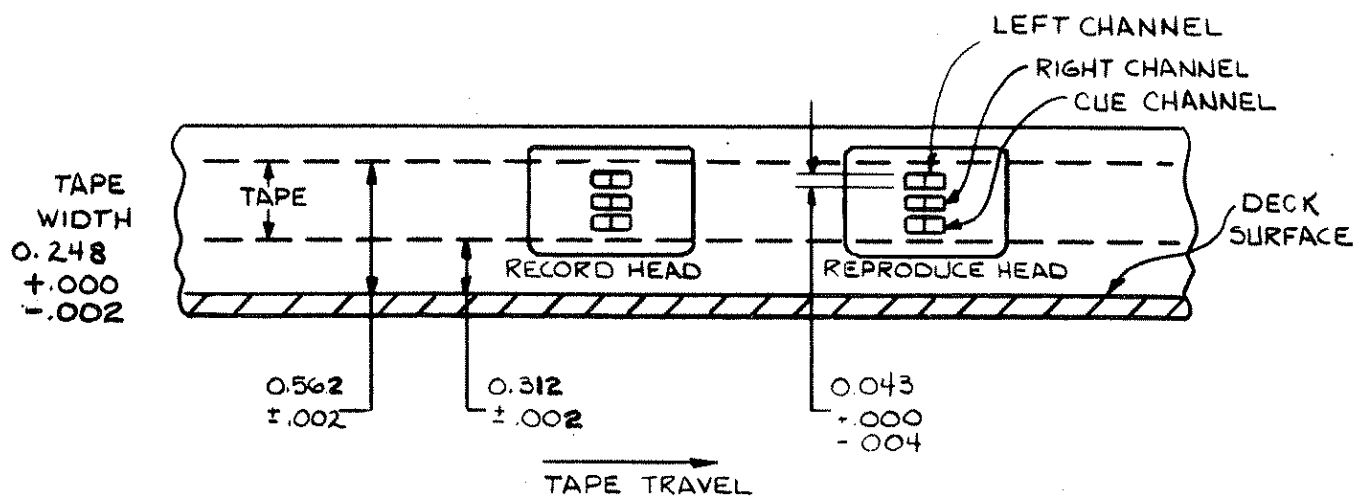
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FIGURE 5-5. HEAD ASSEMBLY ADJUSTMENTS

MONOPHONIC STANDARD

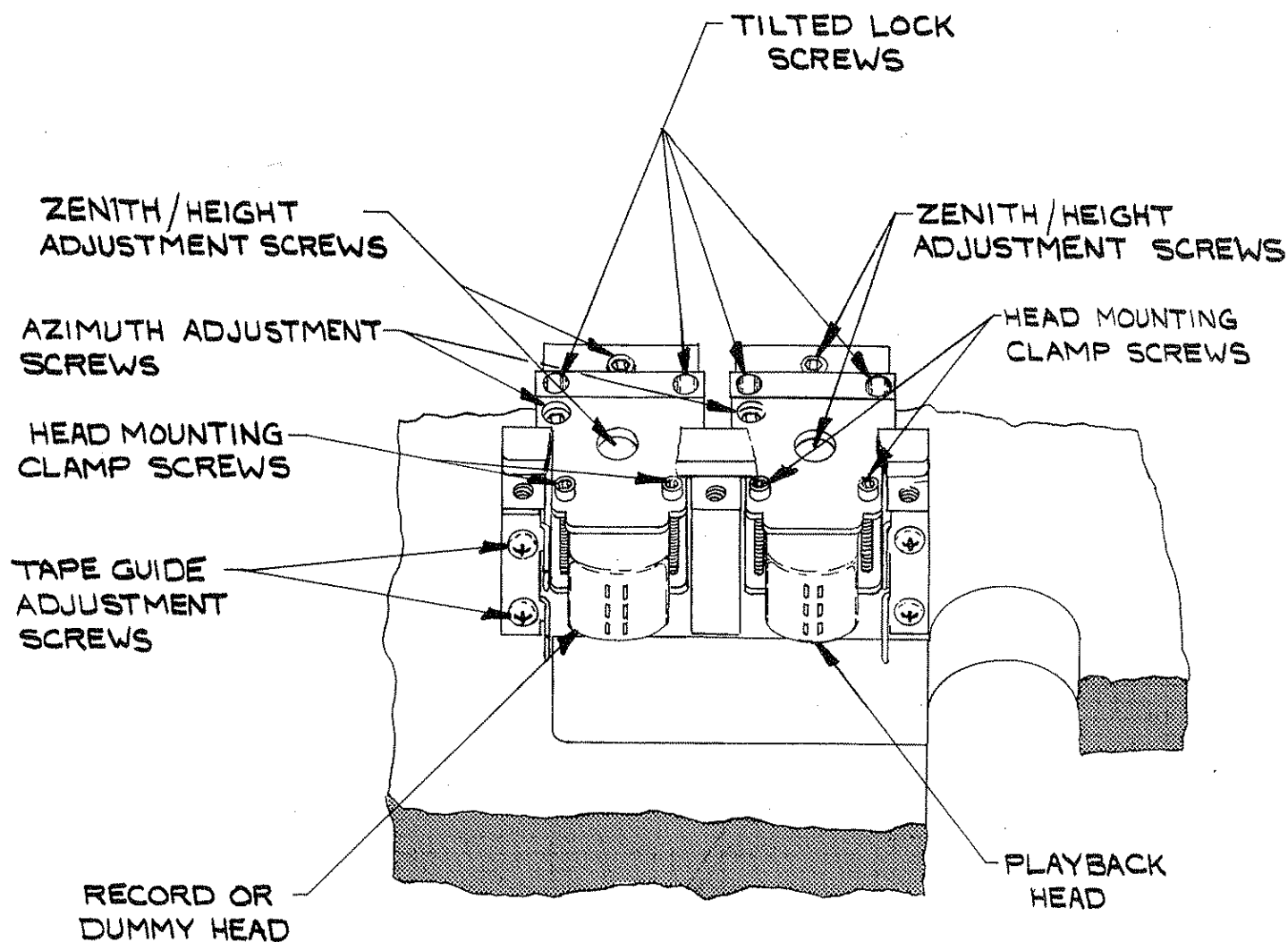


STEREOPHONIC STANDARD



597-5301-12

FIGURE 5-6. TAPE TRACKING HEIGHT



597-5301-13

FIGURE 5-7. HEAD ADJUSTMENT SCREWS

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 5-7).

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 906-5107 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 5-7) of the playback head for maximum output level at 15 kHz. Remove and reinsert the cartridge to verify adjustments.

NOTE

BEFORE MAKING STEREO PHASE ADJUSTMENT,
SET PLAYBACK EQUALIZATION AS OUTLINED
IN PARAGRAPHS 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 5-3). 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 adjustment (refer to paragraph 5-20).

5-50. ELECTRICAL ADJUSTMENTS.

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 5300B: the L CH LEVEL and the R CH LEVEL. On monaural versions of the 5300B, 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 (BE P/N 808-0011) 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
- E. Solenoid Replacement
- F. Power Transformer Replacement

WARNING

DISCONNECT POWER PRIOR TO ANY SERVICING.

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

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

5-70. Remove the nylon washer, press roller, and metal washer from the shaft.

5-71. Place the metal washer, the new roller, and the nylon washer on the shaft, in that order. Then, seat the E-ring on the end of the shaft. When the E-ring is seated properly, it will snap onto the shaft.

5-72. Before putting the unit back into service, adjust the pressure roller alignment as described in paragraph 5-20.

5-73. HEAD REPLACEMENT. Replacement of a head on the top or middle deck 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 and middle decks. Following this, proceed as indicated below.

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

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

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.

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 along with the defective bearing. Insert new bearing and replace screw.

5-83. When the bearing is replaced, the new bearing must be secured in place with an adhesive such as Loctite Brand 85-21 Bearing Mount Adhesive-Sealant (BE P/N 700-0026).

MODEL LMP MONO PLAY (252-0017)



MODEL LSP STEREO PLAY (253-0014)



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

597-5301-14

FIGURE 5-8. TAPE HEAD CONNECTIONS AND CONFIGURATIONS

CAUTION

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

CAUTION

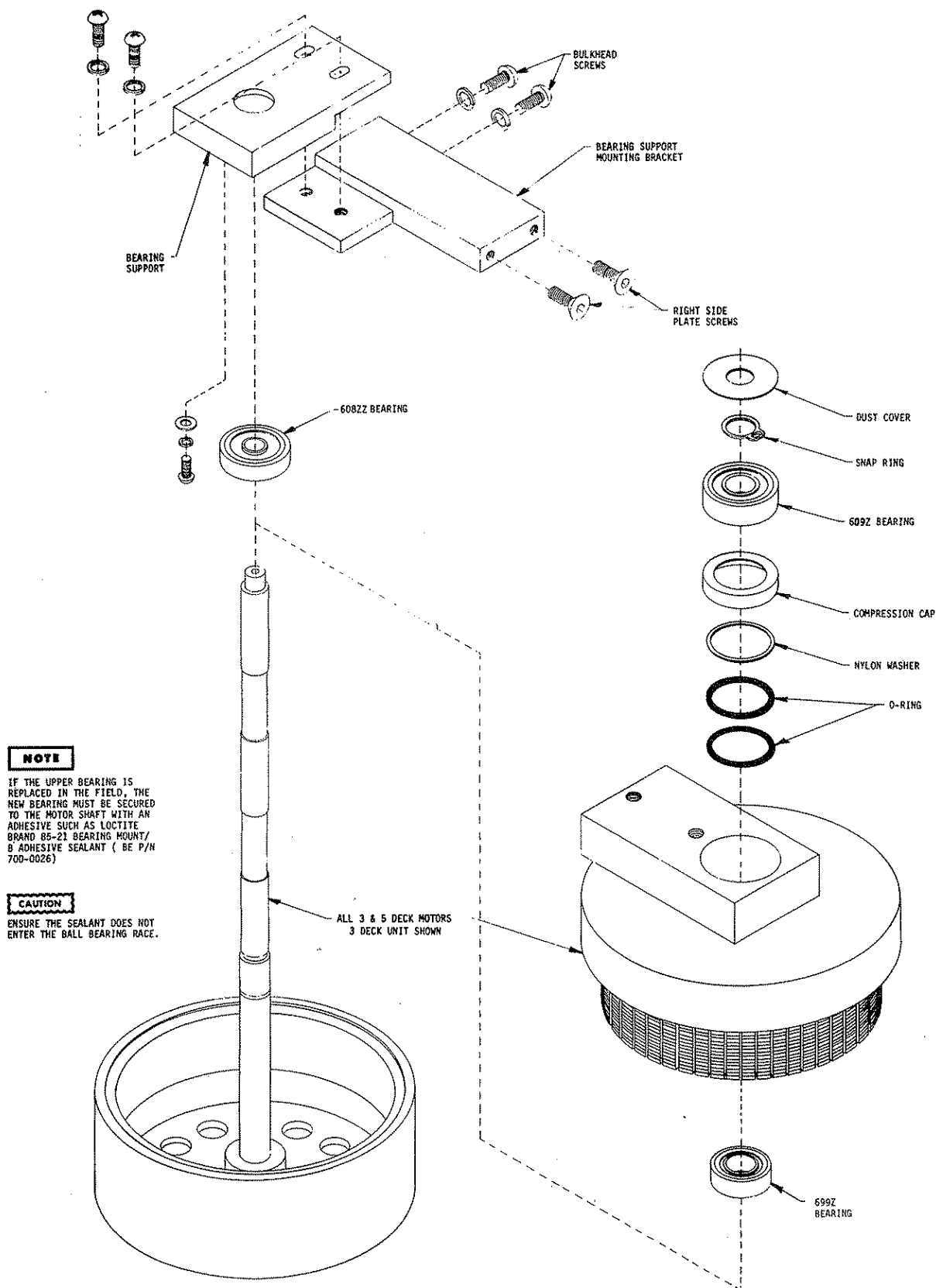
5-84. Cover the bearing face. Apply a portion of a single drop of the bearing sealant to the motor shaft just above the bearing. Capillary action will allow even distribution of the sealant.

5-85. Loosen the two Phillips head screws that hold the bearing support to its mounting bracket. Slide bearing assembly back over motor shaft.

5-86. Reattach mounting bracket assembly to bulkhead. The top of the mounting bracket should be flush with the top edge of the bulkhead.

5-87. Tighten the bearing support screws.

5-88. MOTOR REPLACEMENT. To remove the motor, disconnect the ac power, open the front panel, and remove the top two decks. Remove the top and bottom covers and place the unit on its left side.



597-5301-15

FIGURE 5-9. UPPER MOTOR SHAFT BEARING

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.

5-89. Unplug the motor connector (P13) from the motherboard (see Figure 4-3 for location of jack) and remove the two white leads that connect to the motor capacitor.

5-90. Remove the two Phillips head screws connecting the bearing support to the mounting bracket to free the bearing assembly (see Figure 5-9). Remove the Phillips head screw that secures this top bearing to the support. Pull the bearing from the support.

5-91. Locate the two large Phillips head screws on the top side of the bottom deck (behind the motor shaft) that hold the motor mounting block to the deck. While holding the motor in one hand, remove these two screws from the deck.

5-92. Gently remove the motor, taking extra care to avoid damage to the drive shaft as it is removed through the openings in the deck plates.

5-93. Carefully insert the new motor and loosely secure the mounting block screws on the bottom deck.

5-94. Perform motor alignment as described in paragraph 5-20.

5-95. Replace the top bearing as described in paragraph 5-80.

5-96. SOLENOID REPLACEMENT. Replacement of the solenoid on either the top or middle deck requires removal of the deck. Replacement of the solenoid on the bottom deck requires the removal of the top two decks, the top and bottom cover, and the release of the rear panel assembly (7 Allen screws per side panel).

NOTE

NOTE

NOTE

NOTE

AS REMOVAL OF THE SOLENOID ON THE BOTTOM DECK IS MORE DIFFICULT IN NATURE THAN THE REMOVAL OF THE OTHER SOLENOIDS, IT IS SUGGESTED THAT THE READER FAMILIARIZE HIMSELF WITH THE FOLLOWING PROCEDURE AND THEN PERFORM THE REPLACEMENT IN THE SIMPLEST MANNER POSSIBLE.

5-97. Disconnect the two solenoid leads at the plug-in deck connector located in the left rear corner of the upper two decks. Note the lead connections listed below:

A. White lead to terminal 7

B. Black lead to terminal 14

The leads from the bottom deck solenoid connect to P9 which connects to the motherboard (see Figure 4-3). It is suggested that a pin puller be used to remove the black and white leads from P9, as splicing the leads is an inferior method for this procedure.

5-98. Free the cable from the deck removing it from the black tubing and unthreading it through the openings in the deck.

5-99. Turn the deck bottom side up and locate the junction of the solenoid chain and the solenoid tension spring. Uncouple the spring from the chain and allow the chain to fall through the deck opening to the top side. Remove the solenoid tension spring from the solenoid.

5-100. Remove the two large Phillips head screws that hold the solenoid assembly mounting bracket to the deck. Then, remove the two Phillips head screws, located on either side of the plunger, that connect the solenoid to the mounting bracket.

5-101. Remove the chain and adjustment screw assembly from the solenoid plunger.

CAUTION

PLUNGER AND SOLENOID ARE CUSTOM FITTED.
DO NOT SEPARATE.

5-102. Attach the chain and adjustment screw assembly to new solenoid plunger. Attach the solenoid tension spring to underside of new solenoid.

5-103. Attach the new solenoid to the mounting bracket and then remount the bracket on deck plate.

5-104. With the deck top side up, thread the chain back through the deck opening, so that the small pin protruding from the pressure roller driveshaft assembly comes up through the eighth link opening in the chain.

5-105. Hold the chain and pressure roller assembly in this position and invert the deck. Maintain slight tension on the chain and reattach the tension spring to the last link in the chain. Be sure that the end of the spring is completely inserted through the eyelet in the chain.

5-106. Thread the solenoid wires through the black tubing and back to the plug-in connector (to P9 for bottom deck).

5-107. Solder the two solenoid leads to the plug-in deck connector (white to terminal 7, black to terminal 14). The bottom deck solenoid leads crimp onto the pins. Then insert the pins into the plug and reconnect the plug to the motherboard.

5-108. Perform the solenoid plunger travel adjustment as described in paragraph 5-24.

5-109. POWER TRANSFORMER REPLACEMENT. To replace the power transformer disconnect ac power, turn the unit bottom side up, and remove the bottom cover. Unplug the transformer from the motherboard (P14 as shown in Figure 4-3).

5-110. Remove the four screws that hold the transformer to the right side panel of the unit. Remove the two screws closest to the top of the machine first. Holding on to the transformer, remove the remaining two screws and lift the transformer out of the unit.

5-111. Install the replacement transformer and connector assembly reversing the above procedure. The transformer should be mounted so that the leads are next to the bottom deck.

5-112. ELECTRICAL PARTS REPLACEMENT.

5-113. The circuit boards used in the 5300B 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.

5-114. 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.

5-115. To remove a component from a board such as the type used in the 5300B, cut the leads from the body of the defective component while the device is still soldered to the board.

5-116. 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.

5-117. 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.

5-118. 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.

5-119. 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.

5-120. 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 the Broadcast Electronics 5300B Cartridge Machine. 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 replaceable 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 ALL VERSIONS OF A CIRCUIT BOARD ASSEMBLY ARE LISTED AT THE BEGINNING OF A PARTS TABLE.

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

NOTE

NOTE

TABLE 6-1. REPLACEABLE PARTS LIST INDEX

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-2	CHASSIS MOUNTED COMPONENTS	906-5301B 906-5302B 906-5303B 906-5304B	6-2
6-3	REAR PANEL CONNECTOR CIRCUIT BOARD, ASSEMBLY	914-1801 914-1811	6-4
6-4	MOTHERBOARD BACK PLANE ASSEMBLY	914-1804	6-5
6-5	CONTROL CIRCUIT BOARD ASSEMBLY	914-1831 914-1841	6-6
6-6	TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY	914-1830 914-1840	6-7
6-7	DECK PARTS 5300B SERIES	906-5300	6-10

Table 6-2. Chassis Mounted Components
906-5301B/-5302B/-5303B/-5304B (Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Motor Start, 0.95 uF, 300V ac, 60 Hz	029-1075	1
	Capacitor, Motor Start, 1.4 uF, 250V ac, 50 Hz	029-1463	1
DS1 THRU DS6	Lamp, No. 327, Incandescent, Subminiature, 28V, 0.040 Ampere (for STOP and START switches)	321-0327	6
DS7 THRU DS9	Lamp Assembly, Green (Deck status lights)	324-0151	3
F1	Fuse, 1.5 Ampere, Slow-Blow, 3AG	334-0150	1
J10	Receptacle, 16-Pin DIP, (connects START and STOP switches to motherboard)	417-1601	1
M1 (50 Hz)	Motor, Synchronous, 50 Hz, 375 rpm @ 10 oz-in, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 25W Model: NAH-1202A5C3L	382-1371-1	1
M1 (60 Hz)	Motor, Synchronous, 60 Hz, 450 rpm @ 7 oz-in, 7.5 in/s (19.05 cm/s), 117V $\pm 10\%$ @ 24W Bearings: Precision Ball Duty Cycle: Continuous Model: NAH-1603B6C3L	382-1311-1	1
P6	Plug, 2-Pin (In-line, Power Cord to ON/OFF switch)	418-0702	1
P7 THRU P9	Plug, 4-Pin (Motherboard to Deck Connector)	418-0240	3
P11	Plug, 4-Pin (Motherboard to Regulator)	418-0240	1
P12	Plug, 2-Pin (Motherboard to Power Input)	418-0701	1
P13	Plug, 6-Pin (to Motor Connector)	418-0670	1
P14	Plug, 12-Pin (to Power Transformer Connector)	418-1271	1
P19 THRU P21	Plug, 14-Pin (Bulkhead disconnect for slide- out decks)	418-1410	3
P101,P201, P301	Plug, 24-Pin	418-0306	3
Q1	Transistor, 2N3055, Silicon, NPN, TO-3 Case	219-3055	1
S1 THRU S3	Switch with Bezel, Illuminated, Normally Open, Momentary Contact, SPST, Push (START switch/ indicator)	343-1206	3
S4 THRU S6	Switch with Bezel, Illuminated, Normally Open, Momentary Contact, SPST, Push (STOP switch/ indicator)	343-1205	3
S7	Switch, Toggle, SPST, 3 Ampere, 250V ac (ON/OFF switch)	348-8280	1
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, 3AG	415-2012	1
XQ1	Transistor Socket, TO-3	417-0298	1

Table 6-2. Chassis Mounted Components
906-5301B/-5302B/-5303B/-5304B (Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Cable Assembly	906-5135-1	1
----	Cable Assembly	906-5135-2	1
----	Cable Assembly	906-5135-3	1
----	Cable Assembly	906-5135-4	1
----	Cable Assembly	906-5135-5	1
	Each of the above cable assemblies is made up of 16-Conductor, 28 Gauge Flat-Cable (BE P/N 600-0016) and 2 16-Pin Ribbon Connectors (BE P/N 417-1602)		
----	Head Lead Assembly, Orange/Red, 16.5 inches	940-0004	3
----	Head Lead Assembly, Blue/Yellow, 16.5 inches	940-0005	3
----	Head Lead Assembly, Orange/Red, 5.5 inches	940-0007	3
----	Head Lead Assembly, Blue/Yellow, 5.5 inches	940-0008	3
----	Connector, 2-Pin	418-0701	1
----	Card Guide	409-0020	12
----	Insulator, T0-3	418-0010	1
----	Switch Cap, Green (START switches)	343-0152	3
----	Switch Cap, Red (STOP switches)	343-0013	3
----	Pins for P6	417-0036	2
----	Head, Playback, 2-Channel, Model LMP	252-0017	3
	Inductance: 400 mH		
	Impedance at 1kHz: 2.55 k Ohms		
	DC Resistance: 410 Ohms per channel		
----	Head, Dummy	407-0001	3
----	Rubber Foot	403-2194	4
----	Pins for P13, P14	417-0053	27
----	Bearing, Ball, 608ZZ (Upper Shaft)	442-1020	1
	OD: 0.866 inch (2.2 cm), ID: 0.315 inch (0.800 cm), HT: 0.275 inch (0.596 cm)		
----	Bearing, Ball, 609Z (Upper Motor)	442-0609	1
	OD: 0.9348 inch (2.374 cm), ID: 0.355 inch (0.902 cm), HT: 0.275 inch (0.699 cm)		
----	Bearing, Ball, 699Z (Lower Motor)	442-1023	1
	OD: 0.7873 inch (2.00 cm), ID: 0.355 inch (0.902 cm), HT: 0.2346 inch (0.596 cm)		
----	Bearing Block	459-0044	1
----	Bracket, Bearing Support Mounting	470-0236	1
----	Rear Panel Connector Circuit Board Assembly	914-1801	1
----	Motherboard Back Plane Assembly	914-1804	1
----	Control Circuit Board Assembly	914-1831	3
----	Tape Head Amplifier Circuit Board Assembly	914-1830	3
----	Deck Parts 5300 Series	906-5300	1
	<u>ALTERNATE PARTS FOR 906-5302B MACHINE ONLY</u>		
----	Control Circuit Board Assembly	914-1841	3

Table 6-2. Chassis Mounted Components
906-5301B/-5302B/-5303B/-5304B (Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
<u>ALTERNATE PARTS FOR 906-5303B MACHINE ONLY</u>			
----	Head, Playback, 3-Channel, Model LSP Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per channel	253-0014	3
----	Rear Panel Connector Circuit Board Assembly	914-1811	1
----	Tape Head Amplifier Circuit Board Assembly	914-1840	3
----	Head Lead Assembly, Black/White, 6.5 inches	940-0006	3
----	Head Lead Assembly, Black/White, 5.5 inches	940-0009	3
<u>ALTERNATE PARTS FOR 906-5304B MACHINE ONLY</u>			
----	Head, Playback, 3-Channel, Model LSP Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 600 Ohms per channel	253-0014	3
----	Rear Panel Connector Circuit Board Assembly	914-1811	1
----	Tape Head Amplifier Circuit Board Assembly	914-1840	3
----	Control Circuit Board Assembly	914-1841	3
----	Head Lead Assembly, Black/White, 6.5 inches	940-0006	3
----	Head Lead Assembly, Black/White, 5.5 inches	940-0009	3

Table 6-3. Rear Panel Connector Circuit Board, Assembly - 914-1801/-1811

REF. DES.	DESCRIPTION	PART NO.	QTY.
J1 THRU J4	Receptacle, Integrated Circuit, 16-Pin DIP	417-1601	4
J101, J201, J301	Receptacle, 24-Pin	417-0302	3
T1 THRU T3	Audio Interstage Transformer, 6.3 mW, 30 Hz - 20 kHz ± 1 dB Primary: Dual 250 Ohm Secondary: Dual 250 Ohm	370-0030	3
----	Blank Circuit Board	514-1801	1
<u>ADDITIONAL PARTS FOR STEREO MODELS ONLY</u>			
T4 THRU T6	Audio Interstage Transformer, 6.3 mW, 30 Hz - 20 kHz ± 1 dB Primary: Dual 250 Ohm Secondary: Dual 250 Ohm	370-0030	3

Table 6-4. Motherboard Back Plane - 914-1804

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 35V, Tantalum	064-1063	1
C2	Capacitor, Electrolytic, 33 uF $\pm 10\%$, 35V, Tantalum	064-3373	1
C3 THRU C5	Capacitor, Electrolytic, 1000 uF, 50V	014-1094	3
C6	Capacitor, Electrolytic, 33 uF $\pm 10\%$, 35V, Tantalum	064-3373	1
CR1,CR2	Diode Bridge Rectifier, MDA970-3, Full Wave, 200V, 4 Amperes	239-0003	2
CR3,CR4	Diode, 1N4744, Zener, 15V $\pm 10\%$, 1W	200-0015	2
J1 THRU J6	Receptacle, Card Edge, Dual 22-Pin	417-2300	6
J7 THRU J9	Receptacle, 4-Pin (Motherboard to Deck Connector)	418-0255	3
J10	Receptacle, Header, 16-Pin DIP	417-1601	1
J11	Receptacle, 4-Pin (Motherboard to Regulator)	418-0255	1
J12	Receptacle, 2-Pin (Motherboard to Power Input)	417-0700	1
J13	Receptacle, 6-Pin (To Motor Connector)	417-0677	1
J14	Receptacle, 12-Pin (To Power Transformer Connector)	417-1276	1
J15 THRU J18	Receptacle, Header, 16-Pin DIP	417-1601	4
Q1	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q2	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q3	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q4	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q5	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q6	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q7	Transistor, 2N3053, Silicon, NPN, TO-5 Case	211-3053	1
R1 THRU R3	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R4 THRU R6	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	3
R7 THRU R9	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	3
R10 THRU R12	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	3
R13 THRU R15	Resistor, 1 Ohm $\pm 5\%$, 1/2W	110-1013	3
R16	Resistor, 470 Ohm $\pm 5\%$, 1/4W	100-4733	1
R17	Resistor, 1.5 k Ohm $\pm 5\%$, 1/2W	110-1543	1
R18	Resistor, Power, 47 Ohm $\pm 1\%$, 3 1/2W, W/W	132-4721	1
R19	Resistor, 62 Ohm $\pm 5\%$, 2W, W/W	130-6223	1
R20	Resistor, 620 Ohm $\pm 5\%$, 1/2W	110-6233	1
R21	Potentiometer, 500 Ohm $\pm 20\%$, 1/2W	178-5030	1
R22	Resistor, 680 Ohm $\pm 5\%$, 1/2W	110-6833	1
U1	Integrated Circuit, UA7805, Fixed 5 Volt Positive Regulator, 1.5A Maximum, TO-220 Case	227-7805	1
----	Heatsink, TO-5 (for Q7)	455-0207	1
----	Transistor Mounting Pad (for Q1)	409-0121	1
----	Blank Circuit Board	514-1804	1

Table 6-5. Control Circuit Board Assembly
914-1831/-1841 (Sheet 1 of 2)

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
I1 THRU I3	Diode, HP5802-4487, Light Emitting, 20 mA @ 1.6V Red	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 uF $\pm 10\%$, 35V, Tantalum	064-1063	1
C13,C14	Capacitor, Ceramic, 0.01 uF, 25V	000-1044	2
C15	Capacitor, Electrolytic, 1.0 uF, $\pm 10\%$, 35V, Tantalum	064-1063	1
C16	Capacitor, Mylar, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C17	Capacitor, Mylar, 0.01 uF, 100V	030-1043	1
C18,C19	Capacitor, Poly Film, 0.047 uF $\pm 5\%$, 100V	030-4743	2
C20	Capacitor, Mylar, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C21	Capacitor, Ceramic, 0.01 uF, 25V	000-1044	1
C22	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 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

Table 6-5. Control Circuit Board Assembly
914-1831/-1841 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
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
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 6-6. 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	030-1043	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, NPO	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

Table 6-6. Tape Head Amplifier Circuit Board Assembly
914-1830/-1840 (Sheet 2 of 3)

REF DES.	DESCRIPTION	PART NO.	QTY.
C36,C37	Capacitor, Electrolytic, 1.0 uF $\pm 10\%$, 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
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

Table 6-6. Tape Head Amplifier Circuit Board Assembly
914-1830/-1840 (Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
----	Pin, Amplifier Disconnect	418-0161	6
----	Blank Circuit Board	514-1840	1
<p>ADDITIONAL PARTS FOR MONOPHONIC ASSEMBLIES 914-1830</p>			
C3,C28	Capacitor, Mica, 150 pF, 50V	040-1522	2
<p>ADDITIONAL PARTS FOR STEREOPHONIC ASSEMBLIES - 914-1840</p>			
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

Table 6-7. Deck Parts 5300B Series - 906-5300

REF DES.	DESCRIPTION	PART NO.	QTY.
J19 THRU J21	Receptacle, 14-Pin (Bulkhead disconnect for slide-out decks)	417-1420	3
L1,L2,L3	Solenoid Assembly, Air Damped, 24V, 11W, 52 Ohms, 1.5 inch (3.81 cm) Diameter	950-0026	3
S1,S2,S3	Microswitch, SPDT, 125V ac, 1/2 Ampere	346-6100	3
----	Pressure Roller	444-0795	3
----	Cartridge Guide, Left	452-0030	3
----	Cartridge Guide, Right	452-0031	3
----	Tape Guide	452-0001	6
----	Stop, Solenoid	459-0158	3

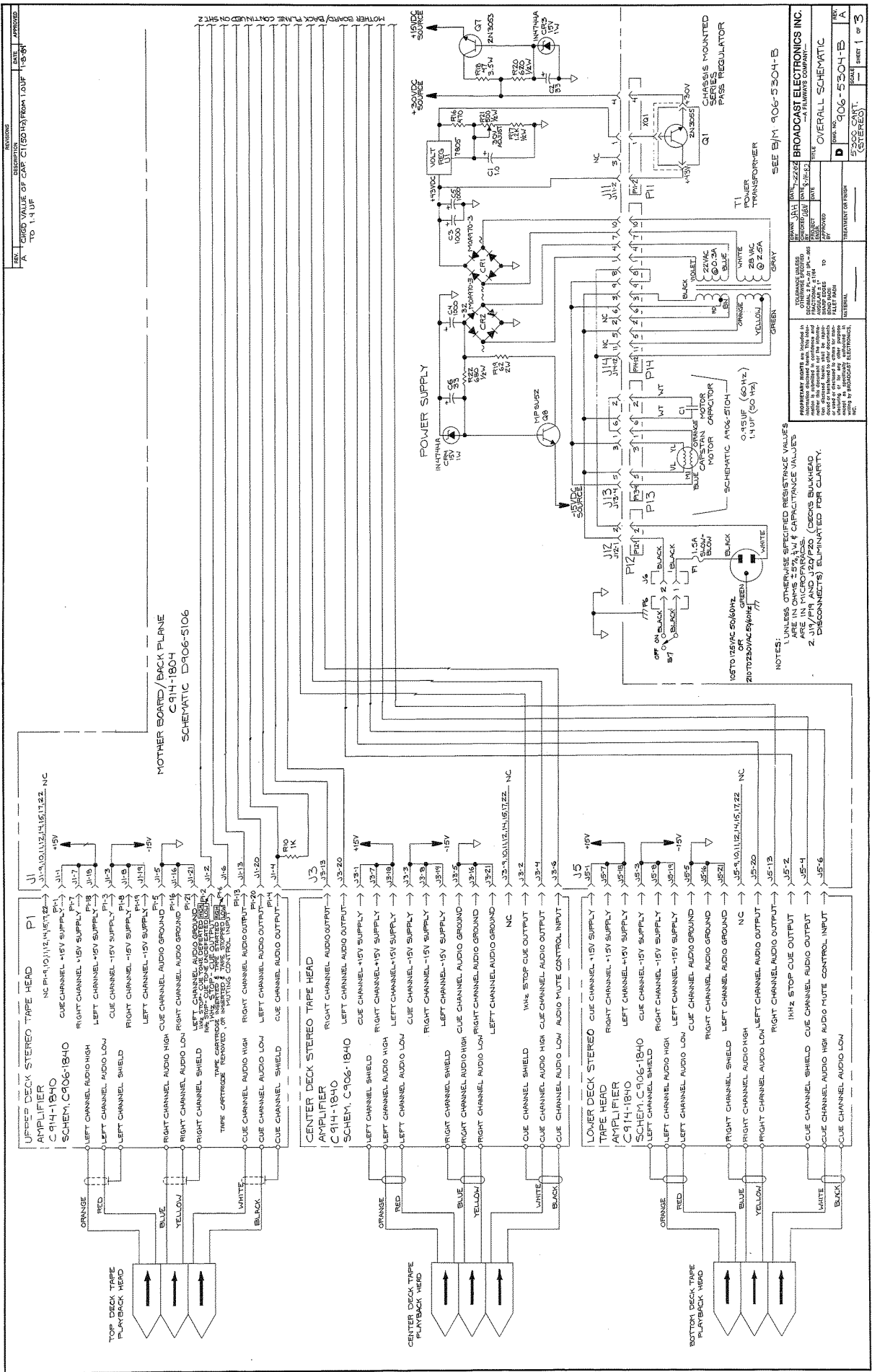
SECTION VII
DRAWINGS

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
SECTION SHOW THE MOST COMPLEX VERSION AVAILABLE.
NOTE LESS COMPLEX VERSIONS OF THE MACHINE OR ITS COM-
 PONENTS ARE COVERED BY THESE TOP LEVEL DRAWINGS.

<u>FIGURE</u>	<u>TITLE</u>	<u>NUMBER</u>
7-1	OVERALL SCHEMATIC DIAGRAM (3 Sheets)	D906-5304B
7-2	REMOTE CONTROL CONNECTOR WIRING DIAGRAM	B906-5107
7-3	FINAL ASSEMBLY DIAGRAM (4 Sheets)	900-5301/ 900-5302/ 900-5303/ 900-5304
7-4	DECK SCHEMATIC DIAGRAM	B906-5500
7-5	FRONT PANEL CONTROL CIRCUIT BOARD SCHEMATIC DIAGRAM	B906-5103
7-6	FRONT PANEL CONTROL CIRCUIT BOARD ASSEMBLY DIAGRAM	C914-1802
7-7	REAR PANEL CONNECTOR CIRCUIT BOARD SCHEMATIC DIAGRAM	D906-5100
7-8	REAR PANEL CONNECTOR CIRCUIT BOARD ASSEMBLY DIAGRAM	C914-1811
7-9	MOTHERBOARD BACK PLANE SCHEMATIC DIAGRAM	D906-5106
7-10	MOTHERBOARD BACK PLANE ASSEMBLY DIAGRAM	C914-1804
7-11	TAPE HEAD AMPLIFIER CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-1840
7-12	TAPE HEAD AMPLIFIER CIRCUIT BOARD ASSEMBLY DIAGRAM	C914-1840
7-13	CONTROL CIRCUIT BOARD SCHEMATIC DIAGRAM	C906-1841
7-14	CONTROL CIRCUIT BOARD ASSEMBLY DRAWING	C914-1841
7-15	POWER TRANSFORMER WIRING DIAGRAM	B906-3136
7-16	SEQUENCE WIRING	B906-5315

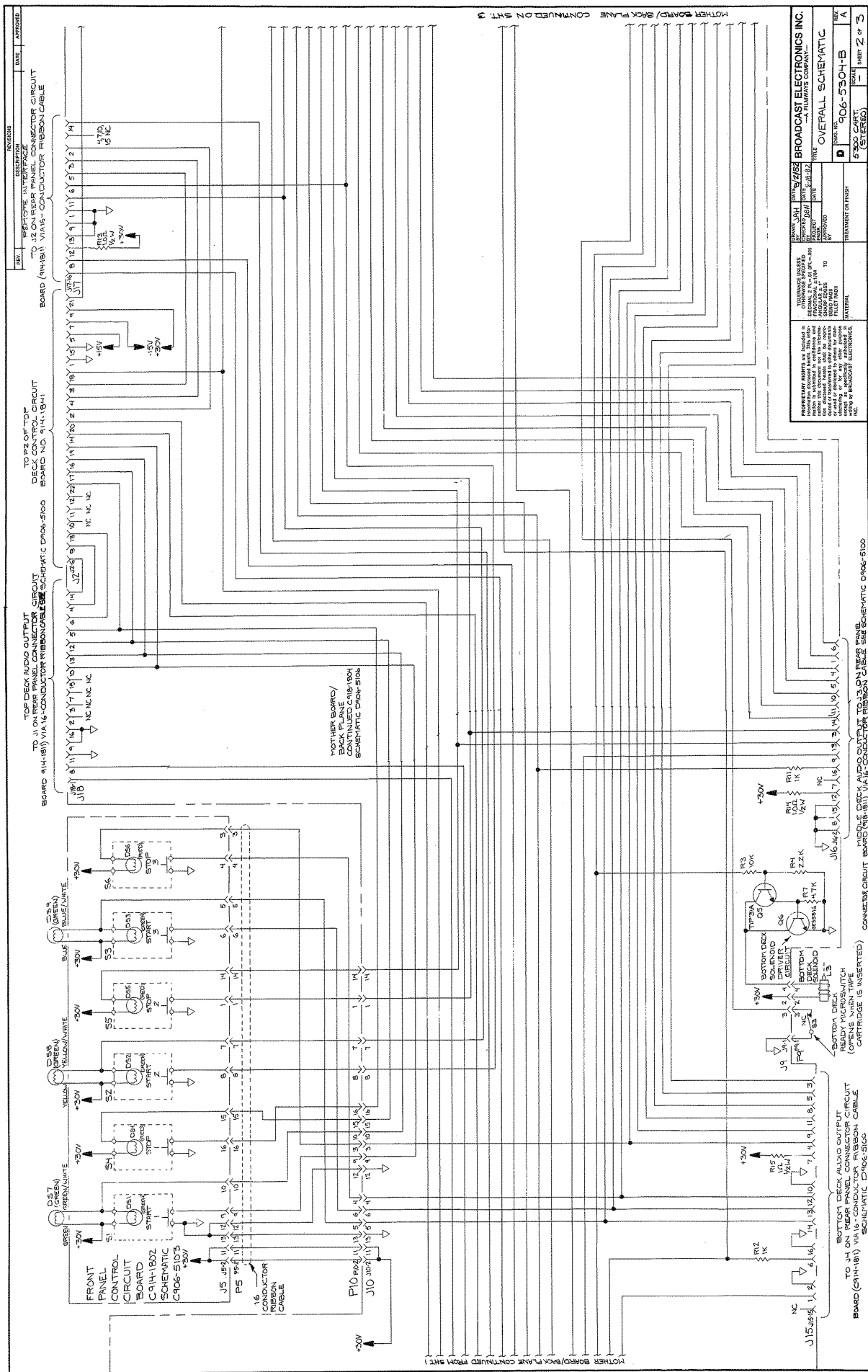


MOTHER BOARD / BACK PLANE
C914-1804
SCHEMATIC D906-5106

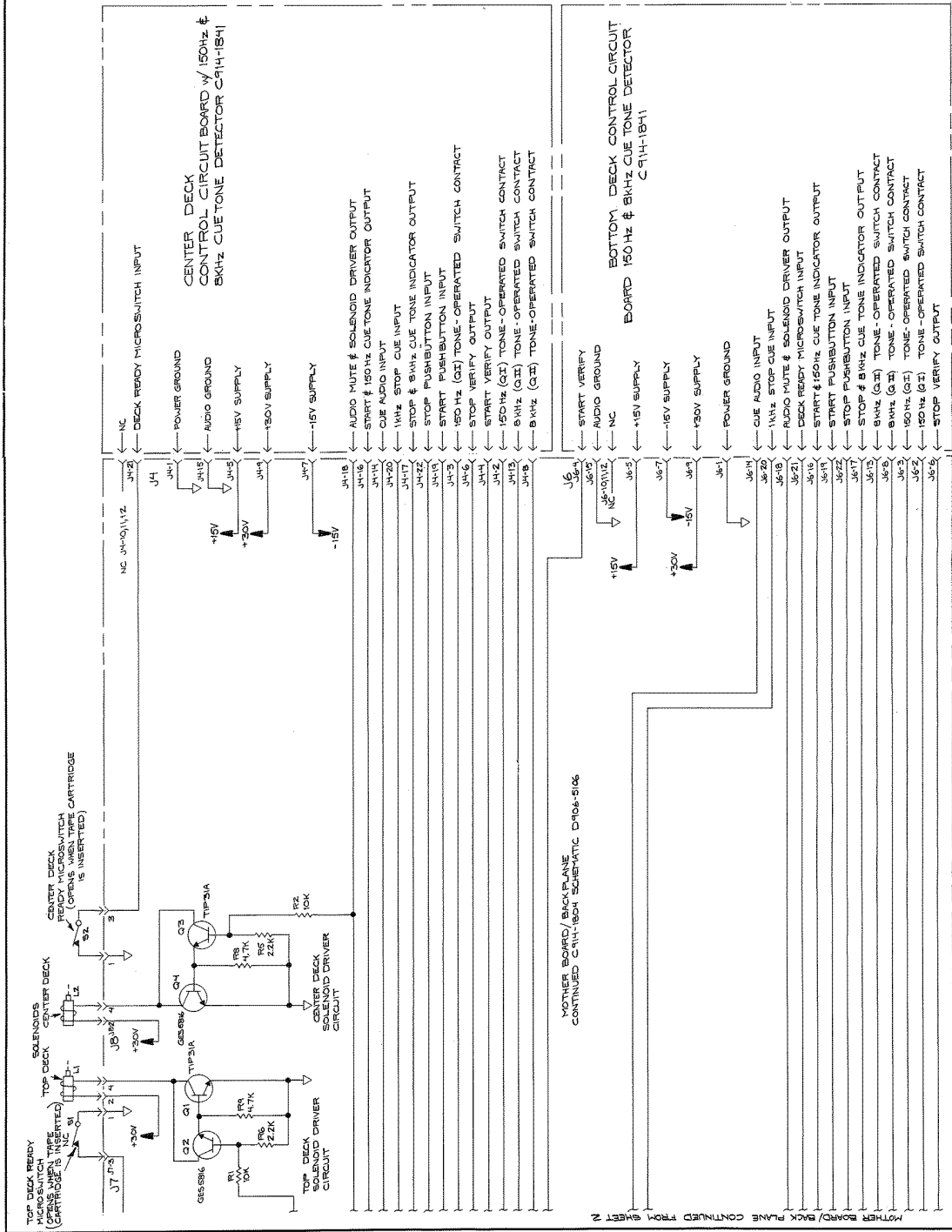
SEE B1M 906-5304-B

- NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS 5% 1/4 W & CAPACITANCE VALUES ARE IN MICROFARADS. (CHECKS BULKHEAD DECONNECTS) ELIMINATED FOR CLARITY.
 2. UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS 5% 1/4 W & CAPACITANCE VALUES ARE IN MICROFARADS. (CHECKS BULKHEAD DECONNECTS) ELIMINATED FOR CLARITY.

BROADCAST ELECTRONICS INC.	
A FILAMENT COMPANY	
OVERALL SCHEMATIC	
D 906-5304-B	
5300 CART. (STEREO)	
SHEET 1 OF 3	



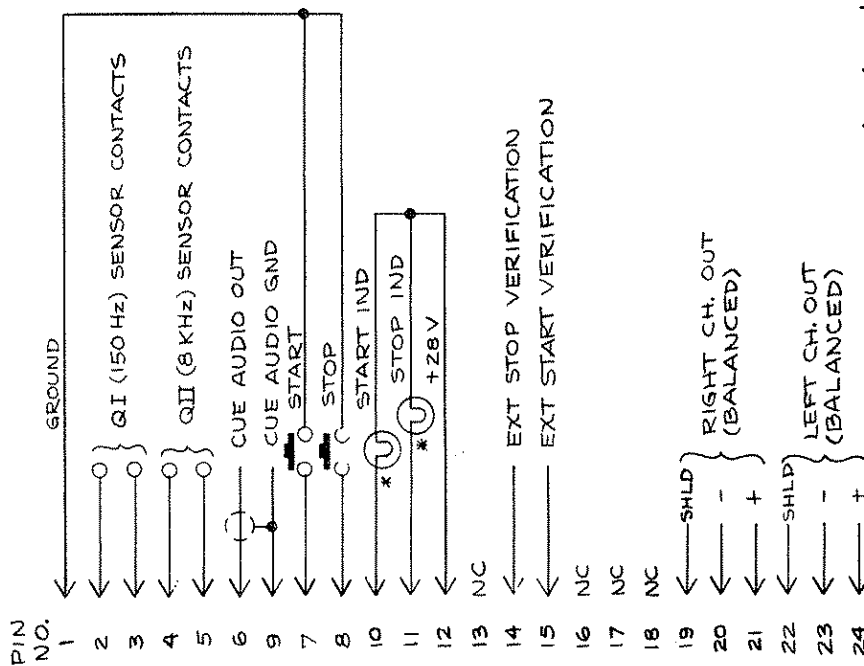
REV.	DESCRIPTION	DATE	APPROVED



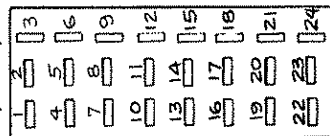
DESIGN NO.	906-5504-B	REV.	A
DATE	JAN 1988	BY	
APPROVED			
OVERALL SCHEMATIC			
5500 CACT			
SHEET 3 OF 3			

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REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	ECN 629	11/5/75	<i>[Signature]</i>



REMOTE CONNECTOR
J101, J201, J301

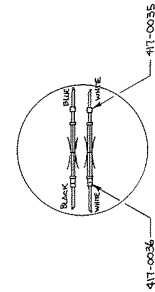
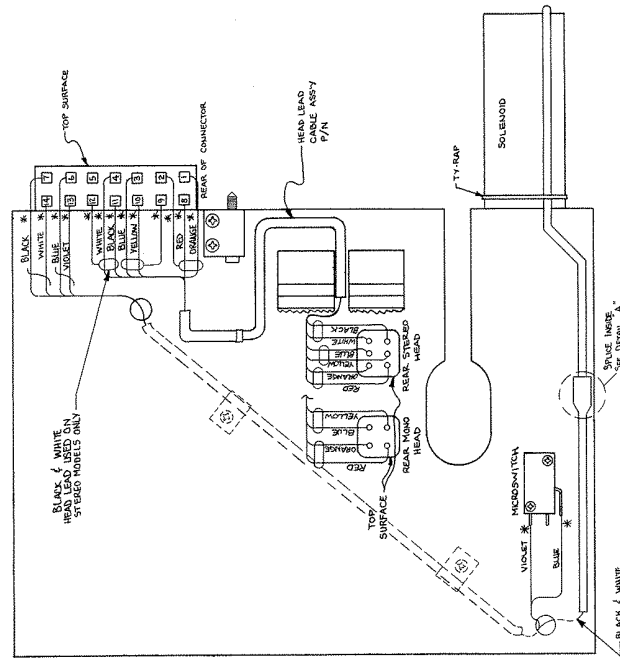
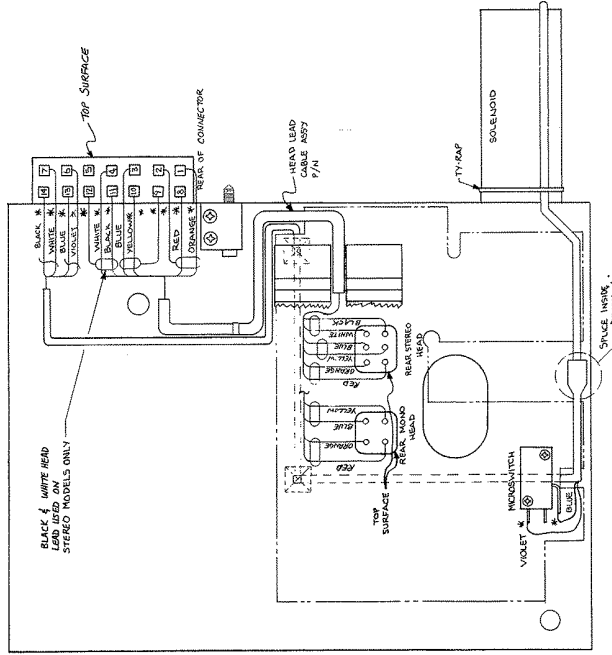


ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE																																													
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LIST OF MATERIAL																																																	
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* #327 OR EQUIV.

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REV	DATE	DESCRIPTION	BY	CHK
1	10/1/54	ASSG. SHLTS. 915. EXG. EGA/SAL	WJP	WJP



NOTES: 1) * WET-DRAWING TUBING TO BE APPLIED AT THESE POINTS.

BROADCAST ELECTRONICS INC.		MATERIAL	
1100 N. 4TH ST. ST. LOUIS, MO. 63102		DATE	
TITLE		REV	
5300 Final Assy		10/1/54	
TYPE		DATE	
A		10/1/54	
MOORE 5300 SERIES		SCALE	
1/2" = 1"		1/2" = 1"	



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

FIGURE 7-3C. FINAL ASSEMBLY, FIXED AND SLIDE OUT DECKS
D 900-5301/-5302/-5303/-5304

MONO PLAY HEAD

FRONT VIEW

REAR VIEW

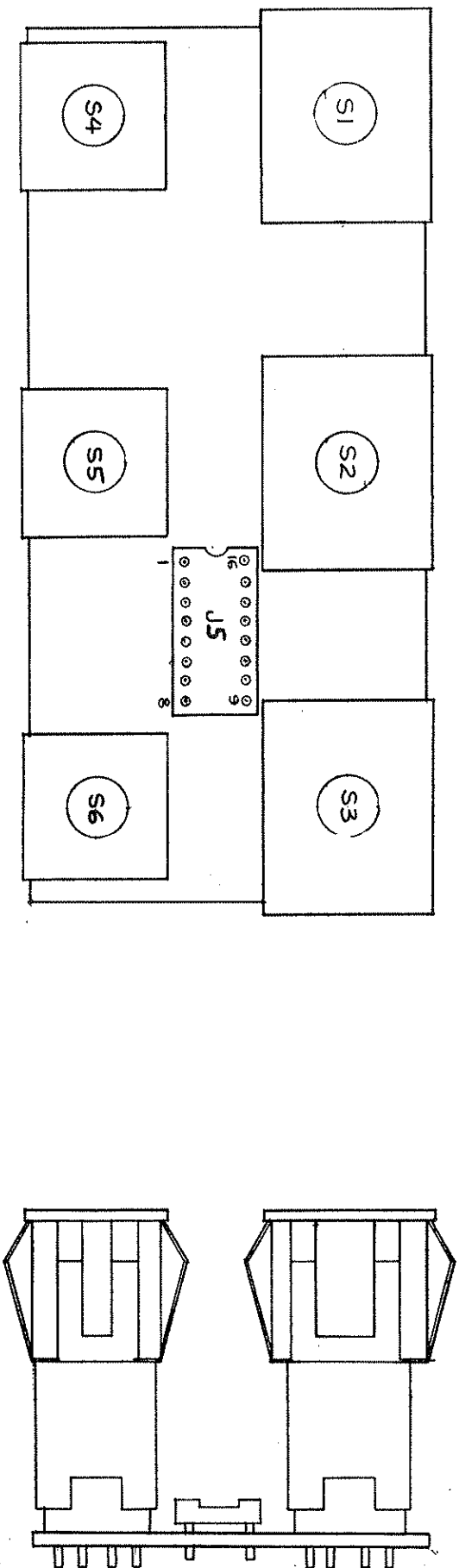
STEREO PLAY HEAD

FRONT VIEW

REAR VIEW

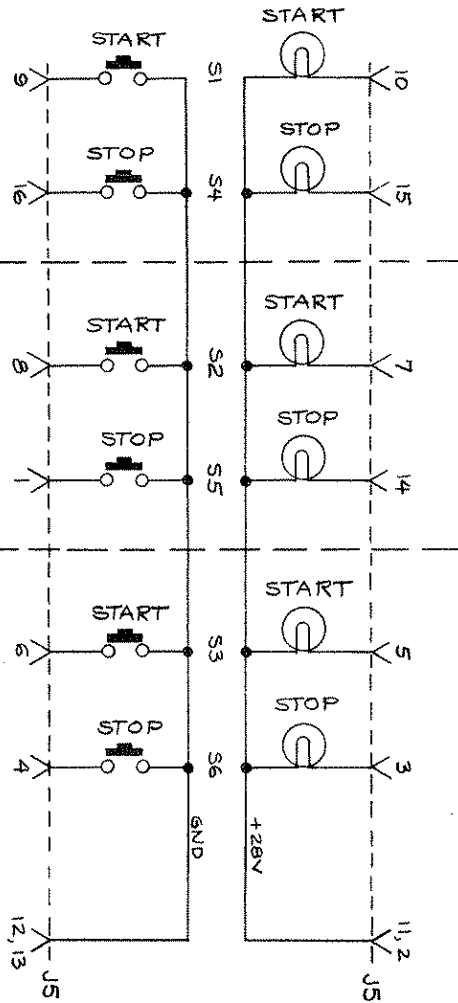
NOTES

- 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 906-5500 FOR 5500B
- REFER TO RC 940-5300(MONO) OR RC 940-5301(STEREO) FOR HEAD AND BULKHEAD CABLING



FRONT PANEL CONTROL CIRCUIT BOARD ASSEMBLY C914-1802

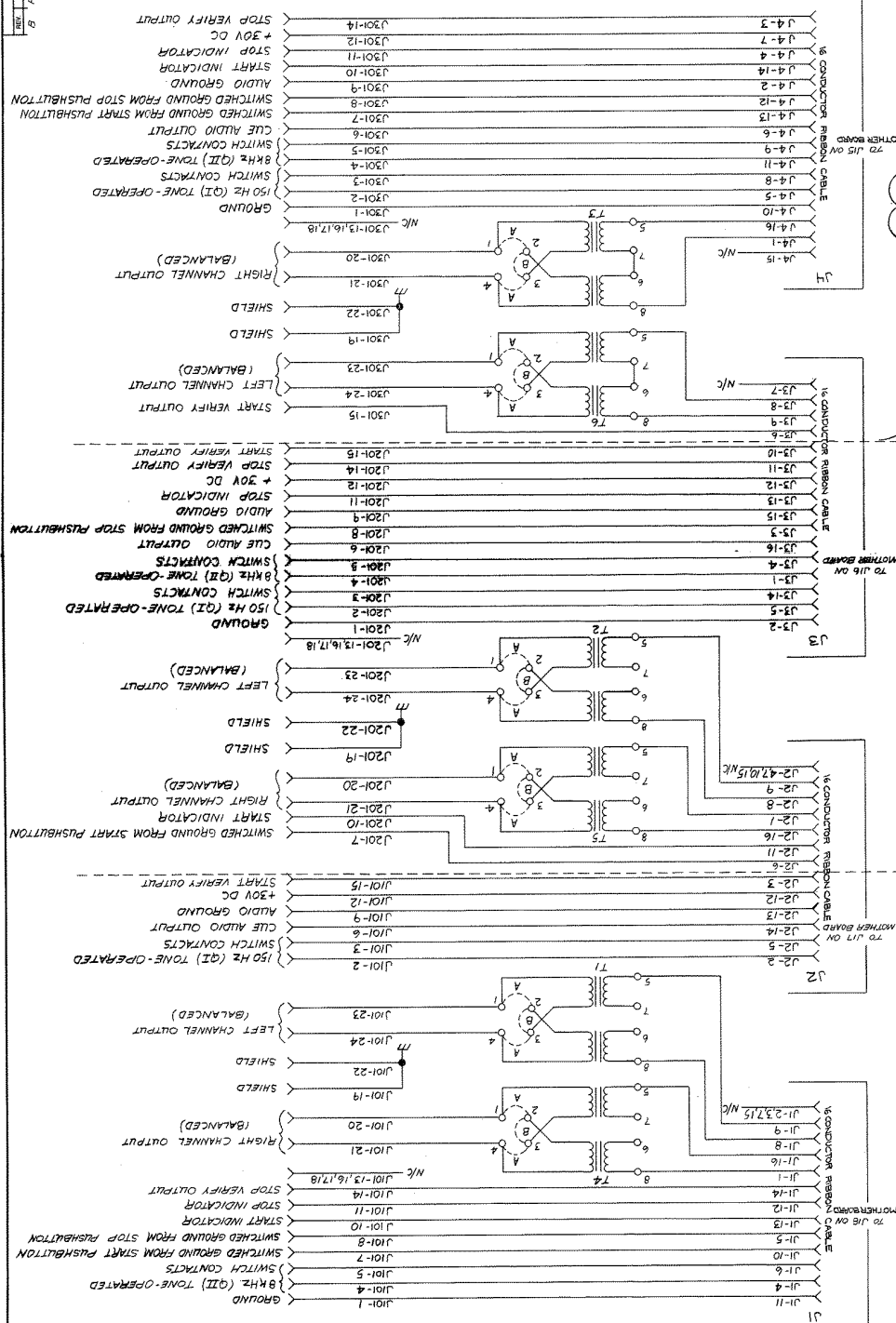
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A	PER E&N 3898	JAH 10/28/82	JL



PCB ASSY # C-914-1802

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL-DI 3 PL-005 FRACTIONAL 1/64 ANGULAR 1° SHARP EDGES TO FILET RADI MATERIAL					
DRAWN: JMS DATE: 9/23/75 CHECKED: JMS DATE: 10/8/75 PROJECT: 10 DATE: 10/5/75 APPROVED: R. J. JMS DATE: 10/17/75 TREATMENT OR FINISH					
TITLE: BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - FRONT PANEL CONTROL ASSY DWG NO. 906-5103 SCALE: 1" = 1" SHEET 1 OF 1					

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NOTES:

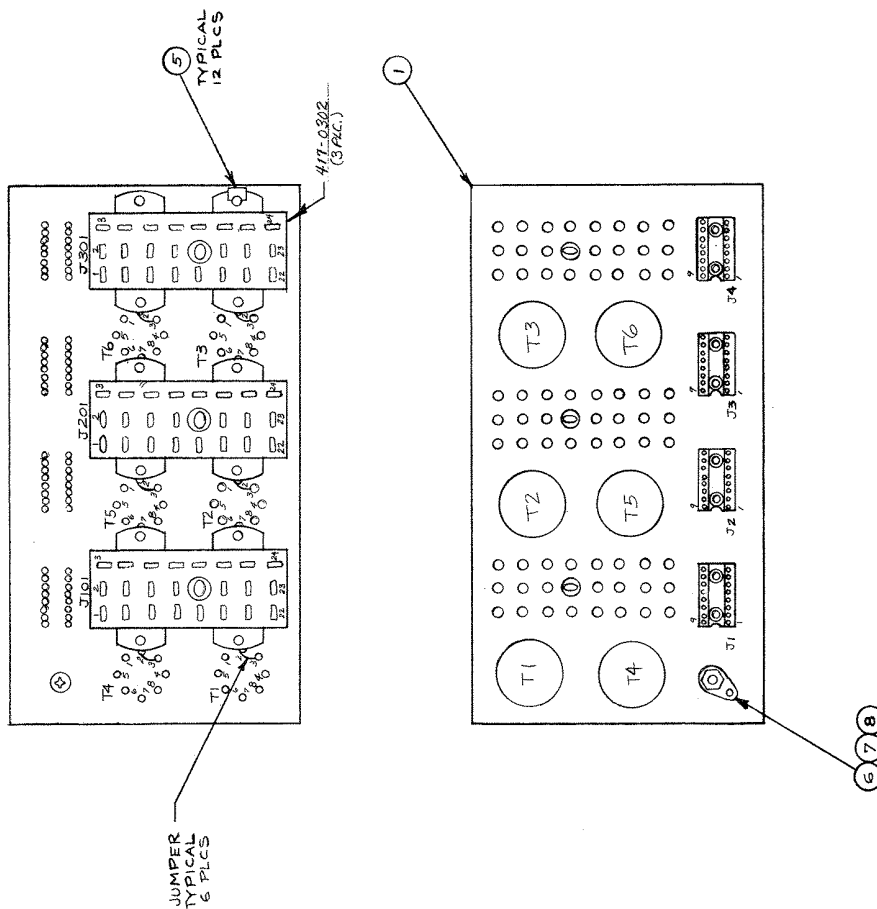
1. 150 Ω OUTPUT JUMPER "A" - 2 PLACES EACH CHANNEL
2. 600 Ω OUTPUT JUMPER "B" - 1 PLACE
3. PCB ASSEMBLY, C914-1801(MONO) AND C914-1
4. TYPICAL OUTPUT TRANSFORMER BASE!

REF ID: A66591 Y 0914-1911

PRODUCTION OF PARTS IS AUTHORIZED BY THE INFORMATION CONTAINED HEREIN. THE INFORMATION CONTAINED HEREIN IS UNCLASSIFIED SINCE THIS INFORMATION IS NECESSARY TO THE NATIONAL DEFENSE AND IS NOT TO BE RELEASED TO THE PUBLIC OR TO OTHER PERSONS WITHOUT THE WRITTEN AUTHORIZATION OF THE SECRETARY OF DEFENSE. IT IS THE POLICY OF THE UNITED STATES GOVERNMENT TO MAKE AVAILABLE TO THE PUBLIC INFORMATION THAT HAS NO OTHER PROTECTIVE VALUE. THIS INFORMATION IS BEING RELEASED TO YOU BY REQUEST OF THE SECRETARY OF DEFENSE.		MATERIAL	
1. STORAGE UNITS 2. SPECIAL INQUIRY 3. REQUEST FOR INFORMATION TO 4. ADDRESS 5. FULL NAME 6. ADDRESS		TREATMENT ON FILE	
DATE <u>11-28-81</u> TIME <u>11:27</u> BY <u>WJL</u> FOR <u>WJL</u> APPROVED <u>WJL</u>		DATE <u>11-28-81</u> TIME <u>11:27</u> BY <u>WJL</u> FOR <u>WJL</u> APPROVED <u>WJL</u>	
BROADCAST ELECTRONICS INC. — A TIMKEN COMPANY —		BROADCAST ELECTRONICS INC. — A TIMKEN COMPANY —	
TITLE SCHEMATIC ARM GUN-5100 CONNECTOR PC 60		PART 9000-5100 1	
5'000 SERIES		SHEET / OF / 1	

A PER ECN # 2666
B PER ECN # 5566

4-20-81 LA
6-23-82



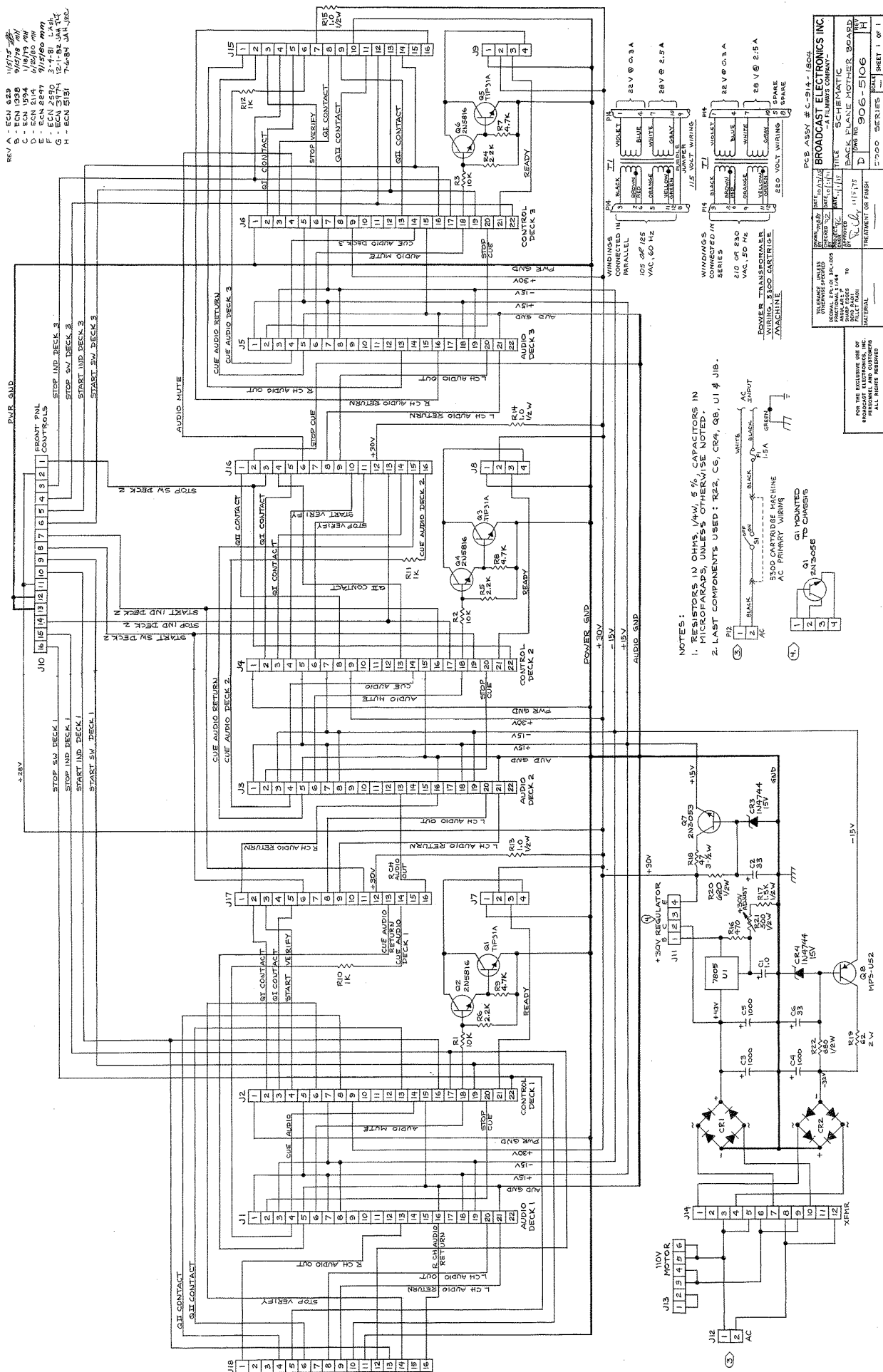
- NOTES:
1. REMOVE JUMPER FROM ITEM 2, TERMINALS 2 TO 3.
 2. WHEN INSTALLING ITEM 2, MAKE SURE XFRM TERMINALS 6 & 7 MATE WITH HOLES THAT ARE JUMPED ON P C BD.
 3. TYPICAL OUTPUT TRANSFORMER BASE.



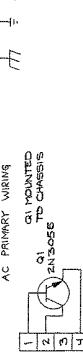
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL/01 3 PL/1005 FRACTIONAL 1/64		DATE 11/21/75		BROADCAST ELECTRONICS INC. - A FILMINTS COMPANY -	
DESIGNED BY		CHECKED BY		TITLE P C BD ASSY	
DRAWN BY		DATE 11/21/75		REAR PANEL CONN BD (STEREO)	
APPROVED BY		DATE 11/21/75		DWG NO 514-1511	
TREATMENT OR FINISH		REV B		5000 SERIES	
MATERIAL		SCALE		SHEET 1 OF 1	

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REV A - ECN 523 1/17/75
 B - ECN 1289 9/17/78
 C - ECN 1304 1/18/79
 D - ECN 2194 1/18/80
 E - ECN 2897 7/15/80
 F - ECN 2890 3-4-81
 G - ECN 2890 3-4-81
 H - ECN 5181 7-6-81



NOTES:
 1. RESISTORS IN OHMS, 1/4W, 5% CAPACITORS IN
 2. MICROFARADS, UNLESS OTHERWISE NOTED.
 3. LAST COMPONENTS USED: R22, C6, CR4, Q8, U1 & J18.



PCB ASSY # C-914-1804	
BROADCAST ELECTRONICS INC.	
A FLAMING COMPANY	
DESIGNED BY	DATE
ENGINEERED BY	DATE
TESTED BY	DATE
ASSEMBLED BY	DATE
INSPECTED BY	DATE
APPROVED BY	DATE
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ALL RIGHTS RESERVED	
TITLE	SCHEMATIC
BACK PLANE MOTHER BOARD	
906-5106	
7000 SERIES	
SHEET 1 OF 1	

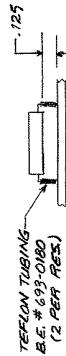
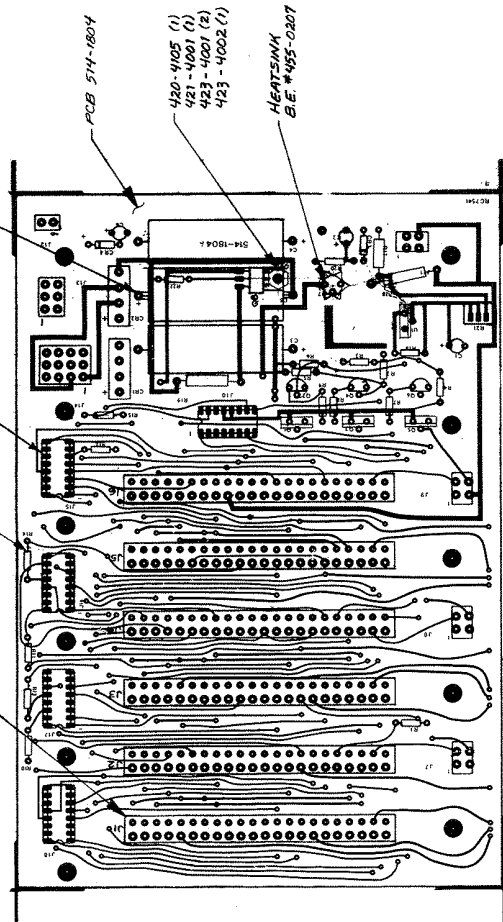
REV.	DESCRIPTION	DATE	APPROVED
C	ECN 905	10-21-77	MH
D	ECN 1024	1-17-78	CLO
E	ECN 1293	8-21-78	CRH
F	ECN 1318	9-17-78	MH
G	ECN 1431	11-21-78	CRH
H	ECN 2114	4-20-80	MH
J	ECN 2132	11-14-82	ORF JLT
K	ECN 3939	3-4-83	JLS
L	PER ECN 4127	4-19-83	MH
M	PER ECN # 4205	4-21-83	JLS
N	PER ECN # 4514	7-6-84	JAN
P	PER ECN # 5131		NRC

417-2300 (6 PLCS.)
J1 THRU J6 ARE
LOCATED ON CIRCUIT
SIDE OF PCB.

SEE DETAIL 'A'

417-1601 (5 PLCS.)

TEFLON TUBING B.E. # 693-0180



DETAIL 'A'

USE #18 GAUGE TEFLON TUBING
ON RESISTORS R13, R14 & R15.

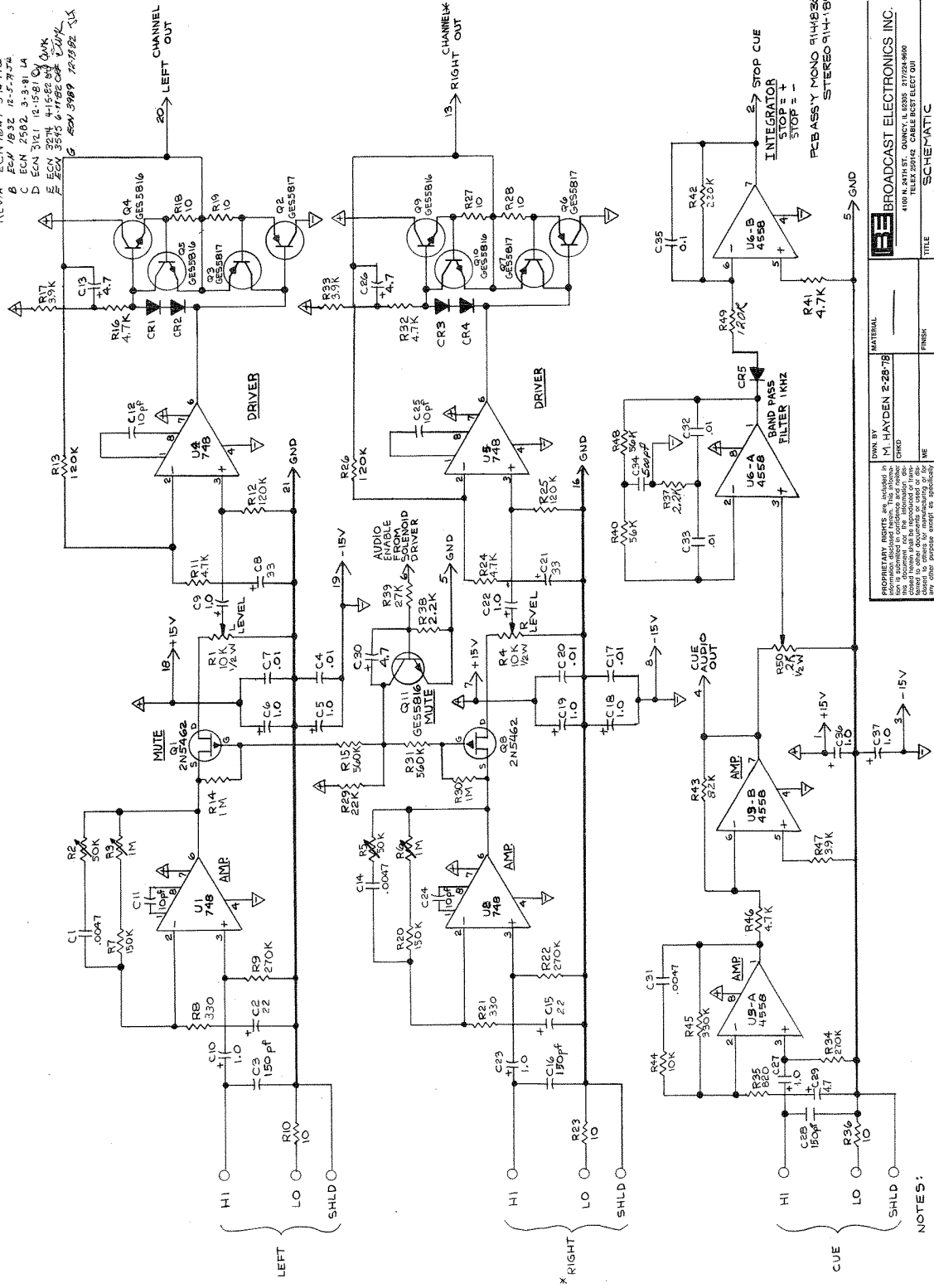
SEE B/M # 914-1804
SEE SCHEMATIC # D-906-5106

BROADCAST ELECTRONICS INC. A FILMWAYS COMPANY	
DATE: 6-24-80	TITLE: MOTHER BOARD BACK PLANE
BY: [Signature]	APPROVED BY: [Signature]
PROJECT: [Blank]	DWG. NO: 914-1804
REVISION: [Blank]	SCALE: SERIES
SHEET 1 OF 1	

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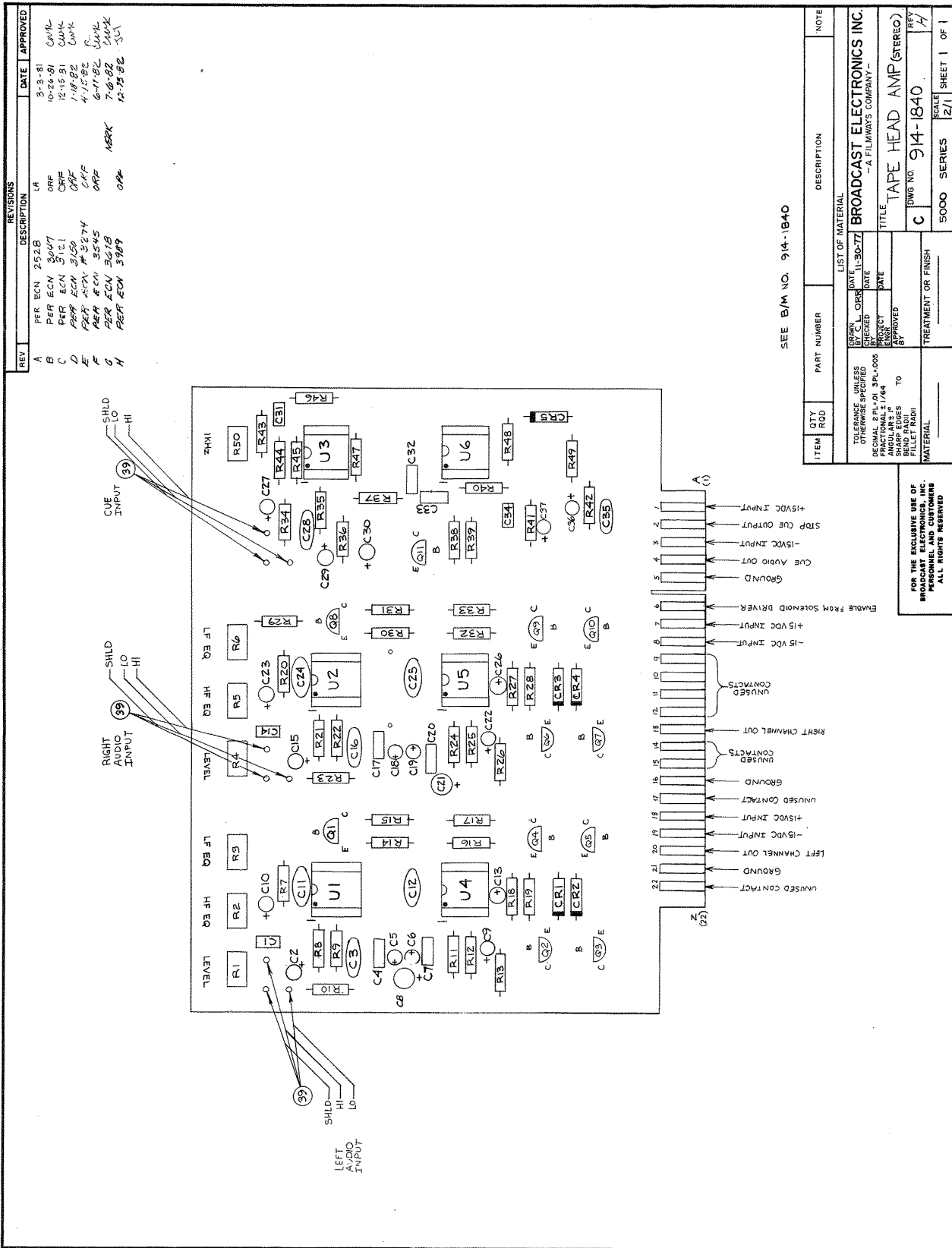
TOLERANCE UNLESS OTHERWISE SPECIFIED:
DIMENSIONS: .125" ± .005
ANGULAR: ± 1°
FILLET RADIUS: .010"

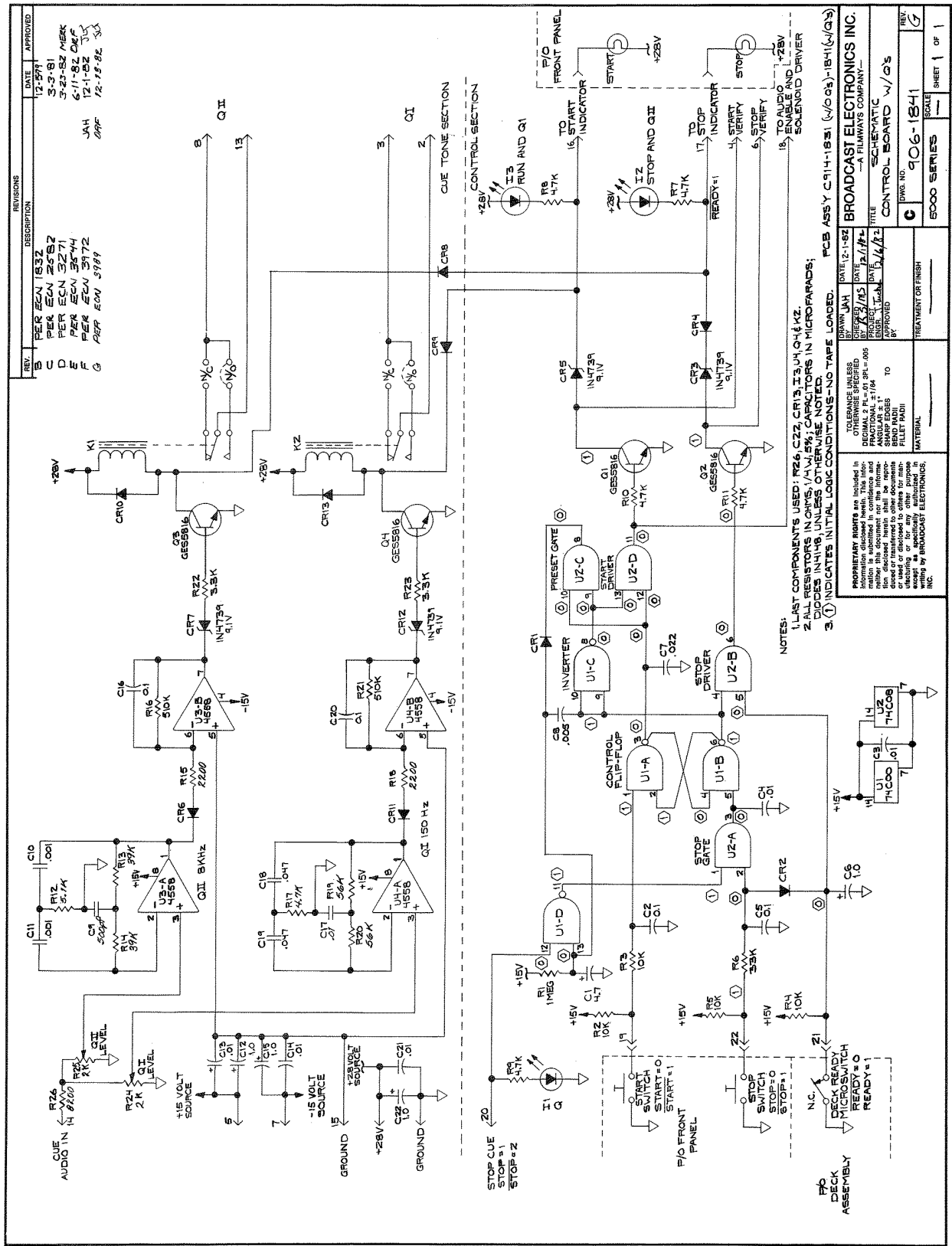
REV/A ECN 1647 3-14-78
 B ECN 1832 12-5-77
 C ECN 2502 3-3-81 LA
 D ECN 3121 12-15-81
 E ECN 3274 4-15-82
 F ECN 3274 4-15-82
 G ECN 3989 12-19-82



BROADCAST ELECTRONICS INC.	
4100 N. 24TH ST. QUINCY, ILL. 62305 317024-8000	
TELEX 28142 CABLE BEST ELECT QUI	
TITLE SCHEMATIC	
STEREO / MONO TAPE HEAD AMP	
TYPE	SC
SIZE	1840
REV	1
DATE	12-19-82
BY	WJS
CHECKED	WJS
APPROVED	WJS
TOLERANCE (DECIMAL UNITS)	
RESISTORS: 1% 5% 10% 20% 50% 100%	
CAPACITORS: 1% 5% 10% 20% 50% 100%	
DIODES: 1% 5% 10% 20% 50% 100%	
TRANSISTORS: 1% 5% 10% 20% 50% 100%	
OTHER: 1% 5% 10% 20% 50% 100%	
MODEL 5000 SERIES	
SCALE 1 OF 1	

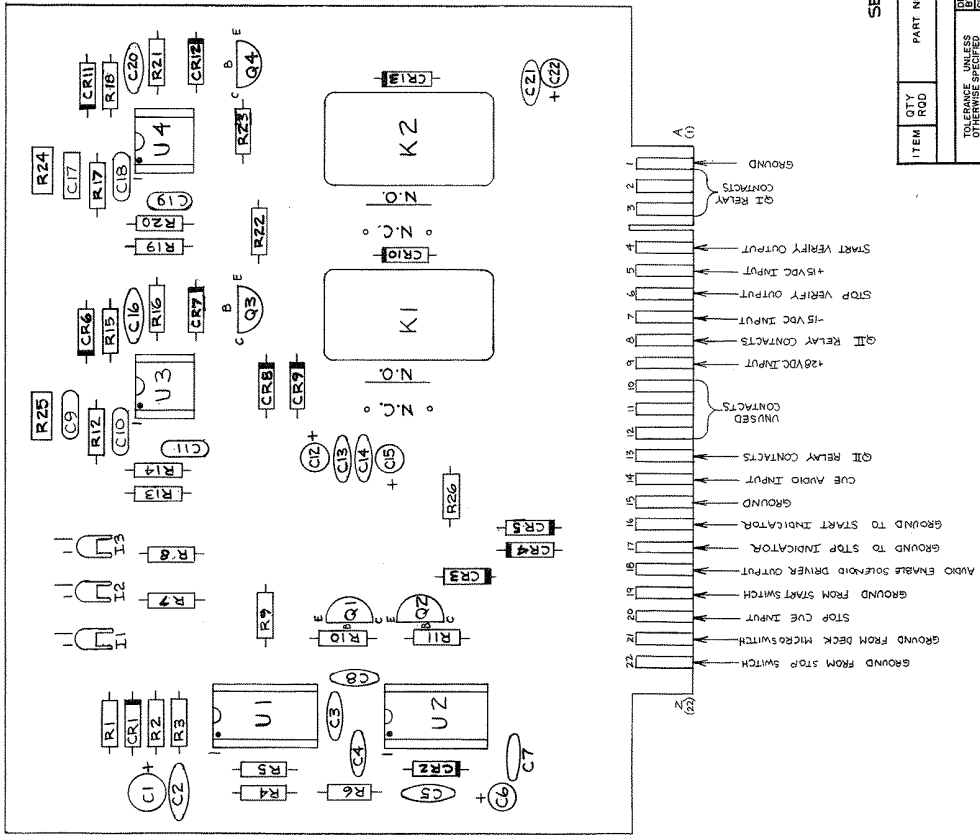
- NOTES:
1. LAST COMPONENTS USED: R50, C37, U6, CR5 & Q11.
 2. * - RIGHT CHANNEL USED ON STEREO UNITS ONLY.
 3. RESISTORS IN OHMS, 1/4W, 5% CAPACITORS IN MICROFARADS, DIODES, 1N4148, UNLESS OTHERWISE NOTED.





REVISIONS		
REV	DESCRIPTION	DATE
A	PER ECN 3553	3-29-82
B	PER ECN 3571	6/11/82
C	SEE ECN 3538	6/11/82
D	ECN 3554	6/11/82
E	PER ECN 3651	7-15-82
F	PER ECN 3889	12-25-82

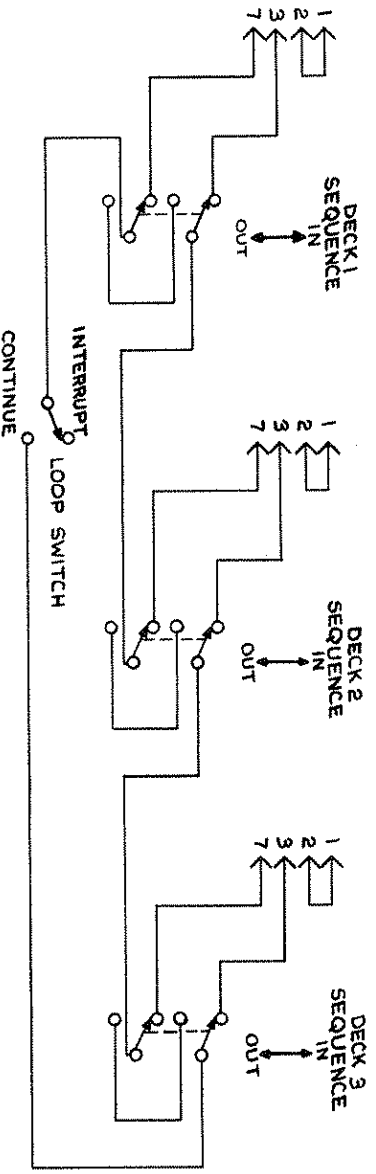
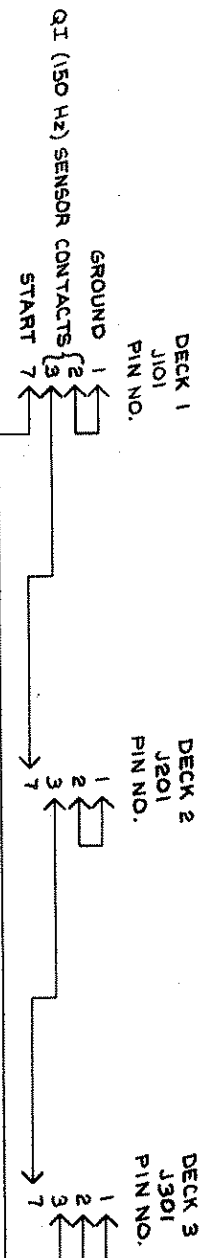
REV	DATE	APPROVED
A	3-29-82	WPK
B	6/11/82	WPK
C	6/11/82	WPK
D	6/11/82	WPK
E	7-15-82	WPK
F	12-25-82	WPK



SEE B/M NO. 914-1841

ITEM	QTY ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TITLE TRANS - UNLESS OTHERWISE SPECIFIED		DRAWN BY C. LORR	DATE 12-12-77	BROADCAST ELECTRONICS INC. - A FLUORINAC COMPANY - TITLE ASSY. - CUE TONE DETECTOR CONTROL PCB OWG NO 914-1841 REV F
DECIMAL 2 PL - 01 3 PL - 005		DESIGNED BY	DATE	
FRACTIONAL 3 1/64		ENGINEER	DATE	
SHARP EDGES		APPROVED		
BEND RADIUS		BY		
Fillet Radii				
MATERIAL		TREATMENT OR FINISH		
		_____		5000 SERIES
				SCALE _____
				SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED



REMOTE
CONNECTOR
J101, J201, J301

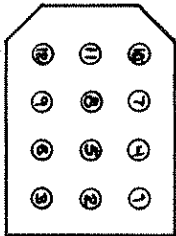
1	2	3
4	5	6
7	8	9
10	11	12
13	14	15
16	17	18
19	20	21
22	23	24

REAR VIEW

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ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED				
DECIMAL 2 PL. ± 0.1 3 PL. ± 0.005				
FRACTIONAL ± 1/64				
ANGULAR ± 1°				
SHARP EDGES				
BEND RADI				
FILLET RADI				
DRAWN BY M. HYDEN DATE 2-23-79				
CHECKED BY DATE				
APPROVED BY DATE				
TREATMENT OR FINISH				
TITLE				
BROADCAST ELECTRONICS INC.				
- A FILMWAYS COMPANY -				
SEQUENCE				
WIRING DIAGRAM				
DWG NO. 906-5315				
REV				
5300 SERIES				
SCALE				
SHEET 1 OF 1				

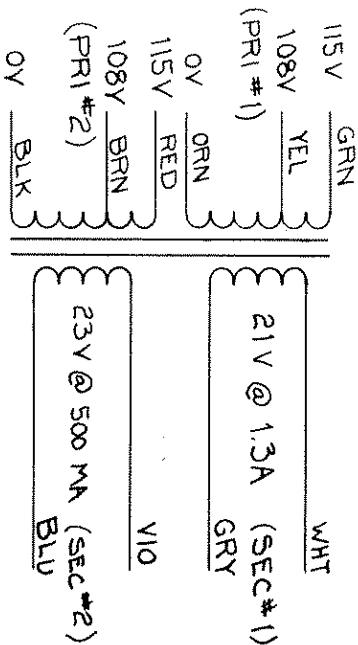
MATING SIDE OF TRANSFORMER PLUG
 SOCKET PART NO. 418-1271
 PINS PART NO. 417-0053



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			ORN	ORN
10	GRY	GRY	GRY	GRY
11	YEL	GRN	YEL	GRN
12	GRN	YEL	GRN	YEL

REVISIONS		
REV	DESCRIPTION	DATE
A	110V WAS 105V; 220V WAS 210V	6/27/75
B	ECN 739 (Dwg # WAS 906-3100)	3/30/76
C	ECN 3024	10/21/81
D	ECN 3898	10/20/82
E	ECN 4089	2/11/83



REF	1	376-7656	3000 SERIES CART. MACH. PWR XMFR
REF	1	376-7660	5000 SERIES CART. MACH. PWR XMFR
ITEM	QTY	PART NUMBER	DESCRIPTION
ITEM	QTY	PART NUMBER	DESCRIPTION

LIST OF MATERIAL

TOLERANCE UNLESS OTHERWISE SPECIFIED
 DECIMAL 2 PL. 01 3 PL. 003
 FRACTIONAL 1/64
 ANGULAR .03 TO
 SHARP EDGES
 BEND RADIUS
 FILLET RADIUS

DATE 2/24/75
 CHECKED BY
 APPROVED BY

BROADCAST ELECTRONICS INC.
 - A FILMWAYS COMPANY -

TITLE
 POWER XMFR WIRING

DWG NO.
 906-3136

SCALE
 1" = 1"

SHEET 1 OF 1

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SECTION VIII

APPENDIX

8-1. INTRODUCTION.

8-2. This appendix lists data applicable to the operation and use of the Broadcast Electronics 5300B Cartridge Machine. The following information is contained in this section:

A. The NAB Tape Cartridge and Its Maintenance.

BROADCAST ELECTRONICS, INC.

The NAB Tape Cartridge and Its Maintenance

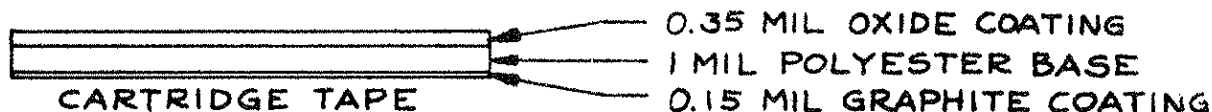
TABLE OF CONTENTS	PAGE NO.
The NAB Tape Cartridge	1
Cartridge Maintenance Tips	7
Cartridge Recording Procedure	10
Cartridges in Stereophonic Systems	11

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.

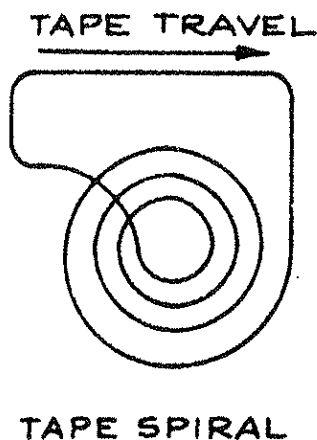
THE TAPE

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.



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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.

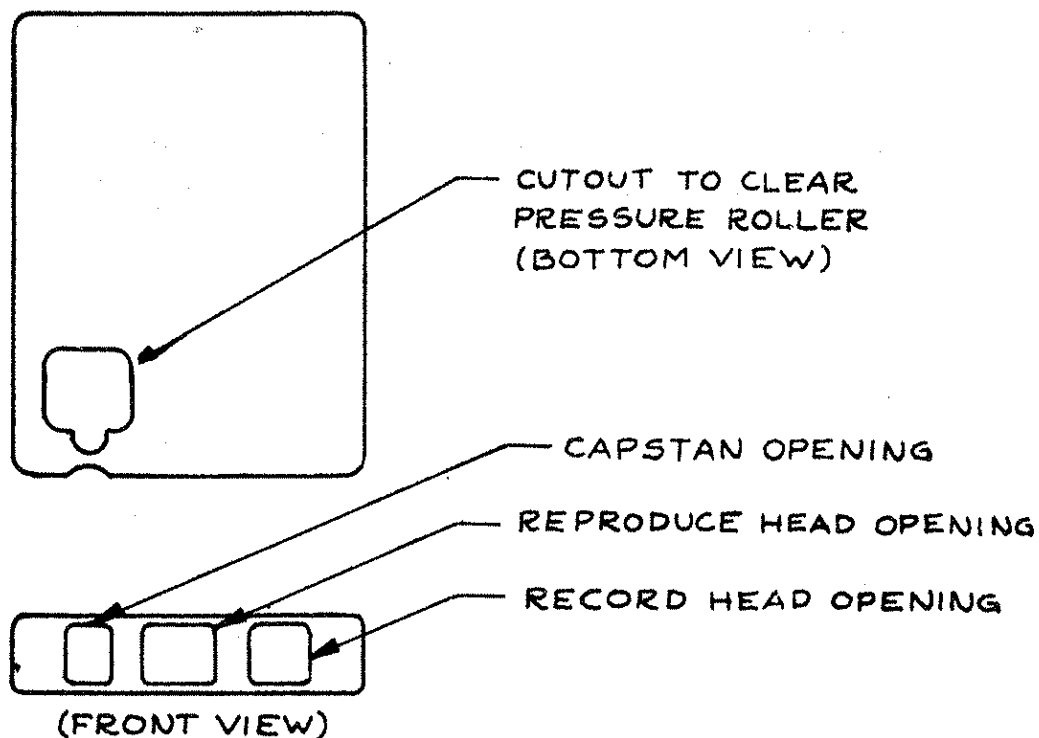


THE SHELL

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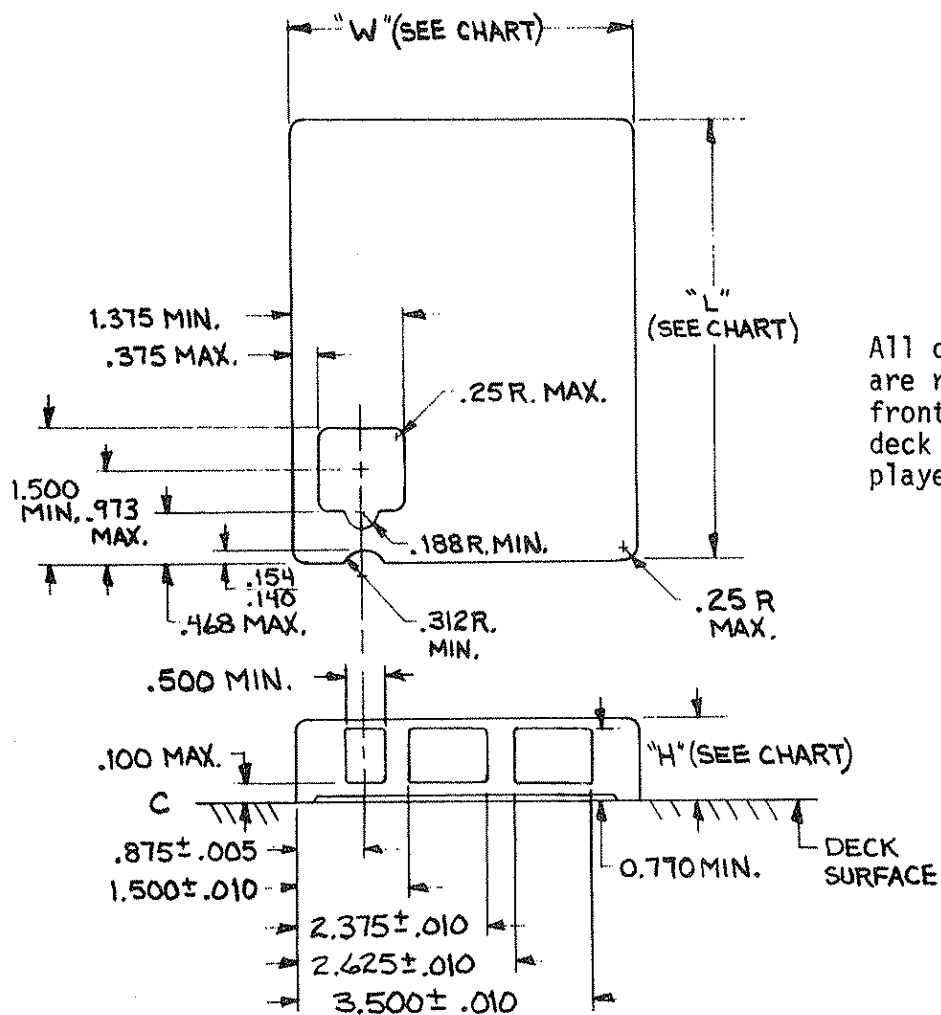
The shell holds the tape and other parts. There are three standard sizes of shells: A (Broadcast Electronics 300 series), B (600 series), and C (1200 series). Assuming 1.5 mil tape, the type A cartridge can be loaded with up to 395 feet of tape, the B with up to 650 feet, and the C with up to 1250 feet.

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.



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



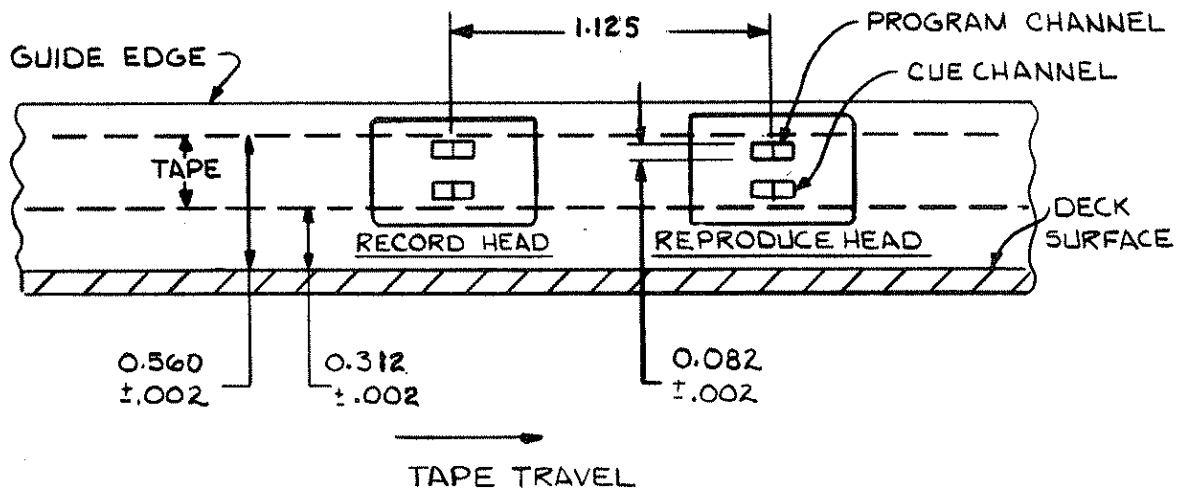
All dimensions are in inches and are referenced from the side and front of the cartridge and the deck surface of the cartridge tape player.

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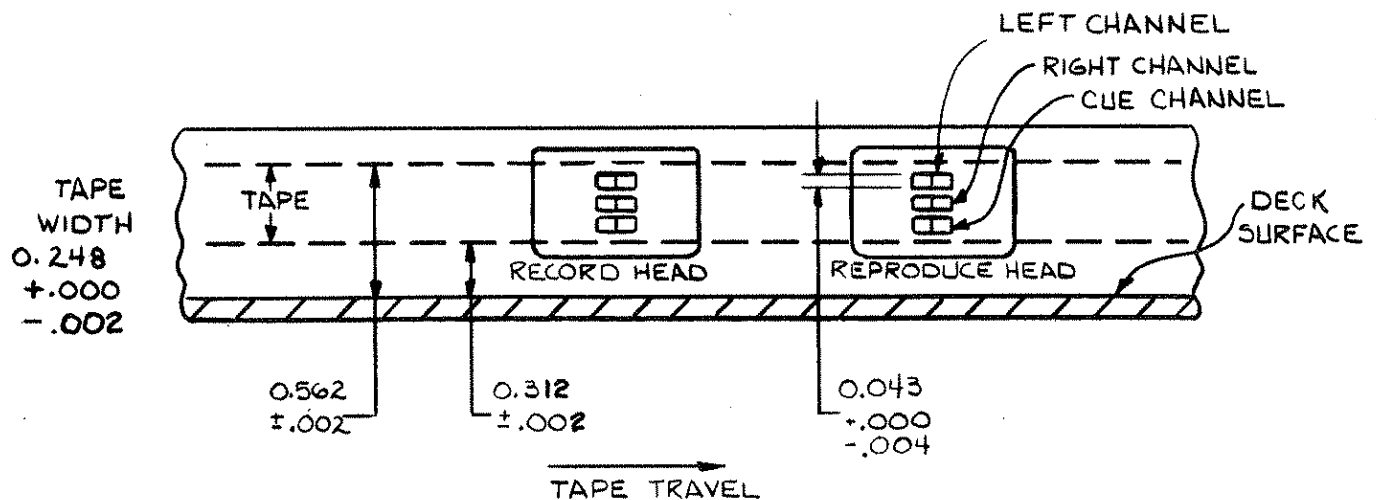
CARTRIDGE NAB TYPE	WIDTH ±0.015625	LENGTH MAXIMUM	HEIGHT MAXIMUM
A,AA	4"	5.25"	0.9375" FOR A 0.895" FOR AA
B,BB	6"	7"	0.9375" FOR B 0.895" FOR BB
C,CC	7.625"	8.5"	0.9375" FOR C 0.895" FOR CC

FIGURE 1. NAB CARTRIDGE DIMENSION STANDARDS

MONOPHONIC STANDARD



STEREOPHONIC STANDARD

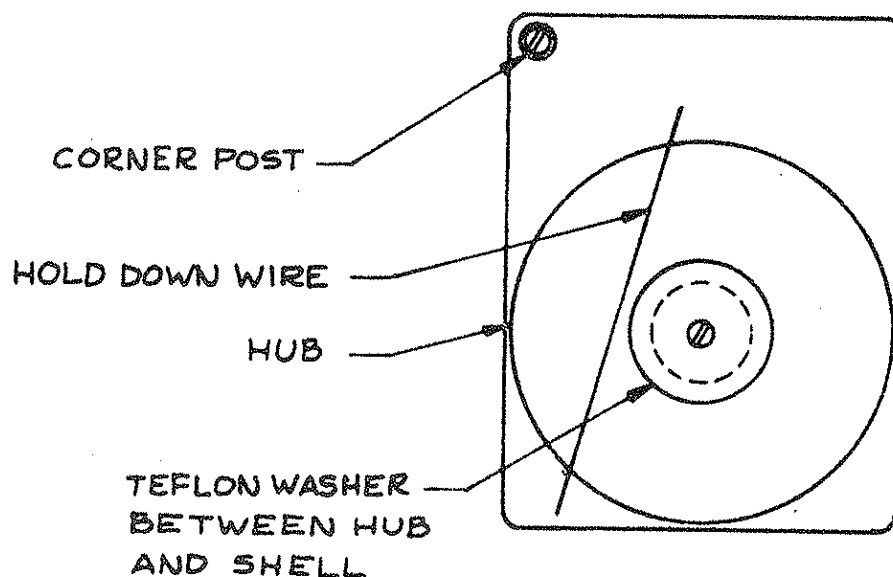


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Figure 2. NAB TAPE HEAD DIMENSION STANDARDS

TAPE HUB, TEFLON WASHER, AND CENTER POST

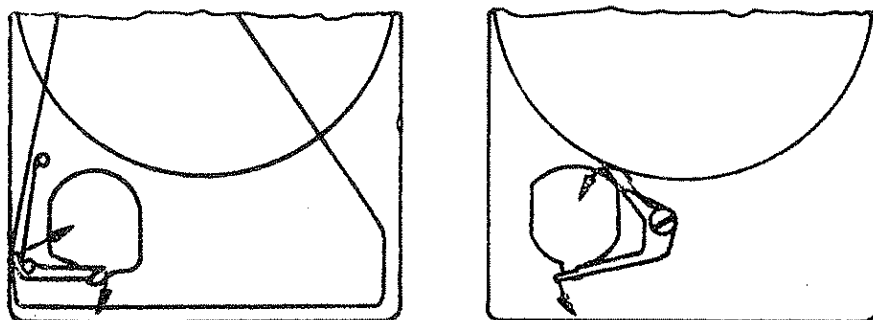
The tape hub stores the tape which is not passing by the cartridge openings. The hub is free to rotate around the center post. To allow free rotation, a teflon washer is used between the hub and the shell. Some means must be provided to keep the tape flat on the hub. A separate cover may fit over the 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.



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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.

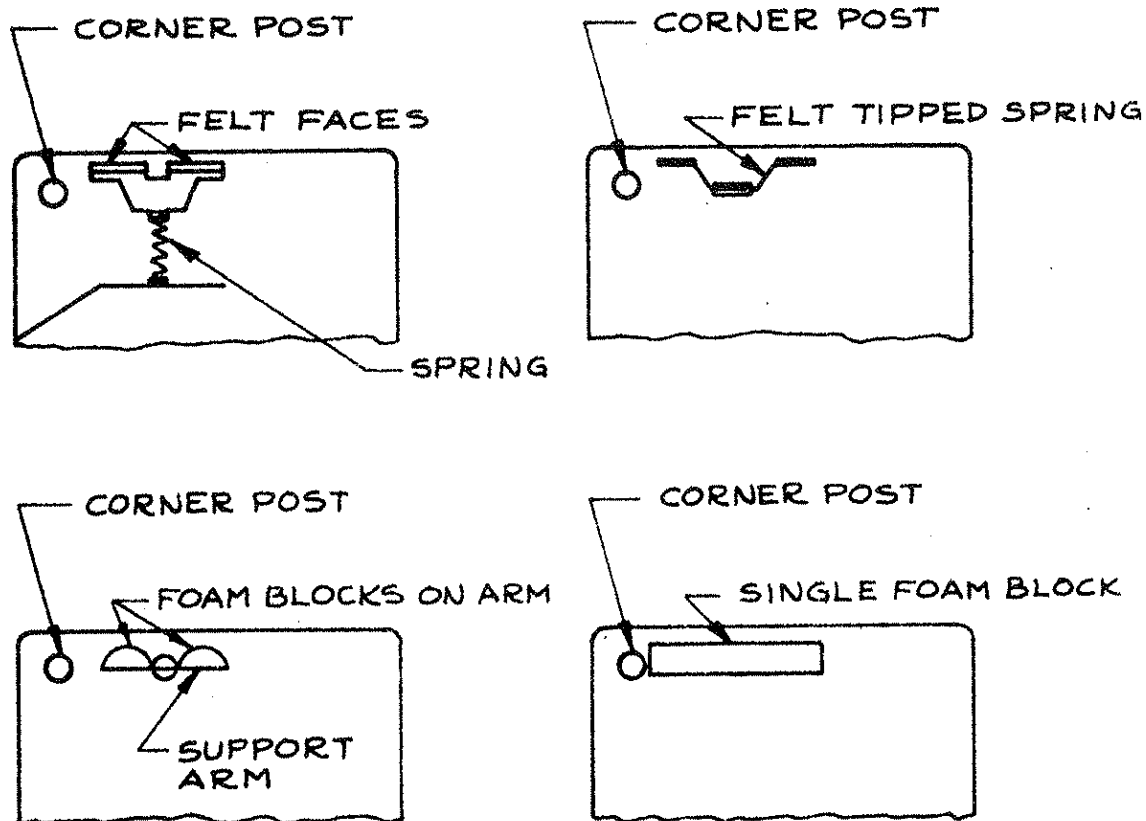


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PRESSURE PADS

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.



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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.

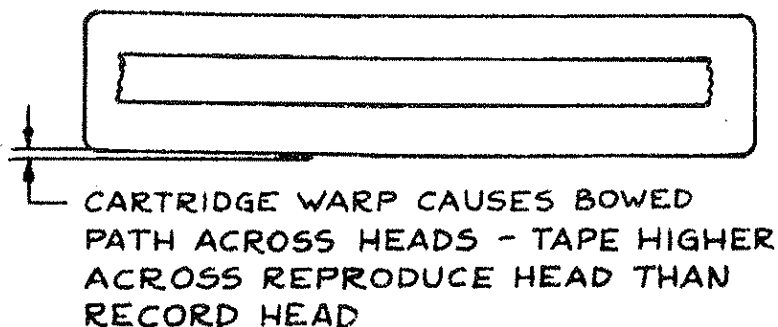
Proper tape tension is most critical. If the tension is too great, the tape will wear rapidly as it is squeezed against the hub, the pressure pads, the corner post, and the tape on the hub. If the tension is too light, the tape will not be pulled back into the hub.

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.

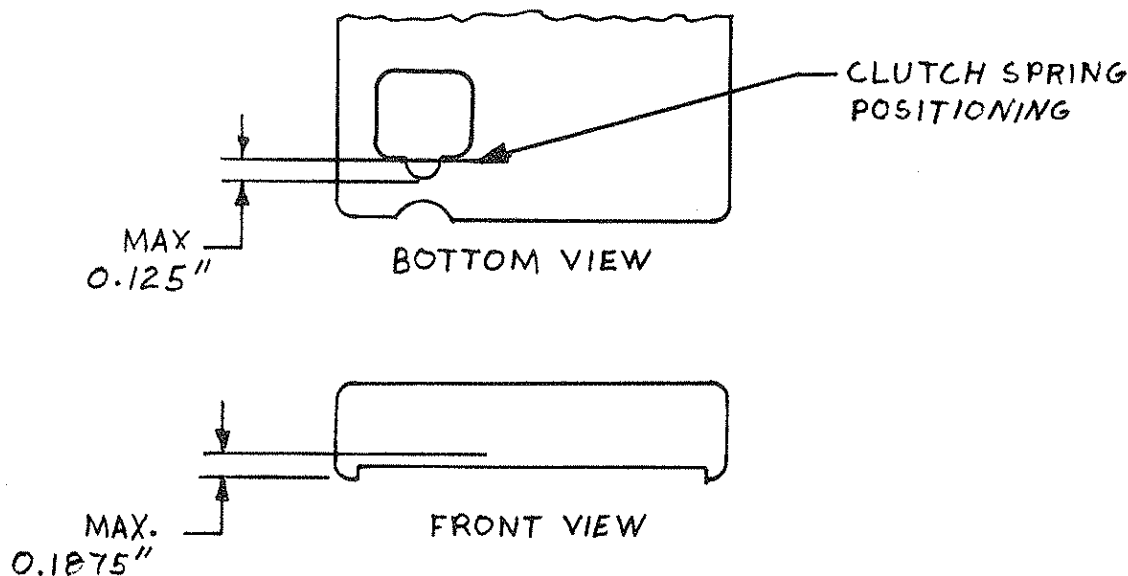
Periodically the cartridge center post should be cleaned. Gummy deposits on the post increase tape tension by not allowing the tape hub to turn freely. Equally important to free movement of the hub is the washer. This washer should always be in place underneath the tape hub, between the hub and the shell.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



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CLUTCH SPRING OR HUB BRAKE

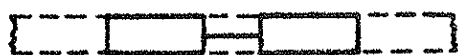
The clutch spring or hub brake should completely release when the pressure roller is in the vertical position. This allows the hub, and the tape, to move freely. An improperly adjusted clutch spring or defective hub brake may prevent the roller from engaging or disengaging. The clutch should be parallel 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.



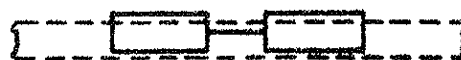
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PRESSURE PADS

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

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PRODUCT WARRANTY

LIMITED ONE YEAR

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

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

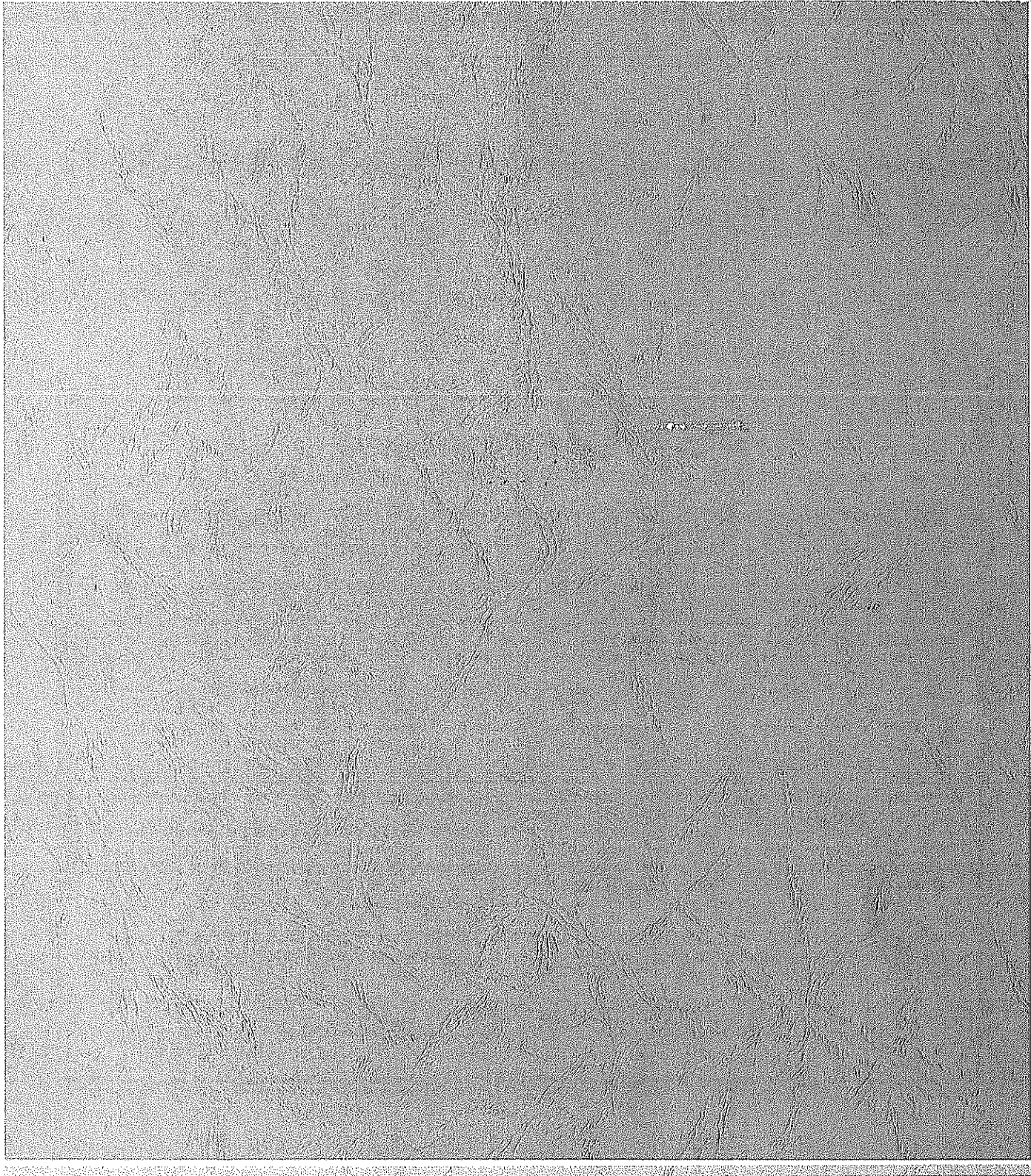
In the event of replacement pursuant to the foregoing warranty, only the unexpired portion of the warranty from the time of the original purchase will remain in effect for any such replacement. However, the warranty period will be extended for the length of time that the original user is without the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

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

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

BROADCAST ELECTRONICS, INC.

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



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