

INSTRUCTION MANUAL

2100C SERIES TAPE CARTRIDGE MACHINES

April, 1992

IM No. 597-2100-001

BROADCAST ELECTRONICS, INC.



IMPORTANT INFORMATION

EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage **WITHIN 15 DAYS** after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

TECHNICAL ASSISTANCE AND REPAIR SERVICE

Technical assistance is available from Broadcast Electronics by letter or prepaid telephone or telegram. Equipment requiring repair or overhaul should be sent by common carrier, prepaid, insured and well protected. Do not mail equipment. We can assume no liability for inbound damage, and necessary repairs become the obligation of the shipper. Prior arrangement is necessary. Contact Customer Service Department for a Return Authorization.

FOR TECHNICAL ASSISTANCE

Phone (217) 224-9600 Customer Service

WARRANTY ADJUSTMENT

Broadcast Electronics, Inc. warranty is included in the Terms and Conditions of Sale. In the event of a warranty claim, replacement or repair parts will be supplied F.O.B. factory. At the discretion of Broadcast Electronics, the customer may be required to return the defective part or equipment to Broadcast Electronics, Inc. F.O.B. Quincy, Illinois. Warranty replacements of defective merchandise will be billed to your account. This billing will be cleared by a credit issued upon return of the defective item.

RETURN, REPAIR AND EXCHANGES

Do not return any merchandise without our written approval and Return Authorization. We will provide special shipping instructions and a code number that will assure proper handling and prompt issuance of credit. Please furnish complete details as to circumstances and reasons when requesting return of merchandise. All returned merchandise must be sent freight prepaid and properly insured by the customer.

REPLACEMENT PARTS

Replacement and Warranty Parts may be ordered from the address below. Be sure to include equipment model and serial number and part description and part number.

Broadcast Electronics, Inc.
4100 N. 24th St., P.O. Box 3606
Quincy, Illinois 62305
Tel: (217) 224-9600
Telex: 25-0142
Cable: BROADCAST
Fax: (217) 224-9607

PROPRIETARY NOTICE

This document contains proprietary data of Broadcast Electronics, Inc. No disclosure, reproduction, or use of any part thereof may be made except by prior written permission.

MODIFICATIONS

Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

TECHNICAL MANUAL

BROADCAST ELECTRONICS

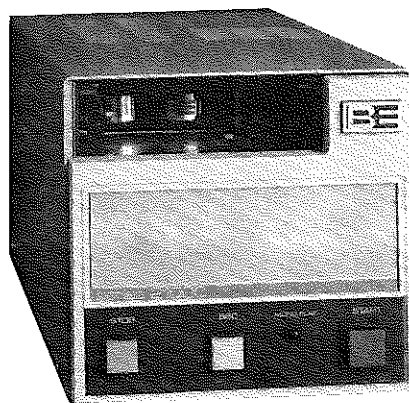
2100C SERIES

TAPE CARTRIDGE MACHINES

597-2100-001

GENERAL INFORMATION	1
INSTALLATION	2
OPERATION	3
THEORY OF OPERATION	4
MAINTENANCE	5
PARTS LISTS	6
DRAWINGS	7

TECHNICAL MANUAL
BROADCAST ELECTRONICS, INC.
2100C SERIES
CARTRIDGE MACHINES



MODEL	PART NUMBER	DESCRIPTION
2100CP	900-2110-001	Single-Deck Playback, Monophonic, Desk Mount. NAB A or AA Size Cartridges, 117V ac 60 Hz Operation.
2100CRP	900-2111-001	Single-Deck Record/Playback, Monophonic, Desk Mount. NAB A or AA Size Cartridges, 117V ac 60 Hz Operation.
2100CPS	900-2112-001	Single-Deck Playback, Stereophonic, Desk Mount. NAB A or AA Size Cartridges, 117V ac 60 Hz Operation.
2100CRPS	900-2113-001	Single-Deck Record/Playback, Stereophonic. NAB A or AA Size Cartridges, 117V ac 60 Hz Operation.
2100CPA	900-2114-001	Single-Deck Playback, Monophonic, with Audition/ Speaker. NAB A or AA Size Cartridges, 117V ac 60 Hz Operation.
—	900-2009	Option, 3.75 IPS Conversion.
—	XXX-XXXX-301	117V/220V 50 Hz Models.

TABLE OF CONTENTS

PARAGRAPH		PAGE NO.
SECTION I	GENERAL INFORMATION	
1-1	Introduction	1-1
1-3	Equipment Description	1-1
1-5	Electrical Description	1-1
1-9	Mechanical Description	1-1
1-12	Options and Accessories	1-1
1-14	Equipment Specifications	1-3
SECTION II	INSTALLATION	
2-1	Introduction	2-1
2-3	Unpacking	2-1
2-6	Installation	2-1
2-7	Placement	2-1
2-9	Interfacing	2-1
2-11	Audio Output Connections	2-1
2-12	Audio Input Connections	2-2
2-13	Remote Control and Indication Connections	2-2
2-14	Playback	2-2
2-20	Record	2-3
2-25	Ground Connection	2-4
2-27	AC Power Connection	2-4
2-30	Electrical Adjustments	2-4
2-31	Audio Output Level Adjustment	2-4
2-32	Operational Equipment Installation	2-4
2-33	General	2-4
SECTION III	OPERATION	
3-1	Introduction	3-1
3-3	Controls and Indicators	3-1
3-5	Operation	3-1
3-6	Playback	3-1
3-12	Monophonic Playback Operation	3-1
3-13	Record Deck Preliminary Set-Up	3-1
3-19	Record Level Adjustment	3-4
3-25	Recording Program Material	3-4
3-31	Secondary Cue Tone Recording	3-4
3-33	Monophonic Encoding	3-4
3-35	Automatic Monophonic Encoding	3-5
3-41	Manual Monophonic Encoding	3-5
SECTION IV	THEORY OF OPERATION	
4-1	Introduction	4-1
4-4	Playback Circuit Board	4-1
4-5	Audio and Metering	4-1
4-9	Stereo Models	4-1
4-11	Cue Track	4-5
4-15	Solenoid Timer	4-5
4-17	Record Circuit Board	4-5
4-18	Audio and Metering	4-5
4-22	Stereo Model RPS	4-5

PARAGRAPH**PAGE NO.****SECTION IV****THEORY OF OPERATION**

4-27	Bias Oscillator, Cue Tone Oscillators, and Cue Tone Logic	4-6
4-29	1 kHz Cue Tone Generator	4-6
4-31	150 Hz Cue Tone Generator	4-6
4-33	Cue Tone Control	4-7
4-35	Bias Oscillator	4-7

SECTION V**MAINTENANCE**

5-1	Introduction	5-1
5-3	Safety Considerations	5-1
5-5	First Level Maintenance	5-1
5-7	General	5-1
5-9	Electrical	5-1
5-11	Mechanical	5-2
5-13	Tape Cartridges	5-2
5-15	Second Level Maintenance	5-2
5-18	Mechanical Adjustments	5-2
5-21	Motor Alignment Procedure	5-3
5-31	Pressure Roller Indentation Adjustment	5-3
5-39	Solenoid Response Adjustment	5-7
5-44	Head Adjustments	5-7
5-115	Electrical Adjustments	5-13
5-118	Playback Adjustments	5-14
5-118	Output Level Adjustment	5-14
5-129	Monophonic Output Level Adjustment	5-16
5-140	Playback Equalization	5-16
5-151	Cue Tone Detection Adjustment	5-17
5-159	VU Meter Calibration	5-17
5-166	Record Adjustments	5-18
5-167	Program Bias Trap	5-18
5-179	Program Bias Level	5-19
5-192	Record Equalization	5-19
5-207	VU Meter Calibration	5-20
5-218	Cue Bias Level	5-21
5-231	Cue Tone Record Level Adjustments	5-22
5-249	Cue Tone Frequency Adjustments	5-23
5-273	Mechanical Parts Replacement Procedures	5-24
5-276	Pressure Roller Replacement Procedure	5-25
5-282	Head Replacement	5-25
5-291	Motor Replacement	5-25
5-301	Troubleshooting	5-26
5-305	Component Replacement	5-29
5-311	Integrated Circuits	5-29

SECTION VI**PARTS LISTS**

6-1	Introduction	6-1
-----	--------------	-----

SECTION VII**DRAWINGS**

7-1	Introduction	7-1
-----	--------------	-----

LIST OF TABLES

TABLE	DESCRIPTION	PAGE NO.
1-1	2100C SERIES CARTRIDGE MACHINE OPTIONS AND ACCESSORIES	1-2
1-2	2100C SERIES CARTRIDGE MACHINE SPECIFICATIONS	1-3
3-1	CONTROLS AND INDICATORS	3-2
5-1	2100C SERIES TROUBLESHOOTING	5-27
6-1	REPLACEABLE PARTS LIST INDEX	6-1

LIST OF ILLUSTRATIONS

FIGURE	DESCRIPTION	PAGE NO.
2-1	SERIES 2100C RECORD/PLAYBACK UNIT REAR-PANEL	2-2
2-2	INPUT/OUTPUT/REMOTE CONNECTIONS	2-3
3-1	2100C CONTROLS AND INDICATORS	3-3
4-1	INTERCONNECTION BLOCK DIAGRAM	4-2
4-2	BLOCK DIAGRAM PLAYBACK CIRCUIT BOARD	4-3
4-3	BLOCK DIAGRAM RECORD CIRCUIT BOARD	4-4
5-1	CARTRIDGE DECK ASSEMBLY	5-4
5-2	MOTOR MOUNTING SCREWS	5-4
5-3	MOTOR ALIGNMENT	5-5
5-4	PRESSURE ROLLER INDENTATION ADJUSTMENT	5-6
5-5	HEAD AND TAPE GUIDE ADJUSTMENTS	5-9
5-6	HEAD ADJUSTMENT CONTROLS	5-10
5-7	HEIGHT CARTRIDGE TAPE TRACKING	5-11
5-8	STEREOPHONIC PHASE RESPONSE LISSAJOUS PATTERNS	5-13
5-9	RECORD AND PLAYBACK AMPLIFIER CIRCUIT BOARD	5-18
	CONTROLS	
5-10	TAPE HEAD CONFIGURATIONS	5-26

SECTION I

GENERAL INFORMATION

1

1-1. INTRODUCTION.

- 1-2. Information presented by this section provides a general description of the Broadcast Electronics 2100C series cartridge machines and lists equipment specifications.

1-3. EQUIPMENT DESCRIPTION.

- 1-4. Broadcast Electronics 2100C series cartridge machines are professional single-deck playback and record/playback units designed for continuous operation. The 2100C series includes monophonic and stereophonic models equipped with primary and secondary cue tone detection circuitry. The 2100C accepts NAB A or AA size cartridges. A wide range of assemblies and accessories provide the flexibility required for any type of installation.

1-5. ELECTRICAL DESCRIPTION.

- 1-6. All 2100C series cartridge machines are designed with a modular plug-in playback logic circuit board. The playback logic circuit board contains the deck control logic, audio amplifier circuitry, and the cue channel detection circuitry. NAB primary (1 kHz) and secondary (150 Hz) cue tone detection is standard on all models. An automatic monophonic/stereophonic switching feature is also incorporated in the circuitry on stereophonic models. A motherboard assembly provides the required internal circuit communication and houses a power supply circuit.

- 1-7. The 2100C record models are equipped with a modular plug-in record circuit board. The record circuit board contains the record control logic, the record audio amplifier circuitry, and the cue tone generator circuitry.

- 1-8. 2100C audition models are equipped with built-in monitor circuitry. The monitor circuitry consists of an amplifier, front-panel speaker, level control, and a headphone receptacle. The circuitry provides monitoring of the on-air broadcast signal.

1-9. MECHANICAL DESCRIPTION.

- 1-10. The cartridge machine deck is equipped with a cartridge guidance system, an air-damped solenoid, and the Broadcast Electronics PHASE LOK V head assembly. The cartridge guidance system is designed with spring-loaded components to channel and lock a cartridge into the proper play position. An air-damped solenoid provides a rapid response to start commands. The PHASE LOK V head assembly provides the tape heads with a secure and stable environment. The head assembly is designed to permit independent adjustment of the head height/zenith, and head azimuth.

- 1-11. The 2100C series cartridge machine also features a direct-drive hysteresis-synchronous motor for precise tape movement. The motor is mounted to the half-inch thick rigid aluminum deck.

1-12. OPTIONS AND ACCESSORIES.

- 1-13. Refer to Table 1-1 for options and accessories available for the 2100C series cartridge machines.

TABLE 1-1. 2100C SERIES CARTRIDGE MACHINE OPTIONS AND ACCESSORIES
(Sheet 1 of 2)

OPTIONS AND ACCESSORIES	PART NUMBER
REMOTE CONTROL UNIT MODEL RC2100C REMOTE CONTROL UNIT FOR 2100C CARTRIDGE MACHINES. Description: Model RC2100C remote control unit provides remote mode functions and indications for a single 2100C cartridge machine.	907-2115-001
AUDIO SWITCHER MODEL SW5F SWITCHER FOR 2100C SERIES CARTRIDGE MACHINES. Description: The SW5F switcher provides a single audio output from five 2100C cartridge machines. Up to three switchers can be connected in parallel to provide a single output from up to 15 units.	904-5001
TELEPHONE ANSWERING EQUIPMENT MODEL PC-1 TELEPHONE INTERFACE. Description: The PC-1 telephone interface provides cartridge machine/telephone network communication. The unit answers incoming telephone calls and enables a cartridge machine for the purpose of transmitting a pre-recorded message.	900-0010
RACK MOUNTING ACCESSORIES RACK SHELF FILLER PANEL, 1/3 RACK. RACK SHELF FILLER PANEL, 2/3 RACK. RACK MOUNT SHELF FOR EIA 19 INCH RACK. TOP COVER FOR ABOVE SHELF.	900-2014 900-2016 900-2013 900-2010
TEST EQUIPMENT EXTENDER CIRCUIT BOARD FOR 2100C SERIES CARTRIDGE MACHINE. SPARE PARTS KIT FOR 2100C CARTRIDGE MACHINES. TAPE HEAD AND TAPE GUIDE ALIGNMENT GAUGE KIT. MOTOR ALIGNMENT GAUGE KIT. PRESSURE ROLLER INDENTATION GAUGE. CARTRIDGE MACHINE TEST TAPES: NAB Monophonic/Stereophonic Reproduce Alignment Test Tape. Tape Alignment Cue-Away Test Cartridge NAB Cue Tone Calibration Cartridge	910-2100 970-0091 970-0102 970-0103 300-0013 808-0004 710-0132 800-1095

TABLE 1-1. 2100C SERIES CARTRIDGE MACHINE OPTIONS AND ACCESSORIES
(Sheet 2 of 2)

OPTIONS AND ACCESSORIES	PART NUMBER
SPLICE FINDER/ERASERS SPLICE-TRAK 90 Description: The ST-90 provided high speed tape splice detection and tape erasing for A or AA size cartridges.	900-9120-000

1

1-14. **EQUIPMENT SPECIFICATIONS.**

1-15. Refer to Table 1-2 for the electrical, mechanical, physical, and environmental specifications of the Broadcast Electronics 2100C series cartridge machines.

TABLE 1-2. 2100C SERIES CARTRIDGE MACHINE SPECIFICATIONS
(Sheet 1 of 2)

PARAMETER	SPECIFICATIONS
ELECTRICAL	
MOTOR	Hysteresis-synchronous.
TAPE SPEED	
Standard	7.5 Inches/Second.
Optional	3.75 Inches/Second.
WOW AND FLUTTER, PLAYBACK OR RECORD	0.15% Maximum DIN. Referenced at 7.5 Inches/Second.
AUDIO OUTPUT IMPEDANCE	600/150 Ohms Selectable, Balanced.
AUDIO OUTPUT LEVEL	-20 dBm to +10 dBm. Continuously Variable. +20 dBm Clip Level.
AUDIO INPUT IMPEDANCE	75 k Ohm, Bridged, Balanced.
AUDIO INPUT LEVEL	-20 dBm to +20 dBm.
DISTORTION, PLAYBACK OR RECORD	2.0% or Less. Reference: 1 kHz at 250 nWb/m.
NOISE (See Note)	
Hum and Noise	
Monophonic	-54 dB. Reference: 1kHz at 250 nWb/m.
Stereophonic	-52 dB. Reference: 1kHz at 250 nWb/m.
Squelch Noise	-70 dB. Reference: 1kHz at 250 nWb/m.

TABLE 1-2. 2100C SERIES CARTRIDGE MACHINE SPECIFICATIONS
(Sheet 2 of 2)

PARAMETER	SPECIFICATIONS
CROSSTALK	-50 dB or greater, Program Channel-to-Program Channel or Program Channel-to-Cue Channel at 1kHz.
FREQUENCY RESPONSE (See Note)	+2 dB, 50 Hz to 15 kHz.
EQUALIZATION	
Standard	1975 NAB Standard.
Optional	I.E.C., CCIR.
POWER REQUIREMENTS	
Standard	105V ac to 125V ac, 60 Hz.
Optional	210V ac to 240V ac, 50 Hz.
CUE TONES	1kHz (Primary) and 150 Hz (Secondary) on all models.
MECHANICAL	
NUMBER OF DECKS	One
CARTRIDGE DECK SIZE	A or AA Size Cartridges.
TRANSPORT TYPE	Direct Drive Capstan.
PHYSICAL	
WEIGHT (Packed)	28 Pounds (12.7 kg).
MOUNTING	
Standard	Desk-Top.
Optional	Rack Mount. 19 Inch (48.3 cm) EIA rack.
DIMENSIONS	
Height	5.25 Inches (13.5 cm).
Width	5.875 Inches (14.9 cm).
Depth	15.5 Inches (39.4 cm).
ENVIRONMENTAL	
AMBIENT OPERATING TEMPERATURE	32°F to 122°F (0°C to 50°C).
HUMIDITY	95% Maximum. Non-Condensing.
NOTE: Specifications measured using 1975 NAB Standard Equalization.	

SECTION II INSTALLATION

2-1. INTRODUCTION.

- 2-2. This section contains the information required for the installation of the Broadcast Electronics 2100C series cartridge machines.

2-3. UNPACKING.

- 2-4. The equipment becomes the property of the customer when the equipment is delivered to the carrier. Carefully unpack the cartridge machine. Perform a visual inspection to determine that no apparent damage has been incurred during shipment. All shipping materials should be retained until it is determined that the unit has not been damaged. Claims for damaged equipment must be promptly filed with the carrier or the carrier may not accept the claim.

- 2-5. The contents of the shipment should be as indicated on the packing lists. If the contents are incomplete, or if the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics, Inc.

2-6. INSTALLATION.

2-7. PLACEMENT.

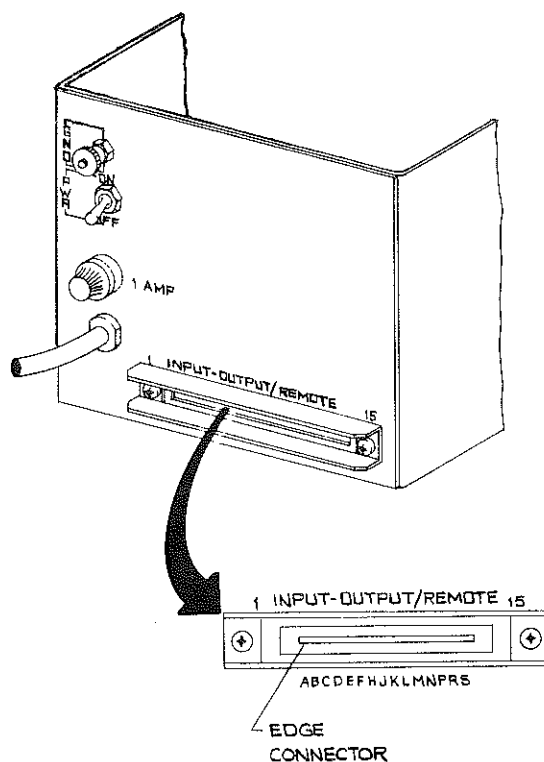
- 2-8. The 2100C series cartridge machines are designed for desk-top placement. Units designed for rack mounting are available by optional assembly. To provide adequate structural support, it is recommended the rack mounted unit be installed in a 2100C rack shelf (refer to 597-2100-51 in SECTION VII, DRAWINGS). Observe the following requirements and place the unit in any convenient location.

- A. Place the cartridge machine within reach of signal and power cables.
- B. Do not place the cartridge machine near heat generating equipment.
- C. To minimize noise, do not place the cartridge machine near equipment generating excessive 50 Hz or 60 Hz radiation.
- D. For rack mounted cartridge machines, allow one inch of rack space above and below the unit for heat dissipation.

2-9. INTERFACING.

- 2-10. All 2100C series cartridge machines are designed with a 30-pin rear-panel connector (refer to Figure 2-1). The connector is designed to interface the cartridge deck input, output, and remote signals to external equipment. An input/output remote mating connector is supplied with the unit for interface cable construction (located in the accessory parts kit).

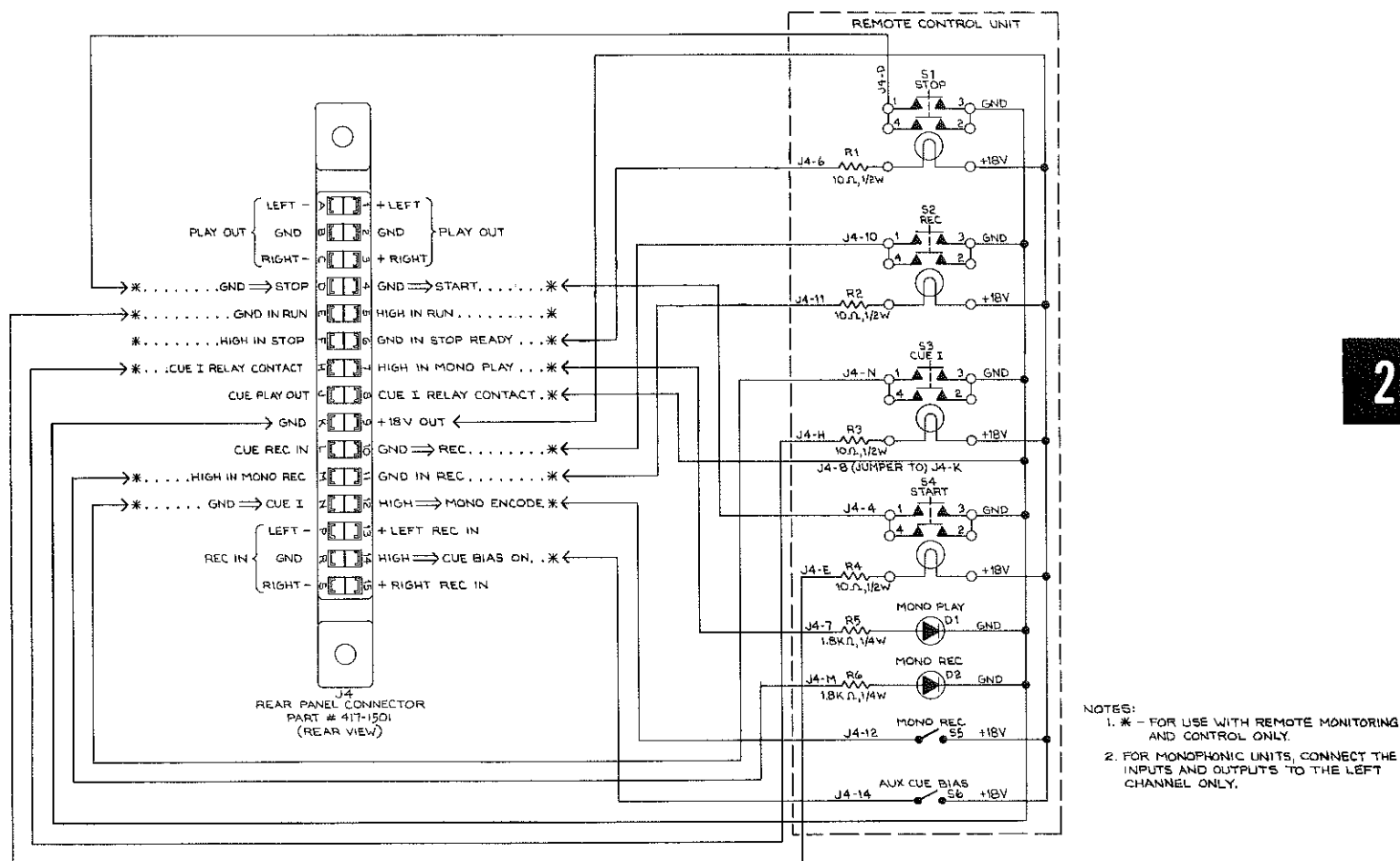
- 2-11. **AUDIO OUTPUT CONNECTIONS.** The series 2100C cartridge machines are shipped from the factory for a 600 Ohm balanced output. For monophonic operation, connect the left channel program line to J4 terminals 1 and A (refer to Figure 2-2). Connect the shield to J4 pin 2. For stereophonic operation, connect the right channel program line to J4 terminals 3 and C. Connect the shield to J4 pin 2.



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-2100-2

FIGURE 2-1. SERIES 2100C RECORD/PLAYBACK UNIT REAR-PANEL

- 2-12. **AUDIO INPUT CONNECTIONS.** Connector J4 is designed to interface the cartridge deck record audio input to external equipment. Signals ranging from -18 to +20 dBm can be applied to the balanced 50 k Ohm bridging input. For monophonic operation, connect the left channel input signal to J4 pins 13 and P (refer to Figure 2-2). Connect the shield to J4 pin R. For stereophonic operation, connect the right channel input to J4 pins 15 and S. Connect the shield to J4 pin R.
- 2-13. **REMOTE CONTROL AND INDICATION CONNECTIONS.**
- 2-14. **PLAYBACK.** The 2100C series playback cartridge deck is equipped with remote start and stop, cue tone, and monophonic playback indicator circuitry. Refer to Figure 2-2 as required to connect the remote control and indicators to the cartridge machine deck.
- 2-15. **Start and Stop Switches.** A SPST normally open momentary contact switch is required for both remote start and stop. For remote start, connect a switch between J4 pins 4 and K. For remote stop, connect a switch between J4 pins D and K.
- 2-16. **Start/Play and Stop/Ready Indicators.** For start/play indications, connect a terminal of a lamp to J4 pin 9. Connect the second terminal of the lamp through a 10 Ohm resistor to J4 pin E. For stop/ready indications, connect a terminal of a lamp to J4 pin 9. Connect the second terminal of the lamp through a 10 Ohm resistor to J4 pin 6.
- 2-17. **Secondary Cue Tone Indication.** For secondary cue tone indications, connect a terminal of a lamp to J4 pin 9. Connect the second terminal of the lamp through a 10 Ohm resistor to J4 pin H.
- 2-18. **Monophonic Play Indication.** For monophonic play indications, connect one terminal of an indicator to J4 pin K. Connect the remaining terminal through a 1.8 k Ohm resistor to J4 pin 7.



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC.
597-2100-102

FIGURE 2-2. INPUT/OUTPUT/REMOTE CONNECTIONS

- 2-19. **Cue Out.** The cue out signal is available at J4 and pin K (ground) for data logging applications. Output is 1.0 volt into a 10 k Ohm load resistance.
- 2-20. **RECORD.** The remote circuitry also provides interfacing for record operation and indication parameters. Refer to Figure 2-2 and the following information to connect record operation and indication parameters to the remote circuitry as required.
- 2-21. **Record Switch and Indicator.** Connect a SPST normally open switch between J4 pins K and 10 for remote record operations. For remote record indications, connect one terminal of an indicator to J4 pin 9. Connect the remaining terminal of the indicator through a 10 Ohm resistor to J4 pin 11.
- 2-22. **Secondary Cue Record Switch.** Secondary (150 Hz) remote record cue requires a SPST momentary switch. Connect the switch between J4 pins N and K to provide remote secondary cue record operation.
- 2-23. **External Cue Record.** The remote record circuitry is designed with an external cue tone record feature. To record external cue tones, connect a SPST normally open external cue record switch to J4 pins 9 and 14. Connect the external cue tone signal to J4 pins K and L.

- 2-24. **Monophonic Record Switch and Indicator.** Connect a SPST switch between J4 pins 12 and 9 for remote monophonic record operations. For monophonic record indications, connect one terminal of an indicator to J4 pin K. Connect the remaining terminal through a 1.8 k Ohm resistor to J4 pin M.
- 2-25. **GROUND CONNECTION.**
- 2-26. The most important consideration in assuring low noise performance from the cartridge machine is the grounding and shielding of the various audio interconnections. First, connect the cartridge machine rear-panel GND terminal to a central earth ground using a braided or solid copper conductor. Second, the shields from audio conductors must be grounded to prevent the coupling of extraneous noise. Generally, the shields are grounded at the studio audio console. However, the shields may require grounding at the cartridge machine or at a point between the cartridge machine and the studio audio console. Particular care must be exercised to avoid ground loops at patch panels, external switching equipment, uninsulated jacks on associated equipment, and grounded racks or cabinets.
- 2-27. **AC POWER CONNECTION.**



WARNING ***ENSURE ALL PRIMARY POWER IS DISCONNECTED
BEFORE PROCEEDING.***

WARNING

- 2-28. The 2100C series cartridge machines are programmed for the proper power supply voltage when shipped from the factory. The operating voltage requirement for the unit is indicated on the cartridge machine identification plate which is located on the cartridge machine rear-panel.
- 2-29. Remove the fuse from the rear-panel fuse-holder. Ensure the fuse and the spare fuse are slow-blow types rated at 1.0A for 105V to 125V operation or 0.50A for 210V to 240V operation.
- 2-30. **ELECTRICAL ADJUSTMENTS.**
- 2-31. **AUDIO OUTPUT LEVEL ADJUSTMENT.** The audio output level is factory adjusted to 0 dBm. If an alternate output level is required, refer to the ELECTRICAL ADJUSTMENTS procedures in SECTION V, MAINTENANCE and perform the OUTPUT LEVEL ADJUSTMENT.
- 2-32. **OPERATIONAL EQUIPMENT INSTALLATION.**
- 2-33. **GENERAL.** The following list presents related publications which provide data required for the installation of options and accessories associated with the 2100C cartridge machines.

OPTIONS OR ACCESSORY	PUBLICATION NUMBER
Model SW5F Audio Switcher	597-5350
Model PC-1 Telephone Interface	597-0047
Model RC2100C Remote Control Unit	597-2101

SECTION III OPERATION

3-1. INTRODUCTION.

- 3-2. This section identifies all controls and indicators associated with the 2100C series cartridge machines and provides standard operating procedures.

3-3. CONTROLS AND INDICATORS.

- 3-4. Refer to Figure 3-1 for the location of controls and indicators associated with the unit. The function of each control or indicator is described in Table 3-1.

3-5. OPERATION.



NOTE

THE FOLLOWING PROCEDURE ASSUMES THAT THE CARTRIDGE MACHINE IS COMPLETELY INSTALLED AND IS FREE OF ANY DISCREPANCIES.

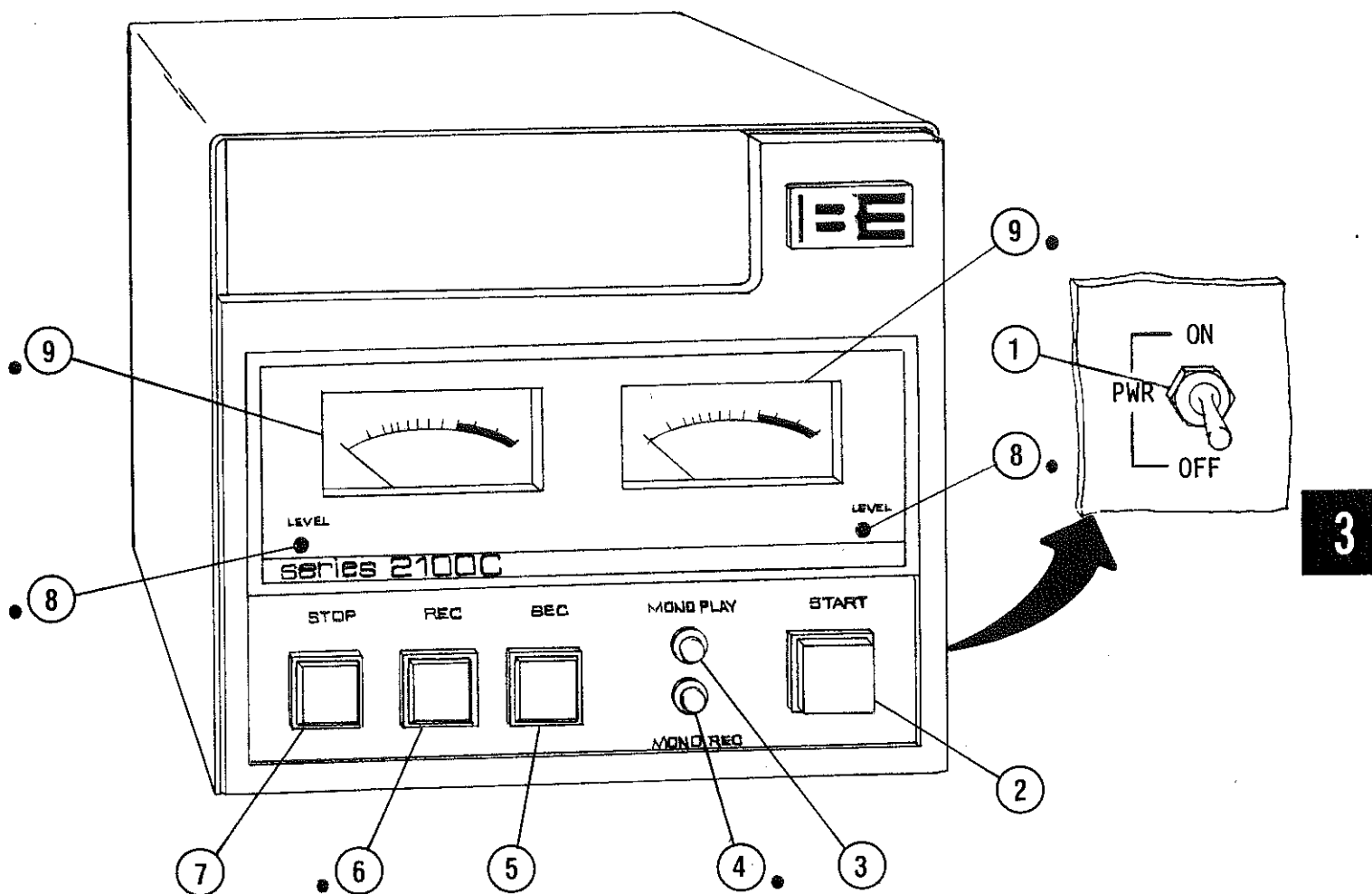
NOTE

3-6. PLAYBACK.

- 3-7. Operate the **ON/OFF PWR** switch to **ON**.
- 3-8. Insert an NAB A or AA size tape cartridge into the deck. The deck **STOP** switch/indicator will illuminate.
- 3-9. Depress the deck **START** switch/indicator to begin cartridge play operation. The **START** switch/indicator will illuminate and the deck **STOP** switch/indicator will extinguish.
- 3-10. The deck will operate until a primary (1 kHz) stop tone is detected or the deck **STOP** switch/indicator is depressed. When deck operation is terminated, the **START** switch/indicator will extinguish. The deck **STOP** switch/indicator will illuminate. If the cartridge is removed, the **STOP** switch/indicator will extinguish.
- 3-11. The 2100C cartridge machine is equipped with secondary (150 Hz) cue tone detection circuitry. The deck **SEC** switch/indicator will illuminate to indicate the detection of a secondary (150 Hz) cue tone.
- 3-12. **MONOPHONIC PLAYBACK OPERATION.** If 1 kHz and 150 Hz cue tones are simultaneously detected within the first three seconds of tape operation (stereophonic models only), the **MONO PLAY** indicator will illuminate to indicate detection of a monophonic encoded tape cartridge. When this occurs, the left channel audio signal is routed to the left and the right playback amplifier circuits.
- 3-13. **RECORD DECK PRELIMINARY SET-UP.**
- 3-14. Select the program material to be recorded. Ensure the playback system output level is within the input level specifications.
- 3-15. Operate the cartridge machine **ON/OFF** power switch to **ON**.
- 3-16. Select a bulk erased cartridge that is approximately 2 seconds longer than the selected material to be recorded.

TABLE 3-1. CONTROLS AND INDICATORS

INDEX NO.	NOMENCLATURE	FUNCTION
1	ON/OFF Switch	Controls the application of ac power to the unit. (Located on the rear-panel.)
2	START Switch/ Indicator	<p>SWITCH: Initiates tape movement for play back and record operations.</p> <p>INDICATOR: Illuminates to indicate deck operation.</p>
3	MONO PLAY Indicator	Illuminates to indicate the unit is in the monophonic playback mode (stereophonic cartridge machines only).
4	MONO REC Indicator	Illuminates to indicate the unit is in the monophonic encode record mode.
5	SEC Switch/ Indicator	<p>SWITCH: When depressed, records a 150 Hz secondary cue tone on the cue track. The secondary cue tone may be recorded when the unit is operating in the record or playback mode.</p> <p>INDICATOR: Illuminates to indicate 150 Hz cue tone detection.</p>
6	RECORD Switch/ Indicator	<p>SWITCH: Operates the unit to the record mode. Operates VU meter(s) from playback output to record input.</p> <p>INDICATOR: Illuminates to indicate the unit is in the record mode.</p>
7	STOP Switch/ Indicator	<p>SWITCH: Terminates tape movement and operates the unit to the ready mode.</p> <p>INDICATOR: Illuminates to indicate the unit is in the ready mode (a cartridge fully inserted and power ON).</p>
8	LEVEL Control	Adjusts record level.
9	VU Meter	Provides level indication of the record signal (record mode) and playback audio (playback mode).



● RECORD MODELS ONLY

COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-2100-3

FIGURE 3-1. 2100C CONTROLS AND INDICATORS

- 3-17. Insert the cartridge into the deck. The **STOP** switch/indicator will illuminate.
- 3-18. Depress the **START** switch/indicator and play the tape for several seconds to align the tape in the guides and to locate the tape splice. Stop the deck just beyond the tape splice to avoid recording on the splice.

3-19. **RECORD LEVEL ADJUSTMENT.**



NOTE

THE DECK WILL NOT OPERATE TO THE RECORD MODE UNLESS A CARTRIDGE IS INSERTED IN THE DECK.

NOTE



NOTE

ALL RECORD/PLAYBACK MODELS ARE SHIPPED FROM THE FACTORY FOR A RECORD LEVEL OF 0 dBm WHEN THE VU METERS INDICATE 0 VU.

NOTE

3-20. Ensure the bulk erased cartridge is inserted into the deck.

3-21. Operate the deck to the record mode by depressing the **RECORD** switch/indicator. The **RECORD** switch/indicator will illuminate.

3-22. Start the program material.

3-23. Adjust the record **LEVEL** control(s) until the VU meter(s) indicate 0 VU.

3-24. Stop and re-cue the program material and the bulk erased cartridge.

3-25. **RECORDING PROGRAM MATERIAL.**

3-26. Ensure the deck is operated to the record mode. The **RECORD** switch/indicator will be illuminated.

3-27. Depress the deck **START** switch/indicator. The **START** switch/indicator will illuminate.

3-28. Wait approximately one-half second, then start the program material. A stop tone will be automatically recorded on the cue track.



NOTE

THE RECORDING PROCESS MAY BE MONITORED IF DESIRED BY CONNECTING A SPEAKER SYSTEM TO THE PLAYBACK DECK OUTPUT.

NOTE

3-29. At the end of the program material, deck operation will terminate automatically, or manually terminate deck operation by depressing the **STOP** switch/indicator.

3-30. When deck operation is terminated, the following events will occur:

A. The deck **STOP** switch/indicator will illuminate, indicating a ready status.

B. The deck will automatically be operated to the playback mode. The **RECORD** switch/indicator will extinguish.

3-31. **SECONDARY CUE TONE RECORDING.**

3-32. Secondary cue tones may be recorded in the playback or record modes of operation. If secondary cue tone recording is desired, proceed as follows:

A. Start the recording system in the playback mode or record mode of operation.

B. Depress the **SEC** switch for the amount of time the tone is desired. Do not record a secondary cue tone of less than one second.

3-33. **MONOPHONIC ENCODING.**

3-34. The 2100C stereophonic model is equipped with automatic or manual monophonic encoding circuitry. Automatic and manual monophonic encoding operations are described in the following text.

- 3-35. **AUTOMATIC MONOPHONIC ENCODING.** Monophonic encoding may be operated in the record mode of operation only. If automatic monophonic encoding is desired, proceed as follows:
- 3-36. Remove the top cover.
- 3-37. Operate the **MONO ENCODE** switch on the record circuit board to **ON** (refer to Figure 5-9A). The **MONO PLAY** indicator will illuminate.
- 3-38. Replace the top cover.
- 3-39. Perform the **RECORD DECK PRELIMINARY SET-UP** procedure.
- 3-40. Perform the **RECORDING PROGRAM MATERIAL** procedure. The secondary cue and the primary cue tones will be recorded onto the tape during the initial three seconds of tape operation. The **MONO REC** indicator will illuminate to indicate mono encode operation.
- 3-41. **MANUAL MONOPHONIC ENCODING.** Monophonic encoding may be operated in the record mode of operation only. If manual monophonic encoding is desired, proceed as follows:
- 3-42. Remove the top cover.
- 3-43. Operate the **MONO ENCODE** switch on the record circuit board to **OFF** (refer to Figure 5-9A).
- 3-44. Replace the top cover.
- 3-45. Perform the **RECORD DECK PRELIMINARY SET-UP** procedure.
- 3-46. Depress the **REC** switch/indicator. The **REC** switch/indicator will illuminate.
- 3-47. Depress the **SEC** switch/indicator. The **SEC** switch/indicator and the **MONO PLAY** indicator will illuminate.
- 3-48. Perform the **RECORDING PROGRAM MATERIAL** procedure. The secondary cue and the primary cue tones will be recorded onto the tape during the initial three seconds of tape operation. The **MONO REC** indicator will illuminate to indicate mono encode operation.

SECTION IV

THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section provides the theory of operation by describing the circuits of the various circuit boards in the machine (refer to Figures 4-1, 4-2, and 4-3). The motherboard interconnects all machine components and contains the power supply. The playback circuit board contains the playback amplifiers, the cue tone amplifiers, the cue tone sensors, the cue tone command logic, and the solenoid timer circuit. The record circuit board contains the program and cue track controls, the record metering circuitry, record logic, and bias oscillator.

4-3. Refer to the schematic drawings in SECTION VII for the following circuit descriptions. The playback and record circuit board assembly drawings are coded with shading to differentiate between monophonic and stereophonic play and record versions.

4-4. PLAYBACK CIRCUIT BOARD.

4-5. AUDIO AND METERING.

4-6. The following text describes the operation of the left and right channel playback amplifier and metering circuitry. The circuits operate identically; therefore, only the left channel circuits will be described.

4-7. The left program track of the playback head is coupled through C3 to the input of preamplifier IC1-A. Integrated circuit preamplifier IC1-A and associated circuitry provides gain and equalization. The left play low frequency equalization control and the left play high frequency equalization control permit adjustment of the equalization for matching head and tape characteristics to NAB or other standards.

4-8. The output of preamplifier IC-1A is coupled to the left play meter input circuit and to the left play level control. The signal from the level control is routed through analog switch IC10. Logic controlled switch IC10 routes the signal to the appropriate output amplifiers and provides muting.

4-9. **STEREO MODELS.** When a stereophonic machine is in the monophonic mode, the signal from the left preamplifier is equally applied to the left and right output amplifier circuits. This is accomplished by simultaneously closing the analog switch at pins 1 and 2, 8 and 9 of IC10 and opening the switch at pins 10 and 11. The signal from the left preamplifier is routed to the left and right output amplifiers. The signal from the right preamplifier is muted. In the stereophonic play mode, the switches are closed at pins 1 and 2, 10 and 11 and open at 8 and 9. The left preamplifier signal is routed to the left output amplifier and the right preamplifier signal is routed to the right output amplifier. Pins 3, 4, and 5 of analog switch IC10 provide logic inversion.

4-10. The signal from the analog switch is routed to single-ended differential line driver IC2-A/-B to provide a balanced output signal. When play operation is terminated, logic will enable the analog switch to open all switches and mute all signals.

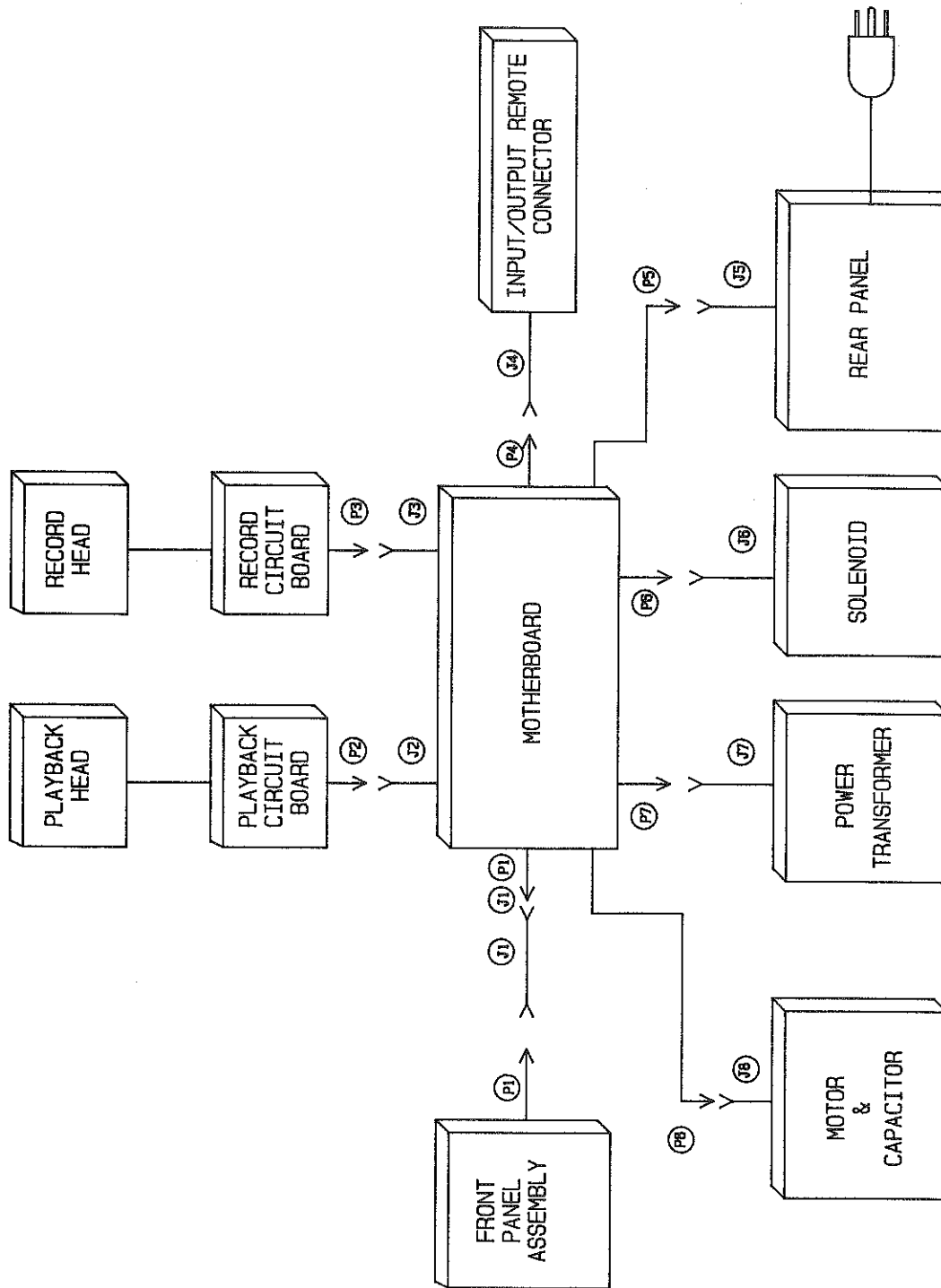


FIGURE 4-1. INTERCONNECTION BLOCK DIAGRAM

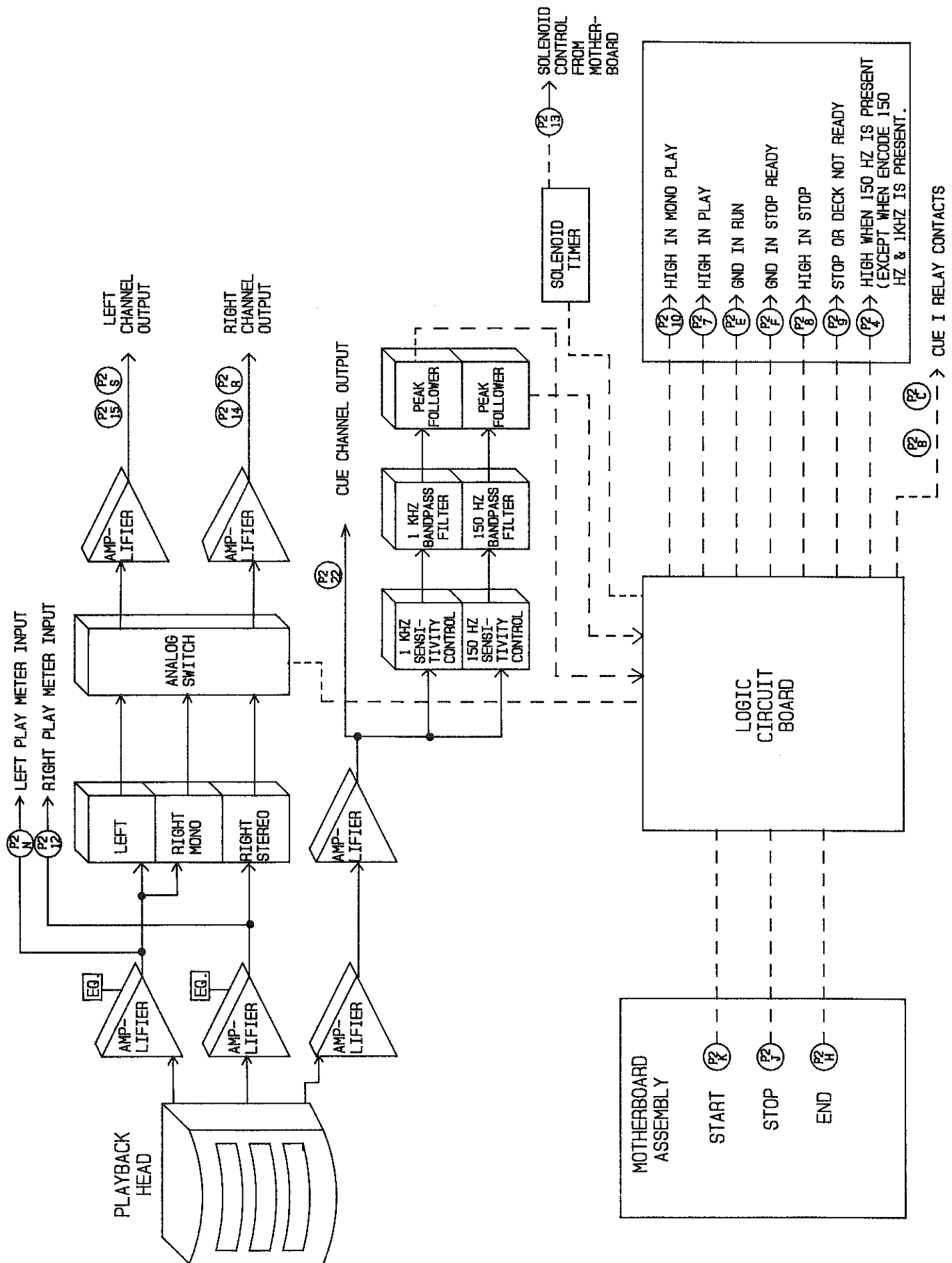


FIGURE 4-2. BLOCK DIAGRAM PLAYBACK CIRCUIT BOARD

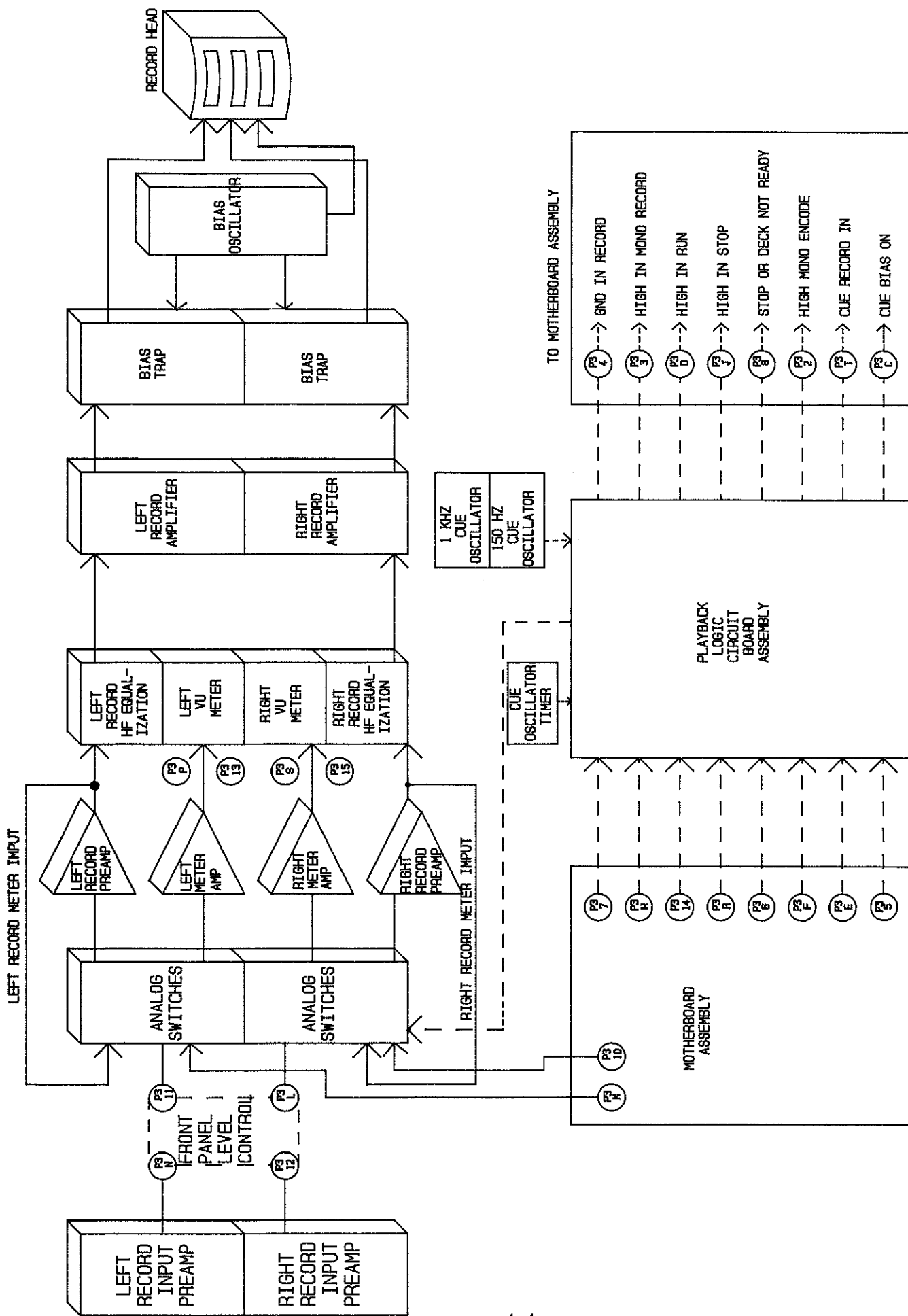


FIGURE 4-3. BLOCK DIAGRAM RECORD CIRCUIT BOARD

- 4-11. **CUE TRACK.**
- 4-12. The cue head input signal is amplified and equalized by IC4-A and further amplified by IC4-B. The signal is routed to the cue play out and the 1 kHz and 150 Hz cue tone circuits.
- 4-13. The 1 kHz cue signal is routed through 1 kHz sensitivity control R53. When a 1 kHz tone is present, the signal is routed through 1 kHz active bandpass filter IC5-A and rectified by 1 kHz peak follower IC6-A. The peak follower converts the signal to logic voltages for the subsequent logic circuits. The 150 Hz circuit operation is similar to the 1 kHz circuit. A sensitivity control (R54), an active bandpass filter (IC5-B), and a 150 Hz peak follower (IC6-B) are components of the 150 Hz cue circuitry.
- 4-14. When either circuit detects a signal, the subsequent logic provides control of the analog switch. When a 1 kHz tone is detected, deck operation is terminated. When a 150 Hz tone is present, the SEC switch/indicator will illuminate. When both tones are present simultaneously at the beginning of tape operation, the monophonic encode mode circuitry is enabled. A stereophonic machine will route left channel audio to both the left and the right outputs in this mode.
- 4-15. **SOLENOID TIMER.**
- 4-16. The solenoid timer is also located on the playback circuit board. The timer circuit enables P2-13 HIGH for 0.5 seconds. This provides +18 and -18 volts across the solenoid (refer to drawing D900-2110 in Section VII) and assures fast pull-in of the solenoid. When C33 is fully charged, a LOW is applied to P2-13 which applies a lower holding voltage (+18 volts) to the solenoid to provide cooler operation.
- 4-17. **RECORD CIRCUIT BOARD.**
- 4-18. **AUDIO AND METERING.**
- 4-19. The following text describes the operation of the left and right record amplifier and metering circuits. The circuits operate identically; therefore, only the left channel circuitry will be described.
- 4-20. The left record input signal is amplified by the left record input preamplifier IC8-A. The signal is then routed through left front-panel record level control R1. Audio signals are routed directly to the analog switch IC6. Metering signals are routed through meter calibration controls R106 and R107 and then to the analog switch. When enabled by logic, the analog switch routes the audio to the appropriate preamplifiers and provides muting.
- 4-21. The mode of operation establishes which section of the analog switch will open or close. Flip-flop IC7-C/IC7-D provides the final instructions to IC6 pins 1 and 2 to open or close the audio route in the record mode. When the audio circuit is closed, the metering circuit at IC6 pins 1 and 2 will close to enable the metering circuits. Logic circuitry also monitors functions and information from the playback circuit board for stop and not ready conditions.
- 4-22. **STEREO MODEL RPS.** Pins 1 and 2, 8 and 9 of analog switches IC6 and IC5 control monophonic/stereophonic switching. In the stereophonic record mode, IC6 and IC5 are closed at pins 1 and 2, 8 and 9 which route the audio and metering signals to the left and right amplifier circuitry. IC6 pins 10 and 11 and IC5 pins 3 and 4 are open to mute the playback circuit route to the VU meters. The VU meters respond to the recorded material in the record mode and the playback material in the play mode.



NOTE

NOTE

IC5 PINS 1 AND 2 ARE CLOSED IN THE MONO RECORD MODE, SO THAT THE RIGHT VU METER RESPONDS TO THE RIGHT TRACK SIGNAL ALTHOUGH NO SIGNAL IS PRESENT AT THE RIGHT RECORD PREAMPLIFIER.

- 4-23. When the machine is in the monophonic encode record mode, the analog switches route the left and right record signals onto the left record head. This is accomplished by opening IC5 pins 8 and 9 and closing IC6 pins 1 and 2, 3 and 4. Flip-flop IC10-C/IC10-D controls the operation. Control logic for the flip-flop is established by IC10-A, IC10-B, and IC11-A. In the monophonic encode record mode, the left and right record signals are summed at C51.
- 4-24. After switching, the audio signal is amplified by the left record preamplifier IC4-A in the stereophonic record mode. The left record high frequency equalization control R84 adjusts the response for matching head and tape characteristics to NAB standards. The signal is further amplified by the left record amplifier consisting of Q11 and the associated circuitry.
- 4-25. The program signal is routed through a bias trap consisting of C61 and L3 to prevent the bias from overloading the record amplifier. Variable inductor L3 adjusts the bias trap to the frequency of the bias oscillator. The audio signal is mixed with the bias supplied through R3 and applied to the left head output. Bias control R3 permits adjustment of the bias level for optimum frequency response and minimum distortion.
- 4-26. Bias is prevented from appearing on the program track of the record head by Q1 except when the machine is in the record mode. Logic gate IC9-C controls the bias oscillator switching circuit to enable the bias oscillator.
- 4-27. **BIAS OSCILLATOR, CUE TONE OSCILLATORS, AND CUE TONE LOGIC.**
- 4-28. The 2100C series record models are equipped with 1 kHz and 150 Hz cue tone generators. The oscillators and the logic are located on the record circuit board.
- 4-29. **1 kHz CUE TONE GENERATOR.**
- 4-30. The 1 kHz cue tone generator consists of IC2-C and IC2-D. Oscillation is established by resistor/capacitor network R68, R60, R67, C38, and C39. The circuit will oscillate when positive feedback is applied through R70 and R69. The output is routed through C7, R6, and level control R5 to cue record preamplifier IC1-C. Switch Q12 enables the generator when the cue oscillator timer is enabled. Cue oscillator timer IC2-A and IC2-B and the associated network is a monostable multivibrator. The output of the multivibrator will go HIGH only when the input from R44 is HIGH. The logic to R44 is controlled by IC12-B. This logic circuit receives and processes information from flip-flop IC11-B and IC11-C. IC12-B enables the multivibrator and oscillator when a record operation is initiated. A 1 kHz cue tone is automatically recorded on the cue track.
- 4-31. **150 Hz CUE TONE GENERATOR.**
- 4-32. The 150 Hz cue tone generator is similar to the 1kHz tone generator. The generator consists of IC1-A and IC1-B and network R24, R26, C26, and C25. The 150 Hz tone generator will oscillate when positive feedback is applied through R21 and R29. The 150 Hz output is routed through C8, R7, and level control R4 to cue record preamplifier IC1-C. Switch Q9 enables the generator when the SEC switch is depressed or when the monophonic encode record mode is initiated. Logic circuits IC12-C and IC11-D provide a timed pulse which enables and disables switch Q9.

4-33. **CUE TONE CONTROL.**

4-34. The cue tones are amplified by cue record preamplifier IC1-C and routed through C17 and R22 to the cue bias trap. The bias trap prevents the 100 kHz bias from overloading the cue record preamplifier. The bias is combined with the cue tone signal and applied to the cue head output. Cue tone audio is routed to the cue head output when IC9-B enables Q3.

4-35. **BIAS OSCILLATOR.**

4-36. The bias oscillator consists of transistors Q5 and Q6 which produce a 100 kHz sinewave signal at terminals 6 and 8 of bias transformer T1. Tuned circuit components T1 and C16 establish the bias oscillator frequency. The bias oscillator operates only in the record mode when +18V is connected to pin 2 of T1 through the bias oscillator switching circuit consisting of Q6, Q7, and Q8.

SECTION V MAINTENANCE

5-1. INTRODUCTION.

- 5-2. This section provides general maintenance information, mechanical and electrical adjustment procedures, and troubleshooting information for the Broadcast Electronics 2100C series cartridge machines.

5-3. SAFETY CONSIDERATIONS.

- 5-4. Low voltages are used throughout 2100C series cartridge machine playback and record circuitry. The motherboard assembly contains primary ac line voltage. Therefore, do not perform any maintenance or troubleshooting procedures on the motherboard with power energized. Maintenance with power energized is always considered hazardous and caution should be observed. Good judgement, care, and common sense must be practiced to prevent accidents. The procedures contained in this section should be performed only by experienced and trained maintenance personnel.

5-5. FIRST LEVEL MAINTENANCE.

- 5-6. First level maintenance consists of precautionary procedures applied to the equipment to prevent future failures. The procedures are performed on a regular basis and the results recorded in a performance log.



WARNING

***DISCONNECT ALL CARTRIDGE MACHINE PRIMARY
POWER BEFORE ATTEMPTING ANY EQUIPMENT
MAINTENANCE.***

WARNING

5-7. GENERAL.

- 5-8. Periodically remove abrasions from the cartridge machine chassis with a cloth moistened with a mild household cleaner. Remove dust from the chassis exterior with a brush and vacuum cleaner as required.

5-9. ELECTRICAL.

- 5-10. The cartridge machine circuitry should be periodically cleaned of accumulated dust using a brush and vacuum cleaner. Check the circuit boards for improperly seated semiconductors and components damaged by overheating.

5-11. **MECHANICAL.**



WARNING

WARNING



WARNING

WARNING

MOST SOLVENTS WHICH REMOVE TAPE RESIDUE ARE VOLATILE AND TOXIC BY NATURE AND MUST BE APPLIED IN SMALL AMOUNTS IN A WELL VENTILATED AREA. OBSERVE THE SOLVENT CONTAINER SAFETY INFORMATION AND DO NOT USE THE SOLVENT NEAR FLAME, CIGARETTES, AND HOT SOLDERING IRONS.

- 5-12. Each day clean the heads, pressure roller, tape guides, and capstan shaft with a cleaning solvent to remove accumulated oxide. Recommended cleaning solvents include: 1) Broadcast Electronics head cleaning kit 979-0064 and 2) isopropal alcohol. Approximately once a week, demagnetize the heads and other ferrous components in the tape path. Perform the demagnetizing with an appropriate degausser. Observe the degausser operating instructions to prevent damage to the heads.

5-13. **TAPE CARTRIDGES.**

- 5-14. The operating condition of the tape cartridges used in the 2100C series cartridge machines directly affects the performance of the unit. Regularly inspect the tape cartridges for accumulated dust, mechanical defects, and tape wear. Replace defective tape cartridges as required.

5-15. **SECOND LEVEL MAINTENANCE.**

- 5-16. Second level maintenance consists of procedures required to restore a 2100C series cartridge machine to operation after a fault has occurred. The procedures are divided into mechanical adjustments, electrical adjustments, mechanical component replacement procedures, electrical component replacement procedures, and troubleshooting.

- 5-17. The 2100C series cartridge machine maintenance philosophy consists of isolating a problem to a specific assembly with subsequent troubleshooting to isolate defective components. The defective components may be repaired locally or the entire assembly may be returned to Broadcast Electronics, Inc. for repair or replacement.

5-18. **MECHANICAL ADJUSTMENTS.**

- 5-19. The following text provides adjustment procedures for mechanical components associated with the 2100C series cartridge machines. The procedures are presented in the following order.

ADJUSTMENT PROCEDURES

- A. Motor Alignment Procedure.
 - B. Pressure Roller Indentation Adjustment.
 - C. Solenoid Response Adjustment.
 - D. Head Adjustments.
- 5-20. The following test equipment is required for the mechanical adjustment procedures. Refer to the following list as required for each procedure.

TEST EQUIPMENT

- A. Calibrated Oscilloscope, 5 MHz Bandwidth, Dual Channel With Lissajous Display of Inputs.

- B. Calibrated Low Distortion Audio Generator, 600 Ohm Output, 20 Hz to 20 kHz Audio Range.
- C. Tape Head and Tape Guide Alignment Gauge (BE P/N 300-0002).
- D. Motor Alignment Gauge (BE P/N 300-0700).
- E. Allen Wrenches (supplied with the Cartridge Machine).
- F. Tape Alignment Cut-Away Test Cartridge (BE P/N 710-0132).
- G. Monophonic/Stereophonic Reproduce Alignment Tape (BE P/N 800-1005).
- H. No. 1 Phillips Screwdriver, 4 Inch (10.2 cm) Blade.
- I. Pressure Roller Indentation Gauge (BE P/N 300-0013).

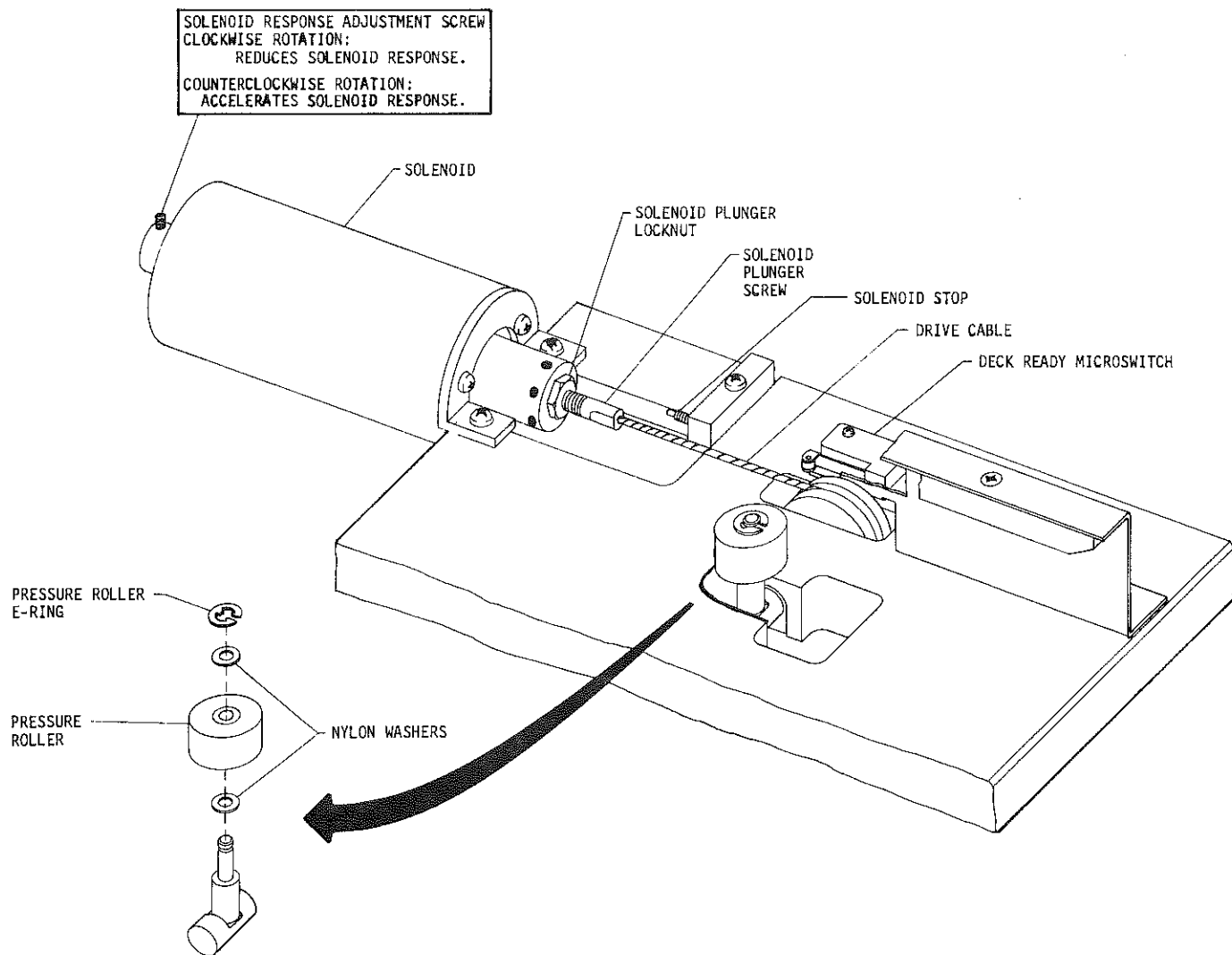
5-21. **MOTOR ALIGNMENT PROCEDURE.** The deck pressure roller operates in conjunction with the motor capstan shaft to provide tape movement. The pressure roller and the motor capstan shaft must be properly aligned to prevent improper tape movement across the heads.

5-22. **Procedure.** To align the cartridge machine motor and deck solenoid, proceed as follows:



WARNING ***DISCONNECT ALL CARTRIDGE MACHINE PRIMARY POWER BEFORE PROCEEDING.***
WARNING

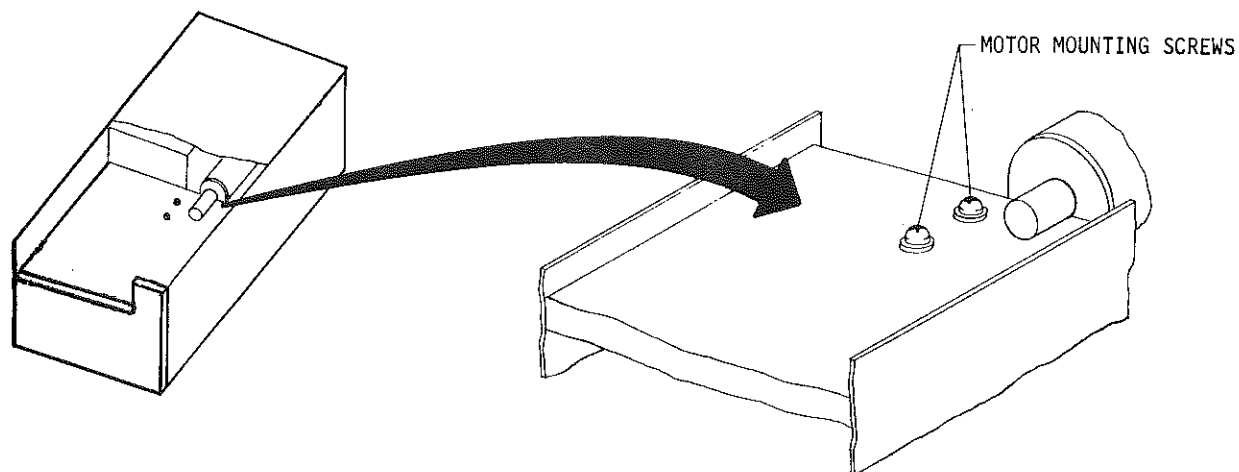
- 5-23. Disconnect the cartridge machine primary power.
- 5-24. Manually retract the deck solenoid plunger (refer to Figure 5-1) and remove the pressure roller E-ring, pressure roller, and the nylon washers.
- 5-25. Refer to Figure 5-2 and loosen the two motor mounting screws to allow movement of the motor assembly.
- 5-26. Refer to Figure 5-3A and place motor alignment gauge 300-0700 on the deck pressure roller shaft.
- 5-27. Refer to Figure 5-3A and move the motor assembly until the capstan shaft is tangent with the alignment gauge.
- 5-28. Secure the two motor mounting screws. Secure the screws alternately to ensure correct motor alignment.
- 5-29. Remove the alignment gauge.
- 5-30. Refer to Figure 5-1 and re-install the pressure roller, the nylon washers, and the pressure roller E-ring.
- 5-31. **PRESSURE ROLLER INDENTATION ADJUSTMENT.** This procedure adjusts the correct pressure roller indentation. Proper pressure roller indentation determines the amount of tape pull. Refer to Figure 5-3 and coarse adjust the solenoid plunger as follows:
 - A. Disconnect the cartridge machine primary power.
 - B. Loosen the solenoid plunger locknut.



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC

FIGURE 5-1. CARTRIDGE DECK ASSEMBLY

597-2100-4



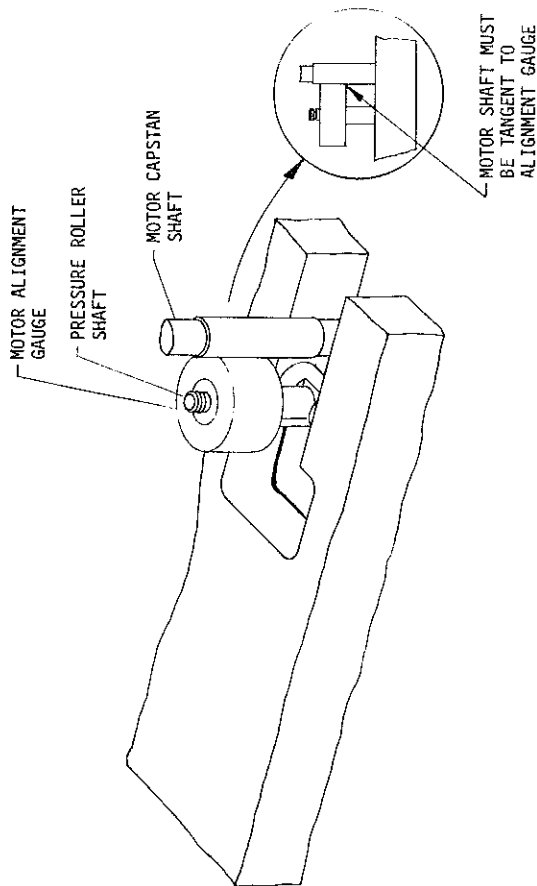
COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC

FIGURE 5-2. MOTOR MOUNTING SCREWS

597-2100-5

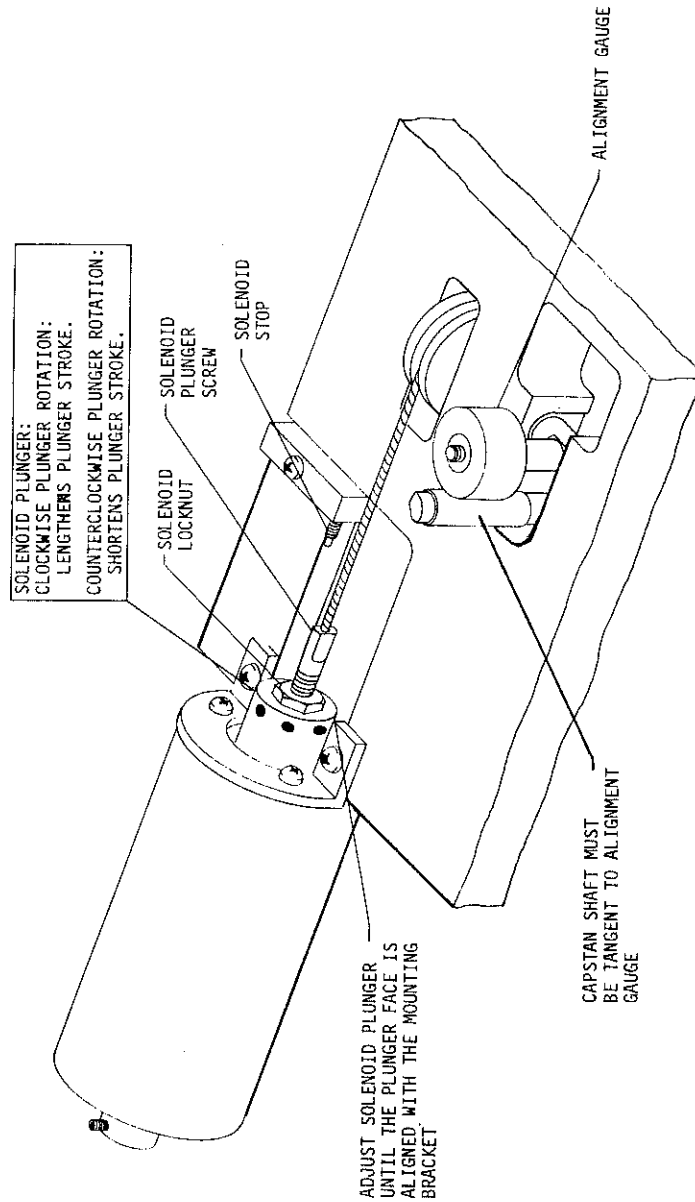
A

MOTOR ALIGNMENT



B

SOLENOID PLUNGER STROKE ADJUSTMENT



NOTE: MOTOR ALIGNMENT GAUGE SHOWN. THE ADJUSTMENT MAY BE PERFORMED WITH THE TAPE HEAD, TAPE GUIDE, AND MOTOR ALIGNMENT GAUGE.

FIGURE 5-3. MOTOR ALIGNMENT

- C. Rotate the solenoid plunger clockwise or counterclockwise as required until the plunger front-surface is aligned with the solenoid bracket.
- D. Finger tighten the solenoid plunger locknut.



CAUTION

CAUTION

WHEN OPERATING THE DECK SWITCH TO THE ON POSITION, DO NOT USE A METALLIC OBJECT.

- 5-32. Temporarily operate the deck switch to the **ON** position.
- 5-33. Apply power to the cartridge machine. Depress the deck **START** switch/indicator to energize the solenoid.

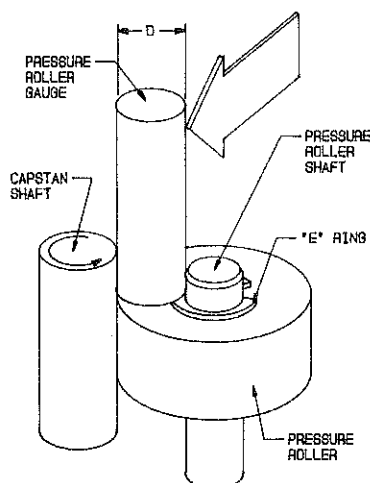


WARNING

WARNING

MAINTENANCE WITH MOVING PARTS IS ALWAYS CONSIDERED HAZARDOUS AND CAUTION SHOULD BE OBSERVED. DO NOT TOUCH THE CAPSTAN SHAFT OR THE PRESSURE ROLLER SHAFT WITH THE PARTS IN MOTION.

- 5-34. Fine adjustment of the pressure roller indentation is accomplished by using the pressure roller indentation gauge as shown in Figure 5-4. Insert the gauge between the capstan shaft and pressure roller shaft in the direction indicated while maintaining the gauge perpendicular to the deck surface.



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-9100-12

FIGURE 5-4. PRESSURE ROLLER INDENTATION ADJUSTMENT

- 5-35. Refer to Figure 5-4 and adjust the pressure roller indentation by rotating the solenoid plunger clockwise to decrease distance D or counterclockwise to increase distance D as required. Correct adjustment is obtained when the gauge will pass between the shafts with a slight resistance. Deenergize the solenoid between measurements to allow the solenoid to stabilize.
- 5-36. Once the correct pressure roller indentation is obtained, depress the deck **STOP** switch/indicator.
- 5-37. Refer to Figure 5-1 and adjust the solenoid plunger stop until the pressure roller is just below the deck surface when the solenoid is deenergized.

- 5-38. Disconnect the cartridge machine primary power. Secure the solenoid plunger locknut and restore the deck switch to normal operation.
- 5-39. **SOLENOID RESPONSE ADJUSTMENT.** The solenoid is equipped with a control to adjust the response of the plunger. The control adjusts the rate of air movement through a relief valve to establish the response of the plunger and the level of noise generated. The control is factory adjusted for a compromise between response and noise level. Generally, the solenoid response will not require adjustment. However, the response may be adjusted to obtain any individual requirements. The solenoid response is adjusted as follows.
- 5-40. **Procedure.** To adjust the solenoid response, proceed as follows:
- 5-41. Disconnect the cartridge machine primary power.
- 5-42. Refer to Figure 5-1 and adjust the solenoid response control clockwise 1/4 of a revolution to reduce the response and decrease the noise level of the solenoid. Adjust the solenoid response control counterclockwise 1/4 of a revolution to accelerate the response and increase the noise level of the solenoid.
- 5-43. Perform an operational test to ensure the deck performs as desired. If required, repeat the procedure to obtain the desired results.



CAUTION *TO PREVENT DAMAGE TO THE PHASE LOK V HEAD ASSEMBLY, PERFORM ALL HEAD ASSEMBLY ADJUSTMENTS USING THE ALLEN WRENCH PROVIDED WITH THE UNIT.*

- 5-44. **HEAD ADJUSTMENTS.** The head adjustments involve the alignment of the tape guide height, head height, head zenith, head azimuth, and head phase response parameters. The head parameters are presented as individual adjustment procedures. Due to the design of the PHASE LOK V head bracket, only head azimuth and the related electrical parameters will require periodic adjustment (example: prior to extensive continuous operation). The following list presents the procedures required for periodic maintenance. When a replacement head is installed, all head adjustment procedures must be performed (refer to the HEAD REPLACEMENT PROCEDURE specific replacement information).

PERIODIC PLAYBACK HEAD ADJUSTMENT PROCEDURES

MONOPHONIC CARTRIDGE MACHINES

- A. The Playback Head Azimuth Adjustment Procedure.
- B. The **PLAYBACK EQUALIZATION** Procedure.

STEREOPHONIC CARTRIDGE MACHINES

- A. The Playback Head Azimuth Adjustment Procedure.
- B. The Playback Head Phase Response Adjustment Procedure.
- C. The **PLAYBACK EQUALIZATION** Procedure.

PERIODIC RECORD HEAD ADJUSTMENT PROCEDURES

MONOPHONIC CARTRIDGE MACHINES

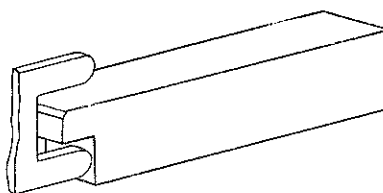
- A. The **PROGRAM BIAS LEVEL ADJUSTMENT**.
- B. The **Record Head Azimuth Adjustment Procedure**.
- C. The **RECORD EQUALIZATION PROCEDURE**.

STEREOPHONIC CARTRIDGE MACHINES

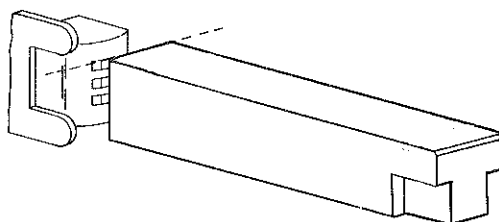
- A. The **PROGRAM BIAS LEVEL ADJUSTMENT**.
- B. The **Record Head Azimuth Procedure**.
- C. The **Record Phase Response Adjustment Procedure**.
- D. The **RECORD EQUALIZATION PROCEDURE**.

- 5-45. The following text presents adjustment procedures for the playback, dummy, and record heads. For record/playback models, align the playback head before adjusting the record head.
- 5-46. An adjustment tool (located in the Accessory Parts Kit) is provided with the unit for head assembly alignment. Perform all head alignments using the adjustment tool.
- 5-47. **Tape Guide Height Adjustment Procedure.** To ensure proper tape movement, perform the height adjustment procedure for each tape guide. To adjust the tape guide height, proceed as follows:
- 5-48. Refer to Figure 5-5A and check the tape guide height. The inside edge of the upper tape guide must be aligned with the top surface of the alignment gauge as shown.
- 5-49. If adjustment is required, refer to Figure 5-6 and loosen the tape guide adjustment screws.
- 5-50. Adjust the tape guide to obtain proper alignment.
- 5-51. Secure the tape guide adjustment screws.
- 5-52. **Head Height Adjustment Procedure.** To adjust the playback, record, or dummy head height, proceed as follows:
- 5-53. Refer to Figure 5-5B and check the playback or record head height. The head upper pole must be aligned with the top of the alignment gauge.
- 5-54. Insert the tape alignment cut-away test cartridge into the cartridge deck and begin deck operation to visually inspect the tape movement across the heads. The magnetic tape must cover the top and bottom of the head poles (refer to Figure 5-7).
- 5-55. If adjustment is required, refer to Figure 5-6 and loosen the appropriate head height/zenith lock-screw.
- 5-56. Refer to Figure 5-6 and adjust the appropriate front and rear head height/zenith adjustment screws as required to obtain the proper head height. The height/zenith screws must be adjusted equally to retain the zenith adjustment.
- 5-57. Secure the head height/zenith lock-screw.
- 5-58. For playback only cartridge machines, the top of the dummy head must be aligned with the top of the playback head. Visually check the height of the dummy head. If required adjust the dummy head height as required. Refer to Figure 5-6 for the location of the dummy head height/zenith adjustment screws.

A
TAPE GUIDE ADJUSTMENT
 THE INSIDE EDGE OF UPPER TAPE
 GUIDE MUST BE ALIGNED WITH
 THE T-END OF ALIGNMENT GAUGE.



B
HEAD HEIGHT ADJUSTMENT
 THE UPPER HEAD POLE
 MUST BE ALIGNED WITH THE
 TOP OF THE ALIGNMENT GAUGE.



C
ZENITH ADJUSTMENT
 THE HEAD MUST BE
 PERPENDICULAR TO
 DECK SURFACE.

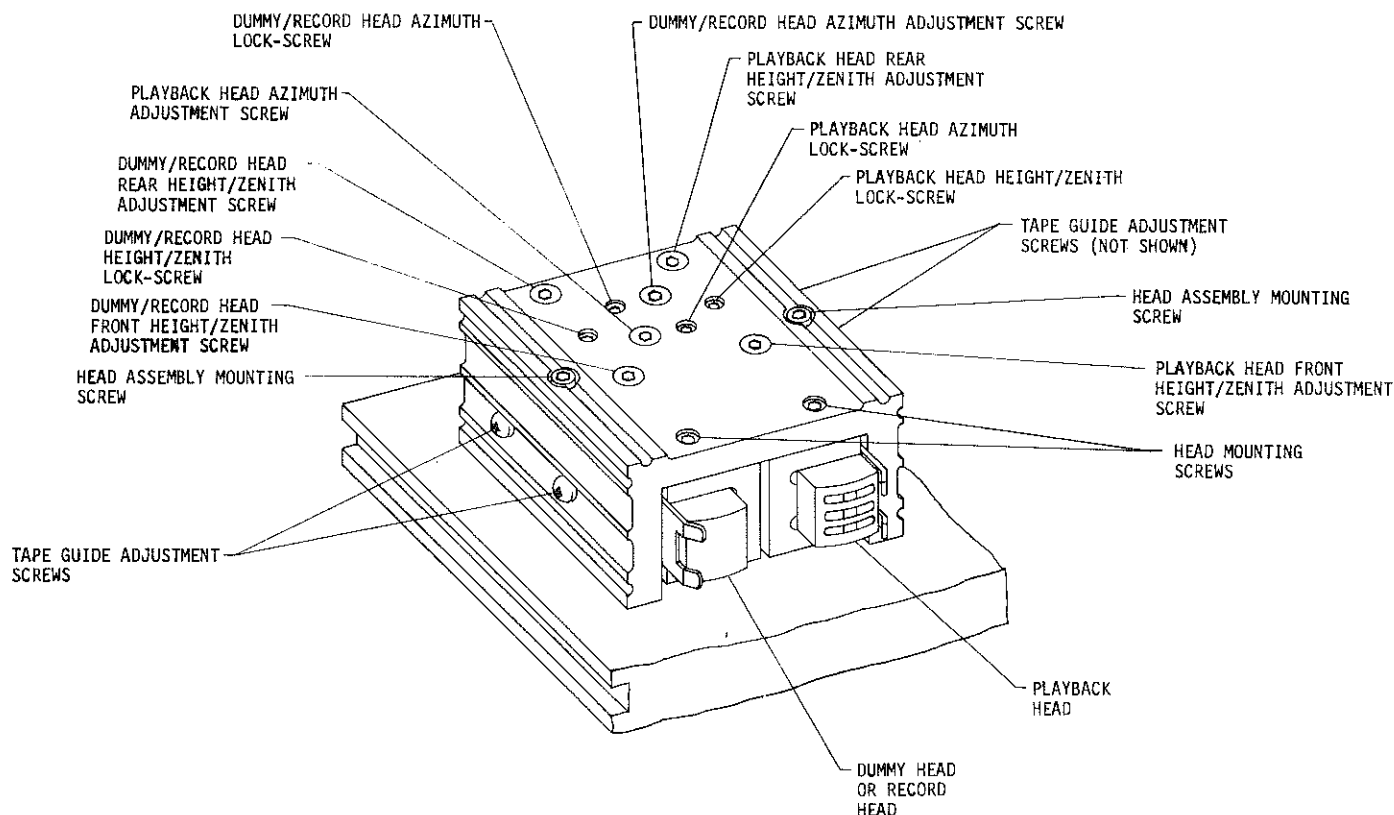


COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC

597-2100-8

FIGURE 5-5. HEAD AND TAPE GUIDE ADJUSTMENTS

- 5-59. **Head Zenith Adjustment Procedure.** To adjust the playback, record, or dummy head zenith, proceed as follows:
- 5-60. Refer to Figure 5-5C and check the playback or record head zenith. The head must be perpendicular to the deck surface.
- 5-61. If adjustment is required, refer to Figure 5-6 and loosen the appropriate head height/zenith lock-screw.
- 5-62. Refer to Figure 5-6 and adjust the appropriate head front or rear height/zenith screw to obtain the proper alignment.
- 5-63. Refer to the **Head Height Adjustment Procedure** and check the head height. If required, re-adjust the head height.
- 5-64. Repeat the procedure until the head zenith and head height are properly adjusted.
- 5-65. Secure the head height/zenith lock-screw.
- 5-66. For playback only cartridge machines, repeat the procedure for the dummy head. Refer to Figure 5-6 for the location of the dummy head height/zenith adjustment screws.

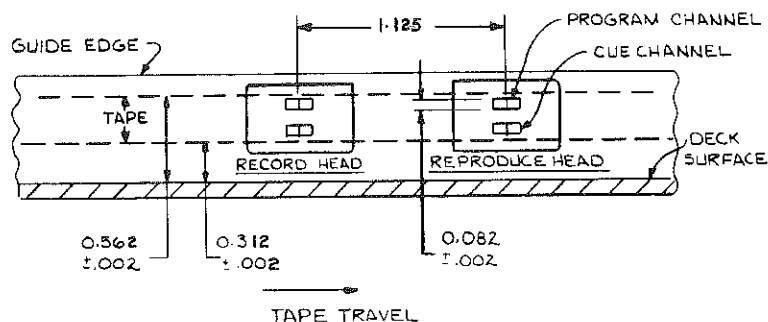


COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-2100-9

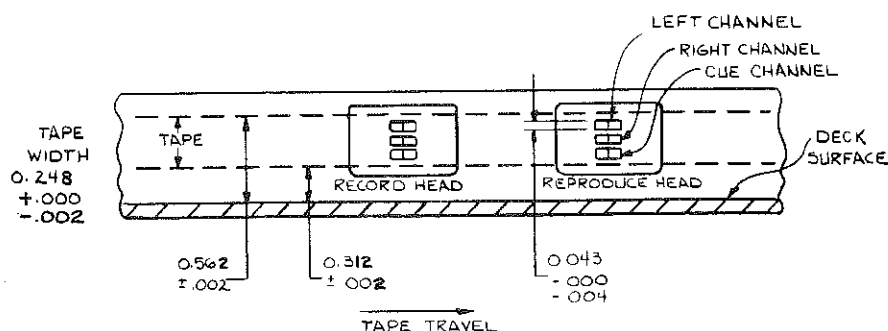
FIGURE 5-6. HEAD ADJUSTMENT CONTROLS

- 5-67. **Playback Head Azimuth Adjustment Procedure.** To adjust the playback head azimuth, proceed as follows:
- 5-68. Disconnect the cartridge machine primary power.
- 5-69. De-magnetize the playback head, the dummy head, and all surrounding ferrous components.
- 5-70. Refer to the OUTPUT LEVEL ADJUSTMENT procedure (located in the ELECTRICAL ADJUSTMENT procedures) and calibrate the cartridge deck for the desired output level.
- 5-71. Connect the oscilloscope to the cartridge deck left channel output on the output receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-72. Refer to Figure 5-6 and loosen the playback head azimuth lock-screw.
- 5-73. Apply power to the cartridge machine.
- 5-74. Insert the reproduce alignment test tape into the cartridge deck and reproduce the 12.5 kHz test tone.
- 5-75. Refer to Figure 5-6 and adjust the playback head azimuth screw for a maximum peak-to-peak voltage indication.
- 5-76. Secure the playback head azimuth lock-screw.
- 5-77. Disconnect power from the cartridge machine and remove the test equipment.

MONOPHONIC STANDARD



STEREOPHONIC STANDARD



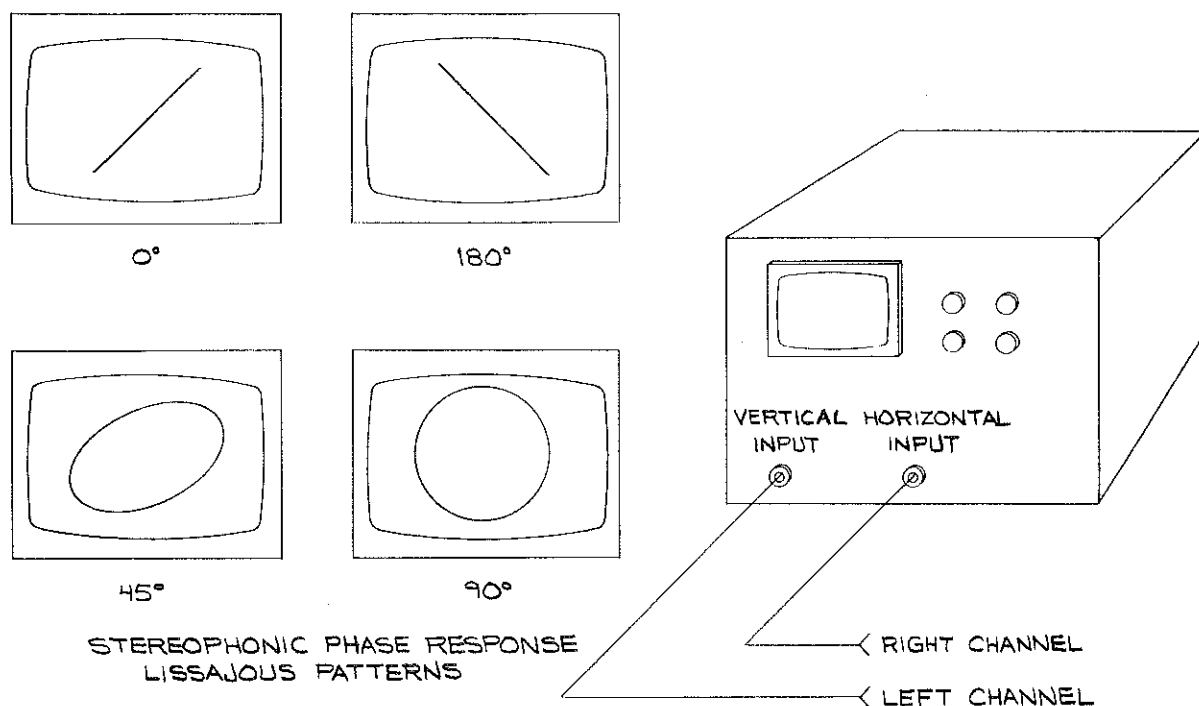
COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC.

597-2100-10

FIGURE 5-7. HEIGHT CARTRIDGE TAPE TRACKING

- 5-78. **Record Head Azimuth Adjustment Procedure.** To adjust the record head azimuth, proceed as follows:
- 5-79. Disconnect the cartridge machine primary power.
- 5-80. Refer to the ELECTRICAL ADJUSTMENTS procedures in the following text and perform the PROGRAM BIAS LEVEL ADJUSTMENT procedure.
- 5-81. Demagnetize the record head, playback head, and all surrounding ferrous components.
- 5-82. Connect the audio generator to the left channel input on the input/output/remote receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-83. Connect the oscilloscope to the left channel output on the input/output/remote receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-84. Refer to Figure 5-6 and loosen the record head azimuth lock-screw.
- 5-85. Apply power to the cartridge machine.
- 5-86. Adjust the audio generator for a 15 kHz output at -20 dBm.
- 5-87. Operate the recording system and begin recording the 15 kHz tone.
- 5-88. Refer to Figure 5-6 and adjust the record head azimuth screw for a maximum peak-to-peak voltage indication.

- 5-89. Secure the record head azimuth lock-screw.
- 5-90. Disconnect power from the cartridge machine and remove the test equipment.
- 5-91. **Playback Head Phase Response Adjustment Procedure (For Stereophonic Cartridge Machines Only).** The phase adjustment involves the fine alignment of the playback head azimuth for maximum phase response. To adjust the playback head phase response, proceed as follows:
 - 5-92. Disconnect the cartridge machine primary power.
 - 5-93. Demagnetize the playback head, the dummy head, and all surrounding ferrous components.
 - 5-94. Refer to the OUTPUT LEVEL ADJUSTMENT procedure (located in the ELECTRICAL ADJUSTMENT procedures) and calibrate the cartridge deck for the desired output level.
 - 5-95. Connect the oscilloscope to the cartridge deck outputs on the input/output/remote connector as shown in Figure 5-8. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
 - 5-96. Refer to Figure 5-6 and loosen the playback head azimuth lock-screw.
 - 5-97. Apply power to the cartridge machine.
 - 5-98. Operate the oscilloscope for lissajous display of inputs.
 - 5-99. Insert the reproduce alignment test tape into the cartridge deck and reproduce the 12.5 kHz test tone.
 - 5-100. Refer to Figure 5-6 and adjust the playback head azimuth screw for a θ° lissajous pattern (refer to Figure 5-8).
 - 5-101. Secure the playback head azimuth lock-screw.
 - 5-102. Disconnect power from the cartridge machine and remove the test equipment.
- 5-103. **Record Head Phase Adjustment Procedure (For Stereophonic Record/Playback Models Only).** The record phase adjustment involves the fine alignment of the record head azimuth for maximum phase response. The record phase response is adjusted as follows:
 - 5-104. Disconnect the cartridge machine primary power.
 - 5-105. De-magnetize the record head, playback head, and all surrounding ferrous components.
 - 5-106. Connect the audio generator to the left and right channel inputs on the input/output/remote receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
 - 5-107. Connect the oscilloscope to the left and right channel outputs on the input/output/remote receptacle as shown in Figure 5-8. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
 - 5-108. Refer to Figure 5-6 and loosen the record head azimuth lock-screw.
 - 5-109. Apply power to the cartridge machine.
 - 5-110. Adjust the audio generator for a 15 kHz output at -20 dBm.
 - 5-111. Operate the recording system and begin recording the 15 kHz tone.
 - 5-112. Refer to Figure 5-6 and adjust the record head azimuth screw for a θ° lissajous pattern (refer to Figure 5-8).



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC

597-2100-11

FIGURE 5-8. STEREOPHONIC PHASE RESPONSE LISSAJOUS PATTERNS

- 5-113. Secure the record head azimuth lock-screw.
- 5-114. Disconnect power from the cartridge machine and remove the test equipment.
- 5-115. **ELECTRICAL ADJUSTMENTS.**
- 5-116. The following text provides electrical adjustment procedures for all controls associated with the 2100C cartridge machines. The procedures are presented in the following order.
 - A. **PLAYBACK ADJUSTMENTS.**
 1. Output Level.
 2. Playback Equalization.
 3. Cue Sensitivity.
 4. VU Meter Calibration (record/playback units only).
 - B. **RECORD ADJUSTMENTS.**
 1. Program Bias Trap.
 2. Program Bias Level.
 3. Record Equalization.
 4. VU Meter Calibration.

5. Cue Bias Level.
6. Cue Tone Record Level Adjustments.
7. Cue Tone Frequency Adjustments.

5-117. The following equipment is required for electrical adjustment procedures:

- A. Hex Wrenches: supplied with the unit.
- B. Oscilloscope: any general purpose model.
- C. Reproduce Alignment Test Tape (BE P/N 800-1005).
- D. Miniature Flat-tip Screwdriver 1/8 inch (0.125 cm) tip.

RECORD MODELS ONLY

- E. Voltmeter.
- F. External Audio Signal Generator (audio range 20 Hz to 20 kHz).
- G. External VU Meter (or decibel calibrated voltmeter).
- H. Frequency Counter.
- I. Audio Analyzer.
- J. Bulk-Erased Cartridge.
- K. NAB Cue Tone/Logging Calibration Test Tape.
- L. Circuit Board Extender Card (BE P/N 910-2100).

5-118. **PLAYBACK ADJUSTMENTS.**

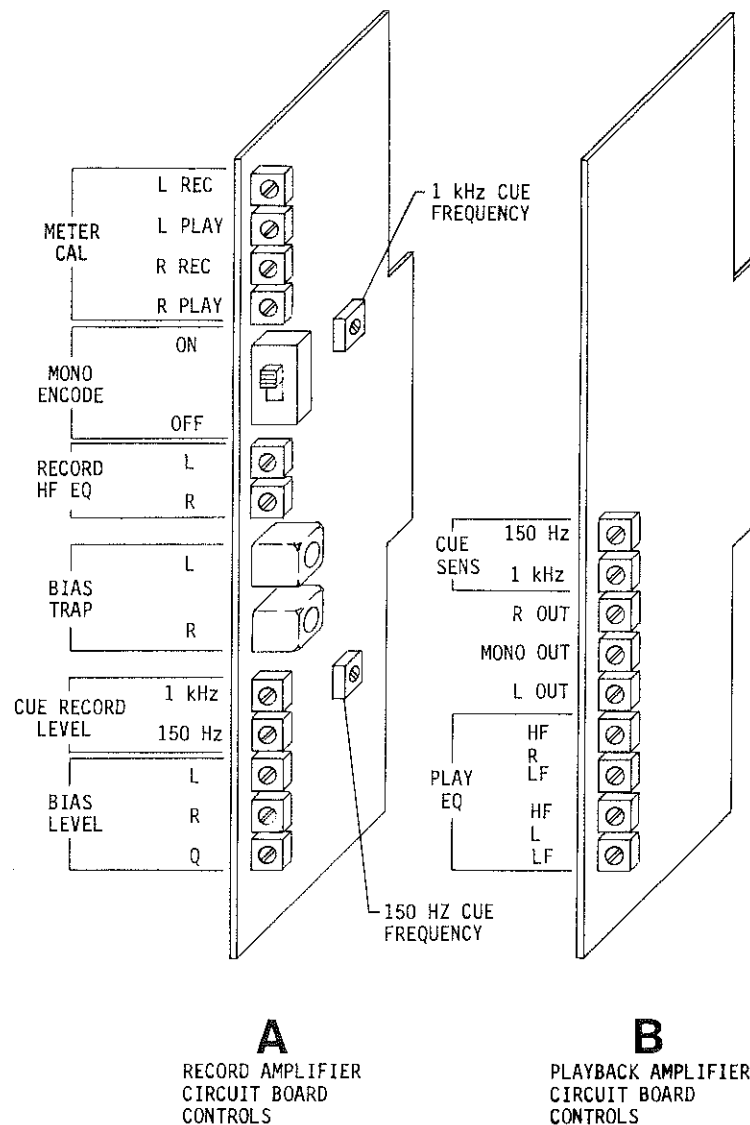
5-119. **OUTPUT LEVEL ADJUSTMENT.** The LEVEL control(s) on the playback amplifier circuit board adjust the output level of the cartridge deck. The output level control(s) are adjusted as follows.

5-120. **Procedure.** To adjust the deck output level, proceed as follows:



WARNING *MAINTENANCE WITH POWER ENERGIZED IS ALWAYS CONSIDERED HAZARDOUS AND THEREFORE CAUTION SHOULD BE OBSERVED. DO NOT TOUCH ANY COMPONENTS OR TRACES ON THE MOTHERBOARD WHEN POWER IS ENERGIZED.*

- 5-121. Disconnect the cartridge machine primary power. Remove the top cover.
- 5-122. Operate the **MONO ENCODE** switch (refer to Figure 5-9A) to OFF.
- 5-123. Connect the external VU meter to the cartridge deck left channel output on the input/output/remote receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-124. Apply power to the cartridge machine.
- 5-125. Insert the alignment tape into the deck and reproduce the operating reference level portion of the test tape.



COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-2100-12

FIGURE 5-9. RECORD AND PLAYBACK AMPLIFIER CIRCUIT BOARD CONTROLS



WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-126. Refer to Figure 5-9B and adjust left channel output **L OUT** control R13 for the desired output level.
- 5-127. For stereophonic cartridge machines, repeat the procedure for the right channel. Adjust the right channel output level with right channel output **R OUT** control R15 (refer to Figure 5-9B).
- 5-128. Disconnect power from the cartridge machine. Remove the test equipment and replace the top cover.

- 5-129. **MONOPHONIC OUTPUT LEVEL ADJUSTMENT.** The monophonic output level adjustment must be performed after the OUTPUT LEVEL adjustment on stereophonic models only. The monophonic level control is adjusted as follows.
- 5-130. **Procedure.** To adjust the monophonic level control, proceed as follows:
- 5-131. Refer to the OUTPUT LEVEL ADJUSTMENT procedure and calibrate the cartridge deck for the desired output level.



WARNING

WARNING

MAINTENANCE WITH POWER ENERGIZED IS ALWAYS CONSIDERED HAZARDOUS AND THEREFORE CAUTION SHOULD BE OBSERVED. DO NOT TOUCH ANY COMPONENTS OR TRACES ON THE MOTHERBOARD WHEN POWER IS ENERGIZED.

- 5-132. Disconnect the cartridge machine primary power. Remove the top cover.
- 5-133. Operate the **MONO ENCODE** switch (refer to Figure 5-9A) to **ON**.
- 5-134. Connect external VU meters to the cartridge deck left and right channel outputs on the input/output/remote receptacle. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-135. Apply power to the cartridge machine.
- 5-136. Insert a pre-recorded monophonic encoded cartridge in the cartridge deck and reproduce the program material.
- 5-137. Ensure the **MONO PLAY** indicator is illuminated.



WARNING

WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

- 5-138. Refer to Figure 5-9B and adjust **MONO OUT** level control R14 until the right channel output level is equal to the left channel output level.
- 5-139. Disconnect power from the cartridge machine. Remove the test equipment and replace the top cover.
- 5-140. **PLAYBACK EQUALIZATION.** Playback equalization involves the adjustment of the tape head amplifier circuit board equalization controls to obtain the required playback response. The playback equalization is adjusted as follows.
- 5-141. **Procedure.** To adjust the equalization controls, proceed as follows:
- 5-142. Refer to the OUTPUT LEVEL ADJUSTMENT procedure in the preceding text and calibrate the cartridge deck for the desired output level.
- 5-143. Disconnect the cartridge machine primary power. Remove the top cover.
- 5-144. Connect the external VU meter to the cartridge deck left channel output on the input/output/remote connector. Refer to Figure 2-2 in SECTION II, INSTALLATION for the receptacle pin designations.
- 5-145. Apply power to the cartridge machine.
- 5-146. Insert the reproduce alignment tape and reproduce the test tones.

**WARNING**

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-147. At the 50 Hz test tone, adjust left channel **LF EQ** control R2 (refer to Figure 5-9B) until the external VU meter indicates a level within -1 dB to 0 dB of the reference tone level.
- 5-148. At the 12.5 kHz test tone, adjust left channel **HF EQ** control R3 (refer to Figure 5-9B) until the external VU meter indicates the level of the reference tone.
- 5-149. For stereophonic cartridge machines, repeat the procedure for the right channel. Adjust the right channel equalization with right channel **LF EQ** control R8 and right channel **HF EQ** control R9 (refer to Figure 5-9B).
- 5-150. Disconnect power from the cartridge machine. Remove the test equipment and replace the top cover.
- 5-151. **CUE TONE DETECTION ADJUSTMENT.** The cue tone controls on the playback amplifier circuit board adjust the sensitivity of the 1 kHz, and 150 Hz cue tone detection circuits. The cue tone detection controls are adjusted as follows.
- 5-152. **Procedure.** To adjust the cue tone detection controls, proceed as follows:
- 5-153. Remove the cartridge machine top cover.
- 5-154. Insert the NAB cue tone calibration cartridge into the deck and reproduce the 1 kHz test tone.

**WARNING**

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-155. Refer to Figure 5-9B and adjust 1 kHz **CUE SENS** control R53 to terminate deck operation during a test tone.
- 5-156. Ensure the cue tone calibration cartridge is inserted into the deck and reproduce the 150 Hz test tone.

**WARNING**

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-157. Refer to Figure 5-9B and adjust 150 Hz **CUE SENS** control R54 until the front-panel **SEC** indicator illuminates.
- 5-158. Replace the top cover.
- 5-159. **VU METER CALIBRATION.** The meter adjustment is performed on playback/record models only. The VU meter calibration controls are located on the record circuit board (refer to Figure 5-9A). The VU meters are adjusted as follows.
- 5-160. **Procedure.** To adjust the VU meter controls, proceed as follows:
- 5-161. Remove the cartridge machine top cover.
- 5-162. Insert the alignment tape into the deck and reproduce the operating reference level portion of the test tape.



WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-163. Refer to Figure 5-9A and adjust left channel **L PLAY** meter control R106 for 0 VU as indicated by the front-panel meter.
- 5-164. For stereophonic cartridge machines, repeat the procedure for the right channel VU meter with right channel **R PLAY** meter control R96 (refer to Figure 5-9A).
- 5-165. Replace the top cover.
- 5-166. **RECORD ADJUSTMENTS.**
- 5-167. **PROGRAM BIAS TRAP.** The bias traps on the record circuit board adjust for minimum bias signal transfer to the record program amplifier circuitry. The bias traps are adjusted as follows.
- 5-168. **Procedure.** To adjust the program bias traps, proceed as follows:



WARNING

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-169. Disconnect the cartridge machine primary power.
- 5-170. Remove the cartridge machine top cover.
- 5-171. Carefully remove the record amplifier circuit board. Insert the extender circuit board and insert the record circuit board into the extender circuit board.
- 5-172. Connect an oscilloscope to test point TP11 on the record circuit board. The test point designations are shown in record circuit board assembly diagram 914-2101-001 (refer to SECTION VII, DRAWINGS).
- 5-173. Apply power to the cartridge machine.
- 5-174. Insert a bulk erased tape into the cartridge deck and operate to the record mode.



WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER ENERGIZED.

WARNING

- 5-175. With the non-metallic adjustment tool, adjust left channel bias trap control L3 (refer to Figure 5-9A) for minimum 100 kHz indication on the oscilloscope.
- 5-176. For stereophonic cartridge machines repeat the procedure for the right channel with bias trap L2 and test point TP10 (refer to Figure 5-9A).



WARNING

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-177. Disconnect power from the cartridge machine.

- 5-178. Remove all test equipment, replace the record circuit board and replace the top cover.
- 5-179. **PROGRAM BIAS LEVEL.** The **L BIAS LEVEL** and the **R BIAS LEVEL** controls on the record amplifier circuit board adjust the level of the program bias. The bias level controls are adjusted as follows.
- 5-180. **Procedure.** To adjust the bias controls, proceed as follows:
- 5-181. Disconnect all primary power to the cartridge machine and remove the top cover.
- 5-182. Refer to Figure 2-2 in SECTION II, INSTALLATION and connect test equipment to the unit as follows:
- A. Connect an external VU meter to the cartridge deck left channel output on input/output/remote connector J4.
 - B. Connect the oscilloscope to the cartridge deck left channel output on the input/output/remote connector J4.
 - C. Connect an audio signal generator to the left record input on the input/output/remote connector J4.
- 5-183. Apply power to the cartridge machine.
- 5-184. Adjust the audio generator for a -20 dBm output at 1 kHz.
- 5-185. Insert a bulk erased cartridge into the deck and operate to the record mode.



WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER ENERGIZED.

WARNING

- 5-186. Adjust the front-panel left record **LEVEL** control for a -10 dBm output level as indicated on the external VU meter.
- 5-187. Using the insulated adjustment tool, refer to Figure 5-9A and adjust **L BIAS LEVEL** control R3 for a maximum 1 kHz waveform without distortion as indicated on the oscilloscope.
- 5-188. For stereophonic cartridge machines, repeat the procedure for the right channel with the front-panel right record **LEVEL** control and **R BIAS LEVEL** control R2 (refer to Figure 5-9A).
- 5-189. Re-calibrate the record circuitry for a 0 dBm record level by performing the **VU METER CALIBRATION** procedure in the following text.
- 5-190. Disconnect power to the cartridge machine.
- 5-191. Remove all test equipment and replace the top cover.
- 5-192. **RECORD EQUALIZATION.** The **L RECORD HF EQ** and **R RECORD HF EQ** controls on the record amplifier circuit board adjust the record equalization. The record high frequency equalization controls are adjusted as follows.
- 5-193. **Procedure.** To adjust the **L RECORD HF EQ** and **R RECORD HF EQ** controls, proceed as follows:
- 5-194. Calibrate the record circuitry for a -10 dBm record level by performing the steps described in the **PROGRAM BIAS LEVEL** adjustment procedure.
- 5-195. Disconnect primary power to the cartridge machine and remove the top cover.

- 5-196. Refer to Figure 2-2 in SECTION II, INSTALLATION and connect test equipment to the unit as follows:
- A. Connect an external VU meter to the cartridge deck left channel output on input/output/remote connector J4.
 - B. Connect an audio signal generator to the left record input on input/output/remote connector J4.
- 5-197. Apply power to the cartridge machine.
- 5-198. Adjust the audio generator for a -20 dBm output at 1 kHz.
- 5-199. Insert the bulk erased cartridge into the deck and operate the unit to the record mode.
- 5-200. Observe the output level as indicated on the external VU meter.
- 5-201. Adjust the audio signal generator for -20 dBm at 12.5 kHz.
- 5-202. Observe the output level as indicated on the external VU meter.



WARNING

WARNING

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

- 5-203. Operate the test equipment and adjust **L RECORD HF EQ** control R84 (refer to Figure 5-9A) with the non-metallic adjustment tool until the 12.5 kHz output is equal to the 1 kHz output level.
- 5-204. For stereophonic cartridge machines, repeat the procedure for the right channel with **R RECORD HF EQ** control R83 (refer to Figure 5-9A).
- 5-205. Re-calibrate the record circuitry for a 0 dBm level by performing the **VU METER CALIBRATION** procedure in the following text.
- 5-206. Disconnect primary power to the cartridge machine. Remove the test equipment and replace the top cover.
- 5-207. **VU METER CALIBRATION.** The **L REC METER CAL** and **R REC METER CAL** controls on the record amplifier circuit board adjust the record VU meters. The record VU meters are adjusted as follows.
- 5-208. **Procedure.** To adjust the **L REC METER CAL** and **R REC METER CAL** controls, proceed as follows:
- 5-209. Disconnect primary power to the cartridge machine and remove the top cover.
- 5-210. Refer to Figure 2-2 in SECTION II, INSTALLATION and connect test equipment to the unit as follows:
- A. Connect an external VU meter to the cartridge deck left channel output on input/output/remote connector J4.
 - B. Connect the audio signal generator to the left channel input on input/output/remote connector J4.
- 5-211. Apply power to the cartridge machine.
- 5-212. Adjust the audio signal generator for a -20 dBm output at 1 kHz.
- 5-213. Insert the bulk erased cartridge into the deck and operate the unit to the record mode.

- 5-214. Adjust the left front-panel **LEVEL** control for a 0 dBm external VU meter indication.



WARNING *DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.*

WARNING

- 5-215. Adjust **L REC METER CAL** control R107 (refer to Figure 5-9A) with the non-metallic adjustment tool for 0 VU as indicated on the front-panel meter.
- 5-216. For stereophonic cartridge machines, repeat the procedure for the right channel with the right front-panel **LEVEL** control and **R REC METER CAL** control R97 (refer to Figure 5-9A).
- 5-217. Disconnect primary power to the cartridge machine. Remove the test equipment and replace the top cover.
- 5-218. **CUE BIAS LEVEL.** The **Q BIAS LEVEL** control on the record amplifier circuit board adjusts the level of the cue bias. The cue bias level is adjusted as follows.
- 5-219. **Procedure.** To adjust the **Q BIAS LEVEL** control, proceed as follows:



WARNING *DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.*

WARNING

- 5-220. Disconnect the primary power to the cartridge machine.
- 5-221. Remove the cartridge machine top cover.
- 5-222. Carefully remove the record amplifier circuit board.
- 5-223. Temporarily connect a 10 k Ohm resistor between IC2 pins 1 and 14 on the record amplifier circuit board to enable the cue bias and the 1 kHz tone generator circuitry. Refer to record circuit board assembly 914-2101-001 as required for component locations.
- 5-224. Insert the record amplifier circuit board.
- 5-225. Connect the oscilloscope to the cue output on the input/output remote connector J4 (refer to Figure 2-2 in SECTION II, INSTALLATION).
- 5-226. Apply power to the cartridge machine.
- 5-227. Insert the bulk erased cartridge into the deck and operate the unit to the record mode.



WARNING *DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.*

WARNING

- 5-228. With the non-metallic adjustment tool, adjust **Q BIAS LEVEL** control R1 (refer to Figure 5-9A) for a maximum output level as indicated on the oscilloscope.

**WARNING**

DISCONNECT PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-229. Disconnect power to the cartridge machine.
- 5-230. Remove the test equipment, the temporary resistor, and replace the record amplifier circuit board. Replace the top cover.
- 5-231. **CUE TONE RECORD LEVEL ADJUSTMENTS.** The **CUE RECORD LEVEL** controls on the record amplifier circuit board adjust the levels of the cue tones. The following text is divided into 1 kHz and 150 Hz cue tone level adjustment procedures.
- 5-232. **1 kHz Cue Tone Record Level Adjustment.** To adjust the 1 kHz cue tone level, proceed as follows:
- 5-233. Measure the NAB 1 kHz cue tone level standard as follows:
- A. Disconnect primary power to the cartridge machine.
 - B. Connect the oscilloscope to the cue play output on input/output/remote connector J4. Refer to Figure 2-2 in SECTION II, INSTALLATION for the connector pin designations.
 - C. Apply power to the cartridge machine.
 - D. Insert the NAB cue tone calibration cartridge into the deck and reproduce the 1 kHz record cue tone.
 - E. Record the peak-to-peak level as indicated on the oscilloscope _____.

**WARNING**

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-234. Disconnect power to the cartridge machine.
- 5-235. Remove the cartridge machine top cover.
- 5-236. Carefully remove the record amplifier circuit board.
- 5-237. Temporarily connect a 10 k Ohm resistor between IC2 pins 1 and 14 on the record amplifier circuit board to enable the cue bias and the 1 kHz tone generator circuitry. Refer to record amplifier circuit board assembly 914-2101-001 as required for component locations.
- 5-238. Insert the record amplifier circuit board.
- 5-239. Apply power to the cartridge machine.
- 5-240. Operate the unit to the record mode.

**WARNING**

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-241. Refer to Figure 5-9A and adjust 1 kHz **CUE RECORD LEVEL** control R5 for the recorded NAB standard level.

**WARNING**

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-242. Disconnect power from the cartridge machine.
- 5-243. Remove the test equipment, the temporary resistor, and replace the record amplifier circuit board and the top cover.
- 5-244. **150 Hz Cue Tone Record Level Adjustment.** To adjust the 150 Hz cue tone level, proceed as follows:
- 5-245. Measure the NAB 150 Hz cue tone level standard by performing the level measurement steps described at the beginning of the **1 kHz Cue Tone Record Level Adjustment** procedure. Record the 150 Hz peak-to-peak level as indicated on the oscilloscope.
- 5-246. Operate the unit to the record mode and begin recording a 150 Hz tone.

**WARNING**

DO NOT TOUCH ANY CIRCUIT BOARD TRACES OR COMPONENTS ON THE MOTHERBOARD CIRCUIT BOARD WITH POWER APPLIED.

WARNING

- 5-247. Refer to Figure 5-9A and adjust 150 Hz **CUE RECORD LEVEL** control R4 for the recorded NAB standard level.
- 5-248. Disconnect power to the cartridge machine. Remove the test equipment and replace the top cover.
- 5-249. **CUE TONE FREQUENCY ADJUSTMENTS.** The cue tone frequency controls on the record amplifier circuit board calibrate the cue tone frequencies. The following text is divided into 1 kHz and 150 Hz adjustment procedures.
- 5-250. **1 kHz Cue Tone Frequency Adjustment.** To calibrate the 1 kHz cue tone frequency, proceed as follows:

**WARNING**

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-251. Disconnect power to the cartridge machine.
- 5-252. Remove the cartridge machine top cover.
- 5-253. Carefully remove the record amplifier circuit board.
- 5-254. Temporarily connect a 10 k Ohm resistor between IC2 pins 1 and 14 on the record amplifier circuit board to enable the cue bias and the 1 kHz tone generator circuitry. Refer to record amplifier circuit board assembly 914-2101-001 as required for component locations.
- 5-255. Insert the extender circuit board and insert the record amplifier circuit board into the extender circuit board.
- 5-256. Connect the frequency counter to the cue output on the input/output remote connector J4. Refer to Figure 2-2 in SECTION II, INSTALLATION for the connector pin designations.
- 5-257. Apply power to the cartridge machine.

- 5-258. Insert the bulk erased cartridge into the deck and operate the unit to the record mode.
- 5-259. Refer to Figure 5-9A and adjust 1 kHz frequency control R60 until the frequency counter indicates 1 kHz \pm 50 Hz.



WARNING

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-260. Disconnect power to the cartridge machine.
- 5-261. Remove the test equipment and the temporary resistor. Replace the record amplifier circuit board and the top cover.
- 5-262. **150 Hz Cue Tone Frequency Adjustment.** To calibrate the 150 Hz cue tone frequency, proceed as follows:



WARNING

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-263. Disconnect power to the cartridge machine.
- 5-264. Remove the cartridge machine top cover.
- 5-265. Carefully remove the record amplifier circuit board.
- 5-266. Insert the extender board and insert the record amplifier circuit board into the extender board.
- 5-267. Connect the frequency counter to the cue play output on input/output/remote connector J4. Refer to Figure 2-2 in SECTION II, INSTALLATION for the connector pin designations.
- 5-268. Apply power to the cartridge machine.
- 5-269. Insert the bulk erased tape into the deck and operate the unit to the record mode.
- 5-270. Refer to Figure 5-9A and adjust 150 Hz frequency control R26 until the frequency counter indicates 150 Hz \pm 8 Hz.



WARNING

DISCONNECT ALL PRIMARY POWER TO THE CARTRIDGE MACHINE BEFORE PROCEEDING.

WARNING

- 5-271. Disconnect power to the cartridge machine.
- 5-272. Remove the test equipment and replace the record amplifier circuit board. Replace the top cover.
- 5-273. **MECHANICAL PARTS REPLACEMENT PROCEDURES.**
- 5-274. The following text provides mechanical parts replacement procedures. The procedures are presented in the following order.

A. Pressure Roller Replacement.

B. Head Replacement.

C. Motor Replacement.

- 5-275. The following equipment is required for the replacement procedures. Refer to the list as required for each procedure.

EQUIPMENT

A. No. 1 Phillips Screwdriver, 4 Inch (10.2 cm) Blade.

B. Needle-nose pliers.

C. Allen Wrenches (supplied with the cartridge machine).

- 5-276. **PRESSURE ROLLER REPLACEMENT PROCEDURE.** To replace the cartridge deck pressure roller, proceed as follows:
- 5-277. Disconnect the cartridge machine primary power.
- 5-278. Refer to Figure 5-1 and manually retract the solenoid plunger.
- 5-279. Remove the pressure roller E-ring, the pressure roller, and the nylon washers (refer to Figure 5-1).
- 5-280. Refer to Figure 5-1 and replace the washers, the pressure roller, and the pressure roller E-ring.
- 5-281. Check the solenoid plunger stroke by performing the plunger adjustment steps described in the **PRESSURE ROLLER INDENTATION ADJUSTMENT PROCEDURE.**
- 5-282. **HEAD REPLACEMENT.** To replace a tape head, proceed as follows:
- 5-283. Disconnect the cartridge machine primary power.
- 5-284. Loosen the head assembly mounting screws (refer to Figure 5-6) and remove the entire head assembly from the cartridge deck.
- 5-285. Refer to Figure 5-6 and loosen the defective tape head mounting screw.
- 5-286. Remove the defective head from the head assembly and disconnect the head leads.
- 5-287. Refer to Figure 5-10 and connect the head leads to the replacement head.
- 5-288. Firmly seat the replacement head into the head assembly and secure the mounting screw.
- 5-289. Replace the head assembly and secure the mounting screws.
- 5-290. Align the head by performing all the **HEAD ADJUSTMENTS** procedures and associated **ELECTRICAL ADJUSTMENT** procedures.
- 5-291. **MOTOR REPLACEMENT.** To replace the cartridge machine motor, proceed as follows:



WARNING **DISCONNECT ALL CARTRIDGE MACHINE PRIMARY POWER BEFORE PROCEEDING.**

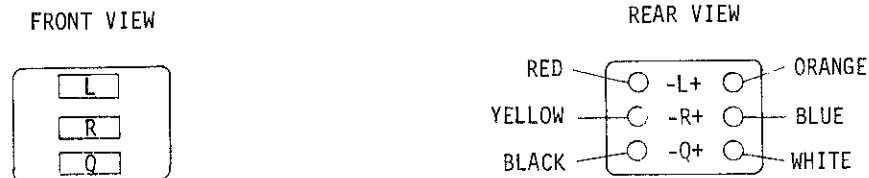
WARNING

- 5-292. Disconnect the cartridge machine primary power.
- 5-293. Remove the cartridge machine top-panel and bottom-panel.
- 5-294. Place the cartridge machine on a side-panel.
- 5-295. Refer to the cartridge machine final assembly diagram in **SECTION VII, DRAWINGS** and perform the following:

MONOPHONIC PLAYBACK/RECORD HEAD



STEREOPHONIC PLAYBACK/RECORD HEAD



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

COPYRIGHT © 1990 BROADCAST ELECTRONICS, INC
597-2100-13

FIGURE 5-10. TAPE HEAD CONFIGURATIONS

- A. Disconnect motor power supply connector P8 (located near the power transformer) from the motherboard circuit board.
- B. Disconnect the motor capacitor wiring.

5-296. Refer to Figure 5-2 and locate the motor mounting screws. While supporting the motor, remove the motor mounting screws and carefully remove the motor from the cartridge machine chassis.



CAUTION
CAUTION

EXERCISE CARE WHEN HANDLING THE CARTRIDGE MACHINE MOTOR TO AVOID DAMAGING THE BEARINGS. NEVER HANDLE THE MOTOR BY THE CAPSTAN SHAFT.

- 5-297. Carefully insert the new motor into the cartridge machine chassis and replace the motor mounting screws. Do not tighten the motor mounting screws at this time.
- 5-298. Reconnect motor power supply connector P2 and the motor capacitor wiring.
- 5-299. Align the motor by performing the MOTOR ALIGNMENT PROCEDURE and PRESSURE ROLLER INDENTATION ADJUSTMENT PROCEDURE described in the preceding text.
- 5-300. Replace the cartridge machine top-panel and bottom-panel.
- 5-301. **TROUBLESHOOTING.**
- 5-302. Low voltages are used throughout 2100C series cartridge machine playback and record circuitry. The motherboard assembly contains primary ac line voltage. Therefore, do not perform any maintenance or troubleshooting procedures on the motherboard with power energized. Troubleshooting with power energized is always considered hazardous and caution should be observed. Good judgement, care, and common sense must be practiced to prevent accidents.

- 5-303. The troubleshooting philosophy for the 2100C cartridge machines consists of isolating a problem to a specific circuit board. The problem may be isolated by referencing the following information and Table 5-1 which presents 2100C cartridge machine troubleshooting.



WARNING

DISCONNECT ALL CARTRIDGE MACHINE PRIMARY POWER BEFORE REMOVING OR INSERTING PRINTED CIRCUIT BOARDS OR REPLACING ANY COMPONENTS.

WARNING



CAUTION

INADVERTENT CONTACT BETWEEN ADJACENT COMPONENTS OR CIRCUIT BOARDS WITH TEST EQUIPMENT MAY CAUSE SERIOUS DAMAGE TO THE CARTRIDGE MACHINE.

CAUTION

- 5-304. Once trouble is isolated and power is totally deenergized, refer to the schematic diagrams and the theory of operation to assist in problem resolution. The defective component may be repaired locally or the entire device may be returned to Broadcast Electronics Inc. for repair or replacement.

TABLE 5-1. 2100C SERIES TROUBLESHOOTING
(Sheet 1 of 2)

SYMPTOM	DEFECT/REMEDY
NO MOTOR OPERATION	<ol style="list-style-type: none"> 1. Check the ac line fuse on the cartridge machine rear-panel. 2. Check the motor power supply connector on the motherboard circuit board. 3. Check the cartridge machine motor.
NO SOLENOID OPERATION	<ol style="list-style-type: none"> 1. Check front-panel START switch/indicator S4. 2. Check the deck microswitch. 3. Check stop/start transistor Q1 and Q2 on the playback amplifier circuit board. 4. Check the solenoid control circuitry on the motherboard circuit board. 5. Check solenoid timer IC6-C/IC6-D on the playback amplifier circuit board. 6. Check the deck solenoid.
NO OUTPUT AUDIO	<ol style="list-style-type: none"> 1. Check the cartridge machine playback head. 2. Check the audio amplifier circuitry on the playback amplifier circuit board. 3. Check switch IC10 on the playback amplifier circuit board.

TABLE 5-1. 2100C SERIES TROUBLESHOOTING
(Sheet 2 of 2)

SYMPTOM	DEFECT/REMEDY
NO 1 kHz STOP TONE OPERATION	<ol style="list-style-type: none"> 1. Check cue channel amplifier IC4-A/IC4-B on the playback amplifier circuit board. 2. Check the 1 kHz stop tone detection circuitry (IC5-A, IC6-A, and IC8-C) on the playback logic circuit board.
NO SECONDARY CUE TONE OPERATION	<ol style="list-style-type: none"> 1. Check cue channel amplifier IC4-A/IC4-B on the playback amplifier circuit board. 2. Check the secondary tone detection circuitry (IC5-B and IC6-B) on the playback amplifier circuit board.
NO RECORD MODE OPERATION	<ol style="list-style-type: none"> 1. Check front-panel RECORD switch/indicator S2. 2. Check record control flip-flop IC7-C and IC7-D on the record amplifier circuit board. 3. Check the cartridge machine record head.
NO RECORD AUDIO	<ol style="list-style-type: none"> 1. Check the record amplifier circuitry on the record amplifier circuit board. 2. Check the record bias circuitry on the record amplifier circuit board.
NO 1 kHz CUE TONE RECORD OPERATION	<ol style="list-style-type: none"> 1. Check 1 kHz tone generator IC2-C/IC2-D on the record amplifier circuit board. 2. Check 1 kHz cue oscillator timer IC2-A/IC2-B on the record amplifier circuit board. 3. Check 1 kHz tone generator switch Q12 on the record amplifier circuit board.
NO 150 Hz CUE TONE RECORD OPERATION	<ol style="list-style-type: none"> 1. Check front-panel secondary record switch/indicator S3. 2. Check 150 Hz tone generator IC1-A/IC1-B on the record amplifier circuit board. 3. Check 150 Hz tone generator switch Q9 on the record amplifier circuit board.
NO CUE TONE RECORD OPERATION	<ol style="list-style-type: none"> 1. Check cue record preamplifier IC1-C on the record amplifier circuit board. 2. Check cue tone bias switch Q3 on the record amplifier circuit board.



WARNING
WARNING

DISCONNECT POWER BEFORE REMOVING OR REPLACING CIRCUIT BOARDS OR COMPONENTS.



CAUTION
CAUTION

WHEN REPLACING A COMPONENT MOUNTED ON A HEAT-SINK, ENSURE A THIN FILM OF A ZINC-BASED HEAT-SINK COMPOUND IS USED TO ASSURE GOOD HEAT DISSIPATION.

- 5-305. **COMPONENT REPLACEMENT.** The circuit boards used in the 2100C cartridge machines are double-sided with plated-through holes. Due to the plated-through hole design, solder fills the holes by capillary action. This condition requires that defective components be removed carefully to avoid damage to the circuit board.
- 5-306. On all circuit boards, the adhesion between the copper trace and the circuit 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 soldering iron with steady pressure is required for circuit board repairs.
- 5-307. To remove a soldered component from a circuit board, cut the leads from the body of the defective component while the device is still soldered to the board. Grip a component lead with needle-nose pliers. Touch the soldering iron to the lead at the solder connection on the circuit side of the board. 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 by careful reheating with a low wattage iron and removing the residual solder with a soldering vacuum tool.
- 5-308. Install the new component and apply solder from the circuit side of the board. If no damage has been incurred to the plated-through holes, soldering of the component side of the board will not be required.



WARNING
WARNING

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



WARNING
WARNING

OBSERVE THE MANUFACTURERS CAUTIONARY INSTRUCTIONS.

- 5-309. After soldering, remove residual flux with a suitable solvent. Rubbing alcohol is highly diluted and is not effective.
- 5-310. The board should be checked to ensure the flux has been completely removed. Rosin flux is not normally corrosive, however in time, the flux will absorb enough moisture to become conductive and create problems.
- 5-311. **INTEGRATED CIRCUITS.** Special care should be exercised with integrated circuits. Each integrated circuit must be installed by matching the integrated circuit notch with the notch on the socket. Do not attempt to remove an integrated circuit from a socket with your fingers. Use an integrated circuit puller to lightly pry the component from the socket.

SECTION VI PARTS LISTS

6-1. INTRODUCTION.

- 6-2. This section provides descriptions and part numbers of electrical components, assemblies, and selected mechanical parts required for maintenance of the Broadcast Electronics 2100C series cartridge machines. Each table entry in this section is indexed by reference designators appearing on the applicable schematic diagram. Table 6-1 presents the 2100C series replaceable parts list index.

TABLE 6-1. REPLACEABLE PARTS LIST INDEX

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-2	2100C CARTRIDGE MACHINE FINAL ASSEMBLY	900-2110-XXX, 900-2111-XXX, 900-2112-XXX, 900-2113-XXX, 900-2114-XXX	6-2
6-3	DECK ASSEMBLY	950-0300-006	6-4
6-4	HEAD BOX, PHASE LOK V ASSEMBLY	950-0302	6-5
6-5	POWER TRANSFORMER ASSEMBLY	376-7675-002	6-5
6-6	2100C PACKING ASSEMBLY	950-0206	6-5
6-7	MOTOR ASSEMBLY 117V 60 Hz	950-0009	6-5
6-8	SINGLE SPEED MOTOR ASSEMBLY	950-2070-001	6-6
6-9	MOTOR ASSEMBLY 220V 50 Hz	950-0008	6-6
6-10	DUAL SPEED MOTOR ASSEMBLY	950-2080-001	6-6
6-11	PLAYBACK MOTHERBOARD CIRCUIT BOARD ASSEMBLY	914-2103, 914-2113	6-6
6-12	PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY	914-2100, 914-2110	6-8
6-13	RECORD CIRCUIT BOARD ASSEMBLY	914-2101-001, 914-2111-001	6-10
6-14	MONITOR PLAYBACK AMPLIFIER CIRCUIT BOARD ASSEMBLY	910-2124	6-15
6-15	PLAYBACK HEAD LEAD AND MOTHERBOARD CABLE ASSEMBLY	940-2143-001	6-16
6-16	RECORD HEAD LEAD AND MOTHERBOARD CABLE ASSEMBLY	940-2143-002	6-16
6-17	MUTE CIRCUIT BOARD	910-0121	6-16

**TABLE 6-2. 2100C CARTRIDGE MACHINE FINAL ASSEMBLY -900-2110-XXX,
900-2111-XXX, 900-2112-XXX, 900-2113-XXX, 900-2114-XXX (Sheet 1 of 4)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
DS4	Subminiature Lamp, No.327, T-1 3/4 Base, 28V, 0.040 Amperes (for START Switch)	321-0327	1
J1	Receptacle, Male, 13-Pin Dual In-line	417-2600	1
J5	Plug, Housing, 4-Pin	418-0240	1
J6	Connector Housing, 2-Pin	418-0701	1
S4	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (START Switch)	343-0225	1
SW1	Switch, Miniature, Toggle, SPDT, 5A @ 120V ac & 2A @ 250V ac (ON/OFF Power Switch)	347-7101	1
XF1	Fuse Holder, AGC	415-2012	1
—	Switch Cap, White (SEC Switch)	343-0156	1
—	Switch Cap, Green (START Switch)	343-0226	1
—	Pins, Connector	417-0053	4
—	Blank Front-Panel Circuit Board	514-2102	1
—	Transformer Assembly	376-7675-002	1
—	2100C Packing Assembly	950-0206	1
—	Head Box, Phase LOK V Assembly	950-0302	1
—	Deck Assembly	950-0300-006	1
117V60 Hz ASSEMBLY			
—	Motor Assembly	950-0009	1
—	Power Cord, N.E.M.A. 3-Wire North American Plug	681-1723	1
F1	Fuse, AGC, 1 Ampere, Fast-Blow	330-0100	1
220V 50 Hz ASSEMBLY			
—	Motor Assembly	950-0008	1
—	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1
F1	Fuse, AGC, 1/2A, 250V, Slow-Blow	330-0050	1
ADDITIONAL PARTS FOR MODEL 2110 MONOPHONIC 900-2110-XXX			
DS1	Indicator, LED, Red, CM6-86B, 2.2V @ 0.1 Ampere Maximum, T-1 3/4 Size (for MONO PLAY)	323-0023	1
S1	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (STOP Switch)	343-0175	1
—	Switch Cap, Yellow (for STOP Switch)	340-0097	1
—	Switch Indicator, Circuit Board Mount (SEC Switch)	343-0155	1
—	Lamp, Wedge-base, No.85, 28V @ 0.04 Amperes (for STOP and SEC Switches)	321-0085	2
—	Card Guide	409-0020	2
—	Head, Dummy	407-0001	1
—	Head, Playback, 2-Channel, Model NPD1484 Inductance at 1 kHz: 475 mH Impedance at 1 kHz: 3.3 Ohms DC Resistance: 500 Ohms	250-0006	1
—	Motherboard Circuit Board Assembly	914-2103	1
—	Monophonic Playback Circuit Board Assembly	914-2100	1
—	Head Lead and Motherboard Cable Assembly	940-2143-001	1

**TABLE 6-2. 2100C CARTRIDGE MACHINE FINAL ASSEMBLY -900-2110-XXX,
900-2111-XXX, 900-2112-XXX, 900-2113-XXX, 900-2114-XXX (Sheet 2 of 4)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR MODEL 2111 MONOPHONIC RECORD 900-2111-XXX			
DS1,DS2	Indicator, LED, Red, CM6-86B, 2.2V @ 0.1 Ampere Maximum, T-1 3/4 Size (for MONO PLAY and MONO REC)	323-0023	2
M1	Meter, VU, 1.5 Inch (3.75 cm), DC Microammeter Type, 200 uA Movement	319-0081	1
R1	Potentiometer, Cermet Linear, Slotted Shaft, 10 k Ohm $\pm 10\%$	191-1053D	1
S1 THRU S3	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (STOP, REC, and SEC Switches)	343-0175	3
—	Switch Cap, Red (for REC Switch)	343-0176	1
—	Switch Cap, Yellow (for STOP Switch)	340-0097	1
—	Lamp, Wedge-Base, No.85, 28V @ 0.04 Amperes (for STOP, REC, and SEC Switches)	321-0085	3
—	Card Guide	409-0020	4
—	Head, Record	252-0018	1
—	Head, Playback, 2-Channel, Model NPD1484 Inductance at 1 kHz: 475 mH Impedance at 1 kHz: 3.3 Ohms DC Resistance: 500 Ohms	250-0006	1
—	Motherboard Circuit Board Assembly	914-2113	1
—	Monophonic Record Amplifier Circuit Board Assembly	914-2101-001	1
—	Monophonic Playback Circuit Board Assembly	914-2100	1
—	Head Lead and Motherboard Cable Assembly	940-2143-001	1
ADDITIONAL PARTS FOR MODEL 2112 STEREOPHONIC 900-2112-XXX			
DS1	Indicator, LED, Red, CM6-86B, 2.2V @ 0.1 Ampere Maximum, T-1 3/4 Size (for MONO PLAY)	323-0023	1
S1	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (STOP Switch)	343-0175	1
—	Switch Cap, Yellow (for STOP Switch)	340-0097	1
—	Switch Indicator, Circuit Board Mount (SEC Switch)	343-0155	1
—	Lamp, Wedge-base, No.85, 28V @ 0.04 Amperes (for STOP and SEC Switches)	321-0085	2
—	Card Guide	409-0020	2
—	Head, Dummy	407-0001	1
—	Head, Playback, 3-Channel, Model NPD1496 Inductance at 1 kHz: 475 mH Impedance at 1 kHz: 3.3 Ohms DC Resistance: 500 Ohms	250-0007	1
—	Motherboard Circuit Board Assembly	914-2103	1
—	Head Lead and Motherboard Cable Assembly	940-2143-001	1
—	Stereophonic Playback Circuit Board Assembly	914-2110	1
ADDITIONAL PARTS FOR MODEL 2113 STEREOPHONIC RECORD 900-2113-XXX			
DS1,DS2	Indicator, LED, Red, CM6-86B, 2.2V @ 0.1 Ampere Maximum, T-1 3/4 Size (for MONO PLAY and MONO REC)	323-0023	2
M1,M2	Meter, VU, 1.5 Inch (3.75 cm), DC Microammeter Type, 200 uA Movement	319-0081	2
R1,R2	Potentiometer, Cermet Linear, Slotted Shaft, 10 k Ohm $\pm 10\%$	191-1053D	2
S1 THRU S3	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (STOP, REC, and SEC Switches)	343-0175	3
—	Lamp, Wedge-base, No.85, 28V @ 0.04 Amperes (for STOP, REC, and SEC Switches)	321-0085	3
—	Switch Cap, Red (for REC Switch)	343-0176	1
—	Switch Cap, Yellow (for STOP Switch)	340-0097	1

**TABLE 6-2. 2100C CARTRIDGE MACHINE FINAL ASSEMBLY -900-2110-XXX,
900-2111-XXX, 900-2112-XXX, 900-2113-XXX, 900-2114-XXX (Sheet 3 of 4)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR MODEL 2113 STEREOPHONIC RECORD 900-2113-XXX (Cont'd)			
—	Card Guide	409-0020	4
—	Head, Record	253-0015	1
—	Head, Playback, 3-Channel, Model NPD1496	250-0007	1
	Inductance at 1 kHz: 475 mH		
	Impedance at 1 kHz: 3.3 Ohms		
	DC Resistance: 500 Ohms		
—	Motherboard Circuit Board Assembly	914-2113	1
—	Stereophonic Record Amplifier Circuit Board Assembly	914-2111-001	1
—	Head Lead and Motherboard Cable Assembly	940-2143-002	1
—	Stereophonic Playback Circuit Board Assembly	914-2110	1
ADDITIONAL PARTS FOR MODEL 2114 MONOPHONIC PLAYBACK WITH MONITOR - 900-2114-XXX			
DS1	Indicator, LED, Red, CM6-86B, 2.2V @ 0.1 Ampere Maximum, T-1 3/4 Size (for MONO PLAY)	323-0023	1
R1	Potentiometer, Cermet Linear, Slotted Shaft, 10 k Ohm $\pm 10\%$	191-0286	1
S1	Switch, Push, Momentary, DPST, Illuminated, 1A @ 125V ac (STOP Switch)	343-0175	1
—	Switch Cap, Yellow (for STOP Switch)	340-0097	1
—	Switch Indicator, Circuit Board Mount (SEC Switch)	343-0155	1
—	Lamp, Wedge-base, No.85, 28V @ 0.04 Amperes (for STOP and SEC Switches)	321-0085	2
—	Speaker, 2 Inch (5.1 cm), 8 Ohms	414-0003	1
—	Speaker, 4 Inch (10.16 cm), 8 Ohms	414-0008	1
—	Knob, Rogan, Black (LEVEL Control)	481-0021	1
—	Plug, Flat Back	418-0227	1
—	Jack	417-0210	1
—	Card Guide	409-0020	4
—	Head, Dummy	407-0001	1
—	Head, Playback, 2-Channel, Model NPD1484	250-0006	1
	Inductance at 1 kHz: 475 mH		
	Impedance at 1 kHz: 3.3 Ohms		
	DC Resistance: 500 Ohms		
—	Motherboard Circuit Board Assembly	914-2113	1
—	Monitor Playback Circuit Board Assembly	910-2124	1
—	Monophonic Playback Circuit Board Assembly	914-2100	1
—	Head Lead and Motherboard Cable Assembly	940-2143-001	1

**TABLE 6-3. DECK ASSEMBLY - 950-0300-006
(Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Shaft, Pressure Roller	446-0056	1
—	Cross Shaft, Pressure Roller	446-0059	1
—	Pressure Roller	444-0700	1
—	Retainer, E-Ring	454-3318	1
—	Solenoid Coil, 32V dc, 1000V RMS, 60 Hz 1.75 Diameter, Resistance: 52.5 Ohms $\pm 10\%$	280-0003	1
—	Solenoid Return Spring	430-0014	1
—	Switch, Micro, Roller Actuator, SPDT, 5A @ 125V ac (Deck READY Switch)	346-0027	1

TABLE 6-3. DECK ASSEMBLY - 950-0300-006
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Cartridge Guide, Right	445-0006	1
—	Pressure Pad, Cartridge Guide	459-0123	2
—	Spring, Pressure Pad	430-0011	4
—	Spring, Left Cartridge Guide	430-0010	1
—	Cartridge Guide, Left	445-0008	1
—	Washer, Nylon (for Pressure Roller) Outside Diameter: 0.312 Inches (0.792 cm) Inside Diameter: 0.190 Inches (0.483 cm) Height: 0.010 Inches (0.254 cm)	423-5008	1
—	Washer, Nylon (for Pressure Roller) Outside Diameter: 0.312 Inches (0.792 cm) Inside Diameter: 0.190 Inches (0.483 cm) Height: 0.150 Inches (0.381 cm)	423-5009	1

TABLE 6-4. HEAD BOX, PHASE LOK V ASSEMBLY - 950-0302

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Tape Guide	445-0004	2
—	Spring, Head Box	430-0012	6

TABLE 6-5. POWER TRANSFORMER ASSEMBLY - 376-7675-002

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Transformer, Power Dual Primary: 120V, 50/60 Hz Dual Secondary: 25V @ 1.0 Ampere	376-7675	1
J7	Connector Housing, 12-Pin	418-1271	1
—	Pins, Connector	417-0053	9

TABLE 6-6. 2100C PACKING ASSEMBLY - 950-0206

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Connector, 15-Pin D-Type	417-3001	1
—	Plug, Amplifier Keying	417-1502	1
—	Connector, Hood, 15-Pin	417-1503	1
—	Pressure Roller Indentation Gauge	300-0013	1

TABLE 6-7. MOTOR ASSEMBLY 117V 60 Hz - 950-0009

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Motor Assembly, Single Speed	950-2070-001	1
	7.5 IPS Motor		
—	Capacitor, 60 Hz Motor Start, 0.7 uF, 300V ac	029-1067	1
	3.75 IPS Motor		
—	Capacitor, 60 Hz Motor Start, 0.95 uF, 300V ac	029-1075	1

TABLE 6-8. SINGLE SPEED MOTOR ASSEMBLY - 950-2070-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Bearing, Ball, 608ZZ (Upper and Lower) Outside Diameter: 0.8661 Inches (2.195 cm) Inside Diameter: 0.315 Inches (0.798 cm) Height: 0.275 Inches (0.698 cm) Model:	442-1020	2
—	Connector, Housing, 12-Pin	418-1271	1
—	Pins, Connector	417-0053	8
7.5 IPS Motor			
—	Motor, Synchronous, 60 Hz, 600 RPM @ 7 oz-in, 7.5 in/s, 26W @ 117V ac $\pm 10\%$	380-1000	1
3.75 IPS Motor			
—	Motor, Synchronous, 60 Hz, 450 RPM @ 7 oz-in, 3.75 in/s, 24W @ 117V ac $\pm 10\%$	382-1011	1

TABLE 6-9. MOTOR ASSEMBLY 220V 50 Hz - 950-0008

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Motor Assembly, Dual Speed	950-2080-001	1
—	Capacitor, 50 Hz Motor Start, 0.95 μ F, 300V ac	029-1075	1

TABLE 6-10. DUAL SPEED MOTOR ASSEMBLY - 950-2080-001

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Motor, Synchronous, 50 Hz Speed 1: 500 RPM @ 10 oz-in, 7.5 in/s (19.05 cm/s), 25W @ 117V ac Speed 2: 1500 RPM @ 10 oz-in, 22.5 in/s (57 cm/s), 60W @ 117V ac Model: NAH-4125B5C	382-2080	1
—	Bearing, Ball, 608ZZ (Upper and Lower) Outside Diameter: 0.8661 Inches (2.199 cm) Inside Diameter: 0.315 Inches (0.800 cm) Height: 0.275 Inches (0.698 cm)	442-1020	2
—	Connector, Housing, 12-Pin	418-1271	1
—	Pins, Connector	417-0053	12

**TABLE 6-11. PLAYBACK MOTHERBOARD CIRCUIT BOARD ASSEMBLY
914-2103, 914-2113 (Sheet 1 of 2)**

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2	Capacitor, Electrolytic, 100 μ F, 25V	023-1084	2
C3	Capacitor, Electrolytic, 4.7 μ F $\pm 20\%$, 50V	024-4764	1
C4	Capacitor, Electrolytic, 33 μ F, 35V	024-3374	1
C5	Capacitor, Electrolytic, 100 μ F, 25V	023-1084	1
C6,C7	Capacitor, Electrolytic, 4700 μ F, 50V	014-4793	2
D1,D2	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	2
D3	Diode, Zener, 1N4749, 24V, 10.5 Ampere	200-0024	1
D4	Diode, Rectifier, 1N4005, Silicon, 600V, 1A	203-4005	1

TABLE 6-11. PLAYBACK MOTHERBOARD CIRCUIT BOARD ASSEMBLY
914-2103,914-2113 (Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
D5	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
D6 THRU D10	Diode, Rectifier, 1N4005, Silicon, 600V, 1A	203-4005	5
IC1	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
IC2	Integrated Circuit, 78L15, Fixed Positive 15V Regulator, TO-92 Case	227-7815	1
IC3	Integrated Circuit, 7918VC, Fixed Negative 18V Regulator, TO-220 Case	227-7918	1
IC4	Integrated Circuit, LM7818CT, Fixed Positive 18V Regulator, TO-220 Case	227-7818	1
J1	Receptacle, Header, 26-Pin	417-2600	1
J2	Receptacle, Card Edge, 22-Pin	417-2300	1
J5	Receptacle, 4-Pin	418-0255	1
J6	Receptacle, 2-Pin	417-0700	1
J7,J8	Receptacle, 12-Pin	417-1276	2
Q1	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q2	Transistor, TIP-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q3	Transistor, TIP-32A, Silicon, PNP, TO-220AB Case	218-0032	1
R1	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R2	Resistor, 1.5 k Ohm $\pm 5\%$, 1/4W	100-1543	1
R3	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R4 THRU R6	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R7	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R8	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R9,R10	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	2
R11 THRU R14	Resistor, 10 Ohm $\pm 5\%$, 1/2W	110-1023	4
R15,R16	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	2
R17, R18	Resistor, 25 Ohm $\pm 5\%$, 5W, W/W	132-2523	2
XIC3,XIC4	Pad, Transistor Mounting	409-7403	2
XQ2,XQ3	Pad, Transistor Mounting	409-7403	2
—	Socket, 8-Pin DIP	417-0804	1
—	Blank Circuit Board	514-2103	1
ADDITIONAL PARTS FOR 914-2113 ASSEMBLY ONLY			
C8 THRU C11	Capacitor, Electrolytic, 100 uF, 25V	023-1084	4
C12 THRU C15	Capacitor, Ceramic, 0.001 uF, 1 kV	002-1034	4
J3	Receptacle, Card Edge, 22-Pin	417-2300	1
L1,L2	Choke, Ferrite, 4 Leg Each Winding 4 turns of No.32 enameled wire wound from same direction on same side.	956-0002	2

TABLE 6-12. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100, 914-2110
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Ceramic, 0.0047 uF $\pm 10\%$, 200V	032-4733	1
C2	Capacitor, Electrolytic, 10 uF, 16V	013-1074	1
C3	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C4	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C5	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C6	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C11	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C12	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C15	Capacitor, Electrolytic, 4.7 uF, 35V	015-5064	1
C16	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C17	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C18	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C19,C20	Capacitor, Electrolytic, 4.7 uF, 35V	015-5064	2
C21	Capacitor, Ceramic, 470 pF, 200V	003-4713	1
C22,C23	Capacitor, Ceramic, 0.01 uF, 100V	003-1013	2
C24	Capacitor, Ceramic, 0.0068 uF, 100V	003-6823	1
C25,C26	Capacitor, Ceramic, 0.047 uF, 50V	003-4733	2
C27 THRU C30	Capacitor, Mylar Film, 0.1 uF, 100V	030-1053	4
C31	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C32	Capacitor, Electrolytic, 47 uF, 16V	013-4750	1
C33 THRU C37	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	5
C38	Capacitor, Mica, 50 pF, 50V	040-5013	1
D1 THRU D13	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	13
D14	Diode, 1N4739, Zener, Silicon, 9.1V $\pm 10\%$, 1W	200-0009	1
IC1	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
IC2	Integrated Circuit, RC4559, Operational Amplifier, 8-Pin DIP	221-4559	1
IC4,IC5	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	2
IC6	Integrated Circuit, LM3900, Quad Operational Amplifier, 14-Pin DIP	221-3900	1
IC7 THRU IC9	Integrated Circuit, 74C00, Quad 2-Input NAND, CMOS, 14-Pin DIP	221-7400	3
IC10	Mute Circuit Board Assembly,	910-0121	1
K1	Relay, SPDT, 12V dc, 2 Ampere	270-0039	1
Q1,Q2	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
Q3	Transistor, GES5817, Silicon, PNP, TO-18 Case	210-5817	1
R1	Resistor, 150 k Ohm $\pm 5\%$, 1/4W	100-1563	1
R2	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R3	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R4	Resistor, 820 Ohm $\pm 5\%$, 1/4W	100-8233	1
R5	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R6	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R13	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	1
R16	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	1
R19	Resistor, 47 k Ohm $\pm 5\%$, 1/4W	100-4753	1
R20	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R23	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	1
R26	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1

TABLE 6-12. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100, 914-2110
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R27	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R28	Resistor, 9.1 k Ohm $\pm 5\%$, 1/4W	100-9143	1
R29	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R30,R31	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	2
R32,R33	Resistor, 33 Ohm $\pm 5\%$, 1/4W	100-3323	2
R43	Resistor, 330 k Ohm $\pm 5\%$, 1/4W	100-3363	1
R44	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R45	Resistor, 820 Ohm $\pm 5\%$, 1/4W	100-8233	1
R46	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R47	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R48,R49	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	2
R50	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R52	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R53,R54	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	2
R55,R56	Resistor, 56.2 k Ohm $\pm 1\%$, 1/4W	103-5651	2
R57	Resistor, 2.21 k Ohm $\pm 1\%$, 1/4W	103-2241	1
R58,R59	Resistor, 56.2 k Ohm $\pm 1\%$, 1/4W	103-5651	2
R60	Resistor, 4640 Ohm $\pm 1\%$, 1/4W	103-4641	1
R61	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R62	Resistor, 15 k Ohm $\pm 5\%$, 1/4W	100-1553	1
R63,R64	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	2
R65	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R66	Resistor, 15 k Ohm $\pm 5\%$, 1/4W	100-1553	1
R67	Resistor, 1.8 k Ohm $\pm 5\%$, 1/4W	100-1843	1
R68	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R69 THRU R71	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R72	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R73,R74	Resistor, 2 Meg Ohm $\pm 5\%$, 1/4W	100-2073	2
R75	Resistor, 200 k Ohm $\pm 5\%$, 1/4W	100-2063	1
R76	Resistor, 1 Meg Ohm $\pm 5\%$, 1/4W	100-1073	1
R77,R78	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	2
R79	Resistor, 2.7 k Ohm $\pm 5\%$, 1/4W	100-2743	1
R80,R81	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	2
R82	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R83	Resistor, 2.2 k Ohm $\pm 5\%$, 1/4W	100-2243	1
R84	Resistor, 36 k Ohm $\pm 5\%$, 1/4W	100-3653	1
R87	Resistor, 82 Ohm $\pm 5\%$, 1/4W	110-8223	1
R88	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
TT1 THRU TT3, TT7 THRU TT9	Disconnect Pins	418-0161	6
—	Socket, 8-Pin DIP	417-0804	4
—	Socket, 14-Pin DIP	417-1404	5
—	Blank Circuit Board	514-2100	1

TABLE 6-12. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100, 914-2110
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
ASSEMBLY PARTS FOR 914-2110 ASSEMBLY (STEREO MODELS) ONLY			
C7	Capacitor, Ceramic Disc, 0.0047 uF, 200V	032-4733	1
C8	Capacitor, Electrolytic, 10 uF, 16V	013-1074	1
C9	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C10	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
C13	Capacitor, Electrolytic, 10 uF, 35V	023-1075	1
C14	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C39	Capacitor, Mica, 50 pF, 50V	040-5013	2
IC3	Integrated Circuit, RC4559, Operational Amplifier, 8-Pin DIP	221-4559	1
R7	Resistor, 150 k Ohm $\pm 5\%$, 1/4W	100-1563	1
R8	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R9	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R10	Resistor, 820 Ohm $\pm 5\%$, 1/4W	100-8233	1
R11	Resistor, 10 Ohm $\pm 5\%$, 1/4W	100-1023	1
R12	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R14,R15	Potentiometer, 10 k Ohm $\pm 10\%$, 1/2W	178-1054	2
R17,R18	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	2
R21,R22	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	2
R24,R25	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	2
R34	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R35	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R36	Resistor, 9.1 k Ohm $\pm 5\%$, 1/4W	100-9143	1
R37	Resistor, 5.1 k Ohm $\pm 5\%$, 1/4W	100-5143	1
R38,R39	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	2
R40,R41	Resistor, 33 Ohm $\pm 5\%$, 1/4W	100-3323	2
R42	Resistor, 47 k Ohm $\pm 5\%$, 1/4W	100-4753	1
R89	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
TT4 THRU TT6	Disconnect Pins	418-0161	3
—	Socket, 8-Pin DIP	417-0804	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101-001, 914-2111-001
(Sheet 1 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,C2,C5,C6	Capacitor, Mica, 50 pF $\pm 5\%$, 50V	040-5013	4
C7,C8	Capacitor, Electrolytic, 1 uF, 50V	024-1064	2
C9	Capacitor, Mylar Film, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C13	Capacitor, Mica, 240 pF, 500V	040-2422	1
C14	Capacitor, Mica, 220 pF, 500V	040-2223	1
C15	Capacitor, Mylar Film, 0.1 uF $\pm 10\%$, 100V	030-1053	1
C16	Capacitor, Mylar Film, 0.02 uF, 100V	030-2043	1
C17	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C18,C19	Capacitor, Ceramic, 0.0047 uF $\pm 10\%$, 200V	032-4733	2
C20	Capacitor, Mylar Film, 0.022 uF, 200V	031-2243	1
C21	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C22	Capacitor, Mylar Film, 0.1 uF $\pm 10\%$, 100V	030-1053	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY-914-2101-001,914-2111-001
(Sheet 2 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
C23	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C24	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C25,C26	Capacitor, Mylar Film, 0.15 uF, 100V	030-1553	2
C27	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C28	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C30	Capacitor, Electrolytic, 10 uF, 25V	023-1075	1
C32	Capacitor, Mica, 220 pF, 500V	040-2223	1
C34	Capacitor, Poly Film, 0.0022 uF $\pm 10\%$, 100V	031-2033	1
C36	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C37	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C38,C39	Capacitor, Mylar Film, 0.039 uF, 100V	030-3942	2
C40	Capacitor, Mica, 50 pF $\pm 5\%$, 500V	040-5013	1
C42,C43	Capacitor, Electrolytic, 1 uF, 50V	024-1064	2
C44,C45	Capacitor, Ceramic Disc, 0.001 uF, 1 kV	002-1034	2
C48,C51	Capacitor, Electrolytic, 10 uF, 25V	023-1075	2
C53	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C55	Capacitor, Poly Film, 0.0033 uF, 630V	030-3033	1
C57	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C58	Capacitor, Electrolytic, 3.3 uF, 50V	020-3363	1
C59	Capacitor, Mylar Film, 0.047 uF $\pm 10\%$, 100V	030-4743	1
C60	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C61	Capacitor, Mica, 150 pF $\pm 5\%$, 500V	040-1522	1
D1 THRU D3	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	3
D8 THRU D11	Diode, 1N98, Germanium, 80V @ 0.2 Ampere	202-0098	4
D12 THRU D23	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	12
L1	RF Choke, 10 mH $\pm 10\%$, 6.3 Ohms DC Resistance, 220 mA Maximum	364-0670	1
L3	Choke, Adjustable, 8-20 uH	363-9061	1
L4	Choke, Ferrite, 4-Leg Each Winding 4 turns of No.32 enameled wire wound from same direction on same side.	956-0002	1
Q1,Q3	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
Q4,Q5	Transistor, 2N6123, Silicon, NPN, TO-220AB Case	219-0031	2
Q6	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q7	Transistor, MPSU02, Silicon, NPN, TO-220AB Case	211-0002	1
Q8	Transistor, GES5817, Silicon, PNP, TO-92 Case	210-5817	1
Q9	Transistor, 2N5457, JFET, N-Channel, TO-92 Case	212-5457	1
Q11	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
Q12	Transistor, 2N5457, JFET, N-Channel, TO-92 Case	212-5457	1
Q13	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	1
R1, R3 THRU R5	Potentiometer, 500 k Ohm $\pm 10\%$, 1/2W	178-5064	4
R6	Resistor, 180 k Ohm $\pm 5\%$, 1/4W	100-1863	1
R7 THRU R9	Resistor, 33 k Ohm $\pm 5\%$, 1/4W	100-3353	3
R10	Resistor, 39 Ohm $\pm 5\%$, 1/4W	100-3923	1
R11,R12	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	2
R13	Resistor, 39 Ohm $\pm 5\%$, 1/4W	100-3923	1
R14	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R15,R16	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	2
R17	Resistor, 3.3 k Ohm $\pm 5\%$, 1/4W	100-3343	1
R18	Resistor, 47 k Ohm $\pm 5\%$, 1/4W	100-4753	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101-001, 914-2111-001
(Sheet 3 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R19	Resistor, 4.7 k Ohm +5%, 1/4W	100-4743	1
R20	Resistor, 47 k Ohm +5%, 1/4W	100-4753	1
R21	Resistor, 39 k Ohm +5%, 1/4W	100-3953	1
R22	Resistor, 4.7 k Ohm \pm 5%, 1/4W	100-4743	1
R23	Resistor, 22 k Ohm \pm 5%, 1/4W	100-2253	1
R24,R25	Resistor, 3.3 k Ohm \pm 5%, 1/4W	100-3343	2
R26	Potentiometer, 2 k Ohm \pm 10%, 1/2W	177-2044	1
R27	Resistor, 560 k Ohm \pm 5%, 1/4W	100-5663	1
R28	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	1
R29	Resistor, 330 k Ohm \pm 5%, 1/4W	100-3363	1
R30	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	1
R31	Resistor, 82 k Ohm \pm 5%, 1/4W	100-8253	1
R33	Resistor, 56 k Ohm \pm 5%, 1/4W	100-5653	1
R34	Resistor, 82 k Ohm \pm 5%, 1/4W	100-8253	1
R35	Resistor, 120 k Ohm \pm 5%, 1/4W	100-1263	1
R36	Resistor, 47 k Ohm \pm 5%, 1/4W	100-4753	1
R37	Resistor, 22 k Ohm \pm 5%, 1/4W	100-2253	1
R38	Resistor, 4.7 k Ohm \pm 5%, 1/4W	100-4743	1
R42	Resistor, 200 k Ohm \pm 5%, 1/4W	100-2063	1
R43,R44	Resistor, 1 Meg Ohm \pm 5%, 1/4W	100-1073	2
R45,R46	Resistor, 2 Meg Ohm \pm 5%, 1/4W	100-2073	2
R47	Resistor, 3.9 k Ohm \pm 5%, 1/4W	100-3943	1
R48	Resistor, 2.7 k Ohm \pm 5%, 1/4W	100-2743	1
R51	Resistor, 1 k Ohm \pm 5%, 1/4W	100-1043	1
R52	Resistor, 22 k Ohm \pm 5%, 1/4W	100-2253	1
R53	Resistor, 330 k Ohm \pm 5%, 1/4W	100-3363	1
R54	Resistor, 100 k Ohm \pm 5%, 1/4W	100-1063	1
R55	Resistor, 75 k Ohm \pm 5%, 1/4W	100-7553	1
R56	Resistor, 56 k Ohm \pm 5%, 1/4W	100-5653	1
R57	Resistor, 100 k Ohm \pm 5%, 1/4W	100-1063	1
R58,R59	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	2
R60	Potentiometer, 5 k Ohm \pm 10%, 1/2W	177-5044	1
R61,R62	Resistor, 22 k Ohm \pm 5%, 1/4W	100-2253	2
R66	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	1
R67,R68	Resistor, 680 Ohm \pm 5%, 1/4W	100-6833	2
R69	Resistor, 56 k Ohm \pm 5%, 1/4W	100-5653	1
R70	Resistor, 110 k Ohm \pm 5%, 1/4W	100-1163	1
R71,R72	Resistor, 100 Ohm \pm 5%, 1/4W	100-1033	2
R76	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	1
R77	Resistor, 270 k Ohm \pm 5%, 1/4W	100-2763	1
R78	Resistor, 10 k Ohm \pm 5% 1/4W	100-1053	1
R84	Potentiometer, 100 k Ohm \pm 10%, 1/2W	178-1064	1
R85,R86	Resistor, 4.7 k Ohm \pm 5%, 1/4W	100-4743	2
R87	Resistor, 39 k Ohm \pm 5%, 1/4W	100-3953	1
R93	Resistor, 9.1 k Ohm \pm 5%, 1/4W	100-9143	1
R94	Resistor, 470 k Ohm \pm 5%, 1/4W	100-4763	1
R95	Resistor, 10 k Ohm \pm 5%, 1/4W	100-1053	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101-001, 914-2111-001
(Sheet 4 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R101	Resistor, 8.2 k Ohm $\pm 5\%$, 1/4W	100-8243	1
R102	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R103	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	1
R105	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R106	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R107	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R108	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R109	Resistor, 1.2 k Ohm $\pm 5\%$, 1/4W	100-1243	1
R110 THRU R113	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	4
R114	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	1
R115	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	1
R116	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R117	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	1
R118	Resistor, 820 k Ohm $\pm 5\%$, 1/4W	100-8263	1
R119	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	1
R120 THRU R122	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	3
R123	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R124	Resistor, 820 k Ohm $\pm 5\%$, 1/4W	100-8263	1
R125	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2053	1
R126	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R127	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R128	Resistor, 7.5 k Ohm $\pm 5\%$, 1/4W	100-7543	1
R129	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R130	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	1
R132	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
S1	Switch, Slide, SPST, 300 mA @ 125V ac	345-0120	1
T1	Transformer, Bias Oscillator, 100 kHz (B.E. Manufacture)	372-0095	1
U1,U2	Integrated Circuit, LM3900, Quad Operational Amplifier, 14-Pin DIP	221-3900	2
U4	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
U6	Integrated Circuit, CD4016AE, Quad Bilateral Switch, CMOS, 14-Pin DIP	228-8016	1
U7	Integrated Circuit, MM74COON, Quad 2-Input NAND, CMOS, 14-Pin DIP	221-7400	1
U8	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
U9,U10	Integrated Circuit, MM74COON, Quad 2-Input, NAND Gate, CMOS, 14-Pin DIP	221-7400	2
U11	Integrated Circuit, MM74CO8N, 2-Input AND, CMOS, 14-Pin DIP	221-7408	1
U12	Integrated Circuit, MM74C32N, 2-Input OR Gate, 14-Pin DIP	221-7432	1
—	Socket, 14-Pin DIP	417-1404	8
—	Socket, 8-Pin DIP	417-0804	2
—	Pins, Circuit Board Disconnect	418-0161	6
—	Blank Circuit Board	514-2101	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101-001, 914-2111-001
(Sheet 5 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
ADDITIONAL PARTS FOR 914-2111-001 ASSEMBLY (STEREO MODELS) ONLY			
C3,C4	Capacitor, Mica, 50 pF $\pm 5\%$, 500V	040-5013	2
C10	Capacitor, Mylar, 0.1 uF, 100V	030-1053	1
C11	Capacitor, Mica, 220 pF, 500V	040-2223	1
C12	Capacitor, Mica, 150 pF, 500V	040-1522	1
C29	Capacitor, Electrolytic, 10 uF, 16V	023-1075	1
C31	Capacitor, Electrolytic, 1 uF, 50V	024-1064	1
C41	Capacitor, Mica, 50 pF, 50V	040-5013	1
C46,C47	Capacitor, Ceramic Disc, 0.001 uF, 1000V	002-1034	2
C49,C50	Capacitor, Electrolytic, 10 uF, 16V	023-1075	2
C52	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C54	Capacitor, Poly Film, 0.0033 uF, 630V	030-3033	1
C56	Capacitor, Electrolytic, 3.3 uF, 50V	020-3363	1
D4 THRU D7	Diode, 1N98, Vermanium, 80V @ 0.2 Ampere	202-0098	4
L2	Inductor, Adjustable, 8-20 uH	363-9061	1
L5	Choke, Ferrite, 4-Leg Each Winding 4 turns of No.32 enameled wire wound from same direction on same side.	956-0002	1
Q2,Q10	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
R2	Potentiometer, 500 k Ohm $\pm 10\%$, 1/2W	178-5064	1
R32	Resistor, 3.9 k Ohm $\pm 5\%$, 1/4W	100-3943	1
R39	Resistor, 2.7 k Ohm $\pm 5\%$, 1/4W	100-2743	1
R40	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R41	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	1
R49	Resistor, 270 k Ohm $\pm 5\%$, 1/4W	100-2763	1
R50	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R63,R64	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	2
R65	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	1
R73,R74	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	2
R75	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	1
R79	Resistor, 470 k Ohm $\pm 5\%$, 1/4W	100-4763	1
R80,R81	Resistor, 4.7 k Ohm $\pm 5\%$, 1/4W	100-4743	2
R82	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	1
R83	Potentiometer, 100 k Ohm $\pm 10\%$, 1/2W	178-1064	1
R88	Resistor, 8.2 k Ohm $\pm 5\%$, 1/4W	100-8243	1
R89	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R90	Resistor, 39 k Ohm $\pm 5\%$, 1/4W	100-3953	1
R91	Resistor, 9.1 k Ohm $\pm 5\%$, 1/4W	100-9143	1
R92	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R96	Potentiometer, 50 k Ohm $\pm 10\%$, 1/2W	178-5054	1
R97	Potentiometer, 1 Meg Ohm $\pm 10\%$, 1/2W	178-1074	1
R98	Resistor, 120 k Ohm $\pm 5\%$, 1/4W	100-1263	1
R99	Resistor, 1.2 k Ohm $\pm 5\%$, 1/4W	100-1243	1
R100	Resistor, 22 k Ohm $\pm 5\%$, 1/4W	100-2253	1
R104	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R131	Resistor, 100 Ohm $\pm 5\%$, 1/4W	100-1033	1
U3	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1

TABLE 6-13. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101-001, 914-2111-001
(Sheet 6 of 6)

REF. DES.	DESCRIPTION	PART NO.	QTY.
U5	Integrated Circuit, CD4016AE, Quad Bilateral Switch, CMOS, 14-Pin DIP	228-8016	1
—	Socket, 8-Pin DIP	417-0804	1
—	Socket, 14-Pin DIP	417-1404	1
—	Pins, Circuit Board Disconnect	418-0161	3

TABLE 6-14. MONITOR PLAYBACK AMPLIFIER CIRCUIT BOARD ASSEMBLY - 910-2124

REF. DES.	DESCRIPTION	PART NO.	QTY.
C1	Capacitor, Ceramic Disc, 50 pF, 500V	001-5014	1
C2	Capacitor, Electrolytic, 1 uF, 35V, Tantalum	064-1063	1
C3	Capacitor, Ceramic Disc, 10 pF $\pm 10\%$, 1 kV	001-1014	1
C4	Capacitor, Electrolytic, 10 uF, 35V	023-1076	1
C5,C6	Capacitor, Electrolytic, 33 uF, 35V	024-3335	2
C7,C8	Capacitor, Electrolytic, 100 uF, 25V	023-1084	2
D1	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
D2	Diode, 1N98, Germanium, 80V @ 0.2 Ampere	202-0098	1
F1	Fuse, AGC, 1 Ampere	330-0100	1
L1	Choke, Ferrite, 2 Leg, 4 Turns of No.32 enameled wire	956-0001	1
LDR1	LDR, LED Type, Opto Isolator, 10-40 mA, 200V Maximum	323-7345	1
Q1	Transistor, 2N6122, NPN, Silicon	219-0031	1
Q2	Transistor, 2N6125, PNP, Silicon	218-0032	1
R1	Resistor, 10 k Ohm $\pm 5\%$, 1/4W	100-1053	1
R2	Resistor, 3.3 k Ohm $\pm 5\%$, 1/4W	100-3343	1
R3	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R4	Resistor, 20 k Ohm $\pm 5\%$, 1/4W	100-2043	1
R5	Resistor, 100 k Ohm $\pm 5\%$, 1/4W	100-1063	1
R6	Resistor, 620 Ohm $\pm 5\%$, 1/4W	100-6233	1
R7,R8	Resistor, 1 k Ohm $\pm 5\%$, 1/4W	100-1043	2
R9	Resistor, 620 Ohm $\pm 5\%$, 1/4W	100-6233	1
R10,R11	Resistor, 33 Ohm $\pm 10\%$, 2W, W/W	122-3302	2
R12	Resistor, 1.2 k Ohm $\pm 5\%$, 1/4W	100-1243	1
U1	Integrated Circuit, NE5534AN, Low Noise Operational Amplifier, 8-Pin DIP	221-5534	1
—	Fuse Clips, AGC	415-2068	2
—	Socket, 8-Pin	417-0804	1
—	Blank Circuit Board	510-2124	1

**TABLE 6-15. PLAYBACK HEAD LEAD AND MOTHERBOARD CABLE ASSEMBLY
940-2143-001**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Plug, Ribbon Cable, 26-Pin Dual In-line	418-2600	2
—	Pin Receptacle	417-0160	9

**TABLE 6-16. RECORD HEAD LEAD AND MOTHERBOARD CABLE ASSEMBLY -
940-2143-002**

REF. DES.	DESCRIPTION	PART NO.	QTY.
—	Plug, Ribbon Cable, 26-Pin Dual In-line	418-2600	2
—	Pin Receptacle	417-0160	18

TABLE 6-17. MUTE CIRCUIT BOARD ASSEMBLY - 910-0121

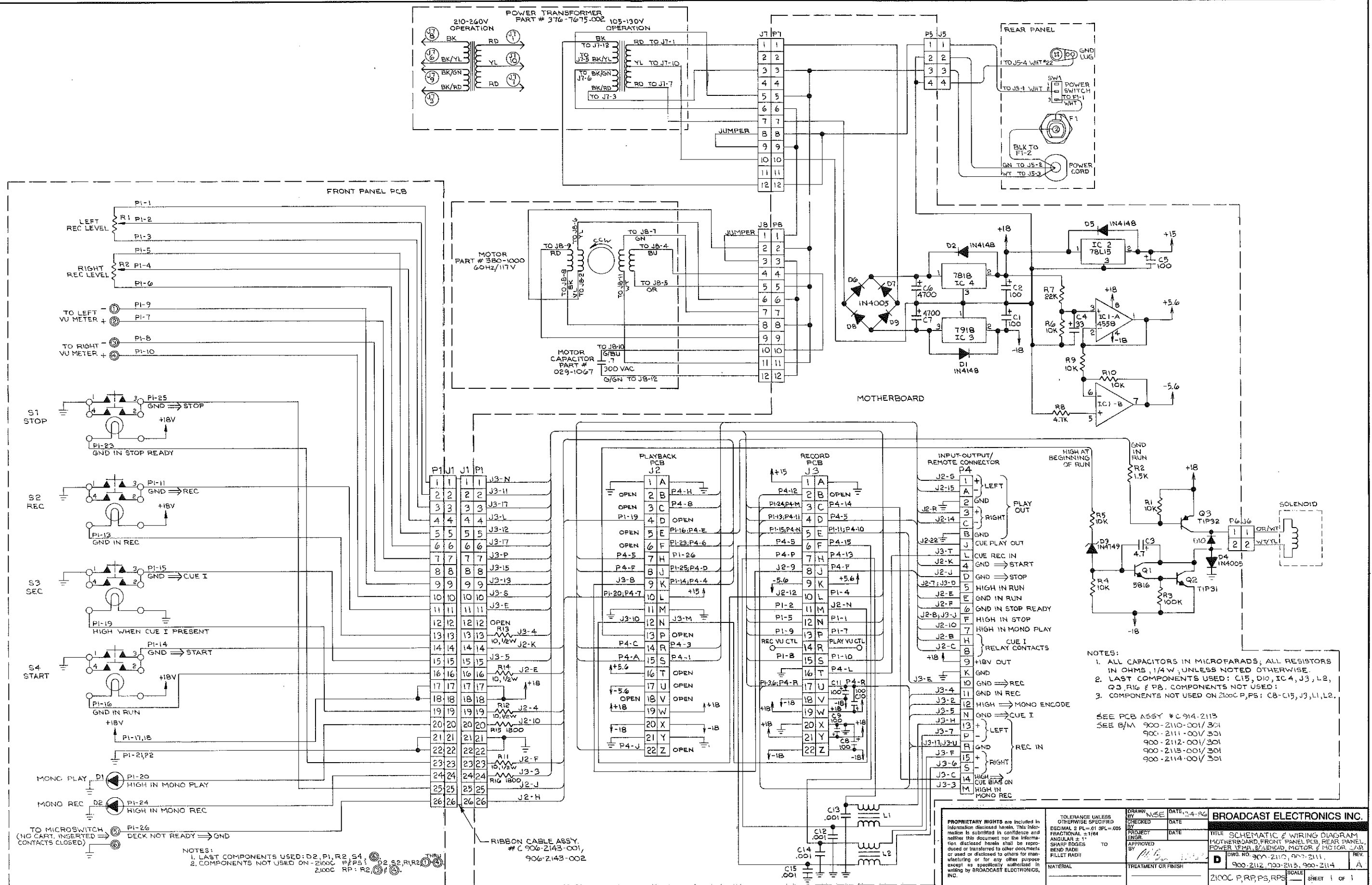
REF. DES.	DESCRIPTION	PART NO.	QTY.
C1,	Capacitor, Electrolytic, 10uf, 35V	023-1075	1
C2,	Capacitor, Monolythic Ceramic, 0.1uf, $\pm 20\%$, 50V	003-1054	1
C3	Capacitor, Electrolytic, 10uf, 35V	023-1075	1
C4, C5	Capacitor, Monolythic, 0.1uf, $\pm 20\%$, 50V	003-1054	2
C6	Capacitor, Electrolytic, 10uf, 35V	023-1075	1
J1	Receptacle, Male, 20-Pin In-line	417-0200	1
J2, J3	Connector, Pins	417-0160	2
Q1	Field Effect Transistor, J271, P-Channel JEFT, TO-92 Case	210-0271	1
Q2	Transistor, 2N3904, NPN, Silicon, TO-92	211-3904	1
Q3, Q4	Field Effect Transistor, J271, P-Channel JFET, TO-92 Case	210-0271	2
Q5	Transistor, 2N3904, NPN, Silicon, TO-92	211-3904	1
R1,R2	Resistor, 100K Ohm $\pm 1\%$, 1/4W	103-1062	2
R3, R4	Resistor, 499K Ohm $\pm 1\%$, 1/4W	103-4996	2
R5	Resistor, 100K Ohm $\pm 1\%$, 1/4W	103-1062	1
R6, R7	Resistor, 499K Ohm $\pm 1\%$, 1/4W	103-4996	2
R8	Resistor, 150K Ohm $\pm 1\%$, 1/4W	103-1561	1
R9, R10	Resistor, 499K Ohm $\pm 1\%$, 1/4W	103-4996	2
R11	Resistor, 100K Ohm $\pm 1\%$, 1/4W	103-1062	1
—	Blank Circuit Board	510-0121	1

SECTION VII DRAWINGS

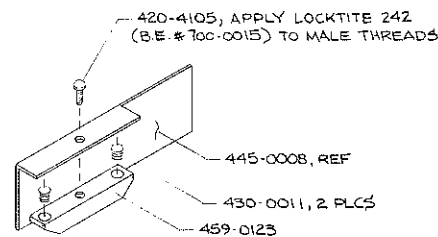
7-1. INTRODUCTION.

- 7-2. This section provides assembly drawings, wiring diagrams, and schematic diagrams as listed below for the Broadcast Electronics 2100C series cartridge machines.

FIGURE	TITLE	NUMBER
7-1	2100C SERIES SCHEMATIC AND WIRING DIAGRAM	SD900-2110, -2111, -2112, -2113, -2114
7-2	MOTHERBOARD CIRCUIT BOARD ASSEMBLY	AC914-2113
7-3	2100C SERIES ASSEMBLY	AD900-21XX-XXX
7-4	PLAYBACK LOGIC CIRCUIT BOARD SCHEMATIC	SD906-2139
7-5	PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY	AC914-2110
7-6	RECORD LOGIC CIRCUIT BOARD SCHEMATIC	SD914-2101-001 -2111-001
7-7	RECORD LOGIC CIRCUIT BOARD ASSEMBLY	AC914-2101-001 -2111-001
7-8	MONITOR/PLAYBACK AMPLIFIER CIRCUIT BOARD SCHEMATIC	SB906-0024
7-9	MONITOR/PLAYBACK AMPLIFIER CIRCUIT BOARD ASSEMBLY	AC910-2124
7-10	MUTE CIRCUIT BOARD SCHEMATIC	SB910-0121
7-11	MUTE CIRCUIT BOARD ASSEMBLY	AC910-0121
7-12	2100C SERIES RACK MOUNT SHELF ASSEMBLY	597-2100-51



DETAIL 'A'



MODEL	MOTHERBOARD
900-2110-001	914-2103
900-2111-001	914-2113
900-2112-001	914-2103
900-2113-001	914-2113
900-2114-001	914-2113

914-2113
MTS TO 471-0046-001 & 471-0047-001
USING (4) 420-4002

MODEL	P.C. BOARD
900-2110-001	NONE
900-2111-001	914-2101-001
900-2112-001	NONE
900-2113-001	914-2111-001
900-2114-001	910-2124

MODEL	P.C. BOARD
900-2110-001	914-2100
900-2111-001	914-2100
900-2112-001	914-2110
900-2113-001	914-2110
900-2114-001	914-2100

471-0050 MTS. TO
471-0046-001 & 471-0047-001
USING (6) 420-6104, (6) 423-6002,
SEE SHT. 3 FOR WIRING.

421-6020
423-6002
423-6001
421-6001
423-6002
410-1416
420-6110
415-2012
330-0100
FOR 220V/50 HZ USE FUSE 330-0050.

681-1723, FOR 220V/50 HZ USE
LINE CORD 681-0001

470-0099, MTS. TO 471-0050
USING (2) 420-6105, (2) 423-6002,
(2) 421-6001

460-0004-001
MTS. TO 471-0046-001 &
471-0047-001 USING (4)
420-4001, SEE SHEET 2
FOR ASSY & SHEET 3
FOR WIRING.

471-0047-001
SEE DETAIL 'A'

445-0008

420-4019, 3
PLCS, LOCKTITE
242 (700-0015) TO
MALE THREADS.

029-1067, FOR 220V/50 HZ
USE 029-1075

591-0016, TRIM
LEGS TO 1/8" LG., MTS
WITH (2) 454-5200
TURNED SIDEWAYS

950-0300-006 MTS.
TO 471-0046-001 & 471-0047-001
USING (4) 420-8508.

420-0116
423-0002
423-0001,
TYP. 2 PLCS

471-0045,
MTS. TO 471-0046-001,
471-0047-001 USING
(3) 420-4504

420-6105
423-6002
421-6001

471-0048, MTS TO
471-0050 & 471-0045,
USING (3) 420-6105,
(3) 423-6002

690-1200, 402-0000

376-7675-002, MTS TO
471-0046-001 USING (3) 420-6133
(4) 423-6002, SEE DETAIL 'B'

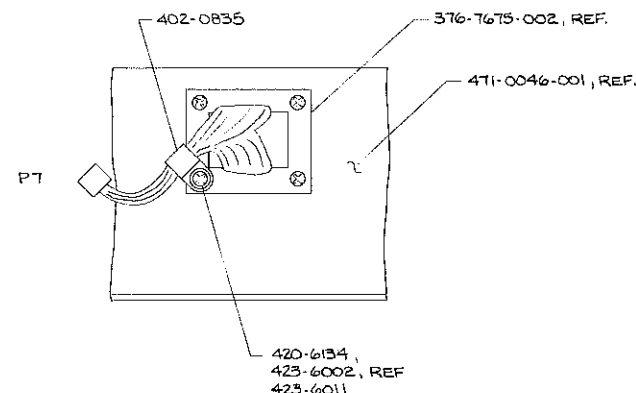
441-0020, 4 PLCS

(4) 420-6004

420-6118
423-6002
421-6001,
TYP. 3 PLCS

900-2110-001	900-2110-301
900-2111-001	900-2111-301
900-2112-001	900-2112-301
900-2113-001	900-2113-301
900-2114-001	900-2114-301

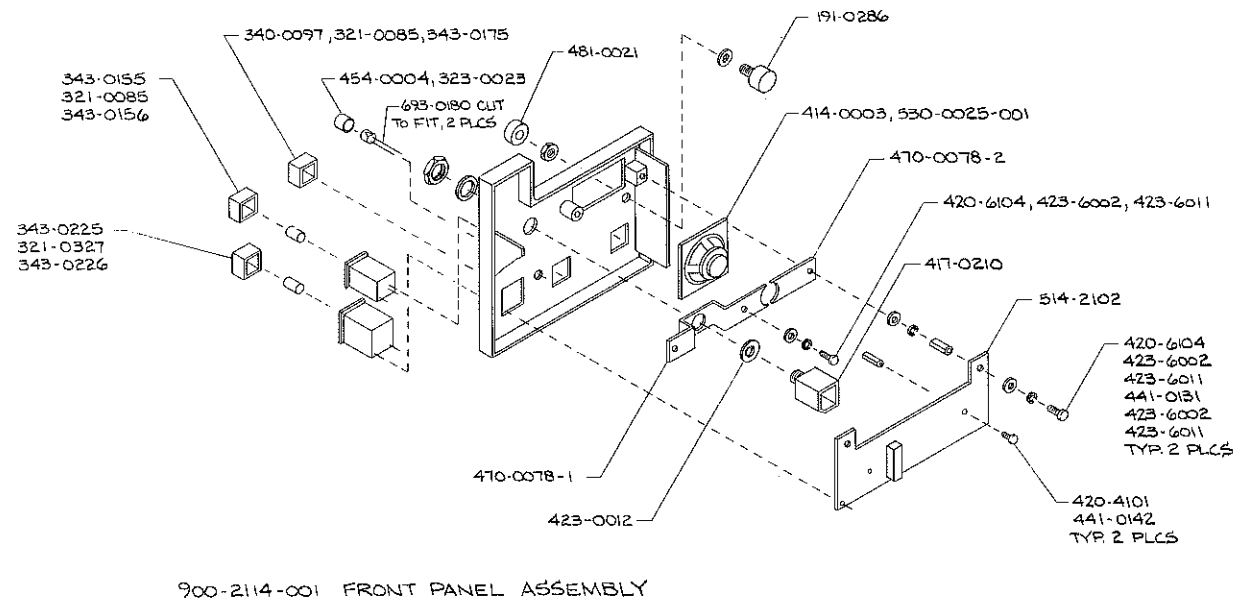
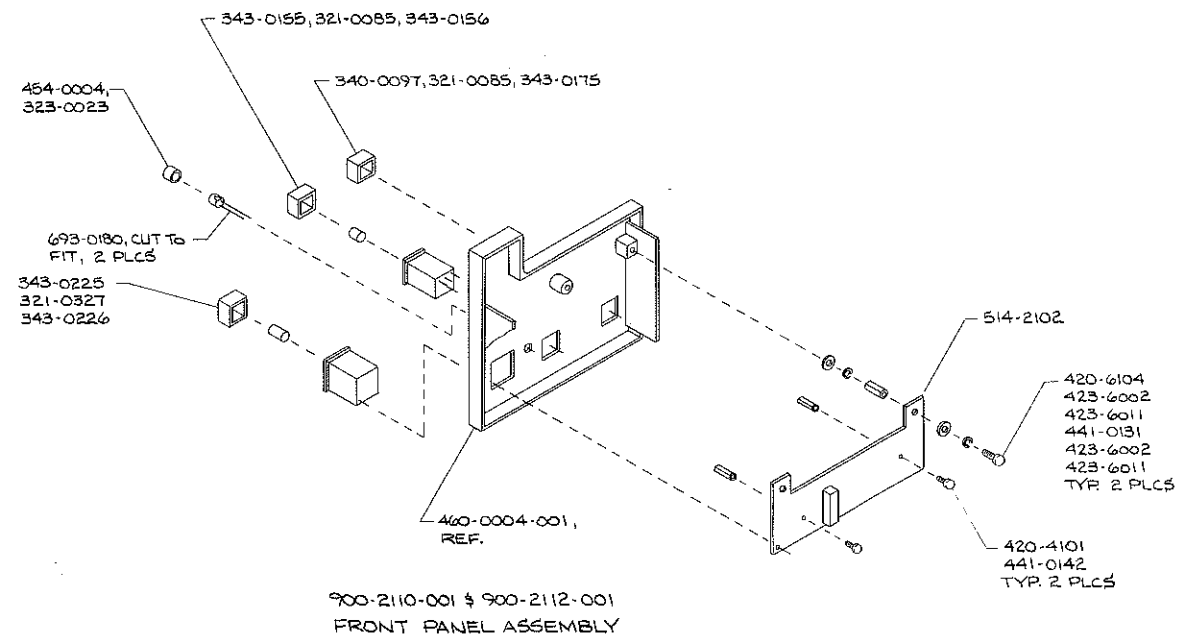
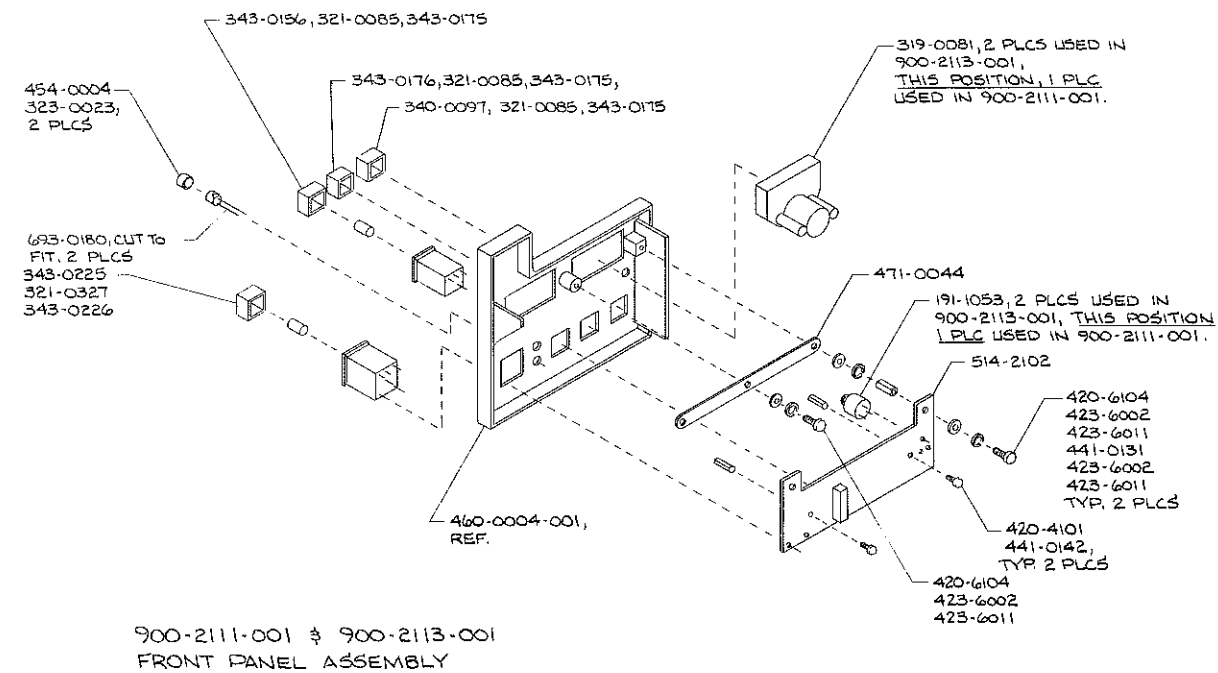
DETAIL 'B'



NOTES:

- 1) * - 2 PLCS ON 900-2110-001/301, 900-2112-001/301,
4 PLCS ON 900-2111-001/301, 900-2113-001/301,
900-2114-001/301.

<small>PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transmitted to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.</small>	<small>DWN. BY</small> MSE 10-31-86 <small>CHKD</small>	<small>MATERIAL</small> SEE B/M	BROADCAST ELECTRONICS INC. <small>4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-8600</small> <small>TELEX 250142 - CABLE BROADCAST</small>
	<small>ME</small> <small>PROJ. ENGR.</small> <small>MFG.</small>	<small>FINISH</small> <small>SEE DWG RA592-0000</small> <small>NEXT ASSY.</small>	
<small>TOLERANCE (DECIMAL) U.S.</small> .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°	<small>DATE</small> 11/1/87	<small>REV</small> A D	<small>TITLE</small> ASSEMBLY 2100 <small>MODEL</small> 2100C <small>SCALE</small> ~ <small>SHEET</small> 1 OF 5



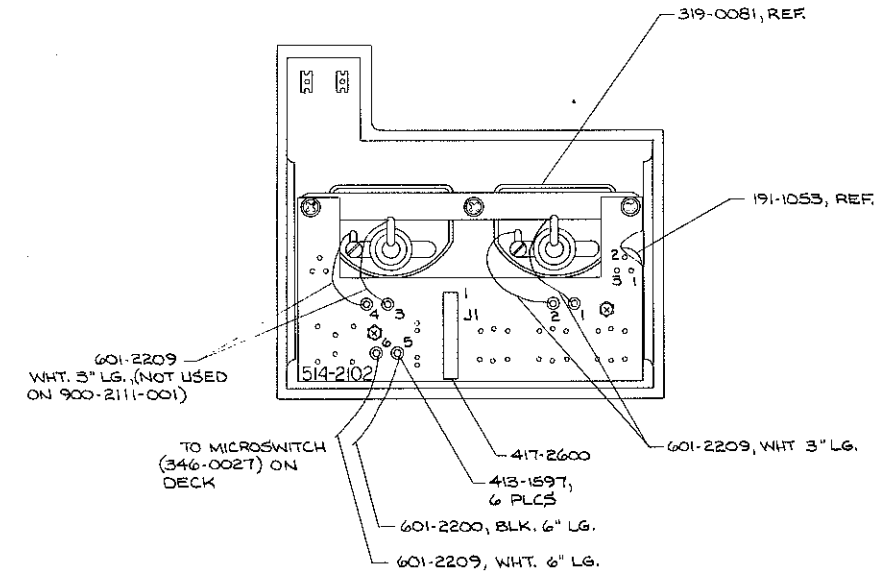
BEFORE FRONT PANEL ASSY.
INSTALL PROPER OVERLAY. REFER
TO CHART BELOW.

MODEL	UPPER OVERLAY	LOWER OVERLAY
900-2110-001/301	596-0004-001	596-0001-001
900-2111-001/301	596-0003-001	596-0000-001
900-2112-001/301	596-0004-001	596-0001-001
900-2113-001/301	596-0002-001	596-0000-001
900-2114-001/301	596-0003-001	596-0001-001

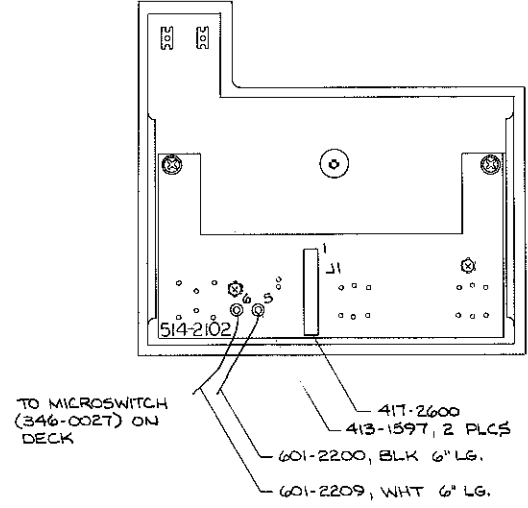
900-2110-001 900-2110-301
900-2111-001 900-2111-301
900-2112-001 900-2112-301
900-2113-001 900-2113-301
900-2114-001 900-2114-301

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transmitted to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.		DWN. BY MSE	MATERIAL SEE B/M	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST
TOLERANCE (DECIMAL) U.S.S. .x ± .030 .xx ± .015 .xx ± .015 ANGLES ± 1°		ME PROJ. ENGR.	FINISH SEE DWG RA582-0000	
TYPE A		SIZE D	DWG. NO. SEE ABOVE	
MODEL 2100C		SCALE 	SHEET 2 OF 5	

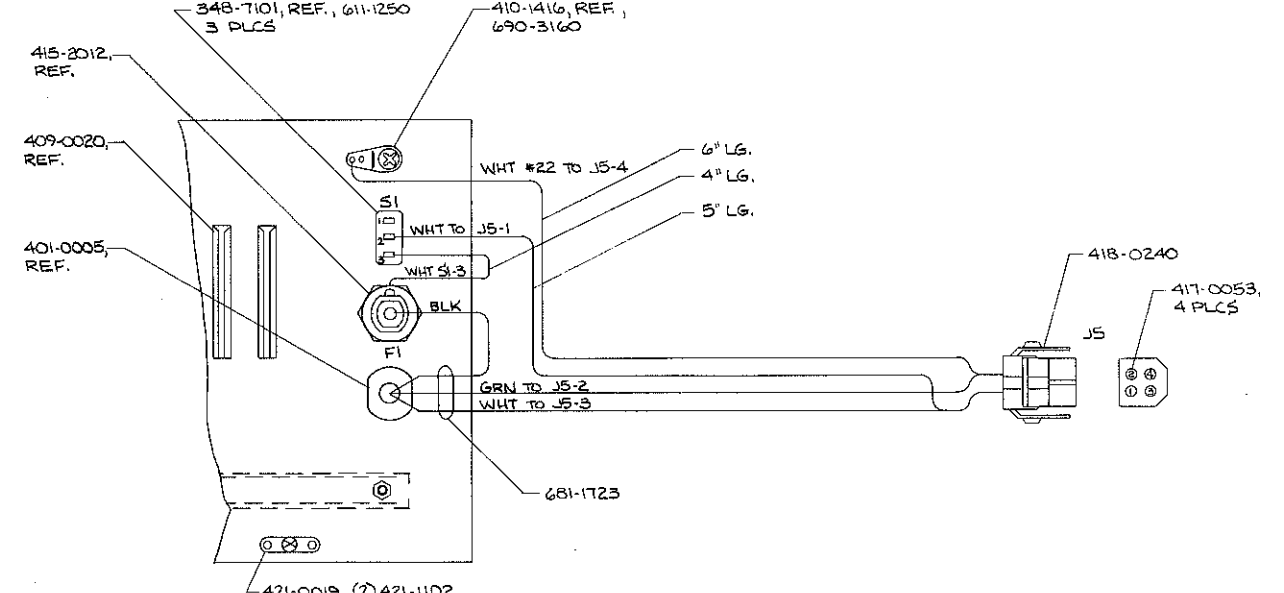
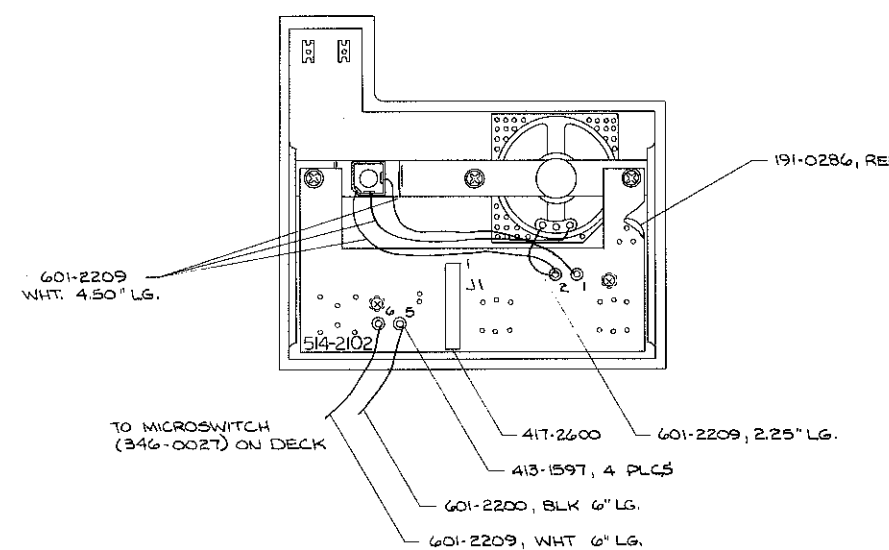
900-2111-001 & 900-2113-001 FRONT
PANEL WIRING



900-2110-001 & 900-2112-001 FRONT
PANEL WIRING




900-2114-001 FRONT PANEL WIRING

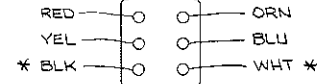


REAR PANEL WIRING FOR 900-2110-001,
900-2111-001, 900-2112-001, 900-2113-001 &
900-2114-001

900-2110-001	900-2110-301
900-2111-001	900-2111-301
900-2112-001	900-2112-301
900-2113-001	900-2113-301
900-2114-001	900-2114-301

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.		DWN. BY MSE	MATERIAL SEE B/M	 BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O. BOX 3806 QUINCY, IL 62305 217/224-9800 TELEX 250142 CABLE BROADCAST
		CHKD		
		ME	FINISH	
		PROJ. ENGR.	SEE DWG RA592-0000	
TOLERANCE (DECIMAL) U.O.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		MFG.	NEXT ASSY.	TITLE ASSEMBLY 2100
				TYPE A
				SIZE D
				DWG. NO. SEE ABOVE
				REV D
				MODEL 2100C
				SCALE ~
				SHEET 3 OF 5

LABEL (MARKINGS)



* - NOT USED IN MONO UNITS

250-0006 (MONO)
250-0007 (STEREO)
252-0018 (MONO)
253-0015 (STEREO)

MODEL	HEAD 1	HEAD 2
900-2110-001/301	40T-0001	250-0006
900-2111-001/301	252-0018	250-0006
900-2112-001/301	40T-0001	250-0007
900-2113-001/301	253-0015	250-0007
900-2114-001/301	40T-0001	250-0006

471-0530 -
SECURE WITH
S.E. #100-0148,
CUT TO FIT.

444-0700 -
454-3318 -
423-5008,
423-5009 OPPOSITE SIDE

490-0008

940-2143-001
(IF USED)
940-2143-002
(IF USED)

280-0003
SEE DETAIL 'B'
FOR WIRING
470-0255, MTS. TO USING
(2) 420-810, (2) 423-8002, (2) 423-8001

421-0102
420-6018

459-0125, MTS. TO 490-0008
USING 420-410T & 423-4002

446-0059

446-0056

346-0027, MTS. TO 445-0006
USING (2) 420-210T, (2) 423-2002,
(2) 423-2001

611-0938, 3 PLCS

445-0006, MTS. TO
490-0008 USING (2)
420-6105, (2) 423-6002,
(2) 423-6011

420-4505
423-4002
410-0022

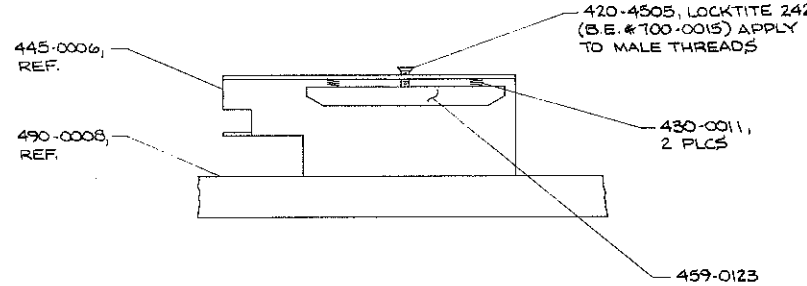
430-0014

449-0025

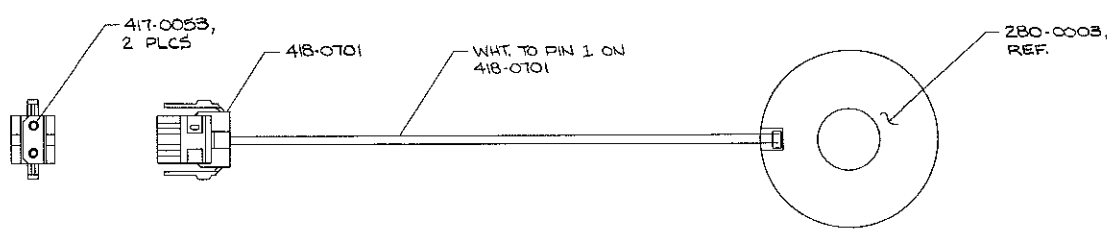
444-0005, INSERT PIN 425-0009 WHEN MOUNTING
TO 446-0059

471-0491, NOT SHOWN
MOUNTS HERE

DETAIL 'A'-A'

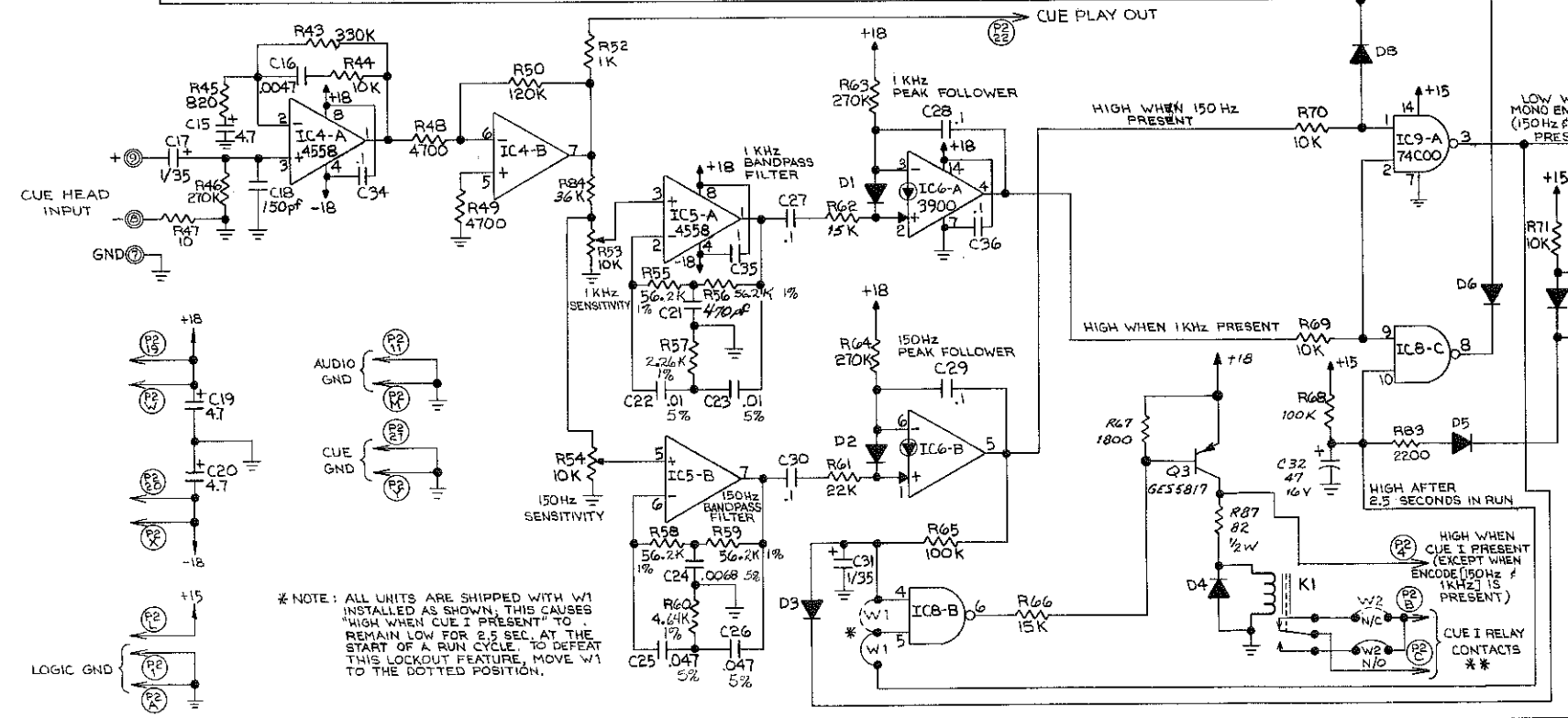
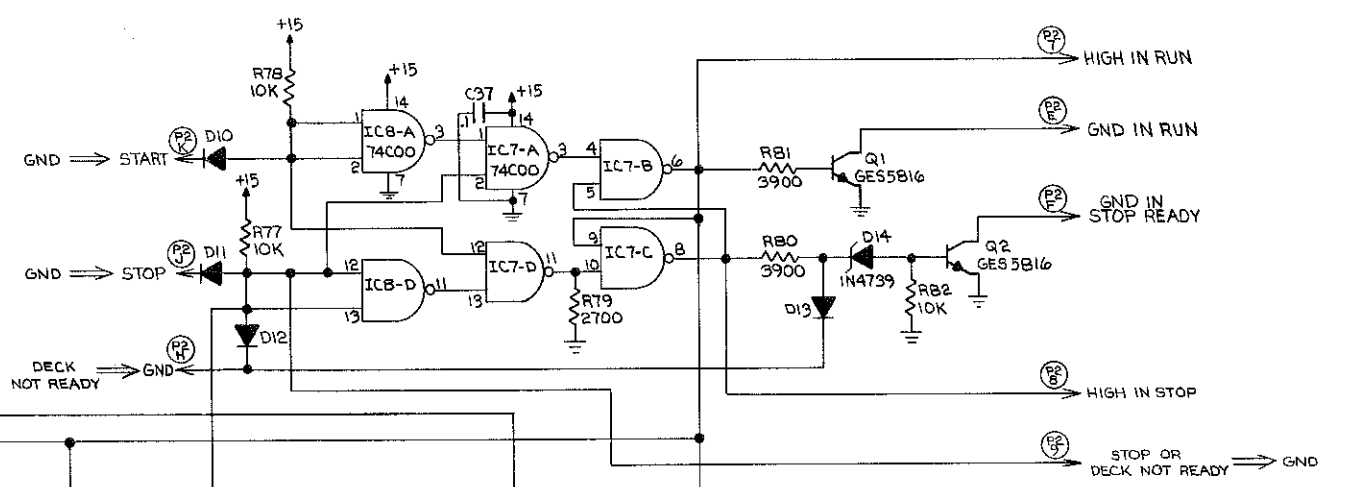
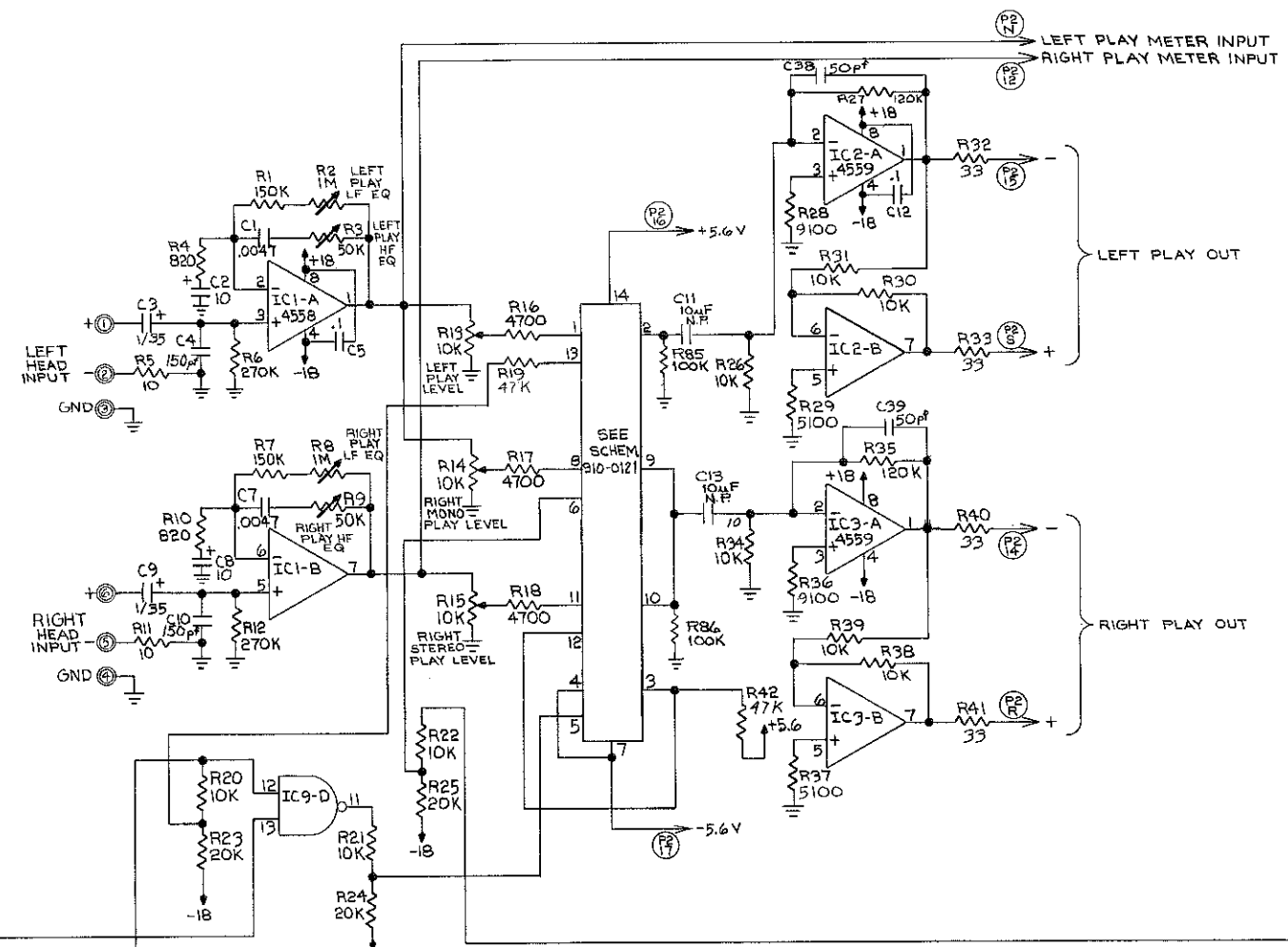


DETAIL 'B'



900-2110-001	900-2110-301
900-2111-001	900-2111-301
900-2112-001	900-2112-301
900-2113-001	900-2113-301
900-2114-001	900-2114-301

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.		DWN. BY MSE	MATERIAL SEE B/M	BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O. BOX 3806, QUINCY, IL 62305 217/224-9900 TELEX 250143 CABLE BROADCAST
TOLERANCE (DECIMAL) U.S.S. .x ± .030 .xxx ± .005 .xx ± .015 ANGLES ± 1°		CHKD	FINISH SEE DWG RA592-0000	
MFG.		PROJ. ENGR.	NEXT ASSY.	
TITLE ASSEMBLY 2100		TYPE A	SIZE D	
MODEL 2100C		SCALE 		SHEET 4 OF 5

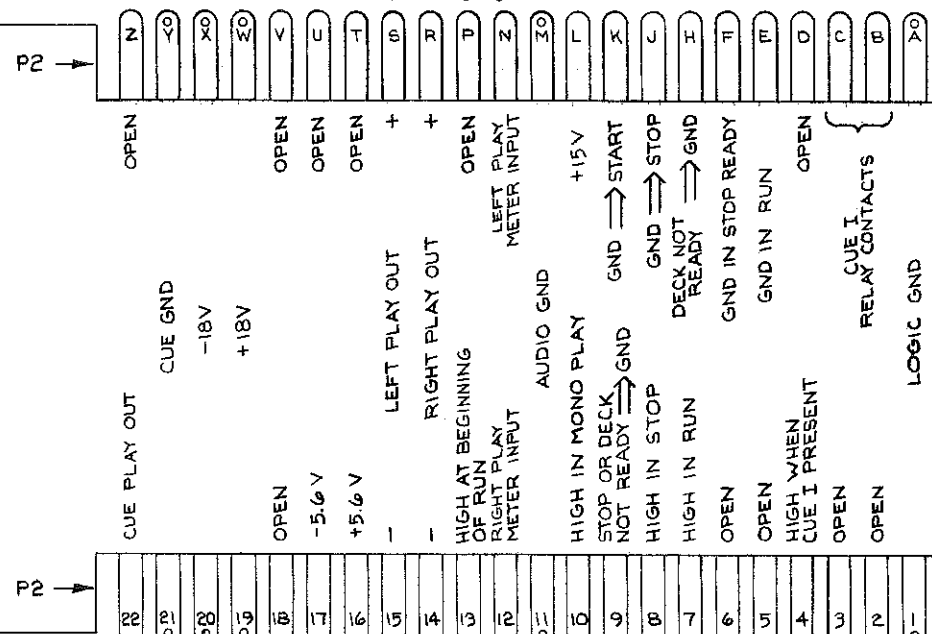
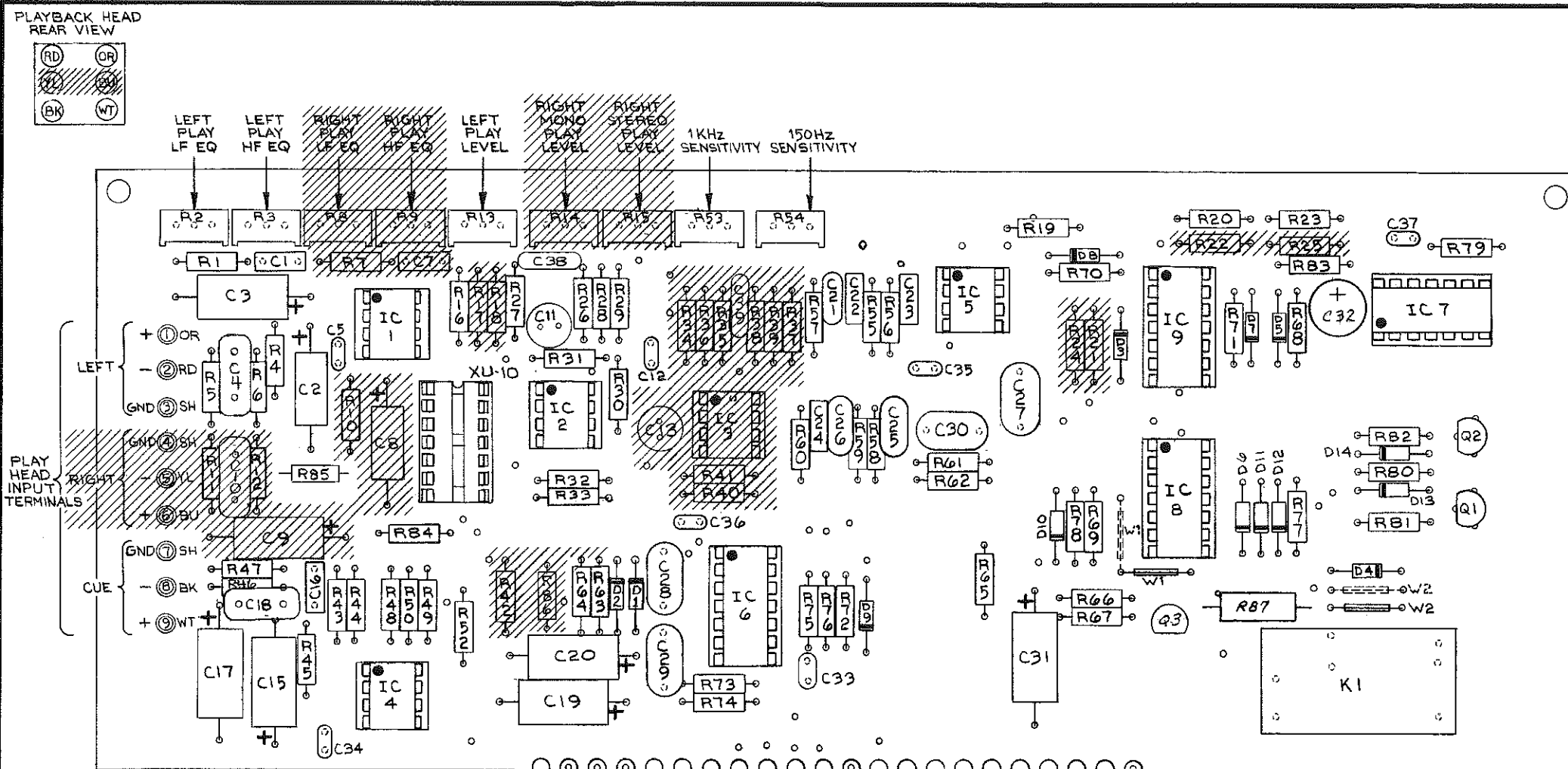


NOTES:
 1. RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS;
 DIODES IN4148, UNLESS OTHERWISE SPECIFIED.
 2. LAST COMPONENTS USED: C39, D14, IC10, K1, Q3, R87, ①.
 3. COMPONENTS NOT USED: R51.
 4. COMPONENTS NOT USED ON MONO VERSIONS: C7-C9, C14, C39, IC3, R7-R12, R14, R15, R17, R18, R21, R22, R24, R25, R34-R42, ④, ⑤.
 SEE B/M # 94-2100 FOR 2100 P, RP
 94-2110 FOR 2100 PS, RPS
 SEE PCB ASSEMBLY #C914-2110.

** NOTE: ALL UNITS ARE SHIPPED WITH W2 INSTALLED AS SHOWN; THIS CAUSES "CUE I RELAY CONTACTS" TO CLOSE WHEN ② IS HIGH.

* NOTE: ALL UNITS ARE SHIPPED WITH W1 INSTALLED AS SHOWN; THIS CAUSES "HIGH WHEN CUE I PRESENT" TO REMAIN LOW FOR 2.5 SEC. AT THE START OF A RUN CYCLE. TO DEFEAT THIS LOCKOUT FEATURE, MOVE W1 TO THE DOTTED POSITION.

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.	TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL-0.01 SPL-0.05 FRACTIONAL ±1/84 ANGULAR ±1° SHARP EDGES BEND RADI FILLET RADI		DRAWN BY M. HAYDEN CHECKED BY PROJECT ENGR. S. KIRK APPROVED BY	DATE 5-4-78 DATE 5-4-78	BROADCAST ELECTRONICS INC. TITLE SCHEMATIC PLAYBACK PCB DWS. NO. 906-2139 2100 P, RP, PS, RPS SCALE SHEET 1 OF 1
	MATERIAL		TREATMENT OR FINISH		



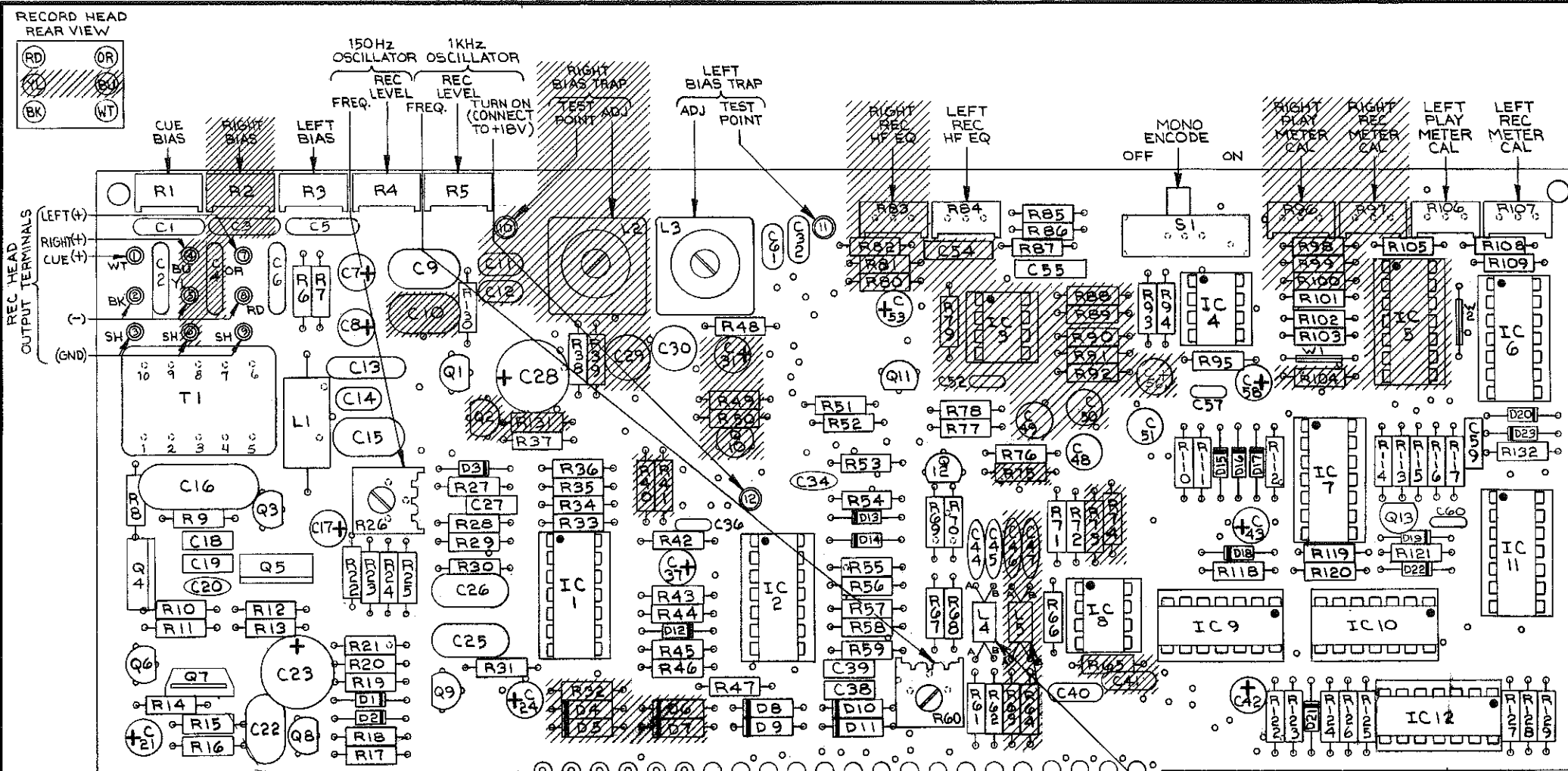
NOTES:
1. // - INDICATES COMPONENTS NOT USED ON MONO VERSIONS.

SEE B/M # 914-2100 FOR 2100 P,RP
914-2110 FOR 2100 PS,RPS
SEE SCHEMATIC # D-906-2139

CIRCUIT SIDE

FOR THE EXCLUSIVE USE OF
BROADCAST ELECTRONICS, INC.
PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL=01 3 PL=005 FRACTIONAL 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADII FILLET RADII		DRAWN BY M. HAYDEN	DATE 9/8/78	BROADCAST ELECTRONICS INC TITLE PCB ASS'Y. PLAYBACK C DWG NO. 914-2110 2100 P,RP,PS,RPS
		CHECKED BY	DATE	
		PROJECT ENGR HVM	DATE 3-16-79	
		APPROVED BY		
MATERIAL		TREATMENT OR FINISH		SCALE 2/1 SHEET 1 OF 1

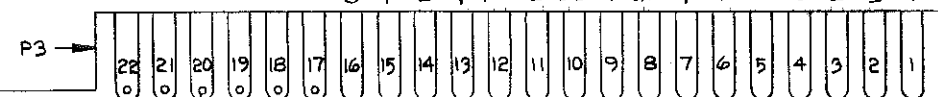


Copyright © 1986 BROADCAST ELECTRONICS, INC.



956-0002

BIAS -18V
BIAS +18V
BIAS GND
+18V
-18V
AUDIO GND
CUE GND
CUE REC IN
RIGHT VU METER
PLAY VU CTL
LEFT VU METER
TO LEFT REC LEVEL
FROM LEFT REC LEVEL
RIGHT PLAY METER INPUT
FROM RIGHT REC LEVEL
-5.6V
STOP OR DECK NOT READY
GND
HIGH IN STOP
LEFT REC IN
RIGHT REC IN
GND
CUE I
GND
HIGH IN REC
HIGH IN MONO REC
CUE BIAS ON
HIGH
MONO ENCODE
+15V



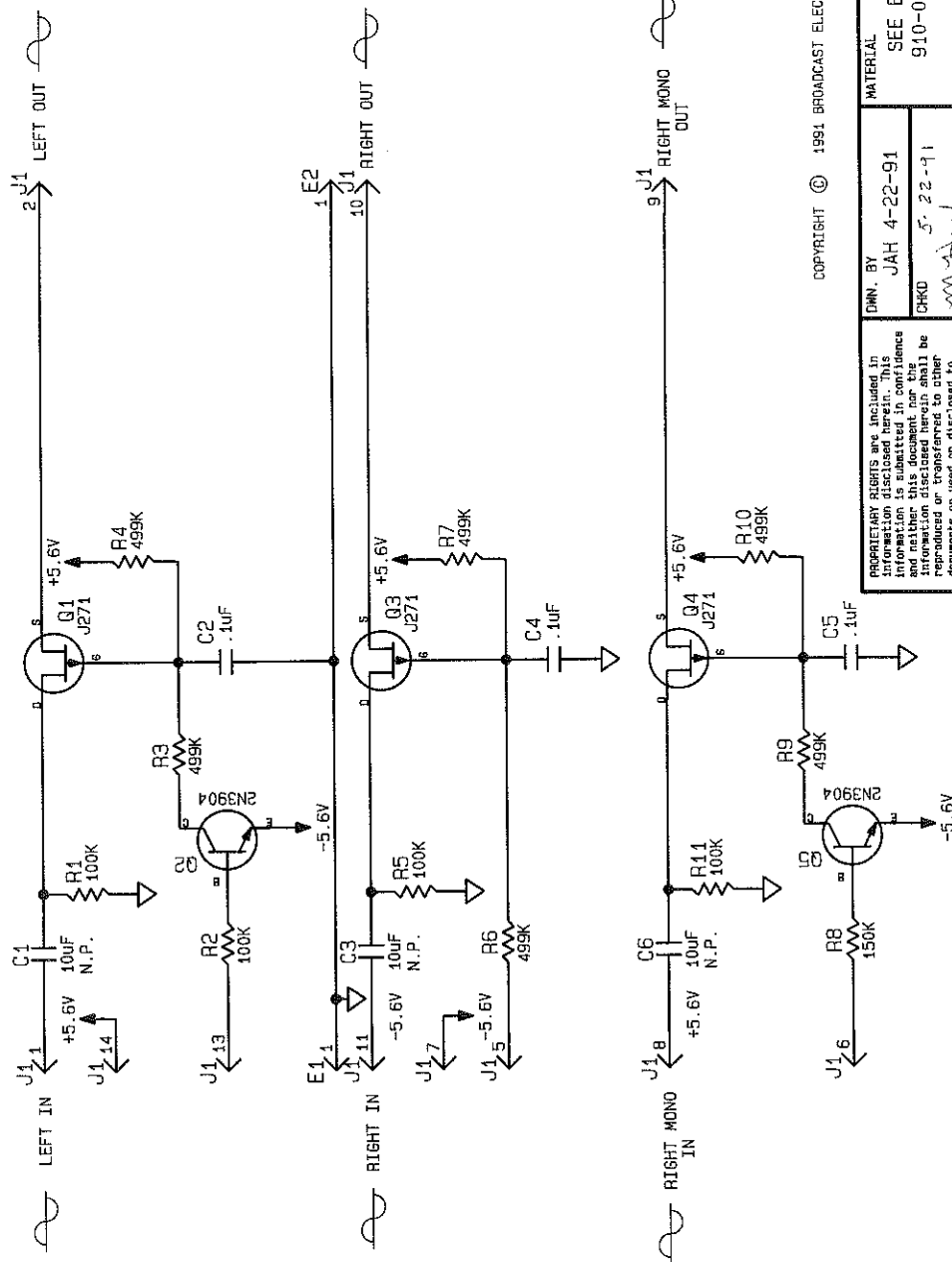
CIRCUIT SIDE

NOTES:
1. // - INDICATES COMPONENTS NOT USED ON MONO VERSIONS.
SEE SCHEMATIC # D 914-2101-001,
914-2111-001
SEE B/M # 914-2101-001 FOR RP
914-2111-001 FOR RPS

Copyright © 1986 BROADCAST ELECTRONICS, INC.

FOR THE EXCLUSIVE USE OF
BROADCAST ELECTRONICS, INC.
PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

ITEM	QTY RQD	PART NUMBER	DESCRIPTION		NOTE	
LIST OF MATERIAL						
TOLERANCE UNLESS OTHERWISE SPECIFIED DECIMAL 2 PL = .01 3 PL = .005 FRACTIONAL ± 1/64 ANGULAR ± 1° SHARP EDGES TO BEND RADI FILLET RADI		DRAWN BY MSE	DATE 11-26-86	BROADCAST ELECTRONICS INC - A FILMWAYS COMPANY -		
		CHECKED BY	DATE			
		PROJECT ENGR	DATE	TITLE PCB ASS'Y. RECORD		
		APPROVED BY				
MATERIAL		TREATMENT OR FINISH		C	DWG NO. 914-2111-001, 914-2101-001	REV F
				2100C RP, RPS	SCALE 2/1 SHEET 1 OF 1	



- NOTES:
1. ALL RESISTORS IN OHMS: 1/4W. 1%
 2. UNLESS OTHERWISE SPECIFIED.
 3. LAST COMPONENT USED: R11, C6, C5, & J3
 4. SEE ASSEMBLY: AC 910-0121

COPYRIGHT © 1991 BROADCAST ELECTRONICS, INC.

PROPRIETARY RIGHTS ARE INCLUDED IN THIS INFORMATION. THIS INFORMATION IS SUBMITTED IN CONFIDENCE AND IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF BROADCAST ELECTRONICS, INC.

TOLERANCE (DECIMAL) U.O.S.
 .X ± .030 .XXX ± .005
 .XX ± .015 ANGLES ± 1°

BROADCAST ELECTRONICS INC.
 4100 N. 24TH ST., P.O. BOX 3606 MILWAUKEE, WI 53235 217/224-9600
 TELETYPE 250142 CABLE BROADCAST FAX 217/224-9607

TITLE: 2100 MUTE
 TYPE: S B
 SIZE: 10-121
 DATE: 910-0121
 MODEL: 2100-CART
 SCALE: NONE
 SHEET: 1 OF 1

COPYRIGHT © 1991 BROADCAST ELECTRONICS, INC.

1 2 3 4

D

D

C

C

B

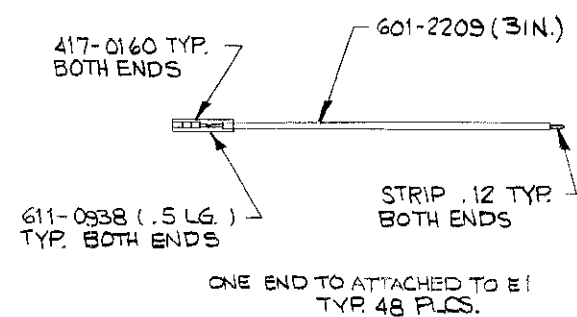
B

A

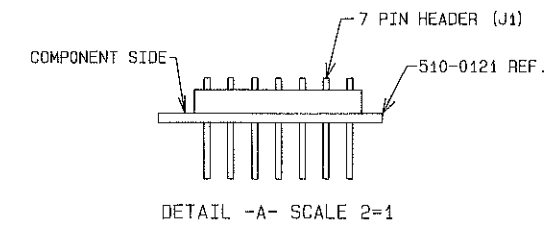
A

SEE DETAIL A

510-0121



NOTE:
1. LEADS TO BE HAND TRIMMED EXCEPT J1



COPYRIGHT © 1991 BROADCAST ELECTRONICS, INC.

COPYRIGHT © 1991 BROADCAST ELECTRONICS, INC.

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.		OWN. BY JAH 5-1-91		MATERIAL SEE B/M 910-0121		BROADCAST ELECTRONICS INC. 4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL. 62305 PH. 217/224-9600 TELEX 250142 CABLE BROADCAST FAX 217/224-9607	
CHKD 5-2-91		ME		FINISH		TITLE PCB ASSEMBLY 2100 MUTE BD	
PROJ. ENGR.		MFG.		SEE DWG RA592-0000 NEXT ASSY.		TYPE A	
TOLERANCE (DECIMAL) U.O.S. .X ± .030 .XXX ± .005 .XX ± .015 ANGLES ± 1°						DWG. No. 910-0121	
						REV A	
						MODEL 2100 CART	
						SCALE 1=1	
						SHEET 1 OF 1	

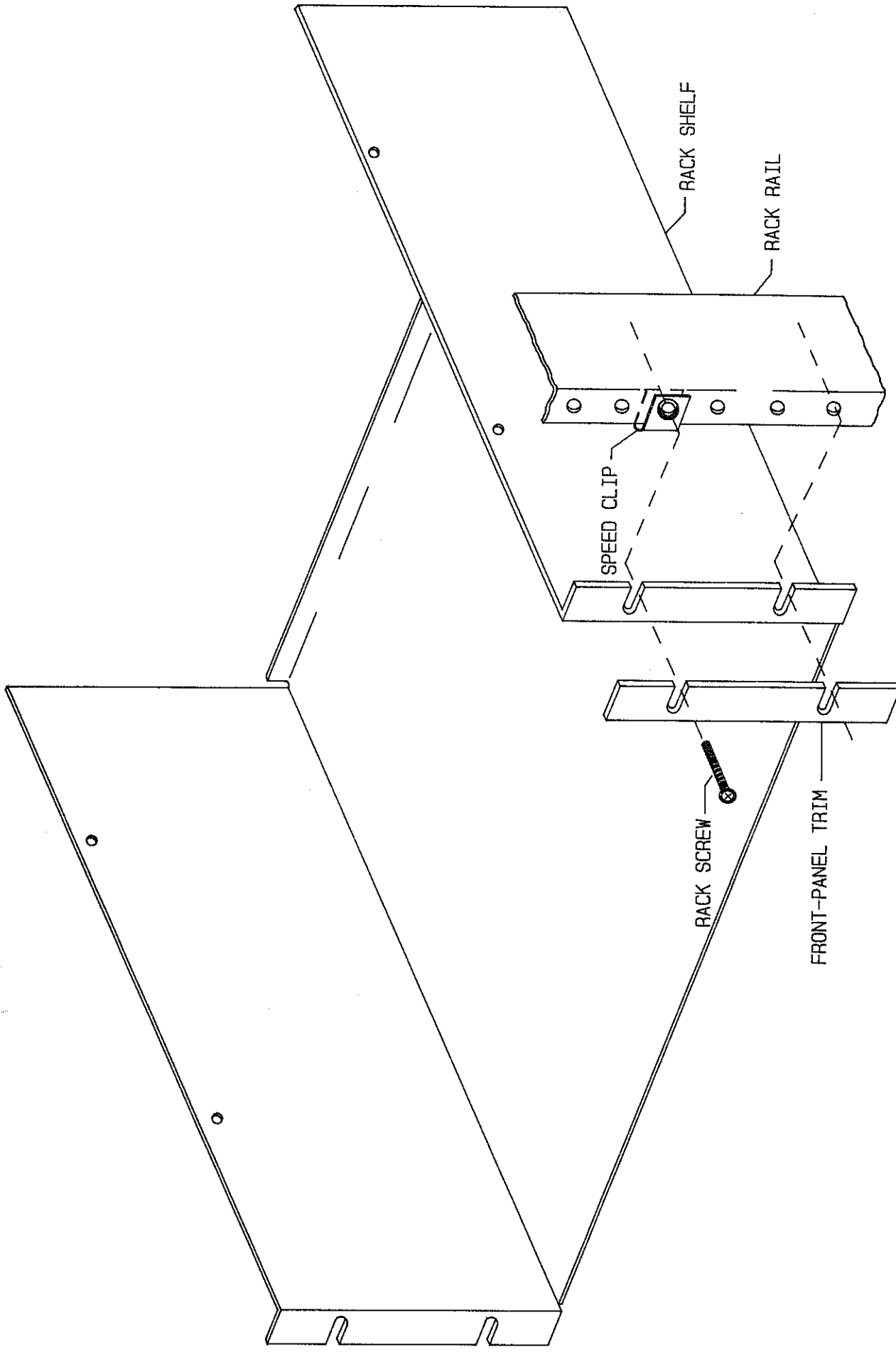
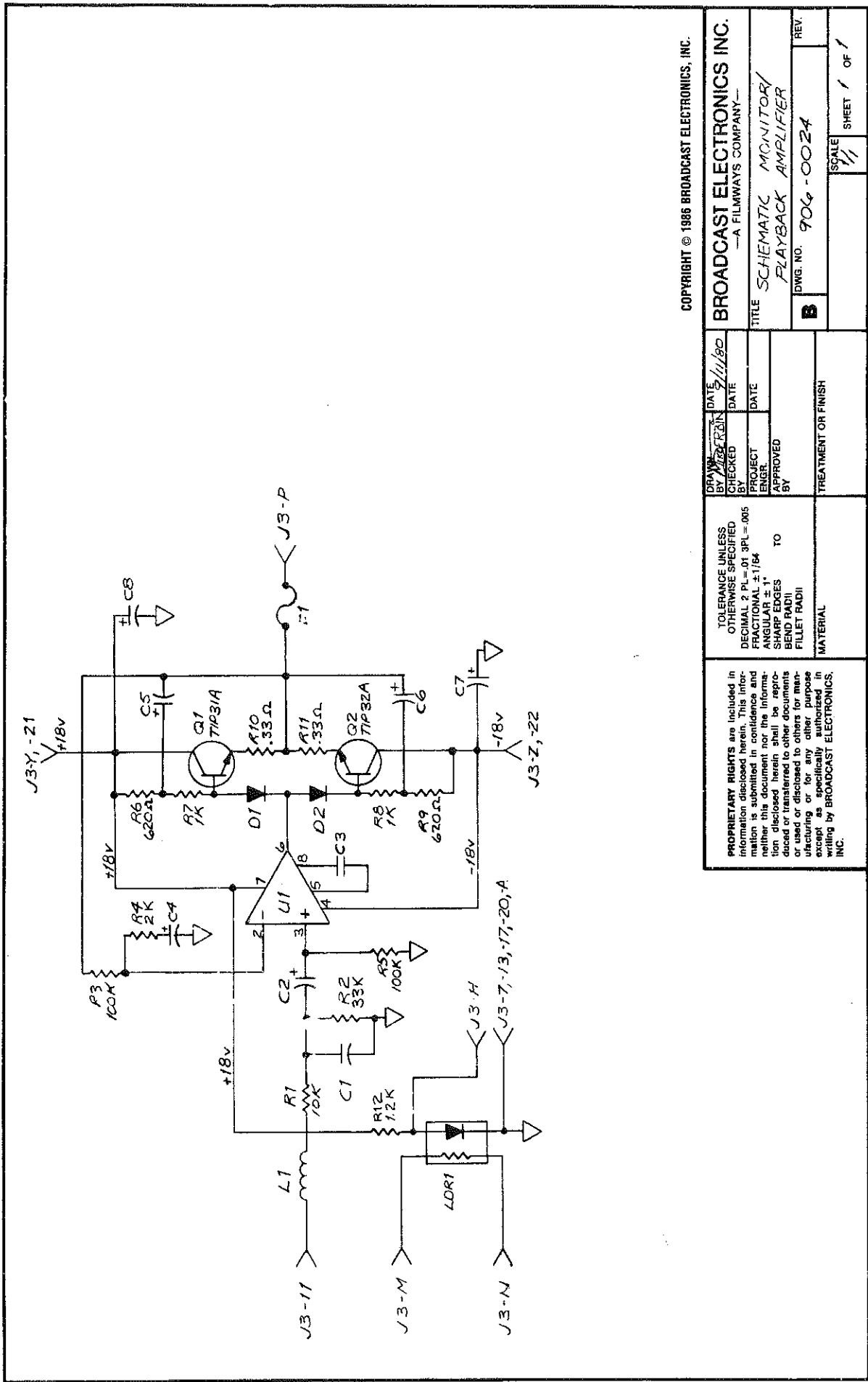


FIGURE 7-12. 2100C SERIES RACK MOUNT SHELF ASSEMBLY



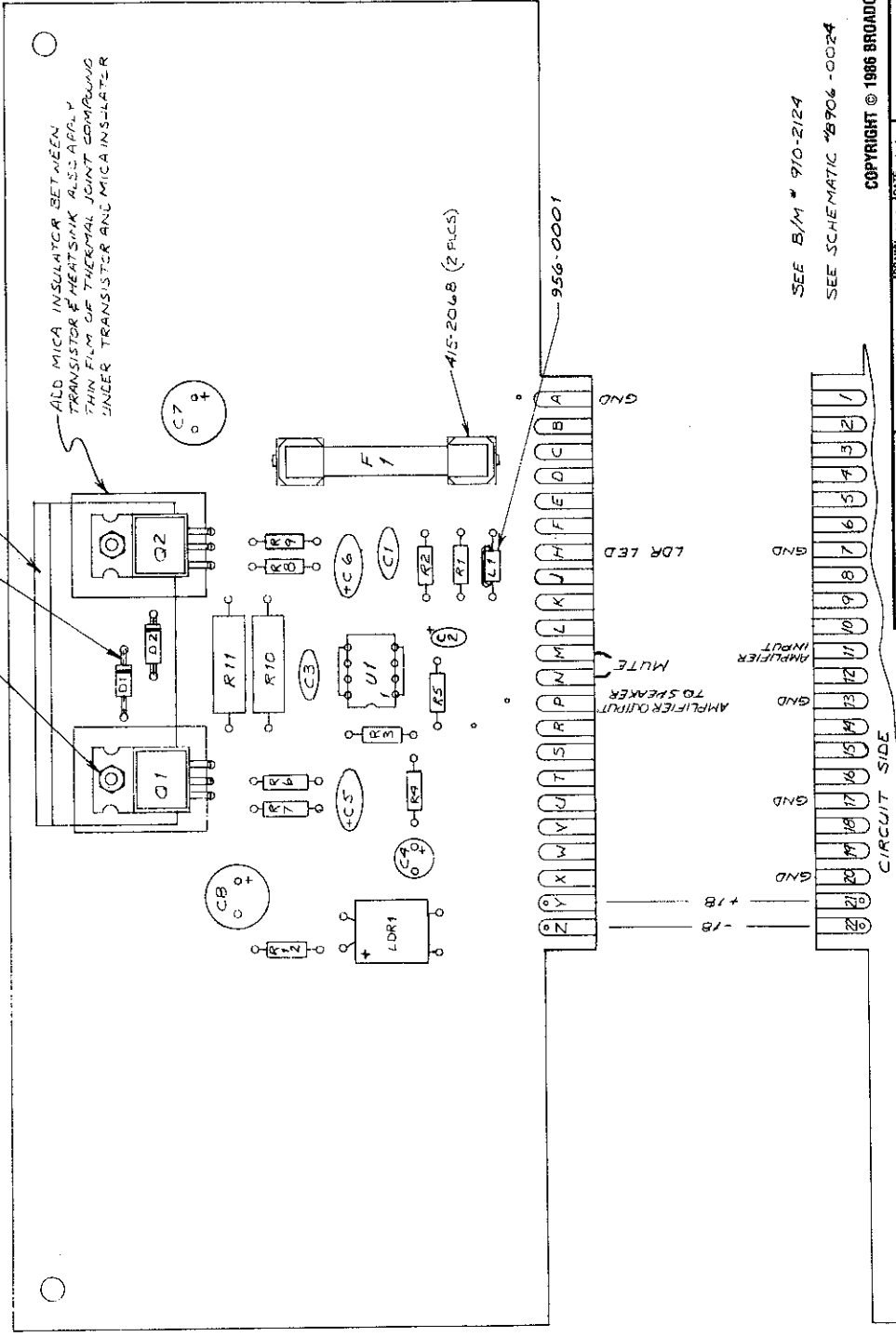
COPYRIGHT © 1986 BROADCAST ELECTRONICS, INC.

BROADCAST ELECTRONICS INC. — A FILMWAYS COMPANY —		DATE	DATE	DATE	DATE
TITLE		BY	CHECKED	PROJECT	ENGR.
SCHEMATIC MONITOR/ PLAYBACK AMPLIFIER		BY	APPROVED	BY	BY
DWG. NO. 906-0024		TREATMENT OR FINISH		MATERIAL	
REV.		SCALE		SHEET 1 OF 1	
B		1/1			

PROPRIETARY RIGHTS are included in information disclosed herein. This information is submitted in confidence and neither this document nor the information disclosed herein shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by BROADCAST ELECTRONICS, INC.

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

420-4107
423-4003 (2 PLCS)
421-9607
423-4001
693-0200 (9 PLCS)
A-755-0053



SEE B/M # 910-2124
SEE SCHEMATIC "B706-0024"

COPYRIGHT © 1986 BROADCAST ELECTRONICS, INC.

BROADCAST ELECTRONICS, INC. —A FILMWAYS COMPANY—	
DATE 7/10/80	DATE 7/10/80
DESIGNED BY	ENGINEER
CHECKED BY	PROJECT
APPROVED BY	BY
TOLERANCE UNLESS OTHERWISE SPECIFIED: DIMENSIONS IN INCHES: FRACTIONAL ±.125 ANGULAR ±.1° SURFACE FINISH: 10 UNLESS OTHERWISE SPECIFIED TO FILLET RADIUS	
MATERIAL	
TREATMENT OR FINISH	
REVISIONS	
REV	DATE
C	910-2124
SHEET 1 OF 1	

PROPRIETARY RIGHTS are included in this document and the information contained herein is confidential and shall not be disclosed or used or transmitted in other documents or publications without the written consent of BROADCAST ELECTRONICS, INC.

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