INSTRUCTION MANUAL

2100 SERIES CARTRIDGE MACHINES

P, PA, PS, RP, RPS

January, 1987 IM No. 597-2100

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.

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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.

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4100 N. 24th St., P.O. Box 3606
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Tel: (217) 224-9600
Telex: 25-0142
Cable: BROADCAST

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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.

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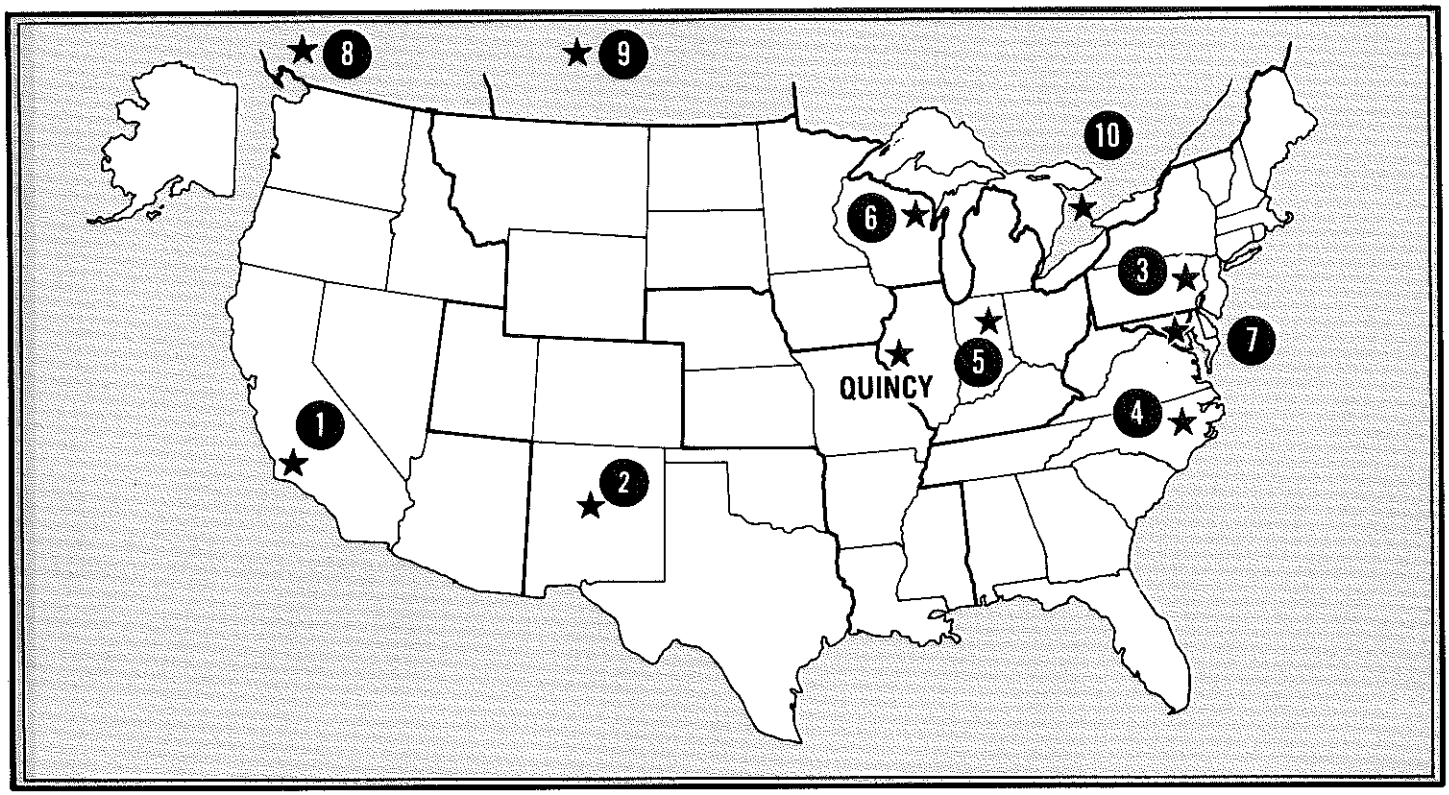

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SECTION I
INTRODUCTION

1-1. GENERAL DESCRIPTION AND FEATURES.

1-2. The Broadcast Electronics Series 2100 cartridge machines incorporate high value with versatility. Record/playback or playback only models are available in mono or stereo versions. All are the same space saving size, due to modular design (see Figure 1-1).

1-3. The wide range of cartridge size accepted is A, AA, B, BB, C, and CC. Top quality heads are secured by the Phase Lok IV head assembly. Azimuth adjustment has no direct effect on height, and no effect on zenith adjustments assuring tight control of stereo phasing. Extensive head shielding prevents hum pickup.

1-4. Both the 1kHz stop tone and the 150 Hz secondary tone are standard along with 2100's exclusive automatic mono/stereo switching. The mono/stereo switching is accomplished by simultaneously recording the 1kHz tone and 150 Hz tone at the beginning of the message on any previously recorded mono cartridge or newly recorded cartridges. A front panel indicator will identify mono encoded tapes.

1-5. The tape transport includes a direct drive, hysteresis synchronous motor, a large air-damped solenoid with a teflon coated plunger, and a precision machined aluminum deck.

1-6. The 2100 PA cartridge machine is a monitor version of the 2100P. It incorporates a built-in amplifier, a self-contained front panel speaker, a level control, and a headphone jack. The 2100 PA can be used as a regular monaural playback machine for on-air broadcasting. The on-air output is available when the unit is in the monitor mode with no switching necessary.

1-7. The speaker and headphones may be muted simultaneously. Insertion of headphone plug into the front panel jack will interrupt the speaker for private monitoring.

1-8. SPECIFICATIONS.

1-9. See Table 1-1 for the specifications for the 2100 cartridge machine.

597-2100-1

FIGURE 1-1. 2100 SERIES CARTRIDGE MACHINES

MODEL	PART NO.
2100P	907-2110 - Mono, Playback Only, 115V, 60 Hz
2100RP	907-2111 - Mono, Record/Playback, 115V, 60 Hz
2100PS	907-2112 - Stereo, Playback Only, 115V, 60 Hz
2100RPS	907-2113 - Stereo, Record/Playback, 115V, 60 Hz
2100PA	907-2124 - Mono, Playback W/Audition Speaker, 115V, 60 Hz
2100P	907-2120 - Mono, Playback Only, 220V, 50 Hz
2100RP	907-2121 - Mono, Record/Playback, 220V, 50 Hz
2100PS	907-2122 - Stereo, Playback Only, 220V, 50 Hz
2100RPS	907-2123 - Stereo, Record/Playback, 220V, 50 Hz
2100PA	907-2125 - Mono, Playback W/Audition Speaker, 220V, 50 Hz

REFER TO PRICE LIST FOR AVAILABLE ACCESSORIES

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

PARAMETER	SPECIFICATION
Tape Speed	
Standard:	7.5 IPS (19.05 cm/s)
Optional:	3.75 IPS (9.53 cm/s)
Wow and Flutter	0.15% peak weighted
Noise (reproduce electronics only no tape running)	
Monophonic:	54 dB below 185 nWb/m at 700 Hz
Stereophonic:	52 dB below 185 nWb/m at 700 Hz
Squelch:	70 dB below 185 nWb/m at 700 Hz
Distortion	2% or less record to playback at 185 nWb/m at 700 Hz
Equalization	NAB, IEC, CCIR as specified
Frequency Response	±2 dB from 50 Hz to 15 kHz exclusive of head contour effect
Crosstalk (magnetic head limited)	-50 dB or better, Program to program or cue channel to program channel at 1kHz
Input Impedance (record models)	Line, 78k Ohms, balanced bridging
Input Levels	Line, -18 to +20 dBm (100 mV to 7.7V)
Audio Output	
Level:	Continuously variable from -20 dBm to +10 dBm
Impedance:	600 Ohms balanced, Transformerless
Peak Output Level	+20 dBm before clipping
Cue Signals	1 kHz stop tone Relay contact closure for external control (150 Hz) External cue input/output available at connector for other control functions

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

PARAMETER	SPECIFICATIONS
Ambient Operating Temperature	Ø° to 55° C (32° to 132° F)
Power Requirements	
60 Hz Models	105 to 130 volts ac or 210 to 230 volts ac, as specified
50 Hz Models	105 to 130 volts ac or 210 to 230 volts ac, as specified
Power Consumption	40W Continuous
Mounting	Desk top standard, adapters for 19 inch (48.26 cm) rack mounting available
External Connectors	Mating connector furnished
Dimensions	
Height	5.25 inches (13.3 cm)
Width	5.875 inches (14.9 cm)
Depth	15.5 inches (39.4 cm)
	Add 0.375 inches (0.95 cm) to height for rubber feet
Weight (all models)	28 pounds (12.7 kg) packed

SECTION II
INSTALLATION

2-1. INTRODUCTION.

2-2. This section contains information required for installation and preliminary checkout of the Series 2100 cartridge machine.

2-3. Carefully unpack the system equipment. 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.

2-4. The contents of the shipment should be as indicated on the packing list. If the contents are incomplete, or if the unit is damaged electrically or mechanically, notify both the carrier and Broadcast Electronics, Inc.

2-5. INSTALLATION.

2-6. MOUNTING.

2-7. The standard 2100 unit comes packaged for table top use. An optional shelf (BE P/N 907-2114) is available for mounting units in a standard EIA 19 inch (48.26 cm) rack . Filler panels and top covers for the rack shelf are also available. Three units, set up to play size A cartridges, may be mounted side-by-side in 19 inches (48.26 cm) of horizontal space and 5.25 inches (13.34 cm) of vertical space.

2-8. RACK MOUNTING. To install rack mounted units, remove the top and bottom covers from the 2100. Install any filler panels in the front of the adapter shelf and mount the adapter shelf in the rack opening from the front. Secure the shelf with No. 10 screws from the front through the trim spacers and the rack shelf into the rack rail. Finally, place the units into the adapter shelf from the front and secure with the captive fasteners at the rear of the shelf.

2-9. WIRING.

2-10. AUDIO INPUT AND OUTPUT. Refer to Drawing 906-2252 in Section VII for the following descriptions. The playback audio output and the line level record inputs are available at the rear connector. The output is balanced with a low impedance for driving a 600 Ohm load. The input accepts high impedance balanced bridging signals from -18 to +20 dBm.

2-11. To ensure proper grounding and to prevent the formation of ground loops, the shield of the audio cable should be connected at one point only. If this does not work, the shield may be connected to ground.

2-12. The output levels are adjusted at the factory for a Ø dBm output at the NAB standard level of 700 Hz at 185 nWb/m. This may be changed as explained in Section V of this manual.

2-13. For use of a microphone input on record models, shunt input resistors R61 and R62 as required (R63 and R64 also on stereo models) to increase the input preamp gain (refer to Schematic 906-2140 in Section VII of this manual).

2-14. REMOTE CONTROL.

2-15. A rear panel 30 pin edge connector allows connection of inputs, outputs, and remote control functions. The schematic of a remote control unit is included in Drawing C906-2252 in Section VII of this manual.

2-16. STATION GROUND.

2-17. The rear panel ground terminal should be connected to the central or station ground with a copper conductor. Ensure the connections are secure.

2-18. AC POWER.

NOTE

NOTE

DIFFERENT FUSES ARE USED FOR 110V AND 220V:
1 AMPERE FOR 110V ac
0.5 AMPERE FOR 220V ac

2-19. All series 2100 units are equipped with a NEMA three conductor ac line cord. The power transformer can be connected for 105-130V ac or 210-230V ac as shown on Drawing 906-2141 in Section VII of this manual. Separate models are available for 50 Hz and 60 Hz operation.

SECTION III
OPERATION

3-1. INTRODUCTION.

3-2. This section provides operating procedures and identifies controls and indicators associated with operation of the 2100 cartridge machine.

3-3. CONTROLS AND INDICATORS.

3-4. Refer to Figure 3-1 for the location of the controls and indicators associated with the 2100. The function of these controls and indicators is described in the following text.

3-5. OPERATION.

3-6. PLAYBACK.

3-7. Turn ac power on with the rear panel switch. The motor shaft will begin to rotate. Load a pre-recorded cartridge into the deck opening. The red STOP switch/indicator will illuminate, indicating that the machine is in the ready mode. The 2100 series machines will accept NAB A, AA, B, BB, C, AND CC size cartridges.

3-8. Momentarily depress the green START switch/indicator. The STOP switch/indicator will go out as the START switch/indicator illuminates and the tape will play. The VU meter on record models will indicate the playback levels.

3-9. CUE TONE DETECTION.

3-10. MONO/STEREO SWITCHING. If during the first three seconds of tape operation, both a 150 Hz and a 1kHz tone are simultaneously detected on the cue track, the red MONO PLAY LED will illuminate. It will remain illuminated for the remainder of the run cycle to indicate that a mono encoded tape has been identified by the machine. When a stereo machine identifies a mono cartridge, the left track audio will be output from both the left play out and the right play out. This is especially useful when using a tape library with both stereo and mono cartridges. If all mono cartridges are encoded with the identifying cue tones, automatic mono/stereo switching will be provided.

3-11. SEC (CUE I) SWITCH. The white SEC switch/indicator will illuminate and remain illuminated as long as only a cue I (150 Hz) tone is detected on the cue track. As shipped from the factory, cue I detection is delayed for approximately three seconds after the start of a run cycle. This delay can be defeated by moving jumper W1, on the playback circuit board, to its alternate location (refer to schematic D906-2139 in Section VII).

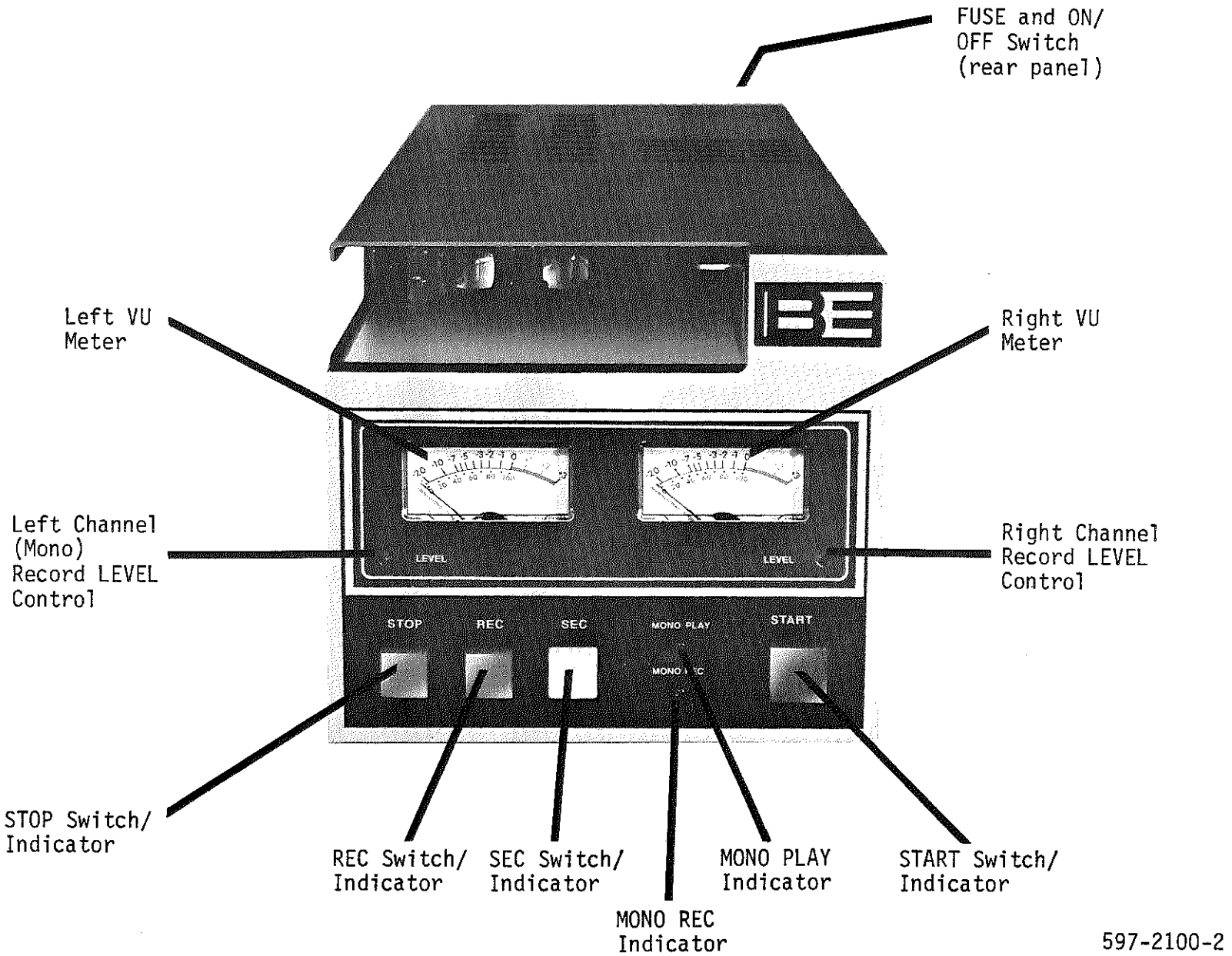


FIGURE 3-1. IDENTIFICATION OF FRONT PANEL CONTROLS AND INDICATORS, RPS MODEL

3-12. STOP. If after the first three seconds of a run cycle, a 1kHz tone is detected on the cue track, the machine will stop, the START switch/indicator will go out, and the STOP switch/indicator will illuminate. When the cartridge is removed, the STOP switch/indicator will go out.

3-13. RECORD.

3-14. Load a bulk erased tape into the deck. Select a cartridge at least two seconds longer than the program material to be recorded. If more than one cut will be recorded on a cartridge, allow at least two seconds between cuts. Run the cartridge in the playback mode for several seconds to align the tape in the tape guides and locate the splice. The splice may automatically be located with the use of an accessory tape fault/splice detector. Avoid recording over the splice, since the audio will drop out or bump on most splices.

3-15. Place the unit in the record mode by depressing the REC switch/indicator. The REC switch/indicator will illuminate. Preset the record level by playing the material to be recorded. Set the front panel LEVEL controls so that the VU meters indicate a maximum of Ø VU (100) on peaks.

3-16. After the level is set, re-cue the material to be recorded. Start the machine by depressing the START switch/indicator. Both the REC and START switch/indicators will illuminate. Start the material to be recorded. For best operation, there should be a 1/4 to 1/2 second lag between the start of the cartridge and the beginning of the program material. The stop cue (1kHz) will automatically record on the cue track for 1/2 second at the beginning of the record cycle.

3-17. To record a mono encode tone on a cue track at the start of a record cycle, the operator must position the internal automatic mono encode switch to ON, or depress the SEC switch/indicator after the REC switch/indicator is depressed, but before the START switch/indicator is depressed. The automatic feature is best used when several mono cartridges are being recorded consecutively.

NOTE EACH TIME THE START SWITCH/INDICATOR IS DEPRESSED WHILE THE AUTOMATIC MONO ENCODE SWITCH IS ON, A 1kHz TONE AND 150 Hz WILL BE RECORDED ON THE TAPE AT THE POINT THE START SWITCH/INDICATOR IS DEPRESSED. TO AVOID RECORDING EXTRA STOP TONES, CUE THE CARTRIDGE BEFORE SWITCHING THE AUTOMATIC MONO ENCODE SWITCH ON.

NOTE

NOTE

NOTE

3-18. On 2100 RPS models, when operating in the mono encode record mode, the REC switch/indicator, the START switch/indicator, the MONO REC LED, and the MONO PLAY LED (after about 1/4 second) will all illuminate. The left record input and the right record input are summed and recorded on the left track.

3-19. On the 2100 RP and RPS models, with the machine in either run or record, a 150 Hz tone can be recorded on the cue track at any time by depressing the SEC switch/indicator. The SEC switch/indicator will illuminate when the recorded tone is detected.

SECTION IV
THEORY OF OPERATION

4-1. INTRODUCTION.

4-2. This section details 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 mounts the power supply. The playback circuit board contains the playback amplifiers for the program tracks, the cue tone amplifiers, the cue tone sensors, the cue tone command logic, and the solenoid timer circuit. The record circuit board (installed only in record models) contains the program and cue track controls, the record metering circuitry, related logic, and bias oscillator.

4-3. Refer to the schematic drawings in Section VII for the following detailed circuit descriptions. The drawings show the most complex arrangement, that is, the one required for a stereophonic machine with playback/record capabilities. The assembly drawings are coded with shading to differentiate between mono and stereo, play and record versions. Right channel information for stereo models appears in parenthesis.

4-4. PLAYBACK CIRCUIT BOARD.

4-5. AUDIO AND METERING.

4-6. The program tracks of the playback head, left head input (right head input), are coupled through C3 (C9) to the input of the preamplifier, IC1-A (IC1-B). This integrated circuit preamplifier provides gain and equalization as predetermined by the surrounding network. The left play low frequency equalization (right play low frequency equalization) control and the left play high frequency equalization (right play high frequency equalization) control permit adjustment of the equalization for matching head and tape characteristics to NAB or other standards.

4-7. The output from the preamplifier is directly coupled to the left play meter input circuit (right play meter input circuit) and to the level control, left play level (right play level). Signals from the level controls go to analog switch IC10. The switch, controlled by logic, guides signals to the appropriate output amplifiers and provides muting at the appropriate times.

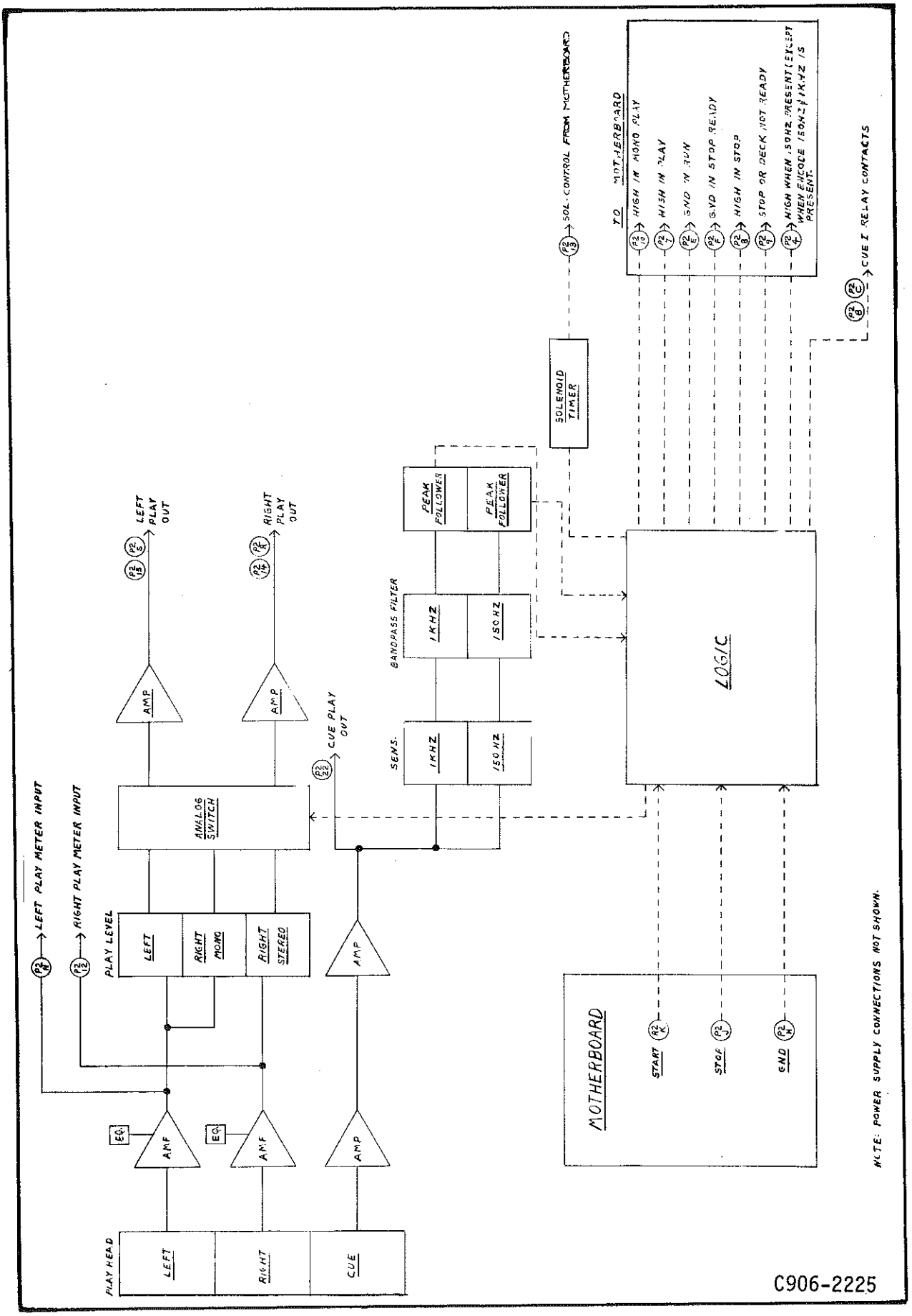


FIGURE 4-2. BLOCK DIAGRAM PLAYBACK CIRCUIT BOARD

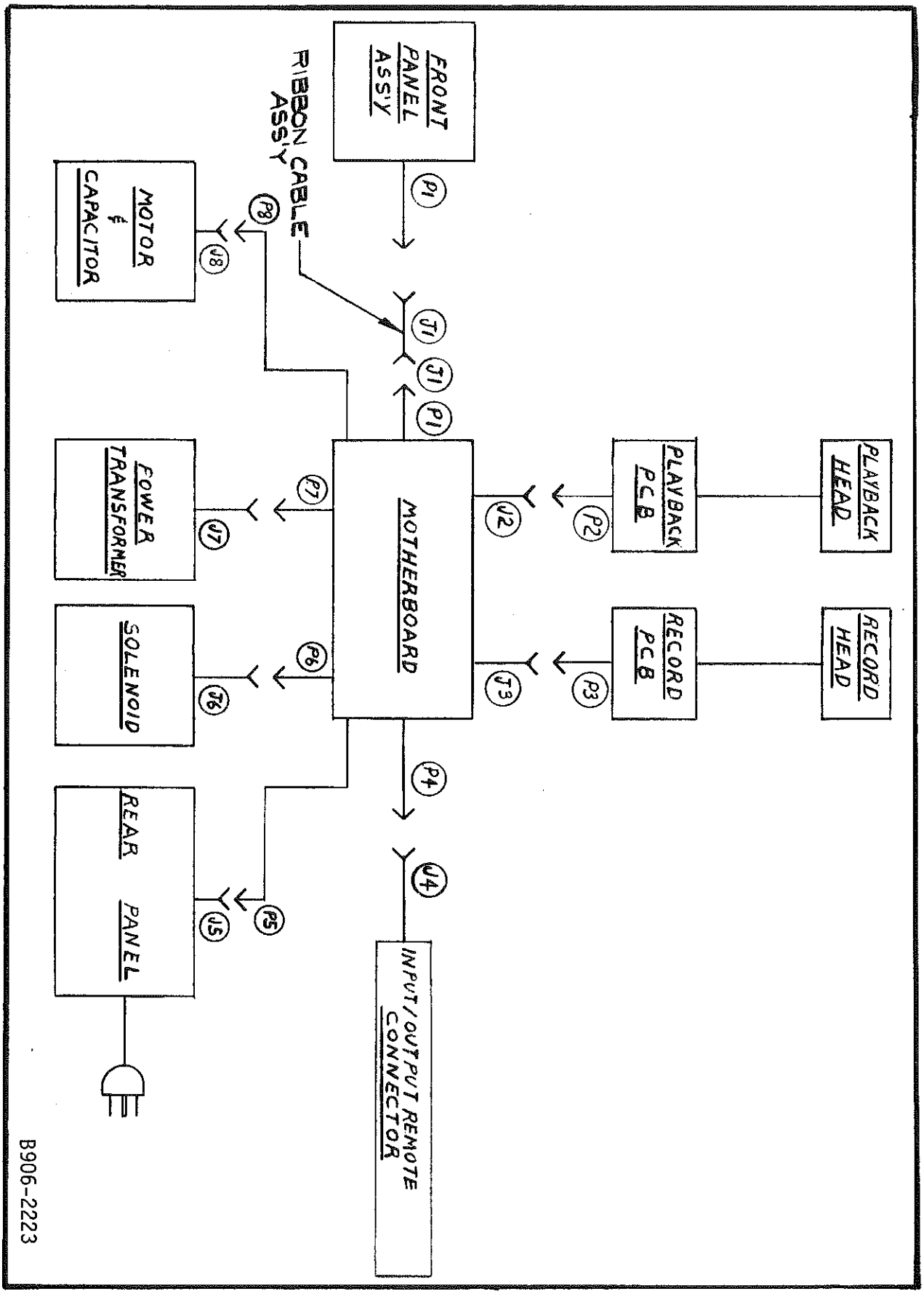


FIGURE 4-1. INTERCONNECTION BLOCK DIAGRAM

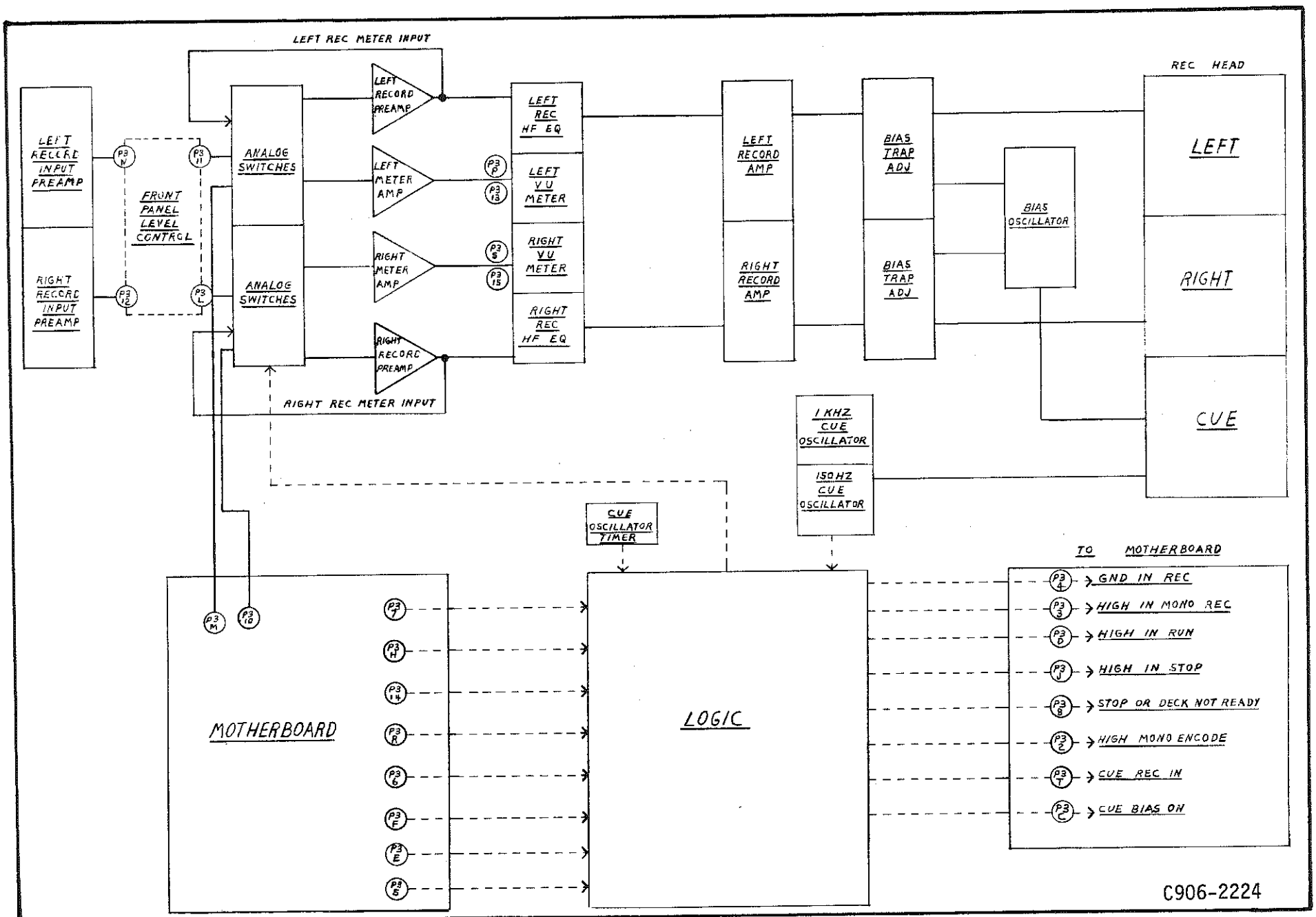


FIGURE 4-3. BLOCK DIAGRAM RECORD CIRCUIT BOARD

4-8. STEREO MODELS. When a machine is in the mono mode, the signal from the left preamplifier is fed equally to the left and right output amplifiers. This is accomplished by simultaneously closing the analog switch at pins 1 and 2, 8 and 9 of IC10 while opening the switch at pins 10 and 11. The signal from the left preamplifier is allowed to pass to the left and right output amplifiers while the signal from the right preamplifier is muted. In the stereo play mode, the switches are closed at pins 1 and 2, 8 and 9 but open at 10 and 11. This allows the left preamplifier signal to go to the left output amplifier and the right preamplifier signal to go to the right output amplifier. Pins 3, 4, and 5 of the analog switch IC10 are used as a logic inverter.

NOTE SHORTING ONE SIDE OF A DIFFERENTIAL LINE DRIVER WILL DRASTICALLY REDUCE THE OUTPUT LEVEL. FOR
NOTE UNBALANCED APPLICATIONS, CONNECT ONLY ONE SIDE.

4-9. The signal from the analog switch is routed to a single-ended differential line driver IC2-A/-B (IC3-A/-B) which outputs a balanced signal. At end of play, logic will instruct the analog switch to open all switches, muting all signals.

4-10. CUE TRACK.

4-11. The cue head input signal is amplified and equalized by IC4-A and further amplified by IC4-B. At this point, the signal is routed to the cue play out, the 1kHz circuit, and the 150 Hz circuit.

4-12. In the 1kHz cue circuit, the signal is routed through the 1kHz sensitivity adjustment (R53). If a 1kHz tone is present, the signal will continue through the 1kHz active bandpass filter (IC5-A) and be rectified by the 1kHz peak follower (IC6-A). The peak follower converts the signal to logic voltages for the subsequent logic circuits. The 150 Hz circuit is similar to the 1kHz circuit. A sensitivity adjustment (R54), an active bandpass filter (IC5-B), and a 150 Hz peak follower (IC6-B) are components of the 150 Hz cue circuit.

4-13. When either circuit detects a signal, the logic uses this signal to control the analog switch. If a 1kHz tone is detected, the machine will stop. The 150 Hz tone, when present, will illuminate the SEC switch/indicator. When both tones are present simultaneously, at the beginning of tape operation, the machine will enter the mono encode mode. A stereo machine will output left channel audio at both the left and right outputs in this mode.

4-14. SOLENOID TIMER.

4-15. The solenoid timer is also located on the playback circuit board. The timer circuit drives P2-13 HIGH for 0.5 seconds. This provides +18 and -18 volts across the solenoid (refer to drawing D906-2141 in Section VII) and assures fast pull-in of the solenoid. As C23 changes, a LOW is applied to P2-13 and a lower holding voltage (+18 volts) is applied to the solenoid, providing cooler operation.

4-16. RECORD CIRCUIT BOARD.

4-17. AUDIO AND METERING.

4-18. The left record input (right record input) signal is amplified by the left record input preamplifier IC8-A (right record input preamplifier IC8-B). The signal is then routed through the left record level control R1 (right record level control R2) which is on the front panel. Audio signals pass directly to the analog switch IC6 (IC5). Metering signals first are routed through meter calibration adjustment controls R106 and R107 (R96 and R97), and then to the analog switch. As instructed by logic, the analog switch applies the audio to the appropriate preamplifiers and provides muting at the appropriate times.

4-19. The mode of operation, read by logic, will dictate when and what section of the analog switch will open or close. IC7-C and IC7-D are a flip-flop that provides the final instructions to IC6 pins 1 and 2 (IC5 pins 1 and 2) to open or close the audio path in the record mode. When the audio circuit is closed, the metering circuit at IC6 pins 1 and 2 (IC5 pins 1 and 2) will close, completing the metering circuits. Logic also monitors functions and information from the playback circuit board regarding stop and not ready states.

4-20. STEREO MODEL RPS. Pins 1 and 2, 8 and 9 of analog switch IC6 (IC5) control mono/stereo switching. In the stereo record mode, IC6 is closed at pins 8 and 9 and IC5 is closed at pins 1 and 2. This closes audio and metering paths respectively, to the left and right tracks. At the same time, IC6 pins 10 and 11 (IC5 pins 3 and 4) are instructed by logic to open, muting the playback circuit path to the VU meters. The VU meters respond to the recorded material in the record mode and to playback material in the play mode.

NOTE IC5 PINS 1 AND 2 ARE CLOSED IN THE MONO RECORD MODE, SO THAT THE RIGHT VU METER RESPONDS TO

NOTE THE RIGHT TRACK SIGNAL EVEN THOUGH THERE IS NO SIGNAL PRESENT AT THE RIGHT RECORD PREAMPLIFIER.

4-21. When the machine is in the mono record mode, logic will instruct the analog switches to route the left record and right record signals onto the left track. This is accomplished by opening IC5 pins 8 and 9 and closing IC6 pins 1 and 2, 3 and 4. This action is controlled by logic circuits IC10-C and IC10-D configured as a flip-flop. Logic information for this flip-flop comes from IC10-A, IC10-B, and IC11-A. In the mono record mode, the left and right tracks are summed at C51.

4-22. After switching, the audio signal is amplified by the left record preamplifier IC4-A (right record preamplifier IC3-B), when in the stereo record mode. The left record high frequency equalizer control R84 (right record high frequency equalizer control R83) adjusts the equalization for matching head and tape characteristics to broadcast standards. Next, the signal is further amplified by the left record amplifier, composed of Q11 (right record amplifier, composed of Q10) and the surrounding network.

4-23. The program signal is coupled through a bias trap consisting of C61 and L3 (C11 and L2), to prevent the bias from overloading the record amplifiers. The variable inductor permits tuning of the bias trap to the frequency of the bias oscillator. The audio signal is mixed with the bias supplied through R3 (R2), and is available at the left head output (right head output). The variable bias control permits adjusting the bias level from optimum frequency response and minimum distortion.

4-24. Bias is prevented from appearing on the program track of the record head except when the machine is in the record mode by Q1 (Q2). The bias oscillator switching circuit enables the bias oscillator only when needed, as controlled by logic IC9-C.

4-25. BIAS OSCILLATOR, CUE TONE OSCILLATORS, AND CUE TONE LOGIC.

4-26. The 2100 series record models have both 1kHz and 150 Hz cue tone generators. The oscillators and the logic are located on the record circuit board.

4-27. 1kHz TONE GENERATOR.

4-28. In the 1kHz tone generator, IC2-C and IC2-D, oscillation is determined by the network of R68, R60, R67, C38, and C39. The circuit will oscillate when positive feedback is available through R70 and R69. The output is routed through R6, C7, level control R5, and is enabled by Q12, whenever the cue oscillator timer is turned on. The cue oscillator timer IC2-A and IC2-B and the surrounding network, is a monostable multivibrator. The output of the multivibrator will go HIGH only when the input from R44 goes HIGH. R44 will go high as controlled by IC12-B. This logic circuit receives its information from flip-flop IC11-B and IC11-C, which processes information from other logic circuits regarding the readiness of the machine and if the machine is in the mono encode mode, requiring a 1kHz tone. The multivibrator and oscillator are also automatically enabled at the beginning of the message by IC12-B whether or not the machine is in mono encode mode for the stop tone.

4-29. 150 Hz TONE GENERATOR.

4-30. The 150 Hz tone generator is similar to the 1kHz tone generator. It is composed of IC1-A and IC1-B and network R24, R26, C26, and C25. The 150 Hz tone generator will oscillate when positive feedback is available through R21 and R29. The 150 Hz output is routed through R7, C8, and level control R4. It is enabled by logic also. Logic circuits IC12-C and IC11-D process information from other logic circuits regarding the machine's readiness and if the SEC switch has been depressed, or when the machine is in the mono encode mode. It too, is timed out by the cue tone oscillator timer when generating a mono encode tone.

4-31. CUE TONE CONTROL.

4-32. The cue tones are independently amplified by cue record preamplifier IC11-C and coupled via 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 is available at the cue head output. Cue tone audio will pass when IC9-B is enabled via Q3. Q3 prevents stray recording of cue tones, which would confuse logic during playback.

4-33. BIAS OSCILLATOR.

4-34. The bias oscillator consists of transistors Q5 and Q6, which produce a sinewave signal of approximately 100 kHz at terminals 6 and 8 of bias transformer T1. The bias oscillator frequency is determined by transformer T1 and parallel capacitor C16 which form a tuned circuit. The bias oscillator operates only in the record mode when +18V is connected to pin 2 of T1 through the oscillator dc power supply circuitry consisting of Q6, Q7, and Q8.

SECTION V
MAINTENANCE

5-1. INTRODUCTION.

5-2. This section provides preventive maintenance information, mechanical and electrical adjustment procedures, and component replacement procedures for the 2100 series cartridge machines.

5-3. FIRST LEVEL MAINTENANCE.

WARNING DISCONNECT POWER PRIOR TO ATTEMPTING ANY MAINTENANCE.

5-4. CLEANING.

5-5. Heads, pressure roller, tape path, guides, and capstan should be cleaned at least once a day with a suitable cleaning solution.

5-6. On a regular basis, use a soft cloth moistened with a household ammonia cleaner to clean fingerprints and other marks from the machine chassis and other surfaces. Remove dust from the interior with a soft brush.

5-7. Routine cleaning of the circuit boards and connector contacts is not necessary. However, if intermittent machine performance indicates that the contacts are dirty, clean the contacts with an aerosol contact cleaner. Do not use an abrasive cleaner.

5-8. DEMAGNETIZING.

5-9. Heads, guides, and other ferrous material in the tape path should be demagnetized at least once a week with a head degausser. Use care not to scratch the heads during this operation.

5-10. CARTRIDGE MAINTENANCE.

5-11. An inserted cartridge is part of the machine system. A defective cartridge will affect machine performance. Do not make adjustments with a defective cartridge. Inspect them frequently for cleanliness, mechanical defects, and tape wear. Replace a worn tape.

5-12. Periodically, the cartridge should be cleaned, with special attention given to the center post. A mild detergent will remove the gummy deposits that can increase tape tension by not allowing parts to turn freely. Check the pressure pads to see that they are alligned squarely with the tape.

5-13. It is recommended that only one type of tape be used in a machine. Different brands and different types of the same brand require different bias currents and different record/playback equalization levels. If more than one type of tape is used, a compromise of control settings will need to be made to obtain acceptable performance from the entire tape library.

5-14. It is also recommended that the operator avoid putting large numbers of new tapes into a system during a short period of time. A sudden influx of new tapes could increase the deposits on the heads and pose a cleaning problem. It is better to plan a long term phasing or continuous addition program for new tape introduction.

5-15. SECOND LEVEL MAINTENANCE.

5-16. Second level maintenance consists of procedures required to restore a machine to satisfactory operation after a fault has occurred.

5-17. It is recommended that the performance of the tape machine be periodically checked to see if it is operating within specifications. If performance is substandard, refer to the adjustment procedures outlined in the following pages.

5-18. MECHANICAL ADJUSTMENTS.

5-19. PRESSURE ROLLER AND MOTOR CAPSTAN ALIGNMENT. Pressure roller alignment involves positioning the motor capstan shaft and the pressure roller so that the pressure roller makes even contact with capstan from top to bottom along the roller surface. This assures even pressure distribution between the pressure roller and the shaft as the tape is fed past the capstan. Improper alignment will direct or skew the tape in either an upward or downward direction, resulting in improper tape flow past the heads.

CAUTION

CAUTION

TO AVOID DAMAGE TO THE UNIT, DO NOT OPERATE THE SOLENOID WITH THE PRESSURE ROLLER GAUGE INSTALLED.

5-20. Two procedures are provided for this alignment. The first procedure is the recommended procedure and requires the use of a motor alignment gauge (BE P/N 836-0009-1). The second procedure is an alternate method of alignment to be used when an alignment gauge is not available.

A. RECOMMENDED PROCEDURE.

1. Turn off ac power and disconnect the ac cord.

2. Remove the unit top cover.

3. Manually raise the pressure roller above deck level by pushing in the solenoid plunger.

4. Remove the E-ring from the top of the pressure roller shaft (refer to Figure 5-1).

5. Remove the pressure roller and the nylon washers.

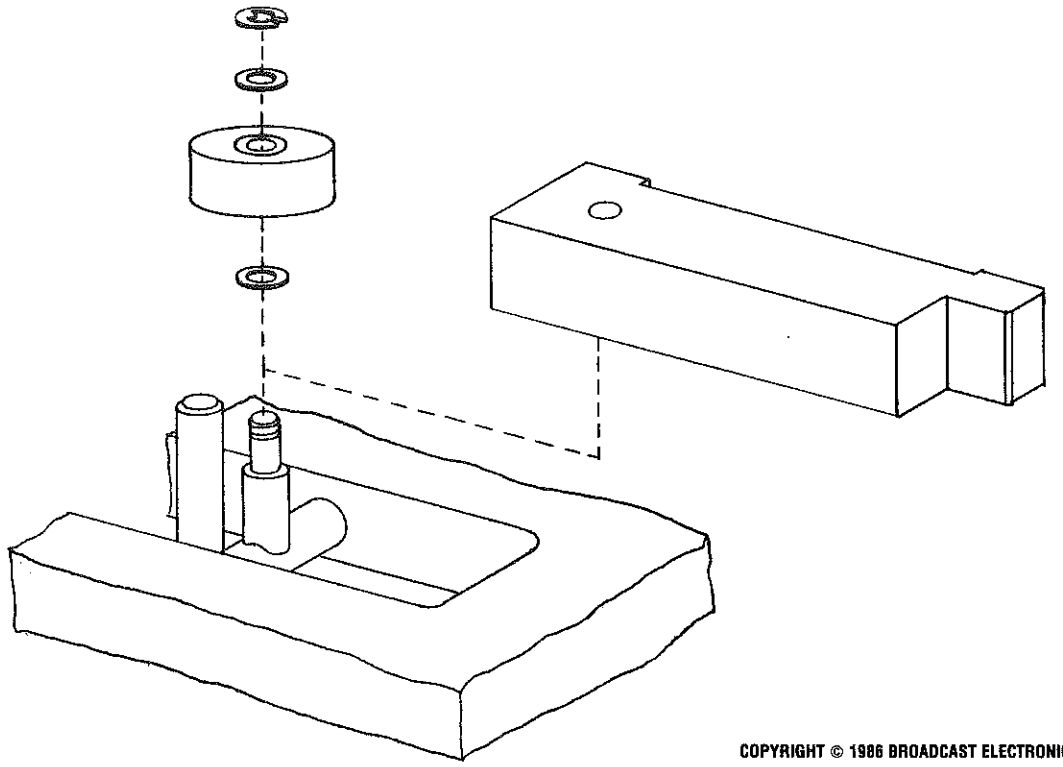
6. Set the alignment gauge on the pressure roller shaft so that the gauge rests on the deck surface.

7. Loosen the two No. 10 Phillips head motor mounting screws and adjust the motor until the motor capstan and the face of the gauge are parallel (refer to Figure 5-7D) and in contact from top to bottom. The center of the capstan shaft is off-set from the center of the pressure roller shaft by 1/16 inch (1.58 mm) towards the tape heads (refer to Figure 5-2) to allow for a slight wrap around effect which results in better pull and minimum wow and flutter.

8. Tighten the motor mounting screws and recheck for proper alignment. Repeat the procedure if necessary to obtain the proper alignment.

9. Remove the alignment gauge and place the first nylon washer, the roller, the second nylon washer, and the E-ring on the shaft, in that order.

10. Adjust solenoid plunger travel before returning the unit to service (refer to paragraph 5-21).

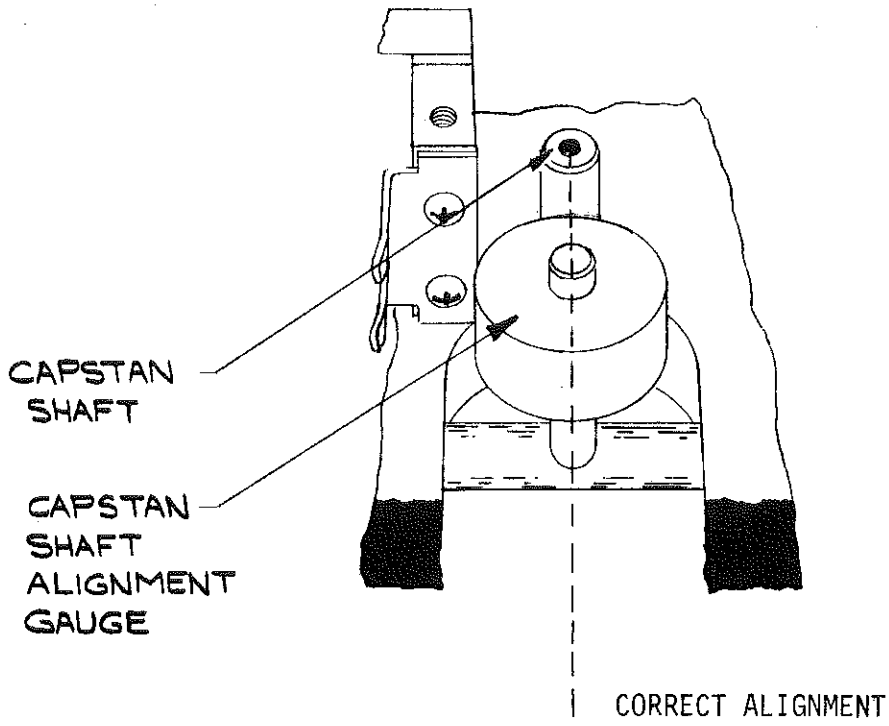


597-2100-3

FIGURE 5-1. PRESSURE ROLLER AND CAPSTAN ADJUSTMENT

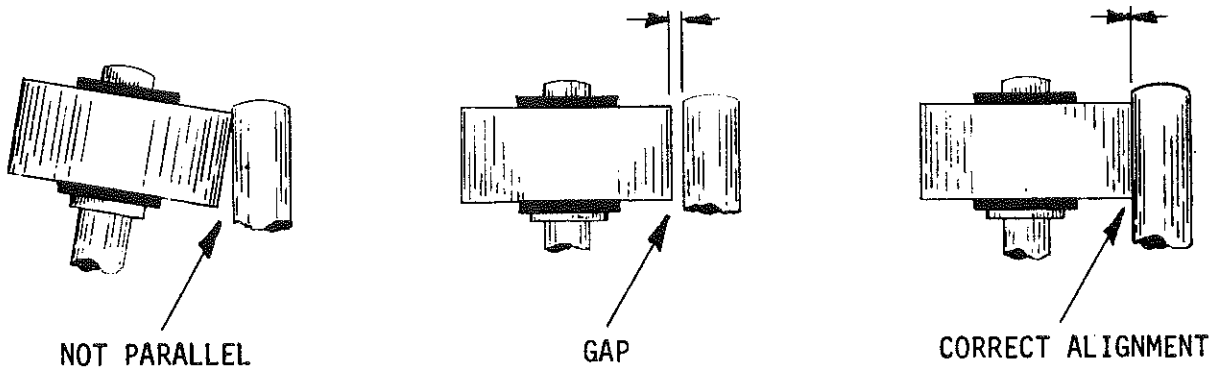
B. ALTERNATE PROCEDURE.

1. Turn off ac power and disconnect the ac line cord.
2. Remove the unit top cover.
3. Loosen the two No. 10 Phillips head motor mounting screws.
4. Manually raise the pressure roller by pushing in the solenoid plunger.
5. Check for parallelism as the pressure roller comes into contact with the shaft (refer to Figure 5-3).
6. Adjust the motor until the pressure roller is parallel to the capstan and slightly indented by the shaft. The center of the capstan shaft should be off-set from the center of the pressure roller shaft by 1/16 inch (1.58 mm) towards the tape heads (refer to Figure 5-2).
7. Tighten the motor mounting screws and recheck for proper alignment. Repeat the procedure if necessary to obtain the correct alignment.
8. Adjust solenoid plunger travel before returning the unit to service (refer to paragraph 5-21).



597-2100-4

FIGURE 5-2. CAPSTAN/PRESSURE ROLLER ALIGNMENT



597-2100-5

FIGURE 5-3. PRESSURE ROLLER PARALLELISM

WARNING: DISCONNECT POWER PRIOR TO SERVICING

NOTE THE PRESSURE ROLLER ALIGNMENT MUST BE PERFORMED PRIOR TO THE SOLENOID PLUNGER ADJUSTMENT.

5-21. SOLENOID PLUNGER ADJUSTMENT. Solenoid plunger travel is determined by the setting of the adjustment stop screw which links the plunger to the solenoid chain. It is set to bring the pressure roller against the capstan driveshaft just prior to the plunger hitting the limit of its travel. Refer to Figure 5-4.

5-22. Remove the cover and turn the machine on. With no cartridge in the machine, hold the ready microswitch open and depress the START switch/indicator. The solenoid will pull the pressure roller onto the driveshaft. Turn the plunger clockwise in one-half turn increments while alternately depressing the START switch/indicator until an audible noise, the plunger hitting bottom, is heard with the solenoid action. Turn the plunger counterclockwise for one and one-half turns beyond the point where the noise has disappeared and tighten the lock-nut snugly against the end of the plunger.

5-23. Adjust the solenoid stop screw so that the retracted pressure roller is flush or slightly below the upper surface of the deck plate.

5-24. The air damping device is adjusted by the screw in the base of the solenoid. Turning the screw clockwise increases air pressure, slowing and quieting operation. Turning the screw counterclockwise increases speed of pull up but also increases noise as the pressure roller hits the capstan.

5-25. HEAD ADJUSTMENTS. Refer to Figure 5-5 for adjustment screw locations. Head alignment requires setting the tracking height, head zenith, and head azimuth. Stereophonic units also require performance of a track phasing test. Because of the unique construction of the Phase Lok IV head bracket, generally only the azimuth adjustment is required unless the head has been replaced. In record units, the record head is adjusted after the playback head.

5-26. Required Equipment. The following equipment is required to align the tape heads:

A. Head and Tape Guide Adjustment Gauge (BE P/N 836-0009).
B. Alignment Cartridge (BE P/N 808-0004).
C. Cut-away Test Cartridge (BE P/N 710-0132).
D. Oscilloscope (any general purpose model).
E. Bulk Erased Cartridge (for record models).
F. Hex Wrenches (supplied with unit).
G. Signal Generator (Audio range: 20 Hz to 20 kHz).

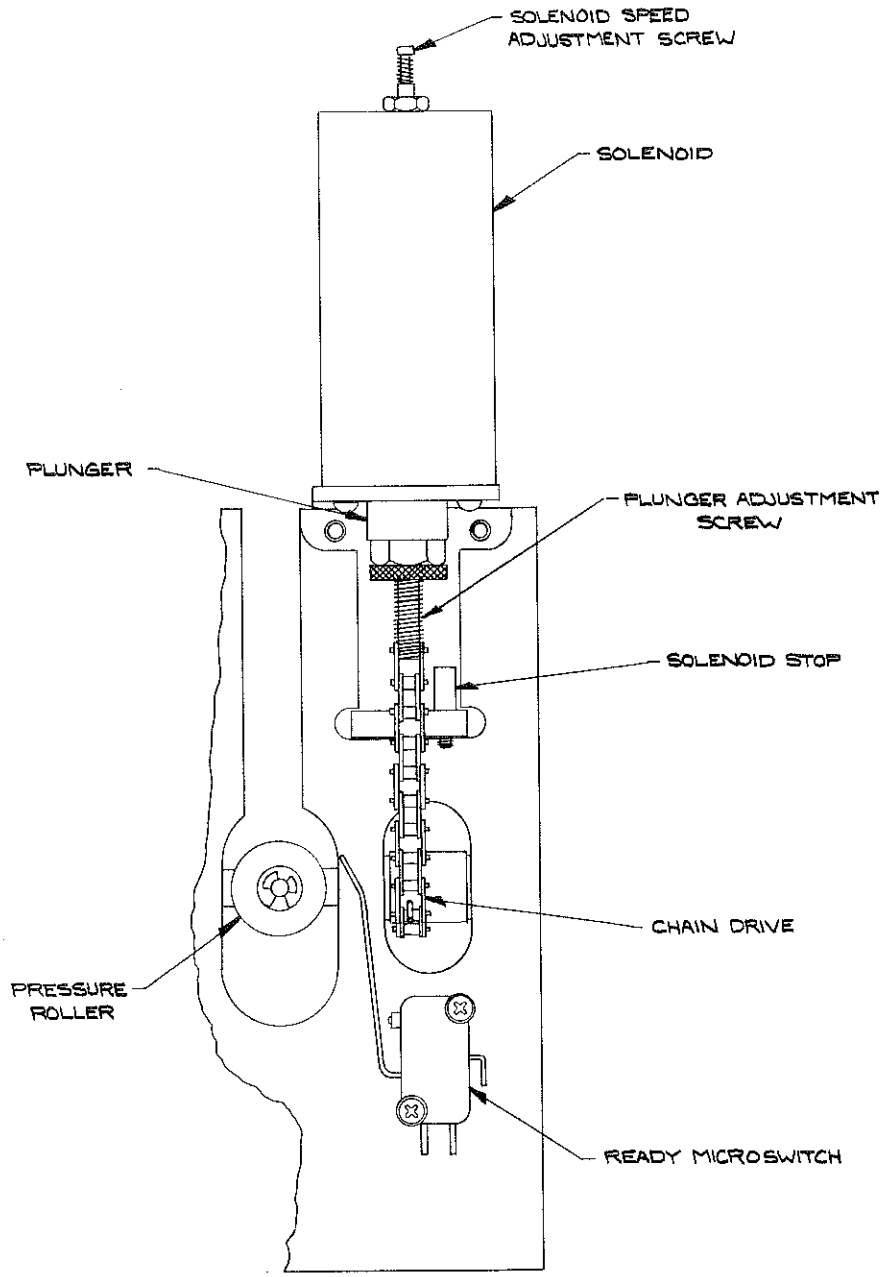


FIGURE 5-4. LOCATION OF SOLENOID PARTS

WARNING: DISCONNECT POWER PRIOR TO SERVICING

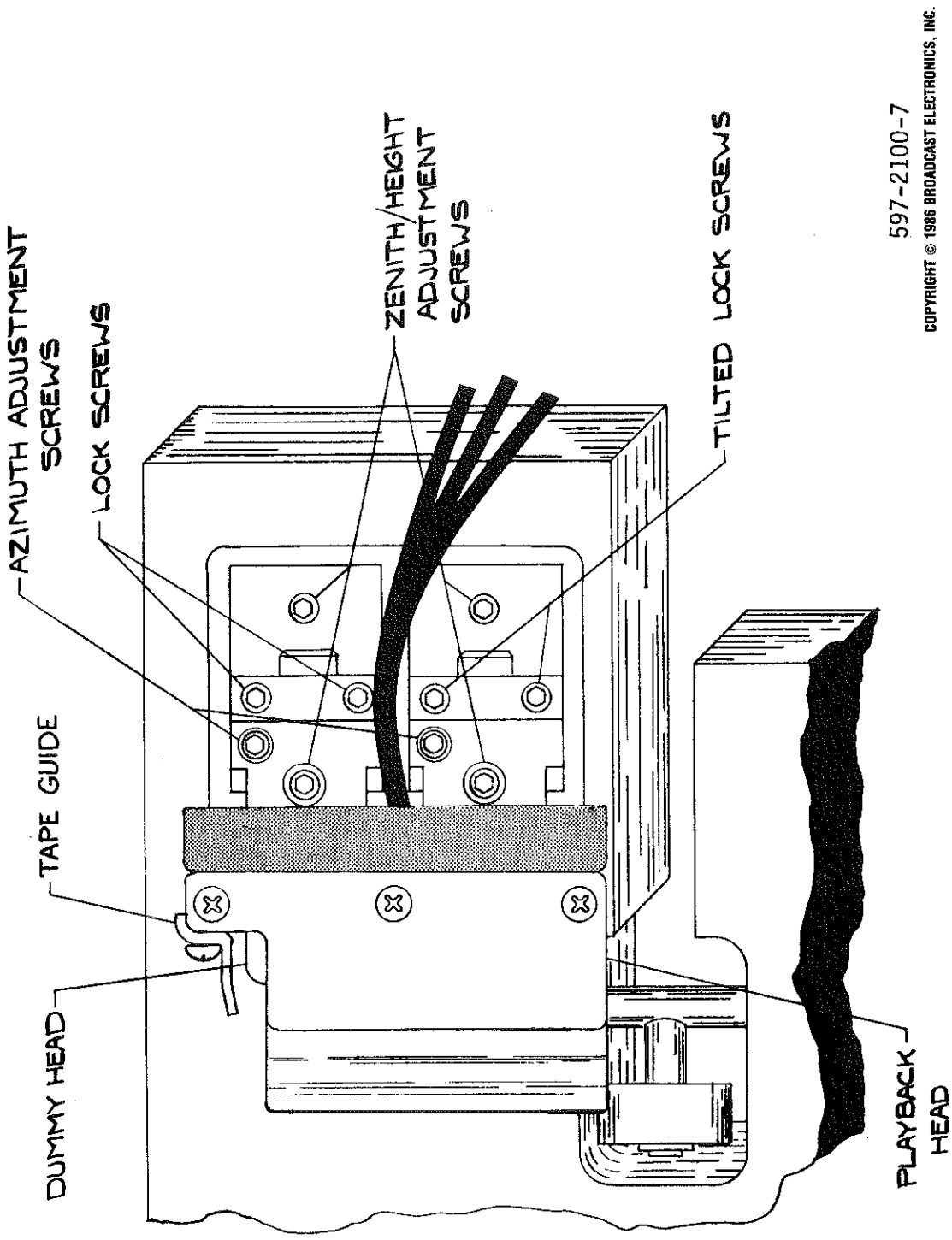


FIGURE 5-5. HEAD ADJUSTMENT SCREW LOCATION

5-27. Tape Guides. The wrap around portion of the tape guides should be flush against the head mounting block. Inspect the tracking height visually with a cut-away test cartridge. Observe the tape as it passes across the head. The tape should just cover the top and bottom of the head pole pieces (see Figure 5-6). Use the tape guide adjustment gauge to check the height of the tape guides. The upper guides should touch the T-portion of the block (refer to Figure 5-7A).

NOTE LOOSEN THE TWO LOCKING SCREWS PRIOR TO MAKING THE FOLLOWING ADJUSTMENTS.

5-28. Zenith. Use the front and back adjustment screws to adjust the Phase Lok IV bracket. Adjust so that the top surface of the base of the bracket is flush with the top surface of the deck (coarse zenith). Using a small square or the tape guide adjustment gauge, check to see if the head is perpendicular to the deck surface (fine zenith). Refer to Figure 5-7C.

5-29. Height. Position the tape guide adjustment gauge as illustrated in Figure 5-7B. The upper pole piece of the head should be even with the top surface of the gauge block. To adjust height, turn both front and rear screws an equal amount to retain the zenith adjustment. Alternate height and zenith adjustment until both are properly set.

5-30. When adjustments are completed, tighten the two locking screws equally and snugly, but not too tight. Always recheck zenith after height adjustment.

5-31. Verify the adjustments with a cut-away test cartridge. The tape should just cover the top and bottom head pole pieces. At start, the tape guides should keep the tape from skewing upward or downward.

5-32. Install the hold-down spring and mu-metal shield. Demagnetize the heads and guides with a head degausser before use.

5-33. Azimuth and Phase Adjustment. To adjust phase and azimuth proceed as follows:

NOTE PLAYBACK HEAD SHOULD BE ADJUSTED BEFORE RECORD HEAD.

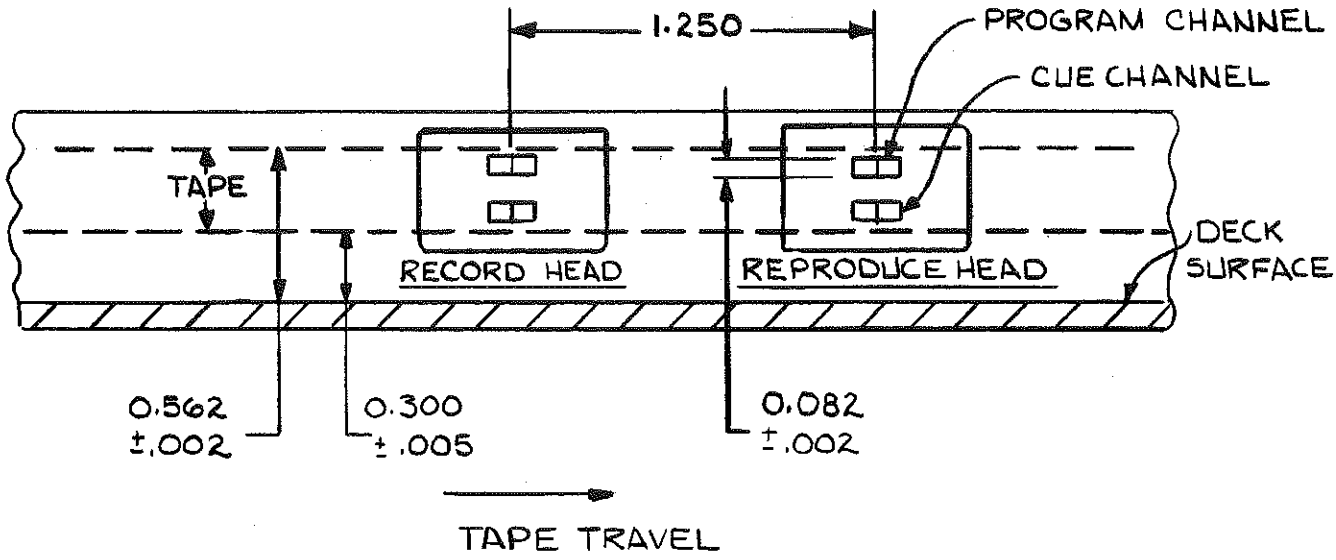
5-34. Playback Head. Turn the machine on and play a reproduce alignment test cartridge while monitoring the output with the oscilloscope (from either left or right output on stereo models). Adjust the playback head azimuth screw to give a peak output level at 15 kHz. Remove and reinsert the cartridge several times to verify the adjustments.

NOTE ADJUST THE OSCILLOSCOPE USED IN THE FOLLOWING STEP FOR EQUAL HORIZONTAL AND VERTICAL SENSITIVITY. CONNECT THE SAME SIGNAL SOURCE TO BOTH THE HORIZONTAL AND VERTICAL INPUTS BEFORE PROCEEDING TO ASSURE A 0° PHASE SHIFT IS PRODUCED BY THE OSCILLOSCOPE (REFER TO FIGURE 5-8).

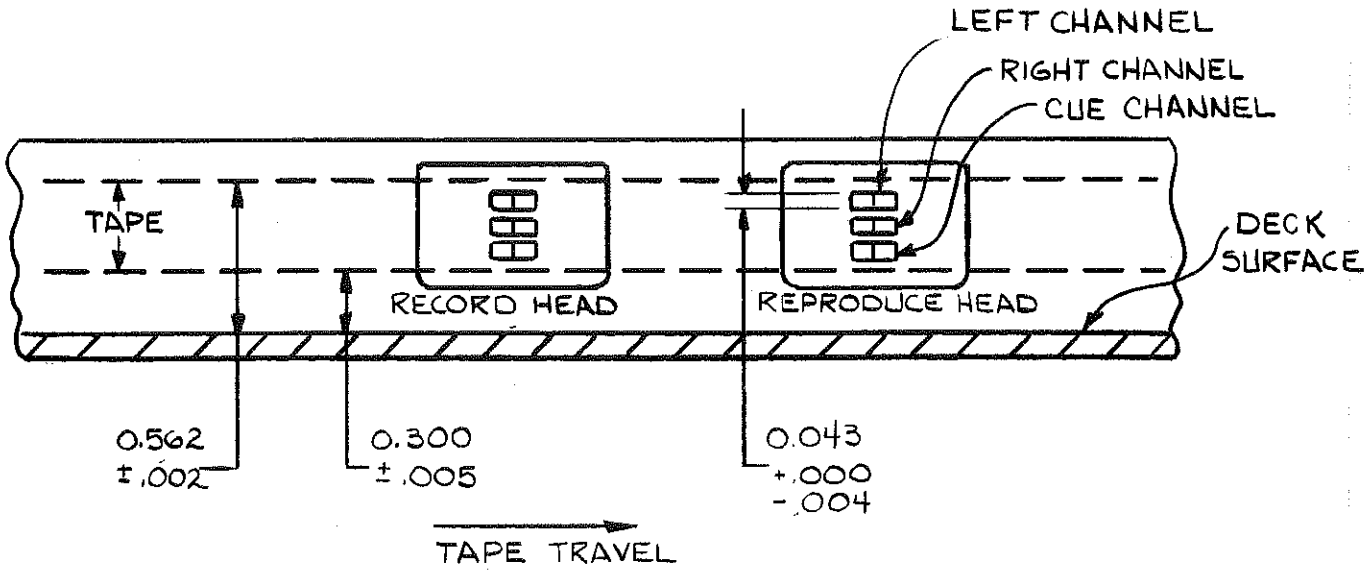
NOTE

NOTE

MONOPHONIC STANDARD



STEREOPHONIC STANDARD



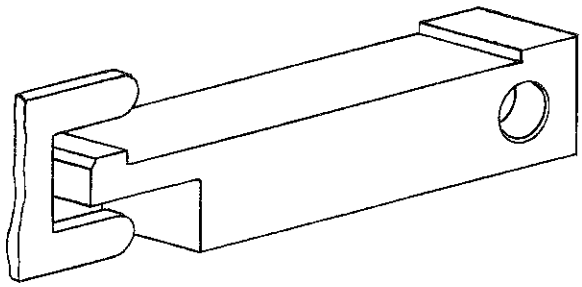
597-2100-8

FIGURE 5-6. TAPE HEAD DIMENSIONS, NAB STANDARDS

A

TAPE GUIDE ADJUSTMENT

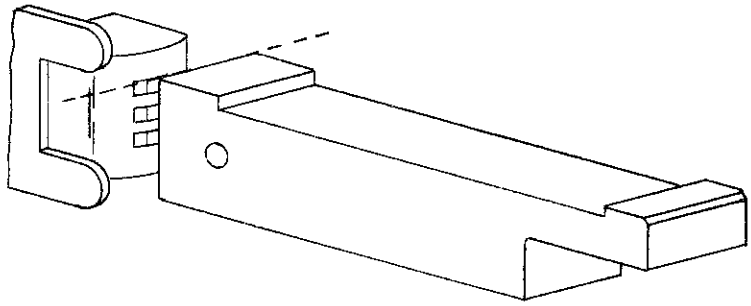
TAPE GUIDE SHOULD TOUCH "T" OF BLOCK.



B

HEAD HEIGHT ADJUSTMENT

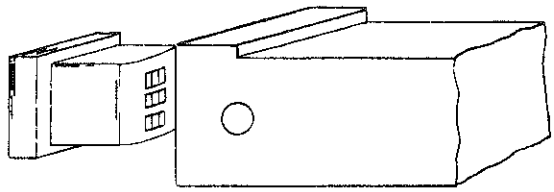
TOP HEAD POLE PIECE SHOULD BE SAME HEIGHT AS BLOCK.



C

ZENITH ADJUSTMENT

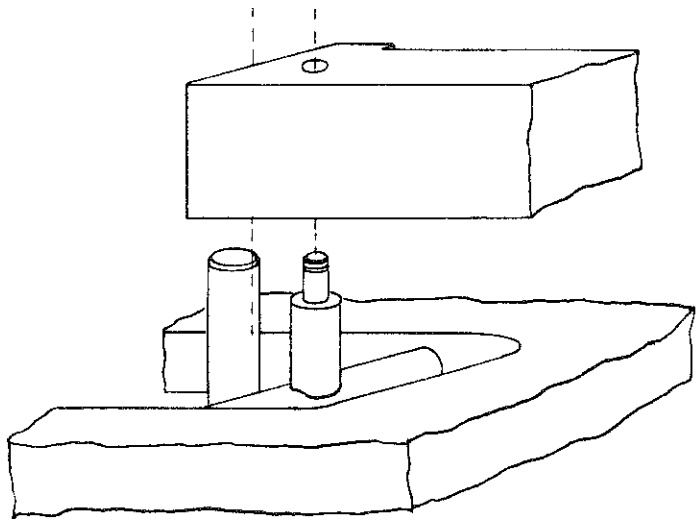
HEAD FACE SHOULD BE AT RIGHT ANGLE TO DECK.



D

MOTOR ADJUSTMENT

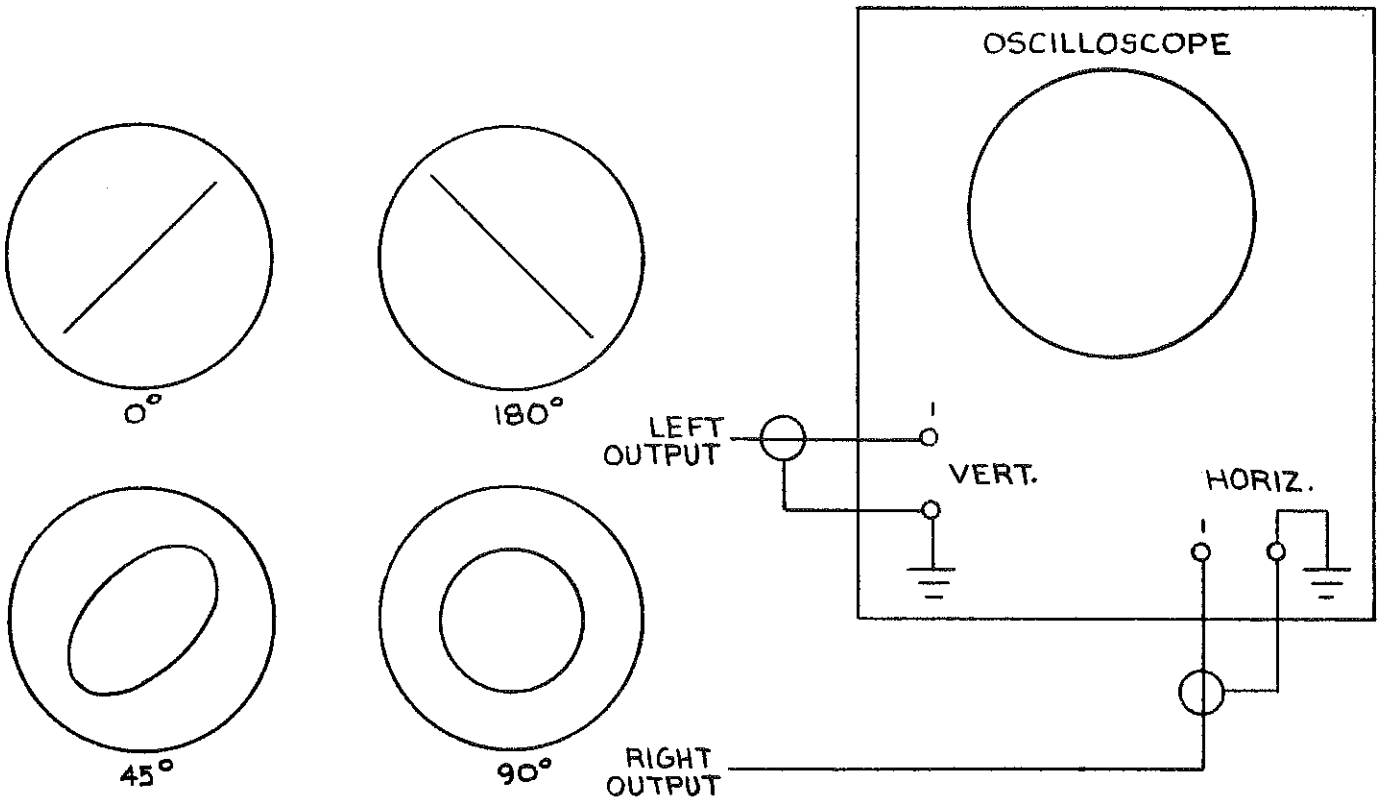
BLOCK FACE SHOULD BUTT UP AGAINST MOTOR SHAFT MAKING EVEN CONTACT FROM TOP TO BOTTOM.



597-2100-9

FIGURE 5-7. HEAD, TAPE GUIDE, AND MOTOR ADJUSTMENT

WARNING: DISCONNECT POWER PRIOR TO SERVICING



597-2100-10

FIGURE 5-8. LISSAJOUS PATTERNS FOR STEREO PHASE ADJUSTMENTS

5-35. Phase Adjustment, Play (stereo models). Connect the left output to the vertical channel of the oscilloscope and the right output to the horizontal channel as illustrated in Figure 5-8. Adjust the playback head azimuth screw slightly to yield a zero degree Lissajous pattern (see Figure 5-8) at the position nearest the present setting. Remove and insert the cartridge several times to verify the adjustments.

5-36. Record Head (record models only). Connect an audio signal generator to the record input. Adjust the audio signal generator to 15 kHz at any level between -15 dBm and Ø dBm. Adjust the record level to -10 VU. Monitor output on the oscilloscope. Adjust the record head azimuth screw for peak output level (from the left or the right output on stereo models). Remove and reinsert the cartridge several times to check adjustments.

5-37. Phase Adjustment, Record (stereo models). Connect the left output to the vertical channel of an oscilloscope, and the right output to the horizontal channel as illustrated in Figure 5-8. Adjust the record head azimuth screw slightly to yield a zero degree Lissajous pattern (see Figure 5-8) at the position nearest the present setting. Remove and reinsert the cartridge several times to check the adjustments.

5-38. ELECTRICAL ADJUSTMENTS.

5-39. PROGRAM PLAYBACK ADJUSTMENTS. This section describes all adjustments made on the playback circuit board. Refer to drawings 914-2110 and 906-2139 for location of components and controls and for other useful information. Right channel instructions are found in parenthesis.

5-40. Required Equipment. The following equipment is needed for these adjustments:

A. Reproduce/Alignment Test Tape (BE P/N 808-0004).

B. Cue Tone Test Cartridge (ordering information available on request).

C. External VU Meter (or decibel calibrated voltmeter).

NOTE AZIMUTH AND PHASING SHOULD BE ADJUSTED BEFORE THE EQUALIZATION. THESE ADJUSTMENTS AFFECT THE

NOTE OUTPUT LEVEL OF THE MACHINE. AFTER COMPLETING THE EQUALIZATION ADJUSTMENT, PROCEED TO THE

NOTE OUTPUT LEVEL ADJUSTMENT.

5-41. Turn the machine on and play the alignment test tape while monitoring the output with the external VU meter. Zero the meter using the 700 Hz/-10 dB reference tone. Adjust the left play high frequency equalizer (right play high frequency equalizer) control so that the 12 kHz test tape tone produces the same level on the meter as did the -10 dB 700 Hz reference tone. Adjust the left play low frequency equalizer (right play low frequency equalizer) control so that the 50 Hz test tape tone is adjusted to the same level as the reference tone of Ø VU. Repeat the procedure, maximizing the effect of these two interacting adjustments. Run the tape again and note the frequency response at all frequencies on the test tape (repeat the procedure for the right channel).

5-42. Output Level. These adjustments should be made after the equalization adjustments. The following procedures will reproduce the factory set level. If another output level is desired, refer to the specifications for the range of possible levels and follow the outlined procedure, using a reference tape recorded at the desired level.

5-43. Turn the machine on and play a reproduce/alignment test cartridge while monitoring the output on an external VU meter. Adjust the left play level (right play level) control to yield zero dBm output from the 700 Hz/zero dB reference tone (same procedure for right channel).

5-44. On record models, first calibrate the cartridge machine's left and right VU meters as described by paragraph 5-54 VU Meter Calibration.

5-45. Play a mono encoded tape with a continuous level tone recorded on the program track. While monitoring the output on an external VU meter, adjust the right mono play level control to equalize the left and right outputs. Remember that a stereo machine in the mono mode has the signal from the left tape track at both the left and right play outputs.

5-46. Cue Sensitivity. The cue tone sensors are adjusted to operate on a tone at a level below the NAB standard cue tone levels, allowing for variations in tone level caused by tape wear.

NOTE WHEN ADJUSTING THE 1KHZ AND 150 HZ CONTROLS, WAIT 3 SECONDS AFTER THE CARTRIDGE STARTS.

NOTE THE SENSOR IS DISABLED FOR THIS TIME.

5-47. Turn the machine on and play the cue tone test tape. During the 1kHz stop tone, adjust the 1kHz sensitivity control so that the sensor triggers and stops the unit.

5-48. During the 150 Hz tone on the tape, adjust the 150 Hz sensitivity control so that the sensor just lights the indicator lamp during the secondary threshold test tone (150 Hz, 1 dB below 185 nWb/m).

5-49. RECORD CIRCUIT BOARD ADJUSTMENTS (2100RP/RPS only). This section describes all the adjustments made on the record circuit board, refer to drawings 914-2111 and 906-2140 for the location of components and controls and other useful information. Right channel adjustments are provided in parentheses.

5-50. Required Equipment. The following equipment is needed for these adjustments:

A. Circuit Board Extender (BE P/N 919-2100).

B. Oscilloscope (any general purpose model).

C. External VU Meter (or decibel calibrated voltmeter).

D. Signal Generator (audio range 20 Hz to 20 kHz).

E. Cue Tone Test Cartridge (ordering information available on request).

F. Miniature Flat-Tip Non-metallic Screwdriver, 1/8 inch (3 mm) tip.

WARNING AC POWER MUST BE TURNED OFF WHEN CIRCUIT BOARDS ARE REMOVED OR REPLACED.

5-51. Use pull-out holes in the upper right and left corners on circuit boards during removal or installation to avoid damaging them. Carefully insert a pointed instrument, such as a narrow screwdriver, in the removal holes and lift up. Do not attempt to pull circuit boards out with fingers as damaged components may result.

5-52. Bias Trap. Disconnect ac power and mount the record circuit board on the extender board (BE P/N 919-2100). Connect an oscilloscope (or 100 kHz bandwidth high impedance voltmeter) to test point 11 (10). Reconnect the ac power and put the machine in the record mode. This can be done by inserting a blank tape and depressing the REC switch/indicator on the front panel. With a non-metallic screwdriver, adjust the left bias trap (right bias trap) control for a minimum 100 kHz signal, as observed on the oscilloscope. (On stereo models, reconnect the oscilloscope to test point 10 and adjust L2).

5-53. Bias Level and Equalization. Load a bulk erased cartridge in the unit. Connect an audio signal generator to the left record input (right record input). Adjust the generator for 700 Hz/-10 VU signal. While recording this signal on the left (right) track, adjust the left bias (right bias) control for peak play output. Measure the left play output level (right play output level) with an external VU meter. Adjust the azimuth or phasing as described in paragraph 5-33 through 5-37. Change the generator frequency to 12 kHz. Adjust the left record high frequency equalizer (right record high frequency equalizer) control unit until the left (right) play output level equals that measured at 700 Hz. Again measure the level at 700 Hz and readjust the left record high frequency equalizer (right record high frequency equalizer) at 12 kHz to equal the level measured at 700 Hz. Continue this process until the left (right) play outputs at 700 Hz and 12 kHz are equal (repeat for right channel).

5-54. VU Meter Calibration. To adjust for playback output, play a reproduce/alignment test cartridge. During the 700 Hz reference tone, adjust the left play meter calibration (right play meter calibration) control to provide a zero VU reading on the machine's front panel meter.

5-55. For record signal input adjustment, connect an audio signal generator to the record input. Adjust the generator for 700 Hz at a level between -18 dBm and +20 dBm; whatever level the user requires. This circuit is factory calibrated to Ø VU output ±1 VU with a -18 dBm input at 700 Hz. While recording this signal on the left (right) track of a bulk erased cartridge, adjust the left record level (right record level) to yield zero dBm playback output on an external VU meter. Adjust the left record meter calibration (right record meter calibration) control to produce a zero VU reading on the machine's front panel meter.

5-56. Cue Section. Refer to drawing 906-2252 in Section VII for the location of outputs.

NOTE WHEN ADJUSTING THE CUE PLAY OUT CONTROL, THE THREE SECOND LOCK-OUT WILL STOP THE MACHINE.

NOTE IT WILL BE NECESSARY TO RESTART THE MACHINE SEVERAL TIMES TO COMPLETE THIS ADJUSTMENT.

5-57. Turn on the cue bias oscillator and the 1kHz oscillator by connecting a 10 k Ohm resistor between pins 1 and 14 of IC2. Use clip leads to attach the resistor. Play a bulk erased tape while monitoring cue play out from rear panel connector J4 (pin J and ground) with an oscilloscope. Adjust the cue bias control for peak cue play output level.

5-58. Adjust the 1kHz oscillator frequency control to 1kHz ±50 Hz as indicated on the oscilloscope. Adjust the 1kHz oscillator record level control to record the 185 nWb/m tone on the tape. Compare the cue play-out level with the level of the secondary threshold test tone on the cue test tape (BE P/N 808-0011). Cue play-out level should be 2.25 times the secondary threshold test tone (8 dB above). The 1kHz oscillator record level control adjusts the level of the 1kHz cue tone. When adjustments are complete turn off the cue bias oscillator and the 1kHz oscillator by removing the 10 k Ohm resistor from pins 1 and 14.

5-59. Adjust the 150 Hz cue tone as follows. Turn the cue tone on by playing a bulk erased tape and depressing the SEC switch/indicator on the front panel. Monitor the cue play output from the machine's rear panel connector J4 (pin J and ground, refer to drawing 906-2252 in Section VII) with an oscilloscope. Adjust the 150 Hz oscillator frequency control so that the frequency is 150 Hz ±8 Hz as indicated on the oscilloscope. Compare the cue play output level with the level of the secondary threshold test tone on the cue test tone tape. The level of the 150 Hz cue tone should be 2.25 times the level of the secondary threshold test tone (8 dB above). The 150 Hz oscillator record level control adjusts the level of the 150 Hz tone.

5-60. When finished, disconnect the ac power, remove the extender board, and replace the record circuit board.

5-61. MECHANICAL PARTS REPLACEMENT.

WARNING DISCONNECT POWER BEFORE ANY SERVICING.

5-62. PRESSURE ROLLER REPLACEMENT. Manually raise the pressure roller above the deck surface by depressing the solenoid plunger. Remove the E-ring, teflon washer, pressure roller, and metal washer. Check the pressure roller alignment as described in paragraph 5-21. Install the metal washer, replacement roller, teflon washer, and secure with E-ring.

5-63. HEAD REPLACEMENT. Refer to Figure 5-9 as needed for the following procedure. Disconnect ac power and remove the top cover. Remove the beryllium copper hold-down spring and the mu-metal shield by removing the three screws from the top of the clamp. Loosen the two head clamp screws, withdraw the head from the clamp and disconnect the leads. Plug the leads into the replacement head and seat the new head in the mounting clamp. Holding the head laterally centered and firmly against the clamp backstops, tighten the clamp screws with moderate pressure. Reconnect ac power. Adjust tracking, zenith, and azimuth as outlined in paragraphs 5-25 through 5-37. Replace the mu-metal shield and the hold-down spring. Replace the top cover.

WARNING DISCONNECT PRIMARY POWER BEFORE PROCEEDING.

5-64. MOTOR REPLACEMENT. Disconnect the ac power cord, remove the top and bottom covers. Remove the playback circuit board, using the removal holes in the corners of the board. Remove the transformer by removing the four mounting screws. Unplug the transformer connector and the motor connector. Place the machine on its left side. Cut the cable tie which secures the motor cable to the partition.

CAUTION CARE MUST BE EXERCISED IN HANDLING AND STORING MOTORS TO AVOID DAMAGING THE BEARINGS. STORE SPARE PARTS IN THE ORIGINAL PACKAGING. DO NOT HANDLE THE MOTOR BY THE SHAFT. IT MAY BE SAFELY HANDLED BY THE CASE. DO NOT SUBJECT THE MOTOR TO SHARP BLOWS, ROUGH HANDLING, ETC. DO NOT LET ANY METAL TOUCH THE SHAFT.

CAUTION

CAUTION

CAUTION

5-65. Supporting the motor case in one hand, remove the two motor mounting screws on the top side of the deck and remove the motor. To install the new motor reverse the above procedure. When tying the motor cable to the partition, be sure that all the wires are clear of all rotating parts. Refer to paragraph 5-19 for the needed adjustments.

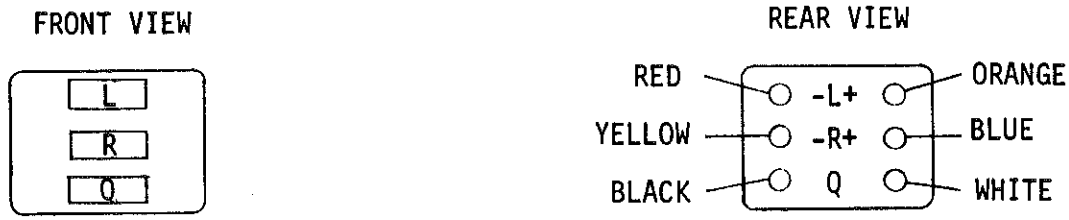
5-66. After adjustments are completed, reconnect the power, The motor shaft rotates counterclockwise. Test the unit with a cartridge for normal operation.

WARNING DISCONNECT PRIMARY POWER BEFORE PROCEEDING.

5-67. POWER TRANSFORMER REPLACEMENT. Disconnect the ac power cord and remove the top cover. Remove the four mounting screws, lift transformer away from machine, and unplug the transformer. To install a new transformer reverse the procedure. Plug in the transformer connector, set the transformer into the machine, and secure with the four mounting screws. Replace the cover and reconnect the power.

MODEL MIP MONO PLAY (252-0007)
MODEL MIR MONO RECORD (252-0008)

MODEL SIP STEREO PLAY (253-0004)
MODEL SIR STEREO RECORD (253-0005)



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

597-2100-11

FIGURE 5-9. TAPE HEAD CONNECTIONS AND CONFIGURATIONS

5-68. COMPONENT REPLACEMENT.

5-69. The circuit boards used in the 2100 cartridge machine are double sided boards with plated through-holes. Because of the plated through-holes, solder fills the holes by capillary action. These conditions require that defective components be removed carefully to avoid damage to the board.

5-70. On all circuit boards, the adhesion of the copper trace to the board fails at almost the same temperature as solder melts. A circuit board trace can be destroyed by excessive heat or lateral movement during soldering. Use of a small iron with steady pressure is required for circuit board repairs.

5-71. To remove a component from a board such as the type used in the 2100, cut the leads from the body of the defective component while the device is still soldered to the board.

5-72. Grip each component lead, one at a time, with long nose pliers. Turn the board over and touch the soldering iron to the lead at the solder connection. When the solder begins to melt, push the lead through the back side of the board and cut off the clinched end of the lead. Each lead may now be heated independently and pulled out of each hole. The holes may be cleared of solder by carefully re-heating with a low wattage iron and removing the residual solder with a soldering vacuum tool.

5-73. Install the new component and apply solder from the bottom side of the board. If no damage has been done to the plated through-holes, soldering of the top side is not required.

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

WARNING OBSERVE THE MANUFACTURER'S CAUTIONARY INSTRUCTIONS.

5-74. After soldering, remove residual flux with a cotton swab moistened with a suitable solvent. Rubbing alcohol is highly diluted and is not effective. Solvents are available from electronic supply houses which are useful.

5-75. The board should be checked to ensure the flux has been removed and not just smeared about. Rosin flux is not normally corrosive, but it will absorb enough moisture in time to become conductive and cause problems.

5-76. Integrated Circuit Replacement. Extra care should be exercised with integrated circuits. All integrated circuits must be oriented so that its notch matches the notch on the socket. Do not attempt to remove an integrated circuit with your fingers. Use a circuit puller to lightly pry the integrated circuit from its socket.

SECTION VI

PARTS LIST

6-1. INTRODUCTION.

6-2. This section provides descriptions and part numbers of parts and assemblies required for maintenance of the 2100 Series cartridge machine. Table entries in this section are indexed by the reference designators of the applicable schematic diagram.

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

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

NOTE

NOTE

Table 6-1. REPLACEABLE PARTS LIST INDEX

TABLE NO.	DESCRIPTION	PART NO.	PAGE
6-2	CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS 2100 SERIES MACHINES	907-2110 907-2111 907-2112 907-2113 907-2120 907-2121 907-2122 907-2123 907-2124 907-2125	36
6-3	60 Hz MOTOR ASSEMBLY	950-0009	40
6-4	50 Hz MOTOR ASSEMBLY	950-0008	40
6-5	FRONT PANEL ASSEMBLY 2100P AND	503-2102 503-2112 503-2122 503-2101	41
6-6	MOTHERBOARD ASSEMBLY	914-2103 914-2113	42
6-7	PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY	914-2100 914-2110	44

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

TABLE 6-2. CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS - 2100 SERIES CARTRIDGE MACHINES - 907-2110/-2111/-2112/-2113/-2120/-2121/-2122/-2123/-2124/-2125 (Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ALL MODELS		
F1	Fuse, 1 Ampere, AGC	330-0100	1
J7	Receptacle, 12-Pin (to Power Transformer)	418-1271	1
P5	Plug, 4-Pin (To Rear Panel)	418-0240	1
P6	Plug, 2-Pin (to Solenoid)	418-0701	1
S1	Switch, Power, Miniature Toggle, SPST, 5 Ampere/120V ac or 2 Ampere/250V ac	348-7101	1
T1	Transformer, Power Dual Primary: 120V, 50/60 Hz Dual Secondary: 25V @ 1.0 Ampere	376-7675	1
T1/J7	Power Transformer and Receptacle	376-7675-002	--
XF1	Fuse Holder, AGC	415-2012	1
----	Pressure Roller	444-0790	1
M1	Motor Assembly, 60 Hz (Table 6-3)	950-0009	1
----	Deck Parts	950-2100	1

NOTE - THE FOLLOWING DECK PARTS CAN BE FOUND ON DRAWING C950-2100 IN SECTION VII.

Solenoid Assembly, P/N 950-0031
Solenoid, Air Damped, 24V, 24W, 52 Ohms, 2 inch (5.08 cm) diameter, P/N 289-2565
Microswitch, SPDT, 1/2 Ampere, 125V ac, P/N 346-6100
Tape Guide, P/N 452-0001
Cartridge Guide, Right, P/N 452-0031
Pinch Roller Shaft, P/N 459-0081-1
Cross Shaft, Pinch Roller, P/N 459-0082-1
Tape Guide Support, P/N 459-0156
Stop, Solenoid, P/N 459-0158
Deck Casting, P/N 494-0000

TABLE 6-2. CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS - 2100 SERIES CARTRIDGE MACHINES - 907-2110/-2111/-2112/-2113/-2120/-2121/-2122/-2123/-2124/-2125 (Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ADDITIONAL PARTS FOR 907-2110 MACHINE ONLY		
----	Front Panel Assembly	503-2102	1
----	Head, Dummy	407-0001	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Motherboard Assembly	914-2103	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	AC Line Cord, N.E.M.A. 5-15P 3-wire North American Plug	681-1723	1
	ADDITIONAL PARTS FOR 907-2111 MACHINE ONLY		
----	Front Panel Assembly	503-2112	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Head, Record, 2-Channel, Model MIR Inductance: 50 mH Impedance at 1kHz: 330 Ohms DC Resistance: 115 Ohms per Channel	252-0008	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	Record Circuit Board Assembly, Mono	914-2101	1
----	AC Line Cord, N.E.M.A. 5-15P 3-Wire North American Plug	681-1723	1
	ADDITIONAL PARTS FOR 907-2112 MACHINE ONLY		
----	Front Panel Assembly	503-2102	1
----	Head, Playback, 3-Channel, Model SIP Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 800 Ohms per Channel	253-0004	1
----	Head, Dummy	407-0001	1
----	Motherboard Assembly	914-2103	1
----	Playback Circuit Board Assembly, Stereo	914-2110	1
----	AC Line Cord, N.E.M.A. 5-15P 3-Wire North American Plug	681-1723	1

TABLE 6-2. CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS - 2100 SERIES CARTRIDGE MACHINES - 907-2110/-2111/-2112/-2113/-2120/-2121/-2122/-2123/-2124/-2125 (Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ADDITIONAL PARTS FOR 907-2113 MACHINE ONLY		
----	Front Panel Assembly	503-2122	1
----	Head, Playback, 3-Channel, Model SIP Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 800 Ohms per Channel	253-0004	1
----	Head, Record, 3-Channel, Model SIR Inductance: 50 mH Impedance at 1kHz: 400 Ohms DC Resistance: 100 Ohms per Channel	253-0005	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Stereo	914-2110	1
----	Record Circuit Board Assembly, Stereo	914-2111	1
----	AC Line Cord, N.E.M.A. 5-15P 3-Wire North American Plug	681-1723	1
	ADDITIONAL PARTS FOR 907-2120 MACHINE ONLY		
F1	Fuse, 1/2 Ampere, AGC	330-0050	1
M1	Motor Assembly, 50 Hz (Table 6-4)	950-0008	1
----	Front Panel Assembly	503-2102	1
----	Head, Dummy	407-0001	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Motherboard Assembly	914-2103	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1
	ADDITIONAL PARTS FOR 907-2121 MACHINE ONLY		
F1	Fuse, 1/2 Ampere, AGC	330-0050	1
M1	Motor Assembly, 50 Hz (Table 6-4)	950-0008	1
----	Front Panel Assembly	503-2112	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Head, Record, 2-Channel, Model MIR Inductance: 50 Mh Impedance at 1kHz: 330 Ohms DC Resistance: 115 Ohms per Channel	252-0008	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	Record Circuit Board Assembly, Mono	914-2101	1
----	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1

TABLE 6-2. CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS - 2100 SERIES CARTRIDGE MACHINES - 907-2110/-2111/-2112/-2113/-2120/-2121/-2122/-2123/-2124/-2125 (Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ADDITIONAL PARTS FOR 907-2122 MACHINE ONLY		
F1	Fuse, 1/2 Ampere, AGC	330-0050	1
M1	Motor Assembly, 50 Hz (Table 6-4)	950-0008	1
----	Front Panel Assembly	503-2102	1
----	Head, Playback, 3-Channel, Model SIP Inductance: 350 mH Impedance at 1kHz: 2.2 k Ohms DC Resistance: 800 Ohms per Channel	253-0004	1
----	Head, Dummy	407-0001	1
----	Motherboard Assembly	914-2103	1
----	Playback Circuit Board Assembly, Stereo	914-2110	1
----	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1
	ADDITIONAL PARTS FOR 907-2123 MACHINE ONLY		
F1	Fuse, 1/2 Ampere, AGC	330-0050	1
M1	Motor Assembly, 50 Hz (Table 6-4)	950-0008	1
----	Front Panel Assembly	503-2122	1
----	Head, Playback, 3-Channel, Model SIP Inductance: 350 mH Impedance a 1kHz: 2.2 k Ohms DC Resistance: 800 Ohms per Channel	253-0004	1
----	Head, Record, 3-Channel, Model SIR Inductance: 50 mH Impedance at 1kHz: 400 Ohms DC Resistance: 100 Ohms per Channel	253-0005	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Stereo	914-2110	1
----	Record Circuit Board Assembly, Stereo	914-2111	1
----	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1
	ADDITIONAL PARTS FOR 907-2124 MACHINE ONLY		
----	Assembly, Speaker (414-0008) and Plug (418-0227)	950-0076	1
----	Front Panel Assembly	503-2101	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Head, Dummy	407-0001	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	Monitor Playback Circuit Board Assembly	910-2124	1
----	AC Line Cord, N.E.M.A., 5-15P 3-Wire North American Plug	681-1723	1

TABLE 6-2. CHASSIS MOUNTED AND DECK ASSEMBLY COMPONENTS - 2100 SERIES CARTRIDGE MACHINES - 907-2110/-2111/-2112/-2113/-2120/-2121/-2122/-2123/-2124/-2125 (Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ADDITIONAL PARTS FOR 907-2125 MACHINE ONLY		
F1	Fuse, 1/2 Ampere, AGC	330-0050	1
M1	Motor Assembly, 50 Hz (Table 6-4)	950-0008	1
----	Assembly, Speaker (414-0008) and Plug (418-0076)	950-0076	1
----	Front Panel Assembly	503-2101	1
----	Head, Playback, 2-Channel, Model MIP Inductance: 400 mH Impedance at 1kHz: 2.55 k Ohms DC Resistance: 410 Ohms per Channel	252-0007	1
----	Head, Dummy	407-0001	1
----	Motherboard Assembly	914-2113	1
----	Playback Circuit Board Assembly, Mono	914-2100	1
----	Monitor Playback Circuit Board Assembly	910-2124	1
----	AC Line Cord, CEE 7/7 3-Wire European Plug	681-0001	1

TABLE 6-3. 60 Hz MOTOR ASSEMBLY - 950-0009

REF. DES.	DESCRIPTION	PART NO.	QTY.
B1	Motor, Synchronous, 60 Hz, 600 rpm @ 7 oz-in/m, 7.5 in/s (19.05 cm/s), 117V ±10% @ 25W	380-1000	1
P8	Plug, 12-Pin	418-1271	1
----	Pins for P8	417-0053	6
----	Capacitor, Motor Start, 0.7 uF, 300V ac	029-1067	1

TABLE 6-4. 50 Hz MOTOR ASSEMBLY - 950-0008

REF. DES.	DESCRIPTION	PART NO.	QTY.
B1	Motor, Synchronous, 50 Hz, 500 rpm @ 10 oz-in/m, 7.5 in/s (19.05 cm/s), 117V ±10%, 25W	382-2080	1
P8	Plug, 12-Pin	418-1271	1
----	Pins for P8	417-0053	6
----	Capacitor, Motor Start, 0.95 uF, 300V ac (w/clamp)	029-1075	1

TABLE 6-5. FRONT PANEL ASSEMBLY - 503-2102/-2112/-2122/-2101
(Sheet 1 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ALL MODELS		
D1	LED, Red, Diffused, 1.7V @ 20 mA (MONO PLAY)	323-0023	1
DS1,DS3	Lamp, No. 85, Incandescent, Subminiature, Wedge Base, 28V, 0.04 Ampere (SEC and STOP Switch/Indicator)	321-0085	2
DS4	Lamp, No. 327, Incandescent, Subminiature, 28V, 0.04 Ampere (START Switch/Indicator)	321-0327	1
J1	Receptacle, Header, Dual 13-Pin	417-2600	1
S1	Switch, Illuminated, DPST, Normally Open, Momentary Contact, Push, 0.25A, 125V ac, (STOP)	343-0175	1
S4	Switch, Illuminated, DPST, Normally Open, Momentary Contact, Push, 1 Ampere, 125V ac (START)	343-0225	1
----	Switch Cap, Red (STOP)	343-0176	1
----	Switch Cap, Green (START)	343-0226	1
----	Switch Cap, White (SEC)	343-0156	1
----	Blank Circuit Board	514-2102	1
	ADDITIONAL PARTS FOR 2100P, PS MODELS ONLY 503-2102		
----	Indicator, 0.25A, 125V ac (SEC)	343-0155	1
	ADDITIONAL PARTS FOR 2100RP MODELS ONLY 503-2112		
D2	LED, Red, Diffused, 1.7V @ 20 mA (MONO REC)	323-0023	1
DS2	Lamp, No. 85, Incandescent, Subminiature, Wedge Base, 28V, 0.04 Ampere	321-0085	1
M1	VU Meter, 1.5 inch (3.8 cm), dc Microammeter Type, 200 uA Movement, 225 Ohm Resistance	319-0081	1
R1	Potentiometer, 10 k Ohm (LEVEL control for left VU meter)	191-1053D	1
S2,S3	Switch, Illuminated, DPST, Normally Open, Momentary Contact, Push, 0.25A, 125V ac (REC and SEC Switch/Indicators)	343-0175	2
----	Switch Cap, Red (REC Switch)	343-0176	1

TABLE 6-5. FRONT PANEL ASSEMBLY - 503-2102/-2112/-2122/-2101
(Sheet 2 of 2)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	ADDITIONAL PARTS FOR 2100RPS MODELS ONLY 503-2122		
D2	LED, Red, Diffused, 1.7V @ 20 mA (MONO REC)	323-0023	1
DS2	Lamp, No. 85, Incandescent, Subminiature, Wedge Base, 28V, 0.04 Ampere	321-0085	1
M1,M2	VU Meter, 1.5 inch (3.8 cm), dc Microammeter Type, 200 uA Movement, 225 Ohm Resistance	319-0081	2
R1,R2	Potentiometer, 10 k Ohm (LEVEL controls for left and right VU Meters)	191-1053D	2
S2,S3	Switch, Illuminated, DPST, Normally Open, Momentary Contact, Push, 0.25A, 125V ac (REC and SEC Switch/Indicators)	343-0175	2
----	Switch Cap, Red (REC Switch)	343-0176	1
	ADDITIONAL PARTS FOR 2100PA MODELS ONLY 503-2101		
----	Speaker, 2 inch, 8 Ohm, 0.1W	414-0003	1
----	Jack for Speaker	417-0210	1
----	Potentiometer, 10 k Ohm ±10%, 1W	191-0286	1
----	Knob for Potentiometer	484-0500	1

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

REF. DES.	DESCRIPTION	PART NO.	QTY.
	BOTH ASSEMBLIES		
C1,C2	Capacitor, Electrolytic, 100 uF, 25V	023-1084	2
C3	Capacitor, Electrolytic, 4.7 uF, 35V	024-4764	1
C4	Capacitor, Electrolytic, 33 uF, 35V	024-3374	1
C5	Capacitor, Electrolytic, 100 uF, 25V	023-1084	1
C6,C7	Capacitor, Electrolytic, 4700 uF, 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
D5	Diode, 1N4148, Silicon, 75V @ 0.3 Ampere	203-4148	1
D6 THRU D10	Diode, Rectifier, 1N4005, Silicon, 600V, 1A	203-4005	5

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

REF. DES.	DESCRIPTION	PART NO.	QTY.
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, T1P-31A, Silicon, NPN, TO-220AB Case	219-0031	1
Q3	Transistor, T1P-32A, Silicon, PNP, TO-220AB Case	218-0032	1
R1	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R2	Resistor, 1.5 k Ohm ±5%, 1/4W	100-1543	1
R3	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R4 THRU R6	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	3
R7	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R8	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R9,R10	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R11 THRU R14	Resistor, 10 Ohm ±5%, 1/2W	110-1023	4
R15,R16	Resistor, 1.8 k Ohm ±5%, 1/4W	100-1843	2
XIC3,XIC4	Pad, Transistor Mounting	409-7403	2
XQ2,XQ3	Pad, Transistor Mounting	409-7403	2
----	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	956-0002	2

TABLE 6-7. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100/-2110
(Sheet 1 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	MONO AND STEREO ASSEMBLIES		
C1	Capacitor, Ceramic, 0.0047 uF, 200V	032-4733	1
C2	Capacitor, Electrolytic, 10 uF, 25V	013-1074	1
C3	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C4	Capacitor, Mica, 150 pF, 500V	040-1522	1
C5	Capacitor, Ceramic, 1 uF, 50V	003-1054	1
C6	Capacitor, Electrolytic, 1 uF, 35V	015-1064A	1
C12	Capacitor, Ceramic, 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, 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, Electroltyic, 47 uF, 16V, Tantalum	013-4750	1
C33	Capacitor, Electrolytic, 1 uF, 35V, Tantalum	064-1063	1
C34 THRU C37	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	4
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 ±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	Integrated Circuit, CD4016AE, Quad Bilateral Switch, CMOS, 14-Pin DIP	228-8016	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 ±5%, 1/4W	100-1563	1
R2	Potentiometer, 1 Meg Ohm ±10%, 1/2W	178-1074	1
R3	Potentiometer, 50 k Ohm ±10%, 1/2W	178-5054	1

TABLE 6-7. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100/-2110
(Sheet 2 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R4	Resistor, 820 Ohm ±5%, 1/4W	100-8233	1
R5	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R6	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	1
R13	Potentiometer, 10 k Ohm ±10%, 1/2W	178-1054	1
R16	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R19	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R20	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R23	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R26	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R27	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R28	Resistor, 9.1 k Ohm ±5%, 1/4W	100-9143	1
R29	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R30,R31	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R32,R33	Resistor, 33 Ohm ±5%, 1/4W	100-3323	2
R43	Resistor, 330 k Ohm ±5%, 1/4W	100-3363	1
R44	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R45	Resistor, 820 Ohm ±5%, 1/4W	100-8233	1
R46	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	1
R47	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R48,R49	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R50	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R52	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R53,R54	Potentiometer, 10 k Ohm ±10%, 1/2W	178-1054	2
R55,R56	Resistor, 56.2 k Ohm ±1%, 1/4W	103-5651	2
R57	Resistor, 2.21 k Ohm ±1%, 1/4W	103-2241	1
R58,R59	Resistor, 56.2 k Ohm ±1%, 1/4W	103-5651	2
R60	Resistor, 4640 Ohm ±1%, 1/4W	103-4641	1
R61	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R62	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R63,R64	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	2
R65	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R66	Resistor, 15 k Ohm ±5%, 1/4W	100-1553	1
R67	Resistor, 1.8 k Ohm ±5%, 1/4W	100-1843	1
R68	Resistor, 1 k Ohm ±5%, 1/4W	100-1063	1
R69 THRU R71	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	3
R72	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R73,R74	Resistor, 2 Meg Ohm ±5%, 1/4W	100-2073	2
R75	Resistor, 200 k Ohm ±5%, 1/4W	100-2063	1
R76	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R77,R78	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R79	Resistor, 2.7 k Ohm ±5%, 1/4W	100-2743	1
R80,R81	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	2
R82	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R83	Resistor, 2.2 k Ohm ±5%, 1/4W	100-2243	1
R84	Resistor, 36 k Ohm ±5%, 1/4W	100-3653	1
R87	Resistor, 82 Ohm ±5%, 1/4W	110-8223	1
XIC1,XIC2, XIC4,XIC5	Socket, 8-Pin DIP	417-0800	4

TABLE 6-7. PLAYBACK LOGIC CIRCUIT BOARD ASSEMBLY - 914-2100/-2110
(Sheet 3 of 3)

REF. DES.	DESCRIPTION	PART NO.	QTY.
XIC6 THRU XIC10	Socket, 14-Pin DIP	417-1400	5
	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, 500V	040-1522	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 ±5%, 1/4W	100-1563	1
R8	Potentiometer, 1 Meg Ohm ±10%, 1/2W	178-1074	1
R9	Potentiometer, 50 k Ohm ±10%, 1/2W	178-5054	1
R10	Resistor, 820 Ohm ±5%, 1/4W	100-8233	1
R11	Resistor, 10 Ohm ±5%, 1/4W	100-1023	1
R12	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	1
R14,R15	Potentiometer, 10 k Ohm ±10%, 1/2W	178-1054	2
R17,R18	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R21,R22	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R24,R25	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	2
R34	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R35	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R36	Resistor, 9.1 k Ohm ±5%, 1/4W	100-9143	1
R37	Resistor, 5.1 k Ohm ±5%, 1/4W	100-5143	1
R38,R39	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	2
R40,R41	Resistor, 33 Ohm ±5%, 1/4W	100-3323	2
R42	Resistor, 36 k Ohm ±5%, 1/4W	100-3653	1
R84	Resistor, 36 k Ohm ±5%, 1/4W	100-3653	1
R87	Resistor, 82 Ohm ±5%, 1/4W	110-8223	1
XIC3	Socket, 8-Pin DIP	417-0800	1

TABLE 6-8. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101/-2111
(Sheet 1 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
	MONO AND STEREO ASSEMBLIES		
C1,C2,C5, C6	Capacitor, Mica, 50 pF ±5%, 50V	040-5013	4
C7,C8	Capacitor, Electrolytic, 1 uF, 50V	024-1064	2
C9	Capacitor, Mylar Film, 0.1 uF ±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 ±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 ±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 ±10%, 100V	030-1053	1
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
C33	Capacitor, Mylar Film, 0.01 uF, 100V	030-1043	1
C34	Capacitor, Poly Film, 0.0022 uF ±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 ±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, 1 uF, 50V	024-1064	1
C59	Capacitor, Mylar Film, 0.047 uF ±10%, 100V	030-4743	1
C60	Capacitor, Ceramic, 0.1 uF, 50V	003-1054	1
C61	Capacitor, Mica, 150 pF ±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
IC1,IC2	Integrated Circuit, LM3900, Quad Operational Amplifier, 14-Pin DIP	221-3900	2
IC4	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1

TABLE 6-8. RECORD CIRCUIT BOARD ASSMEBLY - 914-2101/-2111
(Sheet 2 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
IC6	Integrated Circuit, CD4016AE, Quad Bilateral Switch, CMOS, 14-Pin DIP	228-8016	1
IC7	Integrated Circuit, MM74C00N, Quad 2-Input NAND, CMOS, 14-Pin DIP	221-7400	3
IC8	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
IC9,IC10	Integrated Circuit, MM74C00N, Quad 2-Input, NAND Gate, CMOS, 14-Pin DIP	221-7400	2
IC11	Integrated Circuit, MM74C08N, 2-Input AND, CMOS, 14-Pin DIP	221-7408	1
IC12	Integrated Circuit, MM74C32N, 2-Input OR Gate, 14-Pin DIP	221-7432	1
L1	Choke, 10 uH	364-0670	1
L3	Choke, Adjustable, 8-20 uH	363-9061	1
L4	Choke, Ferrite, 4-Leg (BE Manufacture)	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 ±10%, 1/2W	178-5064	4
R6	Resistor, 180 k Ohm ±5%, 1/4W	100-1863	1
R7 THRU R9	Resistor, 33 k Ohm ±5%, 1/4W	100-3353	3
R10	Resistor, 39 Ohm ±5%, 1/4W	100-3923	1
R11,R12	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R13	Resistor, 39 Ohm ±5%, 1/4W	100-3923	1
R14	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R15,R16	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R17	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R18	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
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 ±5%, 1/4W	100-4743	1
R23	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R24,R25	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	2
R26	Potentiometer, 2 k Ohm ±10%, 1/2W	177-2044	1
R27	Resistor, 560 k Ohm ±5%, 1/4W	100-5663	1
R28	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1

TABLE 6-8. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101/-2111
(Sheet 3 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R29	Resistor, 330 k Ohm ±5%, 1/4W	100-3363	1
R30	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R31	Resistor, 82 k Ohm ±5%, 1/4W	100-8253	1
R33	Resistor, 56 k Ohm ±5%, 1/4W	100-5653	1
R34	Resistor, 82 k Ohm ±5%, 1/4W	100-8253	1
R35	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R36	Resistor, 47 k Ohm ±5%, 1/4W	100-4753	1
R37	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R38	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R42	Resistor, 200 k Ohm ±5%, 1/4W	100-2063	1
R43,R44	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	2
R45,R46	Resistor, 2 Meg Ohm ±5%, 1/4W	100-2073	2
R47	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R48	Resistor, 2.7 k Ohm ±5%, 1/4W	100-2743	1
R51	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R52	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R53	Resistor, 330 k Ohm ±5%, 1/4W	100-3363	1
R54	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R55	Resistor, 75 k Ohm ±5%, 1/4W	100-7553	1
R56	Resistor, 56 k Ohm ±5%, 1/4W	100-5653	1
R57	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R58,R59	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	2
R60	Potentiometer, 5 k Ohm ±10%, 1/2W	177-5044	1
R61,R62, R66	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	3
R67,R68	Resistor, 680 Ohm ±5%, 1/4W	100-6833	2
R69	Resistor, 56 k Ohm ±5%, 1/4W	100-5653	1
R70	Resistor, 180 k Ohm ±5%, 1/4W	100-1863	1
R71,R72	Resistor, 100 Ohm ±5%, 1/4W	100-1033	2
R76	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R77	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	1
R78	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R84	Potentiometer, 100 k Ohm ±10%, 1/2W	178-1064	1
R85,R86	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R87	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R93	Resistor, 9.1 k Ohm ±5%, 1/4W	100-9143	1
R94	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R95	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R101	Resistor, 8.2 k Ohm ±5%, 1/4W	100-8243	1
R102	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R103	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R105	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R106	Potentiometer, 50 k Ohm ±10%, 1/2W	178-5054	1
R107	Potentiometer, 1 Meg Ohm ±10%, 1/2W	178-1074	1
R108	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R109	Resistor, 1.2 k Ohm ±5%, 1/4W	100-1243	1
R110 THRU R113	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	4

TABLE 6-8. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101/-2111
(Sheet 4 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
R114	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R115	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R116	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R117	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R118	Resistor, 820 k Ohm ±5%, 1/4W	100-8263	1
R119	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R120 THRU R122	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	3
R123	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R124	Resistor, 820 k Ohm ±5%, 1/4W	100-8263	1
R125	Resistor, 20 k Ohm ±5%, 1/4W	100-2053	1
R126	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R127	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R128	Resistor, 7.5 k Ohm ±5%, 1/4W	100-7543	1
R129	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R130	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
R132	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
S1	Switch, Slide, SPST, 300 mA @ 125V ac	345-0120	1
T1	Transformer, Bias Oscillator, 100 kHz (BE Manufacture)	372-0095	1
XIC1,XIC2	Socket, 14-Pin DIP	417-1400	2
XIC4	Socket, 8-Pin DIP	417-0800	1
XIC6,XIC7	Socket, 14-Pin DIP	417-1400	2
XIC8	Socket, 8-Pin DIP	417-0800	1
XIC9 THRU XIC12	Socket, 14-Pin DIP	417-1400	4
----	Pins, Circuit Board Disconnect	418-0161	6
----	Blank Circuit Board	514-2101	1

ADDITIONAL PARTS FOR 914-2111 ASSEMBLY (STEREO MODELS) ONLY

C3,C4	Capacitor, Mica, 50 pF ±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
C35	Capacitor, Mylar, 0.01 uF, 100V	030-1043	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, 1 uF, 50V	024-1064	1
D4 THRU D7	Diode, 1N98, Vermanium, 80V @ 0.2 Ampere	202-0098	4

TABLE 6-8. RECORD CIRCUIT BOARD ASSEMBLY - 914-2101/-2111
(Sheet 5 of 5)

REF. DES.	DESCRIPTION	PART NO.	QTY.
IC3	Integrated Circuit, RC4558, Dual Operational Amplifier, 8-Pin DIP	221-4558	1
IC5	Integrated Circuit, CD4016AE, Quad Bilateral Switch, CMOS, 14-Pin DIP	228-8016	1
L2	Inductor, Adjustable, 8-20 uH	363-9061	1
L5	Choke, Ferrite, 4-Leg (BE Manufacture)	956-0002	1
Q2,Q10	Transistor, GES5816, Silicon, NPN, TO-92 Case	211-5816	2
R2	Potentiometer, 500 k Ohm ±10%, 1/2W	178-5064	1
R32	Resistor, 3.9 k Ohm ±5%, 1/4W	100-3943	1
R39	Resistor, 2.7 k Ohm ±5%, 1/4W	100-2743	1
R40	Resistor, 22 k Ohm ±5%, 1/4W	100-2253	1
R41	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	1
R49	Resistor, 270 k Ohm ±5%, 1/4W	100-2763	1
R50	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R63 THRU R65	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	3
R73,R74	Resistor, 100 Ohm ±5%, 1/4W	100-1033	2
R75	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R79	Resistor, 470 k Ohm ±5%, 1/4W	100-4763	1
R80,R81	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	2
R82	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R83	Potentiometer, 100 k Ohm ±10%, 1/2W	178-1064	1
R88	Resistor, 8.2 k Ohm ±5%, 1/4W	100-8243	1
R89	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R90	Resistor, 39 k Ohm ±5%, 1/4W	100-3953	1
R91	Resistor, 9.1 k Ohm ±5%, 1/4W	100-9143	1
R92	Resistor, 10 k Ohm ±5%, 1/4W	100-1053	1
R96	Potentiometer, 50 k Ohm ±10%, 1/2W	178-5054	1
R97	Potentiometer, 1 Meg Ohm ±10%, 1/2W	178-1074	1
R98	Resistor, 120 k Ohm ±5%, 1/4W	100-1263	1
R99	Resistor, 1 Meg Ohm ±5%, 1/4W	100-1073	1
R100	Resistor, 4.7 k Ohm ±5%, 1/4W	100-4743	1
R104	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R131	Resistor, 100 Ohm ±5%, 1/4W	100-1033	1
XIC3	Socket, 8-Pin DIP	417-0800	1
XIC5	Socket, 14-Pin DIP	417-1400	1
----	Pins, Circuit Board Disconnect	418-0161	3

TABLE 6-9. 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, Electroltyic, 1 uF, 35V, Tantalum	064-1063	1
C3	Capacitor, Ceramic Disc, 10 pF ±10%, 1 kV	001-1014	1
C4	Capacitor, Electrolytic, 10 uF, 16V	023-1074	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 Turns #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 ±5%, 1/4W	100-1053	1
R2	Resistor, 3.3 k Ohm ±5%, 1/4W	100-3343	1
R3	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R4	Resistor, 20 k Ohm ±5%, 1/4W	100-2043	1
R5	Resistor, 100 k Ohm ±5%, 1/4W	100-1063	1
R6	Resistor, 620 Ohm ±5%, 1/4W	100-6233	1
R7,R8	Resistor, 1 k Ohm ±5%, 1/4W	100-1043	2
R9	Resistor, 620 Ohm ±5%, 1/4W	100-6233	1
R10,R11	Resistor, 33 Ohm ±10%, 2W	122-3302	2
R12	Resistor, 1.2 k Ohm ±5%, 1/4W	100-1243	1
U1	Integrated Circuit, NE5534AN, Low Noise Operational Amplifier, 8-Pin DIP	221-5534	1
XF1	Fuse Clips, AGC	415-2068	2
XU1	Socket, 8-Pin	417-0800	1
----	Blank Circuit Board	510-2124	1

TABLE 6-10. REMOTE CONTROL PANEL FOR 2100 SERIES - 907-2115

REF. DES.	DESCRIPTION	PART NO.	QTY.
D1,D2	Indicator, LED, Red	323-0023	2
DS1 THRU DS4	Lamp, No. 327, Incandescent, Subminiature 28V, 0.040 Ampere	321-0327	4
J1	Receptacle, 15-Pin	418-0316	1
P1	Plug, 15-Pin	418-0313	1
R1 THRU R4	Resistor, 10 Ohm ±5%, 1/2W	110-1023	4
R5,R6	Resistor, 1.8 k Ohm ±5%, 1/4W	100-1843	2
S1,S2, S3,S4	Switch, Illuminated, SPST, Normally Open, Momentary Contact, Push, 5-100 mA	343-0012	4
S1,S2	Switch Cap, Red (STOP, RECORD)	343-0013	2
S3	Switch Cap, White (SEC)	343-0014	1
S4	Switch Cap, Green (START)	343-0018	1
S5	Switch, Mini Toggle, DPDT	348-7215	1

SECTION VII

DRAWINGS

7-1. INTRODUCTION.

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

NOTE

NOTE

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

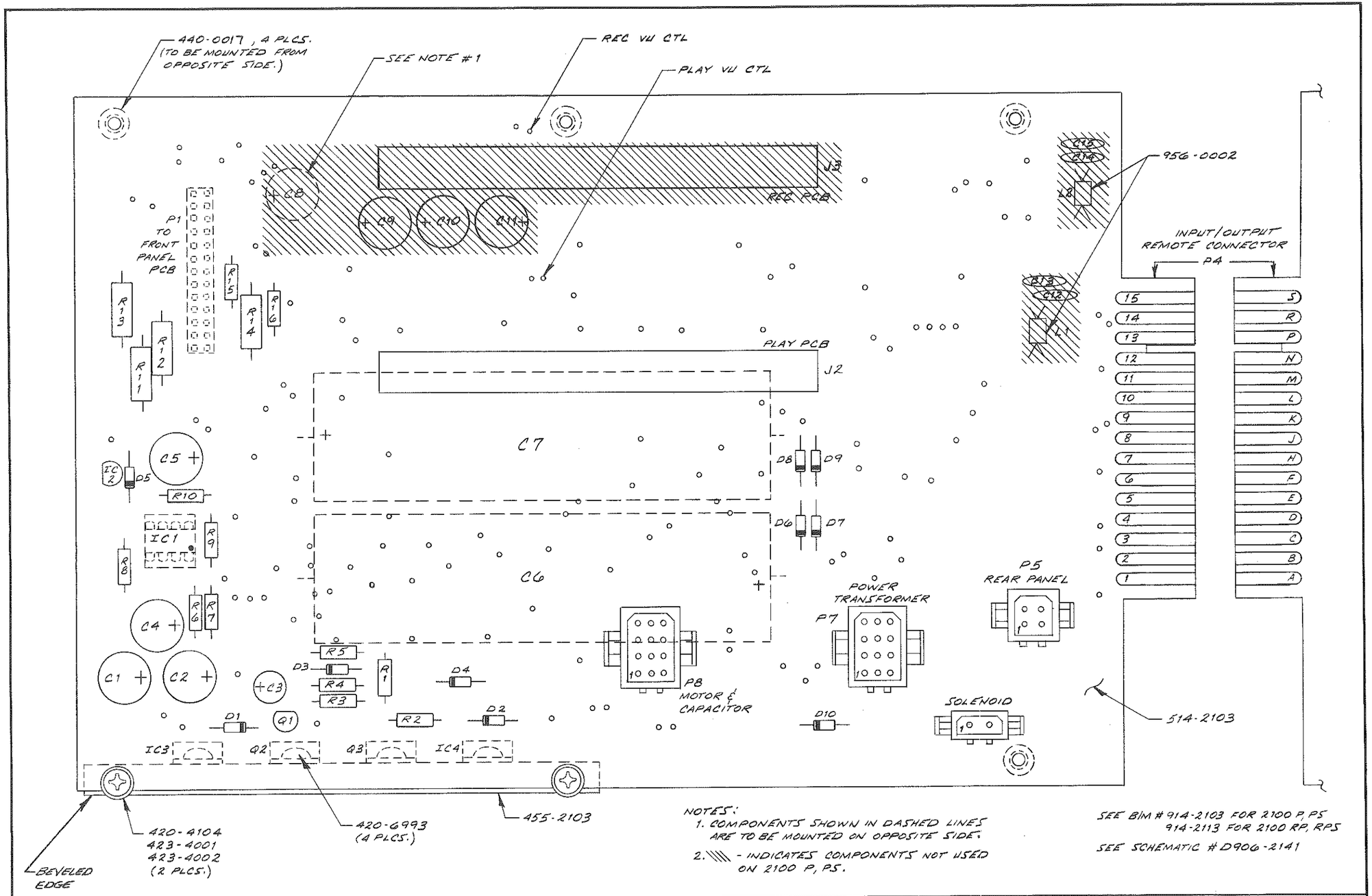
FIGURE	TITLE	NUMBER
7-1	OVERALL SCHEMATIC AND WIRING DIAGRAM	D906-2141
7-2	MOTHERBOARD ASSEMBLY DRAWING	C914-2113
7-3	2100P/PS FRONT PANEL ASSEMBLY DRAWING	C503-2102
7-4	2100RP FRONT PANEL ASSEMBLY DRAWING	C503-2112
7-5	2100RPS FRONT PANEL ASSEMBLY DRAWING	C503-2122
7-6	DECK ASSEMBLY DRAWING	C950-2100
7-7	PLAYBACK CIRCUIT BOARD ASSEMBLY DRAWING	C914-2110
7-8	PLAYBACK CIRCUIT BOARD SCHEMATIC DIAGRAM	D906-2139
7-9	RECORD CIRCUIT BOARD ASSEMBLY DRAWING	C914-2111
7-10	RECORD CIRCUIT BOARD SCHEMATIC DIAGRAM	D906-2140
7-11	MONITOR/PLAYBACK AMPLIFIER CIRCUIT BOARD ASSEMBLY DRAWING	C910-2124
7-12	MONITOR/PLAYBACK AMPLIFIER SCHEMATIC DIAGRAM	B906-0024
7-13	SOLENOID WIRING DIAGRAM	B906-2237
7-14	REAR PANEL CONNECTOR INPUT/OUTPUT AND REMOTE CONTROL WIRING DIAGRAM	C906-2252

POWER TRANSFORMER
PART # 376-7675
210-240V OPERATION
105-130V OPERATION
BK
RD
BK/YL
YL
BK/GN
BK/RD
TO J7-12
TO J7-5
TO J7-6
TO J7-3
TO J7-1
TO J7-10
TO J7-7
J7 P7
JUMPER
P5 J5
REAR PANEL
GND LUG
TO J5-4 WHT
SW1
POWER SWITCH
TO F1-1
TO J5-1 WHT
F1
BLK TO F1-2
GN TO J5-2
WT TO J5-3
POWER CORD
FRONT PANEL PCB
P1-1
LEFT REC LEVEL
R1
P1-2
P1-3
P1-5
RIGHT REC LEVEL
R2
P1-4
P1-6
TO LEFT VU METER
P1-9
P1-7
TO RIGHT VU METER
P1-8
P1-10
S1 STOP
P1-25
GND ⟹ STOP
+18V
P1-23
GND IN STOP READY
S2 REC
P1-11
GND ⟹ REC
P1-13
GND IN REC
S3 SEC
P1-15
GND ⟹ CUE I
P1-19
HIGH WHEN CUE I PRESENT
S4 START
P1-14
GND ⟹ START
P1-16
GND IN RUN
P1-17,18
P1-21,22
MONO PLAY
D1
P1-20
HIGH IN MONO PLAY
MONO REC
D2
P1-24
HIGH IN MONO REC
TO MICROSWITCH (NO CART. INSERTED ⟹ CONTACTS CLOSED)
P1-26
DECK NOT READY ⟹ GND
SEE B/M # 503-2102 FOR 2100 P,PS
503-2112 FOR 2100 RP
503-2122 FOR 2100 RPS
NOTES:
1. LAST COMPONENTS USED: D2, P1, R2, S4
2. U.C. COMPONENTS NOT USED ON - 2100 P&PS: D2,S2,R1,R2 THRU ④
2100 RP: R2, ⑤ & ⑥.
MOTOR
PART # 380-1000
60HZ/117V
TO J8-9 RD
TO J8-8 BK
TO J8-2
TO J8-7 GN
TO J8-4 BU
TO J8-11 WT
TO J8-5 OR
CCW
MOTOR CAPACITOR PART # 029-1067
TO J8-10 G/BU
.7 300 VAC
G/GN TO J8-12
J8 P8
JUMPER
MOTHERBOARD
D6 D7 D8 D9 IN4005
D2 IN4148
D1 IN4148
D5 IN4148
7818 IC 4
7918 IC 3
IC 2 78L15
C6 4700
C7 4700
C2 100
C1 100
C5 100
+18
+15
-18
R7 22K
R6 10K
R9 10K
R10 10K
R8 4.7K
C4 33
IC 1-A 4558
IC 1-B
+5.6
-5.6
P1 J1 J1 P1
J3-N
J3-11
J3-17
J3-L
J3-12
J3-17
J3-P
J3-15
J3-13
J3-S
J3-E
OPEN
R13 10, 1/2W J3-4
J2-K
J3-5
R14 10, 1/2W J2-E
R12 10, 1/2W J2-4
R15 180Ω J2-10
R11 10, 1/2W J2-F
R16 180Ω J3-3
J2-J
J2-H
RIBBON CABLE ASS'Y. # B-906-2143
PLAYBACK PCB J2
P4-H
P4-8
P1-19
P1-16; P4-E
P1-23; P4-6
P1-26
P1-25; P4-D
P1-14; P4-4
P1-20; P4-7
J3-10
J3-M
P4-C
P4-3
P4-A
P4-1
RECORD PCB J3
P4-12
P1-24/P4-M
P1-13; P4-11
P1-15; P4-N
P4-5
P4-P
J2-9
J2-12
P1-2
P1-5
P1-9
REC VU CTL
P1-8
P1-3; P4-R
P4-14
P4-5
P1-11; P4-10
P4-15
P4-13
P4-F
P1-4
J2-N
P1-1
P1-7
PLAY VU CTL
P1-10
P4-L
C11 P4-R
C9 100
C8 100
C13 .001
C12 .001
C14 .001
C15 .001
L1
L2
INPUT-OUTPUT/ REMOTE CONNECTOR P4
J2-S
J2-15
J2-R
J2-14
J2-22
J3-T
J2-K
J2-J
J2-T; J3-D
J2-E
J2-F
J2-8; J3-J
J2-10
J2-B
J2-C
J3-E
J3-4
J3-2
J3-5
J3-H
J3-7
J3-17, J3-V
J3-F
J3-6
J3-C
J3-3
LEFT
GND
RIGHT
PLAY OUT
CUE PLAY OUT
CUE REC IN
GND ⟹ START
GND ⟹ STOP
HIGH IN RUN
GND IN RUN
GND IN STOP READY
HIGH IN STOP
HIGH IN MOND PLAY
CUE I RELAY CONTACTS
+18V OUT
GND ⟹ REC
GND IN REC
HIGH ⟹ MONO ENCODE
GND ⟹ CUE I
CUE BIAS ON
HIGH IN MONO REC
REC IN
HIGH AT BEGINNING OF RUN
GND IN RUN
R2 1.5K
R1 10K
Q3 TIP32
R5 10K
D3 IN4749
C3 4.7
D10
D4 IN4005
SOLENOID
OR/WT
WT/YL
Q1 5816
Q2 TIP31
R4 10K
R3 100K
P6 J6
NOTES:
1. ALL CAPACITORS IN MICROFARADS; ALL RESISTORS IN OHMS, 1/4 W, UNLESS NOTED OTHERWISE.
2. LAST COMPONENTS USED: C15, D10, IC 4, J3, L2, Q3, R16 & P8. COMPONENTS NOT USED:
3. COMPONENTS NOT USED ON 2100 P,PS: C8-C15, J3, L1, L2.
SEE PCB ASS'Y. # C-914-2113
SEE B/M # 914-2103 FOR 2100 P,PS
914-2113 FOR 2100 RP,RPS

TOLERANCE UNLESS OTHERWISE SPECIFIED
DECIMAL 2 PL = .01 3PL = .005
FRACTIONAL ± 1/64
ANGULAR ± 1°
SHARP EDGES TO BEND RADII
FILLET RADII
MATERIAL
TREATMENT OR FINISH

DRAWN BY LHAYDEN DATE 5-10-79
CHECKED BY DATE
PROJECT ENGR. DATE
APPROVED BY

BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—
TITLE SCHEMATIC & WIRING DIAGRAM MOTHERBOARD, FRONT PANEL PCB, REAR PANEL, POWER XFMR, SOLENOID, MOTOR & MOTOR CAP
D DWG. NO. 906-2141 REV. E
2100 P,RP,PS,RPS SCALE — SHEET 1 OF 1



NOTES:
1. COMPONENTS SHOWN IN DASHED LINES ARE TO BE MOUNTED ON OPPOSITE SIDE.
2. \\\ - INDICATES COMPONENTS NOT USED ON 2100 P, PS.

SEE BIM # 914-2103 FOR 2100 P, PS
914-2113 FOR 2100 RP, RPS

SEE SCHEMATIC # D906-2141

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

DWN. BY MERKEL	4-21-83
CHKD. MH	4-21-83
ME	
EE J. Tucker	4-21-83
PROJ. ENGR.	
DFTG. SUPVR. MH	4-21-83
MFG.	

NEXT ASSY. 907-2113

PRODUCT USED ON 2100 P, RP, PS, RPS

FINISH —

BROADCAST ELECTRONICS INC.
4100 N. 24TH ST. QUINCY, IL 62305 217/224-9600
TELEX 250142 CABLE BCST ELECT QUI

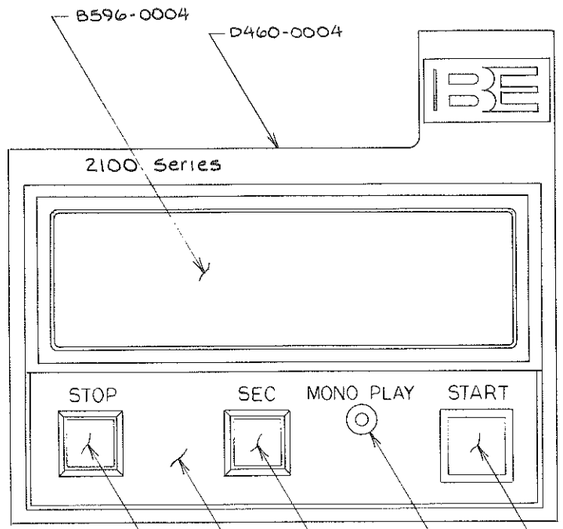
TITLE PCB ASSEMBLY - MOTHERBOARD

SHEET 1 OF 1 | SCALE 2/1 | REV L

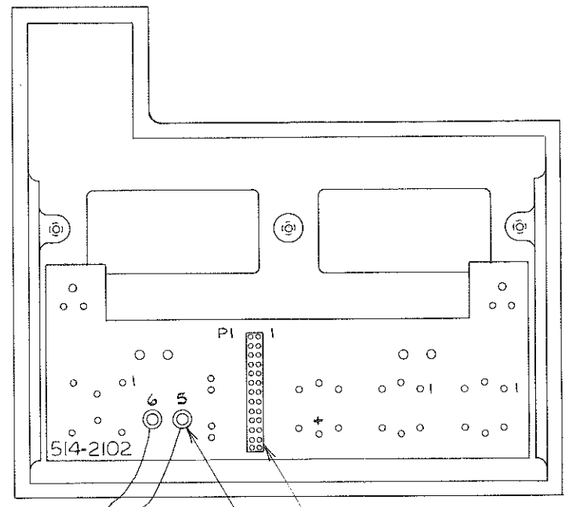
TYPE A | SIZE C | DWG. NO. 914-2113

NC

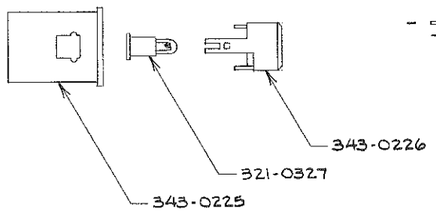
FRONT VIEW



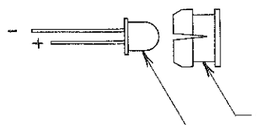
REAR VIEW



DETAIL 'B'



DETAIL 'A'

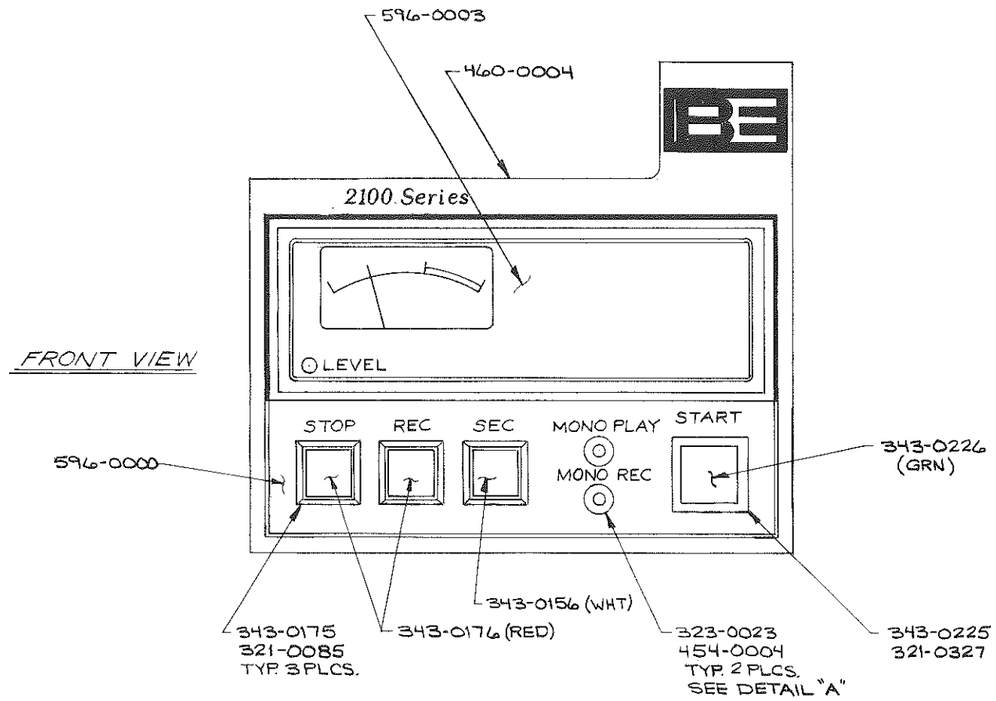


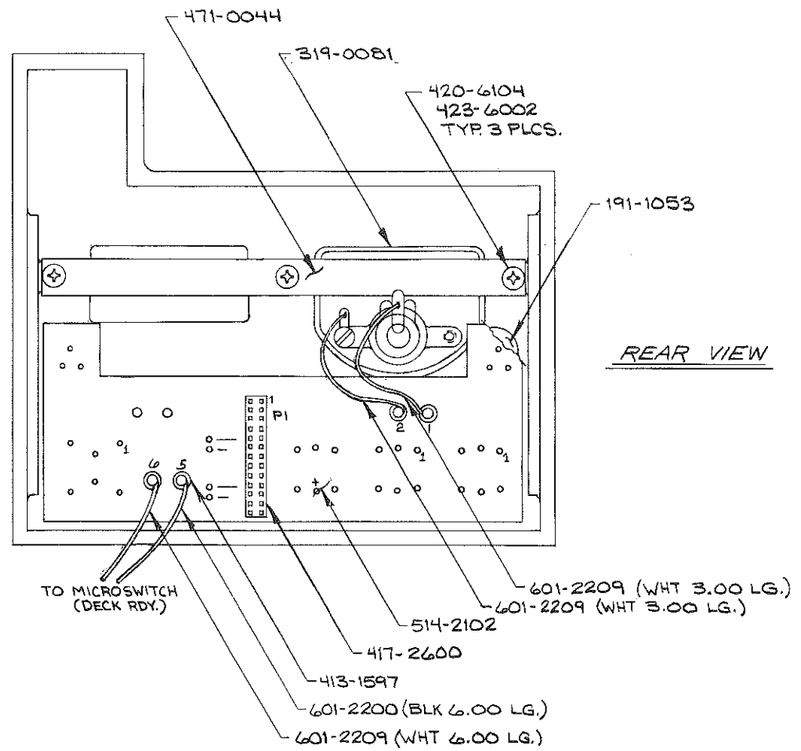
ASSEMBLY PROCEDURE:

A) CLEAN FRONT PANEL, 460-0004, WHERE OVERLAYS WILL COME IN CONTACT WITH FRONT PANEL. ATTACH OVERLAYS.
B) INSERT LAMPS 321-0085 AND 321-0327 INTO SWITCH 343-0175 AND 343-0225 AND INDICATOR 343-0155. INSERT SWITCHES AND INDICATOR INTO FRONT PANEL. NOTE POSITION OF PINS IN RELATION TO PCB HOLES.
C) INSERT BEZEL 454-0004 INTO FRONT PANEL, INSERT LED INDICATOR 323-0023 INTO BEZEL FROM THE BACK.
D) SOLDER CONNECTOR 417-2600 AND TURRET TERMINALS 413-1597 TO PART NUMBER SIDE OF PCB BLANK B514-2102.
E) ATTACH PCB B514-2102 TO SWITCHES, INDICATOR AND LED INDICATOR PER ASSY DWG. AND SOLDER.
F) ATTACH SWITCH CAPS 343-0176, 343-0156 AND 343-0226 TO SWITCHES AND INDICATOR PER ASSY. DWG.
G) SOLDER BLACK WIRE 601-2200 TO TURRET TERMINAL NO. 5 AND WHITE WIRE 601-2209 TO TURRET TERMINAL NO. 6.

TOLERANCE (DECIMAL) U.O.S.
.x ± .030 .xxx ± .005
.xx ± .015 ANGLES ± 1°

DWN. BY MSE 4-11-85	MATERIAL SEE B/M 503-2102	BROADCAST ELECTRONICS INC.	
CHKD		4100 N. 24TH ST., P.O. BOX 3606 QUINCY, IL 62305 217/224-9600 TELEX 250142 CABLE BROADCAST	
ME	FINISH	TITLE ASSEMBLY, FRONT PANEL	
PROJ. ENGR. 4-11-85		TYPE A / SIZE C / DWG. NO. 503-2102	REV E
MFG.	NEXT ASSY.	MODEL 2100 P, PS / SCALE 1/1	SHEET 1 OF 1

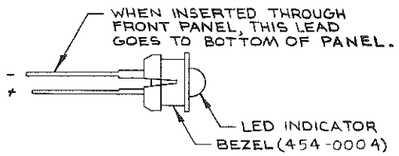




NOTES:

1. ASSEMBLY PROCEDURE:
   - A. CLEAN FRONT PANEL (460-0004) WHERE OVERLAYS (596-0003 & 596-0000) WILL COME IN CONTACT WITH FRONT PANEL. ATTACH OVERLAYS (596-0003 & 596-0000).
   - B. INSERT LAMPS (321-0085 & 321-0327) INTO SWITCHES (343-0175 & 343-0225) INSERT SWITCHES INTO FRONT PANEL. NOTE POSITION OF PINS ON SWITCHES IN RELATION TO HOLES IN PCB (514-2102)
   - C. ASSEMBLE LED INDICATORS (323-0023) AND LED BEZELS (454-0004) PER "DETAIL A". INSERT LED ASSY'S. INTO FRONT PANEL.
   - D. SOLDER CONNECTOR (417-2600) AND TURRET TERMINALS (413-1597) TO PART NO. SIDE OF PCB BLANK (514-2102)
   - E. SOLDER 10K POT (191-1053) TO ASS'Y. SIDE OF PCB PER ASS'Y. DWG.
   - F. ATTACH PCB (514-2102) TO SWITCHES AND LED INDICATORS PER ASS'Y. DWG, AND SOLDER.
   - G. INSERT METER (319-0081) THROUGH REAR OF FRONT PANEL. POSITION VU METER BRKT. (471-0044) PER ASS'Y. DWG. AND INSERT ITEMS (420-6104 & 423-6002)
   - H. SOLDER WIRES (601-2200 BLK & 601-2209 WHT) PER ASS'Y DWG.
   - J. ATTACH SWITCH CAPS 343-0176, 343-0156, & 343-0226 TO SWITCHES PER ASS'Y DWG.

DETAIL "A"



SEE B/M NO. 503-2112
SEE SCHEMATIC NO. B-906-2142

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 C. ORR DATE 3-21-78
CHECKED BY DATE
PROJECT ENGR HBM DATE 3-16-79
APPROVED BY

MATERIAL

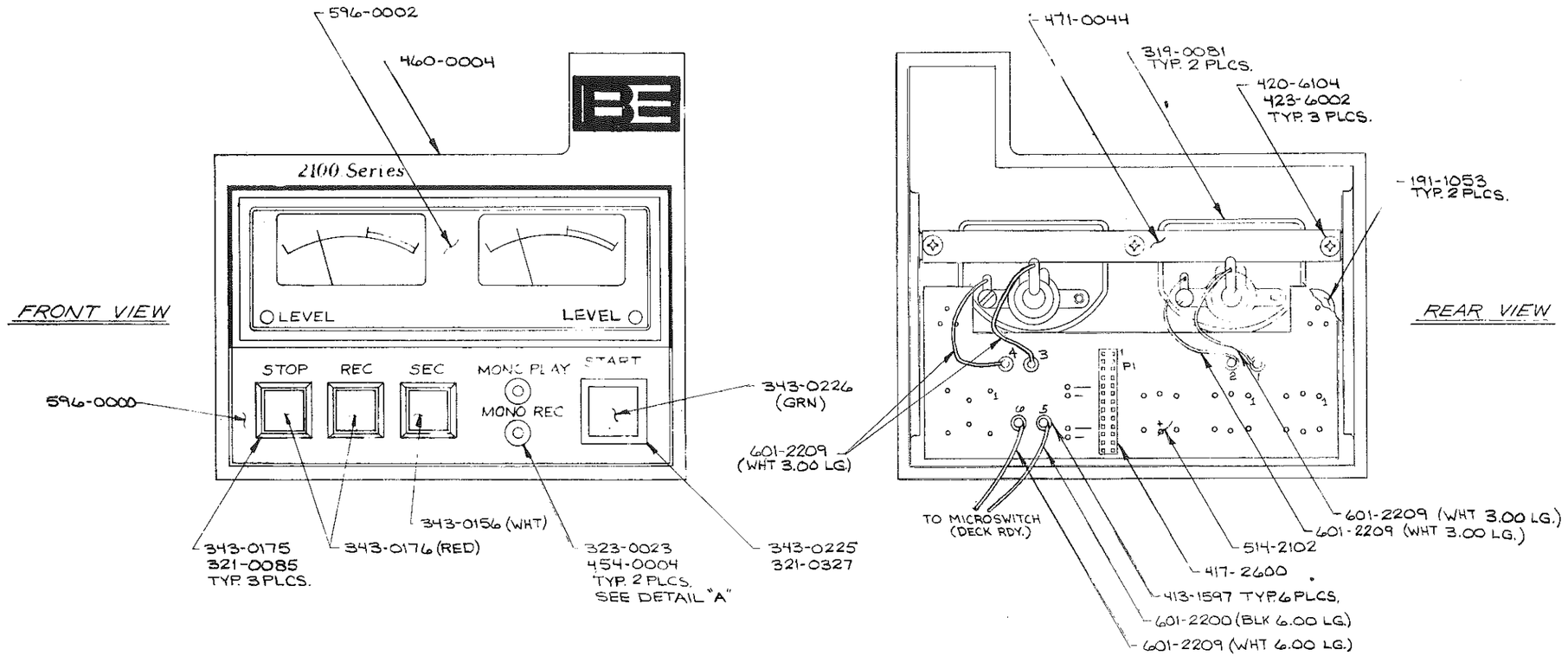
TREATMENT OR FINISH

BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE —ASSEMBLY— FRONT PANEL

C DWG NO. 503-2112 REV D

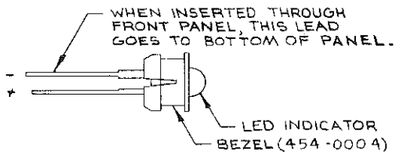
2100 RP SCALE 1/1 SHEET 1 OF 1



NOTES:

1. ASSEMBLY PROCEDURE:
   - A. CLEAN FRONT PANEL (460-0004) WHERE OVERLAYS (596-0002 & 596-0000) WILL COME IN CONTACT WITH FRONT PANEL. ATTACH OVERLAYS (596-0002 & 596-0000).
   - B. INSERT LAMPS (321-0085 & 321-0327) INTO SWITCHES (343-0175 & 343-0225) INSERT SWITCHES INTO FRONT PANEL. NOTE POSITION OF PINS ON SWITCHES IN RELATION TO HOLES IN PCB (514-2102)
   - C. ASSEMBLE LED INDICATORS (323-0023) AND LED BEZELS (454-0004) PER "DETAIL A". INSERT LED ASSY'S. INTO FRONT PANEL.
   - D. SOLDER CONNECTOR (417-2600) AND TURRET TERMINALS (413-1597) TO PART NO. SIDE OF PCB BLANK (514-2102)
   - E. SOLDER 10K POT (191-1053) TO ASS'Y. SIDE OF PCB PER ASS'Y. DWG.
   - F. ATTACH PCB (514-2102) TO SWITCHES AND LED INDICATORS PER ASS'Y. DWG, AND SOLDER.
   - G. INSERT METER (319-0081) THROUGH REAR OF FRONT PANEL. POSITION VU METER BRKT. (471-0044) PER ASS'Y. DWG. AND INSERT ITEMS (420-6104 & 423-6002)
   - H. SOLDER WIRES (601-2200 BLK & 601-2209 WHT) PER ASS'Y DWG.
   - J. ATTACH SWITCH CAPS 343-0176, 343-0156, & 343-0226 TO SWITCHES PER ASS'Y DWG.

DETAIL "A"



SEE B/M NO. 503-2122
SEE SCHEMATIC NO. B-906-2142

ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE

LIST OF MATERIAL

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

MATERIAL

TREATMENT OR FINISH

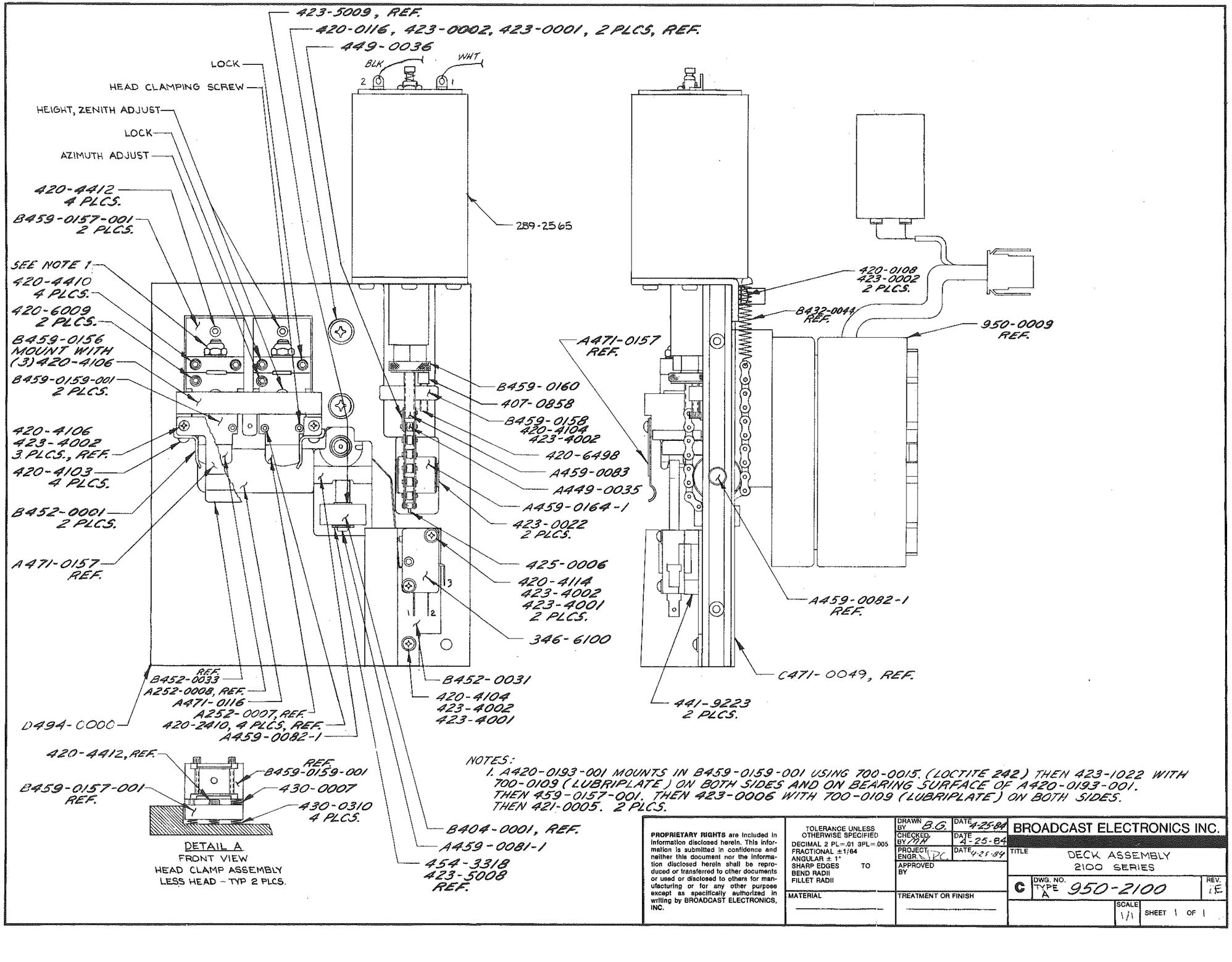
DRAWN BY JAH DATE 6-11-85
CHECKED BY DATE
PROJECT ENGR JJC DATE
APPROVED BY

BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE — ASSEMBLY — FRONT PANEL

C DWG NO. 503-2122 REV E

2100 RPS SCALE 1/1 SHEET 1 OF 1



NOTES:
1. A420-0193-001 MOUNTS IN B459-0159-001 USING 700-0015. (LOCTITE 242) THEN 423-1022 WITH 700-0109 (LUBRIPLATE) ON BOTH SIDES AND ON BEARING SURFACE OF A420-0193-001. THEN 459-0157-001. THEN 423-0006 WITH 700-0109 (LUBRIPLATE) ON BOTH SIDES. THEN 421-0005. 2 PLCS.

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

MATERIAL

DRAWN BY B.G. DATE 4-25-84
CHECKED BY MM DATE 4-25-84
PROJECT ENGR. RPC DATE 4-25-84
APPROVED BY

TREATMENT OR FINISH

BROADCAST ELECTRONICS INC.

TITLE DECK ASSEMBLY 2100 SERIES

C | DWG. NO. TYPE A 950-2100 | REV. E

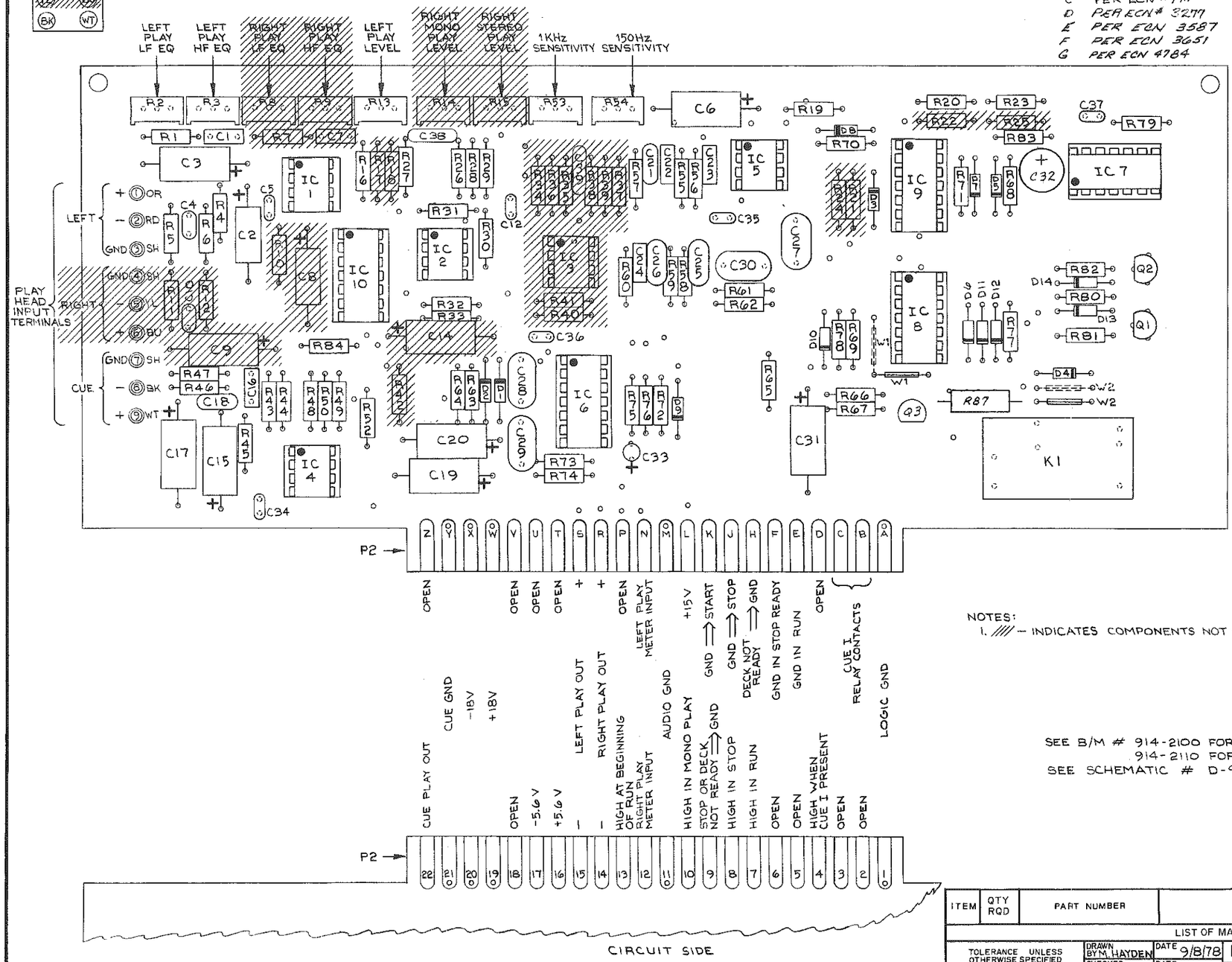
SCALE 1/1 | SHEET 1 OF 1

PLAYBACK HEAD
REAR VIEW

RD OR
YL GN
BK WT

H PER ECN 5158 6-14-84 JRC
J PER ECN 5500 MERK 12-7-84 JLT
K PER ECN 5551 MSE 1-23-85 JRC
L PER ECN 5953 MERK 10-10-85 JRC

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1502	11/27/78	MH
B	PER ECN # 1705	5/7/79	MH
C	PER ECN # 1917	2-11-80	MTS
D	PER ECN # 3279	UNK 4-15-82	--
E	PER ECN 3587	MERK 6-23-82	CWK
F	PER ECN 3651	MERK 7-15-82	CWK
G	PER ECN 4784	MERK 1-23-84	JLT



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

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

MATERIAL

TREATMENT OR FINISH

DRAWN BY M. HAYDEN DATE 9/8/78
CHECKED BY DATE
PROJECT ENGR HM DATE 3-16-79
APPROVED BY

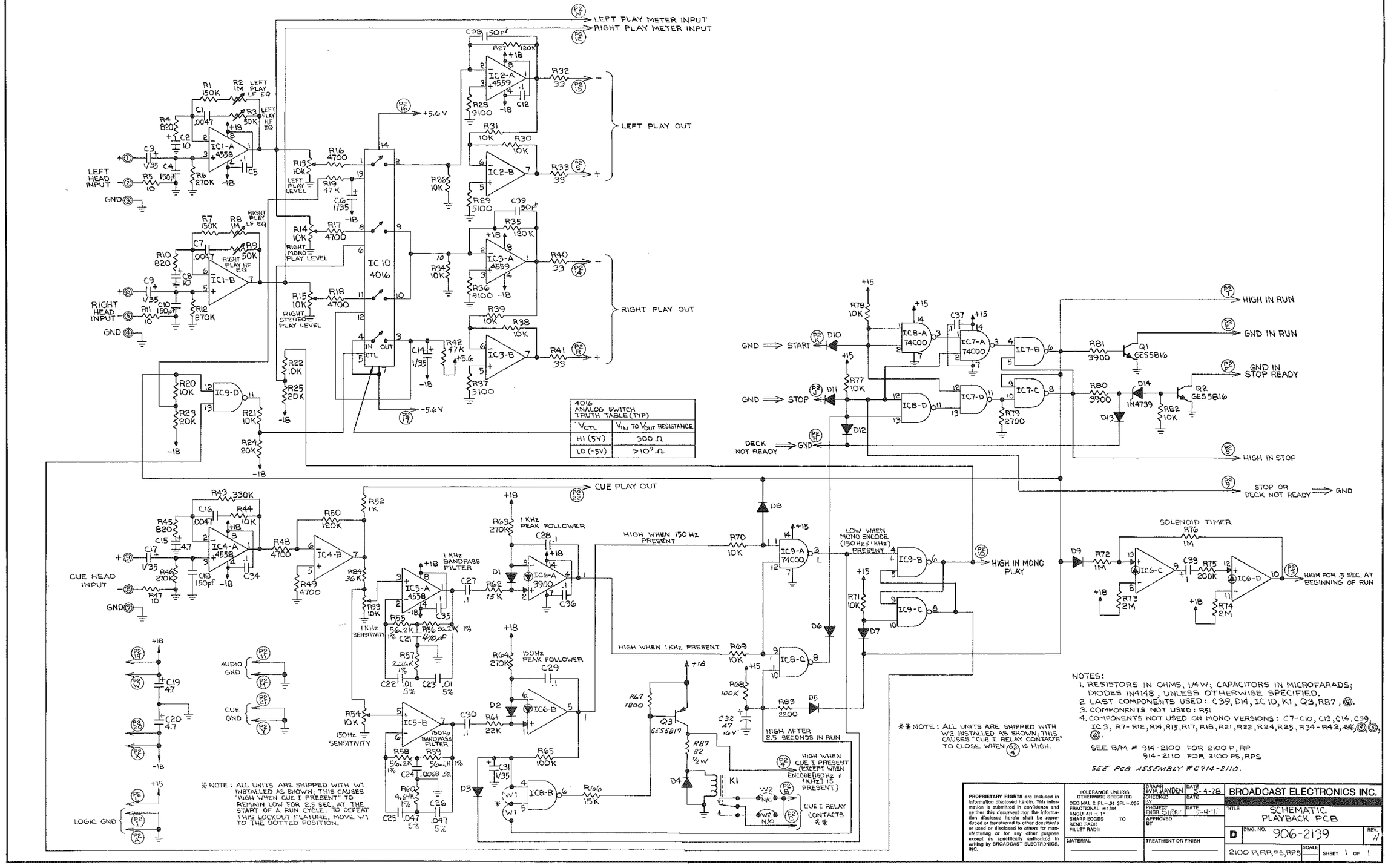
BROADCAST ELECTRONICS INC.

TITLE PCB ASS'Y. PLAYBACK

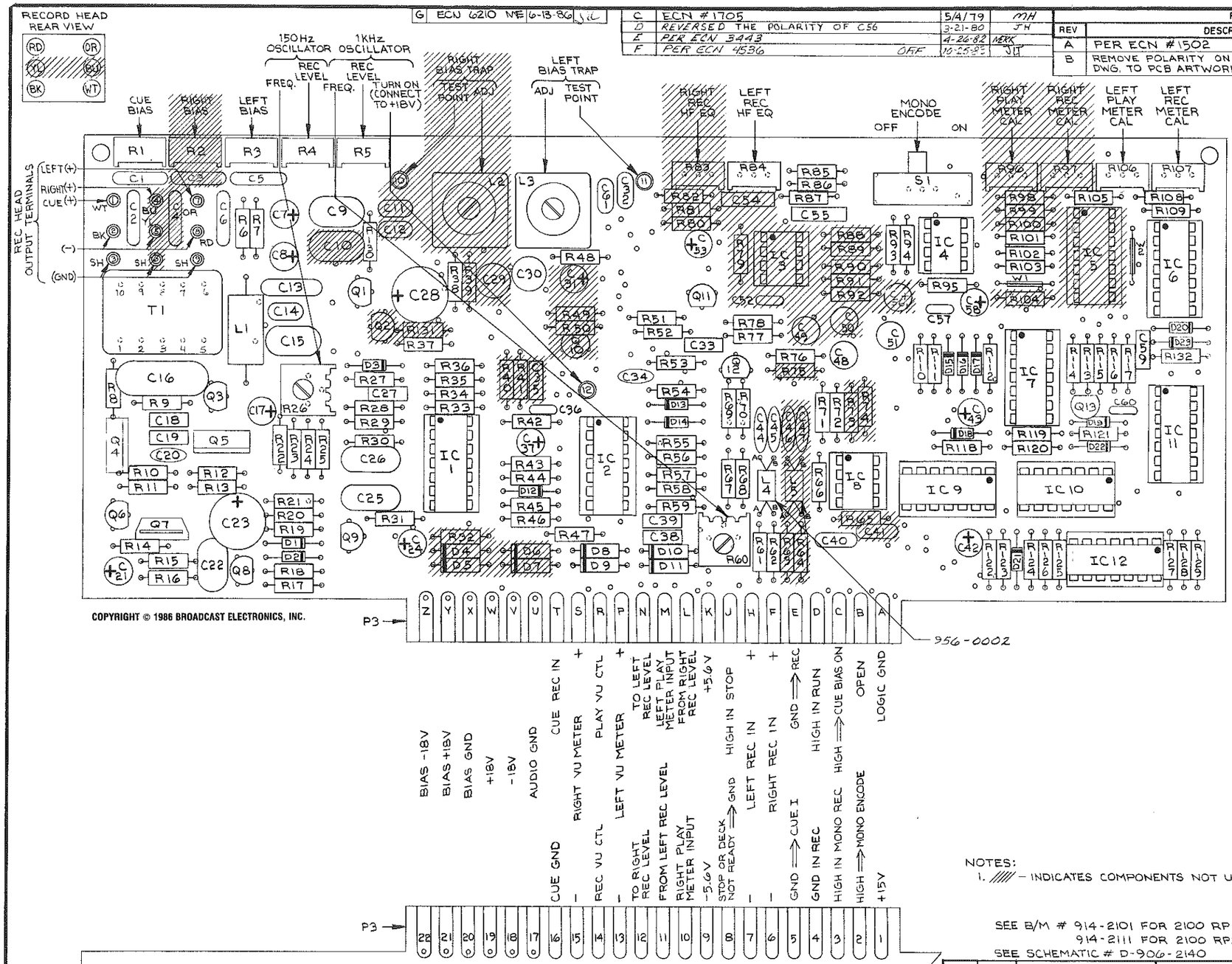
C DWG NO. 914-2110 REV L

2100 P, RP, PS, RPS SCALE 2/1 SHEET 1 OF 1

NC


LEFT PLAY METER INPUT
RIGHT PLAY METER INPUT
LEFT PLAY OUT
RIGHT PLAY OUT
LEFT HEAD INPUT
RIGHT HEAD INPUT
GND
IC 10 4016
4016 ANALOG SWITCH TRUTH TABLE (TYP)
VCTL
VIN TO VOUT RESISTANCE
HI (5V)
300 Ω
LO (-5V)
>10⁹ Ω
HIGH IN RUN
GND IN RUN
GND IN STOP READY
HIGH IN STOP
STOP OR DECK NOT READY ⟹ GND
DECK NOT READY
START
STOP
CUE PLAY OUT
CUE HEAD INPUT
HIGH IN MONO PLAY
HIGH WHEN 150 Hz PRESENT
HIGH WHEN 1 KHz PRESENT
HIGH AFTER 2.5 SECONDS IN RUN
HIGH WHEN CUE I PRESENT (EXCEPT WHEN ENCODE (150 Hz & 1 KHz) IS PRESENT)
CUE I RELAY CONTACTS **
SOLENOID TIMER
HIGH FOR 5 SEC. AT BEGINNING OF RUN
AUDIO GND
CUE GND
LOGIC GND
1 KHz PEAK FOLLOWER
150 Hz PEAK FOLLOWER
1 KHz BANDPASS FILTER
150 Hz BANDPASS FILTER
1 KHz SENSITIVITY
150 Hz SENSITIVITY
LEFT PLAY LEVEL
RIGHT MONO PLAY LEVEL
RIGHT STEREO PLAY LEVEL
* 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.
** NOTE: ALL UNITS ARE SHIPPED WITH W2 INSTALLED AS SHOWN; THIS CAUSES "CUE I RELAY CONTACTS" TO CLOSE WHEN (P2 4) IS HIGH.
NOTES:
1. RESISTORS IN OHMS, 1/4 W; CAPACITORS IN MICROFARADS; DIODES IN4148, UNLESS OTHERWISE SPECIFIED.
2. LAST COMPONENTS USED: C39, D14, IC 10, K1, Q3, R87, ⓖ.
3. COMPONENTS NOT USED: R51
4. COMPONENTS NOT USED ON MONO VERSIONS: C7-C10, C13, C14, C39, IC 3, R7-R12, R14, R15, R17, R18, R21, R22, R24, R25, R34-R42, R86, ④, ⑤, ⓖ.
SEE B/M # 914-2100 FOR 2100 P, RP
914-2110 FOR 2100 PS, RPS
SEE PCB ASSEMBLY #C914-2110.
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 3PL=.005
FRACTIONAL = 1/64
ANGULAR = 1°
SHARP EDGES TO BEND RADII
FILLET RADII
MATERIAL
TREATMENT OR FINISH
DRAWN BY M. HAYDEN DATE 5-4-78
CHECKED BY DATE
PROJECT ENGR. SIGNED DATE 5-4-78
APPROVED BY
BROADCAST ELECTRONICS INC.
TITLE SCHEMATIC PLAYBACK PCB
D DWG. NO. 906-2139 REV. H
2100 P, RP, PS, RPS
SCALE
SHEET 1 OF 1

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	PER ECN #1502	11-27-78	MH
B	REMOVE POLARITY ON C48 THRU C51, UPDATE DWG. TO PCB ARTWORK	2-13-79	MH
C	ECN #1705	5/4/79	MH
D	REVERSED THE POLARITY OF C56	3-21-80	JH
E	PER ECN 3443	4-26-82	MRK
F	PER ECN 4536 ORF	10-25-85	JH
G	ECN 6210 ME 6-13-86		JL



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

SEE B/M # 914-2101 FOR 2100 RP
914-2111 FOR 2100 RPS
SEE SCHEMATIC # D-906-2140

ITEM	QTY RQD	PART NUMBER	DESCRIPTION	NOTE

LIST OF MATERIAL

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

MATERIAL

DRAWN BY M. HAYDEN DATE 9/8/78
CHECKED BY DATE
PROJECT ENGR HJM DATE 3-16-79
APPROVED BY

TREATMENT OR FINISH

BROADCAST ELECTRONICS INC.
– A FILMWAYS COMPANY –

TITLE PCB ASS'Y. RECORD

C | DWG NO. 914-2111 | REV G

2100 RP, RPS | SCALE 2/1 | SHEET 1 OF 1

REVISIONS				
REV.	DESCRIPTION		DATE	APPROVED
A	CHGD. R1, R2 & R3 FROM 100K TO 500K; R6 FROM 270K TO 180K; R7 FROM 47K TO 33K; R31 FROM 470K TO 82K & R128 FROM 10K TO 7.5K		3/12/79	MH
B	PER ECN 1705		5/4/79	MH
C	PER ECN 4536	ORF	10-25-83	JLT
D	PER ECN 6210	ME	6-13-86	NEC

LEFT RECORD INPUT PREAMP

▲NOTE: SHUNT R61&R62 (R63&R64) TO INCREASE INPUT PREAMP GAIN FOR USE WITH MIC INPUT.

LEFT REC IN

RIGHT REC IN

RIGHT RECORD INPUT PREAMP

LEFT REC METER INPUT

RIGHT REC METER INPUT

LEFT RECORD AMP

RIGHT RECORD AMP

1 KHz (STOP CUE) OSCILLATOR

1 KHz OSCILLATOR FREQ.

1 KHz REC LEVEL

150 Hz (CUE I) OSCILLATOR

150 Hz FREQ.

150 Hz REC LEVEL

CUE RECORD PREAMP

CUE BIAS TRAP

CUE OSCILLATOR TIMER

INSTALL WITH CLIP LEADS TO TURN ON CUE BIAS AND 1 KHz OSCILLATOR

1 KHz TURN ON (CONNECT TO +18V)

HIGH FOR .5 SECOND AT BEGINNING OF "REC" OR "MONO ENCODE" CYCLE

HIGH ⟹ 150 Hz OSCILLATOR ON

HIGH ⟹ CUE BIAS ON

HIGH ⟹ CUE BIAS OFF

BIAS OSCILLATOR SWITCHING CIRCUIT

LOW ⟹ BIAS OSCILLATOR ON

+18 ⟹ BIAS OSCILLATOR ON

BIAS OSCILLATOR

GND ⟹ REC

GND ⟹ CUE I

LOGIC GND

STOP OR DECK NOT READY ⟹ GND

HIGH IN STOP

HIGH IN MONO REC

HIGH IN RUN

HIGH ⟹ MONO ENCODE

S1 CLOSED ⟹ MONO ENCODE

GND IN REC

CUE REC IN

CUE HEAD OUTPUT

CUE BIAS

LEFT HEAD OUTPUT

RIGHT HEAD OUTPUT

LEFT REC LEVEL

RIGHT REC LEVEL

LEFT REC MTR CAL

LEFT PLAY MTR CAL

RIGHT REC MTR CAL

RIGHT PLAY MTR CAL

LEFT REC HF EQ

RIGHT REC HF EQ

LEFT BIAS

RIGHT BIAS

LEFT VU METER

RIGHT VU METER

LEFT METER AMP

RIGHT METER AMP

LEFT RECORD PREAMP

RIGHT RECORD PREAMP

BIAS TRAP ADJ

BIAS TRAP TEST POINT

REC/MONO ENCODE ⟺ HI

REC, BUT NOT MONO ENCODE ⟺ HI

NOT IN REC ⟺ HI (+5V); IN REC ⟺ LO (-5V)

NOT IN REC ⟺ LO (-5V); IN REC ⟺ HI (+5V)

REC VU CTL

PLAY VU CTL

LEFT PLAY METER INPUT

RIGHT PLAY METER INPUT

AUDIO GND

BIAS GND

BIAS +18V

BIAS -18V

LOGIC GND

CUE GND

W1 W2

R1 (ON FRONT PANEL)

R2 (ON FRONT PANEL)

*NOTE: ALL UNITS ARE SHIPPED WITH W1 & W2 INSTALLED; THIS PROVIDES FOR REC. INPUT TO VU METERS WHEN "IN REC." AND PLAY INPUT TO VU METERS WHEN "NOT IN REC." IF ANOTHER COMBINATION IS DESIRED, CLIP JUMPER(S) AND CONNECT CONTROL VOLTAGE (S) TO "REC VU CTL" AND "PLAY VU CTL" AS NECESSARY.

4016 ANALOG SWITCH TRUTH TABLE (TYP)

V_{CTL}	V_{IN} TO V_{OUT} RESISTANCE
HI (5V)	300 Ω
LO (-5V)	$>10^9$ Ω

SEE PCB ASSY. # C-914-2111
SEE B/M # 914-2101 FOR 2100 RP
914-2111 FOR 2100 RPS

NOTES:
1. RESISTORS IN OHMS, 1/4 W; CAPACITORS IN MICROFARADS; DIODES IN4148, UNLESS NOTED OTHERWISE.
2. LAST COMPONENTS USED: C61, D23, IC 12, L5, Q13, R132, S1, T1, AND ⓫.
3. COMPONENTS NOT USED ON MONO VERSION: C3, C4, C10-C12, C29, C31, C35, C41, C46, C49, C50, C52, C54, C56, D4-D7, IC3, IC5, L2, L5, Q2, Q10, R2, R32, R39-R41, R49, R50, R63-R65, R73-R75, R79-R83, R88-R92, R96-R100, R104, R131, ⓫, ⓬, ⓭.

TOLERANCE UNLESS OTHERWISE SPECIFIED
DECIMAL 2 PL=.01 3PL=.005
FRACTIONAL ±1/64
ANGULAR ± 1°
SHARP EDGES TO BEND RADII
MATERIAL
TREATMENT OR FINISH

DRAWN BY M. HAYDEN DATE 8-29-78
CHECKED BY DATE
PROJECT ENGR. DATE
APPROVED BY

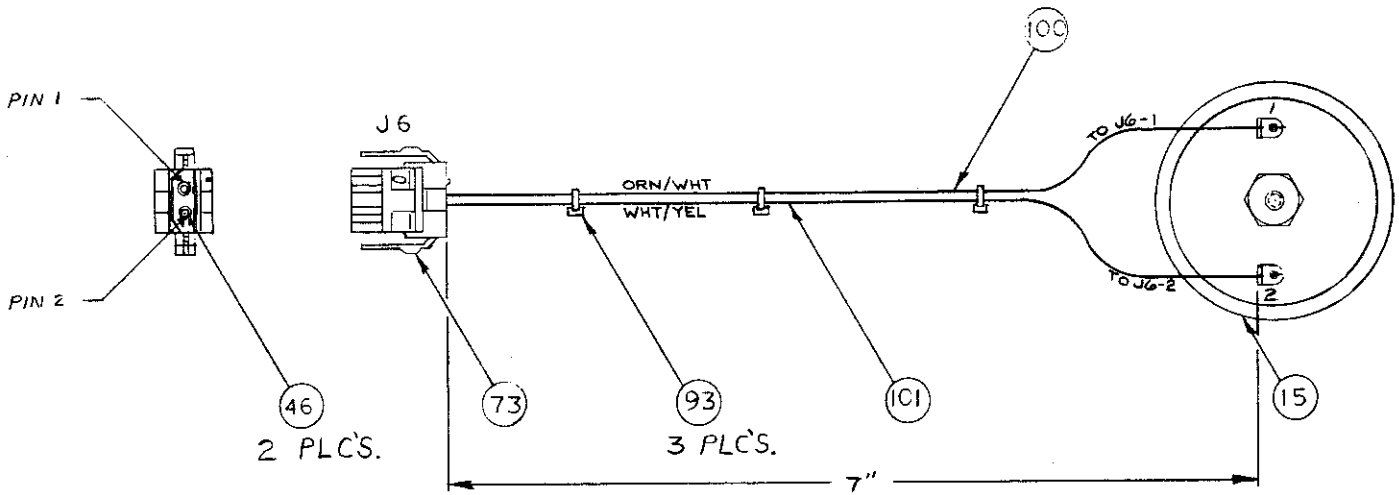
BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE: SCHEMATIC RECORD PCB

D DWG. NO. 906-2140 REV. D

2100 RP, RPS SCALE — SHEET 1 OF 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	CHANGE DIODE ORIENTATION AND REVERSE PINS ON P6 CONNECTOR. LABEL WIRE LENGTH FOR ITEMS 100 & 101.	2-15-79	B.E.
B	PER ECN #1705	5-7-79	MH
C	PER ECN #1982	3-31-80	JH



SEE B/M NO. 907-2110 FOR 2100P
907-2111 FOR 2100RP
907-2112 FOR 2100PS
907-2113 FOR 2100RPS

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

MATERIAL

DRAWN BY CRM DATE 12-8-78
CHECKED BY DATE
PROJECT ENGR. HM DATE 3-16-79
APPROVED BY
TREATMENT OR FINISH

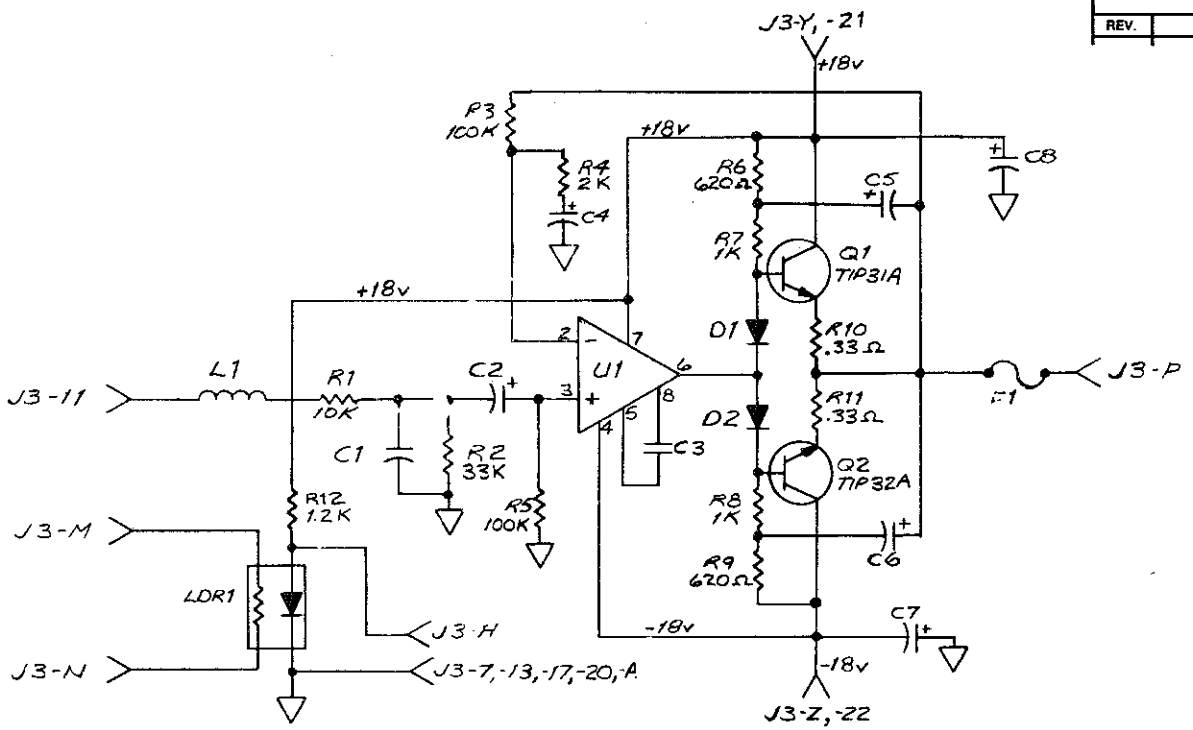
BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE
SOLENOID WIRING DIAGRAM

B DWG. NO. 906-2237 REV. C

2100 P, RP, PS, RPS SCALE — SHEET | OF |

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED



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

MATERIAL

DRAWN BY MKERRIN DATE 9/11/90
CHECKED BY DATE
PROJECT ENGR. DATE
APPROVED BY

TREATMENT OR FINISH

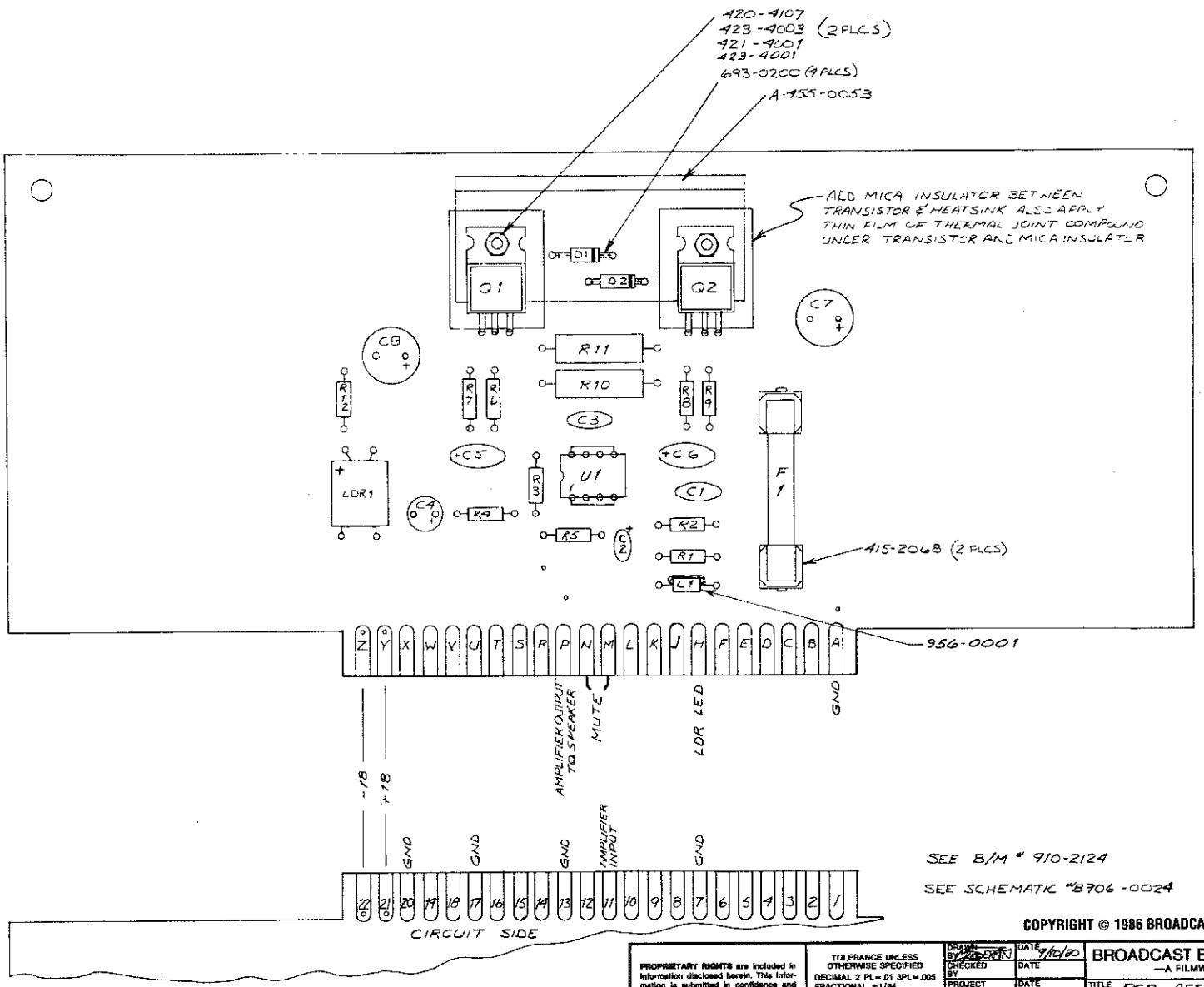
BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE SCHEMATIC MONITOR/ PLAYBACK AMPLIFIER

B DWG. NO. 906-0024 REV.

SCALE 1/1 SHEET 1 OF 1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	PER ECN 2593	3-5-81	LAsh
B	PER ECN 3443	4-27-82	MERK
C	PER ECN 3446	5-6-82	MERK



SEE B/M # 910-2124

SEE SCHEMATIC #8906-0024

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

MATERIAL

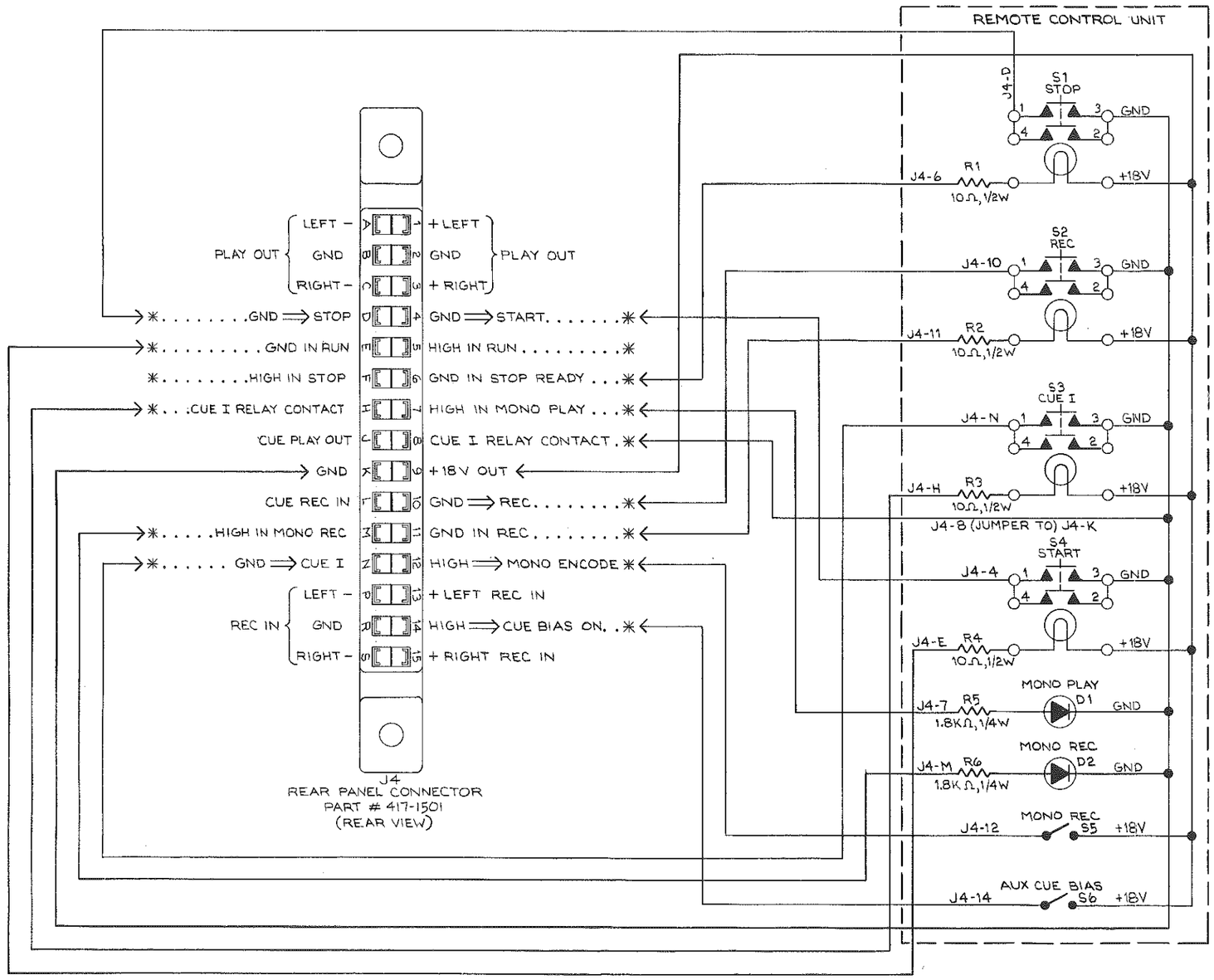
DRAWN BY MERK DATE 9/6/80
CHECKED BY
PROJECT ENGR.
APPROVED BY
TREATMENT OR FINISH

BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE PCB ASSEMBLY MONITOR/PLAYBACK AMPLIFIER

C DWG. NO. 910-2124 REV. C

SCALE 2/1 SHEET 1 OF 1



NOTES:

1. ✳ – FOR USE WITH REMOTE MONITORING AND CONTROL ONLY.
2. FOR MONOPHONIC UNITS, CONNECT THE INPUTS AND OUTPUTS TO THE LEFT CHANNEL ONLY.

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

MATERIAL

TREATMENT OR FINISH

DRAWN BY M. HAYDEN	DATE 5-11-79	
CHECKED BY	DATE	
PROJECT ENGR.	DATE	
APPROVED BY		

BROADCAST ELECTRONICS INC.
—A FILMWAYS COMPANY—

TITLE: INPUT/OUTPUT & REMOTE WIRING DIAGRAM REAR PANEL CONNECTOR

C | DWG. NO. 906-2252 | REV.

2100 P,RP,PS,RPS | SCALE — | SHEET 1 OF 1

NC

SECTION VIII

APPENDIX

8-1. INTRODUCTION.

8-2. This appendix lists data applicable to the operation and use of the Broadcast Electronics 2100 Series Cartridge Machine. The following information is contained in this section.

A. The NAB Tape Cartridge and Its Maintenance.

BROADCAST ELECTRONICS, INC.

The NAB Tape Cartridge and Its Maintenance

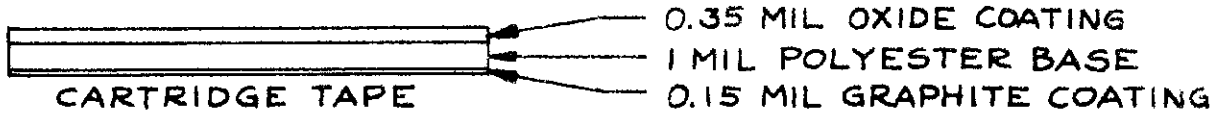
TABLE OF CONTENTS	PAGE NO.

THE NAB TAPE CARTRIDGE

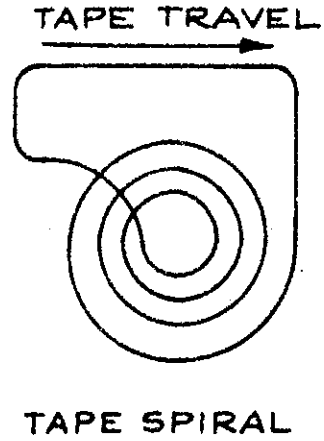
The National Association of Broadcasters (NAB) defines a cartridge as "a plastic or metal enclosure containing an endless loop of lubricated tape, wound on a rotatable hub in such a fashion as to allow continuous motion." Cartridges from the various manufacturers differ slightly in details, but all cartridges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

THE TAPE

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



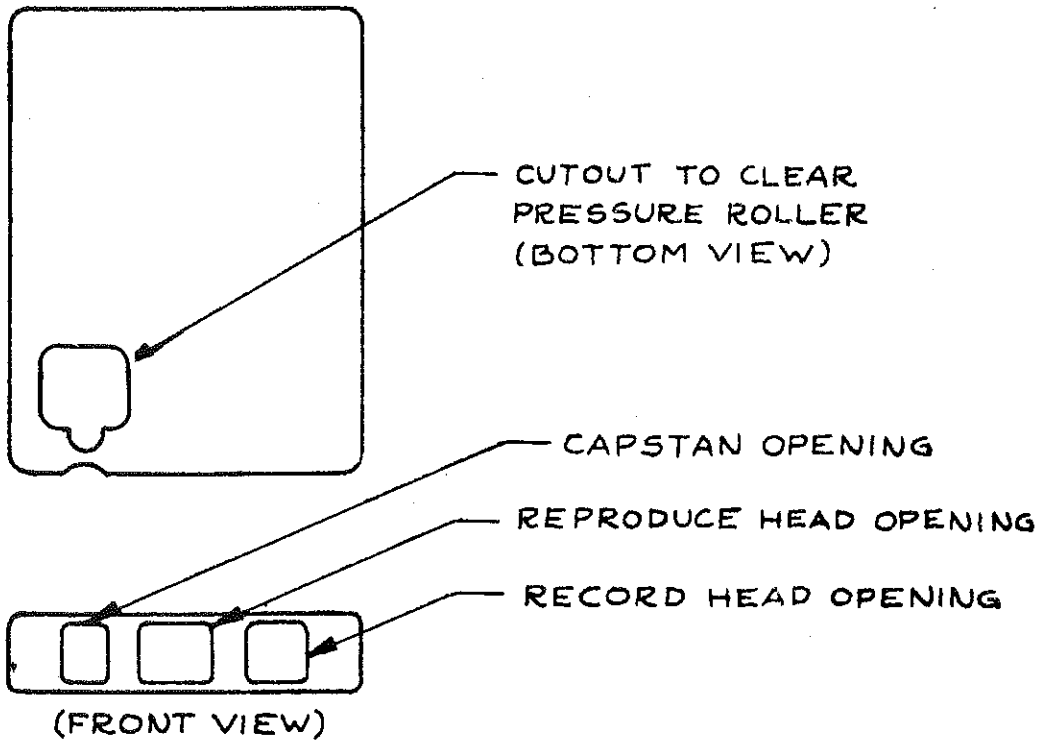
The endless loop is formed by wrapping the tape with the oxide side out into a spiral. The two ends are spliced together so that as the tape is pulled from the center, it passes across the tape heads and winds back onto the outside of the tape spiral.



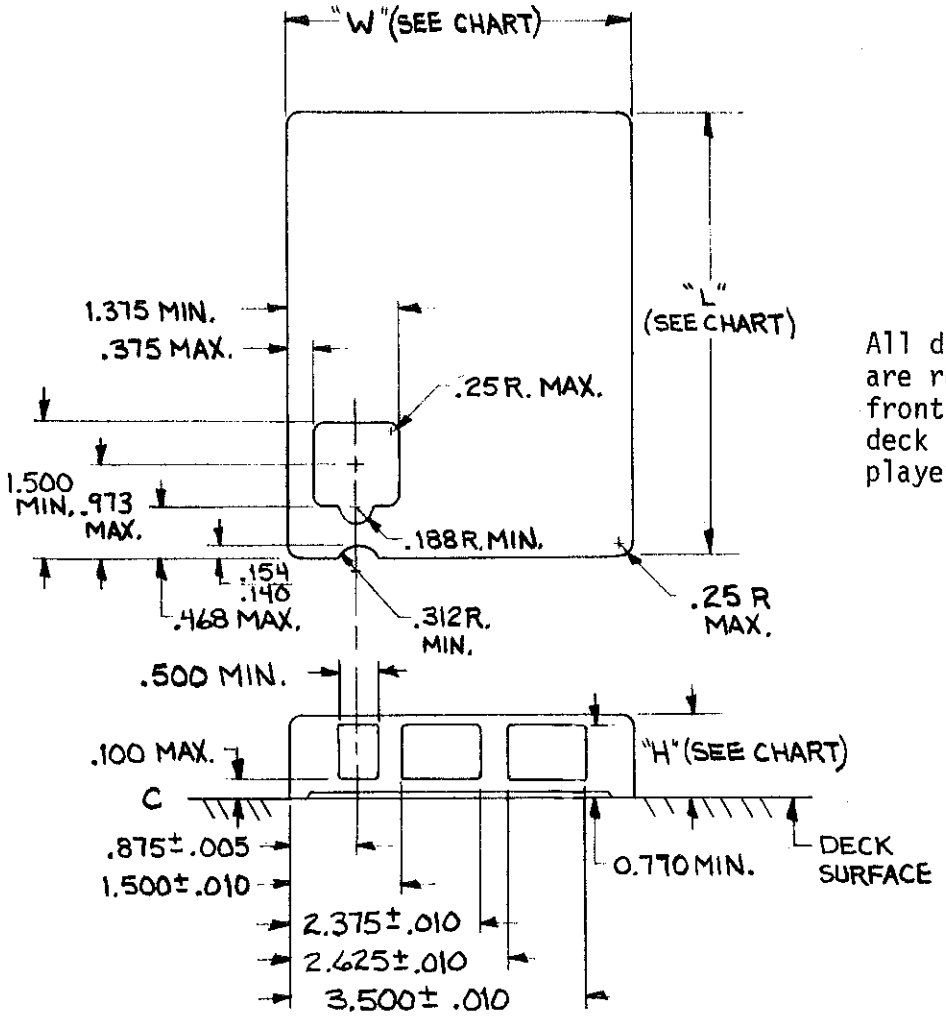
THE SHELL

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

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



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

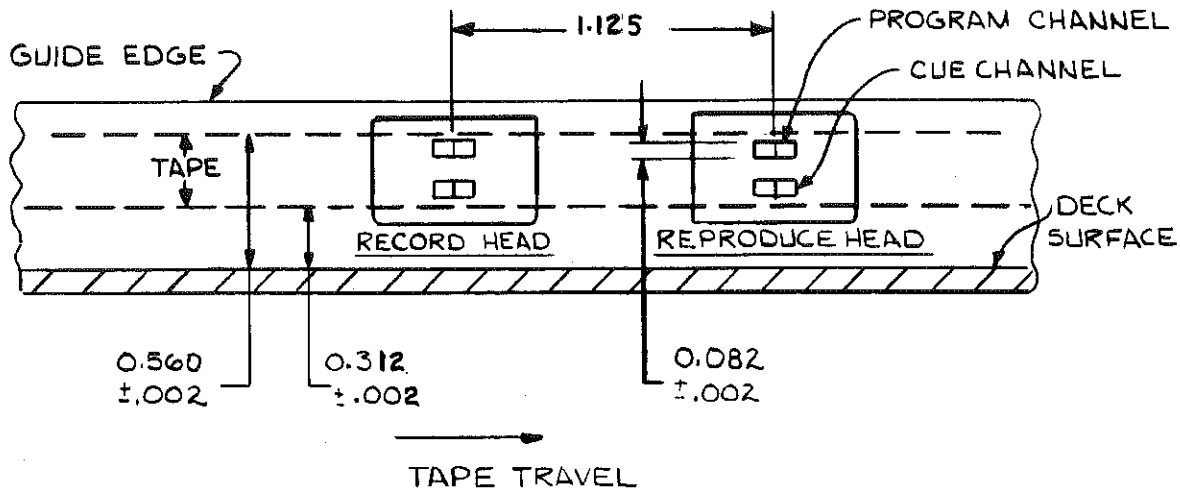


All dimensions are in inches and are referenced from the side and front of the cartridge and the deck surface of the cartridge tape player.

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

FIGURE 1. NAB CARTRIDGE DIMENSION STANDARDS

MONOPHONIC STANDARD



STEREOPHONIC STANDARD

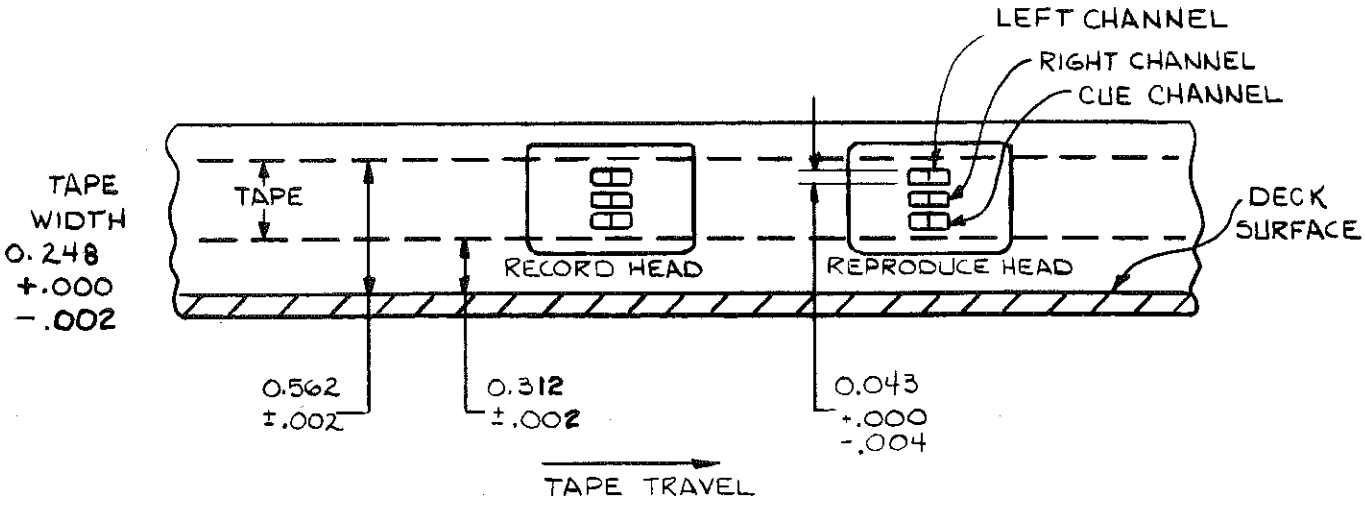
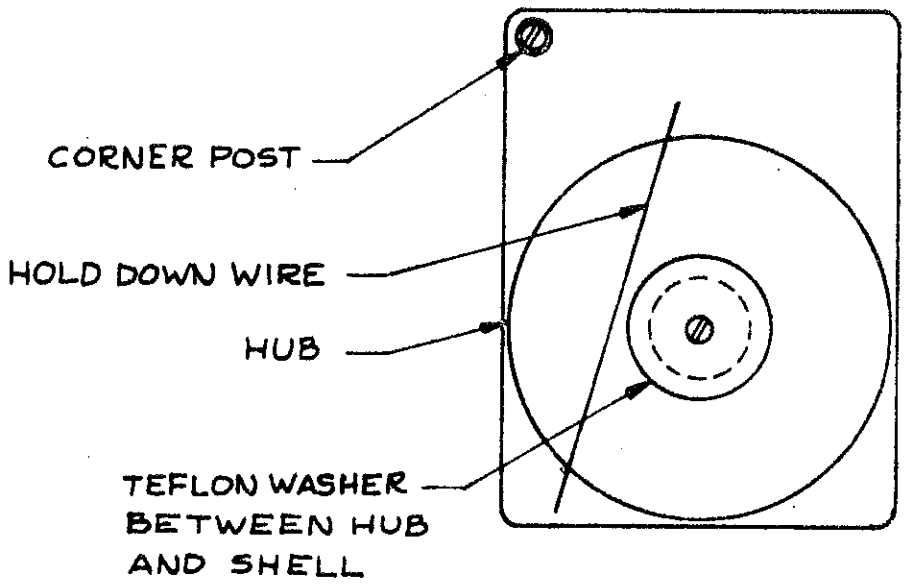


Figure 2. NAB TAPE HEAD DIMENSION STANDARDS

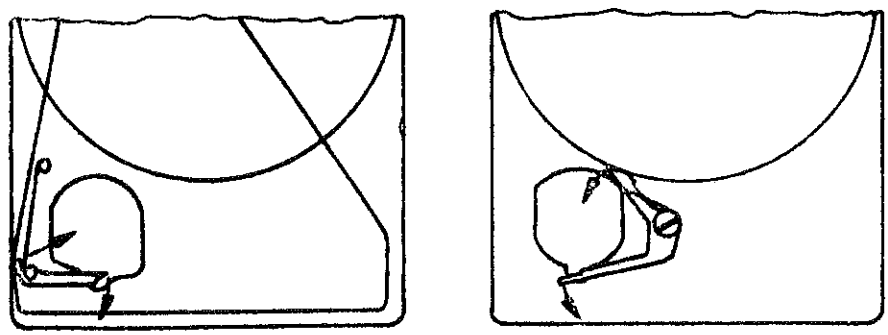
TAPE HUB, TEFLON WASHER, AND CENTER POST

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



CLUTCH SPRING OR HUB BRAKE (SPRING ACTION DEVICE)

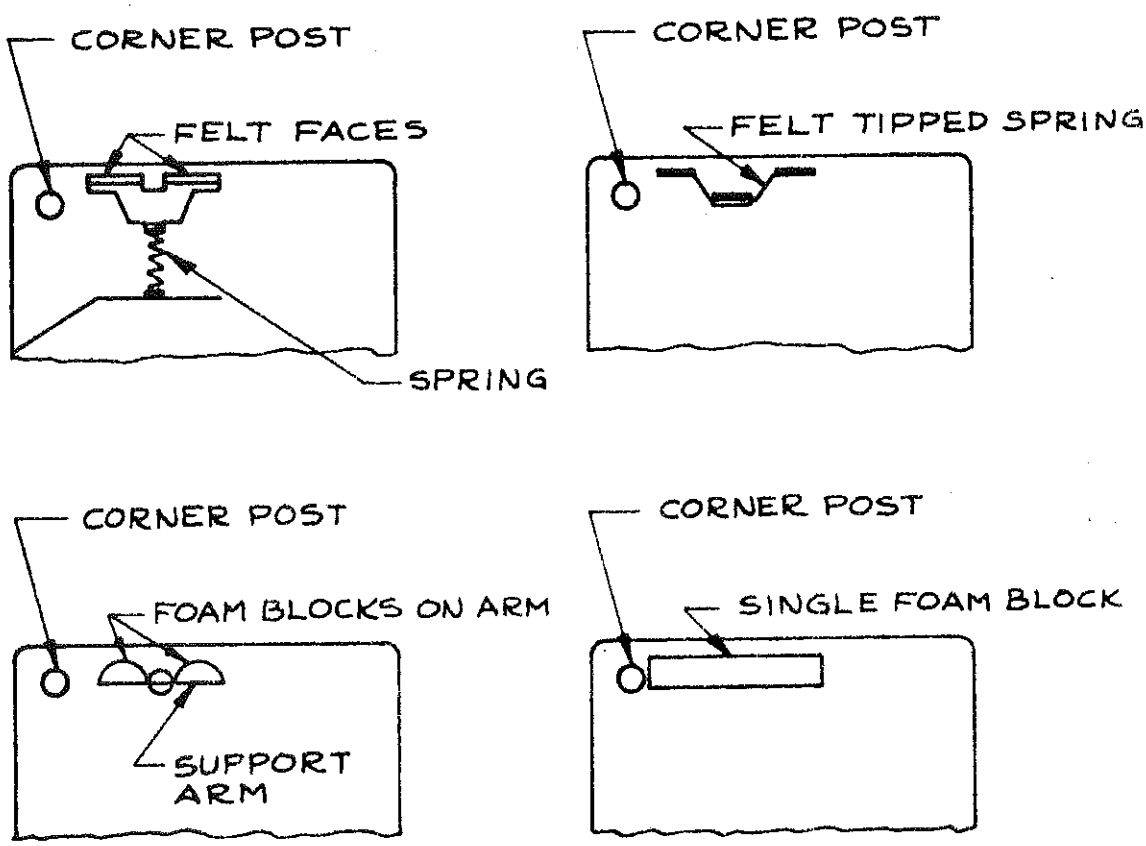
The clutch spring or hub brake keeps the tape from moving when the cartridge is not in place in a machine. This is done either by applying a brake to the hub or by pressing the tape against the shell. The clutch or brake is released by the shaft of the pressure roller when the roller is in the vertical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



PRESSURE PADS

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

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



TAPE GUIDANCE

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

CARTRIDGE MAINTENANCE TIPS

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

TAPE

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

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

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

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

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

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

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

THE SHELL

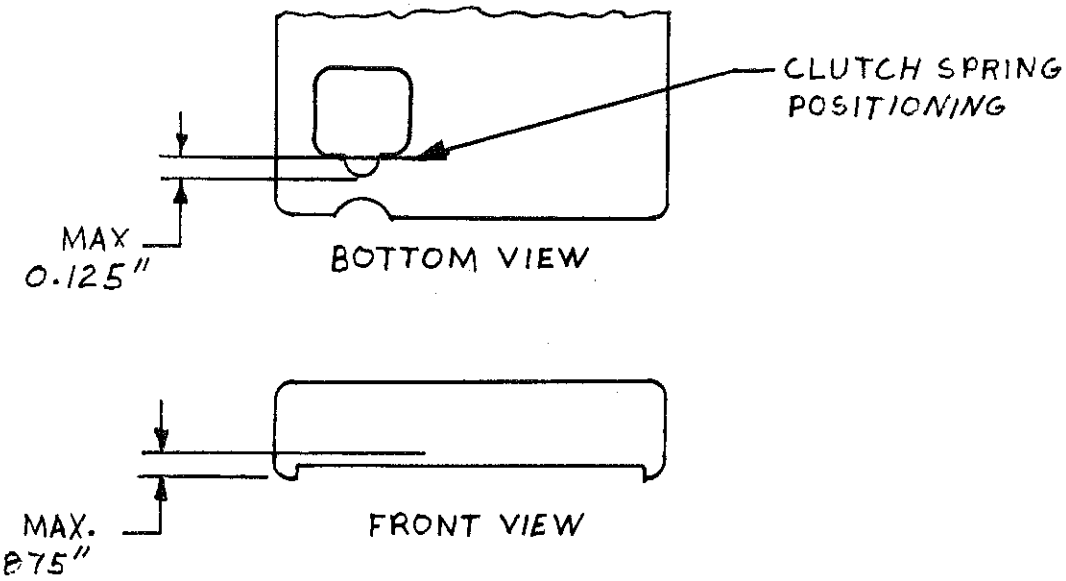
A deformed shell can adversely affect frequency response by distorting the tape path. In particular, a warped cartridge may cause the tape to traverse the head openings in an arc or bowed path rather than a straight line. Sometimes an ill-fitting top can spread the sides of the cartridge enough to cause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

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

CARTRIDGE WARP CAUSES BOWED PATH ACROSS HEADS - TAPE HIGHER ACROSS REPRODUCE HEAD THAN RECORD HEAD

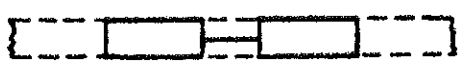
CLUTCH SPRING OR HUB BRAKE

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



PRESSURE PADS

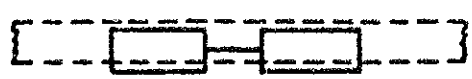
The pressure pads must wrap the tape around the face of the heads. The pressure applied must be uniform across the tape as it is in contact with the head. Periodically check the pads to see that they are lined up squarely with the tape. If one portion of the tape is not in contact with the pads, that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



PROPER ALIGNMENT

PADS TOO HIGH

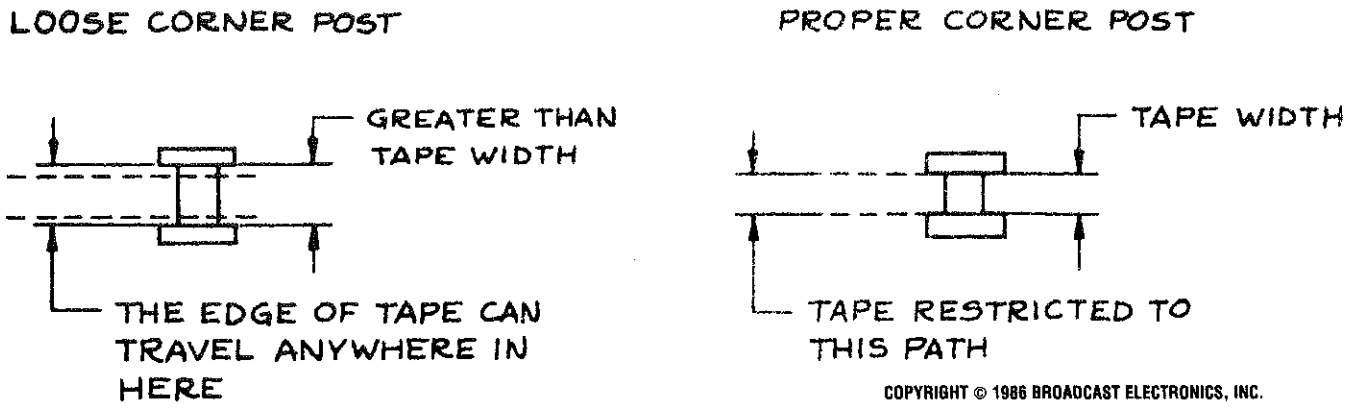
PADS SKEWED



PADS TOO LOW

THE TAPE PATH

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



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

CARTRIDGE STORAGE

The cartridges should be stored away from direct sunlight, or heat from electronic equipment, radiators, etc. Ideal conditions are a temperature of 70^{0} and a relative humidity of 50%. The cartridges storage area should be as free from dust as possible.

CARTRIDGE RECORDING PROCEDURE

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

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

The tape may now be recorded with satisfactory results.

CARTRIDGES IN STEREOPHONIC SYSTEMS

MAINTENANCE

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

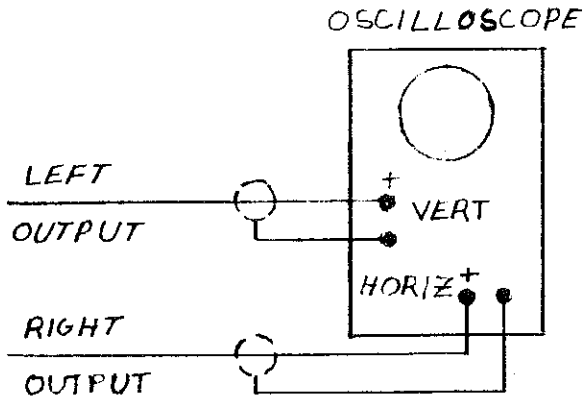
The most important characteristic of a cartridge for stereophonic use is the ability to consistently maintain the identical tape path each time the cartridge is inserted in the player. This allows reliable recording and subsequent accurate reproduction.

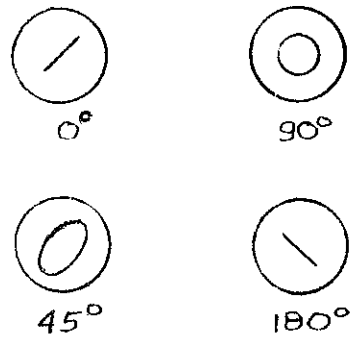
Cartridges used in a stereophonic system should initially be selected for phase repeatability using the phasing test outlined below. This test should be repeated on a regular basis throughout the life of the cartridge. A cartridge which fails this test should be discarded.

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

STEREO PHASING TEST

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





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.

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