

INSTRUCTION MANUAL

*Record Option*  
*Spotmaster Series 5000*  
*Tape Cartridge Machine*

1 March 1981

IM No. 597-5351



BROADCAST ELECTRONICS INC.

FILMWAY company

# IMPORTANT INFORMATION

## EQUIPMENT LOST OR DAMAGED IN TRANSIT

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

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

## TECHNICAL ASSISTANCE AND REPAIR SERVICE

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

### FOR TECHNICAL ASSISTANCE

Phone (217) 224-9600 Customer Service

### WARRANTY ADJUSTMENT

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

## RETURN, REPAIR AND EXCHANGES

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

## REPLACEMENT PARTS

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

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

## PROPRIETARY NOTICE

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

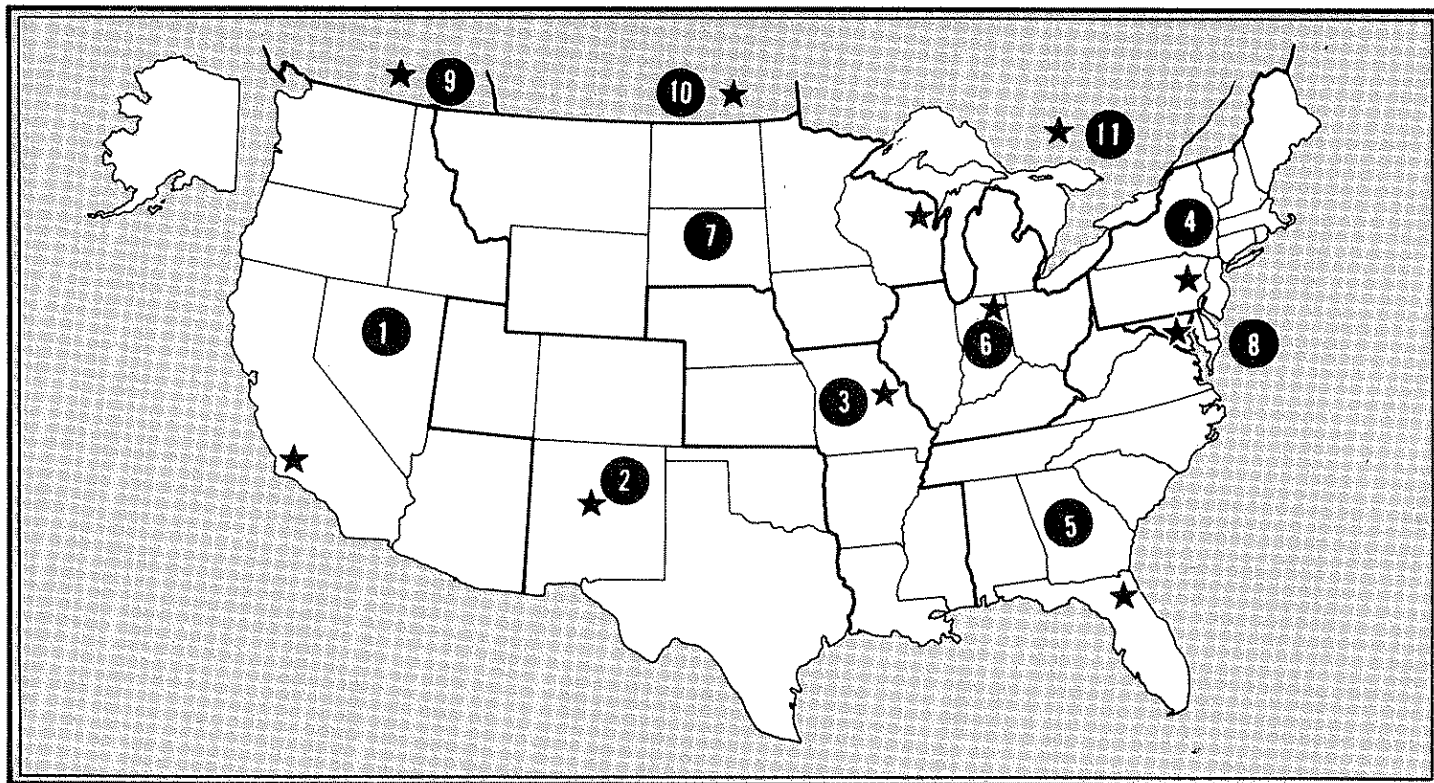
## MODIFICATIONS

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

# AUTHORIZED SERVICE CENTERS

• Equipped to serve you with Broadcast Electronics parts and repairs—both in and out of warranty

• Regional depots reduce parts delivery time and repair turn-around time



## UNITED STATES

**1. Riggins Electronics**  
3272 E. Willow St.  
Long Beach, CA 90815  
Ph: (213) 598-7007

States Covered:  
Alaska  
Arizona  
California  
Hawaii  
Nevada  
Oregon  
Washington

**2. Dyma Engineering**  
213 Pueblo Del Sur  
Box 1697  
Taos, NM 87571  
Ph: (505) 758-8686

States Covered:  
Colorado  
New Mexico  
Oklahoma  
Texas  
Utah

**3. TV Engineering Corporation**  
580 Goddard Ave.  
Chesterfield, MO 63017  
Ph: (314) 532-4700

States Covered:  
Arkansas Missouri  
Kansas Mississippi  
Louisiana Nebraska

**4. Radio Systems Design**  
5131 West Chester Pike  
Edgemont, PA 19028  
Ph: (215) 356-4700

States Covered:  
Connecticut  
Maine  
Massachusetts  
New Hampshire  
New Jersey  
New York  
Pennsylvania  
Rhode Island  
Vermont

**5. Southeast Electronics**  
1125 Rosselle St.  
P. O. Box 41308  
Jacksonville, FL 32203  
Ph: (904) 356-3007

States Covered:  
Alabama  
Florida  
Georgia  
North Carolina  
South Carolina  
Tennessee  
Virginia  
West Virginia

**6. Allied Broadcasting Equipment**  
635 South E. St.  
Richmond, IN 47374  
Ph: (317) 962-8596

States Covered:  
Illinois  
Indiana  
Kentucky  
Michigan  
Ohio

**7. Electronic Industries**  
19 East Irving Ave.  
Oshkosh, WI 54902  
Ph: (414) 235-8930

States Covered:  
Iowa  
Minnesota  
Montana  
North Dakota  
South Dakota  
Wisconsin  
Wyoming

**8. Midwest Telecommunications**  
4720-B Boston Way  
Lanham (Wash., D.C.) MD 20801  
Ph: (301) 577-4903

States Covered:  
District of Columbia  
Delaware  
Maryland

## CANADA

**9. Nortec West, Ltd.**  
325 West Fifth Avenue  
Vancouver V5Y 1J6,  
B.C., Canada  
Ph: (604) 872-8525

Provinces Covered:  
British Columbia  
Yukon Territory

**10. Nortec West, Ltd.**  
7056B Farrell Road  
Calgary, Alta., Canada  
Ph: (403) 252-8141

Provinces Covered:  
Alberta  
Manitoba  
NW Territory  
Saskatchewan

**11. J-Mar Electronics, Ltd.**  
6 Banigan Drive  
Toronto M4H 1E9,  
Ontario, Canada  
Ph: (416) 421-9080

Provinces Covered:  
New Brunswick  
Nova Scotia  
Ontario  
Quebec



**BROADCAST ELECTRONICS INC. *Spotmaster*® TAPE CARTRIDGE SYSTEMS**

INSTRUCTION MANUAL  
SERIES 5000 RECORDER

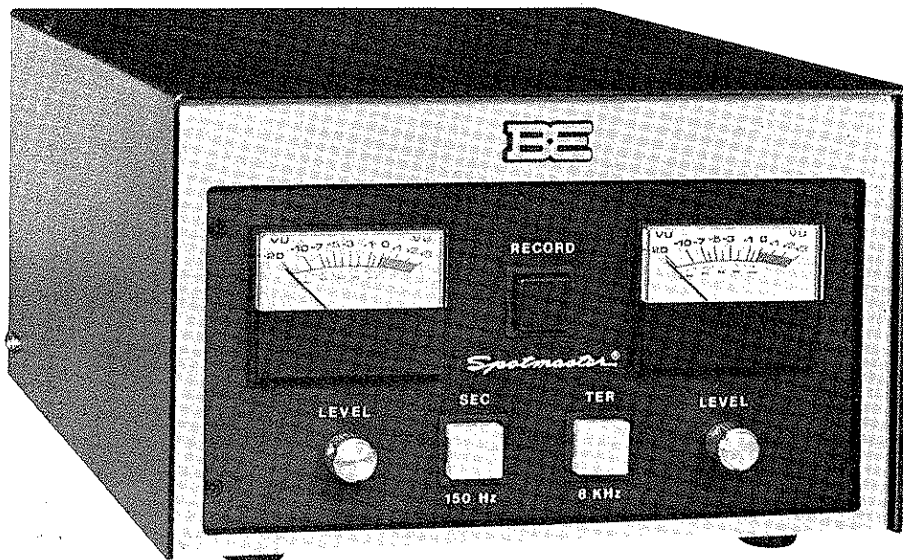


FIGURE 1-1. MODEL 5310 - STEREO RECORD AMP

TABLE OF CONTENTS

Section I	Introduction	Page 1
Section II	Installation	Page 3
Section III	Operation	Page 5
Section IV	Theory of Operation	Page 7
Section V	Maintenance	Page 15
Drawings		



Table 1-1  
Physical and Electrical Specification for Series 5000 Recorder

PARAMETER	SPECIFICATIONS
Input Impedance: Microphone	150 Ohms, (transformer) balanced floating
Line	50k Ohms (transformer) balanced floating
Input Levels: Microphone	-70 to -24 dBm
Line	-24 to +20 dBm (50 mV to 7.7 V)
Power Requirements:	105 to 125 V/210 to 230 V; 50 or 60 Hz
Dimensions:	5.25 inches High x 13.6 inches Deep x 13.5 inches Wide (13.3 cm x 22 cm x 34 cm)
Weight:	16 lbs. (7.25 kg)

5000 Series Recorder

MODEL	PART NO.	DESCRIPTION
5309	906-5309	Recorder, Mono for 3-decker, without Q-Trip Option
5309A	906-5309A	Recorder, Mono for 5-decker, without Q-Trip Option
5310	906-5310	Recorder, Stereo for 3-decker, without Q-Trip Option
5310A	906-5310A	Recorder, Stereo for 5-decker, without Q-Trip Option

## SECTION I INTRODUCTION

### 1-1. FUNCTIONAL DESCRIPTION

1-2. The Series 5000 Recorder Accessory provides record capability to the 5000 Series of cartridge machines; either the three-deck Model 5300A or the 5500 five-deck unit. This accessory consists of:

A. A record-head assembly which mounts in the record-head position of the non-removable deck of the basic machine, deck No. 3 of the 5300A or deck No. 5 of the 5500 Series.

B. The recording amplifier and control unit, shown in Figure 1-1 of this manual.

C. Interconnecting cables between the recording unit and the basic cartridge machine.

1-3. The standard unit provides monaural audio and 1000 Hz cue-tone record capability. Available optional versions include dual channel stereo recording and the extended cue-tone recording capability which permits the recording of the 150 Hz secondary tone, the 8 kHz tertiary cue-signal, and an externally generated cue tone.

1-4. VU meters on the recorder front-panel, one for monaural units and one per channel on stereo systems, provide level monitoring of the record signal when the unit is in the record mode, and of the playback audio when the system is not in the record mode. Front panel controls permit the operator to adjust record levels and to select the secondary and tertiary cue-tones for recording. The 1kHz cue-tone ON/OFF control is located on the top of the record unit and is readily available by lifting the record unit cover.

1-5. The 5000 Series Recorder is configured for table-top mounting. It consists of a main Recorder Amplifier/Control unit, a Record-Head assembly which mounts in the companion cartridge machine, and all inter-connection cables needed between these two units.

The Recorder Amplifier/Control unit contains:

A. Three PC boards; the record amp and bias PC board, the record logic and tone generator PC board, and the power supply PC board.

B. Front panel Record Audio level controls, record set switch, secondary and tertiary cue-tone ON/OFF pushbuttons, and switchable VU meters which automatically show either record or playback levels through the system, according to the operating mode of the machine (RECORD, ON OR OFF).

C. Rear-panel connectors for interfacing with the companion cartridge machine, the 5300A or the 5500 unit.

D. System internal interconnections.

## SECTION II INSTALLATION

### 2-1. UNPACKING

2-2. Immediately upon receipt of the recorder equipment, unpack the equipment, inspect it for damage, and check the items received against the packing list. Important: Report any shipment shortages or damage to the carrier and to Broadcast Electronics, Inc. immediately.

2-3. The Series 5000 Recorder is designed for table-top operation and may be connected to either a rack-mounted or table-top companion cartridge machine, either the three-deck Model 5300 series or the five-deck 5500 unit. In all cases, the recorder functions in conjunction with the lower, non-removable transport deck of the companion machine and the record-head assembly is installed in the record-head position on this deck. Interconnecting cables for table-top installation of both units are included with the system.

2-4. The 5000 Recorder contains its own power supply operating independently of the main machine power supply system. As shown in Dwg. #906-3136, the recorder will operate from nominal AC line voltages of 110, 120, 220, 240 VAC by appropriate wiring of the power transformer connector. AC line frequency may be either 50 or 60 Hz.

### 2-5. INTERCONNECTIONS

2-6. Drawing # 906-5126 shows interconnections between the 5000 Recorder and the Model 5300A Cartridge Machine and Dwg. # 906-5136 gives the same information for the 5500 Series units. Recorder installation consists of:

- A) Installation of the record heads in the companion machine
- B) Plugging in the interconnecting cables between the two units
- C) System Checkout.

2-7. Generally, the Record Option is ordered with a 5300, the heads are factory installed and the system is checked out at the factory. However, the recording unit may be field installed by the customer; all necessary information for field installation is shown on Drawing # 906-5126.

### **NOTE**

THE 5300A CARTRIDGE MACHINE OUTPUT CONNECTORS ARE OF THE 24-PIN CINCH TYPE AND THE 5500 MACHINE USES THE SMALLER 25-PIN AMP CONNECTORS; ALL OTHER INTERCONNECTIONS ARE IDENTICAL ON THE 5300A AND THE 5500 SERIES MACHINES.

2-8. The interconnections between the record head and the 6-pin Jones connector that mounts on the rear-plate of the companion machine are shown in Dwg. # 906-5312. Connections for the 5300A and the 5500 are identical.

2-9. Terminal connections for the Input/Remote connector J4, located on the rear-panel of the recorder are shown in Dwg. # 906-5128. This drawing shows the first six terminals receive the Line Input audio signals for the recorder. Microphone input terminals are through the two (two for stereo) XL Cannon connectors located adjacent to J4. The external cue-tone input is via terminals 23 and 24. Internal recorder connections are indicated on Dwg.# 906-5122. Connections interfacing the recorder and the companion cartridge machine with external equipment are made via the rear-panel deck-connector located on the machine.



### SECTION III OPERATION

3-1. These operating instructions apply to properly aligned equipment, that is equipment that has been adjusted according to the alignment section of this manual or systems that have been adjusted either at the factory or at one of the Broadcast Electronics, Inc. franchised service centers. New equipment is completely aligned at the factory prior to shipment and set for an audio output level of 0dB. If other inter-equipment plant levels are used, cartridge machine output level may be set as required, within the output level specifications listed in Table 1-1. This output level is adjusted via R6 and R56 on the cartridge machine Head Amplifier PC board.

3-2. To make a recording, proceed as follows.

A. Connect a source of audio to the input of the recorder, either a microphone or line input within the input level specifications listed in Section 1 of this manual. The procedure outlined below uses a pre-recorded tape as the program source.

B. Lift the top cover of the recorder and set the GAIN switches (L for mono, both L and R for stereo) to the appropriate position, HI for microphone input and LO for Line input.

C. Set the 1kHz record switch either ON or OFF as required. Replace the top-cover of the recorder. Turn the rear-panel ON/OFF switch to the ON position.

D. Select and bulk-erase a cartridge of the proper length, about 2 seconds longer than the material to be recorded, load the cart into the record-deck and run the cartridge in the playback mode for a few seconds to align the tape in the guides. Note the location of the tape splice and stop the machine so that you will not be recording over the splice.

#### 3-3. SETTING RECORD LEVELS

3-4. Cue-up the material to be recorded, place the recorder in the record mode by pressing the RECORD pushbutton, start the material to be recorded and set the recorder front-panel level control(s) so that audio peaks read "0" on the recorder VU meter. Stop and re-cue the material to be recorded. Leave recorder front-panel level controls at this setting for this material, a re-adjustment may be necessary for other program material.

#### **NOTE**

THE RECORD DECK OF THE 5300A OR THE 5500 MUST BE IN THE STOP MODE WITH A CARTRIDGE LOADED IN ORDER TO PLACE THE SYSTEM IN THE RECORD MODE.

### 3-5. MAKING THE RECORDING

3-6. Push the RECORD button, start the recording deck-transport, allow a 1/4 to 1/2 second pause and start the source material. Since the 5300A and the 5500 will play back the recorded material during the recording process, the quality of the recording may be monitored on a speaker system during the process and a direct comparison may be made between the program source material and the recorded material.

3-7. On machines equipped with QI or QII facilities, these tones may be recorded by pressing the appropriate front-panel pushbuttons at the proper time. Also, an external cue-tone may be recorded via the external cue input and the external cue control facilities. QI, QII or external cue-tones may be recorded with the system in either the record or the playback mode of operation.

3-8. If the 1kHz cue-tone was recorded, this tone will automatically stop the transport and the recording process when the cartridge has made the full cycle. The recording may be manually stopped at any time by pressing the record-deck STOP pushbutton. Stopping the record transport-deck automatically cancels the recording process, placing the system in the playback mode until the RECORD pushbutton is re-pressed. Again, the system will not go into the record mode unless a cartridge is loaded in the record-deck and this transport is in the STOP mode. Removing the cartridge from the transport deck will also stop the system and cancel the record mode status.

## SECTION IV THEORY OF OPERATION

### 4-1. RECORD AMPLIFIER AND BIAS PC BOARD

4-2. This PC board is supplied with either single program audio amplifying and head driving channels for the monaural machine, or with dual program audio channels for the stereo version. Additionally, the PC board contains:

- a) A bias oscillator which generates the 100 kHz bias signal used in the program and cue recording operation;
- b) The record program control logic which shunts the record head inputs to ground when the machine is not in the RECORD mode of operation;
- c) Bias oscillator control logic which keys the bias oscillator on when a recording is to be made. Machine logic is designed to permit the recording of Cue I, Cue II, or external cue tones on an existing pre-recorded cartridge without affecting the recorded program material

4-3. Two sets of Input Terminals are provided for the program audio channels:

- a) An XLR Cannon connector for 150 ohm microphone inputs at -70 to -24 dBm; balanced, floating.
- b) Terminals on the rear panel Cinch connector for bridging line inputs at -24 to +20 dBm; balanced, floating. Bridging impedance is in excess of 35k ohms.

### 4-4. HI/LO GAIN SWITCHES

4-5. These switches located on the Recorder Amplifier and Bias PC board permit recording channel gain to be changed by 35 dB to accommodate both the high and low level input sources.

### 4-6. VU METERS

4-7. The VU meters automatically indicate record levels when the system is in the record mode and playback levels when the 5300A is in the playback mode of operation. The VU meters are located on the recorder front panel.

### 4-8. CIRCUIT DETAILS, RECORD AMPLIFIER AND BIAS PC BOARD

### 4-9. PROGRAM CHANNELS

4-10. The Left and Right amplifier record driver channels are identical, and only the Left channel, used in monaural units, will be described.

4-11. Two primaries on input transformer T1 accommodate mic and line inputs. Input impedance is determined primarily by the reflection of R10 (62k) into the primary windings of T1.

The audio signal is coupled from the secondary of T1 to operational amplifier IC-1A, is amplified by IC-1A and then routed to the front panel Record Level control R1. Potentiometer R1 output is returned to the amplifier via terminal 14 and C11 and applied to the input of op-amp IC-2A. R1 output is also routed from terminal 14 on this PC board to the VU metering circuit on the Record Logic and Tone Generator PC board. Switch S1, which shunts the 27k feedback resistor R15 in its closed position, increases gain of the stage by 35 dB when opened. Voltage divider resistors R19 and R18 establish bias for the first two stages of the Left and Right channels, IC-1A and B and IC-2A and B.

4-12. Op-amp IC-2A provides additional amplification and low frequency equalization boost for the audio signal as determined by R66, R25, C41, R24, and C8.

4-13. The output of amplifier IC-2A drives the Record High Frequency Equalization network consisting of R27, R5, R30, R31, and C15. R5 may be adjusted to match the record response to either the NAB, the IEC, or the CCIR recording standard. The equalized signal is applied to the base of head driving transistor Q2 which supplies the required current to drive the recording heads located in the 5300A. The signal from Q2, however, is routed through FET switch Q4, which passes audio to the record head only when the system is in the record mode. Q4 is controlled by a positive voltage applied through R47 and R49 which prevents it from conducting, and by the program control logic appearing at terminal 16, the cathode sides of CR5 and CR6. When the system is placed in the record mode, a logic signal from the Record Logic and Tone Generator PC board effectively grounds terminal 16, permitting CR6 to conduct, sending the gate terminal of FET Q4 to approximately ground potential. This action turns Q4 on, passing the program audio signal to the recording head through the L1 component of recording bias trap L1/C35.

4-14. Recording Bias is routed to the left channel from the secondary of recording bias transformer T3 (terminal 5), via R64 and the 1 Meg Ohm potentiometer R3. R3 permits the adjustment of recording bias level for minimum distortion, and for maximum signal-to-noise ratio and frequency response. L1 and C35 form a parallel resonant circuit which is tuned (via L1) to the bias frequency (100kHz), isolating the bias signal from the recording head driving circuitry, preventing possible intermodulation distortion of the program audio.

4-15. Q6 shunts the recording head input terminals to ground when the system is not in the program record mode, preventing the application of bias current when the system is not recording. This arrangement is required to prevent the application of the bias signal to the left and right recording heads when recording Q1 or Q11 tones on a pre-recorded cartridge, as the bias oscillator must be operative when recording these tones.

4-16. Q6 is turned off in the program record mode by the application of a low level logic signal to its base from the emitter circuit of PNP transistor Q8. Q8, in turn, was made to conduct in the record mode by the low logic state applied to its base from terminal 16 Program Control, via CR5. R50 and R51 hold Q8 cut off and turn Q6 on during non-recording periods.

#### 4-17. CUE TONE RECORD CHANNEL

4-18. The cue tone record head drivers are located on the record logic and tone generator PC board. However, the record bias stages and the cue-record enabling logic are installed on this PC board. Q10 shunts the cue-record head input to ground when this channel is not expected to record, and present a relative high impedance to ground when the channel is in the record mode. This action is controlled by Q9. Q9 is brought into conduction during the record mode by a high level logic signal on its base from the cue bias switch input terminal 20. Q9 is held cut-off by a low level signal at this terminal when the cue channel is not in the record mode.

#### 4-19. BIAS OSCILLATOR

4-20. The push-pull oscillator comprised of Q11, and Q12 and associated circuitry provides a low distortion sine wave at approximately 100 kHz for the required recording bias currents in the left and right program recording head and in the cue-channel recording head. Positive feedback from the collector circuit of Q11 is supplied to Q12 by C24, and C25 provides positive feedback from the collector circuits of Q12 to Q11. Operating frequency is determined by the inductance of T3 and the capacitance of C39. The required low distortion is achieved by a small amount of negative feedback of (1) emitter resistors R54 and R57, and (2) inter-coupling capacitor C26. C23 minimize start-up transients by providing a gradual turn-on oscillation.

4-21. The oscillator is keyed on in the record mode of operation by a low level logic signal applied to terminal 22 of the PC board connector, the bias switch input. This low level signal causes Q13 to conduct, connecting T3 terminal 2 to the 24 volt supply at PC board terminal 24. When the system is not in the record mode, the bias switch input is at a high logic level, Q13, is non-conduction, and the +24 volts is not applied to the bias oscillator. The circuit does not oscillate. Logic in the record logic and tone generator PC board is designed to turn the bias oscillator on when, (1) the system is placed in the program record mode, and (2) when the system is placed in the QI or QII record modes. As indicated earlier, shunting transients Q6 and Q7 in the program channels prevent bias signal from reaching the program recording heads when the system is in the QI or QII record modes. Cue-Tone input from the record logic and tone generated PC board is via terminal 19, and tuned resonant circuit provide L3/C37 isolation the bias signal from the cue-channel audio driving circuits.

#### 4-22. RECORD LOGIC AND TONE GENERATOR PC BOARD

4-23. This section will describe the complete PC board as used in a stereo system with the optional QI and QII record facilities. Standard versions of the PC board, however, will not contain circuitry for the stereo or QI, QII functions if these were not selected in purchasing a system.

4-24. The record logic and tone generator PC board contains the following basic circuits:

- (1) The bi-stable Record flip-flop with its associated input and output record control logic.

(2) A 1 kHz record timer which sets the duration of the recorded cue-stop tone within the NAB specified 1/2 to 3/4 second limits.

(3) Keyed 150 Hz, and 8 kHz oscillators with associated level control and record head driving transistors.

(4) Level control and input circuitry for recording an externally generated cue-tone.

(5) Control Logic for coordinating all recording functions of the system.

(6) Program channel metering circuits which automatically display either the record input audio signal or the associated 5000 playback audio signal on recorder front panel VU meters, according to the record or playback status of the system.

#### 4-25. RECORD FLIP-FLOP AND RECORD LOGIC

4-26. A bi-stable multivibrator, consisting of transistors Q8 and Q9 activates all record functions and record indications of the system, except the QI and QII record modes. This flip-flop is set in the non-record state when power is initially applied to the system, by the 39k resistor, R42 connected to the base of Q8. R42 holds the base of Q8 at a potential lower than the base of Q9 when the power is applied.

4-27. A high logic level pulse entering the circuit by record set terminal 12 switches the flip-flop to the record state by bringing Q8 into conduction. This action may be inhibited, however, by the run interlock logic at terminal 11. If the cartridge is running when the RECORD button is pressed, terminal 11 is at a low logic level and prevents the flip-flop from going to the record state. If the cartridge is not-running, terminal 11 is at high level and is isolated from the flip-flop by CR15, permitting the flip-flop to trigger to the record mode, Q9 is cut-off, its collector goes positive, Q13 is brought into conduction, and the collector of Q13 drops to approximately ground potential. This action places subsequent logic elements in the record mode unless it is cancelled by a high logic level at record cancel terminal 8. Cancel logic is derived from circuitry on the power supply PC board, to be explained in the corresponding descriptive material. However, record status will be cancelled under any of the following conditions:

- 1) Cartridge not loaded
- 2) Machine stopped manually
- 3) Machine stopped by 1 kHz cue-tone action

4-28. When the RECORD switch is depressed, a positive pulse is delivered to R45. If the unit is in the run mode this pulse will ground through CR15 to the run logic on the power supply board. If the unit is in the stop mode the pulse will be conducted through CR14 to set the flip-flop to record (Q8 conducting). With Q9 off Q13 turns on to supply a ground to the record indicator lamp and the program record circuitry on the record amplifier/amplifier bias board.



4-29. When the STOP switch, 1 kHz (or 3 kHz) cue sensor, or the deck microswitch (if the cartridge is withdrawn) supply a positive pulse to R69, Q9 will begin to conduct and Q8 will turn off. The base of Q12 will go high to supply a ground to the F.F. record interlock. Transistor Q13 turns off to remove the grounds to the record lamp and program control.

#### 4-30. 1 KHZ STOP CUE GENERATOR AND CONTROL

4-31. The stop cue tone generator is composed of IC-2A and IC-2B which oscillate at 1 kHz as determined by R11, R58, R59, C14 and C15. The generator oscillates when positive feedback is available through R48 and R49. The output of the generator is taken through R55, C18, level control R6, R46 and C12 to Q5. This emitter follower stage acts as a current source to drive the cue record head. The cue output is taken from terminal 7 to the record amplifier/bias board.

4-32. The 1 kHz generator is controlled automatically to record a stop cue tone burst when the unit first starts in the record mode. This control is accomplished by IC-2C and IC-2D which are comparators in cascade to form a mono-stable multivibrator. A 12 VDC reference is supplied to IC-2C and IC-2D through R64 and R66 from voltage divider R60, R61. The output of the multivibrator will go high only when the input from R62 goes high.

4-33. A positive 24 VDC is available on S1. Normally S1 is set to the ON position. (The OFF position allows starting the unit in the record mode without recording a stop tone. This might be required in editing, for example). In the ON position +24 VDC is applied to R29. If the record logic is not set for record, the voltage will ground through CR8 to Q12. Similarly, the voltage will ground to the 1 kHz record interlock through CR9 if the unit is in the stop mode (tape not running.) If these conditions are met the voltage will be applied through CR7 and CR18 to IC-2C. This causes IC-2C to go high; this is carried through C28 and R63 to send IC-2D high. When C28 charges fully, the DC path to IC-2D is blocked. The output of IC-2D goes low and remains low until IC-2C is unlatched and relatched.

4-34. When the multivibrator goes high, this voltage is supplied through CR17 and CR24 to the cue bias switching circuit on the record amplifier/bias board. This turns on the 1 kHz generator by turning on FET Q10. Voltage is applied to the gate of Q10 through R67 but is shunted to ground through CR20 and R68. The FET is held non-conducting and the generator is held off. When the multivibrator goes high, CR20 is back biased through CR16 to allow Q10 to turn on. When the multivibrator goes low, Q10 turns off and shuts down the generator. Since the multivibrator has a time constant of approximately three quarters second, a stop tone burst that length is recorded on the cue track.

#### 4-35. AUXILIARY CUE TONE GENERATORS AND CONTROL

4-36. When the optional Q trips are installed, 150 Hz and 8 kHz generators which are similar in operation to the 1 kHz generator are employed. These are two stage operational amplifier oscillators, IC-3A - IC-3B (150 Hz), IC-3C - IC-3D (8 kHz). The frequency is determined by the network R10 (R12), R50 (R92), R51 (R91), C22 (C24), C23 (C25).

Oscillation occurs when positive feedback is supplied by R73 (R93, R94). The output of the generator is supplied through the level control R8 (R7) to the cue head driver Q5.

4-37. To permit recording from an external generator, the rear panel external cue input is connected through a separate level control (R9) to Q5.

4-38. The Q trip generators are not automatically controlled by the machine, but manually by the front panel switches or through the remote control connector. The FET in the feedback circuit, Q11 (Q15), is held off. The voltage on its gate is shunted through CR21 (CR22) and R82 (R83) to ground. When a positive voltage is supplied to the Q control through CR29 (CR28), CR21 (CR22) is back biased to allow the FET to turn on. When the control goes low, the FET is again shut off.

4-39. When the Q control is high, the voltage is also applied through CR26 (CR27) and CR24 to the cue bias switch to enable the bias switching (on the record amplifier/bias board). To supply bias to record an external signal on the cue track, positive must be supplied from the remote control connector through CR25 to the cue bias switch.

4-40. To permit recording the Q trips or an external tone in the playback mode transistor Q14 is installed. A positive voltage on the 150 Hz, 8 kHz, or external cue controls is coupled through R5 and CR23 to the base of Q14. Transistor Q14 turns on to supply a ground to terminal 6 to turn on the bias oscillator. The cue generators run, and the cue track receives bias from the bias oscillator, so a cue tone is recorded. The program track is undisturbed since the program bias and audio are not turned on.

#### 4-41. VU METER AMPLIFIER

4-42. The front panel VU meter (two in stereo models) display the output level in playback and input level in record. The input signal is brought in from the record amplifier/bias board through calibration trimmer R2 (R4) to P channel FET Q2 (Q4). The output signal is brought in from the playback/logic board through calibration trimmer R1 (R3) to N channel FET Q1 (Q3). These FET's are used to switch the input signal to the meter amplifier.

4-43. Bias voltage (+12 VDC) is supplied to the FET's from the voltage divider R30, R31 and R13 (R22), R15 (R23), R17 (R24). This keeps Q1 (Q3) in conduction and Q2 (Q4) shut off. Only the playback signal reaches the meter amplifier. When the record logic is in the record mode, a ground is applied to the gates of the FET's through CR1 (CR6) to Q13. FET Q1 (Q3) turns off and Q2 (Q4) turn on to connect the record signal and disconnect the playback.

4-44. The output of the FET switching is direct coupled through R18 (R26) to the amplifier IC-1A (IC-1B). Capacitors C1 (C3) and C5 (C9) act as blocking capacitors for the DC bias on the FET's. Bias for IC-1A (IC-1B) is supplied from R17 (R24). After amplification, the signal is rectified by bridge rectifier CR2 (CR10), CR3 (CR11), CR4 (CR12), CR5 (CR13) to drive the VU meter.

4-45. Transistor Q7 provides power supply decoupling and a controlled turn on for the VU meter circuit. When AC power is first applied to the unit, the meter circuit is damped to prevent full-scale deflection.

#### 4-46. POWER SUPPLY PC BOARD

4-47. This PC board contains: (1) a Full-Wave Bridge Rectifier and associated voltage regulator which supplies +24 volts DC to the record amplifier and bias PC board, the record logic and tone generator PC board and to the local and remote record mode indicator lights, (2) a resistive voltage divider network which accepts the 5300A playback audio output, attenuates this signal, and routes the divider output to the VU metering circuitry on the record logic and tone generator PC board and (3) IC logic elements which accept various input logic signals from the 5300A and processes these signals.

#### 4-48. CIRCUIT DETAILS, +24 VOLT POWER SUPPLY

4-49. AC power from the line cord is first routed to line fuse and the front panel ON/OFF switch, to the power supply PC board, and then to the power transformer by connector J1. The transformer primary is wired to accept either 110, 120, 220 or 240 VAC, as shown in Dwg. # 906-3136, and to deliver a secondary voltage of nominally 20 VAC. The secondary output voltage is returned to the power supply PC board and drives Full Wave Bridge Rectifier CR1. The output of the rectifier drives filter capacitors C1 and C2 and 24 volt regulator Q1. The +24 volts DC is routed to the record amplifier/bias PC board, to the record logic/tone generator PC board, and to the record mode indicator light(s).

#### 4-50. PLAYBACK AUDIO VOLTAGE DIVIDER

4-51. Resistors R23, 24, 25 and 26 form two voltage dividers that attenuate the incoming audio from the 5300A playback channel(s) and isolate this circuit from the recorder metering circuits. The output(s) from the dividers are routed to the record/playback VU metering circuitry located on the record logic/tone generator PC board.

#### 4-52. LOGIC

4-53. IC-1 and IC-2 are current comparators if the current into the positive input is higher than the current into the negative input, the output will be high (approximately +24 V). If the current into the negative input is higher than that into the positive input, the output will be low (approximately ground).

#### 4-54. RECORD LOGIC INVERTERS

4-55. Comparators IC-2B, IC-2C and IC-2D are driven respectively by the Record set, the QI Record, and the QII Record pushbuttons located on the recorder front-panel, and invert these low logic level inputs to the high logic level signals required to operate the record logic on the record logic and tone generator PC board.

4-56. EXTERNAL Q RECORD BIAS CONTROL

4-57. PNP transistor Q1 controls logic on the record logic and tone generator PC board which turns on the record bias oscillator when the remote external Q record pushbutton is depressed. In the record mode, the pushbutton grounds terminal 18 which in turn pulls the base of Q1 low, bringing it into conduction. This action turns on the bias oscillator for proper recording of the external Q tone.

4-58. RUN INTERLOCK

4-59. IC-1A provides an output at terminal K of the PC board which is routed to the record logic and tone generator PC board to prevent the system from going into the program record mode if the transport is running at the time the record button is pressed. This logic signal is derived from the start verify current sink on the 5300A control logic PC board and is applied to the record flip-flop by the run interlock terminal. If the cartridge is running when the record button is pressed, the run interlock terminal is held at approximately ground potential by IC-1A, preventing the flip-flop from triggering to the record mode.

4-60. RECORD CANCEL LOGIC

4-61. The record cancel logic consists of IC-1A, IC-1B, IC-1C, IC-1D, and IC-2A. This circuitry acts to cancel a record mode status of the flip-flop when:

- 1) A cartridge is not loaded in or is removed from the deck No. 3.
- 2) Deck 3 transport is stopped by either the local or the remote STOP pushbuttons.
- 3) Deck 3 is stopped by a 1 kHz cue tone.

## SECTION V MAINTENANCE

### 5-1. MAINTENANCE AND ALIGNMENT

5-2. Record Head Adjustment. Clean and align the playback head of the recording deck, accurately adjusting the Tape Guides, Head Height, Zenith, and the Azimuth adjustments including stereo phasing on stereo systems. Using the Tape Guide Adjustment-block and a machinist's square, set record-head Height and Zenith. Set playback head equalization.

5-3. Record a 15 kHz tone on the deck under adjustment and listen to the simultaneous playback of this recording on a speaker system while observing the playback level on a VU meter. Adjust the Record Head Azimuth for maximum response to the 15 kHz tone. On stereo systems, trim the Azimuth adjustment for best stereo phase response.

### 5-4. ELECTRONIC RECORD ADJUSTMENTS

5-5. Cue-tone Frequency. The 1 kHz and optional 150 Hz and 8 kHz tone generators are factory set for proper operating frequency and will not normally require adjustment in the field.

5-6. Bias Trap Tuning. Disconnect AC power from the recorder, open the top cover and remove the PC compartment cover-plate. Remove the Record Amplifier/Bias PC board from its socket, insert the extender card, and plug the Record Amplifier/Bias PC board into the extender card. Connect an oscilloscope to test point L on the Record Amplifier/Bias PC board (Dwg. # 906-3110), and restore AC power to the unit. Place the unit in the Record Mode. Using a non-metallic screwdriver, trim inductor L1 for minimum display of the 100 kHz bias signal on the scope. In stereo systems, move the oscilloscope probe to test point R and adjust inductor L2 in the same manner.

5-7. Move the oscilloscope probe to test point Q and adjust inductor L3 for minimum scope response to the bias signal while activating the external cue-control circuit (interconnecting pins 20 and 21 on the input/remote connector on the rear-panel of the record unit).

### 5-8. Program Bias Level

5-9. Optimum frequency response and minimum distortion of the recorded signal require an optimum level of bias signal to the recording head. Bias requirements will vary between brands of tape and between types of tape of the same brand. If more than one brand or type of tape is to be used, check and record the bias requirements for each, and establish the proper bias level for each recording. In some cases, however, a compromise setting may be reached which gives satisfactory performance for several types of tape stock.

5-10. Program Record Level and VU Meter Calibration

5-11. Load a standard test cartridge into the record-deck part of the cartridge machine and play back the reference level portion of the test tape while observing this level on a VU meter. Set the record-deck audio output control for proper plant output level and adjust the Play Meter Calibration control(s), L for monaural or L and R for stereo, for an "0" dB reading on the recorder meter. The recorder must be in the non-record mode for this adjustment.

5-12. Apply a 1 kHz sine wave signal to the line input terminals of the recorder, adjust the level of this signal to approximately 0.5 volts, load a bulk-erased cartridge into the machine, and place the system in the record mode. While making the recording, adjust the Record Level control until the audio output as observed on the external, calibrated VU meter used above for plant reference level measurements, reads "0" VU. This signal now matches the test tape reference level. While still in the record mode, adjust the Record Meter Calibrate control(s) on the record unit to give a reading of "0" VU on the recorder front-panel meter(s).

5-13. Bias Level and Record Equalization Adjustments

5-14. With the above 0.5 volt, 1 KHz sine wave signal still applied to the recorder line input, and with the system still in the record mode, reduce the recorder front-panel RECORD LEVEL control until the record VU meter reads -10 VU. Observe the recorded output of the machine and adjust the bias level for maximum output. On stereo units, repeat this adjustment on the right channel.

5-15. Set the frequency of the signal generator to 15 kHz and maintain the same signal generator output level as used in the record bias adjustment above. Do not change the setting of the RECORD LEVEL control(s). While recording this signal, observe the playback output on the oscilloscope used in the bias adjustment above, and adjust the RECORD EQUALIZATION control to match the level of the 15 kHz signal with that of the 1 kHz signal used in the bias adjustment.

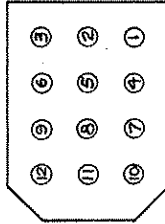
5-16. Cue-Record and Cue-Bias LEVEL

5-17. Apply the 1 kHz tone to the external cue input of the system. Load a standard cue test tape in the record deck transport, connect an oscilloscope to the cue-channel output of this deck and note the peak-to-peak output level of the 1 kHz cue tone as the test tape is reproduced.

5-18. Remove the test tape and load a bulk erased cartridge in the machine. Place the system in the EXTERNAL CUE RECORD mode by inter-connecting pins 20 and 21 on the recorder rear-panel input/remote connector. While recording the 1 KHz tone and observing the playback of this signal on the oscilloscope, adjust the Cue-Bias Level control for maximum output of the signal and adjust the external cue record adjustment to match the level to that produced by the standard cue-tone test tape.



TOP VIEW  
WIRE ENTRY SIDE  
PART NO. 695-1271V



POWER TRANSFORMER (376-7656 & 376-7660 WIRING

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

REV		REVISIONS		DATE	APPROVED
A	110V WAS 105V; 220V WAS 210V			6/27/75	<i>[Signature]</i>
B	ECN 739 (DWG# WAS 906-3100)			3/30/76	

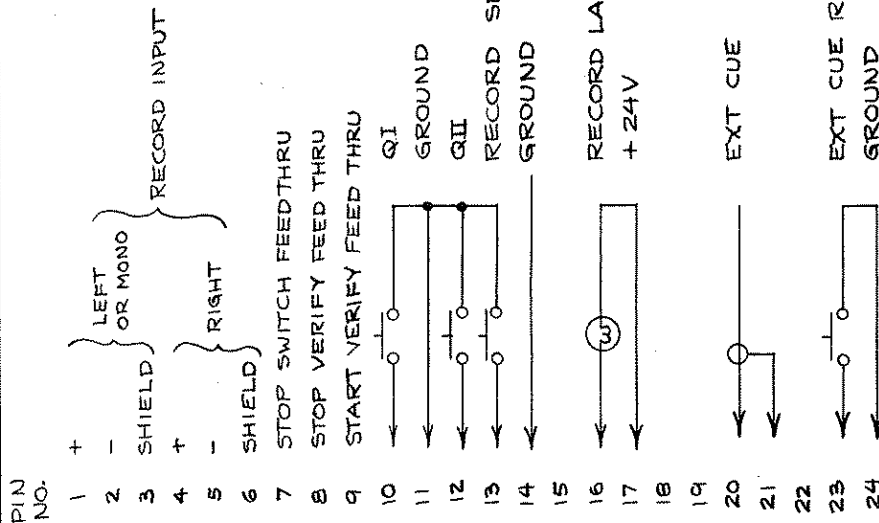
ITEM	QTY	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
<p>TOLERANCE UNLESS OTHERWISE SPECIFIED</p> <p>DECIMAL 2 PL = .01 3 PL = .005</p> <p>FRACTIONAL 1/16</p> <p>ANGULAR ± 1°</p> <p>SHARP EDGES TO</p> <p>BEND RADIUS</p> <p>FILLET RADIUS</p> <p>MATERIAL</p>				

DRAWN BY <i>[Signature]</i>		DATE 2/24/73	BROADCAST ELECTRONICS INC.	
CHECKED BY <i>[Signature]</i>	DATE	- A FILMWAYS COMPANY -		
DESIGNED BY <i>[Signature]</i>	DATE	TITLE POWER XFMR WIRING		
APPROVED BY <i>[Signature]</i>	DATE	DWG NO. 906-3136		
TREATMENT OR FINISH		SCALE	SHEET 1 OF 1	

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

REVISES		
REV	DESCRIPTION	DATE



REMOTE  
CONNECTOR

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

CINCH NO.  
P-324-CCT  
24-PIN MALE

BEI NO.  
418-0306

REAR VIEW  
MATING  
CONNECTOR

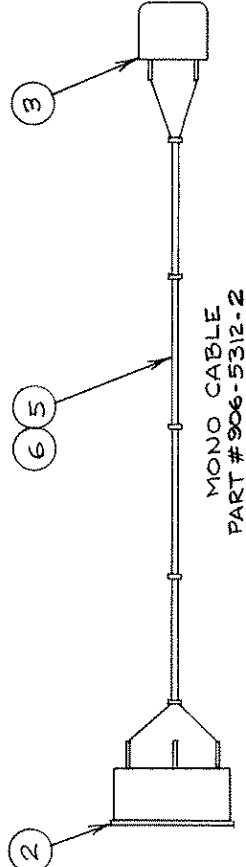
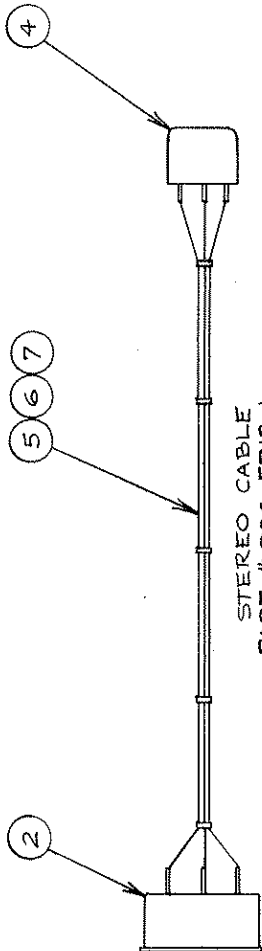
# NOTES:

- UNBALANCED INPUT CONNECTS (-) TO SHIELD.
- ALL LAMPS 28V, .05A OR LESS.

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED					
DECIMAL 2 PL ± 0.1 3 PL ± 0.005					
FRACTIONAL 1/64					
ANGULAR ± 1°					
SHARP EDGES TO					
BEND RADIUS					
FILLET RADIUS					
MATERIAL					
DRAWN BY S/S			DATE 4/13/74	BROADCAST ELECTRONICS INC.	
CHECKED BY S/S			DATE 4/14/74	- A FILMWAYS COMPANY -	
PROJECT ENGR			DATE 4-14-74	TITLE REAR PANEL CONNECTOR WIRING	
APPROVED BY			DATE	DWG NO. 906-5128	
TREATMENT OR FINISH			SCALE	SHEET 1 OF 1	
MATERIAL			5300 RECORDER	REV	

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

REVISIONS		
REV	DESCRIPTION	DATE



IO	REF	D-906-5122	WIRING DIAGRAM
9			
8			
7	1	906-5127-3	HEAD LEAD (BLK & WHT) (USED ON STEREO ONLY)
6	1	906-5127-2	HEAD LEAD (BLU & YEL)
5	1	906-5127-1	HEAD LEAD (ORG & RED)
4	1	253-0005	STEREO RECORD HEAD
3	1	252-0008	MONO RECORD HEAD
2	1	418-0302	CONNECTOR, 6-PIN, FEMALE (J401)
1		906-5312-1	RECORD HEAD LEAD CABLE ASSY-STEREO
		906-5312-2	RECORD HEAD LEAD CABLE ASSY-MONO
ITEM	QTY	PART NUMBER	DESCRIPTION
	RQD		NOTE

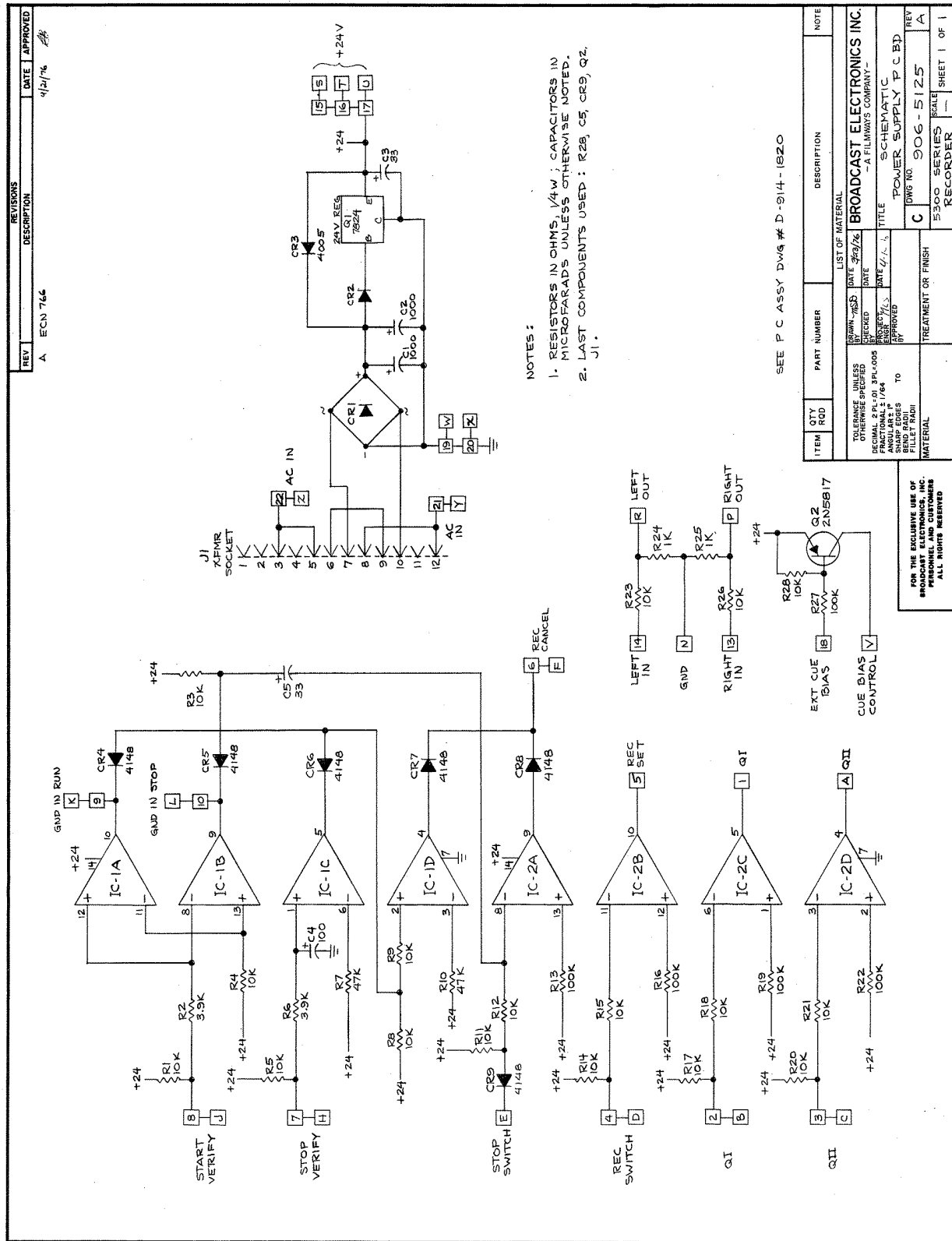
TOLERANCE UNLESS OTHERWISE SPECIFIED		DATE 3/25/76	
DECIMAL 2 PL ± 0.1	FRACTIONAL 1/64"	CHECKED BY	DATE
ANGULAR ± 1°	SHARP EDGES	DESIGNED BY	DATE
FINISH TO		APPROVED BY	DATE
MATERIAL		TREATMENT OR FINISH	

LIST OF MATERIAL	
BROADCAST ELECTRONICS INC.	
- A FILMWAYS COMPANY -	
TITLE	CABLE ASSY
	HEAD LEAD
DWG NO.	906-5312
REV	

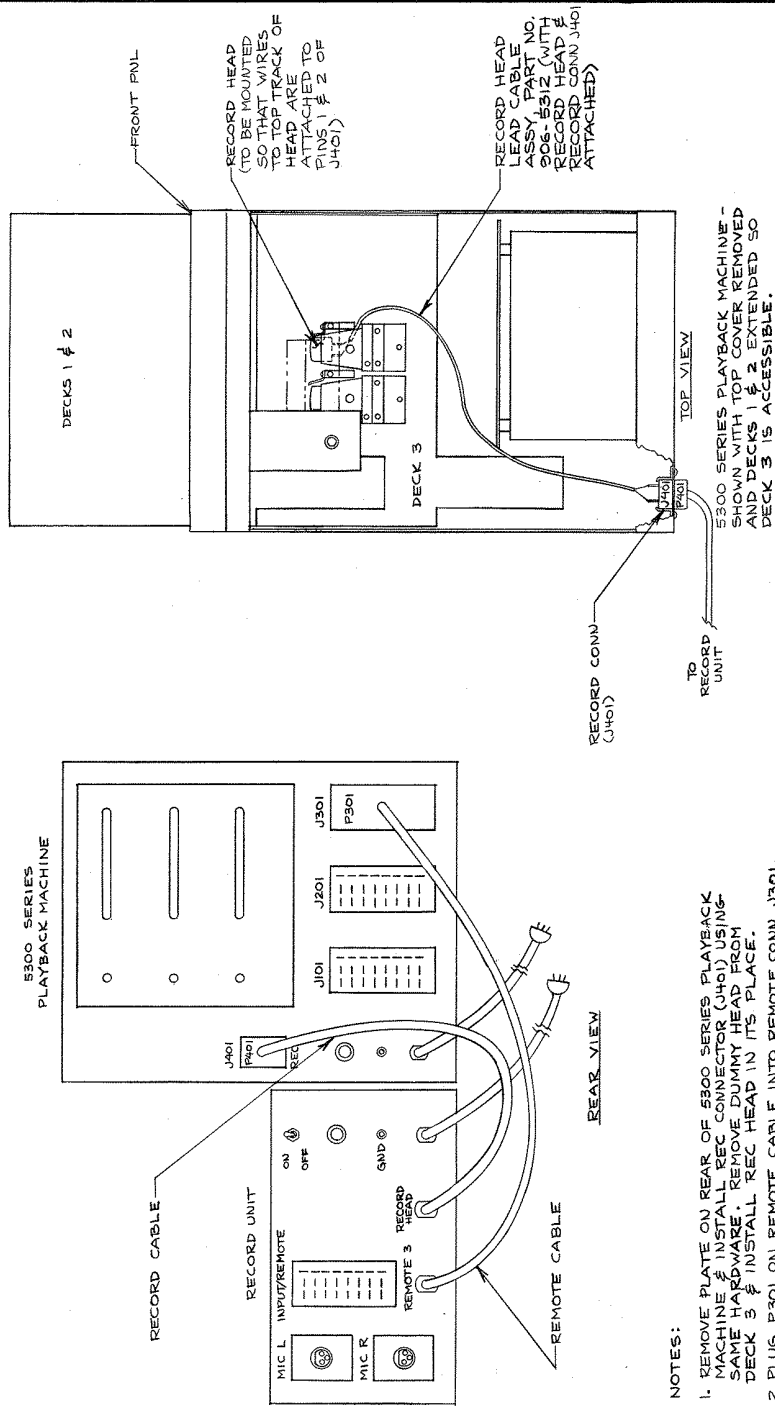
5300 RECORDER	SCALE	SHEET 1 OF 1
---------------	-------	--------------

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





REV		REVISIONS		DATE		APPROVED	
		DESCRIPTION					



NOTES:

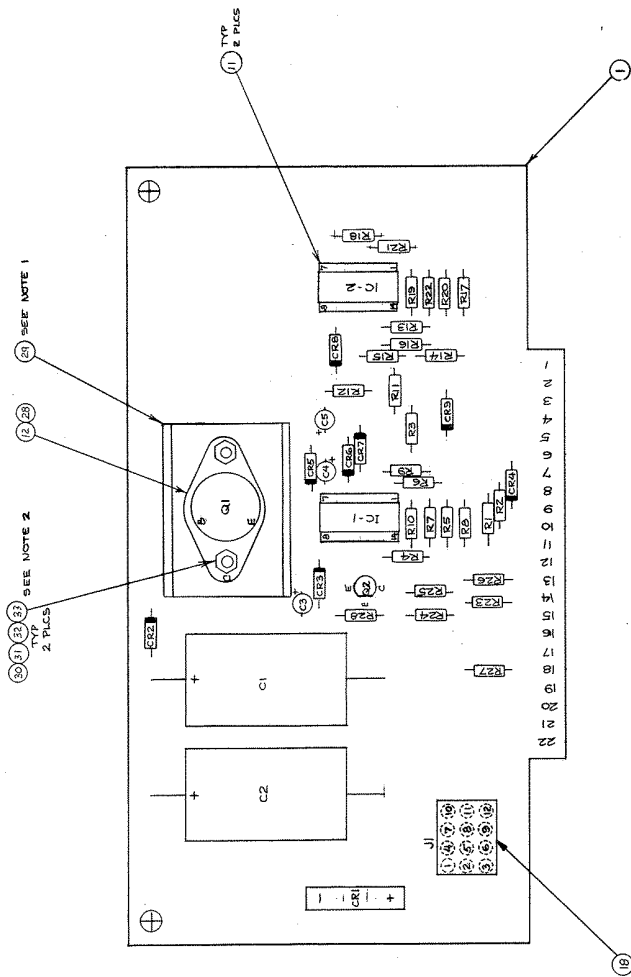
1. REMOVE PLATE ON REAR OF 5300 SERIES PLAYBACK MACHINE & INSTALL REC CONNECTOR (J401) USING SAME HARDWARE. REMOVE DUMMY HEAD FROM DECK 3 & INSTALL REC HEAD IN ITS PLACE.
2. PLUG P301 ON REMOTE CABLE INTO REMOTE CONN J301.
3. PLUG P401 ON RECORD CABLE INTO RECORD CONN J401.

ITEM	QTY	ROD	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
TOLERANCE UNLESS OTHERWISE SPECIFIED		DATE 3/25/76		BROADCAST ELECTRONICS INC.	
DECIMAL 2 PL 01 3 PL 008		DATE		-A FILMWAYS COMPANY-	
ANGULAR 2 P 1/64		DATE		TITLE CABLE ASSEMBLY	
SHARP EDGES TO		DATE		5300 RECORD TO	
FILLET RADI		DATE		5300 PLAYBACK	
MATERIAL		DATE		C DWG NO 906-5126	
TREATMENT OR FINISH		DATE		REV	
5300 SERIES		DATE		SCALE	
F/1		DATE		SHEET 1 OF 1	

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



REV A - ECN 766 4/21/74  
 B - ECN 1096 1/14/78  
 C - ECN 1385 10-27-78 CRM  
 D - ECN # 1483 5-15-80 JDR

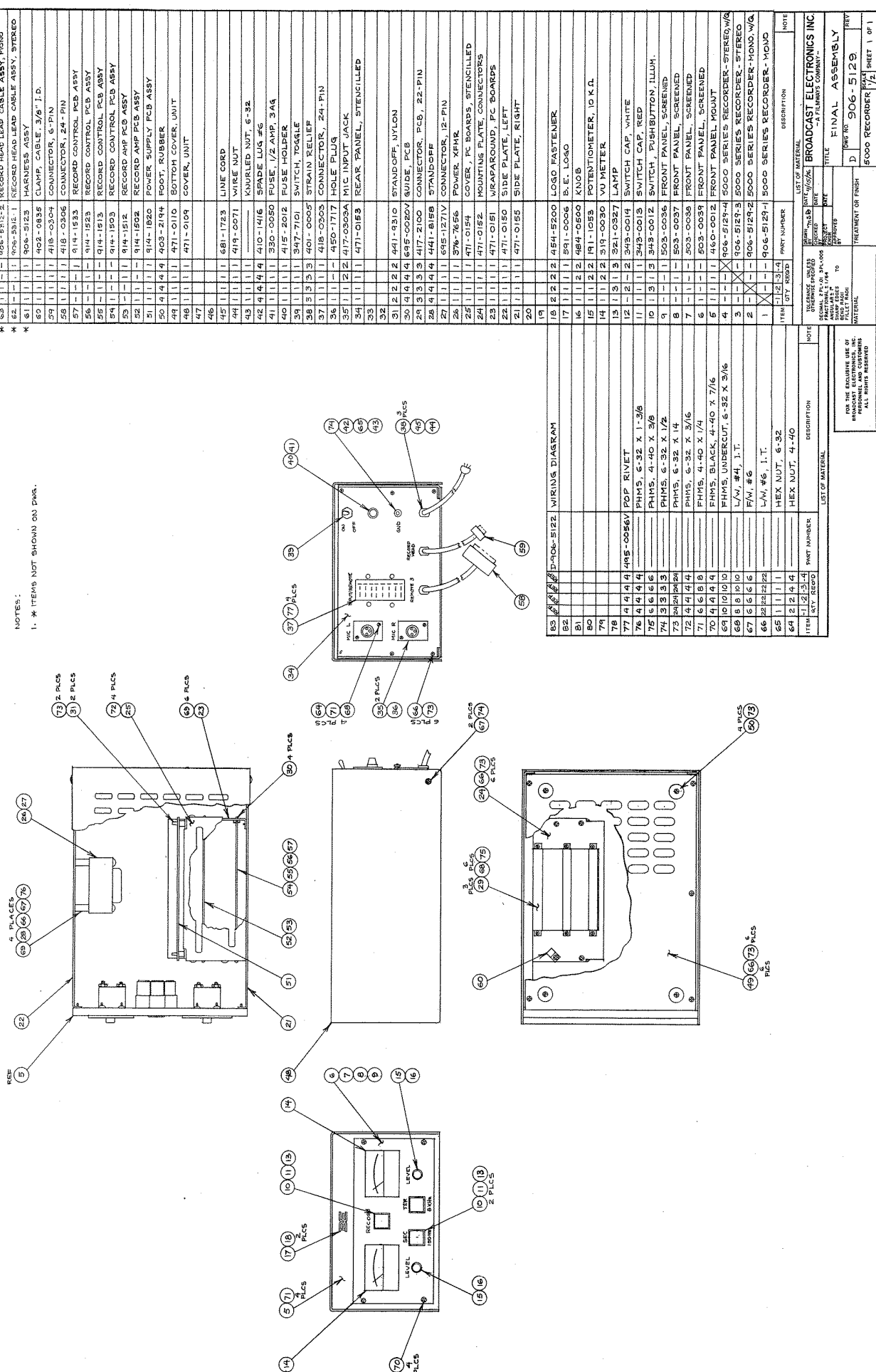


- NOTES:
1. HEATSINK (ITEM 21) TO BE PROPERLY ORIENTED WITH Q1 PINS.
  2. Q1 TO BE MOUNTED WITH SCREWS FROM BOTTOM OF BOARD.

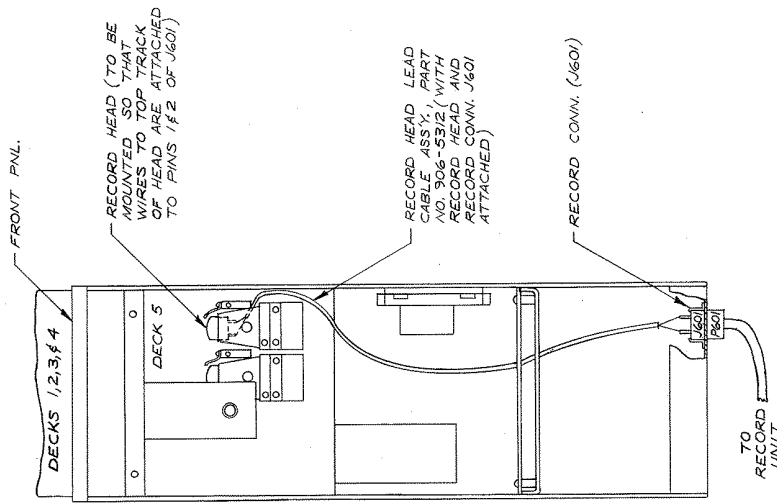
SEE B/M 914-1820

ITEM	QTY	UNIT	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL					
BROADCAST ELECTRONICS INC.					
- A FILMWAYS COMPANY -					
TITLE: POWER SUPPLY P C 90					
REV: D					
DATE: 9/14/80					
BY: 171					
CHECKED: 171					
APPROVED: 171					
TREATMENT OR FINISH: 171					
SHEET 1 OF 1					

FOR THE RECORDING OF  
 PRODUCTION AND CUSTOMER  
 ALL RIGHTS RESERVED

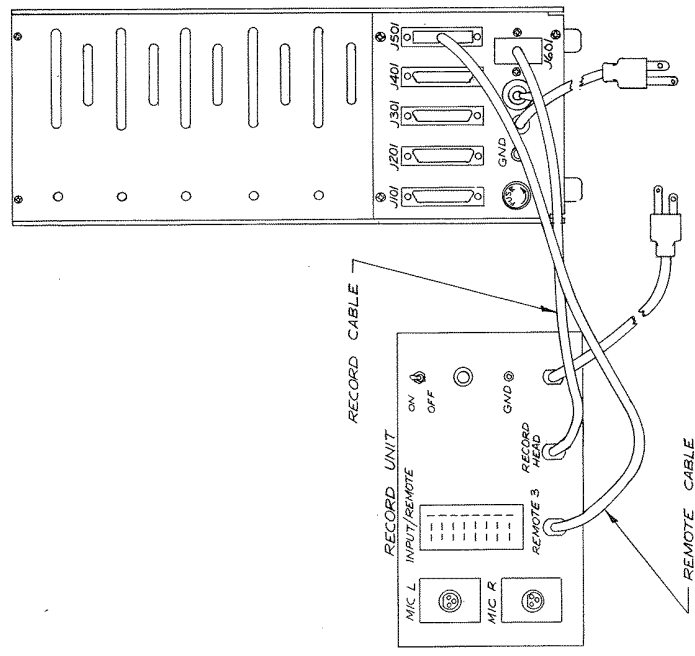


REV	DESCRIPTION	DATE	APPROVED
-----	-------------	------	----------



TOP VIEW

5500 SERIES PLAYBACK MACHINE—  
SHOWN WITH TOP COVER REMOVED  
AND DECKS 1,2,3,4 EXTENDED  
SO DECK 5 IS ACCESSIBLE



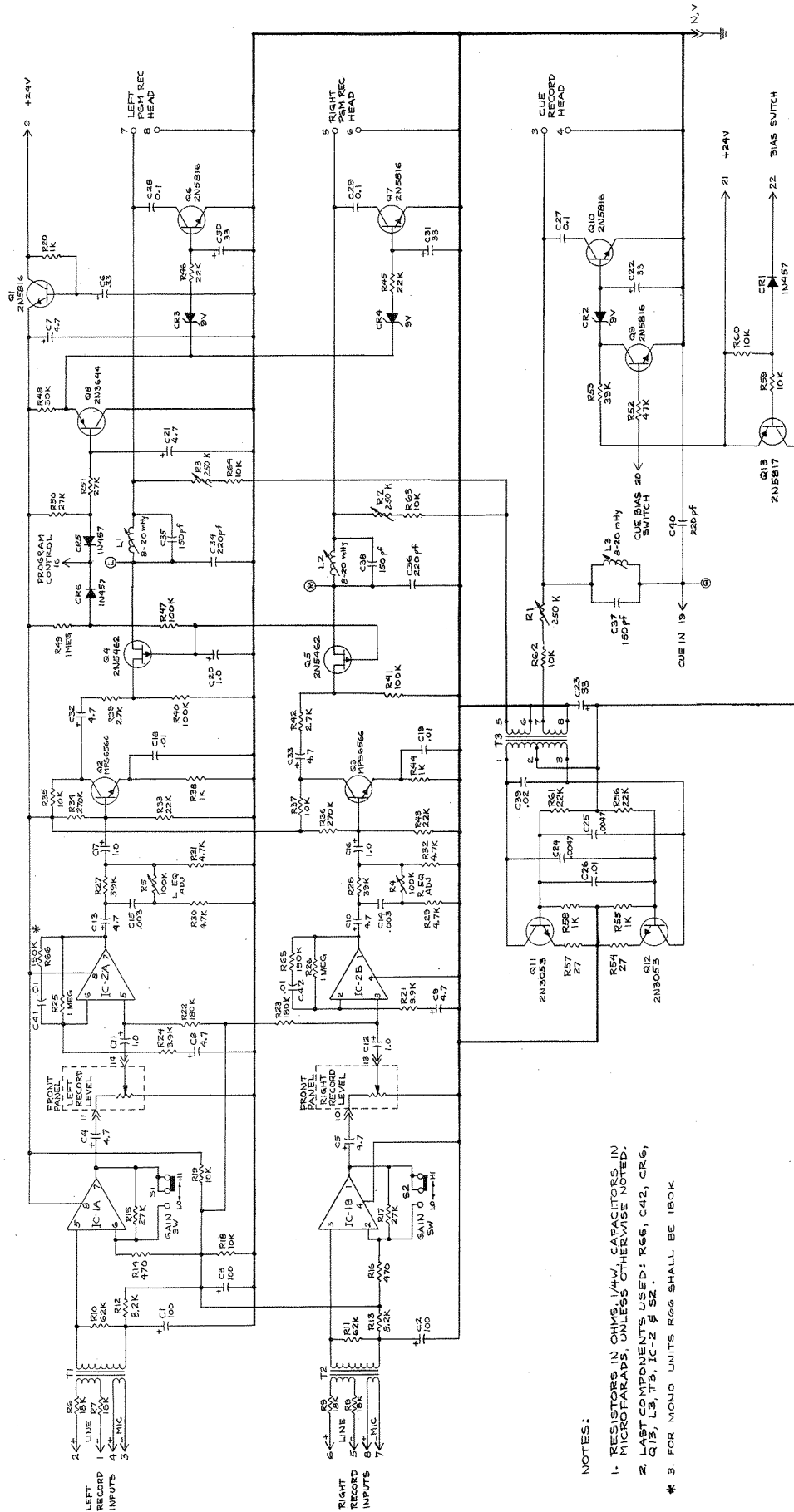
REAR VIEW

NOTES:

1. REMOVE PLATE ON REAR OF 5500 SERIES PLAYBACK MACHINE & INSTALL REC. CONN. (J601) USING SAME HARDWARE. REMOVE DUMMY HEAD FROM DECK 5 & INSTALL REC. HEAD IN ITS PLACE.
2. PLUG P501 ON REMOTE CABLE INTO REMOTE CONN. J501
3. PLUG P601 ON RECORD CABLE INTO RECORD CONN. J601

ITEM	QTY REQ	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
1	1	906-5312	RECORD HEAD LEAD CABLE ASSY.	
2	1	906-5312	RECORD HEAD AND RECORD CONN. J601	
3	1	906-5312	RECORD CONN. J601	
4	1	906-5312	RECORD CONN. J601	
5	1	906-5312	RECORD CONN. J601	
6	1	906-5312	RECORD CONN. J601	
7	1	906-5312	RECORD CONN. J601	
8	1	906-5312	RECORD CONN. J601	
9	1	906-5312	RECORD CONN. J601	
10	1	906-5312	RECORD CONN. J601	
11	1	906-5312	RECORD CONN. J601	
12	1	906-5312	RECORD CONN. J601	
13	1	906-5312	RECORD CONN. J601	
14	1	906-5312	RECORD CONN. J601	
15	1	906-5312	RECORD CONN. J601	
16	1	906-5312	RECORD CONN. J601	
17	1	906-5312	RECORD CONN. J601	
18	1	906-5312	RECORD CONN. J601	
19	1	906-5312	RECORD CONN. J601	
20	1	906-5312	RECORD CONN. J601	
21	1	906-5312	RECORD CONN. J601	
22	1	906-5312	RECORD CONN. J601	
23	1	906-5312	RECORD CONN. J601	
24	1	906-5312	RECORD CONN. J601	
25	1	906-5312	RECORD CONN. J601	
26	1	906-5312	RECORD CONN. J601	
27	1	906-5312	RECORD CONN. J601	
28	1	906-5312	RECORD CONN. J601	
29	1	906-5312	RECORD CONN. J601	
30	1	906-5312	RECORD CONN. J601	
31	1	906-5312	RECORD CONN. J601	
32	1	906-5312	RECORD CONN. J601	
33	1	906-5312	RECORD CONN. J601	
34	1	906-5312	RECORD CONN. J601	
35	1	906-5312	RECORD CONN. J601	
36	1	906-5312	RECORD CONN. J601	
37	1	906-5312	RECORD CONN. J601	
38	1	906-5312	RECORD CONN. J601	
39	1	906-5312	RECORD CONN. J601	
40	1	906-5312	RECORD CONN. J601	
41	1	906-5312	RECORD CONN. J601	
42	1	906-5312	RECORD CONN. J601	
43	1	906-5312	RECORD CONN. J601	
44	1	906-5312	RECORD CONN. J601	
45	1	906-5312	RECORD CONN. J601	
46	1	906-5312	RECORD CONN. J601	
47	1	906-5312	RECORD CONN. J601	
48	1	906-5312	RECORD CONN. J601	
49	1	906-5312	RECORD CONN. J601	
50	1	906-5312	RECORD CONN. J601	
51	1	906-5312	RECORD CONN. J601	
52	1	906-5312	RECORD CONN. J601	
53	1	906-5312	RECORD CONN. J601	
54	1	906-5312	RECORD CONN. J601	
55	1	906-5312	RECORD CONN. J601	
56	1	906-5312	RECORD CONN. J601	
57	1	906-5312	RECORD CONN. J601	
58	1	906-5312	RECORD CONN. J601	
59	1	906-5312	RECORD CONN. J601	
60	1	906-5312	RECORD CONN. J601	
61	1	906-5312	RECORD CONN. J601	
62	1	906-5312	RECORD CONN. J601	
63	1	906-5312	RECORD CONN. J601	
64	1	906-5312	RECORD CONN. J601	
65	1	906-5312	RECORD CONN. J601	
66	1	906-5312	RECORD CONN. J601	
67	1	906-5312	RECORD CONN. J601	
68	1	906-5312	RECORD CONN. J601	
69	1	906-5312	RECORD CONN. J601	
70	1	906-5312	RECORD CONN. J601	
71	1	906-5312	RECORD CONN. J601	
72	1	906-5312	RECORD CONN. J601	
73	1	906-5312	RECORD CONN. J601	
74	1	906-5312	RECORD CONN. J601	
75	1	906-5312	RECORD CONN. J601	
76	1	906-5312	RECORD CONN. J601	
77	1	906-5312	RECORD CONN. J601	
78	1	906-5312	RECORD CONN. J601	
79	1	906-5312	RECORD CONN. J601	
80	1	906-5312	RECORD CONN. J601	
81	1	906-5312	RECORD CONN. J601	
82	1	906-5312	RECORD CONN. J601	
83	1	906-5312	RECORD CONN. J601	
84	1	906-5312	RECORD CONN. J601	
85	1	906-5312	RECORD CONN. J601	
86	1	906-5312	RECORD CONN. J601	
87	1	906-5312	RECORD CONN. J601	
88	1	906-5312	RECORD CONN. J601	
89	1	906-5312	RECORD CONN. J601	
90	1	906-5312	RECORD CONN. J601	
91	1	906-5312	RECORD CONN. J601	
92	1	906-5312	RECORD CONN. J601	
93	1	906-5312	RECORD CONN. J601	
94	1	906-5312	RECORD CONN. J601	
95	1	906-5312	RECORD CONN. J601	
96	1	906-5312	RECORD CONN. J601	
97	1	906-5312	RECORD CONN. J601	
98	1	906-5312	RECORD CONN. J601	
99	1	906-5312	RECORD CONN. J601	
100	1	906-5312	RECORD CONN. J601	

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

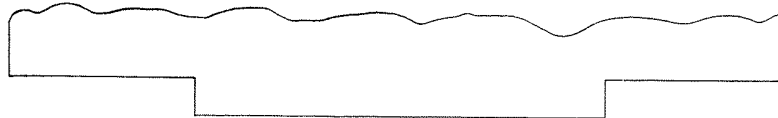
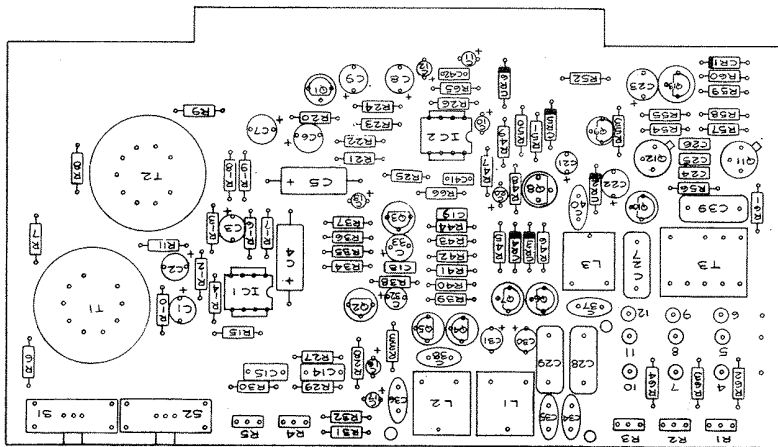


# NOTES:

1. RESISTORS IN OHMS, 1/4W. CAPACITORS IN MICROFARADS, UNLESS OTHERWISE NOTED.
2. LAST COMPONENTS USED: R66, C42, CR6, Q13, L3, T3, IC-2 & S2.
- \* 3. FOR MONO UNITS R66 SHALL BE 180K

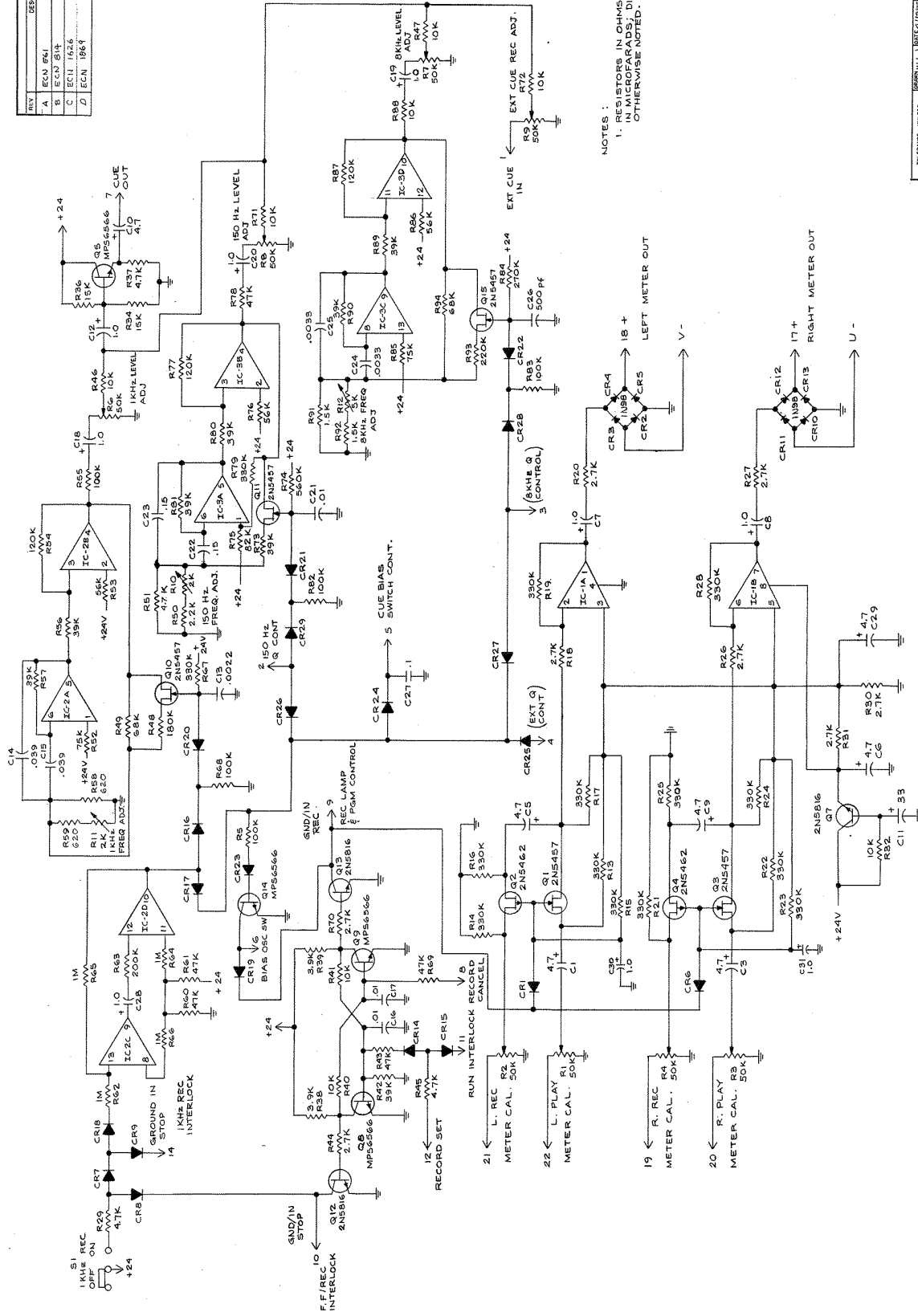
BROADCAST ELECTRONICS INC.			
DATE	REV	DESCRIPTION	DATE
8-7-80	1	7-4-80	1
8-7-80	2	7-4-80	2
8-7-80	3	7-4-80	3
8-7-80	4	7-4-80	4
8-7-80	5	7-4-80	5
8-7-80	6	7-4-80	6
8-7-80	7	7-4-80	7
8-7-80	8	7-4-80	8
8-7-80	9	7-4-80	9
8-7-80	10	7-4-80	10
8-7-80	11	7-4-80	11
8-7-80	12	7-4-80	12
8-7-80	13	7-4-80	13
8-7-80	14	7-4-80	14
8-7-80	15	7-4-80	15
8-7-80	16	7-4-80	16
8-7-80	17	7-4-80	17
8-7-80	18	7-4-80	18
8-7-80	19	7-4-80	19
8-7-80	20	7-4-80	20
8-7-80	21	7-4-80	21
8-7-80	22	7-4-80	22
8-7-80	23	7-4-80	23
8-7-80	24	7-4-80	24
8-7-80	25	7-4-80	25
8-7-80	26	7-4-80	26
8-7-80	27	7-4-80	27
8-7-80	28	7-4-80	28
8-7-80	29	7-4-80	29
8-7-80	30	7-4-80	30
8-7-80	31	7-4-80	31
8-7-80	32	7-4-80	32
8-7-80	33	7-4-80	33
8-7-80	34	7-4-80	34
8-7-80	35	7-4-80	35
8-7-80	36	7-4-80	36
8-7-80	37	7-4-80	37
8-7-80	38	7-4-80	38
8-7-80	39	7-4-80	39
8-7-80	40	7-4-80	40
8-7-80	41	7-4-80	41
8-7-80	42	7-4-80	42
8-7-80	43	7-4-80	43
8-7-80	44	7-4-80	44
8-7-80	45	7-4-80	45
8-7-80	46	7-4-80	46
8-7-80	47	7-4-80	47
8-7-80	48	7-4-80	48
8-7-80	49	7-4-80	49
8-7-80	50	7-4-80	50
8-7-80	51	7-4-80	51
8-7-80	52	7-4-80	52
8-7-80	53	7-4-80	53
8-7-80	54	7-4-80	54
8-7-80	55	7-4-80	55
8-7-80	56	7-4-80	56
8-7-80	57	7-4-80	57
8-7-80	58	7-4-80	58
8-7-80	59	7-4-80	59
8-7-80	60	7-4-80	60
8-7-80	61	7-4-80	61
8-7-80	62	7-4-80	62
8-7-80	63	7-4-80	63
8-7-80	64	7-4-80	64
8-7-80	65	7-4-80	65
8-7-80	66	7-4-80	66
8-7-80	67	7-4-80	67
8-7-80	68	7-4-80	68
8-7-80	69	7-4-80	69
8-7-80	70	7-4-80	70
8-7-80	71	7-4-80	71
8-7-80	72	7-4-80	72
8-7-80	73	7-4-80	73
8-7-80	74	7-4-80	74
8-7-80	75	7-4-80	75
8-7-80	76	7-4-80	76
8-7-80	77	7-4-80	77
8-7-80	78	7-4-80	78
8-7-80	79	7-4-80	79
8-7-80	80	7-4-80	80
8-7-80	81	7-4-80	81
8-7-80	82	7-4-80	82
8-7-80	83	7-4-80	83
8-7-80	84	7-4-80	84
8-7-80	85	7-4-80	85
8-7-80	86	7-4-80	86
8-7-80	87	7-4-80	87
8-7-80	88	7-4-80	88
8-7-80	89	7-4-80	89
8-7-80	90	7-4-80	90
8-7-80	91	7-4-80	91
8-7-80	92	7-4-80	92
8-7-80	93	7-4-80	93
8-7-80	94	7-4-80	94
8-7-80	95	7-4-80	95
8-7-80	96	7-4-80	96
8-7-80	97	7-4-80	97
8-7-80	98	7-4-80	98
8-7-80	99	7-4-80	99
8-7-80	100	7-4-80	100

REV	DESCRIPTION	DATE	APPROVED
B	PER ECN # 533	7/1/78	W/H
C	PER ECN # 5	11/1/78	W/H
D	PER ECN # 7	11/1/78	W/H
E	PER ECN # 1086	11/1/78	W/H
F	PER ECN # 1861	11/1/78	W/H
G	PER ECN # 2266	11/1/78	W/H



ITEM	REV	PART NUMBER	DESCRIPTION	NOTE
LIST OF MATERIAL				
BROADCAST ELECTRONICS INC.				
-ATLANTA COMPANY-				
TITLE: STEREO				
RECORD AMP BIAS BOARD				
D PART NO 314-1512				
3000 ± 4000 1/2				
SERIES				
SHEET 1 OF 1				

REV	DESCRIPTION	DATE	APPROVED
A	ECN 841	8/1/74	BE
B	ECN 814	8/1/74	BE
C	ECN 1624	2-26-79	BE
D	ECN 1969	1-18-80	JMP



NOTES:  
1. RESISTORS IN OHMS, 1/4 WATT; CAPACITORS IN MICROFARADS; DIODES IN 457 UNLESS OTHERWISE NOTED.

BROADCAST ELECTRONICS INC.		DATE: 8/1/74		TITLE: RECORD LOGIC GENERATOR	
DESIGNED BY: J. L. HARRIS		CHECKED BY: J. L. HARRIS		DRAWN BY: J. L. HARRIS	
FOR THE EXCLUSIVE USE OF PERSONNEL AND CUSTOMERS ALL RIGHTS RESERVED		TREATMENT OR FINISH: _____		SHEET 1 OF 1	
D		D		D	
9006-3112		9006-3112		9006-3112	



## PRODUCT WARRANTY

LIMITED ONE YEAR

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

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

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

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

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

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





**BROADCAST ELECTRONICS INC.**

4100 NORTH 24TH STREET • P. O. BOX 3606 • QUINCY, ILLINOIS 62305 • TELEX 250142 • CABLE: BCST. ELECT QUI • PHONE 217-224-9600