



automatic tape control inc

209 EAST WASHINGTON STREET
BLOOMINGTON, ILLINOIS

INSTRUCTION
BOOK

AUTOMATIC TAPE CONTROL

PC-1-150/PC-1-190

PC-2-150/PC-2-190

AC-2-150/AC-2-190

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SECTION I

GENERAL DESCRIPTION

1.1 PURPOSE OF INSTRUCTION BOOK

This instruction book is intended to serve as a guide in the installation, adjustment, operation and maintenance of the PC-1-150/190 and PC-2-150/190 Playback Units, AC-2-150/190 Record Amplifiers, AMS-3A and AMS-4A Automatic Switchers, RC-R and RC-P Remote Control Panels.

1.2 INTRODUCTION

1.2.1 GENERAL. Automatic Tape Control records and plays back on lubricated magnetic tape enclosed in a plastic cartridge. In control room operation, one commercial announcement or production aid is recorded on each cartridge. Automatic Tape Control and the associated cartridges should be considered as a specific method of reproducing tape recorded announcements much as transcription turntables are utilized for the playback of electrical transcriptions and phonograph records. In cases where several announcements, opening and closing themes or other such information may be reproduced in the same sequence at all times, more than one announcement or production aid may be recorded on a cartridge. This method of recording provides for exact sequential playback of the recorded information.

Automatic Tape Control equipment consists of two basic units; the Playback Unit and the Recording Amplifier. To record on tape cartridges, a Recording Amplifier must be connected to a Playback Unit. The Recording Amplifier may be plugged into any Playback Unit to accomplish the recording function. The Playback Unit is designed for reproducing tape cartridges and each unit is complete and ready to feed audio into any audio console. Playback Units may be installed in appropriate multiples in the main control area where the equipment is readily available to the operator for playback on-the-air.

Automatic Tape Control equipment is capable of two basic systems of operation; single tone operation and dual tone operation. A single tone system offers automatic cueing only. The dual tone system, in addition to automatic cueing, offers the option of inserting an auxiliary control tone during or after the recorded material, on the cue track, at any point. During the playback operation this auxiliary control tone will provide a momentarily closed set of contacts which may be used to actuate other Automatic Tape Control units or additional equipment such as automatic television slide projectors, record changers, etc.

The Single Tone Playback Unit, (PC-1-150/190) and the Dual Tone Playback Unit, (PC-2-150/190) differ only in the cueing amplifier. A Single Tone system may be changed in the field at any time to a Dual Tone system by the simple replacement of the Single Tone

plug-in cue amplifier module with the Dual Tone plug-in cue amplifier module. The operation of the two systems is identical in both the record and playback mode with one exception: With the Automatic Tape Control "Dual Tone" system (PC-2-150/190 playback and AC-2-150/190 record amplifier) as the message is being recorded, the operator may press the Auxiliary Tone Button. This will record a tone burst of a different frequency on the cue track. When this tape is reproduced, the recorded Auxiliary Tone will actuate other equipment. If desired, the Auxiliary Tone may be inserted after the message has been completely recorded. This permits monitoring and accurate placement of the tones.

Automatic Tape Control provides for an unlimited quantity of recorded production material. There is no limit to the number of cartridges that can be recorded and retained in the control room available for immediate use. Absolutely no threading or cueing time is required with Automatic Tape Control. Three sizes of cartridges are available for Automatic Tape Control units providing from 40 seconds to 31 minutes of recording time.

1.2.2 DEFINITIONS

PC-1-150	15" Panel, Basic Playback equipped with single tone cue amplifier.
PC-1-155	Same as PC-1-150 except 50 cycle power.
PC-1-190	19" Panel, Basic Playback equipped with single tone cue amplifier.
PC-1-195	Same as PC-1-190 except 50 cycle power.
PC-2-150	15" Panel, Basic Playback equipped with dual tone cue amplifier.
PC-2-155	Same as PC-2-150 except 50 cycle power.
PC-2-190	19" Panel, Basic Playback equipped with dual tone cue amplifier.
PC-2-195	Same as PC-2-190 except 50 cycle power.
AC-2-150	15" Panel, Dual Tone recording amplifier.
AC-2-190	19" Panel, Dual Tone recording amplifier.
AMS-3A	Automatic Switcher for three inputs.
AMS-4A	Automatic Switcher for four inputs.
RC-P-4	4 Push Button Control Panel (4 Start)
RC-RA	4 Push Button Control Panel (Start, Record Set, Stop, Auxiliary Tone)

1.3 PHYSICAL DESCRIPTION

The PC-1-150/190 and PC-2-150/190 Playback units are panel mounted instruments having a panel height of 8-3/4 inches. The panel width of the PC-1-150 and PC-2-150 is 15 inches. The width of the PC-1-190 and PC-2-190 panel is 19 inches. The depth behind the front panel in all cases is 13-3/4 inches and the weight is 40 pounds.

The AC-2-150/190 record amplifiers are panel mounted instruments having a panel height of $5\frac{1}{4}$ inches. The panel width of the AC-2-150 is 15 inches and that of the AC-2-190 is 19 inches. The depth behind the front panel is 12 inches and the weight is 15 pounds.

1.4 ELECTRICAL CHARACTERISTICS

POWER REQUIREMENTS. The Record Amplifier operates from a power source of 105 to 125 volts rms, 50/60 cycles, single phase. Power consumption is 40 watts.

Playback Units operate from a power source of 105 to 125 volts rms, 50/60 cycles. 50 cycle units (PC-1-155/195 or PC-2-155/195) are equipped with a special motor pulley to provide a tape speed of $7\frac{1}{2}$ inches/second.

Power consumption of the Playback Units is 55 watts in the "ready" mode and 90 watts while running.

INPUT IMPEDANCE. The microphone input has an impedance of 250 ohms with optional impedances of 50 ohms or 600 ohms. (The Record Amplifiers are shipped with microphone input connected for 250 ohms.) The line input has an impedance of 600 ohms with optional impedances of 50 ohms or 250 ohms. (The Record Amplifiers are shipped with line input connected for 600 ohms.)

INPUT LEVEL. The Record Amplifier microphone input accommodates signal levels from -65 dbm to -35 dbm. The line input accommodates signal levels from -20 dbm to +10 dbm.

FREQUENCY RESPONSE. The overall record-playback response of the Automatic Tape Control System is +2 db from 70 cycles/second to 12,000 cycles/second, +4 db from 50 cycles/second to 15,000 cycles/second.

EQUALIZATION. The Playback Units have playback equalization required for 7-1/2 inch/second NAB standard tape playback response.

The Record Amplifiers have record equalization required to maintain overall record-playback frequency response for Automatic Tape Control Systems.

SIGNAL TO NOISE. The signal-to-noise ratio of the Automatic Tape Control System is 55 db, signal reference to 400 cycles/second with 3% total harmonic distortion.

DISTORTION. The overall record-playback distortion is 2% or less at a record level of zero VU at 400 cycles/second.

GAIN. The voltage gain of the Program Amplifier is 55 db minimum at 1000 cycles/second.

TAPE TRANSPORT CHARACTERISTICS. The timing accuracy for all cartridge tape lengths to 31 minutes is 0.4% or better at $7\frac{1}{2}$ inches/second. The flutter and wow is less than 0.2% rms. The tape motion time for either start or stop is 0.1 second or less.

AUXILIARY CONNECTIONS. The following auxiliary connections are available at the rear of the Playback unit on TB-201:

- a. Remote Start
- b. Remote Stop
- c. Synchronized Start
- d. Synchronized Automatic Stop
- e. Synchronized Automatic Start

In addition to the above the "Dual Tone" (PC-2) Series has connections available for starting other equipment as described in Section 1.2.

The Recording Amplifiers have the following auxiliary connections available:

- a. Remote "Record Set".
- b. Remote "Auxiliary Tone" keying.

FRONT PANEL CONTROLS. The following controls are mounted on the front panel of the Record Amplifier:

- a. Microphone Input Level
- b. Line Input Level
- c. Record Set Push-button Switch
- d. Power on/off Push-button Switch
- e. Auxiliary Tone Push-button Switch

The following controls are mounted on the front panel of the Playback Unit:

- a. Ready-Stop Push-button Switch
- b. Power on/off Push-button Switch
- c. Start-Run Push-button Switch

SUB-CHASSIS CONTROLS. The following sub-chassis controls are readily accessible on the Record Amplifier:

- a. Record Calibrate (R-127)
- b. Record Bias (R-131)
- c. Record Equalization (C-106)

The following controls are readily accessible on the plug-in modules of the Playback Unit:

- a. Program Gain (R-209)
- b. Playback Equalization (R-208)
- c. Cue Sensitivity (R219 on PC-1 series, R306 on PC-2 series)

1.5 MECHANICAL DESCRIPTION

The Transport Assembly is constructed on a rigid frame consisting of a machined casting. A 1/75 horsepower synchronous motor is shock mounted on a motor mounting plate which in turn is mounted on three mounting bosses projecting from the underside of the transport casting. The tape drive capstan is pressed into the flywheel and U shaped cast mounting bracket, and is mounted on the underside of the transport deck casting as a complete assembly. Special oilite bearings are used. Three O-ring drive belts transmit motion from the tape drive motor to the flywheel and tape drive capstan. A rotating spring loaded cross shaft is mounted in oilite bearings in front of the tape drive capstan, running from the right edge of the transport deck to a bearing point just to the left of the tape drive capstan. A rubber pressure roller is mounted on the cross shaft on a stand-off directly in front of the tape drive capstan. The function of the rubber pressure roller is to rotate upwards from its at-rest position just below the top surface of the transport deck and press the tape against the tape drive capstan. The tape drive actuating solenoid and linkage assembly is mounted on the right side and to the rear of the tape drive capstan on the top surface of the transport deck. The solenoid and linkage assembly is designed to convert the reciprocating motion of the solenoid to the required rotating motion to actuate the cross shaft and bring the pressure roller into contact with the tape and drive capstan. Leverage is greatly increased during the last few degrees of the pressure roller arc in order to compress the rubber pressure roller approximately 1/32 of an inch against the drive capstan.

SECTION II

INSTALLATION

2.1 UNPACKING AND INSPECTING

Remove all packing material and carefully lift the units from their boxes. Check the equipment against the packing slips. Visually inspect the units for any apparent damage and for missing components. Check for proper operation of front panel controls. Any claims for damage should be filed promptly with the transportation agency. If such claims are to be filed, all packing material must be retained.

2.2 INSTALLATION PROCEDURE

2.2.1 GENERAL. The location in an individual station will be determined by the arrangement of the main control room facilities. The placement of equipment and wiring should be planned carefully before any installation work is started. Low-level microphone cables and other audio cables should be shielded and separated from external power and auxiliary control wiring.

2.2.2 RECORD-PLAYBACK INSTALLATION, AC-2 RECORD AMPLIFIER WITH PC-1 PLAYBACK, FOR SINGLE TONE USE

Connect the cable provided with the Record Amplifier between J-101, shown in Figure 2-1, and J-204, shown in Figure 2-2. Remove the top cover of the Playback Unit and verify that the audio cables provided in the Playback Unit are connected properly for Record-Playback operation. Refer to Figure 2-3. Proper connections are:

- a. J-209 connected to J-211
- b. J-210 connected to J-201
- c. J-208 connected to J-207
- d. J-206 connected to J-212

Connect a two-conductor shielded cable from the desired recording source (-20 dbm to +10 dbm, 600 ohms) to the line input terminals 2 and 3, TB-101, and ground the recording source to the Record Amplifier at terminal 1, TB-101, shown in Figure 2-2. For the microphone input, connect a 250 ohm dynamic microphone to J-102 with a shielded three-conductor microphone cable (pin 1, J-102 is ground).

Connect the Record Amplifier power cord to a standard 115 volt, 60 cycle power outlet. Connect the power cord provided with the Playback Unit between J-205, shown in Figure 2-2, and a standard 115 volt, 60 cycle power outlet. If remote Record control is desired, connect terminals 6 and 7, TB-101, to a normally open momentary switch at the remote control position. All external connections that can be made for remote Playback control are listed in Table 2-1.

2.2.3 RECORD-PLAYBACK INSTALLATION AC-2 RECORD AMPLIFIER WITH PC-2 PLAYBACK, FOR DUAL TONE USE

Connect the cable provided with the Record Amplifier between J-101, shown in Figure 2-1, and J-204, shown in Figure 2-2. Remove the top cover of the Playback Unit and verify that the audio cables provided in the Playback Unit are connected properly for the Record-Playback operation. Refer to Figure 2-5. Proper connections are:

- a. J-209 connected to J-211
- b. J-210 connected to J-201
- c. J-208 connected to J-302
- d. J-301 connected to J-212

Connect a two-conductor shielded cable from the desired recording source to the line input terminals 2 and 3, TB-101, and ground the recording source to the Record Amplifier at terminal 1, TB-101, shown in Figure 2-2. For the microphone input, connect a 250 ohm dynamic microphone to J-102 with a shielded three-conductor cable (pin 1, J-102 is ground).

WARRANTY

Seller warrants its title to items sold by it and warrants to Purchaser that such items are free of defects of workmanship or material and are in conformity with applicable specifications and descriptions referred to or set out herein. This warranty is for a period of six (6) months from date of shipment, but no claim shall be maintained hereunder unless written notice thereof is received by Seller within thirty (30) days after discovery of the facts giving rise to the claim. The sole and exclusive liability of Seller for breach of warranty shall be to refund the purchase price of, or at its option to replace or repair the item or part concerned f. o. b. its factory or such other place as it may designate, and Seller's said liability shall arise only if Purchaser causes the defective item or part to be delivered to Seller for inspection upon Seller's request and at Purchaser's expense. Items manufactured by persons other than Seller shall bear the warranty given by such other person and no other warranty. These items are provided equipment or accessories are given normal and reasonable maintenance and care. No equipment or accessories shall be deemed to be defective if, due to maltreatment, exposure, excessive moisture or otherwise after delivery, it shall fail to operate in a normal and proper manner.

Connect the Record Amplifier power cord to a standard 115 volt, 60 cycle power outlet. Connect the power cord provided with the Playback Unit between J-205, shown in Figure 2-2, and a standard 115 volt, 60 cycle power outlet. If remote Record control is desired, connect terminals 6 and 7, TB-101, to a normally open momentary switch at the remote control position. If remote keying of the auxiliary tone is desired, connect a normally open momentary switch to terminals 4 and 5, TB-101. All external connections that can be made for remote Playback control are listed in Table 2-1.

2.2.4 INSTALLATION OF PLAYBACK UNIT ONLY, PC-1-150/190, FOR SINGLE TONE USE

Remove the top cover of the Playback Unit and disconnect the cable between J-210 and J-201. Disconnect the cable between J-207 and J-208. Disconnect the cable connected to J-209 and connect that end to J-201. Refer to Figure 2-4. Proper connections for Playback operation only are:

- a. J-211 connected to J-201
- b. J-212 connected to J-206

Connect a two-conductor shielded cable between the desired audio console input terminals and the 600 ohm program output terminals 2 and 3, TB-201, shown in Figure 2-2. Connect the cable shield from terminal 1, TB-201, to the audio console ground. Connect the power cord provided between J-205 and a standard 115 volt, 60 cycle power outlet. All external connections that can be made to TB-201 for remote control are listed in Table 2-1.

2.2.5 INSTALLATION OF PLAYBACK UNIT ONLY, PC-2-150/190, FOR DUAL TONE USE

Remove the top cover of the Playback Unit and disconnect the cable between J-210 and J-201. Disconnect the cable connected to J-209 and connect that end to J-201. Refer to Figure 206. Proper connections for Playback operation only are:

- a. J-211 connected to J-201
- b. J-212 connected to J-301
- c. J-208 connected to J-302

Connect a two conductor shielded cable between the desired audio console input terminals and the 600 ohm program output terminals 2 and 3, TB-201 shown in Figure 2-2. Connect the cable shield from terminal 1, TB-201, to the audio console ground. Connect the power cord provided between J-205 and a standard 115 volt, 60 cycle power outlet. All external connections that can be made to TB-201 for remote control are listed in Table 2-1.

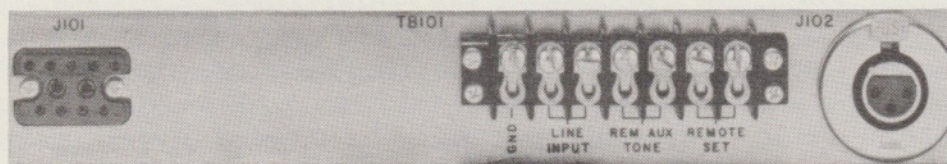


Figure 2-1

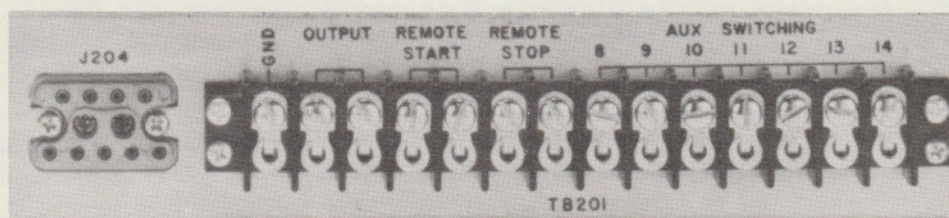


Figure 2-2

TABLE 2-1

EXTERNAL CONNECTIONS TO TB-201

TERMINAL NUMBER	FUNCTION	CONNECT TO
1	Ground	System Ground
2	Audio Output	Console or Switching System Audio Input
3		
4	Remote Start	Normally Open Momentary Switch
5		
6	Remote Stop (Strap Terminals 6 & 7 When not used)	Normally Closed Momentary Switch
7		
8	Auxiliary Start (Momentary Close)	Start Terminals of equipment to be started when ATC starts
9		
10	Cue Start (Momentary Close)	Start Terminals of equipment to be started when ATC stops
11		
11	Cue Stop (Momentary Open)	Stop Terminals of equipment to be stopped when ATC stops
12		
13	Auxiliary Switching (PC-2 Series only)	Start Terminals of equipment to be started by auxiliary tone
14		

NOTE: Auxiliary Switching circuit is factory wired for momentary close. May be changed to momentary open.

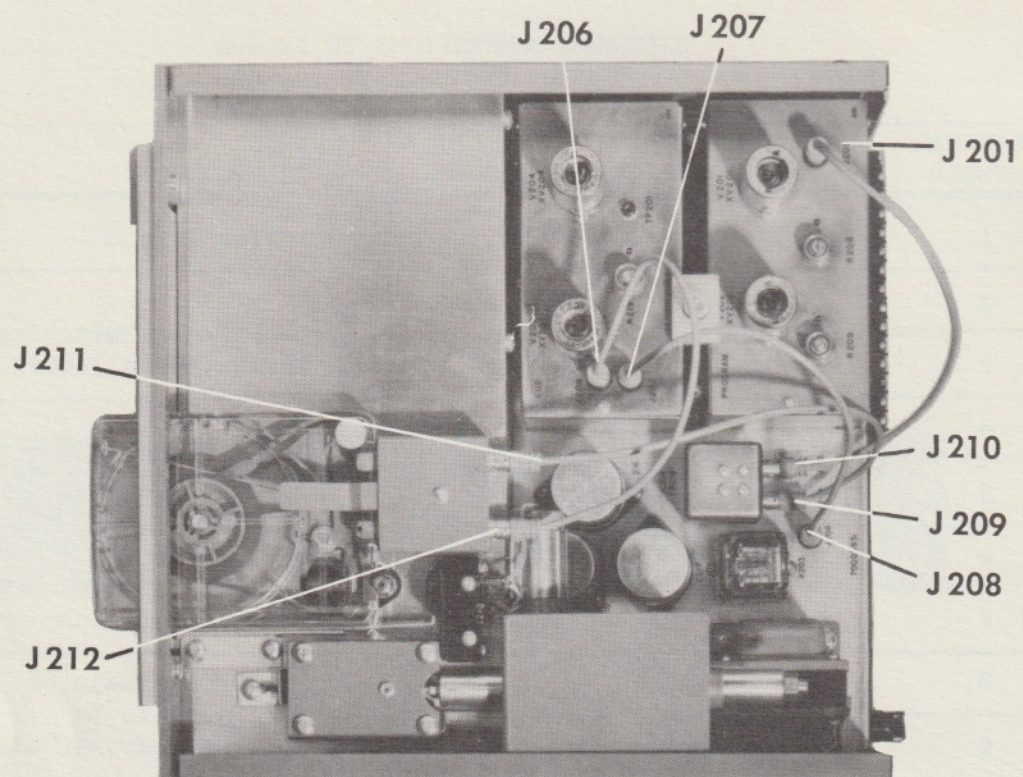


Figure 2-3

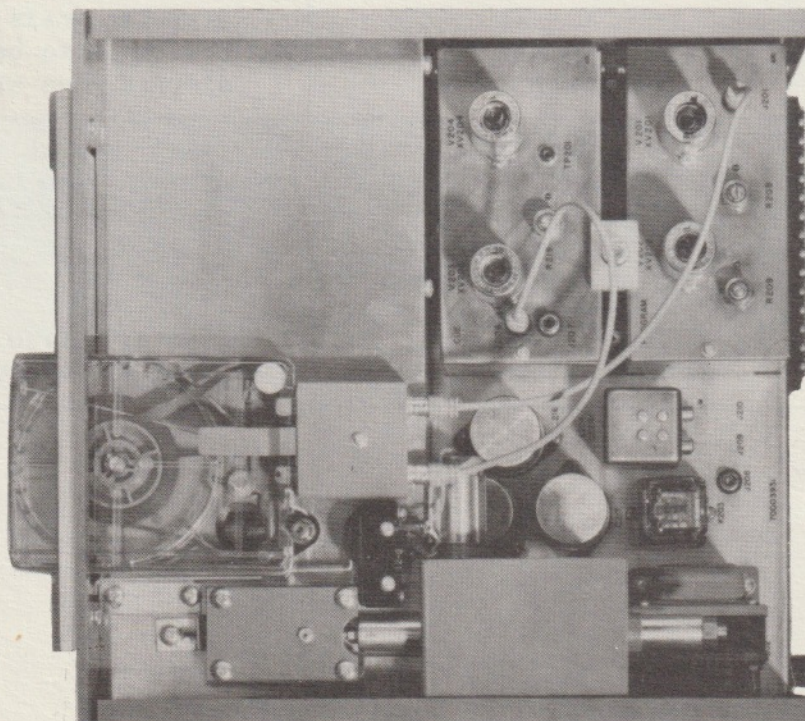


Figure 2-4

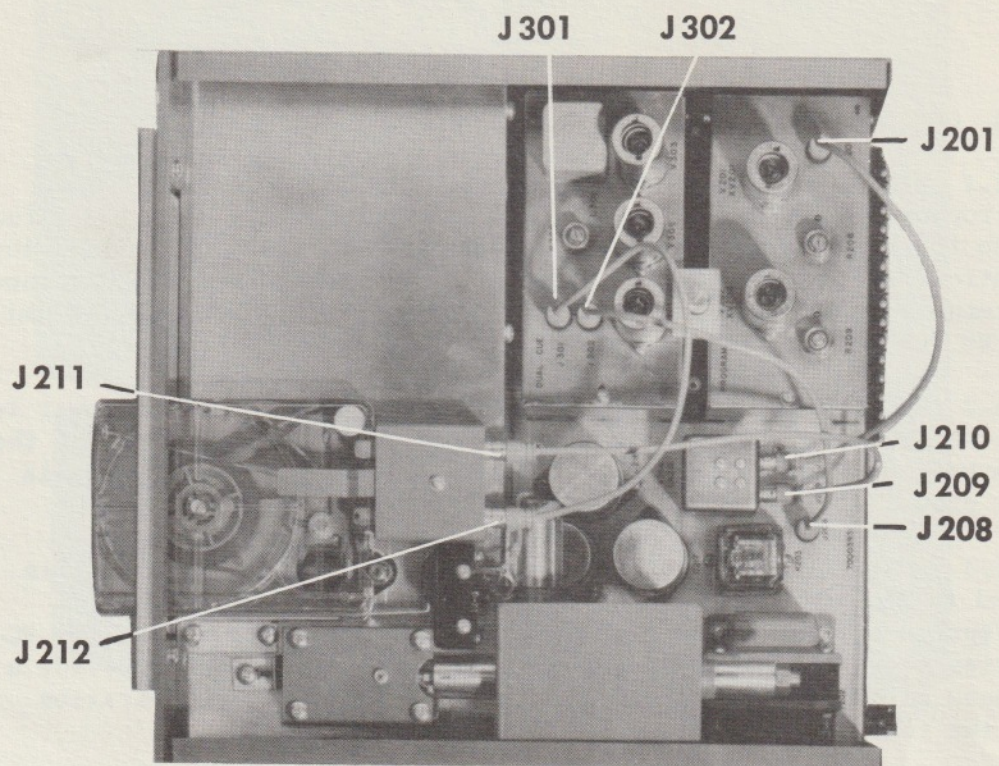


Figure 2-5

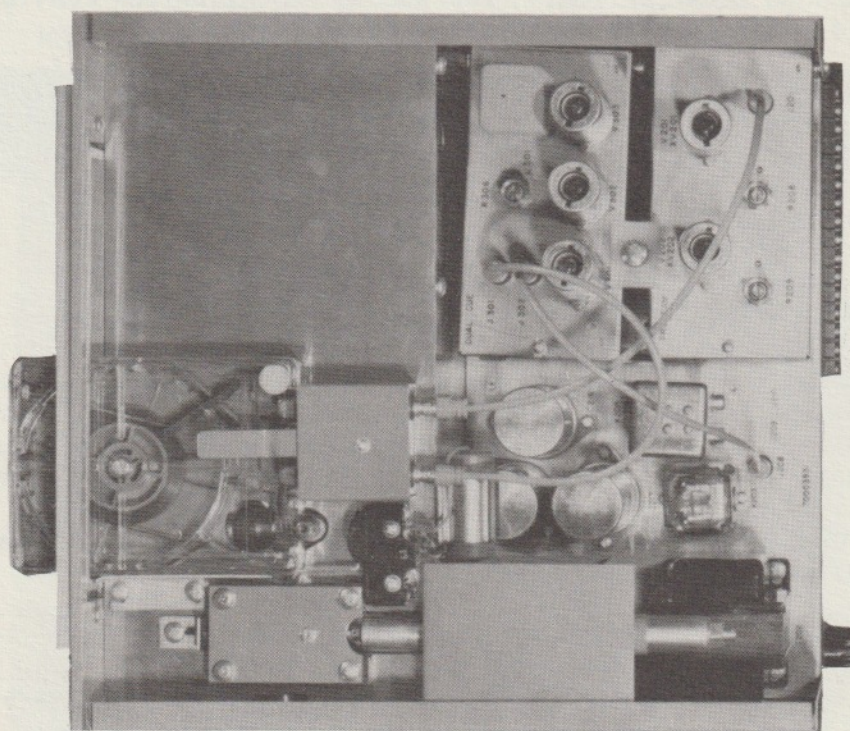


Figure 2-6

SECTION III

OPERATION

3.1 CONTROL FUNCTIONS FOR RECORD AMPLIFIER

3.1.1 RECORD INPUT LEVEL CONTROLS. Refer to Figure 3-1. The microphone input level control, R117, adjusts the signal level fed into the microphone channel of the Record Amplifier. The line level control, R-106, adjusts the signal level fed into the 600 ohm input terminals of the Record Amplifier. Record levels between -20 and +3 VU for either channel are indicated by M-101.

3.1.2 RECORD SET. The RECORD SET switch, S-102, applies power to the Record Relay, K-102. Power to K-102 is not available when the Playback Unit is in the "RUN" mode or when the tape cartridge is not properly inserted in the tape slot.

3.1.3 AUXILIARY TONE. The AUXILIARY TONE push-switch, S103, is used to record a 3200 cycle tone on the cue track of the tape. Reception of this tone by the "dual cue" amplifier used in the PC-2 series playback units causes relay K301 to energize and provide a closed circuit at terminals 13 and 14 of TB201 for the duration of the tone.

3.1.4 POWER. The power on/off switch, S101, is the main power switch for the record amplifier.

3.1.5 RECORD EQUALIZATION. The RECORD -EQUALIZATION control, C-106, adjusts the high frequency record level.

3.1.6 RECORD-CALIBRATE. The RECORD-CALIBRATE control, R-127, adjusts the record signal level into the meter amplifier, V-103, for correct record level indications.

3.1.7 RECORD BIAS. The RECORD BIAS control, R-131, adjusts the 60 kc record bias.

3.2 CONTROL FUNCTIONS FOR PLAYBACK UNIT

3.2.1 READY-STOP. Refer to Figure 3-1. The READY-STOP control, S-203, is used to manually stop the tape. The READY-STOP control is illuminated by I-203 when the tape cartridge is properly inserted in the tape guide and the Playback Unit is in the "READY" mode.

3.2.2 POWER. The POWER on/off switch, S-201, applies filament and plate voltage to all tubes in the Playback Unit.

3.2.3 RUN-START. The RUN-START control, S-204, applies voltage to the control circuits and solenoid. The RUN-START control is illuminated by I-202 when the tape is running in either the "PLAYBACK" or "RECORD" mode.

3.2.4 PROGRAM GAIN. Refer to Figure 2-4. The GAIN control, R-209, adjusts the playback output level.

3.2.5 PLAYBACK EQUALIZATION. The PLAYBACK EQUALIZATION control R-208, adjusts the tape reproduced high frequency response for conformance to NAB standards for $7\frac{1}{2}$ inch per second playback response.

3.2.6 CUE SENSITIVITY. The CUE SENSITIVITY of the PC-1 series playback units is adjusted by means of R219.

The Cue Sensitivity of the PC-2 series playback units is adjusted by means of R306.

3.3 OPERATING PROCEDURES

3.3.1 ROUTINE PLAYBACK. The Procedure for routine on-the-air playback of program material is as follows:

- a. Insert a recorded tape cartridge into the right side of the slot as shown in Figure 2-4.
- b. Observe that the READY-STOP control, S-203, is illuminated, indicating that the cartridge has been properly inserted and the Playback Unit is ready for on-the-air playback.
- c. Momentarily press the RUN-START control, S-204. At the instant S-204 closes, the magnetic tape starts its motion past the Cue and Program Heads, and continues until the automatic cue tone is picked up by the Cue Head.

3.3.2 RECORD OPERATION. The procedure for recording one or more productions is as follows:

- a. Insert an erased tape cartridge into the right side of the slot, as shown in Figure 2-4.
- b. Momentarily press the RECORD SET control, S-102.
- c. Adjust the correct Record Input Level control for the input signal to peak at zero VU as indicated by M-101.
- d. Momentarily press the RUN-START control, S-204.
- e. Start production recording immediately.
- f. Upon completion of the recorded production, momentarily press the READY-STOP control, S-203, only if more than one production is desired on the same cartridge. If only one production is to be used on the cartridge, allow the tape to continue running until it is stopped by the automatic cue tone.
- g. When recording more than one production on a single tape cartridge, follow the procedure listed in steps b through e on this section for each recording. Upon completion of the final recorded production, allow the tape to continue running until it is stopped by the automatic cue tone.
- h. The recorded tape cartridge can be monitored with either headphones or an amplifier-speaker arrangement connected to the program output. The Playback Unit is in the "READY" mode for playback whenever the tape is stopped, either manually or by the automatic cue.
- i. Where a "Dual Tone" system is used the "auxiliary tone" may be recorded as described in Section 1.2.

SECTION IV

PRINCIPLES OF OPERATION

4.1 RECORD AMPLIFIER

4.1.1 LINE PRE-AMPLIFIER. Refer to Figure 4-1. The 600 ohm line input signal is attenuated in the H-Pad network consisting of R-101, R-102, R-103, R-104 and R-105. Amplification of the signal occurs in the first half of V-101 with the equalization network, C-101 and R-108, having a cross-over frequency of 6500 cycles/second. The signal is RC coupled to the Mixer-Amplifier, V-103A, through a 10 kc equalization network, C-111 and R-122.

4.1.2 MICROPHONE PRE-AMPLIFIER. The Microphone Input Pre-Amplifier, V-102, is a low noise, high gain amplifier utilizing de-coupling networks R-116, C-107A and R-118, C-107C. The microphone signal is RC coupled from V-102 to the Mixer-Amplifier, V-103A, Through a 10 kc equalization network, C-110 and R-121.

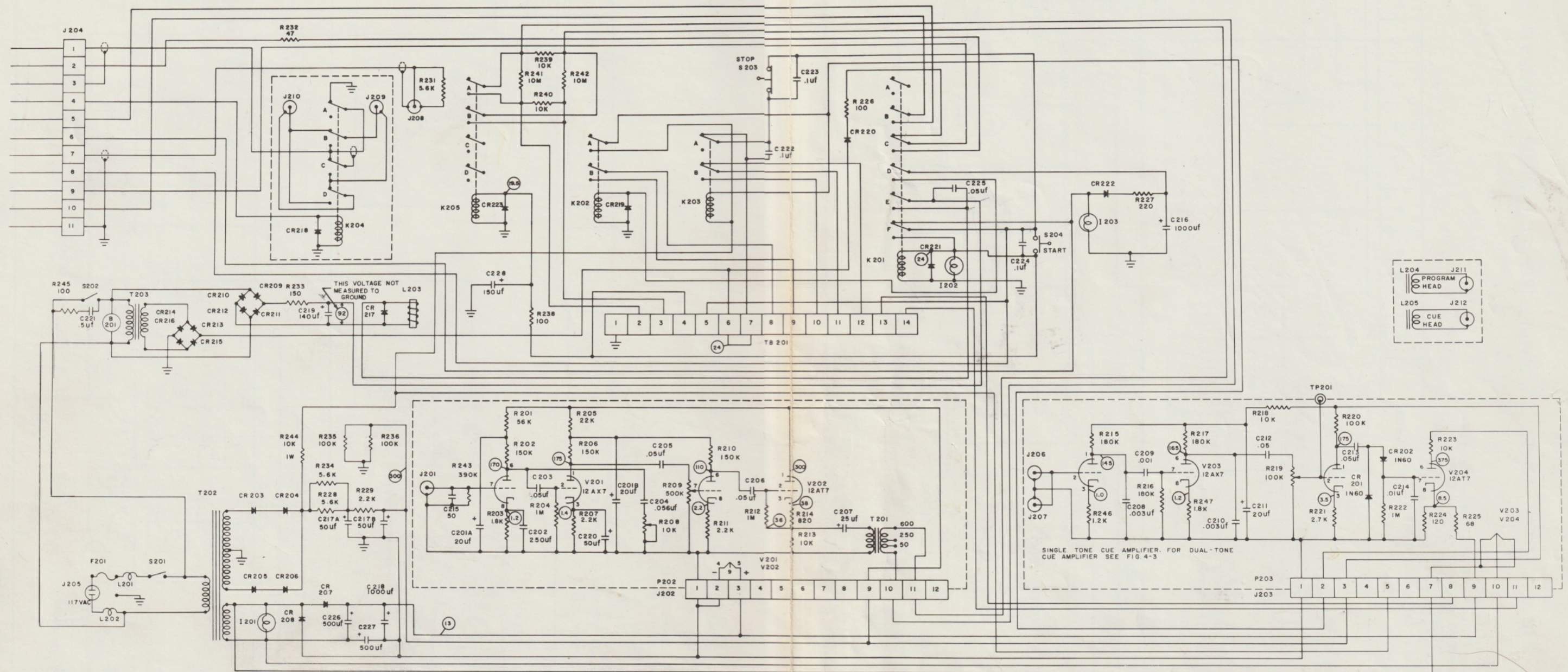
4.1.3 MIXER AMPLIFIER. The Mixer Amplifier stage, V-103A, functions as a conventional audio amplifier whose input is from either the line or microphone pre-amplifiers, or from both simultaneously. The output of V-103A is RC coupled to both the Meter-Amplifier, V-103B, and the Output Amplifier, V-101B.

4.1.4 METER AMPLIFIER. The single-ended audio output of V-103B is rectified by a germanium diode, CR-101, and used to drive the VU meter, M-101. The chassis-located Record Calibrate control, R-127, adjusts the input level of V-103B to the required value.

4.1.5 OUTPUT AMPLIFIER. The Record Amplifier output stage, V-101B, amplifies and supplies the final equalization required. Both high and low frequency boosts are obtained in the input circuitry of V-101B. The coupling network, R-113 and C-106, provides adjustable high frequency equalization. The grid network, R-111, R-112 and C-105, provides the necessary low frequency pre-emphasis. The cathode network, R-110 and C-103, provides additional high frequency equalization.

4.1.6 RECORD BIAS OSCILLATOR. The Bias Oscillator, V-104A, operates at a nominal frequency of 60 kc. The oscillator is followed by an amplifier, V-104B, which is keyed on by operation of relays K-102 and K-201. The output is adjustable by means of the Bias Control, R-131.

4.1.7 TONE OSCILLATORS. The cue and auxiliary tone oscillators consist of V105 and oscillator assemblies L104 and L105. L104 and V105A form the 3200 cycle oscillator and L105 and V105B are used for 1000 cycles. The function of the 1000 cycle oscillator is to automatically apply a short duration tone burst to the tape at the instant the recording starts. The 3200 cycle tone is to be used only in conjunction with a PC-2 series playback unit and is used to apply tone bursts to the tape where auxiliary switching is desired during in-use playback. This oscillator is activated manually by means of S-103. Connections for remote control are also provided.



○-VOLTAGE CHECK POINT
 NOTES: 1. RESISTOR VALUES IN OHMS &
 CAPACITOR VALUES IN MICROMICROFARADS
 2. D.C. VOLTAGES ARE MEASURED FROM POINT
 TO GROUND WITH MACHINE RUNNING
 USING A VTVM HAVING APPROX. 10 MEGOHMS
 INPUT RESISTANCE.

FIG. 4-2 PLAYBACK UNIT SCHEMATIC DIAGRAM

4.1.8 POWER SUPPLY. The Record Amplifier power supply consists of an RC filtered, full-wave silicon diode rectifier plate supply and a half-wave silicon diode negative bias supply. The plate supply for V-105 includes the decoupling network, R-137 and C-119B. Inductors, L-101 and L-102, are used in the power input line for RF suppression.

4.2 PLAYBACK UNIT

4.2.1 PROGRAM PRE-AMPLIFIER. Refer to Figure 4-2. The pre-amplifier, V-201, is designed to amplify the low level signal from the Program Head and provide compensation required to equalize the input signal for a constant output. Amplification is obtained with a low noise, high gain, two-stage RC coupled audio amplifier. Frequency compensation is obtained with the adjustable shunt equalization network, C-204 and R-208.

4.2.2 PROGRAM OUTPUT AMPLIFIER. V-202A serves as a conventional audio amplifier whose output is RC coupled to the cathode-follower output stage, V-202B. The program level is adjustable from zero output to more than +10 dbm by means of the Gain control, R-209. The audio output of V-202B is transformer coupled to balanced 600 ohm terminals 2 and 3, TB-201.

4.2.3 AUDIO SQUELCH CIRCUIT. The program output is attenuated approximately 65 db during the instant playback commences. This is to assure that no undesirable effects from control circuit switching appear in the audio output. The desired attenuation is achieved with R-239, R-240, R-241 and R-242. The attenuating network is by-passed by relay contacts K-205A and K-205B after the control switching is completed. The duration of the squelch is controlled by the delaying time constant of R-238 and C-228 which momentarily delays the energizing of K-205.

4.2.4 CUE AMPLIFIER, SINGLE TONE FOR PC-1 SERIES PLAYBACK UNITS. The Cue Amplifier is a four-stage narrow-band amplifier, designed to respond to a low level 1000 cycle/second tone burst. V-203 provides the gain required to amplify the signal from the Cue Head. The output of V-203 is RC coupled to amplifier V-204A. Cue sensitivity control, R-219. A test point, TP-201, is provided for monitoring the cue signal. The output of V-204A is rectified and applied to the grid of the plate relay control circuit, V-204B. The voltage divider network, R-224 and R-225, provides D-C cut-off bias for the relay control circuit. V-204B conducts sufficiently to energize the Cue Relay, K-203, whenever a 1 kc tone burst is picked up by the Cue Head.

4.2.5 CUE AMPLIFIER, DUAL TONE FOR PC-2 SERIES PLAYBACK UNITS. This cue amplifier consists of three tubes and is designed to separate the cue and auxiliary tone frequencies. V301 provides the gain required to amplify the signal from the cue head. The output of V301 is then applied, through sensitivity control R302, to V302 which operates upon receipt of 1000 cycles and V303 operating from 3200 cycles. V303 is a selective amplifier and is tuned to 3200 cycles by L301. Upon receipt of a 3200 cycle tone V302 is biased to cut-off by means of rectifiers CR303 and CR304. This

prevents the auxiliary tone from tripping the cue relay K203. V303, being frequency selective, will respond only to 3200 cycles. Thus the two frequencies are channeled to the proper relays. The auxiliary tone operated relay K301 is contained within the cue amplifier module.

4.2.6 POWER SUPPLY. The Playback Unit power supply consists of four individual direct current supplies. The 300 volt plate supply is a full-wave rectifier consisting of silicon diodes, CR-203, CR-204, CR-205, CR-206 and the RC filter network, R-228, R-229, R-234, R-235, R-236, C-217A and C-217B. Direct current filament voltage for the Program Amplifier is obtained from the voltage-doubler network, CR-207, CR-208, C-226, C-227 and C-218. 6.3 volts rms filament voltage is applied to the Cue Amplifier filaments directly from the filament winding of T-202. Operating voltage for the tape transport solenoid is obtained from the isolated bridge rectifier using silicon diodes, CR-209, CR-210, CR-211 and CR-212. Solenoid current is filtered by the RC filter, R-233 and C-219. The control circuit relay voltage supply is the bridge rectifier consisting of silicon diodes, CR-213, CR-214, CR-215 and CR-216. RF suppression is obtained with the inductors, L-201 and L-202.

4.2.7 CONTROL CIRCUITS. Proper insertion of a tape cartridge closes the normally open micro-switch, S-202, which allows line voltage to the synchronous motor, B-201, the solenoid bridge supply, and the relay bridge supply transformer, T-203. Also, 24 volts D-C is applied to C-216 through normally closed contacts, K-203A, S-203, normally closed contacts, K-201F, blocking diode, CR-222, and charging resistor, R-227, allowing C-216 to charge to 24 volts. For routine Playback operation, reproduction commences the instant S-204 is depressed. Momentary closure of S-204 allows K-201 to be energized through its normally open holding contacts, K-201F. Voltage is applied to the solenoid through the normally open contacts, K-201E, which causes the tape transport mechanism to operate. Simultaneously with the closure of K-201, C-216 discharges through contacts K-201D to the Start Relay coil, K-202, providing Auxiliary Start contacts closure at terminals 8 and 9, TB-201. Normally open contacts, K202A, are used to disable the stop relay, K203, during the interval of start time that the cue tone burst endures. K-202 is energized only during the discharge time of C-216. The Squelch Relay, K-205, operation is discussed in Section 4.2.3. The Cue Relay, K-203, is energized briefly at the completion of each cartridge. As mentioned in this section, the Control Circuits are protected against being disabled during the start time; however, when a cue tone burst next appears, K-203 is allowed to perform its intended function. K-203A contacts open the Relay Control supply line, disabling K-201, K-205 and the solenoid.

In Record-Playback operation, proper insertion of the tape cartridge closes S-202, enabling 24 volts D-C to follow a path through a blocking diode, CR-220, a charging resistor, R-226, and normally closed contacts, K-201C, to J-204, pin 9. The interconnecting cable carries the 24 volts D-C to J-101, pin 9, to charge C-127. There is also a 24 volt path through normally closed contacts, K-201F, to J-204,

pin 6, whose destination is the RECORD SET control, S-102. The momentary closure of S-102 brings 24 volts D-C to K-102 through its holding contacts, K-102B, from J-101, pin 8. K-102B contacts also provide a 24 volts D-C return path to J-101, pin 4, which interconnects to J-204, pin 4, providing voltage to Switching Relay, K-204. Normally closed contacts, K204A, remove the ground and normally closed contacts, K204C, remove the short from the recording amplifier. Normally open contacts, K204C and K204B, connect the recording amplifier to the program head. At the instant S-204 is depressed, C-127 discharges through K-201C and time-constant resistor, R-232, to the Cue Tone Relay, K-101. The 1 kc cue tone burst is applied to the Cue Head, through K-101. When the tape has run its prescribed length, the cue tone burst will appear and cause K-102, K-201, K-204, K-205 and the solenoid to lose power. Disabling K-204 switches the Program Head output to the Program Amplifier and grounds the output of the Record Amplifier. The system is automatically ready for immediate playback operation. During playback operation, K-201F contacts open the relay supply line to the Record Amplifier, thereby preventing accidental recording.

SECTION V

MAINTENANCE

5.1 PERIODIC INSPECTION AND PREVENTIVE MAINTENANCE

5.1.1 MAGNETIC HEADS. The Program and Cue Heads inherently accumulate dust and oxide. Periodic cleaning of the heads is necessary to maintain quality performance. Wipe each head face with a lint-free cloth that is saturated with denatured alcohol.

NOTE: Do not use commercial head cleaning solvents containing acetone or other harmful chemicals. These chemicals can cause permanent damage to the magnetic heads and also damage the tape and cartridges.

The heads should be demagnetized at least once a month. This is required because the accumulated switching and surges in daily operation will gradually magnetize the heads. Magnetized heads will partially erase the tape and will increase the noise level.

5.1.2 SOLENOID, PRESSURE ROLLER AND SLIDE MECHANISM. Refer to Figure 5-1. The nylon guides in the linkage assembly of the Tape Transport Assembly must allow the slide assembly to move very freely with some side play. The tension on the return spring must be adjusted to the minimum tension required to return the slide assembly. Avoid excessive tension. Adjust the rubber bumper so that the rubber pressure roller, in the "READY" position, is no more than 1/16 inch below the top surface of the transport deck. Adjust the spring bumper for quiet operation of the slide assembly on the return stroke.

Upon completion of the above adjustments, adjust the solenoid pressure at the rear of the solenoid for a compression of the pressure roller against the tape drive capstan of 1/32 inch. The flywheel tape drive capstan assembly may be adjusted in relation to the pressure roller cross shaft. This is done by loosening the inset mounting screws of the flywheel assembly. With the mounting screws loosened, the flywheel and capstan assembly may be moved toward or away from the pressure roller bearing cross shaft. The proper setting for a new pressure roller can be ascertained by removing the pressure roller from the cross shaft standoff. With the stand-off in a vertical position, measure the distance between the stand-off and the drive capstan. The distance should be 0.286 inch. This adjustment should not be attempted without proper gauging tools.

The pressure roller should be cleaned periodically with denatured alcohol. Be careful not to spill or let the alcohol get into any of the oilite bearings. Good periodic cleaning of the pressure roller will prevent glazing of the pressure roller surface and will remove any accumulated tape oxide. The capstan may also be cleaned with denatured alcohol being careful not to get any of the alcohol in the top capstan bearing.

NOTE: Oil should not be allowed to come in contact with the pressure roller surface.

5.1.3 LUBRICATION. The tape drive motor on the Tape Transport Assembly should be oiled at the upper and lower oilers every two months. Use one or two drops of SAE 10 Penn Oil, paraffin base. Do not use shell or naphenic base.

The bearing assembly is a factory-lubricated ball bearing. The left and right guides are specially impregnated nylon and require no lubrication; however, dry graphite may be used if any binding occurs. All other points of wear use Oilite bearings and require no lubrication.

5.1.4 RELAYS. Relay contacts should be cleaned occasionally with a burnishing tool. Exercise care to avoid bending contacts.

5.1.5 WIRING. Check all wiring or loose connections and frayed insulation. Make certain that all terminal strip screws are tight.

5.2 PERIODIC PERFORMANCE TESTS

5.2.1 FREQUENCY RESPONSE. To measure the frequency response of the Automatic Tape Control system, an audio oscillator may be run into the line input of the recording amplifier. The output of the oscillator should be maintained at -5 dbm for each test frequency. Adjust R-106 for -15 VU indication on M-101 at 1000 cps. Do not alter the setting of R-106 for the duration of the response test. Follow the Record-Playback operating instructions, Section 3.3.2, using 1000 cps as the reference frequency. Sweep the audio oscillator from 50 cps to 15,000 cps, keeping the oscillator output constant at -5 dbm.

Playback the recorded tape and adjust R-209, PROGRAM GAIN, for a VTVM reading of -15 db at 1000 cps. The swept frequency response should not deviate from -15 db by more than ± 2 db between 70 cps and 12,000 cps. The response between 50 cps and 15,000 cps should not deviate from -15 db by more than ± 4 db.

5.2.2 RECORD AMPLIFIER CALIBRATE AND RESPONSE. The record equalization test is independent of the Playback Unit; therefore, the interconnecting cable at J-101 should be removed. Remove the bias oscillator tube, V-104. Connect a 3000 ohm $\pm 1\%$ resistor between pin 1 and pin 3, J-101. The record response curve and test setup are shown in Figure 5.2.

Set the audio oscillator output frequency to 400 cps at a level of -5 dbm. Turn R-117 fully counter clockwise. Adjust R-106 for a VTVM reading of .09 volts across the 3K resistor. Do not alter the setting of R-106 for the duration of this response test. To check the RECORD-CALIBRATE control, R-127, observe the reading on M-101. It should indicate zero VU. If not, adjust R-127. Sweep the audio oscillator through the specified frequency range, maintaining a -dbm oscillator output. The output across the 3K resistor should follow the curve shown in Figure 5-3. C-106 should be adjusted at 10,000 cps if the response above 5000 cps departs from the curve.

5.2.3 RECORD BIAS. An easy method of setting the bias is to use the same test setup as in Section 5.2.2 except that no audio oscillator is required. Insert the 12AU7 bias oscillator tube, V-104. Adjust R-131 for a VTVM reading between 4 and 5 volts rms across the 3000 ohm resistor.

NOTE: The VTVM used should have an input resistance of 10 megohms and the shunt capacitance should not exceed 2 mmf.

5.2.4 PROGRAM AMPLIFIER RESPONSE. The Program Equalization test is independent of the Record Amplifier; therefore, the interconnecting cable at J-204 should be removed. The Playback response curve and test setup are shown in Figure 5-3.

Set the audio oscillator to 1000 cps and adjust the output level for -55 dbm across the 100 ohm resistor. Adjust R-209, PROGRAM GAIN, for a reading of -15 db on the output VTVM. Sweep the audio oscillator through the frequency range, maintaining -55 dbm input to the Program Amplifier. The output across the 600 ohm termination should follow the curve shown in Figure 5-3. R-208 should be adjusted at 10,000 cps if the response above 5000 cps departs from the curve.

5.2.5 HARMONIC DISTORTION. Connect the Tape Control System for a Record-Playback operation. Apply a 400 cps sine wave at a level of -15 dbm to the line input. Adjust R-106 for zero VU record level. Record at this level on a 40 second cartridge. Play back the 400 cps tape and measure distortion with a reliable distortion analyzer. The total harmonic distortion should measure 2% or less.

5.2.6 HEAD ALIGNMENT. Head alignment should not be performed promiscuously. If frequency response in the system becomes deficient and is not due to dirt or oxide accumulation on the heads or excessively high bias in the Record Amplifier, the heads probably need azimuth alignment or replacement.

An accurately recorded Head Alignment tape is available on order. Remove the head assembly cover. Loosen the head locking nut on the threaded shank of the head inside the head bracket. Adjust the head vertically so that tape does not bind on the head case and so that the active pole-piece does not overlap its track and interfere with the function of the other head. Using a wrench on the square boss between the Program Head and the mounting bracket, turn the head slightly while observing the program output on a vacuum-tube-voltmeter or oscilloscope. The Cue Head may be aligned by connecting the Cue Head output to the Program Amplifier. Do not attempt to turn heads by twisting the cases.

5.3 TROUBLE SHOOTING

5.3.1 TROUBLE SHOOTING CHART. Table 5.1 is a trouble shooting guide. Voltage measurements are shown on the schematics.

5.4 MODIFICATIONS

5.4.1 RADIO FREQUENCY SUPPRESSION. Chokes L-101 and L-102 in the recording amplifier and L-201 and L-202 in the playback units are used for RF suppression. If additional RF suppression is desired, .1 mfd capacitors may be inserted from these chokes to ground.

5.4.2 EXCESSIVE LINE VOLTAGE. If the normal line voltage consistently exceeds 120 volts rms, the resulting high D-C filament voltage in the Program Amplifier can cause an increased noise level. The remedy for this is to insert a resistor in the D-C filament voltage supply. Refer to Figure 6-5. Remove the jumper between the terminals shown and insert a 5 ohm, 2 watt resistor. This modification will reduce the Program Amplifier filament voltage to less than 12 volts D-C.

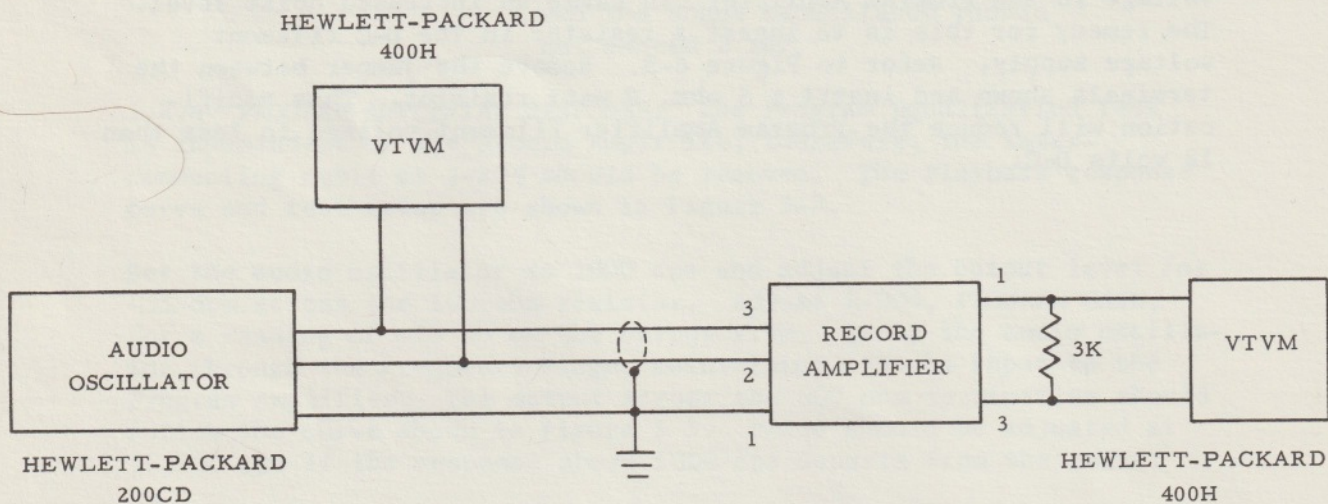
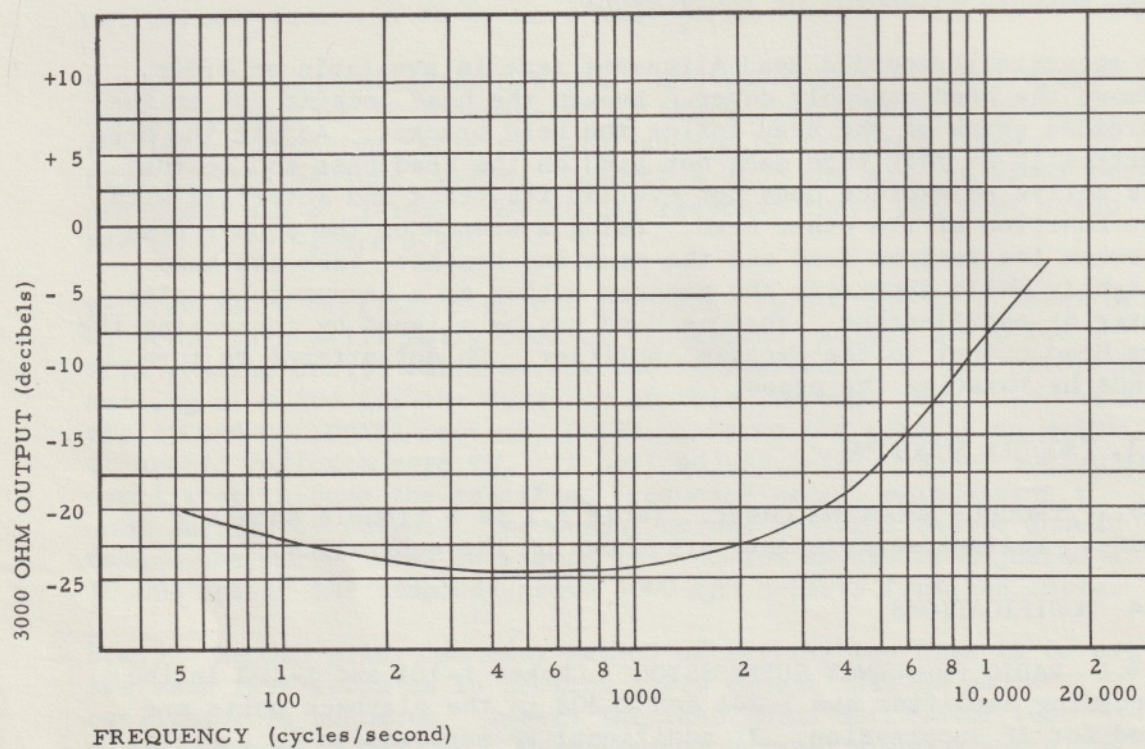


Figure 5-1 Record Amplifier Response

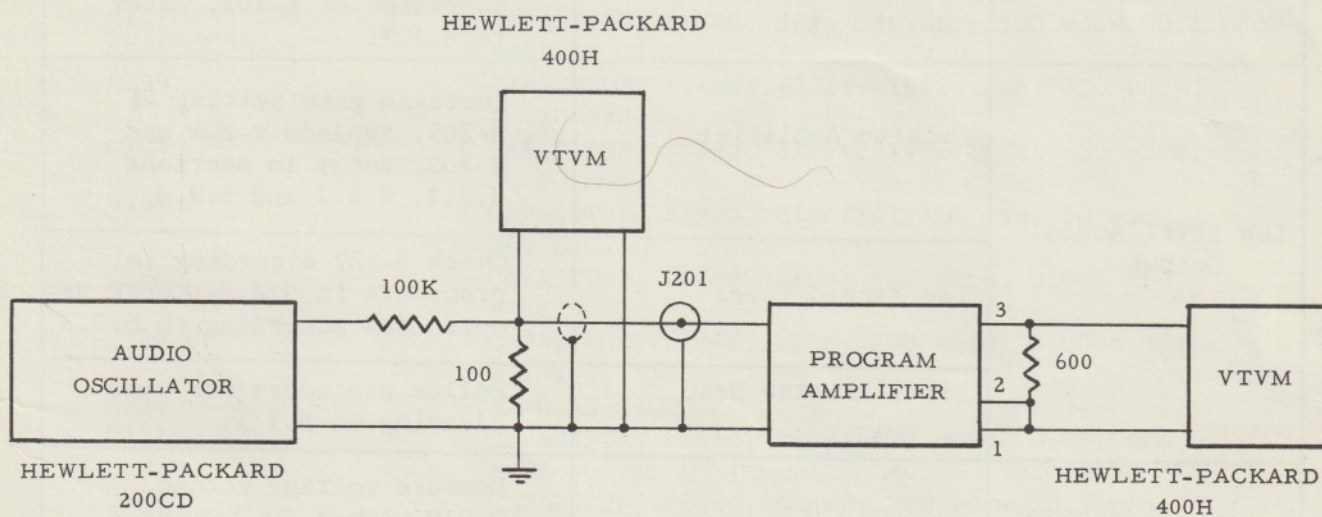
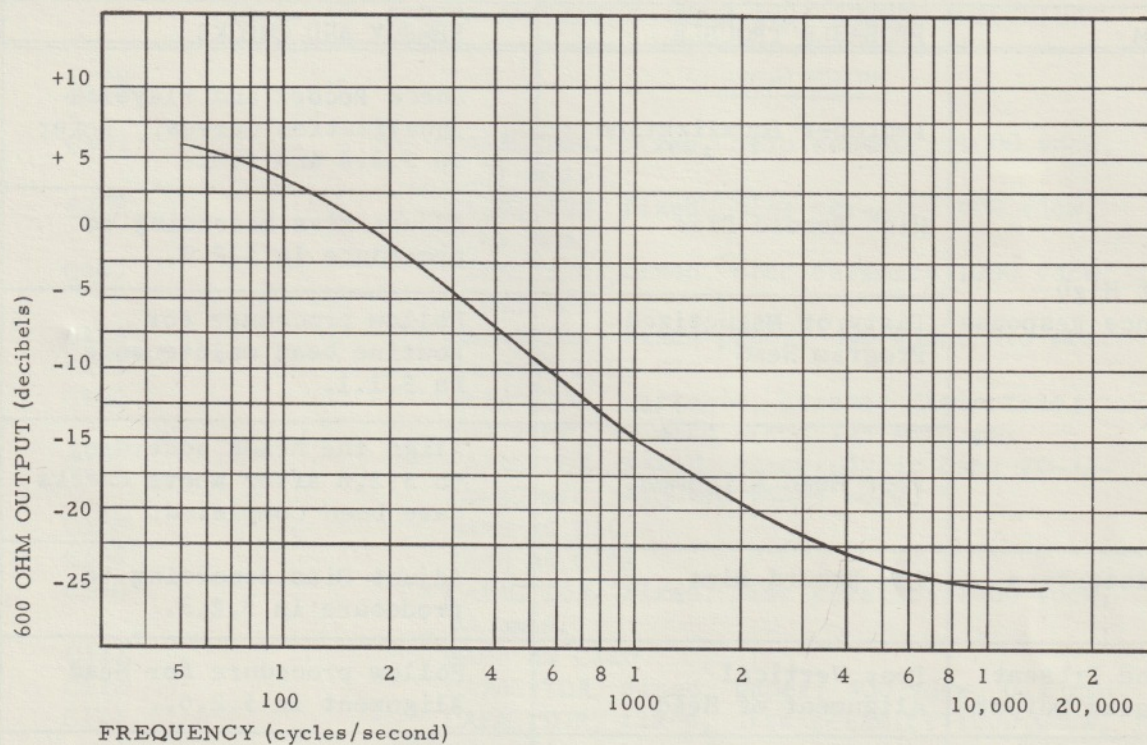


Figure 5-2 Program Amplifier Response

TABLE 5-1

TROUBLE SHOOTING CHART

SYMPTOM	PROBABLE TROUBLE	REMEDY AND CHECKS
Loss of High Frequency Response	Improper Equalization	Check Record and Playback Equalization Curves. Refer to 5.2.2 and 5.2.4
	High Record Bias	Adjust Bias according to procedure in 5.2.3.
	Dirty or Magnetized Program Head	Follow procedure for routine head maintenance in 5.1.1.
	Poor Head Alignment	Align the heads according to 5.2.6 after above checks have been completed.
High Distortion	Low Record Bias	Adjust Bias according to procedure in 5.2.3.
Cue Tone Present in Program Output	Poor Vertical Alignment of Head	Follow procedure for Head Alignment in 5.2.6.
Cue Inoperative or Intermittent	Cue Amplifier	Increase sensitivity. Replace tubes.
	Cue Tone Oscillator	Replace V-105. Check operation of K-103. Refer to 4.1.7.
Low Level Audio Output	Program Amplifier	Increase gain setting of R-209. Replace V-201 and V-202. Refer to sections 4.2.1, 4.2.2 and 5.2.4.
	Low Record Level	Check R-127 according to procedure in 5.2.2. Check Record Bias according to 5.2.3.
	Dirty Program Head	Follow procedure for head cleaning in 5.1.1.
Unsatisfactory Solenoid Operation.	Low Supply Voltage	Measure voltage across C-219 with a 20,000 ohms/volt d-c voltmeter. The voltage should be 90-95 volts with the Playback Unit in the "RUN" mode.
	Slide Mechanism Improperly Adjusted	Follow procedure outlined in 5.1.2.

SECTION VI

PARTS LIST

AC-2-150 RECORD AMPLIFIER AC-2-190 RECORD AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
C101	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 0.01 mfd.
C102	CAPACITOR, fixed, disc ceramic; 600 vdcw, 0.05 mfd.
C103	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 0.005 mfd.
C104	CAPACITOR, fixed paper; 400 vdcw, 0.5 mfd.
C105	SAME AS C102
C106	CAPACITOR, variable, ceramic dielectric; 600 vdcw, 20 mmfd min., 125 mmfd max.
C107	CAPACITOR, fixed, electrolytic can; 20-15-20-20 mfd, 450-450-25-25 vdcw.
C108	SAME AS C102
C109	SAME AS C102
C110	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 33 mmfd.
C111	SAME AS C110
C112	CAPACITOR, fixed, paper; 400 vdcw, 0.1 mfd.
C113	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 50 mmfd.
C114	SAME AS C112
C115	SAME AS C101
C116	CAPACITOR, fixed, disc ceramic; 75 vdcw, 0.1 mfd.
C117	CAPACITOR, fixed, disc ceramic; 500 vdcw, 0.1 mfd.
C118	SAME AS C102
C119	CAPACITOR, fixed, electrolytic can; 350 vdcw, 20-20 mfd.
C126	CAPACITOR, fixed, electrolytic can; 450 vdcw, 50-50 mfd.
C127	CAPACITOR, fixed, electrolytic can; 50 vdcw, 500 mfd.
C128	CAPACITOR, fixed, mica; 500 vdcw, 0.002 mfd, + 2%
C129	CAPACITOR, fixed, mica; 300 vdcw, 0.0068 mfd, + 10%
C130	SAME AS C102
C131	CAPACITOR, fixed, mica; 500 vdcw, 0.001 mfd, + 5%
C132	CAPACITOR, fixed, paper; 200 vdcw, 0.5 mfd.
C133	CAPACITOR, fixed, electrolytic; 150 vdcw, 8 mfd.
C134	CAPACITOR, fixed, electrolytic; 50 vdcw, 500 mfd.
C135	SAME AS C102
C136	SAME AS C102

SECTION VI--PARTS LIST

AC-2-150 RECORD AMPLIFIER AC-2-190 RECORD AMPLIFIER

ITEM	DESCRIPTION
CR101	DIODE, germanium; P.I.V. 75V
CR102	RECTIFIER, silicon; P.I.V. 200V, 500 ma.
CR103	RECTIFIER, silicon; P.I.V. 600V, 500 ma.
CR104	SAME AS CR103
CR105	SAME AS CR103
CR106	SAME AS CR103
CR107	SAME AS CR102
CR108	SAME AS CR102
CR109	SAME AS CR102
CR110	SAME AS CR102
F101	FUSE: 1 ampere, 3AG.
I101	LAMP, miniature bayonet; 150 ma, 6-8V
I102	LAMP, miniature bayonet; 70 ma, 28V.
J101	CONNECTOR: 11 female contacts, chassis socket.
J102	CONNECTOR: 3 female contacts, audio
K102	RELAY, 4PDT; Coil 24 VDC, contacts 2 amperes.
K103	RELAY, 2PDT, Coil 24VDC
K104	SAME AS K103
L101	CHOKER: 22uh, 1.8 amperes.
L102	SAME AS L101
L103	CHOKER: 5 mh
L104	3200 Cycle Oscillator Assembly
L105	1000 Cycle Oscillator Assembly
M101	METER, VU; 200 microamperes full scale.
R101	RESISTOR, fixed, composition; 240 ohms, $\pm 5\%$, 1/2W.
R102	SAME AS R101
R103	RESISTOR, fixed, composition; 150 ohms, $\pm 5\%$, 1/2W.
R104	SAME AS R101
R105	SAME AS R101
R106	RESISTOR, variable, composition; 0.5 megohm, $\pm 10\%$, 2W, linear taper.
R107	RESISTOR, fixed, composition; 0.1 megohm, $\pm 10\%$, 1/2W.
R108	RESISTOR, fixed, composition; 2200 ohms, $\pm 10\%$, 1/2W.
R109	SAME AS R107
R110	RESISTOR, fixed, composition; 3300 ohms, $\pm 10\%$, 1/2W.
R111	RESISTOR, fixed, composition; 47,000 ohms, $\pm 10\%$, 1/2W.
R112	RESISTOR, fixed, composition; 82,000 ohms, $\pm 10\%$, 1/2W.
R113	RESISTOR, fixed, composition; 1.0 megohm, $\pm 10\%$, 1/2W.
R114	SAME AS R107
R115	RESISTOR, fixed, composition; 2700 ohms, $\pm 10\%$, 1/2W.

SECTION VI--PARTS LIST

AC-2-150 RECORD AMPLIFIER

AC-2-190 RECORD AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
R116	SAME AS R111
R117	RESISTOR, variable, composition; 1.0 megohm, +10%, 2W, linear taper.
R118	SAME AS R111
R119	SAME AS R107
R120	SAME AS R108
R121	RESISTOR, fixed, composition; 0.47 megohm, +10%, 1/2W.
R122	SAME AS R121
R123	RESISTOR, fixed, composition; 0.12 megohm, +10%, 1/2W.
R124	SAME AS R108
R125	SAME AS R107
R126	RESISTOR, fixed, composition; 0.22 megohm, +10%, 1/2W.
R127	RESISTOR, variable, composition; 0.25 megohm, +10%, 2W, locking shaft, linear taper.
R128	SAME AS R107
R129	RESISTOR, fixed, composition, 5600 ohms, +10%, 1/2W.
R130	SAME AS R107
R131	RESISTOR, variable, composition; 10,000 ohms, +10%, 2W, locking shaft, linear taper.
R132	SAME AS R107
R133	RESISTOR, fixed, composition; 10,000 ohms, +10%, 1/2W.
R134	RESISTOR, fixed, composition; 56,000 ohms, +10%, 1/2W.
R135	SAME AS R115
R136	RESISTOR, fixed, composition, 1200 ohms, +10%, 1/2W.
R137	RESISTOR, fixed, composition; 4700 ohms, +10%, 1/2W.
R147	RESISTOR, fixed, composition; 2200 ohms, +10%, 2W.
R148	RESISTOR, fixed, composition; 1800 ohms, +10%, 2W.
R149	RESISTOR, fixed, composition; 10,000 ohms, +10%, 1W.
R150	RESISTOR, fixed, composition; 68,000 ohms, +10%, 2 W.
R151	RESISTOR, fixed, composition; 33,000 ohms, +10%, 1/2 W.
R152	RESISTOR, fixed, composition; 12,000 ohms, +10%, 1/2 W.
R153	RESISTOR, fixed, composition; 7,500 ohms, +5%, 1/2 W.
R154	RESISTOR, fixed, composition; .18 megohm, 10%, 1/2 W.

SECTION VI--PARTS LIST

AC-2-150 RECORD AMPLIFIER AC-2-190 RECORD AMPLIFIER

ITEM

R155	RESISTOR, fixed, composition; .39 megohms, +10%, 1/2 W.
R156	SAME AS R107
R157	RESISTOR, fixed, composition; 47 ohms, +10%, 1/2 W.
R158	RESISTOR, fixed, composition; 22,000 ohms, 10%, 1/2 W.
R159	SAME AS R158
R160	RESISTOR, fixed, composition; 3300 ohms, 10%, 1/2 W.
S101	SWITCH, double action push; SPST, rated 3 amperes 250 VAC-DC.
S102	SWITCH, momentary push; SPST, normally open, rated 3 amperes 120 VAC
S103	SAME AS S102
T101	TRANSFORMER, audio; 30-15,000 cps, Pri. 600/250/50 ohms impedance, sec. 86,000 ohms impedance.
T102	SAME AS T101
T103	TRANSFORMER, bias oscillator
TB101	TERMINAL STRIP, Barrier Type; 7 terminals.
TS101	TUBE SHIELD: 9 pin, 1-15/16 in.
TS102	SAME AS TS101
TS103	SAME AS TS101
TS104	SAME AS TS101
TS105	SAME AS TS101
V101	TUBE; 12AU7
V102	TUBE; 12AX7
V103	SAME AS V101
V104	SAME AS V101
V105	SAME AS V102
XF101	FUSEHOLDER; 3AG.
XI101	LAMPHOLDER, miniature bayonet.
XI102	SAME AS XI101
Button	POWER switch, red
Button	AUXILIARY TONE
Button	RECORD SET switch, amber.
Cable	CABLE, interconnecting
Cable	LINECORD, 10 ft.
Knob	LINE LEVEL, black.
Knob	MIC LEVEL, black.

SECTION VI

PARTS LIST

PC-1-150 Playback Unit PC-1-190 Playback Unit
 PC-2-150 Playback Unit PC-2-190 Playback Unit

<u>ITEM</u>	<u>DESCRIPTION</u>
B201	MOTOR; 1/75 horsepower, 60 cycles/second, synchronous, 115 volts.
C216	CAPACITOR, fixed, electrolytic can; 50 vdcw, 1000 mfd.
C217	CAPACITOR, fixed, electrolytic can; 450 vdcw, 50 - 50 mfd.
C218	SAME AS C216
C219	CAPACITOR, fixed, electrolytic; 350 vdcw, 140 mfd.
C221	CAPACITOR, fixed, paper molded; 400 vdcw, 0.5 mfd.
C222	CAPACITOR, fixed, paper molded; 400 vdcw, 0.1 mfd.
C223	SAME AS C222
C224	SAME AS C222
C225	SAME AS C213
C226	CAPACITOR, fixed, electrolytic; 12 vdcw, 500 mfd.
C227	SAME AS C226
C228	CAPACITOR, fixed, electrolytic; 50 vdcw, 150 mfd.
CR203	RECTIFIER, silicon; P.I.V. 600V, 500 ma.
CR204	SAME AS CR203
CR205	SAME AS CR203
CR206	SAME AS CR203
CR207	RECTIFIER, silicon; P.I.V. 200V, 500 ma.
CR208	SAME AS CR207
CR209	RECTIFIER, silicon; P.I.V. 400V, 500 ma.
CR210	SAME AS CR209
CR211	SAME AS CR209
CR212	SAME AS CR209
CR213	SAME AS CR207
CR214	SAME AS CR207
CR215	SAME AS CR207
CR216	SAME AS CR207
CR217	SAME AS CR203
CR218	SAME AS CR207
CR219	SAME AS CR207
CR220	SAME AS CR207
CR221	SAME AS CR207
CR222	SAME AS CR207
CR223	SAME AS CR207
F201	FUSE; .8 ampere, slow blow.

SECTION VI--PARTS LIST

PC-1-150 Playback Unit PC-1-190 Playback Unit
 PC-2-150 Playback Unit PC-2-190 Playback Unit

<u>ITEM</u>	<u>DESCRIPTION</u>
I201	LAMP, miniature bayonet; 150 ma, 6-8V.
I202	LAMP, miniature bayonet; 70 ma, 28V.
I203	SAME AS I202
J202	CONNECTOR; 12 female contacts, chassis socket.
J203	SAME AS J202
J204	CONNECTOR; 11 female contacts, chassis socket.
J205	CONNECTOR; male, AC
J208	JACK, Audio, phone
J209	SAME AS J209
J210	SAME AS J209
J211	SAME AS J208
J212	SAME AS J208
K201	RELAY, 6PDT; Coil 24 VDC, contacts 5 amperes.
K202	RELAY, 2PDT; Coil 24 VDC, contacts 2 amperes.
K203	RELAY, 2PDT; Coil 5000 ohms, 7.2 ma.
K204	RELAY, 4PDT; Coil 24 VDC, contacts 2 amperes.
K205	RELAY, 4PDT; Coil 24 VDC, contact 55 amperes.
L201	CHOKE; 22uh, 1.8 amperes.
L202	SAME AS L201
L203	SOLENOID
L204	HEAD, MAGNETIC, Program.
L205	HEAD, MAGNETIC, Cue.
R226	RESISTOR, fixed, composition; 100 ohms, $\pm 10\%$, 1/2W.
R227	RESISTOR, fixed, composition; 220 ohms, $\pm 10\%$, 1/2W.
R228	RESISTOR, fixed, composition; 5600 ohms, $\pm 10\%$, 2 W.
R229	RESISTOR, fixed, composition, 2200 ohms, $\pm 10\%$, 2 W.
R230	NOT USED
R231	RESISTOR, fixed, composition; 5600 ohms, $\pm 10\%$, 1/2 W.
R232	RESISTOR, fixed, composition; 47 ohms, $\pm 10\%$, 1/2W.
R233	RESISTOR, fixed, composition; 150 ohms, $\pm 10\%$, 10W.
R234	SAME AS R228
R235	RESISTOR, fixed, composition; 0.1 megohm, $\pm 10\%$, 2 W.
R236	SAME AS R235
R238	SAME AS R226
R239	SAME AS R213
R240	SAME AS R213
R241	RESISTOR, fixed, composition, 10 megohms, $\pm 10\%$, 1/2 W.
R242	SAME AS R241
R243	RESISTOR, fixed, composition; 390K, $\pm 10\%$, 1/2 W.
R244	RESISTOR, fixed, composition; 10K, $\pm 10\%$, 1W.
R245	RESISTOR, fixed, composition; 100 ohms, $\pm 10\%$,
S201	SWITCH, double action push; SPST, rated 3 amperes 250 VAC-DC.

SECTION VI--PARTS LIST

PC-1-150 Playback Unit PC-1-190 Playback Unit
 PC-2-150 Playback Unit PC-2-190 Playback Unit

<u>ITEM</u>	<u>DESCRIPTION</u>
S202	SWITCH, micro; SPDT, normally open.
S203	SWITCH, momentary push; SPST, normally closed, rated 3 amperes 120 VAC.
S204	SWITCH, momentary push; SPST, normally open, rated 3 amperes 120 VAC.
T202	TRANSFORMER, filament; 24 VCT at 1 ampere.
TB201	TERMINAL STRIP, Barrier Type; 14 terminals.
TB202	TERMINAL STRIP, 3 terminals.
TB203	TERMINAL STRIP, 2 terminals.
TB204	SAME AS TB203
TB205	TERMINAL STRIP, 1 terminal
XF201	FUSEHOLDER, 3AG.
XI201	LAMPHOLDER, miniature bayonet.
XI202	SAME AS XI201
XI203	SAME AS XI201
Button	POWER switch, red
Button	RUN switch, green
Button	READY switch, amber.
Cable	CABLE, audio, connecting, 12 in.
Cable	LINECORD, 10 ft.

SECTION VI

PARTS LIST

SINGLE TONE CUE AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
C208	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 0.003 mfd.
C209	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 0.001 mfd.
C210	SAME AS C208
C211	CAPACITOR, fixed, electrolytic; 350 vdcw, 20 mfd.
C212	SAME AS C209
C213	CAPACITOR, fixed, disc ceramic; 600 vdcw, 0.05 mfd.
C214	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 0.01 mfd.
CR201	DIODE, germanium; P.I.V. 75V.
CR202	SAME AS CR201
J206	JACK, audio, phono.
J207	SAME AS J206
P203	CONNECTOR, plug; 12 male contacts.
R215	RESISTOR, fixed, composition; 0.18 megohm, +10%, 1/2W.
R216	RESISTOR, fixed, composition; 82,000 ohms, +10%, 1/2W.
R217	SAME AS R215
R218	RESISTOR, fixed, composition; 10,000 ohms, +10%, 1/2W.
R219	RESISTOR, variable, composition; 0.1 megohm, +10%, 19cking shaft, linear taper.
R220	RESISTOR fixed, composition; 0.1 megohm, +10%, 1/2W.
R221	RESISTOR, fixed, composition; 2700 ohms, +10%, 1/2W.
R222	RESISTOR, fixed, composition; 1 megohm, +10%, 1/2W.
R223	SAME AS R218
R224	RESISTOR, fixed, composition; 120 ohms, +10%, 1W.
R225	RESISTOR, fixed, composition; 68 ohms, +10%, 1/2W.
TP201	JACK, Tip, green.
V201	TUBE; 12AX7.
V202	TUBE; 12AT7.

SECTION VI

PARTS LIST

PROGRAM AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
C201	CAPACITOR, fixed, electrolytic; 350 vdcw, 20-20 mfd.
C202	CAPACITOR, fixed, electrolytic; 6 vdcw, 250 mfd.
C203	CAPACITOR, fixed, disc ceramic; 600 vdcw, 0.05 mfd.
C204	CAPACITOR, fixed, plastic film; 500 vdcw, 0.056 mfd, +5%.
C205	SAME AS C203
C206	SAME AS C203
C207	CAPACITOR, fixed, electrolytic; 25 mfd, 25 vdcw.
C215	CAPACITOR, fixed, disc ceramic; 1000 vdcw, 50 mmfd.
C220	CAPACITOR, fixed, electrolytic; 6 vdcw, 50 mfd.
J201	JACK, audio, phono.
P202	CONNECTOR, plug; 12 male contacts.
R201	RESISTOR, fixed, composition; 56,000 ohms, +10%, 1/2W.
R202	RESISTOR, fixed, composition; 0.15 megohm, +10%, 1W.
R203	RESISTOR, fixed, composition; 1800 ohms, +10%, 1/2W
R204	RESISTOR, fixed, composition; 1 megohm, +10%, 1W.
R205	RESISTOR, fixed, composition; 22,000 ohms, +10%, 1/2W.
R206	SAME AS R202
R207	RESISTOR, fixed, composition, 2200 ohms, +10%, 1/2W.
R208	RESISTOR, variable, composition; 10,000 ohms, +10%, 2W, locking shaft, linear taper.
R209	RESISTOR, variable, composition; 0.5 megohm, +10%, 2W, locking shaft, linear taper.
R210	RESISTOR, fixed, composition; 0.15 megohm, +10%, 1/2W.
R211	SAME AS R207
R212	RESISTOR, fixed, composition; 1 megohm, +10%, 1/2W.
R213	RESISTOR, fixed, composition; 10,000 ohms, +10%, 1/2W.
R214	RESISTOR, fixed, composition; 820 ohms, +10%, 1/2W.
T201	TRANSFORMER, single plate to line; pri. impedance 15,000 ohms, sec. 600/250/50 ohms; freq. response, 20 to 20,000 cps.
V201	TUBE; 12AX7.
V202	TUBE; 12AT7.

SECTION VI

PARTS LIST

DUAL TONE CUE AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
C301	CAPACITOR, fixed, disc ceramic, 1000 VDC, .01 mfd.
C302	CAPACITOR, fixed, disc ceramic, 1000 VDC, .005 mfd.
C303	SAME AS C302
C304	SAME AS C302
C305	SAME AS C302
C306	SAME AS C302
C307	CAPACITOR, fixed, disc ceramic, 1000 VDC, 800 mfd.
C308	CAPACITOR, fixed, mica, 500 VDC, .002 mfd., 2%.
C309	SAME AS C307
C310	CAPACITOR, fixed, disc ceramic, 50 VDC, .05 mfd.
C311	SAME AS C302
C312	SAME AS C310
C313	CAPACITOR, fixed, disc ceramic, 50 VDC, .03 mfd. +20%.
CR301	RECTIFIER, Type 1N462
CR302	SAME AS CR301
CR303	SAME AS CR301
CR304	SAME AS CR301
CR305	SAME AS CR301
CR306	SAME AS CR301
J301	JACK, Audio, Phono
J302	SAME AS J301
K301	RELAY, 2PDT, 10,000 ohm coil.
L301	INDUCTOR
P303	CONNECTOR
R301	RESISTOR, fixed, composition, 2.2 megohms, +10%, 1/2W.
R302	RESISTOR, fixed, composition 47,000 ohms, +10%, 1/2W.
R303	RESISTOR, fixed, composition, 100,000 ohms, +10%, 1/2W.
R304	SAME AS R302
R305	RESISTOR, fixed, composition, 1000 ohms.
R306	RESISTOR, variable, composition, .1 megohm, +10%, locking shaft.
R307	SAME AS R302
R308	RESISTOR, fixed, composition, 2200 ohms, +10%, 1/2W.
R309	SAME AS R302
R310	RESISTOR, fixed, composition, 1 megohm, +10%, 1/2W.

SECTION VI--PARTS LIST

DUAL TONE CUE AMPLIFIER

<u>ITEM</u>	<u>DESCRIPTION</u>
R311	RESISTOR, fixed, composition, 10,000 ohms, +10%, 1/2W.
R312	RESISTOR, fixed, composition, 470 ohms, +10%, 1/2W.
R313	RESISTOR, fixed, composition, 68 ohms, +10%, 1/2W.
R314	SAME AS R310
R315	RESISTOR, fixed, composition, 4.7 megohms, +10%, 1/2W.
R316	SAME AS R302
R317	RESISTOR, fixed, composition, 2700 ohms, +10%, 1/2W.
R318	SAME AS R310
R319	RESISTOR, fixed, composition, 470,000 ohms, +10%, 1/2W.
R320	SAME AS R311
V301	TUBE, 12AT7
V302	SAME AS V301
V303	SAME AS V301

SECTION VI

PARTS LIST

TAPE TRANSPORT ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
1	GUIDE, Cartridge
2	SCREW, Mounting
3	SLIDE ASSEMBLY
4	SCREW, Mounting
5	GUIDE, Slide, Left
6	GUIDE, Slide, Right
7	BEARING ASSEMBLY
8	SCREW, Mounting
9	DECK, Sub-assembly
10	SPRING, Slide Return
11	HOLDER, Return Spring
12	SET SCREW
13	SCREW, Mounting
14	COVER, Head Assembly
15	CONNECTOR
16	WASHER, Fiber, Shoulder
17	WASHER, Fiber, Flat
18	HEAD BASE ASSEMBLY
19	STAND OFF, Head Bracket
20	SCREW, Mounting
21	NUT, Lock
22	HEAD ASSEMBLY, Magnetic
23	STUD, Adjusting
24	SWITCH, Micro
25	SCREW, Mounting
26	NUT, Lock
27	SET SCREW
28	SPRING, Solenoid Cushion
29	CUSHION, Solenoid Plunger
30	SOLENOID, Sub-Assembly
31	SCREW, Mounting Solenoid
32	PLUNGER ASSEMBLY, Solenoid
33	LINK, Drag Assembly
34	WASHER, Nylon
35	FLYWHEEL, Sub-Assembly
36	BALL, Flywheel Thrust
37	RETAINER, Ball
38	BELT, Drive
39	BUMPER, Rubber
40	BRACKET, Bumper
41	SPRING, Bumper
42	RING, Retainer
43	WASHER, Nylon
44	SCREW, Mounting
45	PINCH ROLLER

SECTION VI--PARTS LIST
TAPE TRANSPORT ASSEMBLY

<u>ITEM</u>	<u>DESCRIPTION</u>
46	WASHER, Pinch Roller
47	SCREW, Mounting
48	WASHER, Motor Mount
49	MOUNT, Motor Shock
50	PLATE, Motor Mount
51	SPACER, Motor
52	SET SCREW
53	PULLEY, Less Set Screw
54	SCREW, Motor Plate Mount
55	BALL, Motor Thrust
56	DISC, Motor Thrust
57	SHIM, Motor Thrust
58	CAP, Motor Thrust
59	SCREW, Cap Mounting
60	MOTOR, Bodine NYC 12
61	CAPACITOR, Aerovox P104F183
62	SCREW, Capacitor Mount
63	COVER, Slide Assembly

SECTION VI--PARTS LIST
REMOTE CONTROL PANEL

<u>ITEM</u>	<u>DESCRIPTION</u>
1	RC-R-1 Remote Control Panel
2	RC-P-1 Remote Control Panel
3	Terminal Strip
4	Switch, Momentary, N. O.
5	Switch, Momentary, N. C.

SECTION VI--PARTS LIST
TYPE 300-U BLANK CARTRIDGE

<u>ITEM</u>	<u>DESCRIPTION</u>
300-1	Cover mounting screw
300-2	Clear plastic cover
300-3	Guide wire
300-4	Reel
300-5	Nylon washer
300-6	Pressure Pad
300-7	Base

SECTION VI--PARTS LIST
TYPE 600-U BLANK CARTRIDGE

<u>ITEM</u>	<u>DESCRIPTION</u>
300-1	Cover mounting screw
600-2	Cover
600-3	Guide wire

<u>ITEM</u>	<u>DESCRIPTION</u>
600-4	Reel
300-5	Nylon washer
300-6	Pressure pad
600-7	Base

SECTION VI--PARTS LIST
TYPE 1200-U BLANK CARTRIDGE

<u>ITEM</u>	<u>DESCRIPTION</u>
1200-1A	Cover (corner) mounting screw
300-1	Cover (center) mounting screw
1200-2	Cover
1200-3A	Guide wire, straight
1200-3B	Guide wire, notched
1200-4	Reel
300-5	Nylon washer
300-6	Pressure pad
1200-7	Base
1200-8	Retainer ring
1200-9	Tape Guide roller

SECTION VI--PARTS LIST
AUTOMATIC SWITCHER PARTS LIST

<u>ITEM</u>	<u>DESCRIPTION</u>
C501	CAPACITOR, fixed, 500 mfd, 50VDC, electrolytic
CR501	RECTIFIER, Silicon
F501	FUSE, lamp, 3AG
K501	RELAY, 4PDT, 24 VDC Coil
K502	SAME AS K501
K503	SAME AS K501
K504	SAME AS K501
T501	TRANSFORMER, 24 VAC Sec., 110 VAC Primary.
TB501	Terminal Strip, 5 Terminals
TB502	SAME AS TB501
TB503	Terminal Strip, 13 Terminals
XF501	FUSEHOLDER, 3AG

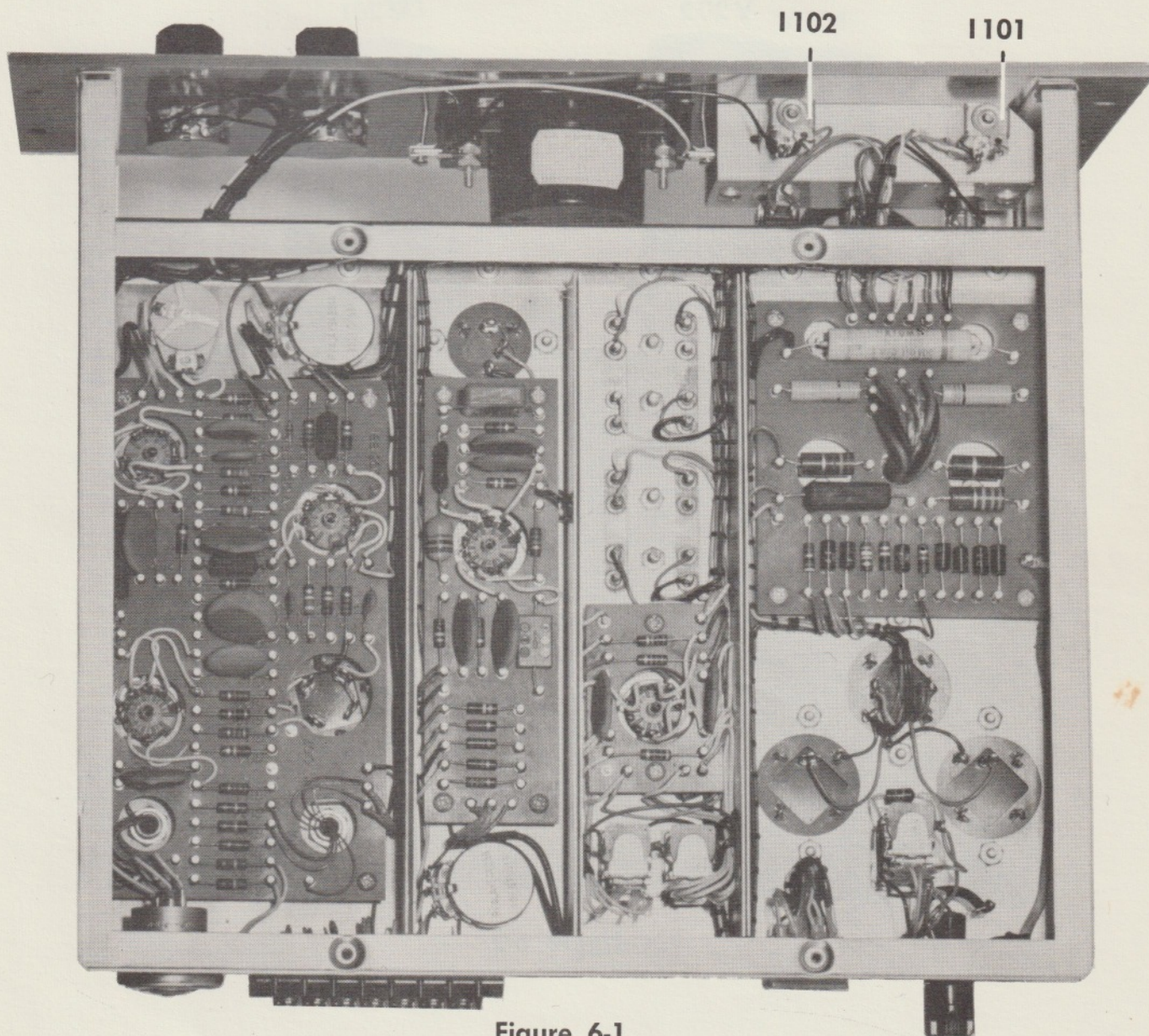


Figure 6-1

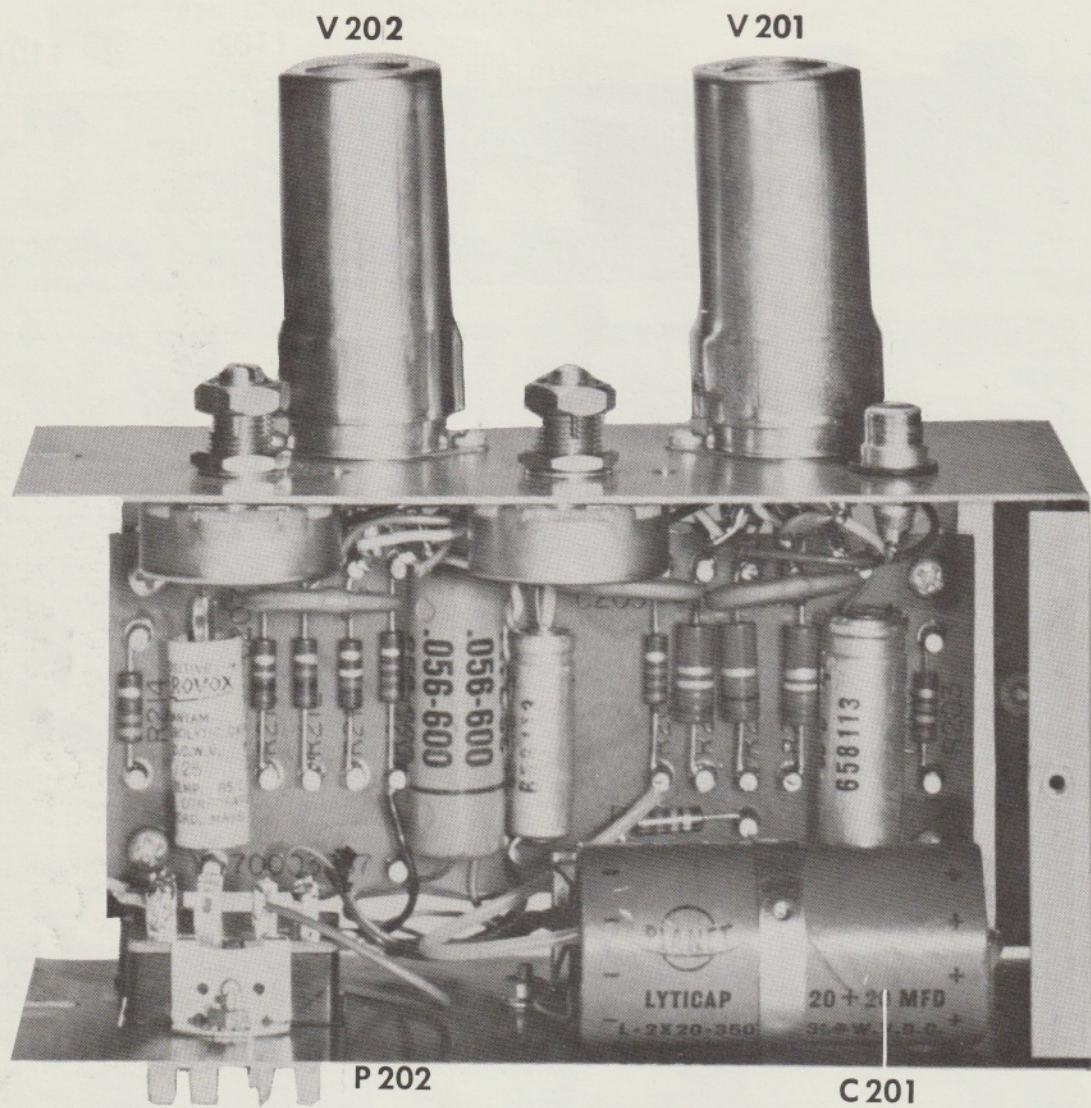


Figure 6-2

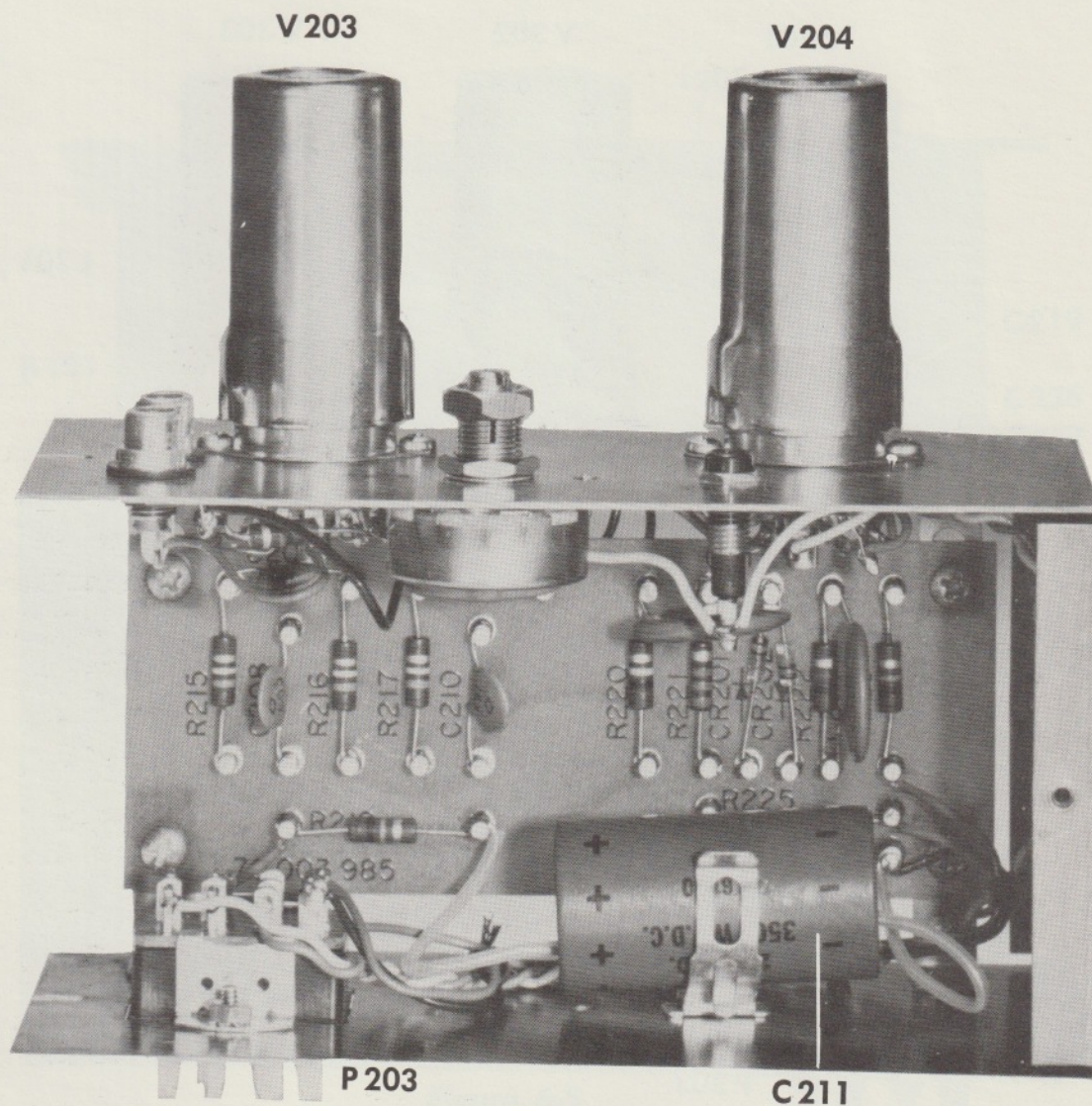


Figure 6-3

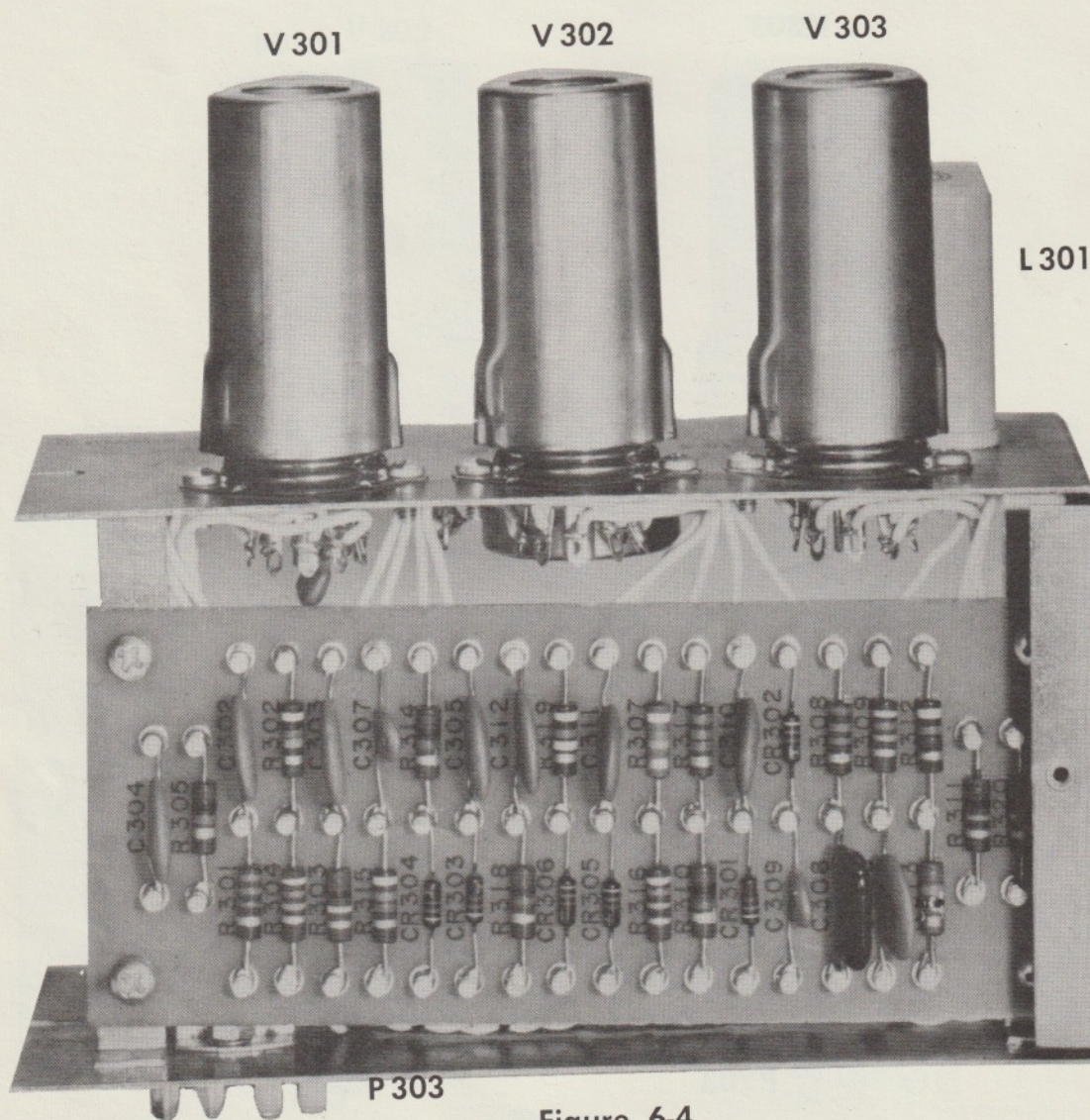


Figure 6-4

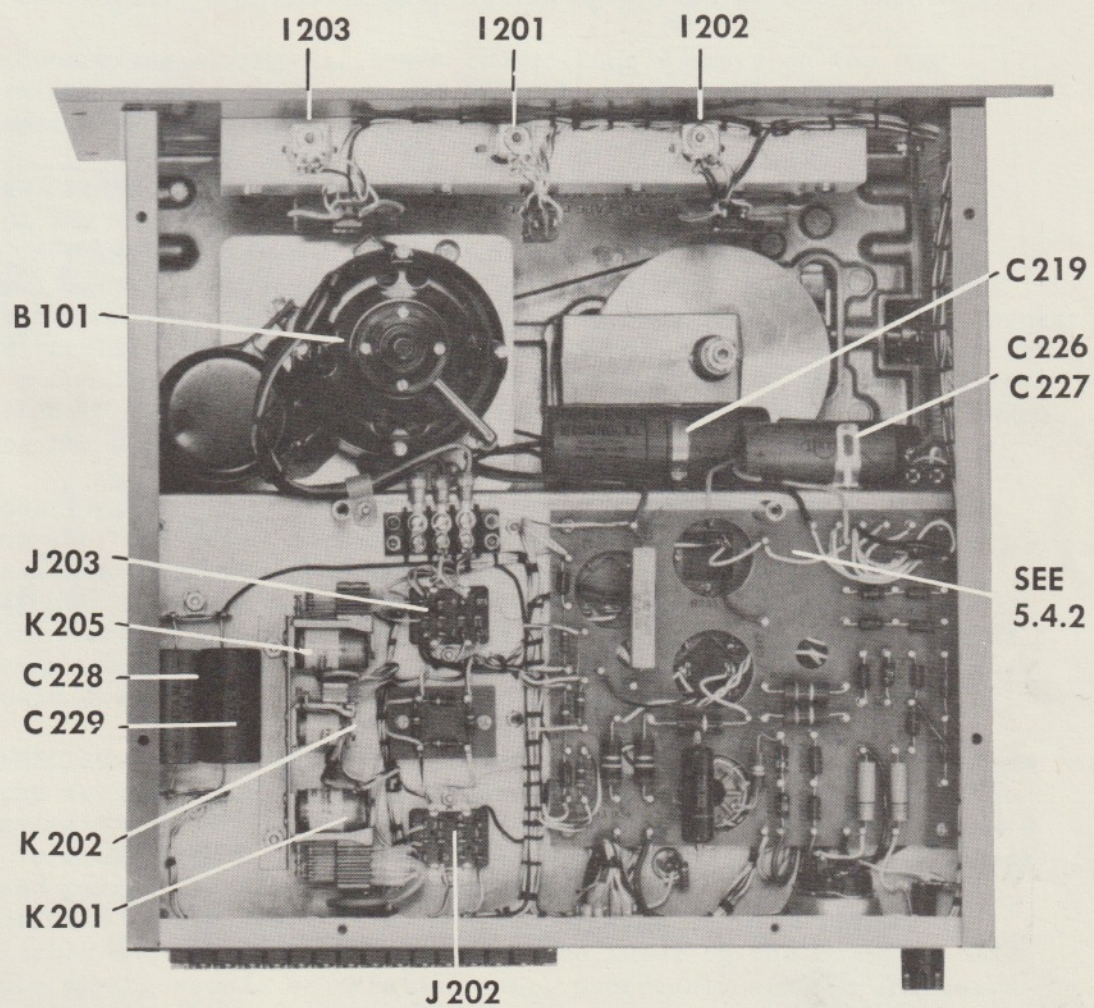


Figure 6-5

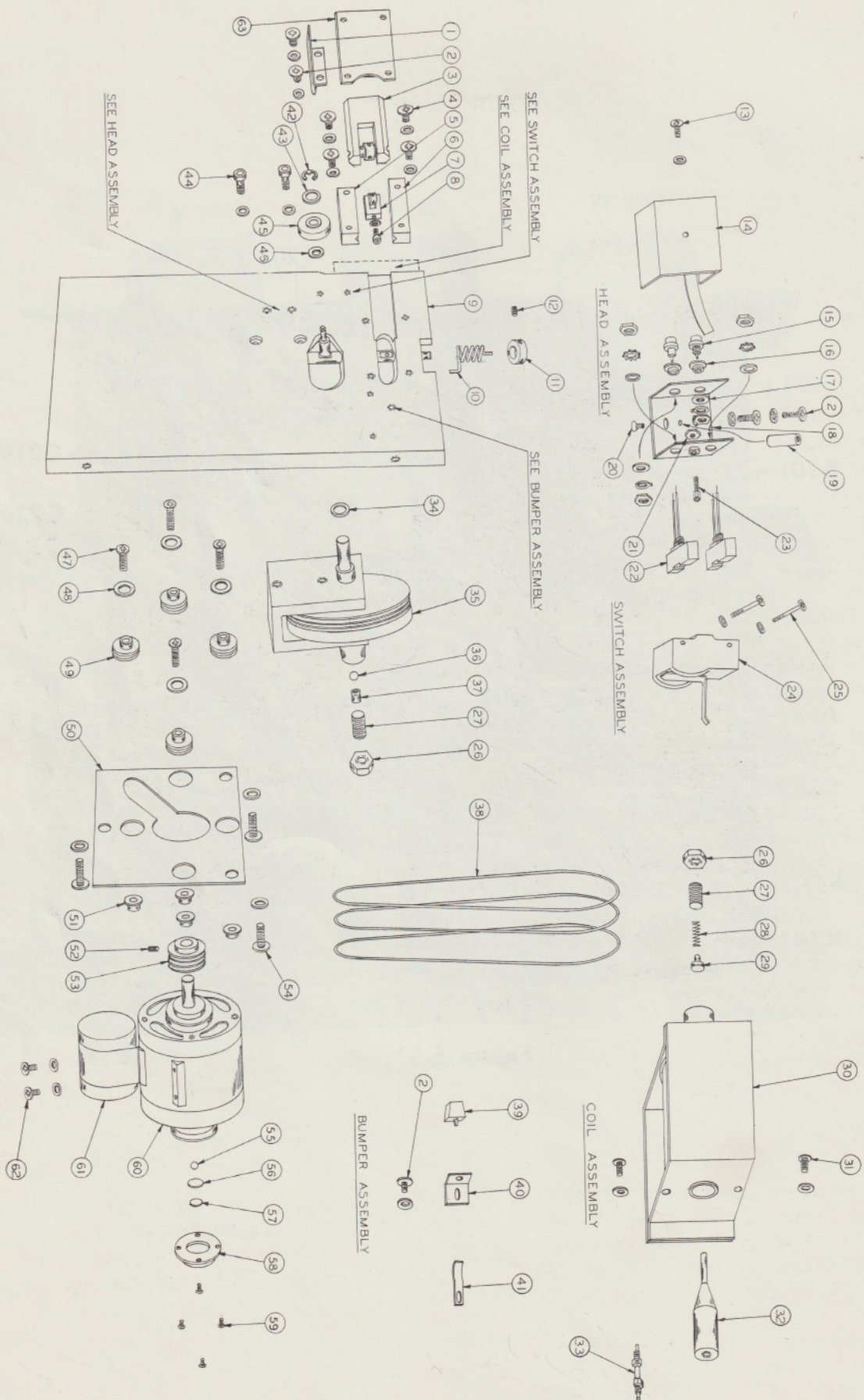


Figure 6-6 Tape Transport Assembly, Exploded View

UNIT INSTRUCTIONS

AUTOMATIC SWITCHER

AMS-3A AMS-4A

1.1 INSTALLATION

The AMS-3A will automatically switch a maximum of three Playbacks to one input. The AMS-4A will switch a maximum of four machines.

If connecting an AMS-3A, leave connections 4 empty on the "ON" terminal strip (TB502) and the "OFF" terminal strip TB501. Pair number 4 of TB503 will also be vacant.

CONNECTIONS TO THE "ON" TERMINAL STRIP. Connect a pair of wires from the "Auxiliary Start" terminals (8-9) of Playback machine 1 to ON terminals C and 1 of the Automatic Switcher. Connect the "Auxiliary Start" terminals of Playback machine 2 to ON terminals C and 2 of the switcher. If a third Playback machine is used, connect the "Auxiliary Start" terminals to terminals C and 3 of the switcher. If a fourth machine and an AMS-4A switcher is used, the "Auxiliary Switcher" terminals of machine 4 are connected to ON terminals C and 4 of the switcher.

CONNECTIONS TO THE "OFF" TERMINAL STRIP. Connect a pair of wires from the "Cue Stop" terminals (11-12) of Playback machine 1 to terminals C and 1 of the OFF terminal strip of the Automatic Switcher. Connect from the "Cue Stop" terminals of Playback 2 to terminals C and 2 of the OFF strip of the switcher. Continue this wiring using switcher OFF terminals C and 3 for Playback 3 and terminals C and 4 if a fourth machine and an AMS-4A are in use.

CONNECTIONS TO THE AUDIO TERMINAL STRIP TB503. Connections to this strip are all audio circuits. Connect the output of Playback 1 to terminals pair number 1 of TB503. Connect the output of Playback 2 to terminal pair 2. Continue this wiring using pair 3 for Playback 3 and pair 4 if a fourth Playback and an AMS-4A are used. The terminals marked "OUT" of this strip are the audio output of the switcher and should be connected to the input of the console. All audio wiring should be shielded pair, preferably with an insulated outer jacket. Three terminals are provided on TB-503 for connecting shields. These terminals are not at chassis ground to prevent possible ground loops in some systems. In other systems it may prove desirable to ground the switcher chassis.

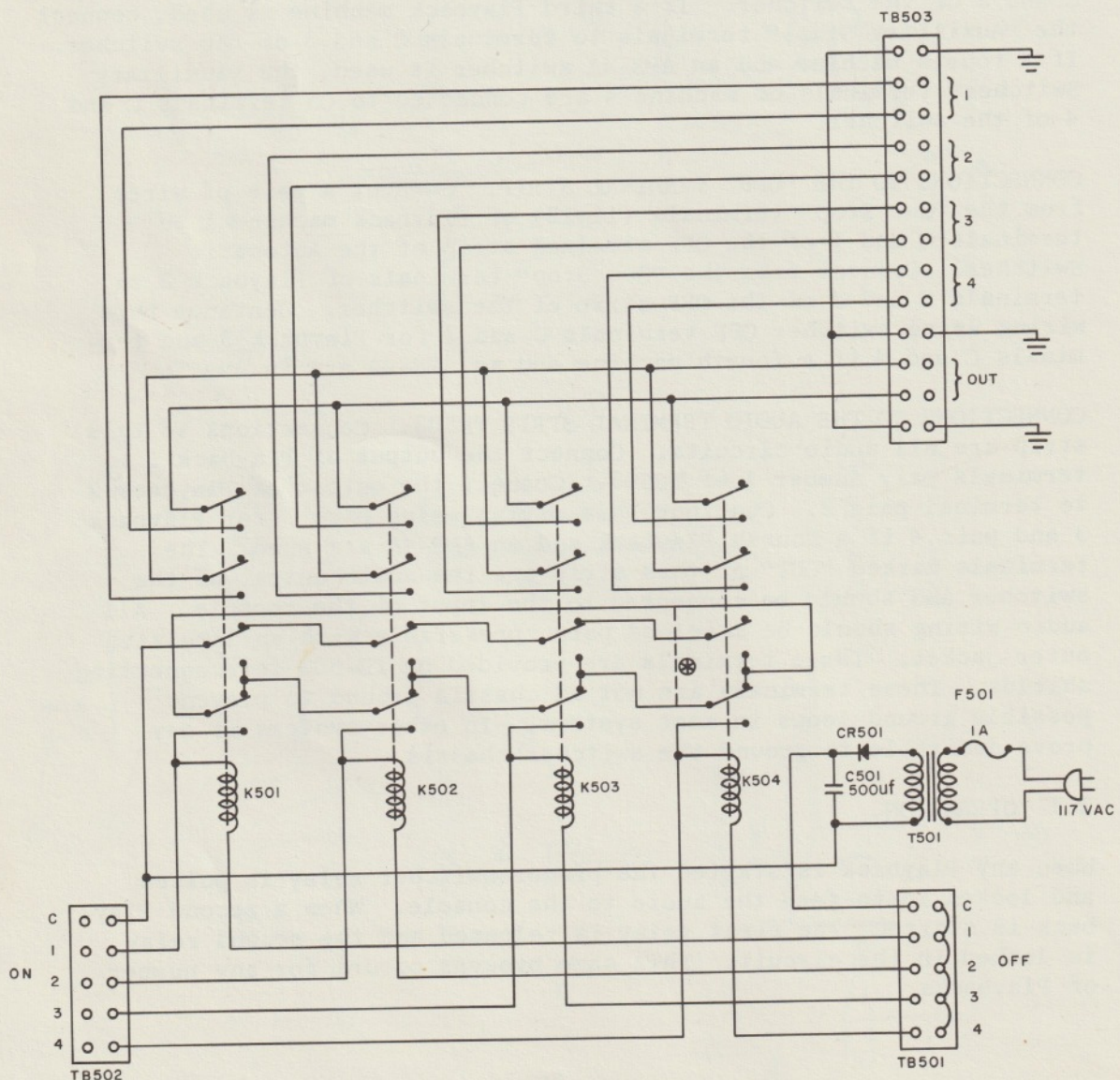
2.1 OPERATION.

When any Playback is started the proper switcher relay is pulsed and locked in to feed the audio to the console. When a second Playback is started, the first relay is released and the second relay is locked in the circuit. This same process occurs for any number of Playbacks.

The only function of the "OFF" connections is to release the last relay after the last tape has cued. Obviously this feature could be omitted if desired. Should this be done it would be necessary to short the pairs of the "OFF" strip for the channels used. These units are shipped with these shorts in place. They should be removed if the "OFF" or disconnect feature is used. This automatic disconnect feature will perform the function of disconnecting, from the mixer, any unit which is not actually in use. This is particularly desirable where the switcher output is worked into a continuously open console fader. In this case, should an undesirable "OFF" switching transient develop, it may be desirable to place .01 condensers across each "OFF" circuit. Connections to the "OFF" and "ON" terminals are D-C control functions.

3.1 MAINTENANCE

If dust covers are kept in place no maintenance is required.



⊗ NOTE 1. CONNECTION FOR AMS-3A ONLY
NOTE 2. K504 & ASSOCIATED WIRING
USED ONLY FOR AMS-4A

AUTOMATIC SWITCHER SCHEMATIC DIAGRAM

UNIT INSTRUCTIONS

MAGNETIC TAPE CARTRIDGE

1.1 OPERATION

The cartridge consists of an endless loop of lubricated tape on a free-turning hub. The tape loops out from the center, travels around the left guide post, across the heads and around the right guide to be wound back on the outside of supply hub.

2.1 LOADING

2.1.1 OPEN CARTRIDGE. Refer to Figure 5-1.

1. The center screw is removed from the cover.
2. The cover is taken off.
3. The wire guide is removed.
4. The reel can then be lifted out.
5. Roll on reel the desired amount of tape with oxide out. See Figure 5-2.
6. Remove about 5 inches of tape from the center of the reel and about 5 inches from the outside of the reel. See Figure 5-3.
7. Splice in normal manner on the side of tape away from the heads with mylar base splicing tape.

2.1.2 CLOSE CARTRIDGE.

1. Place reel in cartridge with the cartridge head openings facing you.
2. With one hand release the spring brake and pull tape from the center until slack is taken up. See Figure 5-4.
3. Place tape around guide post through front guide slots and left guide.
4. Place wire guide under tape coming from center hub, place ends of wire in their respective slots.
5. Put cover in place, being sure wire guide is in place and that lid is not pinching tape.
6. Insert center screw.
7. Place in Playback Unit and run through several times. In some cases there is a slight jerking of tape as it comes off center hub until center slack has worked to the outside where it will disappear.
8. If the cartridge is placed in use without preliminary running there may be a slight tendency for the tape to drag and wow.

2.2 NEW CARTRIDGES.

2.2.1 PRE-RUNNING. New cartridges should be visually inspected for loose mounting screws, pressure pads and possible shipping damage. The tape should be in the proper operating path. After this inspection the cartridge should be run two to four times to insure smooth pull-out of the tape from the inner cartridge hub. If cartridges are placed in use without preliminary running there may be a tendency for the tape to drag and wow.

3.1 MAINTENANCE

Proper maintenance of all sizes of Automatic Tape Control cartridges is necessary to insure proper operation. Cartridges that have been roughly handled can become out of adjustment with subsequent malfunction in use. A cartridge that has been dropped should be run in a Playback machine to insure proper operation.

Many problems which might appear to originate with tape cartridges can often be traced to simple maladjustment of the Tape Transport mechanism. An improperly adjusted or worn pressure roller, improper head alignment, dirty heads, improper adjustment of head bracket assembly, cartridge stop or cartridge guide can cause recording and playback difficulties.

3.1.1 PRESSURE PADS. Pressure pads of Automatic Tape Control cartridges must be properly bent until they are $1/8$ of an inch from the edge of the cartridge case. See Figure 5-5. If they are not properly bent, low level recordings and missing cues can result. If, through use, pressure pads become loose in the cartridge, resulting in loss or deviation from the proper horizontal plane, a drop of any good grade service cement or household cement on the plastic spring-mounting boss will hold the springs securely.

3.1.2 LENGTH OF LOOP. Over extended periods of use, magnetic recording tape will loosen slightly due to a smoothing out of the coatings. This looseness will become apparent in one of two ways. See Figure 5-6.

- a. Tape loops out of drive capstan slot.
- b. Tape will be visibly loose on the reel.

When one of the above conditions exist, the possibility of malfunction will increase and the condition should be corrected immediately. Proceed as follows:

1. Remove the center screw and lift cover.
2. With one hand, release the spring brake and pull tape from center until splice in the loop is visible.
3. Cut the tape on the old splice and take out 2 to 4 inches of tape depending upon the degree of looseness determined.
4. Close cartridge (as described above). Make sure tape is in its original travel path.
5. Place cartridge in Playback Unit and run through several times before placing back in service.
6. If the tape is too tight, the tape will have a tendency to wow. The same procedure is followed as when the tape was too loose, But instead of removing tape from the loop, unwind one turn of tape from the outside of the reel thereby increasing the amount of tape in the loop and re-splice.

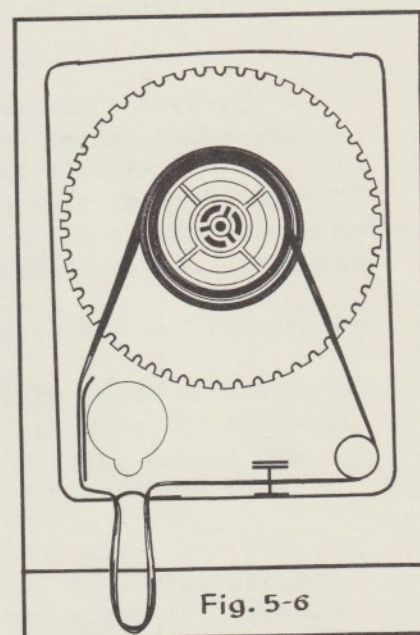
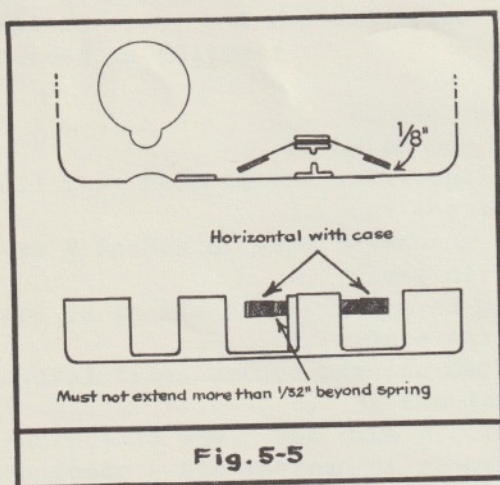
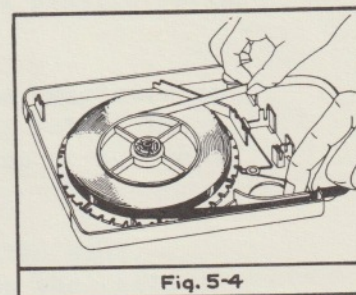
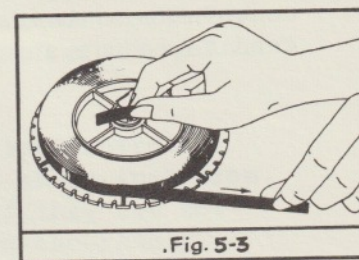
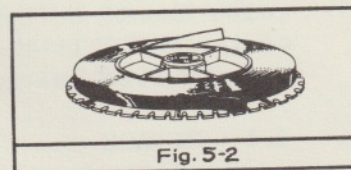
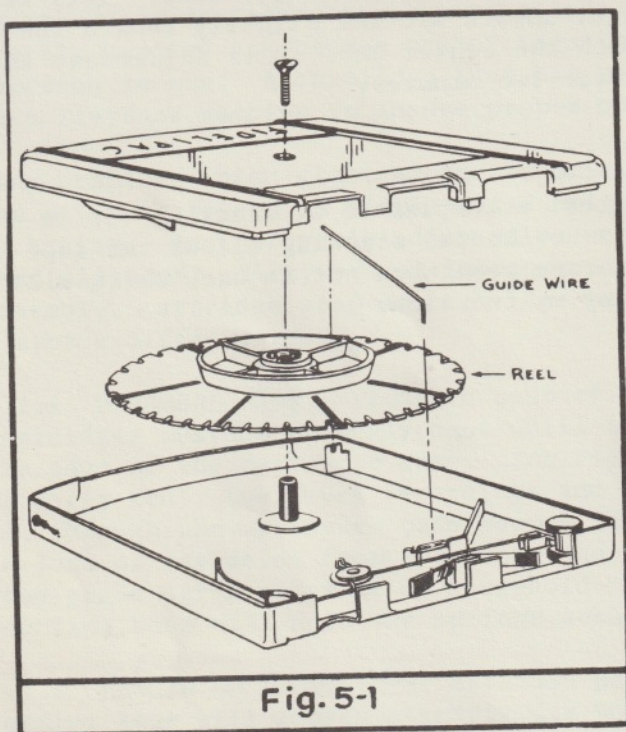
3.1.3 FEATHERING OF THE TAPE. If inspection reveals a "feathering" or slight wrinkling of the magnetic tape on either edge, the transport assembly should be examined carefully to determine if the positions of the Cue Head or the Record-Play Head may be either too high or too low, allowing the tape to abraid on the head cases.

3.1.4 GUIDE SPRING. The wire tape guide spring located on the left side of the tape cartridge and serving to control the pull-out of the inner convolution of tape must be in proper adjustment. This wire guide should be bent in a slight upward arc and slightly toward the center hub. It should not touch the center hub. This adjustment is not required on tape lengths over two minutes.

4.1 STORAGE

Storage of tape cartridges is best accomplished by stacking top to bottom in an appropriate rack. Horizontal stacking allows the tape convolutions to rest on the storage reel when not in use, which will tend to reduce any incidences of malfunction.

5.1 ILLUSTRATIONS OF CARTRIDGES



UNIT INSTRUCTIONS

REMOTE CONTROL PANEL

RC-P-4 RC-RA

1.1 INSTALLATION

RC-P-4 REMOTE CONTROL PANEL. A pair of wires is connected from the "Remote Start" terminals of Playback 1 to terminals 1-2 of the Remote Control Panel. The "Remote Start" terminals of machine 2 are connected to Remote Control Panel terminals 3-4. The "Remote Start" terminals of machine 3 are connected to Remote Control Panel terminals 5-6. The "Remote Start" terminals of machine 4 are connected to Remote Control Panel terminals 7-8.

RC-RA REMOTE CONTROL PANEL. From an inter-connected playback unit-recording amplifier combination, a pair of wires is connected to the "Remote Start" terminals of the playback unit from terminals 1-2 of the Remote Control Panel. The "Remote Set" terminals, located on the back of the recording amplifier, are connected to terminals 3-4 of the Remote Control Panel. The "Remote Auxiliary Tone" terminals of the recording amplifier are connected to terminals 5-6 of the Remote Control Panel. The "Remote Stop" terminals of the playback unit are connected to terminals 7-8 of the Remote Control Panel. The external jumper between terminals 6-7 of TB-201, at the rear of the playback unit, must be removed for "Remote Stop".

The connections to the Remote Control Panel are numbered on the back of the panel.

2.1 OPERATION

RC-P-4 REMOTE CONTROL PANEL. This unit is used when it is desired to control up to four playback units from a remote location.

RC-RA REMOTE CONTROL PANEL. This unit is used when it is desired to control a record-playback combination from a remote location.

3.1 MAINTENANCE

None required

