

INSTRUCTIONS FOR INSTALLING AND OPERATING THE GATES CARTRITAPE II SYSTEM

Consisting of:

- M6211G-PLAYBACK UNIT, MONAURAL
- M6212C-PLAYBACK UNIT, STEREO
- M6213I-RECORD/PLAYBACK UNIT, MONAURAL
- M6214F-RECORD/PLAYBACK UNIT, STEREO
- M6219-AUTOMATIC AUDIO SWITCHER
- M6221-REMOTE UNIT (PLAYBACK)
- M6234-REMOTE UNIT (RECORD)



**HARRIS
INTERTYPE
CORPORATION**

GATES RADIO COMPANY

A Subsidiary of Harris-Intertype Corporation
QUINCY, ILLINOIS

Offices: NEW YORK, HOUSTON, LOS ANGELES, WASHINGTON, D. C. Export: ROCKE INTERNATIONAL CORP., NEW YORK CITY. In Canada: CANADIAN MARCONI COMPANY, MONTREAL

TECHNICAL DATA

System Frequency Response:

+2 db from 50 cps to 12Kc
+4 db from 50 cps to 15 Kc

Equalization: Standard NAB Curve

Harmonic Distortion:

Less than 1% at normal record level (limited by tape)

Noise:

-50 db

Wow and Flutter:

0.2% maximum

Output Level:

-15 dbm, adjustable

Output Impedance:

600 ohms and 150 ohms, balanced (factory wired for 600 ohms)

Speed:

7-1/2 ips \pm .04%

Cartridge Handling Capacity:

All 3 standard size cartridges.

Record Amplifier Input:

Minimum: -20 dbm @ 150/600 ohms matching for 100% on VU meter.

Maximum: +4 to +18 dbm, 10K ohm bridging

Impedances: 600 ohms or 150 ohms (factory wired for 600 ohms)

Cue Signals:

Tone one: 1Kc automatically recorded at the start of the recording to cue up tape for playback.

Tone two: 150 cycles automatically recorded at the end of the recording, to be used for automatic starting of auxiliary equipment.

Tone three: 8Kc may be recorded when desired at any time during the recording. This tone can be used for actuating auxiliary equipment such as slides and film projectors.

Ambient Temperature:

+55°C Maximum

Maximum Power Required:

M6211F - 35 watts

M6213I - 40 watts

Dimensions and Weight:

Playback M6211F

Height: 5-1/4"
Depth: 16-1/2"
Width: 12"
Weight: 21 lbs.

Record Playback Unit M6213I

Height: 5-1/4"
Depth: 16-1/2"
Width: 17"
Weight: 33 lbs.

Switcher M6219 -

Height: 1-3/4"
Depth: 8-5/8"
Width: 15"
Weight: 8 lbs.

Remote Unit M6221, M6234 -

Height: 2-3/4"
Depth: 5-7/8"
Width: 5-3/4"
Weight: 2 lbs.

Switcher M6219 -

Input Capacity: 4 channels
Crosstalk between channels: -65 db or better.

Remote Unit M6221 Playback -

Facilities for remote starting of 4 playback units with lamp status indication.

Remote Record Unit M6234 -

Duplicates all the switching on the M6213C Record Playback Unit including status lights.

DESCRIPTION

The Gates Carritape II System consists basically of the M6213I Record Playback Unit. This unit records and reproduces tape cartridges that are loaded with a continuous loop of recording tape. This tape varies in length to produce different playing times.

The Playback Unit is completely transistorized and utilizes printed glass epoxy chassis that are plug-in modules. The record amplifier attaches to the side of the playback unit to become a record playback unit.

The automatic switch, or M6219, is available to provide automatic switching of up to four playback unit outputs into on console input.

A maximum of four playback or record/playback units may be serviced by one switcher. Switchers may be connected in tandem to accommodate more than four playback units. The M6221 playback remote control unit is available for remotely starting four playback units.

The M6234 record remote unit will provide remote starting functions for a complete record playback unit. The playback units are designed to be installed in either 19" rack mounting or convenient desk mounting.

The following chart lists the equipment for a basic system and all the accessories that are required for different combinations of units.

Qty.	Unit	M Number
1	Record/Playback Unit	M6213I
1	Record/Playback Unit	M6213I
2-3	Playback Units	M6211F
1	Switcher	M6219

Accessories:

Remote Unit Playback (four start pushbuttons w/run illumination lights) M6221
 Remote Unit Record Playback Unit (provides complete remote control switching for 1 record/playback unit, M6213I . . . M6234

Cue Amplifiers:

1 Kc (Stop) M6216C
 150 cps (end of message) M6216A
 8 Kc (Random) M6216B
 Program Amplifier M6215
 Cartridge Storage Rack (40 cap.) M5986
 Tape Eraser 730-0102-000

Cartridges:

<u>Time</u>	<u>Model</u>	<u>Gates Number</u>
EMPTY	F-300	732-0044-000
40 Sec.	F-300A	732-0045-000
70 Sec.	F-300B	732-0046-000
100 Sec.	F-300C	732-0047-000
3-1/2 Min.	F-300D	732-0048-000
5-1/2 Min.	F-300E	732-0049-000
10-1/2 Min.	F-300G	732-0050-000
Empty	F-600	732-0051-000
16 Min.	F-600H	732-0052-000
Empty	F-1200	732-0053-000
31 Min.	F-1200J	732-0054-000

INSTALLATION**Unpacking -**

The equipment will be received in safe transient shipping cartons. Unpack the contents carefully and examine thoroughly for shipping damage. If any such damage is found, file a claim report immediately with the carrier.

The Record/Playback and Playback Units are shipped ready for desk top operation or 19" rack mounting. In either case 5-1/4" of panel space is required.

1. For desk top mounting install the four rubber feet to the bottom panel of the Playback Unit in the holes provided. Use 6-32 x 1/2" hardware shipped with the unit.
2. For 19" rack mounting attach the angles and extension panel to the sides of the unit. With the 10-32 hardware provided, using a shakeproof washer under each screw head.

Installation of Plug-in Amplifiers and Relays -

The units are shipped with one Program Amplifier and the 1Kc Cue Amplifier installed. The additional Amplifiers and Record Amplifier relays are shipped separate for the two and three tone units.

In the Playback Unit - to add the second tone, plug the M6216A (150 cps) board into the track marked 150 cps.

To add the third tone, plug the M6216B (8Kc) board into the track marked 8 Kc.

In the Record Amplifier - to add the second tone, plug a 574-0106-000 relay into the socket marked 150 cps. (Remove jumper).

Wiring Instructions -

Observe drawing 842 3721 001 for the multi-system wiring diagram. This drawing shows one Record Playback Unit, together with three Playback Units, one Switcher, one Playback Remote and one Record Remote wired into a system. Notice that the units are designated as A, B and C.

Audio Output Connections -

As shown on drawing 842 3614 001, the audio output appears between pins 1 and 2 on P110 of each playback unit. The level obtained from this point has been set at the factory for a -15 dbm from a normally recorded tape. If a lower output level is desired, adjust R15 on the printed playback chassis.

Audio Output Impedance -

The Playback Amplifier is wired at the factory for 600 ohms output. Observe drawing 838 0218 001 for strapping information for 150 ohm output.

Audio Input (Record Amplifier) -

The Record Amplifier Input provides a balanced 500/600 ohm input for -20 dbm or will bridge a balanced line up to +8 dbm. Observe drawing 842 3746 001 for this wiring information.

Switcher and Remote Unit Wiring Information -

This information can be found on drawing 842 3721 001, which is the Carritape II System Wiring diagram.

Installation of more than One Automatic Audio Switcher -

Observe drawing 838 0435 001 for the installation instructions for connecting multiple switchers in tandem.

Second and Third Tone Relay Contacts -

The output jack for control circuits on each playback unit is J109. The contacts on the control relays actuated by the second and third tones are brought out on this jack. The 150 cycles "end of message" relay contacts can be found on terminals 4, 5 and 6. Terminal 4 is the normally open contact, terminal 5 is the common contact and terminal 6 is the normally closed contact. The random cue relay terminals (8 Kc) are connected to pins 7, 8 and 9. Complete information is contained on schematic drawing 842 3614 001. The 150 cycle and 8 Kc relays do not perform any function in the basic playback system. They are available in Carritape II for automated operations allowing additional playback units to be started in sequence or to provide immediate switching for external equipment. Since Carritape II provides this complete flexibility of operation, only the basic control wiring is shown on drawing 842 3721 001. This control flexibility allows the station engineer to use the facilities of Carritape II to best advantage as required for his particular station's installation.

OPERATION

Tape Eraser -

Cartridge tape recorders do not utilize erase heads. Therefore, a bulk eraser is required to degauss tape cartridges prior to recording. A bulk tape eraser, such as Gates No. 730 0102 000, is recommended to properly erase the tape. Place the tape eraser on top of a cartridge and make circular motions. This should be done to the bottom and front edge of the cartridge as well. Continue this operation for approximately 15 seconds. Then slowly remove the eraser from the cartridge to a distance of about three feet with a slow, steady withdrawal. Only then should the power be removed from the tape eraser.

PLAYBACK UNIT- M6211G

Function

Ready Light	Part of S102	White, glows when cartridge is inserted properly.
Start "O"	S103	After a cartridge is inserted into the machine, pressing this switch begins tape motion.
Run Light	Part of S103	Amber, glows while tape is running.
Stop Switch "S"	S102	White, depress to stop tape motion. (Normal operation would be to allow tape to recue)

RECORD AMPLIFIER (Part of M6213J)

Function

Record Set "R"	S204	Amber, depressing this push-button readies the record/playback combination for recording.
Record Mode	Part of S204	Amber light, when illuminated indicates unit is not ready to record.
Record Stop "S"	S203	White, to stop recording process and automatically record second 200 cps tone.
Record Indication	Part of S203	White, indicates unit is in the record mode when lit.
Random Tone	S205	Red pushbutton. Actuates application of third tone during the record process.
Random Tone Record Indication	Part of S205	Red illumination, momentary. Indicates random cue tone has been applied to tape.

To Record -

Adjust the variable width cartridge slot opening by grasping the large knob adjacent to the cartridge slot with the thumb and second finger while pulling the top lever forward with the index finger to release the lock. Set the slot width to the desired size. Insert an erased cartridge into the slot and press forward until the cartridge rests against the stop and the ready light comes on.

Feed audio to the Record Amplifier and adjust the level control so peaks read 100% on the VU meter. Press the record set (Amber "R") on the Record Amplifier. This readies the system for the recording process. Cue the audio and start the recording by pressing "operate" (Amber "O") on the Playback Unit.

The 1Kc stop tone is automatically recorded at the beginning of the recording. If the random (8 Kc) cue tone is to be used, it may be applied at any time during the recording. To do so, press the red ("T") switch momentarily every time a pulse is desired.

When the time has arrived to conclude the recording, press the white ("S") on the recording amplifier. This will stop the recording process and in a two tone system automatically insert the second or 150 cps "end of message" cue tone. The tape will continue to run and cue itself up for playback.

NOTE: DURING THE RECORDING PROCESS TIMESWITCHER (M6219) IS DISCONNECTED BY K201 CONTACTS 3-11

Multiple Segments on One Cartridge -

To record more than one segment end-to-end on a single cartridge, press the white stop button ("S") on the playback approximately five seconds after the audio ceases on the first segment. Then repeat prescribed record process. A five second spacing between recorded segments should be allowed to make sure all cue tones on the end of the previous recording have safely passed the playback head to prevent erratic operation.

CAUTION! PLEASE READ - It is necessary to press "record stop" at the end of the audio to remove the bias from the record head. Otherwise the cartridge may not recue due to cue tone erasure by the bias applied to the record head.

To Playback -

Insert a previously recorded cartridge into a playback until it comes to rest against its stop and the ready light comes on. Press the operate ("O") switch and the recorded segment will play back. Allow the cartridge to run and recue itself.

Trouble Shooting -

- 1 - Check system wiring diagram 842 3721 001.
 - A. Have all the interconnecting wires been installed?
 - B. Have the Indicated Jumpers been removed?
 - C. Have incorrect jumpers been removed?
 - D. Is power applied to all units?
 - E. Are all the fuses intact?
 - F. Are the recorder input levels too high? Check sound quality at record monitor jack.
 - G. High hum in Record Amplifier? Turn A.C. power cord over.

11 - Problems related to cartridges.

- A. Poor sound quality. Poor head contact. Cartridge pressure pads misaligned.
- B. Crosstalk or level variation. Corner post in cartridge has popped up, misaligning tape past record head.

MAINTENANCE GUIDE

INTRODUCTION

This guide has been prepared so that a maintenance schedule can be instituted to suit the demands of the station. The only maintenance system that provides the necessary reliability is PREVENTATIVE MAINTENANCE. Much has been written on this subject but a brief explanation is in order.

PREVENTATIVE MAINTENANCE

Preventative maintenance is different from repairing or general maintenance in that the maintenance work is applied before there is a failure. By adopting a schedule of routine preventative maintenance very few on-air failures will occur.

LUBRICATION

1. The bearings used in the motor, flywheel, and pressure roller are permanently lubricated and should require no lubrication. They may be lubricated, however, approximately every six months. When lubrication is used - extreme care should be exercised to keep it from contacting the rubber pinch roller.

2. A fine oil may be used to lubricate the motor and capstan bearings. Molykote Type G, should be used to lubricate the following. Refer to Fig. 1.

1. Pressure roller shaft.
2. Solenoid plunger.
3. Toggle Pawl.
4. Lifter cam surface.

The pivot points should be lubricated with machine oil.

REMOVAL OF THE TAPE DECK ASSEMBLY

If it should become necessary to remove the tape deck assembly proceed as follows:

1. Loosen the four screws on TB101 and take off the wires. Do not take the screws all the way out. When putting these wires back on the terminal use care to match up the wire numbers.
2. Remove the four nuts and washers which secure the front casting to the unit. Then rotate the front casting until it clears the index adjust lever and lay it beside the unit.
3. Remove the five machine screws and cable clamp which

holds the tape deck to the main chassis.

4. Remove the three socket head cap screws which hold the head bracket assembly to the tape deck.

5. Remove the two machine screws holding the micro-switch to the tape deck. Also remove the screw holding the tie point and cable clamp.

6. Slide the tape deck forward and out of the unit.

CARE OF TAPE HEADS, CAPSTAN, AND PRESSURE ROLLER.

As a result of the lubricant used on the tape proper the following cleaning schedule should be used to assure continued high quality reproduction.

1. The tape heads should be cleaned daily to several times a week depending on the service. Wood or isopropyl alcohol may be used for cleaning. Place a cotton swab on a stick long enough to insert in the cartridge slot, moisten and carefully brush across the heads.

2. To clean the capstan and pressure roller the top cover of the unit must be removed. The lifter cam may then be used to raise the pressure roller above the tape deck surface for easy cleaning. Refer to Fig. 1. Use a cotton swab moistened with wood or isopropyl alcohol and clean the capstan and pressure roller surfaces. Inspect the roller for free turning on the bearing and degradation of the rubber parts. If the roller is worn or deformed, inadequate pressure will produce wow, poor starting and slow speed. Replace with Gates part #730-0307-000.

3. Tape heads may become magnetized by large unbalanced pulses through the record head, as well as from strong magnetic fields. Do not saturate the record amplifier with abnormally high input signals. Magnetized heads produce excessively high noise on the recorded tape and if severe enough will partially erase them. Thus, the heads should be demagnetized weekly.

BELT REPLACEMENT

In order to replace the drive belts the top and bottom covers of the unit must be removed. It is best that the unit is set on its side to perform this function.

1. If the old belts are to be removed, take them off of the flywheel. At this point a stiff piece of wire with a small hook on one end is very useful. Then using the hook on the wire pull the old belts up through the pulley cutout from the top.

2. Feed the new belts, one at a time, down through the pulley cutout and place them around the pulley. Use the wire to pull the belts down through the bottom and then place them around the flywheel.

HEAD REPLACEMENT

1. To replace heads remove the pin clips from the pins

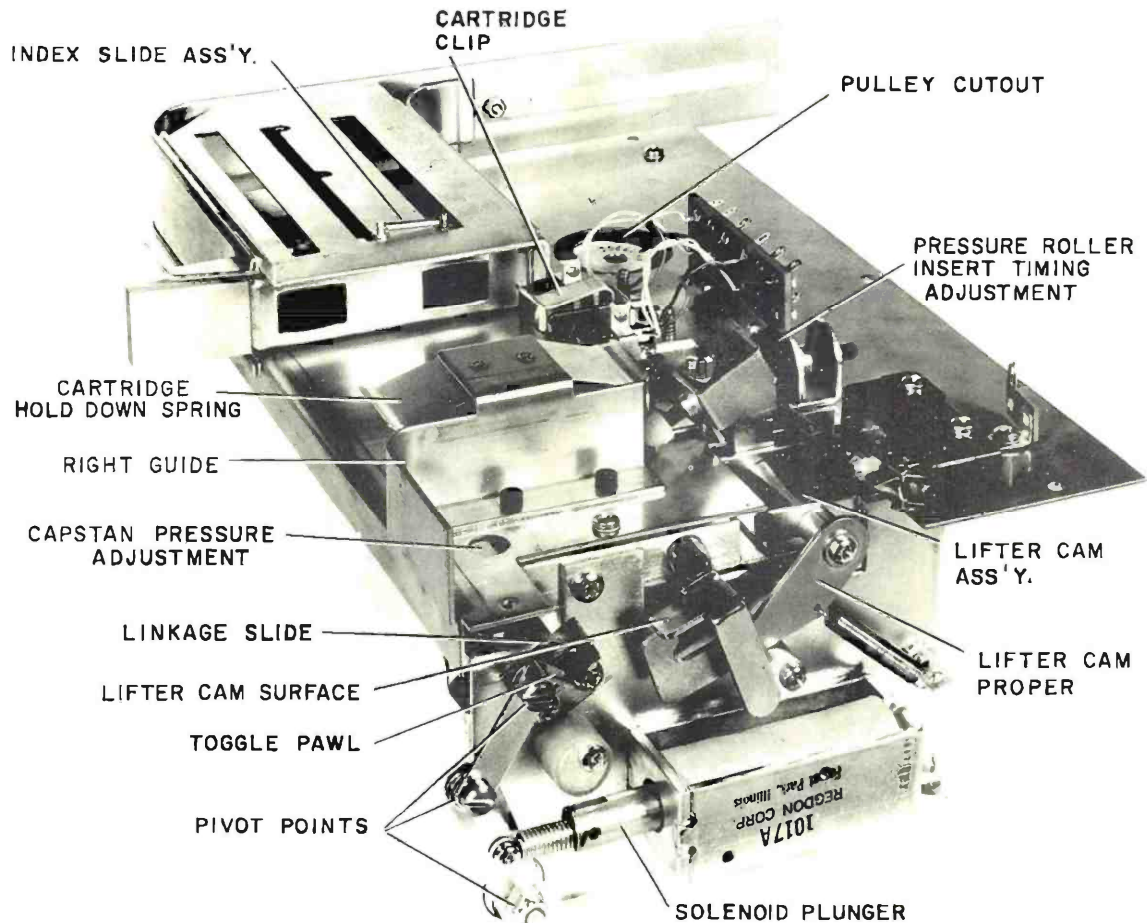


FIG. 1

which are on the rear of the heads. Make a note of the wire color code to make sure they are reinstalled correctly.

2. Loosen the head clamp and remove the head. After the new head is installed refer to Fig. 3 for proper placement.

3. For the final adjustment of the heads a azimuth tape is required. The Gates 732 0169 000 azimuth tape is available for this purpose. Using a meter to read the output level adjust the playback head for maximum output. Record a 15 KC signal, and again read the output level of the playback amplifier, and adjust the record head for maximum output. It is important that the playback head azimuth is adjusted first and then record head.

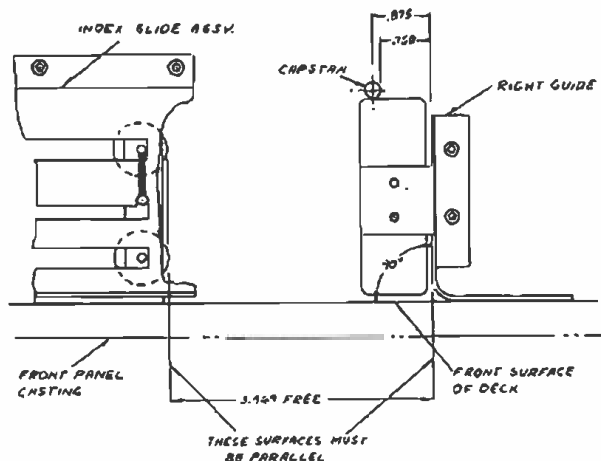


FIG. 2

ELECTRONIC ADJUSTMENTS

1. Repeat Record Bias Current Reading:
Correct Bias Current reads on your VU meter.

2. A.C. Bias Level Adjustment.

The A.C. bias control is a trimmer capacitor located under the recorder chassis. To set the bias remove the bottom cover of the recorder and proceed as follows:

- Connect a 1 KC signal to the input of the recorder. Adjust the level until the VU meter reads zero or 100%.
- Insert a bulk-erased tape cartridge into the playback unit.
- Connect an output meter to the output terminals. Adjust the meter range so that -15 dbm can be used.
- While recording a 1 KC signal adjust the bias level as read on the meter. (For the left channel (or mono) use C201 to set bias and C202 for the right channel.)
- Increase the bias to provide -1/2 to 1 db reduction in the 1 KC recorded level. The bias is now properly adjusted.

3. Playback Gain.

The playback gain is set at the factory for a output level of -15 dbm. This control is a small trimpot (R15) located

on the playback amplifier board and is adjustable from the back of the unit.

4. Bias Trap Adjustment.

Should these traps be replaced or mistuned in the field they may be retuned as follows:

- Connect an oscilloscope to J202, Pin L in the case of the left channel, J203 pin L in the case of the right channel. Place the recorder in the record mode of operation and adjust L201 or L202 for minimum 75 KC bias signal observed in the scope.
- The bias oscillator frequency is set at the factory to approximately 75 KC.

5. V.U. Meter Calibration.

In order to calibrate the VU meter an audio oscillator and distortion meter will be needed.

- Connect a 400 cps signal to the input of the recorder and set the level 6 db above 0 on the VU meter.
- Using a bulk erased cartridge make a recording of the 400 cycle tone. It is best to use a cartridge 100 secs long.
- Playback the tape and measure the total harmonic distortion.
- Repeat steps (a) and (b) at various record levels until the total harmonic distortion is 3%.
- When the 3% point is found reduce the test oscillator output to the record amplifier by 6 db.
- Change the value of R8, a 7.5 K ohm fixed resistor, until the meter reads zero. This resistor is found on the recording amplifier plug-in board. The VU meter is now properly calibrated.

6. Distortion and Signal-To-Noise Ratio.

An audio oscillator and distortion meter is required to perform these measurements. Before these measurements are attempted the heads should be demagnetized, cleaned, and adjusted properly. An inspection should also be made to see if the pressure roller is properly adjusted.

- Using a cartridge that has been bulk-erased record a 400 cps tone using a level that is 6 db above zero on the VU meter. Refer to steps (a) through (e) under VU meter calibration until the 3% total harmonic distortion point is found.
- When the 3% third harmonic distortion point has been established note the output level of the playback amplifier. This will be the reference used to find the signal-to-noise ratio, and is normally approximately a -10 dbm.
- With no input signal applied to the recorder input make a blank recording using a cartridge that has been bulk-erased, making certain the input is properly terminated.

d. Playback this recording and measure the noise level at the output of the playback amplifier. The signal-to-noise ratio is the difference between the noise measured and the reference measured in step (b). This should be a -55 db or better for mono or -50 db for Stereo.

e. With the steps performed above reduce the input to the record amplifier 6 db, or for a reading of 0 on the VU meter. The total harmonic distortion should be about 1%.

7. Overall Frequency Response.

Before an attempt is made to make an overall frequency response the following should be done. The heads should be demagnetized, cleaned, and properly adjusted. The A.C. bias should be checked for this has an effect on response if misadjusted. Refer to A.C. bias level adjustment for this.

a. Connect an audio oscillator to the input of the record amplifier and set the record level for a -10 db as read on the VU meter.

b. Using a cartridge that has been bulk-erased make a recording using 400 cycles as the reference tone. Then record a short series of frequencies from 50 cps to 21 KC, making sure that the input signal is held at a constant level. Playback the tape and note the readings. The response should be approximately ± 3 db.

Factors Which Affect Frequency Response -

1. Head height and head positioning.
Refer to Fig. 3.
2. Azimuth.
3. Worn tape.
4. Pressure pads - as pad pressure is increased the high frequency output will increase until the point is reached where it will level out. Excessive pad pressure will cause wear to the heads as well as to the tape.

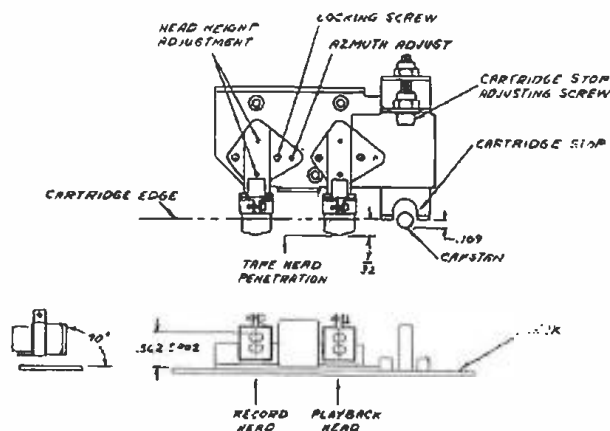


FIG. 3

5. A large accumulation of oxide on the heads will reduce high frequency output. This has the effect of holding the tape away from the heads.

8. Voltage Measurements.

Refer to the voltages shown on the schematic diagrams. Use a 20,000 ohms per voltmeter.

MECHANICAL ADJUSTMENTS

These adjustments are carefully made at the factory, however, a periodic checking is required to keep the unit in peak operating condition. This information is listed below (check every 6 months).

IMPORTANT - The following adjustments are described in the correct sequence of adjustment.

Right Guide Position

Observe Fig. 2 for details. The right guide should be square to the front of the deck, and .875 inches from the center of the capstan to the working edge.

Index Slide Assembly

Observe Fig. 2 for details. This assembly should be positioned parallel to the right guide and adjusted so that the rubber rollers compress a full $1/32$ " when a cartridge is inserted. Try several cartridges as they vary somewhat.

Cartridge Stop

Observe Fig. 3 for details. This stop prevents the capstan from rubbing on the cartridge. Adjust the stop to provide $1/32$ " of clearance between the capstan and the cartridge. Try a number of cartridges as they vary slightly.

Head Penetration

This should be checked every six months or whenever the heads are replaced. Observe Fig. 3 for details. Position the tape head in the head bracket so that it penetrates the cartridge $9/32$ ".

Head Height

This should be checked every 6 months or whenever the heads are replaced. Observe Fig. 3 for details. Adjust the head height by adjusting the two set screws front and rear. The correct head height is .562 inch, $\pm .002$ inch, to the top of the upper head piece. It is important that the front edge of the head be square with the deck surface.

Lifter Cam Position

Observe Fig. 4 for details. The lifter cam should be positioned so there is .020 inch, $\pm .005$ inch, clearance between the roller lever and the lifter cam. The shaft of the assembly should be parallel to the rear of the deck.

Cartridge Insert Timing (Pressure Roller Adjustment)

This adjustment should be checked every month. Observe Fig. 4 for details. Adjust the position of the nylon cap by turning the socket head cap screw. Insert a cartridge

and adjust for $1/64$ inch clearance between the capstan and the rubber pressure roller. Try several cartridges as they vary somewhat. There should be no tape creep.

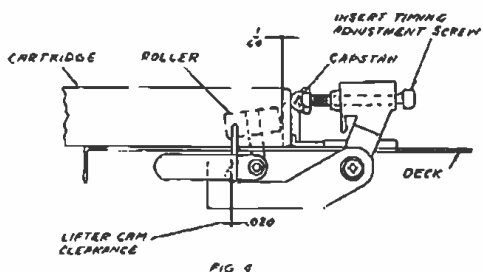


FIG 4

Capstan Pressure (Tape Pulling Force)

This adjustment should be checked once a month. Observe Fig. 5 for details. Turn the socket head cap screw indicated until $1/32$ inch compression of the rubber pressure roller is noted when the unit is in the RUN condition. If there is too much capstan pressure it will cause the machine to run slow.

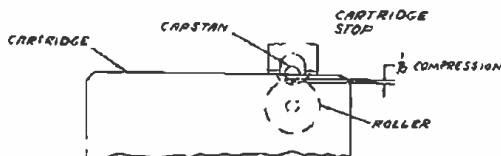


FIG 5

Solenoid Position (Tape Pulling Force)

This should be checked every six months. Observe Fig. 6 for details. The correct position of the solenoid provides $1/16$ to $1/32$ inch of spring stretch at the end of the solenoid plunger when seated.

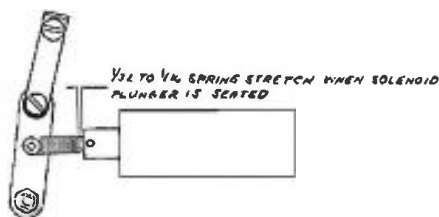


FIG. 6

Cartridge Adjustments

1. Pressure Pads -

The purpose of the pressure pads is to assure head-to-tape contact. When the cartridge is inserted into the heads they should insert far enough into the cartridge to push the pads so that they are approximately parallel to the heads.

2. Brake Release -

As the cartridge is inserted into the machine the brake wire is moved forward by the pressure roller shaft releasing the braking action on the reel. This wire should lie flush with the bottom of the cartridge case. If the wire is located too far into the center of the opening there is a possibility of the wire interfering with the pressure roller when the cartridge is inserted. This wire can be bent therefore checking for this condition is important.

3. Cartridge Reel -

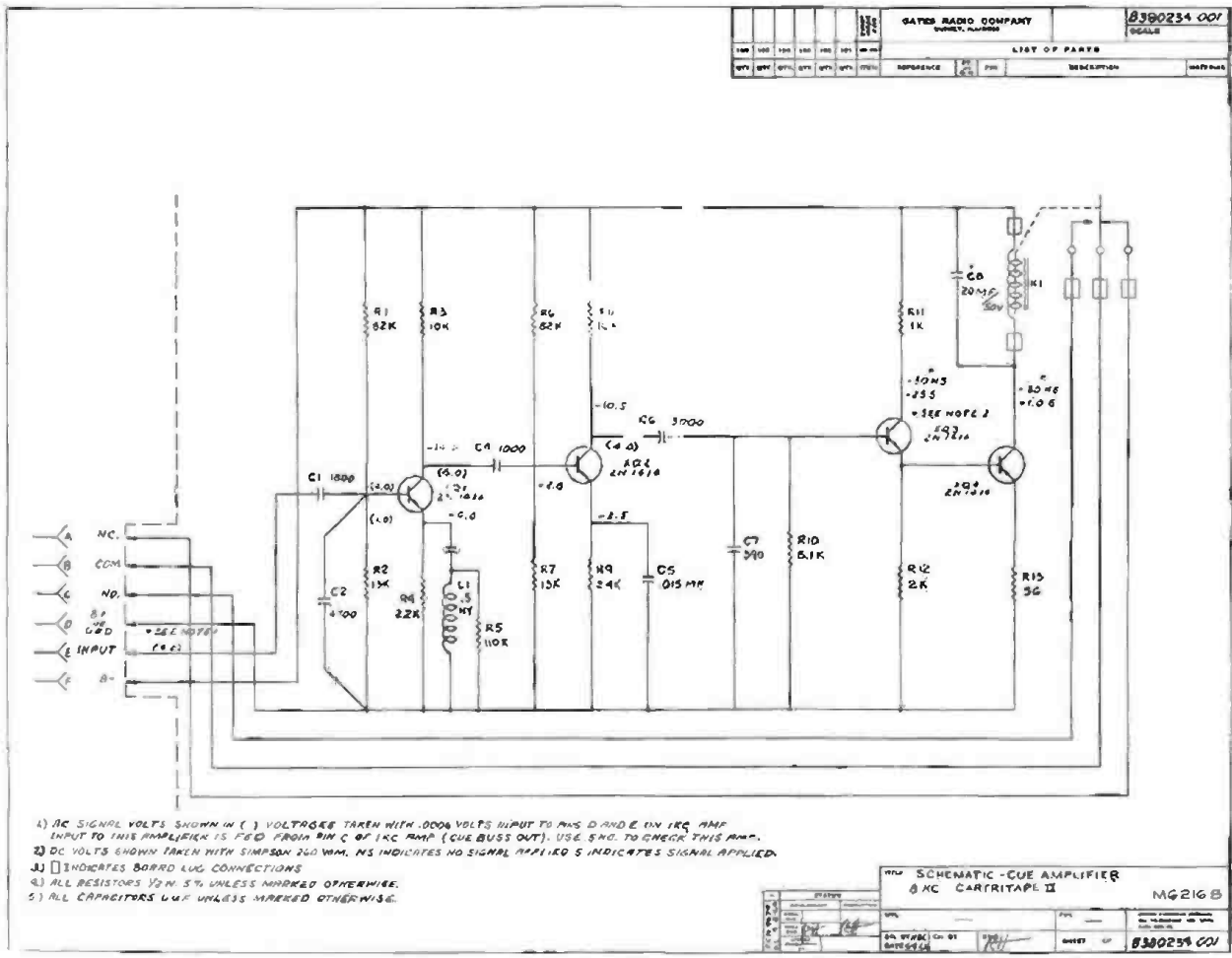
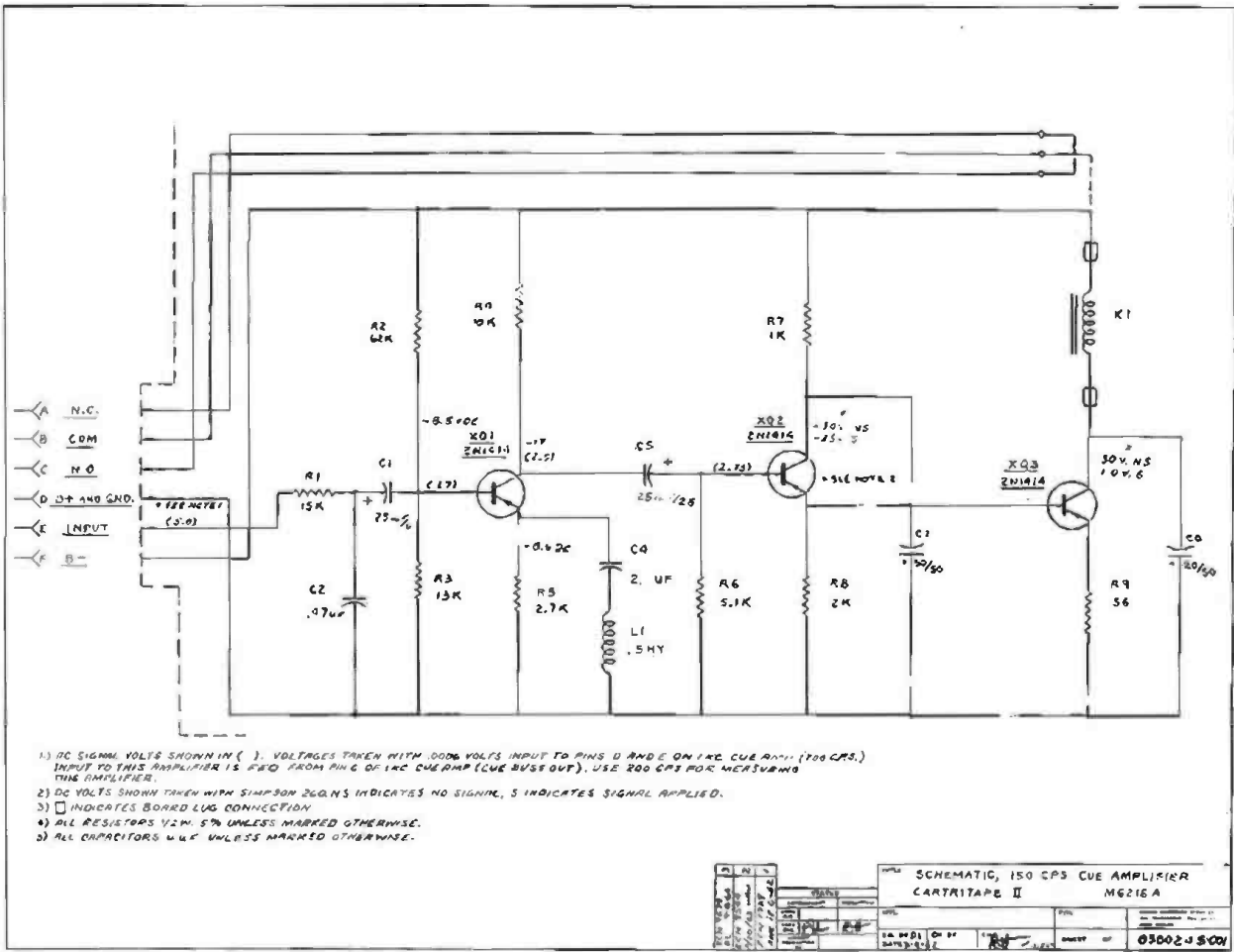
There are teflon washers supplied in each cartridge assembly and their purpose is to keep the reel level free from touching the bottom of the cartridge. If the reel should drag against the cartridge, the timing would be affected as well as increased wow and flutter content.

PARTS LIST

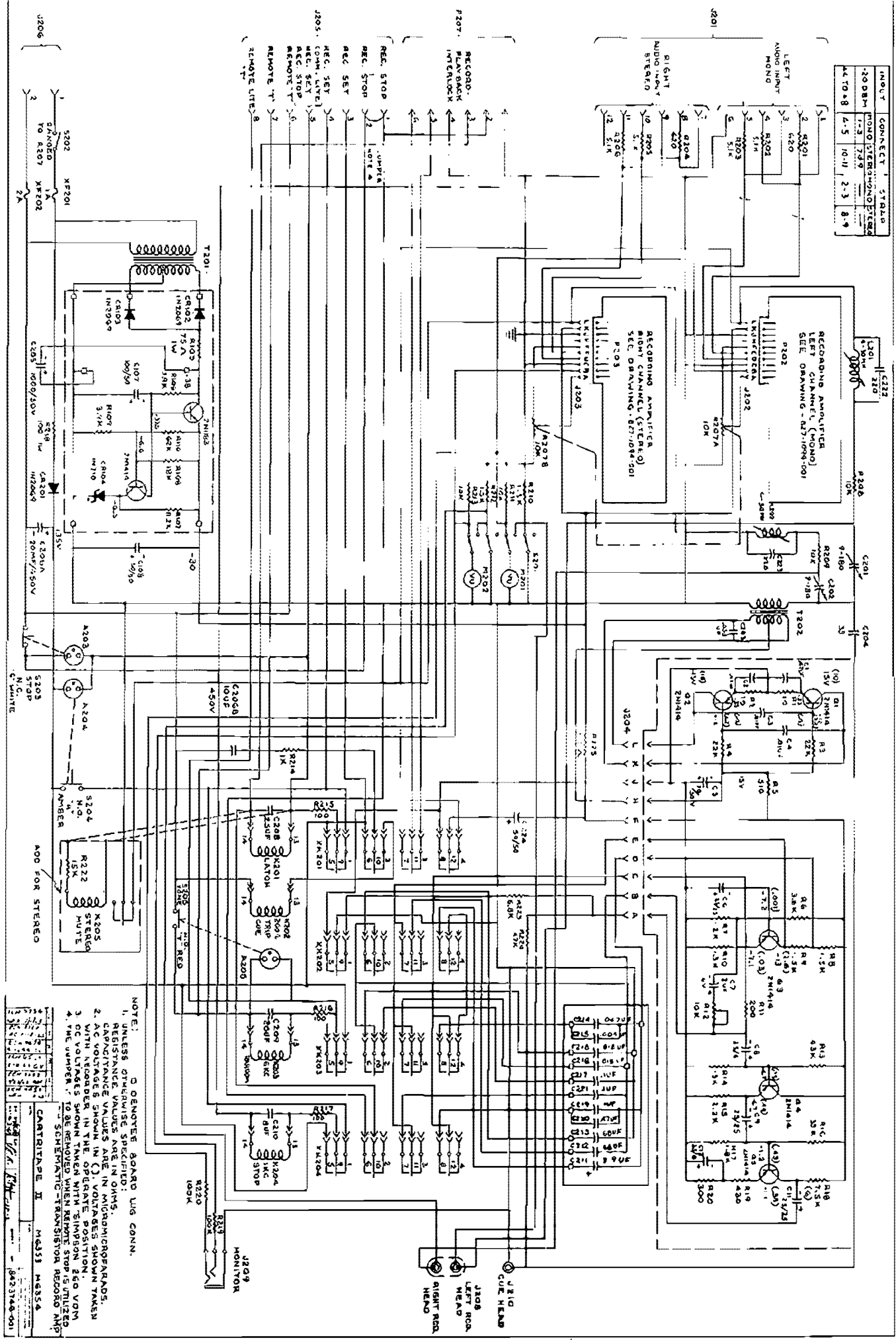
Symbol No.	Description	Part Number	Symbol No.	Description	Part Number
TRANSPORT PART			R107	Resistor, 8.2K ohm	540 0071 000
	Lever Arm Assembly	914 2159 001	R108	Resistor, 18K ohm	540 0079 000
	Complete Indexing Slide Assembly	937 9630 001	R110	Resistor, 62K ohm	540 0092 000
	Pressure Roller	730 0307 000	XQ101	Socket	404 0149 000
	Roller Lever	813 6244 001	XQ102,		
	Toggle Pawl	813 3877 001	XCR104	Socket	404 0066 000
	Toggle Lever	813 3878 001	150 CPS CUE AMPLIFIER M-6216A		
	Toggle Socket	813 3875 001	C1	Capacitor, 25 uf	522 0178 000
	Torsion Spring	813 4326 001	C2	Capacitor, .47 uf	508 0267 000
	Shoulder Screw	813 3881 001	C4	Capacitor, 2 uf	522 0215 000
	Spring Solenoid Tension	456 0001 000	C5	Capacitor, 25 uf	522 0242 000
	Head Bracket Assembly	927 1116 001	C6	Capacitor, 20 uf	522 0256 000
	Motor 50/60 cps	436 0050 000	C7	Capacitor, 50 uf	522 0258 000
	Pulley 60 cps	730 0393 000	K1	Relay	578 0006 000
	Pulley 50 cps	730 0394 000	L1	Toroid Coil	492 0056 000
	Belt, Motor	730 0228 000	Q1,Q2,Q3	Transistor 2N1414	380 0014 000
	Capstan and Flywheel and Bearing Assy.	730 0395 000	R1	Resistor, 15K ohm	540 0077 000
ELECTRICAL PARTS PLAYBACK UNIT M6211/M6212			R2	Resistor, 62K ohm	540 0092 000
C101,C103	Capacitor, .25 uf	508 0269 000	R3	Resistor, 13K ohm	540 0076 000
C102	Capacitor, 30-30 uf	522 0320 000	R4	Resistor, 10K ohm	540 0073 000
C104	Capacitor, .1 uf	508 0270 000	R5	Resistor, 2700ohm	540 0059 000
C105	Capacitor, 40 uf	522 0301 000	R6	Resistor, 5100 ohms	540 0066 000
C106	Capacitor, 1000 uf	524 0100 000	R7	Resistor, 1000 ohm	540 0049 000
C109	Capacitor, 5 uf (motor starting)	510 0410 000	R8	Resistor, 2000 ohm	540 0056 000
CR101	Diode 1N2070	384 0019 000	R9	Resistor, 56 ohm	540 0019 000
CR105	Diode 1N2071	384 0020 000	XQ1, XQ2,		
F101	Fuse 1 amp. Slo-Blo	398 0054 000	XQ3	Socket	404 0066 000
F102	Fuse 2 amp. Slo-Blo	398 0081 000	1KC CUE AMPLIFIER M-6216C		
J101	A.C. Receptacle	610 0401 000	C1	Capacitor, 22 uf	526 0002 000
J102, J103,			C2, C15	Capacitor, 20 uf	522 0256 000
J104, J105,			C3, C6	Capacitor, 25 uf	522 0242 000
J106, J107	Receptacle 6 terminal	612 0373 000	C4, C14	Capacitor, .22 uf	516 0386 000
J108	Receptacle 8 terminal	612 0005 000	C5, C7	Capacitor, 25 uf	522 0178 000
J109	Receptacle 10 terminal	612 0006 000	C8	Capacitor, .0015 uf	516 0059 000
J110, J107	Receptacle 6 terminal	612 0004 000	C9	Capacitor, .05 uf	508 0266 000
J111	Phone Jack	612 0280 000	C10	Capacitor, .04 uf	508 0253 000
K102	Relay	574 0108 000	C11, C12	Capacitor, .47 uf	516 0387 000
K101, K103	Relay	574 0106 000	C13	Capacitor, 50 uf	522 0258 000
L101	Solenoid	913 8946 001	K1	Relay SPDT	578 0006 000
P108	Plug 8 terminal	610 0099 000	L1	Toroid Coil	492 0056 000
P109	Plug 10 terminal	610 0100 000	Q1, Q2, Q3,		
P110	Plug 6 terminal	610 0098 000	Q4, Q5, Q6	Transistor, 2N1414	380 0014 000
R101	Resistor, 30 ohm	542 1068 000	R1	Resistor, 150K ohm	540 0101 000
R102	Resistor, 50 ohm	542 1067 000	R2	Resistor, 180K ohm	540 0103 000
R103	Resistor, 220 ohm	540 0033 000	R3	Resistor, 3600 ohm	540 0062 000
R104	Resistor, 100 ohm	540 0308 000	R4	Resistor, 6800 ohm	540 0069 000
R112, R111	Resistor, 100K ohm	540 0097 000	R5, R20	Resistor, 1000 ohm	540 0049 000
R113, R114	Resistor, 620 ohm	540 0044 000	R6	Resistor, 47K ohm	540 0089 000
R115	Resistor, 100 ohm	540 0166 000	R7	Resistor, 4700 ohm	540 0065 000
S101	Switch	604 0241 000	R8	Resistor, 100 ohm	540 0025 000
S102	Switch	604 0232 000	R9	Resistor, 18K ohm	540 0079 000
S103	Switch	604 0240 000	R10	Resistor, 1800 ohm	540 0055 000
T101	Transformer Power	472 0443 000	R11	Resistor, 62K ohm	540 0092 000
TB101	Terminal Board	614 0444 000	R12, R18	Resistor, 2400 ohm	540 0058 000
XK101, XK102,			R13, R14	Resistor, 22K ohm	540 0081 000
XK103	Socket, Relay	404 0160 000	R15	Resistor, 82K ohm	540 0095 000
XF101, XF102	Fuse Holder	402 0023 000	R16	Resistor, 13K ohm	540 0076 000
	Mono 2 Track Record-Playback Head	730 0729 000	R17	Resistor, 15K ohm	540 0077 000
	Stereo 3 Track Play-Back Head	730 0731 000	R19	Resistor, 5100 ohm	540 0066 000
	Stereo 3 Track Record Head	730 0730 000	R21	Resistor, 2000 ohm	540 0056 000
			R22	Resistor, 56 ohm	540 0019 000
30VDC POWER SUPPLY P.C. BOARD (PART OF M6211/M6212)			XQ1 thru		
C107,C108	Capacitor, 50 uf	522 0258 000	XQ6	Socket	404 0066 000
CR102, CR103	Diode 1N2069	384 0018 000	8KC CUE AMPLIFIER M-6216B		
CR104	Diode 1N710	386 0019 000	C1, C3	Capacitor, 1800 pf	516 0062 000
Q101	Transistor, 2N1183	380 0012 000	C2	Capacitor, 4700 pf	516 0072 000
Q102	Transistor, 2N1414	380 0014 000	C4	Capacitor, .001 uf	516 0054 000
R105	Resistor, 150 ohm	540 0458 000	C5	Capacitor, .015 uf	508 0210 000
R106, R109	Resistor, 3 9K ohm	540 0063 000	C6	Capacitor, .003 uf	516 0067 000
			C7	Capacitor, 390 pf	516 0041 000
			C8	Capacitor, 20 uf	522 0256 000
			K1	Relay	578 0006 000
			L1	Toroid Coil	492 0056 000

PARTS LIST

Symbol No.	Description	Part Number	Symbol No.	Description	Part Number
Q1,Q2 Q3,Q4 Q5	Transistor, 2N1307	380 0018 000	F301,F302	Fuse, 1 amp.	398 0017 000
R1	Resistor, 16K ohm	540 0078 000	J301	A.C. Receptacle	610 0401 00
R2,R12, R17	Resistor, 3600 ohm	540 0062 000	J302	Receptacle	612 0007 000
R3	Resistor, 20K ohm	540 0080 000	J303,J304	Receptacle	612 0009 000
R4,R6,R21	Resistor, 5100 ohm	540 0066 000	K301L,K302L, K303L,K304L	Relay	574 0106 000
R5,R16,R25	Resistor, 10K ohm	540 0073 000	P302	Plug	610 0101 000
R7	Resistor, 6200 ohm	540 0068 000	P303	Plug	610 0103 000
R8	Resistor, 7500 ohm	540 0070 000	R301	Resistor, 100 ohm	540 0587 000
R9	Resistor, 430 ohm	540 0040 000	R302	Resistor, Adj, 4K ohm	552 0031 000
R10	Resistor, 2200 ohm	540 0057 000	R304,R306, R308,R310, R312,R314, R316,R318	Resistor, 7500 ohm	540 0353 000
R11,R15	Resistor, 51K ohm	540 0090 000	R319,R320	Resistor, 620 ohm	540 0044 000
R13	Resistor, 3900 ohm	540 0063 000	R321, R322	Resistor, 10K ohm	540 0073 000
R14	Resistor, 680 ohm	540 0045 000	S301	Switch	604 0244 000
R18,R26	Resistor, 820 ohm	540 0047 000	XF301,XF302	Fuseholder	402 0023 000
R19	Resistor, 2000 ohm	540 0056 000	XK301L/R, XK302L/R, XK303L/R, XK304L/R	Socket, Relay	404 0160 000
R20,R24	Resistor, 47K ohm	540 0089 000			
R22	Resistor, 110K ohm	540 0098 000			
R23	Resistor, 200K ohm	540 0104 000			
T1	Input Transformer	478 0118 000			
XQ1,XQ2, XQ3,XQ4, XQ5	Socket	404 0066 000			
CAPACITOR BOARD (PART OF M6353/M6354)			REMOTE RECORD UNIT M6234		
C211	Capacitor, 3.9 uf	526 0003 000	S501	Switch	604 0240 000
C212, C213	Capacitor, .68 uf	508 0164 000	S502,S504	Switch	604 0232 000
C220	Capacitor, .047 uf	508 0267 000	S503	Switch	604 0234 000
C214	Capacitor, .004 uf	508 0276 000	S505	Switch	604 0233 000
C215	Capacitor, .005 uf	508 0076 000			
C216,C218	Capacitor, .015 uf	508 0210 000			
C217, C219,C221	Capacitor, .1 uf	508 0278 000			
PLUG-IN BIAS & 3 TONE OSCILLATOR (PART OF M6353/M6354)			REMOTE PLAYBACK UNIT M6221		
C1,C2	Capacitor, .47 uf	508 0267 000	S401	Switch	604 0235 000
C3,C4	Capacitor, .01 uf	506 0001 000	S402	Switch	604 0236 000
C5	Capacitor, 20 uf	522 0256 000	S403	Switch	604 0237 000
C6,C9,C11	Capacitor, 25 uf	522 0242 000	S404	Switch	604 0238 000
C7	Capacitor, 2 uf	522 0169 000	S405	Switch	604 0239 000
C8,C12	Capacitor, 25 uf	522 0178 000			
Q1,Q2, Q3,Q4,Q5	Transistor, 2N1414	380 0014 000			
R1,R2	Resistor, 10 ohm	540 0154 000			
R3,R4	Resistor, 22K ohm	540 0194 000			
R5	Resistor, 510 ohm	540 0042 000			
R6	Resistor, 3600 ohm	540 0062 000			
R7	Resistor, 1200 ohm	540 0051 000			
R8,R9	Resistor, 1500 ohm	540 0053 000			
R10	Resistor, 1300 ohm	540 0052 000			
R11	Resistor, 200 ohm	540 0032 000			
R12	Potentiometer, 10K ohm	552 0771 000			
R13	Resistor, 43K ohm	540 0088 000			
R14	Resistor, 13K ohm	540 0076 000			
R15	Resistor, 2200 ohm	540 0057 000			
R16	Resistor, 47K ohm	540 0089 000			
R17	Resistor, 1800 ohm	540 0055 000			
R18	Resistor, 7500 ohm	540 0070 000			
R19	Resistor, 430 ohm	540 0040 000			
R20	Resistor, 300 ohm	540 0036 000			
XQ1,XQ2, XQ3,XQ4,XQ5	Socket	404 0066 000			
MONAURAL SWITCHER M-6219					
C301	Capacitor, 40 uf	522 0315 000			
CR301	Diode 1N2070	384 0019 000			
CR302 thru CR309	Diode 1N2071	384 0020 000			



INPUT	CONNECT	STANDARD
-30 DBM	PHONO SYSTEM MONO/STEREO	1-2 7-9
40 TO +8	4-5 10-11 2-3	8-9

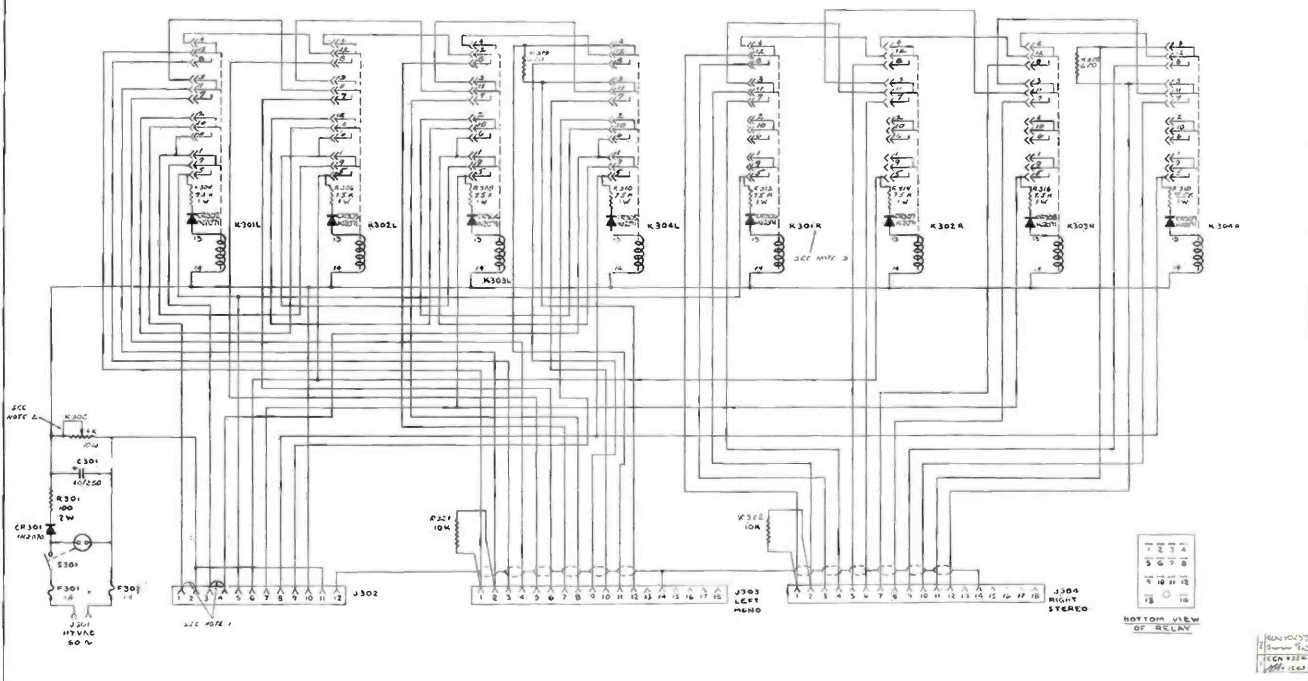


NOTE: O DENOTES BOARD LUG CONN.

1. UNLESS OTHERWISE SPECIFIED: RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROMICROFARADS.
2. AC VOLTAGES SHOWN IN () VOLTAGES SHOWN TAKEN WITH REARBOARD IN THE OPERATE POSITION.
3. C.O. CLOSURES SHOWN TAKEN WITH SIMONSON 850 VORN.
4. THE NUMBER IN THE SQUARE IS THE NUMBER OF THE CORRESPONDING TRANSISTION RECORDS AMP.

COMPONENT	VALUE	TYPE	REMARKS
R101	100K	RES	
R102	100K	RES	
R103	100K	RES	
R104	100K	RES	
R105	100K	RES	
R106	100K	RES	
R107	100K	RES	
R108	100K	RES	
R109	100K	RES	
R110	100K	RES	
R111	100K	RES	
R112	100K	RES	
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R295	100K	RES	
R296	100K	RES	
R297	100K	RES	
R298	100K	RES	
R299	100K	RES	
R300	100K	RES	

CATER RADIO COMPANY										SER. NO. 10717-C		
LIST OF PARTS										BOULE		
NO.	QTY.	DESC.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.	REF. DES.



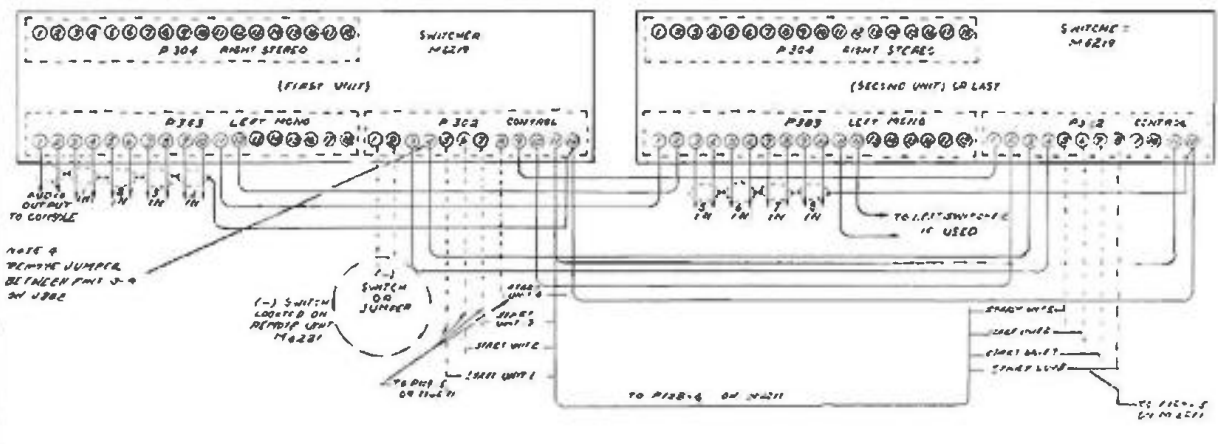
NOTES
 1) JUMBERS WOUND IN UNIT ON BROWN SIDE OF WPC. REMOVE JUMBERS INDICATED UPON INSTALLATION OF REMOTE UNITS.
 2) ADJUST FOR 130 VOLTS ACROSS ROAD (WHEN IDENTIFIED) INCREASE VOLTAGE SLIGHTLY IF RELAYS FAIL TO PULL IN PROPERLY. REDUCE VOLTAGE SLIGHTLY IF RELAYS FAIL TO DROP OUT PROPERLY WHEN GOING TO NEXT DELAY UP THE STAIRS. LEARNER K301/PAUL TO ADJUST WITH K302 IS (NEEDED)
 3) RELAYS NOTED WITH A WHEEL # MARKER ARE FOR THE RIGHT HAND CHANNEL FOR STEREO USE. SET 10K MARKER IS INDICATED BY "L"

REV. NO.			DATE			BY		

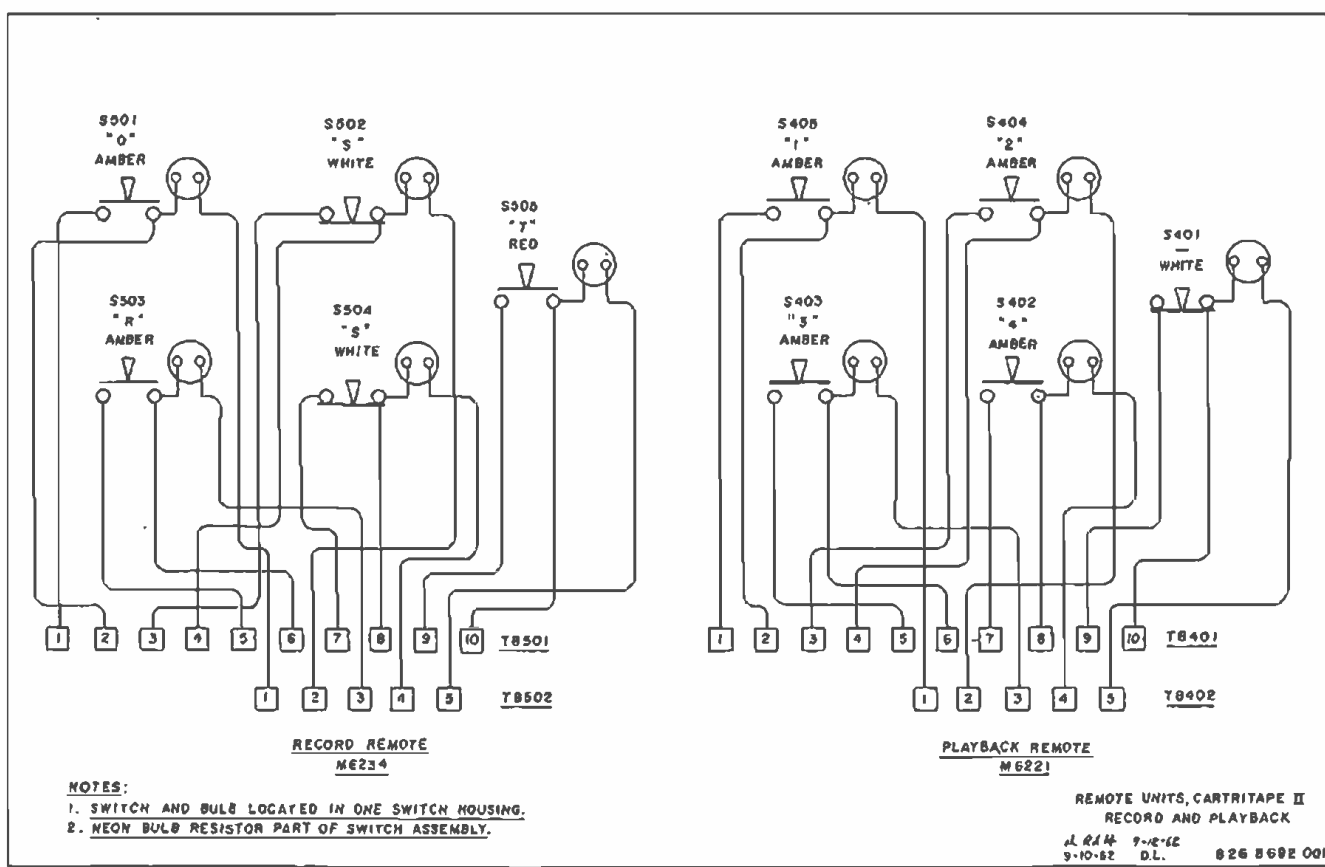
MR. SCHEMATIC - SWITCHER
 AUTHORITY II M-6215 M-220
 DRAWN BY: [Signature] CHECKED BY: [Signature] APPROVED BY: [Signature]

NOTES:
 (1) SEND AUDIO TO PINS MARKED ENL. P.M.E.C.
 (2) REMOVE JUMPER BETWEEN PINS 7 & 4 ON 132B (ON RECEPTACLE)
 (3) THE SWITCHES (S-TAL) FROM EACH UNIT ARE LOCATED ON PINS 6 & 6 ON PINS ON EACH UNIT. CONNECT THESE PINS TO SWITCHER AT MARKED START UNITS, START UNIT 2, ETC.

GATER RADIO COMPANY										REAR	
PART NUMBER										REAR	
LIST OF PARTS										REAR	
NO.	QTY.	NO.	QTY.	NO.	QTY.	NO.	QTY.	NO.	QTY.	DESCRIPTION	REVISION



WIRING DIAGRAM FOR MULTIPLE SWITCHER CONNECTION										M6219	
PART NUMBER										REAR	
LIST OF PARTS										REAR	
NO.	QTY.	NO.	QTY.	NO.	QTY.	NO.	QTY.	NO.	QTY.	DESCRIPTION	REVISION



RECORD REMOTE
 ME234

PLAYBACK REMOTE
 M6221

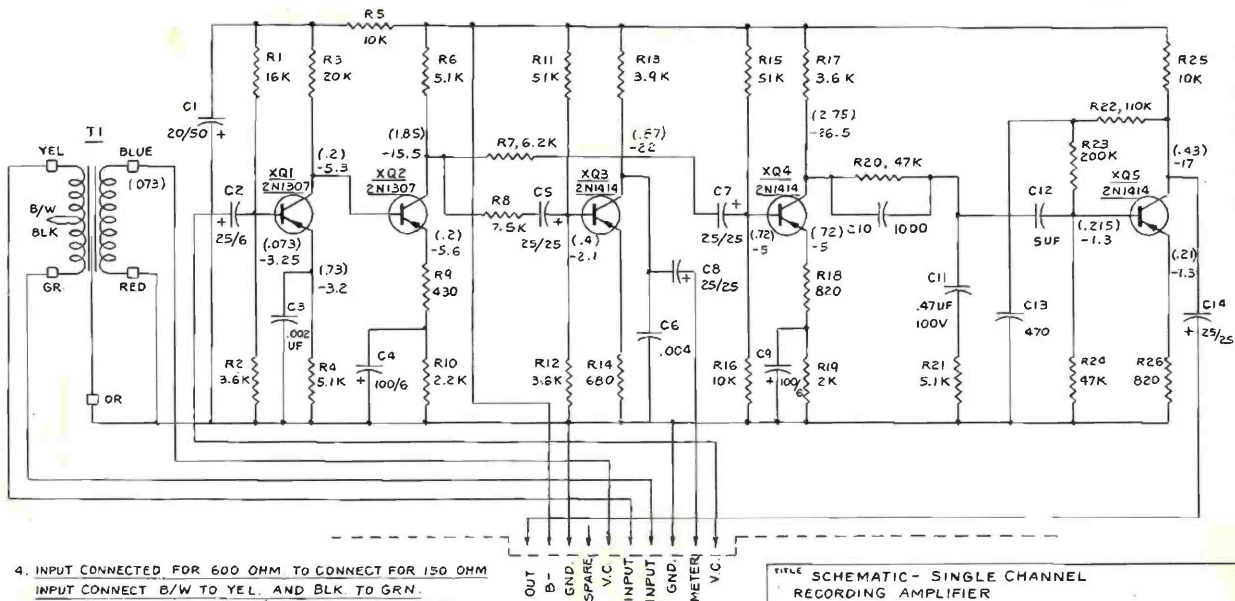
REMOE UNITS, CARTRITAPE II
 RECORD AND PLAYBACK

AL 814 9-10-62
 9-10-62 D.L. 826 869E 001

NOTES:

1. A.C. VOLTAGES SHOWN IN (), VOLTAGES SHOWN TAKEN WITH AUDIO INPUT-20DBM MATCHING R207 MAX. (REC. LEVEL)
2. DC VOLTAGES SHOWN TAKEN WITH SIMPSON 260 VOM.
3. □ DENOTES BOARD LUG CONNECTION.

NO.	DATE	REVISION	DRN	ENG	ECN
1	2/20/64	CIR. WAS 1200, CIR. WAS 1.5UF	WAL	WAL	988
2	7/14/64	CIR. WAS 1.3K	WAL		10070



TITLE SCHEMATIC - SINGLE CHANNEL
RECORDING AMPLIFIER
CARTRITAPE II M6353 & M6354

WFL	CH BY	ENG	DATE	SHEET	OF	827-1094-001
	WFL	RAT	10-2-64			