

OPERATING INSTRUCTIONS

FOR

PLAYBACK
IGM MODEL 10/12



Manufactured By
Moulic Specialties Co.
Bloomington, Illinois U. S. A.

OPERATING INSTRUCTIONS
 FOR
 MODELS 500 - 501 - 502 / 10 - 12
 CARTRIDGE PLAYBACKS
 AND MODELS 570 - 572 - 90 - 92 RECORD CENTERS
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SECTION 1

UNIT DESCRIPTION

1.1 GENERAL

NOTE: Carefully unpack and examine equipment for concealed damage when received. Notify the carrier of any damage.

This equipment is designed to playback magnetic cartridge tape in the Fidelipac cartridge. It provides standard equalized preamplification for recorded program audio and self-contained cueing system for stopping tape drive mechanism (U.S. Patent 3,113,708).

Model 500/10 also contains an independent circuit for responding to a selected frequency signal to provide "end of message" or similar auxiliary equipment activation. 150 cycle signal is standard and 3000 cycles signal is available.

Model 501 is like Model 500 but it is without auxiliary switching feature.

Model 502/12 is like Model 500 but it is Dual Program Channel or Stereo version.

The Record Center Model 570/90 is a self-contained recording and playback facility for the production of magnetic tape cartridges. All the essential audio and high frequency bias currents as well as control track signals are provided for recording and all the receiving facilities are provided for control and preamplification of the recorded information on playback. Bias and program can be monitored by the operator, by front panel metering, as the actual recording is being made.

Two tape tracks ($\frac{1}{2}$) are employed; one each for program and control.

Record Center Model 572/92 is a two-program channel recorder and playback using 3-track heads. The upper track is left channel (A) and center track is right channel (B). Lower track is for cue control.

1.2 SPECIFICATIONS - ALL MODELS

1. Audio output level (across 600 ohm terminated transformer)	0 DBM
2. Harmonic Distortion (400 cps)	3/4%
3. Frequency Response 50 - 12KC cps	+1 -2 DB
4. Signal/Noise ratio Reference signal: 0 DBM(400 cps)	48 DB
5. Cue Control Frequency	1 KC \pm 50 cps
6. Auxiliary "end of message" cue (Plug-in coupler networks available for other frequencies)	150 cps \pm 30 cps
RECORD CENTER 570/90	
7. Audio input level:	-20 to \pm 6 DBM @ 600 ohms (80 mv to 1.6 @ 600 ohms) -12 DBM on Model 572
8. Frequency response: 50-12KC	+1 -2 DB
9. Distortion: - 400 cps NAB level	1%
10. Bias frequency:	75 - 80 KC
11. Audio output level:	+4 DBM
12. Hum & noise:	-48 DB RE/NAB 0 Level
13. Tape speed:	7 1/2 IPS/3-3/4 IPS
14. Tape drive control:	By linear solenoid*
15. Power read Model 500/10 Model 502/12 Model 570/90 Model 572/92	115V 60cyc 45 watts running 45 watts running 62 watts running 62 watts running
16. Size (inches) Model 500/10/502/12 Model 570/90/572/92 Weight - lbs Model 500/10/502/12 Model 570/90/572/92	7" H x 19" W x 13 1/2" D 8-3/4" H x 16" W x 15" D 28 lbs 45 lbs

1.3 CONTROLS

POWER SWITCH: (Models 500/502/570/572 only)

This push-push knob is located at the center of the panel. The knob will light RED when pressed and machine is connected to power.

NOTE: On Models 10/12/90/92, the center push button is a momentary switch to transfer program audio to a "cue audio" circuit. A lamp in this switch is illuminated each time the machine is "on the air".

START: If the machine is turned on and a cartridge inserted, the light at the left will indicate a STOP condition and pressing the START button will cause tape drive to pull tape. Lights will transfer to START.

STOP: This left hand button will disconnect the drive and cause the tape to stop. Lights will transfer back to STOP.

RECORD SET: This push button is used to activate the recording circuits preparatory to making a recording. A signal light shows SET.

AUXILIARY TONE: This push button is used to record the auxiliary tone (used to activate additional equipment) at the selected time in the course of the running of a recording.

METER SWITCH: This rotary switch connects the VU meter to the selected circuit to be measured. It measures audio output (at the 600 ohm output terminals) in VU and record levels that will produce that output. It can be switched to measure relative record bias voltage. This switch is behind panel on Models 90/92.

NOTE: Bias level will not be indicated on meter until Record Set button and Start button are pressed.

LINE LEVEL: This control adjusts audio recording level and will accommodate input signal levels of -20 and +6 DBM from a 600 ohm source. Any other impedance source may be used if it will deliver necessary voltage without distortion. This control is behind panel on Model 90.

BALANCE: This control on stereo (572) units will equalize the gain in right and left channels. There is no balance control on Model 92 and two line controls are mounted behind panel.

SECTION 2

INSTALLATION & OPERATION

2.1 CONNECTIONS

T.B.	MODELS	
	500/570 502/572	10/12 90/92
0 1	Output "A" Left	Output "A" Left
0 2	Output "A" Left	Output "A" Left
0 3	Ground	Ground
0 4	Output "B" Right	Output "B" Right
0 5	Output "B" Right	Output "B" Right
0 6	Ground	Cue Audio "A" (#2 Common)
0 7	Logic Pulse	Cue Audio "B" (#5 Common)
0 8	Remote Start	Remote Start
0 9	Remote Start	Remote Start
0 10	Remote Stop	Remote Stop
0 11	Remote Stop	Remote Stop
0 12	- - - - -	NC
0 13	Secondary	C
0 14	(Auxiliary)	NO
0 15	Contacts	NC
0 16		C
0 17	- - - - -	NO
0 18	Record Set	Record Set
0 19	Record Set	Record Set
0 20	Record Stop	Record Stop
0 21	Record Stop	Record Stop
0 22	Input "B" Right	Input "B" Right
0 23	Input "B" Right	Input "B" Right
0 24	Ground	Ground
0 25	Input "A" Left	Input "A" Left
0 26	Input "A" Left	Input "A" Left

NOTES:

1. On Stereo Models, terminals #1 & #4 are phased.
2. On 3-tone Models, terminals #15, #16, #17 are used for tertiary tone relay contacts.

2.2 CARTRIDGES

Cartridge condition is most important to success of any tape system. When improper reproduction in playback or recording is noted, examine the cartridge.

New cartridges and those suffering rough handling, particularly the large cartridges, should be visually inspected. Turntable release spring, which may be seen through keyhole in bottom of cartridge, must not be jammed under rim of turntable. Inspect tape guide wires and general position of tape in cartridge. Always pre-run new cartridges, those accidentally dropped, and those that have been respliced or adjusted.

In Fig. 12B the correct operating position of cartridge is shown. Pads must hold tape tangent to heads directly over pole piece. If pads are not holding tape tangent to heads at the center of the pole piece, erratic recording, loss of high frequency response and loss of cueing may result.

A cartridge that functions properly should be held aside as a test standard.

Do not store cartridges near heat or magnetic fields.

CARTRIDGE BEHAVIOR

NOTE: The following symptoms also may result from other conditions. It is assumed that some but not all cartridges behave as described.

SYMPTOM	TREATMENT
a. Tape loops out of cartridge at capstan.	a. Tape is too loose on hub. Find splice and remove 1 to 4 inches of tape. Short length cartridges are much more critical to extra tape in the loop.
b. Puckering of tape as it passes over guide wire. Wow and flutter on that particular cartridge.	b. Tape is too tight. Pull one or two turns from inner hub and add to tape in main loop.
c. "Muddy" and/or weak playback for first few seconds of run.	c. Right pressure pad not holding tape up to head.
d. Cue and auxiliary signal "misses".	d. Left pressure pad not holding tape up to cue head.
e. "Thumping" sound reproduced.	e. Cartridge not properly erased. Cover all parts of cartridge with eraser and separate before turning eraser off.

2.3 MAKING GOOD RECORDINGS

These are some of the most important factors in producing first-quality cartridge recordings. While the mechanical details of inserting a cartridge, pressing the proper buttons and turning the knobs is quite simple, it is also true that Careful attention to details, advance planning and the ability to understand fully the recording process is a most valuable tool for first class recordings.

- a. Keep heads clean and in proper adjustment.
- b. Keep tape transport in proper condition.
- c. Select cartridges before recording for the following features:
 1. If cartridge has been played more than 200 times it should be carefully checked for mechanical and tape condition and replaced if in doubt.
 2. Examine pressure pads for proper adjustment. See Section 2.2 and Fig. 12.
 3. Erase cartridge with bulk eraser. It is not the time a cartridge is exposed to the erasing field, but the thoroughness with which all the tape is reached by the magnetic field. Never turn the eraser off until the cartridge has been moved away slowly six inches or more. This will prevent leaving erase "thumps".
 4. Insert cartridge in machine and run the cartridge for a few seconds to allow tape again to run smoothly. Fraying and rough handling may cause jerky operation at very beginning of recording if above suggestion is ignored. An additional refinement is to run the tape around until the splice is at or slightly beyond the capstan. This will prevent recording over the splice.
 5. If cartridge is new and unused it is wise to allow it to run long enough (usually 4 or 5 trips) to assure that it is not too loose or too tight and at the same time this will help remove any excess tape lubrication. Be sure to reclean heads.

Proceed to make recording as follows:

NOTE: The 570 series Record Centers are wired in a manner that terminates the recording of the program track very shortly after the auxiliary tone button is pressed, and returns the machine to the playback mode. If this feature is not wanted, a jumper wire across the normally closed contacts of S105 will

keep the Model 570 in the Record Mode when the Auxiliary Tone button is pressed. This jumper can be installed across terminals #19 and #20 on TB101.

- a. Insert inspected cartridge and pre-run 5 seconds then stop.
- b. Press Set Record button and adjust line level control for 0 VU readings on loudest passages in program material.
- c. At the selected time, press the Start button. This act will cause the cue control signal to be recorded and the program information will begin recording a fraction of a second later.
- d. The auxiliary tone button may be pressed at the time selected (usually, the instant the program material ends and before the tape returns to the cue signal). The length of the tone on the tape is pre-determined. The tone cannot be repeated for about 5 seconds and normally it should not be repeated if the multiple pulses could cause confusion in a programming switch system.
- e. The tape will continue to run until the cue control signal returns to the cue head and in turn stops the tape drive.

NOTE: If the Auxiliary Tone button has not been used, the Model 570 will remain in the Record Mode when the cartridge stops. The machine will return to the play mode by either; (a) press Stop button, (b) remove cartridge.
Do not play a recorded cartridge in the record mode as the bias will cause erasure.
Note this action is not the same as previous record center models.

- f. Multiple recordings on same cartridge can be made by using a tape length sufficient for all material and proceed as above for the first material. Insert Auxiliary tone if desired and then press Stop button. Press Set Record button and proceed again by pressing Start button for second material recording, etc.

NOTE: It is normal for the Auxiliary Tone button to act as a Start button if pressed accidentally. The tone will not be recorded except in the Record Mode, however.

2.4 MODEL 90/92 RECORDING

This equipment includes a special circuit called "recorder release" that returns the unit to "play" mode when it stops after making a recording. It is not necessary to press Stop button to release the Record Mode. See Model 90/92 diagrams.

In addition to this difference, Models 90 and 92 do not terminate Record Mode when Auxiliary button is pressed.

2.5 RECORDING PROBLEMS

Experience has shown that most cartridge recording problems may be grouped into following classes. Probable reasons and solutions are given.

- a. No recording on tape. If VU meter indicates that program audio is into the recorder, check pressure pads in cartridge; bias on head. Use MaCarTa Tape Meter.
- b. No recording at the beginning of the tape. This is usually a pressure pad problem. A badly adjusted pressure roller can make the tape wander over the face of the head and cause loss of early parts of recording or loss of high frequency response.
- c. No high frequency response at beginning of tape. This is usually a pressure pad not holding tape to the head or heads not properly positioned to penetrate cartridges.
- d. Recordings played on another playback lack high response. Head alignment is not the same on both transports; heads dirty.
- e. All recordings weak and distorted. Bias is too low. Use third position of VU meter switch to indicate or use MaCarTa Tape Meter and adapter to read bias current. See Section 3.
- f. All recordings lack high frequency response. Bias may be too great; heads dirty; heads adjusted too far back for pressure pads to do any good.
- g. Cue signal not recorded. Relay CR104 must operate for a short period as the Start button is pressed. (Machine must be in Record Set mode).

When this relay operates, the tone generator records a cue signal on the tape. A bias of 6 to 8 volts is applied to cue head when either cue or auxiliary signal is recorded. The tones can be measured at Green terminal to ground on Tone Generator Modules. If tape does not move immediately following Start

button pressing, the signal at the head may stop before the tape has moved a sufficient distance to properly record. Sluggish solenoid action, tight cross shaft bearings, cartridge too tight can cause this.

- h. Auxiliary signal not recorded. When the Auxiliary push button S105 is pressed relay CR105 is momentarily closed. This relay controls the Auxiliary tone generator and causes it to generate the 150 cycle signal which is recorded on the tape. Observe the operation of CR105 as the tone button is pressed and use Macarta Tape Meter to indicate signal in case of difficulty.

SECTION 3

ADJUSTMENTS AND MAINTENANCE

3.1 CIRCUIT CHARACTERISTICS - GENERAL

This solid state playback and recording equipment has been designed to provide long, trouble free, performance. Particular emphasis has been placed upon standardization of the greatest possible number of parts. There are no "hand picked" components and any stock replacement part of similar tolerance will restore satisfactory performance.

3.2 RELAY ACTION

Relay CR101 is the cue-controlled power relay. This relay is energized when the Start button is pressed (cartridge in machine) and it remains energized until the cue signal is received at which time it drops out and stops tape drive. This relay controls the Stop and Start signal lights and it also disconnects the audio output from the preamplifier when tape is not running.

Relay CR102 is actuated only by the Auxiliary Tone or "end of message" signal. Its action is momentary for the duration of the signal from the tape. One set of contacts is used to interrupt the audio circuit out of the machine. If this feature is not wanted, jumper may be connected across terminals #1 and #9 on CR102. Two other poles are wired to TB101 for external control of other machines.

CR103 is the "Set" record relay used to power record circuits in that mode.

CR104 is the cue tone apply relay and closes momentarily at start of record.

CR105 is the auxiliary tone apply relay and it closes momentarily on pushing Auxiliary button.

3.3 COMPATIBILITY

The wide variety of signal frequencies, and signal levels used by various cartridge tape manufacturers over the past few years make compatibility difficult when exchanging cartridges of one machine with another. Wide differences in signal level as seen by the head make separation of two different frequencies more difficult than if the levels are more nearly equal. Also the harmonic content of the signal of the lower of two frequencies reduces the ability of the higher frequency circuit to ignore the lower one.

In some makes of equipment the approximately 3000 cps signal is considerably stronger than the primary 1000 cycle cue. Normally, a system in which the cartridge signals have the auxiliary or secondary cue equal or up to 6 DB stronger than the primary cue will well be tolerated. If the secondary cue signal is 4 DB or more weaker than the primary cue it may be necessary to reduce the resistor R127 in series with the SENSITIVITY control on the solid state switching module.

3.4 ELECTRICAL ADJUSTMENTS - PLAYBACK

OUTPUT LEVEL: Output level is controlled by R117 on pre-amplifier. See Fig. 4.1

EMPHASIS CONTROL: It is used to vary the response of preamp above 1 KC. It is factory adjusted for standard NAB response. To readjust to this standard, connect the playback head in series with signal generator connected to J1. Turn generator to 8 KC and with same generator output preamp output should be -18 DBM - when 400 cycle output = 0 DBM.

Since heads have different characteristics, it is necessary to adjust emphasis control to give uniform flat response from a frequency standard tape. Do not adjust emphasis without aligning heads first.

CUE SENSITIVITY CONTROL R126 located on the control module may be turned clockwise for greater sensitivity to cue pulses. Do not advance sensitivity to the degree that Auxiliary Tone pulses cause a false cue stop.

AUXILIARY CONTROL R119 should be set at minimum (counter-clockwise) and then advanced until CR102 is being energized by Auxiliary Tone pulses from a test tape. Dirty heads and poor pressure pad adjustment may cause Auxiliary Tone system to fail to operate before cue system fails. Attend to these maintenance points.

3.5 ELECTRICAL ADJUSTMENTS - RECORD

BIAS TUNING: Transformer R202 on the bias module should be adjusted for maximum output as measured by the panel VU meter switched to "Bias". NOTE: Bias voltage is present only when in Record Set Mode and after Start button is pressed.

BIAS TRAPS: Two tunable traps L201 in the record module and L202 in the bias module are adjusted as follows. Remove screw holding module in chassis and pull up to reach traps.

For L202 in Bias Module:

1. Unplug CR10h to allow bias voltage.
2. Put machine in Record Set Mode and press Start button.
3. Connect AC VTVM from green terminal to chassis and set range to give meter reading. (Approx. 10 V)
4. Carefully adjust core of L202 for minimum reading. Use insulated tool.
5. Stop machine and insert CR10h.

For L201 in Record Module:

1. Connect VTVM from junction of L201 and C208 or collector of Q16 to chassis.
2. Put machine in Record Set Mode and press Start button.
3. Adjust L201 for minimum reading.

BIAS VOLTAGE: Record head bias is adjusted by C223. Turn screw clockwise to increase bias. To adjust bias, record 1000 cycles at -4 VU and while monitoring output of the recording using the panel VU meter, adjust (C223) bias for peak amplitude. Repeat. Record on a new cartridge with the tape you normally use. Switch panel meter to "Bias" position and note reading to refer to later.

STEREO MODELS: The bias tuning and bias traps for Models 570/92 are adjusted as described above. Since there are two record modules, each L201 is adjusted separately. Bias voltage for record heads is adjusted by C223 for channel A (left) and by C2h9 for channel B. Repeat the instructions given above under BIAS VOLTAGE. See Fig. 4.7 All other adjustments are duplicates of monaural instructions.

RECORD COMPENSATION: Control R206 located at rear edge of record module board is a 10-turn trim pot to vary the recording at frequencies above 1000 cycles.

To adjust:

1. First, playback amplifiers must be adjusted with standard frequency tape. See 3.4
2. While recording 10 KC, azimuth record head for peak output of playback.
3. Make frequency-run recording at -15 VU and hold constant output from generator. Use good tape and a good cartridge.
4. Adjust R206 until frequency run recording, is ± 2 DB or better from 80 cycles to 12 KC.

METER CALIBRATION:

1. Turn playback Gain control R117 to half gain or less.
2. Using your preferred tape, record 400 cycles from generator with 1/4% or less distortion. With Record Level control R266 at maximum, increase input to Model 570 until distortion at output terminals #1 and #2 is 3% THD. Note input level in DBM and maintain.
3. Reduce output with Level Control by 8 DB.
4. With panel VU meter switched to "Record", adjust Meter Cal. (R220) until meter indicates 0 VU.

TONE GENERATORS: The strength of the primary or cue signal (1000 cycles) as generated by the tone module is adjusted by R241. The secondary or auxiliary tone is adjusted by R257. To adjust Cue tone level on recording:

1. Remove cable from J2 on control module and connect to MaCarTa Tape Meter or similar VTVM.
2. Put machine in Record Mode and push Start button.
3. Remove Cue Apply relay CR104 from its socket. This will record continuous cue tone.
4. Adjust R241 to produce desired cue signal.
NOTE: Since different make cartridge machines operate at various cue signal levels, the Model 570 is adjustable to be as compatible as possible. Replace CR104.

FOR AUXILIARY TONE: Repeat steps above except CR105 is removed and R257 is adjusted to give required Auxiliary tone level.

NOTE: For special conditions these signals can be adjusted between about 4 mv and 8 mv. The MaCarTa control module will operate over this range when the auxiliary and cue signals are equal level. If these control signals are to be less than 3 millivolts, it is necessary to reduce R162 to 56 ohms in control module to give it a range of operation from 3/4 mv to 4 mv.

3.6 REMOVING THE MODULES

To remove modules for testing etc., remove the metal plate above the terminal strip. Crasp the wire terminal pins with long-nose pliers and twist the taper pin (on its own axis) slightly to remove from the socket in the circuit board. Note wire colors and color dots on the boards. Remove screw holding module and slip out of chassis. By bringing wires through opening above terminal board, the module may be reconnected to the circuit and operated out of the chassis for testing.

3.7 POWER SUPPLY PERFORMANCE

NOTE: Accidental power shorts caused by only an instantaneous contacting of certain points in the circuit may destroy power diodes SD104 and SD105. Silicon diodes will invariably blow before fuses can act. Be very careful in testing transistor circuits in order not to cause shorts.

DIFFICULTY	PROBABLE CAUSE	TEST
No DC voltage, blows fuses	Defective diodes in power supply. Shorts on DC Bus.	Test and replace. Use ohmmeter, test routinely.
DC voltage low at modules	Open Q13	Test at Pin 11 of TBI to Chassis(-17 V)
	Open filter capacitor	Test and replace

3.8 PREAMPLIFIER PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
Output distorted, gain low	DC voltage low	Measure at #11 on TBI to Chassis(-17 V) and black wire on program module(-16 V)
No Audio output	Defective contact on CR101 or CR102	Momentarily jumper contacts. Use test tape or Sig. Gen. with 1MV level in input; test by normal sig. tracing methods. Use Macarta Tape Meter.
	Defective Q1, Q2, Q3, or Q4	
Excessive hum and noise	Defective filter capacitor. Shorted Q13	Test and replace

NOTE: A flux shade ring may be clamped to the motor body. It balances hum pickup in head coils. With motor running and solenoid energized, this ring may be rotated (on the capstan axis) slightly to give minimum hum reading at output of amplifier. The ring is factory adjusted and should not be disturbed unless there is cause.

3.9 CUE CONTROL SYSTEM PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
Fails to start	Cartridge not properly engaging switch S102	Check to see that motor runs and "ready" lamp comes on when cartridge is inserted
	No DC voltage	Measure at #11 on TBL to chassis (-17 V)
	Remote stop link missing between 10 and 11 of TBL	Examine visually
	Defective Start push button	Momentarily jumper 8 and 9 on TBL. If machine starts replace Start push button
	Defective Stop push button	Momentarily jumper 11 and 9 on TBL. If machine starts replace Stop push button
Fails to cue	Wrong or no signal on tape	Use tape known to be correct or connect Sign. Gen. set at 1 KC about 4 MV output
	Defective Q5, Q6, or Q7	Use signal Generator as above. Use normal signal tracing method to determine
Fails to stop with Stop button depressed	Sticky Relay CR101 Shorted Q9	Examine Measure DC across CR101. If more than 1 volt when Stop button is depressed and released, test Q9 and replace
	Defective Q8	Connect DC voltmeter across Resistor R114 Depress and release Stop button, if voltage reappears, replace Q8

3.10 AUXILIARY TONE PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
No Auxiliary Tone relay action	Wrong or no signal on tape	Use tape known to be correct or connect Sig. Gen. of 2 to 4 output to module
	Defective Q10, Q11, Q12	Use Sig. Gen. as above and normal signal tracing method
Auxiliary Tone relay stays pulled in	Sticky relay CR102	Examine
	Shorted Q12	Use DC voltmeter across CR101. If voltage remains, replace Q12

3.11 RECORDING BIAS PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
No bias voltage on record head	Relay CR101 or CR102 not bringing power to brown lead	Use voltmeter to ground. Read -17 V DC
	Q21, Q22 PP output or Q20 oscillator	Check for oscillation with scope
No bias at tone record head during closing of CR104 or CR105	Q28 shorted	Replace
Bias at tone head all the time during record (machine will not cue at end of recording)	Positive voltage not present on Blue wire. Contacts on CR104 and CR105 open in yellow lead circuit back to -17 DC	Measure to chassis 6 V DC
		Inspect relays

3.12 RECORDING TONES PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
No cue tone at Green wire on tone module	Q23 - Q24 - CR104	Replace

DIFFICULTY	PROBABLE CAUSE	TEST
No Auxiliary Tone	Q25 - Q26 - CR105	Replace
Both tones missing	Q27 - T204 or no DC power	Check or replace
Cue or Auxiliary Tone continuous	CR104 or CR105 contacts not closed C244 or C243 shorted	Check or replace

3.13 RECORDING AMPLIFIER PERFORMANCE

DIFFICULTY	PROBABLE CAUSE	TEST
VU meter shown normal level -- no recording on tape	No Bias	Check with panel VU meter
	Record head defective or not contacting tape properly	Check head and adjustment
	Q18	Check or replace
No recording & no VU meter indication	Q17, T201, R266	Check or replace
Meter shows bias and output, not record level	Q19	Replace

3.14 MECHANICAL ADJUSTMENTS

The majority of mechanical adjustments that may be required will concern themselves with the deck mechanism. Refer to drawing MS507A for the following references.

SOLENOID POWER UNIT (refer to 1 drawing MS507A) must press pinch roller against capstan with enough pressure to pull tape smoothly. Properly adjusted, a new pinch roller (13) will be indented at the capstan about 1/32". A pinch roller that has become glazed hard, or cupped should be replaced by removing the snap ring, nylon spacer and old roller. Wipe the shaft clean and apply a very small drop of oil to the shaft. Install new roller with bronze bearing projecting down toward cross shaft (9). Reinstall nylon washer and snap ring.

Solenoid may be inspected and adjusted internally by removing from the deck after removing screws (8H and 1H). Plunger may be removed from bore by removing rear bumper bracket (3) and unhooking spring (5). Inspect plunger and bore for dirt; wipe clean. Be careful not to bend plunger guide pin. Inspect thrust roller (2) to see that nylon roller is free on its shaft. This assembly must support the plunger so that it will not drag in the bore.

Reassemble solenoid unit and while supporting it in a horizontal position, press plunger quickly to the bottom of the bore and release. There should be no tendency for plunger to stick and must return to rear bumper. Do not oil plunger. A drop of light oil may be put on guide pin.

Reassemble on deck and adjust as under Pinch Roller Adjustment.

PINCH ROLLER PRESSURE is adjusted by moving solenoid unit forward to reduce pressure and rearward to increase. To move solenoid, loosen three screws (8H and 1H) and move slightly in indicated direction. Retighten screws and check. If adjustment cannot be obtained, move solenoid all the way forward and then move it back until pinch roller will just touch capstan when plunger (4) is pressed all the way into its bore. Tighten all screws and check pressure. Readjust very slightly if required. Clean capstan and pinch roller as discussed under Head Cleaning.

Driving pressure of the roller can be quickly adjusted by the pressure control screw at the rear of the solenoid tube. Turning this screw one turn counter-clockwise to increase pressure and clockwise to reduce pressure.

Do not use more pressure than required to pull tape at uniform speed. Excessive pressure will overload capstan bearings and cause belt slip and slow speed.

CROSS SHAFT (9) should only be adjusted if replacing parts or if malfunction dictates. End bearing blocks (14) should be adjusted so that end play in the cross shaft is barely perceptible. It must always be free enough for recoil spring (12) to return shaft. A drop of oil on the thrust balls (11) should be applied at 6 month intervals.

3.15 HEAD ADJUSTMENTS

HEAD LOCATION should be checked as follows if adjustments have been disturbed.

- a. Loosen head bracket and move to rear.
- b. Set side guide for cartridge to dimensions shown in Fig. 12

- c. Insert cartridge until it touches capstan at center of cutout in lower shell of cartridge.
- d. Pull cartridge back 1/16" and hold.
- e. Move head bracket case forward until case touches front edge of cartridge.
Pressure pads should appear as in Fig. 12B
- f. If bracket setting is correct, the pressure roller will rise and fall freely through keyhole and when cartridge is running there will be about 1/32" freedom to move the cartridge right and left as well as in and out. It is important that the cartridge be free and not jammed against while running.

The head next to capstan is dual $\frac{1}{2}$ track and the upper track is the program play track while the lower track is for playback of control signals. This head should be adjusted for height as shown in Fig. 12C.

The left hand head on Record Center Models is recording program on the upper track and it should be adjusted as in Fig. 12C.

HEAD ALIGNMENT: If head height above deck (track location) has not been changed, proceed as follows to adjust azimuth.

1. Loosen the socket-head set screw one turn. This screw is located just to rear of plug-on head socket.
2. Using alignment tape, turn azimuth screw at right end of head holder for peak output of 10 KC tape signal.
3. Carefully tighten set screw while observing output.

If head track height has been disturbed, the two slotted sleeve nuts at the left of each head are tightened to lower the head. The rear sleeve nut will tilt the head face upward when tightened and the front sleeve nut will tilt the head downward. Use these sleeve nuts and the azimuth screw to make the head position as shown in Fig. 12C.

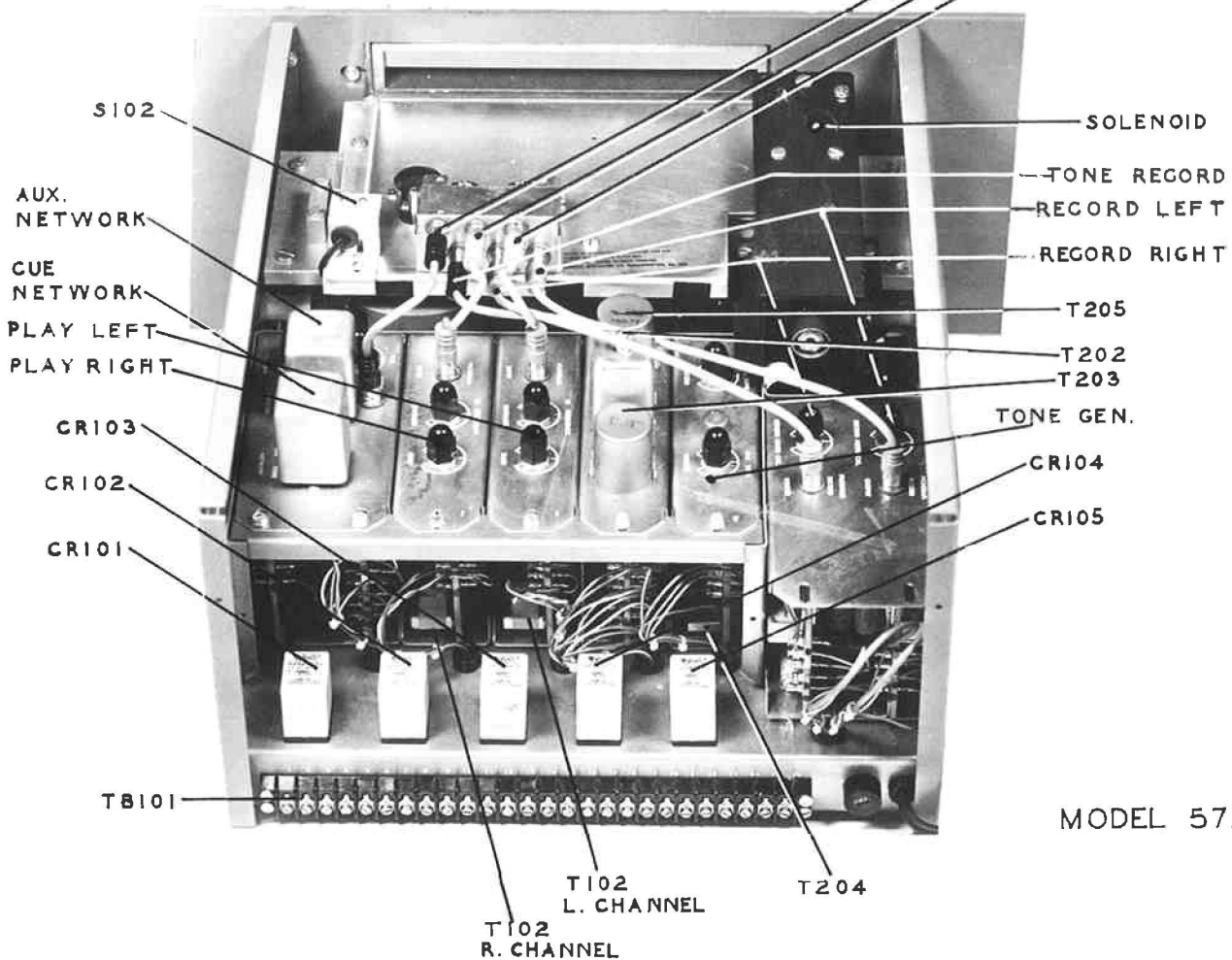
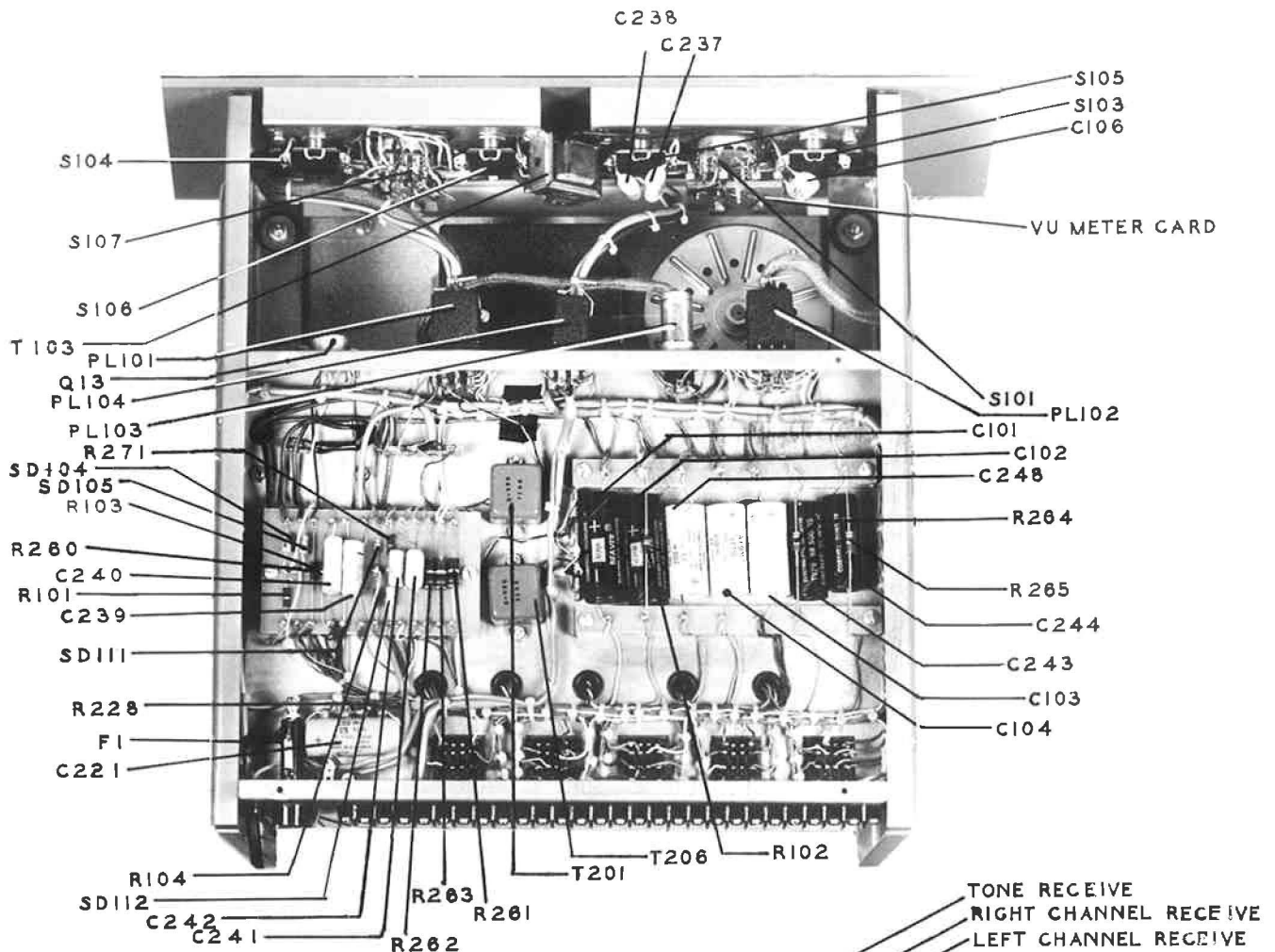
To replace heads, loosen clamp screw, and carefully remove socket from head (pull straight back). Install new head with 3 dots up and socket with notch up. The face of the head should project 9/32" beyond the base of the H84 head holder assembly.

On Stereo models, the 3-track and 4-track (special versions) heads have individual slip-on terminals for connections. These must be installed and removed very carefully to prevent damage.
DO NOT SOLDER TO HEAD PINS.

HEAD CLEANING: Cartridge tape is lubricated to a greater extent than reel to reel tape, thus heads and pressure roller will become "dirty" more often. Use a suitable head cleaner, such as MacCarfa Head and Pinch Roller Cleaner. It is necessary to brush the head face with fluid and wipe off while still damp. This also applies to pressure roller and capstan. Do not merely wet the surfaces and allow to dry. Be sure to wipe clean with a soft cloth.

3.16 LUBRICATION

NOTE: For lubrication of cross shaft bearings use a high grade non-gumming motor oil as Sinclair Rubilene. Motor has sealed ball bearings. Do not oil.



MODEL 572

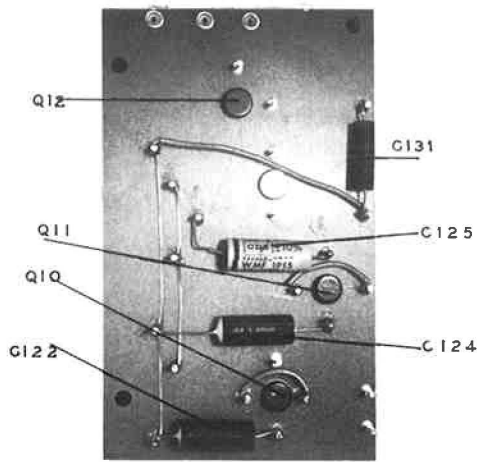


FIG. 4.6 150 CY. AUX. MODULE

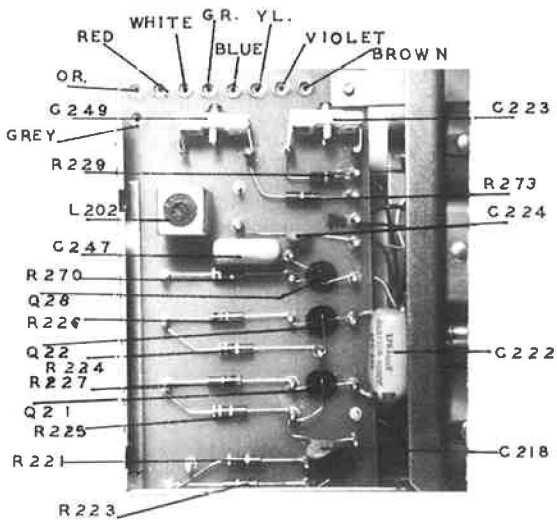
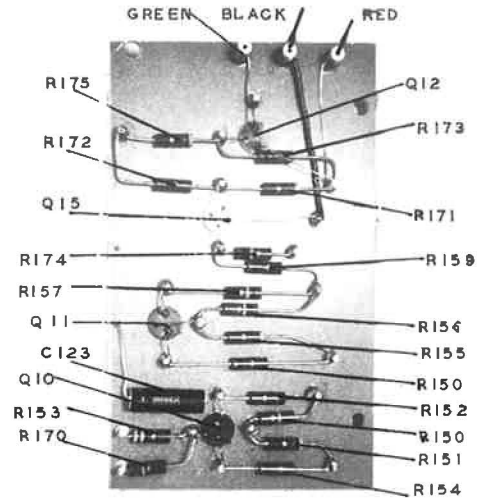


FIG. 4.7 STEREO BIAS MODULE

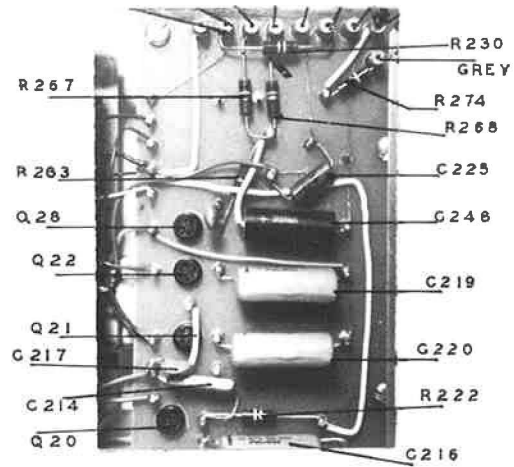


FIG. 4.8 RECORD RELEASE CIRCUIT MODEL 90/92

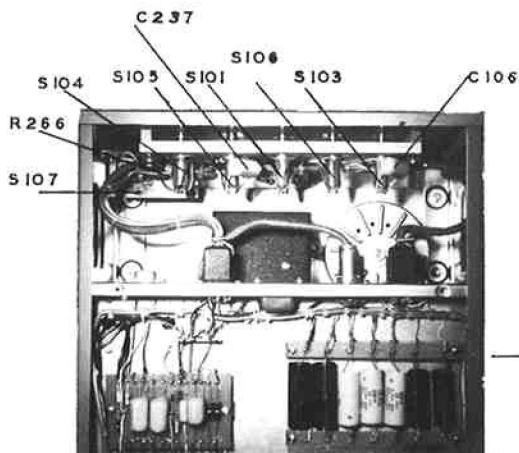
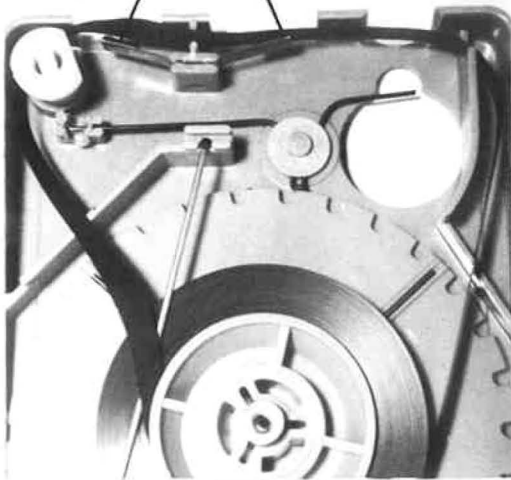


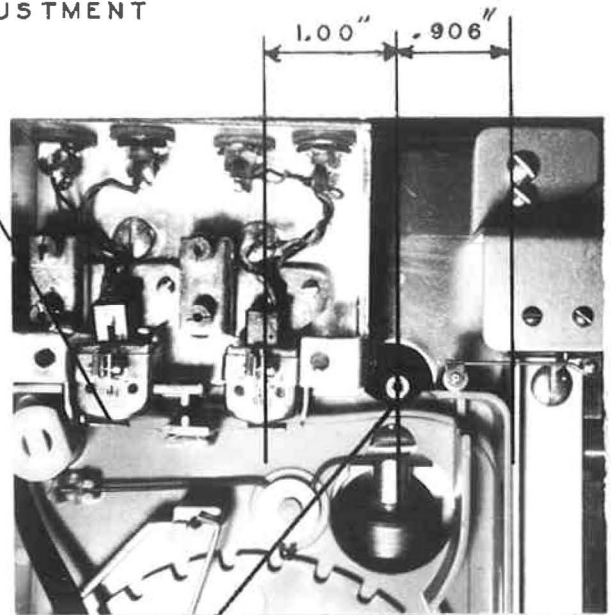
FIG. 4.9 MODEL 90 RECORD CENTER
SEE FIG. 4.2

FIG. 12

CORRECT PRESSURE PAD ADJUSTMENT

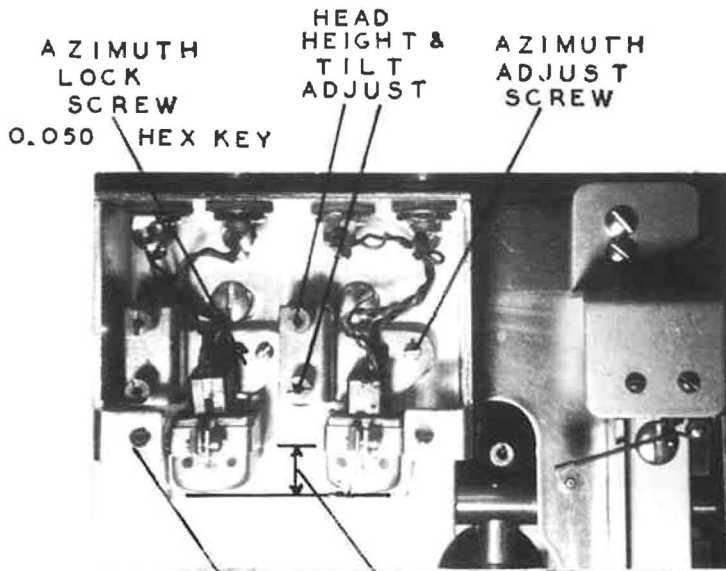


A



B

.030 TO .060 CLEARANCE
CARTRIDGE TO CAPSTAN

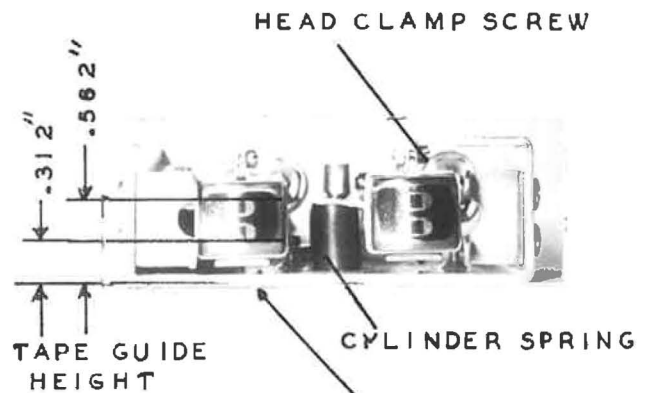


C

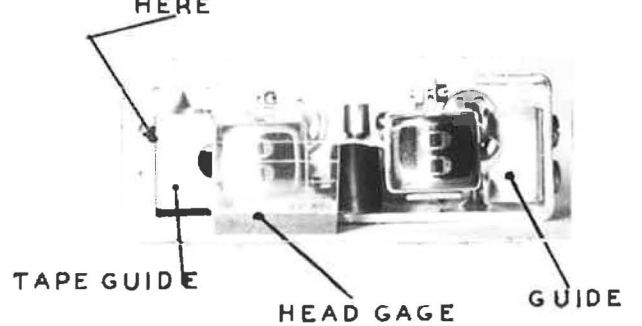
HEAD PENETRATION
0.290"

CARTRIDGE HOLD DOWN
SPRINGS NOT SHOWN

HB-4 HEAD HOLDER



NOTE: CAROUSEL USES .032"
SHIM PLATE UNDER HB-4
HEAD HOLDER & 0.060" SHIM
HERE



MACARTA TRANSPORT
DECK MODEL MS507A

PARTS LIST

<u>REFERENCE NO.</u> <u>DRAWING MS507A</u>	<u>PART NAME</u>	<u>PART NO.</u>
- 1	Solenoid Assembly	MS100-11
- 2	Thrust Roller Assembly	MS100-5
- 3	Plunger Bumper Assembly	MS100-6
- 4	Plunger Asswmbly	MS100-3
- 5	Plunger Spring	MS100-7B
- 8	Solenoid Spacer	MS100-12B
- 9	Cross Shaft Assembly	MS100-2A
-11	Cross Shaft Ball 2rqd. 5/16" D.	
-12	Cross Shaft Spring	MS100-7A
-13	Pinch Roller	MS100-13A
-14	End Bearing, Cross Shaft 2 rqd.	MS100-7A
-16	Cartridge Guide	MS507-34C
-18	Head Bracket Assembly Spec. type	MS100-22
-19	Head Bracket Cover - Spec. type	MS100-22A
-27	Motor-Direct Drive Hysterisis (115 V - 60 cps)	40H-25
-33	Deck Plate	MS507A
-34	Cartridge Plate	MS507A-34
-34S	Plate Spacers 5/8" D x 9/16" High 4 rqd.	MS507A-34S
-36	Cartridge Lever Switch	11SM1-JS246
-37	Playback Head	Specify
-38	Control Head	Specify

C231	50 mf	C241	.2 mf Mylar
*C232	.15 mf Mylar	C242	.1 mf Mylar
*C233	.15 mf Mylar	C243	500 mf
C234	.33 mf Mylar	C244	500 mf
*C235	.15 mf Mylar	C245	.001 mf disc
C236	.33 mf Mylar	C246	50 mf
C237	.33 mf Mylar	C247	.1 Mylar
C238	.33 mf Mylar	C248	250 mf
C239	.33 mf Mylar	C249	50 pf disc
C240	.33 mf Mylar	**C250	1.00 mf

* 5% Tol.

TRANSFORMERS & COILS

T101	M-817 (Power)	T203	MS-T6CT2 (80KC Output)
T102	M-763 (Audio Output)	T204	MS-MK-2
T103	M-820 (Power)	L201	387-20M (Var. Ind.)
T201	M-956 (Audio Inpit)	L202	387-20M (Var. Ind.)
T202	MS-7062 (80KC Osc.)		

THERMISTORS

T1	KA33J1/JA33J1	T3	KA35J3
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DIODES

SD101 & SD103 thru SD108	IN3253	SD111	IN759
SD102	IN3256	SD112	IN3253
**SD109	IN3253		

TRANSISTORS

Q1 thru Q7	2N1415	Q13	2N301/2N2869
Q8	3N59	Q14	2N1415
Q9	2N1304	Q17 thru Q28	2N1415
Q10 thru Q12	2N1415	Q29	2N1304
		**Q30	2N3053

RELAYS

CR101 thru CR105	KHPL7D11 12V DC
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NETWORKS

Cue	500-1K	Auxiliary	500-150cy
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SWITCHES

S101	Power	#1160
**S101	Channel	#1018 Model 90
		#1060 Model 92
S102	Cartridge	#11SM1
S103	Start	#1018
S104	Stop	#1018
S105	Aux	#1018
S106	Set	#1018
S107	Meter	#3123

MISCELLANEOUS

F1	1 A	PL1 & PL2	P312CCT
PL101	#160 line Cord Assy	S01 & S02	S312AB
PL103	91MPM6L	VU Meter	
S0103	78-PGG6		

HEADS

H101 - Playback	FB2H2K-N	H102 - Record	FB2H4R-N
-----------------	----------	---------------	----------

SIGNAL LAMPS

SL101	A/C ON	#328	SL103	Start	#328
**SL101	Channel	#327	SL104	Stop	#328
	Start	#328			

PARTS LIST

RESISTORS

MODEL 500 SERIES

RESISTORS

R101	o o o o	220 ohm	R136	o o o o	1000
R102	o o o o	22 K	R137	o o o o	5600
R103	o o o o	150	R138	o o o o	82 K
R104	o o o o		R139	o o o o	1800
R105	o o o o		R140	o o o o	1000
R106	o o o o		R141	o o o o	3300
R107	o o o o	12 - 2 watt WW	R142	o o o o	1000
R108	o o o o	200 - 10 watt WW	R143	o o o o	4700
R109	o o o o	56	R144	o o o o	4700
R110	o o o o	15 K	R145	o o o o	1000
R111	o o o o	1000	R146	o o o o	33
R112	o o o o	5 K Lin Pot	R147	o o o o	220
R113	o o o o	1500	R148	o o o o	68 - 1 W.
R114	o o o o	220 K	R149	o o o o	100 K Lin Pot
R115	o o o o	4700	R150	o o o o	68 K
*R116	o o o o	10 K	R151	o o o o	4700
R117	o o o o	250 K Lin Pot	R152	o o o o	5600
*R118	o o o o	100 K	R153	o o o o	3300
R119	o o o o	5600	R154	o o o o	1000
*R120	o o o o	10 K	R155	o o o o	4700
R121	o o o o	2200	R156	o o o o	100 K
R122	o o o o	3900	R157	o o o o	10 K
*R123	o o o o	100 K	R158	o o o o	1000
R124	o o o o	1500	R159	o o o o	1000
R125	o o o o	56	R160	o o o o	100 K
R126	o o o o	100 K Lin Pot	R161	o o o o	4700
R127	o o o o	100	R162	o o o o	470
R128	o o o o	10 K	R170	o o o o	22 K
R129	o o o o	82 K	R171	o o o o	4700
R130	o o o o	3300	R172	o o o o	2200
R131	o o o o	8200	R173	o o o o	1 K
R132	o o o o	22 K ohm	R174	o o o o	10 K
R133	o o o o	33 K	R175	o o o o	4700
R134	o o o o	4700			
R135	o o o o	3300			

* 5% Tol.

NOTE: All $\frac{1}{2}$ watt 10% unless marked

THERMISTORS

T1 o o o o o KA33J1/JA33J1 T3 o o o o o KA35J3

TRANSFORMERS

T101 o o o o o M-817 (Power) T103 o o o o o M-820 (Power)
 T102 o o o o o M-763 (Audio)

DIODES

SD101 & SD103 thru SD107 o o o o IN3253 **SD108 o o o IN3253
 SD102 o o o o o o o o o o o o IN3256

CAPACITORS

C101	1000 mf/25V	C116	8 mf
C102	1000 mf/25V	C117	50 mf
C103	250 mf/25V	C118	8 mf
C104		C119	50 mf
C105	50/30 mf/150V	C120	8 mf
C10633 mf	C121	100 mf
C107	8 mf	C122	100 mf
C108	50 mf	C123	8 mf
C10902 mf	C124	100 mf
C110	8 mf	C12515 mf Mylar
C111	50 mf	C1261 mf
C112	8 mf	C128	8 mf
C113	8 mf	C131	8 mf
C114	8 mf	C134	2.5 mf 330 V AC
C115	50 mf	C13547 mf

RELAYS

CR101, CR102 KHP17D 12V DC

TRANSISTORS

Q1 thru Q7 & Q10 thru Q12	2N1415
Q8	3N59
Q9	2N1304
Q13	2N301
Q14	2N1415
Q15	2N1304

SWITCHES

S101	Power	#1160
**S101	Channel	#1018 Model 10
		#1060 Model 12
S102	Cartridge	#11SM1
S103	Start	#1018
S104	Stop	#1018

SIGNAL LAMPS

SL101	Power	#328	SL102	Stop	#328
**SL101	Channel	#327	SL103	Start	#328

HEADS

Monaural	PB2H2K-N
Stereo	3 Track
	4 Track
	FQ03K-N

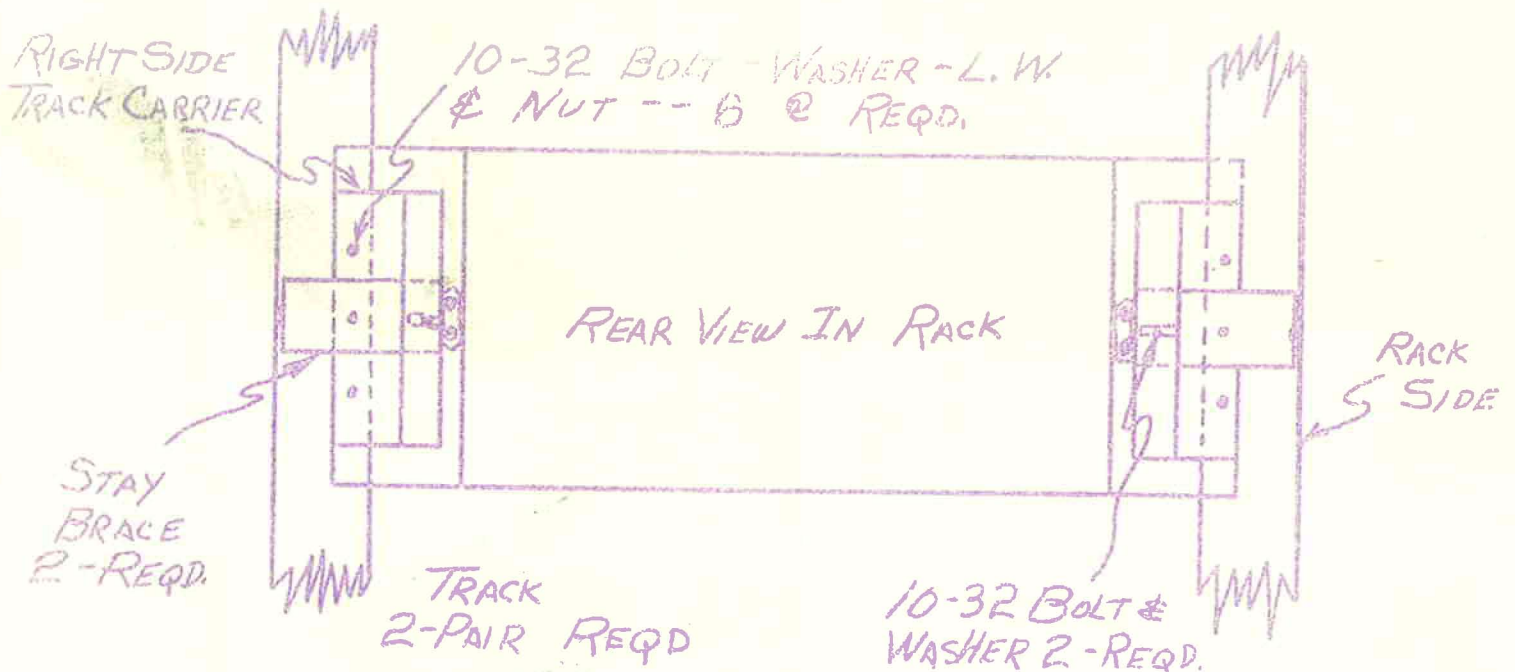
NETWORKS

Que Network	500-1K	Aux. Tone	500-159 cy
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MISCELLANEOUS

FL	1 Amp	PL103	91MPM6L
PL101	#160 Cord	SO102	S310AB
PL102	P310CCT	SO103	78-PCG6

** IGM Model 10/12 Only



1. Remove keeper pin & pull tracks apart.
2. Bolt inner track half to side of machine in holes provided. be certain to have stop pin to rear of machine.
3. Bolt outer track half to carrier bracket. Use upper row of holes for Model 500 equipment & lower holes for other models.
4. Bolt track carriers to sides of the rack.
5. Slide equipment into the rack.
6. Adjust stay braces.
7. Replace keeper pins.

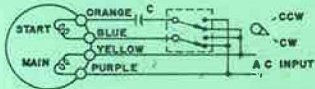
NOTE: When used with the Model 500 equipment the side panels should be mounted at the top of the 7 inch panel space required for this equipment. On Model 570 MARK II attach filler panel to slide track bracket with screws furnished.

SLIDE RACK KIT	
M5-1300	
2-11-65	MOULIC SPECIALTIES CO BLOOMINGTON - ILLINOIS

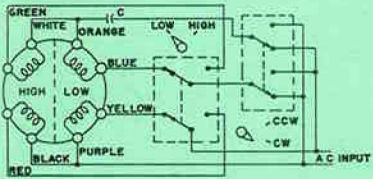
WIRING DIAGRAM

BEAU MOTOR DIV., UMC ELECTRONICS CO.
NORTH HAVEN, CONNECTICUT

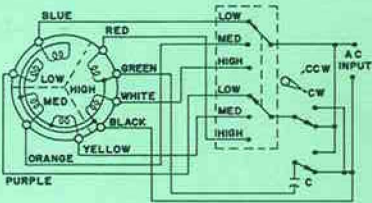
SINGLE SPEED - REVERSIBLE
ROTATION AS VIEWED FROM OUTPUT SHAFT



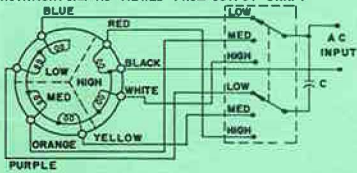
DUAL SPEED - REVERSIBLE
ROTATION AS VIEWED FROM OUTPUT SHAFT



3 SPEED - REVERSIBLE
ROTATION AS VIEWED FROM OUTPUT SHAFT



3 SPEED NOT REVERSIBLE
ROTATION: C.W. AS VIEWED FROM OUTPUT SHAFT



IMPORTANT — DO NOT DROP

THIS MOTOR IS A DELICATE INSTRUMENT AND MUST BE TREATED AS SUCH. PLEASE HANDLE WITH CARE. ANY EVIDENCE OF MISHANDLING WILL VOID THE FACTORY WARRANTY ON THIS INSTRUMENT. THESE MOTORS MUST BE STORED AND / OR USED IN A CLEAN AREA — CONTAMINATION WITH FOREIGN PARTICLES MAY CREATE NOISE. IF THIS MOTOR MUST BE RETURNED TO THE FACTORY FOR ANY REASON, MAKE CERTAIN IT IS ADEQUATELY PACKED TO RESIST SHOCK.