

TAPECASTER®

SERIES 700

TECHNICAL MANUAL



***TAPE CARTRIDGE MACHINE**

- Exceeds NAB specifications
- Remote control of all functions
- 100% solid state
- All silicon transistors
- Vinyl clad steel case for optimum electrostatic & electromagnetic shielding
- Premium core, laminated metal faced heads
- Hysteresis synchronous motor
- Electronic tone cueing
- Auxiliary cue tone option for automation — exhibits — lights — slide projectors

Model 700-P Playback Unit

Specifications

Equalization: NAB Standard.

Frequency Response: $\pm 2\text{db}$ 50-12,000 cps @ 7.5 IPS.
 $\pm 3\text{db}$ 40-15,000 cps @ 7.5 IPS.

Distortion: 2% or less.

Signal to Noise Ratio: 50 db or better.

Wow and Flutter: 0.2% or less @ 7.5 IPS.

Tape Speed: 7.5 IPS.

Output: 0 dbm @ 600 ohms.

Cue-Tones: Primary-1,000 cps (stop)
Secondary-150 cps (optional)

Cueing Accuracy: 0.1 second.

Starting Time: 0.05 second.

Playing Time: 1 second to 31 minutes @ 7.5 IPS.

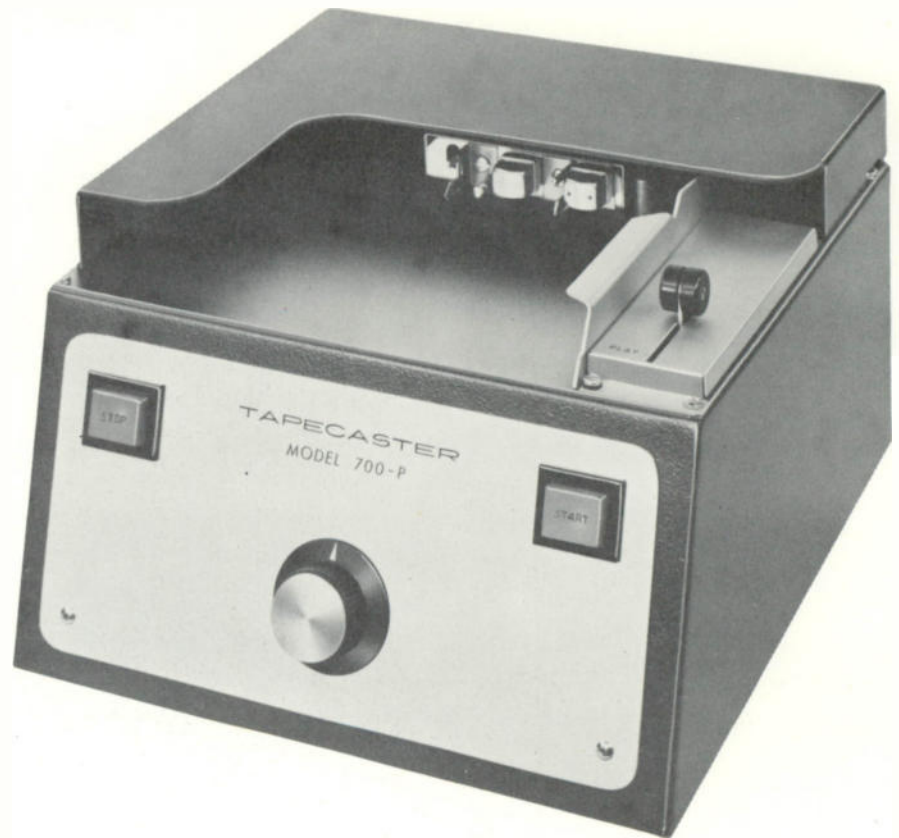
Power Requirement: 105-125 V ac, 60 cps, 50 watts
(115/220 ac, 50 cps optional extra).

Power Supply: Regulated, Solid State.

Motor: Hysteresis Synchronous.

Size: 10½ W x 12 L x 7 H.

Weight: 18 lbs.



Model 700-RP Combination Record-Playback Unit

Specifications

Equalization: NAB Standard

Frequency Response: $\pm 2\text{db}$ 50-12,000 cps @ 7.5 IPS.
 $\pm 3\text{db}$ 40-15,000 cps @ 7.5 IPS.

Distortion: 2% or less.

Signal to Noise Ratio: 50 db or better.

Wow and Flutter: 0.2% or less @ 7.5 IPS.

Tape Speed: 7.5 IPS.

Input (Line): 0.1 Volt (Bridging)

Input (Microphone, 150 ohms): 1.5 mv.

Output: 0 dbm @ 600 ohms.

Cue-Tones: Primary-1,000 cps (stop)
Secondary-150 cps (optional)

Cueing Accuracy: 0.1 second.

Starting Time: 0.05 second.

Playing Time: 1 second to 31 minutes @ 7.5 IPS.

Power Requirement: 105-125 V ac, 60 cps, 50 watts
(115/220 ac, 50 cps optional extra).

Power Supply: Regulated, Solid State.

Motor: Hysteresis Synchronous

Size: 13 W, 12 L, 7 H.

Weight: 21 lbs.



I GENERAL INFORMATION

A. INTRODUCTION:

The purpose of this manual is to provide the reader with information regarding the installation, operation, and maintenance of the Tapecaster Series 700 Tape Cartridge Machines. These cartridge machines utilize magnetic tape stored in convenient cartridges and were developed to satisfy the requirement for high-quality continuous loop message repeaters for use in broadcasting stations. Over the last several years applications have arisen such as in airlines, department stores, taxi companies, animated displays, night clubs, and data acquisition, transfer, delay, and transmission systems. Basically, audio messages are recorded on one channel (two channels for stereo) of the magnetic tape; and control tones are recorded on the other channel. (See Simplified Block Diagram). A 1000 cycle tone is automatically placed on the tape during the record process. This is used to stop the machine at the beginning of the message after it has been played so that the tape in the cartridge will be properly positioned for replay at a later time. An auxiliary 150 cycle cue tone system is available which can be used with peripheral equipment and automation systems. The cartridges can be conveniently stored in racks near the unit for rapid selection.

B. STANDARD SERIES 700 MACHNES:

- Model 700-P: For playback of pre-recorded monaural cartridges. Contains no record electronics.
- Model 700-RP: For both record and playback applications. Contains complete record and playback electronics for monaural operation.
- Model 700-PS: For playback of pre-recorded stereo cartridges. Contains no record electronics.
- Model 700-RPS: For both record and playback applications. Contains complete record and playback electronics for stereo operation. (No microphone preamplifier is provided with stereo units.)
- Model 700-RPD: Primarily for continuous delay between record and playback. Amount of delay (from 2 seconds to 1 hour) depends upon length of tape in cartridge. Front panel Delay/Normal switch also allows normal operation as in the Model 700-RP. Contains complete record and playback electronics plus a seperate erase bias supply for the erase portion of the combination erase record head.

Series 700 units are compatible with all standard NAB cartridges.

II INSTALLATION AND OPERATION

A. INSTALLATION:

1. Referring to the appropriate rear panel connection diagram, connect all inputs and outputs as shown. Suggested mating connectors are as follows:

Microphone Input Cannon No.XLR-3-12C or equiv.
Line Input Switchcraft No.40 or equiv. (Standard 1/4 in. phone plug)
Audio Output Same as Line Input
Remote Control Connector Amphenol No.86-PM8 or equiv. Octal plug.

2. Set output control to its maximum (clockwise) position.
3. Connect power plug into a 105-125V AC 60 cycle power source.
4. Turn ON/OFF toggle switch (on rear panel) to the ON position.

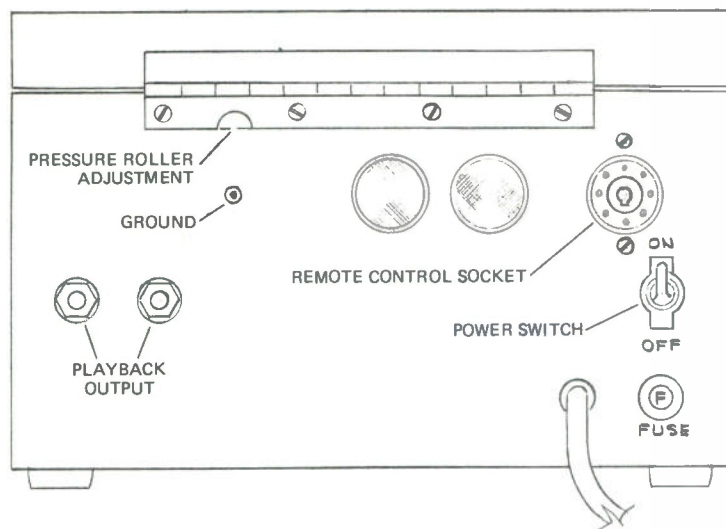
B. OPERATION:

1. Record Process
 - a. With the PLAY/RELEASE lever in the RELEASE position place a clean (new or bulk erased) cartridge of the desired recording time on the tape deck and slide it toward the rear of the deck as far as it will go.
 - b. Move the PLAY/RELEASE lever to the PLAY position.
 - c. Press RECORD switch and with sample audio to be recorded fed into the input line, advance RECORD GAIN control until peaks hit, but do not exceed, 0 VU.
 - d. Press the START switch.
 - e. Immediately apply audio signal to be recorded.
 - f. When message is recorded, press the STOP switch. Steps c, d, e, and f may be repeated for as many messages as desired.
 - g. Press START switch and permit tape to cycle until it automatically stops, at which point the tape will be positioned at the beginning of a message, ready for re-play.
2. Playback Process
 - a. Follow directions a and b above, except use cartridge to be played back.
 - b. Press START switch. Tape will play through message and stop automatically at the beginning, ready for re-play.
 - c. When tape motion stops, (stop light will light) move the PLAY/RELEASE lever to the RELEASE position and remove the cartridge.

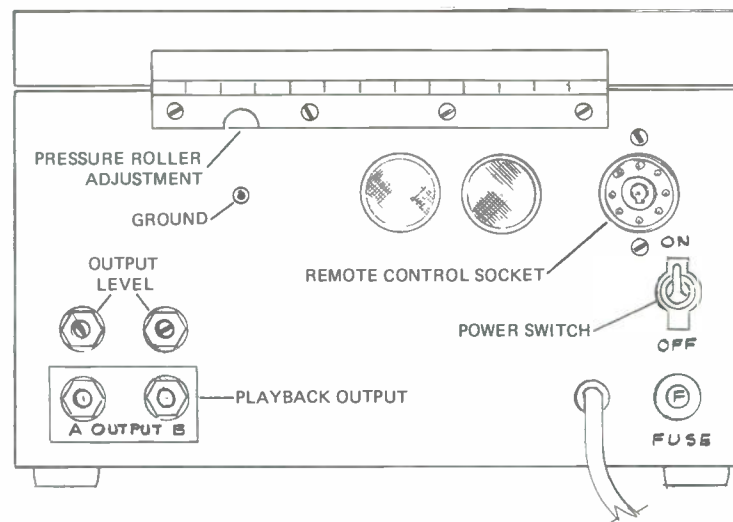
All front panel function switches are back-lighted to provide proper status indication.

REAR PANEL CONNECTIONS – SERIES 700 TAPE CARTRIDGE MACHINES

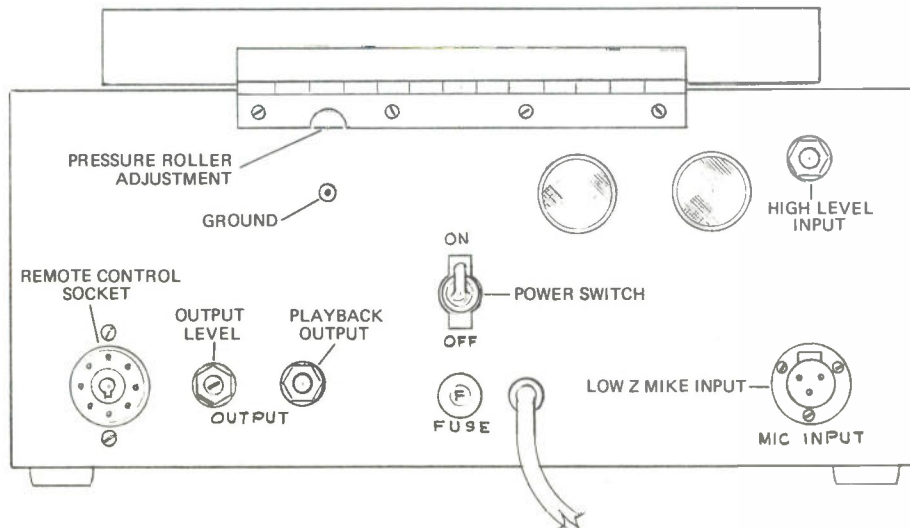
MODEL 700-P



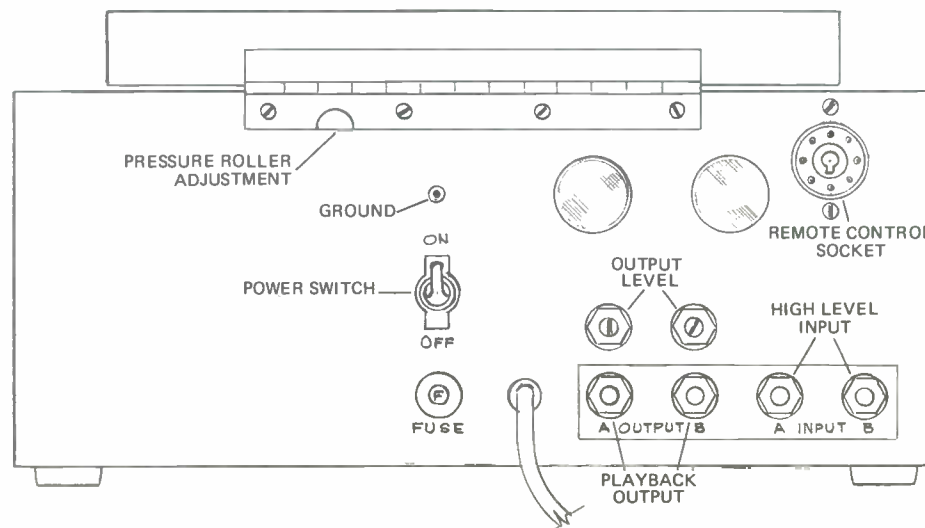
MODEL 700-PS



MODELS 700-RP and 700-RPD



MODEL 700-RPS



III THEORY OF OPERATION

A. SIMPLIFIED THEORY OF OPERATION:

Pressing the RECORD switch transfers the unit to the record mode. Then pressing the START switch automatically records a short duration (1/2 sec.) tone on the cue track of the magnetic tape. A message is also recorded on the audio track via either the microphone input or the line input through the Record Amplifier, the record head, and onto the tape. The STOP switch is then pressed, stopping tape motion and switching the unit out of the record mode.

The recorded message may then be played back by pressing the START switch, which starts tape motion on reproduces the audio message from the playback head, through the Audio Playback Amplifier to the output terminals.

The Model 700-RPD is a "delay" unit which was designed to offer protection for radio stations against crank callers and live commentary shows. Occasionally during these shows a caller's phraseology is not very discreet. With the Model 700-RPD in the DELAY mode, the operator listens to the announcer and callers as they appear live. The radio station feeds the program material through the delay unit which records, stores, and reproduces the program on a 7 to 10 second tape cartridge with no control tones. The material is delayed so that the radio listeners would hear the program material 7 to 10 seconds after it was actually happening. In the event of a callers "indiscreet phraseology" the operator immediately opens a switch, lets the bad section of tape pass unheard by the listeners, then closes the switch. The only noticeable event to the listeners is several seconds of "dead air".

B. CIRCUIT DESCRIPTION:

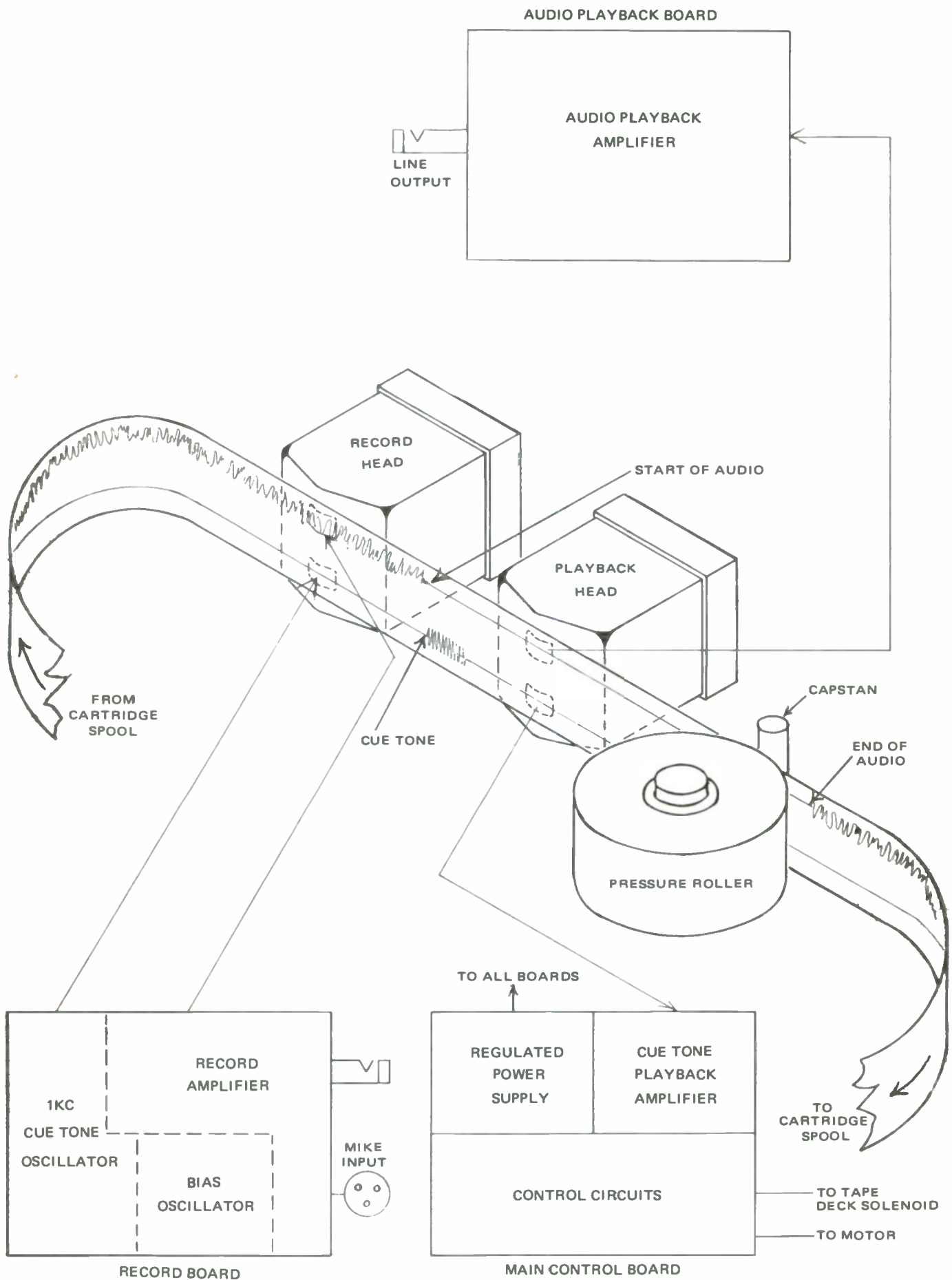
1. Main Control Board

a. Regulated Power Supply:

Voltage from the secondary of the 96K6A power transformer is rectified by a full wave bridge and filtered by a 500 MFD capacitor. This unregulated voltage (approx 35 volts DC) appears on terminal 15 and also feeds the voltage regulators TR-9 and TR-10. The voltage outputs (emitters) of TR-9 and TR-10 are controlled by the 1N970 zener diode in their base circuit. Output of TR-10 is electronically filtered by the 100MFD capacitor and its associated capacitance multiplier and circuit resistances.

b. Solenoid Control and Cue Tone Circuits:

When power is applied TR-7 conducts, lighting the stop switch and biasing TR-8 (delay circuit) on. In the "on" mode TR-8 shorts to ground the collector voltage of TR-4. Voltage from the base of TR-7 is fed to the base of TR-5, biasing TR-5 on. TR-5 shorts to ground the voltage on the base of TR-6. Moving the PLAY/RELEASE lever to the play position closes the two micro-switches on the tape deck. One micro-switch is in series with one side of the AC line to the drive motor and the solenoid power supply. The other micro-switch is in series with the line to the start motor and start light. Pressing the start switch applies voltage to the base of TR-6, biasing it on. TR-6 conducts, energizing the relay. The relay contacts apply voltage to the solenoid. The solenoid pulls the pressure roller against the capstan, starting tape motion. When TR-6 conducts, it shorts to ground the voltage on the base of TR-7 and TR-5. The stop light goes out and voltage to the delay circuit is removed. TR-5 is no longer biased on, allowing voltage to appear on the base of TR-6. TR-6 remains biased on after pressure is removed from the start switch. Approx 3 seconds after the unit starts, the 25MFD capacitor in the base circuit of TR-8 discharges. TR-8 then stops conducting. This allows voltage to appear on the collector of TR-4. A 1,000 cycle cue tone has been recorded on the cue track at the beginning of each message. This cue tone is detected by the cue playback head and amplified by TR-1, TR-2, TR-3, and TR-4. Output of TR-4 goes into a tuned circuit resonant at 1,000 cycles. Frequencies between 700 and 1300 cycles are passed by the tuned circuit and are fed to the base of TR-5. With a signal on it's base, TR-5 conducts, shorting the bias of TR-6 to ground. TR-6 stops conducting, de-energizing



SIMPLIFIED BLOCK DIAGRAM

the relay which removes the voltage to the solenoid, and thus releases the pressure roller from the capstan, stopping tape motion. Voltage is now applied to the bases of TR-7 and TR-5. TR-5 remains biased on. TR-7 conducts, lighting the stop light and applying voltage to the delay circuit, and biasing TR-8 on.

2. Audio Playback Board

The playback amplifier consists of a 6 stage low noise silicon transistorized circuit. The 400 MH premium reproduce head connects via shielded cable to terminals 1 and 2. Transistor TR-1 is an emitter follower to offer a high impedance load for the head. This will match the head impedance at the higher frequencies giving optimum high-end response. NAB equalization is accomplished by the negative feedback circuit (2.2K resistor and .03MFD capacitor) between the collector of TR-3 and emitter of TR-2. Also the high end boost circuit (parallel .003MFD capacitor and 3.3K resistor) in the emitter of TR-4. Transistor TR-6 is an emitter follower with a low output impedance (about 200 ohms). The 390 ohm resistor in the emitter of TR-6 adds to the transistor impedance to give an output of 600 ohms. The 390 ohm resistor also prevents loading of the output stage allowing any number of units to be connected in parallel with no deterioration of quality. The output connects from terminal 4 and 5 to a 2 connector phone jack located on the rear panel. Power is provided to terminal 6 from an electronically filtered series regulated supply on the main control board.

3. Record Board (Monaural)

a. Record Control and Voltage Regulators:

Unregulated voltage from the main control board supplies power to terminal 8 of the record board. This voltage biases TR-10 on shorting to ground the bases of TR-8 and TR-9 and the bias voltage to TR-11. In this mode the record function is off. Pressing the record switch shorts out the bias going to TR-10. TR-10 stops conducting allowing bias voltage to be applied to the bases of TR-8, TR-9, and TR-11. TR-11 conducts, shorting out the base of TR-10, holding the record mode on. Voltage outputs of TR-8 and TR-9 are controlled by the 1N970 zener diode in their common base circuit. TR-8 supplies regulated 23.5 volts to the record amplifier and record bias oscillator. At the end of the recording the unit is switched out of the record mode by pressing the stop switch. This shorts out the bias on TR-11. TR-11 stops conducting allowing TR-10 to conduct shorting out bias to TR-8, TR-9, and TR-11. The record function is now off.

b. Cue Tone Oscillator:

TR-13 and TR-14 comprise the 1 KC notch type RC oscillator. This circuit has high stability and low distortion. Frequency is determined by the two 10 K resistors, the .005 MFD and .05 MFD capacitors in the negative feedback leg. Positive feedback to sustain oscillation is fed from the emitter of TR-13 through the No. 3S6 bulb to the emitter of TR-14. The amount of positive feedback is controlled by the setting of the 500 ohm multi-turn control in the emitter of TR-14. Clockwise adjustment reduces the distortion and stability. The oscillator is adjusted at the factory for 2% distortion. If the oscillator output level and stability should drift with age, adjust the control counter-clockwise. The oscillator is turned on when the record switch is pressed. TR-12 controls the length of tone recorded at the beginning of each message. Pressing the start switch applies a positive voltage, from terminal 8 of the main control board, to the base circuit of TR-12. Approximately one half second later the 100 MFD capacitor in the base of TR-12 charges and TR-12 conducts, turning the oscillator off.

c. Record Amplifier

The record amplifier consists of a 5 stage, low noise, all silicon solid state equalized amplifier and meter driver. A high level low impedance broadcast type microphone may be fed into the mike input connector. The resulting signal is amplified by TR-1. The output of TR-1 is normalled through the line input jack and the RF supression filter (5 MH choke and .001 MFD capacitor) to the record gain control and input (base) of TR-2. TR-2 and TR-3 amplify the signal and feeds the emitter follower, TR-4. The low impedance output of TR-4 feeds the VU meter and the output stage TR-5. High frequency record per-emphasis is accomplished by the variable capacitor and the 68K resistor between TR-4 and TR-5. Output of TR-5 feeds the head through the bias trap. The parallel bias trap circuit is resonant at the 78KC bias frequency and is tuned for minimum 78KC bias on the collector of TR-5. At resonance this also reduces the load on the bias transformer. After adjusting the bias trap, the bias level across the head may be set with the bias level control.

d. Bias Oscillator:

The bias oscillator consists of a tuned primary, transformer-coupled multivibrator. The high-Q tuned primary circuit controls the bias frequency and produces a low distortion, frequency stable, sine wave output.

e. Auxiliary 150 cycle cue tone switcher board (Optional):

Unregulated 35 volts is supplied from terminal 15 of the main control board. When power is applied to the unit, TR-4 is biased on. Voltage to the base of TR-5 is shorted to ground by TR-4. Output (emitter) of TR-5 is therefore zero. The 150 cycle cue tone from the main control board is amplified by TR-1 and TR-2. Output of TR-2 is filtered by the tuned circuit, 1 henry inductor and the 1 MFD capacitor, in the base of TR-3. Signal on the base of TR-3 causes TR-3 to conduct, shorting to ground the bias voltage on TR-4. With TR-4 no longer conducting, voltage will appear on the base of TR-5, permitting TR-5 to conduct. Output from the emitter of TR-5 will start another Series 700 Tape-caster or energize an external 10 MA 25 volt relay. See schematic for connections.

IV MAINTENANCE AND TROUBLESHOOTING

A. MAINTENANCE:

Tapecaster has considered the subject of maintenance from the design stage through the formulation of final systems design criteria in order to create a unit which requires the least amount of maintenance for the task at hand. Therefore, notwithstanding maintenance procedures required with competitive units, or even accepted industry standards, the following maintenance schedule will suffice for even the most rigorous of applications:

1. Weekly Maintenance:

- a. Clean heads with a cotton swab dipped in head cleaner. (A recommended cleaner is Prestone type AS-149 automobile polish.)
- b. Demagnetize heads, tape guides, and capstan using a high quality head demagnetizer.

NOTE: In many instances maintenance personnel actually do more harm than good in demagnetizing the above components. Extreme care should be used not to touch the end of the demagnetizer to the parts being demagnetized. Also the demagnetizer should never be turned on or off when in the vicinity of these parts.

- c. Magnetic tape, as provided in cartridges, is back-lubricated for smooth operation. The lubricating compounds will eventually build up on the pressure roller and capstan. The pressure roller and capstan should be cleaned with a cloth dipped in alcohol.

2. Bi-annual Maintenance:

NOTE: Make sure power cord is un-plugged before performing the following:

- a. Remove tape deck from the unit.
- b. Vacuum or blow out interior if necessary (a new paint brush is helpful for this operation).
- c. Oil motor by either of two methods:
 1. An adequate method of oiling the motor is to place 5 drops of light 3-in-1 oil and 5 drops of WYNN'S Friction-Proofing Oil (available at automobile service station) in the oil trough on the top plate of the motor housing plate and 1 drop of the same oil in the thrust bearing at the bottom of the motor.
 2. A more thorough method of oiling the motor is to:
 - a. Remove the motor from the sub-chassis.
 - b. Remove the pulley from the motor shaft.
 - c. Dis-assemble the motor by removing the U-Bracket taking care not to loose the ball bearing at the bottom of the motor.
 - d. Separate the 2 halves of the motor.
 - e. Place 5 drops of light 3-in-1 oil and 5 drops of Wynn's Friction-Proofing Oil on the felt core in the center of the "winding" section of the motor.
 - f. Re-assemble and re-install motor.
 - g. Check for approximately 1/32nd inch vertical movement of the rotating portion of the motor.

- d. Check belts for signs of deterioration.
- e. Clean belts and grooves in pulley and flywheel.
- f. Re-assemble unit and check for proper operation.

B. TROUBLESHOOTING:

1. Electronic Troubleshooting

Due to the simplicity of design, selection of high quality components, and large safety factors, Tapecaster owners will experience far fewer troubles and breakdowns than are experienced with competitive units. When troubles do occur, they will usually be of a mechanical nature. It is for this reason that no electronic troubleshooting is discussed.

2. Mechanical Troubleshooting

Problems involving tape speed can invariably be traced to the motor and/or the flywheel assembly. Most technicians usually assume that these problems are attributable to worn belts and pressure rollers, when indeed wear of these items seldom affect speed.

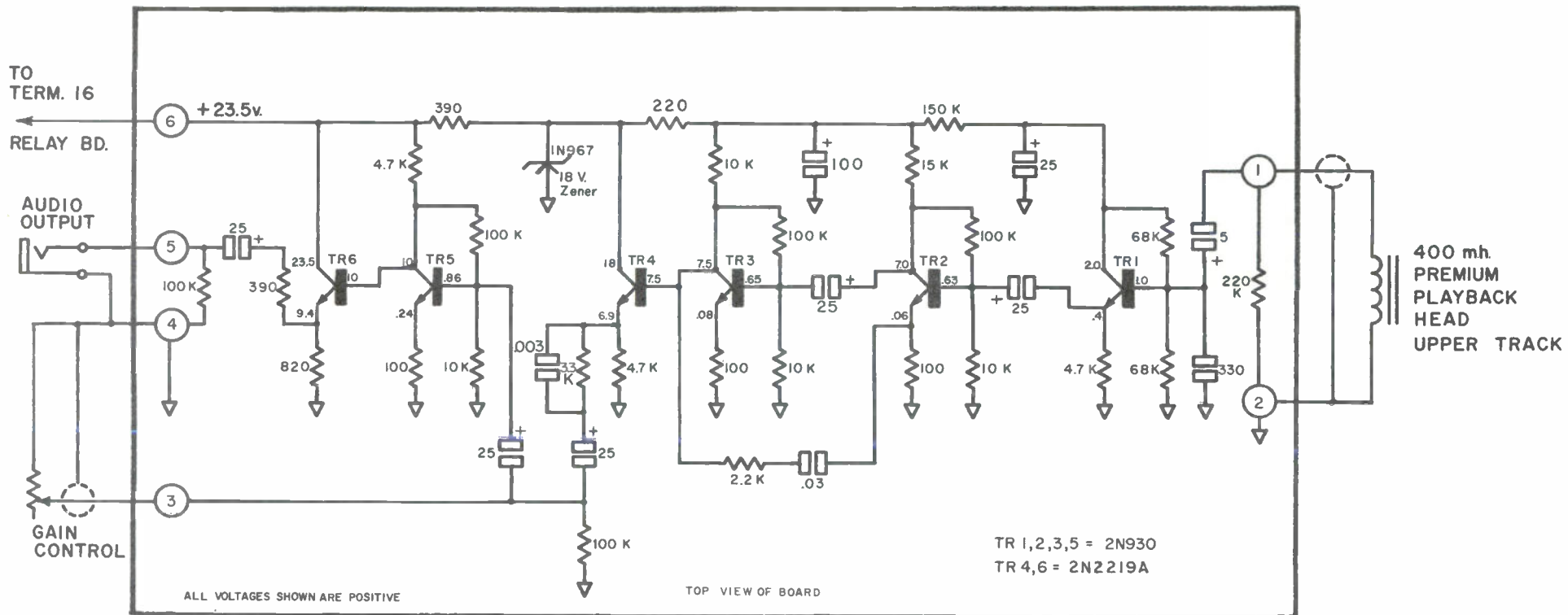
- a. If the unit is slow in attaining proper speed, the trouble is usually a defective motor winding (or capacitor) or binding motor or flywheel bearings.
- b. If the unit attains speed in the normal amount of time (approximately 2 seconds) but runs slightly slow (erratically or at a constant speed) the problem is usually a worn bearing in the flywheel assembly.
- c. If unit's speed is erratic or if wow and/or flutter is excessive, the problem can usually be traced to a dirty or mis-adjusted pressure roller or a defective or improperly wound cartridge.
- d. If tape tends to "creep" before pressing start switch (energizing solenoid) the problem can usually be traced to a broken or mis-adjusted spring at the center of the swing arm (at the solenoid) or a broken or mis-adjusted fiber stop, located under the PLAY/RELEASE cover. Adjustment of this fiber stop should be made only after pressure roller has been properly adjusted.

1. To adjust pressure roller:

- a. Press START switch to energize solenoid.
- b. Turn screw (located on rear panel behind hinge) clockwise one full turn past where pressure roller just touches capstan.
- c. Press STOP switch to release solenoid.

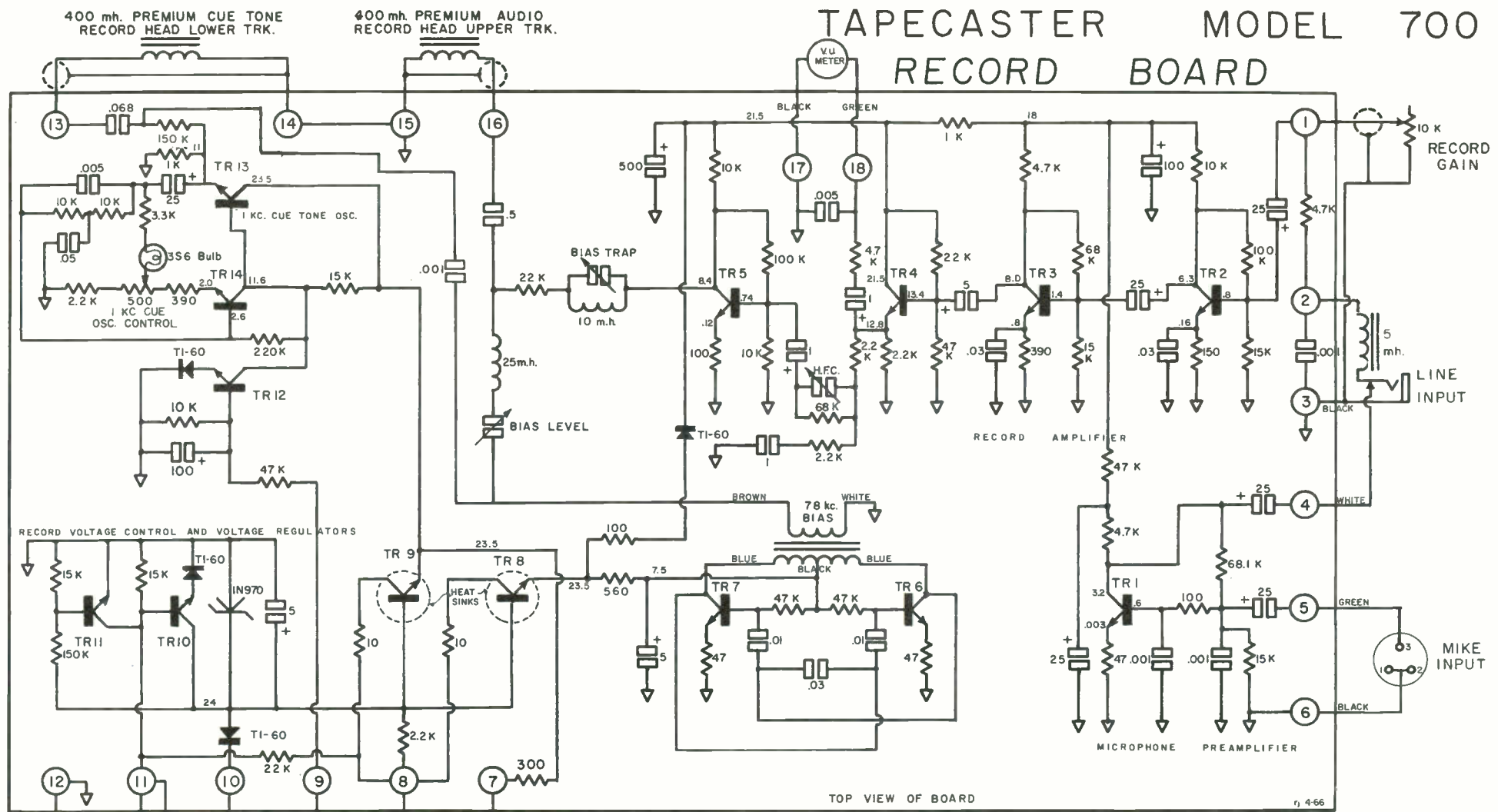
2. To adjust fiber stop:

- a. Put PLAY/RELEASE lever in the PLAY position and remove black knob and cover.
- b. Press START switch.
- c. Loosen screw holding fiber stop.
- d. Slide fiber stop toward rear of unit until it just touches the load lever arm.
- e. Tighten screw holding fiber stop and re-install cover and knob.

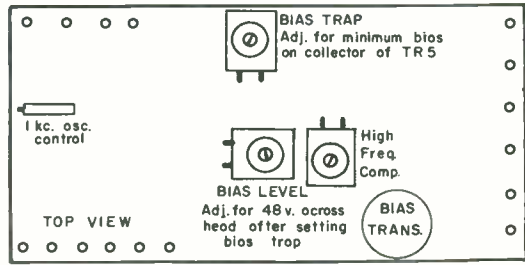


AUDIO PLAYBACK AMPLIFIER
TAPECASTER MODEL 700

TAPECASTER MODEL 700 RECORD BOARD

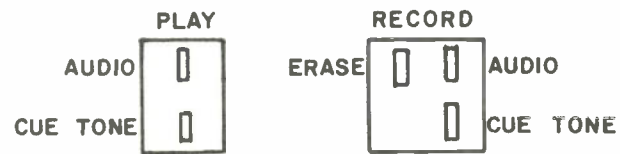
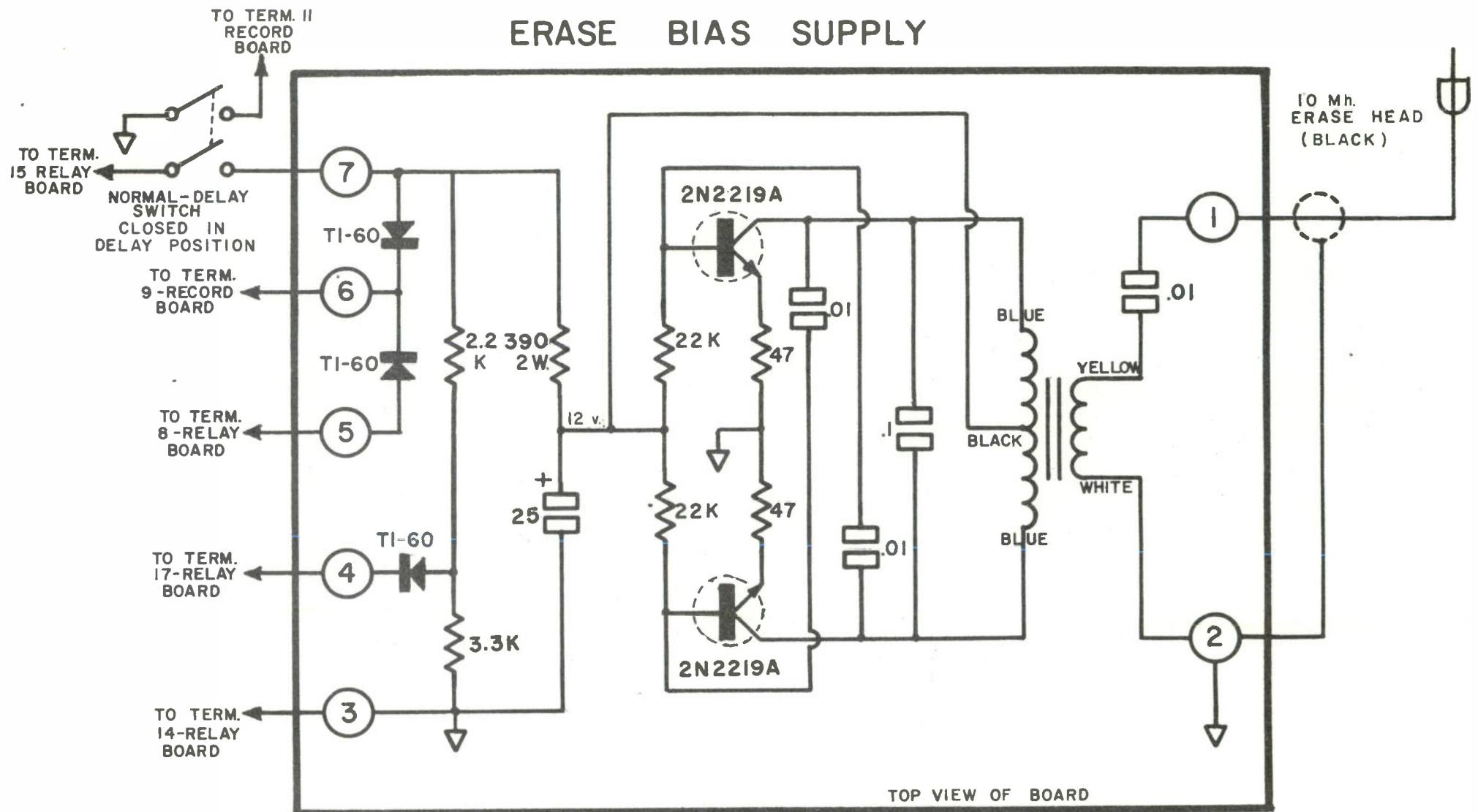


TR'S 4,6,7,8,9,10,11,12,13 = 2N2219A
TR'S 1,2,3,5,14 = 2N930



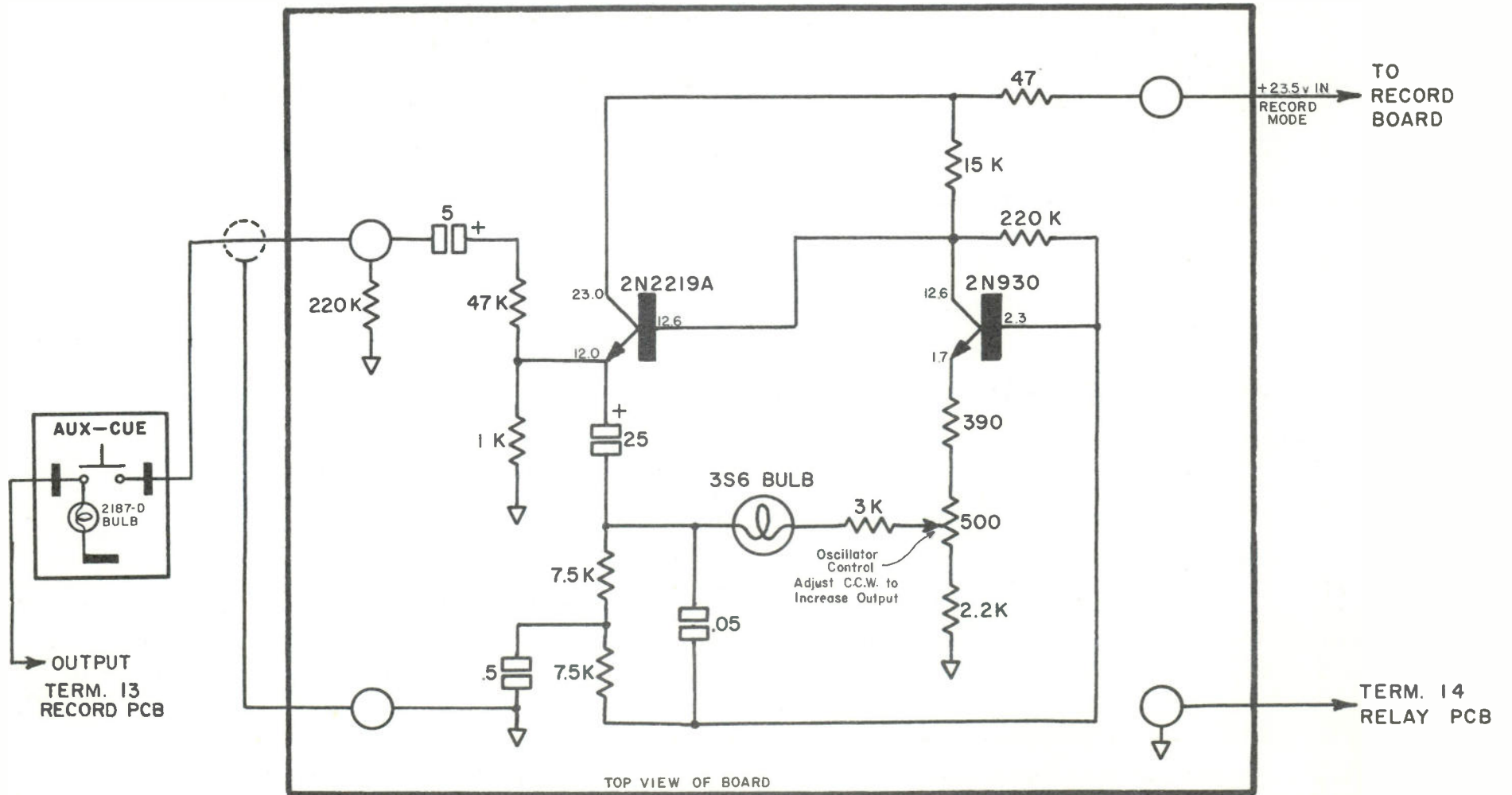
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TAPECASTER MODEL 700 RP DELAY ERASE BIAS SUPPLY



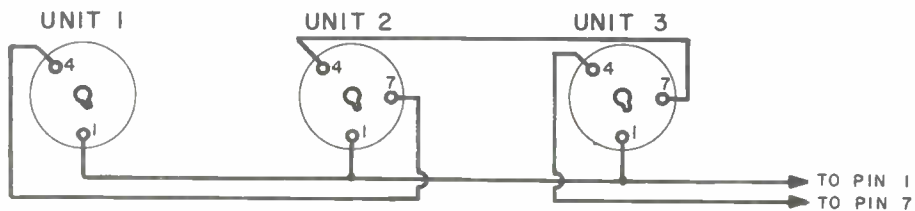
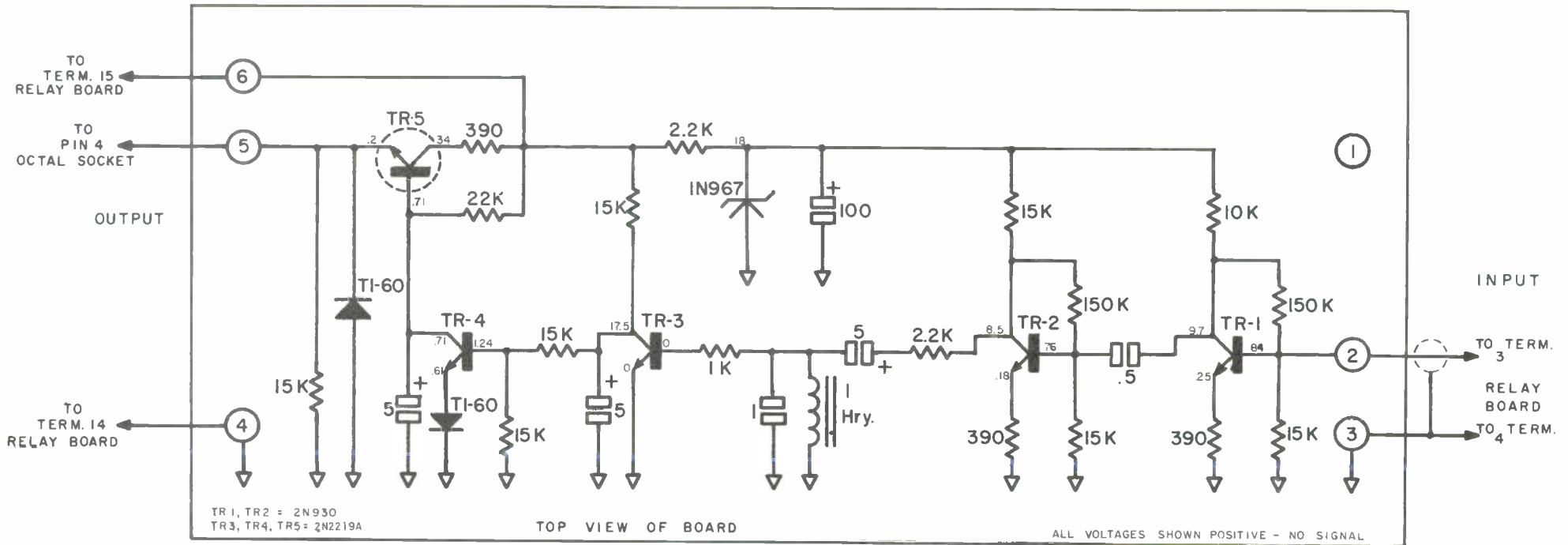
FRONT VIEW OF HEADS

TAPECASTER MODEL 700
150~ AUXILIARY CUE GENERATOR

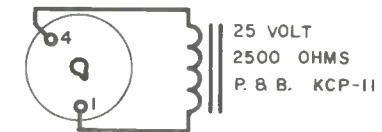


ALL VOLTAGES SHOWN ARE POSITIVE

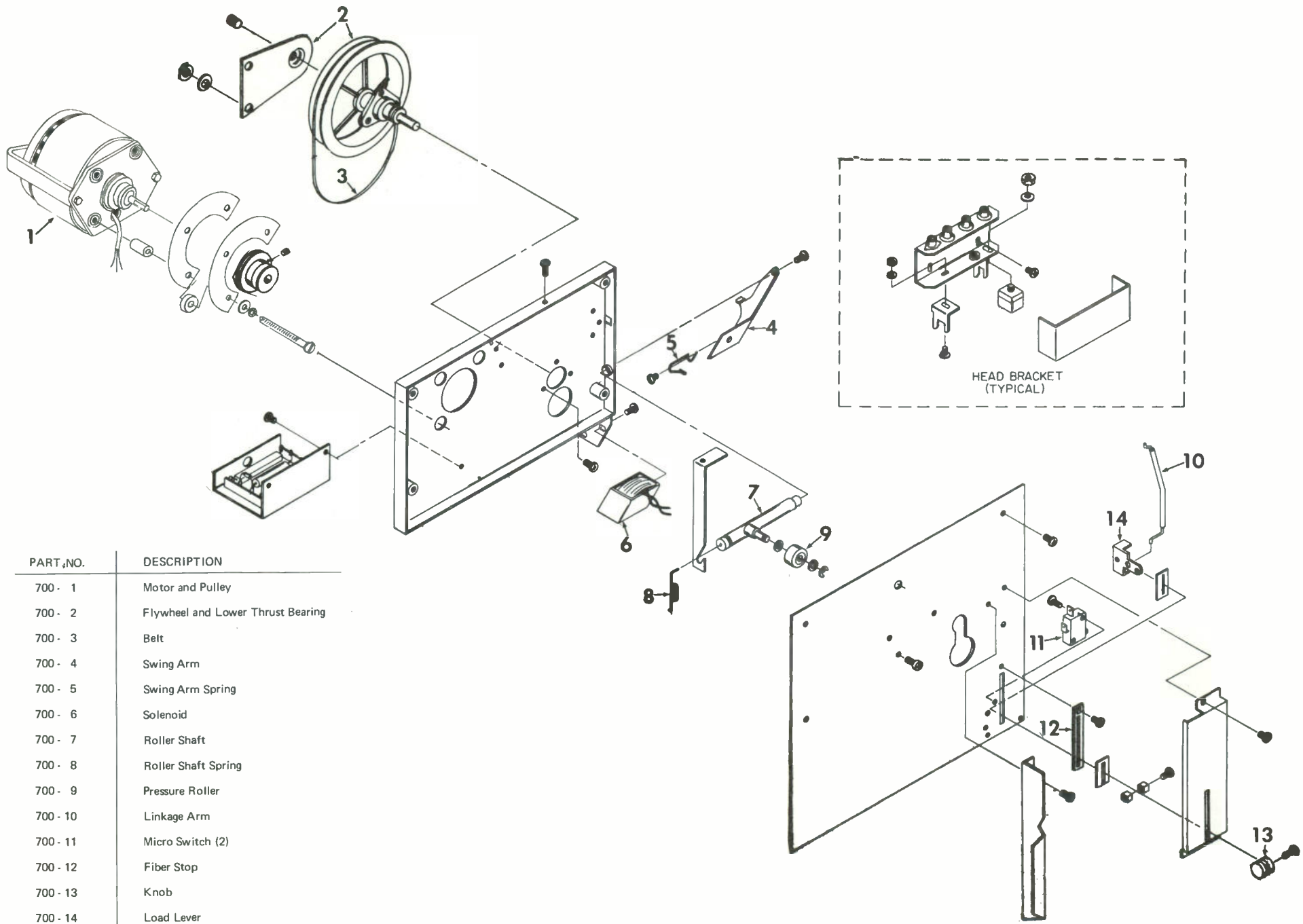
TAPECASTER SERIES 700 AUXILIARY 150~ CUE TONE SWITCHER



CONNECT AS SHOWN ABOVE TO START TWO OR MORE SERIES 700 TAPECASTERS IN SEQUENCE



CONNECTION FOR EXTERNAL RELAY OPERATION



PART NO.	DESCRIPTION
700 - 1	Motor and Pulley
700 - 2	Flywheel and Lower Thrust Bearing
700 - 3	Belt
700 - 4	Swing Arm
700 - 5	Swing Arm Spring
700 - 6	Solenoid
700 - 7	Roller Shaft
700 - 8	Roller Shaft Spring
700 - 9	Pressure Roller
700 - 10	Linkage Arm
700 - 11	Micro Switch (2)
700 - 12	Fiber Stop
700 - 13	Knob
700 - 14	Load Lever



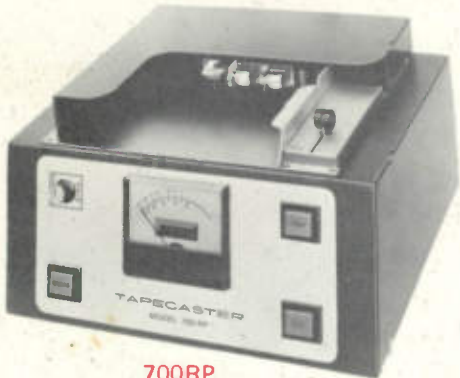
SUPER-TORQUE MOTOR

ACTUAL SIZE

PRICE LIST EFFECTIVE MAY 1, 1970

Subject to change without notice.

SUPER-TORQUE MOTOR STANDARD ON ALL UNITS



700RP

MODEL 700-RP

Solid State Combination Record-Playback Unit **Net Price \$500.00**
 Option 150 Cycle Auxiliary Generator and Sensor **Net Price \$550.00**



700-P

MODEL 700-P

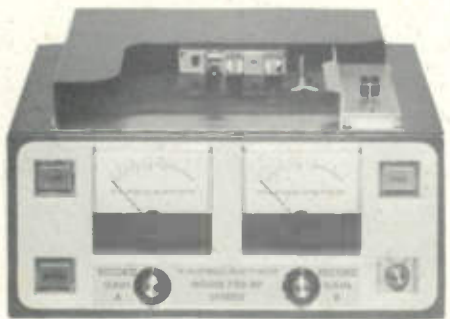
Solid State Playback Unit **Net Price \$350.00**
 Option 150 Cycle Auxiliary Sensor **Net Price \$375.00**



700-RPD

MODEL 700-RPD

Solid State Combination Record-Playback Unit with Delay
 Feature for Telephone Talk Shows **Net Price \$550.00**



700-RPS

MODEL 700-RPS

Stereo Solid State Combination Record-Playback Unit **Net Price \$750.00**
 Option 150 Cycle Auxiliary Generator and Sensor **Net Price \$800.00**

MODEL 700-PS (same case size as 700-P)

Stereo Solid State Playback Unit **Net Price \$500.00**
 Option 150 Cycle Auxiliary Sensor **Net Price \$525.00**

Terms Net Check with Order or COD, FOB Rockville, Maryland

All Tapecaster equipment is sold under a 30 day unconditional money back guarantee.