

INSTRUCTION MANUAL

BROADCAST ELECTRONICS, INC.
MODEL 605B/610B

NO. 597-0605



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Quincy, Illinois 62305
Tel: (217) 224-9600
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Cable: BROADCAST

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

INSTRUCTION MANUAL

SPOTMASTER FIVE SPOT - MODEL 605B

SPOTMASTER TEN SPOT - MODEL 610B

INSTRUCTION MANUAL

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SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

SPOTMASTER TEN SPOT (Model 610B) and FIVE SPOT (Model 605B) multiple cartridge reproducer units are intended for use in AM, FM and TV broadcast stations, recording studios and other installations requiring the use of multiple pre-recorded cartridges on instant demand. Both units are capable of manual operation or may be incorporated into programmed automation systems making use of one, two or three NAB standard cueing tones.

Each cartridge deck is removable from the front of the unit without affecting the operation of the remaining decks. Pressure roller force and cartridge indexing adjustments may be made from the front without removing the deck. A flywheel loaded common capstan supplies tape motive force, the flywheel in turn being driven by a heavy duty hysteresis synchronous motor. Individual power supplies are provided for each solenoid thereby making each deck independent of the other, and, in the TEN SPOT, each module of five decks is completely separate and independent of the other five-deck module both mechanically and electronically.

In the basic equipment, each reproduce channel is separately equipped with primary cueing amplifier/s (1000 Hz) and a program amplifier with the output level adjustable to +4 dBm operating level by means of locking type controls. The amplifier power supply is transistorized and zener regulated.

Auxiliary cueing amplifiers, Cue-Trip I (150 Hz) and/or Cue-Trip II (8 KHz), are available for use in sequential operation or other auxiliary functions. The equipment is wired to accept dual frequency cueing amplifiers, i.e., the 1000 Hz stop tone and either a Cue-Trip I or Cue-Trip II auxiliary cue tone. To make use of an auxiliary cue tone, it is only necessary to remove the 1 KHz cue tone board (normally supplied) and plug in a dual frequency cueing amplifier and extra relay in the socket provided on each channel to be modified. The relay contacts of the relay installed may be picked up at terminals 4 and 5 of the remote socket located on the rear panel. Equipment for a third cueing tone is supplied as an external unit.

Facilities are provided on the rear panel for remote control and for inter-connections between channels so as to permit automatic sequencing from channel to channel. All amplifiers are plug-in modular units. Enclosed plug-in relays are used throughout.

Plug-in facilities are provided on the rear panel for use with an automatic audio switcher, type SW-5A, which automatically connects one program channel at a time to the program line. The use of this unit is recommended where more than three channels

are to be connected into a single program line.

The front panel is equipped with a power switch and fuse for each module of five decks. Also provided on the front panel are START and STOP momentary push button switches and signal lights indicating the "ready" and "running" condition of each deck. These operating functions are extended to the remote control unit when employed.

The TEN SPOT is essentially two FIVE SPOTs mounted on a 15-3/4" X 19" panel and is designed for mounting in a standard relay rack or cabinet with a minimum depth of 15 inches.

The FIVE SPOT is normally supplied in a wood, walnut Formica-covered case 11-5/8" W X 17" D X 17" H, but may be ordered equipped with a TEN SPOT panel in which case the space normally occupied by the second five channel module is filled with a cartridge storage bin capable of storing up to 16 type A cartridges, 11 type B cartridges or a combination of the two.

1.2 SPECIFICATIONS

Equalization:	NAB Standard
Frequency Response:	+2 dB, 50 - 12,000 Hz +4 dB, 50 - 15,000 Hz
Distortion:	2% or less @ normal recording level
Signal to Noise Ratio:	55 dB ref. 3% THD
Wow & Flutter:	.2% or less (RMS)
Tape Speed:	7-1/2 ips (3-3/4 ips available)
Output Level:	Adjustable to +4 dBm (peak factor dB)
Output Load Impedance:	600 ohms (emitter follower) *600 ohms (transformer output)
Cueing Accuracy:	.1 second
Cueing Tones:	Primary - 1,000 Hz (Stop/Re-cue) *Cue-Trip I - 150 Hz (End of Message) *Cue-Trip II - 8,000 Hz (Auxiliary)
Playing Time:	1 sec. to 16 min. per deck @ 7-1/2 ips using NAB type A & B cartridges
Capacity:	FIVE SPOT - 5 type A or B cartridges TEN SPOT - 10 type A or B cartridges
Circuitry:	All solid state
Power Supply:	Transistored filtered, zener regulated
Power Requirement:	108-125 VAC, 60 Hz, 75 watts - FIVE SPOT 108-125 VAC, 60 Hz, 150 watts - TEN SPOT
Dimensions:	FIVE SPOT - 9-13/16" W X 15" D X 15-3/4" H TEN SPOT - 19" W X 15" D X 15-3/4" H
Weight:	FIVE SPOT - 44 lbs. TEN SPOT - 89 lbs.

*Optional

1.3

WARRANTY

Broadcast Electronics products are guaranteed to be free from defects in workmanship and material for a period of one year after shipping date when subjected to normal usage or service. All warranties are void, A) If equipment has been altered or repaired by others without Broadcast Electronics' specific prior authorization, or B) If equipment is operated under environmental conditions or circumstances other than those specifically described in Broadcast Electronics literature or instruction manuals.

1.4

SERVICE

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

SECTION 2

INSTALLATION

2.1 MOUNTING

2.1.1 FIVE SPOT (Model 605B)

The FIVE SPOT is supplied in two versions - encased in a cabinet for installation on a control desk or equipped with a 19" panel for installation in a standard 19" relay rack or cabinet.

If installed on a control desk, the unit should be within convenient access of the operator but, if desired, it may be installed elsewhere and operated by remote control by extending the control circuitry to the operating position. (See Remote Control, Section 2.4.)

If the unit is to be rack mounted, it should preferably be installed approximately 4 feet above the floor level. Ambient temperature in the rack should not exceed 120° for best operation. Provide ventilation, if necessary. Do not mount other equipment having high 60 Hz radiation from power transformers immediately above the FIVE SPOT due to the possibility of hum induction into the heads or program amplifiers.

2.1.2 TEN SPOT (Model 610B)

The TEN SPOT is designed for installation in a standard relay or cabinet rack and should be mounted preferably at a height approximately 4 feet above the floor. Ambient temperature in the rack should not exceed 120° for best operation. Provide ventilation, if necessary. Do not mount other equipment having high 60 Hz radiation from power transformers immediately above the TEN SPOT due to the possibility of hum induction into the heads or program amplifiers.

2.2 POWER CONNECTION

A conventional AC power cord and plug assembly is furnished with the equipment for connection to a standard 115 volt AC convenience outlet. A ground terminal is provided on the rear panel for connecting the equipment to the system ground. A power switch and fuse is mounted on the front panel of each five channel module.

It is important that the power plug be polarized for, as in much AC powered electronic equipment, the minimum noise output may be affected by the polarity of the AC plug. Correct polarization will reduce residual noise to a minimum.

Power requirements of the FIVE SPOT are 115V, 60 Hz, 75 watts.

Power requirements of the TEN SPOT are 115V, 60 Hz, 150 watts.

NOTE: For 115 V, 50 Hz operation, modifications to the drive assemblies are made at the factory, if so ordered. An external 230 V/115 V transformer is provided for operation from 230 V, 50 Hz power mains.

2.3 AUDIO OUTPUT CONNECTIONS

2.3.1 The basic FIVE or TEN SPOT unit is normally supplied with each program channel equipped with an emitter follower output stage (unbalanced) for operation into a 600 ohm or higher load impedance. Output transformers are provided as an optional feature, if ordered.

If the SW-5A switcher is used in the installation, output transformers on the individual reproducing channels are unnecessary as the switcher is so equipped.

The audio output of each program channel appears at a jack located on the rear panel marked OUTPUT JACK #1, etc., corresponding to the numbered tape decks on the front panel. The jacks are insulated from the chassis. The mating plug for the jacks is Switchcraft type 40 or equal. The output level from each channel may be adjusted by means of the associated output level control located near each output jack on the rear panel. (See Fig. 1.)

2.3.2 AUTOMATIC SWITCHER CONNECTIONS

If all outputs are to be connected into a single program line, it is recommended that SPOTMASTER automatic audio switchers, type SW-5A, be installed. The switcher is triggered from impulses transmitted by the SPOTMASTER equipment and connects one audio channel at a time to the outgoing program line. Any of the audio channels may be activated on a completely random basis by depressing the desired START button or, if the unit is equipped for automatic sequencing, the switcher is triggered as each channel is activated. Operation in this manner permits full output level and optimum signal to noise ratios from individual channels. The switcher is equipped with cables and plugs required for connection either to the FIVE SPOT or TEN SPOT. It is only necessary to insert switcher plug #1 into audio output jack #1, plug #2 into audio output jack #2, etc. The switcher signal cable plugs into an octal socket on the rear panel of the cartridge unit marked SWITCHER. The outgoing program line is to be connected to these terminals. One SW-5A switcher is required for the FIVE SPOT and two for the TEN SPOT--one for each module of five channels. Each switcher is capable of switching any one of the five channels to a single program line. If SW-5A switchers are employed in the installation, output transformers on individual audio channels of the SPOTMASTER are unnecessary as the switcher is so equipped.

2.3.3 PARALLEL AUDIO OUTPUT CONNECTIONS

Audio output channels may be connected in parallel, if desired, for operation into a single program line but with a consequent reduction in output level and signal to noise ratio, depending upon the number of output channels so connected. If con-

necting output channels in parallel, it is necessary to isolate each channel from the other by adding suitable isolating resistors in one or both legs of the output channel to eliminate excessive loading of the output stages. (See schematic for details.)

In equipment having emitter follower output stages, the isolating resistors are factory-installed with shorting straps across each resistor. If connecting in parallel, it is only necessary to clip the straps across each resistor (R19).

In equipment provided with output transformers, connected for operation into a 600 ohm load, it is necessary to add a 270 ohm isolating resistor in series with each leg of the output transformer secondary before connecting channels in parallel. This may be done externally or internally, as desired.

Tests were made on a typical production unit utilizing various parallel connections with the following results. In each case, the parallel combination was terminated into a 600 ohm load.

TYPICAL TEST DATA - PARALLEL OUTPUT CONNECTIONS

TEST DESCRIPTION	OUTPUT VOLTAGE ACROSS 600 Ω LINE*	S/N RATIO
Audio Channel #1 (No isolating resistors)	1.23V (+4 dBm)	-55 dB
Audio Channel #1 (with isolating resistor/s)	0.7V (-1 dBm)	-55 dB
Audio Channel #1 + #2 (each with isolating resistor/s)	0.44V	-50 dB
Three Audio Channels in parallel (each with isolating resistor/s)	0.35V	-46 dB
Four Audio Channels in parallel (each with isolating resistor/s)	0.28V	-44 dB
Five Audio Channels in parallel (each with isolating resistor/s)	0.24V	-42 dB
Ten Audio Channels in parallel (each with isolating resistor/s)	0.12V	-36 dB

TABLE #1

*The output level, in each test, was established by reproducing a 400 Hz tape recorded at the NAB Standard Reference Level. (See Section 2.05, NAB Cartridge Tape Recording and Reproducing Standards.)

From the foregoing, it can be seen that, as more channels are added in parallel, the output level as well as the signal to noise ratio diminishes. It is therefore important that the requirements of the overall system be taken into account when making an installation of this type.

An alternate method of connecting channels in parallel is to reduce the output level control setting to three-quarters open (-5 dB). This will eliminate the necessity of adding isolating resistors in the output lead and produces the same effect with respect to protecting the output stage against excessive loading. If this method is chosen, the output level controls should be firmly locked in place to prevent accidental movement of the control to the fully open position.

2.4 REMOTE CONTROL

Remote control circuitry is provided for use when the equipment is installed at a location other than the operating position. Start, stop and tally light circuitry for each deck is connected to terminals in an octal socket, marked REMOTE, located on the rear panel. The mating plug for the socket is Amphenol Plug #86CP8 with #3-24 shield or equal. Five plugs are required for each five-channel module. The sockets are numbered to correspond with the associated deck. (See Fig. 1.)

A remote control and next event (Sequence) indicator unit is available for Broadcast Electronics as an accessory, Model BE-106.

This unit is housed in an attractive slope panel two-color cabinet, providing lighted start-stop functions for five channels.

The Model BE-106 provides next event indication via lighted lamps providing a positive indication of the next event start position.

The Model BE-106 is complete with cable allowing direct connection to the rear of the unit.

2.5 CUE-TRIP

2.5.1 DESCRIPTION (CUE-TRIP)

The SPOTMASTER Cue-Trip system makes use of two auxiliary cueing tones standardized by the National Association of Broadcasters for use in magnetic tape cartridge recording and reproducing systems. These tones, defined in the NAB Standards as secondary and tertiary cue tones, differ from the primary cue tone (1000 Hz stop tone) in that they are used only to control associated devices in the overall system.

For example, the secondary tone (150 Hz) is defined as the "end of message cue" and is generally used to automatically activate another SPOTMASTER reproducer or other such device at the end of the message then being reproduced. Thus, a series of events could be started and sequentially produced by depressing a single button. The number of events produced would be limited only by the number of Cue-Trip-equipped channels connected in the chain.

The tertiary cue tone (8000 Hz) is defined as an "auxiliary" tone and is normally used to activate other devices at any time during reproduction of a message or other program material. As an example, this tone may be used to change slides at precise moments during the showing of a television commercial.

Thus, the primary cue tone, which is at the beginning of the message, is used to re-cue and stop the tape on the originating channel; the secondary tone, which appears at the end of the message, is used to activate a following channel and the tertiary tone, which appears at pre-selected spots during the message, is used to activate other devices such as television slide changers.

SPOTMASTER FIVE SPOT and TEN SPOT reproducers are always equipped with primary cue tone (stop cue) circuitry but, since Cue-Trip tone circuitry is optional, may be equipped for use of either or both of the Cue-Trip tones. When a single Cue-Trip tone (in addition to primary stop tone) is supplied, the extra amplifier is combined on a single printed circuit card with the stop tone cueing amplifier and is designated as a dual cue tone amplifier. (See Fig. 5.) The second cue tone is normally 150 Hz but 8 KHz can be supplied, if so ordered. If a third cue tone is ordered (Cue-Trip II), it is supplied for external mounting and receives excitation from specially installed phono jacks on the rear panel.

SPOTMASTER Cue-Trip amplifiers are frequency selective units designed to respond to Cue-Trip tones which have been pre-recorded on a tape cartridge cue track. The Cue-Trip I amplifier responds only to the 150 Hz cue tone while the Cue-Trip II amplifier responds only to the 8 KHz cue tone. Neither will respond to the 1000 Hz stop cue tone. The Cue-Trip I amplifier is associated with a relay (K2), the normally open contacts of which are extended to terminals 4 and 5 of the octal remote socket on the rear panel.

The Cue-Trip II amplifier (supplied for external mounting) is equipped with a relay, the normally open contacts of which are extended to terminals on the Cue-Trip II chassis. Supplemental instructions are provided when Cue-Trip II equipment is ordered.

The inputs of the Cue-Trip amplifier filters are bridged across the output of the second stage of the primary cueing amplifier as shown on the master schematic diagram (Fig. 9). Thus, any signal recorded on the cue track of the tape will be present at the input of the Cue-Trip amplifiers as well as the primary (stop) cue amplifier when reproduced. The frequency of the cue signal will determine which amplifier will respond and if the cue signal frequency is either 150 Hz or 8 KHz, the contacts of the relay associated with the responsive Cue-Trip amplifier will close for the duration of the tone. It is important to note that the relay contacts will stay closed for the duration of the tone, thus giving the operator complete control, when recording, over the device to be activated. A tone as short as one-half second may be recorded to provide momentary closure of the relay contacts or a longer tone may be recorded to provide for closure of the contacts for a specific period of time. The sensitivity of the cueing amplifiers is

controlled by variable resistors (R29 and R35) but do not change the value of these resistors unless definitely necessary. The sensitivity of Cue-Trip I amplifier is factory-adjusted to .2 mv and that of Cue-Trip II amplifier to .1 mv. The sensitivity of the primary cueing amplifier (stop cue) is .3 mv. (See Maintenance Section for adjustment procedure.)

2.5.2 CONNECTIONS FOR SEQUENTIAL OPERATION

Any number of Cue-Trip equipped reproducing channels may be connected to operate sequentially. Cue-Trip relay contacts are available at terminals 4 and 5 of the remote socket of each reproducing channel so equipped. The START circuitry of each reproducing channel also appears on the remote socket at terminals 2 and 3. If it is desired that channel 2 be automatically started at the end of the message being reproduced on channel 1, it is only necessary that terminals 4 and 5 of channel 1 be connected to terminals 2 and 3 of channel 2 and that a cartridge with properly recorded cue tones be used.

The connections are most conveniently made by the use of a patch cable made of two octal plugs and a suitable length of two conductor cable, the only requirement being that octal plug terminals 4 and 5 of channel 1 be connected to octal plug terminals 2 and 3 of channel 2. When so connected, the Cue-Trip amplifier in channel 1, on sensing the end of message cue tone, transmits a start signal to channel 2. The tape on channel 1, however, will continue to run until it reaches the stop cue at which point the tape will stop and stand ready for re-use.

This process can be continued through channels 3, 4, 5, etc., in any order, connecting as many channels for sequential operation as desired. A round robin effect can be achieved by connecting the last channel in the sequential chain back to the first channel.

SECTION 3

OPERATION

3.1 ON-OFF SWITCH

Power is applied to the equipment when the ON-OFF switch (S1) is operated to the ON position. (Two such switches are provided on the TEN SPOT - one for each module of five channels.) The signal lamp immediately above the ON-OFF switch glows when the switch is on. Power should be applied for a minimum of one minute prior to operation.

CAUTION: Due to surge current, when power is applied, some relays may operate. If so, RUN lamps in the release buttons will glow. Neutralize by pushing STOP buttons.

3.2 TAPE CARTRIDGE LOADING

Slide the tape cartridge into place on the desired deck while holding it against the cartridge guide on the right hand side of the deck. Press firmly when it engages the pressure roller activating lever until a slight mechanical click is heard. This locks the pressure roller and cartridge in the operating position.

3.3 CONTROLS

3.3.1 START/STOP SWITCHES

Five START buttons and five STOP buttons are provided on the control panel for operation of each five channel module. A READY lamp is placed above each START button which glows when a cartridge is in place on the related tape deck indicating that the deck is ready for operation. Each tape deck is numbered and a corresponding number appears above each READY lamp. The deck is placed in operation by momentary depression of the START button. At the same time a lamp in the RELEASE button, immediately to the right of the cartridge, will glow, indicating that the deck is in operation. When the cartridge stops, the lamp goes out and the cartridge may be removed by depressing the RELEASE button. If for any reason it is desired to stop the tape prior to the automatic stop, this may be done by depressing the related STOP button.

3.3.2 OUTPUT LEVEL CONTROLS

Locking type output level controls are located on the rear panel for adjusting the output level of each channel. Maximum operating output level is +4 dBm. The controls are numbered to correspond with the related channel. If operating output channels in parallel, without isolating resistors, these controls should never be operated more than three-quarters open (-1 dBm). (See Section 2.3.3.)

SECTION 4

ELECTRONIC THEORY OF OPERATION

4.1 POWER SUPPLY (See Fig. 1)

4.1.1 AMPLIFIER POWER SUPPLY

The amplifier power supply is a low voltage DC supply consisting of a stepdown transformer, full wave bridge rectifier and transistorized zener regulated RC filter sections. This supply furnishes DC power for the operation of all amplifiers, relays and auxiliary functions of each five channel module.

E₁ furnishes power for the operation of relays, cue and program amplifiers, and for operation of auxiliary equipment such as the SW5A audio switcher or BE-106 sequencer and remote control unit.

A 1/2 ampere fuse (F1) is provided to protect transistor Q12 against accidental short circuits.

4.1.2 SOLENOID SUPPLY

Five separate medium voltage DC power supplies are furnished for the operation of the solenoid in each of the five tape decks in the FIVE SPOT. Ten such supplies are provided with the TEN SPOT. Each supply takes power directly from the 115 volt AC power line and utilizes half wave rectification (D8, D9, etc.). Power is switched to the deck solenoid (K3) via relay K1 when the start switch is momentarily depressed and this relay is energized. Open circuit voltage is approximately 150 volts which drops to approximately 120 volts when the solenoid is energized. The two signal lamps (RUN and READY) associated with each tape deck are energized by this supply.

4.1.3 MOTOR POWER SUPPLY

The motor is a 115 VAC hysteresis synchronous unit operating directly from the 115 VAC power line. The motor runs continuously when switch S1 is on.

4.2 CONTROL CIRCUITRY

4.2.1 POWER SWITCH

115 VAC power is supplied to the equipment when the power switch (S1) is operated to the ON position. Pilot lamp PL1 is energized in this mode.

4.2.2 START CIRCUITRY

Five START buttons, numbered to correspond with the related tape decks, are located on the front panel of each five channel module. The START buttons are attached to momentary SPST switches which, when momentarily closed, apply energizing voltage

(24 V) to relay K1. Pull-in voltage for K1 is approximately 16 volts. Drop-out voltage is approximately 4-1/2 volts. A holding voltage of approximately 8 volts is maintained on the relay coil at all times. Thus, when the relay pulls in, due to the application of 24 V from the start switch, it stays in this position until released.

Power is supplied to the deck solenoid through a set of contacts on relay K1. Therefore, when the START button is depressed, the deck solenoid is energized and advances the pressure roller against the tape and capstan, thereby starting the tape in motion.

When this occurs, the RUN lamp located in the release button and connected across the solenoid circuit, is energized, indicating that the deck is in operation.

Parallel connections across the START switch are extended to terminals 2 and 3 of the remote socket for use in remote control of the equipment.

4.2.3 STOP CIRCUITRY

4.2.3.1 MANUAL STOP

Five STOP buttons are located on the front panel immediately below the START buttons on each five channel module. The buttons are attached to SPST switches, one side of which is connected to ground and the other to the top of K1 relay coil. Thus, when the button is depressed, a short circuit appears across the relay coil and the relay drops out, thereby stopping tape motion. When this occurs, the RUN lamp is de-energized indicating that the deck is no longer in operation.

Parallel connections across the STOP switch are extended to terminals 2 and 7 of the remote socket for use in remote control of the equipment.

4.2.3.2 AUTOMATIC STOP

Tape motion will stop automatically when a 1000 Hz cue tone from the tape appears at the input of the cue tone amplifier. Transistor Q8 is connected directly across K1 relay coil. Q8 is normally non-conducting but when a 1000 Hz cue tone appears it becomes essentially a short circuit. When this occurs, K1 relay releases and stops tape motion in the same manner as if the STOP switch had been manually operated.

4.2.4 DELAY CIRCUIT

The delay control circuitry automatically delays application of voltage to the cue tone amplifier/s until the primary (stop) cue tone has travelled past the cue head when the tape is set in motion.

Delay transistor Q11 receives bias voltage through a set

of back contacts on relay K1 when this relay is in the relaxed position. Q11 is essentially a short circuit in this mode with the result that no operating voltage is supplied to the cue tone amplifier/s.

When relay K1 is energized by the START button, the bias supply voltage is interrupted and the voltage at the base of Q11 gradually decays as a result of the discharge of C33 through R44 and R45. Current is prevented from flowing through R43 to any auxiliary apparatus that may be connected to terminal 18A by diode D7. As the bias decays, Q11 becomes non-conductive and voltage is applied to the cue tone amplifier/s which then stands ready for the detection of the next cue tone. The delay time of the circuitry is approximately 3 seconds.

4.2.5 SIGNAL LAMPS

Pilot lamp PL1 is energized when power is applied to the equipment and is connected across the power line on the equipment side of fuse F1 and switch S1.

The READY lamps are located immediately above each START switch and are energized when cartridges are in place on the respective decks. Power is supplied to the lamps from the solenoid power supplies through micro switch S4 which closes when a cartridge is moved into place on the deck. S4 is located on the under side of the deck.

The RUN lamps are located in the RELEASE buttons and are connected across the solenoid supply circuitry. They are energized with the solenoid through relay K1.

The RELEASE button is purely mechanical in operation. Momentary pressure returns the pressure roller to rest allowing the cartridge to be removed.

4.2.6 OUTPUT LEVEL CONTROL

Potentiometers (P1), located on the rear panel, control the output level from the reproducing channels to the line. (See schematic for output configurations and Sections 2.3.3 and 3.3.2).

4.3 CUE TONE AMPLIFIER/S

4.3.1 PRIMARY CUE TONE AMPLIFIER (1000 HZ)

The primary cue tone amplifier is a modular, plug in, four stage solid state device driven by the cue head. The output stage is connected across relay K1 in such a manner as to de-energize this relay when the cue head detects the presence of a 1000 Hz tone on the cue track of the tape being reproduced.

The first two stages (Q5 and Q6) of the amplifier are essentially linear from 500 Hz to 10 KHz. There is a 5 dB roll off at 150 Hz. The third and fourth stages (Q7 and Q8) comprise an amplifier/band pass filter section with the fourth stage (Q8)

biased to cut-off. The stage becomes conductive when a 1000 Hz signal appears at the base. Since the output of this stage is connected across the K1 relay coil it de-energizes the relay when the cue signal appears, thereby stopping tape motion.

The sensitivity of the amplifier is controlled by variable resistor R29 and is factory-adjusted for a sensitivity of .3 mv at 1000 Hz with the signal being applied to the input of the amplifier (relay board terminals 12 and 13) from the 600 ohm output of an audio signal generator. R29 is marked at the setting obtained at the factory for convenience in returning it to the original adjustment in case of accidental movement of the control. The 1000 Hz cue tone input to the amplifier from a properly recorded tape is approximately 2.2 mv, providing a safety factor of better than 17 decibels. Obviously, the amplifier can be operated with somewhat less sensitivity but the sensitivity should not be increased due to the danger of improper response to impulse noise. See Section 5.7 for adjustment procedure.

The location of the cueing amplifier and relay K1 is shown in Fig. 7.

4.3.2 OPTIONAL SECONDARY CUE TONE AMPLIFIER - CUE-TRIP I (150 HZ)

When equipment is ordered for use with Cue-Trip I cue tones, the primary (1000 Hz) and Cue-Trip I (150 Hz) amplifiers are combined on a single printed circuit card which plugs into the same socket as the single frequency primary amplifier supplied with the basic equipment. An extra relay, K2, which is associated with the Cue-Trip I amplifier, is also provided and installs in a socket on the relay board. (See Fig. 7.)

The amplifier is comprised of one gain stage (Q9), a band pass filter section and a switching stage (Q10) coupled to relay K2. Input to the amplifier is taken from the second stage output of the primary cue amplifier. (See schematic.) Sensitivity is controlled by variable resistor R35 which is factory adjusted for a sensitivity of .2 mv at 150 Hz with the signal being applied to the input (Q5) of the primary cue amplifier across relay board terminals 12 and 13 from the 600 ohm output of an audio signal generator. R35 is marked with the setting obtained at the factory for convenience in returning it to the original adjustment in case of accidental movement of the control. See Section 5.8 for adjustment procedure.

4.3.3 OPTIONAL TERTIARY CUE TONE AMPLIFIER - CUE-TRIP II (8 KHz)

Supplemental instructions are provided when Cue-Trip II equipment is ordered.

4.4 REPRODUCING AMPLIFIER/S

The audio reproducing system consists of plug-in, four stage transistorized amplifiers driven by the upper track of the tape heads which are connected directly to the amplifier inputs.

Five amplifiers are furnished with the FIVE SPOT and ten amplifiers with the TEN SPOT. Audio output from each channel is completely independent of others. The output of each amplifier feeds through an adjustable output level control to an output jack on the rear panel. (If supplied with optional output transformers, see schematic.)

Each amplifier consists of three gain stages (Q1, Q2 and Q3) and an emitter follower output stage (Q4). Audio frequency equalization is accomplished by means of selective feed back circuitry (R9, R9A, C9 and C8) and by-pass capacitor C7. The amplifier response curve, when combined with the response curve of the head, provides the necessary NAB Standard reproduce curve response. IT IS IMPORTANT, THEREFORE, THAT ONLY SPOTMASTER HEADS BE USED FOR REPLACEMENT. Equalization is factory-adjusted for proper response but, if necessary, the high frequency response may be adjusted by means of variable resistor 9A which is effective within the band from 5 Hz to 15 Hz to the extent of approximately 5 decibels. Maximum resistance in the loop produces maximum high end response and vice versa. The control is marked at the factory setting for ease in returning it to the proper position in case of accidental movement. (See Fig. 8 for location of R9A.)

SECTION 5

ELECTRONIC MAINTENANCE AND ADJUSTMENTS

5.1 AMPLIFIER REMOVAL

Program and cue amplifiers as well as delay transistor (Q11) located on each relay board are of the plug-in type, and may be removed for inspection or maintenance.

CAUTION: DO NOT REMOVE OR REPLACE AMPLIFIERS OR TRANSISTORS WITH POWER ON. DAMAGE TO TRANSISTORS MAY RESULT.

5.2 RELAY REMOVAL

Relays are plug-in and may be removed for inspection or maintenance.

CAUTION: DO NOT REMOVE OR REPLACE RELAYS WITH POWER ON. DAMAGE TO TRANSISTORS MAY RESULT.

5.3 HEAD CARE

The heads are a vital link in the chain between recorded program material on the tape and the amplifying system. When given proper care, they will give long, trouble-free service.

Over a period of time, residue will collect on the face of the head. Unless removed, this will cause high frequency loss, and excessive tape and head wear. The heads should be cleaned with a soft cotton cloth dampened with BE903 cleaning fluid on a weekly basis. (More often, if necessary.)

Periodic demagnetization of the heads with a suitable head degausser is recommended.

5.4 HEAD ADJUSTMENT

The alignment of a new head or realignment of the existing head requires two adjustments - tracking and azimuth alignment. Each deck is equipped with an adjustable head bracket which makes these two adjustments comparatively simple. To facilitate making the adjustments, it is best to remove all tape decks from the machine and re-install each deck in turn in the number 5 deck position while doing the work. This arrangement provides adequate space for both the alignment procedure and visual observation. Materials and tools required are:

- (1) A .050" hex key
- (2) A SPOTMASTER 10 KHz alignment cartridge
- (3) A tracking cartridge
(This cartridge may be fabricated from a standard type A cartridge - approximately 70 seconds - with the cover and pressure pads removed so that the

tape travel path across the head may be easily observed. The wire guide usually found in such cartridges should be taped in place at each end to prevent its accidental movement during operation.)

- (4) A means of measuring the output level of the program amplifier.

The adjustment procedure follows:

- (1) Refer to Fig. 3 for location of the tracking and azimuth adjusting screws.
- (2) A coarse adjustment of head tracking should be made by measurement. With the .050" hex key, rotate the tracking screw for a spacing of 5/16" between the deck surface and the lower edge of the head pole pieces (see Fig. A).
- (3) The fine adjustment makes use of the tracking cartridge described in item (3) under "Materials Required". Place the cartridge on the deck and set the tape in motion. Hold cartridge firmly against deck surface with finger pressure. Observe the tape travel path across the head. Adjust the tracking screw so that the top and bottom pole pieces are equidistant from the top and bottom edges of the tape. The ideal tracking adjustment is shown in Fig. (A) below:

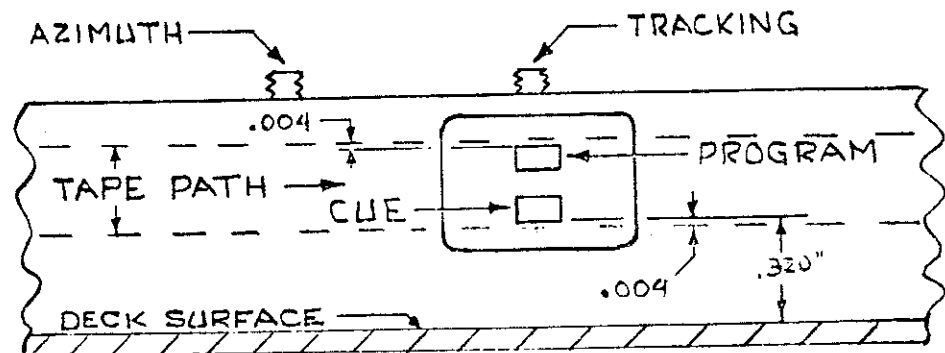


FIG. A

The lower edge of the tape guides, located on the head bracket, should be flush against the deck surface.

- (4) Remove tracking cartridge and place azimuth alignment cartridge on the deck. Set tape in motion and while observing the output level of the playback amplifier adjust the azimuth screw for maximum output at the tape alignment frequency.
- (5) Repeat steps (3) and (4) for final adjustment.

5.5

HEAD PENETRATION

The head bracket, on which the head is mounted, is adjustable, forward or backward, to provide for proper penetration of the head into the cartridge and to permit compensation for various types of pressure pads in common use. The bracket is factory-adjusted for use with Fidelipac cartridges equipped with teflon coated foam pads but may be changed for use with other type pads, if necessary. Generally, the factory adjustment is adequate for most cartridges in common use at this time. (See NAB Cartridge Tape Recording and Reproducing Standards, Chart B, Fig. 2.)

5.6

REPRODUCING AMPLIFIER/S

(See Section 4.4)

No routine maintenance of this amplifier is required.

An adjustable resistor (R9A) is provided to compensate for frequency response tolerances in heads. The adjustment is effective over a five decibel range within the band from 5 Hz to 15 Hz. (See Fig. 8 for location.) The control is factory-adjusted and marked at the factory setting for ease in returning it to its original position in case of accidental movement. Maximum counter-clockwise rotation of the control produces maximum high end response and vice versa.

The voltage gain of the amplifier is approximately 63 decibels at 400 Hz. The amplifier will produce +4 dBm output with a 400 Hz input signal of approximately .8 mv. This measurement may be made by connecting the 600 ohm output of an audio signal generator to terminals 15 (ground) and 16 of the relay printed circuit board and measuring the 400 Hz output voltage (approximately 1.23 VAC) across a 600 ohm load resistor connected across the output terminals of the amplifier. The related tape deck should be removed for this test to prevent head loading at the amplifier input. Harmonic distortion at +4 dBm output level should be less than 1%. Harmonic distortion at +14 dBm should be 2% or less.

5.7

PRIMARY CUE TONE AMPLIFIER/S (1000 Hz)

(See sections 4.2.3.2, 4.3.1 and 2.5.1)

No routine maintenance of this amplifier is required but sensitivity is adjustable as described below.

The primary cue tone amplifier is supplied as a single frequency unit (Fig. 6) or in combination with a Cue-Trip amplifier on a single card (Fig. 5), depending upon how the equipment is ordered. The amplifier performance and electrical characteristics are the same in either configuration.

The sensitivity of the amplifier is controlled by adjustable resistor R29 (see Fig. 5 and Fig. 6 for location). Counter-clockwise rotation increases sensitivity. Clockwise rotation decreases sensitivity. The control is factory adjusted for a sensi-

tivity of .3 mv at 1000 Hz and the factory setting is marked for ease of returning it to its original position in case of accidental movement. It is recommended that the position of the control not be changes unless definitely determined to be necessary. Cueing failures are generally traceable to factors other than amplifier sensitivity, such as improperly recorded tapes, worn heads or badly fitted pressure pads.

The adjustment is made by introducing a 1000 Hz signal from the 600 ohm output of an audio signal generator into terminals 12 and 13 (ground) of the relay board (Fig. 7). The related tape deck should be removed so as to eliminate the possibility of head loading during the test. Reduce the output level of the generator to zero and depress the START button of the channel under test. This will energize K1 relay. Wait five seconds for delay circuit to operate, then gradually increase the signal generator output to determine the drop-out point of the relay. The signal generator output level at this point is the triggering sensitivity of the cue tone amplifier and should be .3 mv. R29 may be adjusted to make any corrections necessary.

Do not increase the amplifier sensitivity beyond the .3 mv level as triggering on noise signals may result. The input level to the amplifier from a properly recorded tape will be approximately 2.2 mv thereby providing a safety factor of 17 decibels.

Voltages appearing at the various terminals of the audio switcher socket (rear panel - see schematic and Fig. 1) may be used to determine the pull-in and drop-out points of K1 relay. For example, if channel 1 is under test, a 27 volt DC potential will appear between terminals 1 and 7 of the switcher socket when K1 is energized. The voltage disappears when K1 drops out. If channel 2 is under test, use terminals 2 and 7, etc.

5.8 OPTIONAL SECONDARY CUE TONE AMPLIFIER/S (CUE-TRIP I - 150 Hz)

(See sections 2.5.1 and 4.3.2)

No routine maintenance of this amplifier is required but sensitivity is adjustable as described below.

The sensitivity is controlled by adjustable resistor R35 (see Fig. 5 for location). Counter-clockwise rotation increases sensitivity. Clockwise rotation decreases sensitivity. The control is factory adjusted for a sensitivity of .2 mv at 150 Hz and the factory setting is marked for ease of returning it to its original position in case of accidental movement. It is recommended that the position of the control not be changed unless definitely determined to be necessary. Cueing failures are generally traceable to factors other than amplifier sensitivity, such as improperly recorded tapes, worn heads or badly fitted pressure pads.

The adjustment is made by introducing a 150 Hz signal from the 600 ohm output of an audio signal generator into terminals 12 and 13 (ground) of the relay board (Fig. 7). The related tape deck

should be removed so as to eliminate the possibility of head loading during the test. Reduce the output level of the generator to zero and depress the START button of the channel under test. Wait five seconds for delay circuit to operate, then gradually increase the signal generator output to determine the operating point of relay K2. The signal generator output level at this point is the triggering sensitivity of the 150 Hz cue tone amplifier and should be .2 mv. R35 may be adjusted to make any corrections necessary.

Do not increase the amplifier sensitivity beyond the .2 mv level as triggering on noise signals may result. The input level to the amplifier from a properly recorded tape will be approximately .8 mv, thereby providing a 12 decibel safety factor.

An ohmmeter connected to terminals 4 and 5 of the related remote socket (located on rear panel - see schematic and Fig. 1) may be used to indicate when relay K2 operates. Switching contacts 9 and 10 of relay K2 are extended to remote socket terminals 4 and 5.

5.9 TERTIARY CUE TONE AMPLIFIER/S (CUE-TRIP II - 8 KHz)

(See section 2.5.1)

Supplemental instructions are provided when Cue-Trip II equipment is ordered.

5.10 CUE TONE TEST

To check whether or not adequate cueing tones have been recorded on a tape, the amplitude of the tones, when reproduced through the program amplifier of a standard SPOTMASTER reproducer (Models 500B, 505B, 400A and 405A), may be compared to a 1000 Hz tone recorded at "0" VU recording level on the program track. The 1000 Hz stop tone should be equal (± 3 dB) to the 1000 Hz program reference tone. The 150 Hz Cue-Trip I tone should be 6 dB (± 3 dB) above the reference tone, and the 8 KHz Cue-Trip II tone should be 9 dB (± 3 dB) below the reference tone.

SECTION 6

MECHANICAL DESCRIPTION, MAINTENANCE, AND ADJUSTMENTS

6.1 INSPECTION PLATE

The inspection plate at the top of the deck chassis may be removed for observation of capstan and deck operation by withdrawing the nine retaining screws.

6.2 TAPE DECK REMOVAL

All tape decks are removable and any of the decks may be withdrawn for maintenance without affecting the operation of the remaining decks.

To remove, loosen the deck anchor screw until deck is free. The anchor screw is located at the rear of the deck immediately to the left of the capstan support bar (see Fig. 3). A screw driver having an 8" shaft and 3/16" blade is best suited for this purpose. Slide the deck out, taking care that the cartridge retaining spring on the head bracket doesn't catch on the deck above. It may be necessary to hold the spring down with a screw driver.

To re-install deck, slide into place, making certain that the runners on each side of the main chassis are properly engaged. The deck plug connector will engage the chassis socket at the end of the deck travel.

IMPORTANT: Tighten the deck anchor screw to hold deck firmly in place.

6.3 PRESSURE ROLLER ACTUATOR LEVER ADJUSTMENT

An adjusting screw located on the pressure roller actuator lever provides adjustment of the amount of lever travel (see Fig. 3). A tape cartridge, when slid into place on the deck, engages the lever and by connecting linkage moves the pressure roller into position near the capstan. The roller locks into place at the end of the cartridge travel and engages the tape and capstan when the deck solenoid is energized.

Proper adjustment is obtained when the pressure roller just locks into position at the end of the cartridge travel. Firm pressure on the heel of the cartridge should be required to snap the roller in place. With proper adjustment the cartridge will seat squarely against the lever adjusting screw, the cartridge stop (see Fig. 3) and the cartridge guide assembly on the right side of the deck.

Further, when the solenoid is energized, the cartridge should be free to move back and forth approximately 1/16" with slight hand pressure. If the cartridge is tight during this test it is an indication that the adjusting screw has been turned too far in a counter-clockwise direction and may result in improper

engagement of the pressure roller and capstan. To correct this condition, turn adjusting screw clockwise. Correct adjustment of the lever screw usually results in there being approximately 1/8" spacing between the leading edge of the screw to the leading edge of the lever. Slight correction of the factory adjustment may be necessary depending upon the type of cartridges used.

6.4 PRESSURE ROLLER ADJUSTMENT

A means is provided for varying the amount of pressure exerted by the pressure roller against the tape and capstan. A small hole on the right-hand side of the front of each deck provides access to the Allen head adjusting screw (see Fig. 3). A 7/64" hex key is required and the adjustment is made with the deck in place. The procedure is as follows:

- (1) Using a small screw driver, push the pressure roller actuating lever (Fig. 3) until the pressure roller locks into position.
- (2) Depress the START button, thereby energizing the solenoid which advances the pressure roller against the capstan.
- (3) Turn the adjusting screw counter-clockwise until roller stops turning.
- (4) With finger pressure on the roller shaft, pull the roller as far as possible away from the capstan.
- (5) Turn the adjusting screw clockwise until the roller just touches the capstan, then advance the screw one full turn in a clockwise direction. The adjustment is now complete.

NOTE: If only NAB type A cartridges are to be used, a three-quarters turn adjustment will be adequate and will result in slightly improved capstan bearing life.

6.5 LUBRICATION

6.5.1 MOTOR LUBRICATION

- (1) Apply one drop of #10 oil to the oil felt at the bottom motor bearing at six-month intervals.
- (2) Oiling of the top felt is not generally recommended, however, under extreme conditions a few drops of #10 non-detergent oil may be placed in the well near the top bearing. It is generally recommended that the motor be disassembled annually and at that time the rotor shaft lightly lubricated with #10 oil.

6.5.2 CAPSTAN THRUST BEARING LUBRICATION

Apply one drop of #10 oil to the thrust bearing located

at the bottom of the fly wheel at six-month intervals.

6.5.3 CAPSTAN SUPPORT BEARINGS LUBRICATION

Five sintered bronze support bearings are located along the length of the capstan at each deck position and under ideal conditions further lubrication should not be necessary. If, however, environment and conditions of use make cleaning and relubrication necessary, the procedure below should be followed:

- (1) Remove top inspection plate by withdrawing nine retaining screws.
- (2) Remove capstan thrust bearing support bar at bottom of flywheel.
- (3) Carefully withdraw flywheel and capstan assembly. Use extreme care to avoid bending of capstan shaft or damage to bearings. Store flywheel and capstan assembly in upright position in safe place.
- (4) Dampen a thin strip of soft cotton cloth with Varsol and thread through each bearing, one at a time. Work the cloth back and forth until the bearing is clean. Do not remove the bearing or disturb its position.
- (5) Carefully clean the capstan shaft with a soft cotton cloth dampened with Varsol.
- (6) Relubricate each bearing with #10 oil. Use oil sparingly and clean off any excess to prevent oil drifting down the capstan during operation. This will inhibit tape motion.
- (7) Carefully replace capstan shaft in bearing assembly and replace the bottom thrust bearing support.
- (8) Clean the capstan with a cloth dampened with BE903 cleaning fluid using care to prevent fluid from running into bearings.
- (9) Replace inspection plate.

6.5.3.1 CAPSTAN BEARINGS LUBRICATION

- (1) Add two drops of #30 oil to the top of each bearing at six-month intervals. (Although it is possible to do this without removing the decks it is probably easier with the decks removed. See section 6.2 of the manual for deck removal procedure.)
- (2) Turn motor on and allow capstan to run for 15 minutes.
- (3) Clean exposed portion of capstan thoroughly with

soft cloth dampened with Varsol or BE903 cleaning fluid. Use care to prevent Varsol or cleaning fluid from running into bearings. Wipe the bottom of each bearing to remove any excess oil.

6.5.4 GENERAL LUBRICATION

Occasional lubrication at points in the deck assembly may be necessary where sliding parts come together.

6.6 BELT REPLACEMENT

The capstan drive belt is of endless woven material and should give long, trouble-free service. It is not subject to any appreciable wear and is highly resistant to deterioration. If it becomes necessary to replace the belt, turn the unit on its side, remove the flywheel thrust bearing support and thread new belt over motor pulley and flywheel. Install new belt with shiny side in. Replace thrust bearing support and test motor for free movement against tension spring.

6.7 CLEANING

- (1) Heads, capstan and pressure rollers should be cleaned with a soft cotton cloth dampened with BE903 cleaning fluid or equivalent on a weekly basis. Clean pressure roller with scrubbing action.

Do not allow cleaning fluid to run into capstan bearings. Do not use spray cleaners.

It is not necessary to remove the deck from the chassis for these operations.

- (2) Finger marks and smudges on the nickel-plated deck surfaces may be removed by rubbing with a dry soft cotton cloth.
- (3) The panel may be cleaned with a soft cotton cloth dampened with a mild solution of detergent and water.

P A R T S L I S T

SPOTMASTER FIVE SPOT - Model 605B/SPOTMASTER TEN SPOT - Model 610B

<u>Description</u>	<u>Stock No.</u>
Transformer, B34-120	376-0120
Fuse, 1 Amp, AGC1	330-0100
Tape Deck:	
Resistor, 33K ohm	110-3353
Resistor, 330 ohm, 2 W.	132-3333
Capacitor, .22 @ 200V	034-2253
Diode 1N4005	203-4005
Run Light, Tineon 4100	324-0101
Micro Switch	346-6210
Solenoid	289-0145
Pressure Roller	404-0001
Tape Head	252-0001
Front Panel:	
Fuse, 1 Amp, AGC1	330-0100
Pilot Lamp, Tineon 4100	324-0101
Ready Lamp, Tineon 4100	324-0101
Resistor, 33K ohm	110-3353
Power Switch SPST	348-8280
Start Switch SPST, Momentary	343-0001
Stop Switch SPST, Momentary	343-0002
Rear Panel:	
Resistor, 560 ohm (output jack)	111-5633
Resistor, 33K ohm (remote socket)	110-3353
Potentiometer, 2.5K ohm, 2 W.	190-2543
Output Transformer	370-0026
Output Jack	417-0211
Remote Socket	417-0877
Switcher Socket	417-0877
Sequencer Socket	417-0877
Motor Deck:	
Motor, HSM 20.65.4/8-300D (50/60 Hz)	384-0645
Capacitor, Motor, MP 53/7/220A, 60 Hz/7 mfd	029-7064
Capacitor, Motor, MP 53/10/220A, 50 Hz/10 mfd	029-1074
Motor Pulley, 7-1/2 ips, 60 Hz	389-0001
Motor Pulley, 7-1/2 ips, 50 Hz	389-0002

All resistors 1/2 watt and capacitors in microfarads unless otherwise noted.

Component values in equipment may sometimes be different from those shown on parts list.

TABLE OF TYPICAL VOLTAGES

SPOTMASTER MODELS 605B AND 610B

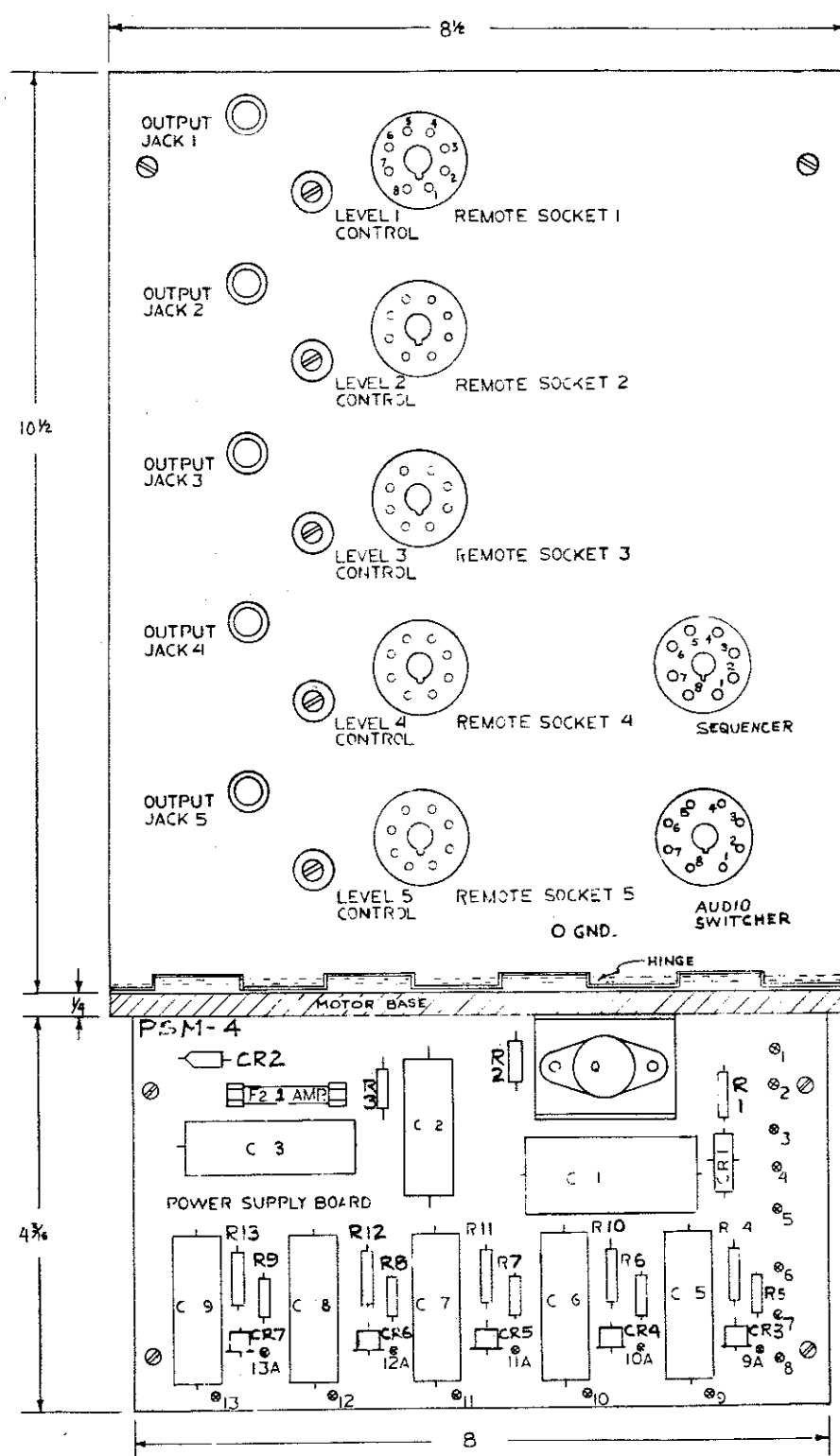
			EMITTER	BASE	COLLECTOR
<u>PROGRAM AMPLIFIER</u>					
	Q1	2N4248	-0.1	-0.7	-6.2
	Q2	2N4248	-0.27	-0.95	-6.5
	Q3	2N4248	-0.36	-0.98	-10.0
	Q4	2N3644	-18.0	-18.2	-25.0
<u>CUE AMPLIFIER (1k Hz)</u>					
	Q5	2N4248	0	-0.6	-4.0
	Q6	2N4248	0	-0.64	-2.2
	Q7	2N4248	0	-0.62	-4.5
	Q8	2N3644	0	-0.01	-7.2
<u>DUAL CUE AMPLIFIER (1k Hz AND 150 Hz)</u>					
	Q5	2N4248	0	-0.6	-4.2
	Q6	2N4248	0	-0.6	-1.8
	Q7	2N4248	0	-0.62	-5.6
	Q8	2N3644	0	-0.01	-7.2
	Q9	2N4248	0	-0.62	-4.8
	Q10	2N3644	0	-0.01	-27.0
<u>DELAY CIRCUIT</u>					
	<u>STOP MODE</u>				
	Q11	2N3644	-0.01	-0.78	-0.03
	<u>RUN MODE</u>				
	Q11	2N3644	0	0	-13.0
<u>FILTER TRANSISTOR</u>					
	Q12	2N2869	-27.0	-27.0	-42.5

AC INPUT 115V

T1 OUTPUT 35VAC RMS

ALL DC VOLTAGES NEGATIVE WITH RESPECT TO GROUND.

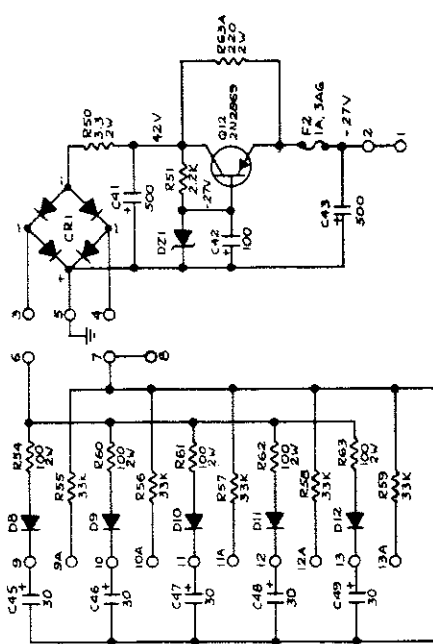
MEASUREMENTS MADE WITH 20,000 OHM PER VOLT METER WITH SPOTMASTER EQUIPMENT IN RUN MODE UNLESS OTHERWISE NOTED.



WIRING TERMINAL, REVERSE SIDE OF BOARD.

FIG. 1

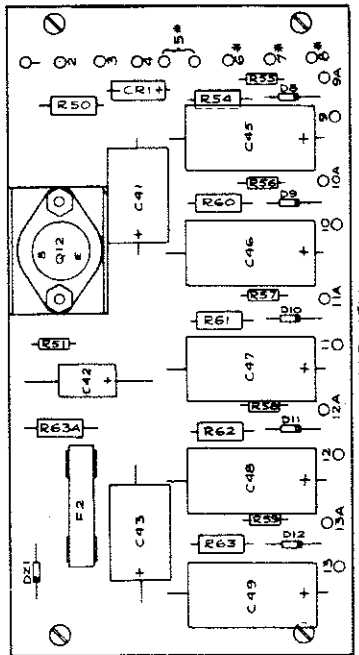
SPOTMASTER FIVE-TEN SPOT
REAR PANEL & POWER SUPPLY
BROADCAST ELECTRONICS, INC.
SILVER SPRING, MD. 70 C 10



- NOTES:
1. TERMINALS 5, 6, 7 & 8 USE PART NO. 415-0025.
 2. Q12 MUST BE MOUNTED WITH SILICON TRANSISTOR GREASE.
 3. ALL TERMINALS MOUNTED ON FOIL SIDE OF BOARD.

PSM-4

DESIGNED BY 4/2/73	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -
CHECKED BY MIA-4/1/73	POWER SUPPLY BOARD
APPROVED BY BS 4/4/73	C-916-0041
	TEXT NO. 916-0041



FUNCTIONS

PIN	DESTINATION
1	-27 VDC
2	
3	35 VAC INPUT
4	
5	GROUND
6	117 VAC INPUT
7	
8	117 VAC TO DECKS
9	120 VDC TO DECK 1 SOLENOID
10	117 VAC TO READY LAMP 1
11	120 VDC TO DECK 2 SOLENOID
12	117 VAC TO READY LAMP 2
13	120 VDC TO DECK 3 SOLENOID
14	117 VAC TO READY LAMP 3
15	120 VDC TO DECK 4 SOLENOID
16	117 VAC TO READY LAMP 4
17	120 VDC TO DECK 5 SOLENOID
18	117 VAC TO READY LAMP 5

PARTS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION
122 - 3312	R50	3.3 OHMS, 2W, WW RESISTOR	200 - 0027	DZ1	ZENER DIODE, 12.2V/B
110 - 2243	R51	2.2K 1/2W, 10%	203 - 2071	D8	IN2071
			203 - 2071	D9	IN2071
			203 - 2071	D10	IN2071
			203 - 2071	D11	IN2071
			203 - 2071	D12	IN2071
			239 - 0001	CR1	BRIDGE RECTIFIER
110 - 3353	R52	33K	218 - 2869	Q12	2N2869 TRANSISTOR
110 - 3353	R53	33K			HEAT SINK
132 - 1033	R60	100	455 - 6103		SCREW 6-32 X 5/16 PAN HD BRASS, NP (2)
132 - 1033	R61	100			WASHER, LOCK #6 INT TEETH PH BN/P (2)
132 - 1033	R62	100			NUT, 6-32, 1/4" FLATS, ST ST (2)
132 - 1033	R63	100			SILICONE TRANSISTOR GREASE
132 - 2233	R63A	220			
014 - 5084	C41	500 MFD, 50V, ELEC CAPACITOR	330 - 0100	F2	FUSE, 3AG1
014 - 1084	C42	100	415 - 2068		FUSE CLIP (2)
014 - 5084	C43	500			TERMINAL, TURRET (1/4)
015 - 3074A	C45	30	415 - 0315		TERMINAL, DOUBLE, TURRET (5)
015 - 3074A	C46	30			
015 - 3074A	C47	30	516 - 0041		P. C. BOARD (PSM-4)
015 - 3074A	C48	30			
015 - 3074A	C49	30			

FIG 1A

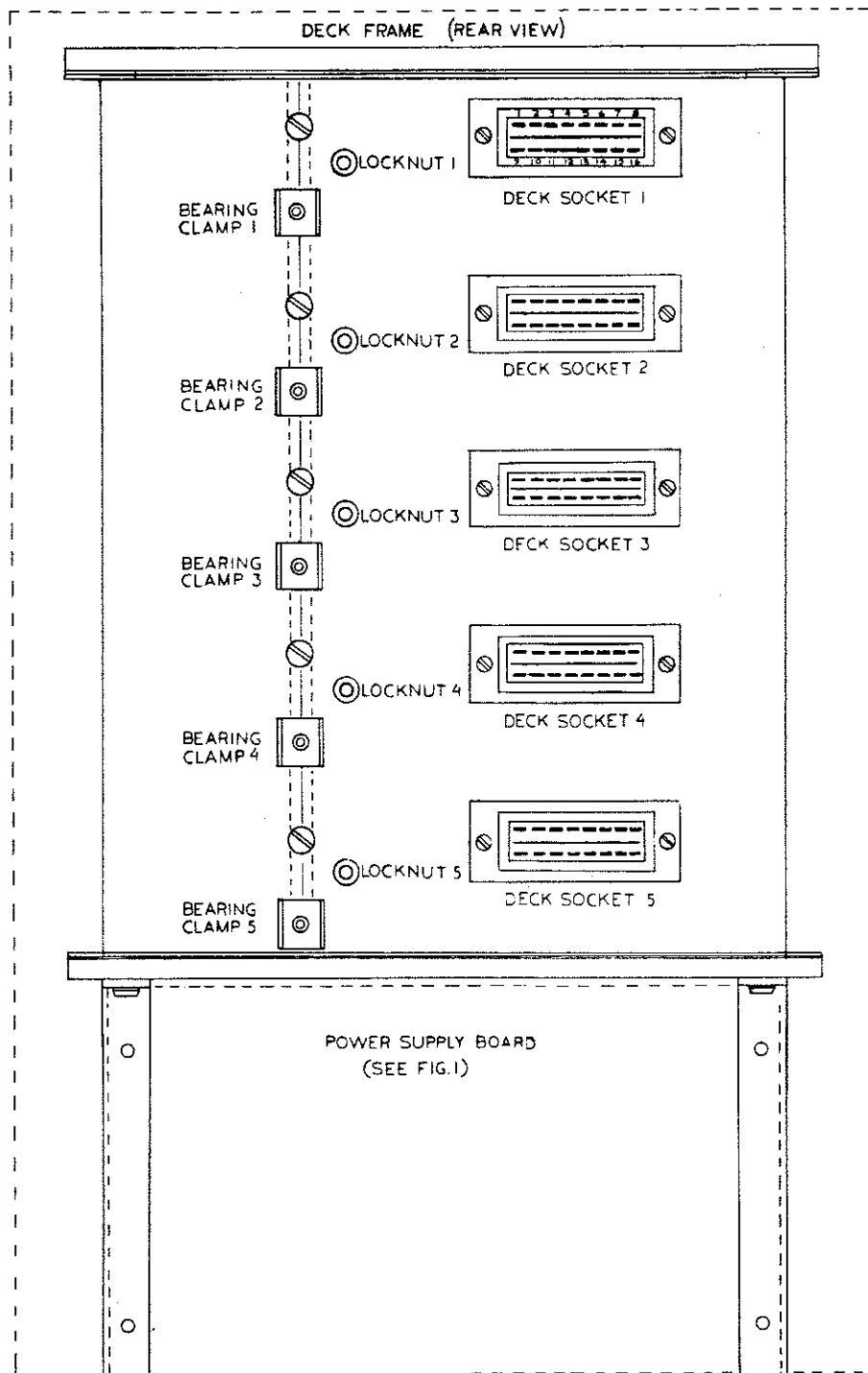


FIG. 2

BROADCAST ELECTRONICS, INC.
SILVER SPRING, MD.

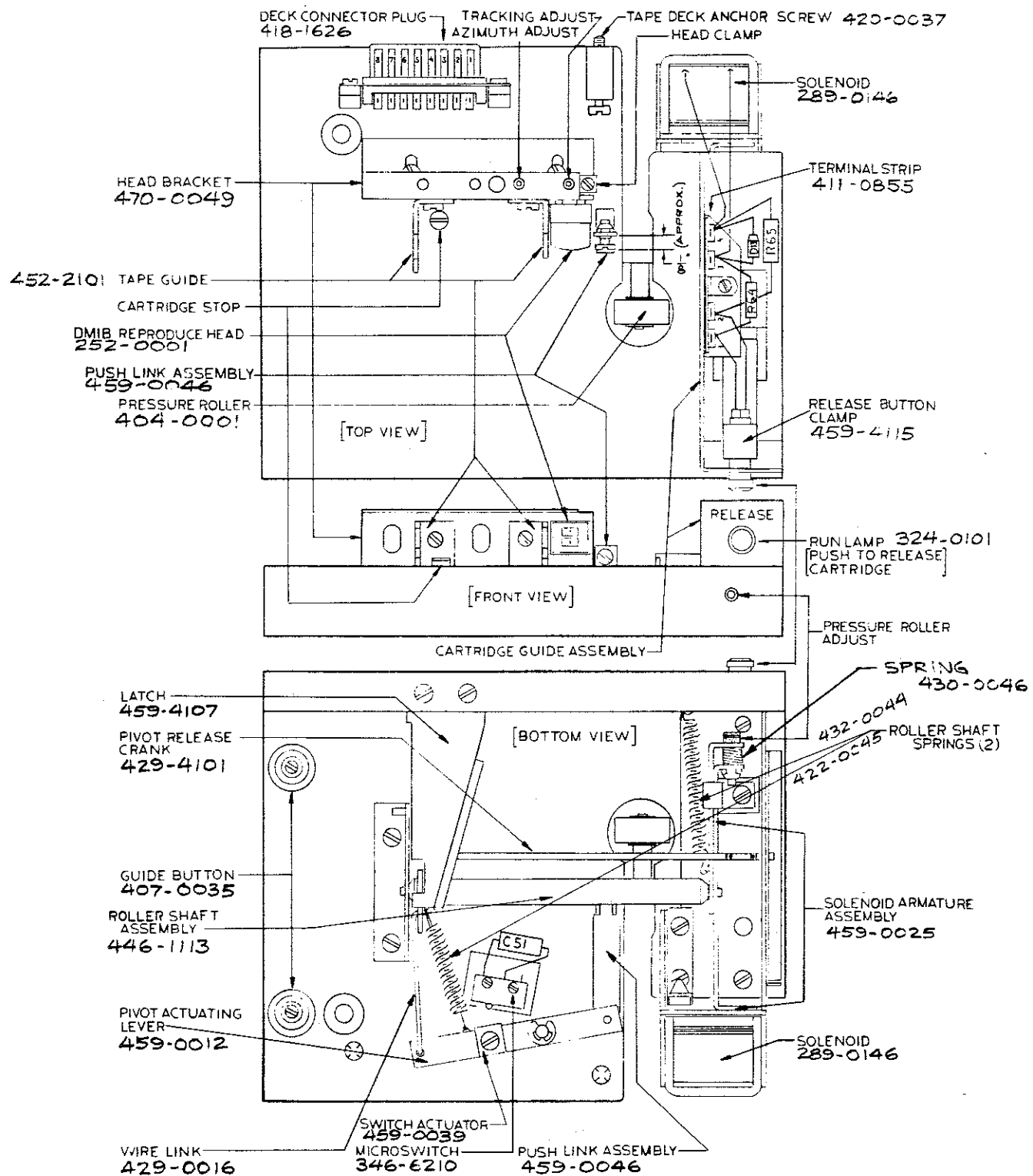
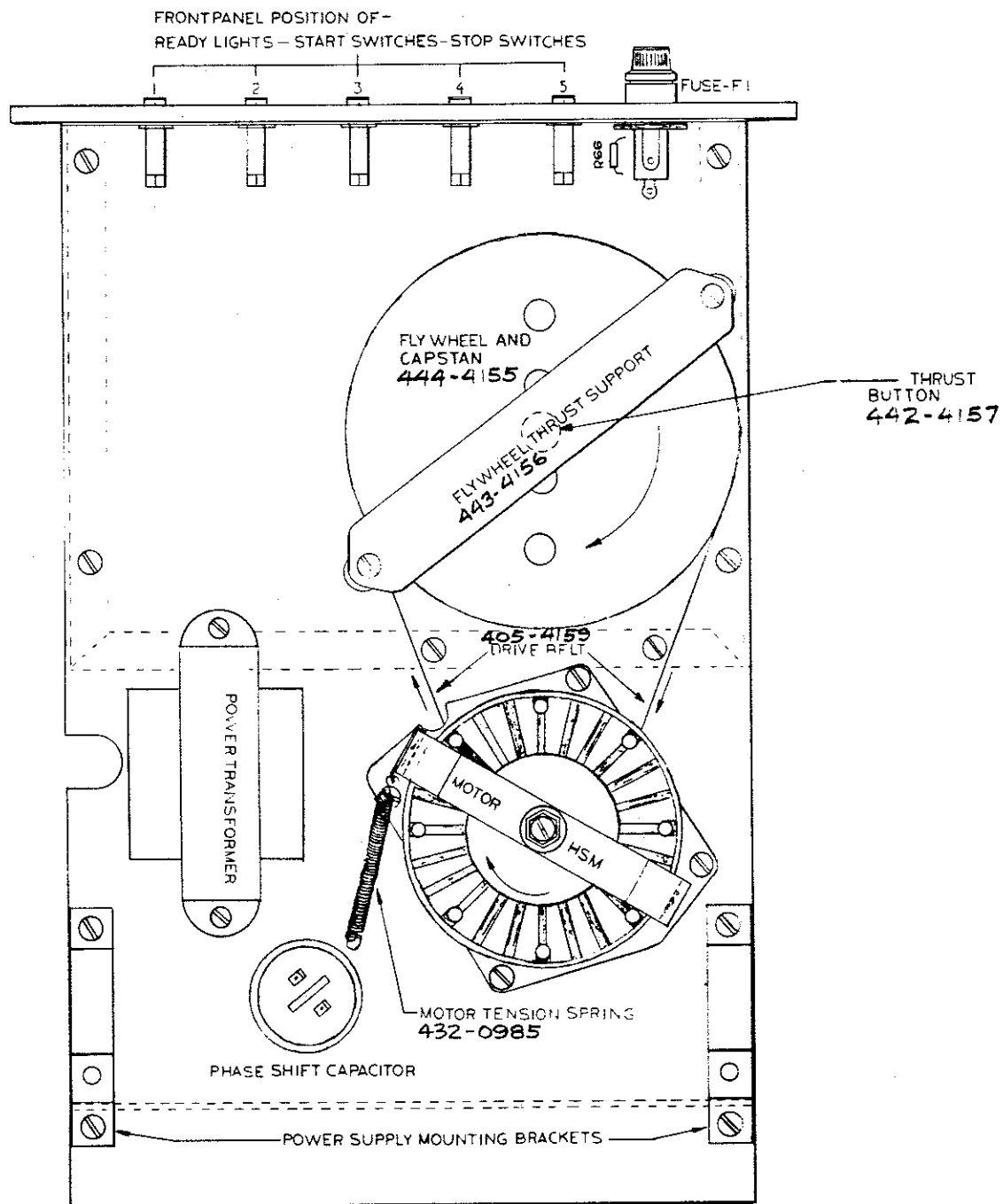


FIG.3

CARTRIDGE DECK ASSEMBLY
SPOTMASTER FIVE-TEN SPOT

BROADCAST ELECTRONICS, INC.,
SILVER SPRING, MARYLAND



BOTTOM VIEW

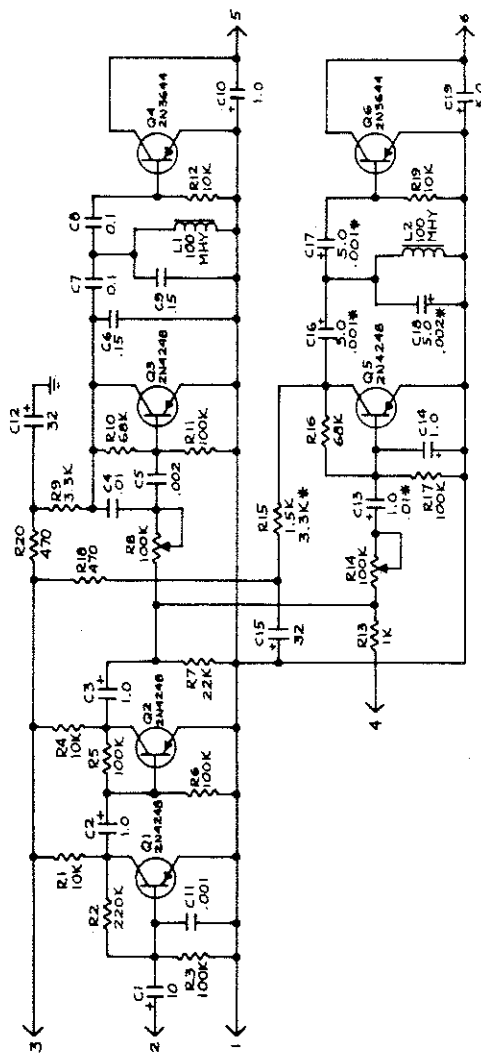
FIG 4

SPOTMASTER FIVE SPOT MOTOR
DECK

BROADCAST ELECTRONICS, INC.
SILVER SPRING, MARYLAND

PARTS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION
110-1053	R1	10K OHMS, 1/2W, 10% RESISTOR	030-1053	C8	0.1 MFD, 100V, MYLAR CAPACITOR
110-2263	R2	220K " " "	030-1523	C9	.15 " " "
110-1063	R3	100K " " "	015-1064A	C10	1.0 " 63V, ELEC "
110-1053	R4	100K " " "	002-1034	C11	.001 " 500V, DISC "
110-1063	R5	100K " " "	014-3274	C12	32 " 40V, ELEC "
110-1063	R6	100K " " "	015-1064A	C13	1.0 " 63V, " "
110-2255	R7	22K " " "	001-1044	C14	1.0 " 500V DISC "
176-1064	R8	100K " 1/10W POTENTIOMETER	015-1064A	C14	1.0 " 63V ELEC "
110-3343	R9	3.3K " 1/2W, 10% RESISTOR	014-3274	C15	32 " 40V " "
110-6853	R10	68K " " "	015-5064	C16	5.0 " 64V " "
110-1063	R11	100K " " "	002-1034	C17	1.0 " 500V, DISC "
110-1053	R12	10K " " "	015-5064	C17	5.0 " 64V, ELEC "
110-1053	R13	1K " " "	002-1034	C18	1.0 " 500V, DISC "
176-1064	R14	100K " 1/10W POTENTIOMETER	015-5064	C18	5.0 " 64V, ELEC "
110-1533	R15	1.5K " 1/2W, 10% RESISTOR	002-2034	C19	1.0 " 500V, DISC "
110-3343	R16	3.3K " " "	015-5064	C19	5.0 " 64V, ELEC "
110-6853	R17	68K " " "			
110-1063	R18	100K " " "	210-4248	Q1	2N4248 TRANSISTOR
110-4733	R19	470 " " "	210-4248	Q2	2N4248 " "
110-1053	R20	10K " " "	210-4248	Q3	2N4248 " "
110-4733	R21	470 " " "	210-3644	Q4	2N3644 " "
			210-4248	Q5	2N4248 " "
013-1074	C1	10 MFD, 16V, ELEC CAPACITOR	210-3644	Q6	2N3644 " "
015-1064A	C2	1 " 63V, " "			
015-1064A	C3	1 " " " "	364-1662	L1	100MHY INDUCTOR
001-1044	C4	0.1 " 500V, DISC "	364-1662	L2	100MHY " "
002-2034	C5	.002 " 1000V, " "			
030-1053	C6	.15 " 100V, MYLAR "	601-0022	—	#22 BARE BUS WIRE (1/16")
030-1053	C7	0.1 " " "	310-0041	—	P.C. BOARD (TAM-4)

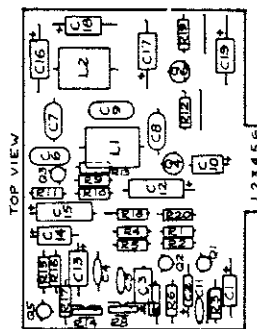


TAM-4

501

NOTE

1. 1 KHz/150Hz · PART # 910-0041
- 1 KHz/8KHz · PART # 910-0041A
2. * · COMPONENT VALUES USED ON 1KHz/8KHz BOARD ONLY.
3. LAST COMPONENTS USED: R20 C19 Q6 & L2.

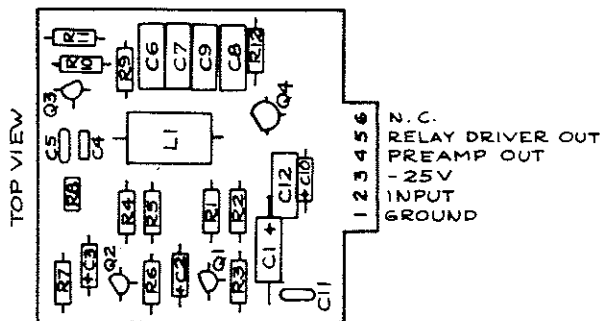


RELAY DRIVER OUT (AUX CUE TONE)
RELAY DRIVER OUT (1KHz STOP TONE)
PREAMP OUT
- 25VDC
INPUT
GROUND

DATE	7/19/78
TIME	10:50
RECEIVED	
DATE	
BY	
REMARKS	
STATION	MIA 7/19/78
TREATMENT OR FINISH	
PART NO.	910-0041 / 910-0041A
C	TOG#NO 910-0041 REV A
DUAL CUE TONE SENSOR	
TITLE	1KHZ/180HZ - 1KHZ/9KHZ
- A FILMWAYS COMPANY -	
BROADCAST ELECTRONICS INC.	

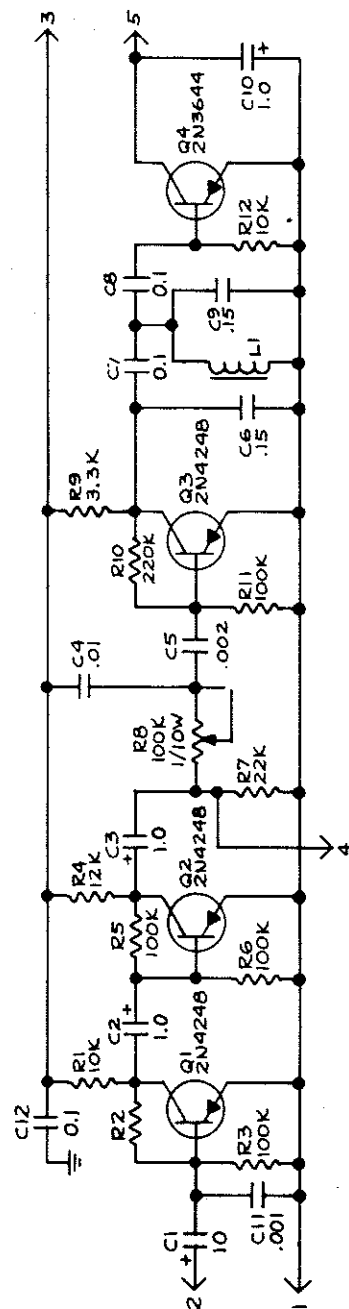
PARTS LIST

PART NO.	SYM	DESCRIPTION	PART NO.	SYM	DESCRIPTION
110-1053	R1	10K OHM, 1/2W, 10% RESISTOR	002-2034	C5	.002 MFD, 500V DISC CAPACITOR
110-2263	R2	220K " " " "	030-1553	C6	.15 " 100V MYLAR "
110-1063	R3	100K " " " "	030-1053	C7	0.1 " " " "
110-1253	R4	12K " " " "	030-1053	C8	0.1 " " " "
110-1063	R5	100K " " " "	030-1553	C9	.15 " " " "
110-1063	R6	100K " " " "	015-1064A	C10	1.0 " 63V ELEC "
110-2253	R7	22K " " " "	002-1034	C11	.001 " 500V DISC "
176-1064	R8	100K " 1/10W TRIMMER	030-1053	C12	0.1 " 100V MYLAR "
110-3343	R9	3.3K " 1/2W, 10% RESISTOR			
110-2263	R10	220K " " " "	210-4248	Q1	2N4248 TRANSISTOR
110-1063	R11	100K " " " "	210-4248	Q2	2N4248 "
110-1053	R12	10K " " " "	210-4248	Q3	2N4248 "
			210-3644	Q4	2N3644 "
013-1074	C1	10 MFD, 16V ELEC CAPACITOR			
015-1064A	C2	1.0 " 63V " " "	364-1662	L1	100 MHY FERRITE CHOKE
015-1064A	C3	1.0 " " " "			
031-1043	C4	.01 " 200V MYLAR " " "	510-0014		P.C. BOARD (TAM-1K6C)

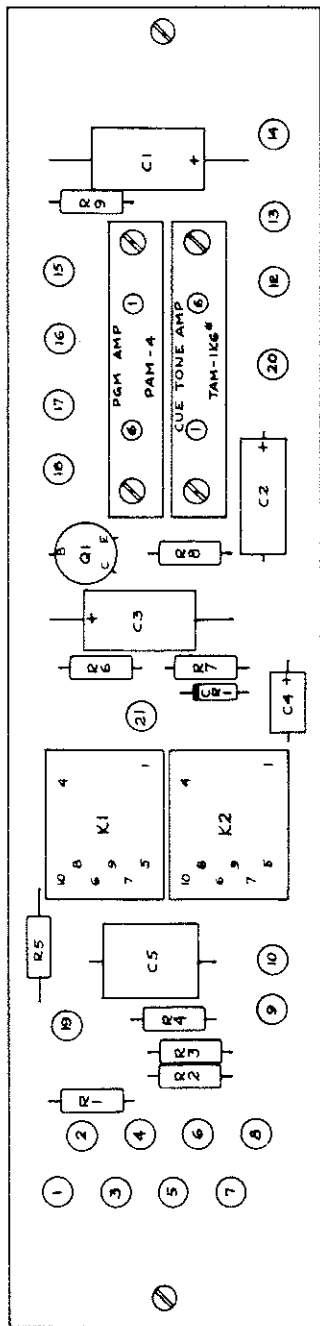


NOTES:
1. RESISTORS IN OHMS, 1/2W, 10%; CAPACITORS IN MICROFARADS.

FIG 6
TAM-1K6C



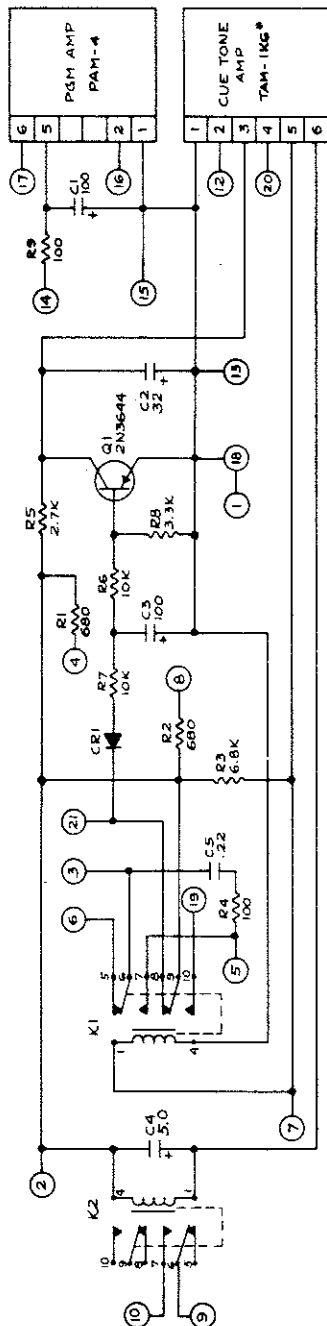
DRAWN 7/13/73	CHECKED 7/13/73	APPROVED 7/13/73	BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY -
			1KHZ SENSOR
			B-910-0014
			PART NO. 910-0014
			REV A REDRAWN ECN 227 5/16/73
			REVISED 7/11/74



TOP VIEW

NOTES:

1. * FOR OPTIONAL Q1 & Q2 USE TAM-4. DUAL CUE TONE SENSOR BOARD.
2. ALL TERMINALS APPLIED TO FOIL SIDE OF BOARD.



PARTS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION
110 - 6833	R1	680 OHMS, 1/2W, 10% RESISTOR	210 - 3644	Q1	2N3644 TRANSISTOR
110 - 6833	R2	680 -	417 - 0333	-	SOCKET,
110 - 6843	R3	6.8K -	271 - 0154	K1	RELAY, DPDT
110 - 1033	R4	100 -	271 - 0154	K2	RELAY, DPDT
110 - 2743	R5	2.7K -	417 - 1230	-	SOCKET, RELAY (2)
110 - 1053	R6	10K -	417 - 0643	-	CONNECTOR, CARD EDGE, 6-PIN (2)
110 - 1053	R7	10K -	420 - 2356	-	SCREW, 2-56 X 1/2, RH, BRASS, NP (4)
110 - 3343	R8	3.3K -	421 - 0002	-	NUT, 2-56, ST STL (4)
110 - 1033	R9	100 -	413 - 0315	-	TERMINAL TURRET (20)
014 - 1084	C1	100 MFD, 40V, ELEC CAPACITOR	514 - 0041	-	P C BOARD (RBM-5)
014 - 3274	C2	32 -	034 - 2253	C5	22 - 200V MYLAR
014 - 1004	C3	100 -	423 - 4005	CR1	1N4005 DIODE
015 - 5064	C4	5.0 - 64V -			
034 - 2253	C5	22 - 200V MYLAR			

FUNCTIONS

PIN	DESTINATION	PIN	DESTINATION
1	GROUND	12	CUE HEAD (CUE AMP INPUT)
2	-27VDC INPUT	13	CUE HEAD SHIELD
3	-120VDC INPUT	14	-27VDC TO PROGRAM AMP
4	REMOTE START CONTROL	15	PROGRAM HEAD SHIELD
5	PLAY SOLENOID (-120VDC)	16	PROGRAM HEAD (PGM AMP INPUT)
6	-120 VDC SWITCHED	17	PROGRAM AMPLIFIER OUTPUT
7	STOP CONTROL	18	GROUND
8	START CONTROL	19	AUDIO SWITCHER CONTROL
9	AUXILIARY CUE TONE SENSOR (NO RELAY CONTACTS)	20	CUE PREAMP OUT (TO AUX SENSOR)
10	NOT USED	21	1KHz RECORD CONTROL (-27VDC)
11	NOT USED		

BROADCAST ELECTRONICS INC.	
MADE IN U.S.A.	RELAY BOARD
MA 0173	C - 914 - 0041
REV 10/13	PART NO 914-0041
REVISED 7/7/74	

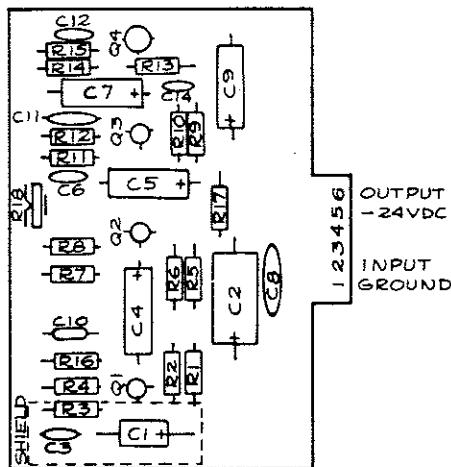
RBM-5

FIG 7

REV A - REDRAWN 6/11/73
B - ECN 268 7/13/73
C - ECN 369 2/11/74

PARTS LIST

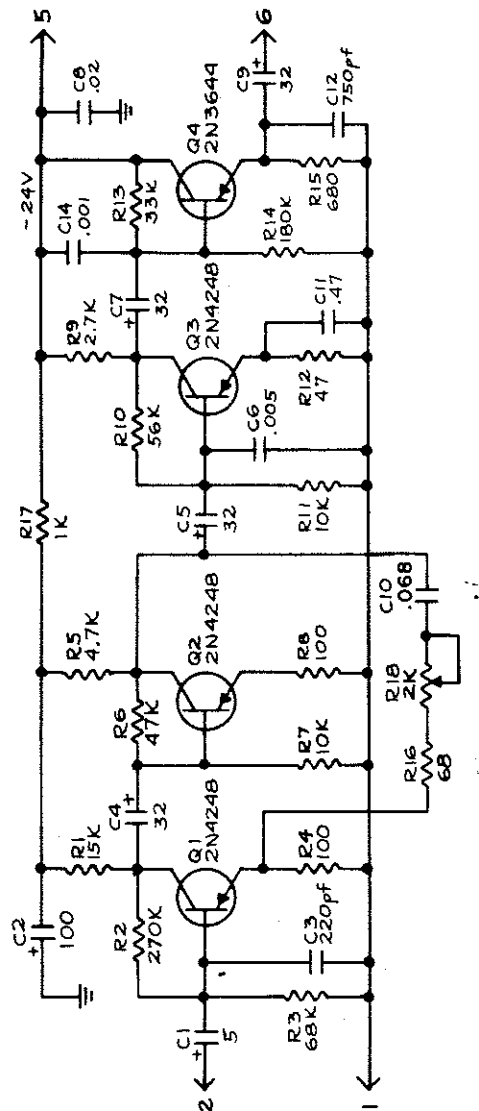
PART NO.	SYM	DESCRIPTION	PART NO.	SYM	DESCRIPTION
110-1553	R1	15K OHMS, 1/2W, 10% RESISTOR	014-3274	C5	32 MFD, 40V, ELEC CAPACITOR
110-2763	R2	270K "	001-5034	C6	.005 " 500V, DISC "
110-6853	R3	68K "	014-3274	C7	32 " 40V, ELEC "
110-1033	R4	100 "	001-2044	C8	.02 " 500V, DISC "
110-4743	R5	4.7K "	014-3274	C9	32 " 40V, ELEC "
110-4753	R6	47K "	005-6843	C10	.068 " 100V, CERAMIC "
110-1053	R7	10K "	000-4754	C11	.47 " 3V DISC "
110-1033	R8	100 "	001-7524	C12	750 pf, 500V, " "
110-2743	R9	2.7K "	002-1034	C14	.001 " " "
110-5653	R10	56K "	210-4248	Q1	2N4248 TRANSISTOR
110-1053	R11	10K "	210-4248	Q2	2N4248 "
110-4723	R12	47 "	210-4248	Q3	2N4248 "
110-3353	R13	33K "	210-3644	Q4	2N3644 "
110-1863	R14	180K "			
110-6833	R15	680 "			
110-6823	R16	68 "			
110-1043	R17	1K "			
176-2044	R18	2K " 0.1W TRIMMER	459-0008		SHIELD
			511-0040		P.C. BOARD (PAM-4)
015-5064	C1	5 MFD, 64V, ELEC CAPACITOR			
014-1084	C2	100 " 40V, "			
001-2224	C3	220pf, 500V, DISC			
014-3274	C4	32 MFD, 40V, ELEC			



NOTES:

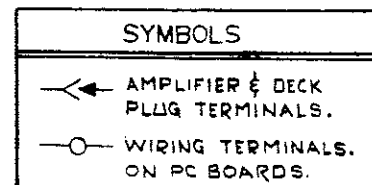
1. LAST COMPONENTS USED: R18, C14 & Q4.

FIG 8
PAM-4



DESIGNED 6/11/73	BROADCAST ELECTRONICS INC.
CHECKED 1/28/74	- A FILMWAYS COMPANY -
APPROVED 7/9/74	PROGRAM AMPLIFIER BD
	REV C
	B-911-0040
	PART NO. 911-0040

REVISED 7/11/74



NOTES:

1. ITEMS MARKED X5 ARE IDENTICAL IN EACH DECK ELECTRONIC ASSEMBLY.
2. AMPLIFIER POWER SUPPLY IS COMMON TO ALL AMPLIFIERS AND RELAYS IN EACH FIVE SPOT ASSEMBLY.
3. SEPARATE SOLENOID SUPPLIES ARE PROVIDED FOR EACH TAPE DECK AS SHOWN.

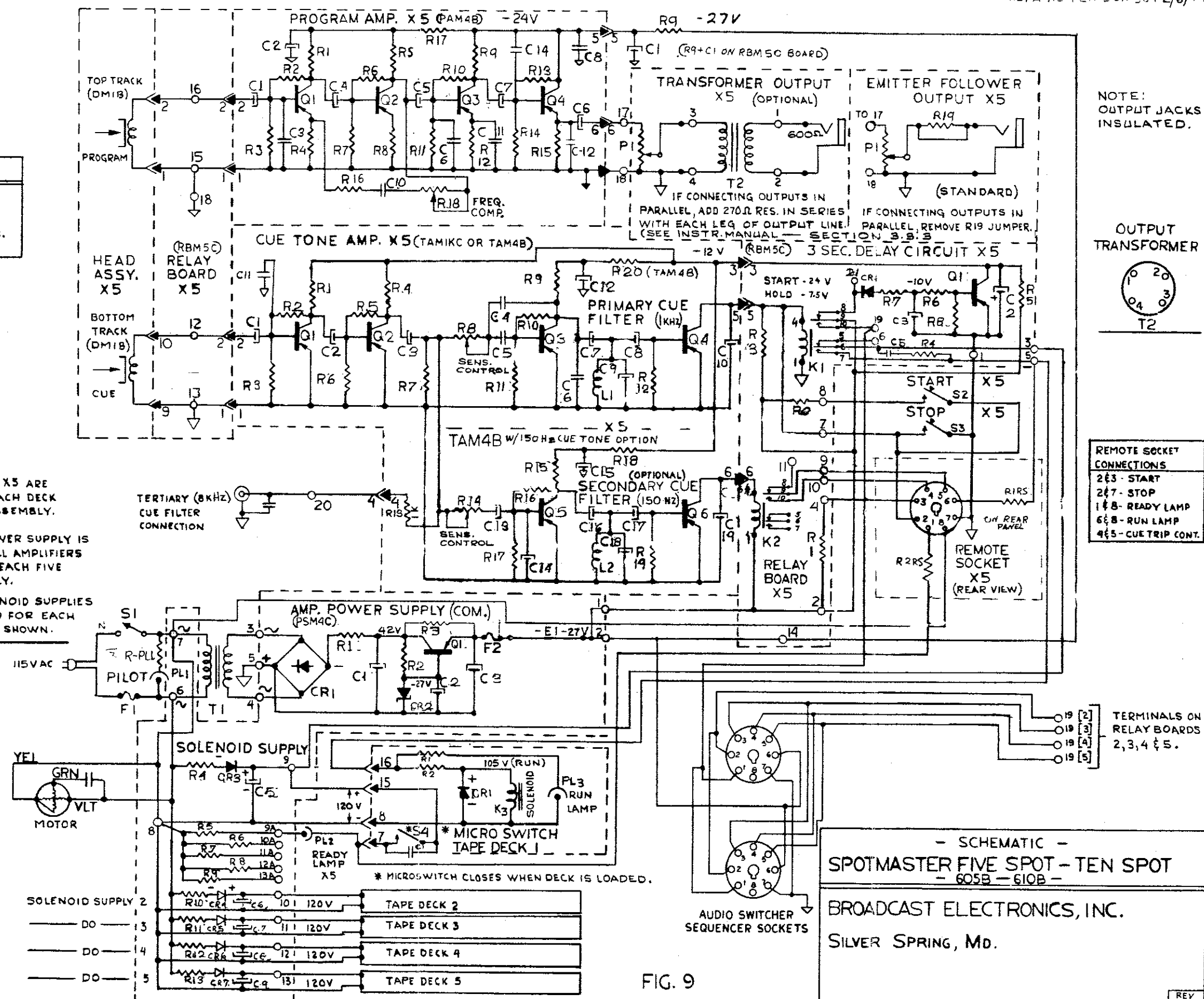


FIG. 9

- SCHEMATIC -
SPOTMASTER FIVE SPOT-TEN SPOT
- 605B - 610B -

BROADCAST ELECTRONICS, INC.
SILVER SPRING, Md.

33-6000-00015

REV
A



Broadcast Electronics, Inc.

No effort has been spared in the manufacture of SPOTMASTER equipment to assure long and reliable service. This unit has been thoroughly tested and inspected, and carefully packed to assure its safe arrival at the destination. The following guarantee applies.

Broadcast Electronics, Inc., hereinafter referred to as Seller, agrees to repair or replace, without charge, any equipment which is defective as to design, workmanship or material, and which is returned to Seller at its factory, transportation prepaid, provided

- (a) Notice of the claimed defect is given Seller within one (1) year from date of delivery and goods are returned in accordance with Seller's instructions.
- (b) Parts not manufactured by Seller or from Seller's design are subject to only such adjustments as Seller may obtain from the supplier thereof.
- (c) Equipment shall not be deemed to be defective if, due to misuse, exposure or excessive impurities or moisture in the atmosphere it shall fail to operate in a normal or proper manner.

The guarantee of these paragraphs is void if equipment is altered by others than Seller or its authorized service center.

No other warranties, expressed or implied, shall be applicable.

BROADCAST ELECTRONICS, Inc.
8800 Brookville Road
Silver Spring, Maryland

PRODUCT WARRANTY

LIMITED ONE YEAR

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

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

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

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

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

BROADCAST ELECTRONICS, INC.

4100 North 24th Street, P. O. Box 3606, Quincy, Illinois 62305