

INSTRUCTION MANUAL

1070 CARTRIDGE MACHINE

1070P 1070RP 1070RP/DL
1070PS 1070RPS 1070SDL

IM No. 597-1070

BROADCAST ELECTRONICS, INC.



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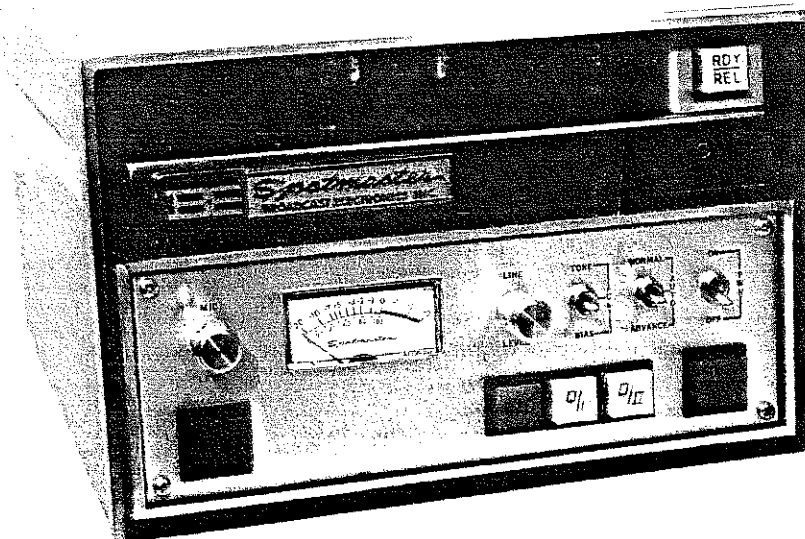
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Instruction Manual



MONOPHONIC MODELS
STEREOPHONIC MODELS

1070-P	1070-RP	1070-RP/DL
1070-PS	1070-RPS	1070-SDL

BROADCAST ELECTRONICS, INC.
- A FILMWAYS COMPANY -

8810 BROOKVILLE ROAD • SILVER SPRING, MD. 20910
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INTRODUCTION

This Instruction Manual supports the SPOTMASTER TEN/70 tape cartridge sound reproduction equipment manufactured by Broadcast Electronics, Inc., Silver Spring, Maryland. Specifically, this Manual contains descriptive, installation, operation, and maintenance data necessary for proper use and extended support of the equipment.

The SPOTMASTER TEN/70 is manufactured in six different models as follows:

1070-P	Monophonic Playback
1070-RP	Monophonic Record/Playback
1070-RP/DL	Monophonic Record/Playback/Delay with Remote Delay Mute
1070-PS	Stereophonic Playback
1070-RPS	Stereophonic Record/Playback
1070-SDL	Stereophonic Delay Programmer with Remote Delay Mute

All six models, which are similar in external appearance and share many common parts, are covered in this Manual. Most text and illustrations apply to all TEN/70 models. Where text material or illustrations apply to a specific model or option, this is indicated by a note in the text (*italic type*) or by the caption to the illustration.

SECTION 1

GENERAL DESCRIPTION

1.1 EQUIPMENT DESCRIPTION AND FEATURES

The SPOTMASTER TEN/70 System represents the most advanced state-of-the-art development in magnetic tape cartridge sound reproduction equipment. Solid state circuitry and human engineering combine to provide compactness, reliability, and simplicity of operation.

TEN/70 innovations include optional microphone and line level mixing (on monophonic record units); manual and automatic fast forward; self-cancelling record preset; front panel measurement of tone, bias and program levels; "A-B" monitoring during recording; automatic pressure roller engagement; electrical cartridge release; plug-in modules; and standard microadjustable or optional precision PHASE-LOK head mounting.

Other features include no-relay, solid-state switching; self-regulated solid state power supply; full bias cue recording; transformer coupled output; taut-band VU meter; flip-top access to the head assembly and drive system; permanently-lubricated, hysteresis synchronous motor; direct drive capstan; and removable deck assembly.

Performance, reliability, flexibility and compact-size were foremost in the TEN/70 design.

The TEN/70 may control or be controlled by external switchers. Every front panel push-button may be controlled remotely and all associated indicator light voltages are available for remote indication. With the auxiliary cue-tone outputs, the units can control other equipment.

Two TEN/70's or one TEN/70 and one RM10 cartridge rack fit the optional 19 inch rack panel which takes just seven inches of vertical rack space.

The TEN/70 System consists of six models:

1070-P	Monophonic Playback
1070-RP	Monophonic Record/Playback
1070-RP/DL	Monophonic Record/Playback/Delay with Remote Delay Mute
1070-PS	Stereophonic Playback
1070-RPS	Stereophonic Record/Playback
1070-SDL	Stereophonic Delay Programmer with Remote Delay Mute

1.2 SPECIFICATIONS

Specifications for the six TEN/70 models are shown in Table 1.1.

TABLE 1.1

1-2

1.3 MODEL CONFIGURATIONS AND ACCESSORIES

The TEN/70 models are available in various configurations with several combinations of options. Major options include:

1. QI sensor.
2. QII sensor.
3. QI generator.
4. QII generator.
5. Phase-Lok head bracket.
6. Microphone input.

The major options and their availability are summarized in Table 1-2. Similar units are available with 220 VAC, 50 Hz power option; and 3.75 ips tape speed option.

Broadcast Electronics carries a complete line of accessories to complement the TEN/70 units. A list of these accessories is at the back of this manual.

1.4 CUSTOMER SERVICE

The Broadcast Electronics Customer Service Department will assist users with problems with their TEN/70 cartridge tape machines. Inquiries should be sent to Customer Service Department, Broadcast Electronics, 8810 Brookville Road, Silver Spring, Maryland 20910. Or during business hours, telephone area code 301/588-4983.

When writing, please give the unit model number and serial number, date purchased, and where purchased. Give complete details of the difficulty and any other pertinent information (such as options installed, peripheral equipment operated with the unit, etc.).

NOTE

Before returning the unit to the factory, contact Broadcast Electronics or an authorized representative.

1.4.1 Model and Serial Numbers

The serial and model numbers are stamped on a plate affixed to the rear panel. The complete serial number consists of a date code, the model designation, and the machine serial.

Model	Serial
00 XX 000 00	
Date	Date

NOTE

When contacting Broadcast Electronics, please give complete serial number.

TABLE 1-2
OPTIONS AVAILABLE

Model	Name	Stock Number	QI Sensor	QII Sensor	QI Generator	QII Generator	Phase-Lok Bracket	Microphone Input
1070-P	Monophonic Playback	900-1071	Yes	Yes	No	No	Yes	No
1070-RP	Monophonic Record/Playback	900-1070	Yes	Yes	Yes	Yes	Yes	Yes
1070-RP/DL	Monophonic Record/Playback/ Delay	900-1072	Yes	Yes	Yes	Yes	Yes	Yes
1070-PS	Stereo Playback	900-1074	Yes	Yes	No	No	Yes	No
1070-RPS	Stereo Record/Playback	900-1073	Yes	Yes	Yes	Yes	Yes	No
1070-SDL	Stereo Delay	900-1075	No	No	No	No	Standard	No

1.4.2 Spare Parts

Broadcast Electronics maintains an inventory of spare parts, electronic components, printed circuit boards, etc. Order by Broadcast Electronics part numbers.

1.4.3 Warranty

The Broadcast Electronics warranty is printed on the final page of this manual.

SECTION 2

INSTALLATION AND OPERATION

2.1 MOUNTING

SPOTMASTER TEN/70 units may be installed within reach of the operator or at a remote location and operated by the optional Remote Control. Units may be placed flat or on an incline. An optional rack mount adapter is available for a standard 19 inch rack.

The units should be mounted so that air may circulate around the top and bottom of the chassis. The machines should not be mounted above high heat producing electronic equipment or where air flow would be restricted. Avoid high magnetic fields, high temperatures, and dusty locations.

2.1.1 Rack Adapter

See Figure 2-1.

Two TEN/70's may be mounted side by side in the optional rack adapter. An optional RM10 cartridge rack can be used beside a single TEN/70. The rack adapter is designed for a standard 19 inch rack.

Remove the slide mounts from the adapter assembly by pressing in the catch and sliding the mounts free.

Position the mounts in the rack *behind* the opening so the mounts do not pass through the rack opening. Mount with No. 10 screws just long enough to securely seat in the hole, but not long enough to stick out the front.

If the mounting holes in the rack are not threaded, screws may be driven through from the front into the threaded blocks provided. When mounted this way, the holes in the rack should be countersunk to allow the adapter assembly to close fully flush with the rack.

When the slide mounts are fitted to the rack, slide the adapter assembly into place.

Place the TEN/70 into the adapter from the back so the front feet fit into the elongated cut-outs in the front of the adapter assembly. Slide the unit forward until the rear feet slip into their cut-outs.

2.3 INTERCONNECTIONS

All audio and control connections are available on the rear panel. Figures 2-2A through 2-2F show the rear panel configurations for all six TEN/70 models. Figure 2-3 shows typical output connections.

Use shielded cable for all audio connections. A ground strap should be run from the grounding lug on the rear panel to the station or house ground. The shields should be grounded at one end only.

2.3.1A PGM OUT Jack

NOTE

This paragraph applies to monophonic units only.

The audio output is available on a three conductor phone jack just below the PGM LEVEL switch. Standard output is 600 ohm balanced. The ring and tip are signal, and the body the shield. The ring and the body may be connected for unbalanced operation. The mating plug is a ¼ inch stereo phone plug (Switchcraft 267 or equivalent). Be sure to use a termination resistor when the output is applied to a high impedance input.

Optional 150 Ω output is available by conversion by the user. See Figure 4-16. On the MB-105 Input/Output Master Board remove the jumper between pins 4 and 5. Add a jumper between pins 3 and 5 and another jumper between pins 4 and 6.

2.3.1B PGM OUT CHAN A and CHAN B Jacks

NOTE

This paragraph applies to stereophonic units only.

The audio outputs are available on two three-conductor phone jacks; channel A just above the PGM LEVEL switch, and channel B just below the PGM LEVEL switch. The standard output is 600 ohm balanced. The ring and tip are signal, the body is the shield. The ring and body may be connected for unbalanced operation. The mating plugs are ¼ inch stereo phone plugs (Switchcraft 267 or equivalent). Be sure to use termination resistors when the output is applied to a high impedance input.

Optional 150 ohm outputs are available by conversion by the user. See Figure 4-17. On the MB-106 Input/Output Master Board remove the jumpers across pins 6 and 7 as well as pins 13 and 14. Add four new jumpers between pins 5 and 7, 6 and 8, 12 and 14, 13 and 15.

2.3.2 CUE OUTPUT Jack

NOTE

This paragraph does not apply to the 1070-SDL.

The output of the cue track reproduce pre-amplifier is available on a phono jack. The level is approximately -22 dBm, high impedance. This feature is designed primarily for providing logging pulses for use with automation systems, but also allows testing and adjustment of the complete cue system (playback and record portion). Cue tone bursts are available for their length as recorded.

2.3.3 TELCO/EXT CONTROL Jack (J3)

NOTE

This paragraph does not apply to the 1070-SDL.

Connections for external relays controlled by the optional secondary and tertiary cue trips (QI and QII) are available at this connector. The optional Broadcast Electronics TELCO IVB or TELCO IVC telephone answering units are connected here. Pin connections are as follows:

PIN	FUNCTION
1	Telco Start Control
2	Telco Stop Lamp
3	Telco Play Lamp
4	Telco Start Enable
6	Ground

PIN	FUNCTION
7	QI Common
8	QI Normally Open Contacts
9	QII Common
10	QII Normally Open Contacts

2.3.4 REMOTE CONTROL Jack (J4)

All operating controls except the cartridge release are available remotely. The remote speed mode allows for manual fast forward. All indicator lamps may be displayed remotely including the Ready/Release indicator.

NOTE

The remote controls and controls on the unit are parallel.
No jumpers are required to operate without the remote controls.

Pin connections are as follows:

PIN	FUNCTION
1	Stop Control
2	Play Control
3	Ready Lamp
4	Stop Lamp
5	Play Lamp
6	Record Control*
7	Record Interlock*
8	Record Lamp*
9	QI Control

PIN	FUNCTION
10	QII Control
11	QI Lamp
12	QII Lamp
13	Start Enable
14	+24V "B" Supply
15	Ground
16	Delay Set*
17	Delay Set Lamp*
18	Manual Advance
19	Manual Advance

*NOTE

These only apply to record or delay units as appropriate.

2.3.5 Ground Lug

Next to the REMOTE CONTROL Connector is the ground lug for connection to the station or house ground.

2.3.6 AC Line Cord

The TEN/70 models are normally supplied for operation on 60 Hz, 105 - 125 VAC. Units are also available for 220 - 240 VAC, 50 Hz, operation.

2.3.7A MONITOR (MON) Jack

NOTE

This paragraph applies to the 1070-RP and 1070-RP/DL only.

This unbalanced, high impedance line (at approximately +4 dBm level) is taken from the output of the record amplifier before equalization. It is active only when the unit is in the record mode. Tip is signal and the ring and body are shield.

2.3.7B MONITOR (MON CHAN A and CHAN B) Jacks

NOTE

This paragraph applies to the 1070-RPS and 1070-SDL only.

These unbalanced, high impedance lines (at approximately +4 dBm level) are taken from the output of the record amplifiers before equalization. They are active only when the unit is in the record mode. The jacks are wired with tip as signal and the ring and body as shield.

2.3.8A INPUT (IN) Jack

NOTE

This paragraph applies to the 1070-RP and 1070-RP/DL only.

This three conductor phone jack gives access to the input bridge. Impedance is 10K ohms, balanced or unbalanced. The ring and tip are signal and the body shield.

2.3.8B INPUT (IN CHAN A and CHAN B) Jacks

NOTE

This paragraph applies to the 1070-RPS and 1070-SDL only.

These three conductor phone jacks give access to the channel A and B input bridges. Impedance is 10K ohms, balanced or unbalanced. The ring and tip are signal, the body shield. Ring and body may be connected for unbalanced operation (and correct phasing).

2.3.9 MICROPHONE (MIC) INPUT Jack

NOTE

This paragraph applies to the 1070-RP and 1070-RP/DL only.

An optional microphone preamplifier is available for use with a 150 ohm balanced microphone at a level as low as -71 dB. Mating connector is Cannon type XLR-3-12C or Switchcraft A3M. Terminal 1 is the shield, terminal 2 signal low, and terminal 3 signal high. Terminals 2 and 1 may be connected for unbalanced operation.

2.3.10 CUE INPUT Jack

NOTE

This paragraph applies to the 1070-RP, 1070-RP/DL, and 1070-RPS only.

This unbalanced, high impedance input allows direct access to the cue track record system. While designed to allow recording of logging pulses for automation systems, it also allows testing and adjustment of the cue system. Bias is applied to the cue record head for approximately 5 seconds after the START button is pushed.

2.3.11 REMOTE MUTE CONTROL Jack

NOTE

This paragraph applies to the 1070-RP/DL and 1070-SDL only.

The remote mute control switch for delay units is connected to this three conductor phone jack. The ring is one side, the tip and the body the other side. A SPST normally closed push button switch is supplied for this purpose. The delayed output is muted when the button is depressed on this switch. The output is restored when the switch is released.

2.4 CONTROLS AND INDICATORS

All front and rear panel controls for the six TEN/70 models are shown in Figures 2-2A through 2-2F. The functions of all controls and indicators is listed in Table 2-1.

2.5A AUDIO REPRODUCTION

NOTE

This paragraph applies to all models except 1070-SDL.

A cartridge is inserted in the deck to the right side of the opening; and against the guide flange. The cartridge is pushed in until it latches in place. The tape is put in motion by pressing the START button. The unit will continue to run until a 1,000 Hz stop cue tone is detected on the cue track or the STOP button is depressed.

The cartridge is released by pressing the Ready/Release button. The controls are electrically interlocked so that a cartridge cannot be removed while the deck is running.

When the unit first starts, the stop cue tone sensor is muted for approximately 1½ seconds. When the tape stops, the full tone burst may not pass by the cue track play head. Therefore, the sensor may see a stop tone when the deck restarts. A 1½ second mute makes the stop tone sensor "blind" when the tape begins to move.

While in the stop mode, the audio output is muted.

2.5B AUDIO REPRODUCTION

NOTE

This paragraph applies to the 1070-SDL only.

A cartridge is inserted in the deck to the right side of the opening; and against the guide flange. The cartridge is pushed in until it latches in place. The tape is put in motion by pressing the START button.

The cartridge is released by pressing the Ready/Release button. The controls are electrically interlocked so that a cartridge cannot be removed while the deck is running.

While in the stop mode, the audio output is muted.

2.6 AUTO Q

NOTE

This paragraph applies to all models except the 1070-SDL.

While the TEN/70 may be manually placed in fast forward, the optional AUTO Q feature automatically switches the unit to fast forward at the end of a recorded segment. For AUTO Q a QI (150 Hz) sensor for playback and a recording unit with a QI generator are needed. The 150 Hz tone is recorded on the cue track at the end of the message. In playback, this tone will switch the motor to triple speed to minimize cueing time. While in fast forward, the audio output will mute.

To prepare cartridges for use with AUTO Q, record a 150 Hz tone on the cue track at the end of the recorded segment. The TEN/70 will switch to fast forward at the end of the tone, so the burst may be started before the actual end of the message. The tone burst must not end before the program material. If the 150 Hz tone is also used to activate other equipment, it may be necessary to begin the tone burst after the end of all program material.

2.7 PROGRAM RECORDING

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

The NAB Cartridge Standards do not provide for an erase capability in cartridge recording units. All cartridges must be bulk erased. Erase both the top and bottom of the cartridge, then tip up and erase the tape exposed at the open end. While erasing move the cartridge (or eraser if a hand model is used) with a clockwise, circular motion. Keep up this motion and slowly withdraw the cartridge (or eraser) several feet before turning off the eraser.

There is no erase capability in the record unit except in the 1070-RP/DL where erase is used only in the delay mode.

Load a cartridge in the deck. Select a cartridge at least two seconds longer than the program material to be recorded. If more than one "cut" will be recorded on a cartridge, allow at least two seconds between cuts.

Frequently, in handling, the tape is skewed in the cartridge. In that case when the cartridge is inserted the tape may not seat properly in the guides and across the heads. This can be aggravated if the teflon post in the cartridge has worked loose. This post should always be glued down tight so that the tape is held in a straight path and is not free to move up and down.

To seat the tape in the guides, run the cartridge in the reproduce mode for several seconds. While running the cartridge to align the tape in the guides, check the location of the splice. Avoid re-cording over the splice, since audio will "drop-out" or "bump" on most splices.

Stop the cartridge and press the REC (record set) button on the front panel. The record set is interlocked so that the unit cannot be put into record when tape is in motion. Preset the level for the material to be recorded. The front panel VU meter should peak to 100% or 0 but no higher. For the best possible reproduction all the devices should be set for normal operating level: the output level of the source, the level at the console, the level at the TEN/70, etc.

In the record mode two things will occur when the START button is pushed: tape travel will begin and a 1,000 Hz stop cue tone will be recorded on the cue track. In the reproduce mode, this 1,000 Hz cue tone will stop tape travel. Of course, the tape will not be able to stop instantaneously at the cue tone. If the program material begins at the same time the stop tone begins, the unit will stop slightly into the program material: a "bump" cue and a "bump" start will result. To prevent this, when recording the cartridge, delay starting the program material for $\frac{1}{4}$ to $\frac{1}{2}$ second after pressing the START button. The cartridge will cue cleanly, but the pause in starting will be unnoticeable.

While recording the quality can be checked if provision is made to feed the audio output to a separate monitor system such as an audition channel of a console. The program material can be "A-B"ed by monitoring alternately the input to the TEN/70 and the output (which is the reproduction of the audio just recorded). With monitor systems of equal quality and equal volume, no difference should be detected in the signal before recording and after.

When the program material is recorded, the unit may be stopped manually or allowed to run until the machine cues. See paragraph 2.8.1 for recording the optional QI and QII cue tones.

The TEN/70 will not go into record if tape is in motion.

Pushing the STOP button will cancel record set. Removing the cartridge will cancel record set. Record will also cancel when the unit recues.

2.8 QI AND QII OPTIONS

NOTE

This paragraph applies to all models except the 1070-SDL.

QI and QII are two auxiliary cue tones standardized by the National Association of Broadcasters for magnetic tape cartridge systems. These tones, defined by the NAB Standards as secondary and tertiary cue tones, are used to control associated devices.

The 150 Hz (QI) secondary tone is defined as the "end of message" cue and is generally used to activate another device at the end of a recorded segment. This could be, for example, a sequence cue to an automation system. In the TEN/70, the secondary tone is also used with AUTO Q to provide fast-forward cueing after a cartridge has played.

The 8,000 Hz (QII) tertiary tone is defined as an auxiliary tone to be used as needed. Generally it is used to activate other devices during reproduction of a recorded segment.

The optional QI and QII Sensors (CA-201) plug into sockets on the MB-102 Reproduce Amplifiers Master Board. Depending on the component values, the CA-201 responds to a 150 Hz or 8 KHz tone and closes a normally open relay on the CA-201. These NO contacts are brought out to the TELCO/EXT CONTROL jack on the rear panel. At the same time the appropriate indicator on the front panel lights to show tone presence. The relay contacts remain closed and the indicator lit for the duration of the tone burst.

The QI and QII options are available when a unit is purchased. The user may add them later by purchasing the sensor and plugging it into the proper socket. No modifications of the unit are necessary.

Instruction on adjusting the QI and QII sensors are included in Section 5. The levels suggested are based on the NAB Standards. Two considerations were taken into account. For maximum reliability the tone levels should be as high as possible. However, to minimize cross talk to the program channel, the tone levels should be as low as practicable.

The levels chosen by NAB are roughly these: the 1,000 Hz stop tone at standard operating level, the 150 Hz tone 6 dB above, and the 8 KHz tone 10 dB below standard operating level. Of course, the sensitivity of the sensors is set to operate with reproduce tone levels considerably below the standard levels.

2.8.1 QI and QII Generators

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

The Optional QI and QII (CG-102) generators plug into sockets on the Record Master Board. Depending on component values, the CG-102 is used as a 1,000 Hz, 150 Hz or 8,000 Hz oscillator. The optional generator may be added later to record units.

QI and QII tones are recorded by pressing the appropriate switch/indicator on the front panel. As long as the switch is depressed the generator will supply tone to the record head. NAB Standards call for a minimum burst of 250 milliseconds duration to insure positive operation of the sensor in playback.

QI and QII tones may also be added when the unit is in the reproduce mode. Depress the QI or QII switch and the REC switch simultaneously. However, any tones previously recorded on the cue track will not be erased and will remain on the tape.

Instructions for adjusting the QI and QII generators are included in Section

2.9 DELAY OPERATION

NOTE

This paragraph applies to models 1070-RP/DL and 1070-SDL only.

The SPOTMASTER 1070-RP/DL combines in one package a record/reproduce unit and a delay recorder. The length of the delay is determined by the cartridge used. The delay function is available whenever needed, but the unit can be used as a recorder or reproducer when not being used for delay.

The SPOTMASTER 1070-SDL is a stereophonic delay record unit only, and it cannot be used as a normal cartridge recorder or reproducer. The unit does not contain cue track circuitry, and no cue track is recorded on the tape. Therefore, the cartridges made on the 1070-SDL are not compatible with the standard stereophonic cartridge units.

To provide delay, an erase/record head is substituted for the record head. The positions of the reproduce and record heads are transposed (see Fig. 6-5 & 6-6). The program material is recorded, passed through the cartridge, played back by the reproduce head, erased, and again passed over the record head. Hence the reproduced output lags behind the input by the length of the tape in the cartridge used.

The program material to be delayed is fed into the program input jack on the rear panel. The delayed material is available at the program output jack.

Tape motion must be stopped to put the unit in the delay mode. Insert a cartridge the length of the delay desired. Press the record set (REC) button and then the delay set (DLY) button (1070-RP/DL only). Both the delay set and record set indicators should light.

NOTE

The unit is electrically interlocked so that it will not go into the delay mode if tape is in motion or if the DLY button is pushed before the REC button.

The machine will remain in the delay mode until the STOP button is pushed.

Included with the 1070-RP/DL and 1070-SDL is a remote switch which will mute the delayed output. This is a normally closed switch which plugs into the Remote Mute Connector on the rear panel. The delayed output is muted whenever, and as long as, the switch is pushed. The machine will continue to run and record, but the audio output will be shut off. Releasing the mute switch restores delayed programming.

In the delay mode the cue circuitry is inactive (1070-RP/DL).

To use the unit as a normal recorder press only the REC button. Cue Tones will be recorded on the cartridge in a normal manner (1070-RP/DL).

NOTE

When recording in the non-delay mode, cartridges MUST be bulk-erased, since the erase head is used only in the delay mode.

The 1070-RP/DL and 1070-SDL will accommodate NAB type A or B cartridges. For best operation a maximum of 8½ minutes should be loaded in the type A and 12½ minutes in the type B. Custom length delay cartridges are available from Broadcast Electronics or the user may prepare his own.

Since precise timing is usually desirable, the following table lists various lengths in seconds and the equivalent length in inches of tape (at 7.5 ips; for 3.75 ips, divide the inches equivalent by 2):

SECONDS

INCHES

5	37.5
6	45.0
7	52.5
8	60.0
9	67.5
10	75.0
11	82.5
12	90.0

SECONDS

INCHES

13	97.5
14	105.0
15	112.5
16	120.0
17	127.5
18	135.0
19	142.5
20	150.0

Allow an additional 2 to 3 inches for the splice.

Make the splice as clean as possible. Any gap or overlapping in the splice will be noticed when the splice passes the reproduce head.

Tape tension is particularly critical in short delay cartridges. Tension must be great enough so that the hub in the cartridge turns as the tape moves. But tension must not be too great. Before making the splice check the tension. The tape loop can be tightened by gently pulling on the end where the tape goes onto the hub. Gently pull tape out of the center to loosen the tape wrap.

It is a good idea to check delay cartridges frequently. A delay cartridge (particularly in short lengths) wears out rapidly, since the tape runs continuously rather than intermittently.

**TABLE 2-1
CONTROLS AND INDICATORS**

Applicability						Name	Functional Description
1070-P	1070-RP	1070-RP/DL	1070-PS	1070-RPS	1070-SDL		
x	x	x	x			PWR ON/OFF Switch	When in the ON position AC power is supplied to the unit. The STOP switch/indicator is illuminated when the AC power is ON.
				x	x	LEFT LEVEL/PWR Switch	The AC power switch is on the left channel input level control on the front panel. AC power is turned off when this level control is at its extreme counterclockwise position. The STOP switch/indicator is illuminated when AC power is ON.
x	x	x	x	x	x	START (Play) Switch/Indicator	Depressing the START switch activates the control logic setting the tape in motion. The START indicator is illuminated when tape is moving and not illuminated when tape travel is stopped.
x			x			STOP Switch/Indicator	Depressing the STOP switch stops tape motion. The STOP indicator is illuminated when tape is not in motion and not illuminated when tape is moving. When in STOP mode, audio output is muted.
	x	x		x	x	STOP Switch/Indicator	Depressing the STOP switch stops tape motion. The STOP indicator is illuminated when tape is not in motion and not illuminated when tape is moving. Record set is automatically cancelled when the STOP switch is depressed. When in STOP mode, audio output is muted.
x	x	x	x	x		Speed Mode (AUTO/NORMAL/ADVANCE) Switch	When held in the ADVANCE position while in the play mode, the drive motor speed is increased three times. When released the motor returns to normal speed. If a 1 KHz stop cue tone is sensed, tape motion will stop. In the center AUTO position the drive motor will go into fast forward automatically when a 150 Hz end of message cue tone is sensed (at the end of the tone burst). The motor will remain in the higher speed until a 1 KHz stop tone is sensed, the unit is stopped manually, or the speed mode switch is placed in the ADVANCE position and released.
					x	Speed Mode (AUTO/NORMAL/ADVANCE) Switch	<p align="center">NOTE</p> <p>While in the AUTO Q mode the unit's audio output is muted.</p> <p>In the NORMAL position the AUTO Q feature is disabled and the unit will operate only at normal speed.</p> <p align="center">NOTE</p> <p>AUTO Q operation is possible only in units equipped with the optional 150 Hz (QI) cue tone sensor.</p> <p>When held in the ADVANCE position while tape is in motion, the drive motor speed is increased three times. When released, the motor returns to normal speed. In the NORMAL position the motor operates only at normal speed. The center AUTO position is inoperative.</p>

Table 2-1 Continued on Next Page

**TABLE 2-1 (Cont'd.)
CONTROLS AND INDICATORS**

Applicability						Name	Functional Description
1070-P	1070-RP	1070-RP/DL	1070-PS	1070-RPS	1070-SDL		
x	x	x	x	x	x	RDY/REL Switch/ Indicator	The indicator is lit only when a cartridge has been inserted in the deck. Pressing the switch releases the pinch roller allowing a cartridge to be removed
	x	x		x		REC Switch/Indicator	<p align="center">NOTE</p> <p>A cartridge will not release if tape is in motion or the AC power is OFF.</p> <p>Depressing the REC button activates the record electronics. The unit can be put into record only when tape is not in motion. Depressing the STOP switch will automatically cancel the record set. Removing the cartridge will also cancel record set. The record indicator is lit when the unit is in the record mode.</p>
					x	REC Switch/Indicator	Depressing the REC button activates the record electronics in the delay mode. The unit can be put into record only when tape is not in motion. Depressing the STOP switch will automatically cancel the record set. Removing the cartridge will also cancel record set. The record indicator is lit when the unit is in the record/delay mode.
x	x					Test (PGM/TONE/BIAS) Switch and VU meter.	<p>In the center PGM position the VU meter indicates audio level present at the output of the Record Driver Amplifier.</p> <p>In the BIAS position the meter shows the record bias level at the input to the program record head.</p> <p>In the TONE position the meter reads cue tone levels at the input of the cue record head.</p>
			x			Test (PGM/TONE/BIAS) Switch and VU meter	<p>In the center PGM position, the VU meters indicate audio levels present at the output of the Record Driver Amplifiers. The meter on the right monitors the right or B channel; the meter on the left monitors the left or A channel.</p> <p>In the BIAS position the meters show the respective record bias levels at the inputs to the program record head.</p>
				x		Test (PGM/TONE/BIAS) Switch and VU meter	<p>In the TONE position the left hand (Channel A) meter reads cue tone levels at the input of the cue record head.</p> <p>In the center PGM position, the VU meters indicate audio levels present at the output of the record driver amplifiers. The meter on the left monitors the A (left) channel, and the meter on the right monitors the B (right) channel.</p>

Table 2-1 Continued on Next Page

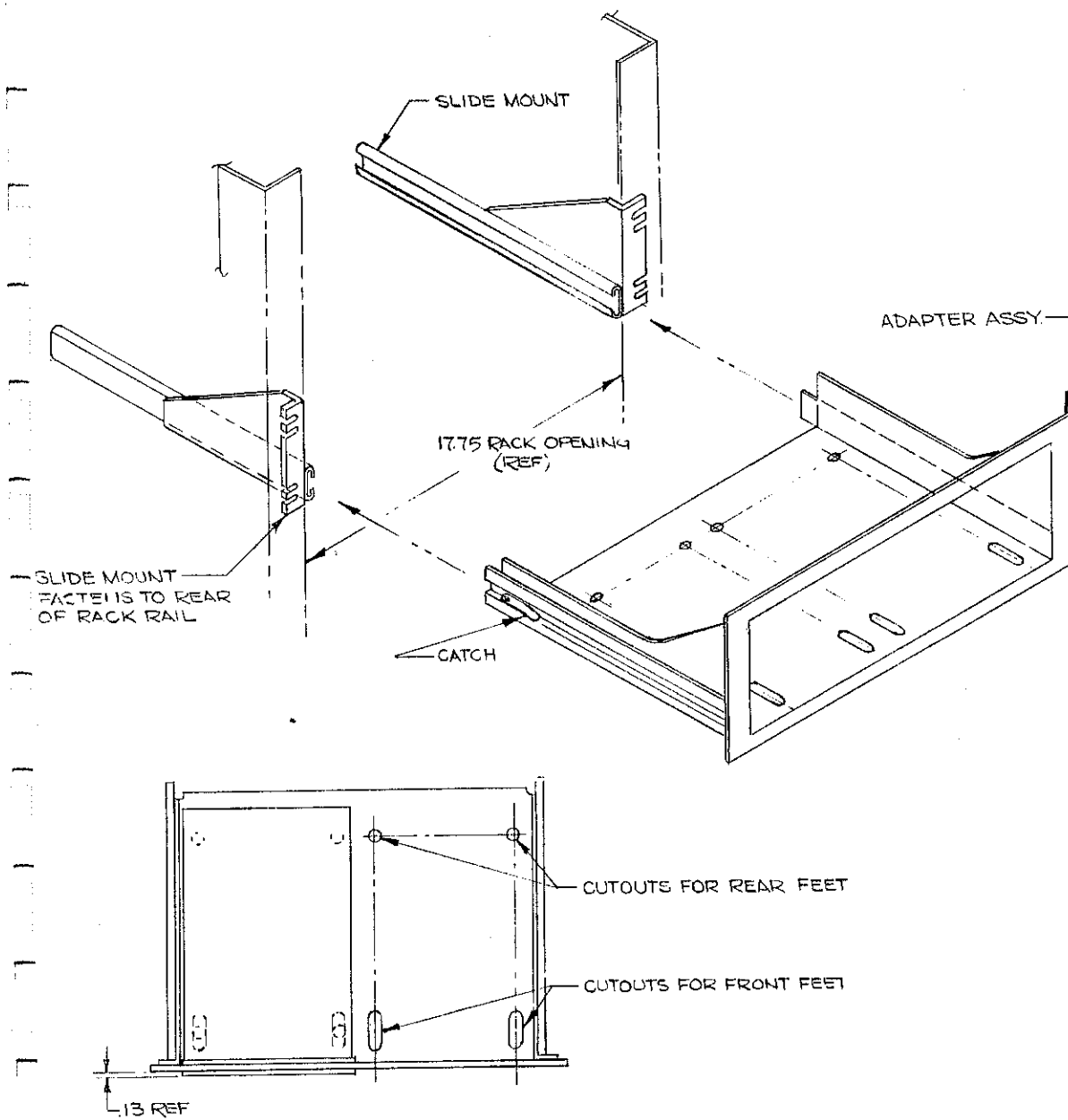
**TABLE 2-1 (Cont'd.)
CONTROLS AND INDICATORS**

Applicability						Name	Functional Description
1070-P	1070-RP	1070-RP/DL	1070-PS	1070-RPS	1070-SDL		
					x		<p>In the BIAS position the meters show the respective record bias levels at the inputs to the program record head.</p> <p>The TONE position is non-functional.</p>
x			x			QI Indicator (Optional)	<p>The QI indicator lights whenever a 150 Hz tone is detected by the optional QI cue sensor. The indicator thus displays QI presence on the tape.</p>
x			x			QII Indicator (Optional)	<p>The QII indicator displays the operation of the optional 8,000 Hz cue tone system. Its operation is identical to that of the QI indicator.</p>
	x	x		x		QI Switch/Indicator (Optional)	<p>The QI indicator lights whenever a 150 Hz tone is detected by the optional QI cue sensor. The indicator thus displays QI presence on the tape.</p> <p>Depressing the QI switch turns ON the optional 150 Hz end of message cue tone generator. The tone is supplied to the cue track record head as long as the switch is held in.</p> <p>The 150 Hz tone may also be recorded when the unit is in the reproduce mode by pressing the REC and QI buttons simultaneously. Previously recorded cue tones will NOT be erased, however.</p>
	x	x		x		QII Switch/Indicator (Optional)	<p>The QII switch/indicator controls and displays the operation of the optional 8,000 Hz cue tone system. Its operation is identical to that of the QI Switch/Indicator.</p>
	x	x				LINE and MIC (Microphone) LEVEL CONTROLS	<p>These mixers control line and microphone input levels. The microphone level control is inoperative in units not equipped with the optional microphone preamplifier.</p>
		x				Delay Set (DLY) Switch/Indicator	<p>In the 1070-RP/DL delay units the QII switch/indicator is replaced by the Delay Set Switch/Indicator. The DLY indicator is lit when the unit is in the delay mode.</p> <p>To put the unit into the delay mode depress the REC (record set) switch and then the DLY switch. The unit is electrically interlocked so that it will not go into delay if the tape is in motion or the DLY switch is pushed before the REC button.</p> <p>Pushing the STOP button automatically cancels delay set.</p>
				x	x	LEVEL RIGHT and LEVEL LEFT	<p>These potentiometers control the input levels to the respective channels: LEFT or Channel A and RIGHT or Channel B. The AC power switch is also on the LEFT LEVEL control.</p>

Table 2-1 Continued on Next Page

**TABLE 2-1 (Cont'd.)
CONTROLS AND INDICATORS**

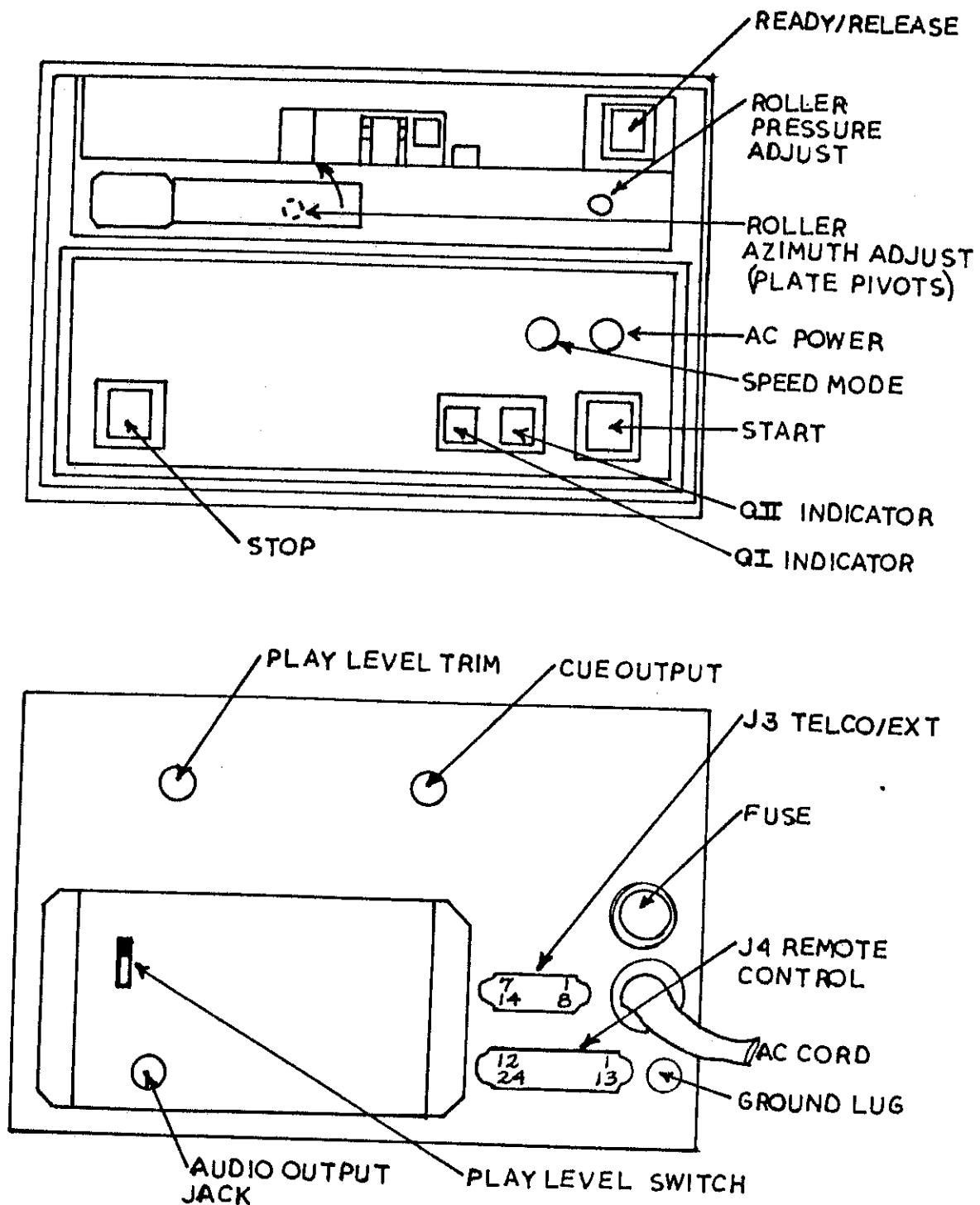
Applicability						Name	Functional Description
1070-P	1070-RP	1070-RP/DL	1070-PS	1070-RPS	1070-SDL	The following controls are located on the rear panel.	
x	x	x				PLAY LEVEL TRIM and PGM LEVEL Switch	The PGM LEVEL switch and PLAY LEVEL TRIM control the audio output level. The PGM LEVEL switch allows a choice of three output level ranges: a maximum -10, 0, or +8 dBm. The PLAY LEVEL TRIM allows adjustment of 10 dB down from the nominal level selected on the PGM LEVEL switch.
			x	x	x	PLAY LEVEL TRIM and PGM LEVEL Switch	The PGM LEVEL switch and PLAY LEVEL TRIM CHAN A and CHAN B control the audio output levels. The PGM LEVEL switch allows a choice of three output level ranges: a maximum -10, 0 or +8 dBm. The CHAN A and CHAN B PLAY LEVEL TRIM allow adjustment of 10 dB down from the nominal level selected on the PGM LEVEL switch.
	x	x		x	x	INPUT LEVEL Switch	This switch selects the nominal level of the line input. LO position should be used with input levels of -24 to 0 dBm and HI with input levels of 0 to +30 dBm.
		x			x	REMOTE MUTE Switch	The 1070-RP/DL and the 1070-SDL come with a remote switch which will mute the audio output. This is a normally closed switch which plugs into the rear panel. The delayed output is muted whenever and as long as the switch is pushed. The machine will continue to run and record, but the delayed audio will be shut off. Releasing the remote mute switch restores delayed programming.



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 RACK ADAPTER MOUNTING
 33-5001-00086

Figure 2-1. Optional 19 Inch Rack Adapter

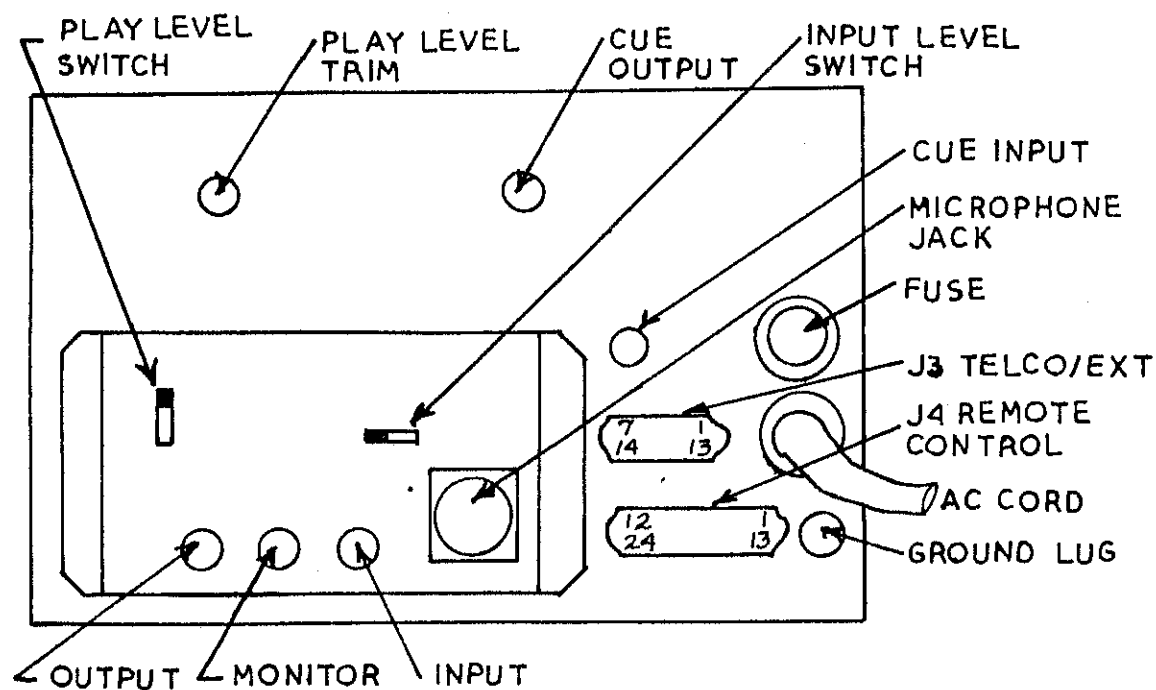
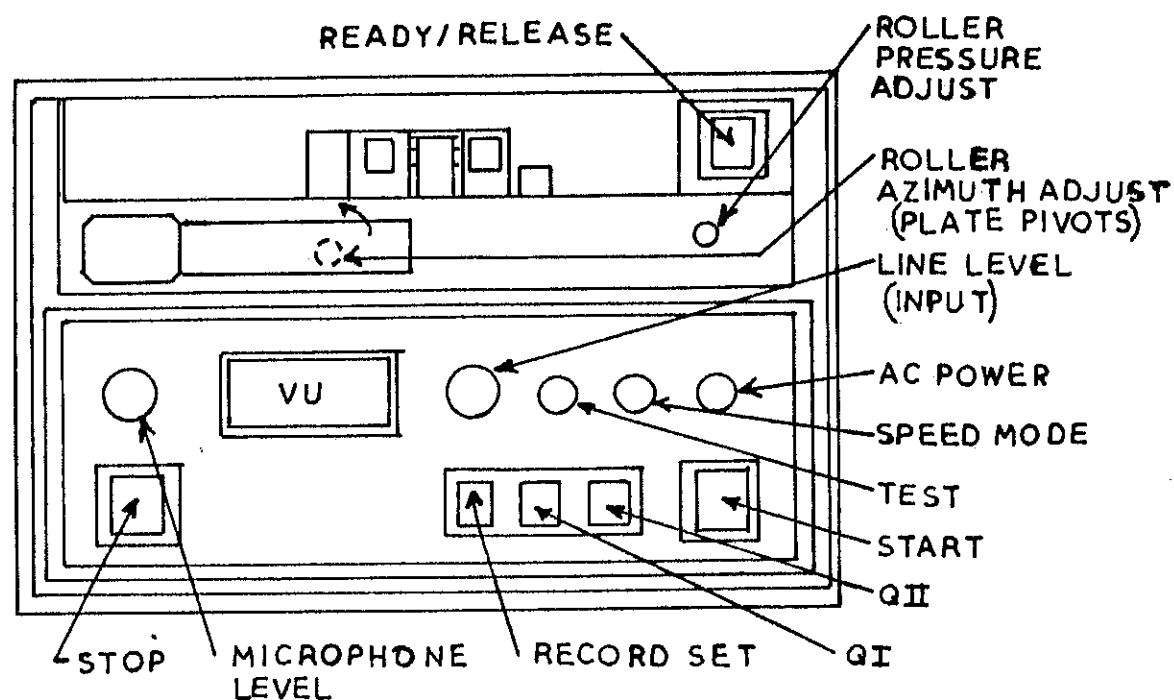
FRONT AND REAR PANELS



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13-1001-00234
1070P

Figure 2-2A. Front and Rear Views 1070-P

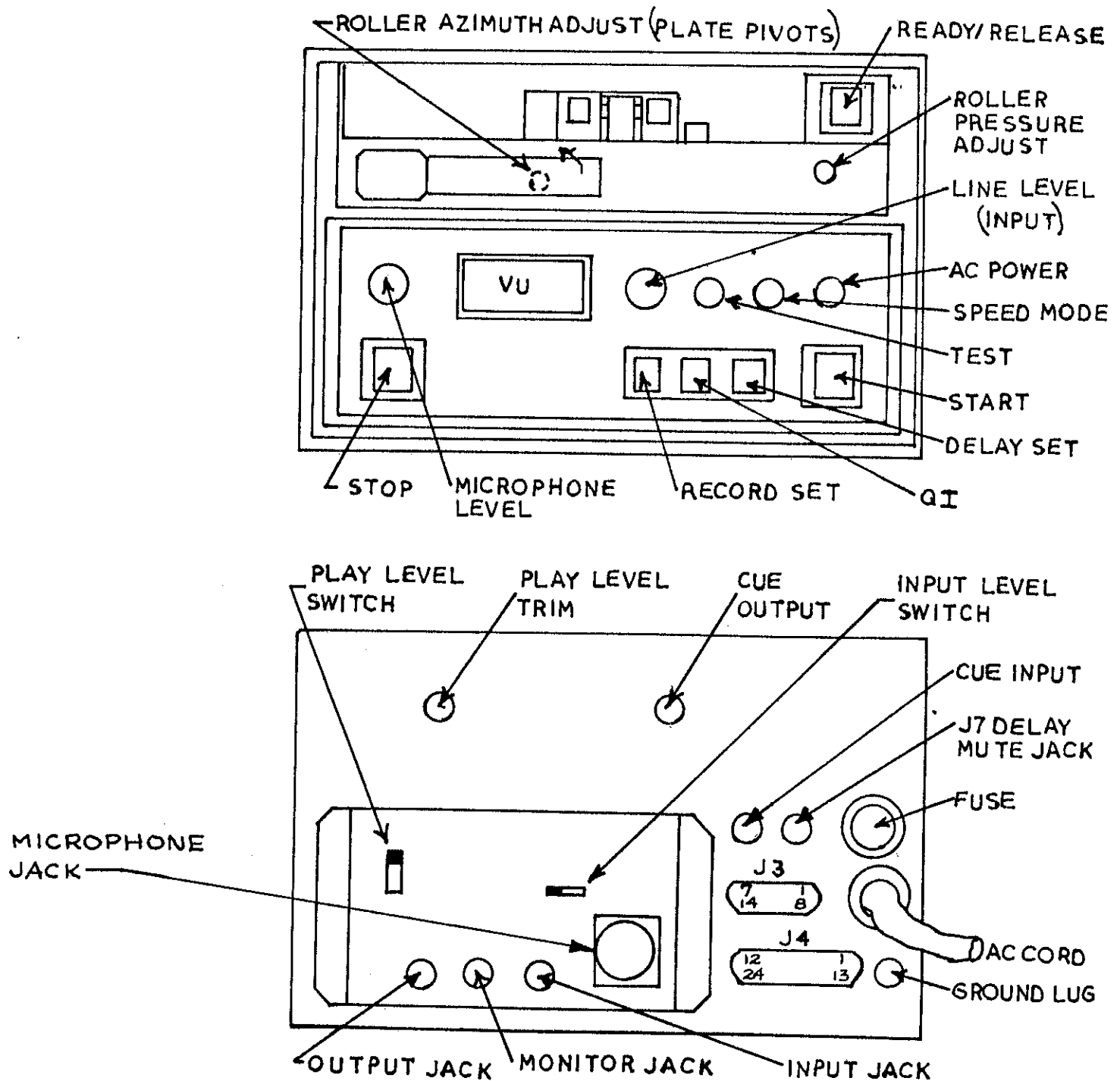
FRONT AND REAR PANELS



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13-1001-00235
1070RP

Figure 2-2B. Front and Rear Views 1070-RP

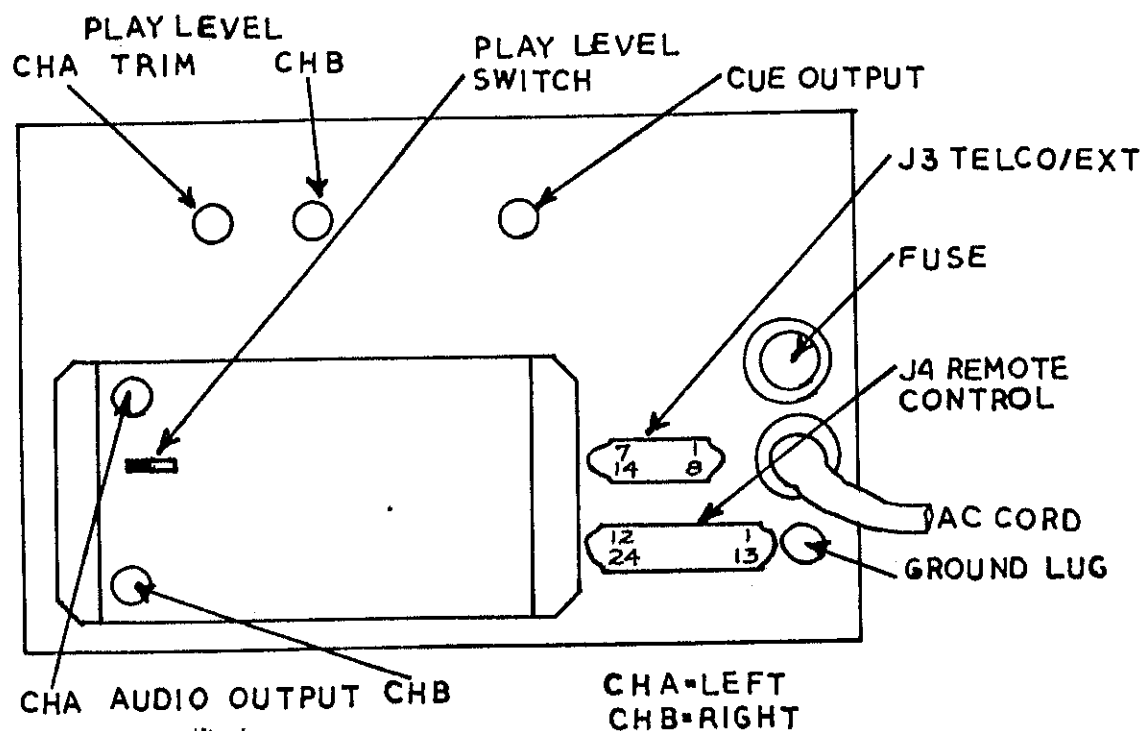
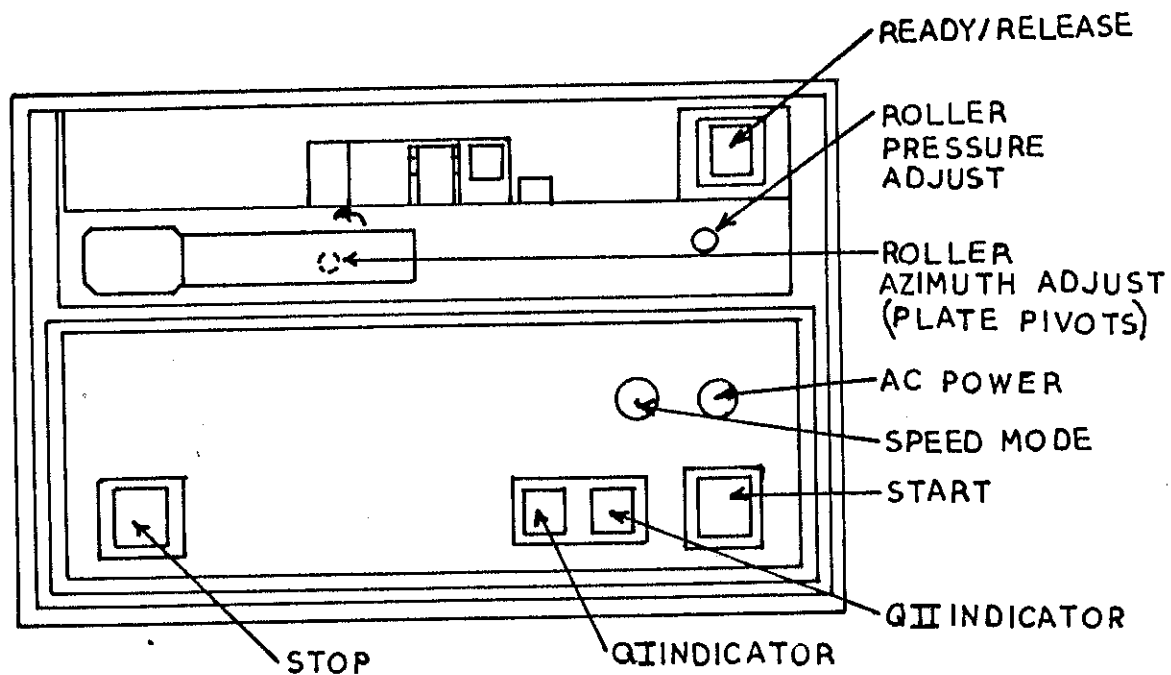
FRONT AND REAR PANELS



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 - A FILMWAYS COMPANY -
 13-1001-00238
 1070RPDL

Figure 2-2C. Front and Rear Views 1070-RP/DL

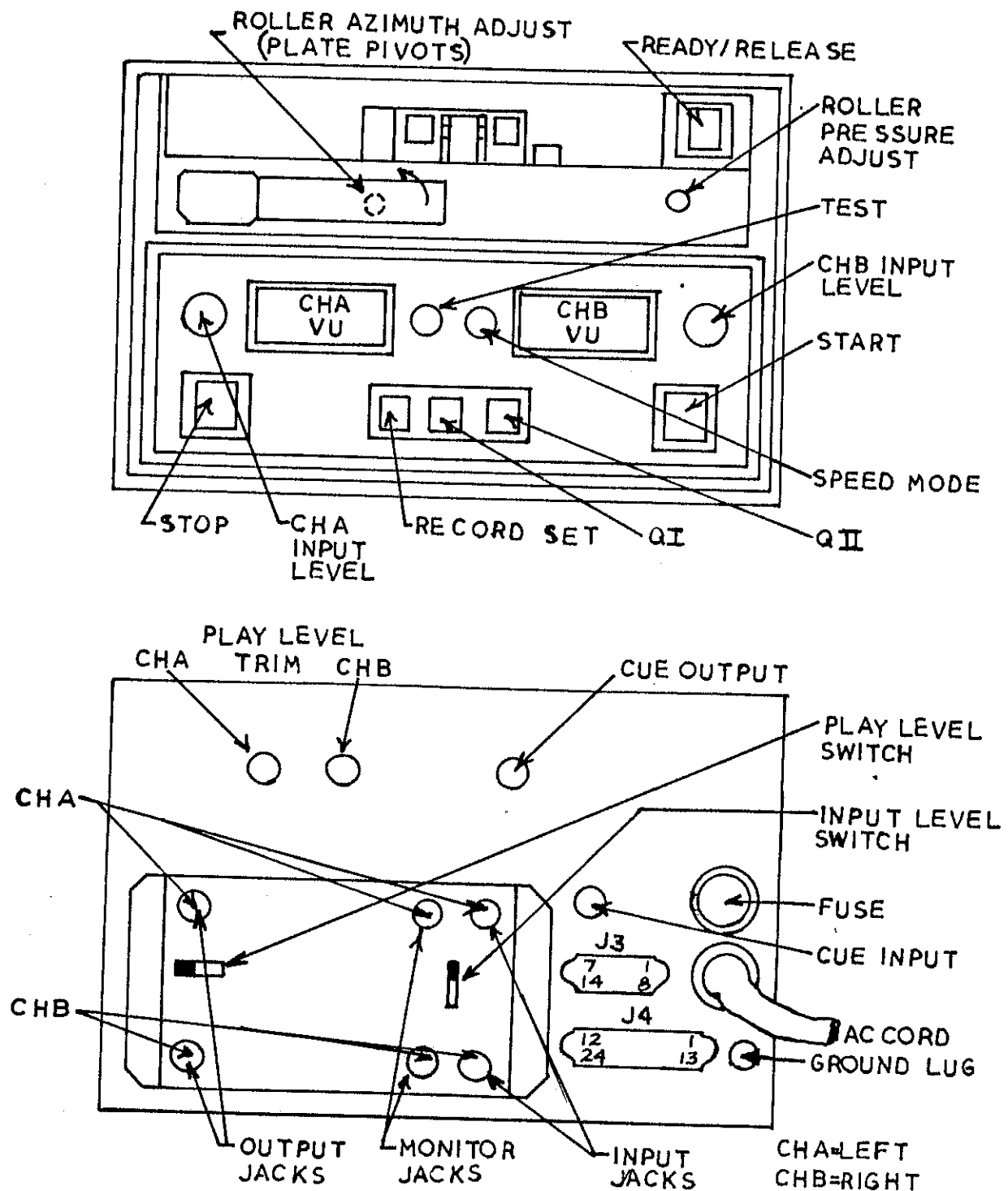
FRONT AND REAR PANELS



BROADCAST ELECTRONICS, INC
- A FILMWAYS COMPANY -
13-1001-00236
1070PS

Figure 2-2D. Front and Rear Views 1070-PS

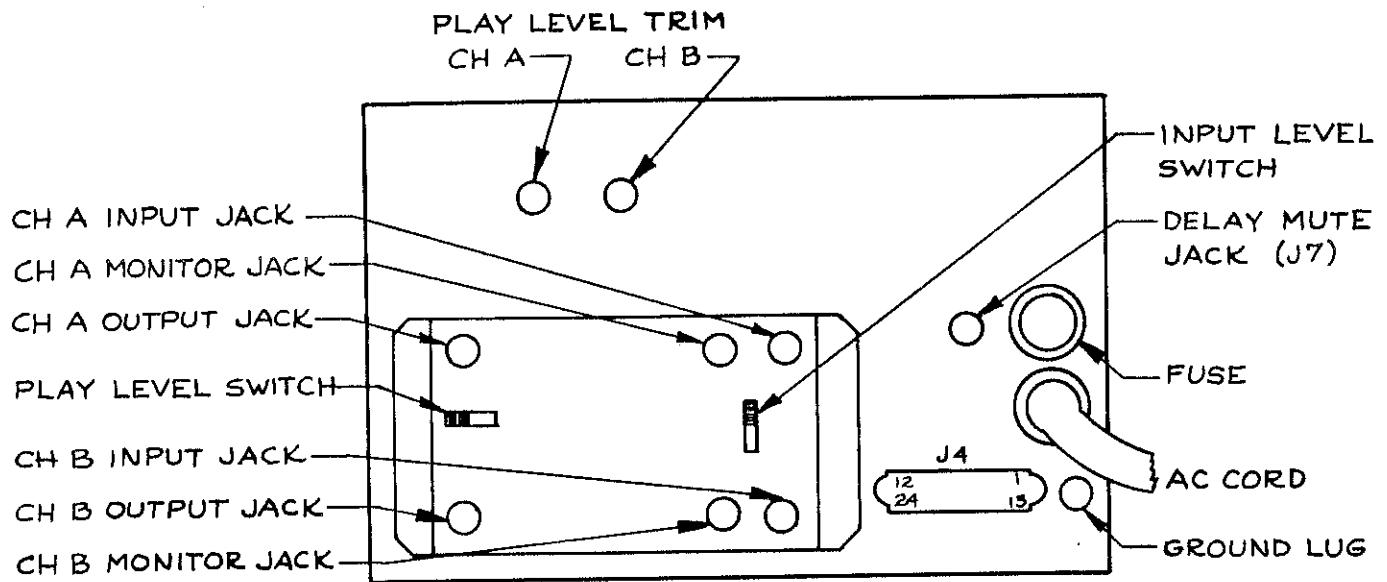
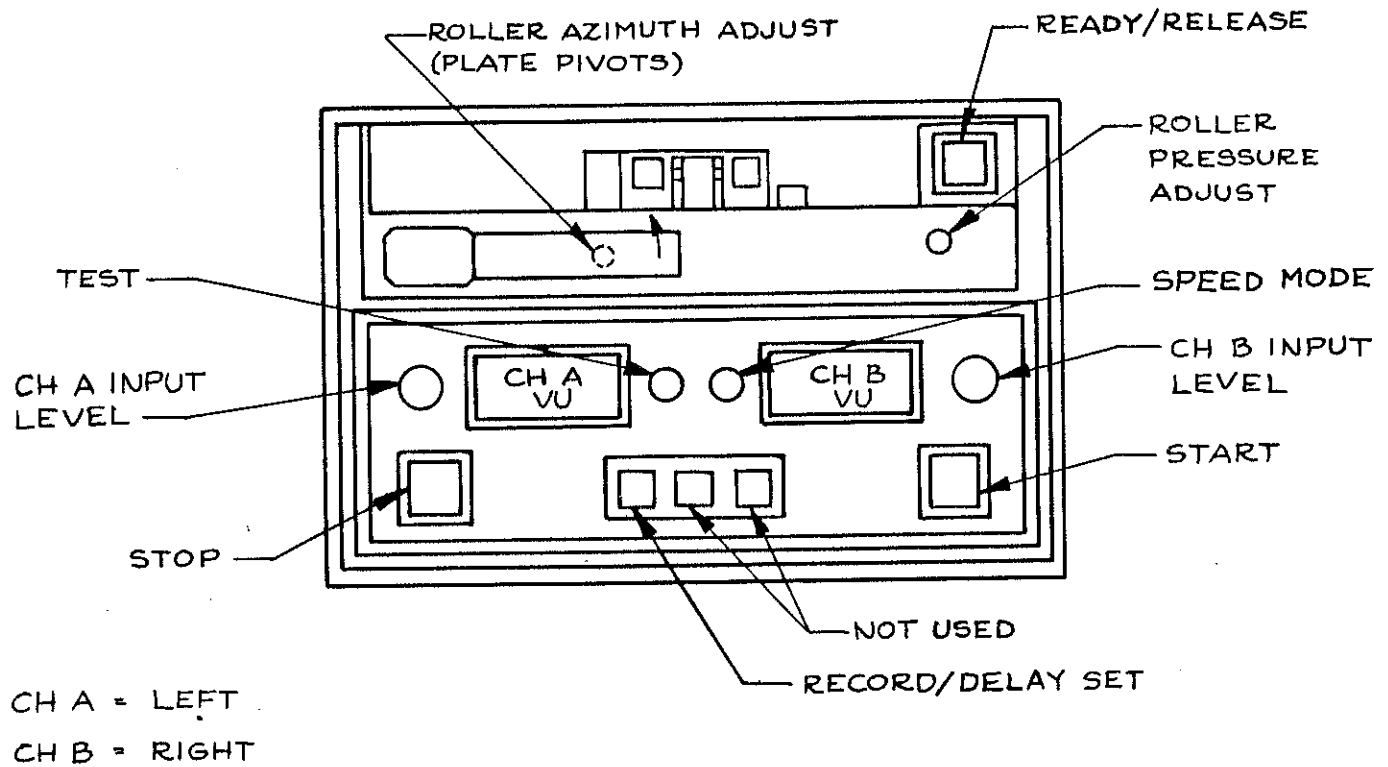
FRONT AND REAR PANELS



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 13-1001-00237
 1070RPS

Figure 2-2E. Front and Rear Views 1070-RPS

FRONT AND REAR PANELS



BROADCAST ELECTRONICS INC

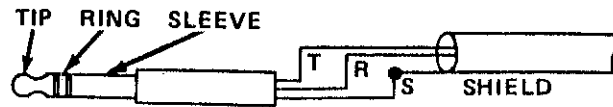
- A FILMWAYS COMPANY -

1070 SDL

13 - 2018 - 01131

Figure 2-2F. Front and Rear Views 1070-SDL

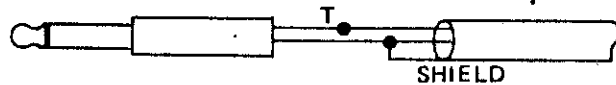
BALANCED USING 1/4" STEREO PHONE PLUG (SWITCHCRAFT 267 OR EQUIVALENT)



UNBALANCED USING 1/4" STEREO PHONE PLUG (SWITCHCRAFT 267 OR EQUIVALENT)

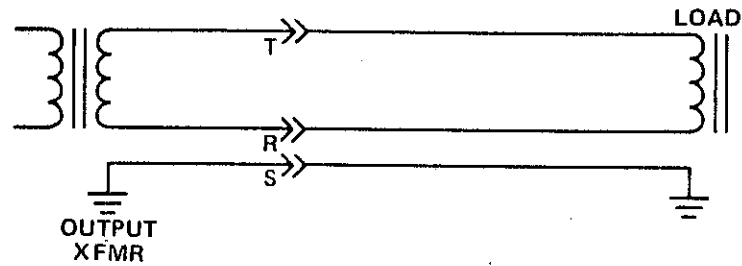


UNBALANCED USING STANDARD 1/4" 2 CONDUCTOR PHONE PLUG

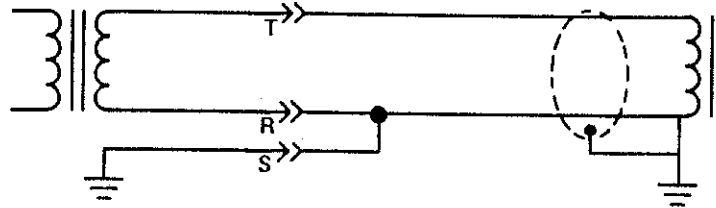


SCHEMATIC CONNECTIONS

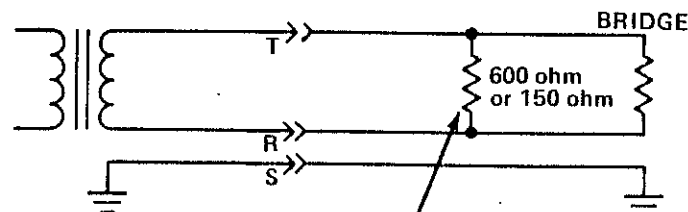
BALANCED, TO 600 OHM TRANSFORMER



UNBALANCED, TO 600 OHM TRANSFORMER



BALANCED, TO HIGH IMPEDANCE BRIDGE



TERMINATION RESISTOR ADDED
TO PROPERLY LOAD UNIT

Figure 2-3. Typical Output Connectors

SECTION 3

SYSTEM DESCRIPTION

3.1 SCOPE

This Section describes the TEN/70 from an overall circuit and operating function viewpoint. Theory of operation for individual circuit modules is given in Section 4. Section 6 discusses the mechanical, head, and deck assemblies.

3.2 BASIC SYSTEM DESCRIPTION

Refer to figures 3-7 thru 3-10 which are overall schematic/wiring diagrams. Also refer to figures 5-2 and 5-3 which show the physical arrangements of the electronic modules.

The TEN/70 consists of a tape transport deck, a two-speed motor and its speed control, a logic control system, the program reproduction circuitry, cue tone system, and the power supply. Record units include program and cue track record systems.

The electronics are modular. Individual modules plug into Master Boards to form the various circuits: reproduction, control, power supply, record, etc.

The Reproduce Amplifiers Master Board holds the playback electronics. Included are the pre-amplifier and driver amplifier boards for the program channel as well as the sensor(s) for the cue track. The frequency compensation networks for the preamplifiers and coupling components are also on the Master Board. The Reproduce Master Board is attached to the main chassis just behind the deck. The program audio is fed to the audio Input/Output Master Board where the output transformers are mounted. This master board is mounted on the inside surface of the rear panel.

The power supply and logic are located on the Machine Master Control Board. The A supply (PS-102) provides power for the electronics. The B supply (PS-104) handles the solenoids, lamps and logic circuits. One (LO-103) flip-flop is used to activate stopping and starting. A second flip-flop is used to activate or deactivate the recording circuitry. The Machine Control Board is mounted beneath the chassis.

The power transformer and the motor speed control relay mount on the High Power Connection Master Board which is on a sub-chassis next to the drive motor. The MB-107 board on the deck contains the circuitry associated with the play and release solenoids.

Record units also contain a Record Master Board on which the bias oscillator, program record amplifiers, and the cue tone generators are mounted. The Record Master Board is mounted on a sub-chassis beneath the main frame. The input transformers are located on the audio Input/Output Master Board which is screwed to the rear panel.

The model 1070-SDL stereo delay programmer differs from the above description only in that no cue tone system is used. The Reproduce Master Board mounts a preamplifier and driver amplifier module for each of the two program channels. The record master board contains the bias oscillator and the program record amplifiers. The optional Phase-Lok head bracket is standard on 1070-SDL units.

3.3 CIRCUIT BOARD COMPLEMENT

The printed circuit board complement for each of the TEN/70 models is shown in Table 3-1.

TABLE 3-1
PRINTED CIRCUIT BOARD COMPLEMENT

Quantity						Board Designation	BE Number	Description
1070-P	1070-RP	1070-RP/DL	1070-PS	1070-RPS	1070-SDL			
1	1					MB-102	914-1020	Reproduce Amplifier Master Board
		1				MB-102	914-1022	Reproduce Amplifier Master Board
			1	1		MB-102	914-1021	Reproduce Amplifier Master Board
					1	MB-102/2018	914-1023	Reproduce Amplifier Master Board
2	2	2	3	3	2	PA-101	911-1010	Preamplifiers (program and cue)
1	1	1	2	2	2	DA-104	910-1040	Driver Amplifier (program channel(s))
1	1	1	1	1		CA-101	910-1012	1,000 Hz Cue Tone Sensor
1	1	1	1	1		CA-201	910-2010	150 Hz Cue Tone Sensor (optional)
1	1	1	1	1		CA-201	910-2011	8,000 Hz Cue Tone Sensor (optional)
1						MB-105P	914-1051	Audio Output Master Board
	1	1				MB-105	914-1050	Audio Input/Output Master Board
			1			MB-106P	914-1061	Audio Output Master Board
				1	1	MB-106RP	914-1060	Audio Input/Output Master Board
1	1	1	1	1	1	MB-107	914-1070	Deck Interconnection Master Board
1	1	1	1	1	1	MB-109	914-1090	Power Connector Master Board (MB-130 replaces MB-109 in some units)
1						MB-110	914-1100	Machine Master Control Board
	1					MB-110	914-1101	Machine Master Control Board
		1				MB-110	914-1102	Machine Master Control Board (Delay)
				1		MB-110	914-1103	Machine Master Control Board
			1			MB-110	914-1104	Machine Master Control Board
					1	MB-110/2018	914-1105	Machine Master Control Board
1	1	1	1	1	1	LO-103	912-1030	Flip-Flop (Run Logic)
	1	1		1	1	LO-103	912-1030	Flip-Flop (Record Logic)
1	1	1	1	1	1	PS-102	916-1020	"A" Supply
1	1	1	1	1	1	PS-104	916-1040	"B" Supply
	1					MB-103	914-1030	Record Master Board
		1				MB-103	914-1031	Record Master Board
			1			MB-108	914-1080	Record Master Board
				1		MB-108/2018	914-1081	Record Master Board
1	1		2	2		DA-104	910-1040	Program Record Driver Amplifier
1	1					RE-203	913-2030	Program Record Equalizer
			1	1		RE-203S	913-2031	Program Record Equalizer (Stereo)
1	1					PA-101	911-1010	Microphone Preamplifier (optional)
1	1		1			CG-102	912-1021	1,000 Hz Cue Tone Generator
1	1		1			CG-102	912-1020	150 Hz Cue Tone Generator (optional)
1	1		1			CG-102	912-1022	8,000 Hz Cue Tone Generator (optional)
1	1		1			RE-302	913-3020	Cue Record Driver Amplifier
1	1		1	1		BO-101	912-1010	Bias Oscillator

3.4 CONTROL LOGIC

Refer to Figures 3-1 through 3-10.

The primary element of the control circuits is the LO-103 Flip-Flop Board described in detail in Section 4. The logic is set to the desired state by supplying a short duration +24 VDC pulse to its input. The logic activates its output by grounding the desired control buss.

3.4.1 Reproduce Control

The LO-103 is internally strapped so that it comes on in the stop condition when the power is applied. When a cartridge is not loaded, the START switch has no enabling voltage. Inserting a cartridge connects the start enable buss to +24 VDC, although no change occurs in the Run Logic.

Depressing the START button delivers a positive pulse to the Run Logic which changes to the run state. The START lamp control buss is grounded, illuminating the lamp. At the same time the play solenoid control and the fast forward enable busses are grounded to activate these functions. The ground is removed from the program mute buss to connect the program audio to the output.

While in the run condition a 150 Hz (QI) tone sensed on the cue track will supply a +24 VDC pulse to the motor speed control to switch the motor to high speed. This will ground the AUTO Q and fast forward mute busses to shut off the audio output and the QI and QII sensors. The 1 KHz sensor is switched, by the grounding of its frequency shift buss, to sense a 3 KHz tone.

Switching the unit to fast forward manually with the speed mode switch activates the 1 KHz sensor frequency shift and the QI and QII mute busses. The program mute buss, however, is not grounded.

A positive pulse on the stop trigger buss will cancel the run condition. This pulse is generated by depressing the STOP button or by the CA-101 sensing a stop tone on the cue track.

With the logic not in the run mode, the fast forward enable buss is no longer energized. The motor control reverts to normal speed and cancels the AUTO Q and fast forward mute busses. The program mute buss, however, is grounded by the run logic to shut off the audio output.

When not in the run state, the cartridge release enable, the stop mute, stop lamp, and program mute, busses are grounded. Pressing the RDY/REL switch will release the cartridge. The stop cue mute disables the CA-101 sensor while tape is not in motion and for 1.5 seconds after tape motion begins. This muting of the stop tone sensor is described in Section 4 in the CA-101 description.

The optional 150 Hz (QI) and 8 KHz (QII) sensors respond to the appropriate tone on the cue track by supplying voltage to the QI and QII lamps. Simultaneously a contact closure occurs on the TELCO/EXT CONTROL jack (J3) on the rear panel.

3.4.2 Record Control

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, 1070-RPS, and 1070-SDL. For 1070-RP/DL and 1070-SDL see also paragraphs 3.4.3A and 3.4.3B respectively.

When the power is turned on the Record Logic comes on in the stop condition. When no cartridge is loaded in the deck, the run logic, through the record interlock, prevents the record logic from setting to the record mode. Inserting a cartridge enables the record set (REC) switch through the run logic.

Depressing the REC switch delivers a +24 VDC pulse to the record logic to set it to record and ground the record busses. Grounding the bias oscillator control turns on the bias oscillator. The program bias control connects the bias voltage to the program record head. The program record enable connects the input audio to the program record equalizer. The 1 KHz record enable turns on the 1 KHz generator.

As long as the record logic is in the record mode but the run logic is at stop, the 1 KHz generator will run, since the 1 KHz record control buss is grounded by the run logic. Grounding the record control buss also activates the cue record bias control to supply bias voltage to the cue record head. (If the record logic is "off" the generator will not turn on, since the enable buss is not at ground.)

When the run logic changes to the run condition (when the START button is pushed), the 1 KHz record control buss is unclamped. After 500 milliseconds the 1 KHz generator stops. After 2 to 3 seconds the bias is disconnected from the cue record head.

A stop trigger pulse from the 1 KHz sensor or the STOP button will cancel the record state. The record cancel buss from the deck will cancel record if the cartridge is removed.

Depressing the QI or QII button starts the appropriate generator and activates the cue record bias control to supply bias to the cue record head. Releasing the button shuts down the generator and disconnects the bias voltage.

In the run mode with the record logic "off", depressing the QI or QII button will not record a tone. The bias oscillator is not running, so the Q record enable buss is not energized.

The record interlock is grounded when the deck is running, so depressing the REC button will ground the bias oscillator control buss to turn on the oscillator and energize the Q record enable.

Since no pulse is supplied to the record logic, it remains in the "off" state. No bias voltage appears at the program record head, and the program track is undisturbed.

If only the REC button is depressed and not the QI or QII button, no recording will take place. The bias oscillator will run, but the bias voltage will not be connected to the cue record head.

By depressing simultaneously the QI or QII button and the REC switch the optional 150 Hz and 8 KHz tones can be recorded while the TEN/70 is in the reproduce mode.

3.4.3A Delay Control

NOTE

This paragraph applies to model 1070-RP/DL only.

Depressing the Delay Set (DLY) switch energizes the coil of the delay relay on the record master board. One set of contacts connects the relay coil to the bias oscillator control buss. If the record logic is set to record, this buss is grounded and holds the relay in the delay position. The same set of contacts interrupt the Q record and 1 KHz record enable busses and ground the cue sensor mute busses to disable the cue track record and reproduce circuits. Another set of contacts on the delay relay connect the erase output of the bias oscillator to the erase portion of the record head. So long as the record logic remains in the record mode, the delay relay remains energized. Removing the cartridge or depressing the stop switch cancels the record mode and removes the ground from the bias oscillator control buss. The delay relay de-energizes, disconnecting the erase voltage and re-connecting the Q record and 1 KHz record enable busses.

The remote delay mute is provided by connecting the Auto Q program mute buss through a switched jack on the rear panel. A normally closed switch is connected to the jack so that the buss can be interrupted when it is desirable to shut-off the audio output.

3.4.3B Delay Control

NOTE

This paragraph applies to model 1070-SDL only.

Since the 1070-SDL operates only as a delay programmer, the erase output of the bias oscillator is connected directly to the erase head. Depressing the REC switch activates the record circuitry as described in 3.4.2 above. When the bias oscillator is turned on, the erase head is activated. There is, however, no cue circuitry in the unit.

The remote delay mute is provided by connecting the Auto Q program mute buss through a switched jack on the rear panel. A normally closed switch is connected to the jack so that the buss can be interrupted when it is desirable to shut off the audio output.

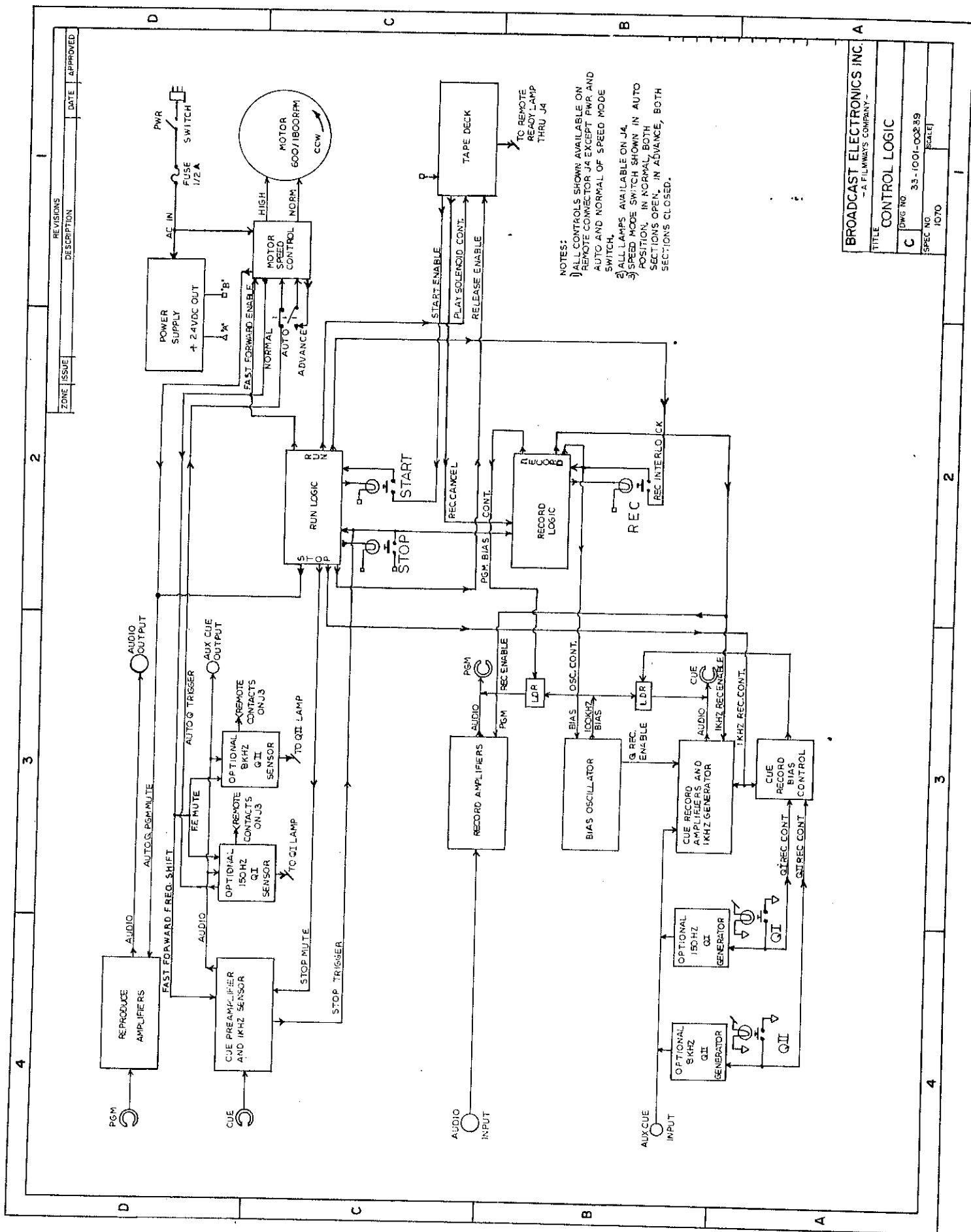


Figure 3-1. Control Logic

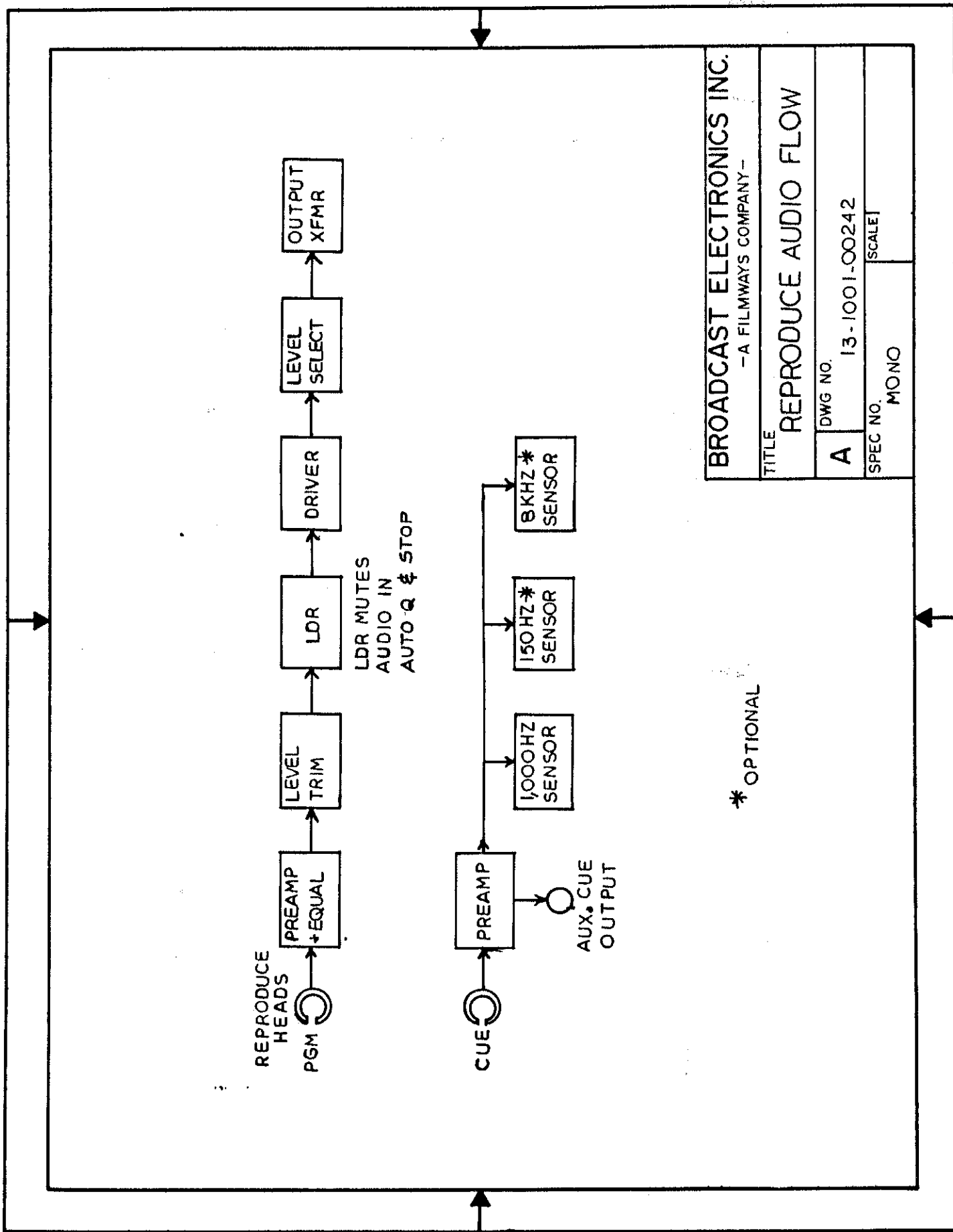


Figure 3-2. Reproduce Audio Flow 1070-P, 1070-RP, and 1070-RP/DL

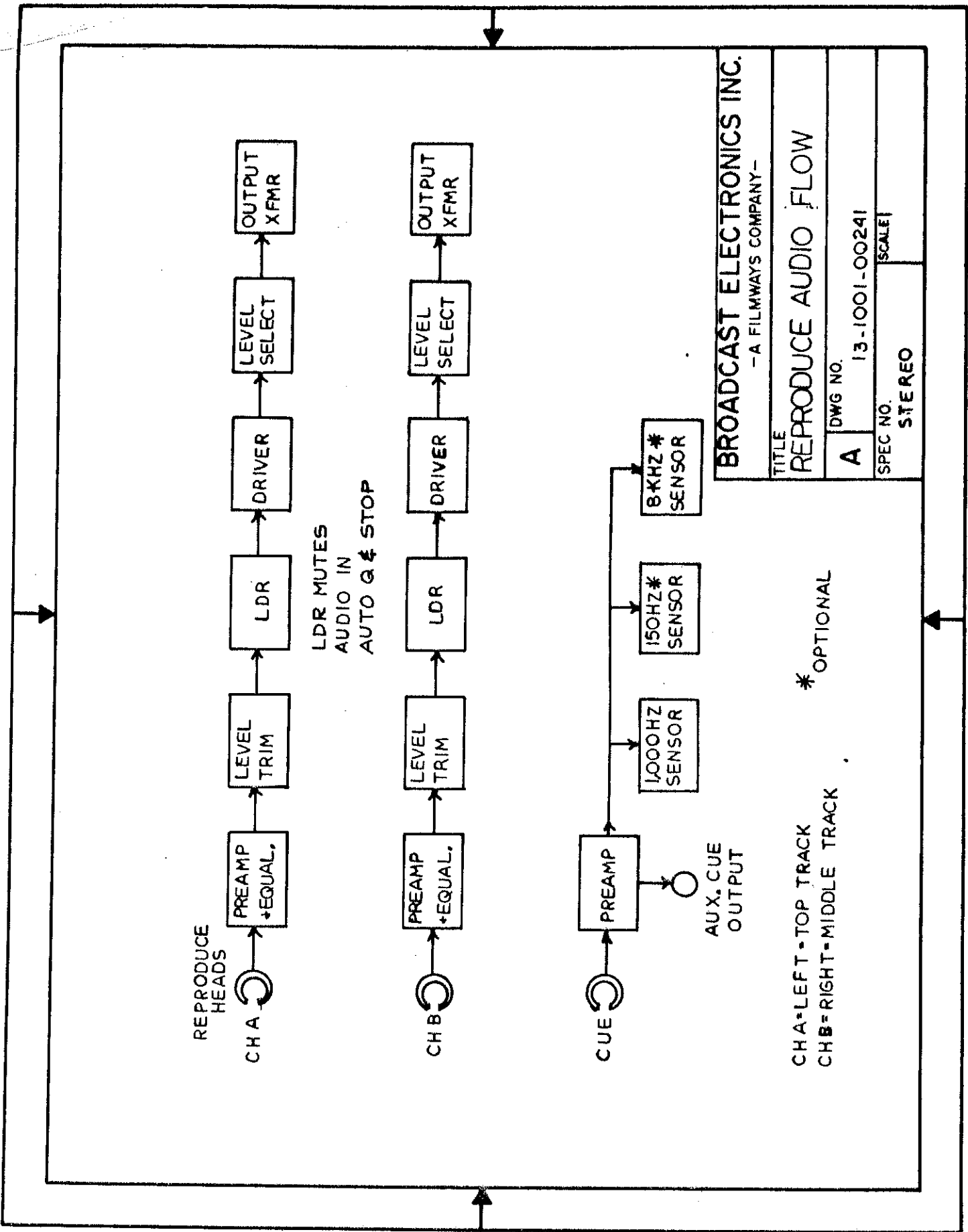


Figure 3-3. Reproduce Audio Flow 1070-PS and 1070-RPS

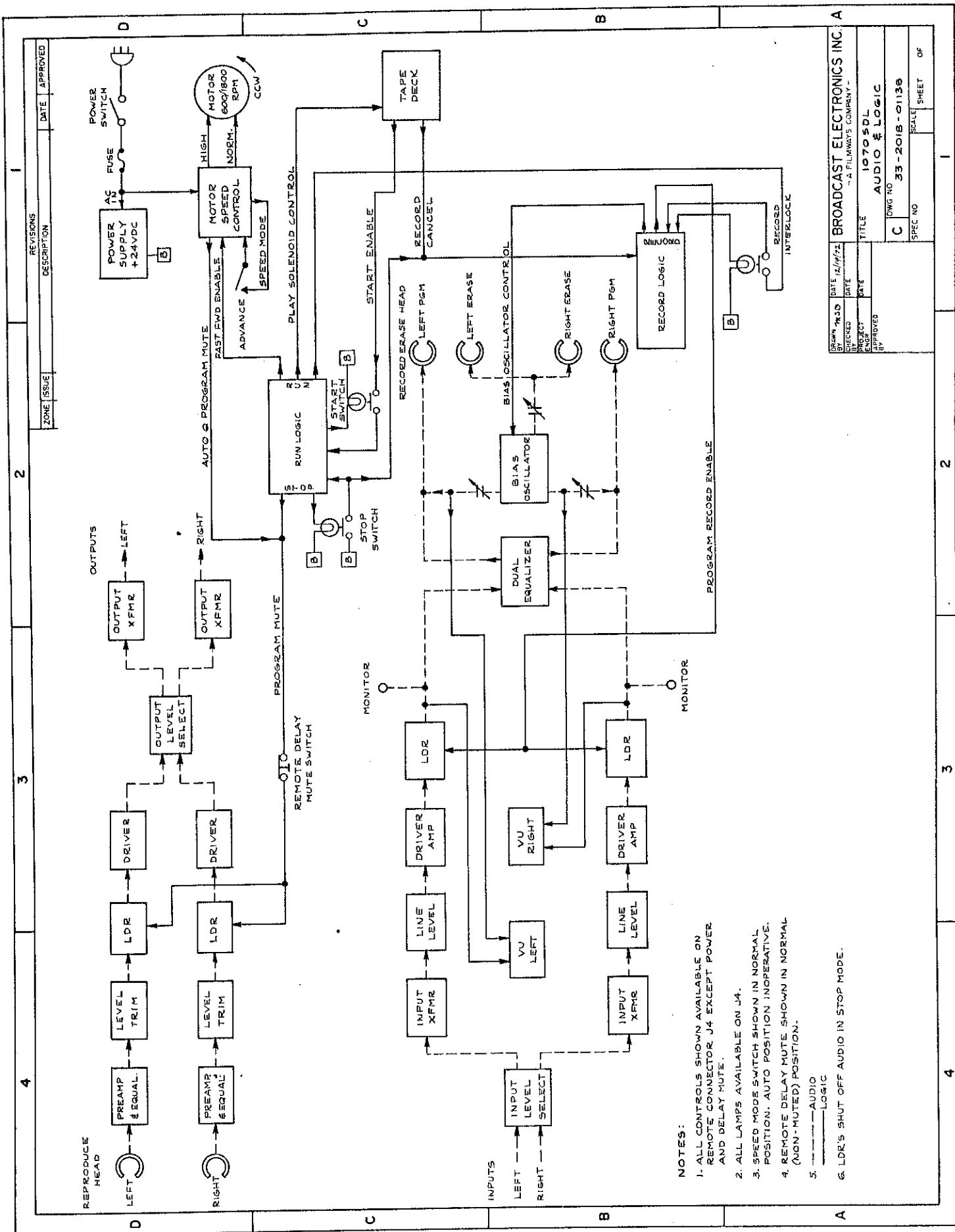
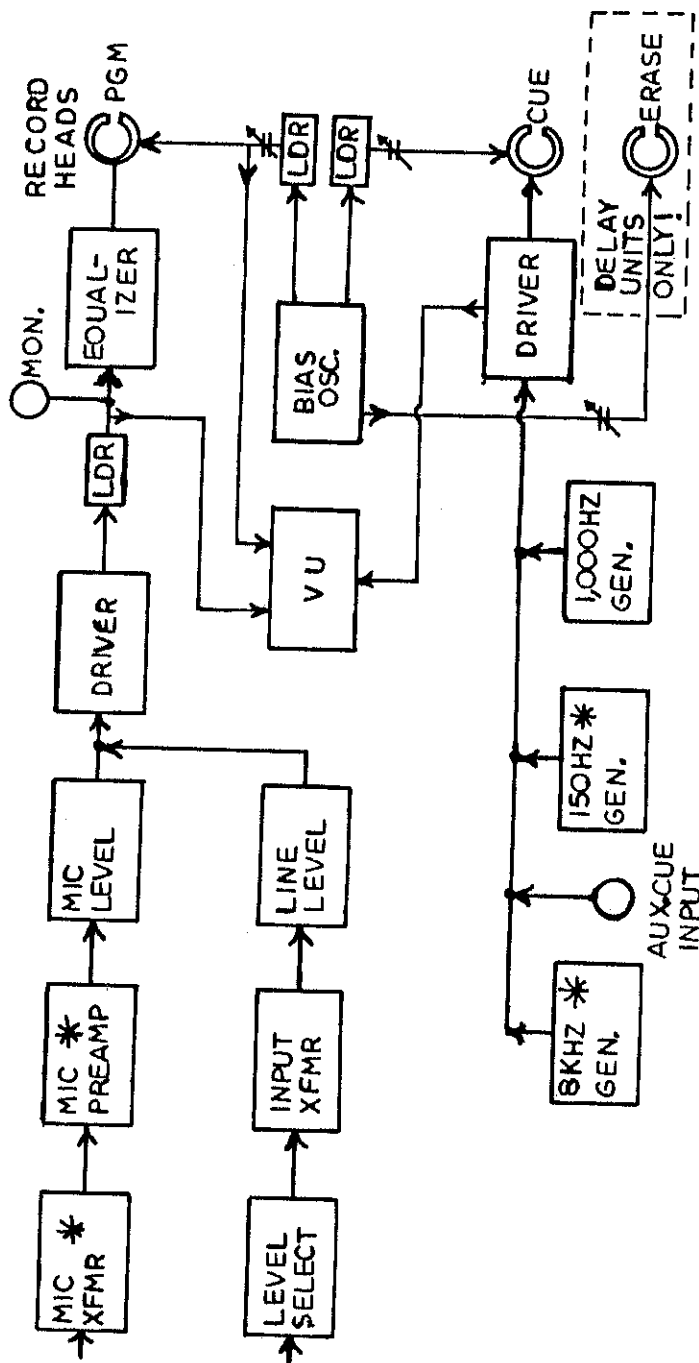


Figure 3-4. Logic and Audio Flow 1070-SDL



* OPTIONAL

BROADCAST ELECTRONICS INC.
-A FILMWAYS COMPANY-

TITLE		RECORD AUDIO FLOW	
A	DWG NO.	13-1001-00244	
	SPEC NO.	RP, DL	SCALE

Figure 3-5. Record Audio Flow 1070-RP and 1070-RP/DL

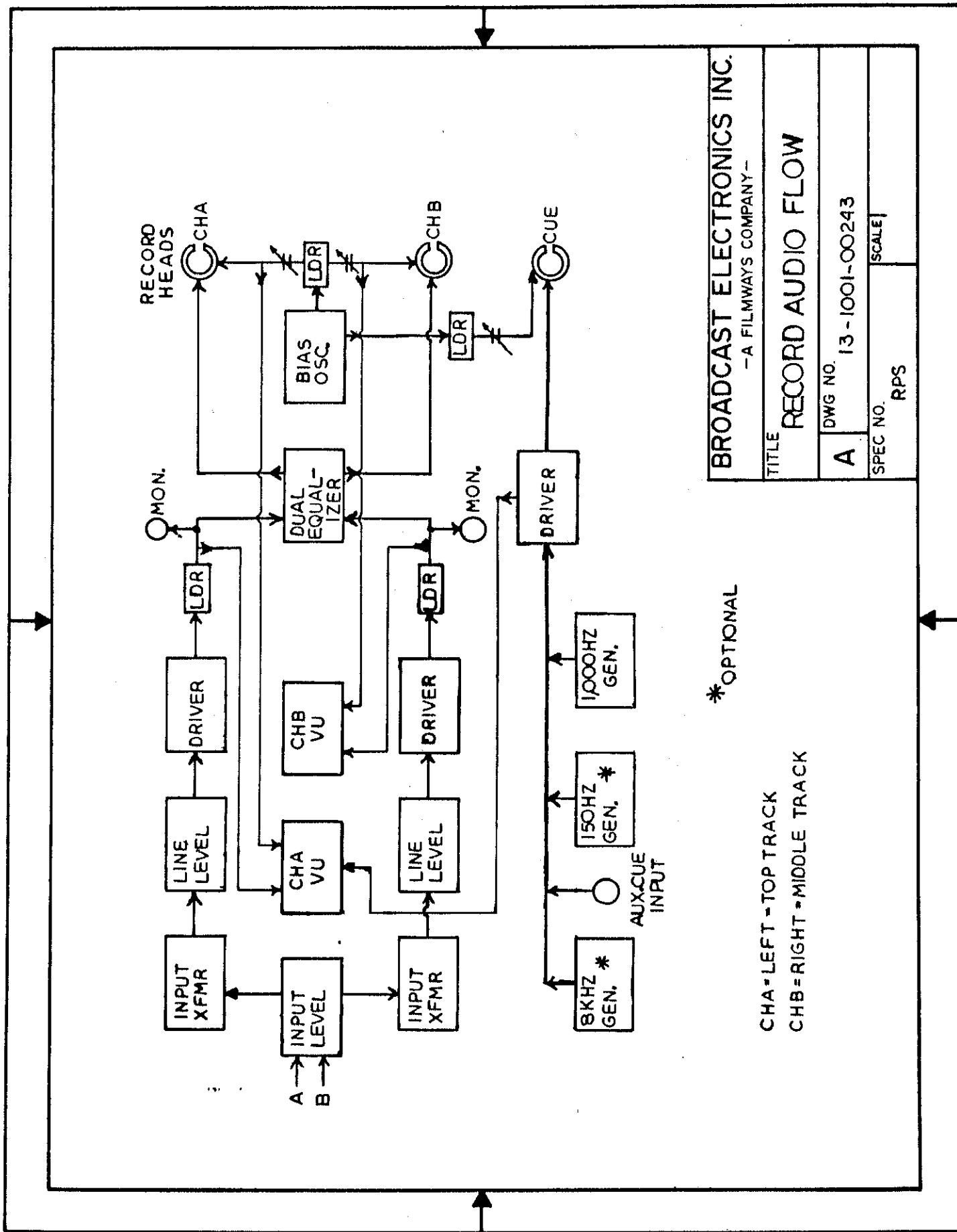


Figure 3-6. Record Audio Flow 1070-RPS

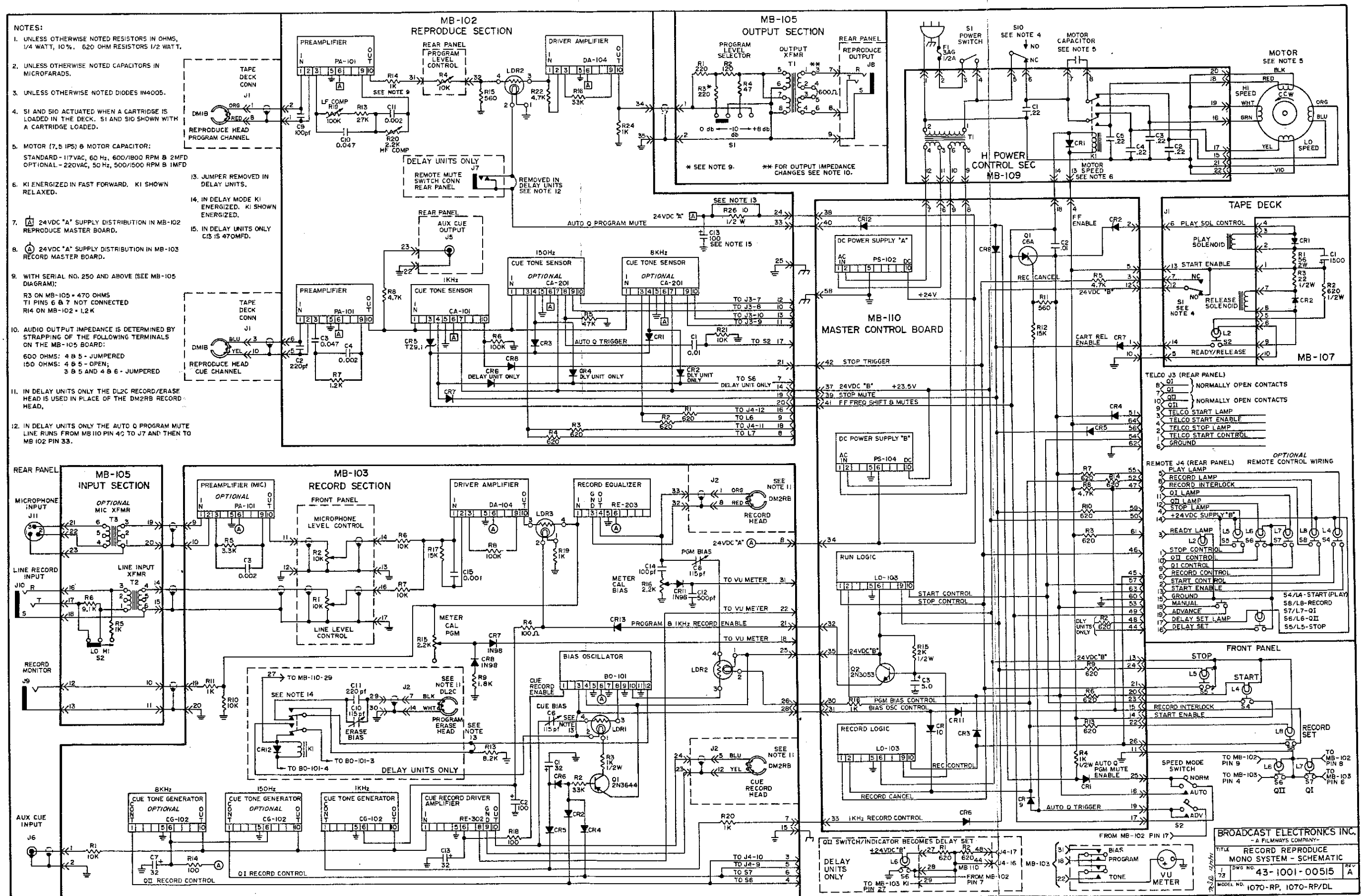


Figure 3-7. Schematic/Wiring Diagram 1070-RP and 1070-RP/DL

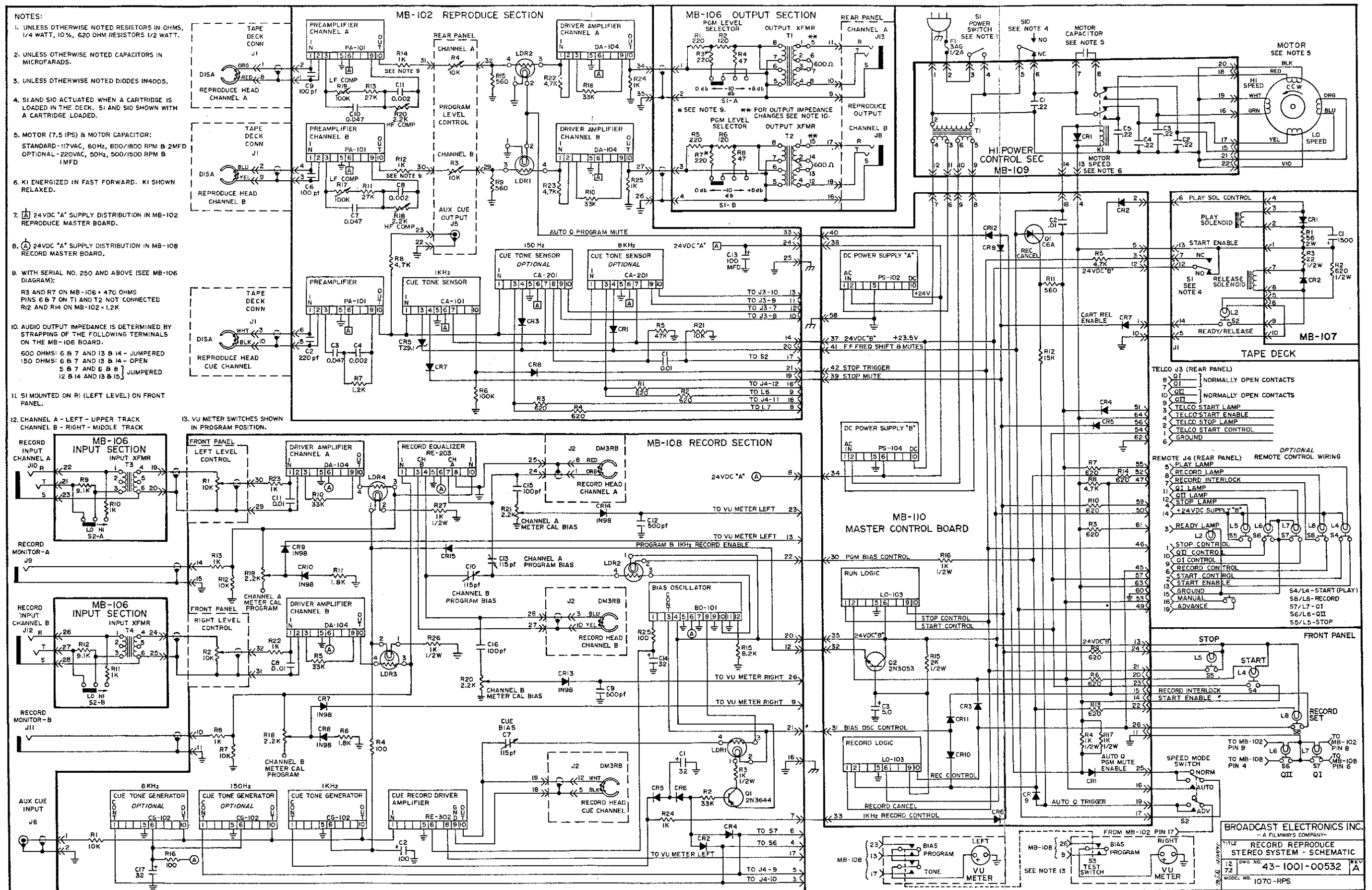


Figure 3-8. Schematic/Wiring Diagram 1070-RPS

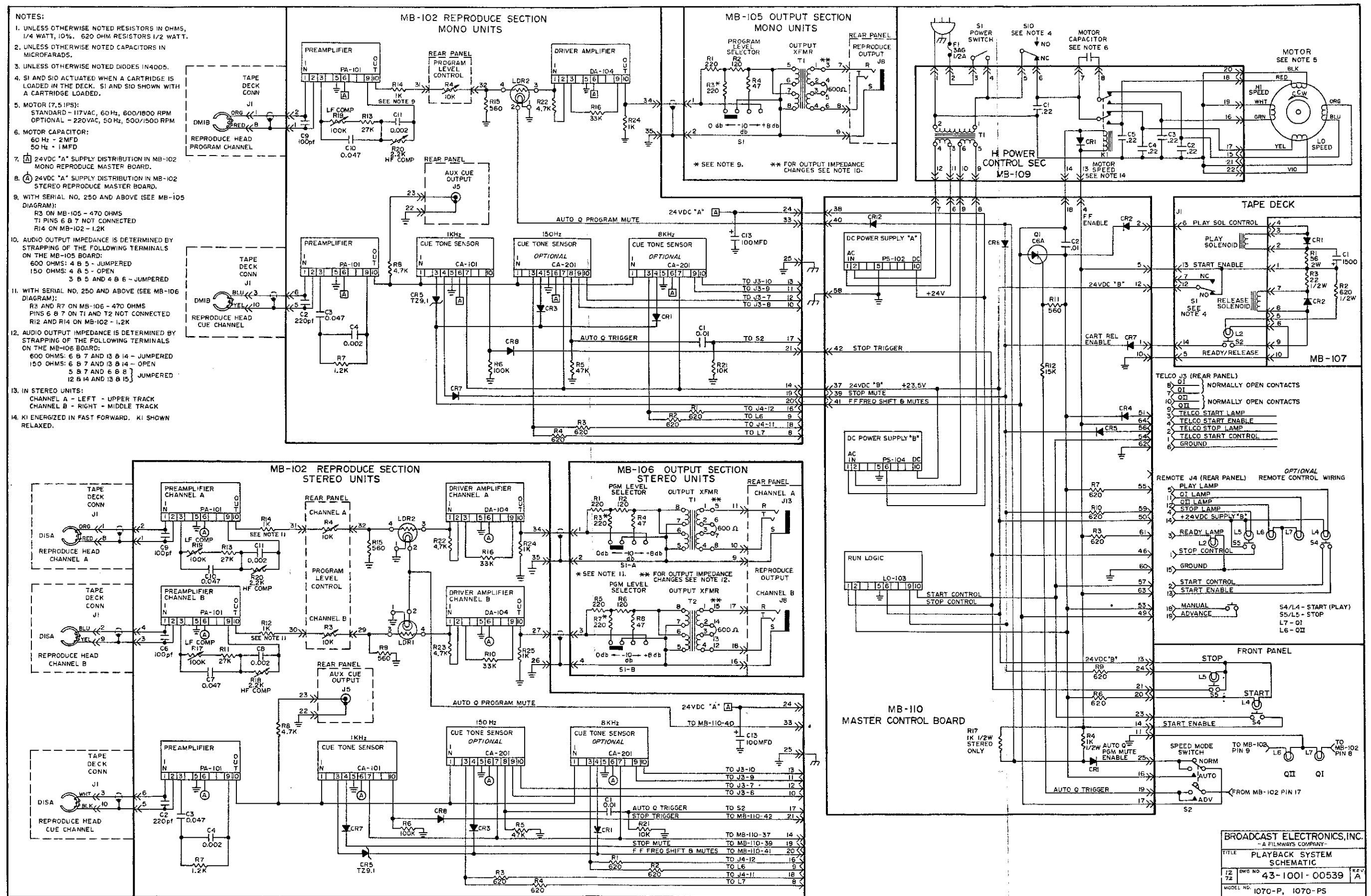


Figure 3-9. Schematic/Wiring Diagram 1070-P and 1070-PS

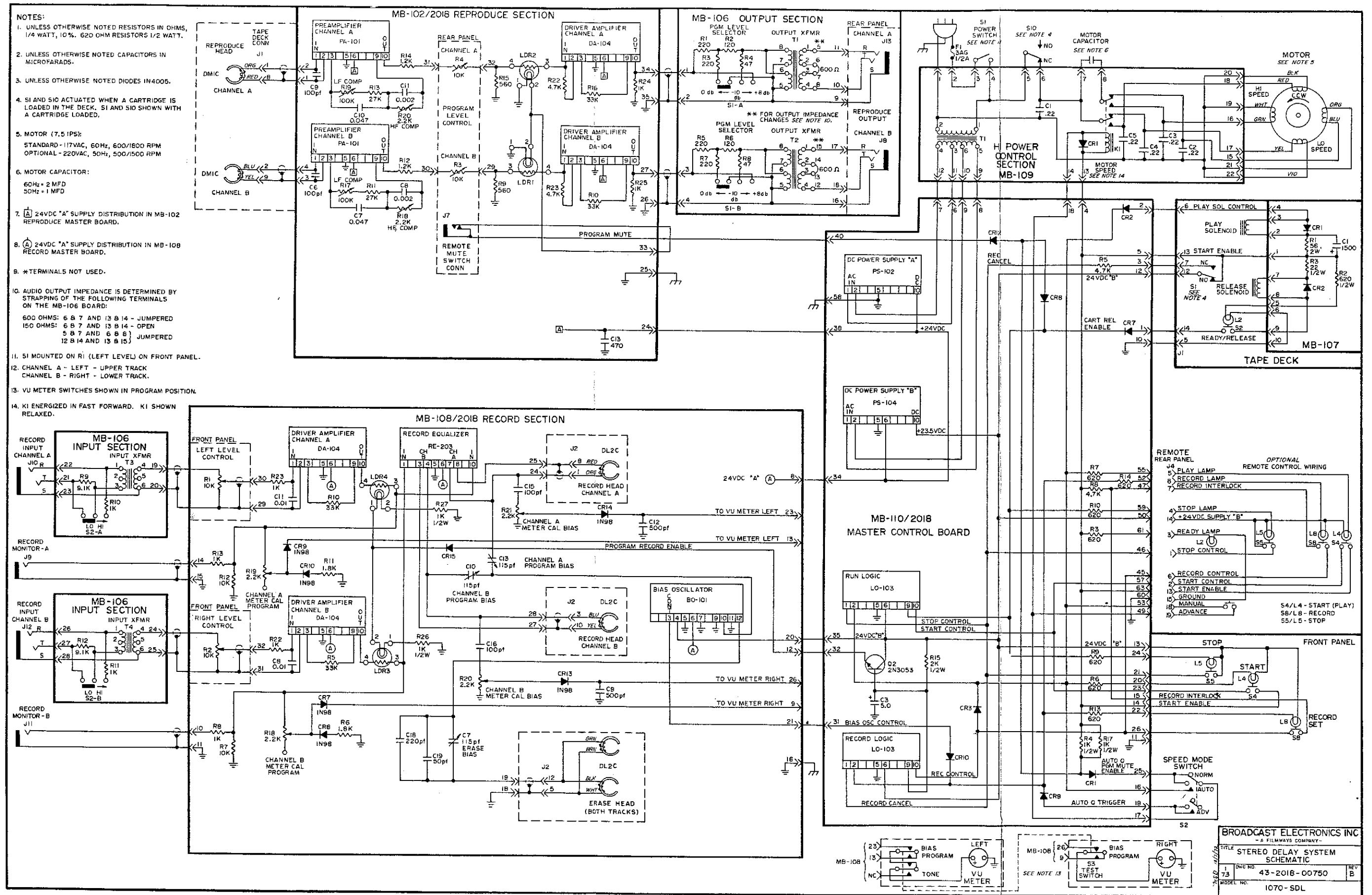


Figure 3-10. Schematic/Wiring Diagram 1070-SDL

SECTION 4

ELECTRONIC THEORY OF OPERATION AND ELECTRONIC PARTS

4.1 SCOPE AND ARRANGEMENT

This Section describes the electronic theory of operation of each module used in the SPOT-MASTER TEN/70. For plug-in modules there is a single diagram that combines schematic, parts location, and parts list data. For master boards (MB-102, MB-103, etc.) this Section contains a parts location and parts list diagram only, as these boards are shown schematically in figures 3-7 through 3-10. The modules used in each TEN/70 model are shown in Table 3-1 together with their part numbers.

For overall operation and module interconnection refer to Section 3, System Description. For electronic maintenance and adjustments, refer to Section 5.

The arrangement of this Section is as follows:

- A. Discussion of Master Control Boards and modules that plug into Master Control Boards.
- B. Discussion of Program Reproduce Boards and modules that plug into Reproduce Boards.
- C. Discussion of Record System Boards and modules that plug into Record Boards.
- D. Discussion of Audio, Deck, and Power Interconnect Boards.

4.2 MASTER CONTROL SYSTEM

4.2.1 MB-110 and MB-110/2018 Master Control Boards

See Figure 4-1 and the system schematic/wiring diagrams in Figures 3-7 to 3-10.

The MB-110 Master Control Board serves as the main interconnection point for the logic and the low voltage power supplies. The board is built in six different versions for the various models. The MB-110/2018 version is used in the 1070-SDL.

Mounted on all the versions of the MB-110 are the two +24 VDC power supply modules. The PS-102 supplies the "A" voltage and the PS-104 the "B" voltage. The dropping resistors for the remote and front panel indicators are mounted here also.

The LO-103 flip-flop modules that are the heart of the run and record logic are mounted on the MB-110. The silicon-controlled rectifier (Q1) drives the motor speed relay to provide the automatic speed switching of the Auto Q feature. When conducting the SCR provide a ground to the run output to keep the relay energized (in fast forward) and to activate the Auto Q program mute and the sensor frequency shift and mute busses. Q1 is turned on automatically by a +24 VDC pulse to its gate from the Auto Q trigger buss (generated by the 150 Hz cue tone sensor). In the manual advance mode Q1 is bypassed and the speed control relay grounded directly to the run output of the run logic.

Q1 will remain in conduction as long as current is drawn through the cathode/anode junction. When the run logic changes to the stop mode, the ground is removed from the cathode to shut Q1 off.

Similarly Q1 shuts off when the speed mode switch is placed in the advance position, since voltage is removed from the anode. Q1 is not included in the version used in the 1070-SDL.

In record units the second LO-103 flip-flop turns on and off the record electronics. Switching transistor Q2 controls the program and 1 KHz record enable busses. When the logic is in the record mode, Q2 conducts and supplies voltage to these busses.

4.2.2 LO-103 Flip-Flop Board

See Figure 4-2.

The LO-103 acts as an electronic relay to control the stopping and starting of tape motion and to enable and disable the record circuitry.

The heart of the circuit is a bi-stable multi-vibrator composed of Q2 and Q3. The two states are Q2 conducting and Q3 off, or Q3 conducting and Q2 off. When Q2 is off, the collector is not drawing current and is at a 15 VDC level. This voltage level is carried through R5 to the base of Q3, holding this device in full conduction. Likewise, when Q3 is off, the voltage from its collector goes to the base of Q2 through R4, holding Q2 at full conduction.

The flip-flop will change state when a positive voltage is applied to the base of the non-conducting transistor (NPN type). This is accomplished through the coupling resistors R2 and R8 from pins 1 and 10 respectively. To prevent false triggering, RC networks R11, C1 and R10, C2 shunt short duration transient pulses to ground.

The output voltages from Q2 and Q3 are coupled to the output drivers Q1 and Q4 by R1 and R9 respectively. Therefore, when Q2 is conducting, its collector is at "zero" volts. Q1 has no base bias and does not conduct. At the same time, Q3 is not conducting and its collector is at approximately 15V. Q4 has forward bias and Q4 will conduct. Similarly, if Q2 is not conducting, Q1 is, but Q4 is not.

The collectors of the driver transistors are connected with Q1 to pin 2 and Q4 to pin 9. Their load is provided by the logic circuit being used. As an example, if one side of the Play Solenoid is connected to pin 2, +24 volts DC is being supplied to the other side of the solenoid, and Q1 is conducting the solenoid will draw current through Q1.

4.2.3 PS-102 "A" Power Supply Board

See Figure 4-3.

The PS-102 supplies highly regulated +24 volts DC. The AC power is brought into the board through pins 1 and 2 to a bridge rectifier, CR1. The output of the rectifier is then filtered by R1 and C1. This filtered voltage is connected to the collector of Q1 which serves as a series pre-regulator.

The pre-regulated output is then connected through R4 to pin E_i of IC1 (the output regulator). The output of IC1 (E_o) is connected to pin 10. IC1 is a self-contained voltage regulator with an internal precision voltage reference ($\pm 1\%$).

Transistor Q2, the current overload switch, turns off the output regulator should the output short circuit. The switching occurs when the load current flowing through R4 produces a voltage drop sufficiently high to cause Q2 to conduct. When Q2 conducts, voltage is connected to pin L of IC1, limiting the current output.

4.2.4 PS-104 "B" Power Supply Board

See Figure 4-4.

The PS-104 is a self-contained voltage supply which converts 30 VAC to low-ripple DC. In the TEN/70, this supply is capable of over 300 milliamps over a line voltage range of 100 to 130 VAC. The heatsink on Q1 allows a maximum power dissipation of approximately 10 watts.

The AC input from pins 1 and 2 goes to a diode bridge rectifier, CR1. The minus side of CR1 is connected to pin 5. The plus side is connected to RC filter R1 and C1, which smoothes out some of the ripple. The output of the filter is connected to pin 8 and the collector of Q1.

An external DC reference voltage is applied to the base of Q1 through CR2. The emitter of Q1 is connected to the load through pin 10. The transistor will maintain across the load a DC voltage equal to the reference voltage input less the junction voltage drop across CR2 and Q1. In the TEN/70, the PS-104 receives a 24V reference from the PS-102 "A" Supply.

4.3 PROGRAM REPRODUCTION SYSTEM

4.3.1 MB-102 Reproduce Amplifier Master Board

See Figure 4-5 and the system schematic/wiring diagrams in Figures 3-7 to 3-10.

The MB-102 Reproduce Master Board contains the circuitry to amplify and equalize the program audio and process the cue track signals. The board is built in three versions: for use in the monophonic 1070-P and RP, for use in the stereophonic PS and RPS, as well as a separate configuration for the monophonic RP/DL. (1070-SDL units require the MB-102/2018 described below.) The monophonic and stereophonic versions differ only in that a second identical program channel is included for the right or B channel. The version used in the RP/DL includes circuitry to deactivate the cue circuitry in the delay mode.

The audio from the program track(s) of the reproduce head is amplified in the PA-101 pre-amplifier. The feedback network R19 (R17), R13 (R11), R20 (R18), C10 (C7), and C11 (C8) provides the proper frequency response. The normal values are selected to yield the NAB 7.5 ips playback response curve. Variable resistors R19 (R17) and R20 (R18) vary the response of the network to compensate for variations in tape, head, and system characteristics.

The output of the preamplifier is taken to the rear panel level trimmer(s) and then returned to the MB-102 where it is applied to the DA-104 driver amplifier through LDR-2 (LDR-1). The LDR (light dependent resistor) consists of a lamp and a photoresistive element in a light tight can. When the lamp is on the resistor shows a resistance of 500 to 1,000 ohms; this increases to a maximum 10 to 15 megohms as the lamp extinguishes. The lamp is controlled by the logic to turn on the audio output in the play mode and shut it off in stop or Auto Q mode.

The audio receives final amplification in the DA-104 module. The gain of this stage is determined by R16 (R10). The output of the DA-104 is supplied to the output transformer(s) on the Input/Output Master Board.

The output of the cue track of the reproduce head is fed directly to a PA-101 preamplifier for amplification. Fixed feedback network R7, C3, and C4 determines the gain and provides equalization to match the NAB 7.5 ips reproduce response curve. The preamplifier output is connected to the rear panel

auxiliary cue output jack, the input of the CA-101 1 KHz (stop tone) sensor, and the inputs of the optional CA-201 150 Hz (QI) and 8 KHz (QII) sensors. The circuitry for these optional sensors is always included, although the modules may not be.

Resistors R1, R2, R3, and R4 are dropping resistors for the front panel and remote QI and QII indicator lamps. Capacitor C1 supplies the +24 VDC pulse to the Auto Q trigger buss. C1 is connected to the normally closed contacts of the optional CA-201 150 Hz (QI) sensor (pin 8). When no 150 Hz tone is present on the cue track +24 VDC is present at C1. When the tone is present, the voltage is removed and C1 discharges through R5 and R21. When the tone ends +24 VDC again appears delivering a pulse until C1 recharges. The connections to the normally open contacts of the optional QI and QII sensors are connected to CA-201 pins 9 and 10.

Diodes CR1, CR3, CR5, CR7, and CR8 act as blocking diodes in the muting circuits of the cue sensors. In 1070-RP/DL models CR2, CR4, and CR6 perform the same function when the unit is in the delay mode. This muting is described in the discussion on the CA-101 and CA-201 sensors.

Capacitor C13 provides filtration for the +24 VDC "A" supply voltage on the Reproduce Master Board. R26 is installed in 1070-RP/DL models to prevent coupling of noise and "cross talk" through the power supply to the Record Master Board. The modules are all powered from this "A" voltage. The +24 VDC "B" (pin 14) is supplied to the cue tone sensors for use with the logic.

4.3.2 MB-102/2018 Reproduce Amplifier Master Board

See Figure 4-5 and the system schematic/wiring diagram in Figure 3-10.

The MB-102/2018 Reproduce Master Board used in the model 1070-SDL stereo delay programmer is similar in operation to the stereo version of the standard MB-102 described above. The cue track circuitry is eliminated. The Auto Q program mute buss is used to accomplish the delay muting by shutting off voltage to LDR-1 and LDR-2 when the delay mute switch is opened.

4.3.3 PA-101 Preamplifier Board

See Figure 4-6.

The PA-101 is a voltage amplifier utilizing low noise junction field effect transistors and an emitter follower output. Total gain without feedback (open loop gain) is approximately 53 dB. Input impedance is high with a very low equivalent input noise level.

The input signal enters the first FET amplifier stage at pin 1. The output of this stage is RC coupled to Q2. To control frequency response and gain, feedback is taken from pin 9 (the output of Q3) to an external network. This feedback re-enters the amplifier through pin 3.

The output of the second FET amplifier is direct coupled to the emitter follower. The output of Q3 is AC coupled to pin 10.

Q4 decouples power supply noise and prevents its appearance in the output of the amplifier. R12 acts as a current limiter to prevent catastrophic failure of Q4. Power is supplied on pin 6. Pin 5 is grounded. Pin 2 is the input shield.

4.3.4 DA-104 Driver Amplifier

See Figure 4-7.

The DA-104 is a DC coupled high gain voltage amplifier. The gain and response characteristics are controlled by an external negative feedback network. The input impedance is high (100K), but the output impedance is low.

Signal enters the board on pin 1 and is applied through C1 to the base of Q1 for amplification. The signal is further amplified by Q3. Q4 and Q5 form a complementary symmetry output stage with an output impedance of less than one ohm. Q4 and Q5 are biased just above cut-off to minimize crossover distortion on signal peaks. CR1, CR2, and CR3 in conjunction with the voltage divider R9 and R10 provide bias for Q4 and Q5.

Unity gain DC feedback is utilized to maintain stable DC operation regardless of fluctuations of DC supply voltage or drift in transistor parameters. Diodes CR1, CR2, and CR3 maintain the proper voltage differential between the bases of Q4 and Q5 for all conditions of drive voltage. The DC feedback path is through R6 to the base of Q2. Q1 and Q2 form a differential amplifier with a relative current determined by the voltage difference between the bases of Q1 and Q2. Through R6, the R9, R10 junction is maintained at the same voltage as the junction of divider R1, R2.

The DA-104 without the external feedback network has a gain of approximately 55 dB and a bandwidth of 10 Hz to 50 KHz. AC feedback is taken from the output pin 9 and returned to Q2 through pin 3. The gain will be determined by the ratio of the parallel configuration of R6 and the external feedback resistor to R5.

4.3.5 CA-101 1,000 Hz Cue Tone Sensor

See Figure 4-8.

The CA-101 sensor detects 1 KHz stop tones on the cue track and commands the control circuitry to stop tape motion. This command is a positive going 24 volt trigger pulse. Maximum sensitivity is -36 dBm detected in 90 milliseconds.

Signal enters on pin 1, passes through potentiometer R20, to a parallel tuned network of L1, C1, and C2. All frequencies except 1 KHz are shunted by the LC circuit and dropped across R1.

Q1 and Q2 form a large signal amplifier with a gain of 500 to 1,000. This amplifier goes into saturation at operating levels, thus acting as a limiter and providing some immunity to fluctuations in level from the tape.

The output of Q1 and Q2 is applied to diode detector CR2 and CR3 and converted to a DC voltage proportional to the amplifier's output. This DC voltage charges C8 through R12. This RC network has a time constant of approximately 50 milliseconds, which provides immunity to noise.

The voltage across C8 is applied to the base of Q4. When the voltage across C8 exceeds approximately 8 volts, Q4 conducts and Q5 turns off. A positive trigger is coupled to pin 10 (CA-101 output) through C9.

Q4 and Q5 comprise a Schmitt Trigger Circuit. At rest, no bias is applied to the base of Q4, so it does not conduct. Q4's collector is at +24 V which provides bias to the base of Q5 through R17. Q5

conducts into saturation, drawing current limited only by R18 and R19. When Q4 conducts, its collector is pulled down and bias is removed from Q5. As Q5 turns off, its collector goes to 24 volts which is coupled to pin 10 through C9.

When it is necessary for the sensor to be inactive, pin 4 is grounded. Q3 conducts and shunts the detector output to ground. When the ground is removed from pin 4, C7 charges to +24 volts through R11. When the base of Q4 is more positive than the signal necessary to trigger the Schmitt circuit, Q3 no longer conducts. The sensor functions normally. The time constant of C7 and R11 is approximately 1.5 seconds.

In the fast forward mode (Auto Q or manual advance), the stop cue tone will be 3 KHz. The filter resonant frequency is changed to 2.5 KHz, however, in case the cue tone occurs before tape reaches three-times-normal speed.

For 1 KHz operation, +24 volts is applied to pin 3; but for fast forward operation, the 24 volt signal is removed from pin 3. With no bias across CR1, CR1 is effectively an open circuit and the AC from C2 does not get to ground. (The AC voltage must be small in comparison to the normal diode forward conducting voltage.) Thus C2 is out of the resonant circuit. L1 and C1 are resonant at 2.5 KHz. The circuit functions the same as if the filter were resonant at 1 KHz.

4.3.6 CA-201 QI (150 Hz) and QII (8 KHz) Cue Tone Sensor

See Figure 4-9.

The CA-201 gives a contact closure output for external use whenever a 150 Hz or 8 KHz tone is detected on the cue track. Normal operating level is approximately -27 dBm for 150 Hz and -37 dBm for 8 KHz. Maximum sensitivity is approximately -45 dBm.

The input signal is applied through pin 1 to potentiometer R15 which determines the threshold of sensitivity of the sensor. The output of R15 goes to R1 and then to a parallel tuned filter (L1 and C1). L1 and C1 are chosen for resonance at either 150 Hz or 8 KHz depending on the sensor's use. Since the tuned circuit is effectively an open circuit at resonance, a minimum of attenuation occurs across R1 at resonance. To off-resonance frequencies, the network is effectively a short-circuit and full attenuation occurs across R1. The Q of the resonant circuit is fairly low to accommodate the NAB tolerances on the tones: ± 30 Hz for the 150 Hz (QI) and ± 1 KHz for the 8 KHz (QII).

The output of the filter is fed to Q1 and Q2 which form an amplifier with a gain of 1,000 or more. Q2 is driven to saturation and cut-off. The wave form is clipped, limiting the signal and minimizing the effects of level fluctuations and noise.

The output of the amplifier is delivered to the voltage doubler rectifier, CR1 and CR2, which drives the RC network, R10 and C6. C6 stores a charge proportional to the rectifier's output. The RC time constant is approximately 50 milliseconds, preventing random noise from triggering the circuit. C6's charge is applied to the base of Q4. When Q4 conducts, relay K1 closes.

Q3 provides muting. When pin 4 is grounded, Q3 conducts, preventing C6 from building any charge even if tone is present at the CA-201 input. When the ground is removed from pin 4, C7 charges to a positive voltage through R12, cutting off Q3. Q4 can operate normally. The time constant of R12 and C7 is approximately 2 or 3 seconds.

The relay contacts connected to +24 volts supply the QI and QII indicators on the control panel through pin 3. In the 150 Hz (QI) sensor, pin 8 supplies a trigger pulse when the relay relaxes at the end of the tone to activate the Auto Q mode. The other relay contacts are brought to pins 9 and 10 for external use.

4.4 RECORD SYSTEM

4.4.1 MB-103 Record Master Board

See Figure 4-10 and the schematic/wiring diagram in Figure 3-7.

The program and cue track record circuitry including the cue tone generators and the bias oscillator are built on the MB-103. The board is available in separate versions for the 1070-RP and the 1070-RP/DL. The configuration used in the 1070-RP/DL includes the delay control relay K1 and the erase bias coupling capacitors C10 and C11.

The MB-103 has provision for mixing line and microphone inputs in the network R6, R7, and R17. The line input signal enters the MB-103 from the front panel level control. The microphone signal enters the MB-103 from the optional microphone transformer and is applied to the input of the optional PA-101 preamplifier. The gain of the module is controlled by the network of R5 and C3. The amplified output of the microphone preamplifier leaves the MB-103 for the front panel microphone level control. From this level control, the signal re-enters the board and the mixing networks.

The mixed signal is amplified in the DA-104 driver amplifier. Feedback resistor R8 determines the gain in this module. The output of the DA-104 is passed through a light dependent resistor (LDR-3) to the RE-203 Record Equalizer and the output to the record monitor jack on the rear panel. The LDR consists of a lamp and photoresistive element in a light-tight can. When the lamp is on the resistance is 500 to 1,000 ohms but increases to 10 to 15 megohms as the lamp extinguishes. The lamp in LDR-3 receives +24 VDC from the program record enable buss when the unit is in the record mode. This minimizes the resistance of LDR-3 to apply program material to the RE-203. R19 drops this +24 VDC to the 10V required by the lamp.

A sampling of the program signal is taken at the input to the RE-203 to the program portion of the front panel VU meter switch. Calibration trimmer R15 adjusts this meter output to yield a "0" meter reading. CR7 and CR8 provide rectification of the audio signal for the meter.

The RE-203 Record Equalizer boosts the program signal to a level sufficient to drive the program portion of the record head. The output of the RE-203 is mixed with the 100 KHz bias voltage and applied directly to the record head.

The bias voltage is supplied from terminal 10 of the BO-101 oscillator and passed through LDR-2. LDR-2 is controlled by the program bias control buss so that the bias is supplied to the program record head whenever the unit is in the record mode. This program bias is coupled to the head through C8 and C14. Variable capacitor C8 adjusts the bias supplied to provide optimum high frequency response for the record head and tape used. A sampling of the program bias is taken through calibration trimmer R16 and rectifier CR11 to the bias portion of the VU meter switch.

Tones for recording on the cue track may be from the CG-102 1 KHz (stop) generator, the optional CG-102 150 Hz and 8 KHz generators, or from any external source. The external input from the rear panel auxiliary cue input jack enters the MB-103 through R1. This is combined with the outputs of the CG-102 generator(s) and applied to the input of the RE-302 cue record driver amplifier which raises the level sufficiently to drive the cue portion of the record head.

Power for the RE-302 is supplied from pin 1 of the BO-101 so that the RE-302 is turned on only when the bias oscillator is also on. R18 and C13 provide isolation between the two modules. Signal for the tone portion of the VU meter is taken from RE-302 terminal 8 to MB-103 terminal 22 and thence to the meter switch on the front panel.

The output of the RE-302 is combined with 100 KHz bias from the BO-101 and fed to the cue portion of the record head. The cue bias voltage is taken from BO-101 terminal 8 through LDR-1 and variable capacitor C6. LDR-1 is controlled by Q1 so that bias is connected when the unit is in record and tape not in motion. When the unit starts, the ground is removed from the 1 KHz record control buss. Once capacitor C1 charges Q1 will stop conducting and shut LDR-1 (and the cue record bias) off.

The cue tone generators are turned on by grounding the control input (terminal 1). The CG-102 1 KHz is controlled directly by the run logic, while the optional 150 Hz and 8 KHz generators are activated by the front panel QI and QII switches. Power for the 1 KHz generator is from the 1 KHz record enable buss driven by the record logic. The auxiliary tone generators are connected to the +24 VDC "A" supply to allow recording of these tones independently of the stop tone (in either the record or reproduce mode). C7 and R14 prevent interaction of the generators and the amplifiers through the supply.

All of the modules except the cue tone generators and the RE-302 are powered directly from the +24 VDC "A" supply (terminal 8). The +24 VDC "B" supply (terminal 25) is applied directly to the lamp of LDR-2 and is switched by the BO-101 and Q1 to LDR-1, the RE-302, and K1 (in delay units).

4.4.2 MB-108 Record Master Board

See Figure 4-11 and the schematic/wiring diagram in Figure 3-8.

In the 1070-RPS the program and cue track record circuitry is built on the MB-108. This board is identical in operation to the MB-103 monophonic record board described above except for three important particulars. First, the MB-108 contains separate circuits for the left (A) and right (B) program channels. Second, provision is made for a line input only. Third, component designations and values may vary from those on the MB-103.

The line input signal enters the board from the front panel level controls through R23 (R22) to the DA-104 driver amplifier. Feedback resistor R10 (R5) determines the gain in this stage. The output of the DA-104 is passed through a light dependent resistor (LDR-4, LDR-3) to the RE-203 Record Equalizer and the output to the record monitor jacks on the rear panel. The LDR consists of a lamp and photoresistive element in a light-tight can. When the lamp is on the resistance is 500 to 1,000 ohms, but increases to several megohms as the lamp extinguishes. The lamp in LDR-4 (LDR-3) receives +24 VDC from the program record enable buss when the unit is in the record mode. This minimizes the resistance of the LDR to apply program material to the RE-203. R27 (R26) drops the voltage to the 10 VDC required by the lamp.

A sampling of the program signal is taken at the input of the RE-203 to the program portions of the front panel VU meter switch. Calibration trimmer R19 (R18) adjusts this meter output to yield a "0" meter reading. CR9 (CR7) and CR10 (CR8) rectify the audio for the VU meter.

The dual channel RE-203 record equalizer boosts the program signal to a level sufficient to drive the program portions of the record head. The separate outputs of the RE-203 are mixed with 100 KHz bias voltage and applied directly to the record head.

The bias voltage is supplied from BO-101 terminal 10 through LDR-2. LDR-2 is controlled by the program bias control buss so that the bias is supplied to the program record head whenever the unit is in the record mode. The program bias is coupled through C13 (C-10) and C15 (C16). Variable capacitor C13 (C10) adjusts the bias supplied to provide optimum high frequency response from the particular head and tape used. A sampling of the program bias is taken through calibration trimmer R21 (R20) and rectifier CR14 (CR13) to the bias portions of the VU meter switch.

The cue track portion of the MB-108 circuitry operates as described for the MB-103.

4.4.3 MB-108/2018 (Stereo Delay) Record Master Board

See Figure 4-11 and the schematic/wiring diagram in Figure 3-10.

The MB-108/2018 Record Master Board used in the 1070-SDL stereo delay programmer is similar to the MB-108 described above except that no cue track record circuitry is included. Since the unit is normally operated in the record/delay mode, the bias voltage for the program record head is applied directly to C10 and C13. LDR-2 is replaced with a jumper. Bias voltage for the erase portions of the record head is taken from pin 12 of the BO-101 Bias Oscillator. Variable capacitor C7 allows adjustment of this erase bias.

4.4.4 DA-104 Record Driver Amplifier Board

The DA-104 Driver Amplifier is described in paragraph 4.3.4.

4.4.5 PA-101 Preamplifier Board

The PA-101 Preamplifier is described in paragraph 4.3.3.

4.4.6 RE-203 Record Equalizer Board

See Figure 4-12.

The RE-203 provides a current source for the program record head. To accommodate varying tape and head characteristics, built-in circuitry allows shaping the frequency response over a wide range. A bias trap prevents amplifier loading by the bias voltage supply.

The RE-203 is used in both the stereo and monaural versions of the TEN/70. For stereo two identical amplifiers are built on the board; for mono only one is built. Only one channel is described here.

The input signal from pin 1 is brought to an attenuator network for frequency response control. Resistors R1 and R5 form a voltage divider, the output of which is applied to the base of Q1. R1 and R5 give approximately 18 dB attenuation at all frequencies. However, the RC networks (C1, R2, R3, R4, R23, C2, R24, and R6) form attenuators in parallel with R1.

C1 and R2 form a high-pass attenuator which begins to pass signal at about 1 KHz. Increasingly more signal is passed at the rate of 6 dB per octave. C2 and R23 form a low pass attenuator with no attenuation at DC, but increasing attenuation at 6 dB per octave.

The amount of attenuation for these networks is controlled by R3 (the high frequency) and R6 (the low frequency). Overall response will be about -18 dB at 400 Hz, -12 dB at 50 Hz, and -5 dB at 15 KHz, depending on the setting of R3 and R6.

The output of the attenuation networks is connected to the base of Q1 which makes up for the gain lost in the attenuators. Q1 has a high output impedance which drives the recording head as a constant current source at mid-frequencies. The emitter resistor (R10) is by-passed at high frequencies, causing an increase in gain to offset the effect of the recording head impedance at high frequencies.

The output of the amplifier is coupled through C4 and R11 (to further minimize effects of the head at low frequencies) and the bias trap, L1, C5 and C6. L1 is a slug tuned, variable inductor. L1 and C5 form a parallel tuned circuit resonant at the bias frequency of 100 KHz. C6 shunts any recorded bias to ground. The trap prevents noise from bias voltage being coupled to the transistor and rectified. The trap also prevents the audio driver circuitry from shunting the bias voltage. The recording head presents

a 20 or 30K impedance at 100 KHz, requiring a large voltage for good recording.

4.4.7 CG-102 Cue Tone Generator Board

See Figure 4-13.

The CG-102 is a self-contained oscillator which generates a single frequency sine wave signal for cue track recording. Depending on component values the output frequency may be 1,000 Hz, 150 Hz or 8,000 Hz.

Transistors Q2 and Q3 comprise an inverting amplifier with a gain of 100, a high input impedance, and a low output impedance. Q2 is a junction Field Effect Transistor, which has an inherently high input impedance. Q2 provides the voltage gain in this stage.

A positive feedback path is provided from the emitter of Q3 to the source of the FET (Q2) through C3, R18, and R14. This positive feedback path allows the amplifier to oscillate. The bridged T network of R15, R16, R17, C8, and C9 provides negative feedback at all frequencies except the null frequency of the network. The positive feedback is cancelled by the negative feedback except at resonance. The amplifier oscillates at a single frequency generating a sine wave.

To further insure the purity of the generated signal, diode CR3 rectifies a portion of the output and supplies a negative bias to the gate of Q2 through R7, R15, R16, and R17. This negative voltage will bias Q2 towards cut-off. Since the transconductance of the FET is inversely proportional to the bias, the gain of the amplifier is reduced. In essence, the output level and the sine wave purity are stabilized.

Variable resistor R17 adjusts the null frequency of the frequency determining network to the exact desired output frequency. R17 is adjusted for the best operating point: purity and starting ability. Potentiometer R19 adjusts the output level.

Q1 provides the switching voltage to start and stop the oscillator. Pin 1 is the control input. When Pin 1 is grounded, current is drawn from C1, R2, and R5. The emitter of Q1 goes more negative than the base and Q1 does not conduct. When the ground is removed from pin 1, current stops flowing through R2 and R5. The negative end of C1 is connected to 24 VDC. Since the voltage across the capacitor is about 18 V (due to R3 and R4), the base of Q1 is at 42 V (24 V + 18 V). The emitter is at 24 V and Q1 still does not conduct. C1, however, immediately begins to discharge through CR2 through R3 and R4. Once the base is more negative than the emitter, Q1 conducts. The collector of Q1 is pulled toward 24 V. The current drawn by Q1 goes through R9, the source resistor of Q2. When Q2 is in full conduction, the source of Q2 is more positive than its gate. Q2 is cut off and oscillation stops.

The circuit remains at rest unless pin 1 is again grounded. CR1 and CR2 insure a clean turn-on and turn-off with a minimum of level fluctuation. Capacitor C1 is chosen to allow a nominal 500 millisecond duration of signal output after pin 1 is removed from ground. In the 150 Hz and 8 KHz versions, capacitor C1 is replaced with a jumper so that the generator turns off with no delay. This allows auxiliary tone bursts of no minimum duration.

The 1,000 Hz unit is controlled in two ways. Supply voltage is not applied except in the record mode. The control signal on pin 1 comes from the stop side of the run Logic (LO-103). When placed in the record mode, the oscillator begins to operate. When the tape is started, the ground is removed from pin 1 and the oscillator stops after one-half second.

The 150 Hz and 8,000 Hz units are operative at all times. The control signals on pin 1 originate at the QI and QII switches. When either of these buttons is depressed, the respective oscillator starts and turns off when the button is released. Unlike the 1,000 Hz version, there is no delay in generator shutdown.

4.4.8 RE-302 Cue Record Driver Amplifier Board

See Figure 4-14.

The RE-302 is a driver amplifier for recording on the cue track. A bias trap and a VU meter rectifier circuit are also included.

The input (pin 1) is terminated by a 1,500 ohm resistor to provide a load for the high impedance of the CG-102 cue tone generator. Q1 is an amplifier with a gain of about 20 to compensate for the loss in the attenuators. The output stage (Q2) is coupled through a parallel tuned LC circuit tuned to 100 KHz. This prevents bias coupling into the transistors.

The output of the amplifier is also coupled to a diode rectifier (CR1 and CR2) which provides a DC voltage proportional to the AC output. This DC voltage is carried out at pin 8 for use with the VU meter as an indication of the recording level of the cue track. Potentiometer R9 is used to set the level of this voltage to a 0 VU indication at normal recording level.

4.4.9 BO-101 Bias Oscillator Board

See Figure 4-15.

The BO-101 consists of a push-pull oscillator providing a 100 KHz sine wave voltage for recording. The oscillator is turned on and off by external logic control.

Q3 and Q4 function as the oscillator/driver. The primary of T1 and C6 form a tuned circuit resonant at 100 KHz. C4 and C5 provide positive feedback. C3 serves to couple a small amount of negative feedback to the non-conducting transistor to insure smooth cut-off and minimize distortion. R5, R7, R8, and R6 provide bias voltages for the transistors. R3 and R4 are emitter dropping resistors that provide a small amount of negative feedback to insure purity of the 100 KHz output.

The secondary of T1 is divided into three parts to provide isolation between the outputs and minimize cross talk. Cue track recording bias is brought out on pins 7 and 8, program track bias on pins 9 and 10. In the 1070-RP/DL and 1070-SDL pins 11 and 12 provide voltage for the erase head.

Q1 and Q2 control the oscillator. Q1 will not conduct when pin 3 is not connected, because its base and emitter are at the same potential. When pin 3 is grounded, the base is more negative than its emitter. Q1 goes into full conduction and +24 VDC appears at its collector.

When Q1 is not conducting the base and emitter of Q2 are both at ground potential; the oscillator receives no current. When Q1 conducts, +24 VDC is applied to the base of Q2. Q2 conducts providing the current used by the oscillator. The +24 VDC at the emitter of Q2 is also supplied to pin 1 for external use. C2 provides a slow turn on time to minimize starting transients.

4.5 INTERCONNECT SYSTEMS

4.5.1 MB-105 Audio Output Master Board

See Figure 4-16.

The MB-105 board contains the output level pad and the output transformer. Signal from the MB-102 reproduce Master Board is applied to the attenuator formed by R1, R2, R3, and R4. Depending on the setting of the level switch S1 (accessible from the rear panel), the level to the output transformer is adjusted to yield a nominal -10, 0 or +8 dBm at the output jack.

Provision is made on the board for selection of 600 or 150 ohm output impedance.

In the 1070-RP and RP/DL, the MB-105 also contains the transformer for the line input and the optional microphone transformer.

4.5.2 MB-106 Audio Output Master Board

See Figure 4-17.

The MB-106 Input/Output Master Board is identical in operation to the MB-105 described above except that separate transformers and attenuators are installed for the right (B) and left (A) program channels. The two level pads are controlled by a single switch, S1. In the 1070-RPS and 1070-SDL models, the line input transformers are mounted on the MB-106.

4.5.3 MB-107 Deck Interconnect Board

See Figure 4-18.

The MB-107 is mounted on the tape deck. It is a passive network to interconnect the transport switches and solenoids with the TEN/70 electronics.

4.5.4 MB-109 Power Connector Master Board

See Figure 4-19A. Some units use the MB-130 Power Connector Master Board shown in Figure 4-19B.

The MB-109 mounts the power transformer and the motor speed control relay.

The low side of the power line input is tied directly to the primary of T1 and the common of the motor windings. The high side passes through the rear panel fuse and the front panel power switch before being applied to T1 and switch S10 on the deck. One secondary of the power transformer T1 supplies 28 VAC for the PS-102 "A" low voltage supply module on the MB-110. The other secondary supplies 30 VAC for the PS-104 "B" supply on the MB-110.

Switch S10 on the deck turns on the motor when a cartridge is loaded in the deck. The AC line voltage is connected through S10 to one pole of the motor speed control relay K1. The second pole of K1 is connected to S10 through the motor capacitor. When energized, the relay connects the high speed motor windings to the AC voltage. When relaxed, the normal speed windings are connected. The relay is controlled by logic on the MB-110 Master Control Board. Capacitors C2, C3, C4, and C5 suppress transients when the relay switches.

NOTES:

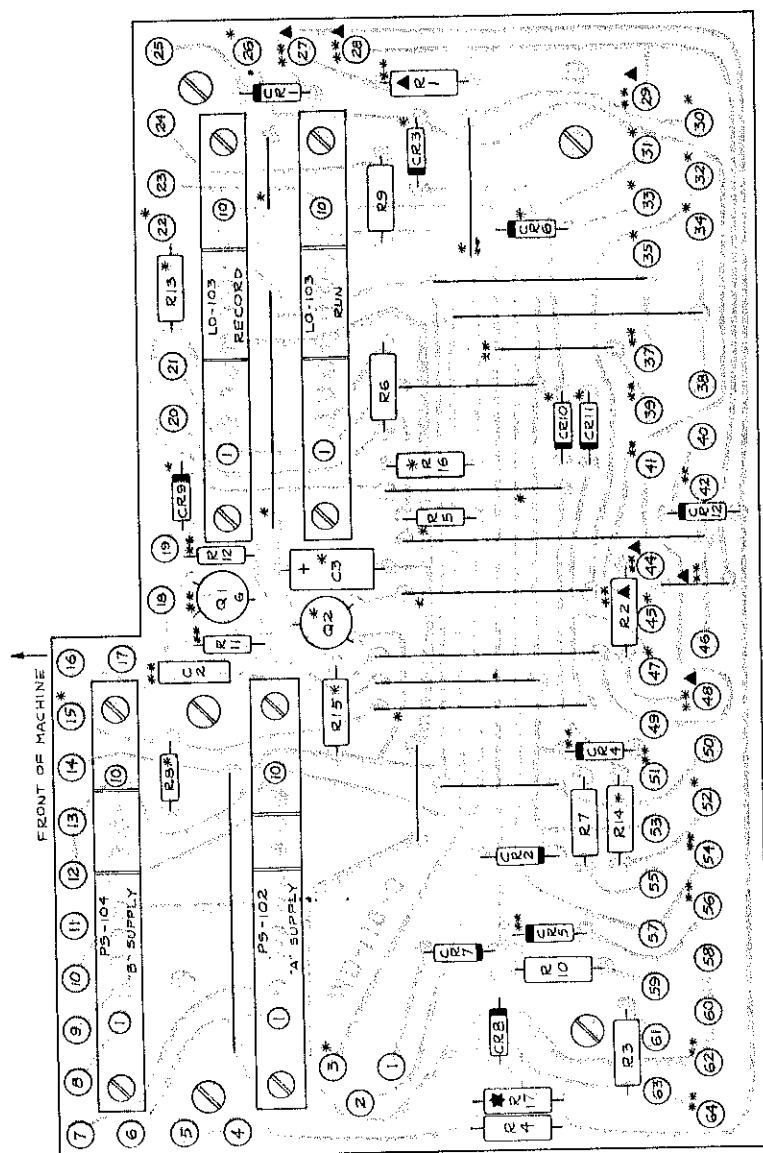
1. MONO REPRODUCE UNITS - PART NO. 914-1100
MONO RECORD/REPRODUCE UNITS - PART NO. 914-1101
MONO DELAY UNITS - PART NO. 914-1102
STEREO RECORD/REPRODUCE UNITS - PART NO. 914-1103
STEREO REPRODUCE UNITS - PART NO. 914-1104
STEREO/DELAY UNITS - PART NO. 914-1105.
2. *COMPONENTS USED WITH RECORD/REPRODUCE UNITS ONLY (914-1101, 1102 & 1103).
3. ▲COMPONENTS USED WITH MONO DELAY UNITS ONLY (914-1102).
4. ★COMPONENT USED WITH STEREO UNITS ONLY (914-1103, 1104 & 1105).
5. **COMPONENTS NOT USED WITH STEREO/DELAY UNITS (914-1105).
6. COMPONENT NUMBERS NOT USED: C1 AND TERMINALS 36 & 43.
7. LAST COMPONENTS USED: R17, C3, CR12, Q2 & TERMINAL 64.

FUNCTION LIST

PIN	DESCRIPTION	PIN	DESCRIPTION
1	CARTRIDGE RELEASE ENABLE	37★	+24V B SUPPLY TO REPRODUCE BD
2	SOLENOID CONTROL	38	+24V A SUPPLY TO REPRODUCE BD
3 *	RECORD CANCEL	39★	STOP MUTE
4	FAST FORWARD ENABLE	40	AUTO-Q PROGRAM MUTE
5	START ENABLE	41★	5 F FREQ SHIFTS & F F MUTES
6	28VAC POWER INPUT	42★	STOP TRIGGER
7			
8	30VAC POWER INPUT	43▲	REMOTE DELAY SET
9		45*	REMOTE RECORD CONTROL
10	GROUND TO DECK	46	REMOTE STOP CONTROL
11	GROUND TO LOCAL CONTROL PNL	47*	REMOTE RECORD INTERLOCK
12	+24VDC B TO DECK	48▲	REMOTE DELAY LAMP
13	+24VDC B TO LOCAL CONTROL PNL	49	REMOTE MANUAL ADVANCE #2
14	START ENABLE TO 54	50	+24VDC B TO REMOTE CONTROL
15 *	RECORD INTERLOCK	51**	TELCO START LAMP
16	LOCAL MANUAL ADVANCE #1	52 *	REMOTE RECORD SET LAMP
17	LOCAL MANUAL ADVANCE #2	53	REMOTE MANUAL ADVANCE #1
18	MOTOR SPEED RELAY CONTROL	54**	TELCO START CONTROL
19	AUTO-Q TRIGGER		
20	LOCAL START LAMP	55	REMOTE START LAMP
21	LOCAL STOP CONTROL	56**	TELCO STOP LAMP
22 *	LOCAL RECORD SET LAMP	57	REMOTE START CONTROL
23	LOCAL START CONTROL	58	CHASSIS GROUND
24	LOCAL STOP LAMP	59	REMOTE STOP LAMP
25	AUTO-Q PGM MUTE ENABLE	60	REMOTE GROUND
26*	LOCAL RECORD CONTROL	61	REMOTE READY LAMP
27▲	LOCAL DELAY LAMP	62**	TELCO GROUND
28▲	LOCAL DELAY SET CONTROL	63	REMOTE START ENABLE
29▲	DLY SET CONTROL TO RECORD BD	64**	TELCO START ENABLE
30*	PROGRAM BIAS CONTROL		
31*	BIA'S OSCILLATOR CONTROL		
32*	PGM 2 KHz RECORD ENABLE		
33*	1 KHz RECORD CONTROL		
34 *	+24V A SUPPLY TO RECORD BD		
35 *	+24V B SUPPLY TO RECORD BD		

BROADCAST ELECTRONICS INC.	
- A FILMWAYS COMPANY -	
DESIGN	7449 9 1/2
CONTRACT	98 11/92
APPROVED	
MASTER CONTROL BOARD	
PART NO.	914-1100, -1101, -1102, -1103, -1104 & -1105
REV	6

MB-110-3
MB-110/2018

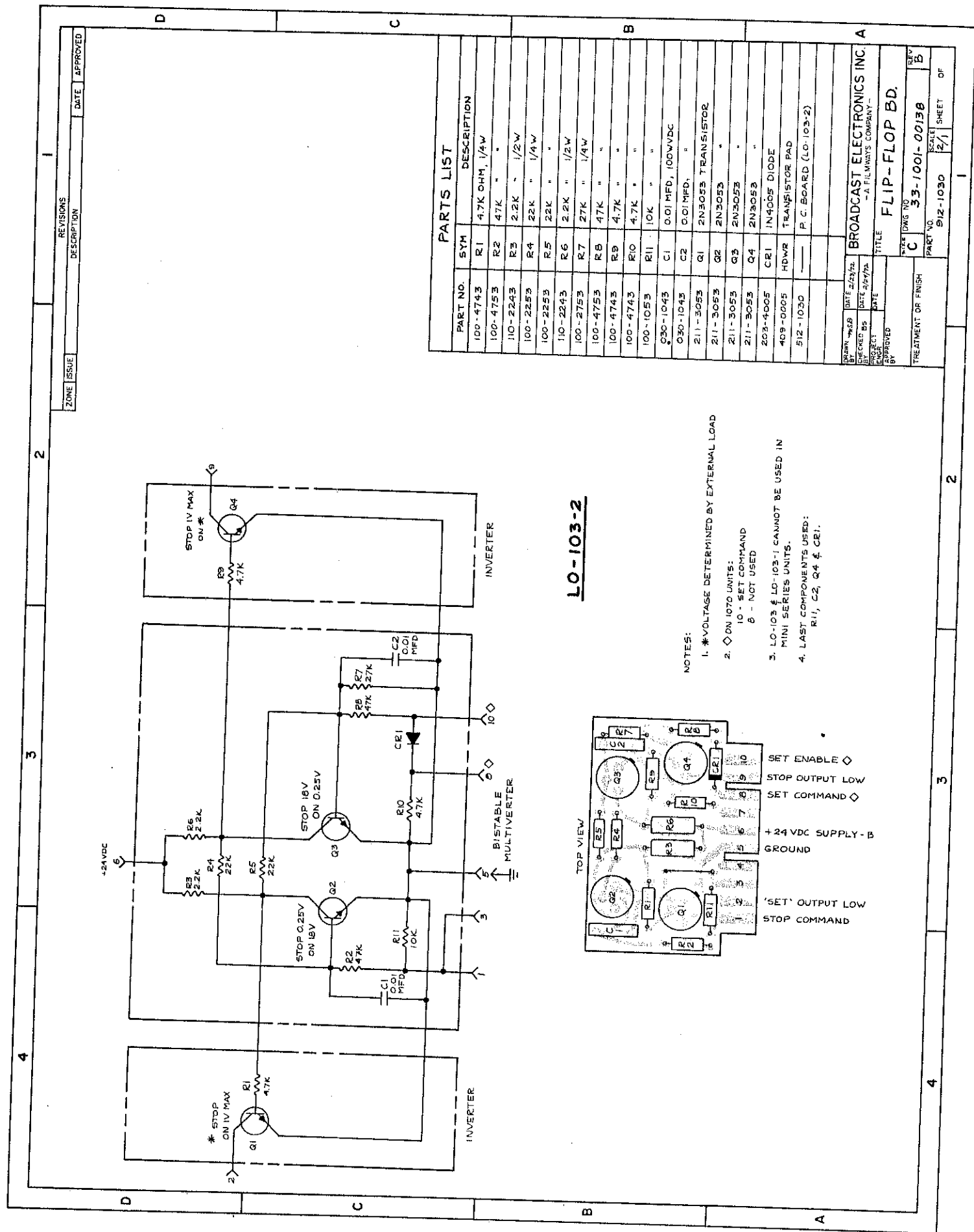


TOP VIEW

PARTS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION
110-6232	R1▲	620 OHMS, 1/2WATT, 10% RESISTOR	203-4005	CR1	IN4005 DIODE
110-6232	R2▲	620 " " " "	203-4005	CR2	IN4005 " "
110-6232	R3	620 " " " "	203-4005	CR3*	IN4005 " "
110-1043	R4	1K " " " "	203-4005	CR4**	IN4005 " "
100-4743	R5 *	4.7K " " " "	203-4005	CR5**	IN4005 " "
110-6232	R6	620 " " " "	203-4005	CR6*	IN4005 " "
110-6232	R7	620 " " " "	203-4005	CR7	IN4005 " "
100-4743	R8 *	4.7K " " " "	203-4005	CR8 *	IN4005 " "
110-6232	R9	620 " " " "	203-4005	CR9 *	IN4005 " "
110-6232	R10	620 " " " "	203-4005	CR10*	IN4005 " "
100-5633	R11**	560 " " " "	203-4005	CR11*	IN4005 " "
100-1553	R12**	15K " " " "	203-4005	CR12	IN4005 " "
110-6232	R13 *	620 " " " "			
110-2043	R14 *	620 " " " "			
110-1043	R15 *	2K " " " "			
110-1043	R16 *	1K " " " "			
110-1043	R17 *	1K " " " "			
			237-0006	Q1**	GE/C6A SCR
			211-3053	Q2 *	2N3053 TRANSISTOR
			417-0333		TRANSISTOR SOCKET
			417-1000		10-PIN CONNECTOR (4)
			417-1001		POLARIZING KEY (8)
030-1043	C2**	.01 MFD, 100 VDC CAPACITOR	418-0161		QUICK DISCONNECT TERMINAL (28)
015-5064	C3 *	5 MFD, 25 VDC " "	413-0024		MINI TURRET TERMINAL (34)
			514-1100		P C BOARD (MB-110-3)

Figure 4-1. MB-110 Master Control Board



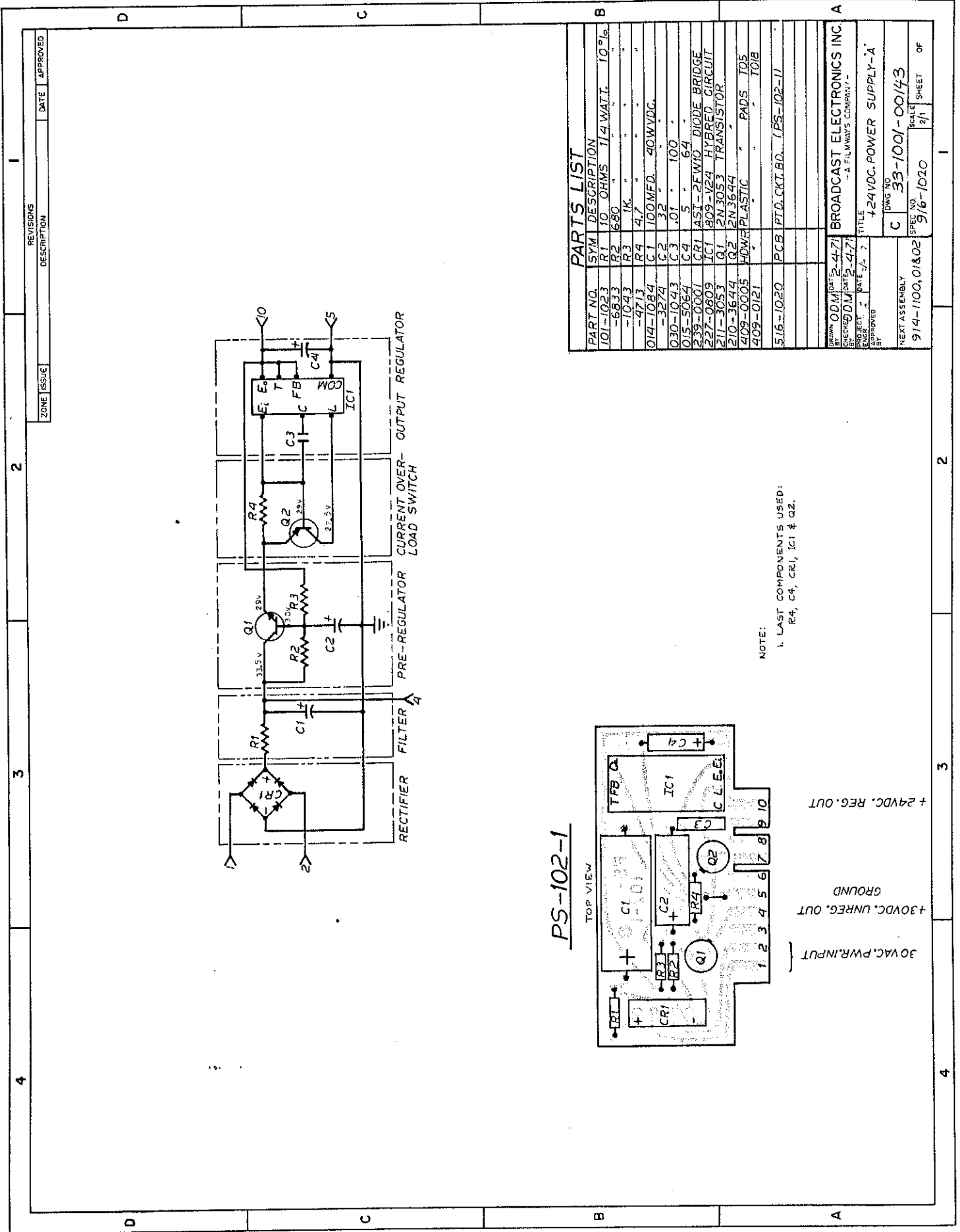
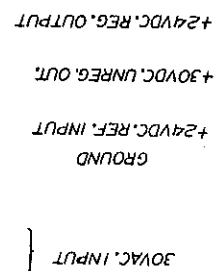


Figure 4-3. PS-102 "A" Power Supply



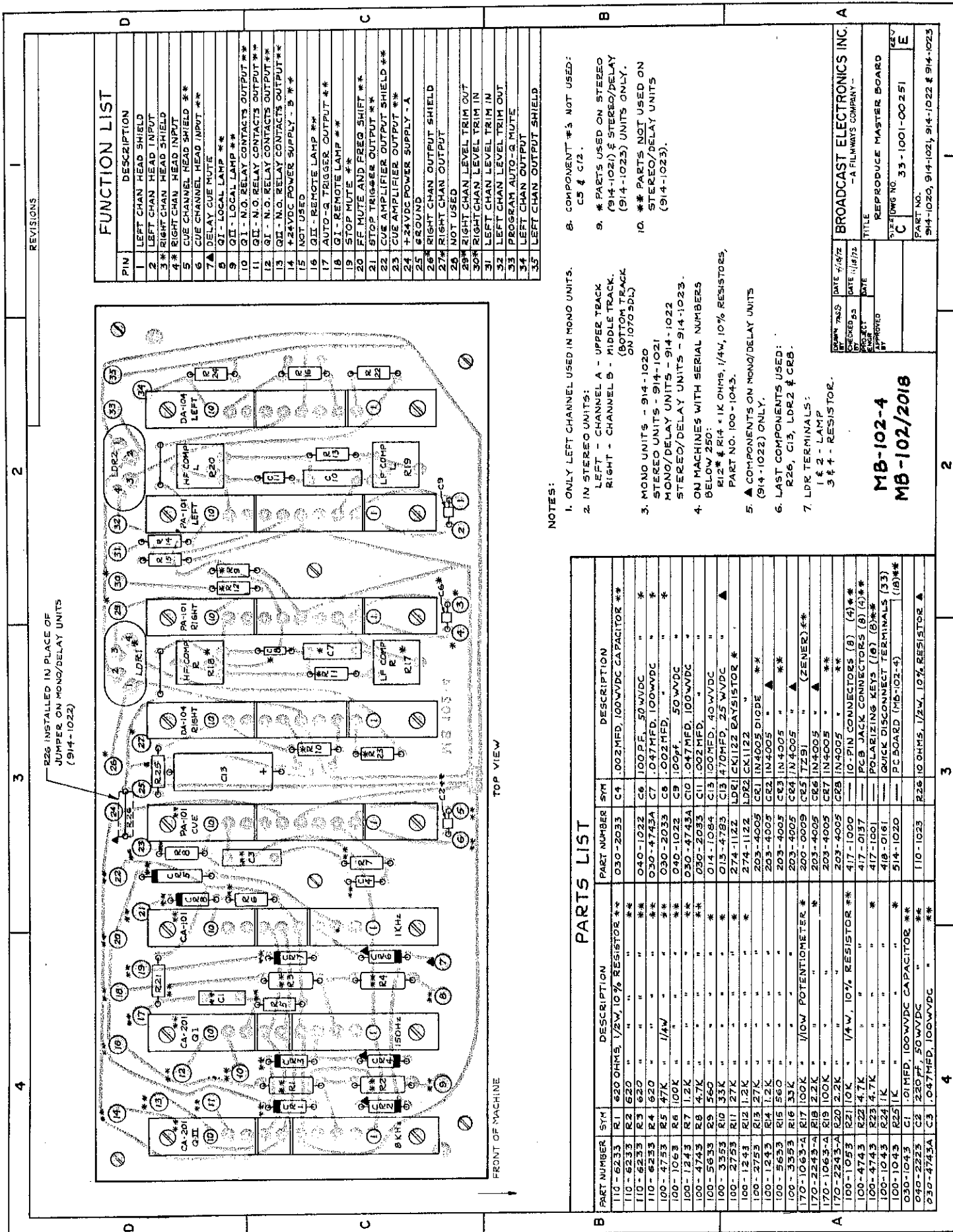
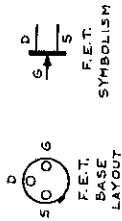
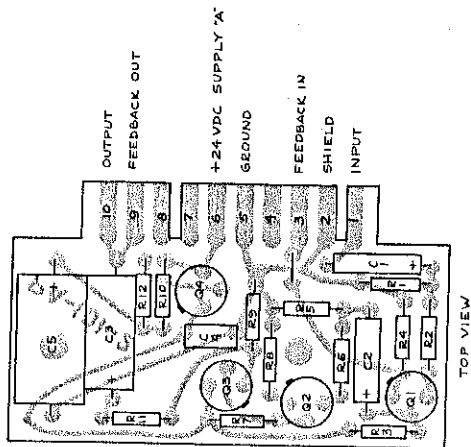


Figure 4-5. MB-102 and MB-102/2018 Reproduce Master Board

ISSUE	REVISIONS	DESCRIPTION	DATE	APPROVED



NOTES:
1. LAST COMPONENTS USED:
R12, C5 & Q4.

PARTS LIST	
PART NUMBER	SYM DESCRIPTION
100 - 3963	R1 390K OHMS, 1/4W, 10% RESISTOR
100 - 1043	R2 1K
100 - 1253	R3 12K
100 - 1033	R4 100
100 - 1063	R5 100K
100 - 4753	R6 47K
100 - 1253	R7 12K
100 - 1033	R8 100
100 - 6843	R9 68K
100 - 1053	R10 10K
100 - 1033	R11 100
100 - 2233	R12 220
014 - 1064	C1 1MFD, 40WVDC CAPACITOR
014 - 1064	C2 1MFD, 40WVDC
013 - 2574	C3 25MFD, 25WVDC
030 - 1043	C4 0.01MFD, 100WVDC
014 - 1064	C5 100MFD, 40WVDC
212 - 5391	Q1 2N5391 FIELD EFFECT TRANSISTOR
212 - 5391	Q2 2N5391
211 - 6566	Q3 MPS6566 TRANSISTOR
211 - 6566	Q4 MPS6566
409 - 0121	TRANSISTOR PAD
511 - 1010	PRINTED CIRCUIT BOARD (PA-101-2)

PA-101-2

DRAWN BY 7/65 JH/2	BROADCAST ELECTRONICS, INC. - E FILMWAYS COMPANY -
CHECKED BY BS 7/672	TITLE PREAMPLIFIER BOARD
DESIGNER BS	DWG NO. 33-1001-0014
APPROVED	REV B
	PART NO. 911-1010

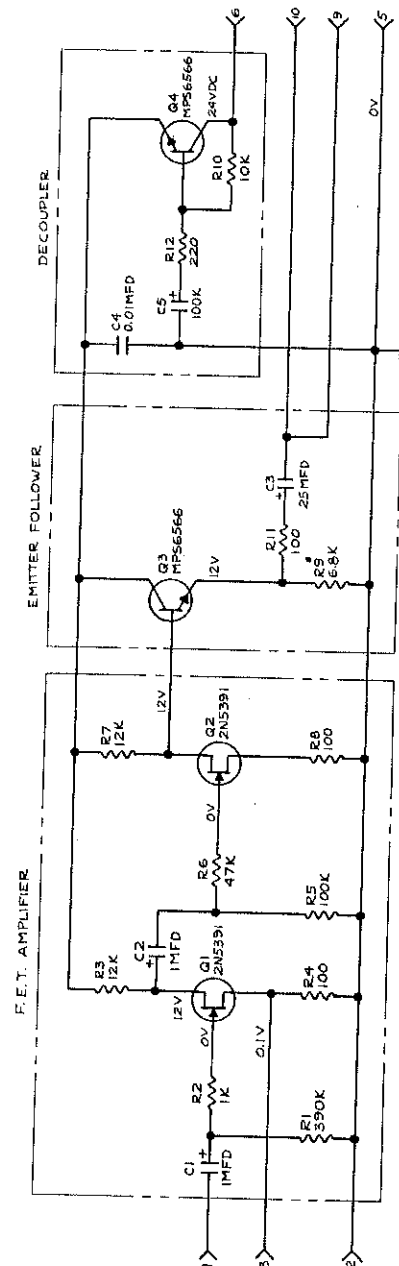
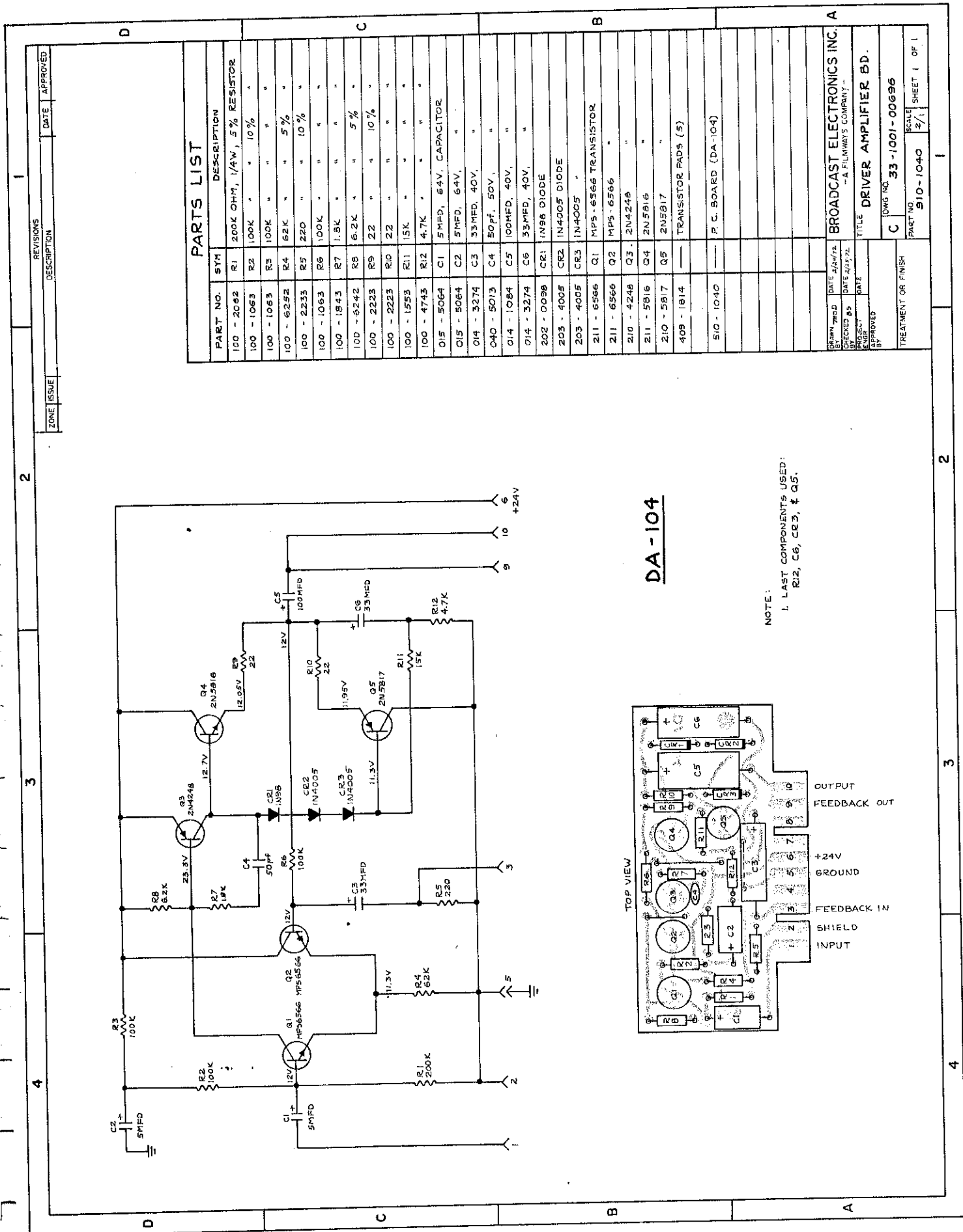


Figure 4-6. PA-101 Preamplifier



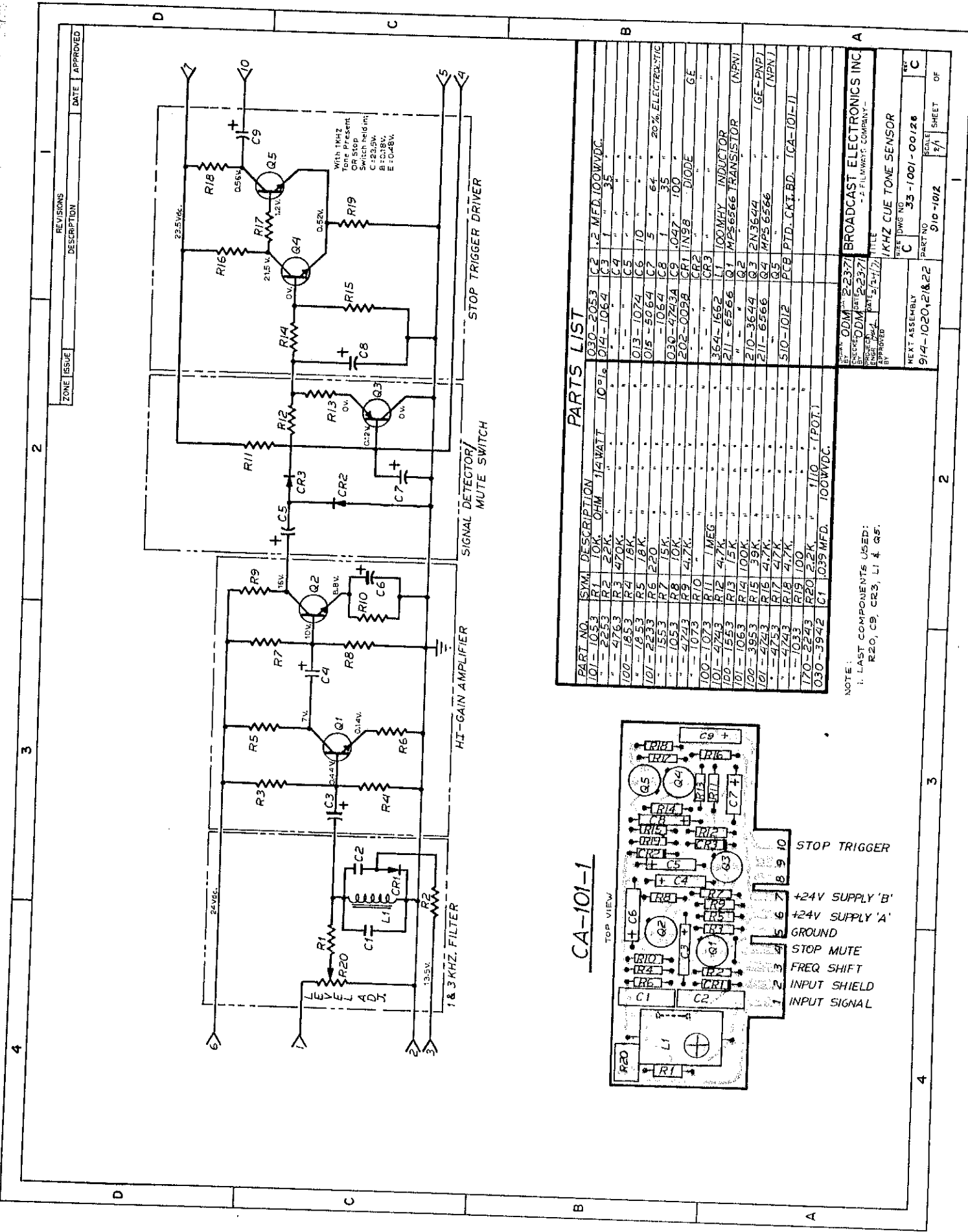
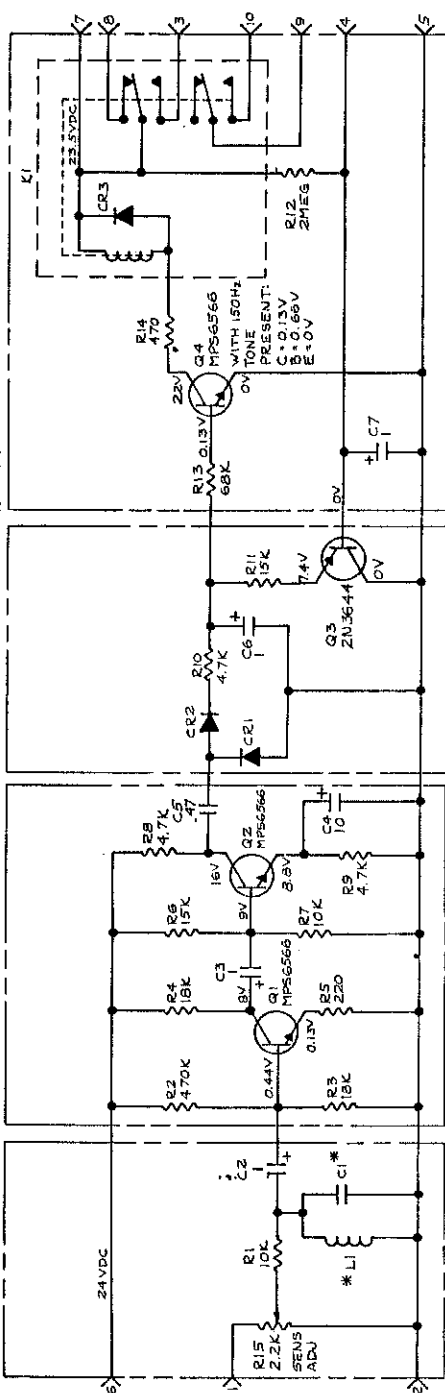


Figure 4-8. CA-101 1 KHz Stop Tone Sensor



1. 150Hz - PART NUMBER 910-2010 (Q1)
8KHz - PART NUMBER 910-2011 (Q2)
2. * COMPONENT VALUES WILL VARY WITH
SENSITED FREQUENCY.
3. LAST COMPONENTS USED: R15, C7, L1,
CR3, K1 & Q4.
4. K1 SHOWN WITH TONE NOT PRESENT.

PARIS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION
100-1053	R1	10K OHMS, 1/4 WATT, 10% RESISTOR	064-4754	C5	.47 MFD, 35 WVDC
100-4763	R2	470K " " " "	014-1064	C6	" " " "
100-1853	R3	18K " " " "	014-1064	C7	" " " "
100-1853	R4	" " " "			
100-2233	R5	" " " "			
100-2233	R5	" " " "			
100-1553	R6	15K " " " "	364-0670	L1*	10MHY INDUCTOR (8KHz)
100-1053	R7	10K " " " "	364-0024		.9HY " (150Hz)
100-4743	R8	47K " " " "	202-0098	CR1	IN98 DIODE
100-4743	R9	47K " " " "	202-0098	CR2	IN98 "
100-4743	R10	47K " " " "	203-4005	CR3	IN4005 "
100-1553	R11	15K " " " "			
100-2072	R12	2MEG " " " "	271-0001	K1	DDPT 24VDC RELAY
100-6853	R13	68K " " " "			
100-4733	R14	470 " " " "	211-6566	Q1	MP6566 TRANSISTOR
170-2243	R15	2.2K " 1/10 " POTENTIOMETER	211-6566	Q2	MP6566 "
			211-3644	Q3	2N3644 "
030-4743A	C1*	.047 MFD, 100 WVDC CAPACITOR (8KHz)	211-6566	Q4	MP6566 "
064-1063		" " 35 " (150Hz)	409-0121		TRANSISTOR PAD (1)
014-1064	C2	" " " "	409-1814		TRANSISTOR PAD (3)
014-1064	C3	" " " "			
013-1074	C4	10 " 15 " "			

DESIGNED BY	7/13/72	P. C. BOARD (CA-201-2)
CHECKED BY	8/1/72	BROADCAST ELECTRONICS INC.
		-A FILMWAYS COMPANY-
APPROVED BY	8/5 11/1/72	CUE TONE SENSOR, Q1 AND Q2
		DWG NO. 33-1001-00260
		SHEET NO. 3
		REV. 910-2010, 910-2011

CA-201-2

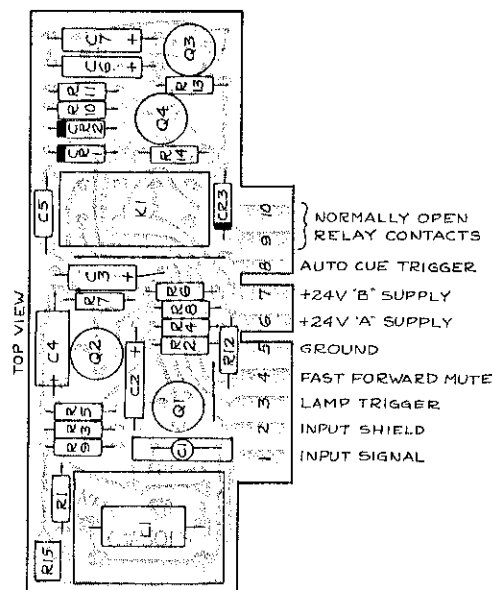
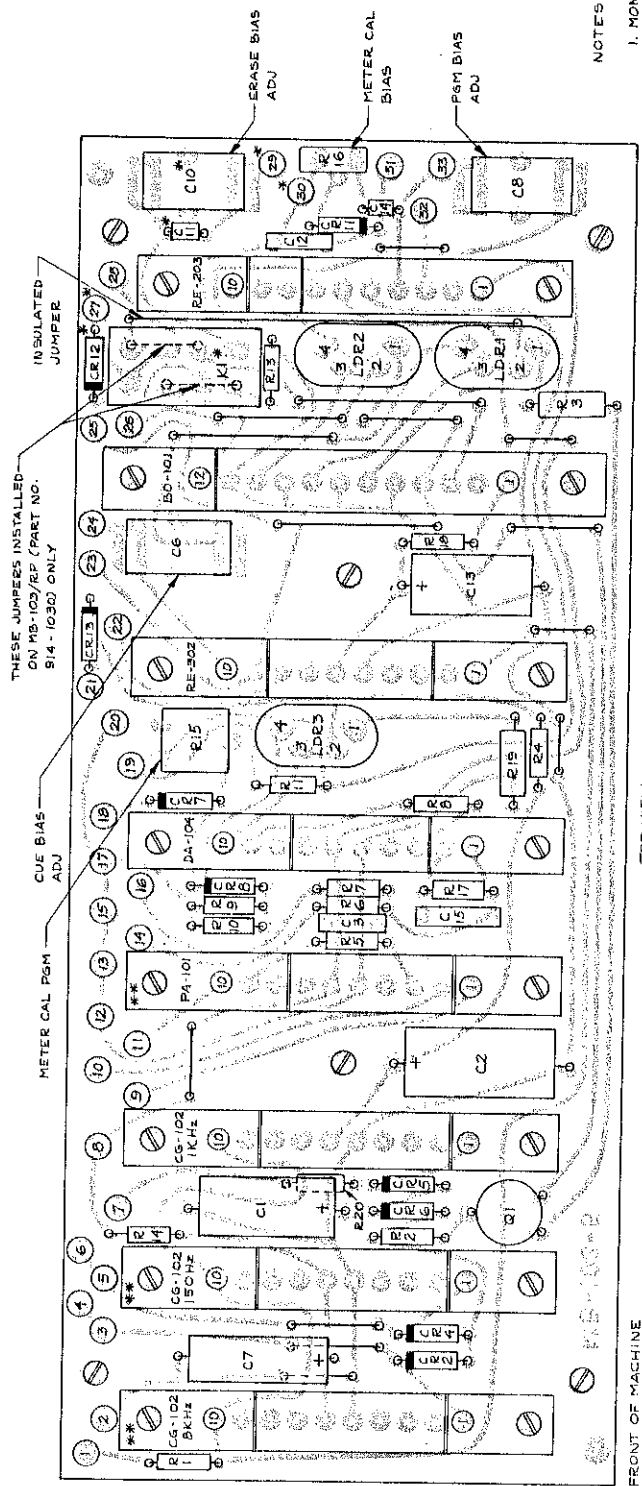


Figure 4-9. CA-201 Qi and QII Sensor



NOTES:

1. MONO RECORD UNITS - 914-1030
2. MONO RECORD DELAY UNITS - 914-1031.
3. * COMPONENTS USED ON DELAY UNITS ONLY.
4. LDR TERMINALS:
1 & 2 - LAMP
3 & 4 - RESISTOR
5. LAST COMPONENTS USED:
R19, C15, CR13, LDR-3, Q1 & K1.
6. COMPONENT NUMBERS NOT USED:
R12, C4, C5, C9, CR1, CR3, CR9 & CR10.
7. ** OPTIONAL MICROPHONE PREAMPLIFIER (PA-101), Q1 (50CH), AND Q3 (8KHZ) GENERATORS.

MB-103-4

FUNCTIONS

PARTS LIST

PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION	PIN	DESCRIPTIONS
100-1053	R1	10K OHMS, 1/4W, 10% RESISTOR	030-1033	C15	100MFD, 100VDC CAPACITOR	1	AUXILIARY CUE INPUT SHIELD
100-3353	R2	33K				2	AUXILIARY CUE INPUT SHIELD
110-1043	R3	1K				3	Q1 REMOTE RECORD CONTROL
100-1033	R4	100				4	Q1 LOCAL RECORD CONTROL
100-3343	R5	3.3K				5	Q1 REMOTE RECORD CONTROL
100-1053	R6	10K				6	Q1 LOCAL RECORD CONTROL
100-1053	R7	10K				7	1KHZ RECORD CONTROL
100-1063	R8	100K				8	+24VDC POWER SUPPLY "A"
100-1043	R9	1.8K				9	MICROPHONE INPUT SHIELD
100-1053	R10	10K				10	MICROPHONE LEVEL CONTROL INPUT SHIELD
100-1043	R11	1K				11	MICROPHONE LEVEL CONTROL INPUT SHIELD
100-8243	R13	8.2K				12	MICROPHONE LEVEL CONTROL OUTPUT SHIELD
100-1033	R14	100				13	MICROPHONE LEVEL CONTROL OUTPUT SHIELD
170-2243A	R15	2.2K				14	MICROPHONE LEVEL CONTROL OUTPUT
170-2243	R16	2.2K				15	GROUND
100-1533	R17	15K				16	LINE LEVEL CONTROL OUTPUT
100-1033	R18	100				17	LINE LEVEL CONTROL OUTPUT SHIELD
110-1043	R19	1K				18	PROGRAM VU OUTPUT
100-1043	R20	1K				19	MONITOR OUTPUT
014-5274	C1	32MFD, 40VDC CAPACITOR				20	MONITOR OUTPUT SHIELD
014-1084	C2	100MFD				21	PROGRAM & 1KHZ RECORD ENABLE
030-2033	C3	0.02MFD, 100VDC				22	TO NE VU OUTPUT
099-1124	C6	15pf VARIABLE				23	CUE RECORD HEAD OUTPUT SHIELD
014-3274	C7	32MFD, 40VDC				24	CUE RECORD HEAD OUTPUT SHIELD
099-1124	C8	15pf VARIABLE				25	+24VDC POWER SUPPLY "B"
099-1124	C9	15pf VARIABLE				26	PROGRAM BIAS CONTROL
099-1124	C10	15pf VARIABLE				27	DELAY SET
040-5023	C11	220pf, 50VDC				28	BIAS OSCILLATOR CONTROL
014-3274	C12	500pf				29	BIAS OSCILLATOR CONTROL
040-1023	C13	100pf, 50VDC				30	BIAS OSCILLATOR CONTROL
	C14	100pf, 50VDC				31	BIAS VU OUTPUT
						32	PROGRAM RECORD HEAD OUTPUT SHIELD
						33	PROGRAM RECORD HEAD OUTPUT

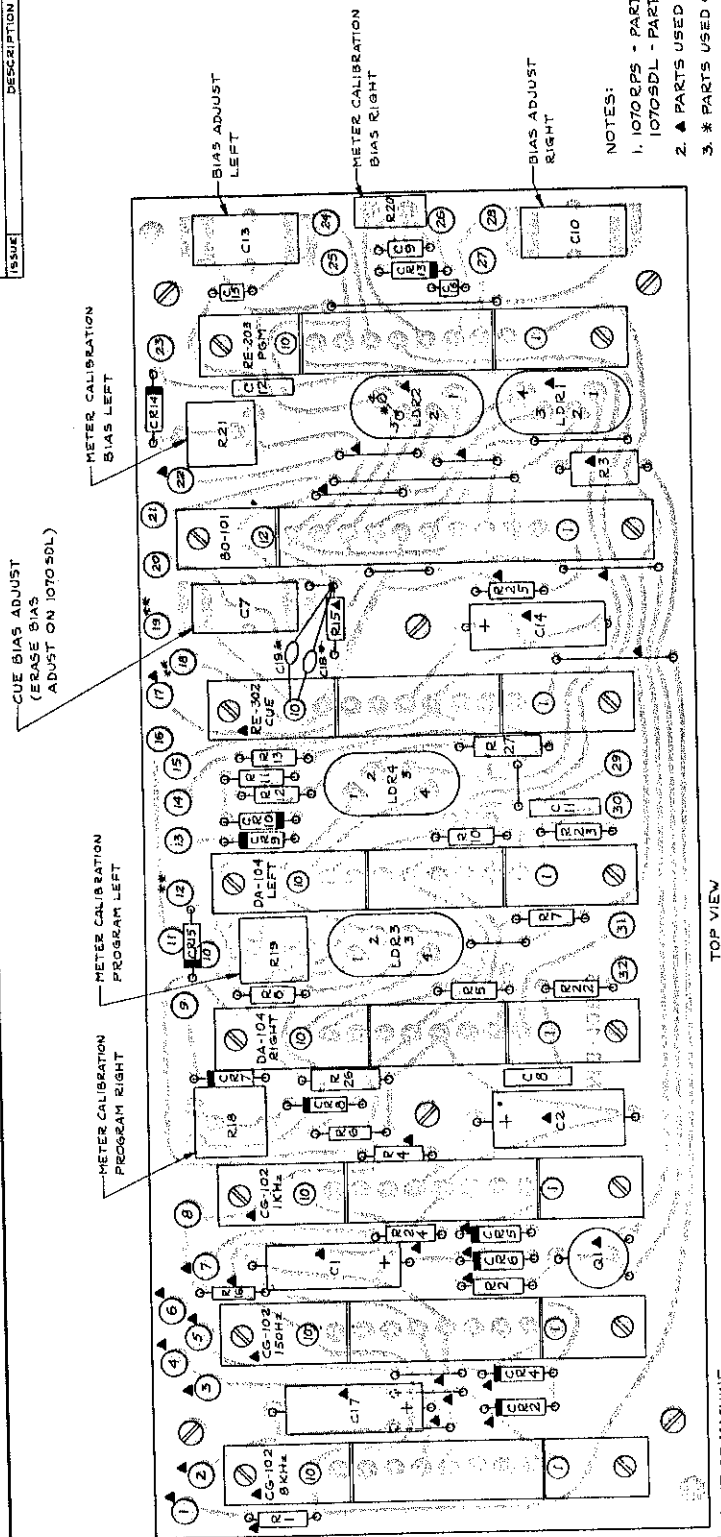
DESIGNED BY
T.M. 4/74

CHECKED BY
T.M. 4/74

PROJ. NAME
33-1001-C0252

DATE
9/4-1030 & 9/4-1031

Figure 4-10. MB-103 Record Master Board



NOTES:

1. 1070RPS - PART # 914-1080
2. 1070SDL - PART # 914-1081
3. * PARTS USED ON 1070RPS UNITS ONLY.
4. ** ON 1070SDL UNITS FUNCTIONS FOR PINS 12, 16 & 19 ARE AS FOLLOWS:
PIN 12 - PGM RECORD ENABLE
" 16 - ERASE HEAD OUTPUT
" 19 - ERASE HEAD OUTPUT
5. CHANNEL A - LEFT - TOP TRACK
CHANNEL B - RIGHT - MIDDLE TRACK
BOTTOM TRACK ON 1070SDL
6. Q1 - 150KHz AUXILIARY TONE
Q2 - 8KHz AUXILIARY TONE
7. LDR TERMINALS: 1 & 2 - LAMP, 3 & 4 - RESISTOR
8. LAST COMPONENTS USED:
R27, C19, Q1, C21 & LDR4.
9. COMPONENT NUMBERS NOT USED:
R9, R14, R17, C3 THRU C6, C21, C23, C25, C27 & C212.

MB-108-4
MB-108/2018

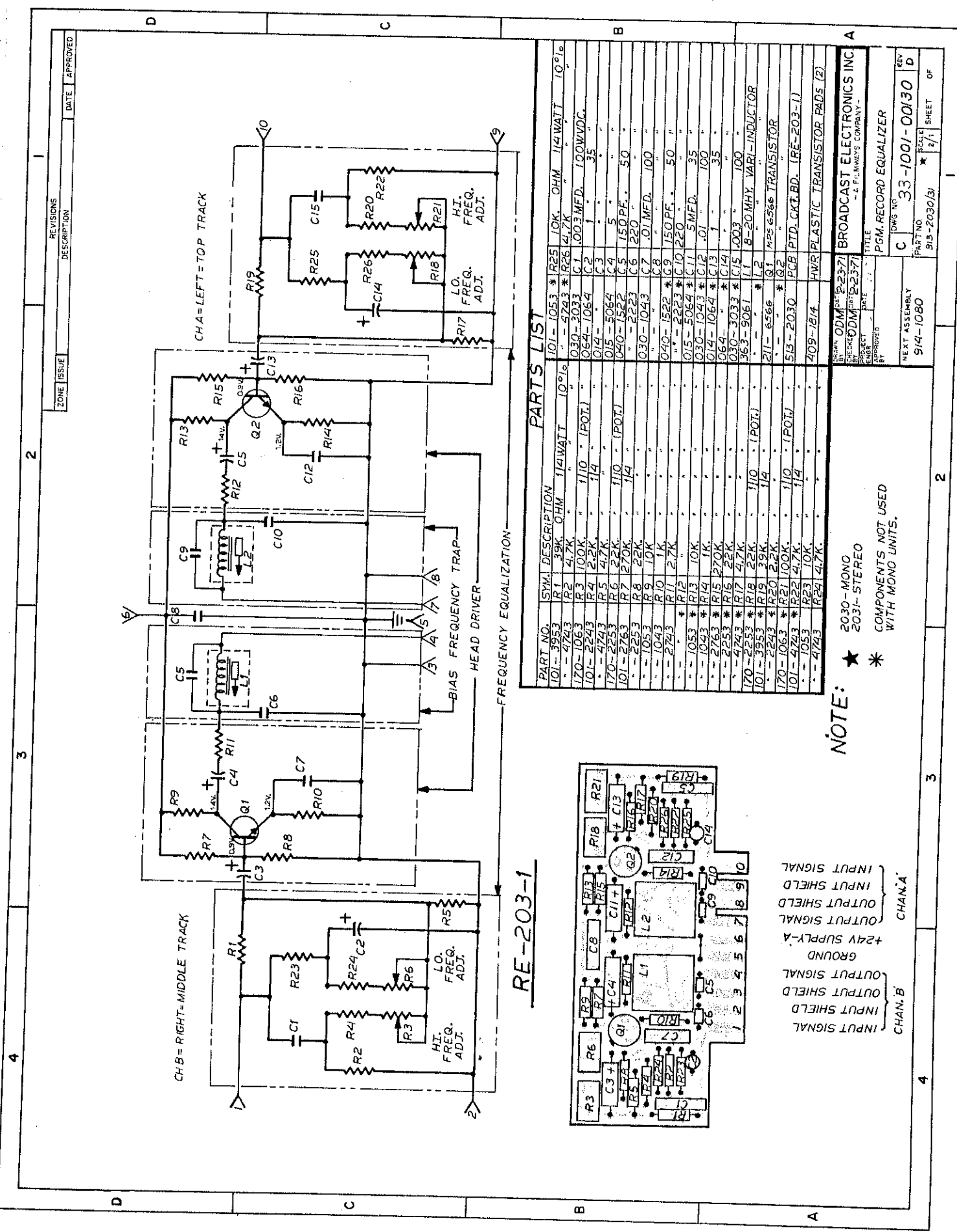
BROADCAST ELECTRONICS INC.
- A FILMWAYS COMPANY -
MASTER RECORD BOARD
(STEREO)
PART NO. 33-1001-00254
REV F
PART NO. 914-1080 & 914-1081

FUNCTIONS

PARTS LIST

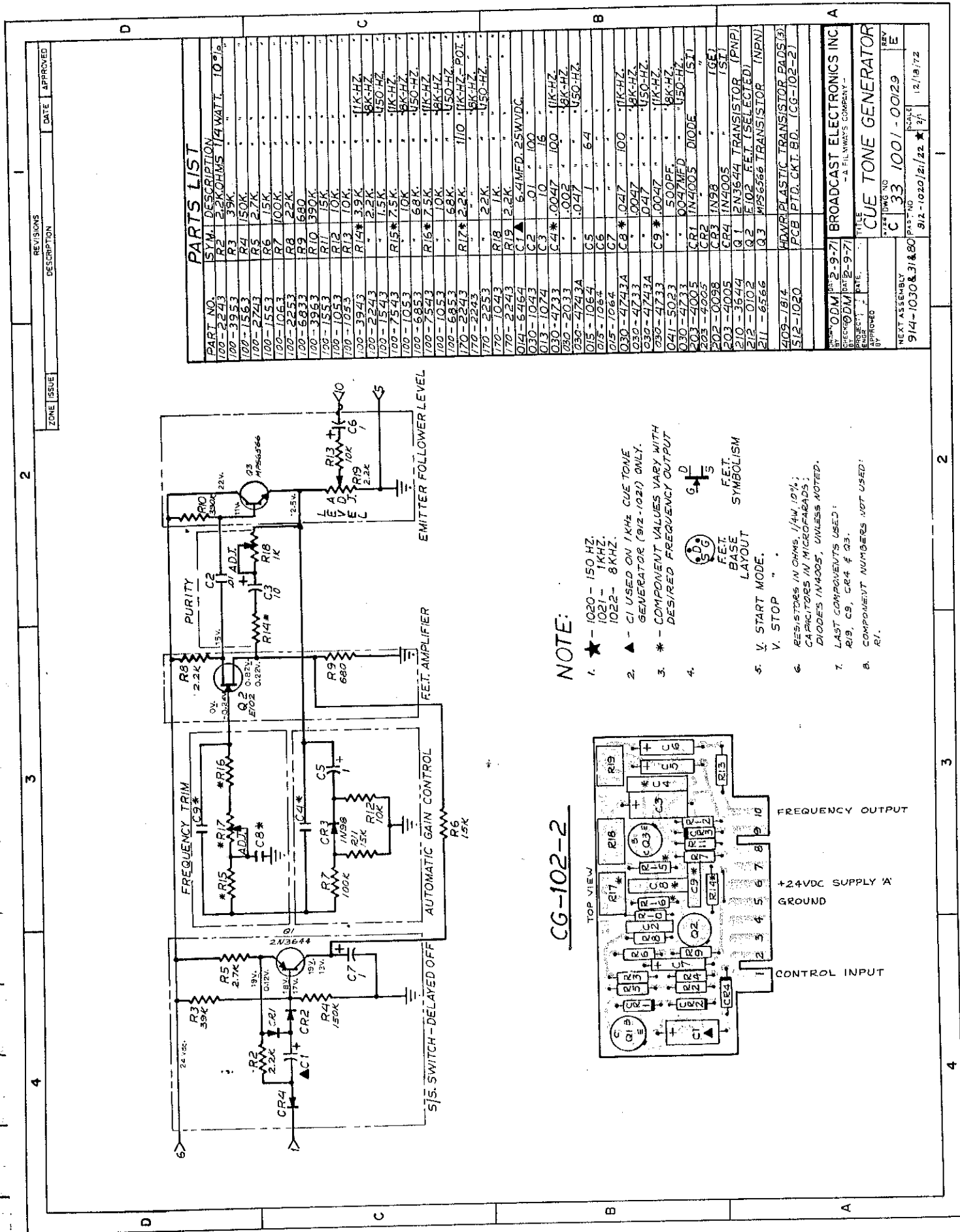
PART NUMBER	SYM	DESCRIPTION	PART NUMBER	SYM	DESCRIPTION	PIN	DESCRIPTION
100-1053	R1	10K OHM, 1/4W, 10% RESISTOR	099-1124	C10	115µF VARIABLE CAPACITOR	1	AUXILIARY CUE INPUT SHIELD
100-1843	R2	33K	030-1043	C11	0.01MFD, 100WVDC (MYLAR)	2	AUXILIARY CUE INPUT SHIELD
100-1043	R3	1K	040-5023	C12	500µF, 50 (MICA)	3	Q1 REMOTE RECORD CONTROL
100-1033	R4	100	099-1124	C13	115µF VARIABLE	4	Q1 LOCAL RECORD CONTROL
100-1043	R5	33K	014-3274	C14	32MFD, 40WVDC (ELEC)	5	Q1 REMOTE RECORD CONTROL
100-1843	R6	1.8K	040-1032	C15	100µF, 50 (MICA)	6	Q1 LOCAL RECORD CONTROL
100-1053	R7	10K	040-1032	C16	100µF, 50 (ELEC)	7	KHz RECORD CONTROL
100-1043	R8	1K	014-3274	C17	32MFD, 40 (ELEC)	8	+24VDC POWER SUPPLY "A"
100-3353	R10	33K	001-2224	C18	222µF, 500 (GRAM DRC)	9	RIGHT CHANNEL PGM VU OUTPUT
100-1843	R11	1.8K	001-5014	C19	50µF	10	RIGHT CHANNEL MONITOR OUTPUT
100-1053	R12	10K	310-3644	Q1	2N3644 TRANSISTOR	11	RIGHT CHANNEL MONITOR SHIELD
100-1043	R13	1K	203-4005	C22	IN4005	12	PGM & KHz RECORD ENABLE
100-1043	R15	1K	203-4005	C24	IN4005	13	LEFT CHANNEL PGM VU OUTPUT
100-5243	R17	8.2K	203-4005	C25	IN4005	14	LEFT CHANNEL MONITOR OUTPUT
100-1033	R16	100	203-4005	C26	IN4005	15	LEFT CHANNEL MONITOR SHIELD
170-4743A	R18	2.2K	202-0098	C27	IN95	16	GROUND
170-4743A	R19	2.2K	202-0098	C28	IN95	17	GROUND
170-2243A	R20	2.2K	202-0098	C29	IN95	18	CUE RECORD HEAD SHIELD
100-1043	R21	2.2K	202-0098	C30	IN95	19	CUE RECORD HEAD SHIELD
100-1043	R22	1K	202-0098	C31	IN95	20	+24VDC POWER SUPPLY "B"
100-1043	R23	1K	202-0098	C32	IN95	21	BIAS OSCILLATOR CONTROL
100-1043	R24	1K	202-0098	C33	IN95	22	PROGRAM BIAS CONTROL
100-1043	R25	100	202-0098	C34	IN95	23	LEFT CHANNEL BIAS VU OUTPUT
100-1043	R26	1K	202-0098	C35	IN95	24	LEFT CHANNEL RECORD HEAD OUTPUT
100-1043	R27	1K	202-0098	C36	IN95	25	LEFT CHANNEL RECORD HEAD SHIELD
100-1043	R28	1K	202-0098	C37	IN95	26	RIGHT CHANNEL BIAS VU OUTPUT
100-1043	R29	1K	202-0098	C38	IN95	27	RIGHT CHANNEL RECORD HEAD SHIELD
100-1043	R30	1K	202-0098	C39	IN95	28	RIGHT CHANNEL RECORD HEAD OUTPUT
100-1043	R31	1K	202-0098	C40	IN95	29	LEFT CHANNEL INPUT SHIELD
100-1043	R32	1K	202-0098	C41	IN95	30	LEFT CHANNEL INPUT SHIELD
100-1043	R33	1K	202-0098	C42	IN95	31	RIGHT CHANNEL INPUT SHIELD
100-1043	R34	1K	202-0098	C43	IN95	32	RIGHT CHANNEL INPUT
100-1043	R35	1K	202-0098	C44	IN95	33	RIGHT CHANNEL INPUT
100-1043	R36	1K	202-0098	C45	IN95	34	RIGHT CHANNEL INPUT
100-1043	R37	1K	202-0098	C46	IN95	35	RIGHT CHANNEL INPUT
100-1043	R38	1K	202-0098	C47	IN95	36	RIGHT CHANNEL INPUT
100-1043	R39	1K	202-0098	C48	IN95	37	RIGHT CHANNEL INPUT
100-1043	R40	1K	202-0098	C49	IN95	38	RIGHT CHANNEL INPUT
100-1043	R41	1K	202-0098	C50	IN95	39	RIGHT CHANNEL INPUT
100-1043	R42	1K	202-0098	C51	IN95	40	RIGHT CHANNEL INPUT
100-1043	R43	1K	202-0098	C52	IN95	41	RIGHT CHANNEL INPUT
100-1043	R44	1K	202-0098	C53	IN95	42	RIGHT CHANNEL INPUT
100-1043	R45	1K	202-0098	C54	IN95	43	RIGHT CHANNEL INPUT
100-1043	R46	1K	202-0098	C55	IN95	44	RIGHT CHANNEL INPUT
100-1043	R47	1K	202-0098	C56	IN95	45	RIGHT CHANNEL INPUT
100-1043	R48	1K	202-0098	C57	IN95	46	RIGHT CHANNEL INPUT
100-1043	R49	1K	202-0098	C58	IN95	47	RIGHT CHANNEL INPUT
100-1043	R50	1K	202-0098	C59	IN95	48	RIGHT CHANNEL INPUT
100-1043	R51	1K	202-0098	C60	IN95	49	RIGHT CHANNEL INPUT
100-1043	R52	1K	202-0098	C61	IN95	50	RIGHT CHANNEL INPUT
100-1043	R53	1K	202-0098	C62	IN95	51	RIGHT CHANNEL INPUT
100-1043	R54	1K	202-0098	C63	IN95	52	RIGHT CHANNEL INPUT
100-1043	R55	1K	202-0098	C64	IN95	53	RIGHT CHANNEL INPUT
100-1043	R56	1K	202-0098	C65	IN95	54	RIGHT CHANNEL INPUT
100-1043	R57	1K	202-0098	C66	IN95	55	RIGHT CHANNEL INPUT
100-1043	R58	1K	202-0098	C67	IN95	56	RIGHT CHANNEL INPUT
100-1043	R59	1K	202-0098	C68	IN95	57	RIGHT CHANNEL INPUT
100-1043	R60	1K	202-0098	C69	IN95	58	RIGHT CHANNEL INPUT
100-1043	R61	1K	202-0098	C70	IN95	59	RIGHT CHANNEL INPUT
100-1043	R62	1K	202-0098	C71	IN95	60	RIGHT CHANNEL INPUT
100-1043	R63	1K	202-0098	C72	IN95	61	RIGHT CHANNEL INPUT
100-1043	R64	1K	202-0098	C73	IN95	62	RIGHT CHANNEL INPUT
100-1043	R65	1K	202-0098	C74	IN95	63	RIGHT CHANNEL INPUT
100-1043	R66	1K	202-0098	C75	IN95	64	RIGHT CHANNEL INPUT
100-1043	R67	1K	202-0098	C76	IN95	65	RIGHT CHANNEL INPUT
100-1043	R68	1K	202-0098	C77	IN95	66	RIGHT CHANNEL INPUT
100-1043	R69	1K	202-0098	C78	IN95	67	RIGHT CHANNEL INPUT
100-1043	R70	1K	202-0098	C79	IN95	68	RIGHT CHANNEL INPUT
100-1043	R71	1K	202-0098	C80	IN95	69	RIGHT CHANNEL INPUT
100-1043	R72	1K	202-0098	C81	IN95	70	RIGHT CHANNEL INPUT
100-1043	R73	1K	202-0098	C82	IN95	71	RIGHT CHANNEL INPUT
100-1043	R74	1K	202-0098	C83	IN95	72	RIGHT CHANNEL INPUT
100-1043	R75	1K	202-0098	C84	IN95	73	RIGHT CHANNEL INPUT
100-1043	R76	1K	202-0098	C85	IN95	74	RIGHT CHANNEL INPUT
100-1043	R77	1K	202-0098	C86	IN95	75	RIGHT CHANNEL INPUT
100-1043	R78	1K	202-0098	C87	IN95	76	RIGHT CHANNEL INPUT
100-1043	R79	1K	202-0098	C88	IN95	77	RIGHT CHANNEL INPUT
100-1043	R80	1K	202-0098	C89	IN95	78	RIGHT CHANNEL INPUT
100-1043	R81	1K	202-0098	C90	IN95	79	RIGHT CHANNEL INPUT
100-1043	R82	1K	202-0098	C91	IN95	80	RIGHT CHANNEL INPUT
100-1043	R83	1K	202-0098	C92	IN95	81	RIGHT CHANNEL INPUT
100-1043	R84	1K	202-0098	C93	IN95	82	RIGHT CHANNEL INPUT
100-1043	R85	1K	202-0098	C94	IN95	83	RIGHT CHANNEL INPUT
100-1043	R86	1K	202-0098	C95	IN95	84	RIGHT CHANNEL INPUT
100-1043	R87	1K	202-0098	C96	IN95	85	RIGHT CHANNEL INPUT
100-1043	R88	1K	202-0098	C97	IN95	86	RIGHT CHANNEL INPUT
100-1043	R89	1K	202-0098	C98	IN95	87	RIGHT CHANNEL INPUT
100-1043	R90	1K	202-0098	C99	IN95	88	RIGHT CHANNEL INPUT
100-1043	R91	1K	202-0098	C100	IN95	89	RIGHT CHANNEL INPUT
100-1043	R92	1K	202-0098	C101	IN95	90	RIGHT CHANNEL INPUT
100-1043	R93	1K	202-0098	C102	IN95	91	RIGHT CHANNEL INPUT
100-1043	R94	1K	202-0098	C103	IN95	92	RIGHT CHANNEL INPUT
100-1043	R95	1K	202-0098	C104	IN95	93	RIGHT CHANNEL INPUT
100-1043	R96	1K	202-0098	C105	IN95	94	RIGHT CHANNEL INPUT
100-1043	R97	1K	202-0098	C106	IN95	95	RIGHT CHANNEL INPUT
100-1043	R98	1K	202-0098	C107	IN95	96	RIGHT CHANNEL INPUT
100-1043	R99	1K	202-0098	C108	IN95	97	RIGHT CHANNEL INPUT
100-1043	R100	1K	202-0098	C109	IN95	98	RIGHT CHANNEL INPUT
100-1043	R101	1K	202-0098	C110	IN95	99	RIGHT CHANNEL INPUT
100-1043	R102	1K	202-0098	C111	IN95	100	RIGHT CHANNEL INPUT

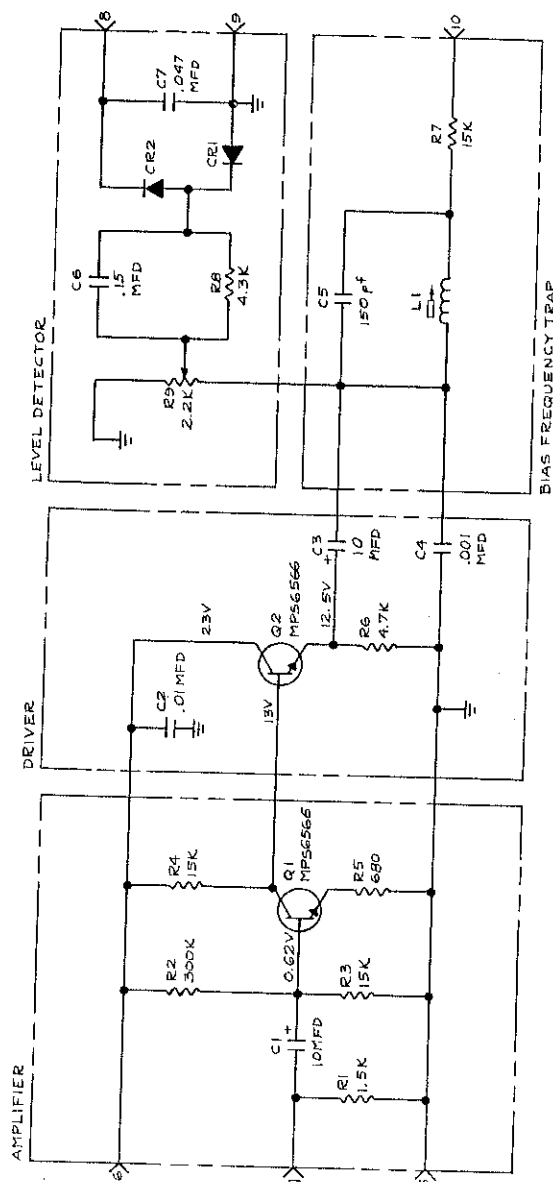
Figure 4-11. MB-108 and MB-108/2018 Record Master Board



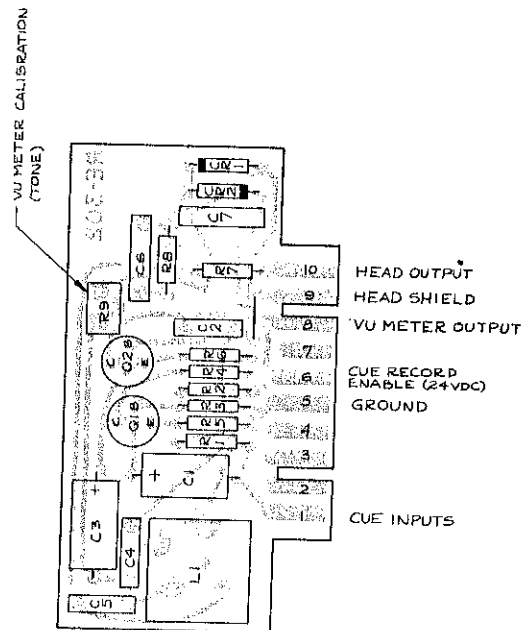
NOTE: ★ 2030-MONO
* 2031-STEREO
COMPONENTS NOT USED WITH MONO UNITS.

Figure 4-12. RE-203 Program Record Equalizer



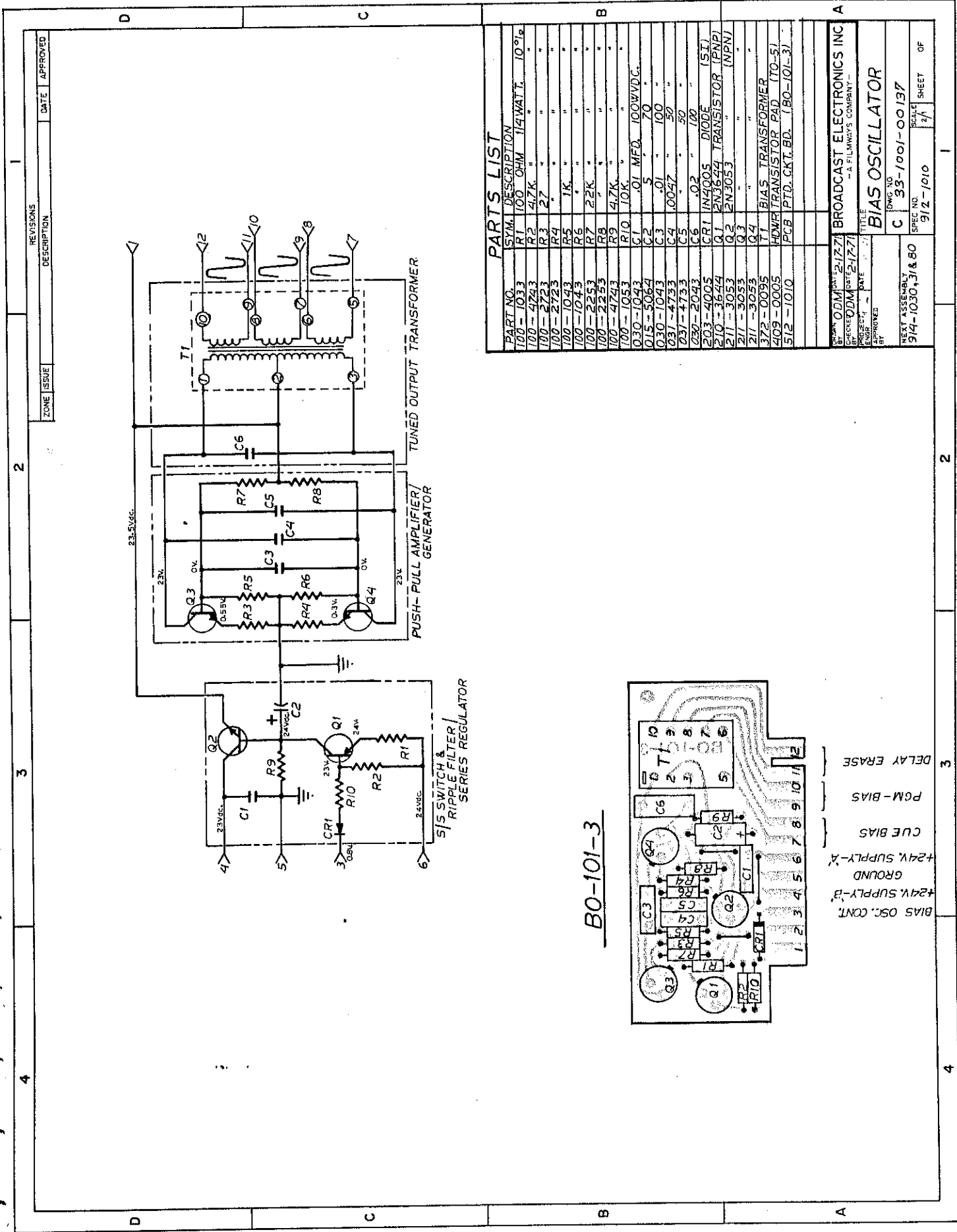


PARTS LIST		
PART NUMBER	SYM	DESCRIPTION
100-1543	R1	1.5K OHMS, 1/4WATT, 10% RESISTOR
100-3063	R2	300K " " " " " "
100-1553	R3	15K " " " " " "
100-1553	R4	15K " " " " " "
100-6833	R5	680 " " " " " "
100-4743	R6	4.7K " " " " " "
100-1553	R7	15K " " " " " "
100-4343	R8	4.3K " " " " " "
170-2243	R9	2.2K " " 1/10 " POTENTIOMETER
013-1074	C1	10MFD, 16WVDC CAPACITOR
030-1043	C2	0.1MFD, 100WVDC "
013-1074	C3	10 " 16 " "
030-1033	C4	.001 " 100 " "
040-1523	C5	150pf 50 " "
030-1553	C6	.15MFD 100 " "
030-4743A	C7	.047 " 100 " "
202-0098	CR1	1N98 DIODE
202-0098	CR2	1N98 " "
363-8061	L1	8-20MHY VARI-INDUCTOR
211-6565	Q1	MP5 6566 TRANSISTOR
211-6566	Q2	MP5 6566 " "
409-1814	—	PLASTIC TRANSISTOR PAD (2)
513-3020	—	P.C. BOARD (RE-302)
BROADCAST ELECTRONICS INC.		
— A FILMWAYS COMPANY —		
DRAWN	7/15/72	TITLE
CHECKED	BS 1/1/74	CUE RECORD DRIVER AMPLIFIER
APPROVED		REV
		C
		913-3020



RE-302

Figure 4-14. RE-302 Cue Record Driver Amplifier



PARTS LIST

PART NO.	SYM.	DESCRIPTION
100 - 1033	R1	100 OHM 1/4WATT 10%
100 - 4743	R2	4.7K "
100 - 2723	R3	27 "
100 - 2723	R4	" "
100 - 1043	R5	1K "
100 - 1043	R6	" "
100 - 2253	R7	2.2K "
100 - 2253	R8	" "
100 - 4743	R9	4.7K "
100 - 1053	R10	10K "
030 - 1043	C1	.01 MFD. 100WVDC.
015 - 5064	C2	.5 70 "
030 - 1043	C3	.01 " 100 "
031 - 4733	C4	10047 " 50 "
031 - 4733	C5	" 50 "
030 - 2043	C6	.02 " 100 "
203 - 4005	Q1	IN4005 DIODE (5T)
210 - 3644	Q2	2N3644 TRANSISTOR (PNP)
211 - 3053	Q3	2N3053 "
211 - 3053	Q4	" "
372 - 0035	T1	BIAS TRANSFORMER
409 - 0005		HMW TRANSISTOR PAD (TO-5)
512 - 1010		PCB PTD. CKT. BD. (80-101-3)

DESIGN: ODM DATE: 2-12-71		BROADCAST ELECTRONICS INC	
CHECKED: ODM DATE: 2-17-71		TITLE: BIAS OSCILLATOR	
ENGINEER: [Signature]		DRAWING NO: C 33-1001-00137	
APPROVED: [Signature]		SPEC. NO. 912-1010	
TEXT ASSEMBLY: 914-1030, J1880		SHEET 4 OF 4	

Figure 4-15. BE-101 Bias Oscillator

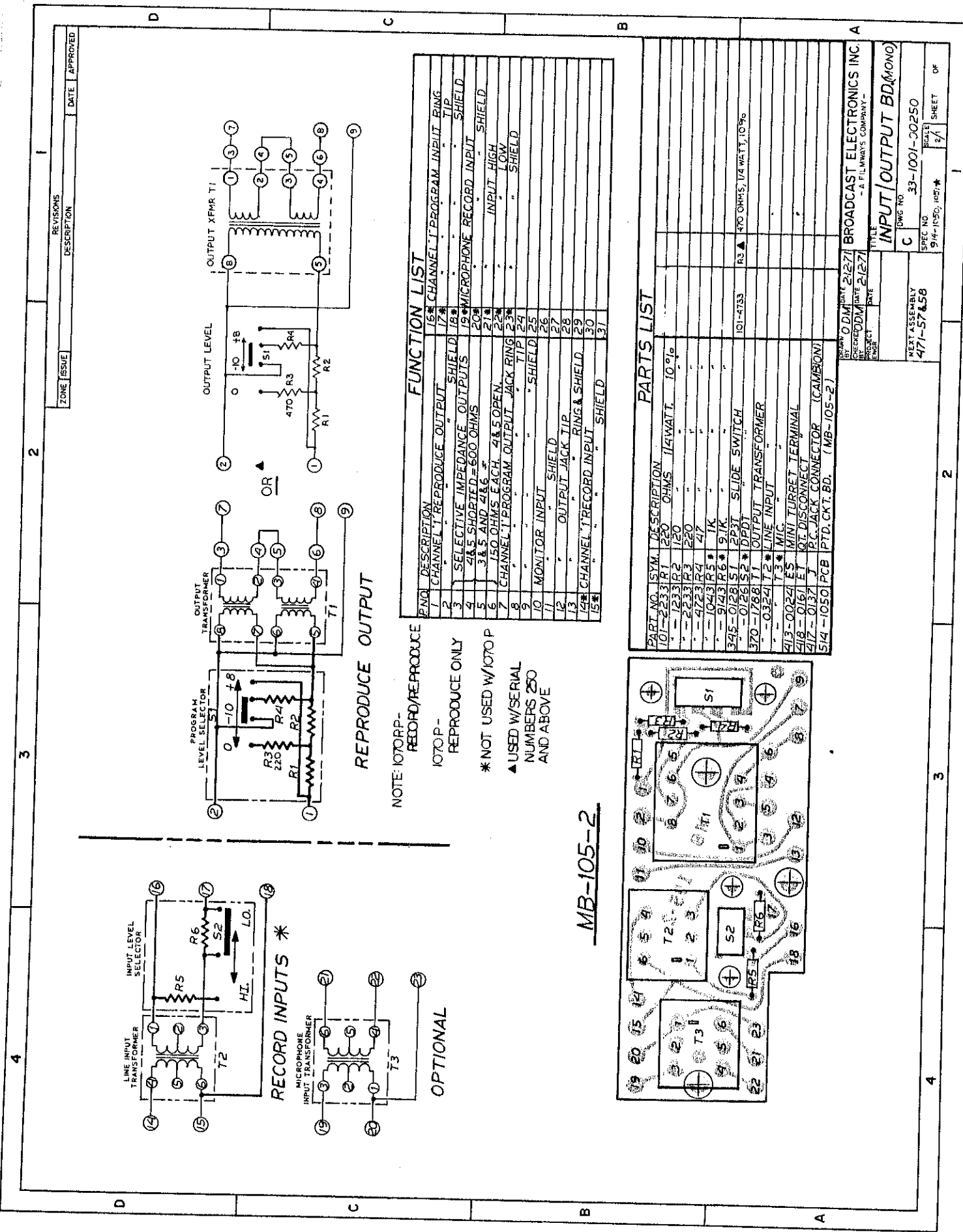


Figure 4-16. MB-105 Input/Output Master Board

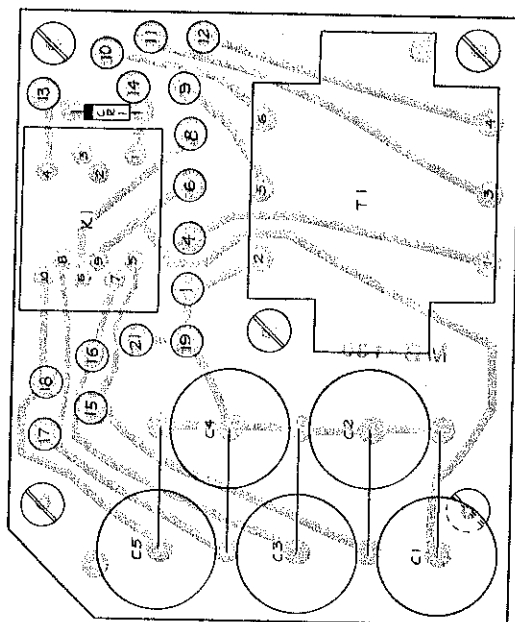


PARTS LIST

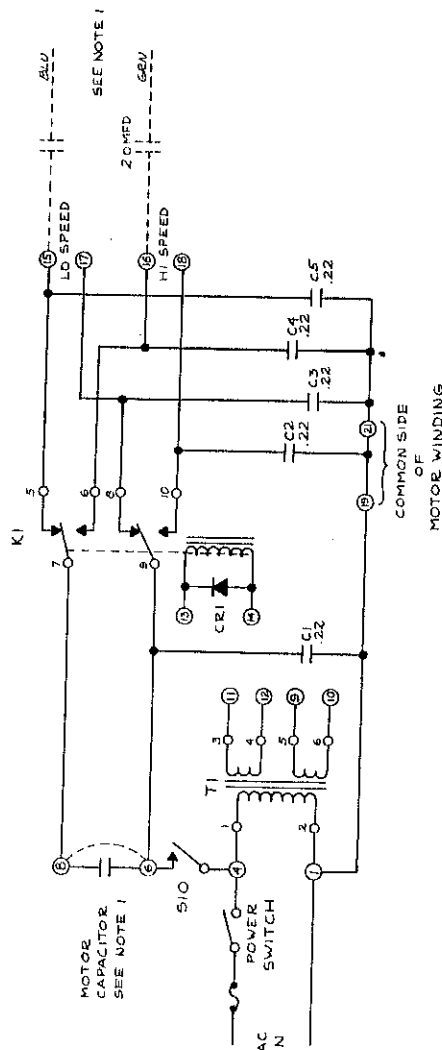
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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NOTES:

1. IN 115 VAC, 60 HZ UNITS MOTOR CAPACITOR CONNECTED ACROSS ⑥ AND ⑦. IN 240 VAC, 50 HZ UNITS SEPARATE HI AND LO SPEED MOTOR CAPACITORS ARE CONNECTED AS SHOWN. ⑥ AND ⑦ JUMPED.



TOP VIEW



FUNCTION LIST	
PIN NO.	DESCRIPTION
1	LOW SIDE - AC
4	HIGH SIDE - AC
6	MOTOR SWITCH, S10
8	MOTOR CAPACITOR (SEE NOTE 1)
9	28 VAC, 100 MA
10	30 VAC, 400 MA
11	FAST FORWARD ENABLE
12	MOTOR SPEED RELAY CONTROL
13	LOW SPEED MOTOR WINDING (BLU)
14	HIGH SPEED MOTOR WINDING (GRN)
15	LOW SPEED MOTOR WINDING (YEL)
16	HIGH SPEED MOTOR WINDING (RED)
17	COMMON MOTOR WINDING
21	COMMON MOTOR WINDING

PARTS LIST	
PART NUMBER	SYM
203-4005	CRI IN4005 SILICON DIODE
033-2253	C1 .22MFD, 600VDC CAPACITOR
033-2253	C2 .22MFD, "
033-2253	C3 .22MFD, "
033-2253	C4 .22MFD, "
033-2253	C5 .22MFD, "
417-1230	RELAY SOCKET WITH SPRING CLIP
271-0154	K1 RELAY
470-0096	BRACKET, P.C. TRANSFORMER
376-0025	T1 POWER TRANSFORMER, 230V PRIMARY
413-1597	TURRET TERMINALS (16)
440-0805	STANDOFF, SWAGED (3)
514-1300	MB-130 P.C. BOARD

DESIGNED BY	MB-130
CHECKED BY	MB-130
DATE	11/1/74
APPROVED	
BROADCAST ELECTRONICS, INC.	
- A RILANTIS COMPANY -	
HIGH POWER CONTROL BOARD	
33-1001-0127	
REV. 00	
914-1301	

MB-130

Figure 4-19B. MB-130 High Power Board

SECTION 5 ELECTRONIC MAINTENANCE AND ADJUSTMENTS

5.1 SCOPE

This section describes various electronic maintenance and adjustment procedures required for continued optimum performance of the TEN/70. Electronic parts information is contained on the parts locations diagrams figures 4-1 through 4-19. Refer to the next section for mechanical maintenance and parts data.

5.2 GENERAL MAINTENANCE

Routine cleaning of the printed circuit board and connector contacts is not necessary. In case of intermittent operation, however, clean the contacts by spraying with an aerosol contact cleaner. Do not use a cleaner with abrasives. To work grime free, polish the contacts lightly with a soft pencil eraser. Be sure the power is disconnected. The push on connectors may loosen after repeated disconnection. To tighten, pinch lightly with a pair of pliers. Be careful not to force the connector out of round, however.

Accumulated dust should be cleaned out of the chassis with a soft brush. Fingerprints and smudges can be removed from the chassis with a cloth moistened with a household ammonia solution.

At least quarterly the performance of the electronics should be checked and compared with the Acceptance Test Results supplied by Broadcast Electronics with each TEN/70. The NAB alignment cartridge contains the necessary tones and reference levels for checking the program and cue systems.

5.3 EB-103 EXTENDER BOARD

As an aid in troubleshooting the plug-in modules, the optional EB-103 extender board is available. The EB-103 raises any 10 pin module approximately 2.5 inches above the master board. The EB-103 is shown in Figure 5-1.

5.4 PRINTED CIRCUIT BOARD REPAIRS

NOTE

AC power must be turned off when printed circuit boards are removed or replaced.

Plug-in printed circuit boards with the same number etched on the board (e.g. PA-101, CA-101, etc.) may be interchanged for troubleshooting. However, permanent interchange is not recommended without re-optimizing levels and equalizations.

Great care should be exercised when working on printed circuit boards, since excessive heat may cause the foil to peel off. The Broadcast Electronics warranty on printed circuit boards is void if boards are damaged by improper handling.

Broadcast Electronics maintains a complete inventory of parts (e.g. resistors, transistors, etc.) as well as complete board assemblies. Order by Broadcast Electronics part number.

When replacing components on a printed circuit board use a small soldering iron (15 to 30 watts) with a small tip. Use a brush or de-soldering tool to remove excess solder. Protect the board contacts with masking tape and mount gently in a small vise.

Touch the iron to the connection to be unsoldered. When heated, quickly remove the iron and brush away the excess solder. Be careful that no solder splatters onto the board. Unbend the leads with a small pair of needle nose or diagonal cutting pliers and remove the component.

NOTE

When replacing multi-pin components (transformers, connectors, etc.) de-solder all the pins before attempting to remove the component. It is virtually impossible to heat all the pins simultaneously.

Check the mounting holes in the board to be sure they are clear of solder and open before mounting the replacement. Put the leads through the holes and trim the leads to about 1/8 inch. Bend the leads over so they touch only the foil strips the leads are to be soldered to.

Touch the iron to the leads and let the solder flow onto the foil. Always use a fine rosin core solder such as No. 20 gauge. Check for "bridges" of solder between adjacent foil strips.

Clean the flux off the connection with alcohol. Solder flux left on the printed circuit board may cause noise in the circuit. If the contacts were covered with masking tape, clean them also with alcohol.

5.5 MODULE LOCATIONS AND ADJUSTMENT POINTS

Figures 5-2 and 5-3 show the locations of various modules for both monophonic and stereophonic units. Individual electronic parts are shown on the assembly diagrams in Section 4. Figures 5-2 and 5-3 also show the locations of electronic adjustments.

5.6 ELECTRONIC ADJUSTMENTS

5.6.1 General Considerations

Before adjusting the electronics make sure the reproduce and record heads are aligned properly (head azimuth and tracking height) as described in Section 6. The heads should be cleaned with BE-903 cleaning fluid or isopropyl alcohol.

The adjustments to the reproduce electronics should be made before those to the record electronics.

Most of the record adjustments are located on the underside of the chassis. No damage will result if the TEN/70 is placed on the bench with its right side down.

Adjustments to the program channels should be made with the unit's output referenced to the NAB Standard Operating Level. This is a most important point. If the unit is normally operated at a different level it should be compared to standard level before adjusting the electronics. Use an alignment cartridge of known quality. The NAB alignment cartridge is available from Broadcast Electronics (stock number 808-0003).

If the reproduce electronics are not adjusted to NAB standards, the record electronics cannot be set to proper specifications. If levels are incorrect, distortion and signal to noise figures cannot be optimized. If frequency response is not properly set, cartridge interchangeability will suffer.

Different types of magnetic tape will give slightly different output levels for the same head drive and bias. If several types of tape are used, the electronics should be adjusted to give the best compromise between the tapes in use.

Worn, damaged, or dirty tape will have poor response characteristics. Do not attempt to adjust the electronics to compensate for deteriorated tape.

Response also depends on proper tape wrap around the heads. Worn or misshapen pressure pads in the cartridge should be replaced. Broadcast Electronics maintains a supply of cartridge parts, cartridges, and cartridge tape. A cartridge rewinding and repair service is also available.

Rarely will it be necessary to make all of the adjustments. Indeed, the bias oscillator and cue tone generator frequency as well as the bias traps should only be adjusted when necessary. However, the adjustments are listed in order of priority.

In recording magnetic tape, magnetic saturation limits the maximum output. Completely flat frequency response cannot be obtained at NAB standard operating level. So the tones on the alignment tape are recorded 10 dB below standard level. Equalization adjustments, record and reproduce, must be made 10 dB below operating level.

5.6.2 Output Level

The output level controls are located on the rear panel. Set the PGM LEVEL switch to the desired nominal output (-10, 0, or +8 dBm). While reproducing the 400 Hz operating level tone from the NAB test cartridge adjust the PLAY LEVEL TRIM (CHAN A and CHAN B for stereo units) for "0" level on subsequent equipment.

5.6.3A Reproduce Frequency Response (Mono)

NOTE

This paragraph applies to monophonic units only.

The high and low frequency compensation networks for the program channel are located on the MB-102 Reproduce Master Board. These are adjusted while reproducing an NAB alignment test cartridge. During the 15 KHz tone adjust the high frequency compensator for -10 VU. During the 50 Hz tone adjust the low frequency compensator for -10 VU.

5.6.3B Reproduce Frequency Response (Stereo)

NOTE

This paragraph applies to stereophonic units only.

The high and low frequency compensation networks for the program channels are located on the MB-102 Reproduce Master Board. Separate networks are provided for the A and B channels. These are adjusted while reproducing an NAB alignment test cartridge. Since a stereo alignment cartridge is not now available, the B channel equalization can be set by feeding the output of the A channel head to the B channel electronics. See the Function List of Figure 4-5 for the pin designations on the MB-102 Reproduce Master Board.

During the 15 KHz tone adjust the high frequency compensators for -10 VU. During the 50 Hz tone adjust the low frequency compensator for -10 VU.

After adjusting the B channel electronics, reconnect the B channel head leads if necessary.

5.6.4 Cue Sensor Sensitivity (1,000 Hz)

NOTE

This paragraph applies to all models except the 1070-SDL.

The CA-101 Stop Cue Sensor is mounted on the MB-102 Reproduce Master Board. R20 is the sensitivity control, which should be set to trigger on a 1,000 Hz burst of -28 dBm. Remove the cue channel preamplifier (PA-101) and feed a 1,000 Hz tone into the CUE OUTPUT jack at a level of approximately .03V rms. Manually cock the pressure roller and put the machine into the play mode. Slowly adjust R20 until the sensor just triggers and the deck stops. The sensor will be muted for 1½ seconds after the deck starts, so check the operation of the sensor several times. Do not increase the sensitivity, or the sensor's selectivity in fast forward may be insufficient to prevent miscueing.

Finally replace the PA-101 preamplifier in its connector on the MB-102 Master Board.

NOTE

The NAB alignment cartridge includes 1 KHz, 150 Hz, and 8 KHz tone bursts on the cue track. These provide a quick test of cue sensor operation.

5.6.5 Cue Sensor Sensitivity (150 Hz) (Option)

NOTE

This paragraph applies to all models except the 1070-SDL.

The optional CA-201 150 Hz Cue Sensor is mounted on the MB-102 Reproduce Master Board. R15 is the sensitivity control which should be set to detect a 150 Hz tone burst at approximately -22 dBm. Remove the cue channel preamplifier (PA-101) and feed a 150 Hz tone into the CUE OUTPUT jack at a level of .06V rms. Adjust R15 until the sensor just triggers and lights the Q1 indicator on the front panel. Check the operation of the sensor several times.

Finally, replace the PA-101 preamplifier on the MB-102 Master Board.

5.6.6 Cue Sensor Sensitivity (8 KHz) (Option)

NOTE

This paragraph applies to all models except the 1070-SDL.

The optional CA-201 8 KHz Cue Sensor is mounted on the MB-102 Reproduce Master Board. R15 is the sensitivity control which should be set to detect an 8 KHz tone burst at approximately -37

dBm. Remove the cue channel preamplifier (PA-101) and feed an 8-KHz tone into the CUE OUTPUT jack at a level of approximately .01V rms. Adjust R15 until the sensor just triggers and lights the QII indicator on the front panel. Check the operation of the sensor several times.

Finally, replace the PA-101 preamplifier on the MB-102 Master Board.

NOTE

Tune the bias traps on the RE-203 and RE-302 boards only with a non-metallic screwdriver such as the G.C. Electronics number 2515 alignment tool.

5.6.7A Bias Trap on Program Record Equalizer (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

L1 and C5 on the RE-203 board mounted on the MB-103 Record Master Board form a bias trap to isolate the 100 KHz bias from the program record amplifiers. While the unit is recording depress the meter switch (front panel) to the BIAS position. Tune L1 for a peak reading on the meter.

5.6.7B Bias Traps on Program Record Equalizer (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL only.

Two bias traps on the RE-203 board mounted on the MB-108 Record Master Board isolate the 100 KHz bias from the program record amplifiers. L2 and C9 form the trap for channel A; L1 and C5 the trap for channel B.

While the unit is recording depress the channel B (RIGHT) meter switch (front panel) to the BIAS position. Tune L1 for a peak reading on the meter. Now depress the channel A (LEFT) meter switch to the BIAS position and tune L2 for a peak reading.

5.6.8A Bias Trap on Cue Record Equalizer (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

L1 and C5 form a bias trap on the RE-302 cue driver board mounted on the MB-103 Record Master Board. Remove the DA-104, PA-101, and CG-102 boards to reach the access hole in the RE-302. Manually cock the pressure roller and place the unit in record. Do not press the START button, however. Tune L1 for a maximum voltage (as measured with a high frequency high impedance VTVM) across terminals 23 and 24 on the MB-103 board.

Finally replace the boards removed.

5.6.8B Bias Trap on Cue Record Equalizer (Stereo)

NOTE

This paragraph applies to model 1070-RPS only.

L1 and C5 form a bias trap on the RE-302 board mounted on the MB-108 Record Master Board. Remove the two DA-104 boards and the CG-102 generators to reach the access hole in the RE-302. Manually cock the pressure roller and place the unit in record. Do not press the START button, however. Tune L1 for the maximum voltage (as measured with a high frequency, high impedance VTVM) across terminals 18 and 19 on the MB-108 board.

Finally replace the boards removed.

NOTE

Tune the bias traps on the RE-203 and RE-302 boards only with a non-metallic screwdriver such as the G.C. Electronics number 2515 alignment tool.

5.6.9A Cue Record Bias Level (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

The level of the bias to the cue record head is determined by C6 on the MB-103 Record Master Board. Adjust C6 for 15V rms (measured with a high impedance, high frequency VTVM) across terminals 23 and 24 of the MB-103 board.

5.6.9B Cue Record Bias Level (Stereo)

NOTE

This paragraph applies to model 1070-RPS only.

The level of the bias to the cue record head is determined by C7 on the MB-108 Record Master Board. Adjust C7 for 15V rms (measured with a high frequency, high impedance VTVM) across terminals 18 and 19 of the MB-108 board.

5.6.10A Program Record Bias Level (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

The bias level to the program record head is set by C8 on the MB-103 Record Master Board. Program record bias should be adjusted while recording a 400 Hz tone and observing the reproduced output.

Feed a 400 Hz tone into the program input jack and adjust the LINE LEVEL control for -10 VU on the meter. Begin recording a bulk-erased cartridge. Observe the reproduced output and adjust C8 for the peak output level.

The bias adjustment of the program record head is very important. Too high a bias level will actually decrease high frequency response. Bias requirements will vary from tape type to tape type. If more than one type of tape is in use, check the performance of each type at its optimum bias level against its performance at the optimum-bias level for other types. Where older and newer types are both in use, a setting just less than the optimum for the newer type usually is an acceptable compromise.

5.6.10B Program Record Bias Level (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL only.

The bias level to the channel A record head is set by C13 on the MB-108 Record Master Board. Program record bias should be adjusted while recording a 400 Hz tone and observing the reproduce output.

Feed a 400 Hz tone into the CHAN A IN jack on the rear panel and adjust the LEFT LEVEL control for -10 VU on the meter. Begin recording a bulk-erased cartridge. Observe the reproduced output and adjust C13 for the peak output level.

The bias level to the channel B record head is set by C10 on the MB-108 Record Master Board.

Feed a 400 Hz tone into the CHAN B IN jack on the rear panel and adjust the RIGHT LEVEL control for -10 VU on the meter. Begin recording a bulk-erased cartridge. Observe the reproduced output and adjust C10 for the peak playback output level.

The bias adjustment of the program record heads is very important. Too high a bias will actually decrease high frequency response. Bias requirements will vary from tape type to tape type. If more than one brand of tape is in use, check the performance of each at its optimum bias level against its performance at the optimum bias for other types. Where older and newer types are in use, a setting just less than the optimum for the newer type useable is an acceptable compromise.

5.6.11A VU Meter Calibration (Bias Position) (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

R16 on the MB-103 Record Master Board should be adjusted so that the VU meter (front panel) reads "0" VU in the BIAS position when the optimum bias level has been set.

5.6.11B VU Meter Calibration (Bias Position) (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL only.

R20 and R21 on the MB-108 Record Master Board are the VU Meter calibration trimmers for the BIAS positions. R20 for channel B and R21 for channel A. The trimmers should be adjusted so that the VU meters read "0" VU in BIAS position when the optimum bias level has been set.

5.6.12A VU Meter Calibration (PGM position) (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

R15 on the MB-103 Record Master Board is the VU meter calibration trimmer for the program position. The meter should read "0" VU when the input level is sufficient to record a tape that will reproduce at a level equal to the NAB standard operating level. This adjustment is made while recording a 400 Hz tone.

If the unit is not adjusted for output at standard operating level, use an NAB alignment test tape and adjust the PLAY LEVEL TRIM for standard operating level output at 400 Hz.

Feed a 400 Hz tone into the program INPUT jack and record a bulk-erased cartridge. Adjust the LINE LEVEL control (front panel) so that the reproduced output is 0 dB. Now adjust R15 on the MB-103 Record Master Board until the VU meter on the front panel reads "0" VU.

5.6.12B VU Meter Calibration (PGM position) (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL only.

R18 (Channel B) and R19 (Channel A) on the MB-108 Record Master Board are the calibration trimmers for the PGM positions on the VU meters. The meter should read "0" VU when the input level is sufficient to record a tape that will reproduce at a level equal to the NAB standard operating level. This adjustment is made while recording a 400 Hz tone.

If the unit is not adjusted for output at standard operating level, use an NAB alignment test tape and adjust the two PLAY LEVEL TRIM'S for standard operating level output at 400 Hz.

Feed a 400 Hz tone to the CHAN A and CHAN B IN jacks and record a bulk-erased cartridge. Adjust the RIGHT and LEFT level controls (front panel) so that the reproduced outputs are at 0 dB. Now adjust R18 (RIGHT) and R19 (LEFT) on the MB-108 Board until the VU meters on the front panel read "0" VU.

5.6.13A Program Record Equalization (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

The record frequency compensation controls are on the RE-203 board mounted on the MB-103 Record Master Board. R3 adjusts the high frequency end and R6 the low. These are adjusted while recording tones from a signal generator connected to the INPUT jack (rear panel).

Adjust the LINE LEVEL control (front panel) to yield a reproduced output of standard operating level at 400 Hz. Now feed a 15 KHz tone to the recorder at -10 dB by adjusting the output of the signal generator rather than the LINE LEVEL control. Begin recording a blank cartridge and adjust R3 to yield a reading 10 dB below standard operating level at the reproduced output.

Feed a 50 Hz tone in at -10 dB and begin recording. Adjust R6 for a -10 dB reproduced output.

5.6.13B Program Record Equalization (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL only.

The Channel A record frequency compensation controls are on the RE-203 board mounted on the MB-108 Record Master Board. R18 adjusts the low frequency end and R21 the high. These are adjusted while recording tones from a signal generator connected to the CHAN A IN jack on the rear panel.

Adjust the LEFT LEVEL control (front panel) to yield a reproduced output of standard operating level at 400 Hz. Now feed a 15 KHz tone to the recorder at -10 dB by adjusting the output of the signal generator rather than the LEFT LEVEL control. Begin recording a blank cartridge and adjust R21 to yield a reading 10 dB below standard operating level at the reproduced output.

Feed a 50 Hz tone in at -10 dB and begin recording. Adjust R18 for a -10 dB reproduced output.

The frequency compensation networks for channel B are also on the RE-203 board mounted on the MB-108 Record Master Board. R3 adjusts the high frequency end and R6 the low.

Connect the signal generator to the CHAN B IN jack on the rear panel. Adjust the RIGHT LEVEL control to yield a reproduced output of standard operating level at 400 Hz.

Now feed a 15 KHz tone to the recorder at -10 dB by adjusting the output of the signal generator rather than the RIGHT LEVEL control. Begin recording a blank cartridge and adjust R3 to yield a reading 10 dB below standard operating level at the reproduced output.

Feed a 50 Hz tone in at -10 dB and begin recording. Adjust R6 for a -10 dB reproduced output.

NOTE

After adjusting the channels A and B record equalization, sweep the audio signal generator over the entire frequency range. Note any extreme deviations in frequency response and adjust the recording frequency compensation networks for the best overall flat response.

5.6.14 1,000 Hz Cue Tone Generator Level

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL and 1070-RPS only.

R19 on the CG-102 board mounted on the MB-103 (or MB-108) Record Master Board adjusts the output level of the stop cue tone generator. The level should be set by recording a tone on the cue track and measuring the reproduced output at the CUE OUTPUT jack (rear panel).

Place the unit in the record mode, but do not push the START button. Instead, manually cock the pressure roller and push the play solenoid armature to bring the roller against the capstan so tape will move. This will cause a continuous recording of the tone rather than a burst. Adjust R19 for .06V rms (measured with a high impedance VTVM) at the cue output jack.

5.6.15 1,000 Hz Cue Tone Generator Frequency

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL and 1070-RPS only.

The frequency of the generator is adjusted by R17 on the CG-102 board mounted on the MB-103 (or MB-108) Record Master Board. The frequency should be adjusted to 1,000 Hz \pm 75 Hz. Heterodyne the CG-102 output with that of another audio oscillator of known accuracy. The RE-302 cue driver may be removed to give a higher level at the auxiliary cue input jack.

5.6.16 1,000 Hz Cue Tone Generator Purity

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

R18 is the feedback or purity control for the CG-102 board mounted on the MB-103 Record Master Board. R18 should be adjusted so that the output of the generator has a total harmonic distortion of less than 1%. This adjustment is not critical, but gross misadjustment may cause the generator to fail to turn-on or turn-off.

5.6.17A VU Meter Calibration (Tone Position) (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL only.

R9 on the RE-302 board mounted on the MB-103 Record Master Board is the calibration trimmer for the VU meter in the TONE position. Place the unit in record, but do not press the START button. Depress the meter switch to the TONE position and adjust R9 until the VU meter reads "0" VU.

5.6.17B VU Meter Calibration (Tone Position) (Stereo)

NOTE

This paragraph applies to model 1070-RPS only.

R9 on the RE-302 board mounted on the MB-108 Record Master Board is the calibration trimmer for the TONE position on the LEFT (channel A) VU meter. Place the unit in record, but do not press the START button. Depress the meter switch to the TONE position and adjust R9 until the VU meter reads "0" VU.

5.6.18 150 Hz and 8 KHz Cue Tone Generators Level (Optional)

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

R19 on the optional CG-102 150 Hz and CG-102, 8,000 Hz boards mounted on the MB-103 (or MB-108) Record Master Board adjusts the output levels of the QI and QII generators. The level should be set by recording a tone on the cue track and measuring the reproduced output at the CUE OUTPUT jack on the rear panel.

Place the unit in the record mode and begin recording a bulk-erased cartridge. Depress the QI or QII button on the front panel and hold it to make a continuous recording.

For QI adjust R19 on the CG-102 150 Hz board for .125V rms (measured with a high impedance VTVM) at the CUE OUTPUT jack. For QII adjust R19 on the CG-102 8,000 Hz board for .022V rms (measured with a high impedance VTVM) at the CUE OUTPUT jack.

NOTE

While the TONE position of the VU meter is calibrated for the 1,000 Hz tone, the meter will give a relative indication of the QI and QII tone levels. After the QI and QII generator levels are set, note the TONE position meter reading for future reference.

5.6.19 150 Hz and 8 KHz Cue Tone Generators Frequency (Optional)

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

The frequency of the optional QI and QII generators is adjusted by R17 on the CG-102 150 Hz and CG-102 8,000 Hz boards mounted on the MB-103 (or MB-108) Record Master Board. The frequency should be adjusted to 150 Hz \pm 30 Hz or 8,000 Hz \pm 1,000 Hz. At the AUX CUE INPUT jack heterodyne the output of the CG-102 with that of another audio oscillator of known accuracy. To increase the level, remove the RE-302 Cue Driver.

5.6.20 150 Hz and 8 KHz Cue Tone Generators Purity (Optional)

NOTE

This paragraph applies to models 1070-RP, 1070-RP/DL, and 1070-RPS only.

R18 is the feedback or purity control on the CG-102 150 Hz and CG-102 8,000 Hz boards mounted on the MB-103 (or MB-108) Record Master Board. R18 should be adjusted so that the output of the generator has a total harmonic distortion of less than 2% in the 150 Hz unit and less than 1% in the 8,000 Hz unit. This adjustment is not critical, but gross misadjustment may cause the generator to fail to turn on or turn-off.

5.6.21 Erase Bias Level

NOTE

This paragraph applies to models 1070-RP/DL and 1070-SDL only.

The erase head should provide a 55 dB erasure. This can be checked by recording a cartridge, playing it back, erasing the cartridge, and again playing it back. No program material should remain above -55 dB. The level of the output of the bias oscillator to the erase head is controlled by C10 on the MB-103 (or C7 on the MB-108/2018) Record Master Board. Adjust C10 (C7) for approximately 40V rms (measured with a high impedance, high frequency VTVM) across terminals 29 and 30 of the MB-103 (or 18 and 19 of the MB-108/2018) board.

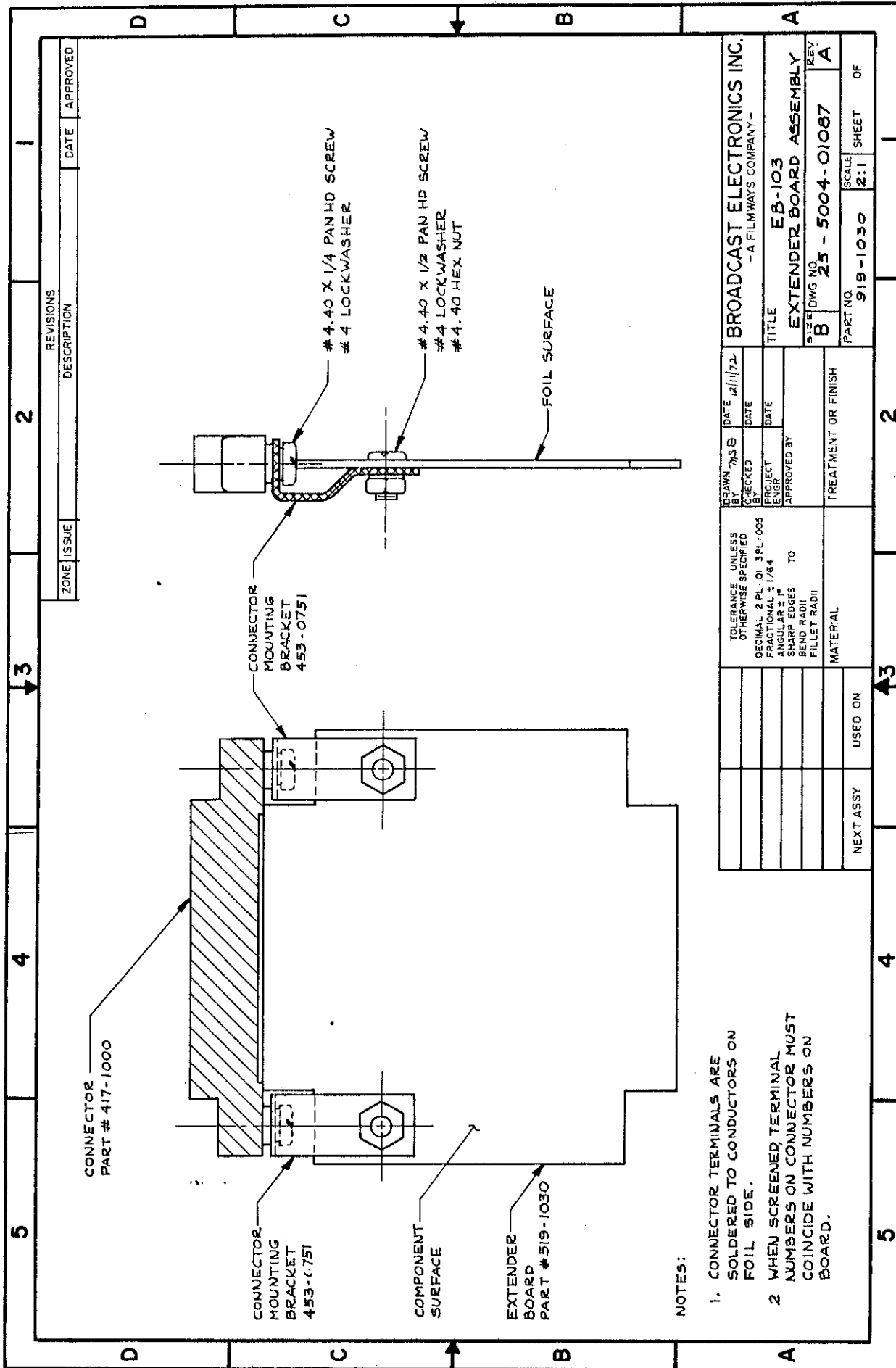
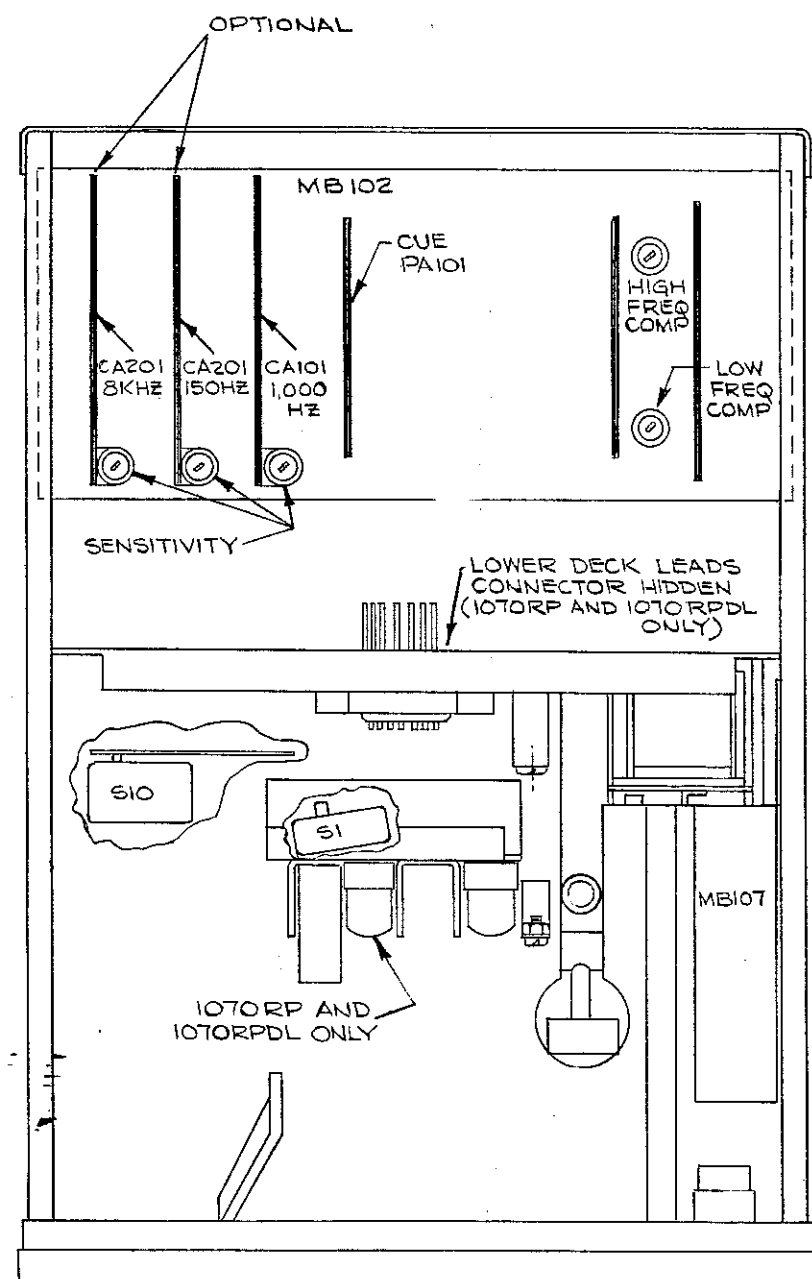
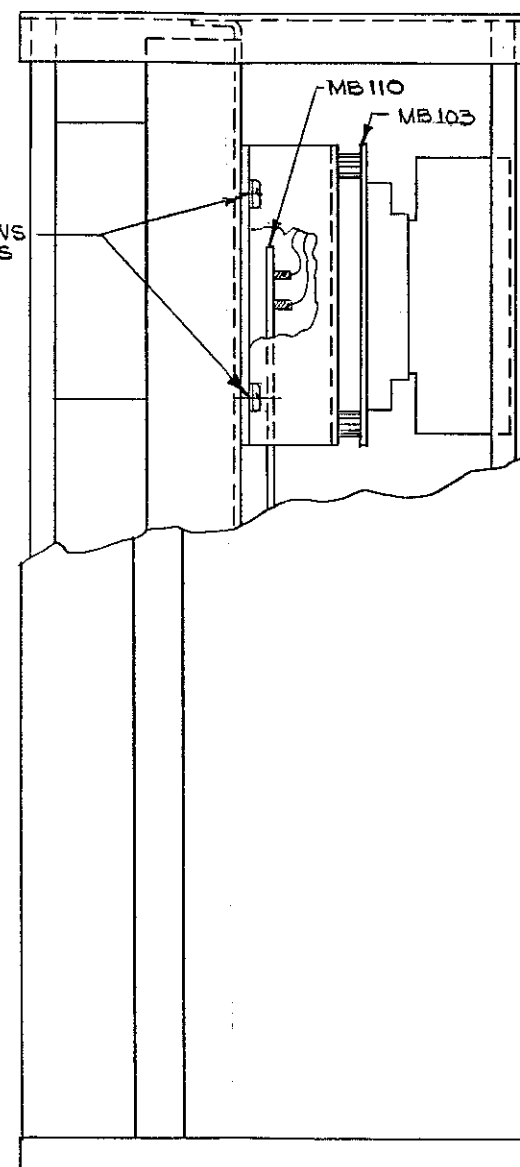


Figure 5-1. EB-103 Extender Board

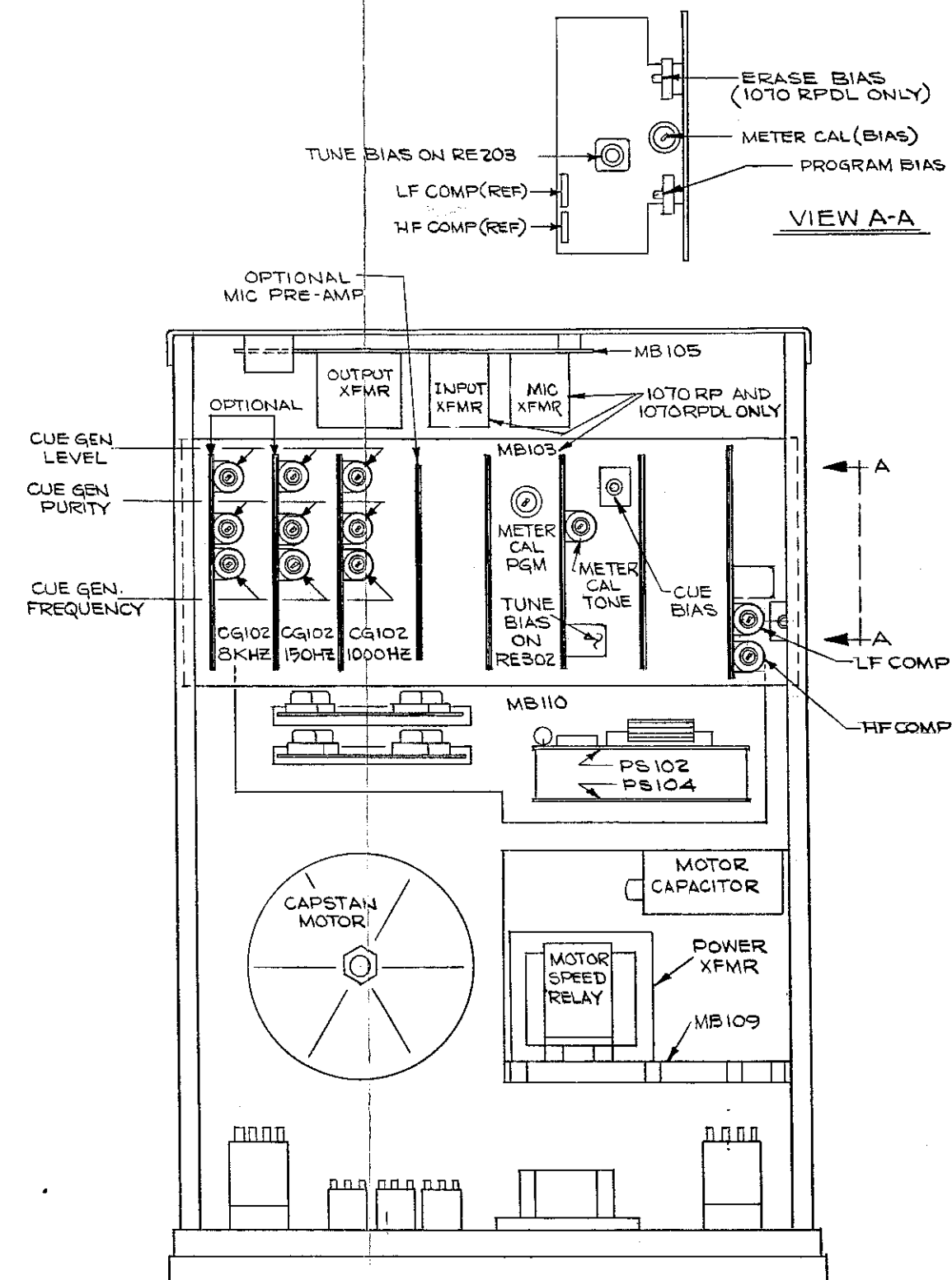


TOP VIEW
COVER & SIDE TRIM REMOVED

REMOVE FOUR SCREWS
IN LOWER BRACKETS
TO REACH HIDDEN
CONNECTIONS ON
MB110 (1070 RP AND
1070RPDL ONLY)



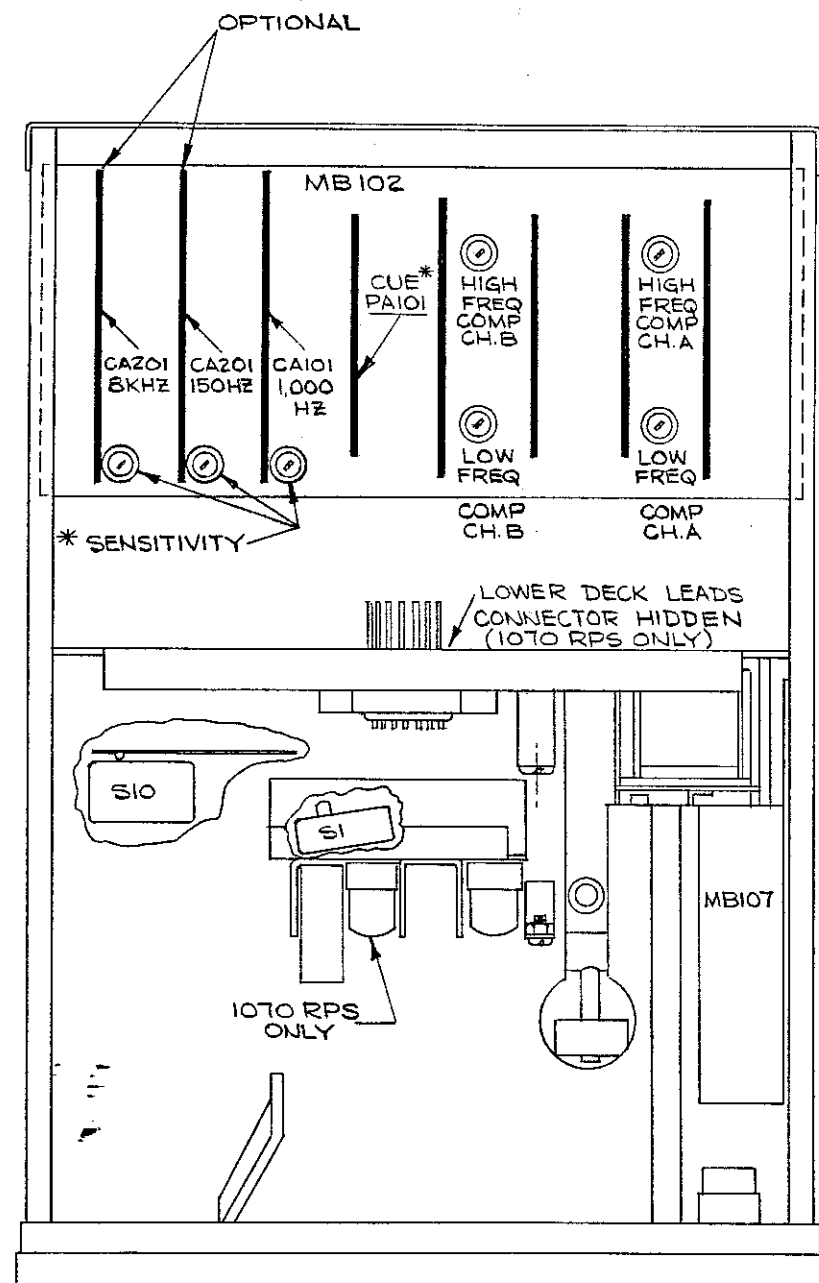
SIDE VIEW



BOTTOM VIEW
COVER AND SIDE TRIM REMOVED

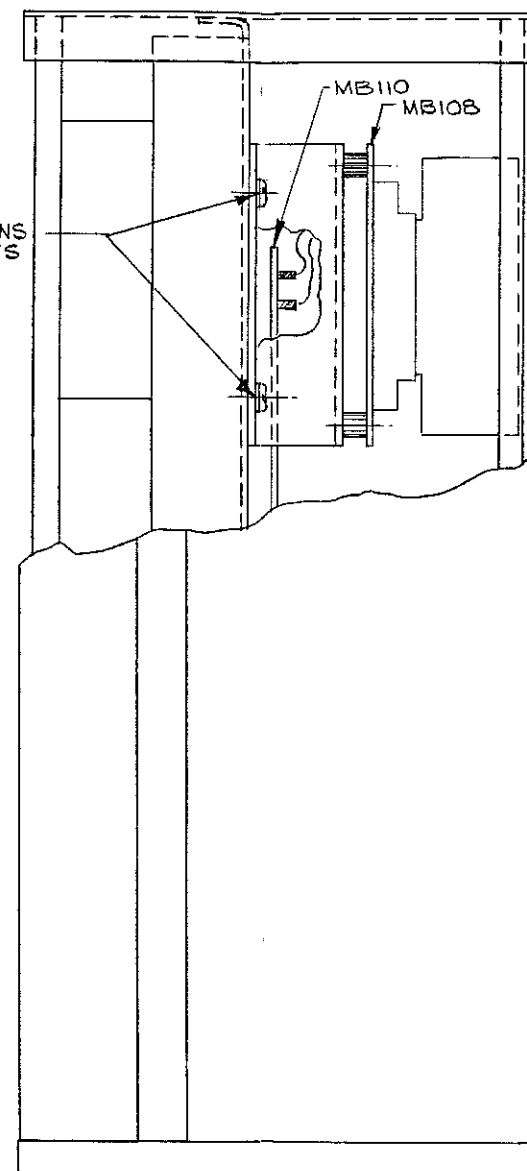
TOP & BOTTOM VIEWS
1070P, 1070RP AND 1070RPDL
43-1001-00219

Figure 5-2. Top and Bottom Views (Mono Units)



TOP VIEW
COVER & SIDE TRIM REMOVED

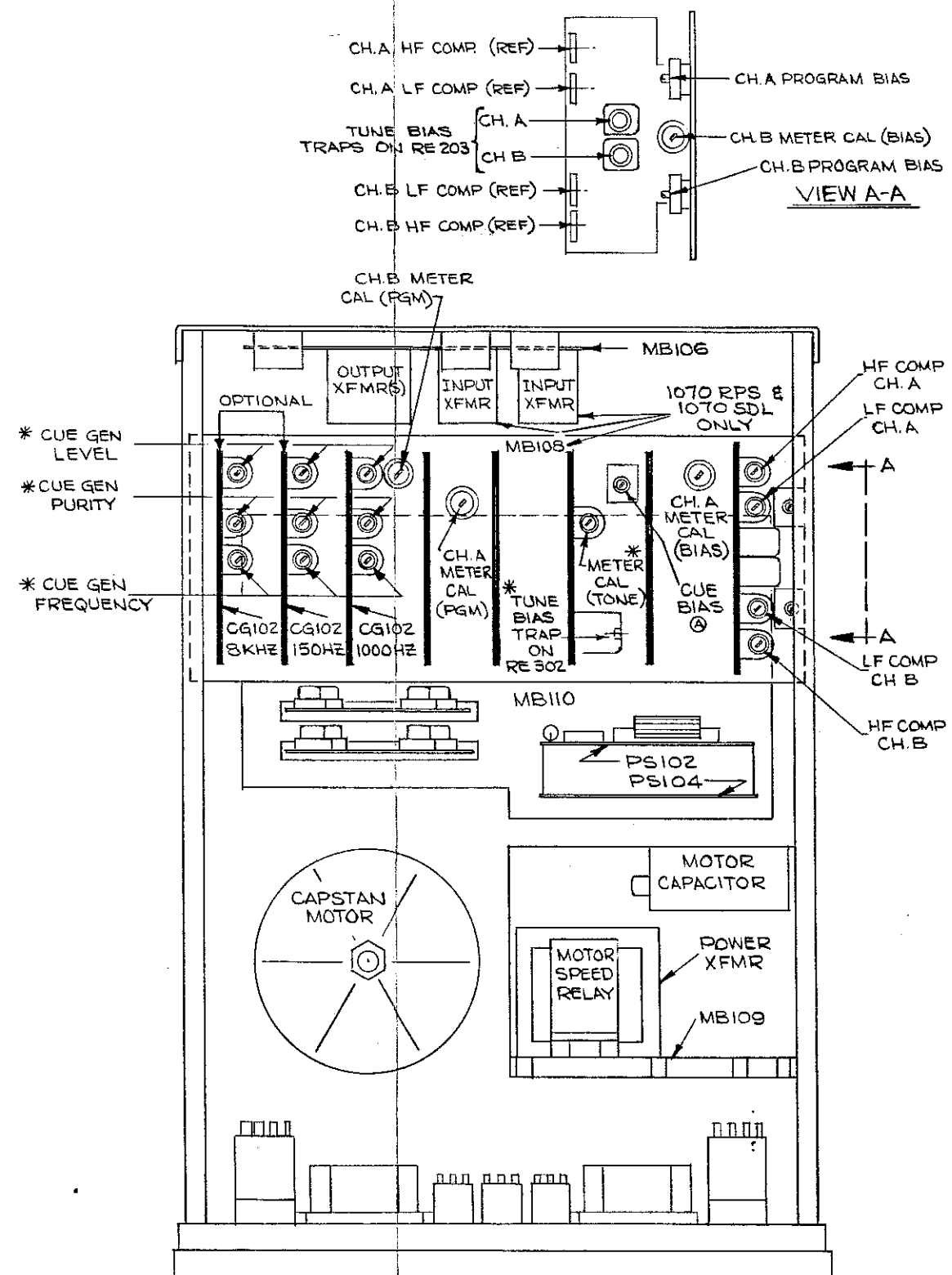
REMOVE FOUR SCREWS
IN LOWER BRACKETS
TO REACH HIDDEN
CONNECTIONS ON
MB110 (1070 RPS &
1070 SDL ONLY)



SIDE VIEW

NOTES:

1. * NOT IN 1070 SDL UNITS
2. @ ERASE BIAS ADJUSTMENT IN 1070 SDL UNITS.



BOTTOM VIEW
COVER AND SIDE TRIM REMOVED

TOP & BOTTOM VIEWS
1070 PS, 1070RPS & 1070 SDL

Figure 5-3. Top and Bottom Views (Stereo Units)

SECTION 6

MECHANICAL DESCRIPTION, MAINTENANCE, AND ADJUSTMENTS

6.1 MECHANICAL SYSTEM

A dual speed, hysteresis synchronous motor provides direct capstan drive for the TEN/70 models. The motor is attached to the main frame of the chassis. The motor capstan shaft passes up through the deck surface. The pressure roller pinches the tape in the cartridge against the capstan to move the tape.

The tape head or heads are mounted on a bracket attached to the top surface of the deck. The unit may be equipped with either the standard microadjustable head bracket or the optional PHASE-LOK head bracket. (The PHASE-LOK is standard on the 1070-SDL.) Both head brackets are discussed in this Section.

Microswitch S10 is mounted on the main frame (beneath the deck). This normally closed switch is opened when the deck is in place but closes to turn on the motor when a cartridge is in the deck.

One or two 14-pin connectors carry all electrical connections to the deck. Interconnections are made on the MB-107 printed circuit board which is mounted on the deck.

The deck is held in place by the anchor block screw. The deck is removed by loosening the anchor block screw and sliding the deck out of the chassis.

6.2 OPERATION OF THE DECK (See Figure 6-1)

Inserting a cartridge moves the push link assembly (A), rotates the pivot lever actuator (B), and, through the wire link and cam (C), rotates the pressure roller shaft assembly (D), bringing the pressure roller into the vertical ready position. The roller is held in place by the pressure roller latch (E) seating in the slot of cam (C). S10 turns on the motor, and S1 enables the control logic.

The play solenoid (F) is energized when the start button is pushed, pulling the roller shaft assembly towards the back of the deck and the pressure roller against the capstan.

When the cartridge re-cues or the stop button is pushed, the play solenoid de-energizes and the return spring (G) brings the roller shaft assembly back to the ready position. When the Ready/Release button is pushed, the release solenoid (H) unseats the latch (E) from the cam (C) allowing the roller assembly to return to the horizontal position.

NOTE

The release and play solenoids are electrically interlocked so that a cartridge can only be removed when a cartridge is not running. A cartridge cannot be released if the AC power is off.

6.3 MECHANICAL ADJUSTMENTS

When making adjustments on the mechanical assembly, keep in mind the interdependence of the various assemblies. One mechanical adjustment will necessitate another. Normally only the pressure roller needs to be adjusted by the user. However, should the deck not appear to function properly, refer to the mechanical set-up procedure outlined in this Section.

6.3.1 Pressure Roller Azimuth and Pressure Adjustments

See Figure 6-1.

From time to time, as the pressure roller wears, it will be necessary to readjust the pressure the roller exerts on the capstan shaft. Before beginning, clean the pressure roller and capstan. Be sure the deck is properly seated so that the anchor block is flush against the bulkhead of the chassis.

There are two access holes in the front edge of the deck. Behind the hole on the right, below the Ready/Release button, is the screw to adjust roller PRESSURE. Behind the SPOTMASTER nameplate is the screw which adjusts the roller's AZIMUTH or perpendicularity with respect to the deck. Push up on the right hand side of the SPOTMASTER logo to rotate it from in front of the pressure roller AZIMUTH adjustment access hole.

NOTE

The AZIMUTH adjustment screw (behind the SPOTMASTER nameplate) SHOULD NOT BE USED TO ADJUST THE ROLLER PRESSURE. To confuse these two adjustments will cause improper adjustment of the mechanical assembly.

With the deck in place in the chassis, press the push link assembly (A) back until the pressure roller latches in the vertical ready position. Observe the gap between the roller and the capstan. Check to see that the roller's shaft is parallel to the capstan. With the finger press back slightly on the pressure roller to take up any slack in the roller shaft assembly. (Should this slack exceed 1/32 inch refer to the complete mechanical adjustment procedures.)

If the two shafts are not parallel, insert an XCELITE Phillips screwdriver through the access hole behind the nameplate on the left front of the deck. Adjust the roller AZIMUTH until the two shafts are parallel. Before adjusting roller pressure, the roller azimuth should always be checked.

NOTE

Never force the pressure or azimuth adjusting screws. The linkages may bend if forced.

To set the roller pressure, press the start button. Insert the 7/64 inch Allen wrench through the access hole on the RIGHT FRONT edge of the deck (below the Ready/Release button). Turn this roller pressure adjustment screw counterclockwise until the pressure roller just contacts the capstan. Now turn the pressure adjustment screw 3/4 turn CLOCKWISE.

NOTE

In some TEN/70 models both the roller AZIMUTH and PRESSURE adjusting screws require the 7/64 inch Allen wrench. With these decks be especially careful not to accidentally adjust the AZIMUTH instead of the PRESSURE.

When a flutter meter is available, the pressure roller adjustment may be made by adjusting for minimum pressure and minimum flutter output when playing a standard flutter test tape.

Finally, run several cartridges in the deck to check operation. Test with the longest length cartridge the deck will have to handle.

6.3.2 Mechanical Set-Up Procedure

The following is a step-by-step procedure to be used if the deck fails to operate properly.

Loosen the anchor block screw and slide the deck out of the chassis. Loosen the three play solenoid mounting screws. Square the solenoid by PRESSING the armature against the coil plate and tightening the mounting screws.

Travel of the play solenoid is controlled by the rubber-tipped bumper strip mounted underneath the deck, just forward of the play solenoid. In the de-energized position the armature should be 0.050 inch (the thickness of a dime) away from the coil plate.

Insert a 7/64 inch Allen wrench through the front of the deck to the pressure roller PRESSURE adjustment screw (the right hand opening just below the Ready/Release button). Adjust this screw until the pin on the end of the roller shaft assembly (D) is centered in the slot in the play solenoid armature assembly.

Now cock the pressure roller into the vertical ready position manually. Insert an XCELITE No. X100 Phillips screwdriver in the pressure roller AZIMUTH adjustment screw. Adjust this screw until the pressure roller is perpendicular to the surface of the deck.

NOTE

In some TEN/70 models both the AZIMUTH and PRESSURE adjusting screws require the 7/64 inch Allen wrench. With these decks be particularly careful not to confuse the AZIMUTH and PRESSURE adjustments.

Now check the roller shaft assembly for play. The shaft should not be able to move more than 1/32 of an inch laterally. Loosen the two screws which mount the electrical release assembly and adjust the shaft assembly for minimum play. The shaft should rotate freely without binding. Re-tighten the two mounting screws securely.

To manually release the roller assembly, press on the lever of the release solenoid (H). Manually cock the pressure roller several times to see when the switch actuator contacts S-1. Adjust the switch actuator so that it will activate S1 without striking the body of the switch.

Next check the release solenoid (H) and lift. The armature should sit down flat against the coil when the solenoid is energized. The release lift should raise the latch (E) just enough to clear the slot in the cam (C) when the solenoid energizes.

Cock the pressure roller manually. Loosen the two coil mounting screws. With the thumb slowly press the armature against the coil until the latch releases. Now tighten the mounting screws. Check the release operation manually several times. The lift should easily release the latch. The latch should just clear the cam; travel of the release lift should be at a minimum. Repeat the adjustment as often as necessary to get smooth operation. Since the coil is spring-loaded, the mounting screws must be tight or the adjustment will not hold.

Now set the latch so that there is no slop when the latch is seated in the slot of the cam. Cock the pressure roller. Loosen the two screws which mount the latch. Adjust the latch laterally to minimize the slop. But do not cock the latch so much that it is jammed in the slot. This will not allow the latch to release. Too much play will allow the tape to creep when a cartridge is inserted.

Slide the deck back in the chassis and tighten the anchor block screw. Be sure the anchor block screw draws the anchor block flush against the bulkhead of the chassis.

The screw a cartridge butts against on the push link assembly (A) controls how far back on the deck a cartridge can travel. If this screw is set too far out the roller will interfere with the cartridge housing or the lock spring in the cartridge. Turn the screw clockwise until it is screwed all the way into its lock nut.

By hand cock the pressure roller in the vertical ready position. The pressure roller will bear against the capstan. Insert a 7/64 inch Allen wrench through the hole in the front of the deck just below the Ready/Release button (roller PRESSURE adjustment screw) and adjust counterclockwise until the pressure roller is 1/32 inch away from the capstan.

With your hand, pull back slightly on the pressure roller. Notice whether or not the pressure roller's shaft is parallel with the capstan. If it is not, the hole behind the SPOTMASTER nameplate gives access to the pressure roller AZIMUTH adjustment screw. With your finger keep a light tension on the pressure roller and adjust the roller AZIMUTH with an XCELITE No. X100 Phillips screwdriver until the two shafts are parallel.

NOTE

Do not force the pressure roller azimuth or pressure adjustment screws. These parts may bend if forced.

When the pressure roller azimuth is set, press the start button. Insert the 7/64 inch Allen wrench through the access hole below the Ready/Release button. Turn this roller PRESSURE adjustment screw clockwise until the pressure roller just contacts the capstan and the roller just begins to turn. Now turn the PRESSURE adjustment screw 3/4 turn CLOCKWISE. The pressure the roller exerts on the capstan is now set.

Press the STOP button. The pressure roller should move back to the vertical ready position. Now press the Ready/Release button. The pressure roller should return to its horizontal position below the deck surface.

Now adjust the screw on the push link assembly (A) by turning it counterclockwise in steps of no more than one turn. After each step, SLOWLY push in a cartridge, pushing on the cartridge on the side next to the Ready/Release button so that the cartridge is not skewed as it is pushed in. The cartridge must be inserted slowly so that the linkage is not forced. Keep adjusting the push link assembly screw in one turn steps until the cartridge will latch into place with the pressure roller in the vertical ready position as the cartridge just touches the cartridge stop pin.

When adjusted properly, the cartridge will latch into place smoothly and tape will not move if the cartridge is pushed in. Some play is necessary or the lock spring in the cartridge may not release or the play solenoid may not pull in.

If the deck will not properly handle a cartridge, recheck the adjustments. In particular, the two screws which hold the play solenoid bumper strip must be tight. If not, tape will move when the cartridge is pushed. Repeat the mechanical setup procedures.

An indicator of improper adjustment is the amount of adjustment necessary to set the pressure roller azimuth and pressure. After the procedures with the deck removed from the chassis, the roller

azimuth and pressure adjustment screws should be tightened two (2) turns at the most. If more turns are used, repeat the mechanical set-up procedures.

Always adjust the deck in the following order: With the deck out of the chassis:

1. Square the play solenoid.
2. Set the travel of the play solenoid.
3. Center the pin of the roller shaft assembly in the play solenoid armature assembly.
4. Adjust the roller shaft azimuth so the pressure roller is perpendicular to the deck surface.
5. Minimize play in the roller shaft assembly.
6. Set the switch actuator.
7. Set the release solenoid armature travel.
8. Adjust the latch.

With the deck in the chassis:

9. Turn the push link assembly screw clockwise until it is all the way into its lock nut.
10. Set the pressure roller AZIMUTH.
11. Set the pressure roller PRESSURE.
12. Adjust the push link assembly.

Once the deck is operating properly, check the cartridge hold down spring. It should press down on the cartridge slightly but not enough to hold the cartridge in place when the Ready/Release button is pushed.

6.4 MECHANICAL PARTS REPLACEMENT

6.4.1 Motor Replacement

See Figures 5-2 and 5-3.

Remove the side and bottom covers.

Remove the deck and place the unit on its right side so the motor is down and the stop button up.

The motor is held in place by three screws through the main plate of the chassis to the motor. Remove the mounting screws. (The motor can be held in place by its shaft or its case.) Set aside the mounting plate.

The motor leads are connected to the MB-109 printed circuit board (see Figure 4-19) which also mounts the transformer and motor speed relay. Looking at the diagram of the MB-109, notice that the eight leads from the motor are connected to pins 15 - 22, all in the area between relay K-1 and the capacitors.

Remove the relay and unsolder the motor leads. Use a small iron to avoid damaging the board or its components. Connect the leads of the replacement motor and replace the relay.

NOTE

Remove as much solder as possible from the terminals so that the replacement leads can be wrapped securely around the terminals before resoldering.

Turn the chassis upside down. To gain more work room position the chassis out over the edge of the workbench. Position the motor mounting plate so that its holes line up with the holes in the chassis. Fit one of the mounting screws through the chassis and mounting plate. Now fit the shaft of the motor through the chassis and line up one of its threaded holes with the screw. Tighten loosely. Fit a second screw through the chassis into the motor and tighten. Fit and loosely tighten the third screw.

Turn the chassis right side up and tighten all three screws. Turn on the AC power. The motor should run counter-clockwise if the deck has not been replaced. Replace the deck and tighten the anchor block screw. Insert a cartridge and operate the drive in both the normal and fast forward modes. Finally replace the chassis covers.

6.4.2 Pressure Roller Replacement

See Figure 6-1.

It is not necessary to remove the deck to replace the pressure roller. Cock the pressure roller in the vertical ready position by pressing on the push link assembly (A). Remove the E retaining washer and the teflon washer. Slip the roller off its shaft and slip the replacement on. Replace the teflon washer and the E retaining washer.

NOTE

Whenever the pressure roller is replaced or removed the pressure should be checked as outlined in paragraph 6.3.1.

6.5 MICROADJUSTABLE HEAD BRACKET

NOTE

See paragraph 6.6 for the PHASE-LOK head bracket.

See Figure 6-2.

The heads are mounted in a precision assembly designed to provide ease of adjustment but secure mounting. The head fits through the mounting bracket and is threaded into the brass hex-headed collar (clamping nut). A single screw clamps this collar into the clamping block. The block is held between a spring on its underside and the two adjustable screws on the top. A brass Belleville conical washer between the clamping block and the mounting bracket restricts the movement of the head and the block. Thus the head is held securely in gross adjustment. Fine adjustment is provided by the two set screws which bear on the top of the clamping block.

The path the tape travels over the head is maintained by a system of guides mounted both in the cartridge and on the head mounting bracket. The guides are attached to the mounting bracket with single screws. The guides should be down square against the surface of the deck.

6.5.1 Head Alignment - Microadjustable Head Bracket

See Figures 6-4 and 6-5 (mono) or 6-6 (stereo).

The alignment of a new head or the realignment of a head requires two adjustments: tracking height and azimuth. The reproduce head is adjusted first and then the record head. The heads should be cleaned with BE-903 Cleaning fluid or isopropyl alcohol before beginning the adjustments.

Check the tracking height of the reproduce head. Remove the pressure pads from the cartridge so that the tape can be watched as it passes the head. The top can be left off of the cartridge if the hold-down wire is glued in place. Or a section may be cut out of the top in the area of the pressure pads. See Figure 6-4.

NOTE

When adjusting head tracking height and azimuth, final turns should be made on the adjusting screws clockwise so that the spring under the mounting block is being compressed. The adjustment screws are .050 inch Allen. A proper size Allen wrench is included with each TEN/70.

Place the tracking cartridge in the machine and put the tape in motion. Observe the tape travel path across the head. Adjust the tracking height screw until the top edge of the tape just covers the top of the head pole piece and the bottom edge of the tape just covers the bottom pole piece.

Remove and re-insert the tracking test cartridge and stop and start tape motion several times. If the tape does not repeat each time, check the tape guides mounted on the head mounting bracket. The guides should be down square against the deck surface.

When tracking height is adjusted, remove the tracking test cartridge and insert a 15 KHz azimuth test tape. Set the tape in motion and observe the output level on a VU meter. Adjust the reproduce head azimuth adjustment screw for maximum output.

NOTE

When aligning a newly installed head it may not be possible to get correct azimuth if the brass collar has been tightened too much. This will compress the washer so much that the head and the clamping block cannot move.

Remove the azimuth test cartridge and re-insert the tracking cartridge. If the tracking height must be readjusted also readjust the head azimuth.

When the reproduce head adjustments are complete, adjust the tracking height of the record head. The azimuth of the record head is determined by recording a 15 KHz tone and adjusting the record head for maximum output at the reproduce head.

When the tracking height of the record head is set, feed a 15 KHz tone to the record input. Adjust the line level control for a program level indication of -10 VU on the front panel VU meter. Insert an erased cartridge and put tape in motion in the record mode.

Adjust the azimuth adjustment screw of the record head while observing the output level on an external VU meter. Adjust for maximum output. When the azimuth is set, recheck the height with the tracking test cartridge. If the height must be re-adjusted also readjust the azimuth.

Improper tracking height will reduce separation between the cue and program tracks, and cause crosstalk to increase. Improper azimuth will cause high frequency response to decrease. Frequency response should be checked quarterly. See Section 5 for record bias adjustment.

NOTE

The azimuth adjustment of stereo heads is most critical, since a small error will cause phase differences between the A and B channels. When aligning stereo heads, always check the channel phasing. Adjust head azimuth for optimum stereo operation. See paragraph 6.7.

6.5.2 Head Replacement - Microadjustable Head Bracket

See Figure 6-2.

To remove either the reproduce or record head, remove the deck from the chassis by loosening the anchor block screw (see Figure 6-1) and sliding the deck out. Disconnect the head leads from the deck connector. Remove the two screws which hold the head mounting bracket to the deck. Loosen the screw which holds the head assembly in the clamping block. Now remove the brass clamping nut from the threaded bushing of the head, being careful not to lose the conical washer.

Fit the replacement head's bushing through the mounting bracket (printing side up), the conical washer, and the clamping block. Tighten the clamping nut. This nut should be just tight enough to hold the assembly in the mounting block. Press down on one end of the block. If it moves up to its original position, the clamping nut is tight enough. It is too tight if the block remains down.

Remount the bracket on the deck with the two mounting screws. Position the bracket so that its back edge is 1.312 inches from the back edge of the deck. The bracket should be parallel to the front edge of the deck and at a right angle to the cartridge guide flange (see Figure 6-1).

Resolder the head leads to the deck connector. Head tracking height and azimuth adjustments should now be made as described in paragraph 6.5.1.

6.6 OPTIONAL PHASE-LOK HEAD BRACKET

NOTE

Your SPOTMASTER TEN/70 unit may be equipped with either the optional Phase-Lok stereo head bracket described herein or the microadjustable head bracket described previously.

See Figure 6-3.

The Phase-Lok head bracket was designed to minimize tape travel deviation across the head to maximize phase accuracy and repeatability. The head is held in the mounting angle by the flat washer and head nut. Two screws hold the mounting angle (and the head) to the mounting block. The mounting block is suspended above the base plate by three compression springs. Three adjusting screws pass through the mounting block into the base plate. Tightening the adjusting screws compresses the springs and moves the head to set azimuth, zenith, and tracking height. The head position is secured after adjustment by the lock screw which is threaded through the mounting block and bears against the base plate.

Three precision tape guides engage the tape and stabilize its path across the head. The wire cartridge hold-down spring ensures that the cartridge is held flat against the deck surface across the entire front of the cartridge.

6.6.1 Head Alignment - Phase-Lok Head Bracket

Head alignment of the Phase-Lok bracket requires adjusting the tracking height, the zenith, and the azimuth. In record units, the record head is adjusted after the reproduce head. The adjustment screws require an XCELITE No. X100 Phillips screwdriver or the equivalent.

6.6.2 Tracking Height and Zenith - Phase-Lok Bracket

NOTE

When re-aligning a head the complete procedures for setting the tracking height and zenith should not be necessary. Do visually check the zenith and tracking height. If necessary, the front and rear height screws should be trimmed. The complete procedures may not be necessary when replacing a head, if the adjustment screws are not disturbed when the mounting angle is removed and replaced.

Loosen the lock screw and tighten both the front and back height adjustment screws completely until the mounting block is drawn flush against the base plate. With a feeler gauge set the approximate height by loosening the height adjustment screws until the mounting block is 0.050 inches above the base plate. (Or the top surface of the head is 0.684 (11/16) inch above the deck surface.) To keep the head level, be careful to take equal turns on the front and back screws. Once the approximate height is set, use a square to trim the zenith. Adjust the back height screw (Zenith Trim) until the face of the head is perpendicular with the surface of the deck.

NOTE

Front and back height screws will interact.

When the zenith is set, use a test alignment cartridge to trim the height adjustment. While reproducing a 400 Hz tone, adjust the front height screw for peak output. If an alignment cartridge is not available, set the tracking height visually.

Remove the pressure pads from a cartridge so that the tape is visible as it passes the head. The top can be left off of the cartridge if the hold down wire is glued in place. Or a section can be cut out of the top in the area of the pressure pads as shown in Figure 6-4. Observe the tape path across the head. Adjust the height so that the top edge of the tape just covers the top of the pole piece and the bottom edge of the tape just covers the bottom pole piece.

6.6.3 Azimuth - Phase-Lok Bracket

For stereophonic operation, azimuth adjustment is most critical. Minor azimuth error causes phase differences between the program material on the two tracks. When mixed, the phase differences cause deterioration of the frequency response. If head alignment is within ± 2 dB of the

optimum 15 KHz output, the inherent azimuth error is great enough to cause a 90 degrees phase shift at 3 KHz and a 180 degree shift at 6 KHz. In other words, the response at 3 KHz is down 6 dB, and all frequencies above 6 KHz are phase inverted causing loss of directional information in stereo and cancellation in the mono portion of FM multiplex broadcast.

In addition, apparent azimuth errors can be introduced by the angle of the travel of the tape across the head. Assuming standard tolerances for tape width and tape guide aperture, an azimuth error as great as above is possible.

The cumulative results of tape travel and head alignment can easily cause a 90 degree phase shift at 1.5 KHz and complete cancellation at 3 KHz.

Careful head alignment and strict attention to cartridge and guide maintenance are imperative. To allow cartridge interchangeability, all machines in an installation must be adjusted for optimum SYSTEM response. This can best be done by preparing a reproduce alignment cartridge on a record unit. All other machines in the installation can then be adjusted to this one standard. If pre-recorded cartridges are used, the units must be matched to the record machine used to prepare the cartridges.

While a stereophonic NAB alignment cartridge is not presently available, the monophonic version can be used satisfactorily to align the reproduce head. Alternatively, an alignment tape could be made up on a reel to reel recorder and loaded into cartridge. Be certain to use a graphite-lubricated tape intended for cartridge use (such as SCOTCH 156 or equivalent).

The azimuth is adjusted while reproducing a 15 KHz tone from an alignment cartridge. Adjust the azimuth screw for peak 15 KHz output. Remove and re-insert the alignment cartridge several times and repeat the adjustment.

6.6.4 Record Head Alignment - Phase-Lok Bracket

The procedures described above are also necessary to align the record head. Connect an audio signal generator to the record input. Adjust the input level for -10 VU. While recording the appropriate tone, adjust the record head for maximum output at the reproduce head.

6.6.5 Head Replacement - Phase-Lok Bracket

To remove the head, remove the deck from the chassis by loosening the anchor block screw and sliding the deck out. Disconnect the head leads from the deck leads connector. Loosen the two screws which attach the head mounting angle to the mounting block. Remove the nut from the head bushing. Remove the head from the mounting angle.

Fit the replacement head's bushing through the opening in the mounting angle and fit on the washer and nut. Before tightening the nut, orient the head in the angle with the printed side up and top surface parallel with the top of the angle. Re-attach the mounting angle to the mounting block. Reconnect the head leads to the deck leads connector.

Perform the head alignment procedures described above.

6.7 STEREO PHASING TEST

NOTE

This paragraph applies to stereo units only.

Once the azimuth and height are established as described in paragraphs 6.5 or 6.6, the reproduce head should be checked for phasing. Connect the unit's right and left channel outputs to an oscilloscope as shown in Figure 6-7. Using the monophonic NAB or a prepared test cartridge, observe the Lissajous pattern produced on the oscilloscope. Alternately check the phase response of a 400 Hz and a 4,000 Hz tone. Make minor adjustments of the azimuth adjustment to yield the best overall stereo response. The 4 KHz tone can easily be phased 360 degrees rather than 0, so re-check the 400 Hz tone after adjusting the azimuth with the 4 KHz tone.

Remove and re-insert the cartridge and repeat the phasing test several times. This is to prevent improper adjustment caused by poor tape seating when the cartridge is inserted. When the adjustments are complete, tighten the lock screw on the Phase-Lok bracket.

NOTE

This same phasing test set-up can be used to test cartridges. Cartridges which show poor repeatability when removed and re-inserted should be discarded.

6.8 HEAD LEAD CONNECTORS

6.8.1A J1 Head Lead Connectors (Mono)

NOTE

This paragraph applies to models 1070-P, 1070-RP, and 1070-RP/DL.

The leads to the reproduce head are connected to J1 (upper deck lead connector) as shown below:

PIN	DESCRIPTION	COLOR
1	Program Track High	Orange
3	Cue Track High	Blue
8	Program Track Low	Red
10	Cue Track Low	Yellow

6.8.1B J1 Head Lead Connectors (Stereo)

NOTE

This paragraph applies to models 1070-PS, 1070-RPS, and 1070-SDL.

The leads to the reproduce head are connected to J1 (upper deck lead connector) as shown below:

PIN	DESCRIPTION	COLOR
1	Channel A High	Orange
2	Channel B High	Blue
3*	Cue Track High	White
8	Channel A Low	Red
9	Channel B Low	Yellow
10*	Cue Track Low	Black

*Cue track connections are omitted on the 1070-SDL.

6.8.2 J2 Head Lead Connectors (Mono)

NOTE

This paragraph applies to models 1070-RP and 1070-RP/DL.

The leads to the record/erase head are connected to J2 (lower deck lead connector) as shown below. These leads are enclosed in a braided shield.

PIN	DESCRIPTION	COLOR
1	Program Track High	Orange
5	Cue Track High	Blue
7	Erase Head High	Black
8	Program Track Low	Red
12	Cue Track Low	Yellow
14	Erase Head Low	White

6.8.2 J2 Head Lead Connectors (Stereo)

NOTE

This paragraph applies to models 1070-RPS and 1070-SDL.

The leads to the record/erase head are connected to J2 (lower deck lead connector) as shown below. These leads are enclosed in a braided shield.

PIN	DESCRIPTION	COLOR
1	Channel A High	Orange
3	Channel B High	Blue
5	Cue Track High	Black
5*	Channel A Erase High	Black
5*	Channel B Erase High	Brown
8	Channel A Low	Red
10	Channel B Low	Yellow
12	Cue Track Low	White
12*	Channel A Erase Low	White
12*	Channel B Erase Low	Green

*These are unique to 1070-SDL.

6.9 MAINTENANCE

To keep your SPOTMASTER TEN/70 units operating at the optimum, several maintenance procedures should be followed at regular intervals.

6.9.1 Cleaning

Once a day the heads, capstan, and pressure roller should be cleaned with BE-903 cleaning fluid or isopropyl alcohol. Johnson and Johnson cotton buds or other cotton swabs work well. Use enough to remove dirt and accumulated graphite, but not enough to leave the heads or pressure roller wet.

Periodically accumulated dust should be swept out of the chassis with a soft brush. Fingerprints and smudges can be removed from the deck and case with a cloth moistened with a household ammonia solution.

6.9.2 Lubrication

The capstan motor has permanently sealed ball bearings, so it does not need lubrication.

The pressure roller shaft assembly pivot points and friction areas in the deck are lubricated with lubriplate at the factory and should not need any additional for several years unless the deck is disassembled and these parts cleaned.

6.9.3 Demagnetizing

At least once every six months the heads should be demagnetized with a SPOTMASTER head Degausser.

6.9.4 Cartridge Maintenance

The following information on cartridges is excerpted from Engineering Bulletin 1003: The NAB Tape Cartridge and Its Maintenance. Copies are available from Broadcast Electronics.

The cartridge is the second half of the tape cartridge system. The cartridge needs regular care just like the cartridge recorder or reproducer. The Service Department of Broadcast Electronics has developed over the years a rule of thumb for troubleshooting. Check the cartridge before adjusting the machine.

TAPE

For maximum performance the tape must be in good working condition. The tape in cartridges wears rapidly, particularly in short length cartridges (70 seconds or less) and cartridges that are used frequently. The tape should be inspected regularly and frequently for obvious signs of wear.

Cartridges should be rewound or replaced when the oxide side of the tape is shiny. Likewise the tape should be discarded if it is wrinkled, or contaminated with fingerprints, grease, or dirt. Less obvious are drop-outs or areas where the iron oxide particles have come loose from the base of the tape. Drop-outs may not be visible, but will show up as a loss of audio signal.

If possible only one type of tape should be in use in an installation. Different brands, and even different types of the same brand, require different bias recording levels for optimum response.

When rewinding cartridges use only a graphite lubricated tape. Silicone lubricated tapes cannot stand up to the rugged service in a cartridge.

Every cartridge tape must have one splice, but more than one can cause problems. If the tape ends overlap at the splice or do not meet squarely, the audio may drop-out. In addition, a poor splice will catch on the cartridge or the hub. After a splice has been in use for some time, the tape tension may pull the two ends of the tape apart, slightly opening up the splice.

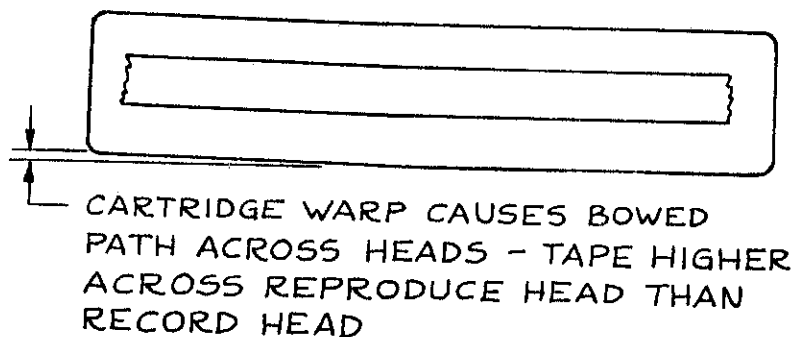
Proper tape tension is most critical. If the tension is too great, the tape will wear rapidly as it is squeezed against the hub, the pressure pads, the corner post, and the tape on the hub. If the tension is too light, the tape will not be pulled back onto the hub.

The NAB specifies that tape tension at the capstan should not exceed 6 ounces. Cartridges over 70 seconds in length tend to have too little tension, while those less than 70 seconds tend to have too much. When running, a properly wound cartridge moves tape freely with no reluctance to wind onto the hub. To increase the tension in a cartridge, open up the splice and gently pull on the tape as it wraps onto the hub. To decrease the tension, open up the splice and gently pull out several loops from the center of the hub. Trim off the excess and resplice the tape.

THE SHELL

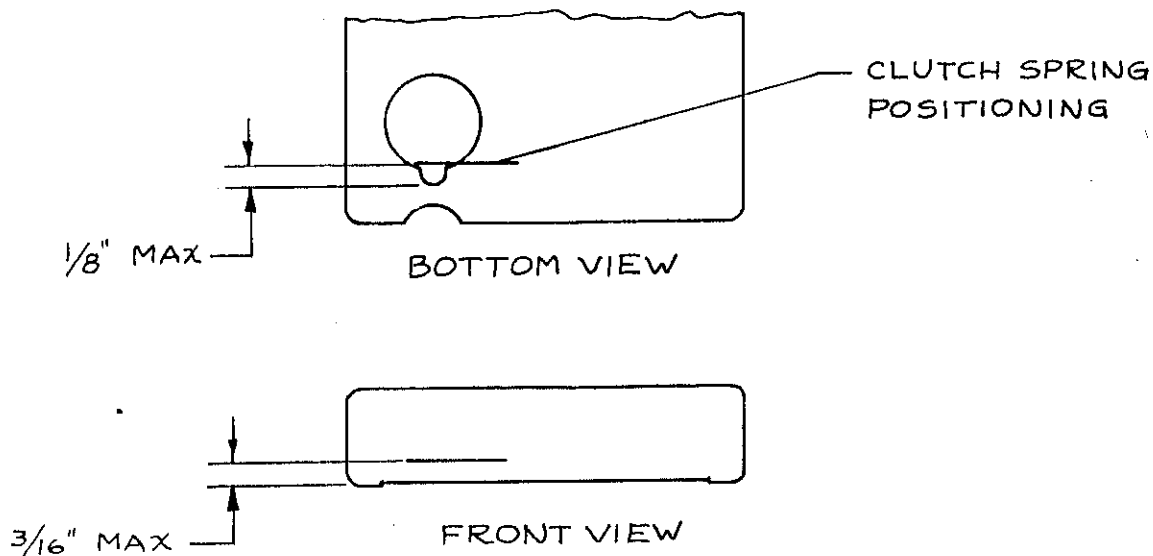
A deformed shell can adversely affect frequency response by distorting the path the tape travels. In particular, a warped cartridge may cause the tape to traverse the head openings in an arc or bowed path rather than a straight line. Sometimes an ill-fitting top can spread the sides of the cartridge enough to cause this same bowing. Check suspect cartridges on a flat surface.

Periodically the cartridge center post should be cleaned. Gummy deposits on the post, in effect, increase tape tension by not allowing the tape hub to turn freely. Equally important to free movement of the hub is the TEFLON washer. This washer should always be in place underneath the tape hub, between the hub and the shell. This washer is easily misplaced when the cartridge is opened and the hub removed.



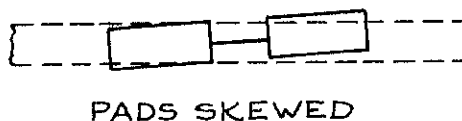
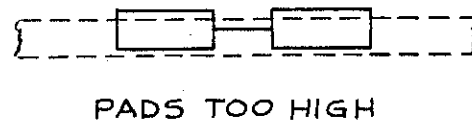
CLUTCH SPRING OR HUB BRAKE

The clutch spring or hub brake should completely release when the pressure roller is in its vertical position. This allows the hub, and the tape, to move freely. An improperly adjusted clutch spring or defective hub brake may prevent the roller from engaging or disengaging. The clutch should be parallel to the bottom of the shell and no more than $\frac{3}{16}$ inch above the surface of the tape deck. The clutch must not protrude more than $\frac{1}{8}$ inch into the opening for the pressure roller. Less than 8 ounces should be required to release the clutch.



PRESSURE PADS

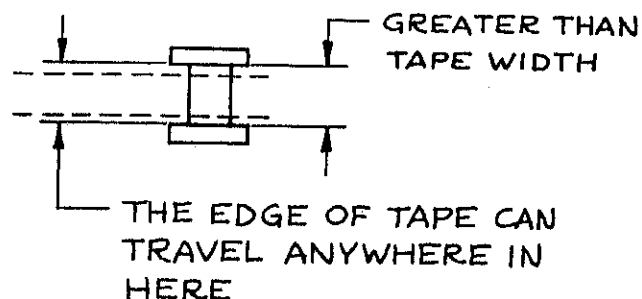
The Pressure pads must wrap the tape around the face of the heads. The pressure applied must be uniform across the tape as it is in contact with the head. Periodically check the pads to see that they are lined up squarely with the tape. If one portion of the tape is not in contact with the pads, that portion of the tape will make poor contact with the head. This may show up as poor frequency response from an individual cartridge.



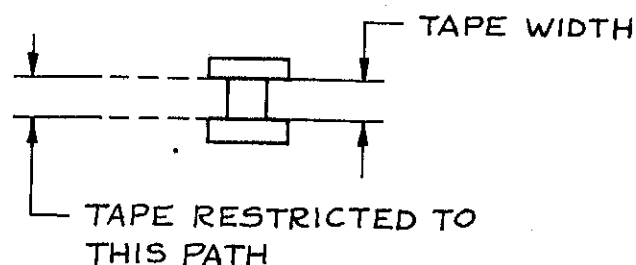
THE TAPE PATH

The most frequent cause of distortion of the tape path in the cartridge is a loose corner post. The post should always be glued down so that there is 1/4 inch between the shoulder of the post and the shell. If the post is high the tape will not run straight across the heads. A loose post frequently causes muffled-sounding audio when the cartridge unit starts.

LOOSE CORNER POST



PROPER CORNER POST



The hold down wire used in many cartridges is important in maintaining proper tape travel. This wire keeps the stored tape flat on the hub as tape is pulled from the center and then returned to the outside. The wire must not exert any pressure on the stored tape or the tape may wrinkle and jam. If a cartridge is dropped the hold down wire may unseat.

CARTRIDGE STORAGE

The cartridges should be stored away from direct sunlight, or heat from electronic equipment, radiators, etc. Ideal conditions are a temperature of 70° and a relative humidity of 50%. The area where cartridges are kept should be as free of dust as possible.

6.10 MECHANICAL PARTS LIST

Tables 6-1 through 6-6 show the mechanical parts used in each of the TEN/70 models.

**TABLE 6-1
CHASSIS PARTS**

Quantity						BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL		
1	1	1	1	1	1	470-0002	Chassis Support
11	11	11	11	11	11	440-9533	Threaded Studs
2	2	2	2	2	2	470-0011	Bracket Housing
1	1	1	1	1	1	470-0007	Upper Bracket
1	1	1	1	1	1	471-0004	Rear Panel With Markings
1	1	1	1	1	1	415-2012	Fuse Holder
1	1	1	1	1	1	330-0050	3AG, ½ Amp Fuse
1	2	2	1	2		417-0135	Phono Jack
1	1	1	2	2		191-1053B	10K Potentiometer
					2	450-0652	3/8 inch hole Plugs
1	1	1	1	1	1	460-0003	Front Panel Frame
4	4	4	4	4	4	441-0006	Stand-Offs
	1	1	1	1	1	470-0007	Lower Bracket Assembly
1	1	1	1	1	1	417-1440	14-Pin Connector (TELCO/EXT)
		1			1	417-0210	Switched Phone Jack (J7)
1	1	1	1	1	1	417-2440	24-Pin Connector (REMOTE CONTROL)
1	3		2	6	6	417-0311	Phone Jack (Audio Inputs and Outputs)
	1	1				417-0303A	Microphone Jack
2	2	2	2	2	2	465-0021	Trim Strips
1	1	1	1	1	1	415-0018	Bottom Cover
1	1	1	1	1	1	471-0019	Top Cover
1	1	1	1	1	1	346-3301	Cherry Switch (S10)
1	1	1	1	1	1	346-0026	Cherry Switch Actuator
1	1	1	1	1	1	453-0004	Cherry Switch Cover

**TABLE 6-2
FRONT PANEL PARTS**

Quantity						BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL		
1	1	1				500-1070	Front Panel Chassis Plate
			1		1	500-1071	Front Panel Chassis Plate
		1				500-1072	Front Panel Chassis Plate
2	2	2	2	2	2	343-0012	Push Button Switches (STOP and START)
2	3	3	2	3	3	343-0020	Push Button Switches (REC, QI, QII)
1	1	1	1	1	1	343-0015	Red Button (STOP)
1	1	1	1	1	1	343-0016	Green Button (START)
1	1	1	1			343-0021	White Button (QI)
1	1		1	1		343-0022	White Button (QII)
					2	343-0036	White Button
	1	1		1	1	343-0023	Red Button (REC)
2	2	2	2	2	2	321-7338	Lamps No. 7338 (STOP, START)
2	3	3	2	3	1	321-7369	Lamps No. 7369 (REC, QI, QII)
		1				343-0024	Red Button (DLY)
1	1	1	1			348-7101	Miniature Toggle-Power
	1	1				348-7215	Miniature Toggle-Test
1	1	1	1	1	1	348-7213	Miniature Toggle-Speed Mode
				1	1	348-7321	Miniature Toggle-Test
	2	2		1	1	191-1053	10K Miniature Potentiometer and Hardware
				1	1	191-1053A	10K Miniature Potentiometer with Switch
	2	2		2	2	484-0500	Miniature Knobs
	1	1		2	2	319-0081	Miniature VU Meter
				4	4	453-0097	Meter Mounting Clips
1	1					453-0054Z	VU Meter Mounting Strap

**TABLE 6-3
DECK ASSEMBLY PARTS**

Quantity						BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL		
1	1	1	1	1	1	493-0600	Deck Chassis
1	1	1	1	1	1	459-0067	Nameplate Pivot Assembly
1	1	1	1	1	1	430-0045	Nameplate Pivot Assembly Spring
1	1	1	1	1	1	591-0003	Nameplate
2	2	2	2	2	2	449-0066	Cap Spring Strip
1	1	1	1	1	1		Retractable Cartridge Guide Assembly
1	1	1	1	1	1	436-0061	Retractable Cartridge Guide Spring
2	2	2	2	2	2	407-0035	Nylon Deck Guide
1	1	1	1	1	1	422-0036	Anchor Block
1	1	1	1	1	1	420-0037	Anchor Block Screw
1	1	1	1	1	1		Roll Pin (1/8 x 1/4 long)
1	1	1	1	1	1		Pivot Post
1	1	1	1	1	1	449-0070	Cartridge Stop Pin
1	1	1	1	1	1	420-0112	Solenoid Bracket
1	1	1	1	1	1	470-0013	Solenoid Assembly (play)
1	1	1	1	1	1	289-0033	Deck Guide
1	1	1	1	1	1	459-0026	Armature Assembly
1	1	1	1	1	1	459-0025	Pivot Strap Shaft
1	1	1	1	1	1	459-0022	Armature Return Spring
1	1	1	1	1	1	432-0044	6 - 32 x 7/8 Socket Head Screw
1	1	1	1	1	1		Bumper Strap
1	1	1	1	1	1	459-0040	Bumper Plug
1	1	1	1	1	1	403-0038	Guide Strap
1	1	1	1	1	1	459-0021	Spacer Guide
1	1	1	1	1	1	459-0020	Spacer Guide Spring (Pressure Adjust)
1	1	1	1	1	1	430-0045	Shaft Assembly
1	1	1	1	1	1	446-1113	Pressure Roller
1	1	1	1	1	1	404-0001	Nylon Washer
1	1	1	1	1	1		Nylatron Washer
3	3	3	3	3	3	454-3318	E Retaining Rings
1	1	1	1	1	1	429-0016	Wire Link
1	1	1	1	1	1	459-0046	Push Link Assembly
1	1	1	1	1	1	459-0012	Pivot Actuating Lever
1	1	1	1	1	1	459-0039	Switch Actuator
1	1	1	1	1	1	432-0045	Shaft Return Spring
1	1	1	1	1	1	950-0988	Electrical Release Assembly
1	1	1	1	1	1	289-0007	Release Solenoid (only)
1	1	1	1	1	1	436-1114	Release Solenoid Pressure Spring
1	1	1	1	1	1	403-0042	Cam Cushion
1	1	1	1	1	1	420-0065	Shoulder Screw
1	1	1	1	1	1	430-0180	Spring Lift Control
1	2	2	1	2	2	470-0015	Connector Brackets
1	2	2	1	2	2	418-1410	Connectors (Deck Leads)
1	1	1	1	1	1	346-6210	Cherry Switch (S1 on Deck)
1	1	1	1	1	1	407-0043	Cherry Switch Insulator
1	1	1	1	1	1	343-0020	Switch (RDY/REL)
1	1	1	1	1	1	343-0025	Yellow Button (RDY/REL)
1	1	1	1	1	1	321-7369	No. 7-7369 Lamp (RDY/REL)
1	1	1	1	1	1	472-0069	Cartridge Guide Assembly
1	1	1	1	1	1	472-0014	Guide Cartridge
1	1	1	1	1	1	914-1070	Tape Deck Interconnection PCB Assembly (MB-107)
2	2	2	2	2	2	441-9223	Spacer
1	1	1	1	1	1	459-1111	Latch Pressure Roller
1	1	1	1	1	1	472-0068	Flange Cartridge Guide

**TABLE 6-4
MOTOR AND DRIVE PARTS**

Quantity						BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL		
1	1	1	1	1	1	470-0086	Hi-Power Bracket
1	1	1	1	1	1	029-0274	2 Microfarad Motor Capacitor
1	1	1	1	1	1	681-1723	Line Cord
1	1	1	1	1	1	401-0006	Strain Relief
1	1	1	1	1	1	384-0106	Motor (7.5 ips) (117 VAC) (60 Hz)
1	1	1	1	1	1	459-0064	Motor Spacer

**TABLE 6-5
HEAD ASSEMBLY AND BRACKET PARTS**

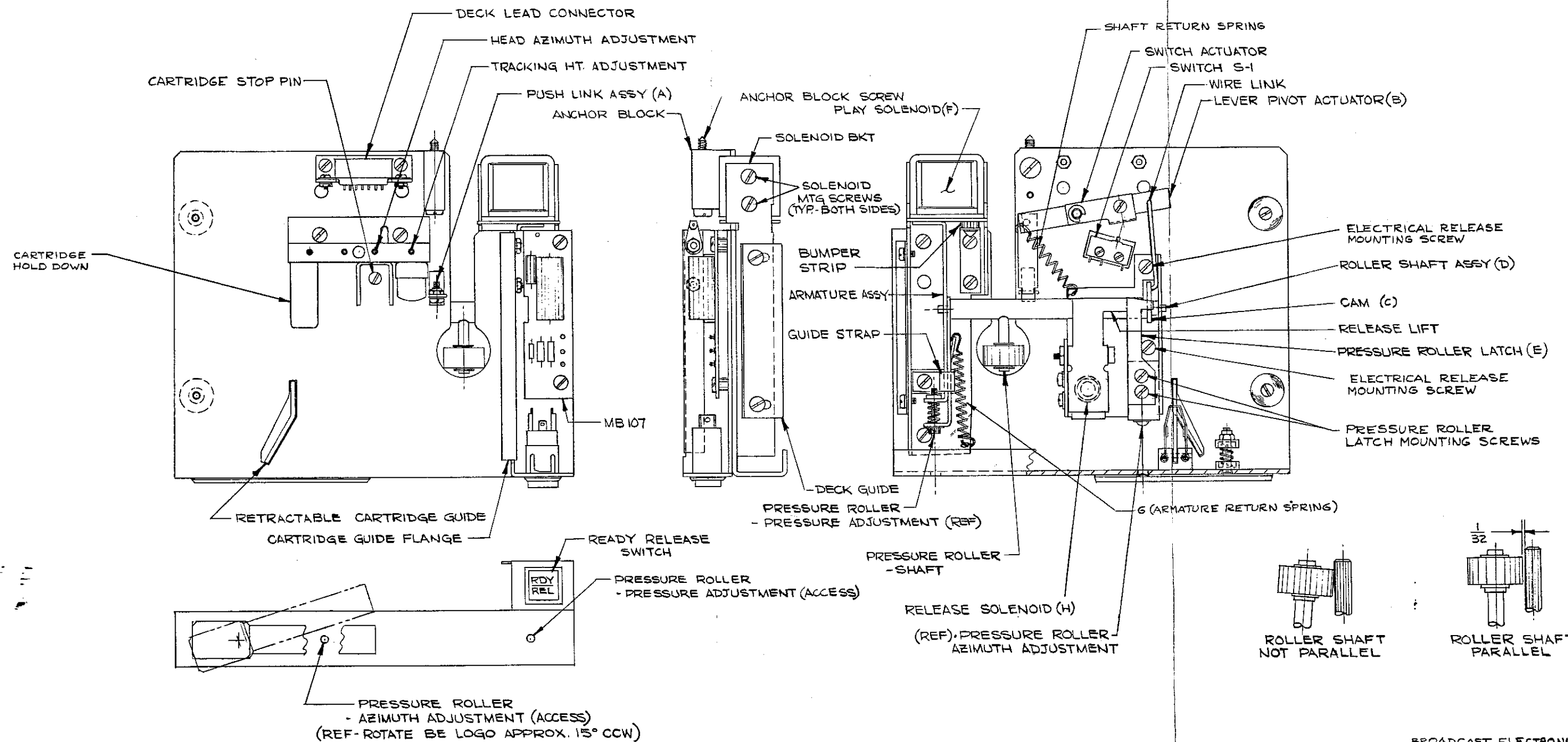
Quantity						BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL		
							MICROADJUSTABLE HEAD BRACKET
1	1	1	1	1		407-0049	Head Bracket
1	2	2	1	2		409-0050	Clamping Blocks
1	2	2	1	2		421-0003	Clamping Nuts
1	2	2	1	2		436-0052	Conical Washers
2	4	4	2	4		330-0053	Block Springs
1	1	1	1	1		459-0002	Cartridge Spring
2	4	4	2	4			4 - 40 x 1/2 Allen Head Set Screws
1	2	2	1	2			4 - 40 x 3/8 Screws
1	1	1	1	1		452-2101	Left Cartridge Guide
1	1	1	1	1		452-0103	L/R Combined Cartridge Guide
2	2	2	2	2			4 - 40 x 1/4 Screws
2	2	2	2	2			No. 4 Lock Washers
2	2	2	2	2			No. 4 Flat Washers
			1	1		253-0002	Reproduce Head D1SA
	1					252-0003	Record Head DM2RB
				1		253-0001	Record Head DM3RB
1	1	1				252-0001	Reproduce Head DM1B
		1				259-0003	Delay Record/Erase Head DL2C
							PHASE-LOK HEAD BRACKET
X			X			952-7600	Complete PL-HB1 Bracket (Mounts 1 Head)
	X	X		X	X	952-7601	Complete PL-HB2 Bracket (Mounts 2 Heads)
1	1	1	1	1	1	469-0051	Base Plate
1	1	1	1	1	1	452-0047	Inboard Guide
1	1	1	1	1	1	452-0048	Center Guide
1	1	1	1	1	1	452-0049	Outboard Guide
1	2	2	1	2	2	469-0410	Head Mounting Bracket
1	2	2	1	2	2	466-0050	Head Mounting Angle
3	6	6	3	6	6	430-0120	Compression Springs

**TABLE 6-5 (Cont'd.)
HEAD ASSEMBLY AND BRACKET PARTS**

Quantity							BE Number	Description
1070P	1070RP	1070RP/DL	1070PS	1070RPS	1070SDL			
1	1	1	1	1	1		436-0555	Cartridge Hold Down Spring
10	12	12	10	12	12			Screw, Stainless Steel, Phillips, Pan Head, 2 - 56 x 1/4
3	6	6	3	6	6			Screw, Stainless Steel, Phillips, Flat Head, 2 - 56 x 1/4
1	2	2	1	2	2			Screw, Stainless Steel, Phillips, Filister Head, 4 - 40 x 1/2
8	10	10	8	10	10			Lock Washer, Internal Teeth, No. 2
1	1						252-0001	DM1B Reproduce Head
		1			1		252-0005	DM1C Reproduce Head
	1						252-0006	DM2RC Record Head
		1			1		259-0005	DL2C Record/Erase Head
			1	1			253-0003	DM3RC Record Head
			1	1			253-0002	D1SA Reproduce Head

**TABLE 6-6
RACK ADAPTER PARTS**

Quantity	BE Number	Description
	921-1070	RACK ADAPTER
1	501-1070	Rack Adapter Panel
1	470-0040	Rack Adapter Chassis
2	486-1377	Handles
2	489-0464	Slides
8		6 - 32 x 3/8 Screws & Nuts
8		No. 6 Lock Washers
4		8 - 32 x 5/16 Screws
	818-0010	RM10 CARTRIDGE RACK ASSEMBLY
1	479-0046	Cart Rack Shelf Top
4	479-0047	Cart Rack Shelf Center
1	479-0048	Cart Rack Plate Center
1	951-0052	Rear Panel Assembly
10		Self Tapping 6 x 5/16 Screws

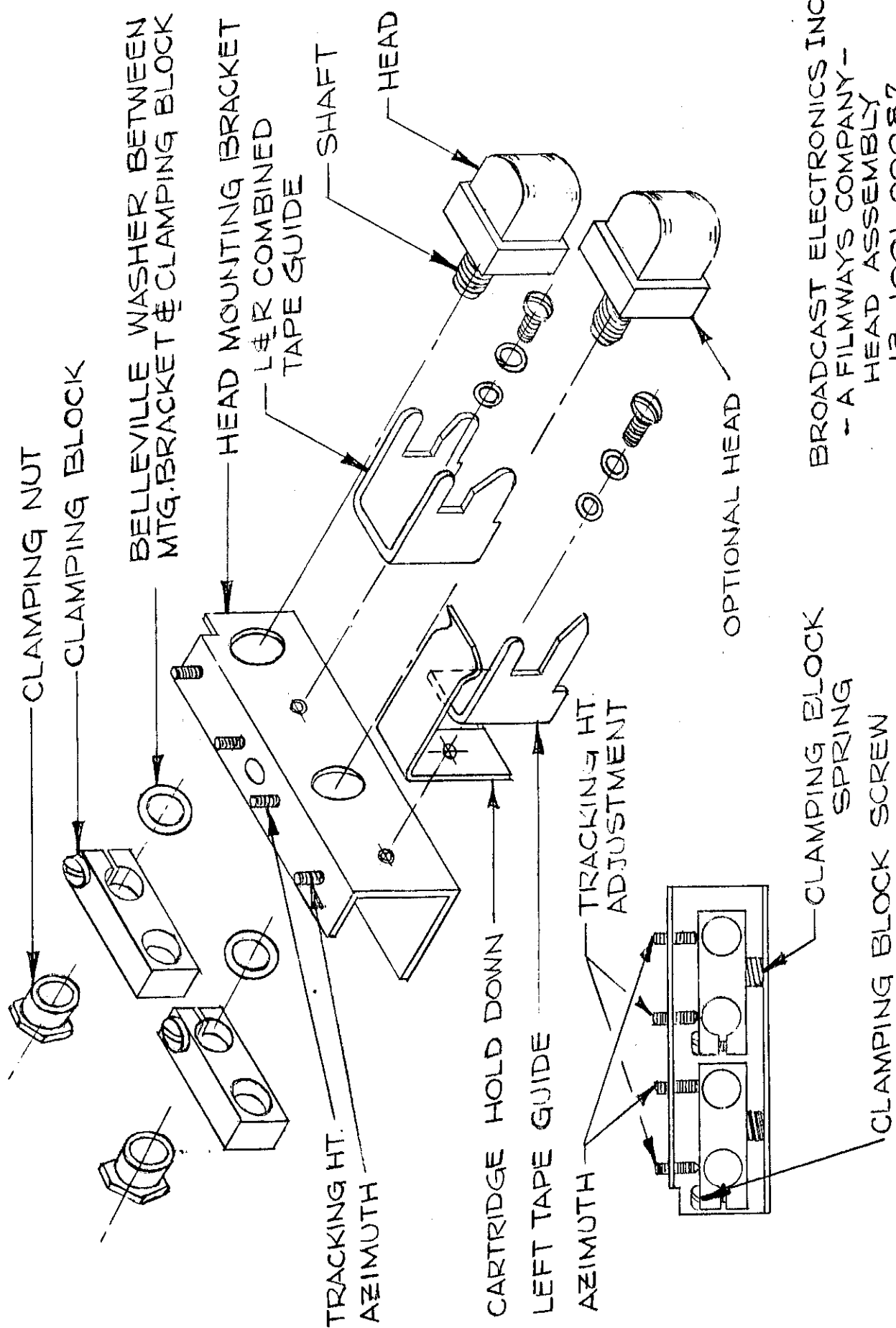


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600 SERIES DECK
43-1001-00044 REV A

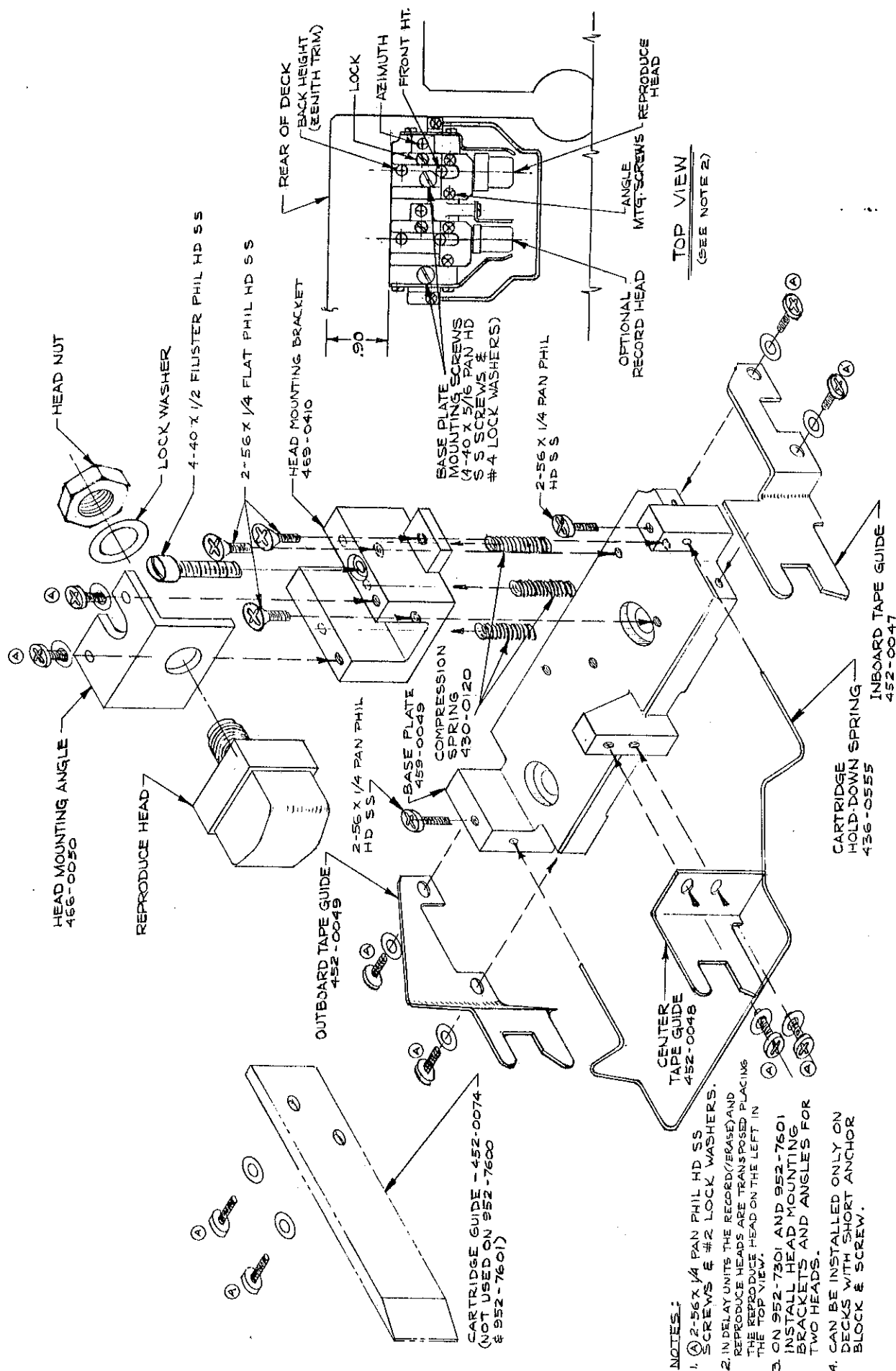
Figure 6-1. Deck Assembly

6-23/6-24



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 HEAD ASSEMBLY
 13-1001-00087

Figure 6-2. Microadjustable Head Bracket



STEREO HD. BRACKET_{REV}
952-1003-00540 A

PART NOS. 952-7300, 952-7301,
952-7600 & 952-7601

Figure 6-3. Phase-Lok Head Bracket

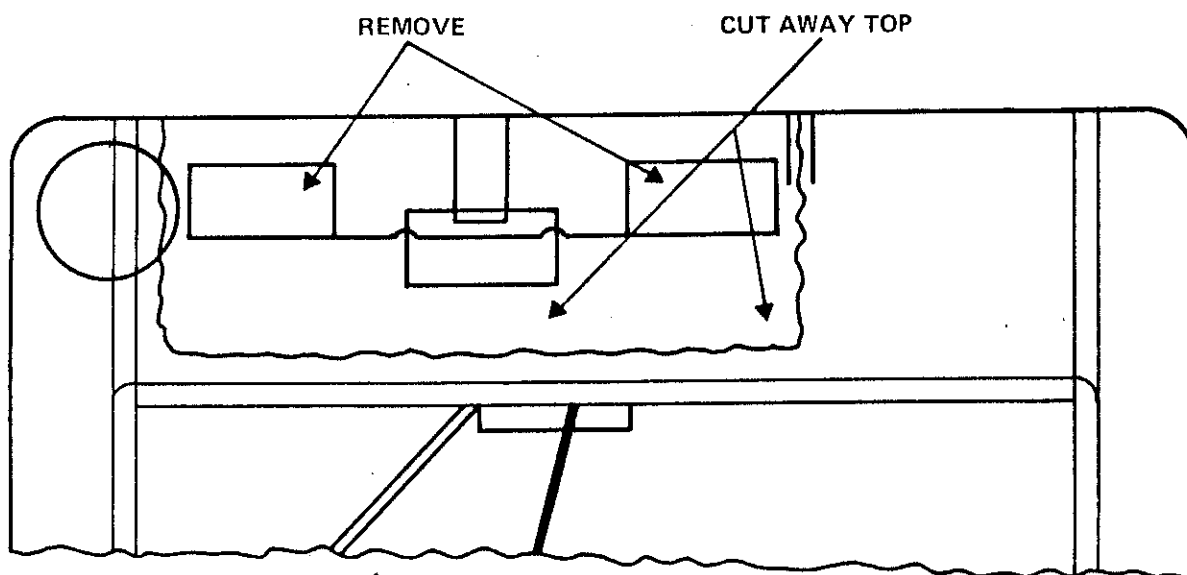
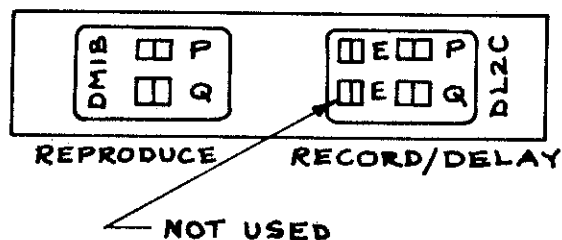
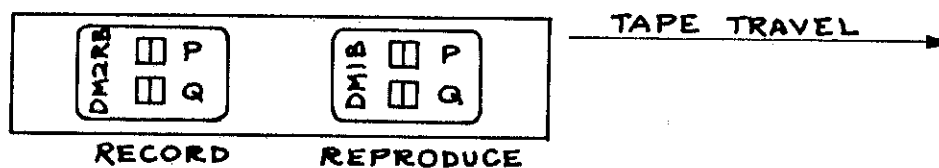
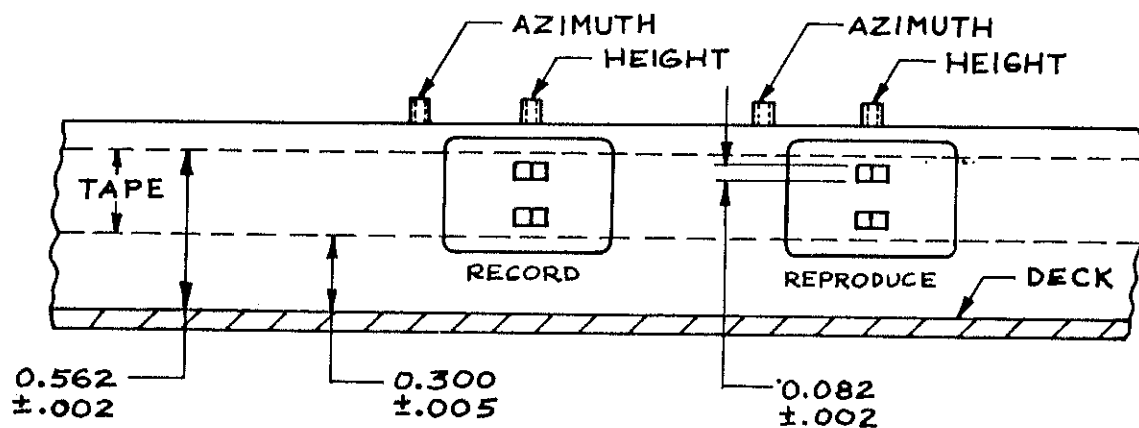


Figure 6-4. Tracking Cartridge



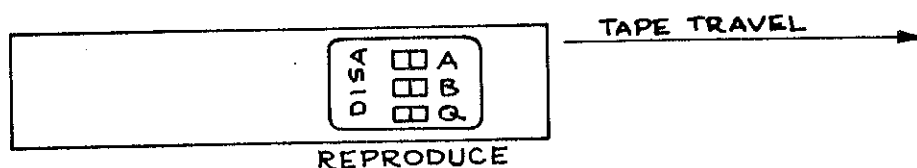
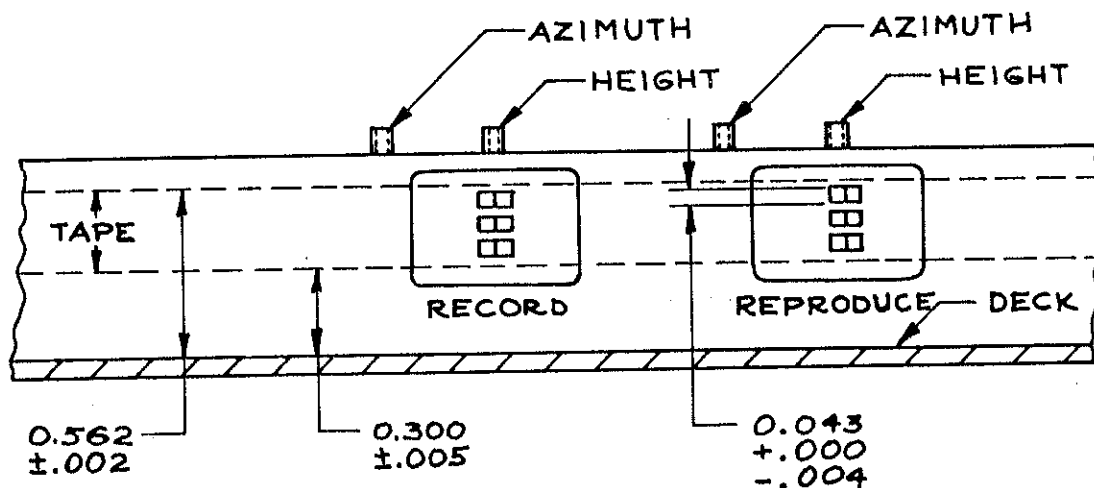
P - PROGRAM
Q - CUE
E - ERASE

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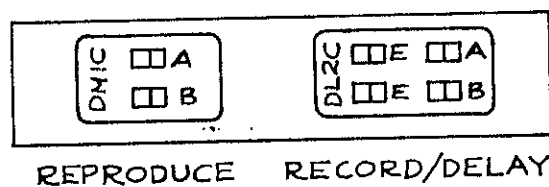
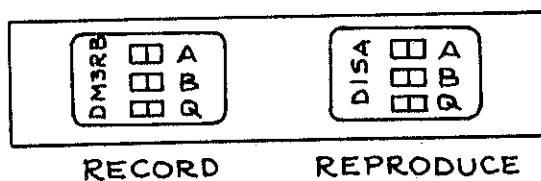
HEAD POSITION DIAGRAM

13-1001-00126

Figure 6-5. Head Position Diagram (Mono)



A-LEFT CHANNEL
B-RIGHT CHANNEL
Q-CUE
E-ERASE



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STEREO HEAD POSITIONS

13-1001-00107

Figure 6-6. Head Position Diagram (Stereo)

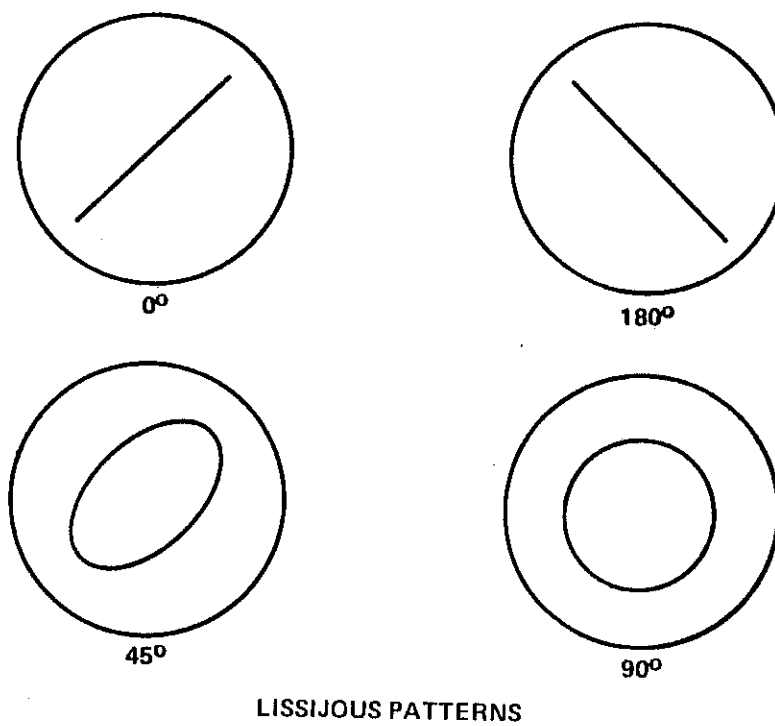
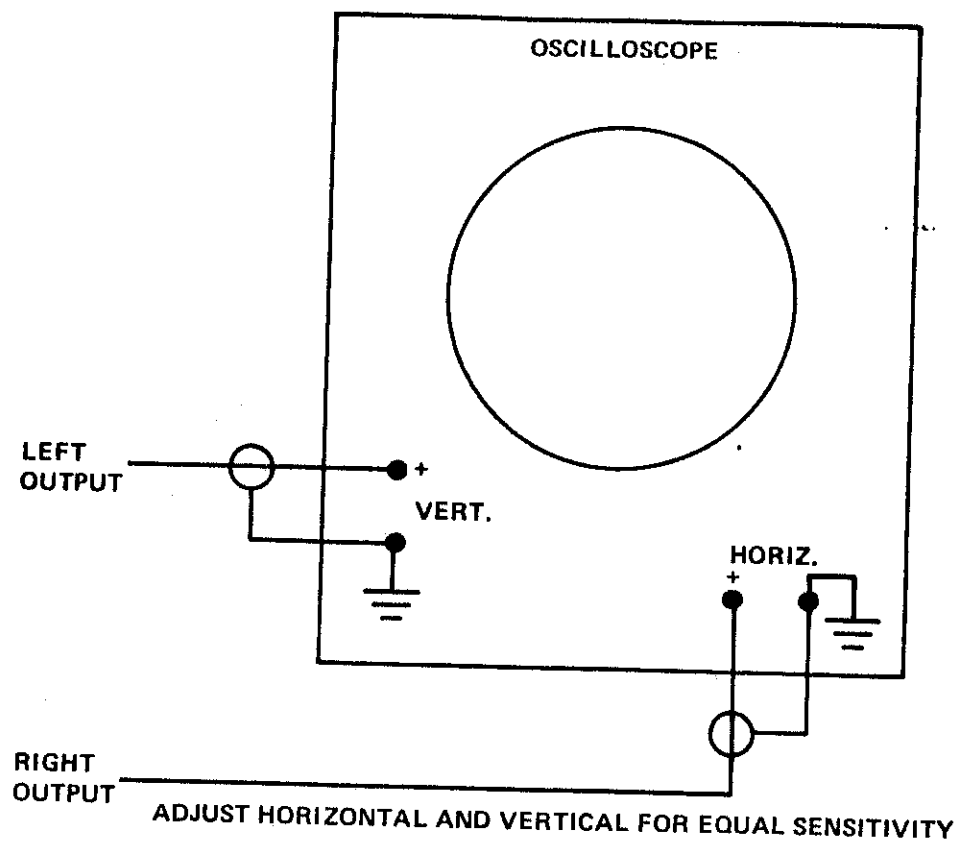


Figure 6-7. Stereo Phasing Test

SECTION 7

TROUBLE SHOOTING GUIDE

Problem	Possible Cause	Remedy
Motor Inoperative	Defective motor S10 not closing or defective K1 Defective Open motor capacitor	Replace Replace Replace Replace
Cartridge will not latch into place	Deformed spring in cartridge Push link assembly screw misadjusted Pressure roller latch deformed Release lift blocking pressure roller latch Release solenoid energized Play solenoid energized	Repair or replace Re-adjust Replace Re-adjust Shorted RDY/REL switch shorted wire in deck leads connector Push STOP button Shorted wire Defective transistor on LO-103 Run Logic
Cartridge will not release	AC power off Machine in play No control voltage on deck No supply voltage to release solenoid Spring in cartridge too tight Broken return spring on pivot actuator lever Release solenoid lever arm too tight or too far from solenoid Defective cartridge CR2 on MB-107 shorted R3 on MB-107 open	Push STOP button and RDY/REL PS-104 defective LO-103 defective Broken wire in deck leads connector S1 (on deck) misadjusted RDY/REL switch defective Defective transistor on LO-103 Run Logic Adjust Replace Re-adjust Replace Replace Replace

Problem	Possible Cause	Remedy
Cartridge wows or drags	Improperly wound cartridge Spring in cartridge not releasing Spring in cartridge dragging on pressure roller shaft Pressure roller dirty Capstan dirty Pressure pads in cartridge pressing tape against the heads too tightly Head bracket mounted too far forward on deck Pressure roller pressure misadjusted Play solenoid travel not adjusted properly Improper voltage on the play solenoid	Rewind or replace Adjust or Replace Adjust or Replace Clean Clean Adjust or replace Adjust Re-adjust (if roller pressure is too high, the play solenoid may not "pull in") Re-adjust (Should be 17 volts in play)
No fast forward speed (Manual ADVANCE)	Defective K1 on MB-109 or MB-130 Defective speed mode switch Open motor winding Shorted CR1 on MB-109 or MB-130	Replace Replace Replace motor Replace CR1
No Auto Q NOTE: This does not apply to 1070-SDL	Defective CA-201 150 Hz sensor Defective speed mode switch 150 Hz tone not being sensed	Repair or replace Replace Check cue system
Motor will not come out of fast forward	Defective speed mode switch Defective K1 on MB-109 or MB-130 Defective motor	Replace Replace Replace
Motor goes into fast forward too soon(AUTO Q)	Improper QI (150 Hz) sensing QI (150 Hz) tone recorded too soon or of too short duration	See erratic QI operating below Unit begins fast forward mode at the end of the 150 Hz tone burst
Loud Popping Noise Heard When Going Into AUTO Q or ADVANCE	Defective CR1 on MB-109 or MB-130 Defective C1, C2, C3, C4, or C5 on MB-109 or MB-130	Replace Replace defective capacitor

Problem	Possible Cause	Remedy
Erratic QI, QII Operation in reproduce NOTE: This does not apply to 1070-SDL	Tone bursts on tape: 1. Not present 2. Incorrect level 3. Wrong frequency 4. Too short duration High noise level on tape Sensitivity on CA-201 misadjusted Defective CA-201 Defective PA-101 (in cue channel)	Check Recorder Cartridge poorly erased Re-adjust Repair or replace Repair or replace
Deck won't stop on 1,000 Hz Cue Tone NOTE: This does not apply to 1070-SDL	1 KHz tone on cue track: 1. Not present 2. Level too low 3. Wrong frequency 4. Too short duration CA-101 sensitivity misadjusted CA-101 defective PA-101 (in cue channel) defective Run Logic LO-103 defective Defective cue head Defective CR8 on MB-102	Check Recorder Tone should be ½ second in length Re-adjust Repair or replace Check in program channel Repair or replace Replace Replace
Deck won't stop manually	Defective LO-103 Run Logic STOP switch defective PLAY switch shorted Pressure roller set too close to capstan	Repair or replace Replace Replace Re-adjust pressure roller pressure or travel of the play solenoid
Deck inoperative STOP Lamp not lit, motor inoperative	No AC Power Defective LO-103 Run Logic Defective PS-104 Defective PS-102	Check fuse Repair or replace Repair or replace Repair or replace
Deck inoperative STOP Lamp remains lit	S1 on deck not closed (RDY/REL not lit) Defective LO-103 Run Logic S1 on deck defective Defective START switch Shorted STOP switch	Re-adjust switch actuator Repair or replace Replace Replace Replace
Deck inoperative START Lamp lights	Defective coil on play solenoid Pressure roller too far away from capstan Spring in cartridge jamming pressure roller Defective C1 on MB-107 Shorted diode CR1 on MB-107 R1 on MB-107 bad Anchor block screw not tight S10 on chassis defective	Replace Re-adjust play solenoid and/or pressure roller pressure Adjust Replace Replace Replace Tighten Replace

Problem	Possible Cause	Remedy
Remote Control Inoperative	Broken lead in remote control wiring Remote control wired incorrectly	Check operation of the control on the unit first Check wiring Check wiring
Spurious operation with remote control connected	Controls on machine inadvertently operated Lamps incorrect Too high capacity between remote cable leads EXTREMELY high RF fields (Not necessary in most broadcast and studio operations)	Remote control does not disable the machine controls Use only lamps rated at 12V and 17 MA. A larger current drain will overload the power supply. Cable length should not exceed 100 feet Run cable in shielded conduit Use shielded cable Ground case of control box to central or station ground
Q Tones heard in program track NOTE: This does not apply to 1070-SDL	Recorder head too high Play head too low Tape guides installed incorrectly Q recording level too high Defective cartridge Defective head Head height misadjusted Tape guide on head bracket loose or out of position	Check recorder Re-adjust Adjust Adjust Repair or replace Replace Re-adjust Adjust
Audio output poor (Distorted, Noisy, High Hum Level)	Audio output attenuator switch set incorrectly Audio output incorrectly terminated Defective PA-101 pre-amp Defective DA-104 driver amp Open reproduce head Ground Loop between TEN/70 and other equipment Output plug wired incorrectly	Set and adjust System is normally wired for 600 ohms output at factory. To change to 150 ohms output, add jumpers shown on the Output Master printed circuit board diagram. Repair or replace Repair or replace Replace Check shields and grounds, shields may be grounded at a central point. Shield should only be grounded at one end. Machines should be connected to the central or station ground via separate grounding leads TIP - high RING - low SLEEVE (BODY) - shield Sleeve and Ring may be connected together for unbalanced output

Problem	Possible Cause	Remedy
No Audio Output	Output plug wired incorrectly Open output transformer Tape blank Dirty reproduce head Open head Defective PA-101 pre-amp on Reproduce Master printed circuit board Defective level control AC power off or defective power supply Defective LDR on Reproduce Master printed circuit board	See Above Replace Check with known cartridge Clean Replace Repair or replace Replace Restore, repair or replace Replace
<p align="center">NOTE The following apply to record units only.</p>		
Unit will not record. REC not lit	Cartridge not loaded Machine in play mode Defective LO-103 Record Logic	Load Push STOP and then REC buttons Repair or replace
Unit will not record. REC Lit	Q2 on MB-110 defective Bias oscillator defective Defective LDR on record master printed circuit board Defective RE-203 Defective DA-104 driver amp. on record master board Input transformer open Defective input level control	Replace Check bias level on VU meter Replace Repair or replace Repair or replace Replace Replace
No VU Meter indication	Not in record Mode Defective diode (in meter circuit) on Record Master Board Defective meter switch Defective meter	Push REC button Replace Replace Replace
Unit will not come out of Record Mode	Shorted transistor on LO-103 Record Logic Shorted REC switch	Repair or replace Replace
QI, QII will not record. 1,000 Hz Records Normally. NOTE: This does not apply to 1070-SDL.	No QI, QII generators Defective LDR in Q bias circuit QI on Record Master board defective Dirty record head Generator output level low Generator frequency off Purity controls on CG-102 incorrectly set Defective CG-102 on Record Master printed circuit board Defective QI, QII switch	Order from factory Replace Replace Clean Check tone level on VU meter Adjust to NAB tolerances: 150 Hz \pm 30 Hz; 8 KHz \pm 1 KHz Repair or replace Replace

Problem	Possible Cause	Remedy
Audio Input Poor (Distorted, Noisy, High Hum Level)	Input attenuator switch set incorrectly Input plug wired incorrectly Ground loop between input jack and other equipment High RF fields Power line noise Low line voltage	LO for -24 to 0 dBm HI for 0 to +30 dBm TIP - high RING - low SLEEVE (BODY) - shield (Ring and sleeve may be connected together for unbalanced input) Check shields and grounds Shields may be grounded at a central point. Shields should only be grounded at one end. Machines should be connected to the central or station ground via separate grounding leads. Ground unit to station ground (RF) Put good quality RF noise filter in series with AC power plug Increase line voltage (117 VAC, 60 Hz domestic, or optional 220 VAC, 50 Hz)
No Audio Input	Input plug wired incorrectly Open input transformer Level control set incorrectly Defective DA-104 driver amp. on Record Master printed circuit board Defective LDR on Record Master board Defective Q2 on MB-110 Not in RECORD mode	See above Replace Set for "0" VU Repair or replace Replace Replace Push REC button
No MIC input LINE Input Normal NOTE: This does not apply to 1070-SDL or 1070 RPS	No microphone pre-amp/input transformer MIC level control set incorrectly Unit not in record mode Microphone connector not wired correctly High impedance microphone Defective microphone transformer or pre-amp	Option available only on 1070-RP and 1070-RP/DL models Set to "0" VU. Line input may be used simultaneously Push the REC button 1. Shield 2. Low 3. High 2 and 1 may be connected together for unbalanced input Unit is wired for 150 ohm microphone Repair or replace
No erase in delay, Records Normally NOTE: This does not apply to 1070-RP or 1070 RPS	Not in delay mode Defective relay on record master board Insufficient erase bias Low output from bias oscillator	Push REC and then DLY (RP/DL) button Replace (RP/DL) Normally 40V across head Should be 46V rms across pins 11 and 12 on MB-103 board (RP/DL) or pins 18 and 19 on MB-108/2018 board

Problem	Possible Cause	Remedy
No erase in delay, Records Normally (Cont'd.)	Bias oscillator frequency off	Should be 100 KHz \pm 5 KHz
	Defective erase/record head	Replace
	Dirty erase/record head	Replace
	Erase/record head tracking height misadjusted	Adjust
	Defective pressure pads in cartridge	Replace

TEN/70 ACCESSORIES

When ordering accessories use the Broadcast Electronics stock number.

QI (150 Hz) Cue Sensor (910-2010)
QI (150 Hz) Generator (912-1020) (record units only)
QII (8 KHz) Cue Sensor (910-2011)
QII (8 KHz) Generator (912-1022) (record units only)
Rack Adapter (921-1070)
Chassis Slides for Rack Adapter (489-0464)
RM10 Cartridge Rack for Rack Adapter (818-0010)
TEN/70 Remote Control
TELCO IV B Telephone Answering Accessory (904-0007)
TELCO IV C Telephone Answering Accessory with manual/automatic switch and remote start (904-0008)
TC-4 Counter for TELCO (290-0404)
(NOTE: TELCO used with Bell KS19522 recorder coupler)
Microphone Preamplifier with Transformer (830-0500) (1070-RP and 1070-RP/DL only)
TP1B Cartridge Winder with Tape Timer (904-0002)
NAB Monophonic Head Alignment Cartridge (808-0003)
Broadcast Electronics Monophonic Head Alignment Cartridge (808-0001)
Broadcast Electronics Stereophonic Head Alignment Cartridge (808-0002)
200C Hand Held Cartridge Eraser (820-0200)
300C Table Model Cartridge Eraser (820-0300)
Head Degausser (820-0040)
Allen Wrench for Deck Adjustments (836-0003)
Allen Wrench for Head Adjustments (836-0002)
EB-103 PC Board Test Extender for any 10-pin plug-in module (919-1030)

Phase-Lok Field Installation Kits (less heads):

1070-P and 1070-PS (830-9601)

1070-RP, 1070-RP/DL, and 1070-RPS (830-9602)

These heads must be ordered for use with the Phase-Lok Bracket:

1070-RP — DM2RC Record Head (252-0006)

1070-RP/DL — DM1C Reproduce Head (252-0005)

1070-RPS — DM3RC Record Head (253-0003)

Units manufactured prior to 10/1/72 also require anchor block replacement kit (830-9000)

Connector Kits:

For 1070-RP and 1070-RP/DL consists of one mating plug each for the TELCO/EXT. CONTROL, REMOTE, microphone, input, output, and monitor jacks (830-0600)

For 1070-P consists of one mating plug each for the TELCO/EXT. CONTROL, REMOTE, and output jacks (830-0601)

For 1070-RPS consists of one mating plug each for the TELCO/EXT. CONTROL, REMOTE, and monitor jacks as well as two mating plugs for the two input and two output jacks (830-0602)

For 1070-PS consists of one mating plug each for the TELCO/EXT. CONTROL and REMOTE jacks as well as two plugs for the output jacks (830-0603)

Broadcast Electronics also carries Scotch and Audio Tape cartridge tape, Fidelity and Audiopak cartridges, cartridge parts, cartridge labels, and cartridge racks.

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.

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