

Broadcast Electronics

INSTRUCTION MANUAL
SERIES 2000
TAPE CARTRIDGE MACHINE

Tim Beiler



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TAPE CARTRIDGE MACHINE**

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INSTRUCTION MANUAL
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SECTION 1 INTRODUCTION

1.1 GENERAL DESCRIPTION AND FEATURES

The SPOTMASTER SERIES 2000 tape cartridge machines are designed to meet or exceed the National Association of Broadcasters standards for tape cartridge recording and reproduction. Available in either monaural or stereo, the SERIES 2000 machines are capable of performing a variety of studio assignments ranging from straight playback and/or recording to the latest in telephone answering and information services using the TELCO interface option.

Standard features include the 1 kHz and 150 Hz Cue tones for "end of message" triggering of program material sequences or other pre-recorded commands. The use of balanced transformer output assures quality audio signals with a minimum of interference. Remote control and telephone interface connections are available on the same rear panel pin connector. Quick response — under 80 milliseconds — Start/Stop times and a noise figure of 54 dB, well above NAB standards, make the SERIES 2000 machines a practical piece of studio equipment.

Table top units accept standard A, B and C size cartridges. The dual rack mounted configuration accepts A and B size only.

Separate front panel plug-in modules are used to convert the standard Monophonic SERIES 2000 playback machine for record and audition functions. Modular flexibility permits easy field conversion and maintenance.

1.2 SPECIFICATIONS

| | |
|----------------------------|--|
| Noise | 54 dB below +8 dBm output |
| Frequency Response | ±2 dB, 50 - 15,000 Hz |
| Distortion | 2% or less at +16 dBm output |
| Tape Speed | 7.5 ips accurate 0.2% or better. Optional 3.75 ips accurate 0.4% or better. |
| Wow and Flutter | Less than 0.2% RMS (NAB unweighted) |
| Output (SERIES 2000) | Peak output +16 dBm, continuously adjustable, 600 ohms, transformer balanced |
| Start and Stop Time | 80 milliseconds minimum |
| Equalization | NAB Standard |
| Drive | Hysteresis synchronous, indirect |
| Power | 117 VAC/60 Hz Standard 220 VAC/50 Hz Optional 117 VAC/50 Hz Optional |
| Cue Tones | 1 kHz stop standard, 150 Hz standard. |
| Remote Control | 24 pin connector, Stop, Start, TELCO telephone answering accessory and 150 Hz cue tone logic ground |
| Dimensions | 5-5/8" high x 8-1/2" wide x 12" deep |
| OPTIONS | |
| Record Module | Plug-in for simple field installation; includes VU meter, microphone input provision and 150 Hz tone generator |
| Input | High level -32 to +18 dBm. Microphone inputs -70 to -25 dBm |

| | |
|---------------------------|---|
| Audition Module | Plug-in unit with 5 watt amplifier and speaker or output for external 8 to 16 ohm speaker (Monophonic Units Only) |
| Rack Adapter | Mounts two SERIES 2000 units side by side in 19" rack |
| Telephone Answering | Prewired for TELCO telephone answering interface |

1.3 WARRANTY

Broadcast Electronics, Inc. products are guaranteed to be free from defects in workmanship and material for a period of one year from the date shipped when subjected to normal usage and service. All Warranties are void, A) If equipment has been altered or repaired without specific prior authorization from Broadcast Electronics, Inc., or B) If equipment is operated under environmental conditions or circumstances other than those specifically described in the appropriate literature or instruction manuals provided with each unit.

1.4 SERVICE

The customer Service Department is at your service to answer questions involving Broadcast Electronics, Inc. products. Technical assistance is available in your area from the local franchised dealer or you can write or call us direct at (301) 588-4983. Our address is on the cover of this manual.

In the event a unit must be returned to us for repair, please make arrangements in advance by contacting the customer Service Department or your local dealer for return authorization procedures. Equipment being returned should be sent by common carrier, prepaid, insured and well protected as we can assume no liability for inbound damage — making necessary repairs the obligation of the shipper.

SECTION 2 INSTALLATION

2.1 UNPACKING

Your new SPOTMASTER SERIES 2000 will be ready to go to work as soon as all protective packing material has been removed. The Carrier has assumed all responsibility for the safe delivery of this unit to you: therefore, any claim for damage should be made promptly and directly to them.

Note

Before connecting the unit to a power source, be sure the clear plastic ty-rap, used to secure the motor to the bottom panel during shipment, has been removed and discarded.

2.2 AUDIO OUTPUT/INPUT CONNECTIONS

The rectangular pin-type connector J-5 on the rear panel provides Audio Output and Input. The mating connector may be wired for either balanced or unbalanced operation as shown in the diagram on page 7-3.

The output level is set at the factory for a nominal +8 dBm level and is designed to be connected to a 600 ohm load. If placed in a higher impedance situation, a termination must be provided in the form of a 560 or 620 ohm resistor across the output to ensure proper frequency response (See diagram page 7-3).

The recorder input channel provides a high impedance for high level (-32 to +18 dBm) line signals. If a 600 ohm source is being recorded, install a 600 ohm terminating resistor as shown in the diagrams on page 7-4, to insure proper frequency response.

2.3 MICROPHONE INPUT

The record input is set at the factory for line level recording. If a microphone is to be used, the following terminals within the record module must be jumped — pin 11 to pin 12 and pin 10 to pin 13, and pin 26 to pin 27, and pin 28 to pin 29 in stereo.

2.4 MONITOR OUTPUT (SERIES 2000PA) Monophonic Units Only

Monitor output on the SERIES 2000PA unit provides for the use of the built-in speaker or a choice of high or low impedance headphones or an external speaker. The amplifier in the audio module will produce sufficient power for a high efficiency 8 or 16 ohm speaker. The internal speaker disconnects when either the headphone or speaker plug is inserted in the monitor jack.

2.5 REMOTE CONTROL

Remote control capabilities are provided on the rear panel pin connector J5 to parallel the front panel STOP/START switches and the logic ground output of the 150 Hz Q1 auxiliary cue sensor. If remote run or stop lamps are used, a 28 VDC lamp with a maximum current drain of 40 mA or less should be used. The remote stop lamp will illuminate in the run mode during playback to indicate Q1 presence.

SECTION 3 OPERATION

3.1 PLAYBACK

For Playback, begin by turning on the AC power at the switch located on the rear panel. When the STOP lamp on the front panel is illuminated, the tape drive capstan is rotating and pressure roller is in release position, you are ready to insert a cartridge.

Table top mounted units will accept all three sizes of NAB standard cartridges. Because the C size (1200 series) extends beyond the left side of the machine, it cannot be used if two units are mounted side-by-side in the dual rack adapter.

TO PLACE THE TAPE IN MOTION, depress the START switch on the front panel. Only momentary pressure is required as you observe the STOP switch lamp extinguish and the START switch lamp illuminate.

The SPOTMASTER SERIES 2000 is equipped with an auxiliary cue tone sensor as a standard feature. A visual indication of the cue tone's presence on the cue track is provided by the STOP switch lamp which will illuminate during tone presence even though it is normally off when the tape is in motion.

3.2 AUDITION (MONO UNITS ONLY)

For Audition purposes in a unit equipped with an audio module, the cartridge may be monitored during playback by adjusting the front panel LEVEL control for the desired volume. The speaker may be shut off entirely by placing the control in the extreme counter-clockwise position. Adjustment of this control does not affect the rear panel audio output.

3.3 RECORD

To Record, begin by depressing the red REC switch. The lamp in this switch will illuminate indicating the unit is in the recording mode. Changing to the recording mode can be accomplished only after the unit has been taken out of the playback or run mode by depressing the STOP switch.

Before starting the cartridge, preset the record level by playing the material to be recorded or speaking into the microphone. Adjust the front panel LEVEL control so that the VU meter, which is active only in the record mode, indicates a maximum 0 VU (100) on peaks.

When the level is set, re-cue the material to be recorded and return the unit to the record mode. START the SERIES 2000 unit by depressing the START switch. Then start the material to be recorded allowing a 1/4 to 1/2 second lag between the start of the cartridge and the start of the program material.

The unit will stop automatically when the cartridge reaches the end of its tape, or you can manually halt the recording at any point by depressing the STOP switch. In any case, the unit will return to the playback mode whenever it is stopped.

Note

In the record mode, the 1 kHz stop tone is placed on the tape whenever the START switch is depressed.

3.4 AUXILIARY CUE TONE

The Auxiliary Cue Tone is recorded by depressing the white Q1 switch on the front panel while the unit is in the record mode. The exact positioning and duration of the tone depends on your individual requirements and may be recorded at any time during the program segment. In most cases, the tone is recorded at the end of the program material to start another unit. If it will be used to start another SERIES 2000 unit, begin recording the tone just before the program material ends, allowing at least a 1/2 second count. The next machine will start at the end of the auxiliary cue tone.

SECTION 4 MAINTENANCE

4.1 CLEANING AND ADJUSTMENTS

As you already know from experience, any good piece of equipment will last longer and run better if it is given regular maintenance attention. Your SPOTMASTER SERIES 2000 tape cartridge machine is no different.

Tape heads and pressure rollers should be cleaned daily using the appropriate head cleaner solution. Traces of lubricant and oxide can be removed from the capstan and pressure rollers with a cloth that has been dipped in alcohol.

Tape heads should be demagnetized and alignment adjusted (see para 4.2) periodically depending on machine use.

4.2 HEAD ALIGNMENT

The alignment of a new head or the realignment of the present head requires two adjustments; tracking height and azimuth. Check the tracking height of the REPRODUCE head first and then the RECORD head. All adjustments will be made first on the REPRODUCE head.

When adjusting the tracking height and azimuth, final turns should be made on the adjusting screws in a clockwise direction so that the spring under the mounting block is being compressed. A .050 Allen Wrench is provided with each unit for these adjustments.

To check the tracking height of the reproduce head, remove the pressure pads from the cartridge so the tape can be observed as it passes the head. The top can be left off 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.

With the tracking cartridge in the machine and the tape in motion, observe the path the tape travels 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 is in a similar position in reference to the bottom pole piece.

Remove and re-insert the tracking test cartridge and start and stop the tape motion several times. If the tape does not repeat each time, check the tape guides 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 that when aligning a newly installed head, it may not be possible to get correct azimuth readings if the brass collar has been tightened too much. This will compress the washer so much that the head and clamping block cannot move.

When the azimuth adjustments are complete, re-insert the tracking cartridge to confirm the tracking height adjustment. If the adjustment has changed, continue to reference the two test cartridges against each other to establish correct head placement.

When the REPRODUCE head adjustments are complete, proceed to adjust the tracking height of the RECORD head. The azimuth of the RECORD head is determined by recording a 12 kHz tone and adjusting the RECORD head for maximum output at the REPRODUCE head.

With the tracking height of the RECORD head set, insert an erased cartridge and put the tape in motion in the RECORD mode. Feed a 12 kHz tone to the RECORD input and adjust the line level control for a program level indication of -10 VU on the front panel VU meter.

Adjust the azimuth adjustment screw for the RECORD head to maximum output using an external VU meter. When the azimuth is set, re-check the height with the tracking cartridge. If the adjustment has changed, continue to reference the two test cartridges against each other to establish correct head placement.

Improper tracking height will reduce separation between the cue and program tracks causing an increase in cross-talk. Improper azimuth will cause high frequency response to decrease.

4.3 STEREO PHASING TEST (STEREO UNITS ONLY)

Once the azimuth and height are established as described in paragraph 4.2, check the unit's phase response. Connect the right and left playback outputs to an oscilloscope as shown in Figure 7-6. Reproducing the alignment test cartridge (playback units) or recording from an external signal generator connected to both inputs (record units), observe the Lissajous pattern produced on the oscilloscope. Alternately check the phase response at the highest frequency on the test cartridge and the reference frequency. Make minor adjustments to yield the best overall stereo response. The higher frequency tone can easily be phased 360 degrees rather than 0 degrees, so check the reference tone after adjusting the azimuth.

Remove and reinsert the cartridge and perform the phasing test several times.

4.4 DECK ADJUSTMENTS

Refer to Drawing Number D906-2109, Figure 7-25.

4.4.1 Roller Perpendicularity

Manually raise the pressure roller by pushing the push link assembly screw. Apply a slight back pressure to the pressure roller. With a square, Broadcast Electronics gage block (stock number 836-0004), or by eye, determine if the pressure roller is parallel to the plane of the motor capstan.

If the roller is not parallel to the capstan, remove the two flat head screws on the extreme right and left in front and the two pan head screws in the rear which secure the tape deck to the chassis. **DO NOT REMOVE THE TWO CENTER SCREWS IN FRONT.** Raise the tape deck to gain access to the pressure roller latch on the underside of the deck. Loosen the two screws which mount the latch and move it as required toward the front or back of the deck, until the roller is parallel to the capstan. Retighten the latch mounting screws when finished.

4.4.2 Push Link Assembly Screw

Check the adjustment of the push link assembly screw by slowly inserting a cartridge in the deck and noting when the pressure roller latch engages. The latch should engage just as the cartridge comes in contact with the cartridge stop.

If the cartridge latches before it comes in contact with the stop, adjust the push link screw **CLOCKWISE**. If the latch is not engaged with the cartridge against the stop, adjust the push link screw **COUNTER-CLOCKWISE**.

If the tape creeps when the right hand corner of the cartridge is pushed, turn the push link screw **1/4" CLOCKWISE**. If the tape still creeps, check for excessive gap between the solenoid armature assembly and the solenoid. The gap should be no more than the thickness of a dime.

Optimum adjustment of the push link assembly screw will differ depending on the cartridge manufacturer. If different makes of cartridges are intermixed, each type should be tested and an acceptable compromise setting established.

4.4.3 Pressure Adjustment

Using a 5-1/2" to 10-minute cartridge, start the unit. Insert a 7/64" Allen wrench (stock number 836-0003) through the access opening in the front panel just below the release button and turn **COUNTER-CLOCKWISE** until the tape stops moving. Now turn the adjustment **3/4" CLOCKWISE** or until the tape runs smoothly.

When a flutter meter is available, the pressure should be adjusted for minimum pressure and flutter output when reproducing a standard flutter test tape.

4.5 TAPE DRIVE SYSTEM SERVICING

Refer to Drawing Number C-906-2105, Figure 7-24.

Remove the screws which secure the deck plate to the chassis (see second paragraph 4.4.1). Raise the deck plate and unplug the motor from the power supply.

Note

Release the motor plug locking device before removing the plug.

In the record equipped units, also unplug the record head leads from the phono jacks underneath the deck plate.

With the deck plate on the workbench, remove the subassembly and dismount the motor from its mounting plate. Set the motor and mounting hardware aside. To remove the drive pulley from the motor shaft, loosen the set screw. Grasp the top of the motor in the left hand and the rotor in the right. Firmly but gently pull the motor and shaft out of the stator.

Using a soft, lint-free cloth, clean the motor shaft with a household cleanser (Comet, Bon-Ami, etc.) and warm water. Rinse and dry the shaft. Avoid getting water on the rotor. Re-oil the shaft with light-weight, non-detergent oil (stock number 832-0010). Wipe off excess oil with a soft, lint-free cloth.

Re-insert the rotor in the stator. Carefully fit — don't force — the shaft straight through the bottom bearing. Line up the plastic dust cap with the end of the shaft and firmly push the shaft through the cap. If this cap pops loose, simply press it and the corresponding metal cap back into place. By hand check the rotor for free rotation.

Reinstall the pulley on the motor shaft with the large diameter towards the motor. Position the pulley approximately 3/8" away from the motor and set the motor aside for the moment.

Note

Belts must run level when deck is in operating position.

Clean and lubricate the bearing surface in the motor shield and set it aside.

Remove the shaft retaining plate. With a soft, lint-free cloth, wipe off the thrust bushing and flywheel bearing. Re-lubricate the thrust bushing with "Lubriplate" or "Vaseline." Use isopropyl alcohol to clean any dirt from the belt grooves on the flywheel. Remount the shaft retaining plate.

Fit the drive belts on the flywheel and the pulley. Remount the motor with the motor leads oriented as shown on drawing number C-906-2105. The long screws and bushings are used to mount the motor.

Visually check the alignment of the drive belts and pulley with the flywheel. Be sure the belts do not rub on the motor leads.

Remount the sub-assembly on the deck plate. Reconnect the motor plug (and head leads in record units). Remount the deck plate in the chassis.

When AC power is applied to the unit, the drive system should operate smoothly and quietly.

SECTION 5

ELECTRONIC ADJUSTMENTS

5.1 GENERAL CONSIDERATIONS

Before adjusting the electronics, clean the tape head(s) with BE-903 cleaning fluid or isopropyl alcohol. Be sure the reproduce (and record) head(s) are properly aligned.

In record models, the reproduce electronics should be adjusted before the record section.

An NAB standardized test and alignment cartridge is required for proper adjustment of the unit. Two different styles are available from Broadcast Electronics: stock numbers 808-0003 (NAB type 3 Mono) and 808-0004 (Fidelipac 350 STA Stereo).

The tones recorded on these test and alignment cartridges are at two levels: NAB standard operating level and 10 dB below NAB level. The operating level segment is required for adjusting output level and in measuring noise and distortion. Frequency response measurements and equalization adjustments are made with the other tones.

5.2 OUTPUT LEVEL

Refer to Drawing Numbers C-914-1390, 915-1394 and 914-1400, Figures 7-10, -12 and -14.

While reproducing the NAB operating level tone from the test cartridge, adjust output level on the playback board for the desired output as measured on an external VU meter connected to the output.

5.3 PLAYBACK EQUALIZATION

Refer to Drawing Numbers 914-1390, 915-1394 and 914-1400, Figures 7-10, -12 and -14.

While reproducing the 50 Hz tone from the test cartridge, adjust low end equalizer on the playback board for -10 VU (10 dB below the output level setting) as measured on an external VU meter connected to the output. Reproduce the 10 kHz test tone and adjust high end equalizer on the playback board for -10 VU on the external VU meter.

5.4 CUE TONE SENSOR LEVEL

Refer to Drawing Numbers C-914-1390, 915-1394 and 914-1400, Figures 7-10, -12 and 14.

Both cue tone sensors are adjusted while reproducing a cue tone test cartridge. During the 1000 Hz stop tone, adjust the 1 kHz sensor level so that the sensor just triggers and stops the unit. During the 150 Hz tone, adjust 150 Hz sensor level so that the sensor just triggers and lights the front panel STOP lamp. THE START lamp should remain on.

Each time the test cartridge is started, wait 3 seconds before adjusting the stop sensor. The sensor circuitry is disabled for this time.

If a cue tone cartridge is not available, tones from an audio signal generator may be used to adjust the sensors. To do this, begin by disconnecting the AC power and then the blue head leads from the playback board. Connect the signal generator to the cue head input of the playback board. DO NOT load a cartridge in the unit but manually raise the pressure roller and operate the controls. Set the generator pressure roller and operate the controls. Set the generator for 1,000 Hz with a level of .45 MV and adjust 1 kHz sensor level. With the generator set for 150 Hz at a level of .3 mV, adjust 150 Hz sensor level. When the adjustments are complete, disconnect the AC power and reconnect the head leads.

5.5 PROGRAM RECORD ADJUSTMENTS

Note that the following adjustments are required only in units equipped with the record module. Remove the cover to gain access to the record board. If necessary, adjustments may be performed with the module outside the unit. Always be sure the power is off before removing or inserting modules.

5.5.1 Bias Trap Tuning

Refer to Drawing Numbers 914-1393 and 914-1397, Figures 7-16 and 7-18.

Connect a high frequency, AC VTVM between point noted on drawing and ground. Depress the REC switch to place the unit in record. DO NOT supply any signal to the input. It is not necessary to load a cartridge in the machine. With a non-metallic screwdriver, such as a G.C. Electronics alignment tool, tune bias trap for a minimum reading on the VTVM.

5.5.2 Program Bias Level

The bias supplied to the record head is most important in providing optimum frequency response. Bias requirements vary between brands of tape and between series of one brand. If more than one type of tape is in use, check the performance of each type at its optimum bias level against the performance at the optimum bias level for other tapes. Where older and newer tapes are both in use (such as 3M154 and 156), bias just less than the optimum for the newer type usually is an acceptable compromise.

Once the bias trap is tuned, load a bulk-erased cartridge in the unit. Connect an audio signal generator to the rear panel record input. Set the generator for 400 Hz at a level of 0.5 V. Adjust the record level control for -10 VU on the front panel meter. Connect an external VU meter to the OUTPUT. Begin recording. Observe the external meter and adjust the PGM Bias Adjust on the record module for the peak output.

5.6 VU METER CALIBRATION

While recording the 400 Hz tone, adjust the record level control until the external meter indicates the output level determined in paragraph 5.2. Now adjust VU Meter calibrate on the record module so that the front panel VU meter indicates 0 VU.

5.7 RECORD EQUALIZATION

Now set the signal generator for 15 kHz. Adjust the generator output for 10 dB below level in the meter calibration step. DO NOT ADJUST THE FRONT PANEL LEVEL CONTROL. While recording the 15 kHz tone, adjust hf Adj on the record module for -10 VU on the external VU meter (10 dB below the output level established in paragraph 5.2).

SECTION 6

CUE RECORD ADJUSTMENTS

6.1 CUE BIAS LEVEL

Refer to Drawing Number C-914-1393 and 914-1397, Figures 7-16 and 7-18.

Connect a high frequency, high impedance VTVM to terminals 1 and 2 of the record module (the cue record head leads). Depress the REC switch to place the unit in record. Do not load a cartridge in the unit but depress the START Switch. After 3 seconds, adjust cue bias adj on the record module for 5 VRMS as measured on the VTVM.

6.2 CUE TONE RECORD LEVELS

Refer to Drawing Numbers C-914-1390, 915-1394 and 914-1400, Figures 7-10, -12 and -14.

Connect a VTVM to the cue lead input of the playback board. Load a bulk-erased cartridge in the deck and depress the REC switch. DO NOT DEPRESS THE START SWITCH. Instead, manually put the tape in motion by pressing the play solenoid armature against the play solenoid by hand. While thus recording a continuous stop tone, adjust 1 kHz level adjust on the record module for 0.45 mV on the VTVM.

Release the solenoid and depress the Start switch. After 3 seconds, depress the Q1 switch to record continuously the 150 Hz auxiliary cue tone. Adjust 150 Hz Level Adjust module for 0.3 mV on the VTVM.

SECTION 7

TROUBLESHOOTING SUGGESTIONS

7.1 AUDIO QUALITY PROBLEMS (PLAYBACK)

- a. To determine if the cartridge is properly recorded, test any suspect cartridge in another unit, or test the suspect playback unit with an NAB test and alignment cartridge.
- b. Check connections to the output jack for continuity, proper wiring, loading, and grounding.
- c. Check tape head alignment.
- d. Check playback equalization. If the equalization controls cannot properly adjust the output response, replace the playback head.
- e. Check the playback amplifiers.

7.2 AUDIO QUALITY PROBLEMS (RECORD)

- a. Check the input connection for continuity, proper wiring, loading, and grounding. Check the jumpers on the record board for proper sensitivity for the input signal (microphone or line.)
- b. Check record head alignment.
- c. Check the record amplifiers.
- d. Check the record bias adjustment.
- e. Check the record equalization.
If bias and equalization controls will not properly adjust the record performance, replace the record head.

7.3 CUE TONE PROBLEMS (PLAYBACK)

- a. To determine if the cartridge is properly recorded, test the cartridge in another unit, or test the suspect unit with an NAB test and alignment cartridge.
- b. Clean the playback head.
- c. Check tape head height.
- d. Check the cue tone sensor sensitivity.
- e. Check operation of the manual stop (or start) controls. If remote controls are connected, check these for proper operation when connected and when disconnected.
- f. Check the cue circuit amplifiers.

7.4 CUE TONE PROBLEMS (RECORD)

- a. Clean the record head.
- b. Check the record head height.
- c. Check the tone record level.
- d. Check operation of the 1 kHz record logic. The 1 kHz generator should run when the unit is in the record mode but tape not in motion. The generator should continue to run for about 1-1/2 seconds after tape motion begins.
- e. Check operation of the 150 Hz generator. This generator should run whenever the unit is in record and the front panel Q1 switch is depressed. When the switch is released, the generator should turn off.
- f. Check the frequency of the cue generator's output.
- g. Check the cue record bias.

7.5 CHECKING INTEGRATED CIRCUIT AMPLIFIERS

- a. Check all capacitors for shorting or reversed polarity.
- b. Test integrated circuits by measuring the DC voltage present on the IC input and output pins (with a 20,000 ohms/volt VOM). This should be one half the DC voltage present at the IC DC supply voltage input pin (V+).

7.6 TAPE SPEED PROBLEMS

- a. Clean pressure roller and capstan. If the pressure roller is worn or cupped, replace the pressure roller.
- b. Check pressure roller perpendicularity and pressure.
- c. Check adjustment of the push link assembly.
- d. Service the tape drive system.
- e. Check the operation of the play solenoid. This should energize when the START switch is depressed and de-energize when the STOP switch is depressed. (When energized, the solenoid should draw 170 mA at 23 volts.)
- f. Check tape head penetration. Different makes of cartridges require different positions of the head bracket. Follow the recommendations of the cartridge manufacturer.
- g. Check the motor and motor capacitor for continuity.

SCHEMATIC CONNECTIONS

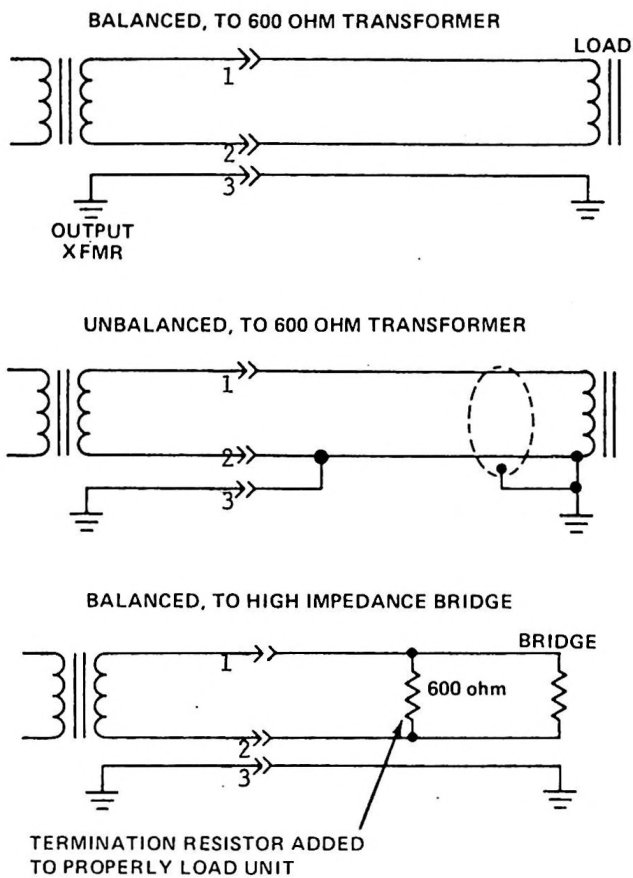
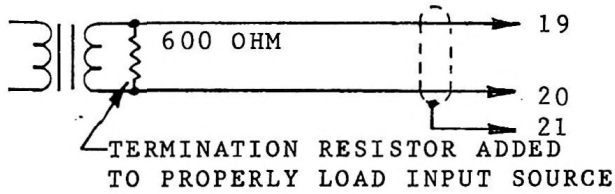


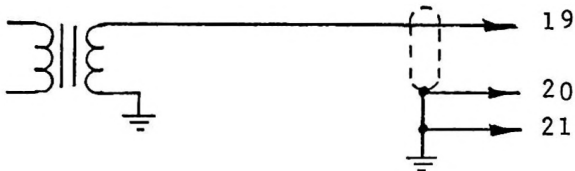
Figure 7-1. Typical Output Connections

SCHEMATIC CONNECTIONS

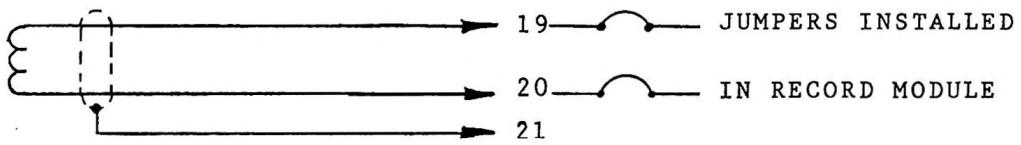
BALANCED LINE FROM 600 OHM TRANSFORMER



UNBALANCED LINE FROM 600 OHM TRANSFORMER



BALANCED MICROPHONE



UNBALANCED MICROPHONE

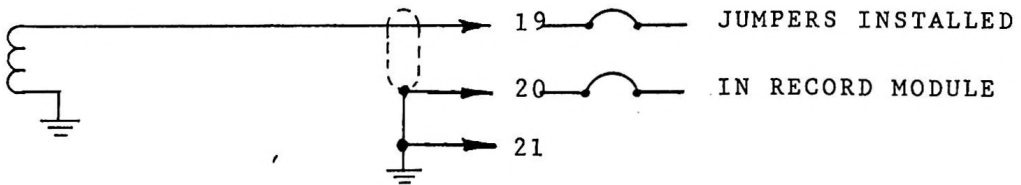
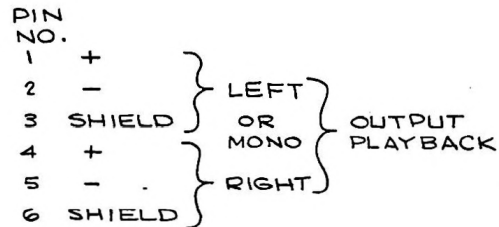
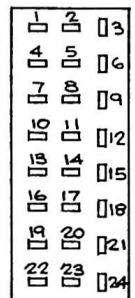


Figure 7-2. Typical Input Connections

| REVISIONS | | | |
|-----------|-------------|------|----------|
| REV | DESCRIPTION | DATE | APPROVED |



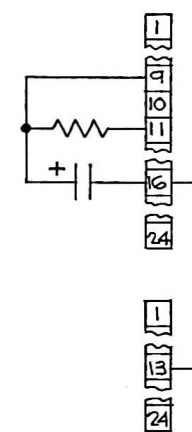
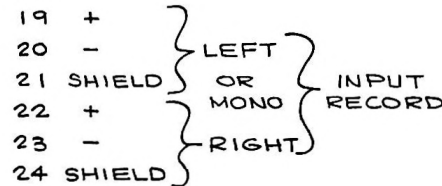
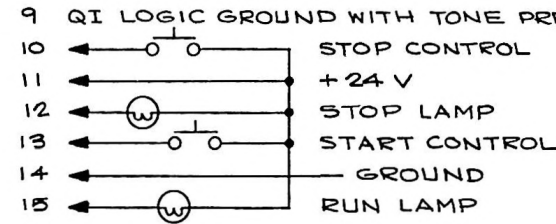
REMOTE CONNECTOR



CINCH NO.
P-324-CCT
24 PIN MALE

BEI NO.
418-0306

REAR VIEW MATING CONNECTOR



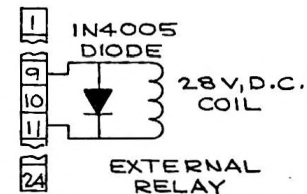
ADD TO REMOTE SOCKET INTERNALLY OR EXTERNALLY

1/4 W RESISTOR (1 TO 5K OHMS)
ELECTROLYTIC CAPACITOR (1 TO 10 MFD)

(SEE NOTE 2)

START CONTROL SECOND UNIT

USING 150 HZ (QI) PROVISION TO DRIVE EXTERNAL RELAY



EXTERNAL RELAY

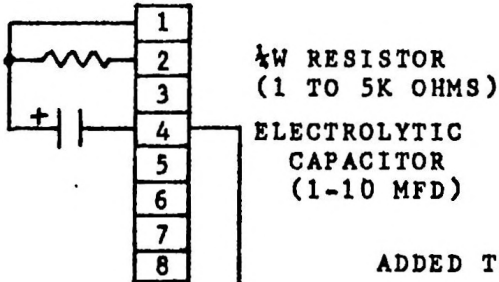
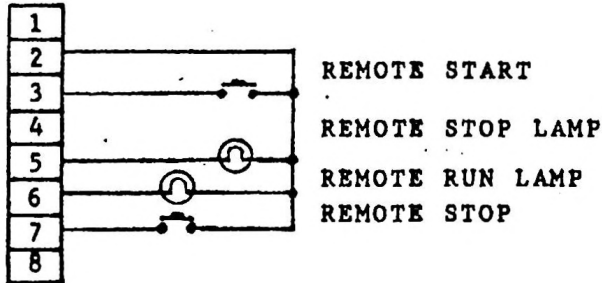
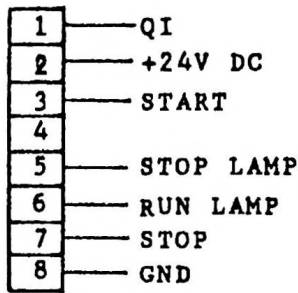
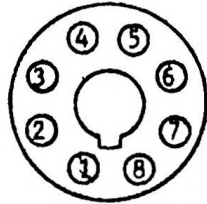
NOTES :

1. UNBALANCED INPUT OR OUTPUT CONNECT (-) TO SHIELD.
2. PROVIDING SEQUENCING OF SEVERAL SERIES 2000 MACHINES USING BUILT IN 150 HZ (QI) PROVISION.
3. ALL LAMPS 28V, .05A OR LESS.

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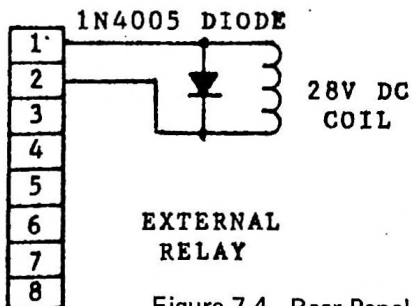
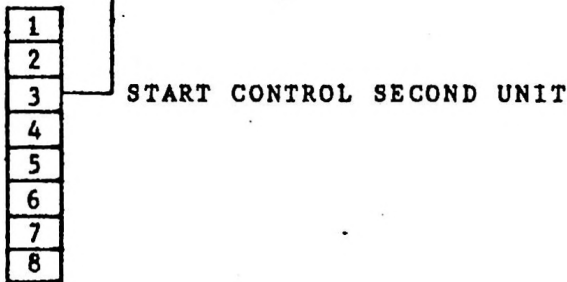
| ITEM | QTY | PART NUMBER | DESCRIPTION | NOTE |
|--------------------------------------|-----|---------------------|-------------|--|
| LIST OF MATERIAL | | | | |
| TOLERANCE UNLESS OTHERWISE SPECIFIED | | DRAWN BY L. BLUM | DATE 6-6-75 | BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - |
| DECIMAL 2 PL ± .01 3 PL ± .005 | | CHECKED BY | DATE | |
| FRACTIONAL ± 1/64 | | PROJECT ENGR | DATE | TITLE REAR PANEL CONNECTOR WIRING |
| ANGULAR ± 1° | | APPROVED BY | | DWG NO. 906-2115 |
| SHARP EDGES | | | | REV |
| BEND RADI | | | | B |
| FILLET RADI | | | | 2000 SERIES |
| MATERIAL | | TREATMENT OR FINISH | SCALE | SHEET 1 OF 1 |

Figure 7-3



PROVIDING SEQUENCING OF SEVERAL SERIES 2000 MACHINES USING BUILT IN 150 HZ (QI) PROVISION

ADDED TO REMOTE SOCKET INTERNALLY OR EXTERNALLY



USING 150 HZ (QI) PROVISION TO DRIVE EXTERNAL RELAY

Figure 7-4. Rear Panel Remote Control Connector and Typical Connections

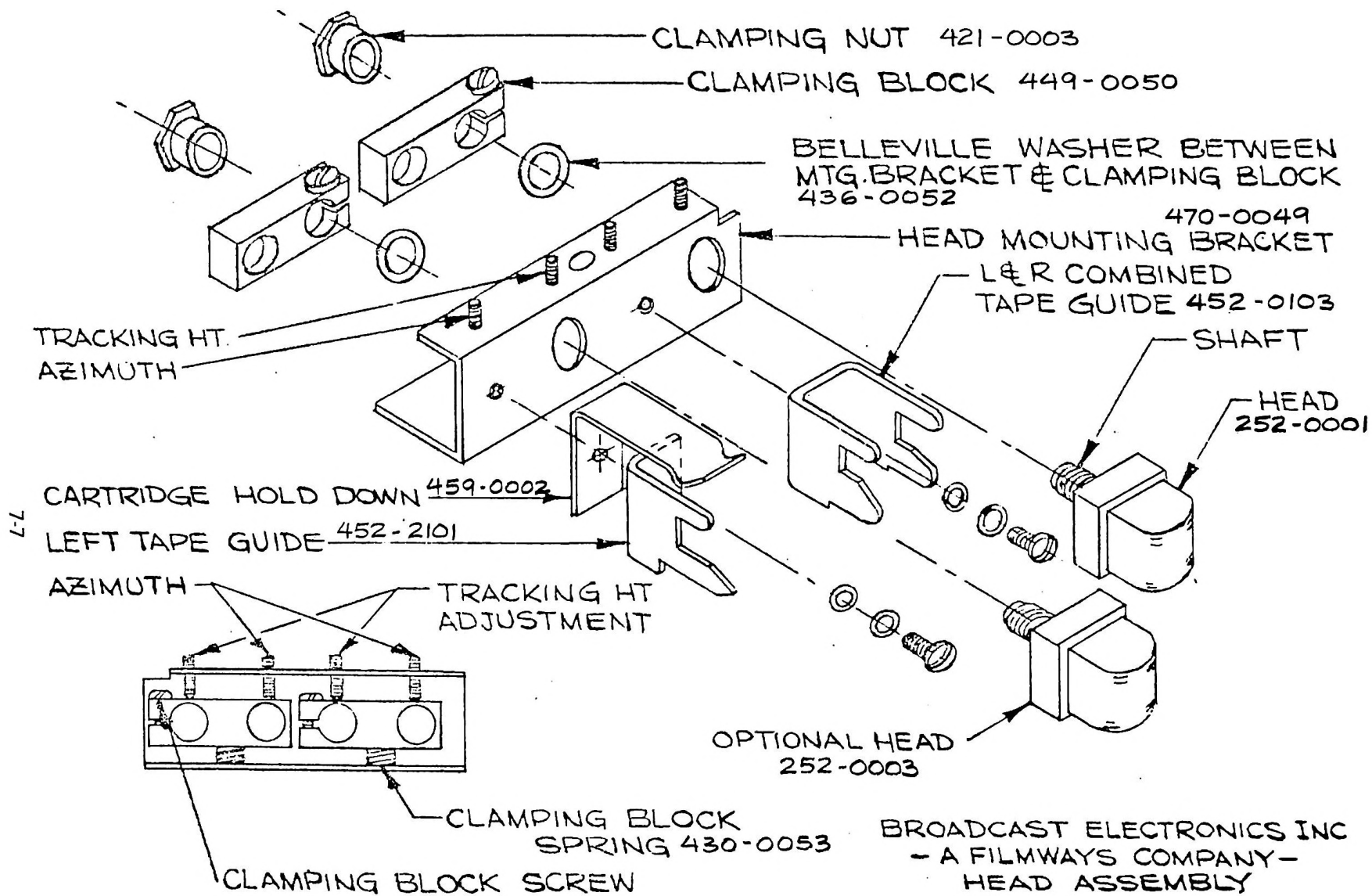
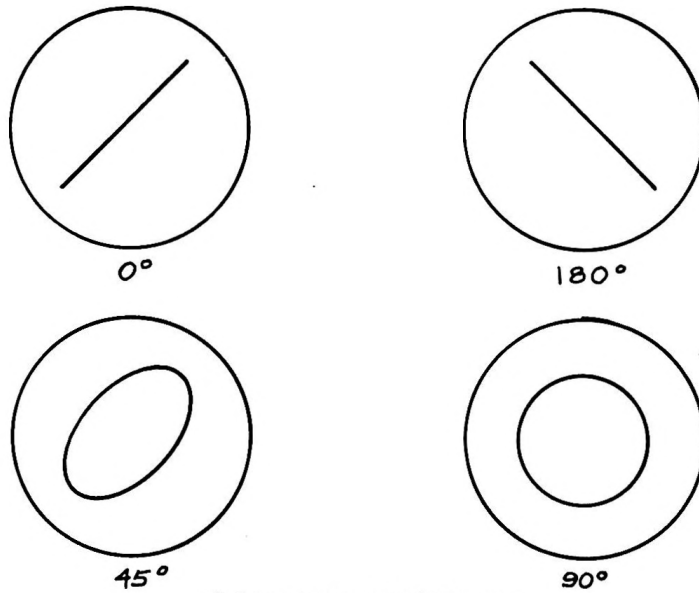
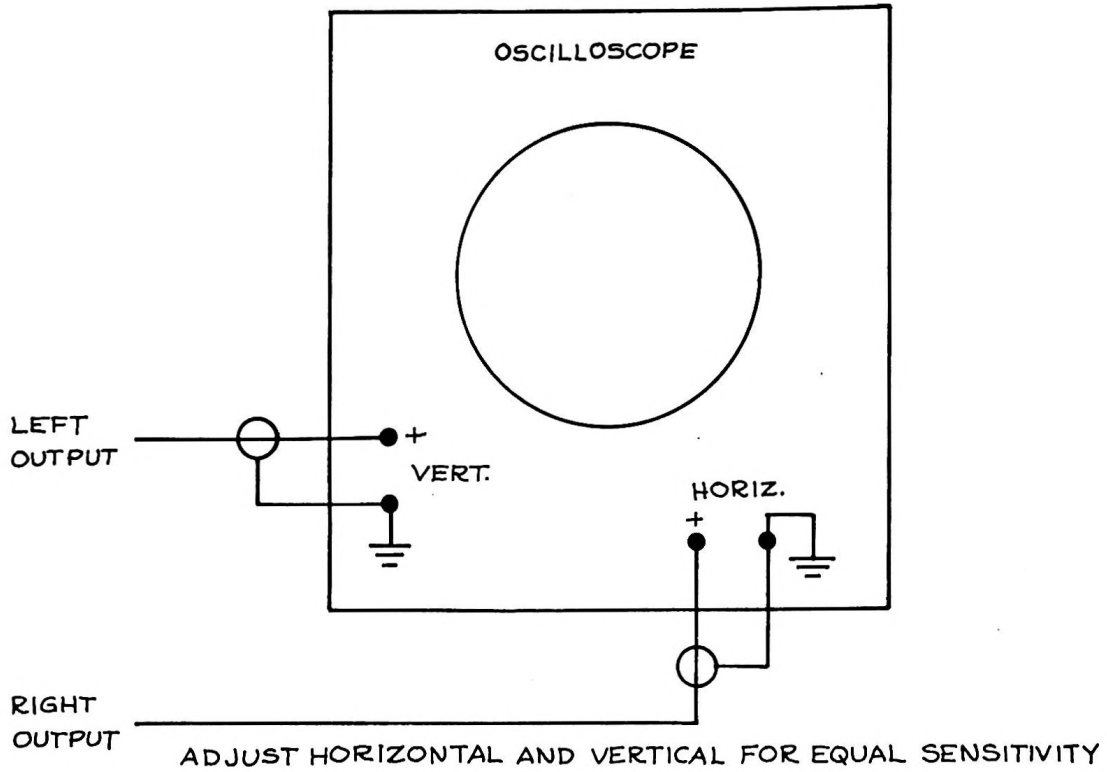


Figure 7-5. Head Assembly

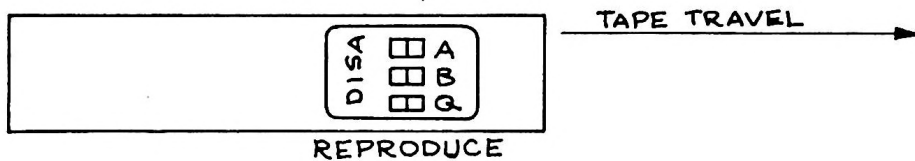
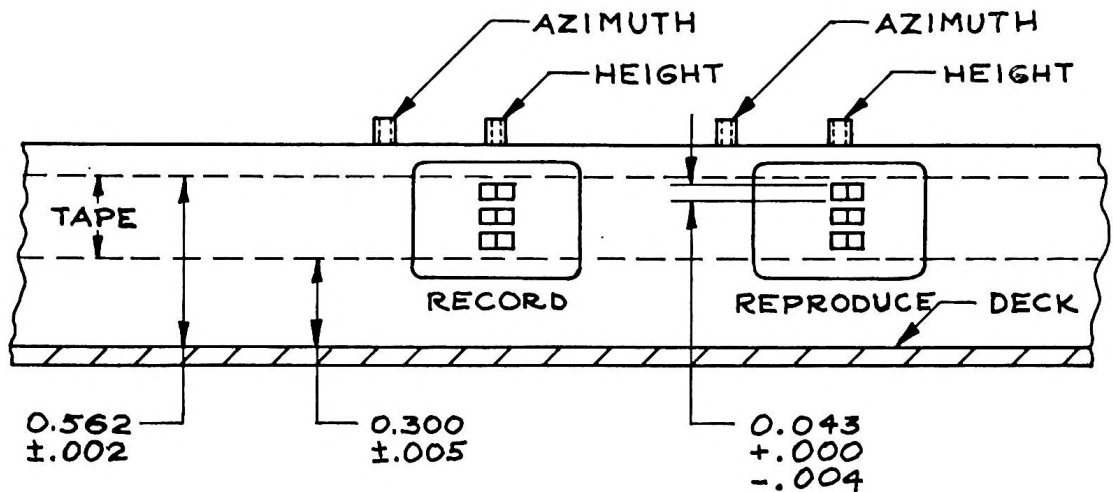


LISSIJOUS PATTERNS

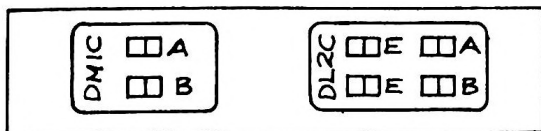
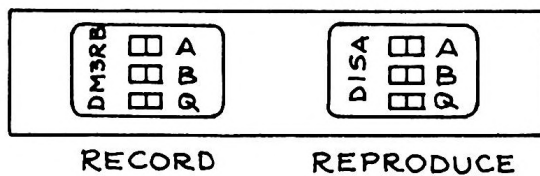
BROADCAST ELECTRONICS, INC.
 -A FILMWAYS COMPANY-

STEREO PHASING TEST

Figure 7-6



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



BROADCAST ELECTRONICS INC.
- A FILMWAYS COMPANY -

STEREO HEAD POSITIONS

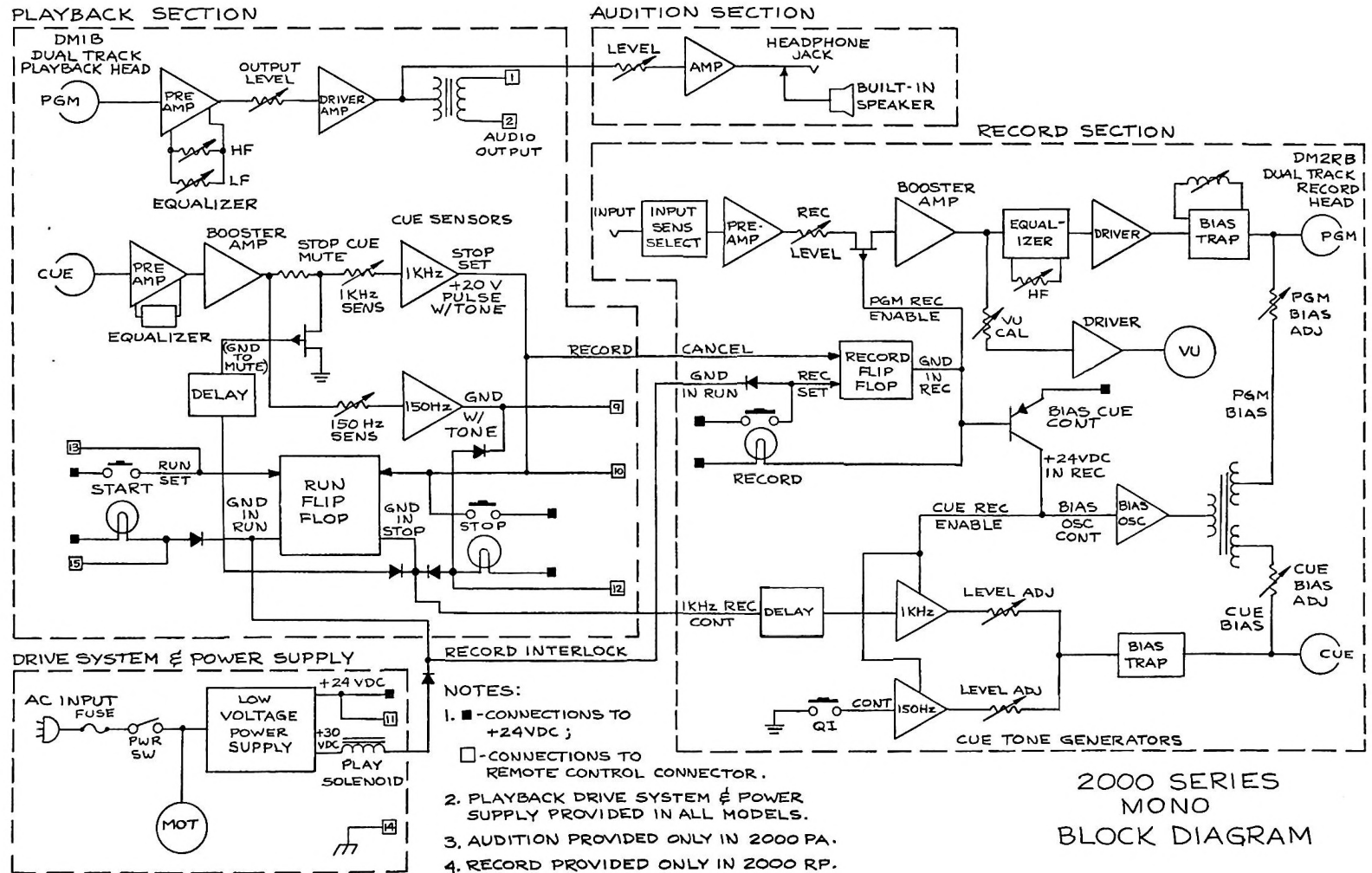
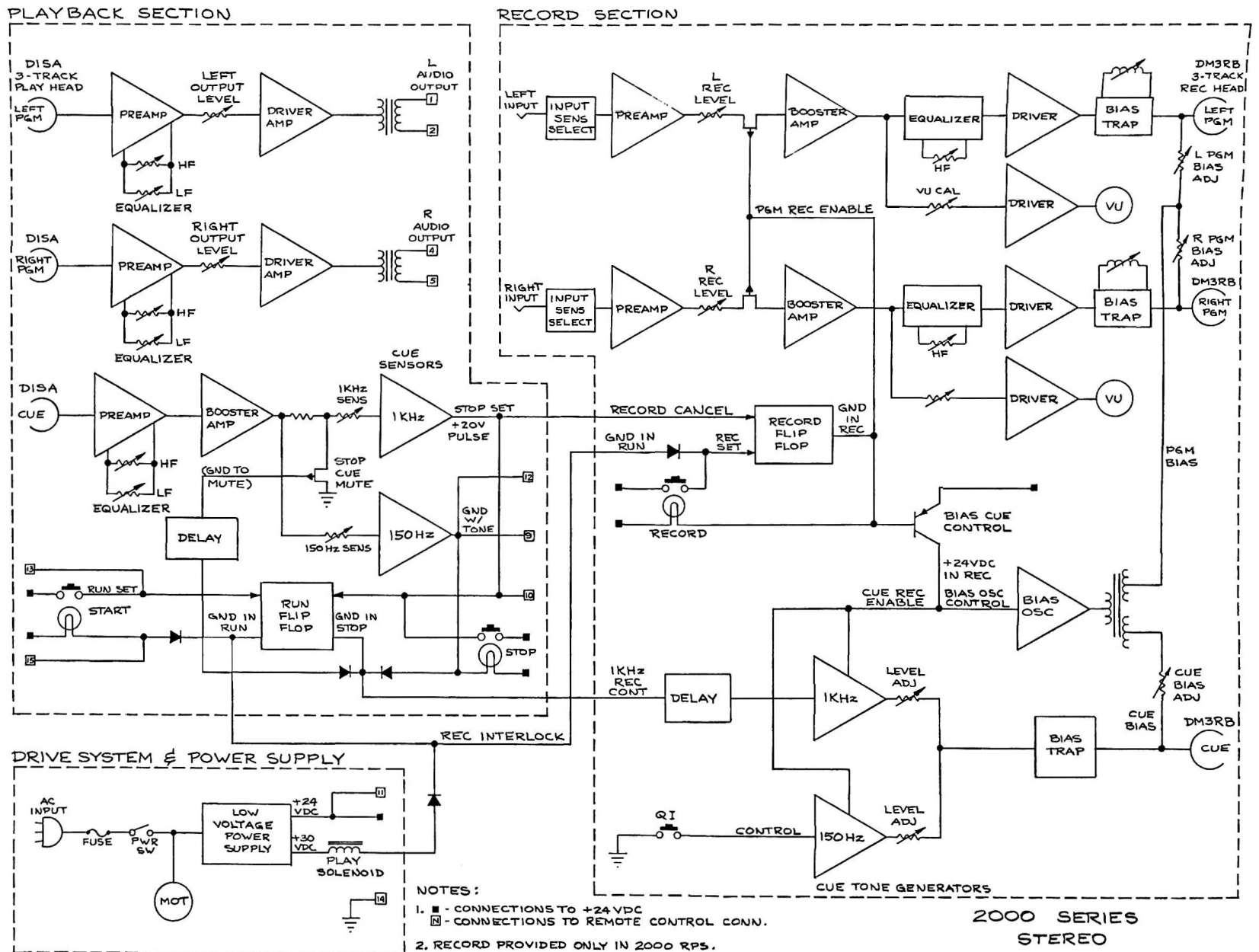


Figure 7-8

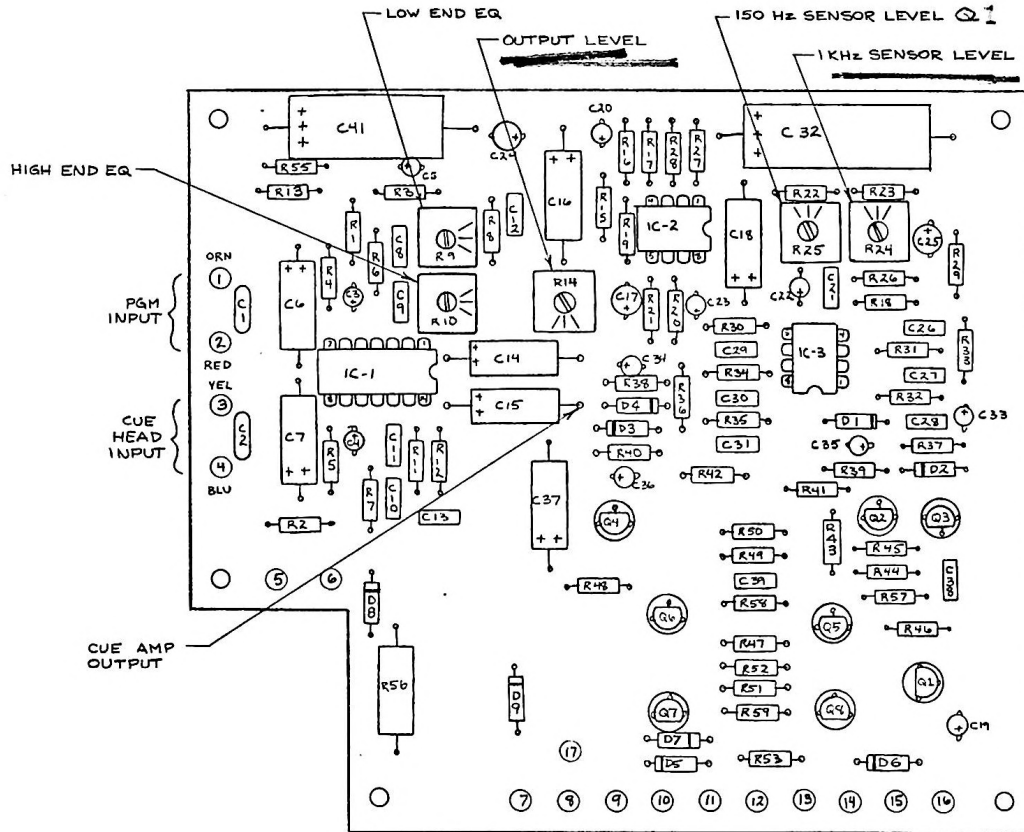
7-11



2000 SERIES
STEREO
BLOCK DIAGRAM

Figure 7-9

REV 007 PER ECN 431 12-23-74
 REV 008 PER ECN 441 1-21-75
 REV 009 PER ECN 445 2/12/75
 REV 010 PER ECN 517 6/20/75
 REV 011 PER ECN 595 7/29/75
 T PER ECN 759 4-14-76



| | | | | |
|----|----------|---|--------------------------------------|--|
| 37 | 064-3373 | 2 | CAPACITOR, 33 MFD, 35V | (C29, C25) |
| 36 | 030-2033 | 1 | .0022 MFD, 100V | (C21) |
| 35 | 064-4763 | 6 | 4.7 MFD, 35V (C8, C9, C10, C11, C12) | (C8, C9, C10, C11, C12) |
| 34 | 032-4733 | 9 | .0047 MFD, 50V (C13, C26, C27, C28) | (C13, C26, C27, C28) |
| 33 | 015-5064 | 7 | 4.7 MFD, 50V (C18, C37) | (C18, C37) |
| 32 | 064-1063 | 6 | 1 MFD, 35V (C3, C4, C5, C22) | (C3, C4, C5, C22) |
| 31 | 041-2722 | 2 | CAPACITOR, 270pf, 500V | (C23, C33) |
| 30 | | | | (C1, C2) |
| 29 | | | | |
| 28 | | | | |
| 27 | 177-1054 | 3 | TRIMMER, 10K Ω , .1W | (R14, R24, R25) |
| 26 | 177-5054 | 1 | TRIMMER, 50K Ω , .1W | (R10) |
| 25 | 177-1074 | 1 | TRIMMER, 1.0 MEG Ω , .1W | (R9) |
| 24 | 132-5622 | 1 | RESISTOR, 56 Ω , 2W, W/W | (R56) |
| 23 | 100-3953 | 1 | 39K Ω , 1/4W | (R58) |
| 22 | 100-1543 | 1 | 1.5K Ω | (R55) |
| 21 | 100-2223 | 1 | 22 Ω | (R53) |
| 20 | 100-2743 | 2 | 2.7K Ω | (R51, R52) |
| 19 | 100-3943 | 2 | 3.9K Ω | (R47, R48) |
| 18 | 100-2072 | 1 | 2.0 MEG Ω | (R46) |
| 17 | 100-1033 | 2 | 100 Ω | (R41, R42) |
| 16 | 100-6232 | 2 | 620 Ω | (R37, R38) |
| 15 | 100-1853 | 1 | 18K Ω | (R36) |
| 14 | 100-8243 | 1 | 82K Ω | (R30) |
| 13 | 100-1843 | 1 | 1.8K Ω | (R29) |
| 12 | 100-1863 | 3 | 180K Ω | (R27, R34, R35) |
| 11 | 100-4743 | 7 | 4.7K Ω | (R21, R28, R33, R39) (R40, R43, R44) |
| 10 | 100-4753 | 8 | 47K Ω | (R17, R18, R19, R20) (R26, R45, R57, R59) |
| 9 | 100-2753 | 4 | 27K Ω | (R15, R16, R22, R23) |
| 8 | 100-1053 | 3 | 10K Ω | (R12, R49, R50) |
| 7 | 100-3363 | 1 | 330K Ω | (R11) |
| 6 | 100-1563 | 1 | 150K Ω | (R8) |
| 5 | 100-1023 | 2 | 10 Ω | (R6, R7) |
| 4 | 100-8233 | 2 | 820 Ω | (R4, R5) |
| 3 | 100-5653 | 4 | 56K Ω | (R3, R13, R31, R32) |
| 2 | 100-2743 | 2 | RESISTOR, 270K Ω , 1/4W | (R1, R2) |
| 1 | 514-1390 | 1 | BLANK P C BOARD | |
| | 914-1390 | | PLAYBACK/LOGIC P C BOARD ASSY | |

PARTS LIST

BROADCAST ELECTRONICS, INC.
- A FILMWAYS COMPANY -

2000 SERIES
PLAYBACK/LOGIC P C ASSEMBLY

REV F
C-914-1390

DRAWN: 12/4/74 JAB
CHECKED: SCALE: 2:1

| | | | 48 | 211-5816 | 2 | TRANSISTOR ZN5816 | (Q7, Q8) |
|------|-------------|-----|------------------------------|-----------|-------------|---|----------------------|
| | | | 47 | 211-6566 | 5 | TRANSISTOR MPS 6566 (Q2, Q3, Q4, Q5, Q6) | |
| | | | 46 | 203-4005 | 4 | IN4005 DIODE | (D5, D7, D8, D9) |
| | | | 45 | 201-0457V | 5 | IN457 DIODE | (D1, D2, D3, D4, D6) |
| | | | 44 | 413-1597 | 17 | TURRET TERMINAL | |
| | | | 43 | | | | |
| | | | 42 | 013-4783 | 1 | CAPACITOR, 470 MFD, 25V | (C91) |
| | | | 41 | | | | |
| | | | 40 | 030-4743A | 1 | .047 MFD, 100V | (C38) |
| | | | 39 | 014-1084 | 1 | 100 MFD, 40V | (C32) |
| | | | 38 | 030-1043 | 4 | CAPACITOR, .01 MFD, 100V (C29, C30, C31, C39) | |
| 55 | 417-0800 | 2 | 8-PIN DIP IC SOCKET | | | | |
| 54 | 417-1400 | 1 | 14-PIN DIP IC SOCKET | | | | |
| 53 | 221-4558 | 2 | DUAL OP-AMP (IC-2, IC-3) | | | | |
| 52 | 221-2310 | 1 | DUAL LOW NOISE PREAMP (IC-1) | | | | |
| 51 | 417-0330 | 2 | TRANSISTOR SOCKETS | | | | |
| 50 | 409-0121 | 6 | TRANSISTOR PADS | | | | |
| 49 | 212-5462 | 1 | ZNS462 F.E.T. (Q1) | | | | |
| ITEM | PART NUMBER | QTY | DESCRIPTION | ITEM | PART NUMBER | QTY | DESCRIPTION |

Figure 7-10

7-12

X

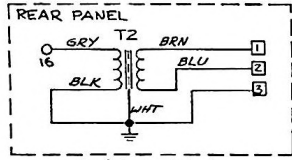
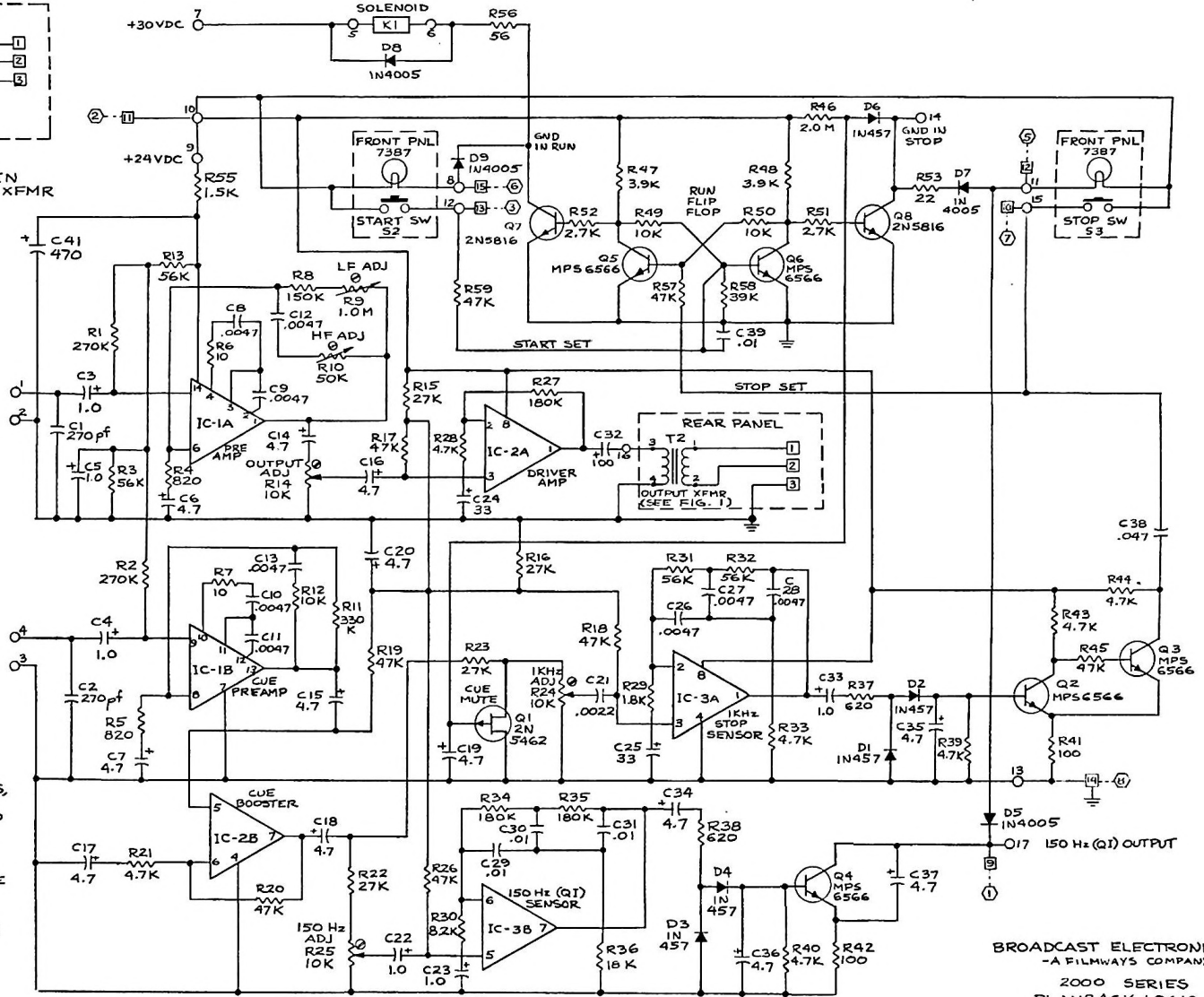


FIGURE 1
(CONFIGURATION WHEN ALTERNATE OUTPUT XFMR IS USED)



NOTES:

1. RESISTORS IN OHMS, 1/4W; CAPACITORS MFD, UNLESS NOTED OTHERWISE.

2. [N] REAR PANEL REMOTE CONTROL SOCKET ON UNITS WITH OCTAL TYPE (INSTEAD OF [N])

3. [N] REAR PANEL REMOTE CONTROL SOCKET:
 1 - +OUTPUT
 2 - -OUTPUT
 3 - SHLD
 4 - NC
 5 - NC
 6 - NC
 7 - NC
 8 - NC
 9 - Q1 LAMP
 10 - STOP CONTROL
 11 - +24V
 12 - STOP LAMP
 13 - START CONTROL

14 - GROUND
 15 - RUN LAMP
 16 - NC
 17 - NC
 18 - NC
 19 - + INPUT
 20 - - INPUT } RECORD ONLY
 21 - SHLD

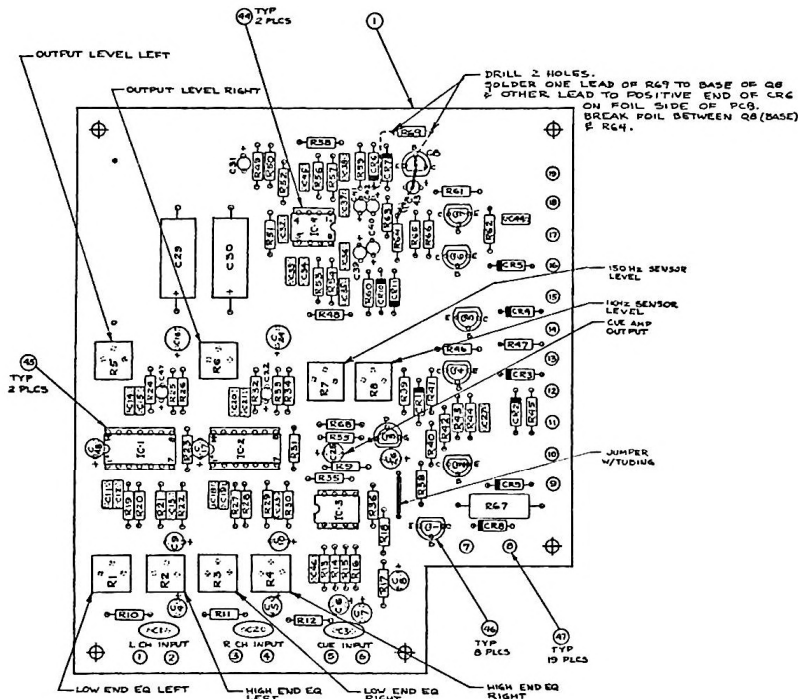
22 - NC
 23 - NC
 24 - NC

F - ECN 884 10-11-76
 E - ECN 596 4-29-75
 D - ECN 522 6/29/75
 C - ECN 480 5/12/75
 B - REVISED 5/6/75
 REV A - ECN NO. 445

BROADCAST ELECTRONICS, INC.
 - A FILMWAYS COMPANY -
 2000 SERIES
 PLAYBACK LOGIC PCB
 MONO
 SCHEMATIC
 REV
 C-906-2100 F

DRAWN: 11/19/74 JSD

Figure 7-11



| REVISION | | | |
|----------|----------------|---------|----------|
| REV | DESCRIPTION | DATE | APPROVED |
| — | REVISED (1C-4) | 1/2/65 | |
| A | ECN 519 | 1/2/65 | |
| B | ECN 751 | 1/17/70 | |
| C | ECN 850 | 1/21/70 | |

| QTY | REV | PART NUMBER | DESCRIPTION | QTY | REV | PART NUMBER | DESCRIPTION |
|-----|-----|-------------|--|-----|-----|-------------|-------------|
| 20 | 5 | 064-1063 | CAPACITOR, 1.0MFD, 35V (C7, C25, C31, C39, C40) | | | | |
| 28 | 3 | 040-2723 | CAPACITOR, 270 pf., 50V (C1, C3, C3) | | | | |
| 27 | 14 | 064-4763 | CAPACITOR, 0.7MFD, 35V (C4, C9, C6, C8, C9, C10, C17, C22, C26, C40, C42, C43, C47, C48) | | | | |
| 26 | 1 | 132-3622 | RESISTOR, 56 Ω, 2W (R47) | | | | |
| 25 | 3 | 100-2755 | 27K Ω, 1/4W (R23, R31, R40) | | | | |
| 24 | 1 | 100-1053 | 100 Ω (R62) | | | | |
| 23 | 2 | 100-6232 | 620 Ω (R59, R60) | | | | |
| 22 | 4 | 100-5695 | 86 K Ω (R53, R54, R56, R57) | | | | |
| 21 | 1 | 100-2243 | 2.2K Ω (R48) | | | | |
| 20 | 1 | 100-3953 | 39K Ω (R44) | | | | |
| 19 | 2 | 100-3943 | 3.9K Ω (R40, R41) | | | | |
| 18 | 1 | 100-2075 | 2M Ω (R39) | | | | |
| 17 | 2 | 100-2743 | 2.7K Ω (R36, R46) | | | | |
| 16 | 7 | 100-4755 | 47K Ω (R36, R45, R47, R49, R50, R55, R44) | | | | |
| 15 | 3 | 100-1843 | 180K Ω (R64, R25, R33) | | | | |
| 14 | 2 | 100-1843 | 180K Ω (R17, R18, R24, R24, R35, R50) | | | | |
| 13 | 9 | 100-4745 | 4.7K Ω (R41, R63, R45) | | | | |
| 12 | | | DIODE, 1N4005 (CR2, CR3, CR4, CR5, CR8, CR9) | | | | |
| 11 | 5 | 100-2763 | 270K Ω (R16, R10, R28, R21, R22) | | | | |
| 10 | 3 | 100-8233 | 820 Ω (R15, R22, R30) | | | | |
| 9 | 1 | 100-3363 | 330K Ω (R14) | | | | |
| 8 | 4 | 100-1053 | 10K Ω (R29, R33, R42, R43) | | | | |
| 7 | | | DIODE, 1N4005 (CR2, CR3, CR4, CR5, CR8, CR9) | | | | |
| 6 | 7 | 100-1023 | 10 Ω (R10, R11, R12, R19, R24, R27, R32) | | | | |
| 5 | 1 | 100-1063 | 100K Ω, 1/4W (R9) | | | | |
| 4 | 4 | 177-1054 | TRIMMER, 10K Ω (R5, R6, R7, R8) | | | | |
| 3 | 2 | 177-5054 | TRIMMER, 50K Ω (R2, R4) | | | | |
| 2 | 2 | 177-1074 | RESISTOR, TRIMMER, 1M Ω (R1, R3) | | | | |
| 1 | 1 | 514-1394 | PLAYBACK LOGIC BLANK P.C.B. | | | | |
| — | — | 515-1394 | PLAYBACK LOGIC PCB ASSY (STEREO) | | | | |

| LIST OF MATERIAL | | | |
|------------------|-----|-------------|----------------------------------|
| QTY | REV | PART NUMBER | DESCRIPTION |
| 1 | 1 | 515-1394 | PLAYBACK LOGIC PCB ASSY (STEREO) |
| 1 | 1 | 514-1394 | PLAYBACK LOGIC BLANK P.C.B. |
| 1 | 1 | 515-1394 | PLAYBACK LOGIC PCB ASSY (STEREO) |

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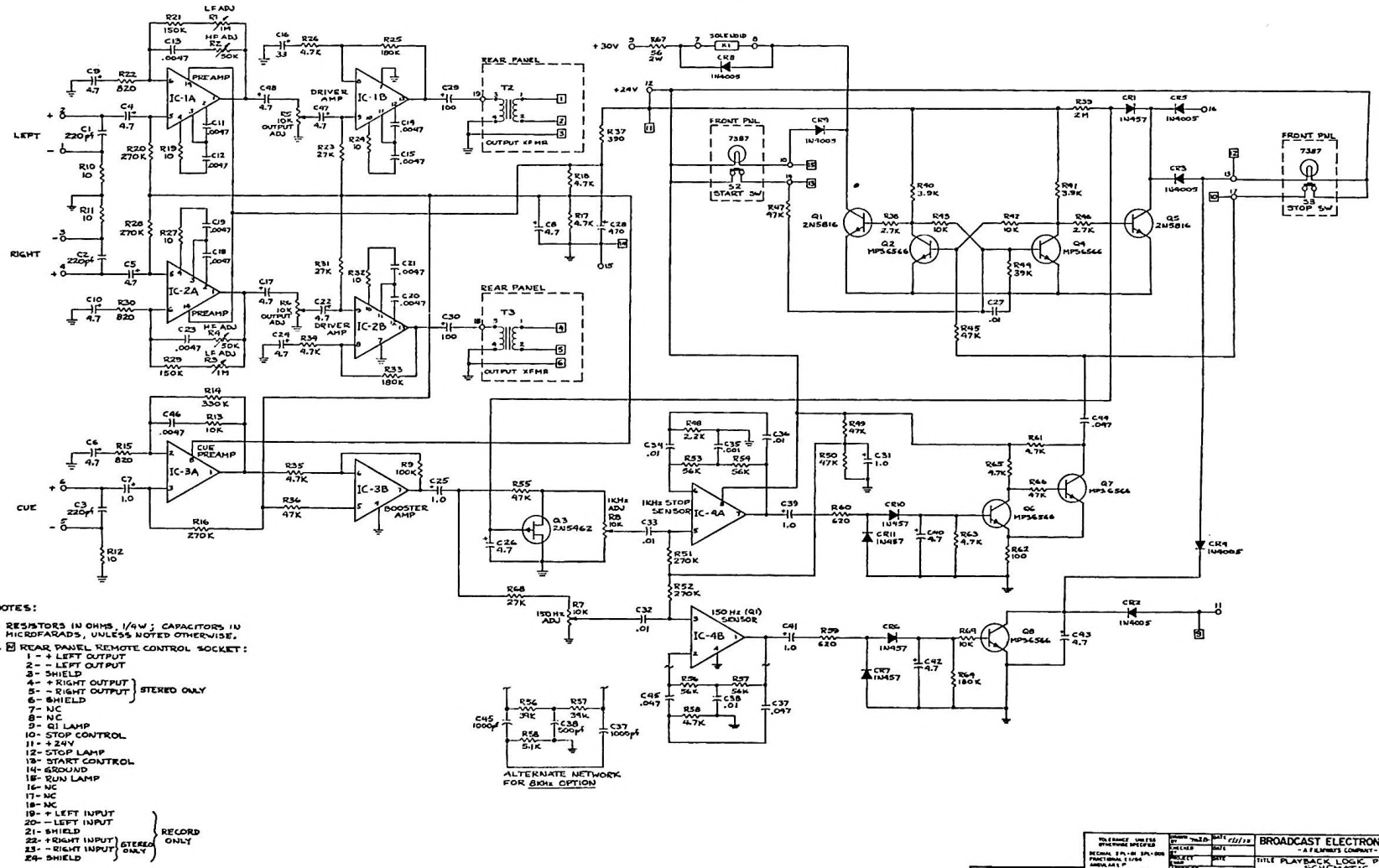
TREATMENT OF FISH

2000 SERIES

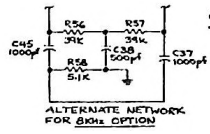
SHEET 1 OF 1

Figure 7-12

7-15

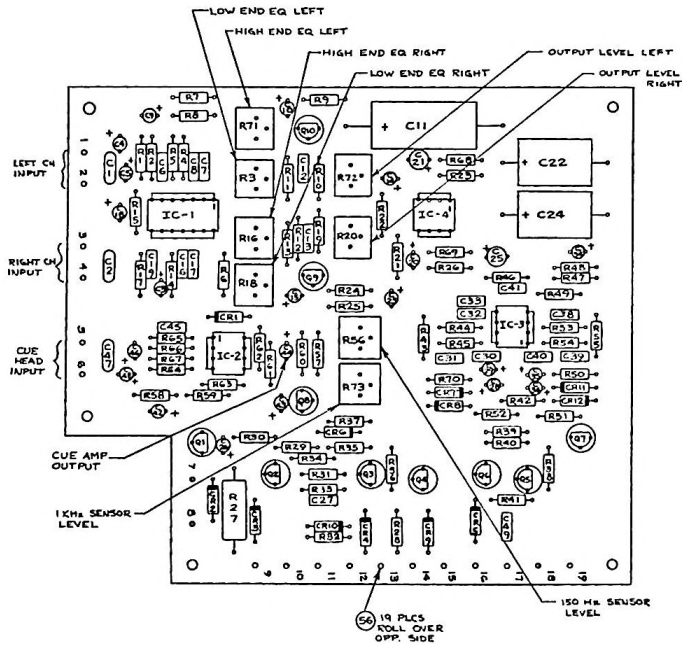


- NOTES:
- RESISTORS IN OHMS, 1/4W; CAPACITORS IN MICROFARADS, UNLESS NOTED OTHERWISE.
 - REAR PANEL REMOTE CONTROL SOCKET:
 - 1 - LEFT OUTPUT
 - 2 - LEFT OUTPUT
 - 3 - SHIELD
 - 4 - RIGHT OUTPUT
 - 5 - RIGHT OUTPUT
 - 6 - SHIELD
 - 7 - NC
 - 8 - NC
 - 9 - 61 LAMP
 - 10 - STOP CONTROL
 - 11 - +24V
 - 12 - STOP LAMP
 - 13 - START CONTROL
 - 14 - GROUND
 - 15 - SUN LAMP
 - 16 - NC
 - 17 - NC
 - 18 - NC
 - 19 - + LEFT INPUT
 - 20 - LEFT INPUT
 - 21 - SHIELD
 - 22 - RIGHT INPUT
 - 23 - RIGHT INPUT
 - 24 - SHIELD



| | | | | | | |
|---|---------------------|-----|----|------|------|----|
| FOR THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. PERSONAL AND CUSTOMER ALL RIGHTS RESERVED | DATE | REV | BY | CHKD | DATE | BY |
| | | | | | | |
| MATERIAL | TREATMENT OR FINISH | QTY | | | | |
| BROADCAST ELECTRONICS, INC. - A FLORHAM COMPANY - TITLE: PLAYBACK LOGIC PCB (WAS: 100-2112-2-10-76) 2000 SERIES | | | | | | |
| D 906-2112 | | | | | | |
| SHEET 1 OF 1 | | | | | | |

Figure 7-13



| REV | DESCRIPTION | DATE | APPROVED |
|-----|---------------|-------|-------------|
| A | PER ECN # 817 | 11/76 | [Signature] |
| B | PCU 851 | 1/77 | [Signature] |
| C | ECN 858 | 11/77 | [Signature] |

| REV | DESCRIPTION | DATE | APPROVED |
|-----|---|------|----------|
| 39 | 7 203-4003 DIODE IN4005 (CR2,CR3,CR4,CR5) | | |
| 37 | 2 100-1022 RESISTOR, 10Ω 1/4W (R4,R14) | | |
| 36 | 3 040-2723 CAPACITOR, 270M (C1,C2,C47) | | |
| 35 | 7 030-4733 .0047 Mfd (C1,C6,C16,C17) | | |
| 34 | 15 064-4763 4.7 (C4,C9,C10) | | |
| 33 | 2 039-3942 .039 (C12,C13) | | |
| 32 | 1 013-4783 470 (C11) | | |
| 31 | 2 064-3373 33 (C21,C25) | | |
| 30 | 1 030-1033 .001 (C31) | | |
| 29 | 3 030-4743A .047 (C38,C40,C49) | | |
| 28 | 2 014-1084 100 (C22,C24) | | |
| 27 | 6 064-1065 1.0 (C3,C5,C29) | | |
| 26 | 6 030-1043 CAPACITOR, .01 Mfd (C27,C30,C32) | | |
| 25 | 1 100-3562 RESISTOR 330K 1/4W (R66) | | |
| 24 | 1 100-2252 22K 1/4W (R13) | | |
| 23 | 2 177-5054 TRIMMER, 50K (R16,R71) | | |
| 22 | 2 177-1074 TRIMMER, 1MΩ (R3,R18) | | |
| 21 | 4 177-1054 TRIMMER, 10K (R26) | | |
| 20 | 1 100-2072 2 MEG 1/4W (R27) | | |
| 19 | 1 132-5632 56Ω 2W (R27) | | |
| 18 | 1 100-1032 100 1/4W (R41) | | |
| 17 | 1 100-2242 2.2K (R43) | | |
| 16 | 1 100-1262 120K (R61) | | |
| 15 | 2 100-3942 390Ω (R29,R35) | | |
| 14 | 4 100-5652 56K (R44,R45,R53,R54) | | |
| 13 | 1 100-3952 39K (R33) | | |

| ITEM | QTY | PART NUMBER | DESCRIPTION | QTY | PART NUMBER | DESCRIPTION | NOTE |
|------|-----|-------------|--------------------------------|-----|-------------|-------------|---------------------------------|
| | | | SCHEMATIC # D-906-2132 | | | | |
| 57 | | | | | | | |
| 56 | 19 | 413-1597 | TURRET TERMINAL | | | | |
| 55 | | | | | | | |
| 54 | | | | | | | |
| 53 | 1 | 417-1400 | IC SOCKET DIP 14 | | | | |
| 52 | 3 | 417-0800 | IC SOCKET DIP 8 PIN | | | | |
| 51 | 1 | 221-2310 | IC 14 PIN 4739 (IC-1) | | | | |
| 50 | 3 | 221-4558 | IC 8 PIN 4558 (IC-2,IC-3,IC-4) | | | | |
| 49 | 2 | | | 10 | 12 | 100-4742 | 4700 |
| 48 | | | | 9 | 2 | 100-6232 | 620 |
| 47 | 10 | 409-1814 | TRANSISTOR PADS | 8 | 3 | 100-1862 | 180K (R24,R25,R25A,R25B) |
| 46 | 3 | 212-3462 | 2N5462 (Q8,Q9,Q10) | 7 | 7 | 100-2752 | 27K (R7,R8,R10,R19) |
| 45 | 2 | 211-5816 | 2N5816 (Q1,Q4) | 6 | 5 | 100-2762 | 270K (R42,R47,R48) |
| 44 | 5 | 211-6566 | TRANSISTOR MP3 6566 (Q2,Q3,Q5) | 5 | 1 | 100-1542 | 1.5K (R9) |
| 43 | | | | 4 | 4 | 100-1052 | 10K (C34,R31,R36) |
| 42 | | | | 3 | 2 | 100-1562 | 150K (R2,R17) |
| 41 | 5 | 201-0457 | DIODE IN457 (CR6,CR7,CR8,CR12) | 2 | 3 | 100-8232 | RESISTOR, 82Ω 1/4W (R1,R15,R67) |
| | | | | 1 | 1 | C-514-1400 | BLANK PC BOARD |

| FOR THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. (RENDERED AND EXTENDED ALL RIGHTS RESERVED) | | INFORMATION UNIT | | BROADCAST ELECTRONICS, INC. - A FILMWAYS COMPANY - | |
|--|-------------|------------------|------|--|------|
| DATE | BY | REV. | DATE | TITLE | REV. |
| | | | | PLAYBACK (STEREO) | |
| D | 914-1400 | | | | |
| | 2000 SERIES | | | | |

Figure 7-14

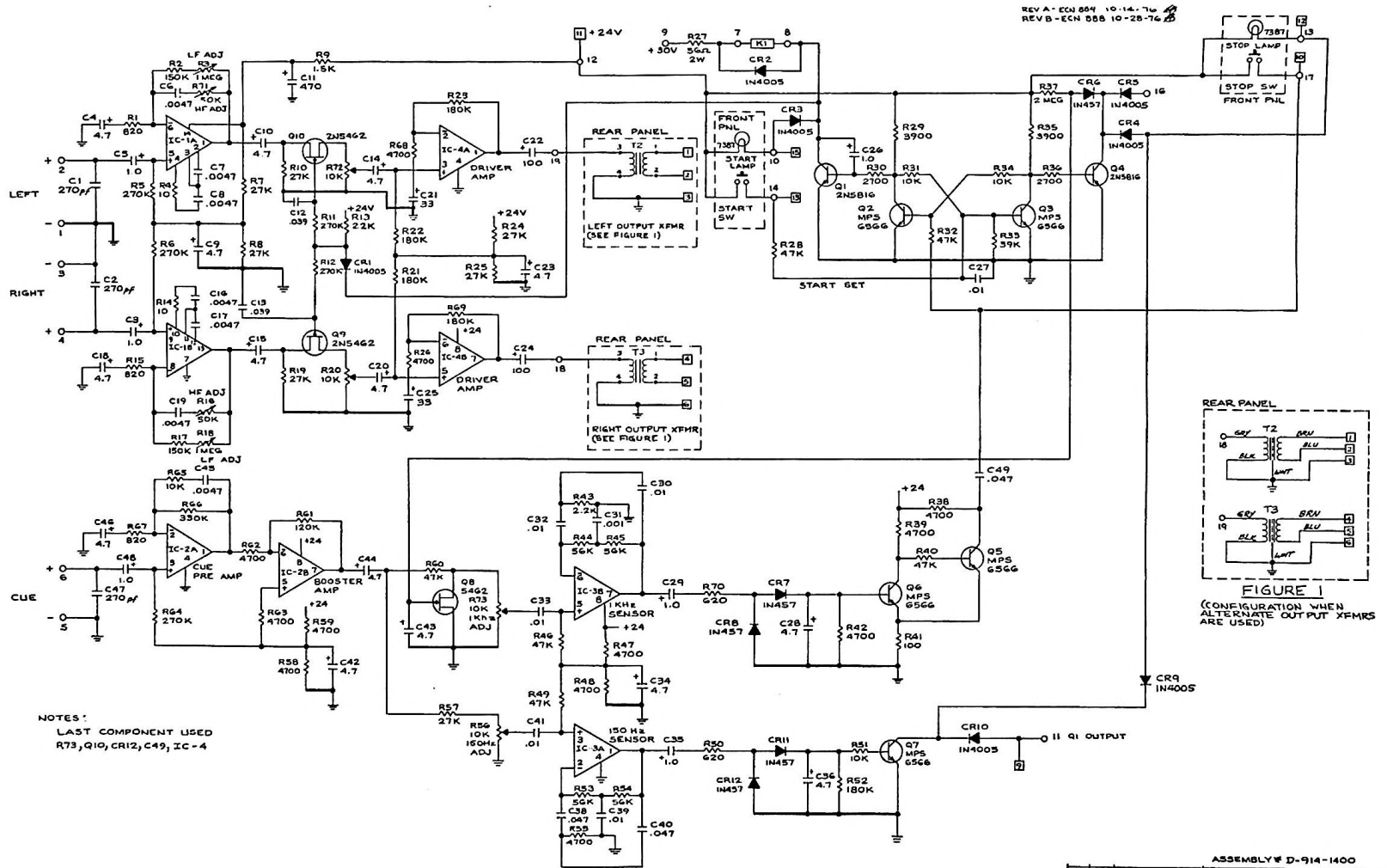


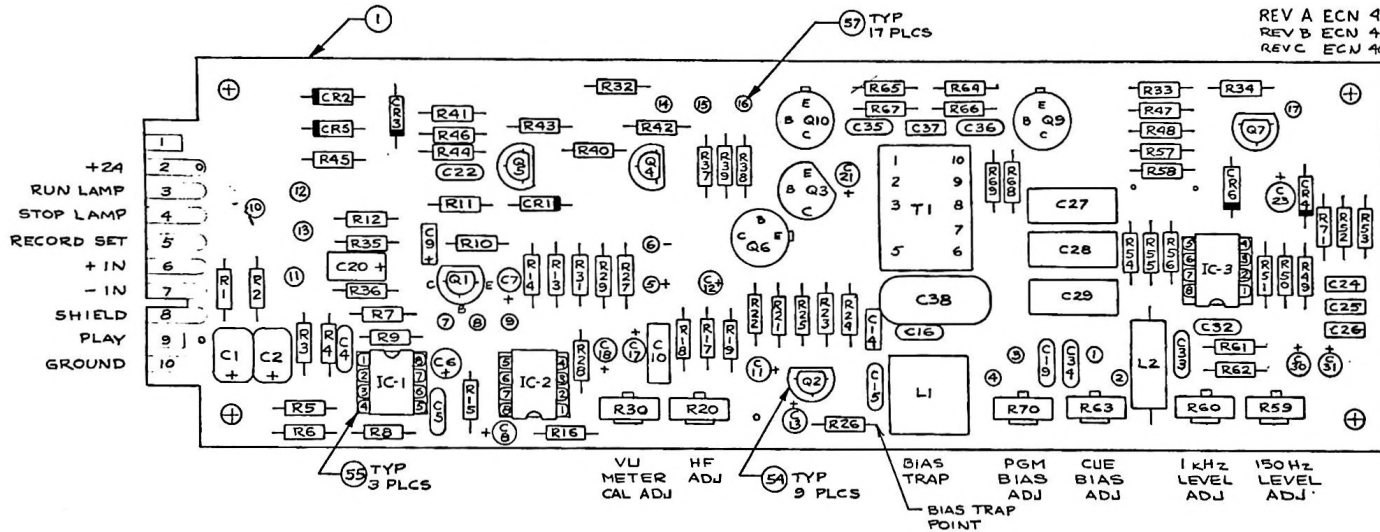
Figure 7-15

ASSEMBLY # D-914-1400

| ITEM | QTY | PART NUMBER | DESCRIPTION | NOTE |
|--|-----|-------------|-------------|------|
| LIST OF MATERIAL | | | | |
| BROADCAST ELECTRONICS INC. - FARMERS COMPANY | | | | |
| TITLE (SCHEMATIC) STEREO PLAYBACK/LOGIC PCB | | | | |
| D 906-2132 REF B | | | | |
| 2000 SERIES SHEET 1 OF 1 | | | | |

FOR THE EXCLUSIVE USE OF BROADCAST ELECTRONICS, INC. PERSONAL AND CUSTOMERS ALL RIGHTS RESERVED

REV A ECN 433 12/30/74
 REV B ECN 436 1/6/75
 REV C ECN 462 & 467 04/29/75
 REV D ECN 477 5/27/75
 REV E ECN 556 7/21/75



7-18

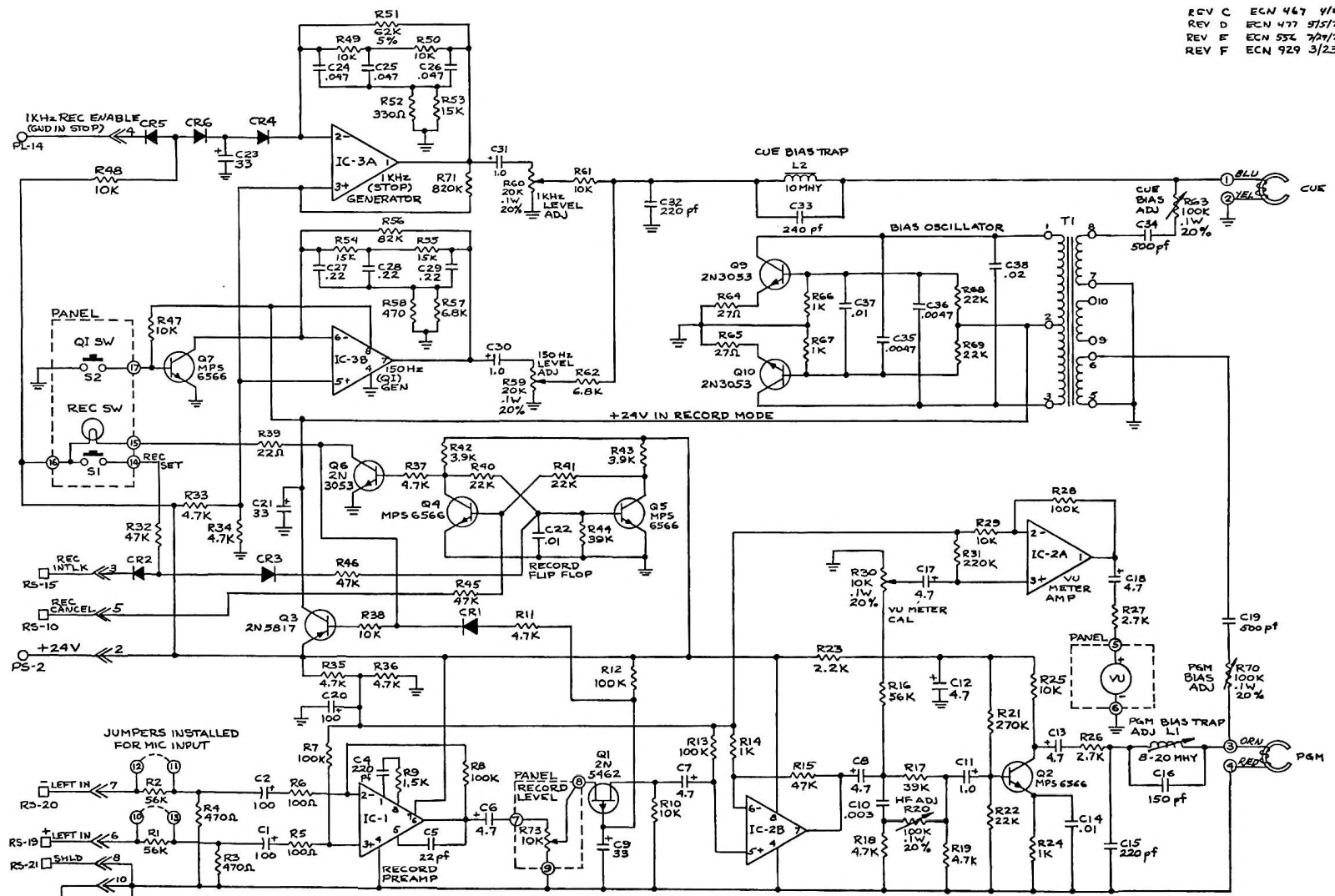
| | | | | | | | | | | | | | | | | | |
|------|-------------|-----|---|------|-------------|-----|--|---|-------------|-----|------------------------------|---|------------|-------------|-----|-------------|--|
| | | | | 47 | 211-6566 | 4 | TRANSISTOR, MPS6566 (Q2, Q4, Q5, Q7) | 18 | 100-2743 | 2 | RESISTOR, 2.7KΩ, 1/4W, 10% | (R24, R27) | | | | | |
| | | | | 46 | 212-5462 | 1 | FET, 2N5462 (Q1) | 17 | 100-3953 | 2 | 39KΩ | (R17, R44) | | | | | |
| | | | | 45 | | | | 16 | 100-3943 | 2 | 3.9KΩ | (R42, R43) | | | | | |
| | | | | 44 | 030-2043 | 1 | CAPACITOR, .02 MFD, 100 V (C38) | 15 | 100-3333 | 1 | 330Ω | (R52) | | | | | |
| | | | | 43 | 032-4733 | 2 | .0047 MFD, 100V (C35, C36) | 14 | 100-2763 | 1 | 270KΩ | (R21) | | | | | |
| | | | | 42 | 040-2422 | 1 | 240 pf, 50V (C33) | 13 | 100-2723 | 2 | 27 Ω | (R64, R65) | | | | | |
| | | | | 41 | 030-2253 | 3 | .22 MFD, 100V (C27, C28, C29) | 12 | 100-2263 | 1 | 220KΩ | (R31) | | | | | |
| | | | | 40 | 030-4743A | 3 | .047 MFD, 100V (C24, C25, C26) | 11 | 100-2253 | 5 | 22KΩ | (R22, R40, R41, R68, R69) | | | | | |
| | | | | 39 | 041-5023 | 2 | 500 pf, 500V (C19, C34) | 10 | 100-2243 | 1 | 2.2KΩ | (R23) | | | | | |
| | | | | 38 | 040-1522 | 1 | 150 pf, 50V (C16) | 9 | 100-2223 | 1 | 22 Ω | (R39) | | | | | |
| | | | | 37 | 030-1043 | 3 | .01 MFD, 100V (C14, C22, C37) | 8 | 100-1553 | 3 | 15KΩ | (R53, R54, R55) | | | | | |
| | | | | 36 | 064-1063 | 3 | 1 MFD, 35V (C1, C30, C31) | 7 | 100-1543 | 1 | 1.5KΩ | (R9) | | | | | |
| | | | | 35 | 030-3033 | 1 | .003 MFD, 100V (C10) | | | | | | | | | | |
| | | | | 34 | 064-3373 | 3 | 33 MFD, 35V (C9, C21, C23) | | | | | | | | | | |
| | | | | 33 | 064-4763 | 7 | 4.7 MFD, 35V (C6, C7, C8, C12, C13, C17, C18) | 5 | 100-1063 | 5 | 100KΩ | (R7, R9, R12, R13, R28) | | | | | |
| | | | | 32 | 040-2213 | 1 | 22 pf, 50V (C5) | 4 | 100-1053 | 9 | 10KΩ | (R10, R25, R29, R38, R47, R48, R49, R50, R61) | | | | | |
| | | | | 31 | 040-2223 | 3 | 220 pf, 50V (C4, C15, C32) | 3 | 100-1043 | 4 | 1KΩ | (R14, R24, R64, R67) | | | | | |
| | | | | 30 | 063-1083 | 3 | CAPACITOR, 100 MFD, 20V (C1, C2, C20) | 2 | 100-1053 | 2 | RESISTOR, 100Ω, 1/4W, 10% | (R5, R6) | | | | | |
| | | | | 29 | 100-8263 | 1 | RESISTOR, 820KΩ, 1/4W, 10% (R71) | 1 | C-914-1393 | 1 | BLANK P C BOARD | | | | | | |
| | | | | 28 | 176-1054 | 1 | TRIMMER, SIDE ADJ, 10KΩ, 1W, 20% (R30) | | C-914-1393 | | RECORD MODULE P C BOARD ASSY | | | | | | |
| | | | | 27 | 176-2054 | 2 | TRIMMER, SIDE ADJ, 20KΩ, 1W, 20% (R59, R60) | ITEM | PART NUMBER | QTY | DESCRIPTION | | | | | | |
| | | | | 26 | 176-1064 | 3 | TRIMMER, SIDE ADJ, 100KΩ, 1W, 20% (R20, R63, R70) | PARTS LIST | | | | | | | | | |
| | | | | 25 | 100-8253 | 1 | RESISTOR, 82KΩ, 1/4W, 10% (R58) | | | | | | | | | | |
| | | | | 24 | 100-6843 | 2 | 6.8KΩ 10% (R57, R62) | BROADCAST ELECTRONICS, INC. - A FILMWAYS COMPANY - 2000 SERIES RECORD MODULE P C BOARD LAYOUT & PARTS C-914-1393 REV E | | | | | | | | | |
| | | | | 23 | 100-6252 | 1 | 62KΩ 5% (R51) | | | | | | | | | | |
| | | | | 22 | 100-5653 | 3 | 56KΩ 10% (R1, R2, R16) | | | | | | | | | | |
| | | | | 21 | 100-4753 | 4 | 47KΩ 10% (R15, R32, R45, R46) | | | | | | | | | | |
| | | | | 20 | 100-4743 | 8 | 4.7KΩ 10% (R11, R18, R19, R33, R34, R35, R36, R37) | | | | | | | | | | |
| | | | | 19 | 100-4733 | 3 | RESISTOR, 470Ω, 1/4W, 10% (R3, R4, R58) | | | | | | | | | | |
| 59 | 364-0670 | 1 | CHOKE, 10 MHY (L2) | 29 | 100-8263 | 1 | RESISTOR, 820KΩ, 1/4W, 10% (R71) | | | | | | | | | | |
| 58 | 363-9061 | 1 | INDUCTOR, ADJUSTABLE, 8-20 MHY (L1) | 28 | 176-1054 | 1 | TRIMMER, SIDE ADJ, 10KΩ, 1W, 20% (R30) | | | | | | | | | | |
| 57 | 413-1597 | 17 | TERMINAL, TURRET | 27 | 176-2054 | 2 | TRIMMER, SIDE ADJ, 20KΩ, 1W, 20% (R59, R60) | | | | | | ITEM | PART NUMBER | QTY | DESCRIPTION | |
| 56 | 372-0095 | 1 | TRANSFORMER, BIAS OSCILLATOR (T1) | 26 | 176-1064 | 3 | TRIMMER, SIDE ADJ, 100KΩ, 1W, 20% (R20, R63, R70) | | | | | | PARTS LIST | | | | |
| 55 | 417-0800 | 3 | SOCKET, IC, 8-PIN DIP | 25 | 100-8253 | 1 | RESISTOR, 82KΩ, 1/4W, 10% (R58) | | | | | | | | | | |
| 54 | 417-0330 | 9 | SOCKET, TRANSISTOR | 24 | 100-6843 | 2 | 6.8KΩ 10% (R57, R62) | BROADCAST ELECTRONICS, INC. - A FILMWAYS COMPANY - 2000 SERIES RECORD MODULE P C BOARD LAYOUT & PARTS C-914-1393 REV E | | | | | | | | | |
| 53 | | | | 23 | 100-6252 | 1 | 62KΩ 5% (R51) | | | | | | | | | | |
| 52 | 221-4558 | 2 | RC-4558 DUAL OP-AMP (IC-2, IC-3) | 22 | 100-5653 | 3 | 56KΩ 10% (R1, R2, R16) | | | | | | | | | | |
| 51 | 221-7091 | 1 | LM-709 CN OP-AMP (8PIN DIP) (IC-1) | 21 | 100-4753 | 4 | 47KΩ 10% (R15, R32, R45, R46) | | | | | | | | | | |
| 50 | 203-0457V | 6 | DIODE, IN457 (CR1, CR2, CR3, CR4, CR5, CR6) | 20 | 100-4743 | 8 | 4.7KΩ 10% (R11, R18, R19, R33, R34, R35, R36, R37) | | | | | | | | | | |
| 49 | 211-3053 | 3 | TRANSISTOR, 2N3053 (Q6, Q9, Q10) | | | | | | | | | | | | | | |
| 48 | 210-5817 | 1 | TRANSISTOR, 2N5817 (Q3) | 19 | 100-4733 | 3 | RESISTOR, 470Ω, 1/4W, 10% (R3, R4, R58) | | | | | | | | | | |
| ITEM | PART NUMBER | QTY | DESCRIPTION | ITEM | PART NUMBER | QTY | DESCRIPTION | | | | | | | | | | |

DRAWN: 12/5/74 7459
 CHECKED:
 SCALE: 2:1

Figure 7-16

REV C ECN 447 4/24/75
 REV D ECN 477 8/15/75
 REV E ECN 554 7/21/75
 REV F ECN 929 3/23/77

7-19



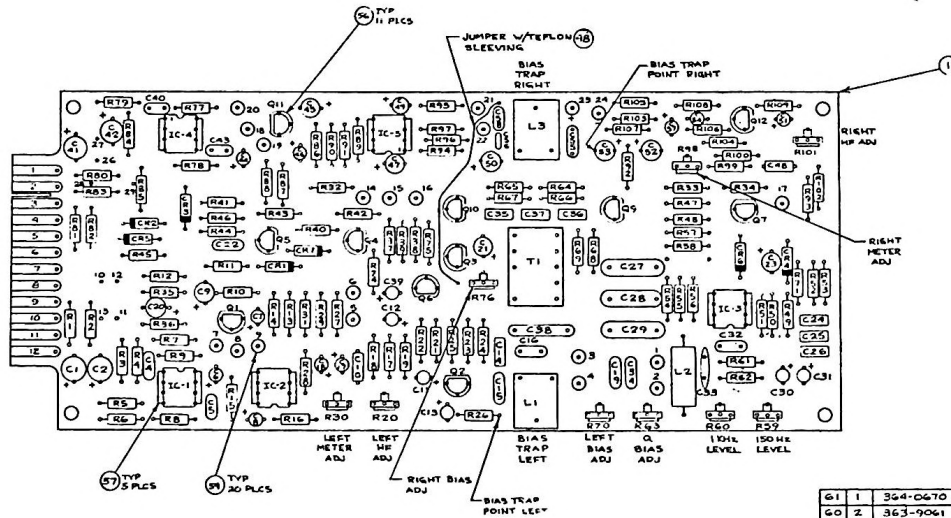
NOTES:
 1. RESISTORS IN OHMS, 1/4W, 10%; CAPACITORS IN MICROFARADS; DIODES IN457; UNLESS NOTED OTHERWISE.

BROADCAST ELECTRONICS, INC.
 - A FILMWAYS COMPANY -

2000 SERIES
 RECORD MODULE SCHEMATIC
 REV F
 C-906-2102

DRAWN: 12/9/74 TMSB
 CHECKED:

Figure 7-17



| REV | DESCRIPTION | DATE | APPROVED |
|-----|----------------|----------|----------|
| A | PER. ECN # 763 | 11/24/59 | |

SEE SCHEMATIC DWG # D-706-2128

| QTY | PART NUMBER | DESCRIPTION | REV |
|------|-------------|---|-----|
| 32 | | | |
| 31 | | | |
| 30 | 2 | 100-8243 RESISTOR, 8.2K, 1/4W, 10% (R15, R109) | |
| 29 | 1 | 100-8243 820K Ω , 1/4W, 10% (R71) | |
| | | (R30, R78) | |
| 28 | 2 | 176-1054 10K Ω , 1/4W, 30% SIDE ADJ. TRIM | |
| | | (R59, R60) | |
| 27 | 2 | 176-2054 20K Ω , 1/4W, 30% SIDE ADJ. TRIM | |
| | | (R20, R101) | |
| 26 | 2 | 176-1064 100K Ω , 1/4W, 30% SIDE ADJ. TRIM | |
| 25 | 1 | 100-8253 82K Ω , 1/4W, 10% (R56) | |
| 24 | 2 | 100-6843 6.8K Ω , 1/4W, 10% (R57, R62) | |
| 23 | 1 | 100-6252 62K Ω , 1/4W, 10% (R51) | |
| | | (R63, R99) | |
| 22 | 6 | 100-5653 56K Ω , 1/4W, 10% (R14, R21, R100) | |
| | | (R4, R5, R8) | |
| 21 | 5 | 100-4753 47K Ω , 1/4W, 10% (R15, R32, R44) | |
| | | (R73, R102) | |
| | | (R36, R37, R87) | |
| | | (R33, R34, R35) | |
| | | (R11, R18, R19) | |
| | | (R58, R82) | |
| | | (R3, R4, R61) | |
| | | (R24, R25, R27) | |
| | | (R124, R100) | |
| | | (R42, R43) | |
| | | (R52) | |
| | | (R21, R103) | |
| | | (R64, R65) | |
| | | (R81, R97) | |
| 20 | 11 | 100-4743 4.7K Ω , 1/4W, 10% (R16, R22, R106) | |
| | | (R10, R11, R12, R13, R17, R23, R26, R28, R29, R31, R35, R38, R39, R40, R41, R43, R45, R46, R47, R48, R49, R50, R53, R54, R55, R56, R57, R66, R67, R68, R69, R70, R72, R74, R75, R76, R77, R79, R80, R82, R83, R84, R85, R86, R88, R89, R90, R91, R92, R93, R94, R95, R96, R98, R99) | |
| 61 | 1 | 364-0670 10 MHY CHOKE (L2) | |
| 60 | 2 | 363-7061 8-20 MHY INDUCTOR, ADJ. (L1, L3) | |
| 59 | 20 | 413-1597 TURRET TERMINALS | |
| 58 | 1 | 372-0095 BIAS OSCILLATOR TRANSFORMER (T1) | |
| 57 | 5 | 417-0800 8-PIN DIP IC SOCKET | |
| 56 | 11 | 417-0330 TRANSISTOR SOCKET | |
| 55 | 3 | 321-4858 RC-455B DUAL Op-Amp IC (IC-1, IC-4) | |
| 54 | 2 | 221-7091 LM-109 CN Op-Amp (8-PIN DIP) (IC-1, IC-4) | |
| 53 | 7 | 201-0457V 1N457 DIODE (CR1 THRU CR7) | |
| 52 | 3 | 211-3053 2N3053 NPN TRANSISTOR (Q6, Q9, Q10) | |
| 51 | 1 | 210-5817 2N5817 PNP TRANSISTOR (Q3) | |
| 50 | 5 | 211-6564 MPS4666 WPN TRANSISTOR (R2, Q4, Q5, Q12) | |
| 49 | 2 | 212-5462 2N5462 P-CHANNEL FET (Q1, Q11) | |
| 48 | 1 | 601-0012 60S WIRE, AWG 22 (3') | |
| 47 | 1 | 030-2043 CAPACITOR, .02 MF, 100V. (C38) | |
| 46 | 2 | 032-4753 .0047 MF, 100V. (C35, C36) | |
| 45 | 1 | 040-2422 240 pf, 50V. (C35) | |
| 44 | 3 | 030-2033 .0022 MF, 100V. (C27, C28, C29) | |
| 43 | 3 | 030-4743A .047 MF, 100V. (C24, C25, C26) | |
| 42 | 3 | 041-3023 500 pf, 500V. (C19, C34, C38) | |
| 41 | 2 | 040-1522 150 pf, 50V. (C16, C36) | |
| 40 | 4 | 030-1043 .01 MF, 100V. (C18, C22, C37, C39, C51, C57) | |
| 39 | 6 | 064-1063 1M Ω , 35V. (C11, C30, C31) | |
| 38 | 2 | 030-3033 .003 MF, 100V. (C10, C48) | |
| 37 | 4 | 064-3373 33 MF, 35V. (C9, C12, C20, C21, C50, C49, C52, C53) | |
| | | (C13, C17, C40, C44, C46, C47) | |
| 36 | 14 | 064-4763 4.7 MF, 35V. (C6, C7, C8) | |
| 35 | 2 | 040-2218 22 pf, 50V. (C5, C48) | |
| | | (C40, C50) | |
| 34 | 5 | 040-2223 220 pf, 50V. (C4, C15, C30) | |
| | | (C42, C50) | |
| 33 | 5 | 063-1083 CAPACITOR, 100 MF, 20V. (E1, C2, C4) | |
| ITEM | PART NUMBER | DESCRIPTION | REV |

FOR THE SOLE USE OF BROADCAST ELECTRONICS, INC. PARTS AND COMPONENTS ALL OTHERS EXCEPT

BROADCAST ELECTRONICS INC. A PLANNET COMPANY

DATE: 11/24/59

TITLE: STEREO RECORD PCB

REV: D

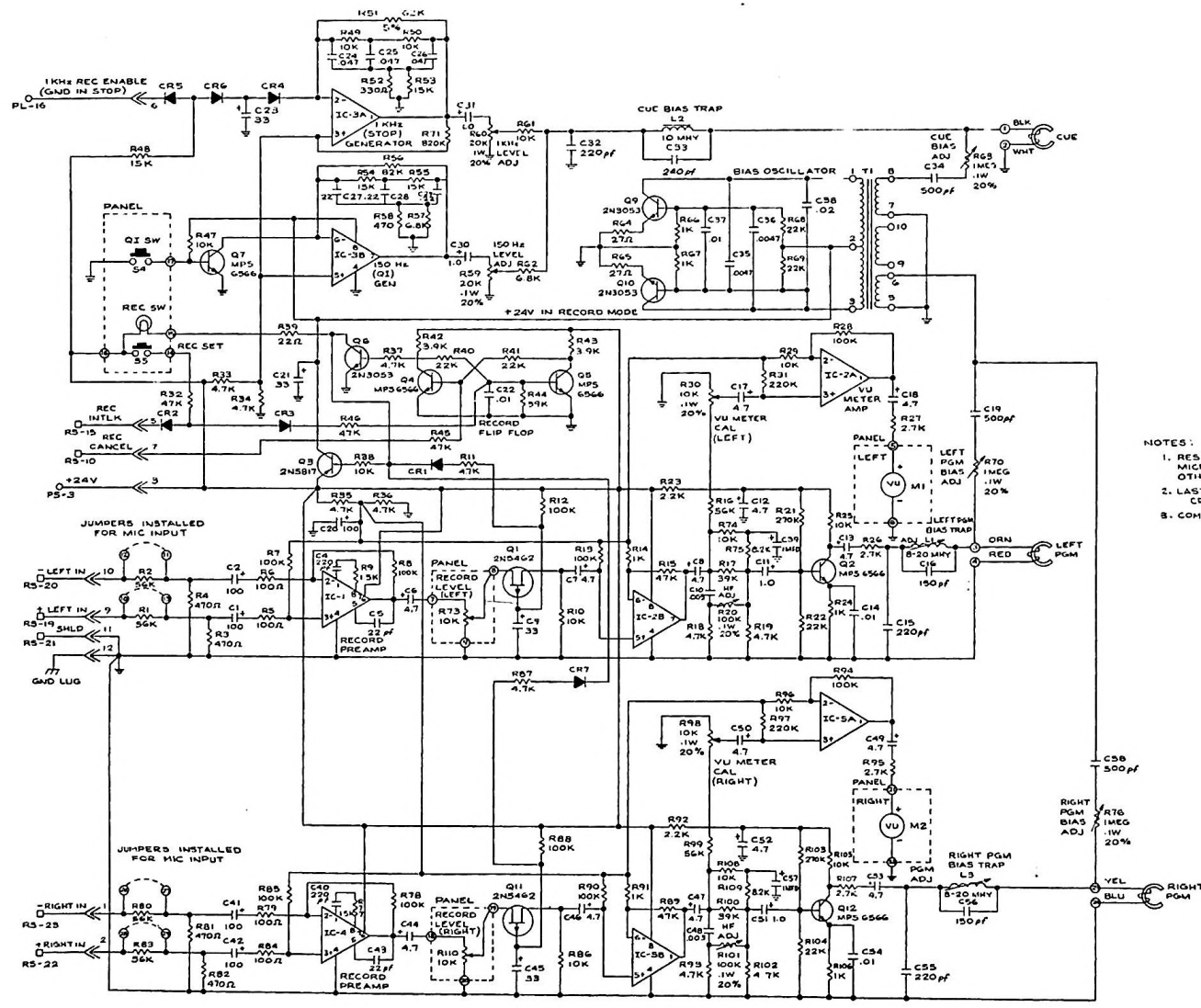
QTY: 914-1597

3000 SERIES

SHEET 1 OF 1

Figure 7-18

7-21



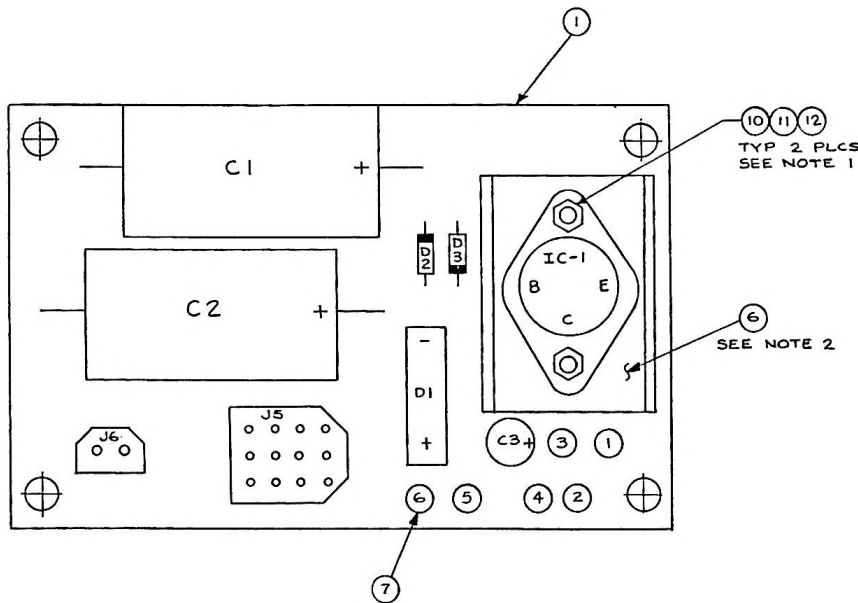
- NOTES:
1. RESISTORS IN OHMS, 1/4W, 10%; CAPACITORS IN MICROFARADS; DIODES 1N4148, UNLESS NOTED OTHERWISE
 2. LAST COMPONENTS USED: R109, C55, Q12, CR7, IC9, T1 & L3.
 3. COMPONENT NOS. NOT USED: R72, C3 & Q6.

SEE PCB ASSY DWG #D-914-1597
BROADCAST ELECTRONICS, INC.
 - A FILMWAYS COMPANY -
 2000 SERIES
 RECORD STEREO PCB
 SCHEMATIC
 D-906-2128 REV. B

DRAWN: 1/7/76 Wm.
 14

Figure 7-19

7-22



10 11 12
 TYP 2 PLCS
 SEE NOTE 1

6
 SEE NOTE 2

| ITEM | PART NUMBER | QTY | DESCRIPTION |
|------------|-------------|-----|-----------------------------------|
| 13 | 239-0003 | 1 | BRIDGE RECTIFIER (D1) |
| 12 | --- | 2 | HEX NUT, #6-32 |
| 11 | --- | 2 | L/WASHER, #6, INT TEETH |
| 10 | --- | 2 | PHMS, PHIL, #6-32 X 3/8 |
| 9 | 695-0700 | 1 | 2-PIN CONNECTOR AMP (J6) |
| 8 | 695-1276 | 1 | 12-PIN CONNECTOR AMP (J5) |
| 7 | 413-1597 | 6 | TURRET TERMINAL |
| 6 | 455-6103 | 1 | HEATSINK |
| 5 | 064-3373 | 1 | CAPACITOR, 33 MFD, 35V (C3) |
| 4 | 014-1094 | 2 | CAPACITOR, 1000 MFD, 50V (C1, C2) |
| 3 | 203-4005 | 2 | IN4005 DIODE (D2, D3) |
| 2 | 227-7824 | 1 | 24V REGULATOR (IC-1) |
| 1 | C-514-1391 | 1 | BLANK PC. BOARD |
| | B-914-1391 | | POWER SUPPLY PC. BOARD ASSY |
| PARTS LIST | | | |

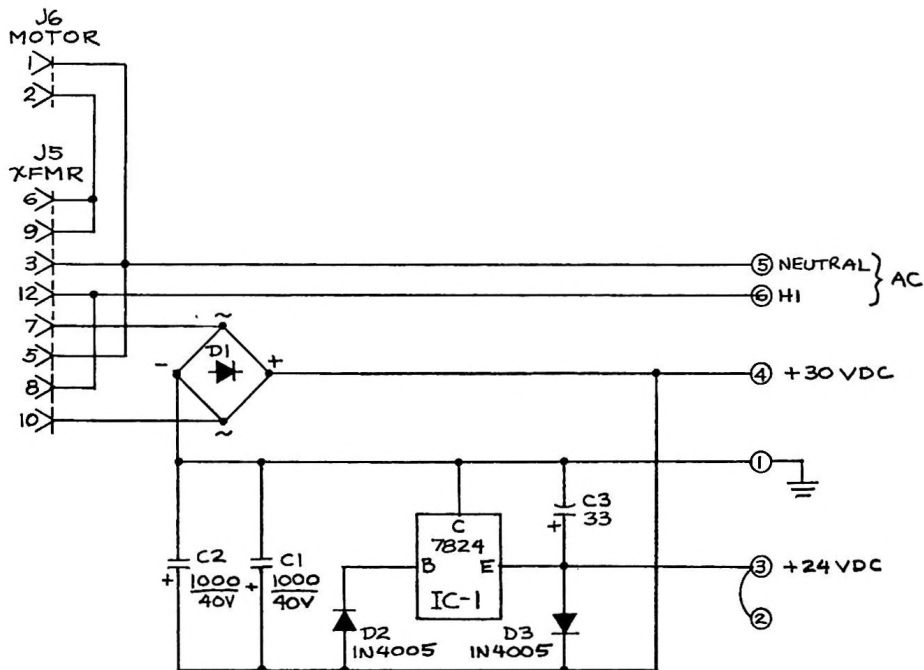
NOTES:

1. REGULATOR TO BE MOUNTED WITH SCREWS FROM BOTTOM OF BOARD.
2. HEAT SINK TO BE PROPERLY ORIENTED WITH REGULATOR PINS.

BROADCAST ELECTRONICS INC
 - A FILMWAYS COMPANY -
 1000/2000 SERIES
 POWER SUPPLY PC ASSY
 C-914-1391 REV B

DRAWN: 01/29/75 WLJ. SCALE: 2/1

Figure 7-20

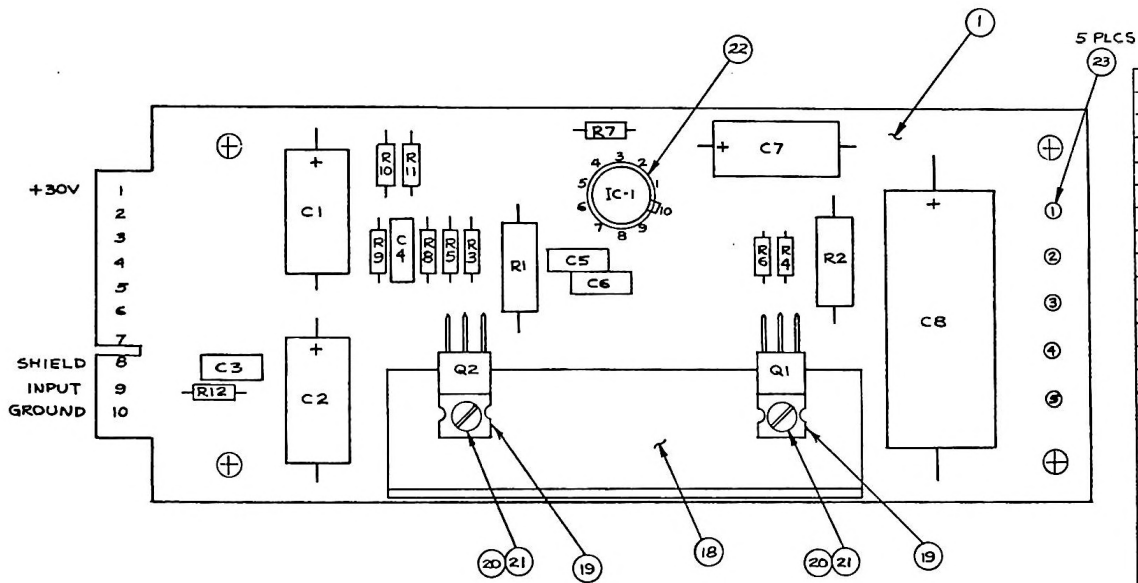


| REVISIONS | | | |
|-----------|-------------|------|----------|
| REV | DESCRIPTION | DATE | APPROVED |

| ITEM | QTY | PART NUMBER | DESCRIPTION | NOTE |
|--|-----|-------------|------------------------------------|--------------|
| LIST OF MATERIAL | | | | |
| TOLERANCE UNLESS OTHERWISE SPECIFIED | | | DRAWN BY <i>MSD</i> DATE 5/22/75 | |
| DECIMAL 2 PL+.01 3 PL+.005 | | | CHECKED BY <i>MSD</i> DATE 5-23-75 | |
| FRACTIONAL $\pm 1/64$ | | | PROJECT ENGR | |
| ANGULAR $\pm 1^\circ$ | | | APPROVED BY | |
| SHARP EDGES | | | BY | |
| BEND RADII | | | DATE | |
| FILLET RADII | | | DATE | |
| MATERIAL | | | TREATMENT OR FINISH | |
| | | | | |
| BROADCAST ELECTRONICS INC. - A FILMWAYS COMPANY - | | | | |
| TITLE POWER SUPPLY PCB SCHEMATIC | | | | |
| DWG NO. | | 906-2114 | | REV |
| B | | | | |
| 1000/2000 SERIES | | | SCALE | SHEET 1 OF 1 |
| | | | - | |

FOR THE EXCLUSIVE USE OF
BROADCAST ELECTRONICS, INC.
PERSONNEL AND CUSTOMERS
ALL RIGHTS RESERVED

Figure 7-21



| 23 | 413-1597 | 5 | TURRET TERMINALS |
|------|-------------|-----|--|
| 22 | 455-0207 | 1 | HEATSINK (FINNED, TO-5) |
| 21 | | 2 | HEX NUT #4-40, NYLON |
| 20 | | 2 | PHMS, #4-40 X 3/8 NYLON |
| 19 | | 2 | INSULATORS FOR ITEMS 16 & 17 |
| 18 | A-455-2000 | 1 | HEAT SINK |
| 17 | 218-0032 | 1 | PNP TRANSISTOR (Q2) |
| 16 | 219-0031 | 1 | NPN TRANSISTOR (Q1) |
| 15 | 222-5400 | 1 | NE540 DRIVER AMP IC (IC-1) |
| 14 | 014-1094 | 1 | 1000 MFD, 40V CAPACITOR (C8) |
| 13 | 014-3274 | 1 | 32 MFD, 40V CAPACITOR (C7) |
| 12 | 001-2044 | 2 | .02 MFD, 500V CAPACITOR (C5, C6) |
| 11 | 040-2213 | 1 | 22 pf, 50V CAPACITOR (C4) |
| 10 | 040-2723 | 1 | 270 pf, 50V CAPACITOR (C3) |
| 9 | 014-1084 | 2 | 100 MFD, 40V CAPACITOR (C1, C2) |
| 8 | 100-2253 | 1 | 22 K Ω , 1/4W, 10% RESISTOR (R12) |
| 7 | 100-4743 | 2 | 4.7 K Ω , 1/4W, 10% RESISTOR (R10, R11) |
| 6 | 100-4733 | 1 | 470 Ω , 1/4W, 10% RESISTOR (R9) |
| 5 | 100-1053 | 2 | 10 K Ω , 1/4W, 10% RESISTOR (R7, R8) |
| 4 | 100-8243 | 2 | 8.2 K Ω , 1/4 W, 10% RESISTOR (R5, R6) |
| 3 | 100-5623 | 2 | 56 Ω , 1/4W, 10% RESISTOR (R3, R4) |
| 2 | 122-3302 | 2 | .33 Ω , 2W, 5% RESISTOR (R1, R2) |
| 1 | C-514-1392 | 1 | BLANK P. C. BOARD |
| | C-914-1392 | | AUDIO POWER AMPLIFIER P C ASSY |
| ITEM | PART NUMBER | QTY | DESCRIPTION |

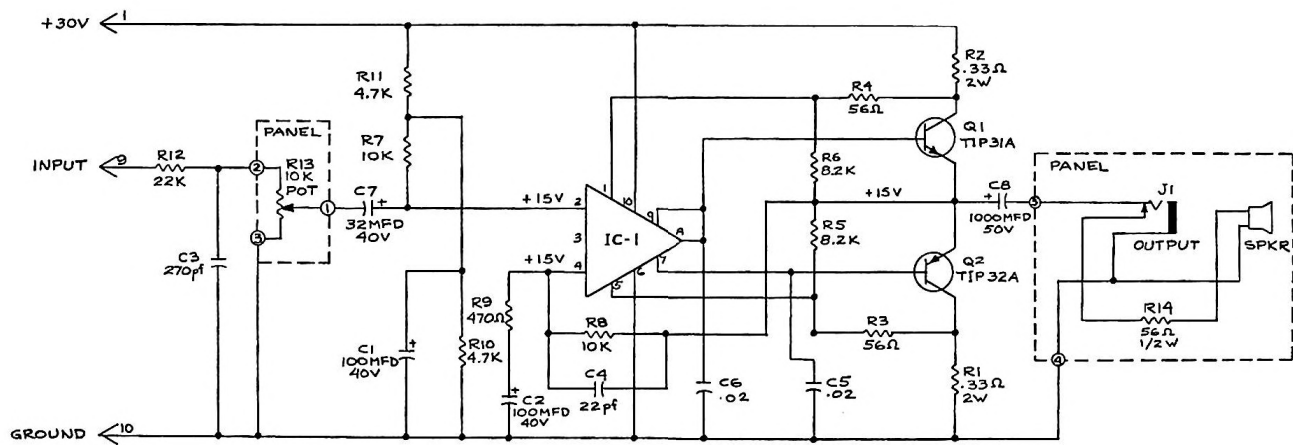
BROADCAST ELECTRONICS, INC.
- A FILMWAYS COMPANY -

2000 SERIES
AUDIO MODULE
LAYOUT & PARTS
PRODUCTION DRAWING
C-914-1392

DRAWN: 11/22/74 W.SB
CHECKED:

Figure 7-22

7-25



BROADCAST ELECTRONICS, INC.
- A FILMWAYS COMPANY -

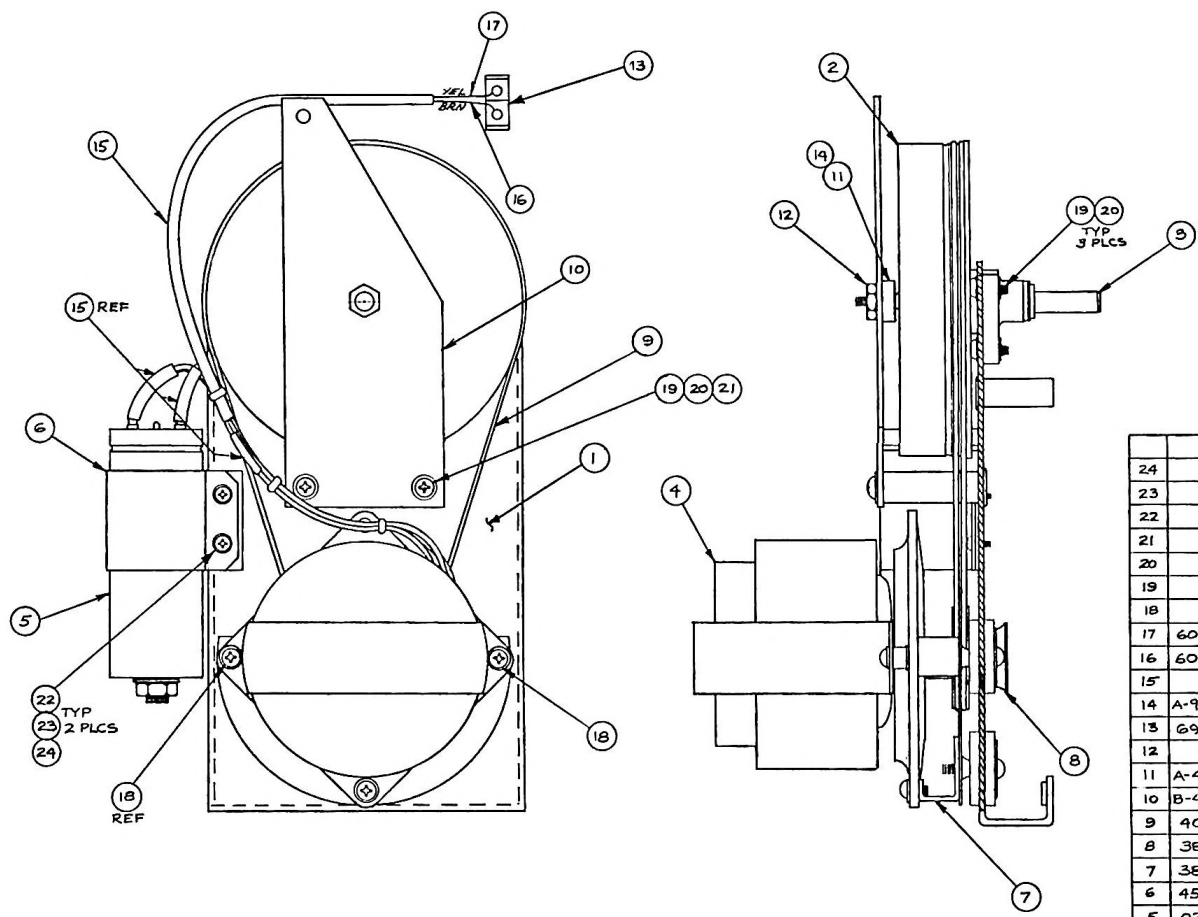
2000 SERIES
AUDIO MODULE
SCHEMATIC
C-906-2101

DRAWN: 11/22/74 TMSB
CHECKED:

Figure 7-23

REV A 04/09/75 ECN 463 Wm.
 B ECN 813 6-4-76 JB
 C ECN 839 9-29-76

7-26



NOTES:

1. REMOVE SHAFT FROM FLYWHEEL ASSY (ITEM 2) & REPLACE WITH SHAFT (ITEM 3).

| | | | |
|------|-------------|-----|------------------------------|
| 24 | — | 2 | FLAT WASHER, #4 |
| 23 | — | 2 | LOCK WASHER, INT; TEETH #4 |
| 22 | — | 2 | PHMS, PHIL #4-40 X 1/4" |
| 21 | — | 2 | FLAT WASHER, #6 |
| 20 | — | 5 | LOCK WASHER, INT TEETH #6 |
| 19 | — | 5 | PHMS, PHIL #6-32 X 3/8" |
| 18 | — | 2 | PHMS, PHIL #6-32 X 1/2" |
| 17 | 601-2209 | 14" | WIRE, AWG 22, YEL |
| 16 | 601-2201 | 12" | WIRE, AWG 22, BRN |
| 15 | — | 12" | TUBING |
| 14 | A-906-0074 | 1 | PAD, THRUST BUSHING |
| 13 | 695-0701V | 1 | 2-PIN PLUG |
| 12 | — | 1 | NUT, HEX, NYLON, #10-32 |
| 11 | A-420-0074 | 1 | THRUST BUSHING |
| 10 | B-470-0100 | 1 | SUPPORT BRACKET |
| 9 | 405-0438 | 2 | "O" RING BELT |
| 8 | 389-0100 | 1 | MOTOR PULLEY |
| 7 | 389-9156 | 1 | MOTOR MOUNTING KIT |
| 6 | 453-0006 | 1 | CAPACITOR HOLDER |
| 5 | 029-6064 | 1 | CAPACITOR |
| 4 | A-384-1052 | 1 | MOTOR |
| 3 | B-444-4152 | 1 | FLYWHEEL SHAFT |
| 2 | 444-0335 | 1 | FLYWHEEL ASSEMBLY |
| 1 | C-530-0003 | 1 | MOTOR MOUNTING SUPPORT PLATE |
| X | C-906-2105 | X | MOTOR MOUNTING SUB ASSY |
| ITEM | PART NUMBER | QTY | DESCRIPTION |

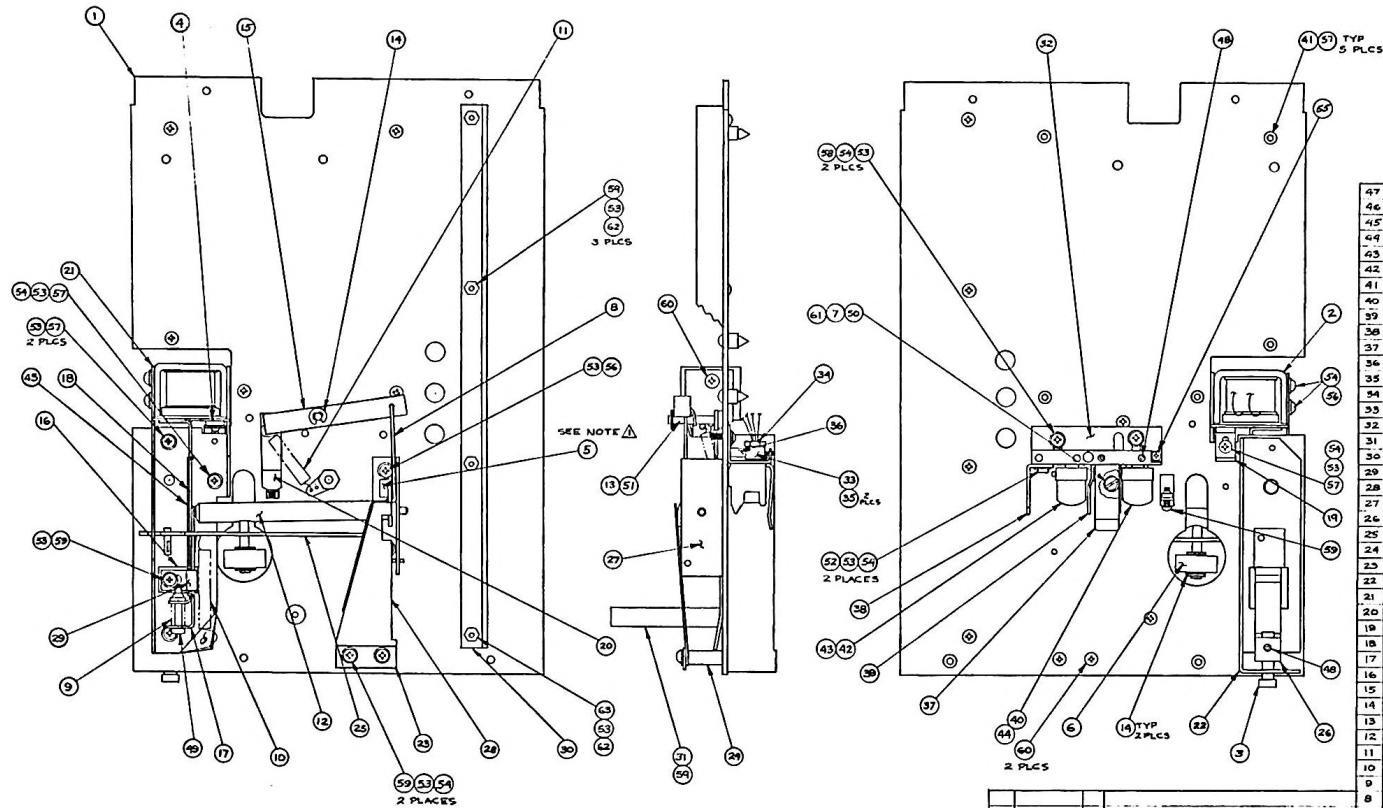
PARTS LIST

BROADCAST ELECTRONICS, INC.
 - A FILMWAYS COMPANY -
 1000/2000 SERIES
 MOTOR MOUNTING SUB ASSEMBLY
 REV C
 C-906-2105

DRAWN: 12/13/74 TMSB SCALE: FULL

Figure 7-24

7-27



NOTES :

1. APPLY ITEM 5 USING CARTER'S RUBBER CEMENT #095 (OR EQUAL) IN APPROXIMATE POSITION SHOWN.

REV A ECN # 750 4/13/70
 B ECN #13 6-4-76
 C ECN #39 9-14-76
 D ECN #90 11-13-76
 E ECN 926 3-15-77

| ITEM | PART NUMBER | QTY | DESCRIPTION |
|------|-------------|-----|---|
| 47 | | | |
| 46 | | | |
| 45 | A-436-0001 | 1 | SPRING ARMATURE ASSY. |
| 44 | 253-0002 | 1 | HEAD, DISA (STEREO, PLAYBACK ONLY) |
| 43 | 252-0003 | 1 | HEAD, DM2RB (MONO, RECORD PLAYBACK) |
| 42 | 255-0001 | 1 | HEAD, DM3RB (STEREO, RECORD PLAYBACK) |
| 41 | 441-9311 | 5 | SUPPORT |
| 40 | 252-0001 | 1 | HEAD, DM1B (MONO, PLAYBACK ONLY) |
| 39 | B-452-2103 | 1 | L/R COMBINED CARTRIDGE GUIDE |
| 38 | B-452-2101 | 1 | LEFT CARTRIDGE GUIDE |
| 37 | B-459-0002 | 1 | CARTRIDGE SPRING |
| 36 | A-430-0053 | 1 | SPRING, BLOCK |
| 35 | A-436-0057 | 2 | CONICAL WASHER |
| 34 | A-421-0003 | 1 | CLAMP NUT |
| 33 | A-449-0050 | 1 | CLAMP BLOCK |
| 32 | B-470-0043 | 1 | HEAD BRACKET |
| 31 | 441-9381 | 1 | STANDOFF, 3/8 DIA X 2-1/8 LG X 6-32 TAP |
| 30 | B-478-0001 | 1 | BRACE, DECK |
| 29 | A-459-0021 | 1 | GUIDE STRAP |
| 28 | A-459-0107 | 1 | LATCH |
| 27 | A-459-0297 | 1 | PIVOT ANGLE |
| 26 | A-459-4115 | 1 | CLAMP, RELEASE BUTTON |
| 25 | A-429-4101 | 1 | RELEASE CRANK |
| 24 | A-422-0035 | 1 | LATCH STANDOFF |
| 23 | A-459-0048 | 1 | NUT BAR SPACER |
| 22 | A-472-0015 | 1 | CARTRIDGE GUIDE |
| 21 | C-470-0013 | 1 | SOLENOID BRACKET |
| 20 | B-459-0046 | 1 | PUSHLINK ASSEMBLY |
| 19 | A-459-0199 | 1 | BUMPER STRAP |
| 18 | B-459-0025 | 1 | ARMATURE ASSEMBLY |
| 17 | A-459-0022 | 1 | SHAFT, PIVOT STRAP |
| 16 | A-459-0020 | 1 | SPACER, GUIDE |
| 15 | A-459-0012 | 1 | LEVER, PIVOT ACTUATING |
| 14 | A54-3318 | 3 | E-RING |
| 13 | B-449-0070 | 1 | PIVOT POST |
| 12 | B-946-1113 | 1 | SHAFT ASSEMBLY |
| 11 | B-432-0045 | 1 | SHAFT RETURN SPRING |
| 10 | B-432-0044 | 1 | ARMATURE RETURN SPRING |
| 9 | 430-0046 | 1 | SPRING |
| 8 | A-429-0016 | 1 | WIRE LINK |
| 7 | 420-0112 | 1 | CARTRIDGE STOP PIN SCREW |
| 6 | B-404-0001 | 1 | PRESSURE ROLLER ASSEMBLY |
| 5 | 403-0042 | 1 | CUSHION, CAM |
| 4 | 403-0038 | 1 | PLUG BUMPER |
| 3 | A-442-4200 | 1 | RELEASE BUTTON |
| 2 | B-289-0003 | 1 | SOLENOID ASSEMBLY |
| 1 | C-530-0000 | 1 | DECK PLATE |
| | D-804-2109 | | DECK PLATE ASSEMBLY |
| ITEM | PART NUMBER | QTY | DESCRIPTION |

BROADCAST ELECTRONICS, INC.
 A PHILIPS COMPANY
 1000/2000 SERIES
 DECK PLATE ASSEMBLY

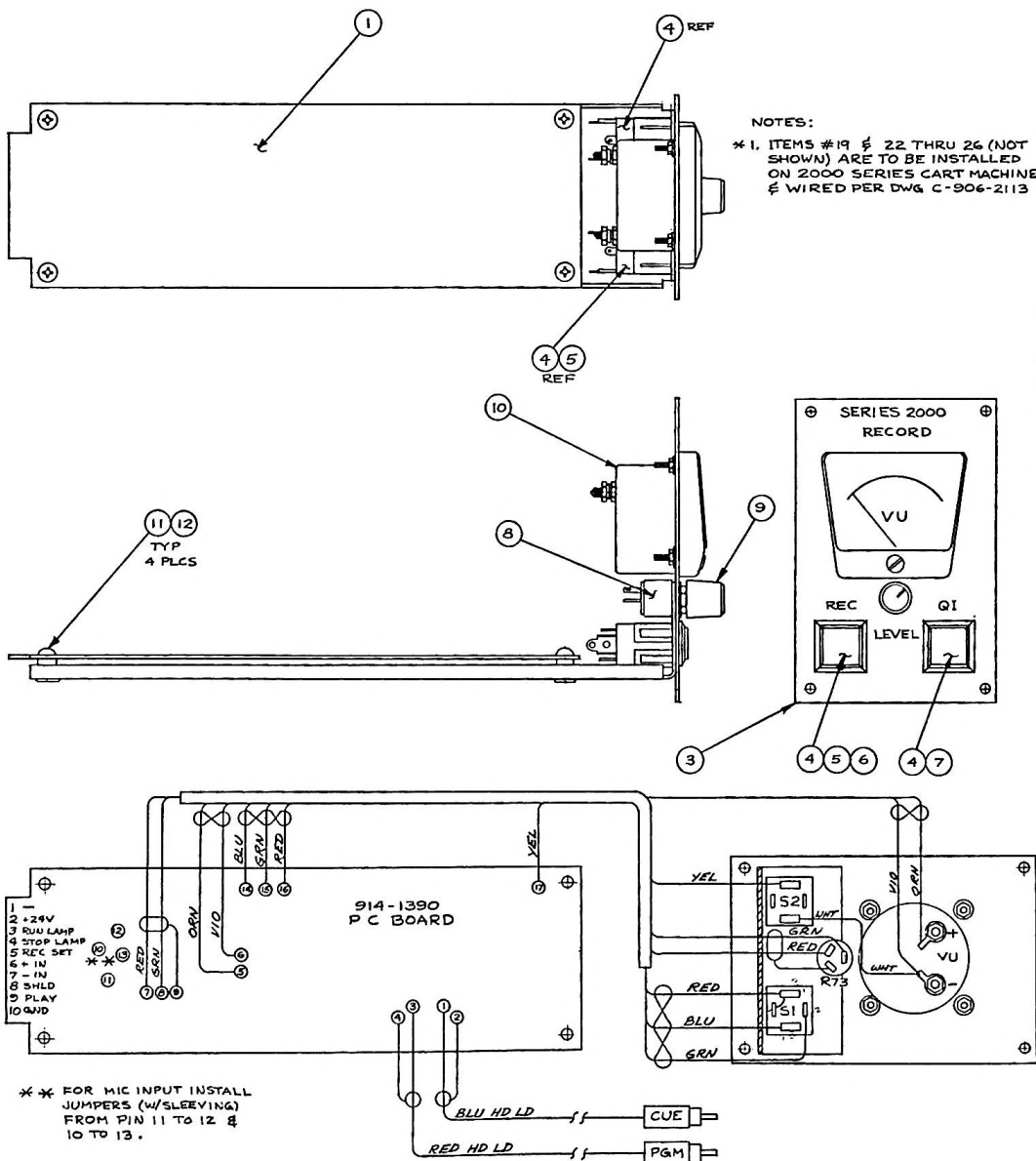
D 906-2109 REV. E

DRAWN: 4/11/78 JSB
 CHECKED: 111

| 65 | 1 | PHMS, PHIL #6-32 X 3/8 | |
|------|-------------|--------------------------------|-------------|
| 62 | 4 | HEX NUT #6-32 | |
| 61 | 1 | #8 SOLDER LUG | |
| 60 | 3 | PHMS, PHIL #6-32 X 3/16 | |
| 59 | 5 | PHMS, PHIL #4-40 X 1/4 | |
| 58 | 2 | #6-32 X 3/16 | |
| 57 | 8 | #6-32 X 1/4 | |
| 56 | 5 | #6-32 X 3/16 | |
| 55 | 1 | PHMS, PHIL #4-40 X 3/8 | |
| 54 | 11 | P/WASHER, #6 | |
| 53 | 11 | L/WASHER, #6 INT TEETH | |
| 52 | 2 | SOCKET HD MACH SCR #4-40 X 1/4 | |
| 51 | 1 | PHMS, PHIL #4-40 X 1/4 | |
| 50 | 1 | HEX NUT #8-32 | |
| 49 | 1 | SOCKET HD MACH SCR #6-32 X 7/8 | |
| 48 | 3 | SET SCREW #4-40 X 1/4 | |
| ITEM | PART NUMBER | QTY | DESCRIPTION |

Figure 7-25

REV A ECN 434 1/1/75
 B ECN 556 7/29/75
 C ECN 889 10-29-76
 D ECN 898 11-15-76



7-28

| ITEM | PART NUMBER | QTY | DESCRIPTION |
|------|-------------|-----|--------------------------------------|
| 18 | | | |
| 17 | | | |
| 16 | | | |
| 15 | | | |
| 14 | | | |
| 13 | | | |
| 12 | — | 4 | L/WASHER, #6 |
| 11 | — | 4 | PHMS, PHIL, #6-32 X 1/4" |
| 10 | 319-0134 | 1 | METER, VU |
| 9 | 482-2392 | 1 | KNOB |
| 8 | 191-1053 | 1 | POTENTIOMETER, 10K, W/MTG HDWR (R73) |
| 7 | 343-0036 | 1 | SWITCH CAP, WHITE |
| 6 | 343-0037 | 1 | SWITCH CAP, RED |
| 5 | 321-7387 | 1 | LAMP |
| 4 | 343-0020 | 2 | SWITCH, PUSHBUTTON (S1, S2) |
| 3 | A-530-0006 | 1 | FRONT PANEL - RECORD W/S-SCRN |
| 2 | B-479-0011 | 1 | PC BOARD FRAME |
| 1 | C-914-1393 | 1 | RECORD P C BOARD ASSY |
| X | C-906-2012 | X | RECORD MODULE |
| | | | DESCRIPTION |

PARTS LIST

BROADCAST ELECTRONICS, INC.

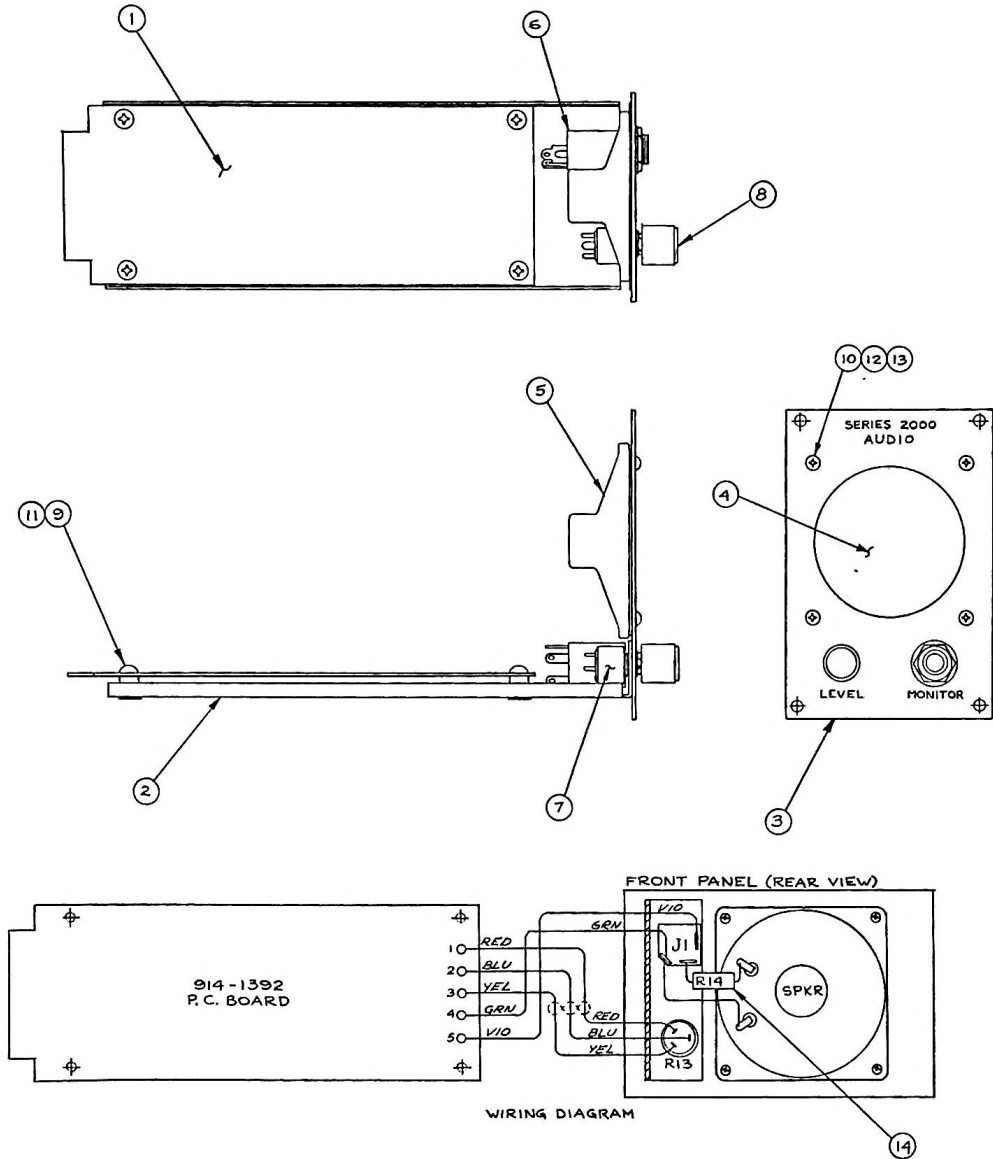
2000 SERIES
 RECORD MODULE
 FINAL ASSEMBLY
 & WIRING
 REV D
 C-906-2012

DRAWN: 12/6/74 TMS
 CHECKED:

SCALE:
 FULL

(FORMERLY C-906-2104)

Figure 7-26



| ITEM | PART NUMBER | QTY | DESCRIPTION |
|------|-------------|-----|------------------------------------|
| 14 | 110-5623 | 1 | 56 Ω, 1/2W, 10% RESISTOR (R14) |
| 13 | | 4 | HEX NUT, #4-40 |
| 12 | | 4 | L/WASHER, INT TOOTH, #4 |
| 11 | | 4 | L/WASHER, INT TOOTH, #6 |
| 10 | | 4 | PHMS, PHIL #4-40 X 1/2 |
| 9 | | 4 | PHMS, PHIL #6-32 X 1/4 |
| 8 | 482-2392 | 1 | KNOB |
| 7 | 191-1053 | 1 | 10K POTENTIOMETER W/MTG HDWR (R13) |
| 6 | 417-0210 | 1 | JACK W/MTG HARDWARE (J1) |
| 5 | 414-2000 | 1 | 2" SPEAKER |
| 4 | A-530-0007 | 1 | SPEAKER GRILL |
| 3 | A-530-0005 | 1 | FRONT PANEL |
| 2 | B-479-0010 | 1 | P C BD FRAME |
| 1 | C-914-1392 | 1 | AUDIO P C BOARD ASSEMBLY |
| X | C-906-2013 | X | AUDIO MODULE |
| | | | PARTS LIST |

BROADCAST ELECTRONICS, INC.
- A FILMWAYS COMPANY -

2000 SERIES
AUDIO MODULE
FINAL ASSEMBLY
& WIRING

C-906-2013

REV
A

DRAWN: 11/23/74 7MSD

SCALE:
FULL

CHECKED:

(FORMERLY C-906-2103)

Figure 7-27

7-31

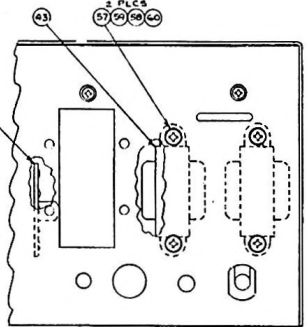
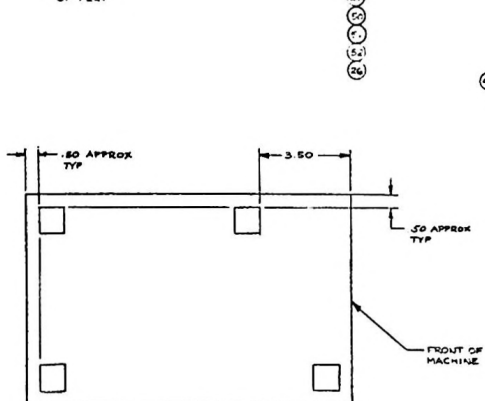
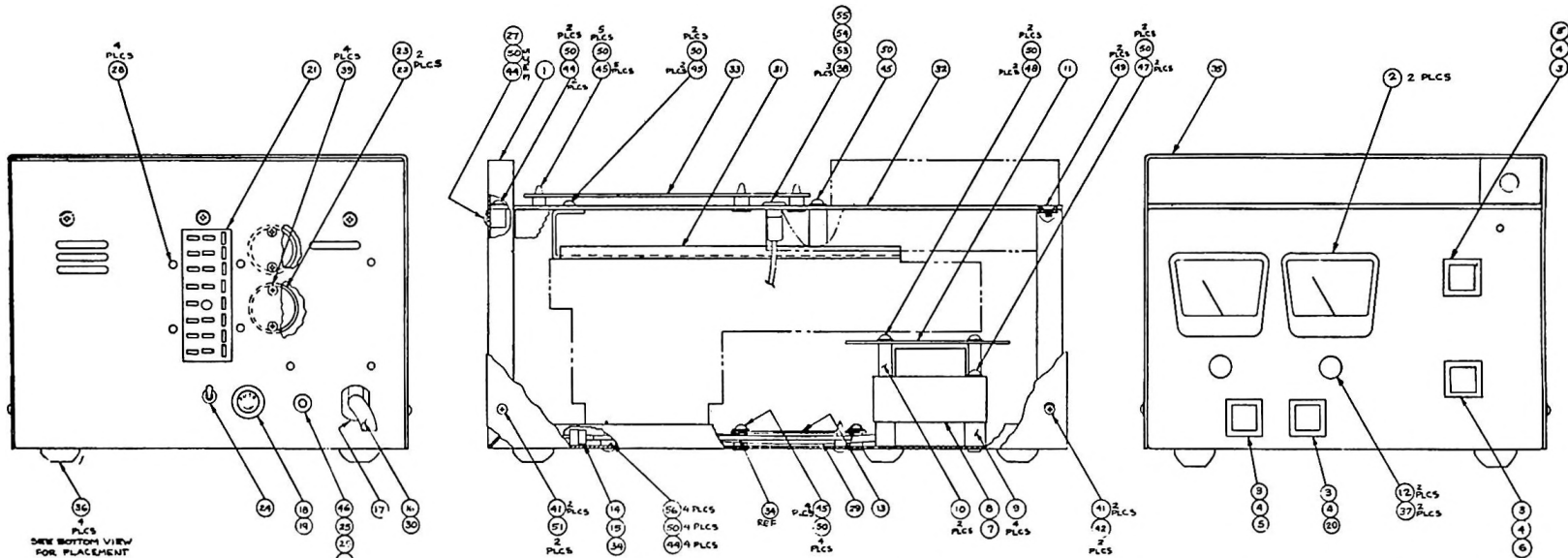


FIGURE 1
 CONFIGURATION WHEN ALTERNATE
 OUTPUT XFMRS ARE USED

| | | | | | | | | |
|----|------------|----|--------------------------------------|----|------------|---|--|----------|
| 55 | 680-0720 | 1 | HEAD LEAD, GRV, 9" | 22 | 370-0026 | 2 | AUDIO OUTPUT XFMR | (T2, T3) |
| 54 | 680-0723 | 1 | HEAD LEAD, RED, 9" | 21 | 418-0503 | 1 | 24-PIN CONNECTOR - CHUCK | |
| 53 | 680-0722 | 1 | HEAD LEAD, BLU, 9" | 20 | 343-0036 | 1 | WHITE SWITCH CAP | |
| 52 | ---- | 1 | HEX NUT # 6-32 | 19 | 354-0050 | 1 | FUSE, 1/2 AMP. | |
| 51 | ---- | 3 | F/WASHER, # 8 | 18 | 41F-2012 | 1 | FUSE POST | |
| 50 | ---- | 19 | L/WASHER, INT TEETH, # 6 | 17 | 401-0004 | 1 | STRAIN RELIEF | |
| 49 | ---- | 2 | PHMS, PHIL, # 6-32 X 3/16 | 16 | 681-1729 | 1 | LINE CORD, 3WIRE | |
| 48 | ---- | 2 | PHMS | 15 | 417-1211 | 1 | KEY, CONNECTOR | |
| 47 | ---- | 1 | 1-3/8" | 14 | 417-1210 | 1 | 12-PIN CARD EDGE CONNECTOR | |
| 46 | ---- | 1 | 1/2" | 13 | 8-914-1391 | 1 | POWER SUPPLY P.C. ASSY | |
| 45 | ---- | 14 | 3/8" | 12 | 482-2392 | 2 | KNOB | |
| 44 | ---- | 19 | PHMS, PHIL, # 6-32 X 3/16 | 11 | A-479-0018 | 1 | SHIELD, XFMR | |
| 43 | 371-0008 | 2 | AUDIO OUTPUT XFMR (SEE FIGURE 1) | 10 | 441-9205 | 2 | STANDOFF, 5/8" LONG | |
| 42 | ---- | 2 | L/WASHER, INT TEETH, # 6 | 9 | 441-8300 | 4 | STANDOFF, NYLON, 1/2" | |
| 41 | ---- | 4 | PHMS, PHIL, # 6-40 X 3/8 | 8 | 374-1658 | 1 | POWER TRANSFORMER | (T1) |
| 40 | 441-0066 | 1 | TERMINAL STRIP, 5 LUG (SEE FIGURE 1) | 7 | 645-1214 | 1 | CONNECTOR | |
| 39 | ---- | 4 | PHMS, PHIL, # 2-56 X 1/4 | 6 | 343-0038 | 1 | GREEN SWITCH CAP | |
| 38 | 417-0135 | 3 | JACK, PHONO, WHITE & INSUL HDWR | 5 | 343-0037 | 2 | RED SWITCH CAP | |
| 37 | 191-1063 | 2 | ROT IDK, WHITE, # 2x2 (873 R10) | 4 | 321-7587 | 4 | LAMP #7387 | |
| 36 | 403-0001 | 4 | FEET | 3 | 343-0030 | 2 | SWITCH, ILLUM PUSH BUTTON (S2 THRU S8) | |
| 35 | C-830-0002 | 1 | COVER | 2 | 319-0134 | 2 | METER, VU (M1, M2) | |
| 34 | C-914-1997 | 1 | RECORD P.C. ASSY | 1 | D-530-0009 | 1 | CHASSIS, STENCILED & SCREWEDED | |
| 33 | C-914-1400 | 1 | PLAYBACK/LD/NC P.C. ASSY | 1 | D-904-2-21 | 1 | RECORD STEREO FINAL ASSEMBLY | |
| 32 | D-904-2109 | 1 | DECK ASSEMBLY | | | | | |
| 31 | C-904-2103 | 1 | MOTOR MOUNTING SUB ASSY | | | | | |
| 30 | 419-0071 | 1 | WIRE NUT | | | | | |
| 29 | C-976-2129 | 1 | WIRE HARNESS | | | | | |
| 28 | 420-1503V | 4 | POP RIVET | | | | | |
| 27 | B-470-0101 | 1 | SUPPORT BRACKET, DECK | | | | | |
| 26 | 421-0013 | 1 | KNURLED NUT, # 6-32 | | | | | |
| 25 | 410-1416 | 1 | TERMINAL LUG, # 6-32 | | | | | |
| 24 | 348-7101 | 1 | PWR SWITCH, WHITE HDWR | | | | | (S1) |
| 23 | 370-0017 | 2 | SHIELD AUDIO OUTPUT XFMR | | | | | |

PARTS LIST

| ITEM | PART NUMBER | QTY | DESCRIPTION |
|------|-------------|-----|--|
| 56 | 441-9310 | 4 | STANDOFF, NYLON, 1/4 X 6-32 TAP |
| 55 | 680-0720 | 1 | HEAD LEAD, GRV, 9" |
| 54 | 680-0723 | 1 | HEAD LEAD, RED, 9" |
| 53 | 680-0722 | 1 | HEAD LEAD, BLU, 9" |
| 52 | ---- | 1 | HEX NUT # 6-32 |
| 51 | ---- | 3 | F/WASHER, # 8 |
| 50 | ---- | 19 | L/WASHER, INT TEETH, # 6 |
| 49 | ---- | 2 | PHMS, PHIL, # 6-32 X 3/16 |
| 48 | ---- | 2 | PHMS |
| 47 | ---- | 1 | 1-3/8" |
| 46 | ---- | 1 | 1/2" |
| 45 | ---- | 14 | 3/8" |
| 44 | ---- | 19 | PHMS, PHIL, # 6-32 X 3/16 |
| 43 | 371-0008 | 2 | AUDIO OUTPUT XFMR (SEE FIGURE 1) |
| 42 | ---- | 2 | L/WASHER, INT TEETH, # 6 |
| 41 | ---- | 4 | PHMS, PHIL, # 6-40 X 3/8 |
| 40 | 441-0066 | 1 | TERMINAL STRIP, 5 LUG (SEE FIGURE 1) |
| 39 | ---- | 4 | PHMS, PHIL, # 2-56 X 1/4 |
| 38 | 417-0135 | 3 | JACK, PHONO, WHITE & INSUL HDWR |
| 37 | 191-1063 | 2 | ROT IDK, WHITE, # 2x2 (873 R10) |
| 36 | 403-0001 | 4 | FEET |
| 35 | C-830-0002 | 1 | COVER |
| 34 | C-914-1997 | 1 | RECORD P.C. ASSY |
| 33 | C-914-1400 | 1 | PLAYBACK/LD/NC P.C. ASSY |
| 32 | D-904-2109 | 1 | DECK ASSEMBLY |
| 31 | C-904-2103 | 1 | MOTOR MOUNTING SUB ASSY |
| 30 | 419-0071 | 1 | WIRE NUT |
| 29 | C-976-2129 | 1 | WIRE HARNESS |
| 28 | 420-1503V | 4 | POP RIVET |
| 27 | B-470-0101 | 1 | SUPPORT BRACKET, DECK |
| 26 | 421-0013 | 1 | KNURLED NUT, # 6-32 |
| 25 | 410-1416 | 1 | TERMINAL LUG, # 6-32 |
| 24 | 348-7101 | 1 | PWR SWITCH, WHITE HDWR (S1) |
| 23 | 370-0017 | 2 | SHIELD AUDIO OUTPUT XFMR |
| 22 | 370-0026 | 2 | AUDIO OUTPUT XFMR (T2, T3) |
| 21 | 418-0503 | 1 | 24-PIN CONNECTOR - CHUCK |
| 20 | 343-0036 | 1 | WHITE SWITCH CAP |
| 19 | 354-0050 | 1 | FUSE, 1/2 AMP. |
| 18 | 41F-2012 | 1 | FUSE POST |
| 17 | 401-0004 | 1 | STRAIN RELIEF |
| 16 | 681-1729 | 1 | LINE CORD, 3WIRE |
| 15 | 417-1211 | 1 | KEY, CONNECTOR |
| 14 | 417-1210 | 1 | 12-PIN CARD EDGE CONNECTOR |
| 13 | 8-914-1391 | 1 | POWER SUPPLY P.C. ASSY |
| 12 | 482-2392 | 2 | KNOB |
| 11 | A-479-0018 | 1 | SHIELD, XFMR |
| 10 | 441-9205 | 2 | STANDOFF, 5/8" LONG |
| 9 | 441-8300 | 4 | STANDOFF, NYLON, 1/2" |
| 8 | 374-1658 | 1 | POWER TRANSFORMER (T1) |
| 7 | 645-1214 | 1 | CONNECTOR |
| 6 | 343-0038 | 1 | GREEN SWITCH CAP |
| 5 | 343-0037 | 2 | RED SWITCH CAP |
| 4 | 321-7587 | 4 | LAMP #7387 |
| 3 | 343-0030 | 2 | SWITCH, ILLUM PUSH BUTTON (S2 THRU S8) |
| 2 | 319-0134 | 2 | METER, VU (M1, M2) |
| 1 | D-530-0009 | 1 | CHASSIS, STENCILED & SCREWEDED |
| X | D-904-2-21 | X | RECORD STEREO FINAL ASSEMBLY |
| ITEM | PART NUMBER | QTY | DESCRIPTION |

BROADCAST ELECTRONICS, INC.
 A PHILIPS COMPANY

2000 SERIES
 RECORD PLAY STEREO
 FINAL ASSEMBLY
 D-904-2021 REV B

SCALE: 1-29-76 WM. 1:1
 CHECKED:

Figure 7-29



BROADCAST ELECTRONICS, INC.

- A FILMWAYS COMPANY -

4100 NORTH 24th STREET • QUINCY, ILLINOIS 62301 • PHONE 217-224-9600

| | | |
|----------|-----------------------|------|
| TO | FROM | DATE |
| CUSTOMER | BROADCAST ELECTRONICS | |

SUBJECT

2000 UNITS

SAY IT IN WRITING

CUSTOMER

To further protect 2000 units during shipment,
we have added a cardboard spacer between flywheel
and bearing support.

Please remove two front screws and lift cover to
remove spacer before operation of unit.

Thank you

Shipping Dept.

Signed



Broadcast Electronics, Inc.

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

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

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

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

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

BROADCAST ELECTRONICS, Inc.
8810 Brookville Road
Silver Spring, Maryland 20910