7837 8
Vince Solace

S 107
CTD 7
9pin PWR connector

# OPERATING INSTRUCTIONS
## FOR

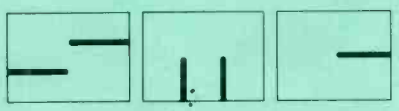
## Models 790/792
## Models 721/722
## Models 710/712

Jolene
Kirby
R+1
B.S.

Pearl Coffee
2513 Cindy

1-309-452-5313

**Manufactured By**



**SONO MAG CORPORATION**
1019 W. Washington St., Bloomington, Ill. 61701 U.S.A.

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700 SERIES PLAYERS AND RECORDERS




SONO-MAG CORPORATION

BLOOMINGTON, ILLINOIS USA

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Sono-Mag Corporation
Bloomington, Illinois USA

January, 1978

SECTION I

EQUIPMENT DESCRIPTION

1.1 INSTRUCTION MANUAL: This Instruction Manual covers the Installation, Operation and Maintenance of the following SMC Cartridge equipment:

790 Monophonic Record Center
792 Stereophonic Record Center
710 Monophonic Playback
712 Stereophonic Playback
721 Dual Monophonic Playback
722 Dual Stereophonic Playback

The 790, 792, 710 and 712 Models are available as either desk or rack mounting units. The 721 and 722 Dual Playbacks are rack mounting only.

1.2 GENERAL DESCRIPTION: The Logi-Cart Series of cartridge equipment features interlocked control of all operating functions using logic circuitry. Switching is solid-state; all relays have been eliminated.

Hysteresis-Synchronous capstan motors provide direct tape drive, assuring timing accuracy and low wow and flutter. The Record Centers provide meters for monitoring record, play and bias levels. Circuit boards and integrated circuit components are plug-in. Primary and Secondary cue record-playback facilities are provided in all models. Provision for alpha-numeric logging is also standard.

## 1.3 SPECIFICATIONS

### 1.3.1 ALL UNITS

Tape Speed: 7½ Inches per second (19.05 CMPS)
Output: 600 ohms, balanced
12 dBm before clipping
Normally O dBm @ NAB Reference
Playback Distortion: Less 1% @ O dBm, 400 Hz
NAB Reference
Frequency Response: ± 2dB, 50 Hz to 15 kHz
Equalization: NAB, adjustable for head wear
Other equalization on special order.
Wow/Flutter: .15% din. maximum
Noise: Mono, 57 dB below 3% THD @ 400 Hz
49 dB below NAB Reference
Stereo, 52 dB below 3% THD, 400 Hz
45 dB below NAB Reference
Speed Accuracy: 99.8% or better
Remote Control: All operating functions
Head Configuration: In accordance with NAB specifications
Dimensions: Rack mounts, 19" W x 5¼" H x 14" D
48CM x 13.31CM x 35.6CM
Desk mounts, 15" W x 6" H x 14" D
38.1CM x 15.25CM x 35.6 CM
Weight: 30 pounds (13.6 Kg.)

### 1.3.2 RECORD CENTERS

Input: 600 Ohms, balanced

w/RP-4 -20 dBm minimum

Metering: Audio output
Recording level
Bias level
Recording peak indicator

Primary cue tone: 1000 Hz ± 75 Hz
Secondary cue tone: 150 Hz ± 10 Hz
Third Tone: External input
Distortion: Record to playback, 3% THD
Maximum @ 8 dB above NAB
Reference level

SECTION 2

INSTALLATION

## 2.1 INSTALLATION

2.1.1 GENERAL: Carefully remove the equipment from the packing box. Inspect for any possible shipping damage. Make certain all plug-in assemblies are secure in the proper sockets. Check that all integrated circuit packages are in place. Check the physical operation of the front panel controls.

Damage claims should be filed promptly with the carrier. All packing material should be retained until the inspection is complete.

2.1.2 RACK SLIDES: If the equipment is to be rack mounted, install the rack slides.

2.1.3 SYSTEM CONNECTION: External connections are made to TB-1, TB-2, SO-1 or SO-2, depending upon the application. All connector circuit functions are described in Section 2.2.

Connectors SO-1 and SO-2 are generally used for connection to an automation system. TB-1 and TB-2 are for general purpose control-room use.

## 2.2 EXTERNAL CONNECTIONS

2.2.1 CONNECTOR SO-1: Connector SO-1 is used on all units. Connections are as follow:

| | |
|---|---|
| Terminal 1: | Left (or mono) Audio out |
| 2: | Left (or mono) Audio out |
| 3: | Audio Ground |
| 4: | Stereo, Right Audio out |
| 5: | Stereo, Right Audio out |
| 9: | 5.1 vdc, plus |
| 10: | 150-4000 Hz Sensor Enable |
| 11: | Remote start (active low) |
| 12: | Ground |
| 13: | Secondary (Auxiliary) Cue out (active high) |
| 14: | Secondary (Auxiliary) out, Open Collector |
| 15: | Logging out (active high) |

Notes:

1. In Stereophonic use, Terminals 1-4 and 2-5 are in phase.

2. Outputs at Terminals 13 and 15 are active only when these circuits are enabled by a logic 1 applied to Terminal 10. All units are supplied with a connector having an enable strap between Terminals 9 and 10. In automation systems these circuits are usually enabled by a "now playing" signal from the system.

3. Outputs at Terminals 13 and 15 are high (logic 1) with signal detection.

4. Application of a "ground" to Terminal 11 will cause the unit to start.

5. Terminal 14 connects directly to the open collector of an NPN transistor which has a grounded emitter. This transistor conducts when a 150 Hz tone is detected. This will furnish a "ground-going" circuit which may be used as a "start switch" for other equipment. NOTE: This circuit is intended ONLY for switching 24 vdc, or less, and is limited to a 40 milliampere load. If used to switch a relay or other inductive devices a transient suppressor, such as a diode, should be used across the load to protect the transistor.

2.2.2 TERMINAL STRIP TB-1: Terminal Strip TB-1 is used on all units except the Dual Playback Series. Connections are:

| | |
|---|---|
| Terminal 1: | Left (or mono) Audio out |
| 2: | Left (or mono) Audio out |
| 3: | Audio Ground |
| 4: | Stereo, Right Audio out |
| 5: | Stereo, Right Audio out |
| 6: | Remote Start |
| 7: | Remote Common (Ground) |
| 8: | Remote Stop |
| 9: | Not Used |
| 10: | Not Used |

Note: In Stereo use, Terminals 1-4 and 2-5 are in phase.
Remote start or stop circuits are normally open switches operating between ground (Term. #7) and the start (Term. #6) or stop (Term. #8).

2.2.3 TERMINAL STRIP TB-2: Terminal Strip TB-2 is used on all Record Centers. Connections are:

| | |
|---|---|
| Terminal 1: | Left (or mono) Audio in |
| 2: | Left (or mono) Audio in |
| 3: | Audio Ground |
| 4: | Stereo, Right Audio in |
| 5: | Stereo, Right Audio in |
| 6: | Remote Record Set |
| 7: | Remote Common (Ground) |
| 8: | Remote Secondary (aux) Cue apply |
| 9: | Not Used |
| 10: | Not Used |

Note: In Stereo use, Terminals 1-4 and 2-5 are in phase.
All remote control circuits are normally open switches common to ground, Term. #7.

2.2.4 CONNECTOR SO-2: Connector SO-2 is used on Record Centers only. This connector provides all circuits between the Record Center and an SMC Logging Encoder. Connections are as follow:

Terminal 1: Input to cue track recording circuit
2: Ground
3: Goes high momentarily each time the Recorder is started.
4: 150-4000 Hz Sensor Enable
5: Logging output
6: VCC (5.1 volts plus)
7: Logging Output (See Note 6)
8: Cue track bias control
9: Ground

NOTES:
1. An SMC Logging Encoder furnishes a 4000 Hz signal at the proper level for the input to Terminal 1.

2. The momentary high signal at Terminal 3 is used to "trigger" the Encoder record delay timer.

3. The function of Terminal 4 is exactly the same as SO-1 Terminal 10.

4. The output at Terminal 5 goes high (approx. 5v) with 4000 Hz signal detection when Terminal 4 is enabled.

5. Terminal 8 controls the cue track bias system for Encoding purposes.

6. The output at Terminal 7 goes low with 4000 Hz signal detection.

3.1.1 POWER SWITCH: On all units, except Dual Playbacks, the main AC switch is on the front panel. On Dual Players, this switch is located immediately back of the front panel on the left side of the main chassis.

3.1.2 START: When a cartridge is in place, pressing the START switch will start tape drive, and is indicated by illumination of the switch lamp. NOTE: Intensity of this lamp will increase slightly with detection of an auxiliary cue signal.

3.1.3 STOP: Pressing this switch will stop tape drive. The lamp in this switch indicates power is on but tape drive has not started.

## 3.2 OPERATING CONTROLS, RECORD CENTERS

3.2.1 RECORD SET: Pressing this switch will place the unit in the record mode; the lamp in this switch will be ON.

3.2.2 AUXILIARY CUE: Pressing this switch will cause an auxiliary (secondary) cue signal to be recorded for the period of time the switch is depressed. The lamp in this switch is turned ON by the cue amplifier as the recorded tone is detected; recording of the tone is thus self-checking. NOTE: This tone may be recorded in EITHER the play or record modes. The duration of the AUX tone is the same as the time this button is pressed.

3.2.3 METER SWITCH: This rotary switch connects the panel meter(s) to the selected circuit. Position 1 measures output level, position 2 recording level and position 3 relative bias level. NOTE: Bias level will be indicated only in the record mode AND the start switch has been pressed.

3.2.4 GAIN CONTROL: This control adjusts the audio recording level. Stereophonic Record Centers are provided with separate left and right channel controls.

3.2.5 PEAK INDICATOR: A Light Emitting Diode (LED) is used as a recording peak indicator. This device provides an indication of instantaneous audio peaks which the meter may not be able to follow. NOTE: This is a PEAK recording indicator and serves as a warning that tape saturation level has been approached. It is a supplement to, but not a replacement for, the panel meter. It indicates a level which is approximately 8dB higher than the meter O VU reading.

SECTION 4

# THEORY OF OPERATION

## 4.1 GENERAL

4.1.1 SCHEMATICS: Schematics of all equipment to be described in this section will be found in Section 8.

4.1.2 LOGIC DEFINITIONS: To simplify the explanation of the 700 Series cartridge equipment, certain basic logic terms will be used. These are defined below:

1. Logic 1: The high voltage state, typically in the order of 3.3 to 5.1 volts.

2. Logic 0: The low voltage state, typically in the order of 0.0 to 0.8 volts.

4.1.3 PRINTED CIRCUIT ASSEMBLIES: Printed circuit board assemblies furnished are as follow:

ALL UNITS:
- PS-24B Power Supply
- PR-2 Playback Amplifier
- CSC Control Sensor
- LC-1 Logic Control

RECORDERS:
- RP Recording Amplifier
- TGA Tone Generator-Amplifier
- BGC Bias Generator-Control

4.1.4 CONTROL SWITCHES: All panel switches, except the power switch, are of the Hall Effect type. There is no mechanical connection and thus no wear. The output of these switches stand high, going low when actuated.

## 4.2 POWER SUPPLIES

4.2.1 PS-24B SUPPLY: The 24 volt supply consists of four diodes arranged in a bridge configuration. The output is regulated by transistor Q1 and Zener diodes D5-D6.

4.2.2 VCC LOGIC SUPPLY: The logic power supply consists of an integrated circuit bridge rectifier and associated filter furnishing approximately 13 volts to an integrated circuit voltage regulator. Output of the regulator is 5.1 volts.

4.2.3 SG-1A SOLENOID GATE ASSEMBLY: The solenoid power supply is part of the SG-1A Solenoid Gating Assembly located on the underside of the tape transport. This assembly is used on all units except Dual Playbacks. The SG-1A consists of an SCR controlled by a photo-coupled trigger device and associated filter. Output is 95 volts $\pm$ 5 volts. Since this assembly is connected to the primary power source, a metal protecting cover is furnished.

The LED in 1C1 is controlled by the LC-1 Logic board. When the machine is started, the LED is "ON" by control of the LC-1 circuit and the optically coupled SCR in 1C1 "fires" the main SCR, Q1. This rectifies the AC supply and provides power for the solenoid.

This switching method gives total isolation between the logic circuits and the AC power without the use of a mechanical relay.

4.2.4 SG-2A SOLENOID GATE ASSEMBLY: The SG-2A Solenoid Gate Assembly is used in all Dual Players. The circuit action is the same as the SG-1A and there are two separate control sections, one for each solenoid.

4.3 PR-2 PROGRAM AMPLIFIER: The PR-2 Program amplifier consists of IC-1, a dual low noise integrated circuit preamplifier, followed by output transistors 1Q1 for the left channel (or monophonic) and 2Q1 for the right channel. Gain controls 1R2 and 2R2 are for left and right channels respectively. Variable resistors 1R15 and 2R15 are high frequency compensators for the left and right channels.
NOTE: The input to the right channel preamplifier is grounded in monophonic units.

Connections to this board are as follow:

| | | |
|---|---|---|
| Terminal | 1: | Left preamplifier out |
| | 2: | Left output amplifier in |
| | 3: | 24 volts + |
| | 4: | Left amplifier out |
| | 8: | IC Ground |
| | 9: | Left preamplifier in |
| | 11: | Ground |
| | 12: | Power Ground |
| | 13: | IC Ground |
| | 15: | Right preamplifier in |
| | 17: | 24 volts + |
| | 19: | Right amplifier out |
| | 20: | 24 volts + |
| | 21: | Right output amplifier in |
| | 22: | Right amplifier out |

## 4.4 CSC-1 CONTROL SENSE CIRCUIT

4.4.1 GENERAL: The CSC-1 Control Sense Circuit assembly amplifies all control signal information recorded on a cartridge cue track, converts this information to digital form and controls the resulting signals.

The CSC assembly provides switching circuits which enable, or inhibit, transmission of logging and secondary (auxiliary) signals as required. In routine operation these signals are enabled at all times; however, in automation systems the outputs are usually inhibited except when the program source is actually on the air. This permits auditioning of cartridges but prevents transmission of switching information.

IC-1 is a single Integrated Circuit package containing two identical high gain amplifiers. The output of the cue playback head feeds the input of both amplifiers. Section A of IC-1 is used as an amplifier for 1000 Hz cue and 4000 Hz logging signals. Section B is a 150 Hz secondary cue selective amplifier in a "Twin T" configuration.

4.4.2 1000 HERTZ CUE SECTION: The output of the 1000-4000 Hz amplifier, IC-1 section A, is clipped by diodes D3 and D4 and fed to the input of IC-3, an NE-567 phased-lock loop tone decoder. The center frequency of the decoder detection band is set at 1000 Hz by variable resistor R26. Detection of a 1000 Hz cue signal causes the decoder output (board terminal 21) to change from high (logic 1) to low (logic 0) for the duration of the tone.

4.4.3 4000 HERTZ SECTION: The clipped output of the 1000-4000 Hz amplifier is fed to the input of tone decoder IC-4. The center frequency of the decoder detection band is set at 3850-3890 Hz by variable resistor R29. Detection of a 4000 Hz causes a low (logic 0) signal to appear at board terminal 20.

4000 HERTZ ENABLING CIRCUIT: The 4000 Hz logic 0 signal appearing at board terminal 20 re-enters the CSC assembly on terminal 5 where it is routed to pin 6 of IC-2 section D. Section D is a two input NOR gate; both inputs must be at logic 0 to produce a logic 1 output. The second input is controlled by transistor Q3. When a logic 1 is applied to the base of Q1, via board terminal 6, a logic 0 appears at IC-2 pin 5. Therefore, when the circuit enabling logic 1 is applied to board terminal 6 AND a 4000 Hz signal is detected, a logic 1 appears at output board terminal 4.

4.4.4 150 HERTZ SECONDARY CUE SECTION: The center frequency of the 150 Hz detection band is set by variable resistor R5. The output of the 150 Hz amplifier, IG-1 section B, is rectified by diodes D1 and D2 and thus controls switching transistor Q1. The output of Q1 is properly shaped by sections A and B of IC-2. A logic 0 appears at the output of section B during detection of a 150 Hz tone.

150 HERTZ ENABLING CIRCUIT: The two inputs of IC-2 section C must be at logic 0 to produce a logic 1 output. It can be seen that this condition exists when a 150 Hz tone is detected AND the enabling logic is applied to board terminal 6.

4.4.5 150 HERTZ SWITCHING CIRCUITS: The CSC assembly provides three output switching circuits which are activated by the 150 Hz tones. As previously described, IC-2 provides a signal at logic level. This same signal controls transistor Q4 which provides an open collector, general purpose switching circuit. Both of these circuits are controlled by the board inhibit-enable system. A third output is provided by transistor Q2 and is used in Record Centers as a switch for the secondary cue lamp indicators; this circuit is enabled at all times.

4.4.6 BOARD TERMINALS: Functions of the CSC-1Board terminals are as follow:

Terminal 1: VCC, plus 5 volts
2: Ground
3: To 150 Hz indicator in Record Centers
4: 4000 Hz logging output
5: 4000 Hz logging from Terminal 20
6: 150-4000 Hz enable
7: 150 Hz logic out
8: Ground
9: 150 Hz switch, open collector
11: Ground
14: 24 volts +
15: Cue Head input
17: Ground
19: VCC, + 5 volts
20: 4000 Hz logic signal to pin 5
21: 1000 Hz logic signal out
22: Ground

## 4.5 LC-1 LOGIC CONTROL BOARD

4.5.1 GENERAL: The LC-1 Logic Control board is the switching center for all record and playback functions. Basically, the LC-1 consists of two flip-flops which control the stop-run and record-playback modes. The input and output circuits of these flip-flops are controlled by additional logic which inhibit or enable the switching functions as required.

Among other functions, this circuit controls the solenoid through the SG-1 (or SG-2) and the recording bias through the BGC-1.

4.5.2 START-STOP FLIP-FLOP

STOP MODE: In the STOP mode (tape not running) IC-2A pin 8 is at logic 0 and IC-2B is at logic 1. Transistor Q4 is conducting; the STOP indicator is ON.

START-RUN MODE: Two start inputs are provided: (1) board terminal 8 for the front panel START switch and (2) board terminal 19 is used for external start circuits such as automation systems or remote control. A momentary logic 0 applied to either input will cause the start-stop flip-flop to reverse output conditions with pin 8 going high and pin 12 low. The following conditions will then exist:

1. Transistor Q4 becomes non-conducting; the STOP indicator if OFF.
2. Transistor Q2 conducts; solenoid drive is provided.
3. Transistor Q3 conducts; the START indicator is ON.
4. IC-4, functioning as a timer, is triggered by a "one shot" pulse thru capacitor C9. Pin 3 goes high for approximately 2 seconds and inhibits 1000 Hz cue gate IC-3B which prevents machine stoppage during the initial tape start. An additional output is provided during this time at board terminal 5 which will be considered later.

STOP CIRCUIT: To stop tape drive, the start-stop flip-flop must be re-set to the off condition. Two reset circuits are provided: (1) from the front panel STOP switch (and remote stop circuit TB-1 terminal 8 to IC-2B pin 1.) If either line goes low the flip-flop will reset; all circuits revert to the STOP mode.

4.5.3 RECORD CONTROL CIRCUITS: The RECORD-SET function is controlled by a flip-flop consisting of the C sections of IC-1 and IC-2. This flip-flop is set in the RECORD mode when a low signal is applied to pin 2 of IC-1C by the output of gate control IC-1B. Both inputs of IC-1B must be high to obtain the desired low output; this condition exists only when the unit is in the STOP mode AND during the time the Record Set switch is pressed. Re-set occurs when either pin 3 or 4 of IC-2C goes low: pin 4 going low when a 1000 Hz signal is detected and pin 3 going low when the STOP switch is pressed.

In the Record-Set mode, the output of IC-1 pin 3 is high; transistor Q5 conducts and turns ON the Record-Set lamp.

Logic is required which will indicate a Recorder is, or is not, in a Record-Set AND running (set-plus-run) condition. In the NOT set-plus-run condition the output of IC-1D (pin 11) is high and the output of IC-3D (pin 4) is low. These conditions will reverse in the TRUE set-plus-run mode.

## 4.6 BGC-1 BIAS GENERATOR AND CONTROL BOARD

4.6.1 GENERAL: The BGC-1 assembly consists of a high frequency bias oscillator, push-pull amplifier, power switching and bias output clamping circuits.

4.6.2 BIAS OSCILLATOR-AMPLIFIER: Transistor Q1 operates as an oscillator at approximately 80 kHz. Transistors Q2 and Q3 operate as a push-pull amplifier working into output transformer T2. Three bias outputs are provided; (1) left program or monophonic), (2) right program and (3) cue track. Bias current to the program record heads is adjustable by variable capacitors C10 and C11.

4.6.3 POWER SWITCHING: Diodes D1, D2 and D3 in the base circuit of Q4 form an OR gate. A high (logic 1) signal applied to any one of these diodes will cause power to be applied to the bias oscillator-amplifier thru pass transistor Q6. This signal appears at (1) board pin 1 when the recorder is in the Record-Set mode AND running, (2) board pin 2 when a 150 Hz secondary cue tone is recorded or (3) at board pin 4 when 4 kHz logging information is recorded.

4.6.4 BIAS OUTPUT CLAMPS

PROGRAM RECORD HEAD CLAMPS: When a high signal is applied to board terminal 5, transistors Q9 and Q10 conduct and clamp the right and left bias outputs to ground. Conversely, the clamps are released when this signal is low. The controlling signal is generated by the LC-1 Board and is high except when the recorder is in the Record-Set mode AND is running.

4.6.5 CUE RECORD HEAD CLAMP: Diodes D4, D5 and D6 form an OR gate in the base circuit of Q7; Q7 controls O8. Transistor Q8, when conducting, clamps the cue bias output to ground. The clamp is released when a high signal is applied to the base of Q7. This signal appears at (1) board terminal 2 when a 150 Hz secondary cue is recorded, (2) board terminal 3 when a 1000 Hz primary cue is recorded, or (3) board terminal 4 when 4 kHz logging signals are recorded.

NOTE: The BGC-1 is inherently a stereo bias system. When the machine is mono, C11 is adjusted for minimum capacitance to prevent the unused bias voltage from causing a "beat" signal on a tape.

## 4.7 TGA-1 TONE GENERATOR-AMPLIFIER

4.7.1 1000 HERTZ GENERATOR: The 1000 Hertz primary cue tone generator consists of square wave oscillator IC-2 followed by shaping network R9-C1 and level control R27. Frequency is determined by R6, R7, R8 and C5 with R7 providing a vernier adjustment.

CUE BURST CONTROL: The 1000 Hertz cue burst duration is controlled by IC-1 functioning as a time-keyer for IC-2. The time period is determined by R3-C3.

The timer is triggered thru C1 each time the unit is started while in the RECORD mode; the output at IC-1 pin 3 is high (logic 1) for approximately 500 milliseconds. This high signal keys the oscillator and, via board terminal 21, releases the cue track bias clamp.

4.7.2 150 HERTZ GENERATOR: Two 150 Hertz oscillator clamps, Q1 and Q2 are provided. The oscillator is inhibited when either transistor is in the ON state. Q2 is released (off) as the unit starts, a logic 0 (ground) signal from the LC-1 Logic Board having been applied to board terminal 17. Q1 is released when a logic 0 is applied to board terminal 15 by the front panel auxiliary cue switch. When both clamps are released the voltage at oscillator pin 4 goes to logic 1, the oscillator is keyed and, via board terminal 14, the cue track bias clamp is released.

4.7.3 EXTERNAL INPUT: An external tone input is provided at board terminal 2. This is used normally for recording logging information on the cue track. This input is placed on a common cue tone mixing buss thru isolating resistor R10.

SECTION 5

## ELECTRICAL MAINTENANCE AND ADJUSTMENT

5.1 GENERAL: Use extreme care in removing circuit boards or integrated circuit packages from their sockets. Power should be OFF prior to removal. When replacing integrated circuits be absolutely certain they are returned to the proper socket and in the correct direction with IC pin 1 in socket pin 1; reversal will invariably result in immediate destruction of the IC.

5.2 PR-2 PROGRAM AMPLIFIER: Two sets of controls are located on the PR-2 Program Amplifier Board; these are explained below. Refer to Figure 5-2 for control locations.

5.2.1 GAIN CONTROLS: The left (or monophonic) output level is set by 1R2. Stereophonic right channel output is set by 2R2. The output level is set a 0 dBm while playing the Standard Level portion of an NAB Primary Reference Tape. The output of the unit must be connected to a 600 ohm load during this adjustment. NOTE: This adjustment calibrates the gain of the playback amplifier for several adjustments which will follow.

5.2.2 HIGH FREQUENCY COMPENSATION: The left channel (or monophonic) high frequency response is set by variable resistor 1R15 and the right channel by 2R15. These controls should be adjusted ONLY after playback head azimuth has been carefully checked. An NAB Primary Reference Tape should be used for both azimuth and frequency checks. The program amplifier should be properly loaded with 600 ohms.

5.2.3 IEC COMPENSATION: The PR-2 can be adjusted to IEC characteristics by changing 1R6 and 2R6 to 220 ohms.

## 5.3 CSC CONTROL SENSE CIRCUIT

5.3.1 GENERAL: Three frequency discriminating networks, 150, 1000 and 4000 Hertz, are located on this board. The frequency determining resistors, all located on the CSC board (See Figure 5-2) are set at the factory. Should adjustments become necessary, proceed as described below.

To make these adjustments, an accurately calibrated signal generator is necessary. The output of the generator will be connected directly to the input of the cue amplifier; therefore, very low signal levels will be used. A shielded connecting cord must be used with a phono-type connector at the Recorder/Playback end.

5.3.2 150 HERTZ SENSOR: Detection of a 150 Hertz tone is indicated by illumination of the lamp in the Auxiliary Cue push-switch of Recording Centers and the Start switch lamp in Playbacks. The center frequency is set at 150 Hz by resistor R5. Adjustment is as follows:

1. Disconnect the Cue head by pulling the phono connector at the chassis.
2. Set the Signal Generator to exactly 150 Hz at approximately 1.0 millivolt output. Using the shielded test lead, connect the cue amplifier to the Generator.
3. Adjust R5 until the lamp indicator is ON. Reduce the signal input until the lamp dims slightly. Re-adjust R5 for maximum lamp intensity. Continue reducing the input and adjusting R5 for maximum lamp intensity.

NOTE: The optimum adjustment is at the point of least signal input which will give a lamp indication as R5 is varied. At this point the lamp will be quite dim and the "swing" of R5 very small, and will occur with an input of approximately 0.2 millivolt.

5.3.3 1000 HERTZ SENSOR: Detection of the 1000 Hz primary cue tone, and conversion of this signal to digital form, is by means of phase-locked-loop IC-3. An integral part of this integrated circuit is a continuously running oscillator. Calibration of the detector consists simply of accurately setting this internal oscillator to 1000 Hz. NOTE: Rejection of out-of-band signals by this system is extremely high; therefore the oscillator should be set at exactly 1000 Hz since this will establish the lower frequency of the pass-band.

CALIBRATION METHOD 1: The most easy and accurate method of setting the internal oscillator is by means of a frequency counter connected to IC-3 pin 6, or more conveniently to board test point A (See Figure 5-2). Adjust R26 for 1000 Hz.

METHOD 2: Using a calibrated oscilloscope, observe the triangular wave form at test point A. Adjust R26 for a complete cycle of 1 millisecond.

METHOD 3: Connect a voltmeter to board terminal 21. It will measure 5.1 volts with no cue signal input. Proceed as follows:

1. Using the same set-up as for 150 Hertz, set the signal generator to exactly 1000 Hz and connect to the cue amplifier input. Raise the output to approximately 3 millivolts and adjust R26 until the voltmeter reads zero.

2. Decrease the signal input until the voltmeter reading starts to rise but does not indicate the full 5.1 volts. This indicates the threshold of the cue signal "capture" point. Adjust R26 for the lowest reading. Continue lowering the signal input and readjusting R26 for the lowest voltmeter reading.

3. As the signal input is decreased, the more narrow the pass-band becomes and the more accurately the center frequency can be set. Therefore, the optimum adjustment point occurs with the least signal input which will give the least voltmeter downward deflection as R26 is adjusted.

NOTE: Not all recorders apply 1000 Hz tones to tapes. Some are lower by 100 Hz and others higher by 50 Hz. For complete compatibility with these tapes, it may be necessary to adjust R26 to a frequency about 10 to 15 Hz <u>below</u> the cue frequency on these tapes.

5.3.4 4000 HERTZ SENSOR ADJUSTMENT: The adjustments for the 4000 Hz Sensor are identical to the 1000 Hz with the following exceptions:

1. Signal Generator is set at precisely 3850-3890 Hz.

2. 3890 Hz center frequency is set by R29.

3. If Calibration Method 1 is used, connect to Test Point B.

4. If Calibration Method 2 is used, the time period for one cycle is 257 microseconds.

5. If Calibration Method 3 is used, the readings are taken at board terminal 20.

NOTE: This circuit can be used for 8 KHz tone sensing by retuning the phase lock loop detector. Change C20 to 0.01 mf. and adjust R29 for nominal 8 KHz.

5.4 LC-1 LOGIC CONTROL: There are no adjustments for this board. For testing purposes, the logic truth table for all operating conditions of the LC-1 board is given in Figure 5-9.

5.5 SG SOLENOID GATE ASSEMBLY: An SG-1A Solenoid Gate Assembly is used in all units except Dual Playbacks which use the SG-2A. The SG-1A unit is mounted on the under side of the tape deck. The SG-2A is mounted under the chassis in dual play units.

## 5.6 BGC-1 BIAS GENERATOR-CONTROL

5.6.1 GENERAL: An extender circuit board holder, 222EX, is available to facilitate bias adjustments. Adjustments must be made using an alignment (non-ferrous) type screw driver.

5.6.2 BIAS TUNING: The tuning slug in Bias Transformer T1 of the BGC-1 board (See Figure 5-5) should be adjusted for maximum bias output as measured by the panel meter(s) set in the "Bias" position. Frequency will be 80 kHz $\pm$ 5%. NOTE: Bias voltage will be present only when the Recorder is in the Record-Set and Run condition.

5.6.3 BIAS TRAPS, RP-3 RECORD AMPLIFIER: Two bias traps, L1 and L2, are on the RP-3 Recording Amplifier board (See Figure 5-7). L1 is used for stereo left (or mono) and L2 for stereo right channel. Adjust these traps as follows:

1. Connect the high side of a high impedance voltmeter or oscilloscope to either side of capacitor C5. Connect the ground side of the test device to chassis.

2. Set the Recorder in the Record and Run mode.

3. Using the alignment tool, adjust the tuning slug in L1 for minimum voltage reading.

4. If stereo, repeat the process with the voltmeter connected to either side of capacitor C15 and adjust L2 for minimum voltage reading.

NOTE: For the RP-4 record amplifier, repeat the above, connecting the test equipment to C7 for left channel and to C19 for right channel. See Figure 5-8.

5.6.4 BIAS TRAP, TGA TONE GENERATOR AMPLIFIER: A single bias trap is used on the TGA-1 Tone Generator-Amplifier board (See Figure 5-6). Adjust this trap as follows:

1. Temporarily connect a jumper wire between SO-2 terminals 6 and 8. This will place the cue bias system in operation.

2. Connect the high side of a high impedance voltmeter or oscilloscope to the end of R26 which connects to the bias trap. Connect the ground side to chassis.

3. Using the alignment tool, adjust the bias trap slug for minimum voltage reading.

4. Remove the SO-2 temporary strap and voltmeter.

5.6.5 BIAS CURRENT: Refer to Figure 5-5. Recording head bias is adjusted by variable capacitors C10 (mono or stereo left) and C11 (stereo right). Bias is adjusted while recording a 1000 Hz signal at a level which will produce -4 dBm output. Adjust C10 for maximum output on the left channel (or mono) panel meter and C11 for maximum output on the right channel meter.

NOTE: Bias requirements vary with tape characteristics. The above adjustments should be made with the type tape normally used.

If the recorder is Mono, adjust the un-used coupling trimmer C11 for minimum capacitance.

## 5.7 TGA TONE GENERATOR

5.7.1 GENERAL: The TGA Tone Generator board adjustments consist of setting the primary and secondary (auxiliary) cue tone generators at 1000 and 150 Hertz respectively, and adjusting the output of each so the recorded signal will yield the proper playback level.

The operating reliability of this equipment depends to a large extent on the accuracy of these adjustments. They should not be attempted without proper test equipment.

Refer to Figure 5-6 for the location of all adjustment controls.

5.7.2 1000 HERTZ FREQUENCY ADJUSTMENT: Variable resistor R7 is the frequency set control for the 1000 Hz primary cue generator. Three calibrating methods will be described below. Any of these methods requires removing IC-1 from its socket. This will cause 1000 Hz generator IC-2 to oscillate continuously and thus facilitate adjustment. Proceed as follows:

METHOD 1: Connect a frequency counter to test point A (located between C17 and C11). Adjust R7 for 1000 Hz. Remove test equipment, replace IC-1.

METHOD 2: Using a calibrated oscilloscope connected to test point A, adjust R7 for a complete cycle of 1 millisecond. Remove test equipment, replace IC-1.

METHOD 3: Connect the vertical input of an oscilloscope to test point A. Adjust the oscilloscope vertical input for a useful vertical deflection. Connect the oscilloscope horizontal input to an accurately calibrated signal generator set at 1000 Hz. Adjust the signal generator output for a horizontal deflection approximately equal to the vertical deflection. A rotating, approximately circular pattern will be observed. Adjust R7 until the pattern stops rotating. Remove the test equipment and replace IC-1.

5.7.3 150 HERTZ FREQUENCY ADJUSTMENT: Variable resistor R13 is the frequency set control for the 150 Hz secondary (auxiliary) cue generator. Calibration is exactly the same as for 1000 Hz with the following exceptions:

1. If Calibration Method 1 is used, R13 is adjusted for 150 Hz.

2. If Calibration Method 2 is used, a complete cycle is 6.66 milliseconds.

3. If Calibration Method 3 is used, the Signal Generator is set to exactly 150 Hz.

5.7.4 1000 HERTZ LEVEL SET: The cue recorded level will be set by playing the output of the cue track thru the program amplifier. However, before the level can be set, it is necessary that the Playback Amplifier be calibrated by playing the STANDARD LEVEL portion of an NAB Primary Reference Tape and setting the output of the Playback Amplifier to 0 dBm when the amplifier output is terminated with a 600 ohm load.

The output level of the 1000 Hz Primary Cue Generator is set by R27. Adjustment is as follows:

1. Temporarily remove IC-1 from its socket to provide continuous 1000 Hz output.

2. Temporarily connect the cue playback head to the program amplifier. On stereo units the left channel connector is the most accessible.

3. Install an erased cartridge and with machine in record mode, start the recording process.

4. Adjust R27 for an output of plus 0.4 dBm as indicated by the front panel meter.

5. Replace IC-1 and replace head connectors.

5.7.5 150 HERTZ SECONDARY CUE LEVEL SET: The Secondary (auxiliary) cue level is set by R13 as follows:

1. Temporarily connect the cue playback head to the calibrated playback amplifier.

2. Install a cartridge and start the recording process.

3. While holding the front panel push-switch, adjust R13 for an output of plus 6.1 dBm as indicated by an external meter connected to the amplifier 600 ohm load.

4. Replace head connectors.

## 5.8 RP-3 AND RP-4 RECORDING AMPLIFIERS

5.8.1 GENERAL: Two interchangeable Recording Amplifiers are available for the SMC Record Centers. The Model RP-3 has approximately 20 dB more gain than the RP-4 and is supplied where extreme input bridging isolation is necessary.

5.8.2 RP-3 ADJUSTMENTS: Adjustments for the RP-3 are as follows:

1. Playback amplifier(s) must first be adjusted with a Standard Alignment Tape as described in Sections 5.2.1 and 5.2.2.
2. Record a 12 kHz tone at an input level which will produce an output of -15 VU. Adjust the RECORD HEAD azimuth for peak playback output.
3. Make a frequency run recording at -15 VU output while maintaining constant signal generator output. Adjust R3 (See Figure 5-7), for mono or stereo left, for a frequency run $\pm$ 2 dB from 50 Hz to 15 kHz. Make the same adjustment with R19 for stereo right channel.

Meter Calibration: Before making this adjustment, make certain the Program Amplifier gain is calibrated as described in Section 5.2.1. Proceed as follows:

1. With the panel meter(s) set in the Playback position, record a 400 Hz signal at a level which will produce 0 VU output.
2. Continue recording with panel meter(s) set in the Record position. Adjust R8 (Figure 5-7) for mono or stereo left, until the meter reads 0 VU. Make the same adjustment with R24 for stereo right channel.

5.8.3 RP-4 ADJUSTMENTS: Adjustments for the RP-4 Recording Amplifier are idential to the above except Refer to Figure 5-8 for the following controls:

R6 Mono (left stereo) high frequency adjust
R8 Mono (Left stereo) meter adjust
R19 Right stereo high frequency adjust
R21 Right stereo meter adjust

NOTE: The RP-4 is normally supplied with 790 and 792 Recorders.

## 5.9 MISCELLANEOUS

5.9.1 CONNECTOR SO-4: Connector SO-4 is used on all units, and provides circuits between the Tape Transport mechanism and the main assembly. Connections are as follow:

| | | |
|---|---|---|
| Terminal | 1: | 5.1 volts dc, minus |
| | 2: | 5.1 volts dc, plus |
| | 3: | 117 volts AC |
| | 4: | 117 volts AC |
| | 5: | Chassis ground |
| | 6: | Not used |

5.9.2 PARTS LOCATION: Refer to Figures 5-10, 5-11 and 5-12 for the location of all Printed Circuit Boards, Head Connectors and Head Assembly details.

5.9.3 CONNECTOR SO-3: Connector SO-3 is used on all Record Centers, and provides circuits between the front panel and main chassis assemblies. Connections are as follow:

Terminal 1: 5 vdc, plus, for Switches
2: Not used
3: Ground for Switch PC Board
4: Start Switch output
5: Stop Switch output
6: Start Lamp
7: Stop Lamp
8: Not Used
9: 5 vdc, plus, for Lamps
10: Record Set Switch output
11: Aux Tone Switch output
12: Record Set Lamp
13: Aux Lamp
14: Not used
15: Not used
16: Not used
17: Not used
18: Peak Indicator, 5 vdc
19: Peak Indicator, to Record Amplifier
20: Not used
21: To Left Gain Control
22: Left Ground
23: From Left Gain
24: To Right Gain Control
25: Right Ground
26: From Left Gain
27: Not used
28: Not used
29: Left Channel Meter, High
30: Left Channel Meter, Low
31: Right Channel Meter, High
32: Right Channel Meter, Low
33: Bias Meter, Left
34: Bias Meter, Right
35: Record Level, Left
36: Record Level, Right
37: Ground, Meter Switch

5.9.4. CONNECTOR SO-3, PLAYBACK UNITS: On Playback units a nine pin connector is used for SO-3. Connections are identical to the first nine terminals described above.

# LC-1 LOGIC CONTROL BOARD

START-STOP LOGIC

| IC | 3A | | | 2A | | | | 2B | | | | 3B | | | 3C | | | CIRCUIT STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIN | 2 | 3 | 1 | 9 | 10 | 11 | 8 | 1 | 2 | 13 | 12 | 8 | 9 | 10 | 11 | 12 | 13 | |
| LOGIC | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | STOPPED |
| | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | REMOTE START |
| | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | PANEL SWITCH START |
| | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | CUE PROTECT TIME |
| | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | RUNNING |
| | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | CUE SIGNAL STOP |
| | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | MANUAL STOP |
| | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | RETURNS TO #1 CONDITION |

RECORD SET-RELEASE LOGIC

| IC | 1A | | | 1B | | | 2C | | | | 1C | | | 3D | | | 1D | | | CIRCUIT STATUS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIN | 9 | 10 | 8 | 4 | 5 | 6 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 5 | 6 | 4 | 12 | 13 | 11 | |
| LOGIC | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | NOT SET |
| | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | PRESS SET SWITCH |
| | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | SET |
| | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | RECORDING |
| | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | CUE SIGNAL |
| | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | RETURN TO #1 COND. |

Figure 5-9
LC-1 Board (Logic Diagram)

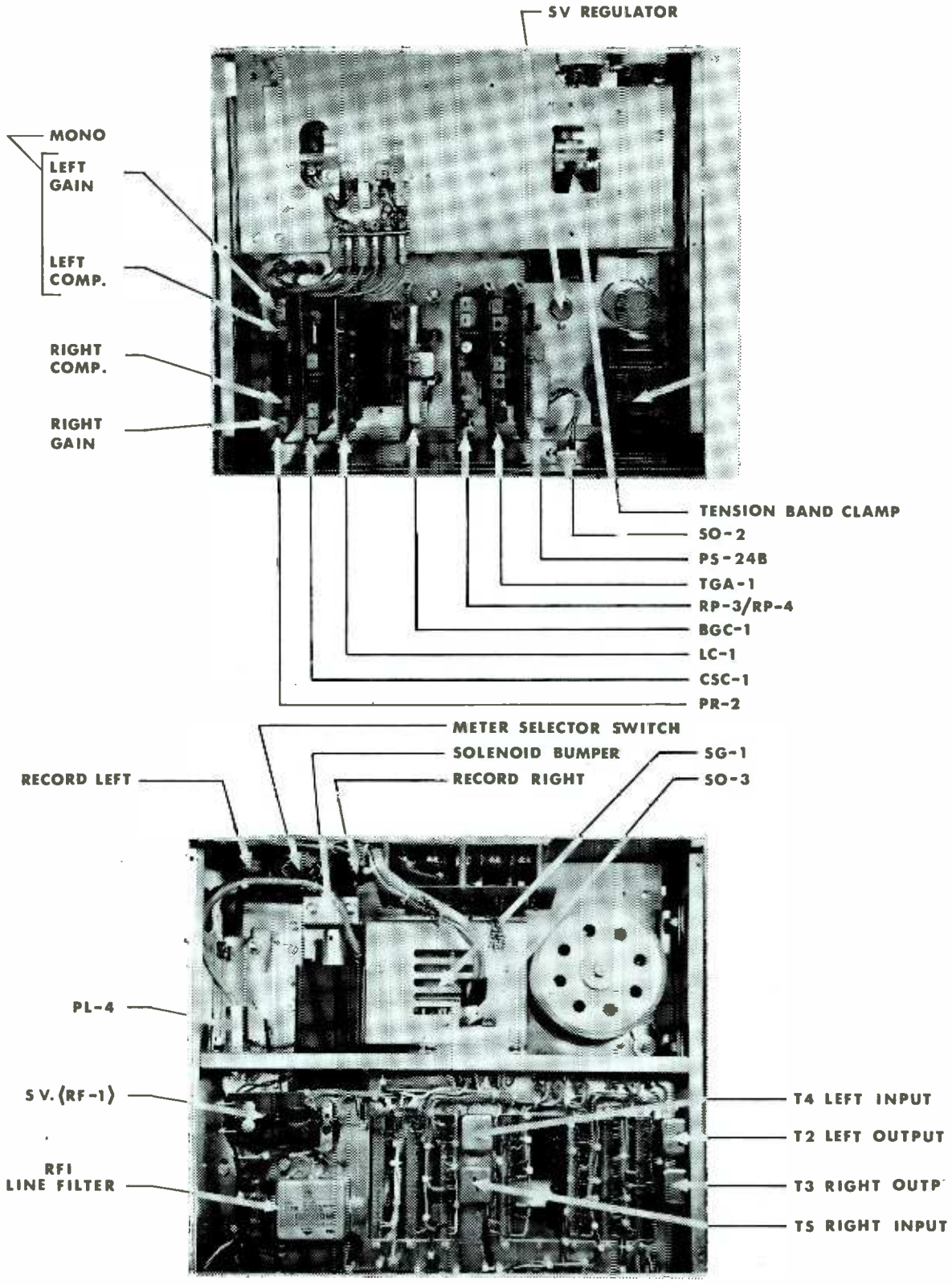



Figure 5-10
790-792 Record Center
Top & Bottom Assembled Views

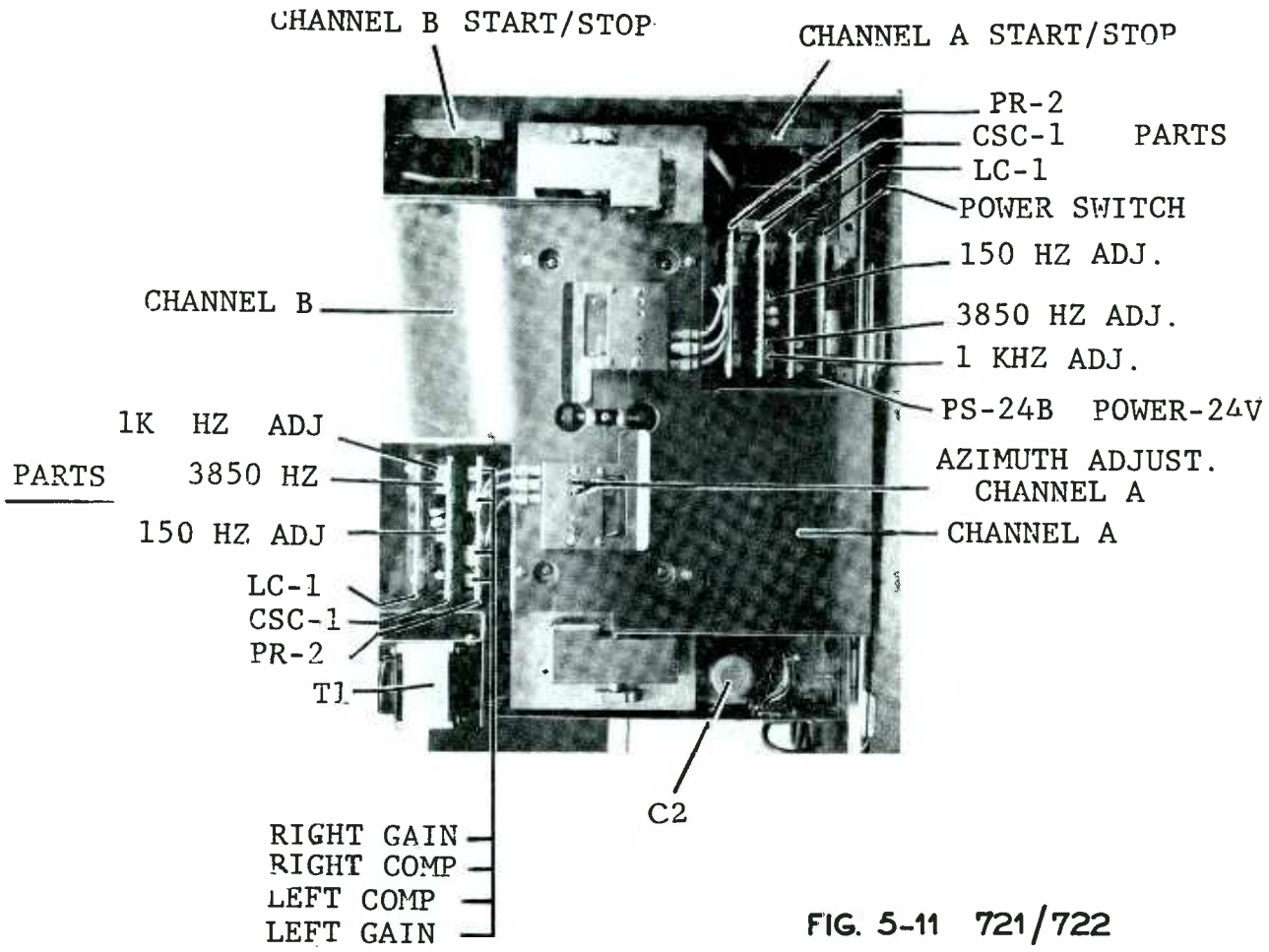
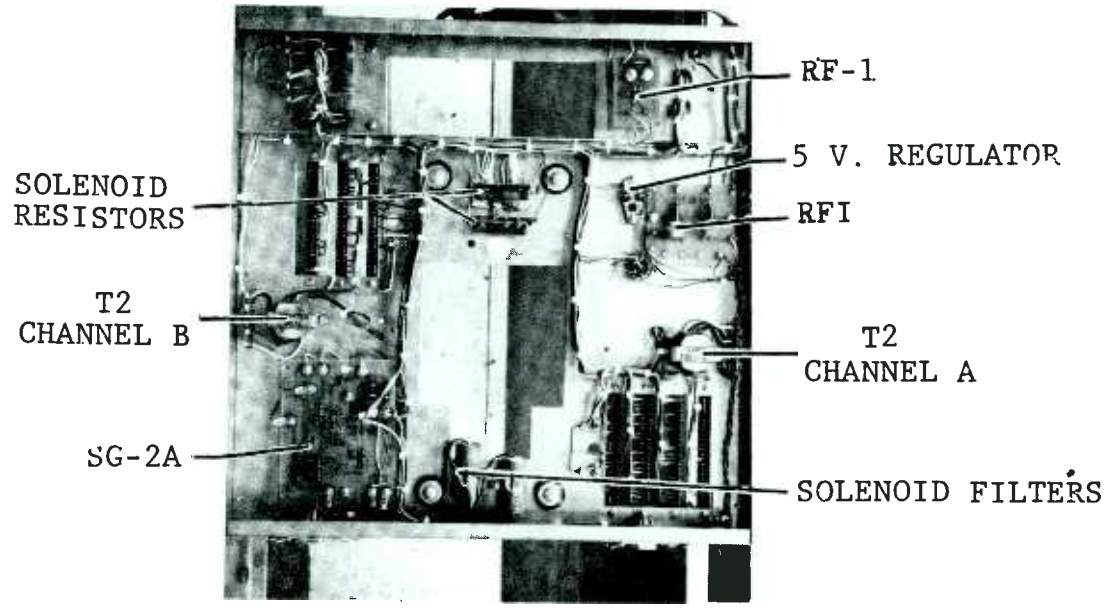



FIG. 5-11 721/722



# SECTION 6

# MECHANICAL

MECHANICAL ADJUSTMENT AND MAINTENANCE

OF 700 SERIES TAPE DECKS

## 6.1 MECHANICAL ADJUSTMENTS

The majority of mechanical adjustments that may be required will concern themselves with the tape deck mechanism.

Refer to Figure 6-1 for the model 705A transport or Figure 6-2 for the dual-play deck, model 725A, for all references in the following information.

## 6.2 SOLENOID OPERATOR

The solenoid unit is a precision device and its parts should be handled with care to prevent damage.

The plunger, and the bore of the solenoid coil must not be dented or bent. When handling these pieces, keep free of dirt, etc. and do not oil plunger.

### 6.2.1 SOLENOID DISASSEMBLY

To remove the plunger from the coil, loosen the set screws in the outer end of the plunger to release the tension band clamp segments and pull out the tension band. Remove the screws holding the idler roller assembly and pull the plunger straight back.

Re-assemble in the reverse order making certain the idler roller assembly is square with the edge of the deck. This is to insure the tension band pulling in a straight line.

To remove the entire solenoid unit, unsolder its leads from the power supply terminals, and remove the four screws holding the solenoid to the deck plate.

When re-assembling, be certain the solenoid is square with the deck edge before tightening mounting screws.

The nylon screw at the rear of the solenoid is adjusted one turn clockwise from the position that the plunger bottoms out in the coil.

## 6.3 PINCH ROLLER ADJUSTMENTS

The purpose of the pinch (pressure) roller on a tape deck is to hold the tape against the rotating capstan shaft with sufficient pressure to pull the tape. Pressure alone does not guarantee satisfactory tape pulling. The surface of the capstan shaft if too smooth will reduce the pulling power, particularly if the shaft has become coated with the lubricant used on cartridge tape. Some of these lubricants cannot be removed with typical head cleaning compounds.

Before making any pressure roller adjustments, the capstan should be thoroughly cleaned of tape lubricants. Use a fine abrasive such as "crocus cloth" held lightly against the revolving shaft. Follow this with head cleaning compound and wipe dry.

### 6.3.1 NORMAL ROLLER CONDITIONS

Properly adjusted, the new pinch roller will touch the capstan shaft first at its bottom edge as it swings into a position parallel with the capstan. A new roller will be indented approximately 0.030 inches at point where it contacts the shaft.

As the pinch roller ages with time and use, its hardness factor increases and the indentation will become less. This hardened roller may still pull tape, but its reduced ability to flex off dirt and oxide particles will contribute to a greater wow and flutter factor.

### 6.3.2 SETTING ROLLER PRESSURE

The pressure of the pinch roller is adjusted by moving the tension band in or out of the clamp on the cross shaft cam. Refer to Figure 6.1 for these parts.

The cam is located on the end of the cross shaft opposite the capstan end. A small clamp bar is attached to the cam with two screws and this clamp locks the tension band to the cam. By releasing the clamp slightly, the tension band can be pulled forward to increase pressure roller tension, and sliding the band toward the back will reduce pressure.

For the initial adjustment, loosen the clamp, and while pulling on the tension band, rotate the cam until the edge of the pinch roller is just flush with the top of the cartridge plate. Tighten the clamp.

### 6.3.3 PINCH ROLLER REPLACEMENT

To replace the pinch roller, first remove the snap ring on top of the roller shaft, then lift off the nylon washer and the old roller. Clean the shaft thoroughly with solvent and, if the shaft shows any trace of copper-colored deposits, use crocus cloth to polish.

Oil the shaft with a drop of non-gumming lubricant. Install the new roller with the bearing projection down. Put top nylon washer and snap ring in place. Test for free rolling action with no evidence of binding. Move roller up and down on its shaft to seat the nylon washers.

Pinch rollers should be replaced when they have become hard, grooved, or cupped from excessive use. Also those rollers that do not spin freely on the shaft due to excessive cleaning fluid removing the lubrication in the bearing.

## 6.4 CROSS SHAFT ADJUSTMENTS

The cross shaft translates the linear motion of the solenoid to the rotary motion necessary to bring the pinch roller in contact with the capstan. The position of this shaft in relation to the capstan is essential to correct operation.

While this shaft rarely requires adjustment, it should be checked at the time a pinch roller is replaced. Test the shaft for end play by grasping the pinch roller and seeing if there is any "play" along the axis of the cross shaft.

Being field adjustable, excessive end play can be eliminated by slightly loosening one of the end bearing blocks and lightly tapping it toward the shaft. Do not over tighten to the extent that the cross shaft return spring will not freely return it to its rest position.

If the cross shaft is to be removed for any reason, take the bearing block at the solenoid end off, disconnect the tension band and lift out.

Correctly adjusted, the pinch roller shaft will be directly in line with the capstan shaft and spaced 0.503 inches (center to center) from a standard 0.238 inch diameter capstan. This spacing is equal to 0.290 inches between facing shafts.

## 6.5 TAPE HEAD ADJUSTMENTS

Each of the following head adjustments is vitally important to optimum operation.

a. Location of head to capstan.
b. Penetration of head into cartridge.
c. Height of pole faces above deck surface.
d. Zenith, or head face to deck relation.
e. Azimuth, or pole gap to deck relation.

The first three adjustments can be made by reference to Figure 6-7

The head assembly (HB-4) can be accurately located in relation to the capstan by using a standard cartridge such as Fidelipac.

a. Place the cartridge in the machine until it touches the capstan shaft in the center of the notch in the bottom of the cartridge, then pull the cartridge back 1/16 inch.

b. Hold the cartridge in position (a) and adjust head assembly until it touches the front edge of the cartridge and the tape guides have equal clearance in the cartridge windows.

Properly adjusted head assembly will allow the pinch roller to operate through the cartridge keyhole and when the tape is playing, the cartridge should have freedom to be moved in and out or right and left by about 1/32 inch. In no case should the cartridge be held by the machine without this freedom.

### 6.5.1 ZENITH ADJUSTMENT

This important head position should be established before setting track height or azimuth. With a head gage or small square adjust the small cylinder nuts atop the rubber springs to bring the face of the head square with the deck. Note that this adjusting will change the track height setting and azimuth. Combine observations of track height and pole gap (azimuth) as you adjust head zenith.

### 6.5.2 TRACK HEIGHT

Since the tape is held at a fixed location by the tape guides on the head assembly, it is very important to adjust the heads so that their pole tracks are uniformly related to the edges of the tape. In stereo, where the tracks are narrow, an error of 0.010 inches can result in about 2 DB loss of output. Be certain that record head and play head are identical in this track height setting.

NOTE: The Zenith adjustment is "factory set" with the HB-10 head assembly, and also the track height.

### 6.5.3 AZIMUTH ADJUSTMENT

This adjustment is to align the head pole gap at exact right angle to the path of tape travel. The side of the head should be square with the deck before using an alignment tape. Do this by loosening the azimuth lock screw (with 0.050 Allen Key) and turning the azimuth screw. Recheck zenith and track height before proceeding. On the HB-10 Assembly, (see Figure 6.8) adjust allen screws alternately to set azimuth.

Use a standard 10 - 12 KHz alignment tape and observe the output meter while turning the azimuth adjust screw. The peak output reading should be obtained within 1 turn of this screw if the head was mechanically azimuthed as described above. It is possible to observe "false" azimuth peaks on either side of the true azimuth. These will be less pronounced than the true one.

After aligning the play head, tighten the lock screw enough to hold the setting but not reduce the peak reading. Proceed to make a 10 KHz recording at -10 DBM and adjust the record head azimuth for peak output from the play head.

## 6.6 CAPSTAN MOTOR

The capstan motor is a hystersis synchronous outside rotor design. The rotor is mounted with precision, sealed ball bearings. No lubrication is required. The running speed at 60 Hz is 600 RPM and the shaft is ground to provide tape speed of 7.5 IPS. An AC capacitor of the size specified on the motor name plate runs in series with one motor winding.

The motor is mounted to the main deck with four bolts and is not adjustable. When removing or installing motors, be extremely careful not to bump either the shaft or the rotor as this will ruin performance. Use only the correct length screws to mount the motor as too long screws will cut into the motor windings.

## 6.7 LUBRICATION & CLEANING

Lubrication is required only at the ball on each end of the cross shaft, the cross shaft spring, and the pinch roller shaft. Use a light, non-gumming oil one drop at each point approximately each 3 months use. Keep oil from the rubber pinch roller.

Use only approved cleaners on heads, capstan and pinch roller. Be particularly careful that the cleaner does not attack the pinch roller. Keep cleaner from running into motor and pinch roller bearings. Always wipe part dry rather than allowing cleaner to evaporate.

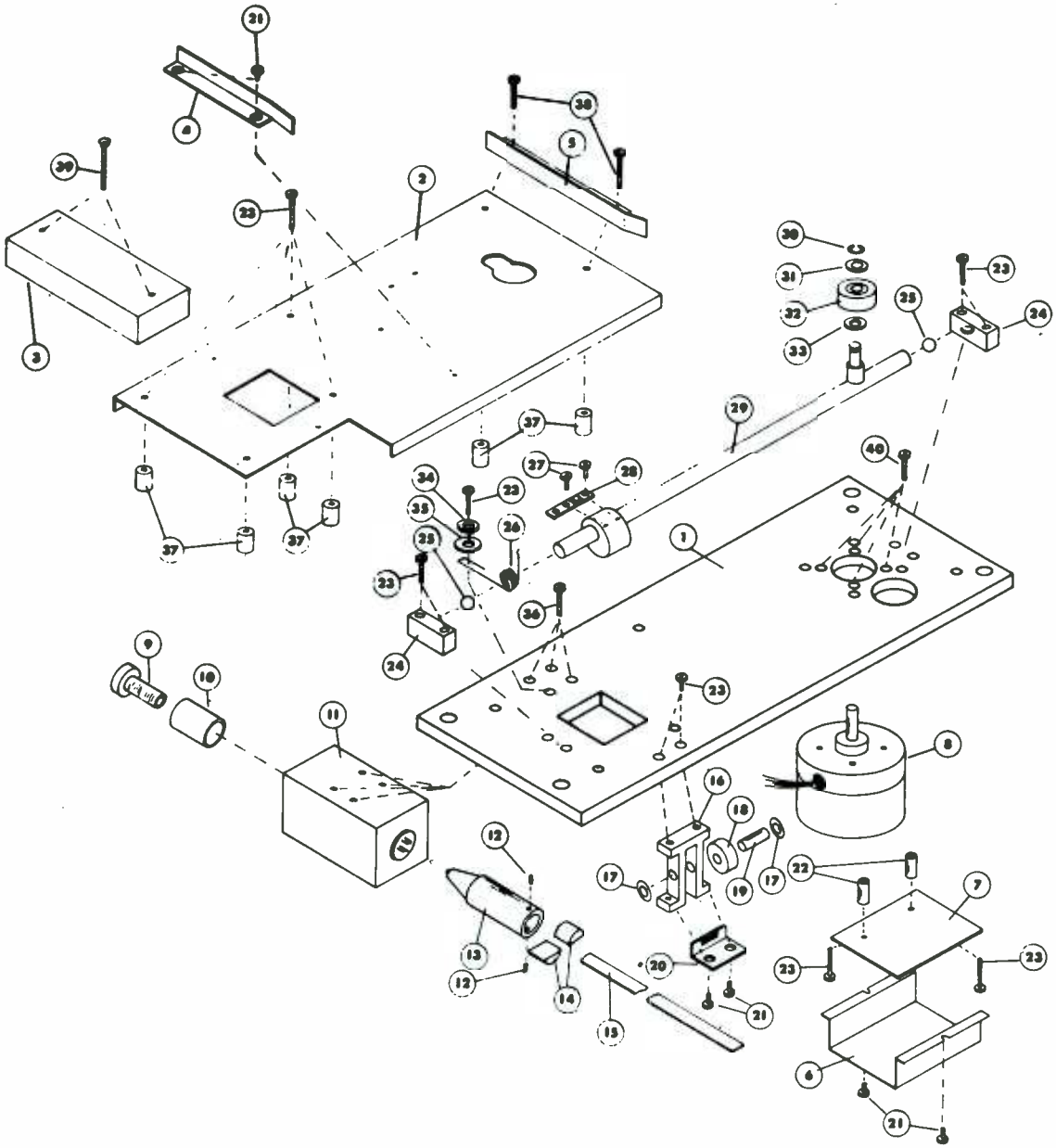


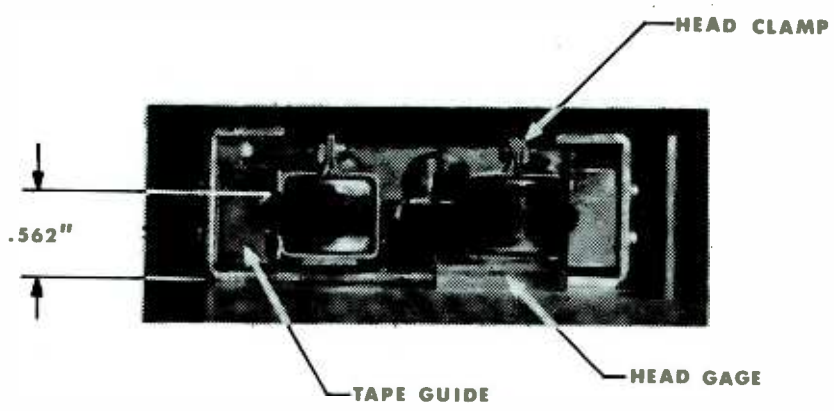
Figure 6-1
Exploded View - Model 705 Deck

DECK ASSEMBLY, 710/712/790/792 TAPE MACHINES
REFERENCE TO ILLUSTRATION

| ITEM NO. | QTY | PART NO. | DESCRIPTION |
|---|---|---|---|
| 1 | 1 | 020-0006-001 | Deck Plate |
| 2 | 1 | 020-0009-001 | Cartridge Plate |
| 3 | 1 | 040-0291-001 | Cover, Mechanism |
| 4 | 1 | 030-0211-001 | Cartridge Guide, Left |
| 5 | 1 | 030-0210-001 | Cartridge Guide, Right |
| 6 | 1 | 040-0294-001 | Cover, Power Supply |
| 7 | 1 | 155-0006-001 | SG-1 Printed Circuit Board |
| 8 | 1 | 775-0010-000 | Capstan Motor, SA-2, 60Hz |
| 9 | 1 | See Note 1 | Butt Screw |
| 10 | 1 | See Note 1 | Butt Piece |
| 11 | 1 | See Note 1 | Solenoid |
| 12 | 2 | See Note 1 | #6-32 x 1/4" Set Screw |
| 13 | 1 | See Note 1 | Solenoid Plunger |
| 14 | 2 | See Note 1 | Locking Plate, Lower |
| 15 | 1 | 040-0295-001 | Deck Drive Band |
| 16 | 1 | 040-0015-001 | Idler Bracket |
| 17 | 2 | See Note 2 | 1/4" PAL nut |
| 18 | 1 | 040-0014-001 | Idler Wheel |
| 19 | 1 | 040-0026-001 | Idler Shaft |
| 20 | 1 | 040-0018-001 | Idler Bracket |
| 21 | 4 | See Note 2 | #8-32 x 1/4" Pan Head Slotted Screw |
| 22 | 2 | 040-0460-002 | Spacer, #8, 1/4" dia., 3/8" long |
| 23 | 11 | See Note 2 | #8-32 x 3/4" Pan Head Slotted Screw |
| 24 | 2 | 040-0420-001 | Cross Shaft Bearing Block |
| 25 | 2 | 837-0002-000 | Steel Ball, 5/16" diameter |
| 26 | 1 | 040-0326-001 | Cross Shaft Return Spring |
| 27 | 2 | See Note 2 | #6-32 x 1/4" Pan Head Slotted Screw |
| 28 | 1 | 040-0269-001 | Locking Plate, Upper |
| 29 | 1 | 130-0449-001 | Cross Shaft Assembly |
| 30 | 1 | 837-0001-000 | Retainer, Pinch Roller, Tru-Arc X5133-18 |
| 31 | 1 | 812-0001-000 | Washer, Nylon, .010 Thick |
| 32 | 1 | 762-0004-000 | Pinch Roller |
| 33 | 1 | 812-0002-000 | Washer, Nylon, .015 Thick |
| 34 | 1 | See Note 2 | #10 x 1/2" Washer |
| 35 | 1 | See Note 2 | #10 x 3/4" Washer |
| 36 | 3 | See Note 2 | #8-32 x 1/2" Pan Head Slotted Screw |
| 37 | 6 | 040-0227-006 | Spacer, #10, 9/16" Long, 1/2" Diameter |
| 38 | 2 | See Note 2 | #8-32 x 1" Pan Head Slotted Screw |
| 39 | 2 | See Note 2 | #8-32 x 1 3/16" Pan Head Slotted Screw |
| 40 | 4 | See Note 2 | #10-32 x 1/2" Pan Head Slotted Screw |

NOTE 1 -- Items 9 thru 14 are part of the Solenoid Assembly and are not available separately. The assembled and tested Solenoid carries part no. 130-0100-001.

NOTE 2 -- Hardware items listed here are common, locally available items. If they must be ordered, please supply complete description shown plus item numer.



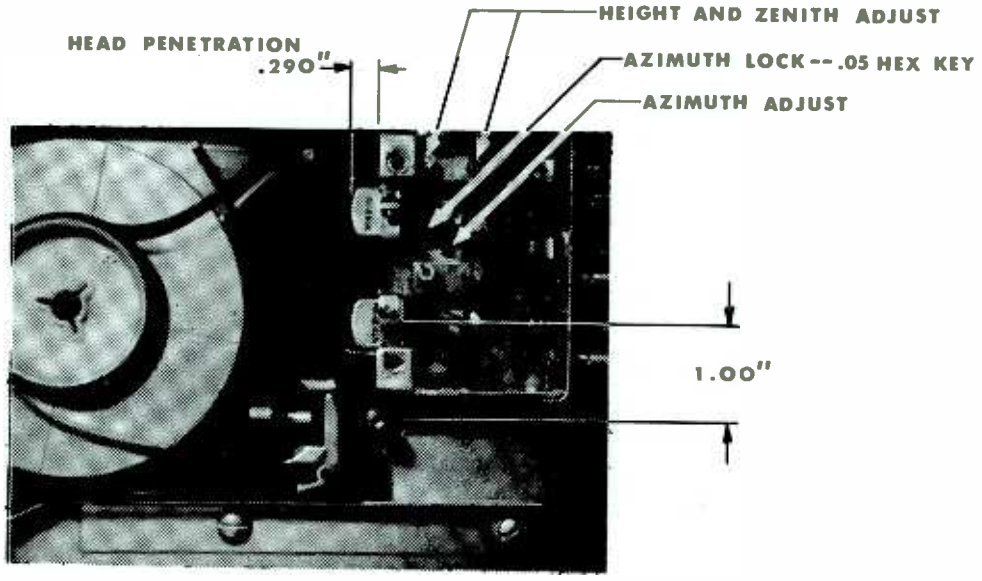
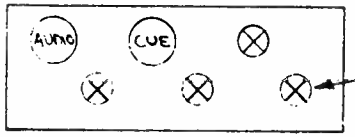




Figure 6-7
Head Adjustment Information

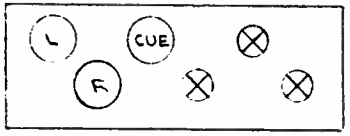
130-0144-001/004

ASSY REAR VIEW
-001 VERSION -- MONO PLAY ONLY
— TOP —




INDICATES UNUSED POSITION.

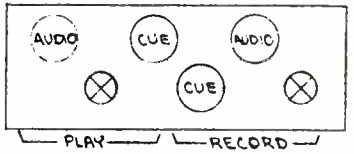
ASSY REAR VIEW
-002 VERSION -- STEREO PLAY ONLY
— TOP —



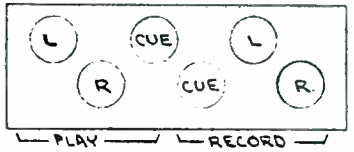

RECORD "RIGHT" — USED ONLY ON RECORD UNITS.
RECORD "LEFT" — RECORD "RIGHT" OMITTED ON
RECORD "CUE" — MONO ASSEMBLIES.

PLAY "CUE" — PLAY "RIGHT" OMITTED ON
PLAY "RIGHT" — MONO ASSEMBLIES
PLAY "LEFT"

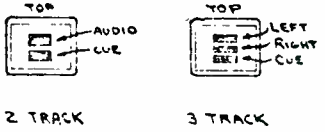
ASSY REAR VIEW
-003 VERSION -- MONO REC/PLAY
— TOP —



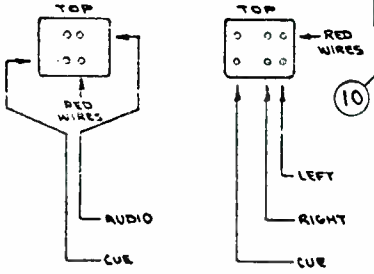

ASSY REAR VIEW
-004 VERSION -- STEREO REC/PLAY
— TOP —

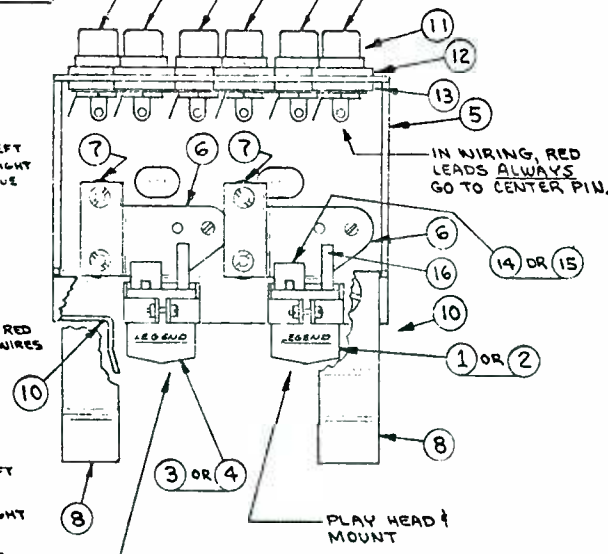



HEAD FRONT VIEWS




HEAD REAR VIEWS




| ITEM | -001 | -002 | -003 | -004 | | PART NUMBER | DESCRIPTION |
|---|---|---|---|---|---|---|---|
| | QTY. FOR VERSION | | | | | | |
| 16 | – | – | – | 2 | | | CONNECTOR ASSY, HEAD, CUE |
| 15 | – | 1 | – | 2 | | | CONNECTOR ASSY, HEAD, STEREO |
| 14 | 1 | – | 2 | – | | | CONNECTOR ASSY, HEAD, MONO |
| 13 | 2 | 3 | 4 | 6 | | | WASHER, FIBER |
| 12 | 2 | 3 | 4 | 6 | | | WASHER, FIBER, W/SHOULDER |
| 11 | 2 | 3 | 4 | 6 | | | PHONO JACK |
| 10 | 2 | 2 | 2 | 2 | | 040-0200-001 | GUIDE, TAPE |
| 9 | 1 | 1 | 1 | 1 | | | COVER, HEAD BOX (NOT SHOWN) |
| 8 | 2 | 2 | 2 | 2 | | | SPRING, CARTRIDGE |
| 7 | 2 | 2 | 4 | 4 | | | SPRING, RUBBER ROCKER-CLAMP |
| 6 | 1 | 1 | 2 | 2 | | 140-0300-001 | ROCKER-CLAMP ASSEMBLY |
| 5 | 1 | 1 | 1 | 1 | | 030-0121-001 | BOX, HEAD |
| 4 | – | – | – | 1 | | | HEAD, STEREO, RECORD - VIKRON 12HS |
| 3 | – | – | 1 | – | | | HEAD, MONO, RECORD - VIKRON 103HS |
| 2 | – | 1 | – | 1 | | | HEAD, STEREO, PLAY - VIKRON 12CC |
| 1 | 1 | – | 1 | – | | | HEAD, MONO PLAY - VIKRON 103CC |

TABULATION

| PART NUMBER | HEAD ASSY DESCRIPTION |
|---|---|
| 130-0144-001 | MONOPHONIC PLAY ONLY |
| 130-0144-002 | STEREOPHONIC PLAY ONLY |
| 130-0144-003 | MONOPHONIC PLAY/RECORD |
| 130-0144-004 | STEREOPHONIC PLAY/RECORD |

Head Assembly - HB-4
Monophonic and Stereophonic Play Only
Monophonic and Stereophonic Play/Record

700 SERIES
300 SERIES

X-592

SCALE: Full
DATE: 1 MAR 73
APPROVED BY
DRAWN BY Shadid

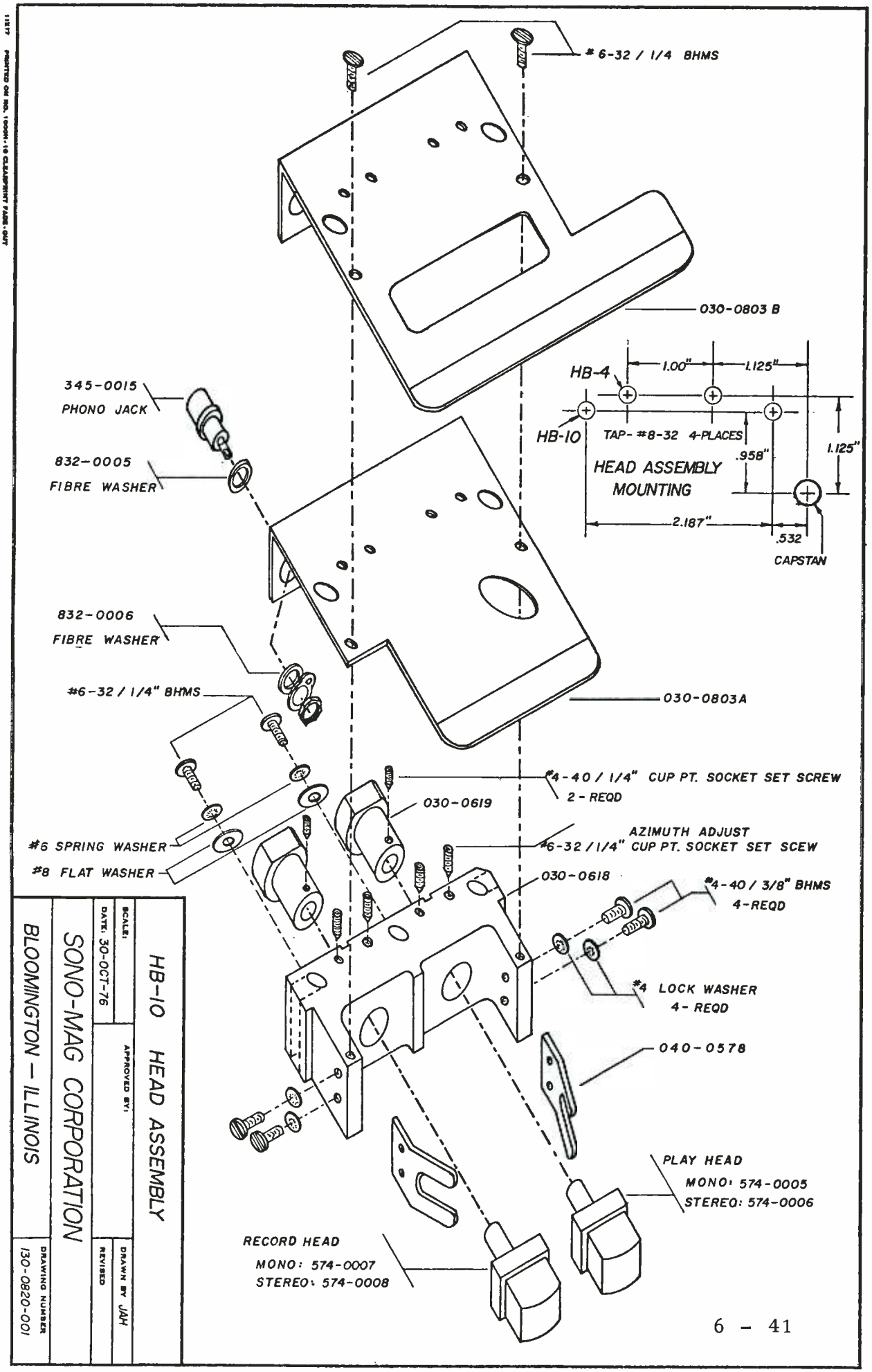
SONO-MAG CORPORATION
Bloomington, Illinois

REV 3 MAY '73
REV 2 AUG 73

DRAWING NUMBER
130-0144-001/004

6-40

DIETZGEN NO. 10007 ACEPROOF "MASTER FORM"




HB-10 HEAD ASSEMBLY

SONO-MAG CORPORATION

BLOOMINGTON — ILLINOIS

SCALE:

DATE: 30-OCT-76

APPROVED BY:

DRAWN BY JAH

REVISED

DRAWING NUMBER 130-0820-001

SECTION 7
DIAGRAMS AND

PARTS LIST

FOR

710/712 - 790/792/ - 721/722

## 7.1.1 PR-2 PROGRAM AMPLIFIER - #150-0146-004

| SYMBOL | DESCRIPTION |
|---|---|
| 1C1, 2C1 | Capacitor, Plastic, .1 uF, 100 v |
| 1C2, 2C2, 1C3, 2C3 | Capacitor, Electro, 250 uF, 3 v |
| 1C4, 2C4 | Capacitor, Plastic, .022 uF, 100 v |
| 1C5, 2C5, 1C6, 2C6, 1C7, 2C7 | Capacitor, Electro, 8 uF, 25 v |
| *1C8, 2C8 | Capacitor, Disc, 50 pF, 1000 v |
| 1C9,2C9 | Capacitor, Disc, 270pF. |
| IC1 | Integrated Circuit, LM-381 |
| 1Q1, 2Q1 | Transistor, 2N3053 |
| 1R1, 2R1 | Resistor, 4700, ¼w, 5% |
| 1R2, 2R2, 1R15, 2R15 | Resistor, 10K variable |
| 1R3, 2R3 | Not used |
| 1R4, 2R4 | Resistor, 15K, ¼w, 5% |
| 1R7, 2R7, 1R8, 2R8 | Resistor, 1500, ¼w, 5% |
| 1R5, 2R5 | Resistor, 1000, ¼w, 5% |
| 1R6, 2R6 | Resistor, 470, ¼w, 5% |
| 1R9, 2R9 | Resistor, 15, ¼w, 5% |
| 1R10, 2R10 | Resistor, 2700, ½w, 5% |
| 1R11, 2R11 | Resistor, 22K, ¼w, 5% |
| 1R12, 2R12 | Resistor, 10K, ¼w, 5% |
| 1R13, 2R13 | Resistor, 56, ½w, 5% |
| 1R14, 2R14 | Resistor, 470, ½w, 5% |
| 1R16, 2R16 | Resistor, 150K, ¼w, 5% |

NOTE: For IEC Compensation:

| | |
|---|---|
| 1R6, 2R6 | 220 ohms |

*Not Used on Later Models.

NOTE: When output transformer is M-975 type, 1R13 and 2R13 are to be 22 OHMs.

## 7.1.2 CSC-1 CUE SENSE CIRCUIT - #150-0145-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1, C11, C12, C25, C28 | Capacitor, disc, .1 uF, 12 v |
| C2, C10, C16 | Capacitor, plastic, .1 uF, 100 v |
| C3 | Capacitor, electrolytic, 8 uF, 50 v |
| C4 | Capacitor, tantalum, 15 uF, 20 v |
| C5, C6, C7, C24 | Capacitor, plastic, .033 uF, 100 v |
| C8 | Capacitor, electrolytic, 2 uF, 25 v |
| C9 | Capacitor, disc, .001, 1000 v |
| C13 | Capacitor, disc, .22 uF, 12 v |
| C14, C15, C17 | Capacitor, tantalum, .47 uF, 35 v |
| C18, C19, C27, C29 | Capacitor, disc, .01 uF, 10 v |
| *C20 | Capacitor, plastic, .022 uF, 200 v |
| C21, C22, C23 | Capacitor, disc, 50 pF, 1000 v |
| C26 | Capacitor, electrolytic, 50 uF, 50 v |
| D1, D2, D3, D4, D5, D6 | Diode, 1N914 |
| IC1 | Integrated Circuit, LM-381 |
| IC2 | Integrated Circuit, 7402A |
| IC3, IC4 | Integrated Circuit, NE567V |
| Q1, Q2, Q3, Q4 | Transistor, 2N2222 |
| R1, R8, R19, R23, R30, R35, R39 | Resistor, 2200, ¼w, 5% |
| R2, R6, R17, R9 | Resistor, 220K, ¼w, 5% |
| R3, R15 | Resistor, 4700, ¼w, 5% |
| R4, R16 | Resistor, 33K, ¼w, 5% |
| R5, R26, R29 | Resistor, 10K, variable |
| R7, R12, R18, R22 | Resistor, 22K, ¼w, 5% |
| R11 | Resistor, 220, ¼w, 5% |
| R13, R34 | Resistor, 1000, ¼w, 5% |
| R14, R32 | Resistor, 100, ¼w, 5% |
| R20, R21, R33, R38 | Not used |
| R24 | Resistor, 27K, ¼w, 5% |
| R25, R28 | Resistor, 15K, ¼w, 5% |
| R27 | Resistor, 33K, ¼w, 5% |
| R31 | Resistor, 82K, ¼w, 5% |
| R36, R10 | Resistor, 10K, ¼w, 5% |
| R37 | Resistor, 15, ¼w, 5% |

*For 8 KHz operation, change C20 to 0.01 mf

## 7.1.3 LC-1 LOGIC CONTROL - #150-0144-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1, C2, C6, C7, C8, C9, C10, C11, C12, C15, C17 | Capacitor, disc, .1 uF, 10 v |
| C5, C14 | Capacitor, disc, .01 uF, 10 v |
| C3 | Capacitor, disc, 470 pF, 1k v |
| C4, C13 | Capacitor, tantalum, 8.2 uF, 6 v 10% |
| C16 | Capacitor, tantalum, 2.2 uF, 20 v |
| D1, D2, D3 | Diode, 1N914 |
| IC1 | Integrated Circuit, 7400 |
| IC2 | Integrated Circuit, 7410 |
| IC3 | Integrated Circuit, 7402 |
| IC4, IC5 | Integrated Circuit, NE555V |
| Q1, Q2, Q3, Q4, Q5, Q6 | Transistor, 2N2222 |
| R1 | Not used |
| R2, R6, R7, R13, R20 R28, R29, R31 | Resistor, 1000, ¼w, 5% |
| R3, R25 | Resistor, 10K, ¼w, 5% |
| R4, R5, R14, R15, R18, R19, R23, R24 | Resistor, 2200, ¼w, 5% |
| R8 | Resistor, 150, ¼w, 5% |
| R9, R11, R21 | Resistor, 15, ¼w, 5% |
| R10, R12, R22 | Resistor, 220, ¼w, 5% |
| R16, R27 | Resistor, 220K, ¼w, 5% |
| R26 | Resistor, 3300, ¼w, 5% |
| R30 | Resistor, 470, ¼w, 5% |

## 7.1.4 PS-24B POWER SUPPLY - #150-0147-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1, C2, C3 | Capacitor, electrolytic, 500 uF, 50 v |
| C4 | Capacitor, .1 uF, 100 v, 10% |
| D1, D2, D3, D4 | Diode, 1N3253 |
| *D5 | Diode, Zener, 1N4746A, 18 v |
| D6 | Diode, Zener, 1N4735A, 6.2 v |
| Q1 | Transistor, 2N1701 |
| R1, R2 | Resistor, 220, ½ w, 5% |
| R3 | Resistor, 15, ¼w, 5% |

*D5 may be 1N4748A (22 v) and D6 deleted

## 7.1.5 BGC-1 BIAS GENERATOR CONTROL - 150-0141-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1 | Capacitor, elect., 250 uF, 25v |
| C2 | Capacitor, paper, .0047 uF, 100v, 10% |
| C3 | Capacitor, paper, .0022 uF, 100v, 10% |
| C4, C6, C8 | Capacitor, paper, .1uf, 100v, 10% |
| C5, C7 | Capacitor, plastic, 470 pf, 600 v, 5% |
| C9 | Capacitor, .033 uf, 100v, 5% |
| C10, C11 | Capacitor, 16-150 variable |
| C12 | Capacitor, disc, 50 pf, 1000v |
| C13, C14, C15 | Capacitor, paper, .01 uf, 100v, 5% |
| C16 | Capacitor, elec., 100 uf, 25v |
| C17 | Capacitor, disc, .1 uf, 12 v |
| C18, C19 | Capacitor, ele t., 300 uf, 3v |
| C20 | Capacitor, mylar, .001, 100v |
| C21 | Capacitor, 47mf. Tantalum, 10v |
| D1, D2, D3, D4, D5, D6 | Diode, 1N914 |
| Q1, Q4, Q7, Q8, Q9, Q10 | Transistor, 2N3053 or 2N2222 |
| Q5 | Transistor, 40319 or 2N2907 |
| Q2, Q3, Q6 | Transistor, 2N3053 |
| R1 | Resistor, 56, ½w, 5% |
| R2, R10, R26 | Resistor, 100K, ¼w, 5% |
| R3 | Resistor, 470, ½w, 5% |
| R4 | Resistor, 4700, ¼w, 5% |
| R6, R7 | Resistor, 100, ½w, 5% |
| R9, R11, R14, R16, R18, R19, R21 | Resistor, 10K, ¼w, 5% |
| R13, R15, R17, R20, R24 | Resistor, 1000, ¼w, 5% |
| R22 | Resistor, 22K, ¼w, 5% |
| R23 | Resistor, 2200, ¼w, 5% |
| R25 | Resistor, 220, ½w, 5% |
| T1 | Transformer, M7064 |
| T2 | Transformer, M7066 |

## 7.1.6 RP-4 RECORD AMPLIFIER -- 150-0149-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1, C13 | Capacitor, elect., 250 uF, 25v |
| C2, C15 | Capacitor, elect., 1 uF, 25v |
| C3, C8, C9, C14, C20, C21 | Capacitor, disc, 270 pF, 1000v |
| C4, C16 | Capacitor, mylar, .1 uF, 100 v |
| C5, C12, C17, C23 | Capacitor, elect., 15 uF, 25v |
| C6, C18 | Capacitor, mylar, .0068 uF, 100v |
| C7, C10, C11, C19, C22, C24 | Capacitor, elect., 4 uF, 25v |
| C25, C26 | Capacitor, disc, .001 uF |
| D1, D2 | Diode, 1N914 |
| IC1 | Integrated circuit, CA3048 |
| Q1, Q2, Q3 | Transistor, 2N2222 |
| R1, R2, R7, R15, R16, R20 | Resistor, 12K, ¼w, 5% |
| R3, R17, R26, R27 | Resistor, 10K, ¼w, 5% |
| R4, R9, R14, R22 | Resistor, 100, ¼w, 5% |
| R5, R18 | Resistor, 4700, ¼w, 5% |
| R6, R8, R19, R21 | Resistor, Trimpot, variable, 10K |
| R12, R13 | Resistor, 2200, ¼w, 5% |
| R24 | Resistor, 15K, ¼w, 5% |
| R25 | Resistor, 220, ¼w, 5% |
| L1, L3 | Inductor, 20 mH, Wecoil 387-20M |
| L2, L4 | Inductor, 10 mH |

NOTE: IEC EQUALIZATION:

Remove Capacitors C25 and C26 (.001 uf)
Change Capacitors C5 and C17 to 2.2 uf tantalum
Change Capacitors C6 and C18 to .01 uf mylar
Change Resistors R3 and R17 to 3900, ½w, 5%
Change Resistors R2 and R16 to 22K, ¼w, 5%
Add Resistor R28, 4700 ohm, ¼w, 5%
Add Resistor R29, 4700 ohm, ¼w, 5%

## 7.1.7 TGA-1 TONE GENERATOR/AMPLIFIER - 150-0143-001

| SYMBOL | DESCRIPTION |
|---|---|
| C1, C17 | Capacitor, elect., 1 uF, 25v |
| C2, C7, C9, C12, C13 | Capacitor, disc, .1 uF, 10v |
| C3 | Capacitor, tant., 3.9 uF, 25v |
| C4 | Capacitor, disc, .01 uF, 10v |
| C5, C8, C14, C16 | Capacitor, plastic, .1 uF, 100v |
| C11 | Capacitor, disc, .47 uF, 3v |
| C15 | Capacitor, plastic, .0022 uF, 100v |
| C18 | Capacitor, elect., 4 uF, 25v |
| C19 | Capacitor, disc, 270 pF, 1000v |
| C20 | Capacitor, plastic, .001 uF, 100v |
| IC1, IC2, IC3 | Integrated circuit, NE555V |
| IC4 | Integrated circuit, ULN2301M |
| D1, D2, D3 | Diode, 1N914 |
| L1 | Inductor, 10 mH, WECOIL 387-20M |
| Q1, Q2, Q3 | Transistor, 2N3053 or 2N2222 |
| R1, R15 | Resistor, 47K, ¼w, 5% |
| R2, R5, R12, R14, R26, R30, R22 | Resistor, 1000, ¼w, 5% |
| R3, R10, R11, R21, R23 | Resistor, 100K, ¼w, 5% |
| R4, R6, R9, R25 | Resistor, 10K, ¼w, 5% |
| R7, R13 | Resistor, 10K, Trimpot |
| R8 | Resistor, 15K, ¼w, 5% |
| R17, R18, R28, R29 | Resistor, 2200, ¼w, 5% |
| R19 | Resistor, 33K, ¼w, 5% |
| R20, R27 | Resistor, 100K, Trimpot |
| R24 | Resistor, 4700, 5%, ¼w |
| R31 | Resistor, 22K, ¼w, 5% |

## 7.2 MAIN CHASSIS ASSEMBLY

### 7.2.1 SG-1A SOLENOID GATE ASSEMBLY - #155-0006-002

| SYSTEM | DESCRIPTION |
|---|---|
| | Circuit board |
| | Socket, IC, 14 Pin DIP |
| C1 | Capacitor, Electro., 30/50 uF, 150v |
| C2 | Capacitor, Oil, 1.5 uF, 220 v (See note below concerning C2) |
| IC1 | Integrated Circuit, MCS-2/H11C1/H11C2 |
| Q1 | Transistor, 2N6240 or S2060D |
| R1, R4 | Resistor, 10K, ½ w, 5% |
| R2 | Resistor, 22K, ¼ w, 5% |
| R3 | Resistor, 2200, ¼ w, 5% |
| R5 | Resistor, 200, 10 w |
| R6 | Resistor, 12, 2w, BWH |

NOTE: On Tape Cartridge machines using 50 Hz capstan motors, C2 becomes a 1.8 uF oil filled capacitor. On some units, this 1.8 uF unit may be mounted off of the SG-1 board.

### 7.2.2 SG-2A DUAL SOLENOID GATE - #155-0024-002

| | |
|---|---|
| IC1, IC2 | Integrated Circuit, H11C1, MCS-2 |
| R1, R2, R7, R8 | Resistor, 10K, ½w, 5% |
| R3, R9 | Resistor, 22K, ¼w, 5% |
| R4, R10 | Resistor, 2200, ¼w, 5% |
| R5, R11 | Resistor, 12, 2 w |
| Q1, Q2 | Transistor, 2N6240 |

### 7.2.3 RF-1 RECTIFIER FILTER

| SYMBOL | DESCRIPTION |
|---|---|
| D1 | Rectifier, Bridge, MDA-920A-6 |
| R1 | Resistor, 10K, ¼w, 5% |

### 7.2.4 CHASSIS MOUNTED PARTS

| | |
|---|---|
| C1 | Capacitor, 5600 uF, 25v |
| F1 | Fuse, 1 amp, 3AG |
| FL1 | RF Line Filter, CORCOM 2K2 or RFI |
| Q1 | Regulator, 5v, LM-309K |
| * T1 | Transformer, Power, M873/A/B |
| T2 | Transformer, Output, M956/M975 |
| T3 | Transformer, Output, M956/M975 |
| T4 | Transformer, Input, Recorders only, M956 |
| T5 | Transformer, Input, Stereo Recorders only, M956 |
| R6, R12 | 200 ohm, 10 w (Part of SG-2) |

*For 705A Transport parts, refer to P.6-40
For magnetic heads, refer to P.6-14

## 7.3 PLAYBACK FRONT PANEL ASSEMBLY

### 7.3.1 HEB-2 SWITCH ASSEMBLY

| SYMBOL | DESCRIPTION |
|---|---|
| SW-1, SW-2 | Switch, Hall-Effect, Micro 201SN1A1 |

### 7.3.2 GENERAL PANEL PARTS

| | |
|---|---|
| SW-1 | Switch, Toggle, Micro 8H1011<br>Lamp, Switch, Micro SW-10569, 5v |

## 7.4 RECORDER FRONT PANEL ASSEMBLY

### 7.4.1 HEB-1 SWITCH ASSEMBLY

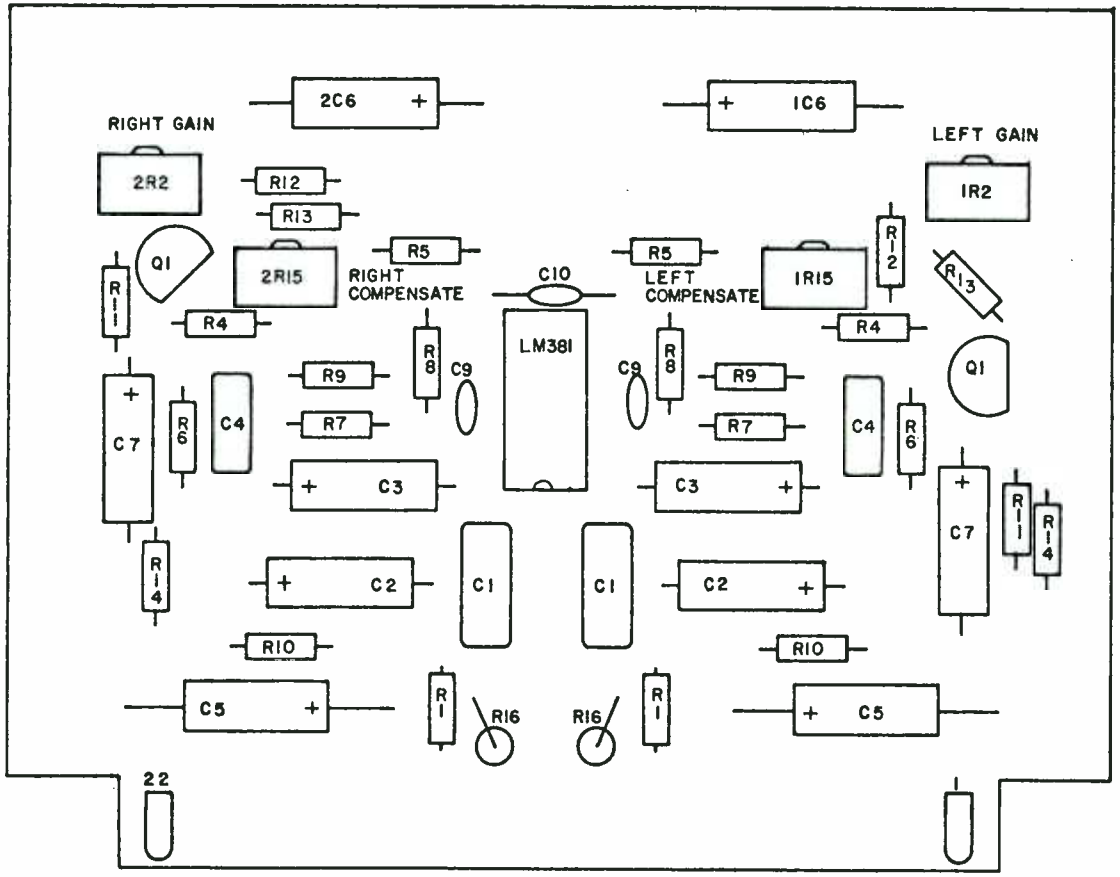
| | |
|---|---|
| SW-1, SW-2, SW-3, SW-4 | Switch, Hall-Effect, Micro 201SN1A1 |

### 7.4.2 GENERAL PANEL PARTS

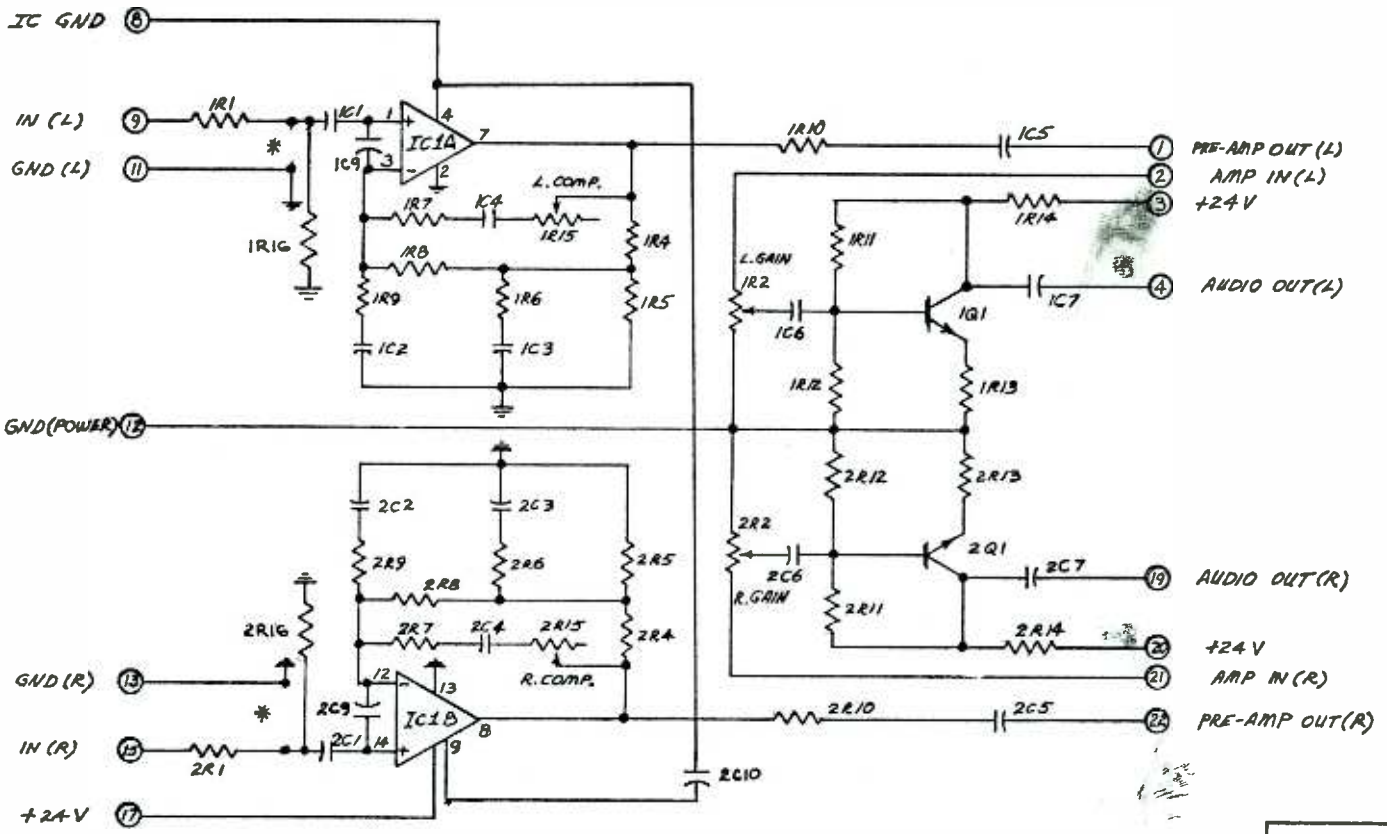
| | |
|---|---|
| SW-1 | Switch, Toggle, Micro 8H1011<br>Lamp, Switch, Micro SW-10569, 5v |
| M1 | Meter, 200 uA |
| M2 | Meter, 200 uA, Stereo only |
| R1 | Resistor, variable, 1000 ohm |
| R2 | Resistor, variable, 1000 ohm Stereo only |
| D1 | Diode, LED, RL209 |
| SW2 | Switch, Rotary 4P3T, 3243J |

### 7.4.3 MR-2 METER RECTIFIER ASSEMBLY

| | |
|---|---|
| C1, C2, C3, C4 | Capacitor, Disc, 470 pF, 1kV |
| D1, D2, D3, D4 | Diode, 1N54A/ 1N295 |
| R1 | Resistor, 2200, ¼w, 5% |




| PROGRAM AMPLIFIER LAYOUT (PR-2) | | |
|---|---|---|
| SCALE: —— | APPROVED BY: | DRAWN BY J.A.H. |
| DATE: 1 MAY 77 | | REVISED |
| SONO-MAG CORPORATION | | |
| BLOOMINGTON - ILLINOIS - USA | | DRAWING NUMBER 030-0175-002 |




* Rvd. May, 77
1C8 & 2C8 Removed
C9 & C10 Added

Layout: 030-0175-001

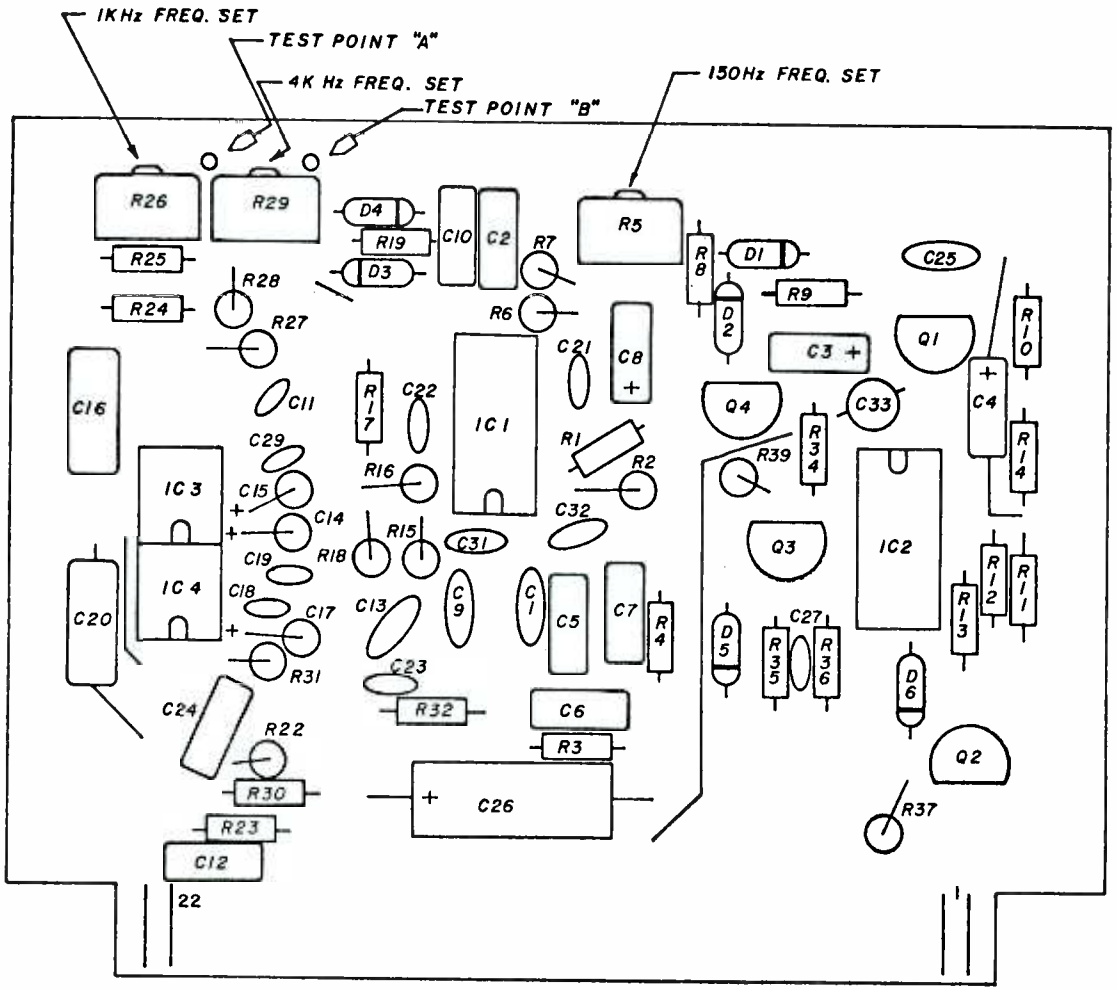
7 - 12

TAPE PRE-AMPLIFIER PR-2

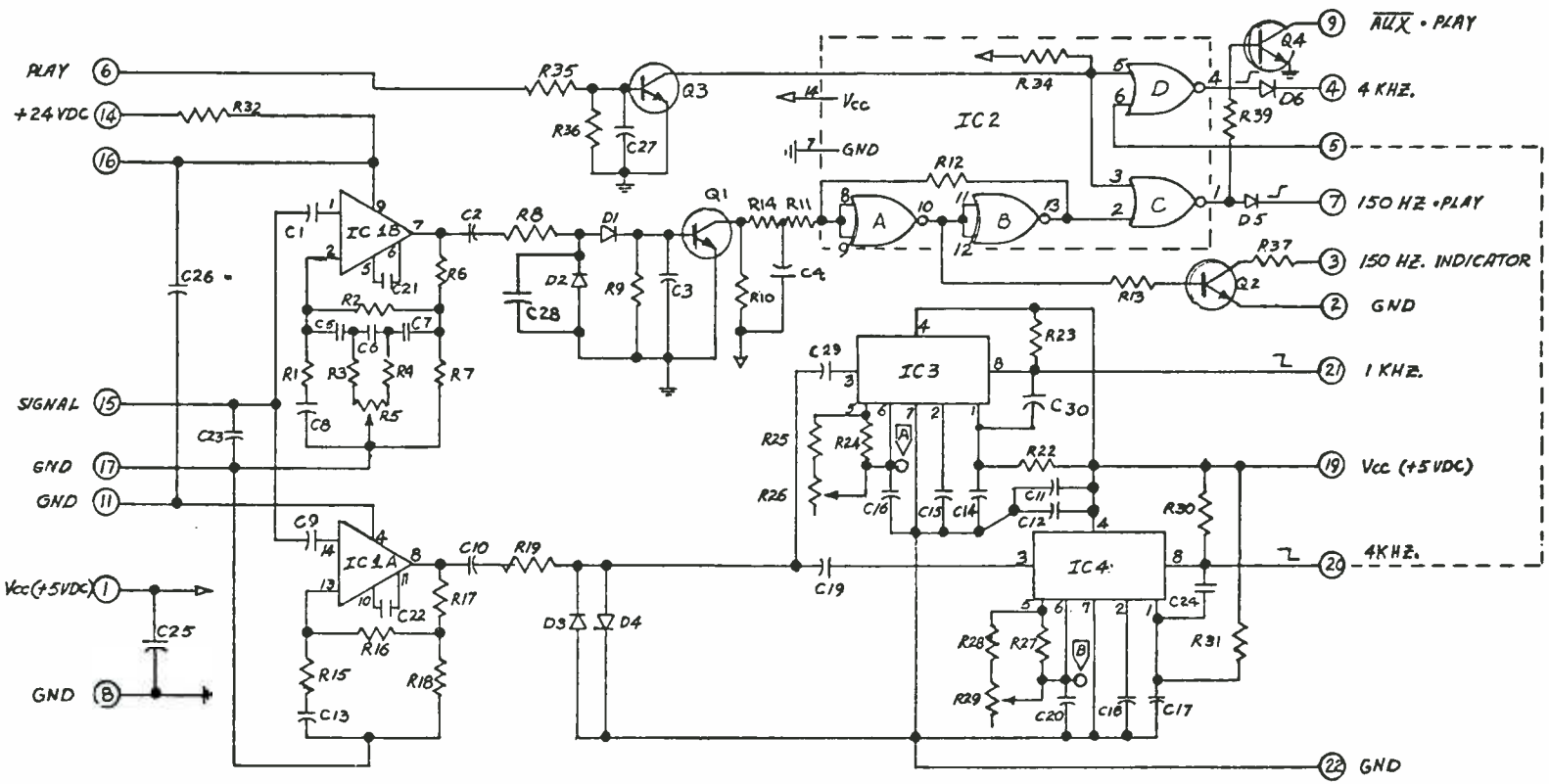
| | | |
|---|---|---|
| SCALE: | APPROVED BY | DRAWN BY TA |
| DATE: 26 JAN 73 | | |

SONO-MAG CORP.
BLOOMINGTON, ILLINOIS

| | |
|---|---|
| 18 Jun 75<br>28 Nov. 77 | DRAWING NUMBER<br>030-0129-002 |



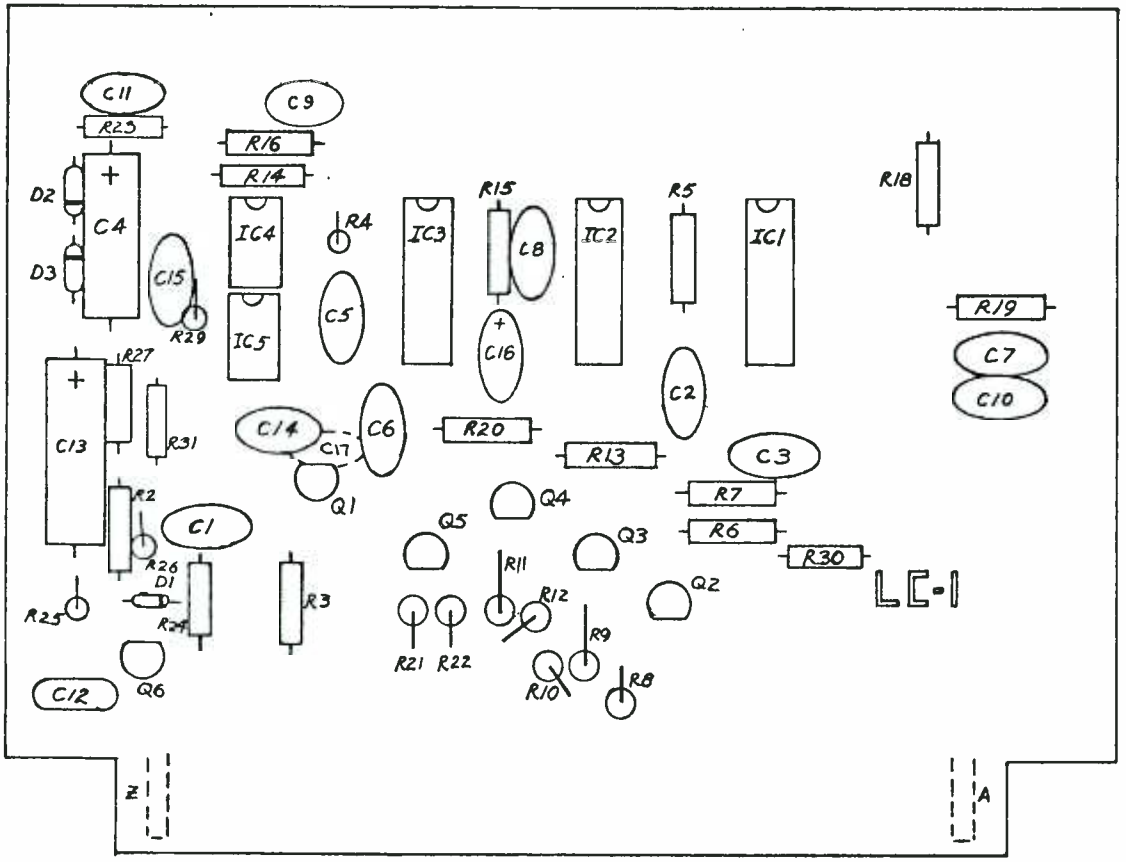

| | | |
|---|---|---|
| CUE SENSOR CONTROL - CSC-1 | | PARTS LAYOUT |
| SCALE: | APPROVED BY: | DRAWN BY JAH |
| DATE: 15 MAY 77 | | REVISED |
| SONO - MAG CORPORATION | | |
| BLOOMINGTON ILLINOIS USA | | DRAWING NUMBER 030-0095-C02 |




Layout: 030-0095-001

DIETZGEN NO. 1086F AGEPROOF "MASTER FORM"

| | | |
|---|---|---|
| CONTROL SENSE CIRCUIT CSC-1 | | |
| SCALE: | APPROVED BY | DRAWN BY TA |
| DATE: 12-7-72 | | |
| SONO-MAG CORP<br>BLOOMINGTON, ILLINOIS | | |
| RVD 28 AUG 73<br>25 APR 75<br>18 JUN 75 | | DRAWING NUMBER<br>030-0102-001 |




7 - 15

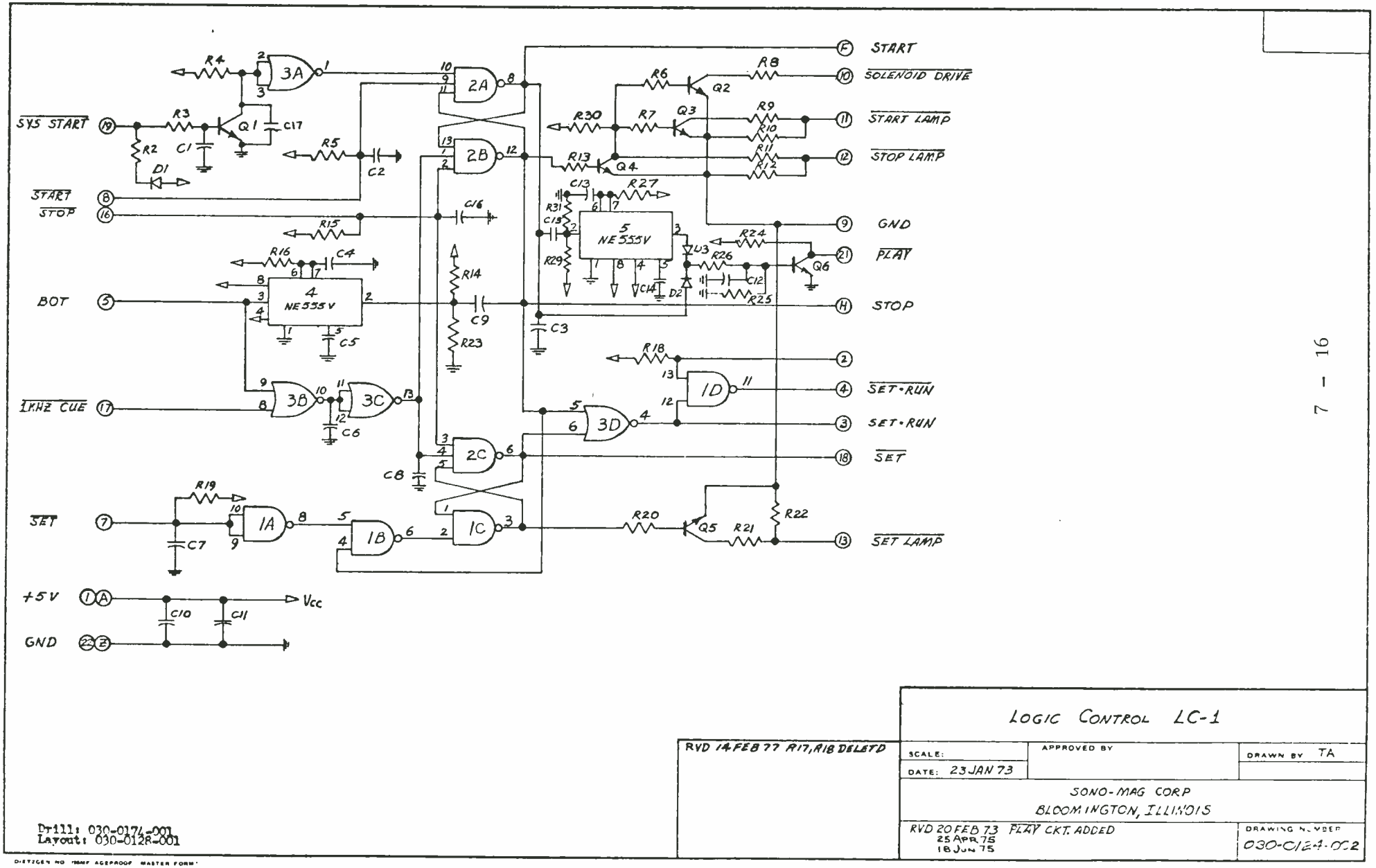
LC-1 LOGIC CONTROL PARTS LAYOUT

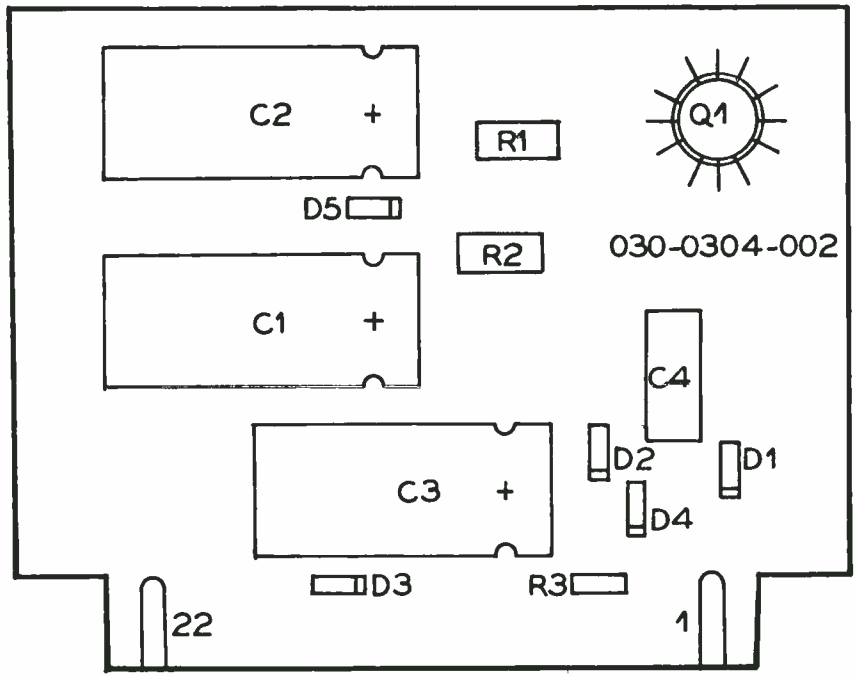
| | | |
|---|---|---|
| SCALE: DOUBLE | APPROVED BY | DRAWN BY TA |
| DATE: 25 JAN 73 | | |

SONO-MAG CORP.
BLOOMINGTON, ILLINOIS

| | |
|---|---|
| RVD 20 FEB 73<br>25 APR 75<br>16 JUN 75<br>18 FEB 77 | DRAWING NUMBER<br>030-0128-002 |

DIETZGEN NO. 11BMF AGEPROOF "MASTER FORM"


SYS START
START
STOP
BOT
1KHZ CUE
SET
+5V
GND
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R29
R30
R31
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C16
C17
D1
D2
LD3
Q1
Q2
Q3
Q4
Q5
Q6
1A
1B
1C
1D
2A
2B
2C
3A
3B
3C
3D
4
5
NE555V
Vcc
START
SOLENOID DRIVE
START LAMP
STOP LAMP
GND
PLAY
STOP
SET•RUN
SET•RUN
SET
SET LAMP
RVD 14 FEB 77 R17, R18 DELETD
LOGIC CONTROL LC-1
SCALE:
DATE: 23 JAN 73
APPROVED BY
DRAWN BY TA
SONO-MAG CORP
BLOOMINGTON, ILLINOIS
RVD 20 FEB 73 PLAY CKT. ADDED
25 APR 75
18 JUN 75
DRAWING NUMBER
030-0124-002
Drill: 030-0174-001
Layout: 030-0128-001

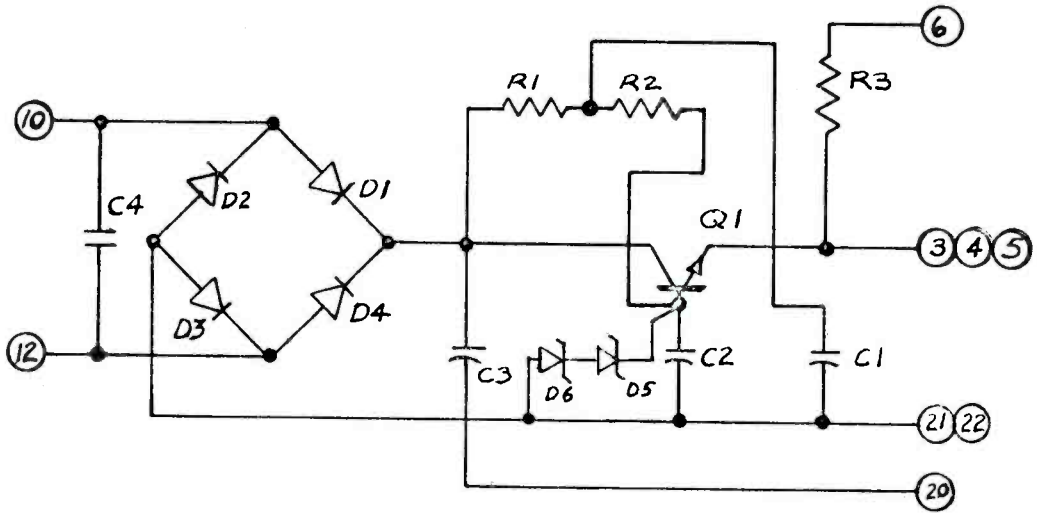



PHYSICAL LAYOUT
PS-24B POWER SUPPLY - PRINTED CIRCUIT BOARD

| | | |
|---|---|---|
| SCALE: FULL | APPROVED BY: | DRAWN BY G. |
| DATE: 11 JAN 78 | | REVISED |

SONO - MAG CORPORATION
BLOOMINGTON, ILLINOIS

DRAWING NUMBER
040-0794-001




7 - 18

POWER SUPPLY — PS-24B

| | | |
|---|---|---|
| SCALE: —— | APPROVED BY | DRAWN BY TA |
| DATE: 29 JAN 73 | | |

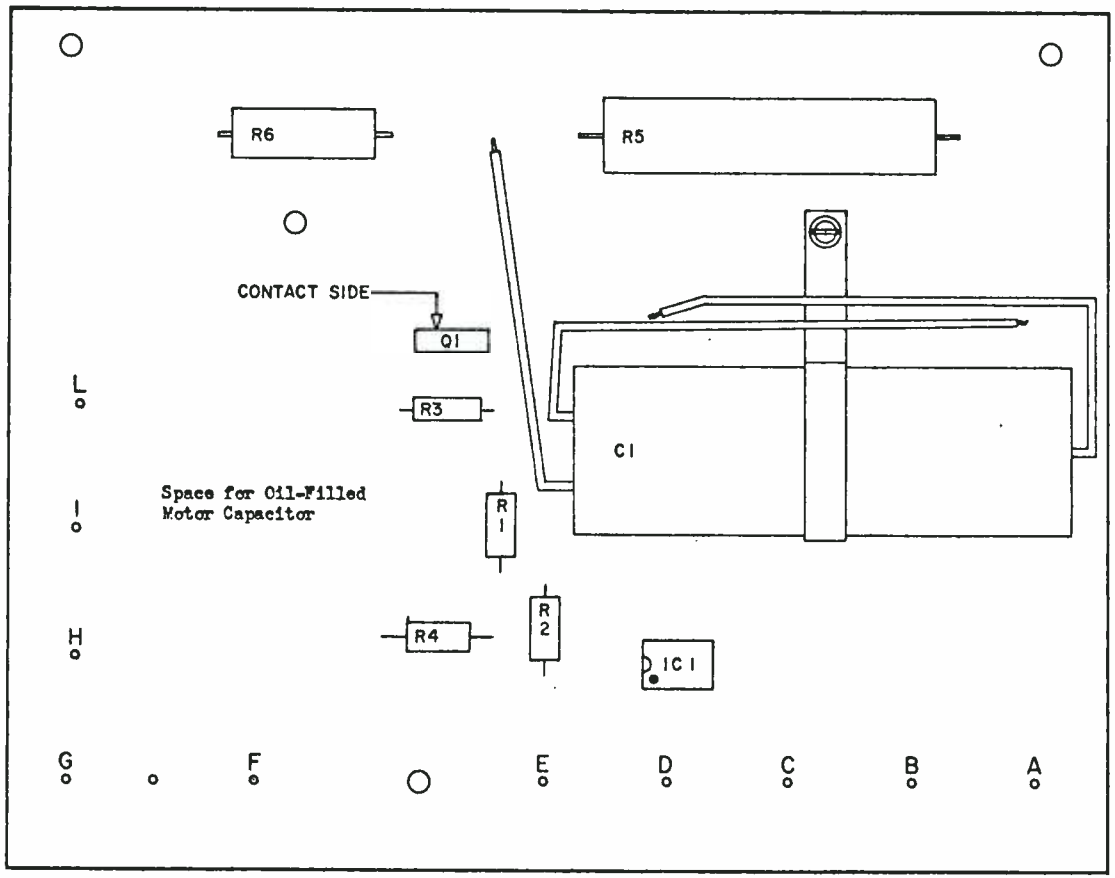
SONO-MAG CORP
BLOOMINGTON, ILLINOIS

Rev 15 Oct 74
29 Oct 74
18 Jun 75

DRAWING NUMBER
040-0273-001

LAYOUT: 030-0678-001

DESIGNED ON SAME AS APPROVED MASTER FORM

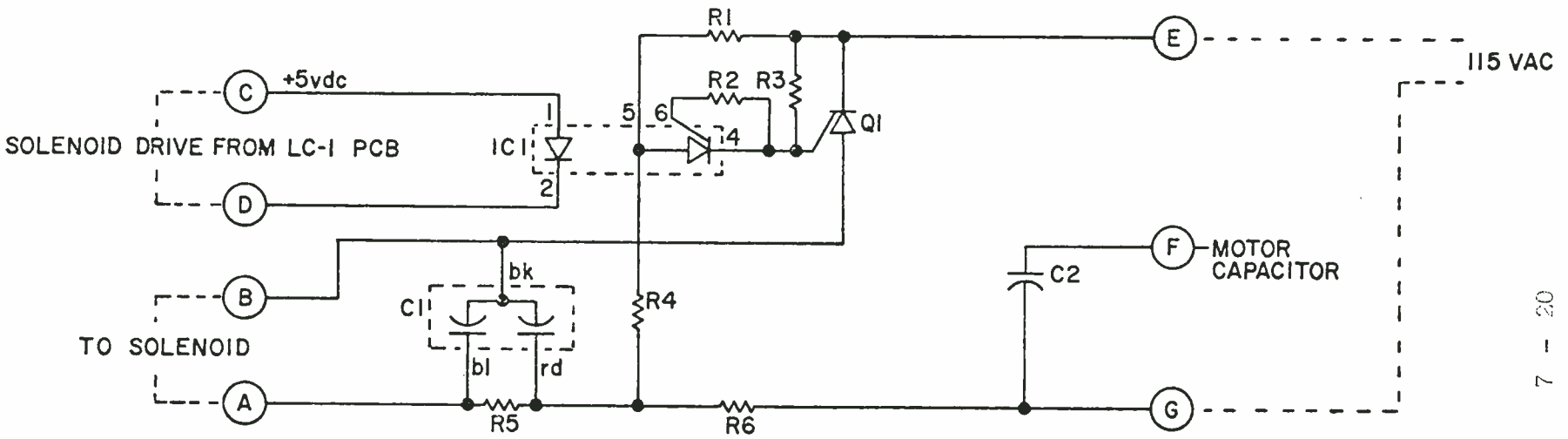


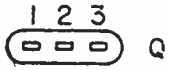

Schematic Diagram 040-0322-002

| | | | |
|---|---|---|---|
| Physical Layout<br>SG-1A Solenoid Gate Circuit Board<br>700 and 350 Series Machines | | | |
| DRAWN BY<br>Shadid | CHECKED BY | APPROVED BY | SCALE<br>---- |
| DATE<br>16 June 1975 | DATE | DATE | REVISED |
| SCNO-MAG CORPORATION<br>Bloomington, Illinois | | | |
| JOB | | | DRAWING NO.<br>030-0161-002 |

VAL PROOF-816 M

040-0322-002




Q1 Details

*Heat Sink*

1 – ANODE
2 – CATHODE (Common with heat sink)
3 – GATE

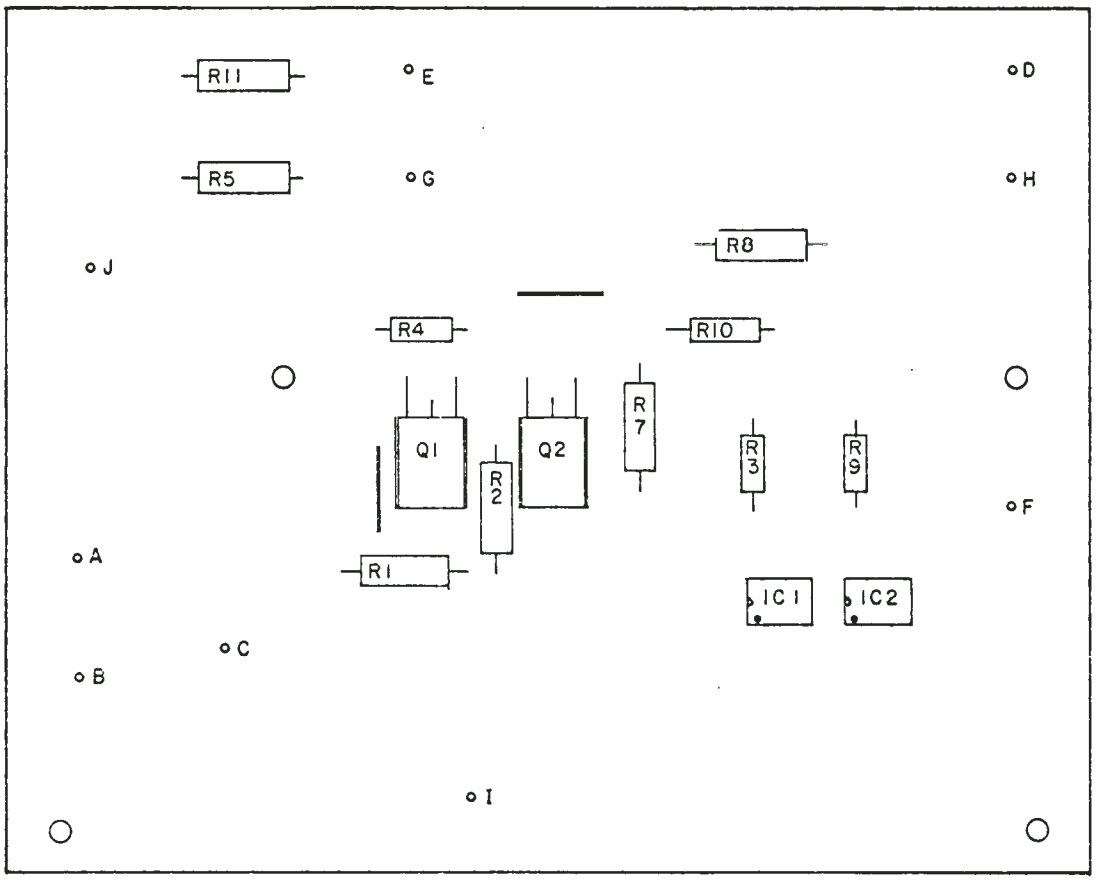
Board Physical Layout - 030-0161-002

Schematic Diagram
SG-1A Solenoid Gate Circuit Board
700/350 Series Players

| | | |
|---|---|---|
| SCALE: --- | APPROVED BY | DRAWN BY WWS |
| DATE: 14 MAY 75 | | |

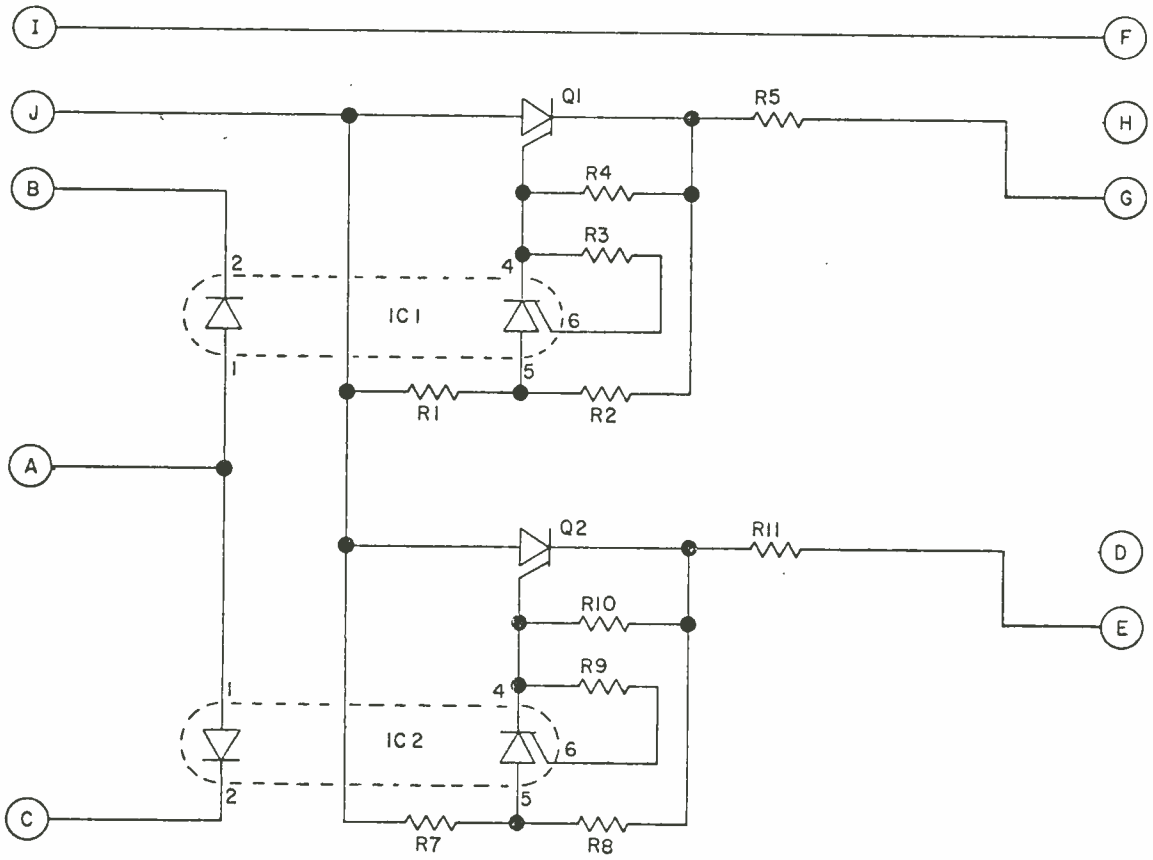
S O N O - M A G  C O R P O R A T I O N
Bloomington, Illinois

DRAWING NUMBER
040-0322-002




| Circuit Board Physical Layout<br>SG-2A Solenoid Gate Board | | | |
|---|---|---|---|
| DRAWN BY<br>WKS | CHECKED BY | APPROVED BY | SCALE<br>---- |
| DATE<br>24 JULY 75 | DATE | DATE | REVISED |
| SCNO-MAG CORPORATION<br>Bloomington, Illinois | | | |
| JOB | | | DRAWING NO.<br>030-0206-002 |

Schematic Diagram: 030-0207-002




7 - 22

Schematic Diagram
SG-2A Solenoid Gate Board

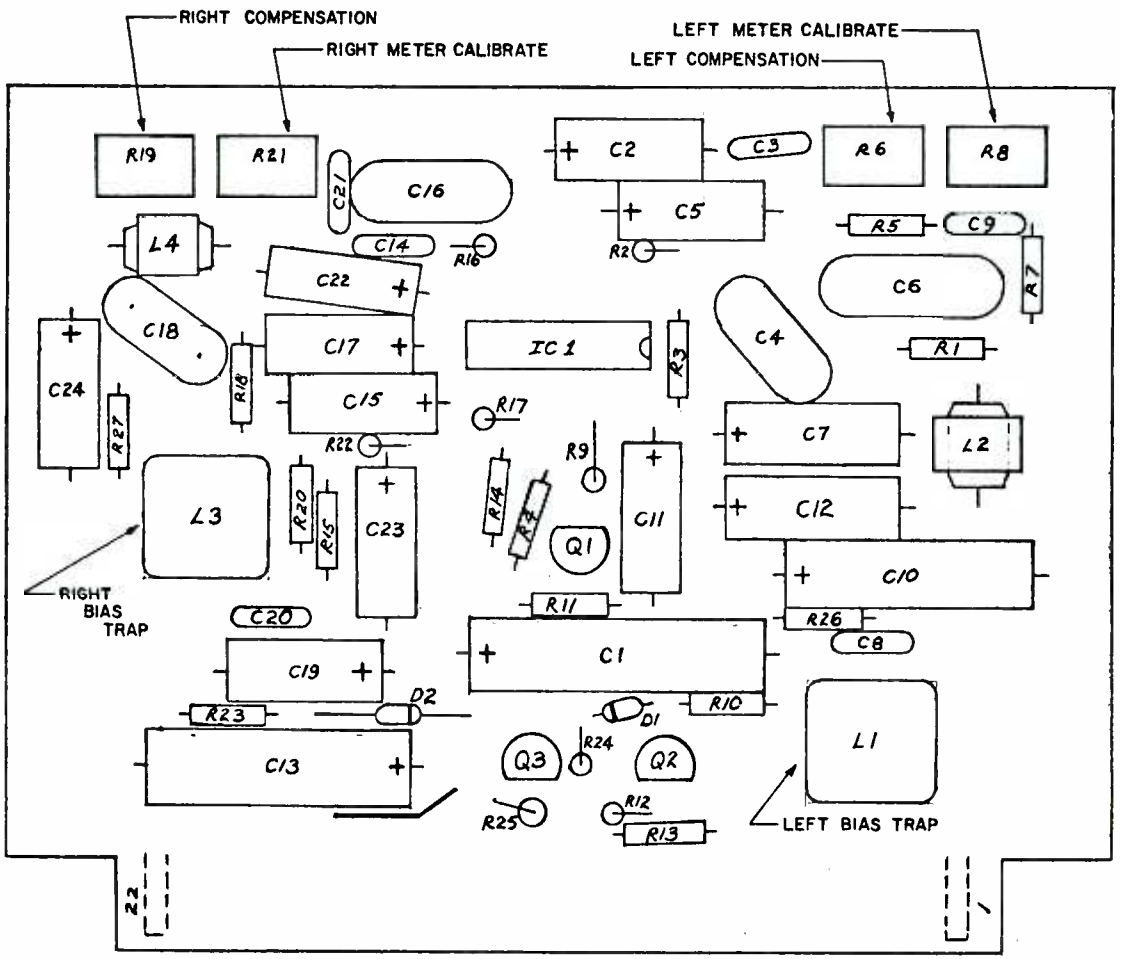
| DRAWN BY | CHECKED BY | APPROVED BY | SCALE |
|---|---|---|---|
| RMS | | | ---- |
| DATE | DATE | DATE | REVISED |
| 24 JULY 75 | | | |

SONO-MAG CORPORATION
Bloomington, Illinois

| JOB | DRAWING NO. |
|---|---|
| | 030-0207-002 |

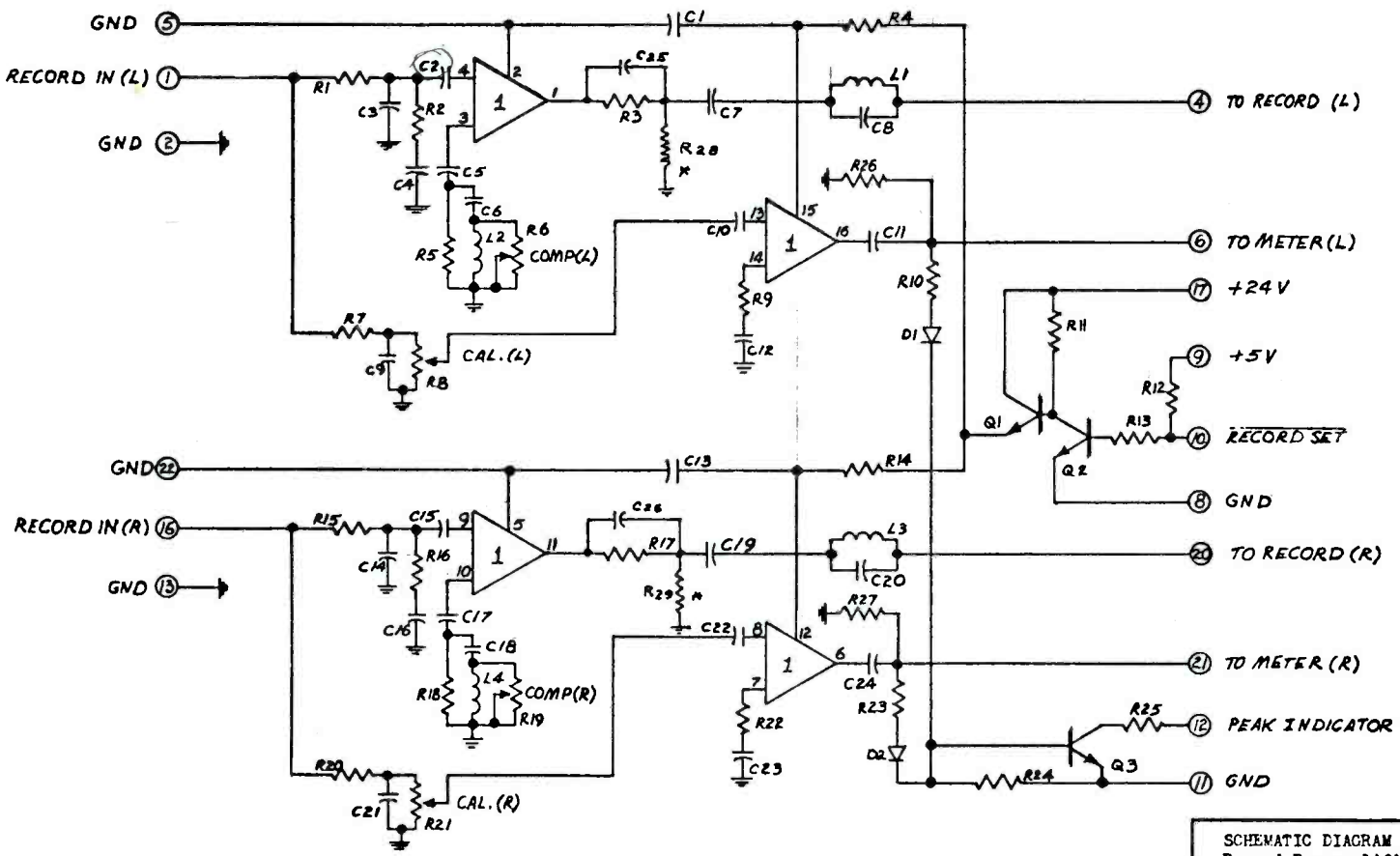
Board Layout: 030-0206-002

VAI PROOF-816 M




7 - 23

| | | |
|---|---|---|
| PARTS LAYOUT<br>Record Pre-amplifier RP-4 | | 790-792 |
| SCALE: | APPROVED BY | DRAWN BY |
| DATE: 11 Sept 73 | | Alexander |
| SONO-MAG CORPORATION<br>Bloomington, Illinois | | |
| | | DRAWING NUMBER<br>030-0311-001 |



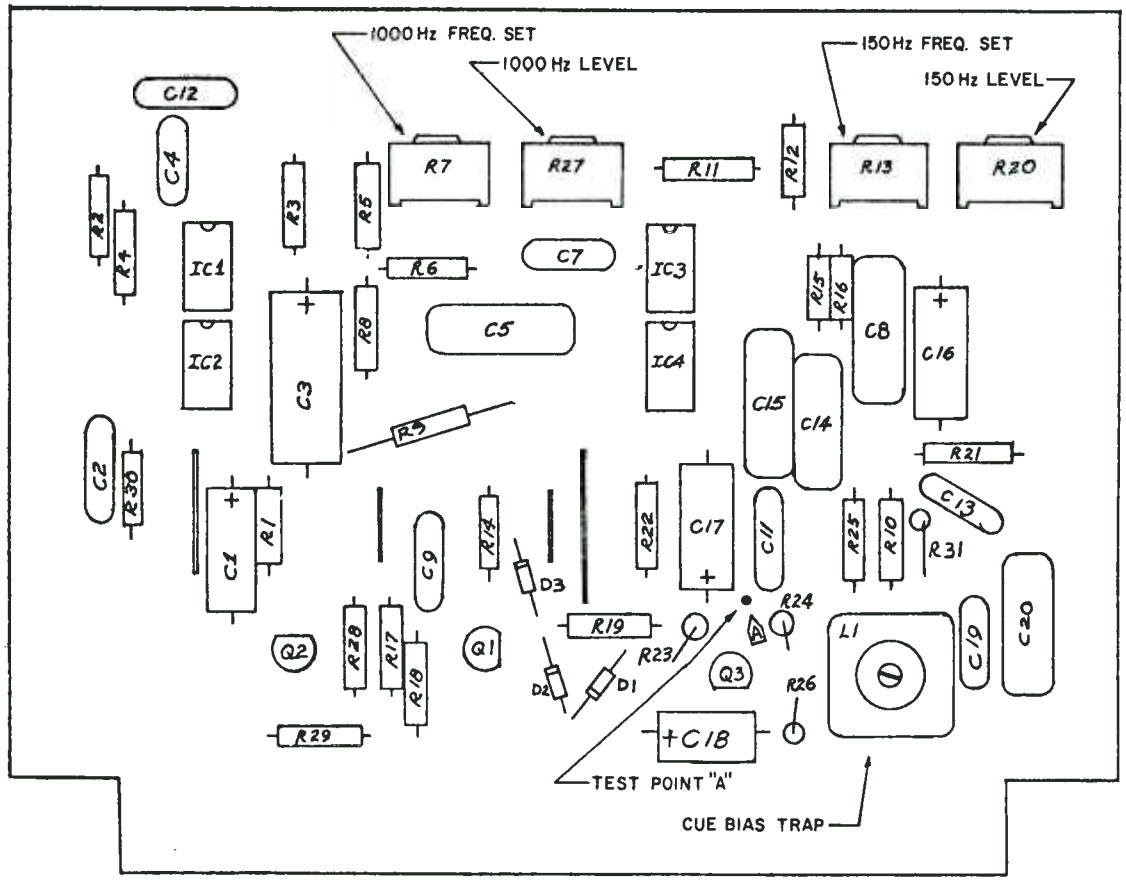

SCHEMATIC DIAGRAM
Record Pre-amplifier RP-4 790-792

| | | |
|---|---|---|
| SCALE: | APPROVED BY | DRAWN BY |
| DATE: 11 Sept 73 | | Alexander |

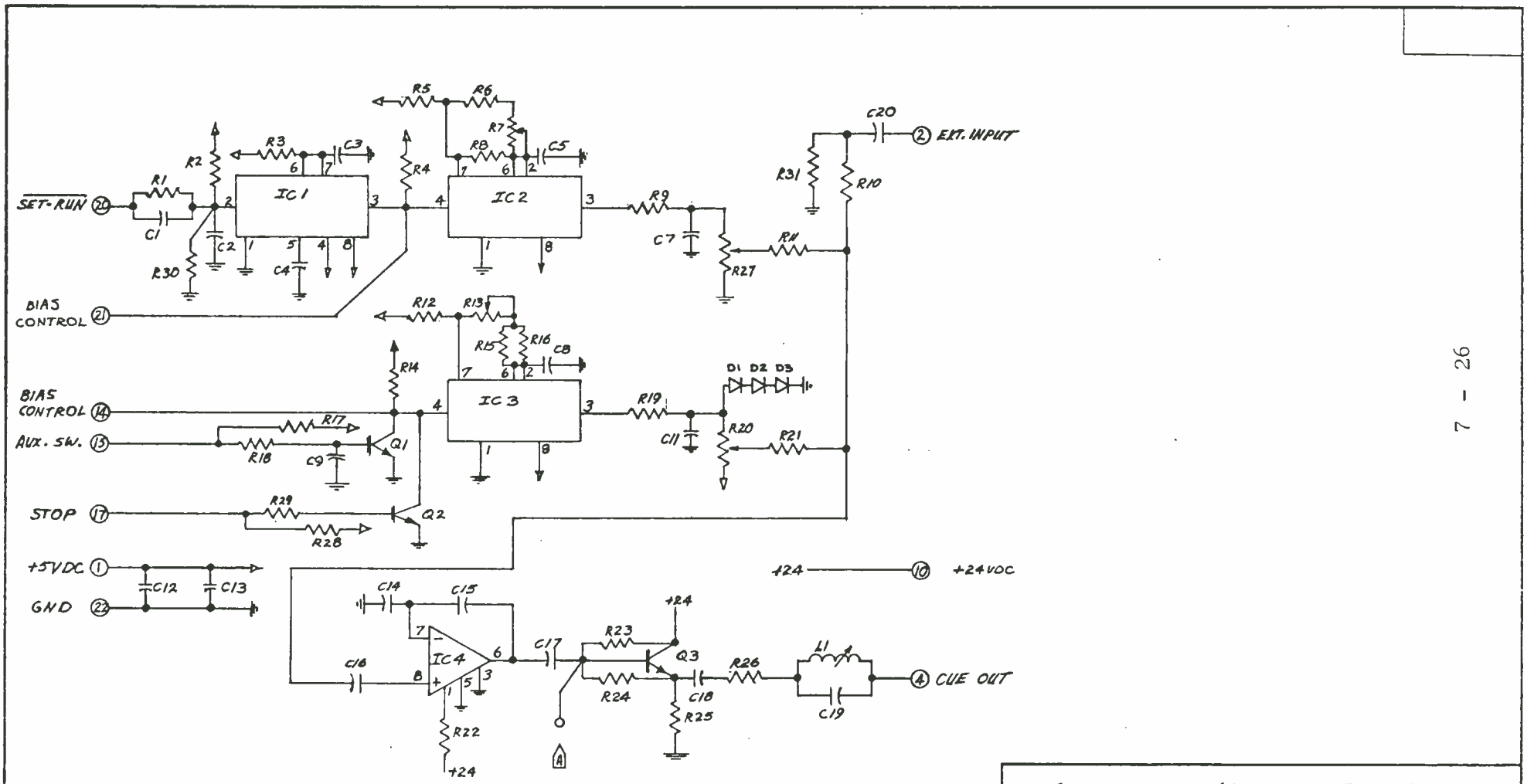
SONO-MAG CORPORATION
Bloomington, Illinois

RVD-7-24-73

DRAWING NUMBER
030-0310-001




| | | |
|---|---|---|
| TONE GENERATOR/AMPLIFIER TGA-1 | | |
| SCALE: DOUBLE | APPROVED BY | DRAWN BY TA |
| DATE: 29JAN73 | | |
| SONO-MAG CORP. BLOOMINGTON, ILLINOIS | | |
| RVD 28AUG73 12AUG74 | | DRAWING NUMBER 030-0133-001 |




7 - 26

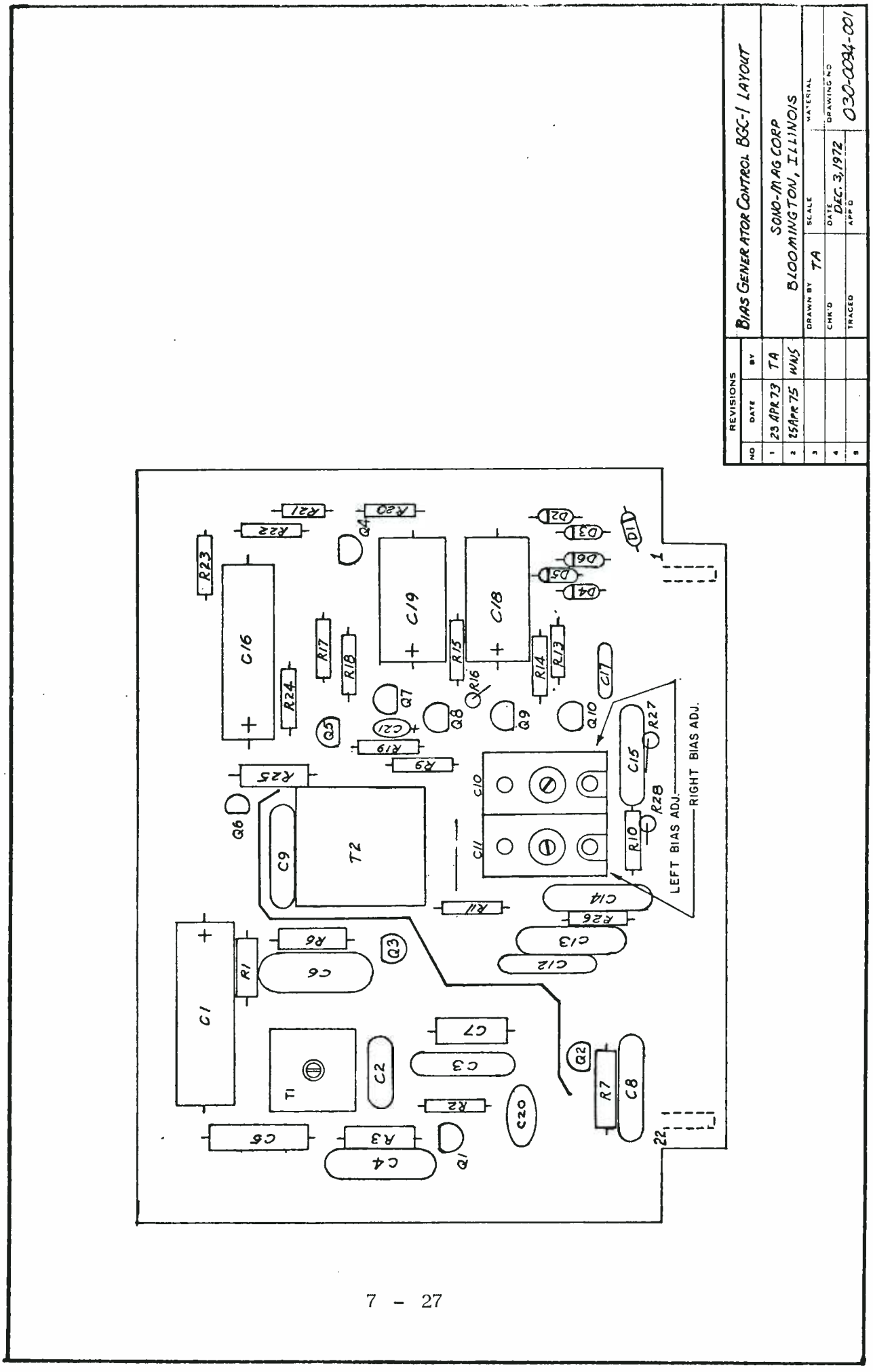
LAYOUT: 030-0133-001

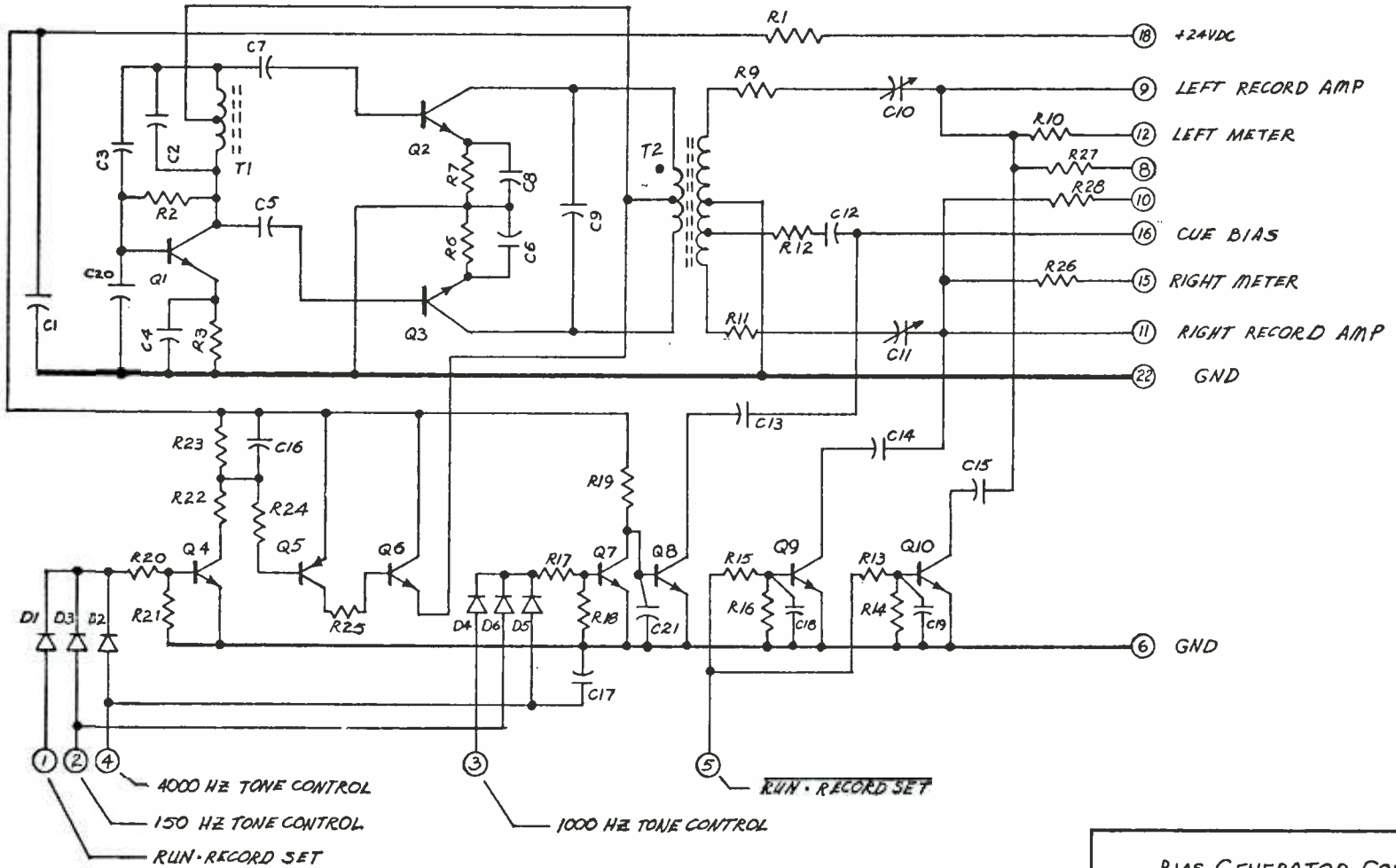
TONE GENERATOR/AMPLIFIER TGA-1

| | | |
|---|---|---|
| SCALE: | APPROVED BY | DRAWN BY TA |
| DATE: 25 JAN 73 | | |

SONO-MAG CORP
BLOOMINGTON, ILLINOIS

| | |
|---|---|
| RVD 28 AUG 73<br>11 JUN 74 | DRAWING NUMBER<br>030-0135-001 |


BIAS GENERATOR CONTROL BGC-1 LAYOUT
SONO-MAG CORP
BLOOMINGTON, ILLINOIS
REVISIONS
NO DATE BY
1 23 APR 73 TA
2 15 APR 75 WHS
DRAWN BY TA
SCALE
MATERIAL
CHK'D
DATE DEC. 3, 1972
DRAWING NO 030-0034-001
TRACED
APP'D
LEFT BIAS ADJ.
RIGHT BIAS ADJ.
T1
T2
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
C16
C17
C18
C19
C20
C21
R1
R2
R3
R5
R6
R7
R9
R10
R11
R12
R13
R14
R15
R16
R17
R18
R19
R20
R21
R22
R23
R24
R25
R26
R27
R28
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
D1
D2
D3
D4
D5
D6
1
22




7 - 28

Layout: 030-0094-001

DETAILED PER PRINT ACCEPTED OF "MASTER FORM"

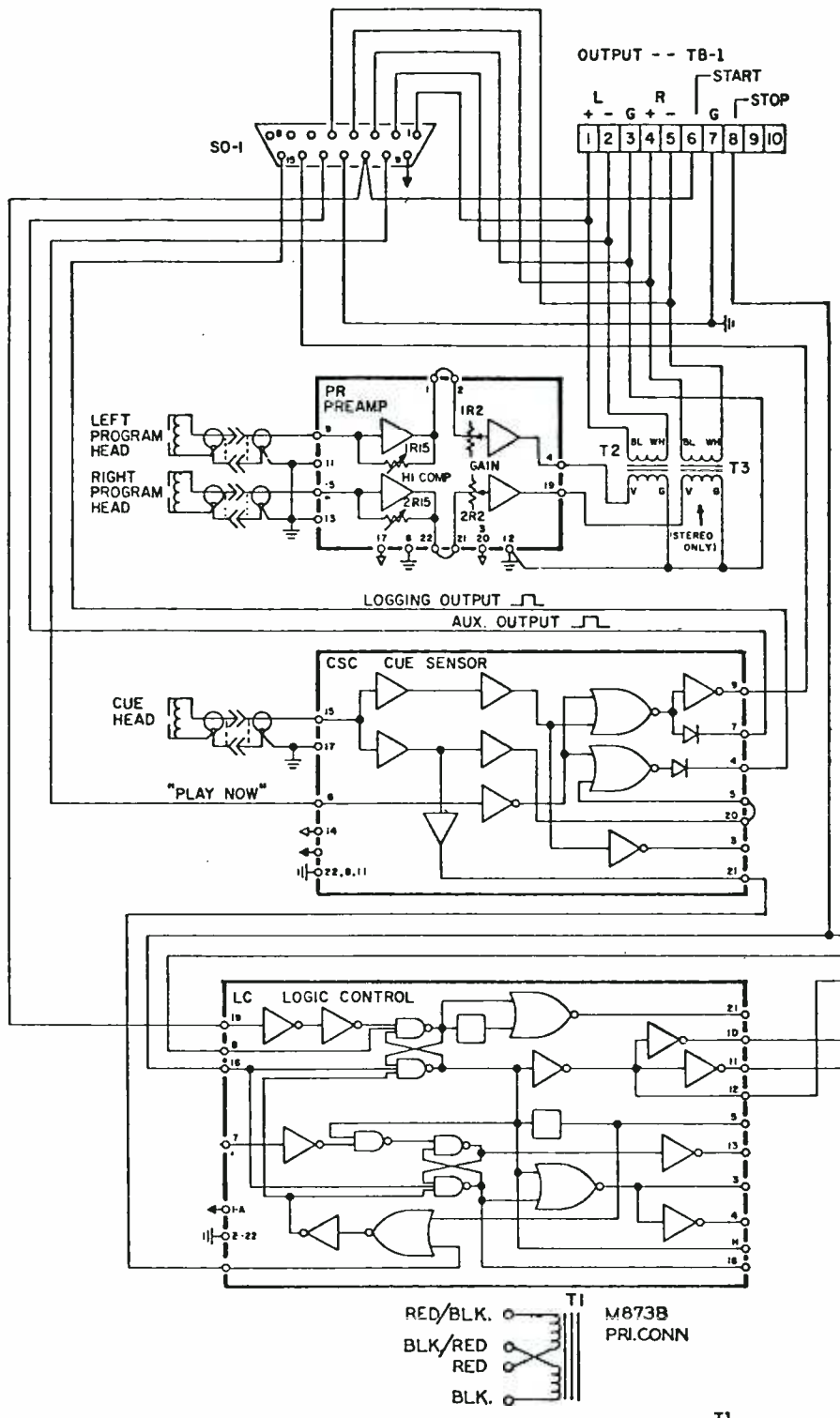
# BIAS GENERATOR CONTROL BGC-1

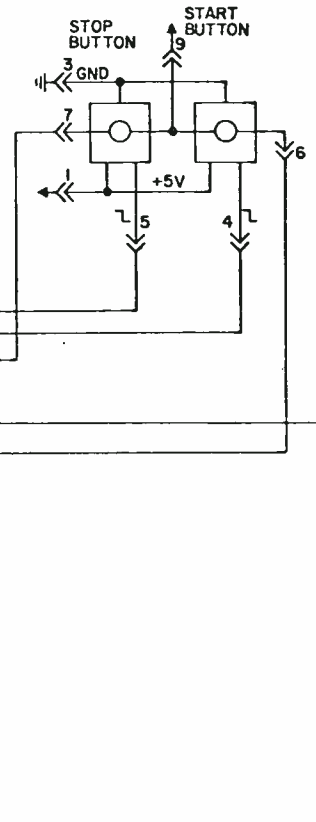
| | | |
|---|---|---|
| SCALE: | APPROVED BY | DRAWN BY TA |
| DATE: 1 DEC 72 | | |

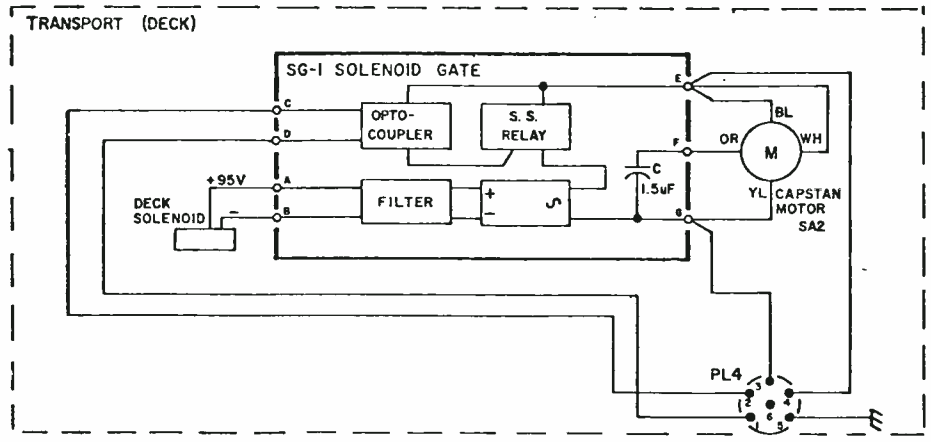
SONO-MAG CORP
BLOOMINGTON, ILLINOIS

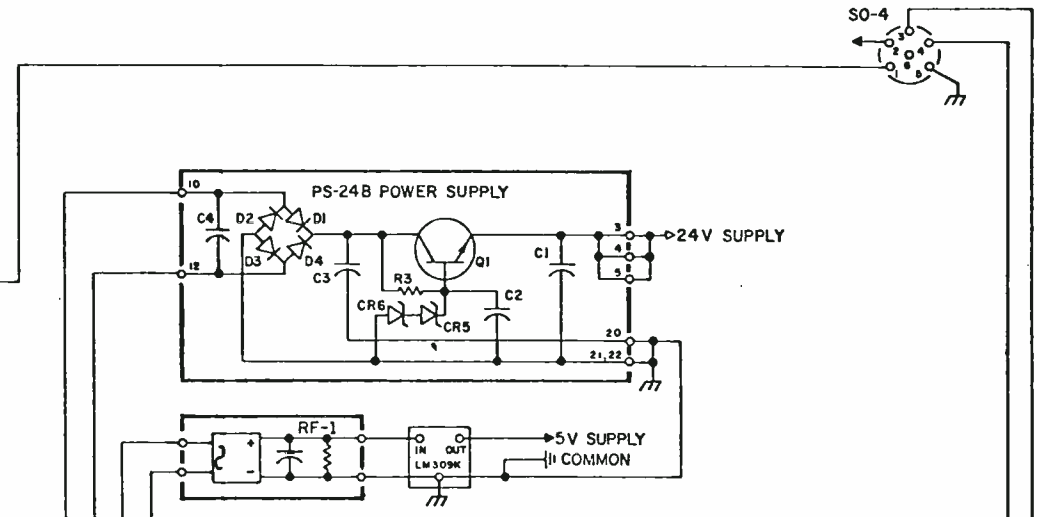
23 APR 73 RVD(C18-C19) 10 DEC 77: ADD C21.
9 DEC 74 RVD(R28 CHAN)
25 APR 76

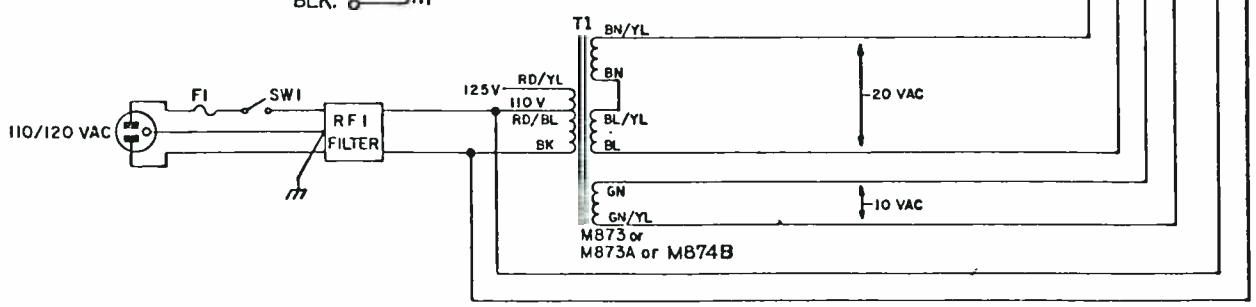
DRAWING NUMBER 030-0120-001



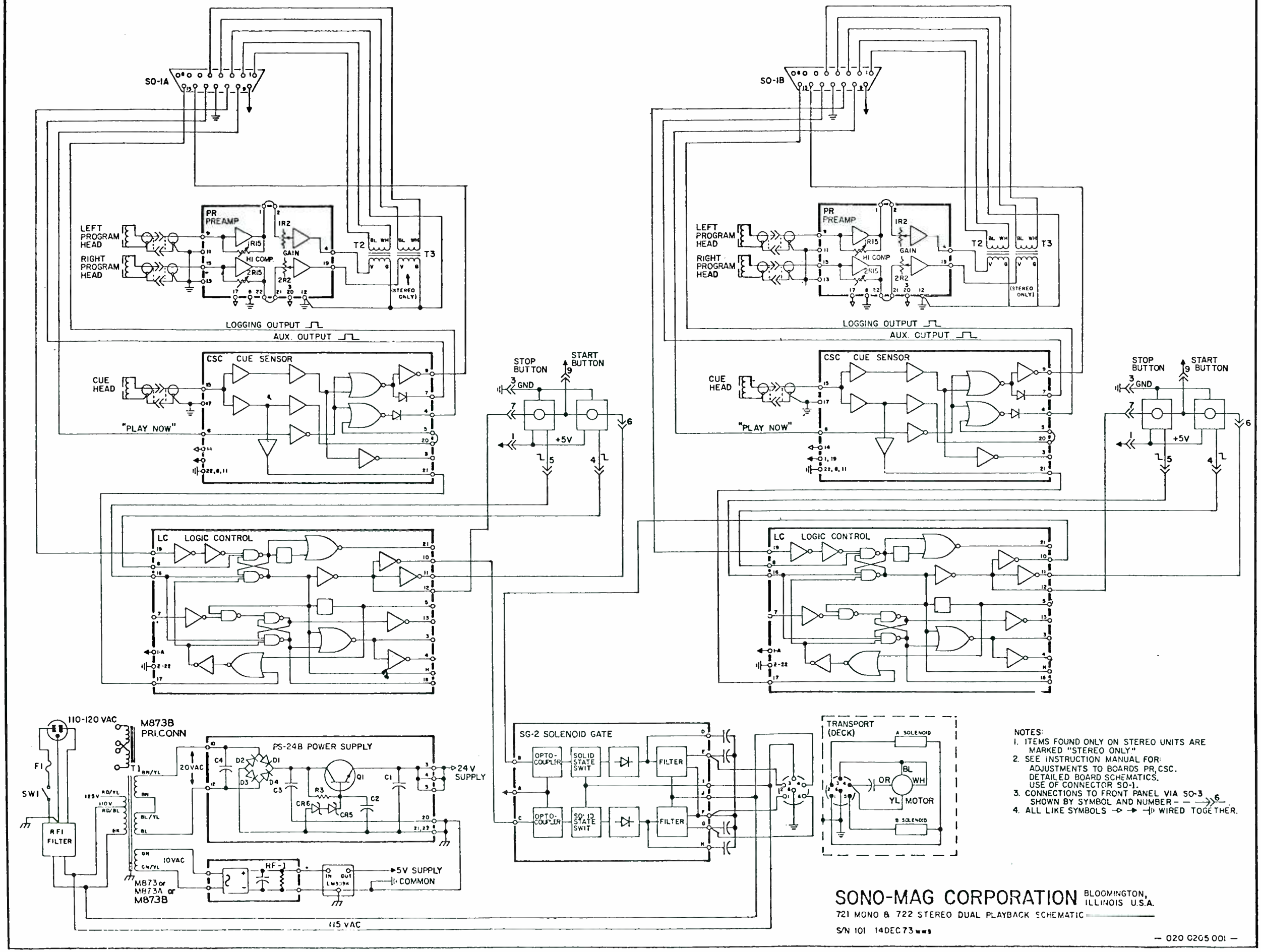

NOTES:
1. ITEMS FOUND ONLY ON STEREO UNITS ARE MARKED "STEREO ONLY."
2. SEE INSTRUCTION MANUAL FOR:
   ADJUSTMENTS TO BOARDS PR & CSC.
   DETAILED BOARD SCHEMATICS.
   USE OF CONNECTOR SO-1.
3. CONNECTIONS TO FRONT PANEL VIA SO-3 SHOWN BY SYMBOL AND NUMBER - - →» 6 .
4. ALL LIKE SYMBOLS →o →→ ⊣|| WIRED TOGETHER.

SONO-MAG CORPORATION BLOOMINGTON, ILLINOIS U.S.A.

710MONO & 712 STEREO PLAYBACK SCHEMATIC

S/N 101 14DEC73 WWS

— 020 0204 001 —



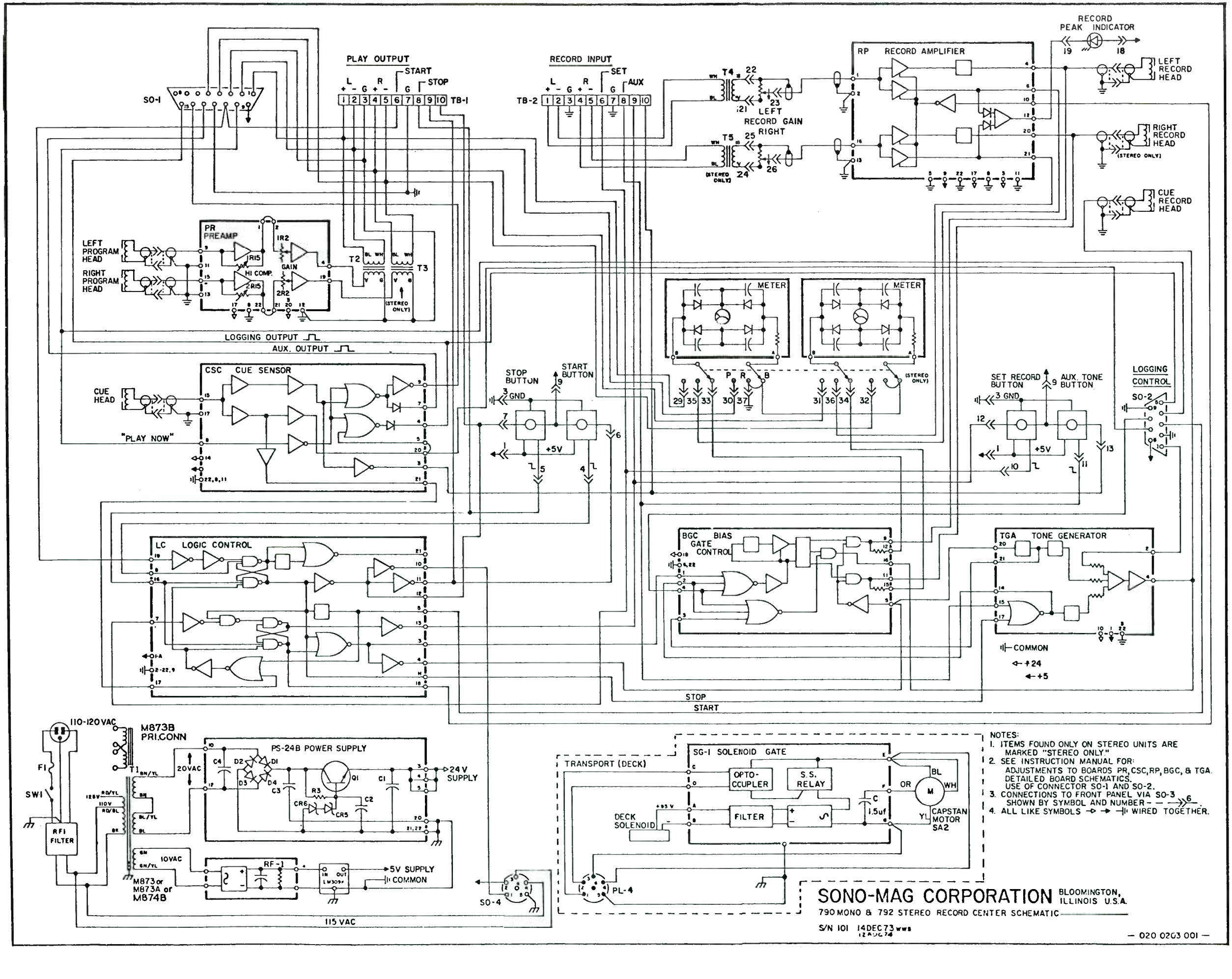

NOTES:
1. ITEMS FOUND ONLY ON STEREO UNITS ARE MARKED "STEREO ONLY"
2. SEE INSTRUCTION MANUAL FOR: ADJUSTMENTS TO BOARDS PR, CSC. DETAILED BOARD SCHEMATICS. USE OF CONNECTOR SO-1.
3. CONNECTIONS TO FRONT PANEL VIA SO-3 SHOWN BY SYMBOL AND NUMBER — — —⟩ 6
4. ALL LIKE SYMBOLS → → ⊣⊢ WIRED TOGETHER.

# SONO-MAG CORPORATION BLOOMINGTON, ILLINOIS U.S.A.

721 MONO & 722 STEREO DUAL PLAYBACK SCHEMATIC

S/N 101 14DEC73 WWS

— 020 0205 001 —




NOTES:
1. ITEMS FOUND ONLY ON STEREO UNITS ARE MARKED "STEREO ONLY."
2. SEE INSTRUCTION MANUAL FOR: ADJUSTMENTS TO BOARDS PR, CSC, RP, BGC, & TGA. DETAILED BOARD SCHEMATICS. USE OF CONNECTOR SO-1 AND SO-2.
3. CONNECTIONS TO FRONT PANEL VIA SO-3 SHOWN BY SYMBOL AND NUMBER – – →6.
4. ALL LIKE SYMBOLS → → ⊣⊢ WIRED TOGETHER.

# SONO-MAG CORPORATION BLOOMINGTON, ILLINOIS U.S.A.

790 MONO & 792 STEREO RECORD CENTER SCHEMATIC

S/N 101 14DEC73 WWB 12AUG74

— 020 0203 001 —