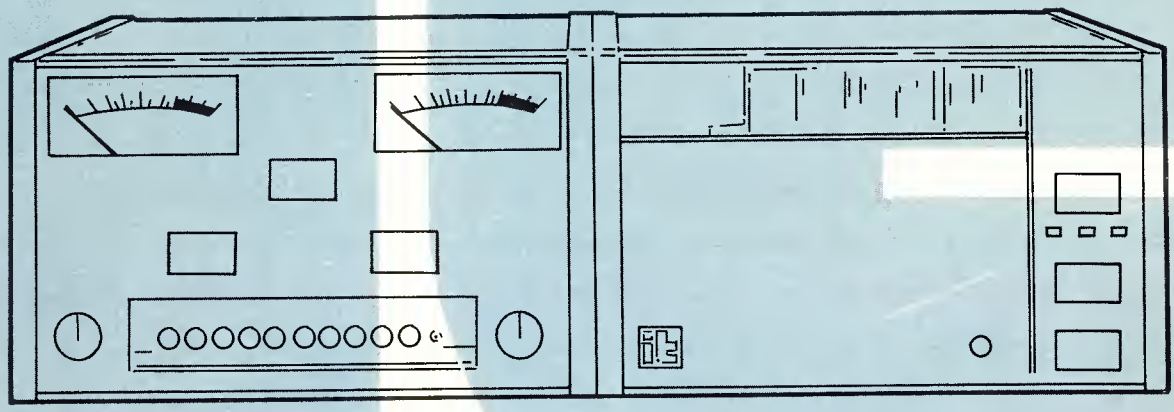

# TECHNICAL MANUAL
# SERIES 99B
# CARTRIDGE MACHINE
# REPRODUCER/RECORDER


INTERNATIONAL TAPETRONICS CORPORATION

2425 South Main Street

Bloomington, Illinois 61701

ITC Stereo Cart (Production Room) 99 SERIES

# PREFACE

## THE ITC INSTRUCTION MANUAL

International Tapetronics Corporation Manuals are written with the intent of assisting the reader-user toward a better understanding of ITC equipment. Most instruction manuals are seldom read except at the time of crisis when equipment malfunction is suspected. When this happens, the manual is usually missing, or at best, difficult to locate. PLEASE FIND A CONVENIENT SPOT TO KEEP THIS MANUAL.

We at ITC have tried to produce a useable manual. But, being human, we are subject to the frailities of behavior. Therefore, should you discover any errors or omissions, or should you wish to contribute any recommendations, please send us your comments. We will be most appreciative.

# TECHNICAL MANUAL
# (890-0022-000)

# SERIES 99B
# CARTRIDGE MACHINE
# REPRODUCER/RECORDER

INTERNATIONAL TAPETRONICS CORPORATION
2425 South Main • Bloomington, Illinois
Telephone: 309/828-1381

800 447-0414
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4,096,533 4,158,888 4,078,709 4,193,103 3,801,043
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3,942,189 4,105,934 4,040,114 4,142,221 4,101,937
D248,393 4,153,918 4,221,316 4,219,167

OTHER PATENTS PENDING

# TABLE OF CONTENTS

# ILLUSTRATIONS

ILLUSTRATIONS (Continued)

# SECTION I. INTRODUCTION/SPECIFICATIONS

## I. INTRODUCTION/SPECIFICATIONS

### A. GENERAL DESCRIPTION

The Series 99B cartridge equipment from International Tapetronics Corporation has been designed and built using the technology available today. Microprocessor control is the key behind the innovative standard features of the Series 99B. Low-noise and BI-FET op-amp circuits have provided the basis for an audio system which easily accomodates the best magnetic tapes of today.

One of the guidelines used during the development of the Series 99B was the December, 1975, NAB Standards for cartridge tape recordings and reproductions. The standards outlined therein have been met and in many cases improved upon.

The Series 99B is built on a modular basis in which the playback transport electronics and the recording electronics are each housed in separate units. This allows greatest flexibility in mounting the Series 99B and also makes the addition of a recorder unit to an existing reproducer at a later date a simple task. All sub-assemblies such as motherboard, amplifiers, control circuits, power supplies, front and rear panels, and head assemblies are either plug or bolt-in place. This feature makes service convenient and efficient. Sockets are also used for IC's and transistors to ease individual component replacement.

Mechanically, the Series 99B is built with the reliability of standards set by ITC. These include solid 1/2 inch thick anodized aluminum deck, full swing chain driven pressure roller assembly, heavy duty air-damped solenoid, and a precision micro-adjust head assembly. A long lasting high adhesion pressure roller material which pulls better with less pressure is standard.

Solenoid operation provides for stable tape travel path, lower operating temperature, and minimal tape overshoot. The tape path has greater stability due to consistent plunger location under all temperature variations. The coil current is also reduced after engagement as a result of the true positioning feature. This serves to lower the operating temperature. Faster tape stop time occurs because less field-to-collapse in the winding produces faster solenoid plunger release. This results in minimal tape overshoot.

The entirely new true, center-pivot head module is designed with rotational axis in the exact vertical and horizontal centerline of the heads. Height, zenith and azimuth adjustments are independent and individually lock, preventing interaction between any of the three. Steel ball pivots combine with a longer azimuth pivot to permit much finer tuning. The entire head module can be removed without destroying previous adjustments thus allowing for greater interchangeability and flexibility.

Performance improvements realized by the previously described mechanical changes can best occur when the tape cartridge is positioned accurately, consistently, and without distortion to the cartridge material. ITC, therefore, has designed a completely new cartridge positioning system which assures precise, rigid alignment of tape and head, even when cartridge insertion is hurried or somewhat careless.

Electronically, the Series 99B incorporates many standard features made possible by micro-processor technology. The cue tones which are generated and detected digitally are crystal referenced for long term frequency stability. Cue tones include Primary, Secondary and Tertiary. A two speed (standard 7.5 IPS and 20.25 IPS high speed cue) crystal locked DC brushless servo motor dramatically improves flutter performance and reduces heat.

A specially designed reproduce head, coupled with a low inductance recording head, contribute to frequency response which equals open reel quality. High frequency bias (256 kHz) and a unique bias and program mixing amplifier combine to reduce intermodulation distortion to the point at which the magnetic

tape and cartridge become the limiting factors.

Group delay compensation is used in the recording amplifier to improve square wave performance and transient response. Peak indicators which follow tape saturation are conveniently mounted in the meters. Meters may be used to monitor input, output, program and cue bias and cue playback. These functions are all selectable from the front panel. Input monitoring (NORM REC) is automatically switched to output monitoring (PGM PLAY) when the machine is not recording. The primary cue tone may be recorded at any time from the front panel 1 kHz cue control switch.

A new standard feature with Series 99B recorders is CUE ERASE. Selective erasure of any material on the cue track is possible using this function. Another operational feature especially useful in machine maintenance is the multi-function test tone generator. A complete frequency response test can be made in less that five minutes without taking the machine out of service. The output of the tone generator is accessible from the remote connector for external use.

The RPSE (Stereophonic) and RPME (Monophonic) units incorporate all the features of the Series 99B. These include stereo or mono recording and reproducing; automatic erase, azimuth (phase) alignment of the recording head, and splice location (ELSA); brushless DC servo motor and previously described features. Variations of these units are available and may be obtained by contacting ITC Sales Department.

## B. SPECIFICATIONS

**Power:** 120/240 volts AC, 50/60 Hz; 40 VA. 800 VA during erase cycle of ELSA equipped units. Selectable taps for accommodating varying line voltage conditions. Taps at 105V, 120V, 210V, 225V, and 240V.

**Capstan Motor:** Direct drive, crystal referenced, brushless DC servo, capstan motor with ceramic shaft and permanently lubricated ball bearings.

**Tape Speed:** 7.5 IPS (19 cm/s): High speed cue standard on models at 20.25 IPS (51.4 cm/s). Normal operating speed may be changed by jumper to 3.75 or 15 IPS (9.5 or 38 cm/s).

**Wow & Flutter:** Playback: 0.12% or less DIN weighted. Record/play: 0.15% or less DIN weighted.

**Speed Accuracy:** 0.1% maximum deviation.

**Rated Output Load Impedance:** 600 ohms balanced. May be strapped for 150 ohms. Measured at 1 kHz in accordance with 1975 NAB standard.

**Audio Output Capability:** +25 dBm maximum before clipping. May be strapped to provide the following operating ranges without deteriorating the signal-to-noise ratio.

-18 to - 1 dBm
-10 to + 7 dBm
- 5 to +12 dBm
+ 1 to +18 dBm

**Amplifier Distortion:** Reproducer: 0.5% or less total harmonic distortion, 0.1% or less third harmonic distortion. Recorder: 0.5% or less total harmonic distortion, 0.1% or less third harmonic distortion. Measured in accordance with the 1975 NAB standard.

**System Distortion:** 0.8% or less total harmonic distortion, 0.5% or less third harmonic distortion. Record to playback at +4 VU recording level.*

**Noise:** *, **, ***

| | Monophonic | Stereophonic |
|---|---|---|
| Squelched | 74 dB or greater | 74 dB or greater |
| S/N | 53 dB or greater | 50 dB or greater |
| Hum & Noise | 58 dB or greater | 56 dB or greater |

**Preamplifier Head Room:** *****
Reproducer: +25 dB
Recorder: +24 dB

**Crosstalk Between Channels:*** Among program and cue channels.

| Program to Program | | Cue to Program | |
|---|---|---|---|
| 40 Hz | 50 dB | 150 Hz | 52 dB |
| 1 kHz | 48 dB | 1 kHz | 50 dB |
| 10 kHz | 45 dB | 8 kHz | 40 dB |

(Specification limited for record/play by noise of tape, **NOT** electronics.)

**Frequency Response:** Record to playback at -14 VU recording level.* +/-1.0 dB from 31.5 Hz to 16 kHz.

**Equalization:** 1975 NAB standard, (50 us) adjustable for CCIR (70 us). 1964 NAB standard may be accomodated by strap removal in recorder (3180 us, 50 us). High frequency equalization control included in recording amplifier, with both high and low frequency controls in reproducer.

**Head Configuration:** NAB - two tracks for mono (0.080" track width), three tracks for stereo (0.043" track width). Separate record and reproduce heads permit playback monitoring while recording.

**Cue Signals:** NAB - primary (1 kHz), secondary (150 Hz) and tertiary (8 kHz) all standard. Open collector transistor switching for external control available for 150 Hz and 8 kHz in accordance with 1975 NAB standard. Optional relays available. Secondary cue, 150 Hz, and tertiary cue, 8 kHz may be applied during recording process or during playback. 150 Hz and/or 8 kHz tones are strappable to initiate high-speed cue upon conclusion of detection of tone (playback or record/playback mode). Individual and/or simultaneous tone generation and detection are available for 1 kHz, 150 Hz, and 8 kHz.

**Logging Signals:** External input to the cue recording amplifier and external output from the cue reproducer amplifier are available for recording and reproducing logging signals at -10 VU between 3.3 kHz and 6.5 kHz. Externally applied cue tones are not for simultaneous generation or detection with 1 kHz, 150 Hz, 8 kHz or any other combination. Input and output to cue system are compatible with 1975 NAB standards.

**Audio Input Impedance:** 20 K ohm balanced bridging standard. 600 ohm and 150 ohm balanced terminating loads may be selected by jumper.

**Audio Input Capability:** +28 dBm @ 0.5%d THD (recorder). Strappable for the following mid-range (level control knob position) sensitivity levels to facilitate front panel adjustment ease and optimize signal-to-noise.

-20 dBm
-10 dBm
0 dBm
+10 dBm

**Metering:** Taut band movement with "A" scale. Switch selection for monitoring: Recording input (automatic switching to program playback when machine is not recording): program playback; program bias; cue bias; an cue playback. Built in LED peak indicators follow tape saturation.

**Bias Amplifier:** Crystal referenced 256 kHz for program track(s), 83 kHz for cue track.

**Cue Erase:****

| Frequency | Cue Track Erase Depth |
|---|---|
| 150 Hz | 36 dB |
| 1 kHz | 40 dB |
| 8 kHz | 50 dB (limited by tape noise) |

**Square Wave Response:** At 1 kHz* phase distortion compensation in recorder to minimize overshoot.

**Tape Capacity:** NAB size AA

**Start Time:** 100 milliseconds (tape movement).
150 milliseconds (to audio on).

**Stop Time:** 75 millisconds (transport and electronics). Tape travel after stop signal varies according to type of cartridge used and length of tape.

**Ambient Operating Temperature Range:**
10° C to 55° C. (50° F to 131° F).

**Remote Control:** All front panel controls and indicators plus cue erase, 1 kHz record and defeat and external cue tones record input and enable lines.

**External Connectors:** XLR audio and latching remote control. Mating connectors are furnished.

**Mounting:** Table top mounting. Rack mount housing optional.

**Dimensions (Maximum):**

| Width | Depth | Height | Add for Feet |
|---|---|---|---|
| 216 mm | 394 mm | 133 mm | 90 mm |
| (8.5 in) | (15.5 in) | (5.25 in) | (.354 in) |

**Weight:** Playback: 13.6 kg (30 pounds), with ELSA 14.1 kg (31 pounds). Recording amplifier: 6.8 kg (15 pounds).

**ELSA System:**

Splice Locate:** Detect one mil thick splicing tape thickness minimum, square and diagonal ended cut.

Automatic Phase Alignment:**

Monophonic: 1.0 dB or less azimuth loss at 10 kHz.

Stereophonic: +/- 20 degrees or less difference between left and right program channels at 10 kHz (to be measured under steady state conditions after application of ELSA sequence).

**Automatic Erase:**** Monophonic and Stereophonic*

| | 60 Hz Line | 50 Hz Line |
|---|---|---|
| Average | Specification Pending | |
| Peak | Specification Pending | |

(Erase mode not intended for continuously repeated operation.)

*All measurements made using 3M Scotchcart tape and referenced to 1 kHz recorded at 250 nW/m, 4 dB higher than the 160 nW/m reference of the 1975 NAB Cartridge Recordings and Reproductions Standard.

**All measurements - 3M Scotchcart AA cartridge with 3.5 minutes tape load running at 7.5 IPS.

*** Audio measurements band limited to 20 Hz to 20 kHz.

****Referenced from NAB cue tone reproduce levels.

*****Referenced to 160 nW/m as specified in the 1975 NAB Cartridge Recordings and Reproductions Standard.

# SECTION II. INSTALLATION AND OPERATION

## II. INSTALLATION AND OPERATION

### A. INSTALLATION

Adjustments outlined within this section are made at the factory to achieve optimum performance from Series 99B cartridge machines. At the time of installation, three adjustments may be required: program reproduce level, recorder input level strap, and internal test tone generator "0" VU level calibration.

The Series 99B machines are designed for table top mounting. Machines, including recording amplifiers, may be safely stacked 3 to 4 high if desired. Vertical space requirement for each Series 99B machine is 7 inches when rack mounted in the ITC rack mount housing. The rack mount housing accommodates either two playback units side by side or one recorder/playback. See Figure 2-1 and 2-2 for additional mounting information.

### B. EXTERNAL AUDIO CONNECTIONS

An appropriate combination of plugs and sockets is provided with each Series 99B machine for connecting audio inputs and outputs. Refer to Figures 2-6 and 2-7 for proper location of connectors. Inputs and outputs are balanced; it is therefore recommended that two-conductor shielded cable be used for each. Attach the shield only at either the machine end or the console to prevent any potential ground loop. Figure 2-3 shows a proper method of connection for the playback output lines. Figure 2-4 illustrates the connections required for the recorder inputs.

It is important to note that the + (plus) and - (minus) signs are indications of proper phase relationships only and do not reflect DC voltage potential. It is necessary to connect the + lines of both channels to the corresponding + (or equivalent) terminal of the external source in order to prevent phase reversals.

Shielded cables are recommended for all remote audio functions (cue amp output, square wave output, test tone generator, cue amp input).

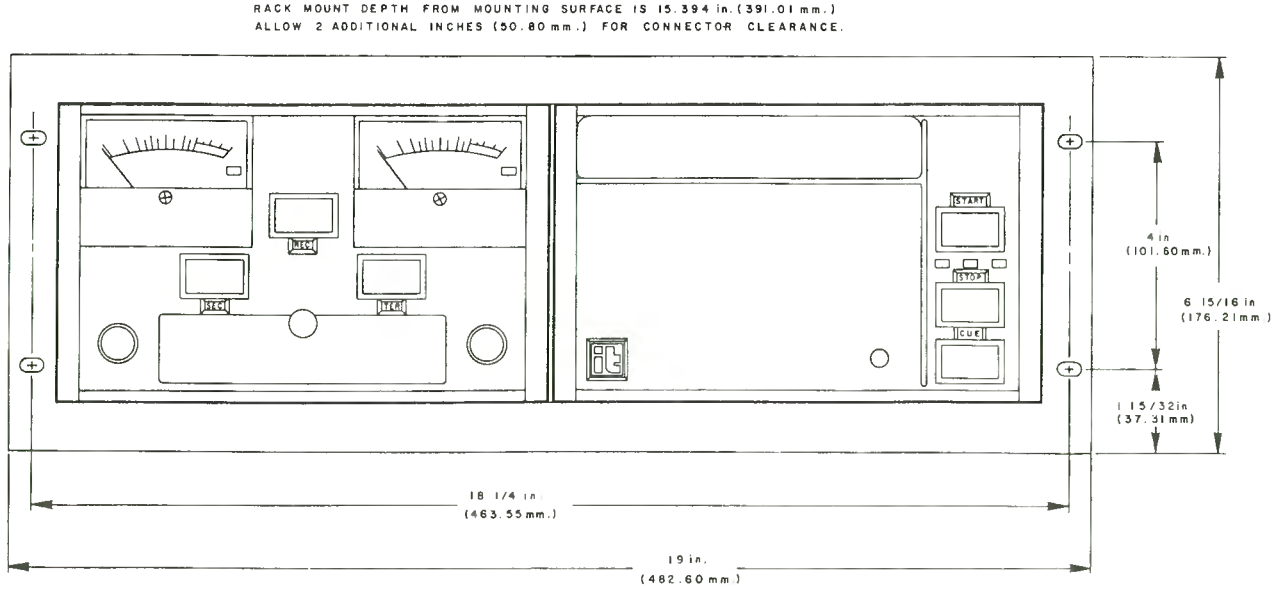



**Figure 2-1**

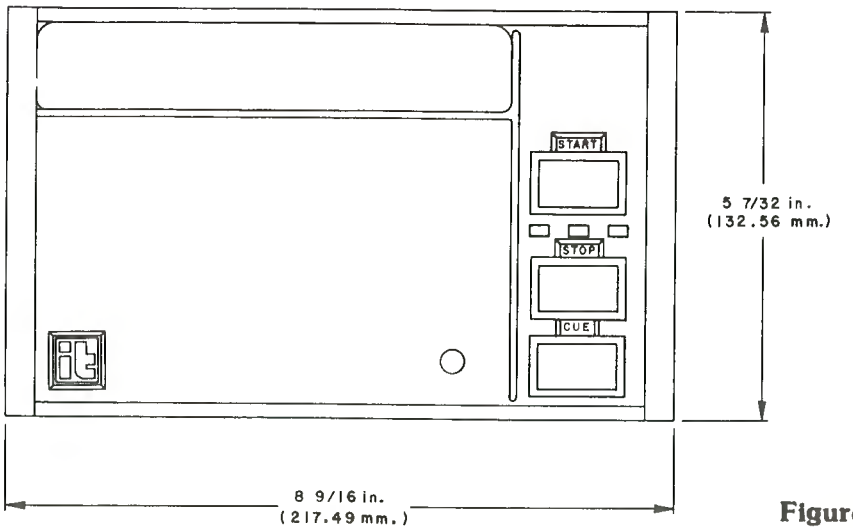



**Figure 2-2**

## C. EXTERNAL CONTROL CONNECTIONS

All remote control functions are accessible through one connector, J1, located on the playback rear panel. Figure 2-5 illustrates many of the common remotes used and the proper method for making the connections.

Insome cases, unshielded lines may be tolerated for remote switch functions However, it is recommended that shield cables be used in all installations.

All switches shown are momentary action, single pole. Typical switching current is 5 ma. DC at a maximum 5 VDC.

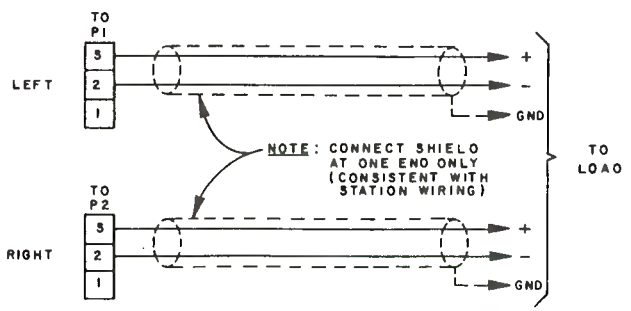
Additional remotes available are:

**1. Secondary cue open collector output —** -- pin 40 -- 200 ma. switching current (sinking), maximum 25 VDC open circuit voltage, switches to ground upon sensing of secondary cue.

**2. Tertiary cue open collector output —** -- pin 37 -- switches to ground upon sensing of tertiary cue.

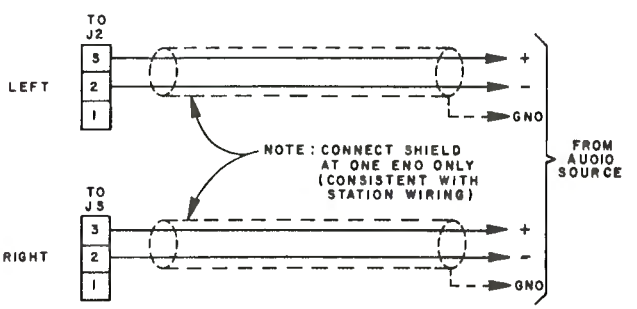
**3. Auxiliary Start Pulse —** pin 28 — momentary (100 msec) pulse to ground upon start of cartridge -- open collector. May be used to start an external clock or timer. Maximum 25 VDC open circuit voltage, at 200 ma.

**4. Ready Ground —** pin 3 -- follows ready lamp function, when lamp is on, ready ground signal is at ground. When lamp is off, signal is open collector. Caution: ready ground follows condition of front panel ready lamp. If ready lamp is strapped to flash (see page 2-8) ready ground will change states synchronous with front panel ready




REPRODUCER AUDIO OUTPUT CONNECTIONS

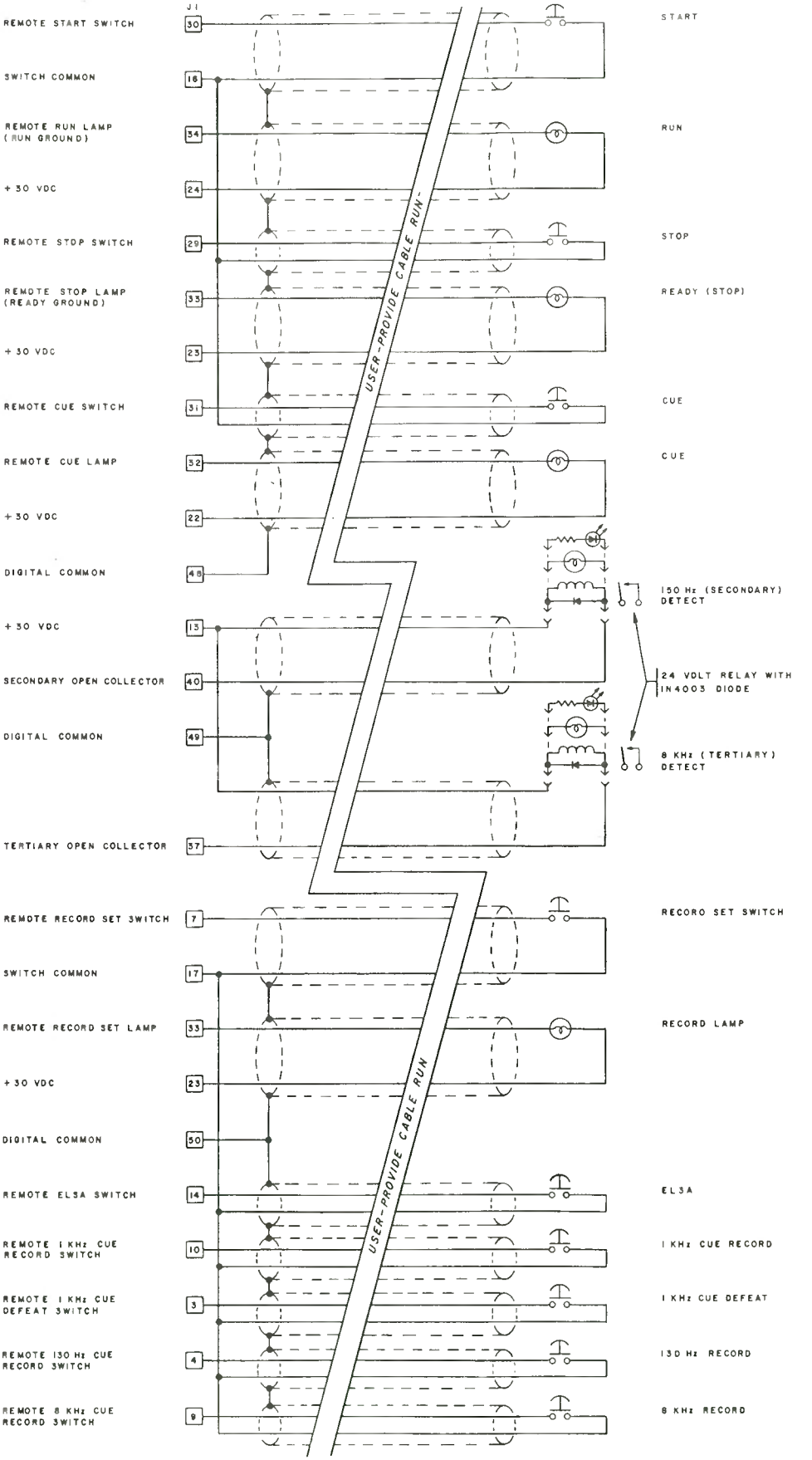
**Figure 2-3**




RECORDER AUDIO INPUT CONNECTIONS

**Figure 2-4**

## SAMPLE REMOTE CONTROL SCHEMATIC




### Notes

1. Use shielded cable runs where possible.
2. Tie shields and "commons" together only at the machine end.
3. Do not tie commons, shields, or +30 volt lines together between other machines.*
4. Keep all switch and lamp circuits "above" any ground at all points outside the machine.
5. Do not "mix" digital ground, switch common, or audio ground circuits, to prevent digital or DC ground loops.
6. For other J1 connections not noted here, refer to the reproducer motherboard schematic in the electrical drawings section of this Technial Manual.
7. Keep all interface cabling segregated from high-power cables (such as A.C. runs and speaker leads).

*For "Daisy Chain" operation, ITC recommends the use of the optional plug-in relays for absolute ground and power supply isolation between machines and peripheral interface gear.

**Figure 2-5**

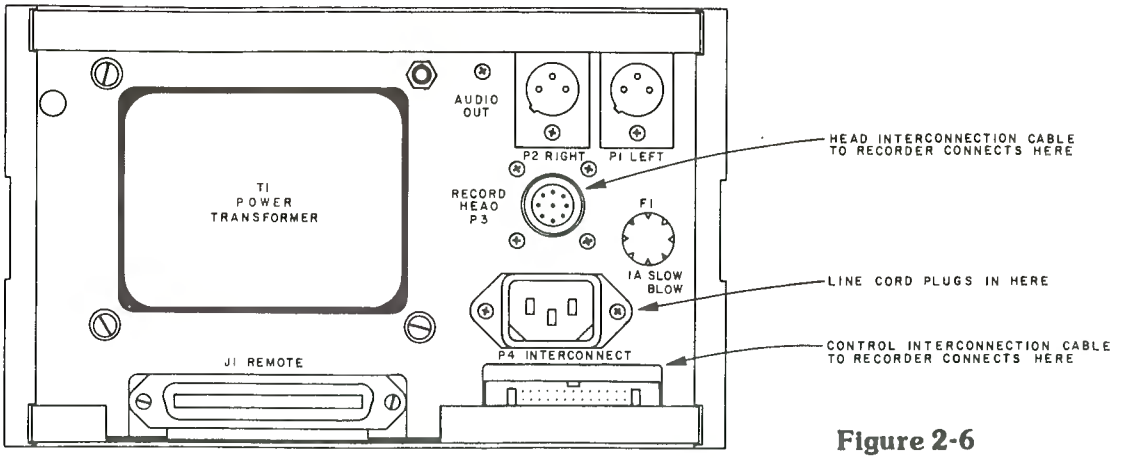



**Figure 2-6**

lamp. Maximum open circuit voltage 25 VDC, maximum current at 200 ma.

**5. External Fade Control —** pin 21 — this is a DC control point for varying playback output level. Connect a potentiometer (25K ohms) across +15V and ground (pins 13 and 16), connect the wiper arm of the potentiometer to pin 21. When the wiper potential is +15 VDC audio is ON, at 0 VDC audio is OFF. CAUTION -- with potentiometer in OFF position, internal audio ON circuit is disabled. Both channels on a stereo machine are controlled simultaneously with one potentiometer.

**6. Cue Amplifier Outputs:**

a. Cue preamplifier output available on pin 11. For monitoring, connect ground lead (shield) to pin 45 -- audio ground. Nominal voltage is .5V r.m.s.

b. Square Wave output (analog signal from tape converted to square waves) is accessible on pin 44. This output must be referenced to the digital ground on pin 48 in order to prevent interaction with analog circuitry. Voltage swing is ±15 volts (peak to peak). Load impedance not to be less than 5K ohms.

**7. Cue Erase —** pin 8 -- switch to ground (pin 16) with a momentary switch (normally open contact arrangement) for erasure of cue tone and logging information previously recorded on the cue track. Active

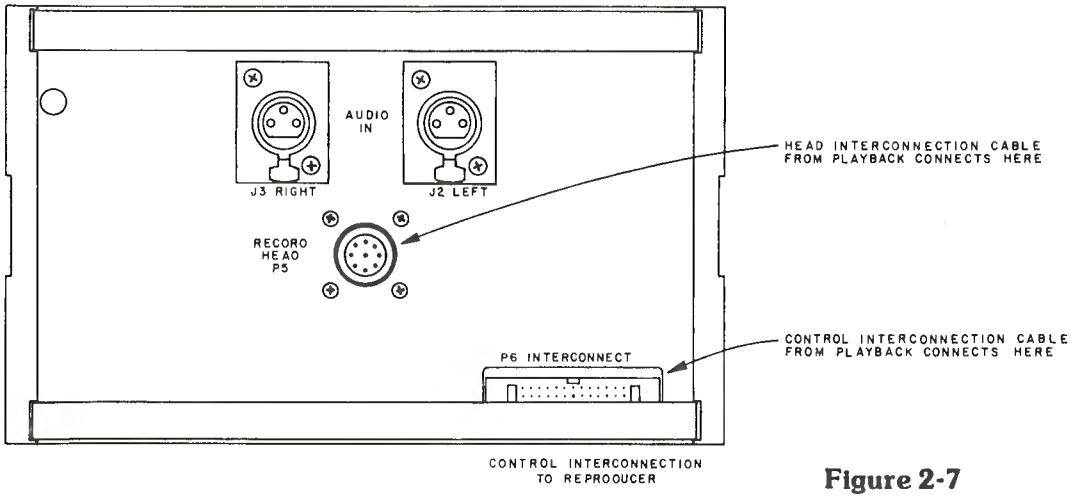



**Figure 2-7**

only in playback mode after the first 1.5 seconds of tape has played. Erases only when switch is closed. (RECORDER ONLY).

8. **External Cue Tone Record —** Other auxiliary tones may be recorded onto the cue track by connecting the signal to pin 2 (cue record input) and pin 45 (audio ground) and enabling the cue recording system by switching pin 26 to ground (pin 16). Nominal input voltage -- 1 VAC r.m.s. Input impedance approximately 15K ohms. (RECORDER ONLY).

9. **Test Tone Generator —** All internal test tone generator frequencies are available at pin 27 referenced to ground at pin 45 (unbalanced). Output level is nominally 2.5 VAC (r.m.s.) into a 600 OHM load. The output is directly coupled to an OP-AMP, therefore, a slight DC offset voltage of no more than 20 mv may occur.

**NOTE: IN ORDER TO PREVENT POTENTIAL OPERATIONAL PROBLEMS, EXTERNAL LOAD COMBINED CURRENT DRAIN MUST NOT EXCEED 0.2 AMPERES.**

## D. CONTROLS AND INDICATORS

1. **Stop Switch —** Active when cartridge is loaded properly. Overrides all other operations within the machine.
2. **Ready Lamp —** On when cartridge is loaded properly. Flashes (as supplied from factory) after cartridge has played and cued. For optional operation of the Ready function, see SECTION II. E. Operational Options.
3. **Start Switch —** Active whenever a cartridge is loaded properly or in a CUE mode.
4. **Run Lamp —** On when in a RUN mode.
5. **Power Indicator —** Red LED located between the yellow and green cue tone LED's on the playback front panel.
6. **Cue Switch —** Used for high speed cue and audio mute from STOP, START, or RECORD (cancels record set) modes. Pressing CUE while in high speed mode causes audio to turn on for duration switch is held. CUE is also used in conjuction with ELSA switch.
7. **Cue Lamp —** On when in a CUE mode.
8. **ELSA (Erase, Locate Splice, Azimuth) Switch —** Pressed and held in conjunction with CUE causes automatic cartridge preparation cycle to begin. NOTE: the ELSA switch must be pressed first and held while the cue switch is pressed. Pressing only the ELSA switch during any ELSA cycle sets up an automatic stop at the end of that particular cycle. Simultaneous illumination of RUN, CUE, and READY LAMPS verifies that the machine has accepted this command.

   Pressing and **holding** both ELSA and CUE switches until first flash of the CUE lamp will automatically skip the automatic azimuth cycle (for erase and splice locate only). Allowing CUE lamp to flash twice before releasing switches will automatically skip the azimuth and erase cycles (for splice locate only).
9. **Record Set Switch** Active only in the READY mode. When pressed, external audio signals are switched into the recording amplifier circuit. Pressing START causes the recording process to begin.
10. **Record Set Lamp** A visual indication showing that the machine is either ready to record or in the process of recording.
11. **1 kHz Cue Record —** Enables the operator to record a 1 kHz primary cue tone at any desired time as in the case of editing a tape. Automatic timing of the tone length is controlled by the micro-processor. The switch is active in a playback or recording mode. The 1 kHz cue detector is defeated while switch is depressed. (See Figures 2-8, 2-9, and 2-10.)
12. **1 kHz Cue Defeat —** Active only in a RECORD preset mode (no tape running -- READY and RECORD lamps on). When pressed, LED (directly above switch) latches on as an indication that the 1 kHz cue tone will not record automatically when the cartridge is started. (See Figures 2-8 through 2-10.)
13. **Secondary Cue Switch —** Active in either record or playback modes. Used to record a secondary cue tone

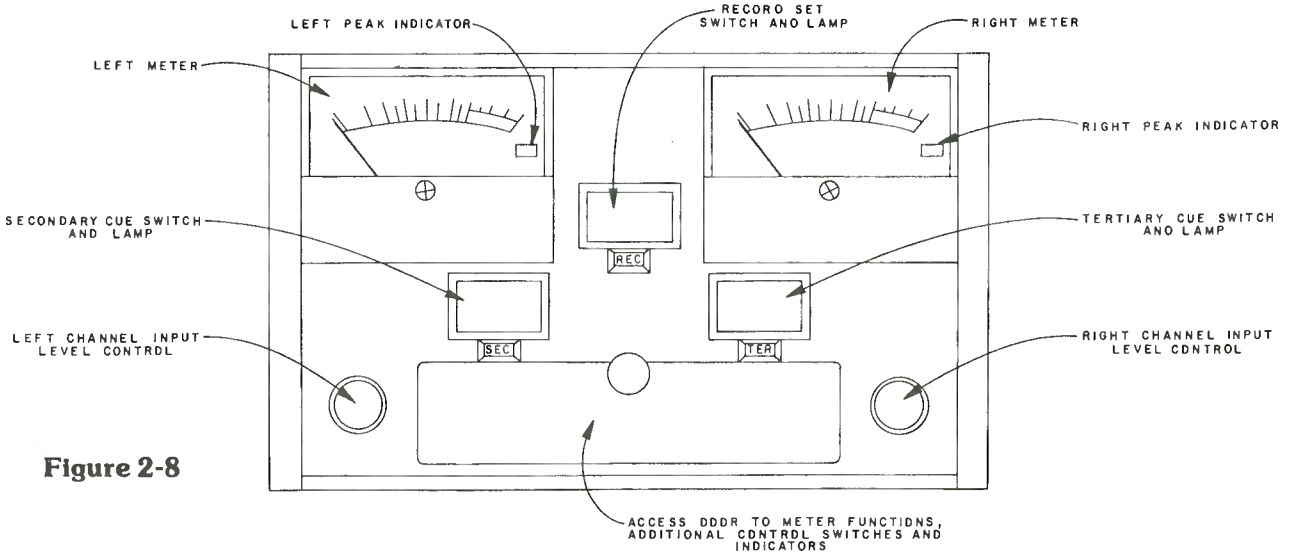



**Figure 2-8**

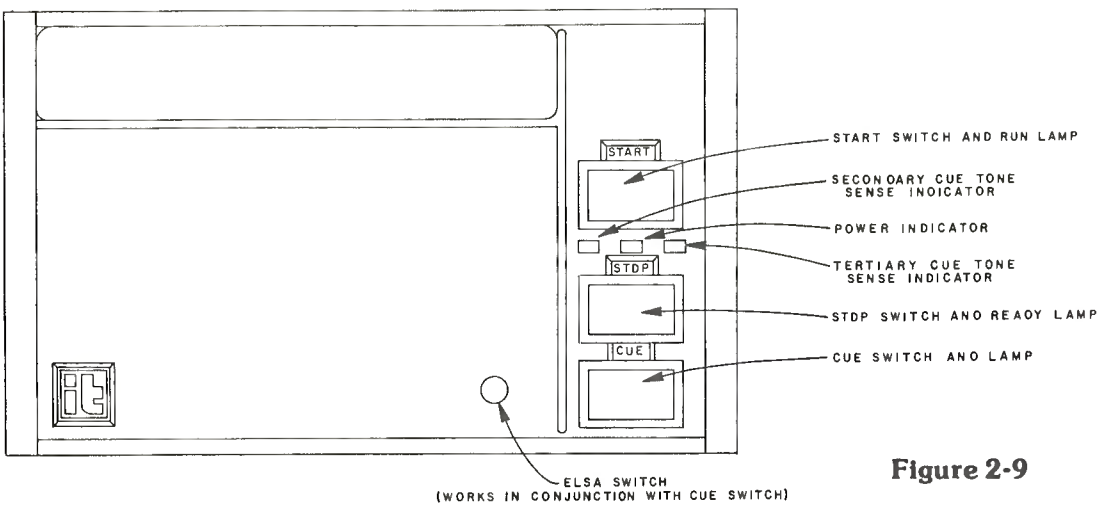



**Figure 2-9**

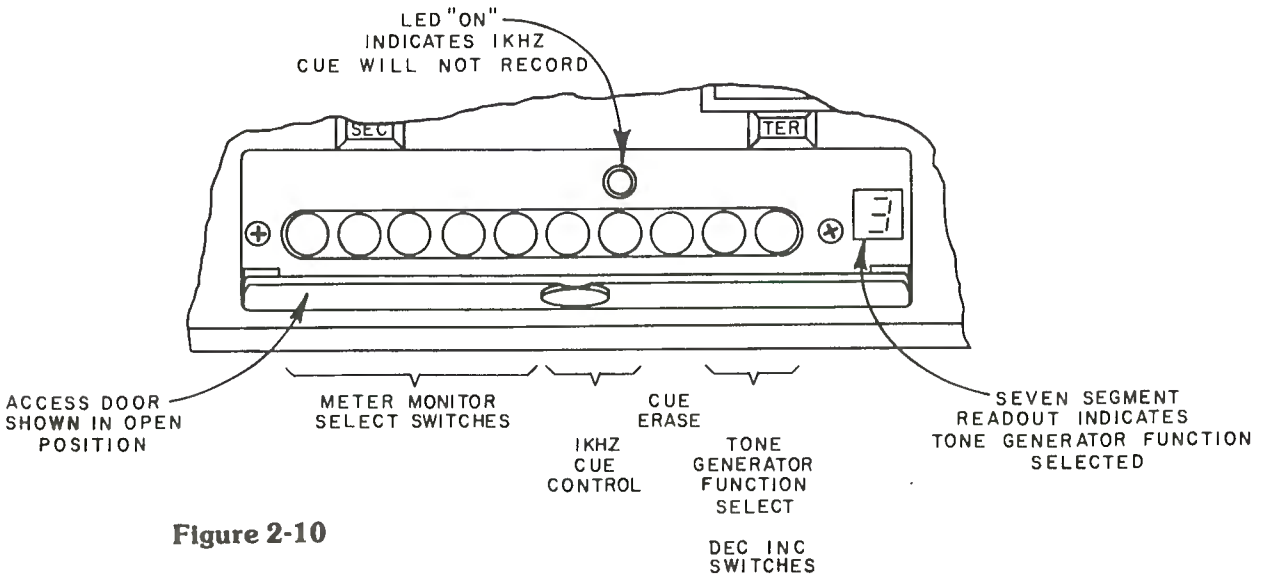



**Figure 2-10**

(150 Hz) on the cue track. The secondary LED (green) on the playback chassis illuminates and a remote switching signal occurs upon sensing of the cue tone. As supplied from the factory, high speed recue is initiated at the end of secondary cue tone when the unit is in playback mode. Jumpers provided on Play Logic Card to defeat high-speed cue if desired.

14. **Tertiary Cue Switch —** Active in either record or playback modes. Used to record a tertiary cue tone (8 kHz). Illumination of the tertiary LED (yellow) on the playback chassis and a remote switching signal occurs upon sensing of the tone. Reproducer can be programmed (jumper optional) to initate high-speed recue at the end of tertiary tone rather that secondary tone, if desired. Jumpers located on Play Logic Card.

15. **Cue Erase Switch —** Active only in playback after first 1.5 seconds of tape travel. This prevents accidental erasure of primary cue tone which, if desired, can be erased when tone appears again at end of tape. Erases cue track data only during the time the switch is pressed. See Figure 2-10.

16. **Decrement and Increment —** Test tone generator control, active in Record. Pressing and holding either switch will automatically clock the seven segment readout from 1-7 (INC) or 7-1 (DEC). Releasing the switch stops the clocking, causing the readout to remain in the selected mode (number). Starting the transport then causes the selected tone (tones) to record. The output of the generator is also accessible through the remote connector described earlier. The seven functions include:

0 — OFF (readout blank)
1 — 1 kHz at OVU reference level
2 — 1 kHz at -10 dB
3 — 10 kHz at -10 dB
(modes 2 and 3 may be used for bias calibration, rough azimuth and equalization maintenance).
4 --14.5 kHz at -10 dB (for fine azimuth adjustment).
5 -- Slow frequency step including 50 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz, 10 kHz, 12.5 kHz, 14.5 kHz and ends with a continuous 3150 Hz tone for use in measuring wow and flutter. All tones (except 3150 Hz) are 8 seconds long.
6 -- Hold -- indefinitely holds any of the frequencies used in modes 5 or 7.
7 — Same as 5 except duration of frequencies is 4 seconds each.

Pressing the RECORD switch will automatically reset modes 5 or 7 to the beginning step frequency of 50 Hz.

The reference level of the tone generator is internally adjustable as well as variable through the use of the front panel level controls. The factory setting of the 1 kHz 0 VU reference tone is matched to an equivalent 0 dBm input signal. To make optimum useage of the tone generator reference level it is recommended that the internal level adjustment be made to match the buss reference level commonly used in the user's application. In this manner, the front panel level controls can always be easily recalibrated using the internal reference tone generator, eliminating the need to "patch-in" an external tone oscillator. See Section V for information regarding this adjustment.

17. **Peak Indicators —** Located on the lower right hand side of the level meters, used to indicate peaks (which the meters cannot follow due to ballistics) and also to indicate tape saturation. The peak circuitry monitors the audio information as it is fed to the recording head, thereby, "seeing" the contouring effects of the amplifier and giving a relatively true indication of when tape is being saturated. The factory setting is +8 VU, but may be reset to almost any desired trip point, depending on the saturation point on

the type of tape used. (For Scotchcart, this setting should be +12 VU.) This adjustment is outlined in Section V, Electrical Adjustments.

18. **Meter Monitoring —** For monitoring of the following:
    a. Normal Record -- input level. Automatically switches to Program Playback when machine is not recording.
    b. Program Playback
    c. Program Bias
    d. Cue Bias
    e. Cue Play

    All switches are accessible directly behind the front panel Special Functions door.

## E. OPERATIONAL OPTIONS

1. **Playback Logic Control Board —**
A 16 pin DIP socket is located on the playback control board in which special DIP programming jumpers are loaded. Positioning the DIP programming jumpers in the stated positions (counting top to bottom) will cause the following logic (operational) changes to occur. Positions 1 thru 3 are jumper storage positions. (See board pictorial , page for details.)

Position 4 - Ready lamp will not flash after cartridge has played thus defeating any visual indication that cartridge has played.

NOTE: Position 7 option must not be used if Position 4 option is selected.

Position 5 - Audio will not mute in high speed.

Position 6 - Automatic high speed operation with sensing of secondary cue (150 Hz).

Position 7 - Cartridge is prevented from restarting after first play until removed and reinserted into the machine. Ready lamp also flashes after play of cartridge.

Position 8 - Automatic high speed operation with sensing of tertiary cue tone.

Relays may be substituted for the open collector outputs of the 150 Hz and 8 kHz cue tone detectors.

2. **Reproduce Amplifier Board —** Provides output level range select for preservation of best signal-to-noise ratio -- DIP programming jumpers are located in the the upper left hand (left channel) and the upper right hand (right channel) corner of board. See board pictorial , page for details.

    A ..... -18 dBm to - 1 dBm
    B ..... -10 dBm to + 7 dBm
    C ..... -5 dBm to +12 dBm
    D ..... +1 dBm to +18 dBm

3. **Playback Output Impedance —** See the playback mother board drawing in Section VI. 600 ohms is standard.
4. **ELSA Board (when supplied) —** Erase only, azimuth only, splice only, or any combination may be inhibited by appropriately locating the plug-in DIP programming jumpers in the 14 pin DIP socket.

    S -- Splice locate only
    E -- Erase only
    A -- Azimuth only

5. **Recorder Input Impedance —** 20K ohms bridging is standard. The input may be terminated by a 150 ohm or 600 ohm resistor (already loaded on the recorder mother PC board) by adding a strap in the appropriate location. See the Recorder Mother Board drawing in Section VI.
6. **Input Level Strapping —** 4 input strap options are provided to insure best signal-to-noise performance and greater control ease with the front panel level controls. -20, -10, 0, and +10 dBm input ranges are selectable by strap (See Recorder Mother Board drawing Section VI).

# SECTION III. MECHANICAL ADJUSTMENTS

## III. MECHANICAL ADJUSTMENTS

### A. IMPORTANT CONSIDERATIONS

The rugged mechanics built into Series 99B cartridge machines are designed to provide extremely reliable and long-term operation with only a minimum of simplified adjustments. The sequence in which mechanical adjustments are completed, however, is important due to the fact that many of these adjustments are inter-related. Therefore, if a complete check of all mechanical adjustments is required, start at the beginning of this section and follow the proper sequence.

Alignment gauges to which references are made are available from ITC.

The pressure roller pressure gauge, 830-0032-021 has been designed for use in the ITC Series 99B only. When utilized for either checking or adjusting pressure roller pressure, a clear understanding of its purpose will be most helpful in making an accurate and speedy set-up.

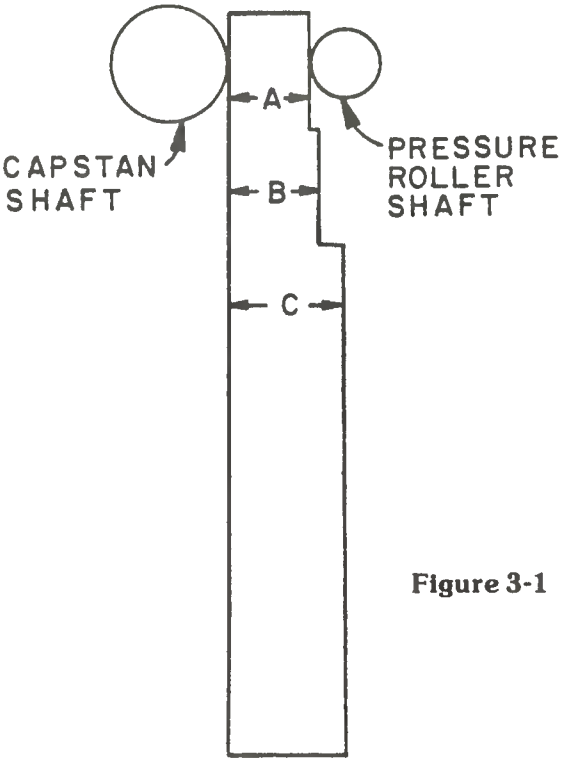
The three primary width dimensions are shown to the right. Dimension "C" is a low-tolerance dimension, and should never be used to measure any mechanical parameter in the Series 99B. Its prime function is as a handle and may be held at this point, or at any place along its length.

Dimensions "A" and "B" are used to measure the range of pressure roller pressure. Dimension "A" measures maximum roller pressure. Dimension "B" is used to show when pressure roller pressure is too low. The pressure of the pressure roller is properly adjusted when dimension "A" slides between the capstan shaft and pressure roller shaft and dimension "B" does not. This measurement should be made when the unit is warm and without tape running. This operation is shown in Figure 3-1.

### B. PRESSURE ROLLER SHAFT/CROSS SHAFT CLAMP ADJUST

This adjustment is made at the factory and should not normally have to be repeated unless a parts replacement (solenoid, chain, spring clevis screw, or cross-shaft clamp) has been made in the solenoid linkage assembly. If adjustment is not required, skip ahead to part "C" of this Section.

1. Check to see if the steel roll pin protruding from the cross shaft clamp is inserted between the 9th and 10th connector pins in the linkage chain, counting from the retaining spring. See Figure 3-2.




GAUGE, SOLENOID SET-UP
(830-0032-021)

**Figure 3-1**

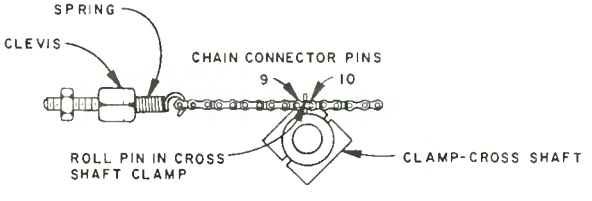



**Figure 3-2**

2. Loosen the clevis lock nut and rotate the solenoid plunger and the lock nut until the dimension shown in Figure 3-3 is attained. The lock nut must be finger tight against the plunger.
3. Remove the Capstan Motor Control PC Board from the machine and then actuate the cartridge sensing switch with a rubber band or other device so that both hands are free to make the following adjustments.
4. Loosen the screws in the cross-shaft clamp (Figure 3-3). Adjust the screws so that the clamp is snug on the shaft but can be moved with a small amount of force.
5. Notice the location of the pressure roller. Use a #54 drill or equivalent feeler gauge (.055") and insert it between the right hand edge of the deck opening and the pressure roller as illustrated in Figure 3-4. If the roller is not located properly in the deck opening, it must be moved to the right or left. Failure to locate this assembly properly may cause mechanical interference on some cartridges.
6. Press the START switch to energize the solenoid. NOTE: The solenoid plunger should "bottom" against the seat of the solenoid. Press the pressure roller against the capstan shaft and compress it approximately 1/64 of an inch at its contact point with the capstan. See Figure 3-3. While holding it in this position, tighten the two cross-shaft clamp screws. Press the STOP switch and recheck the location of the pressure roller in the center of the deck opening (Step 5). If it has changed location, repeat steps 4-6.

## C. CAPSTAN SHAFT (MOTOR) POSITION

The following adjustment is only necessary if a motor or solenoid has been removed. The adjustment should be checked any time a new pressure roller is installed.

NOTE: The pressure roller capstan shaft locator gauge (ITC part #830-0027-021) and the pressure roller pressure gauge (ITC part #830-0032-021) are required for the following procedure.

1. Remove the pressure roller and place the special locator gauge (830-0027-021) over the pressure roller shaft and capstan shaft simultaneously as illustrated in Figure 3-5. Do not force the gauge into position as this may cause damage to either the capstan or pressure roller shaft.
2. If the gauge does not fit over both shafts simultaneously, loosen the two motor mounting screws and reposition the motor so that the gauge

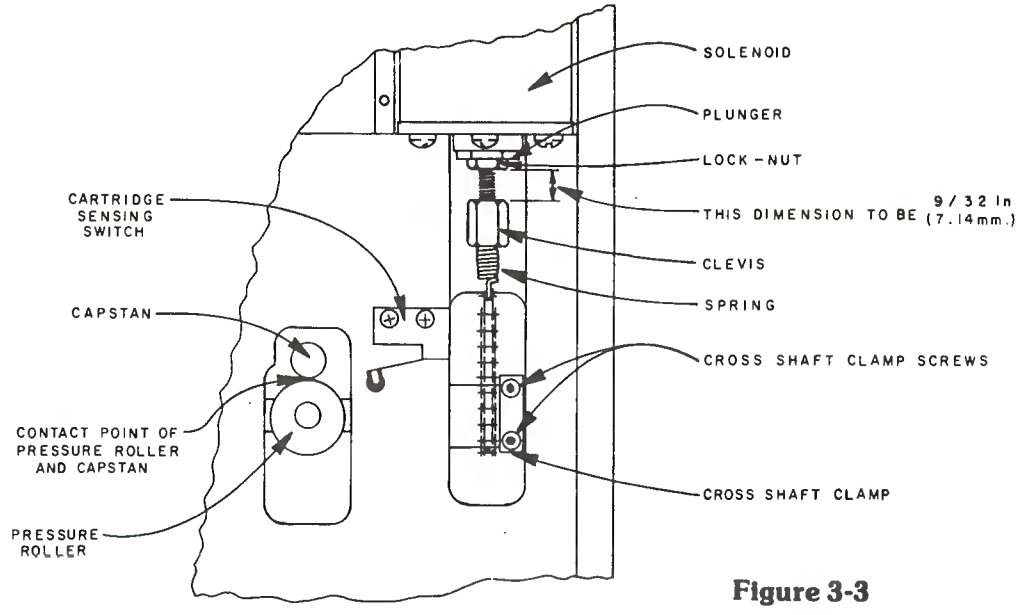
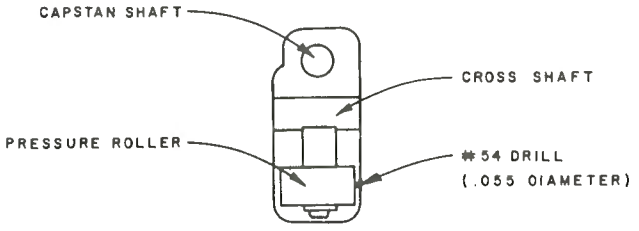



**Figure 3-3**

does slip over both shafts. With the gauge 830-0027-021 in place, take gauge 830-0032-021 (pressure roller pressure gauge) and insert it with the "go" (1st step) end between the pressure roller and the capstan shaft. (See Figure 3-6.) If the "no go" (2nd step) end slips between the two shafts, loosen the motor mounting screws and adjust so only the "go" (1st step) section will slip through easily.




CORRECT LOCATION OF PRESSURE ROLLER IN DECK

**Figure 3-4**

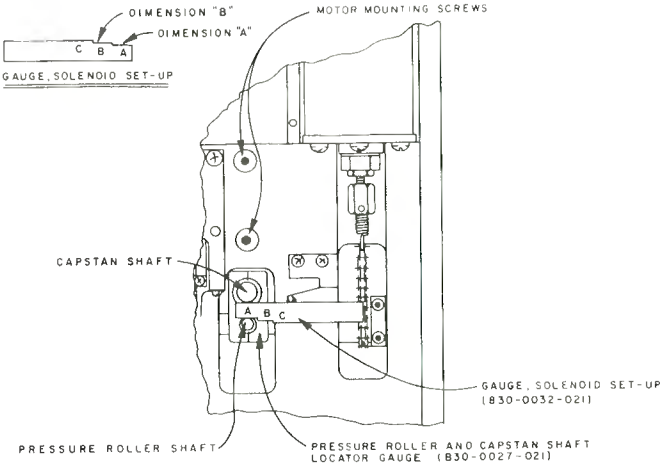



**Figure 3-6**

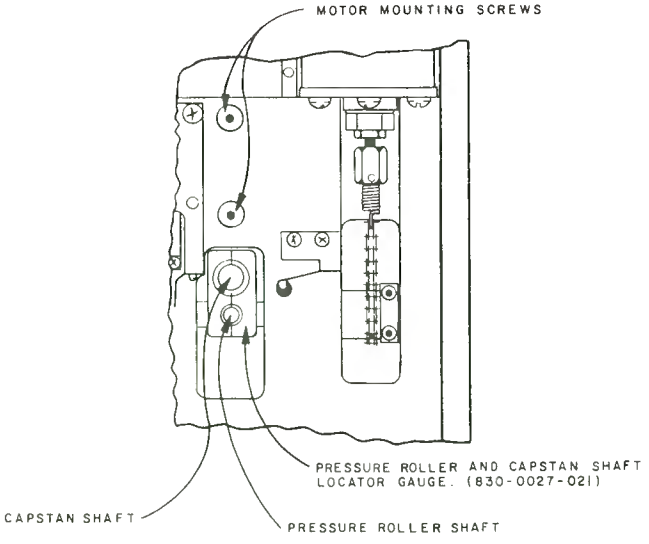



**Figure 3-5**

3. Carefully tighten motor mounting screw while making certain that the scribed line on top of the motor locating gauge is parallel to the opening of the deck. (See Figure 3-5.) This is the proper position of the pressure roller shaft as related to the capstan shaft.
4. Remove the two gauges from the machine and install the pressure roller. The steel washer fits over the shaft first, followed by the pressure roller, nylon washer, and the retainer clip.

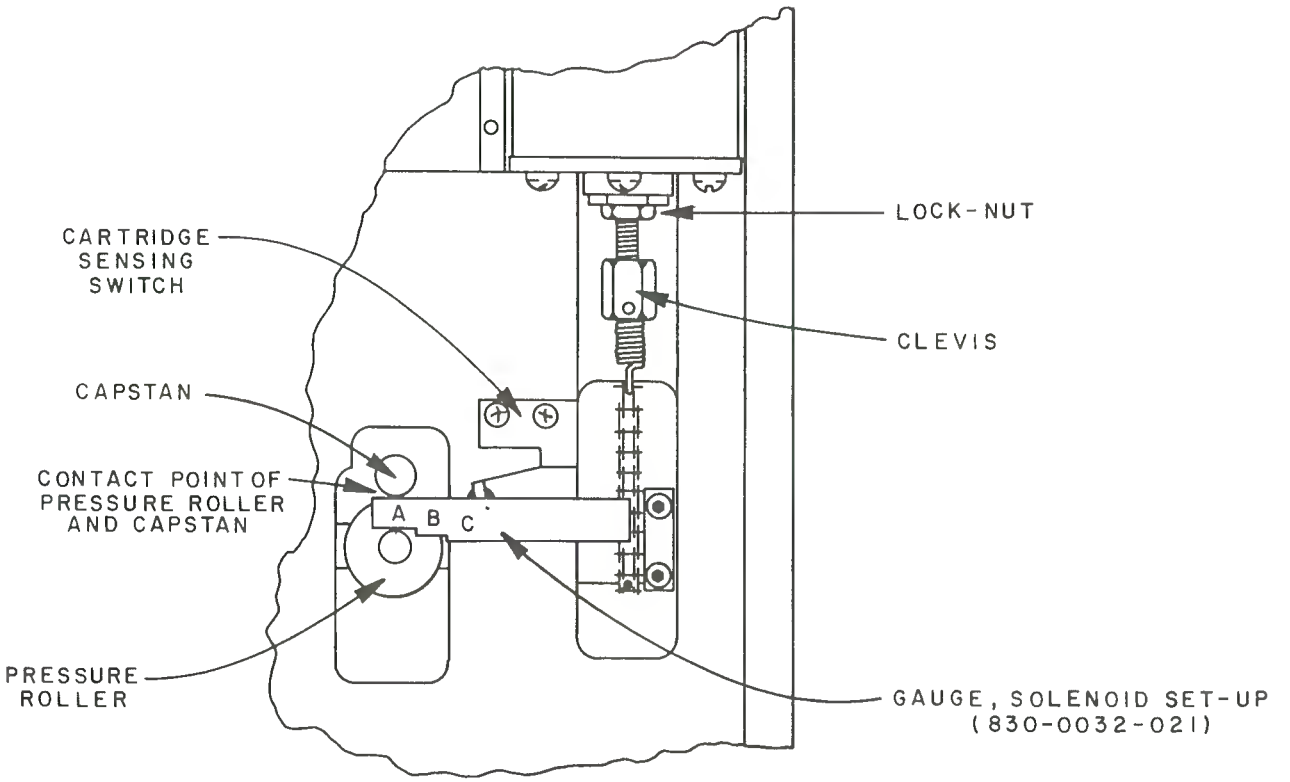



**Figure 3-7**

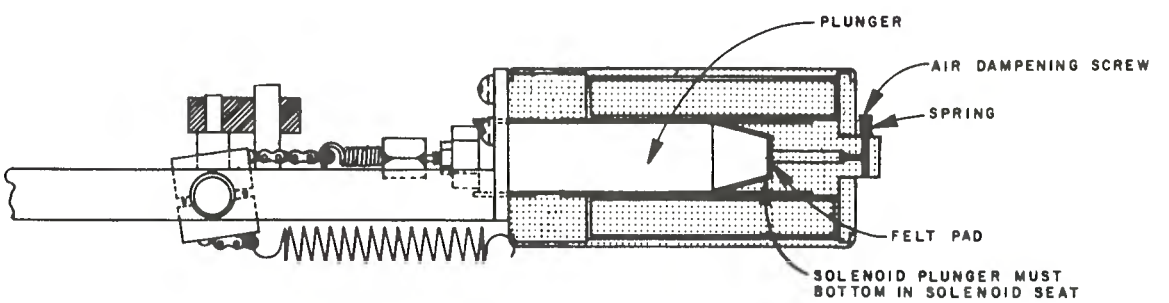



**Figure 3-8**

## D. PRESSURE ROLLER PRESSURE/SOLENOID ADJUSTMENT

(Performed with Motor Running)

This adjustment will normally be required only after parts replacement; but for best results, a check of the pressure roller/capstan pressure should be on the routine maintenance schedule.

1. With pressure roller installed, turn power on machine. Holding cart sensing switch closed, press start switch.
2. With the solenoid engaged (plunger bottomed) and pressure roller running on capstan, place gauge 830-0032-021 with "go" (1st step - Dimension A) end between pressure roller shaft and capstan shaft. (See Figure 3-7.)
3. The "no go" (2nd step - Dimension B) section (see Figure 3-7) should not slip through. If it does go, the plunger is to be rotated counter-clockwise until the "no go" (2nd step - Dimension B) will not slip through. If the "go" (1st step - Dimension A) end of the gauge will not slip through, the plunger is to be rotated clockwise until the "go" (1st step) end will slip through easily.
4. Once this setting has been obtained, tighten the 10-32 lock nut on the clevis to the plunger.

## E. SOLENOID DAMPENING ADJUSTMENT

Figure 3-8 illustrates the location of the screw used to adjust the air dampening of the solenoid plunger. The speed of the solenoid operation is proportional to the speed at which air is allowed to move through the small hole in the solenoid seat. The noise of the solenoid operation shares the same relationship.

Adjustment requires turning the screw clockwise for more dampening and the opposite for less. It is important to note that too much dampening will affect the start and stop time of the cartridge, therefore, the minimum dampening necessary is the most desirable.

## F. CARTRIDGE GUIDANCE SYSTEM ALIGNMENT

Optimum performance from the Series 99B machine and the tape cartridges can only occur if the cartridge is positioned accurately and consistently in precisely the same location each time it is inserted into the machine. A means of cartridge guide alignment can be achieve by using a specially marked cartridge as illustrated in Figure 3-9. Use a point or scriber and mark a cartridge as shown.

Refer now to Figure 3-10 in which the cartridge is shown in its properly aligned position. If the alignment cartridge does not position as illustrated, remove the left hand cartridge guide completely and loosen (do not remove) the mounting screws on the right hand cartridge guide. Position the cartridge to the right or left until the scribed lines are located directly over the heads as shown. Be certain that the front edge of the cartridge seats firmly and squarely against the tape guide screws. With the cartridge held securely in this location, position the right hand cartridge guide firmly against the side of the cartridge and then tighten down both cartridge guide mounting screws.

Remove the cartridge and reinsert it into the machine forcing it to slide squarely against the right hand guide. Check the alignment again, if it is not exactly positioned, repeat the alignment procedure.

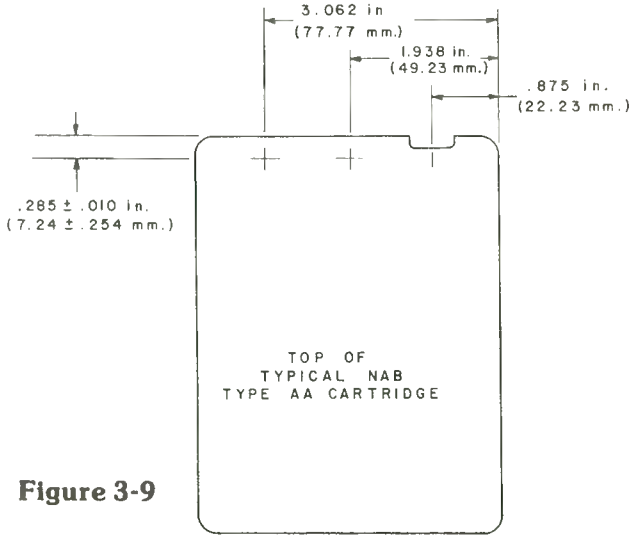



**Figure 3-9**

NOTE: It is very important that this alignment be made as accurately as possible and that it is consistent in all other cartridge machines in the system. Failure to achieve consistent alignment from machine to machine will create inconsistent tape travel path and thus phase error on stereo machines and azimuth level errors on mono machines. Check the position of the capstan shaft and pressure roller shaft. If they are not correctly positioned, repeat steps III B and C before proceeding.

Mount the left hand cartridge guide as illustrated in Figure 3-10.

## G. TAPE GUIDE ADJUSTMENT

Series 99B units use three independent tape guides to provide optimum tape guidance outside of the cartridge. The left tape guide has been specially formed to provide clearance for the cartridge corner post area.

1. Check the positioning of each tape guide by advancing the tape height gauge into the tape guide as shown in Figure . The gauge should advance fully into the tape guide without friction, while resting flat on the deck -- not tilted as shown by the dashed line (or its opposite) in Figure 3-11. **The tape height gauge must be demagnetized so that it will not magnetize the "heads".** If gauges become magnetized, they can be de-Gaussed using a standard bulk eraser.
2. If adjustment is required, loosen the two mounting screws.
3. Keeping the tape height gauge flat on the deck, position the tape guide as shown in Figure 3-11. Position the tape guides as close to the head as possible without contacting the head mounting blocks or any parts mounted on these blocks. Keep the tape guide vertical.
4. Tighten the tape guide mounting screws and recheck the adjustment.
5. Check and adjust the other tape guides as required. The slot in the tape guide is .249 inch wide (actual tape width is .248, +.000, -.002 inch). The width of this slot can also be properly gauged with the tape height gauge. The arm on the gauge should advance fully into the slot without friction, but there should be no room for noticeable movement of the tool in the slot.

## H. HEAD HEIGHT AND ZENITH ADJUSTMENT

The magnetic tape head nearest the capstan shaft is the reproducing head. The head farthest from the capstan is the recording head except on playback only machines. A dummy head is mounted in this position on playback machines in order to maintain constant tension on the tape and thus minimize wow and flutter and improve tape guidance.

The adjustment procedure outlined below should be followed in positioning both the reproducing and recording heads. Only height and zenith adjustments are required for a "dummy" head. See Figure 3-12 for the location of the adjustment screws.

1. Loosen the lock nut by turning it counterclockwise approximately two complete turns.
2. Coarse Height: Adjust the Front Height Set Screw until the top of the upper head track (pole piece) is 9/16 of an inch (14.29 mm) above the deck surface.
3. Coarse Zenith: Adjust the Rear Height Set Screw until the face of the head is perpendicular with the surface of the deck. Position the Tape Height Gauge, or any gauge known to be square, on the deck surface and move it against the face of the head as shown in Figure 3-13. **The gauge must be demagnetized before making adjustments. Be careful to avoid scratching the face of the head.** When the head is perpendicular, the face of the head and the "square" will be flush.
4. Fine Height and Zenith: This adjustment is made using the alignment gauge.
   a. Position the gauge in front of the face of the head as the tape would be positioned if it were being played as shown in Figure 3-11.
   b. Alternately adjust the Rear and Front Height Set screws to position the top of the upper head track (pole piece) so that it is

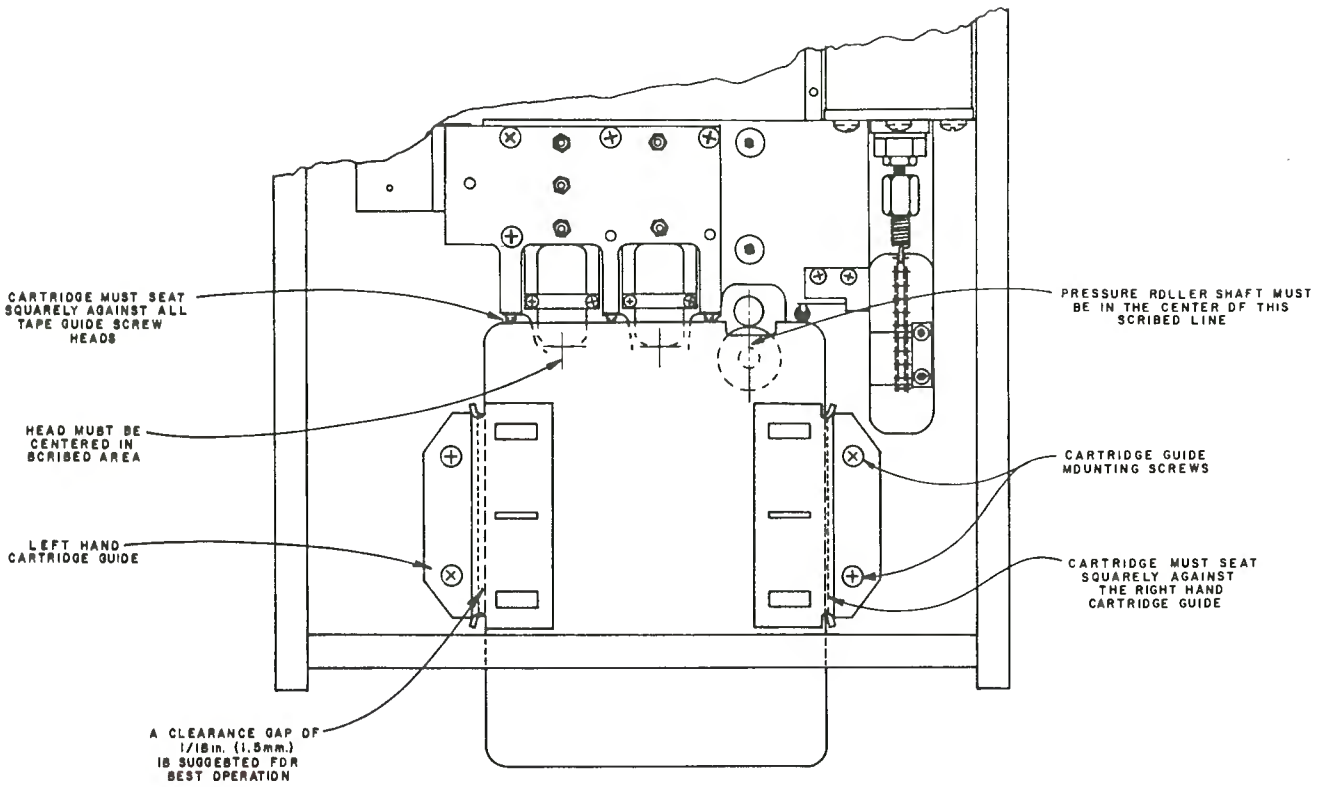



**Figure 3-10**

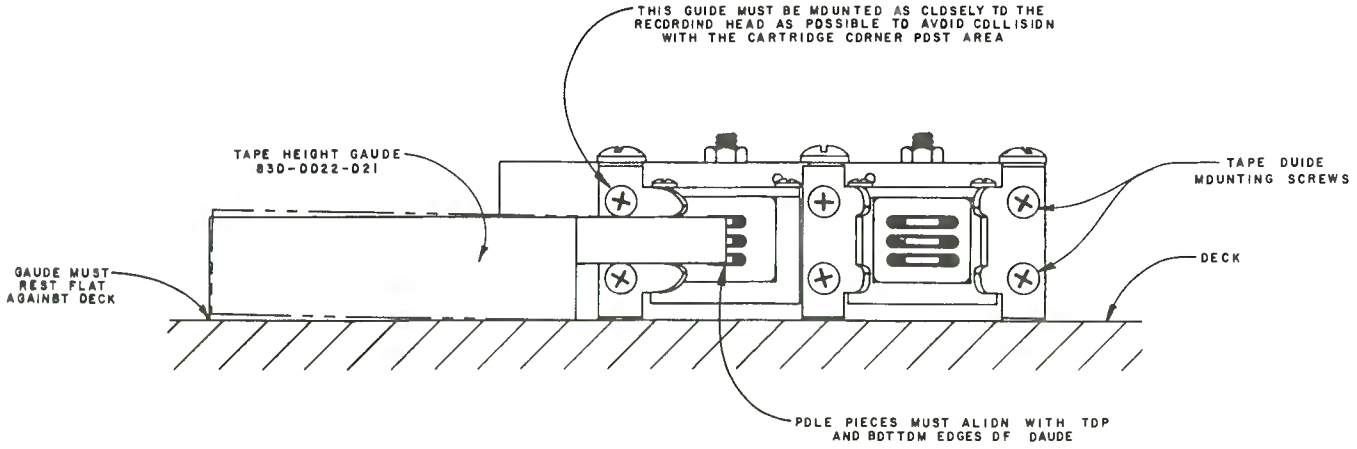



**Figure 3-11**

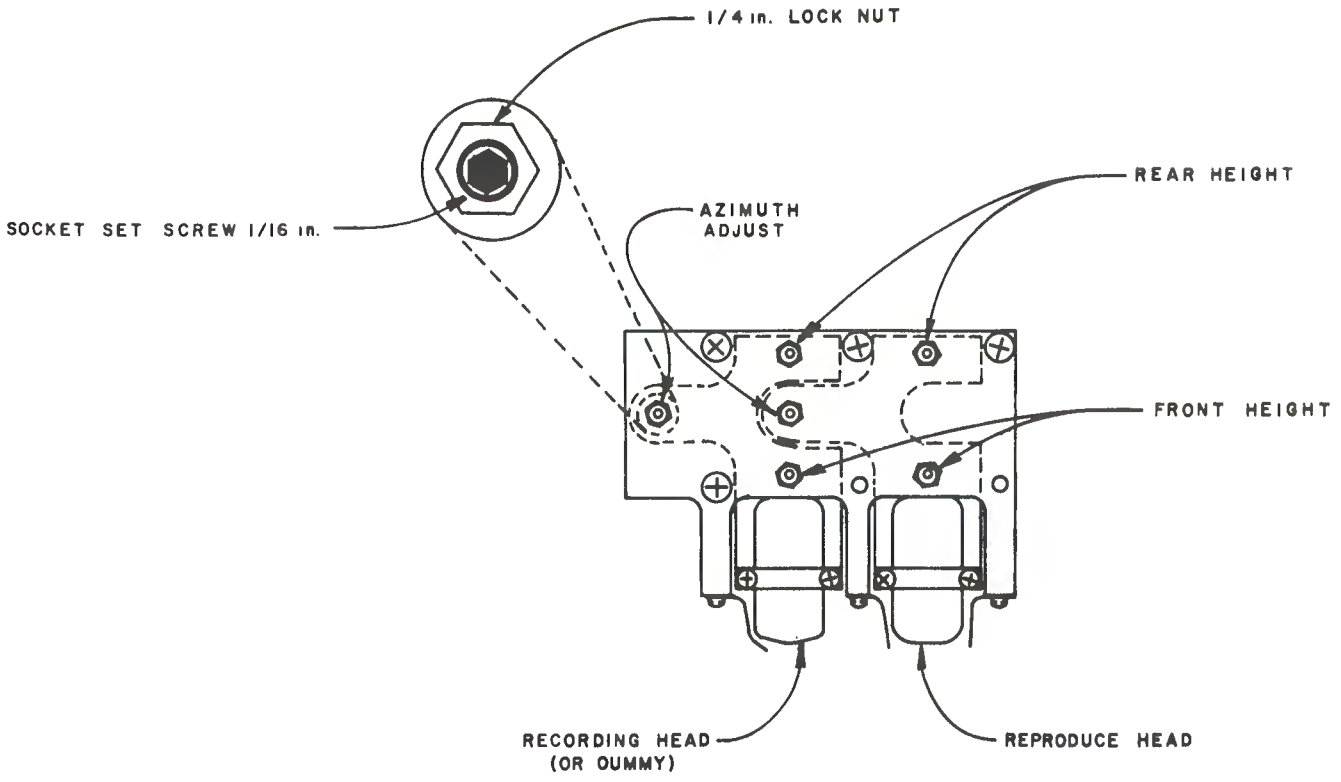



**Figure 3-12**

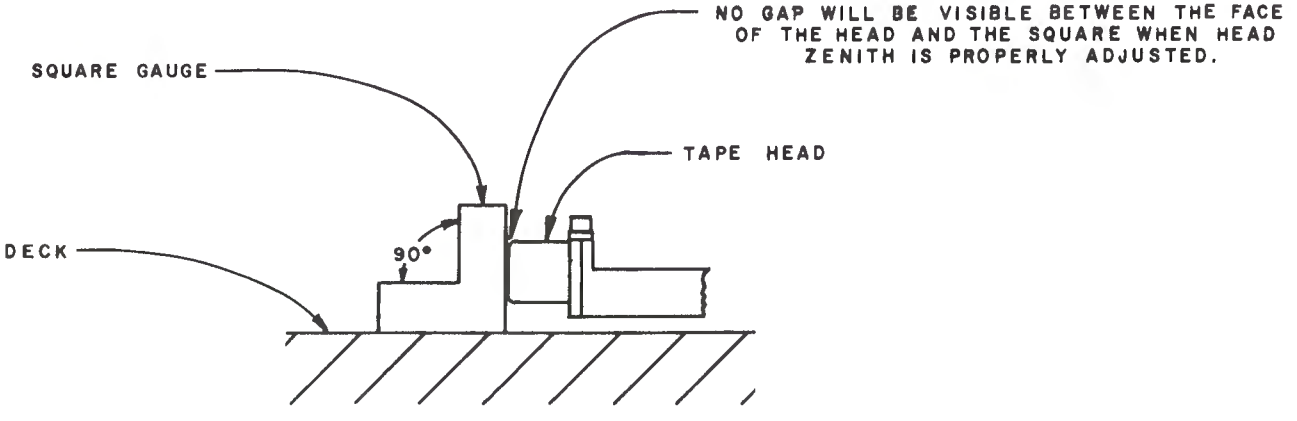



**Figure 3-13**

even with the upper edge of the gauge, and to position the bottom of the lower head track (pole piece) so that it is even with the lower edge of the gauge. The set screw should be adjusted by equal amounts in the same direction to maintain zenith.

c. Recheck the zenith of the head as instructed in step 3. If adjustment is necessary, height must also be rechecked and adjusted until both height and zenith are correct.

d. Carefully tighten the Front and Rear Height Lock Nuts. Recheck the height and zenith adjustments. If a change has resulted, repeat the Fine Height and Zenith adjustment.

## I. MONOPHONIC HEAD AZIMUTH ADJUSTMENT

Before attempting these adjustments insure the following: the mechanical adjustment of the tape guides, as outlined in Section III G, and the adjustment of height and zenith of both the Record and Reproduce heads (or Reproduce and "dummy" in Reproduce only machines), as outlined in Section III H, are correct.

1. Reproduce Head Azimuth Adjustment:
   a. Connect a 600 ohm load to the reproduce amplifier output terminals. Connect a high impedance voltmeter across this load.
   b. Insert a 15 kHz Standard Azimuth Alignment Tape and start the machine.
   c. Adjust the reproduce head azimuth set screw (refer to Figure 3-12 for location) to produce maximum output level.
   d. Carefully tighten the lock nut observing the voltmeter to insure that no change in output level occurs.
2. Record Head Azimuth Adjustment

Be aware that changes in azimuth to the "Master" Record head can result in azimuth errors in all the Reproduce machines within a system unless the resultant azimuth is carefully checked against each of these Reproducers. Any change in azimuth of the record head should be attempted ONLY AFTER all mechanical adjustments are carefully checked and the "Master" Reproduce head is aligned to the 15 kHz Standard Azimuth Alignment Tape as above.

a. Select an erased 3-1/2 minute cartridge which is known to have consistently good operating characteristics. It is suggested that this cartridge be set aside and used only for recording head adjustments. It thus will become the standard for your operation.
b. Connect a 600 ohm load to the Reproducer output terminals. Connect a high impedance voltmeter across this load.
c. Set the internal tone generator to function #4 (14.5 kHz at - 10 VU) and adjust the Normal Record Level to - 10 VU.
d. Start the recorder and adjust the azimuth set screw on the record head to produce maximum output level. See Figure 3-12.
e. Carefully tighten the lock nut observing the voltmeter to insure that no change in output level occurs.
f. Machines equipped with the automatic azimuth (ELSA) function use a D.C. gearhead motor in place of the recording head azimuth set screw to control the recording head azimuth. Azimuth motor manual control is achieved by shorting control pins 2 to 1 or 2 to 3 on the ELSA PC board. See Figure 3-14. For Mono phase adjustment see Electrical Adjustment V.

## J. STEREO SYSTEM HEAD AZIMUTH ADJUSTMENT

Two track stereo recording-reproducing performance is subject to several contributing mechanical inaccuracies which can cause phase shift in simultaneously monitored reproducer outputs. In stereo systems these phase shifts are generally not perceptable in the final reproduction; however, in cases where monophonic "dubbing" or channel summing is desired, phase shifts can result in serious amplitude variations or drop-outs especially at the higher frequencies. Most common causes of these problems are:

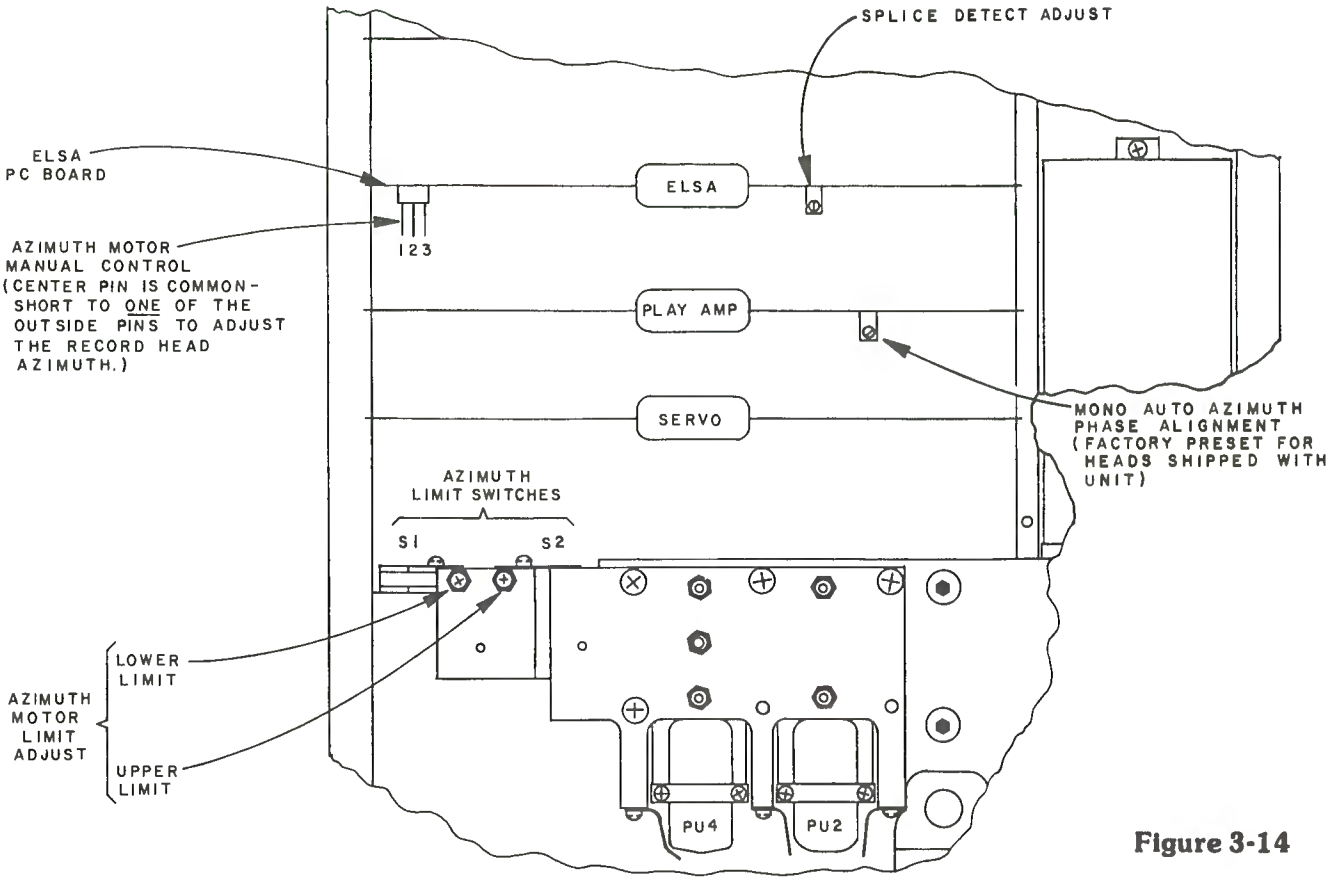



**Figure 3-14**

1. Lateral displacement of the pole pieces with respect to each other within the head case.
2. Improper azimuth of the heads with respect to each other (record head to play head on any reproducer in a system).
3. Improper tape guidance (skew) either within the cartridge or through the tape guide system.

International Tapetronics has attempted to provide the best features possible to assist in the proper guidance of tape outside of the cartridge. Three adjustable tape guides, heavy-duty micro-adjustable patented head module, and the use of "dummy" heads in Reproduce only machines, lend to consistent guidance of the tape through the head assembly. Gauges made available for the purpose of maintaining accurate adjustment and maintenance of these assemblies are other measures taken by ITC to aid the discriminate in maintaining the best possible stereo performance from this equipment. The following tests and adjustments do not preclude the many possible techniques for measuring phase shift, but provide the basis for satisfactory results using a minimum of equipment and skill.

1. Master Reproduce Head Azimuth
   a. Connect 600 ohm loads to both left and right channel outputs. Connect a high impedance voltmeter to the left channel output. Insert a STEREO 1 kHz reference "0" level tape and start the machine. Set left gain control R425 for 0 dBm output. Now connect the voltmeter to the right channel output and adjust right gain control R426 for 0 dBm output.
   b. Insert a 15 kHz STEREO azimuth alignment tape and carefully adjust the playhead azimuth screw for a maximum reading on the voltmeter. Observe the mechanical position of the azimuth screw.
   c. Move the voltmeter to the left channel output. Now, move the azimuth screw a small amount in

either direction and observe the voltmeter reading as an increasing or decreasing output. Continue moving the screw in the direction that produces increasing output until a maximum reading is obtained.

d. Observe direction and amount that the screw was turned to obtain maximum reading on the left output with respect to the previous setting for maximum on the other channel. Set the azimuth screw to the midpoint between these setting to obtain AVERAGE azimuth for the two channels.

e. Connect the horizontal input of a scope so equipped to the right channel output. Insert a STEREO FREQUENCY ALIGNMENT TAPE and start the machine. Adjust the horizontal gain, if provided on the scope to a suitable amplitude. Remove the horizontal input.

f. Connect the vertical input to the same right channel output and adjust the vertical gain to provide a deflection equal to that of the horizontal above.

g. Connect the horizontal input to the left channel output. Run the tape to the 1 kHz section. A pattern such as Figure 3-15A should now appear. If not, reverse the two leads of the horizontal input. This pattern represents the "0" or near "0" phase shift pattern of the system.

h. Allow the tape to run to the 4 kHz section and observe if phase shift has occurred. Refer to Figures 3-15B through 3-15D. If phase shift has occurred, adjust the play head azimuth screw to correct this phase shift in the exact reverse rotation to which it has occurred. This means that if the pattern was increased clockwise from 0 shift as frequency increased, the azimuth screw should be turned in such a way to cause the scope display to rotate CCW back to the "0" position.

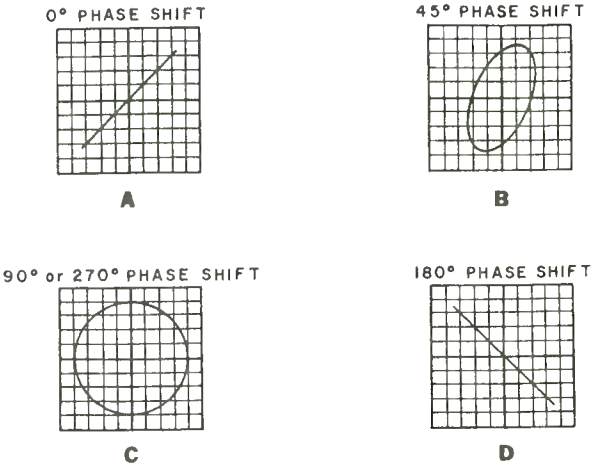



**Figure 3-15**

i. Allow the tape to continue through the various frequencies observing the scope display to insure that no 180° reversals occur. At 16 kHz final adjustment of the azimuth screw can be made to provide best average phase shift. It is normal for shift "jitters" of several degrees to occur at the highest frequencies, so setting should be based on best results. It is desirable to run the tape several times, observing that phase reversals do not occur at any frequency. Tighten the lock nut and observe that no change occurs.

2. Master Record Head Azimuth:

a. Select a 3-1/2 minute cartridge that is known to have consistently good operating characteristics.

b. Set the internal tone generator to Function #4 (14.5 kHz - 10 VU) and adjust the Normal Record level to -10 VU.

c. Start the recorder and adjust the recording head azimuth screw for maximum amplitude of the display on the scope. The scope gains may be adjusted in equal amounts to increase amplitude of the display if necessary.

d. Set the internal tone generator to Function #5 (slow frequency step) and allow the automatic frequency step to begin. As the

frequency increases (beginning frequency is 50 Hz, then 63 Hz, 125 Hz, 250 Hz, etc.) observe the phase rotation on the scope display.

If phase error or reversal begins to occur, slowly adjust the azimuth screw (recording head only) to retain minimum phase shift pattern. Because the step frequency function continues to increase frequency (up to 14.5 kHz) each azimuth adjustment with succeeding tones tends to "fine-tune" the head assembly for a very accurate alignment by the time 14.5 kHz is reached. Repeat this procedure again by pressing REC (resets automatic frequency step routine) and observe the results. When the 14.5 kHz tone occurs, advance to tone generator function #6 (Hold). This will hold the 14.5 kHz tone continuously. Tighten the azimuth lock nut while making certain that the phase does not change.

e. Machines equipped with the automatic azimuth function use a DC gearhead motor in place of the recording head azimuth set screw to control the recording head azimuth. Azimuth motor manual control is achieved by shorting control pin 2 to 1 or 2 to 3 on the ELSA PC board. See Figure 3-14.

3. Other Reproduce Head Azimuth: It is important to realize that all reproducers within a system must be azimuth aligned to the master recorder. To implement this it is necessary to prepare a test cartridge recorded on the master recorder each time any adjustment to this recorder is performed. This cartridge is in turn used to align EACH reproducer in the system, using the technique outlined in paragraph one above.

## K. HEAD REPLACEMENT

ITC Series 99B machines utilize strap-mount type heads to provide quick and easy installation, Figure 3-16.

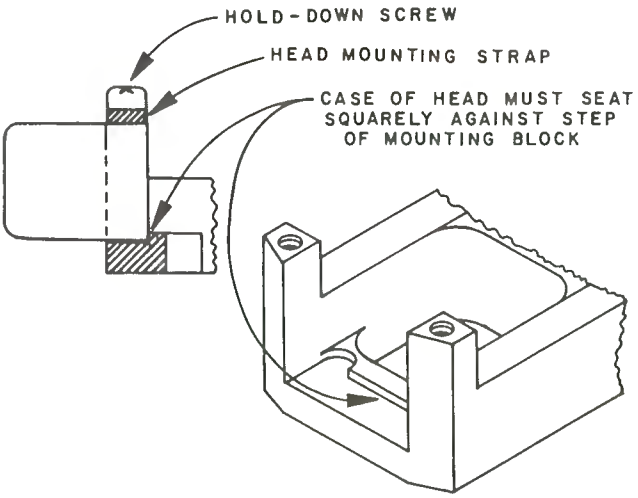



**Figure 3-16**

1. Loosen the two screws in the head mounting strap.
2. Remove the old head and insert a new one. The side of the head with the printing on it should be positioned up.
3. Reconnect the head cables. See the schematic diagram for the color code of the head lead arrangement used. **CAUTION: Use care when reconnecting the head cables as the head pins can be broken off if excessive side pressure is exerted against them.**
4. Follow the procedures outlined in this SECTION regarding height, zenith, and azimuth/phase alignment.

## L. RECORDING HEAD LIMIT SWITCH ADJUSTMENT

(Auto-Azimuth Units Only)

The following alignment procedure is necessary only when the recording head has been replaced. Choose a cartridge of known good operating characteristics which exhibits the "average" azimuth (phase) alignment. Experimentation may be required in order to select this cartridge.

Once a test cartridge is selected, proceed on to the following steps.

1. Insert the cartridge and carefully align the recording head azimuth as outlined in Section III-I or III-J.

2. Loosen the two lock nuts used to secure the Azimuth motor limit-switch screws.
3. Slowly turn the Lower Limit switch screw clockwise, shown in Figure 3-14, until a "click" is heard. The "click" is produced when the switch changes state.
4. Turn the screw counterclockwise exactly 1/2 turn and then secure the lock nut. Do not allow the screw to rotate as the lock nut is tightened.
5. Turn the Upper Limit switch screw counterclockwise until the "click" is heard.
6. Turn the screw clockwise exactly 1/2 turn and secure the lock nut. Again, be careful not to allow the screw to rotate as the lock nut is tightened.

Test to see that the adjustment is correct by observing the scope (or voltmeter on mono units) while manually controlling the azimuth motor. Approximately the same amount of phase "error" of a 14.5 kHz tone being recorded should be observed on both sides of the optimum "0" phase adjustment when manually controlling the azimuth motor to its upper and lower extremes. On mono units, equal level loss should be observed from peak azimuth when manually controlling the azimuth motor to its extremes.

See Figure 3-14 for location of the azimuth motor manual control pins (located on the ELSA PC board). After testing, be certain to re-adjust phasing or azimuth of the recording head as outlined in Section III I or III J.

## M. SPLICE LOCATOR SENSOR ADJUSTMENT

The following adjustment is required when one or more of the following is replaced: solenoid, clevis screw, spring, pressure roller, or capstan shaft.

1. Jumper the unused terminal on the deck microswitch to chassis ground so you can energize the solenoid without a cartridge when you press the start switch.
2. Press start switch to energize solenoid.
3. With solenoid energized and pressure roller running on capstan shaft, loosen the two screws mounting the bracket with the sensing coil on it. See Figure 3-17.
4. Slide the bracket forward placing a business card between the magnet and the head of the screw holding the coil. See Figure 3-18. (The average thickness of a business card is .010 thick.)
5. Tighten the bracket mounting screws.
6. For splice sensitivity adjustment, see Electrical Adjustment, Section V Reproducer Sec. 3 "Splice Detector Sensivity".

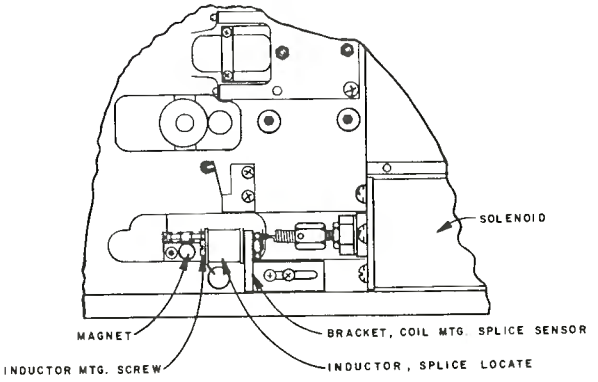



**Figure 3-17**

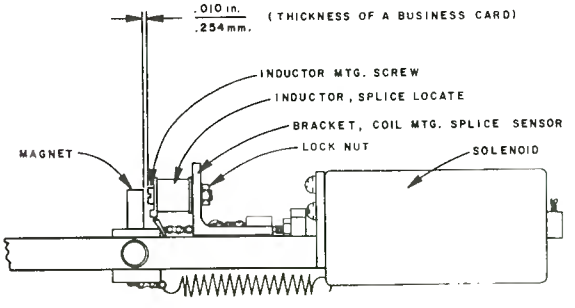



**Figure 3-18**

# SECTION IV. MECHANICAL DRAWINGS

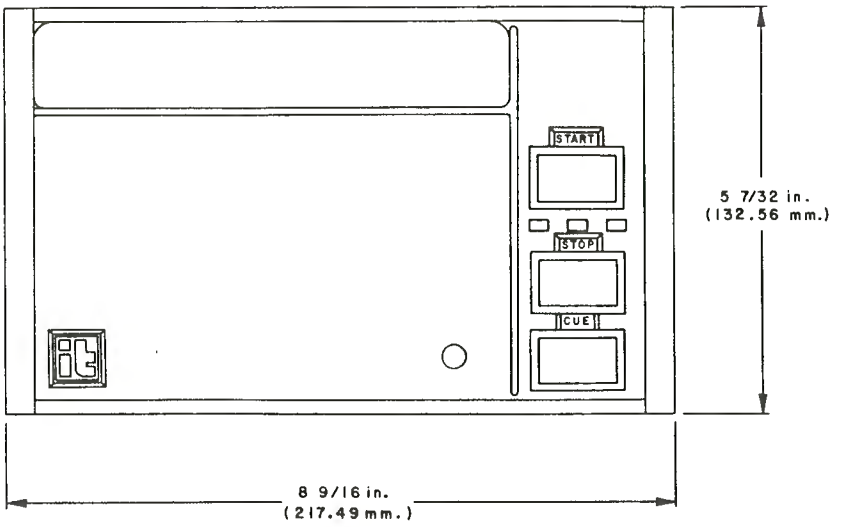



**Figure 4-1**

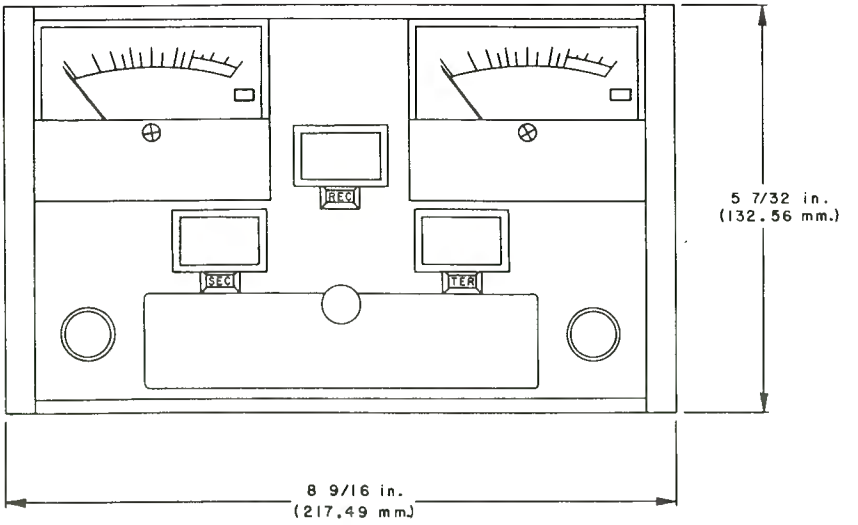



**Figure 4-2**

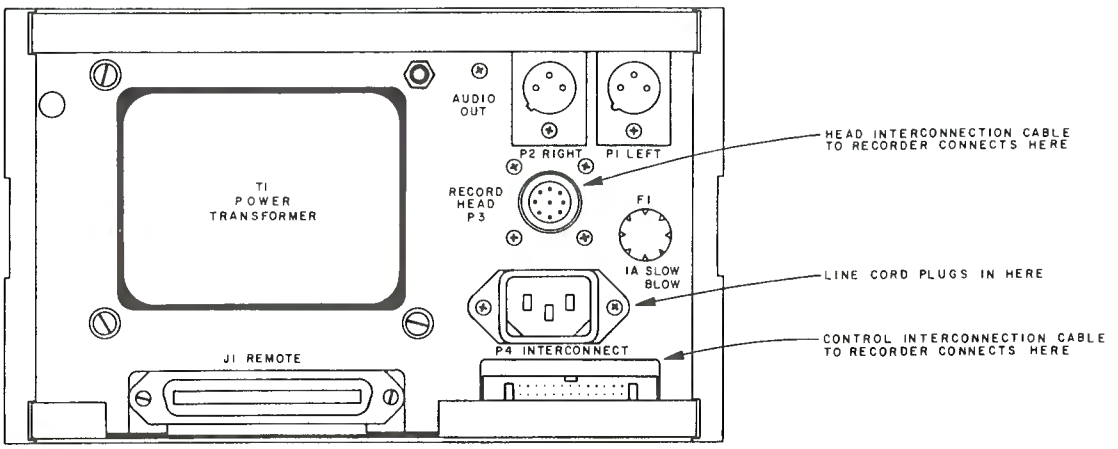



**Figure 4-3**

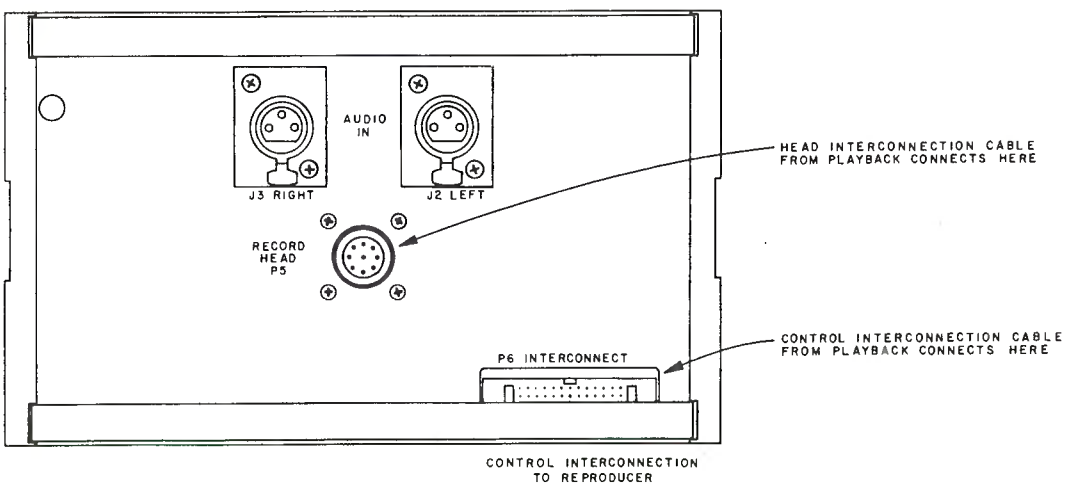



**Figure 4-4**

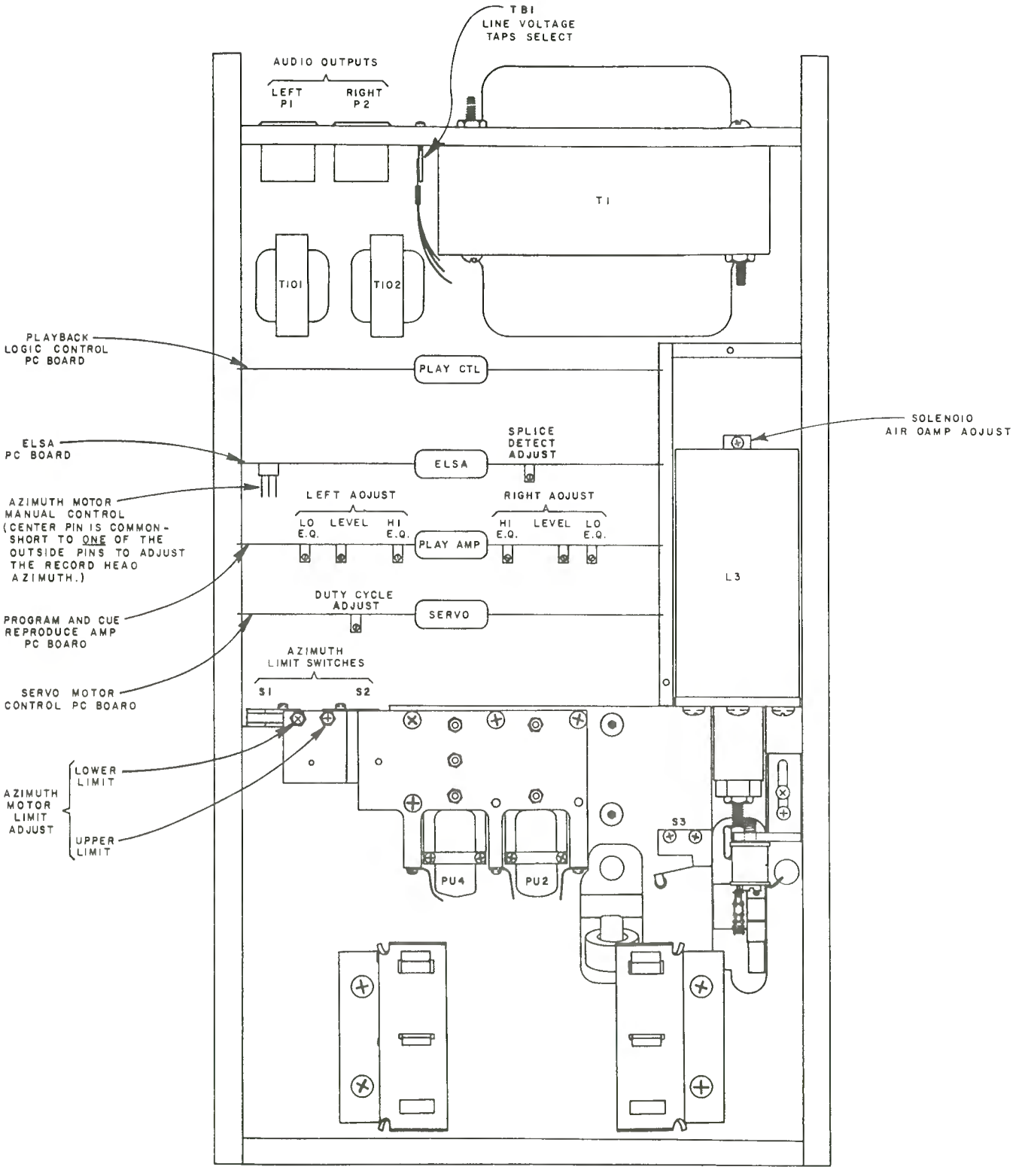



**Figure 4-5**

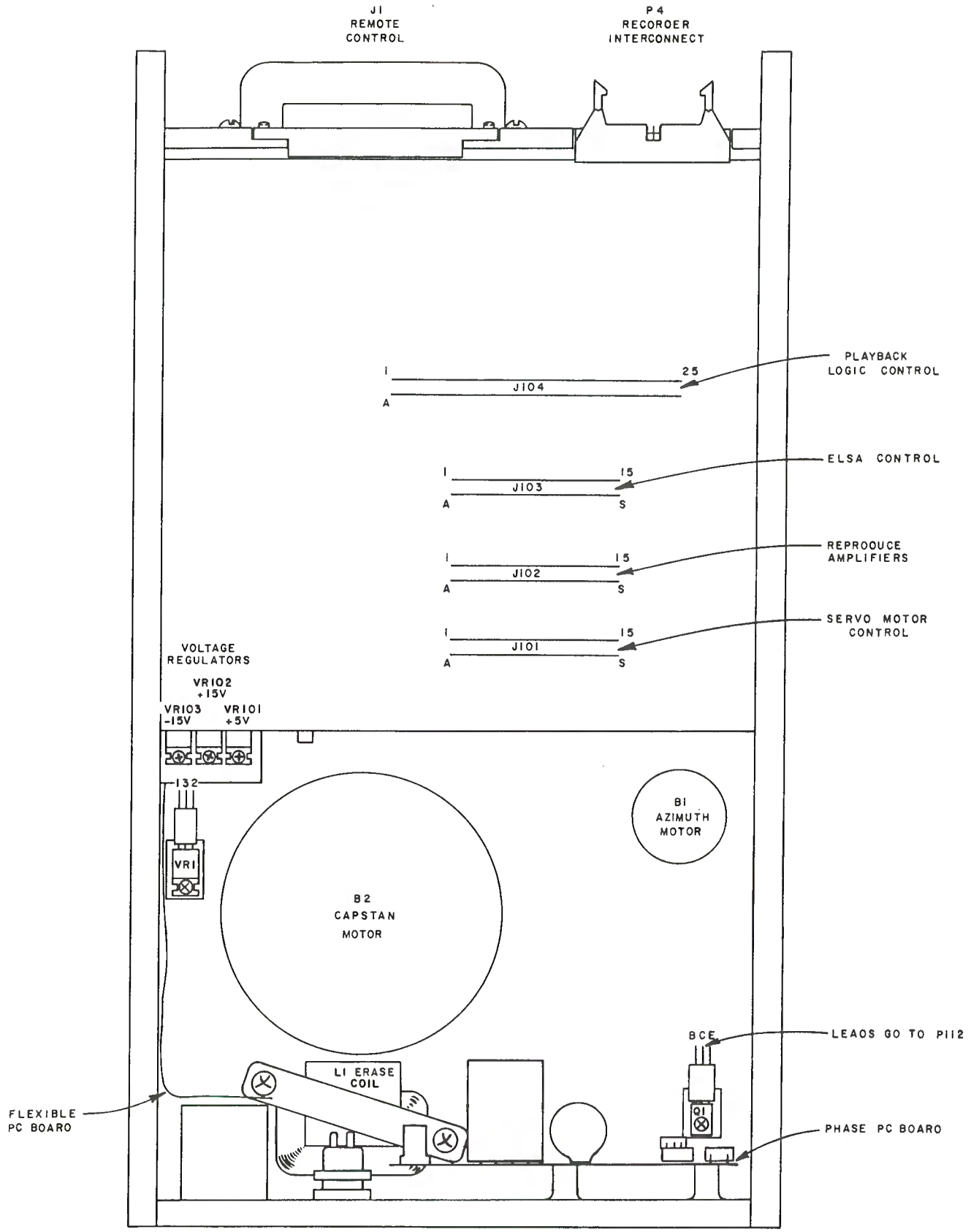



**Figure 4-6**

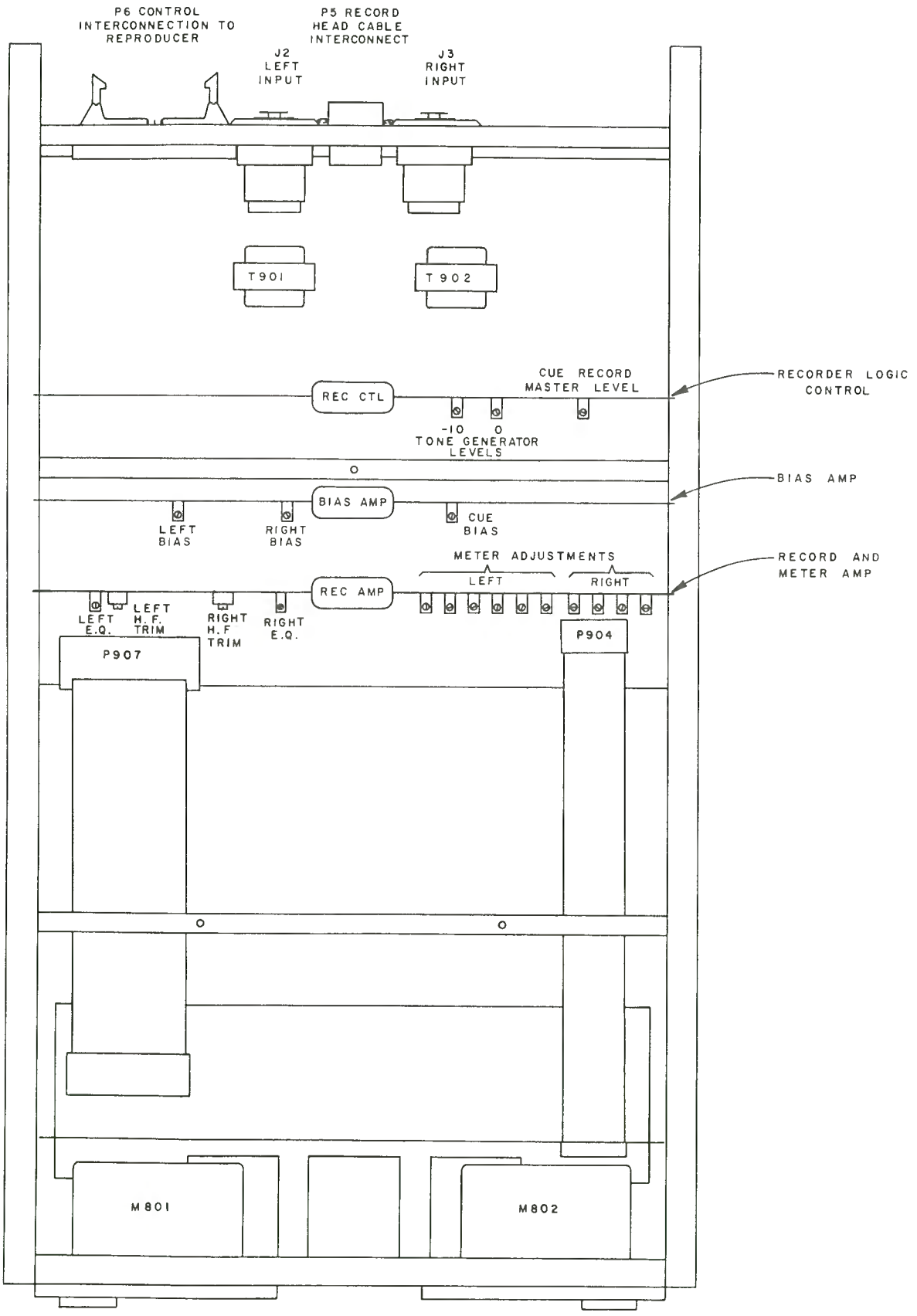



**Figure 4-7**

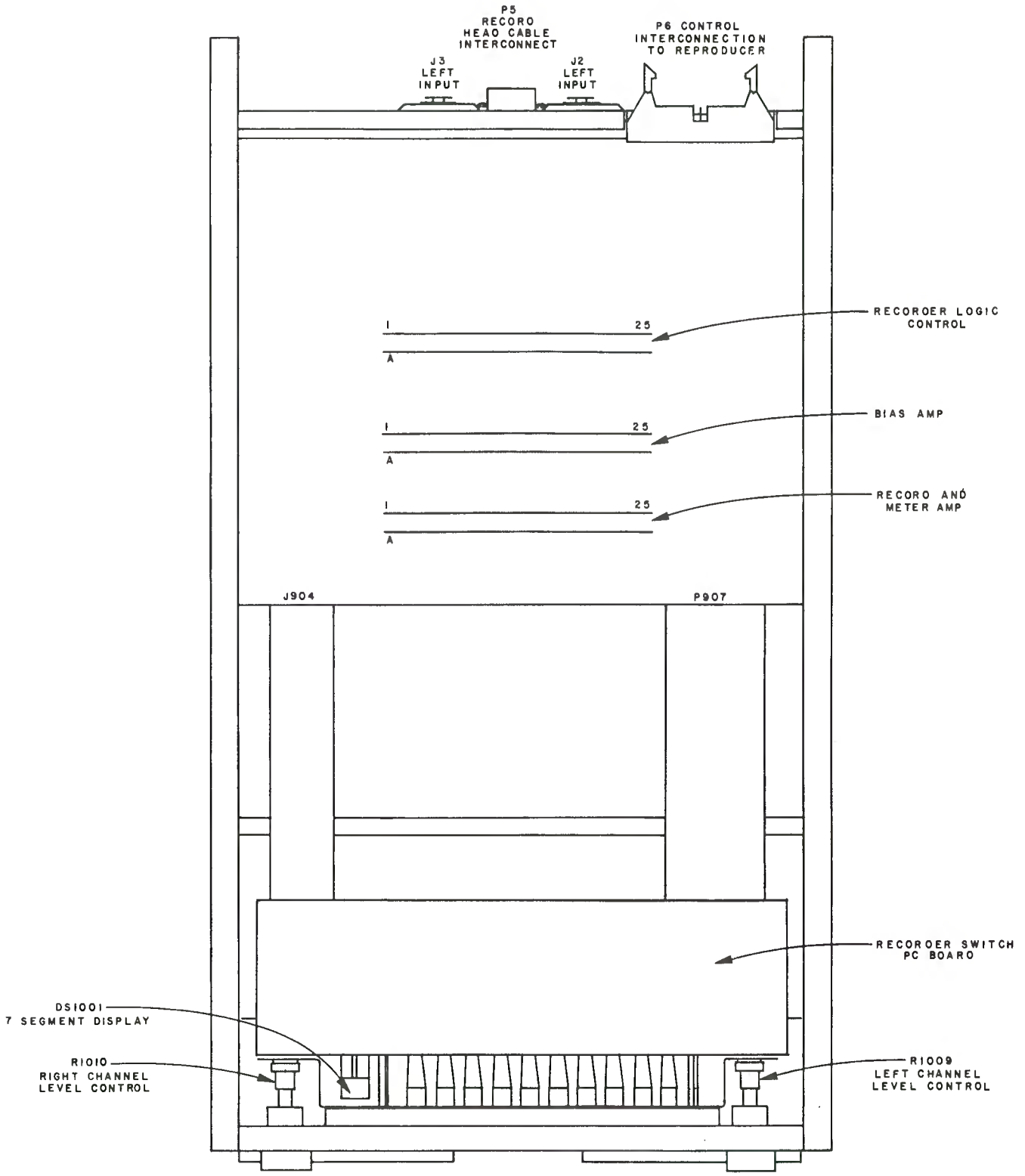
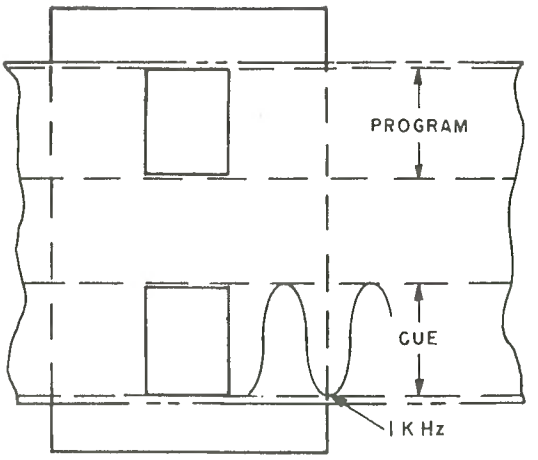
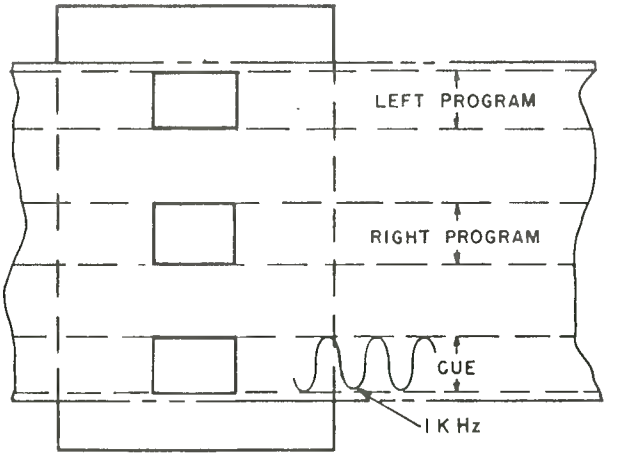



**Figure 4-8**




MONOPHONIC




STEREOPHONIC

STANDARD NAB TRACK FORMATS

**Figure 4-9**

Cartridge Guides Assembly

832-0907-010 (Left)
832-0907-011 (Right)

| | | |
|---|---|---|
| 1 | 301-0050-001 | Spring, Cart Hold Down |
| 2 | 272-0020-012 | Guide, Cart |
| 3 | 350-0620-000 | Screw, 6-32 x 1/4 Phil Truss |

Head Block Assembly

832-0904-015 (ELSA)
832-0904-010 (Non-ELSA)

| | | |
|---|---|---|
| 4 | 282-0001-001 | Pin, Roll 1/16 x 5/16 |
| 5 | 303-0001-001 | Strap, Head Mounting |
| 6 | 301-0036-000 | Spring, Head Loading 3/16 x 7/16 |
| 7 | 350-0403-000 | Screw, 4-40 x 3/16 PP HD ZP |
| 8 | 272-0003-011 | Guide, Tape LH |
| 9 | 253-0057-023 | Block, Head Mounting Frame |
| 10 | 355-0608-000 | Screw, 6-32 x 3/8 Sock Set Black |
| 11 | 370-0601-000 | Nut, Hex 6-32 x 1/4 ZP |
| 12 | 350-0615-000 | Screw, 6-32 x 1 3/8 PP HD ZP |
| 13 | 297-0010-001 | Shield, Upper Head |
| 14 | 350-0604-000 | Screw, 6-32 x 1/4 PP HD ZP |
| 15 | 282-0034-001 | Pin, Dowel 3/32 x 1 5/16 |
| 16 | 272-0002-012 | Guide, Tape RH |
| 17 | 350-0305-000 | Screw, 3-48 x 5/16 PP HD ZP |
| 18 | 322-0002-000 | Ball, 5/16 Dia. |
| 19 | 253-0056-012 | Block, Head Mounting |

Cart. Micro Switch Assembly

| | | |
|---|---|---|
| 20 | 350-0206-000 | Screw, 2-56 x 1/2 PP HD ZP |
| 21 | 392-0006-000 | Switch, Micro Cherry E6300K |

Pressure Roller Parts

| | | |
|---|---|---|
| 22 | 289-0002-000 | Ring, Retaining Roller |
| 23 | 359-0006-001 | Washer, Pressure Roller Nylon |
| 24 | 291-0017-001 | Roller, Pressure Roller 525 Rubber Comp. |
| 25 | 360-1005-010 | Washer, Pressure Roller Steel |

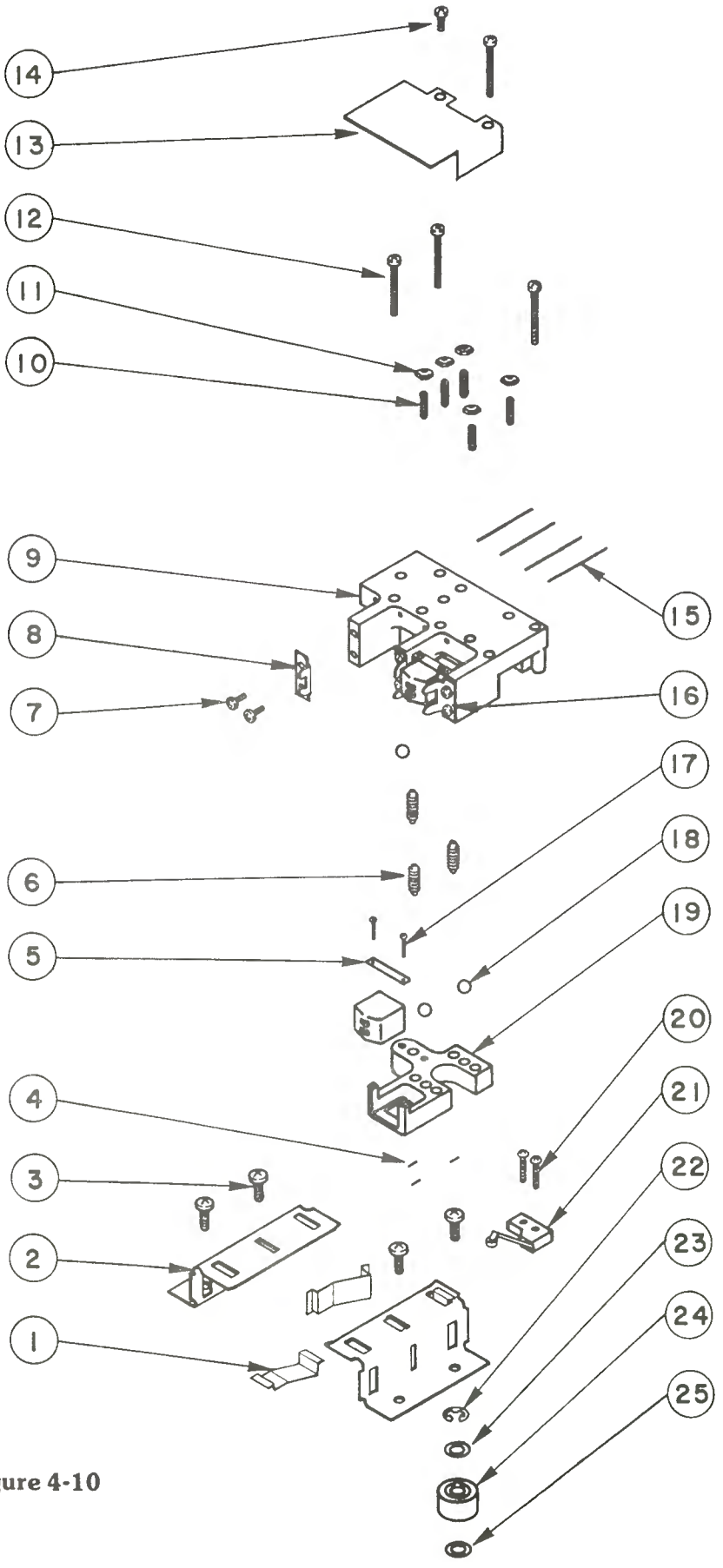



**Figure 4-10**

## 99B DECK WITH ELSA OPTIONS

### Erase Coil Parts

| | | |
|---|---|---|
| 1 | 350-0640-000 | Screw, 6-32 x 1 1/2 PP HD ZP |
| 2 | 303-0005-001 | Strap, Erase Coil |
| 3 | 300-0094-000 | Standoff, #6 1/4" Dia. 1" L |
| 4 | 514-0005-003 | Coil, Erase 117/234 (AM9292B) |

### Deck

| | | |
|---|---|---|
| 5 | 267-0024-014 | Deck w/ELSA |

### Head Block Assembly

| | | |
|---|---|---|
| 6 | 253-0069-002 | Block, Azimuth Head Mounting |

### Azimuth Extension Block

| | | |
|---|---|---|
| 7 | 251-0022-000 | Bearing, (Fafnir 33KDD3) |
| 8 | 253-0061-001 | Block, Azimuth Extension |
| 9 | 350-0614-000 | Screw, 6-32 x 7/8 PP HD ZP |

### Splice Locate Coil

| | | |
|---|---|---|
| 10 | 370-1001-000 | Nut, 10-32 x 3/8 Hex |
| 11 | 350-0410-000 | Screw, 4-40 x 3/8 PP HD ZP |
| 12 | 254-0095-001 | Bracket, Coil (Splice Sensor Mounting) |
| 13 | 512-0007-001 | Inductor, Splice Locate |
| 14 | 350-1031-000 | Screw, 10-32 x 3/4 PP HD ZP |

### Azimuth Motor Assembly

| | | |
|---|---|---|
| 15 | 353-0406-000 | Screw, 4-40 x 5/8 Soc Cap (Hold-Krome) |
| 16 | 392-0007-010 | Switch, Micro w/Lever Cut (Down Limit) |
| 17 | 256-0005-001 | Bushing, Bronze Int. THD. 1/4 - 28 NF |
| 18 | 343-0002-001 | Screw, 1/4 - 28 Azimuth Pivot |
| 19 | 453-0002-002 | Motor, 24 VDC, Azimuth (Pittman) |

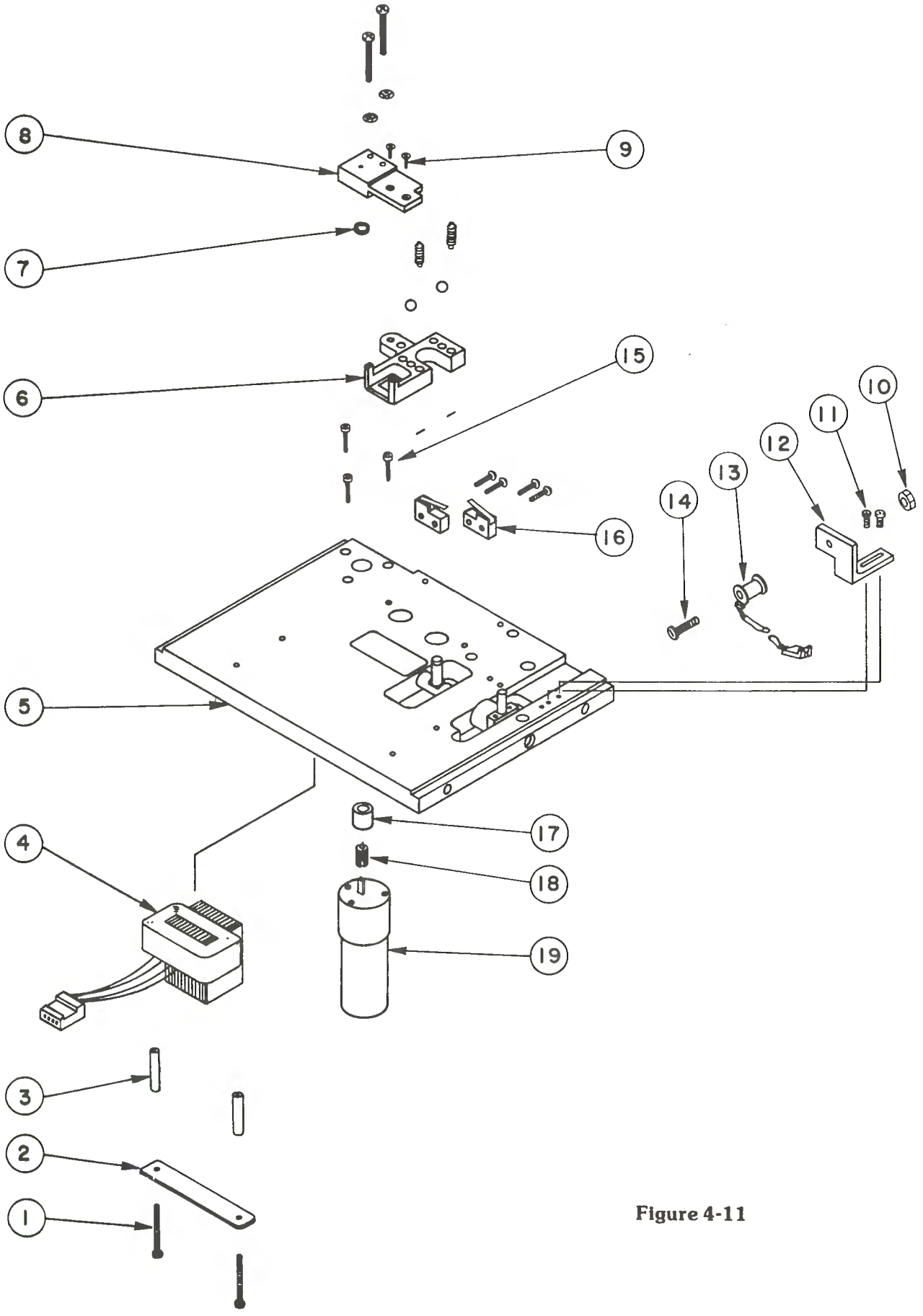



**Figure 4-11**

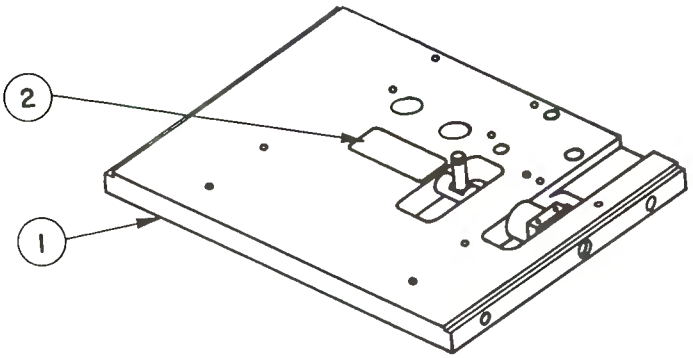



**Figure 4-12**

Deck

| | | |
|---|---|---|
| 1 | 267-0021-014 | Deck w/o ELSA |
| 2 | 297-0009-001 | Shield, Head Deck Mount |

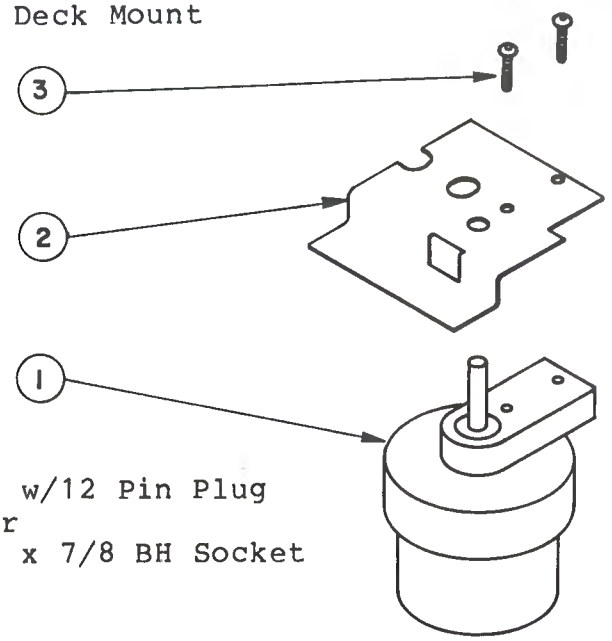



**Figure 4-13**

Capstan Motor Assembly

| | | |
|---|---|---|
| 1 | 455-0002-030 | Motor, Servo w/12 Pin Plug |
| 2 | 297-0011-002 | Shield, Motor |
| 3 | 353-1002-000 | Screw, 10-32 x 7/8 BH Socket Cap, Black |

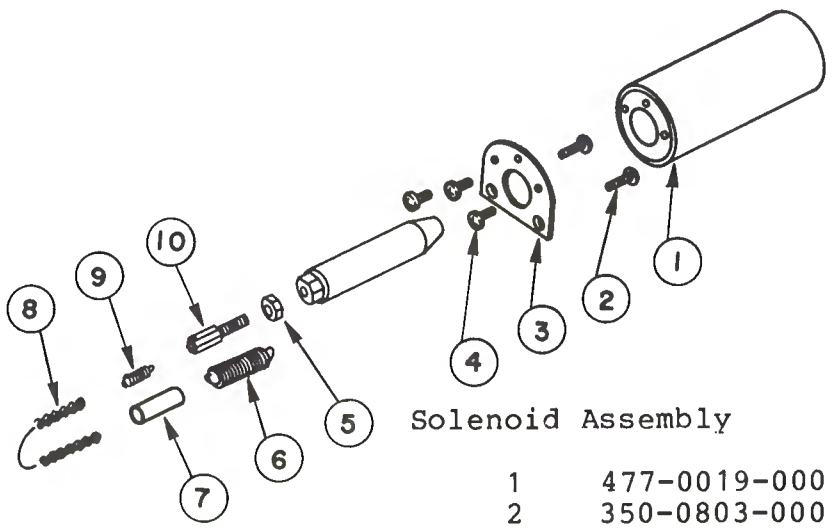



**Figure 4-14**

Solenoid Assembly

| | | |
|---|---|---|
| 1 | 477-0019-000 | Solenoid Assembly |
| 2 | 350-0803-000 | Screw, 8-32 x 3/8 PF HD ZP |
| 3 | 254-0068-012 | Bracket, Solenoid Mounting |
| 4 | 350-0804-000 | Screw, 8-32 x 3/8 PP HD ZP |
| 5 | 370-1001-000 | Nut, Hex 10-32 x 3/8 ZP |
| 6 | 301-0005-001 | Spring, Solenoid |
| 7 | 441-0004-010 | Tube, Damper |
| 8 | 277-0001-011 | Chain, Linkage 17 Links |
| 9 | 301-0036-000 | Spring, 7/16 x 3/16 O.D. |
| 10 | 264-0001-001 | Clevis, Screw |

# SECTION V. ELECTRICAL ADJUSTMENTS

## V. ELECTRICAL ADJUSTMENTS

### A. GENERAL

Before making any of the adjustments described in this section, make certain that all mechanical adjustments outlined in Section III have been properly made. Due to the critical interdependent electro-mechanical relationships involved, erroneous electrical adjustments may occur if the mechanical adjustments are in error. It must also be stressed that in order for the electrical adjustments to be made properly, the sequence of adjustments outlined in this section must be followed.

### B. REPRODUCER

1. **Servo Motor Duty Cycle**
   a. Connect an oscilloscope probe to the junction of pin 6, U310B (shown on brushless motor control PC board schematic as "test point") and R308.
   b. Adjust R330 so that a 35% duty cycle is observed on the scope display. This adjustment must be made with a tape cartridge runing in the transport. See Figure 5-1. Slight variations in the duty cycle will be observed as the controller compensates for rotational non-linearities of the motor.
2. **Splice Detector Sensitivity**
   a. Prior to making any electrical adjustments the mechanical set up procedure in Section III should be reviewed. **The splice detector will not function unless the mechanics are properly adjusted.**
   b. The varying DC signal level present on pin 13 of U508D (located on ELSA control PC Board - Section VI) must always be slightly higher than that seen on pin 12 of U508D except when a splice passes through the pressure roller and capstan contact point. At this point, the noise "spike" created by the effective change in tape thickness must cause the voltage at pin 12 to be higher than pin 13.
   c. Normally, the splice detector mechanism can be aligned by:
      1) Turning pot R570 full clockwise.
      2) Placing a cartridge in the transport and putting the machine into the splice locate mode.
      3) Turn pot R570 counterclockwise until the machine stops from the splice locate mode. The machine must stop only when the splice is located.
      4) Turn pot R570 counterclockwise three full turns.
      5) Clockwise turns of R570 decreases sensitivity. A counterclockwise turn increases sensitivity.

      In order to assure correct operation when using a wide variety of tape cartridge lengths/types, an additional procedure must be followed.
   d. Select a short, mechanically "noisy" cartridge with a splice typical of those commonly used in your operation.
   e. Place the cartridge in the machine and cycle it through the splice locate function. If the machine cycles and "finds" the splice properly, cycle several other cartridges to confirm proper set-up.

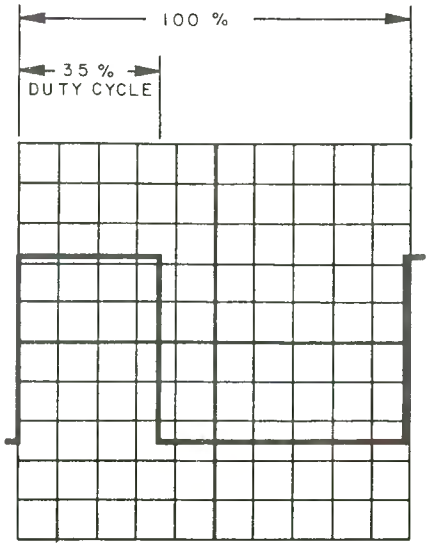



**Figure 5-1**

f. The example cartridge stops without locating the splice, decrease the sensitivity of R570 (clockwise). Make sure that the tape in the cartridge is not wrinkled. This stoppage is legitimate! If the splice is missed, increase the sensitivity of R570.

g. To confirm final adjustment, cycle at least 10 different cartridges.

h. If a reliable adjustment cannot be made, refer back to Section III (Pressure Roller Pressure Solenoid Adjustment) and (Splice Locator Sensor Adjustment).

3. **Program Playback Amplifier**

a. Program level - The output level is factory adjusted to 0 dBm while reproducing an NAB 1 kHz reference tone (160 nW/m). R425 is the mono level control and left channel of stereo. R426 is used for right channel level control. If an output level outside of the -10 dBm to +7 dBm range is required, change the output level strap location to the appropriate position prior to final level calibration. (See PC card overlay - Section VI, page .)

| Strap Position | Output Range |
|---|---|
| A | -18 dBm to -1 dBm |
| B | -10 dBm to +7 dBm |
| C | -5 dBm to +12 dBm |
| D | +1 dBm to +18 dBm |

If an output level lower than dBm dBm is required, an external pad must be added in order to preserve the optimum signal-to-noise performance of the system. Whenever an output level adjustment is made, a corresponding Program Play meter calibration must be made, as outlined later in this section.

b. High Frequency Equalization

--High frequency equalization controls R411 (left or mono) and R412 (right channel) are used to adjust 10 kHz so that it matches the 1 kHz level established earlier on the test tape.

--Upper high frequency E.Q. is provided for compensation of variations in distributed capacitance within the head and head cable as well as gap length. After the 10 kHz equalization is adjusted as outlined in the previous step, adjust R403 (left or mono) and R404 (right channel) for the same response at 16 kHz.

c. Low frequency equalization is set to the 1975 NAB Standard and should not be adjusted unless the 1964 NAB standard equalization curve is used. While playing a 50 Hz tone (1964 NAB standard alignment tape) adjust the low frequency control R431 (left or mono) and R432 (right channel) until 50 Hz matches the established reference level. Due to fringing effects of some test tapes, it is best to recheck the adjustment while recording a 50 Hz tone and then make final playback LF adjustments.

d. Phase Offset Adjustment
(Only applies to Monophonic Machines with ELSA)

-Prior to making this adjustment, confirm that the recording head has been setup according to Section III.

-While monitoring the playback output, begin recording a 14.5 kHz tone (function #4 of the internal tone generator) and manually run the azimuth motor for peak output.

-On the Bias Amp card enable the Cue head by grounding pin 5 of U1208B and enable the cue bias by grounding pin 9 of U1209A. This will allow the cue channel to record 1 kHz simultaneously with the program channel using the internal tone generator.

-While recording a 1 kHz tone at OVU (function #1 of the internal tone generator) monitor

the azimuth outputs from the Reproduce Amp with a phase meter or oscilloscope.

-Adjust R426 on the Reproduce Amp for zero phase error. The auto azimuth circuitry will seek this zero phase error position each time it is run, azimuthing the record head for maximum level at the playback head.

## C. RECORDER

### 1. Input Level Strapping

a. This "adjustment" involves only a strap position change if required. The strap positions accommodate a wide range of input reference levels in order to obtain optimum signal-to-noise and front panel level control positioning.

b. Refer to the Recorder Mother Board PC card overlay drawing found in Section VI, page

c. As shipped from ITC, the input strap is connected to the "0" input level range. The "0" corresponds to a 0 VU meter reading when the level control is at its approximate mid-range position.

d. To accomodate other input reference levels, disconnect only the end of the strap closest to the back of the machine and solder it into the appropriate input level pad.

### 2. Program Record Bias

a. Prior to making any bias adjustments, confirm that the recording head azimuth (phase alignment) has been correctly adjusted as outlined in Section III.

b. While monitoring the respective playback output channel (use a high impedance voltmeter), begin recording a 10 kHz tone at an indicated -10 VU level (front panel Norm Record meter). Function #3 of the internal tone generator may be used. Be certain the cartridge selected is typical of the type to be used in the machine; especially the type of magnetic tape.

c. Turn R1211 (mono or left channel) until a maximum output level of the 10 kHz tone is observed. Once this "peak" bias setting is found, continue to turn R1211 in a clockwise direction until the average level of the tone decreases -2.0 dB.

d. Repeat this procedure on the right channel using R1230 to adjust the bias.

### 3. Program Record Equalization

a. Connect the high impedance AC voltmeter to the respective playback program channel output. Be sure to properly load the output with 600 ohms.

b. Set the internal test tone generator to function #2 (1 kHz at -10 VU) and set the front panel indicated Norm Record level to -10 VU. (An external oscillator may also be used.)

c. Observe the playback level on the voltmeter and adjust its range switch to a convenient reference reading.

d. Set the internal test tone generator to function #3 (10 kHz at -10 VU) and observe the level on the external voltmeter. If the level differs from the 1 kHz tone level, adjust R1145 on the Record/Meter Amp PC board until the 1 kHz and 10 kHz tones are indicated at equal levels.

e. Repeat this same procedure for the right channel using R1146.

f. High frequency trim requires the use of an external oscillator. Connect the oscillator to the input of the Series 99B recording amplifier and set its output to 10 kHz. Observe the level on the external voltmeter and adjust oscillator output to match that of the internal test tone generator at 10 kHz. Now turn the oscillator to 16 kHz and adjust R1143 (left or mono) and R1144 (right channel) for equal response at 16 kHz.

4. **Cue Bias**
   a. Swap the left program playback head cable with the cue playback head cable. See Section VI, page Playback Mother Board overlay drawing for location.
   b. While monitoring the left program playback output with a high impedance AC voltmeter, begin recording a continuous 8 kHz (Tertiary) cue tone.
   c. Adjust cue bias trimmer R1264 (located on the Bias Amp PC board) until a maximum output level of the 8 kHz cue tone is observed.
   d. Alternately record a Primary cue tone (1 kHz cue record switch behind the front panel door) and an 8 kHz (Tertiary) cue tone. The 8 kHz cue tone should be 10 dB lower in level than the 1 kHz tone. The 1975 NAB standards call for -10 dB nominal, -9 dB maximum, -13 dB minimum.
   **NOTE: The program playback amplifier must be properly equalized in order to make this adjustment.**
   e. Slight level changes of the 8 kHz tone can be made by overbiasing the cue recording head (using R1264) without deteriorating system performance.
   f. Record a 150 Hz (Secondary) cue tone and observe its level relationship to the Primary cue tone. +6 dB is nominal, +7 dB maximum and +3 minimum.
5. **Cue Master Level**
   a. With the head cables still connected as outlined in the previous Cue Bias procedure, record a 1 kHz Primary cue tone and observe the output level.
   b. The Primary cue tone must playback at the same relative output level as the 1 kHz reference tone (160 nW/m) used on the 1975 NAB standard alignment tape.
   c. If cue level adjustment is required, turn trimmer R1326 (located on the Recorder Logic Control PC Board) until the Primary cue tone is equal to the NAB standard reference tone (1 kHz at 160 nW/m).
   d. Return the left program playback and cue playback head cables back to their original locations.
6. **Test Tone Generator Level**
   The internal trimmer used for setting the "0" level of the 1 kHz reference tone (function #1 of the test tone generator) should be set to "match" the normal reference level of the buss line feeding the Series 99B Recorder. Once the internal tone generator level is calibrated as such, it is no longer necessary to "patch" in an external tone to establish front panel level control reference settings.
   a. "0" VU
      --Connect an external reference level tone (preferably 1 kHz) to the input of the Series 99B recording amplifier. Be certain that the level of this tone is adjusted externally to the common buss voltage level.
      --Now set the machine to the recording mode and select the NORM REC meter monitoring mode.
      --Adjust the front panel level control(s) to read 0 VU on the meter(s). From this point on, **DO NOT TOUCH THE FRONT PANEL CONTROLS OR THE EXTERNAL TONE OSCILLATOR LEVEL CONTROL.**
      --Select function #1 of the internal test tone generator (1 kHz at 0 VU).
      --Adjust trimmer R1355 (located on the Recorder Logic Control PC board) until a 0 VU reading is observed on the front panel meter(s). There may be a slight variation in level indication from the left to the right meter due to componenet tolerances. If this occurs, adjust the trimmer so the meters "straddle" the 0 VU reading (i.e., one meter reads slightly above 0 VU, the other slightly below).
      --The internal 0 VU level is now established. If front panel level control settings are

changed, the calibrated reference level can easily be re-established by selecting function #1 of the test tone generator, and, while monitoring NORM REC, adjusting the level control(s) to obtain a 0 VU reading on the meter(s).

b. "-10" VU
--Put the Series 99B machine in the record mode and select function #1 of the internal test tone generator.
--While monitoring NORM REC, set the front panel level control(s) to obtain a 0 VU meter reading.
--Select function #2 of the internal test tone generator (1 kHz at -10 VU) and adjust trimmer R1356 until a -10 VU reading is established.
--Select function #2 of the internal test tone generator (1 kHz at -10 VU) and adjust trimmer R1356 until a -10 VU reading is established.

**7. Meter Calibration**

The following adjustments are made with multi-turn potentiometers located on the Record/Meter Amp PC Board. Potentiometers are identified on the stainless steel card cover.

a. Program Play
--Select the PGM PLAY meter switch position.
--Connect a 600 ohm load across the left or mono program playback output terminals.
--Insert and play an NAB standard reference level tape (1 kHz at 160 nW/m recorded level - 1975 standard). Adjusted R1175 for a 0 VU indication.
--Repeat this procedure for the right channel if the machine is stereo. Use R1176 for calibrating the right PGM Play meter for 0 VU.

b. Normal Record
--Select the PGM PLAY meter switch position.
--Place the machine into the recording mode and select function #1 of the test tone generator (1 kHz at 0 VU).
--Select the NORM REC meter switch position and observe the level(s).
--Use R1179 to obtain a 0 VU indication for the left channel (or mono).
--Use R1180 to adjust the right meter to read 0 VU.

c. Program Bias
--Select the PGM Bias meter switch.
--Insert an erased cartridge, press REC and START.
--Adjust the left channel (mono) program bias trimmer R1177 for a 0 VU reading on the left channel meter.
--Repeat this same procedure for the right channel using trimmer R1178.

d. Cue Bias
--Select the CUE BIAS meter switch.
--Insert an erased cartridge and press START.
--While pressing and holding the TER (Tertiary) cue switch, adjust trimmer R1185 for a 0 VU reading on the front panel meter (left meter only on stereo units).

e. Cue Play
--Select the CUE PLAY meter switch.
--Insert an erased cartridge tape and press START.
--Press the 1 kHz CUE REC switch. A meter deflection for approximately 3/4 of a second in length will be observed. The point at which the meter settles in the last 1/4 second is the point at which 0 VU should be calibrated.
--Record several 1 kHz cue tones and adjust trimmer R1181 for a 0 VU reading on the front, panel meter (left meter only on stereo machines).

**8. Peak Detector**

a. Connect an audio signal generator to the input of the recording amplifier, set the frequency to 10 kHz and level to read -2 VU on the Series 99B front panel meter.

**The machine must be in the REC SET mode with the NORM REC meter select button depressed.**

b. Increase the level of the signal generator by exactly 10 dB. (For Scotchcart, this level can be increased by 14 dBm.)
c. Adjust trimmer R1157 (left peak level set) only far enough for the LED located in the meter bezel to turn on.
d. Repeat this same procedure for the right channel using R1158.
e. It may be desirable in some cases to adjust the peak level indicator "trip" point to a different setting. Because of the wide range of adjustments available, this can be done quite easily to suit many different tape types and saturation levels. The ideal "trip" point setting should correspond to the saturation point of the tape being used.

# SECTION VI. ELECTRICAL DRAWINGS

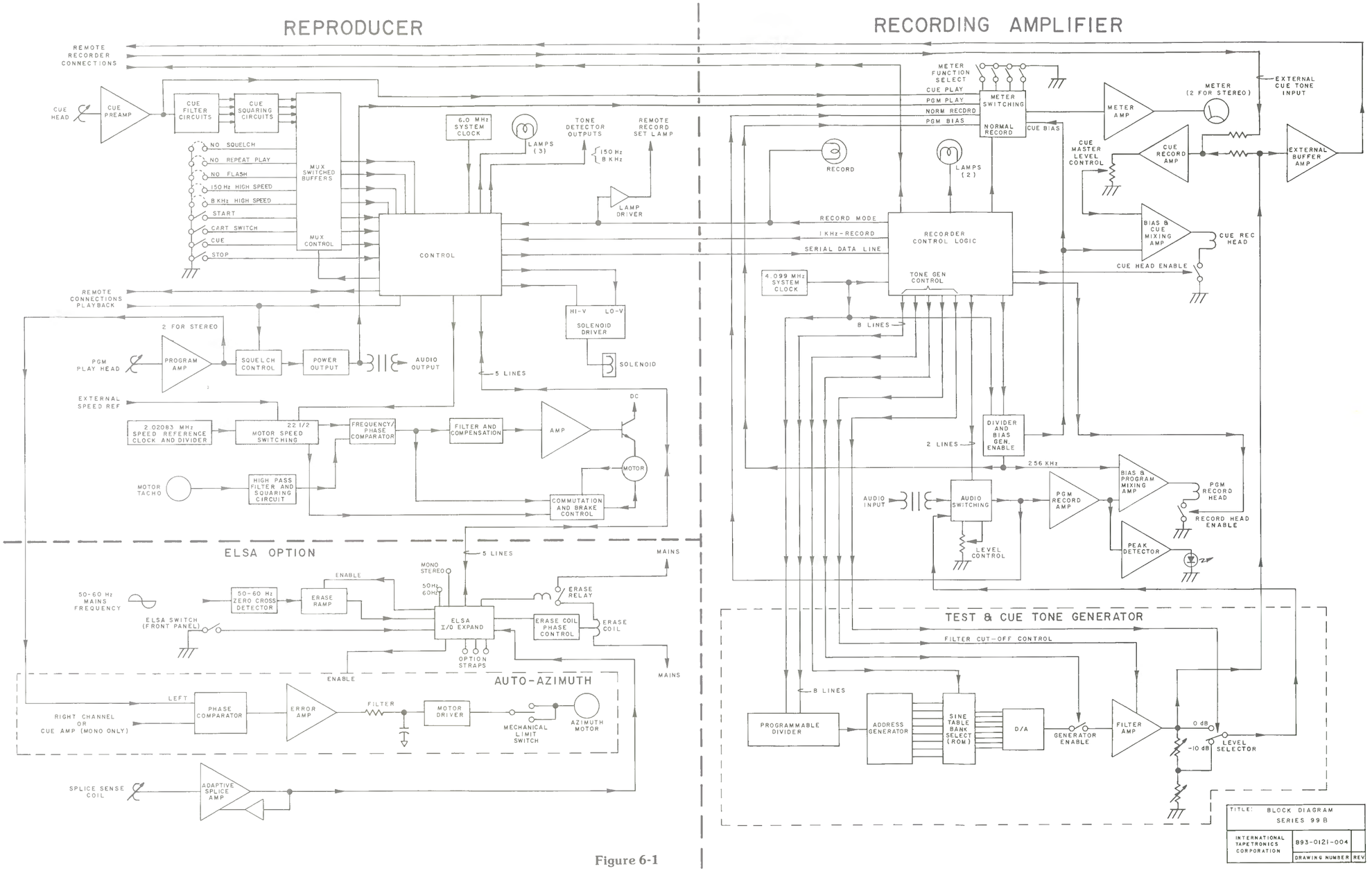
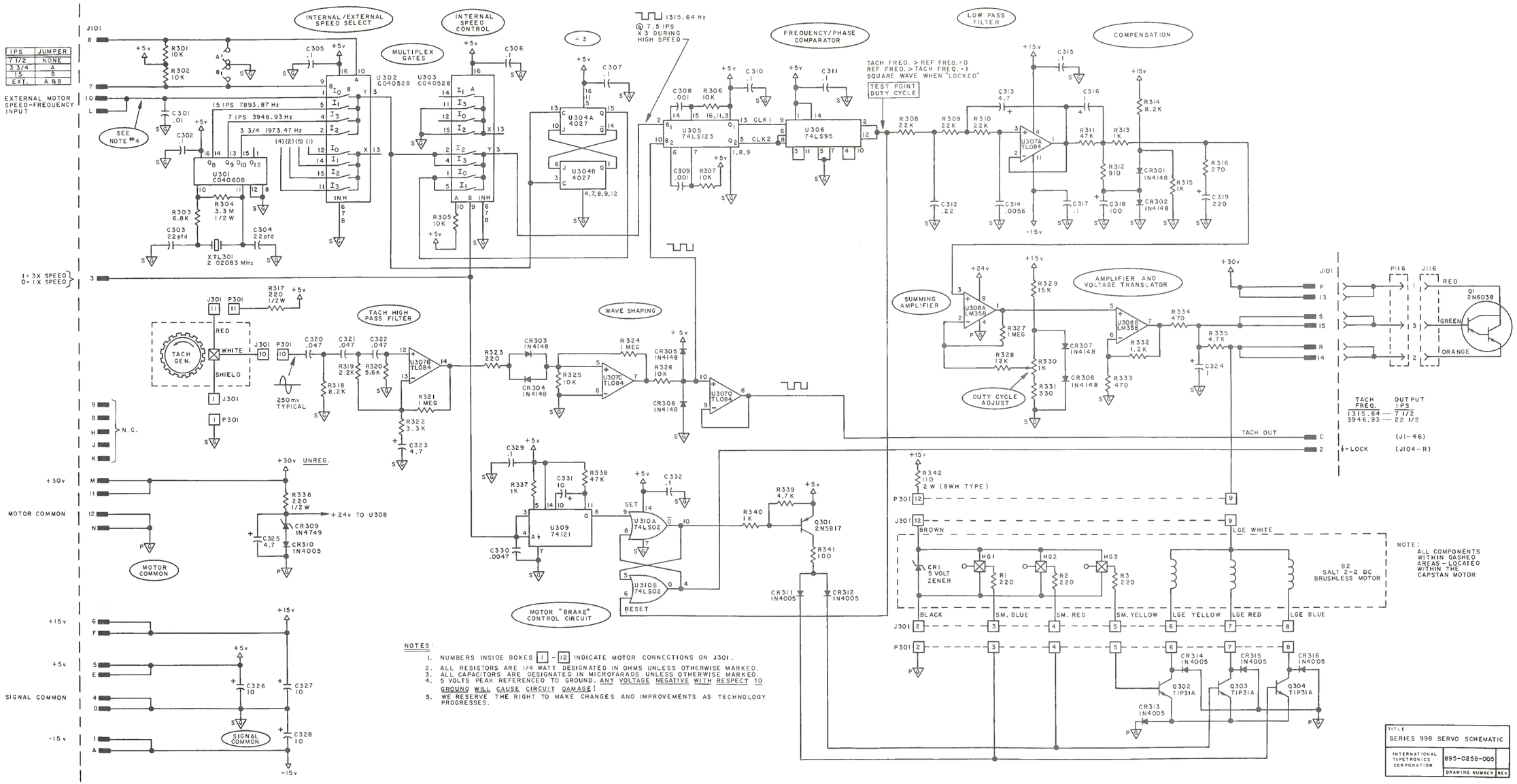



**Figure 6-1**




NOTES:

1. NUMBERS INSIDE BOXES [1] - [12] INDICATE MOTOR CONNECTIONS ON J301.
2. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. 5 VOLTS PEAK REFERENCED TO GROUND. ANY VOLTAGE NEGATIVE WITH RESPECT TO GROUND WILL CAUSE CIRCUIT DAMAGE!
5. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

NOTE: ALL COMPONENTS WITHIN DASHED AREAS - LOCATED WITHIN THE CAPSTAN MOTOR

TITLE: SERIES 998 SERVO SCHEMATIC

INTERNATIONAL TAPETRONICS CORPORATION | 895-0258-005 | DRAWING NUMBER | REV.

**Figure 6-2**

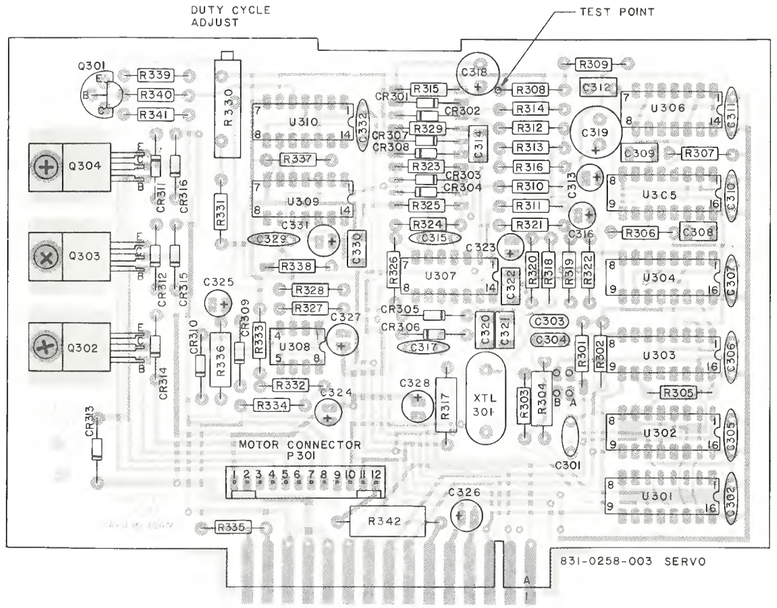



**Figure 6-3**

| TITLE | |
|---|---|
| SERIES 998 SERVO OVERLAY | |
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0258-003 |
| | DRAWING NUMBER / REV. |

998 PLAY SERVO CARD
(ASSEMBLY 831-0258-003)

| | | | |
|---|---|---|---|
| **##CAPACITORS** | | | |
| C301 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C302 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C303 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C304 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C305 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C306 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C307 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C308 | 680-0101-033 | 1 | .001 UFD 100V POLY |
| C309 | 680-0101-033 | 1 | .001 UFD 100V POLY |
| C310 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C311 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C312 | 680-2963-033 | 1 | .22 UFD 63V POLY |
| C313 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C314 | 680-1001-033 | 1 | .0056 UFD 100V POLY |
| C315 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C316 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C317 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C318 | 695-1925-013 | 1 | 100 UFD 25V ALUM |
| C319 | 695-2106-013 | 1 | 220 UFD 6.3V ALUM |
| C320 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C321 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C322 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C323 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C324 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C325 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C326 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C327 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C328 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C329 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C330 | 680-0901-033 | 1 | .0047 UFD 100V POLY |
| C331 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C332 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| **##DIODES** | | | |
| CR301 | 575-0014-000 | 1 | 1N4148 |
| CR302 | 575-0014-000 | 1 | 1N4148 |
| CR303 | 575-0014-000 | 1 | 1N4148 |
| CR304 | 575-0014-000 | 1 | 1N4148 |
| CR305 | 575-0014-000 | 1 | 1N4148 |
| CR306 | 575-0014-000 | 1 | 1N4148 |
| CR307 | 575-0014-000 | 1 | 1N4148 |
| CR308 | 575-0014-000 | 1 | 1N4148 |
| CR309 | 577-0002-000 | 1 | 1N4749 24V ZENER |
| CR310 | 575-0007-000 | 1 | 1N4005 |
| CR311 | 575-0007-000 | 1 | 1N4005 |
| CR312 | 575-0007-000 | 1 | 1N4005 |
| CR313 | 575-0007-000 | 1 | 1N4005 |
| CR314 | 575-0007-000 | 1 | 1N4005 |
| CR315 | 575-0007-000 | 1 | 1N4005 |
| CR316 | 575-0007-000 | 1 | 1N4005 |
| **##TRANSISTORS** | | | |
| Q301 | 590-0018-000 | 1 | 2N5817 PNP |
| Q302 | 590-0027-000 | 1 | TIP31A NPN POWER |
| Q303 | 590-0027-000 | 1 | TIP31A NPN POWER |
| Q304 | 590-0027-000 | 1 | TIP31A NPN POWER |
| **##RESISTORS** | | | |
| R301 | 630-0087-000 | 1 | 10K |
| R302 | 630-0087-000 | 1 | 10K |
| R303 | 630-0083-000 | 1 | 6.8K |
| R304 | 630-0348-000 | 1 | 3.3 MEG 1/2W |
| R305 | 630-0087-000 | 1 | 10K |
| R306 | 630-0087-000 | 1 | 10K |
| R307 | 630-0087-000 | 1 | 10K |
| R308 | 630-0095-000 | 1 | 22K |
| R309 | 630-0095-000 | 1 | 22K |
| R310 | 630-0095-000 | 1 | 22K |
| R311 | 630-0103-000 | 1 | 47K |
| R312 | 630-0062-000 | 1 | 910 OHM |
| R313 | 630-0063-000 | 1 | 1K |
| R314 | 630-0085-000 | 1 | 8.2K |
| R315 | 630-0063-000 | 1 | 1K |
| R316 | 630-0049-000 | 1 | 270 OHM |
| R317 | 630-0247-000 | 1 | 220 OHM 1/2W |
| R318 | 630-0085-000 | 1 | 8.2K |
| R319 | 630-0071-000 | 1 | 2.2K |
| R320 | 630-0081-000 | 1 | 5.6K |
| R321 | 630-0135-000 | 1 | 1 MEG |
| R322 | 630-0075-000 | 1 | 3.3K |
| R323 | 630-0047-000 | 1 | 220 OHM |
| R324 | 630-0135-000 | 1 | 1 MEG |
| R325 | 630-0087-000 | 1 | 10K |
| R326 | 630-0087-000 | 1 | 10K |
| R327 | 630-0135-000 | 1 | 1 MEG |
| R328 | 630-0089-000 | 1 | 12K |
| R329 | 630-0091-000 | 1 | 15K |
| R330 | 636-0033-000 | 1 | 1K POT |
| R331 | 630-0051-000 | 1 | 330 OHM |
| R332 | 630-0065-000 | 1 | 1.2K |
| R333 | 630-0055-000 | 1 | 470 OHM |
| R334 | 630-0055-000 | 1 | 470 OHM |
| R335 | 630-0079-000 | 1 | 4.7K |
| R336 | 630-0247-000 | 1 | 220 OHM 1/2W |
| R337 | 630-0063-000 | 1 | 1K |
| R338 | 630-0103-000 | 1 | 47K |
| R339 | 630-0079-000 | 1 | 4.7K |
| P340 | 630-0063-000 | 1 | 1K |
| R341 | 630-0039-000 | 1 | 100 OHM |
| R342 | 628-0074-000 | 1 | 110 OHM 2W BWH |
| **##INTEGRATED CIRCUITS** | | | |
| U301 | 608-0010-000 | 1 | 4066B |
| U302 | 608-0004-000 | 1 | 4052B |
| U303 | 608-0004-000 | 1 | 4052B |
| U304 | 608-0011-000 | 1 | 4027 |
| U305 | 607-0034-000 | 1 | 74LS123 |
| U306 | 607-0035-000 | 1 | 74LS95 |
| U307 | 606-0015-000 | 1 | TL084 |
| U308 | 606-0007-000 | 1 | LM358 |
| U309 | 607-0008-000 | 1 | 74121 |
| U310 | 607-0036-000 | 1 | 74LS02 |
| **##MISCELLANEOUS** | | | |
| XTL301 | 448-0007-000 | 1 | CRYSTAL, 2.02083 MHZ .05% |
| P301 | 376-0042-000 | 1 | PLUG, 12 PIN (MOTOR) |
| | 613-0009-000 | 5 | SOCKET, 16 PIN DIP |
| | 613-0008-000 | 4 | SOCKET, 14 PIN DIP |
| | 613-0007-000 | 1 | SOCKET, 8 PIN DIP |
| | 613-0001-000 | 1 | SOCKET, TRANSISTOR TO-92 |
| | 350-0404-000 | 3 | SCREWS, 4-40 X 1/4 PP HD |
| | 370-0403-000 | 3 | NUT, KEPS 4-40 X 1/4 HEX |
| | 323-0001-031 | 1 | CARD PULL, SERVO |
| | 325-0258-003 | 1 | PCB, PLAY SERVO CARD 998 |

## 99B PLAY PROGRAM AND CUE AMP. CARD - STEREO
(ASSEMBLY 831-0257-013)

| | | | |
|---|---|---|---|
| **## CAPACITORS** | | | |
| C401 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C402 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C403 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C404 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C405 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C406 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C407 | 695-2106-013 | 1 | 220 UFD 6.3V ALUM |
| C408 | 695-2106-013 | 1 | 220 UFD 6.3V ALUM |
| C409 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C410 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C411 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C412 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C413 | 677-0006-000 | 1 | 150 PFD 300V SILVER MICA |
| C414 | 677-0006-000 | 1 | 150 PFD 300V SILVER MICA |
| C415 | 680-0701-033 | 1 | .0033 UFD 100V POLY |
| C416 | 680-0701-033 | 1 | .0033 UFD 100V POLY |
| C417 | 680-1101-033 | 1 | .0068 UFD 100V POLY |
| C418 | 680-1101-033 | 1 | .0068 UFD 100V POLY |
| C419 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C420 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C421 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C422 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C423 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C424 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C425 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C426 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C427 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C428 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C429 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C430 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C431 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C432 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C433 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C434 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C435 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C436 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C437 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C438 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C439 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C440 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C441 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C442 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C443 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C444 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C445 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C446 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C447 | 677-0005-000 | 1 | 47 PFD 300V SILVER MICA |
| C448 | 680-1863-033 | 1 | .027 UFD 63V POLY |
| C449 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C450 | 680-1563-033 | 1 | .015 UFD 63V POLY |
| C451 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C452 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C453 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C454 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C455 | XXX-XXXX-XXX | | NOT USED |
| **## DIODES** | | | |
| CR401 | 575-0007-050 | 1 | 1N4005 |
| CR402 | 575-0007-050 | 1 | 1N4005 |
| CR403 | 575-0007-050 | 1 | 1N4005 |
| CR404 | 575-0007-050 | 1 | 1N4005 |
| CR405 | 575-0007-050 | 1 | 1N4005 |
| CR406 | 575-0007-050 | 1 | 1N4005 |
| **## FERRITE BEADS** | | | |
| FB401 | 516-0001-000 | 1 | 57-3425 BEAD |
| FB402 | 516-0001-000 | 1 | 57-3425 BEAD |
| FB403 | 516-0001-000 | 1 | 57-3425 BEAD |
| FB404 | 516-0001-000 | 1 | 57-3425 BEAD |
| FB405 | 516-0001-000 | 1 | 57-3425 BEAD |
| FB406 | 516-0001-000 | 1 | 57-3425 BEAD |
| **## TRANSISTORS** | | | |
| Q401 | 590-0031-000 | 1 | 2N5087 PNP LOW-NOISE |
| Q402 | 590-0031-000 | 1 | 2N5087 PNP LOW-NOISE |
| Q403 | 590-0017-010 | 1 | 2N5816 NPN |
| Q404 | 590-0017-010 | 1 | 2N5816 NPN |
| Q405 | 590-0018-010 | 1 | 2N5817 PNP |
| Q406 | 590-0018-010 | 1 | 2N5817 PNP |
| Q407 | 590-0017-010 | 1 | 2N5816 NPN |
| **## RESISTORS** | | | |
| R401 | 630-0103-000 | 1 | 47K |
| R402 | 630-0103-000 | 1 | 47K |
| R403 | 636-0038-000 | 1 | 100K POT (L-HIGH TRIM) |
| R404 | 636-0038-000 | 1 | 100K POT (R-HIGH TRIM) |
| R405 | 630-0103-000 | 1 | 47K |
| R406 | 630-0103-000 | 1 | 47K |
| R407 | 630-0087-000 | 1 | 10K |
| R408 | 630-0087-000 | 1 | 10K |
| R409 | 630-0041-000 | 1 | 120 OHM |
| R410 | 630-0041-000 | 1 | 120 OHM |
| R411 | 636-0031-000 | 1 | 20K POT (L-HIGH EQ.) |
| R412 | 636-0031-000 | 1 | 20K POT (R-HIGH EQ.) |
| R413 | 630-0125-000 | 1 | 390K |
| R414 | 630-0125-000 | 1 | 390K |
| R415 | 630-0055-000 | 1 | 470 OHM |
| R416 | 630-0055-000 | 1 | 470 OHM |
| R417 | 630-0071-000 | 1 | 2.2K |
| R418 | 630-0071-000 | 1 | 2.2K |
| R419 | 630-0095-000 | 1 | 22K |
| R420 | 630-0095-000 | 1 | 22K |
| R421 | 630-0085-000 | 1 | 8.2K |
| R422 | 630-0085-000 | 1 | 8.2K |
| R423 | 630-0077-000 | 1 | 3.9K |
| R424 | 630-0077-000 | 1 | 3.9K |
| R425 | 636-0035-000 | 1 | 5K POT (L-LEVEL SET) |
| R426 | 636-0035-000 | 1 | 5K POT (R-LEVEL SET) |
| R427 | 630-0059-000 | 1 | 680 OHM |
| R428 | 630-0059-000 | 1 | 680 OHM |
| R429 | 630-0093-000 | 1 | 18K |
| R430 | 630-0093-000 | 1 | 18K |
| R431 | 636-0029-000 | 1 | 50K POT (L-LOW EQ.) |
| R432 | 636-0029-000 | 1 | 50K POT (R-LOW EQ.) |
| R433 | 630-0093-000 | 1 | 18K |
| R434 | 630-0093-000 | 1 | 18K |
| R435 | 630-0105-000 | 1 | 56K |
| R436 | 630-0105-000 | 1 | 56K |
| R437 | 630-0099-000 | 1 | 33K |
| R438 | 630-0099-000 | 1 | 33K |
| R439 | 630-0091-000 | 1 | 15K |
| R440 | 630-0091-000 | 1 | 15K |
| R441 | 630-0081-000 | 1 | 5.6K |
| R442 | 630-0081-000 | 1 | 5.6K |
| R443 | 630-0087-000 | 1 | 10K |
| R444 | 630-0087-000 | 1 | 10K |
| R445 | 630-0103-000 | 1 | 47K |
| R446 | 630-0103-000 | 1 | 47K |
| R447 | 630-0079-000 | 1 | 4.7K |
| R448 | 630-0079-000 | 1 | 4.7K |
| R449 | 630-0119-000 | 1 | 220K |
| R450 | 630-0119-000 | 1 | 220K |
| R451 | 630-0087-000 | 1 | 10K |
| R452 | 630-0087-000 | 1 | 10K |
| R453 | 630-0087-000 | 1 | 10K |
| R454 | 630-0087-000 | 1 | 10K |
| R455 | 630-0087-000 | 1 | 10K |
| R456 | 630-0087-000 | 1 | 10K |
| R457 | 630-0087-000 | 1 | 10K |
| R458 | 630-0087-000 | 1 | 10K |
| R459 | 630-0007-000 | 1 | 4.7 OHM |
| R460 | 630-0007-000 | 1 | 4.7 OHM |
| R461 | 630-0007-000 | 1 | 4.7 OHM |
| R462 | 630-0007-000 | 1 | 4.7 OHM |
| R463 | 630-0115-000 | 1 | 150K |
| R464 | 630-0095-000 | 1 | 22K |
| R465 | 630-0065-000 | 1 | 1.2K |
| R466 | 630-0055-000 | 1 | 470 OHM |
| R467 | 630-0093-000 | 1 | 18K |
| R468 | 630-0115-000 | 1 | 150K |
| R469 | 630-0111-000 | 1 | 100K |
| R470 | 630-0089-000 | 1 | 12K |
| R471 | 630-0111-000 | 1 | 100K |
| R472 | 630-0031-000 | 1 | 47 OHM |
| R473 | 630-0087-000 | 1 | 10K |
| R474 | XXX-XXXX-XXX | | NOT USED |
| R475 | XXX-XXXX-XXX | | NOT USED |
| R476 | XXX-XXXX-XXX | | NOT USED |
| R477 | 630-0041-000 | 1 | 120 OHM |
| R478 | XXX-XXXX-XXX | | NOT USED |
| **## IC'S** | | | |
| U401 | 606-0022-010 | 1 | NE5533AN OP AMP |
| U402 | 606-0022-010 | 1 | NE5533AN OP AMP |
| U403 | 606-0021-010 | 1 | NE5532AN OP AMP |
| U404 | 606-0021-010 | 1 | NE5532AN OP AMP |
| U405 | 606-0014-000 | 1 | TL072 |
| U406 | 606-0007-000 | 1 | LM358 |
| **## SOCKETS** | | | |
| | 613-0001-000 | 7 | SOCKET, TRANSISTOR TO-92 |
| | 613-0008-000 | 2 | SOCKET, 14 PIN DIP |
| | 613-0007-000 | 6 | SOCKET, 8 PIN DIP |
| **## MISCELLANEOUS** | | | |
| L401 | 512-0004-000 | 1 | 8.2 MHY |
| L402 | 512-0004-000 | 1 | 8.2 MHY |
| LDR401 | 650-0006-000 | 1 | LDR, DUAL |
| JP401 | 613-0015-000 | 1 | JUMPER, DIP PROGRAM |
| JP402 | 613-0015-000 | 1 | JUMPER, DIP PROGRAM |
| | 429-0001-000 | 1 | CABLE, SHIELDED |
| | 323-0001-021 | 1 | CARD PULL, PLAY AMP |
| | 325-0257-003 | 1 | PCB, PLAY REPRODUCE AMPLIFIER 99B |

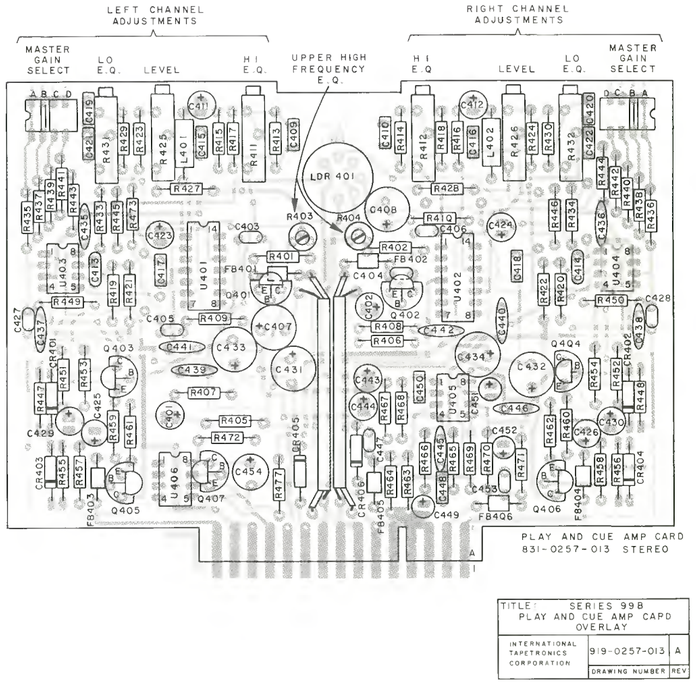



Figure 6-5

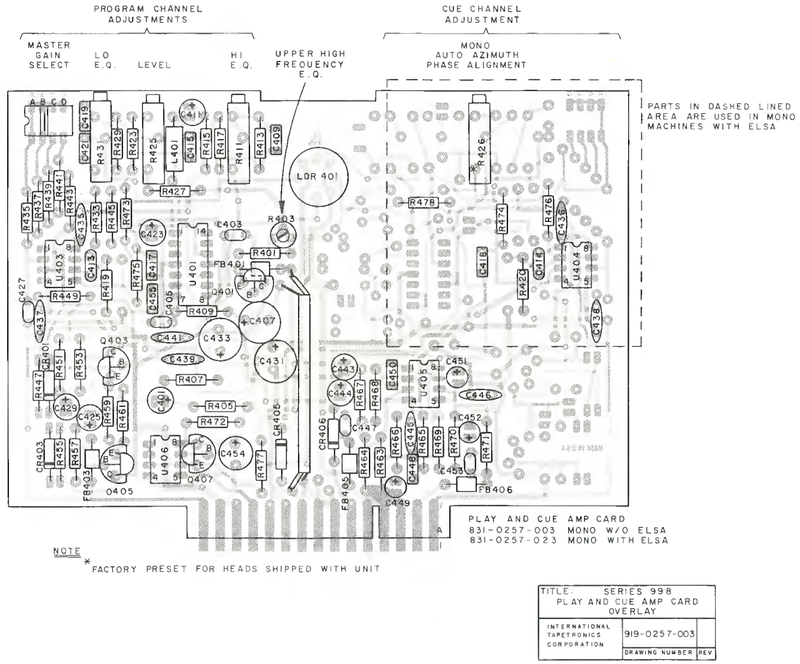



Figure 6-6

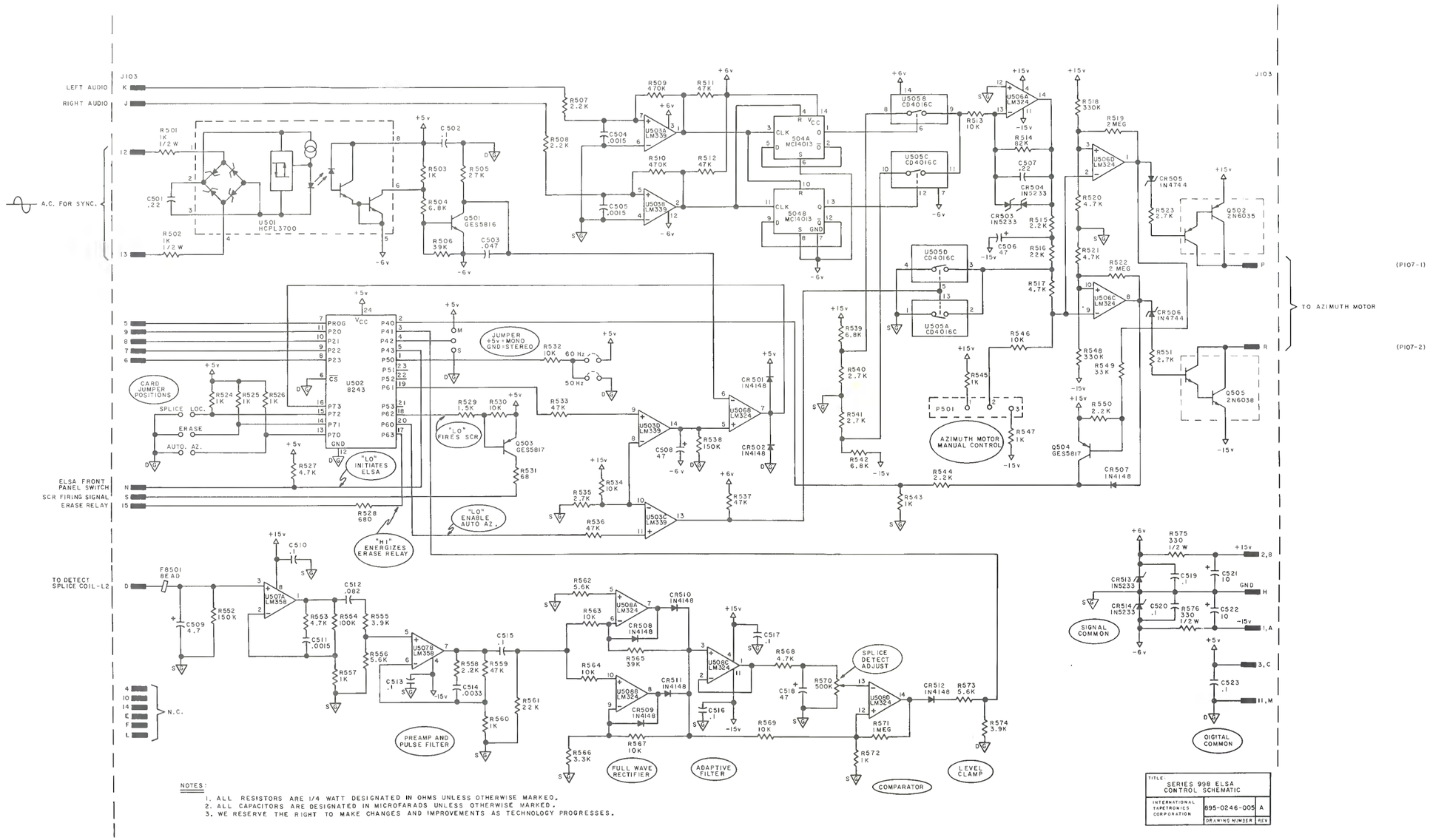
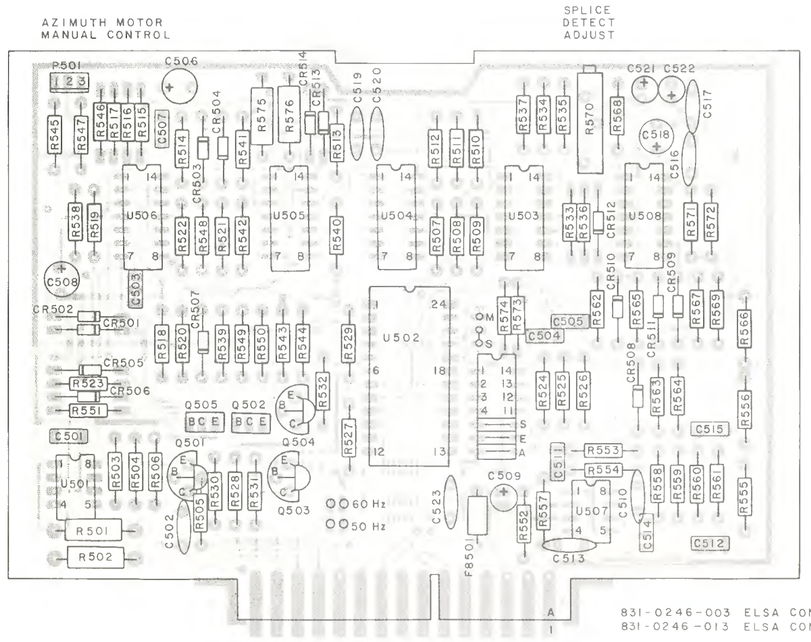



**Figure 6-7**




831-0246-003 ELSA CONTROL CARD 99A
831-0246-013 ELSA CONTROL CARD 99B

| TITLE: SERIES 99B ELSA CARD | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0246-003 | A |
| | DRAWING NUMBER | REV. |

```
##       B99JE.DAT          99B PLAY ELSA CARD
##                        (ASSEMBLY 831-0246-003)

## CAPACITORS
C501    680-2963-033    1       .22 UFD 63V POLY
C502    686-0009-000    1       .1 UFD 25V DISC
C503    680-2163-033    1       .047 UFD 63V POLY
C504    680-0301-033    1       .0015 UFD 100V POLY
C505    680-0301-033    1       .0015 UFD 100V POLY
C506    695-1735-013    1       47 UFD 35V ALUM
C507    680-2963-033    1       .22 UFD 63V POLY
C508    695-1735-013    1       47 UFD 35V ALUM
C509    695-1135-013    1       4.7 UFD 35V ALUM
C510    686-0009-000    1       .1 UFD 25V DISC
C511    680-0301-033    1       .0015 UFD 100V POLY
C512    680-2463-033    1       .082 UFD 63V POLY
C513    686-0009-000    1       .1 UFD 25V DISC
C514    680-0701-033    1       .0033 UFD 100V POLY
C515    680-2563-033    1       .1 UFD 63V POLY
C516    686-0009-000    1       .1 UFD 25V DISC
C517    686-0009-000    1       .1 UFD 25V DISC
C518    695-1735-013    1       47 UFD 35V ALUM
C519    686-0009-000    1       .1 UFD 25V DISC
C520    686-0009-000    1       .1 UFD 25V DISC
C521    695-1335-013    1       10 UFD 35V ALUM
C522    695-1335-013    1       10 UFD 35V ALUM
C523    686-0009-000    1       .1 UFD 25V DISC

##DIODES
CR501   575-0014-000    1       1N4148
CR502   575-0014-000    1       1N4148
CR503   577-0003-000    1       1N5233 6V ZENER
CR504   577-0003-000    1       1N5233 6V ZENER
CR505   577-0007-000    1       1N4744 15V ZENER
CR506   577-0007-000    1       1N4744 15V ZENER
CR507   575-0014-000    1       1N4148
CR508   575-0014-000    1       1N4148
CR509   575-0014-000    1       1N4148
CR510   575-0014-000    1       1N4148
CR511   575-0014-000    1       1N4148
CR512   575-0014-000    1       1N4148
CR513   577-0003-000    1       1N5233 6V ZENER
CR514   577-0003-000    1       1N5233 6V ZENER

##TRANSISTORS
Q501    590-0017-010    1       2N5816 NPN
Q502    590-0024-000    1       2N6035 PNP DARL
Q503    590-0018-010    1       2N5817 PNP
Q504    590-0018-010    1       2N5817 PNP
Q505    590-0022-000    1       2N6038 NPN DARL

##RESISTORS
R501    630-0263-000    1       1K 1/2 WATT
R502    630-0263-000    1       1K 1/2 WATT
R503    630-0063-000    1       1K
R504    630-0083-000    1       6.8K
R505    630-0097-000    1       27K
R506    630-0101-000    1       39K
R507    630-0071-000    1       2.2K
R508    630-0071-000    1       2.2K
R509    630-0127-000    1       470K
R510    630-0127-000    1       470K
R511    630-0103-000    1       47K
R512    630-0103-000    1       47K
R513    630-0087-000    1       10K
R514    630-0109-000    1       82K
R515    630-0071-000    1       2.2K
R516    630-0095-000    1       22K
R517    630-0079-000    1       4.7K
R518    630-0123-000    1       330K
R519    630-0142-000    1       2 MEG
R520    630-0079-000    1       4.7K
R521    630-0079-000    1       4.7K
R522    630-0142-000    1       2 MEG
R523    630-0073-000    1       2.7K
R524    630-0063-000    1       1K
R525    630-0063-000    1       1K
R526    630-0063-000    1       1K
R527    630-0079-000    1       4.7K
R528    630-0059-000    1       680 OHM
R529    630-0067-000    1       1.5K
R530    630-0087-000    1       10K
R531    630-0035-000    1       68 OHM
R532    630-0087-000    1       10K
R533    630-0103-000    1       47K
R534    630-0087-000    1       10K
R535    630-0073-000    1       2.7K
R536    630-0103-000    1       47K
R537    630-0103-000    1       47K
R538    630-0115-000    1       150K
R539    630-0083-000    1       6.8K
R540    630-0073-000    1       2.7K
R541    630-0073-000    1       2.7K
R542    630-0083-000    1       6.8K
R543    630-0063-000    1       1K
R544    630-0071-000    1       2.2K
R545    630-0063-000    1       1K
R546    630-0087-000    1       10K
R547    630-0063-000    1       1K
R548    630-0123-000    1       330K
R549    630-0099-000    1       33K
R550    630-0071-000    1       2.2K
R551    630-0073-000    1       2.7K
R552    630-0115-000    1       150K
R553    630-0079-000    1       4.7K
R554    630-0111-000    1       100K
R555    630-0077-000    1       3.9K
R556    630-0081-000    1       5.6K
R557    630-0063-000    1       1K
R558    630-0071-000    1       2.2K
R559    630-0103-000    1       47K
R560    630-0063-000    1       1K
R561    630-0095-000    1       22K
R562    630-0081-000    1       5.6K
R563    630-0087-000    1       10K
R564    630-0087-000    1       10K
R565    630-0101-000    1       39K
R566    630-0075-000    1       3.3K
R567    630-0087-000    1       10K
R568    630-0079-000    1       4.7K
R569    630-0087-000    1       10K
R570    636-0032-000    1       500K POT
R571    630-0135-000    1       1 MEG
R572    630-0063-000    1       1K
R573    630-0081-000    1       5.6K
R574    630-0077-000    1       3.9K
R575    630-0251-000    1       330 OHM 1/2 WATT
R576    630-0251-000    1       330 OHM 1/2 WATT

##INTEGRATED CIRCUITS
U501    585-0007-000    1       HCPL-3700
U502    609-0011-000    1       8243
U503    609-0002-000    1       LM339
U504    608-0008-000    1       4013
U505    608-0009-000    1       4016
U506    606-0006-000    1       LM324
U507    606-0007-000    1       LM358
U508    606-0006-000    1       LM324

##MISCELLANEOUS
FB501   516-0001-000    1       BEAD, FERRITE 57-34254
JP501   613-0015-000    1       JUMPER, DIP PROGRAM
JP502   613-0015-000    1       JUMPER, DIP PROGRAM
JP503   613-0015-000    1       JUMPER, DIP PROGRAM
P501    376-0032-000    1       PLUG, 3 POS
        613-0001-000    3       SOCKET, TRANSISTOR TO-92
        613-0019-000    1       SOCKET, 24 PIN DIP
        613-0008-000    6       SOCKET, 14 PIN DIP
        613-0007-000    2       SOCKET,  8 PIN DIP
        323-0001-041    1       CARD PULL, ELSA
        325-0246-003    1       PCB, PLAY ELSA CARD  99B
```

**Figure 6-8**

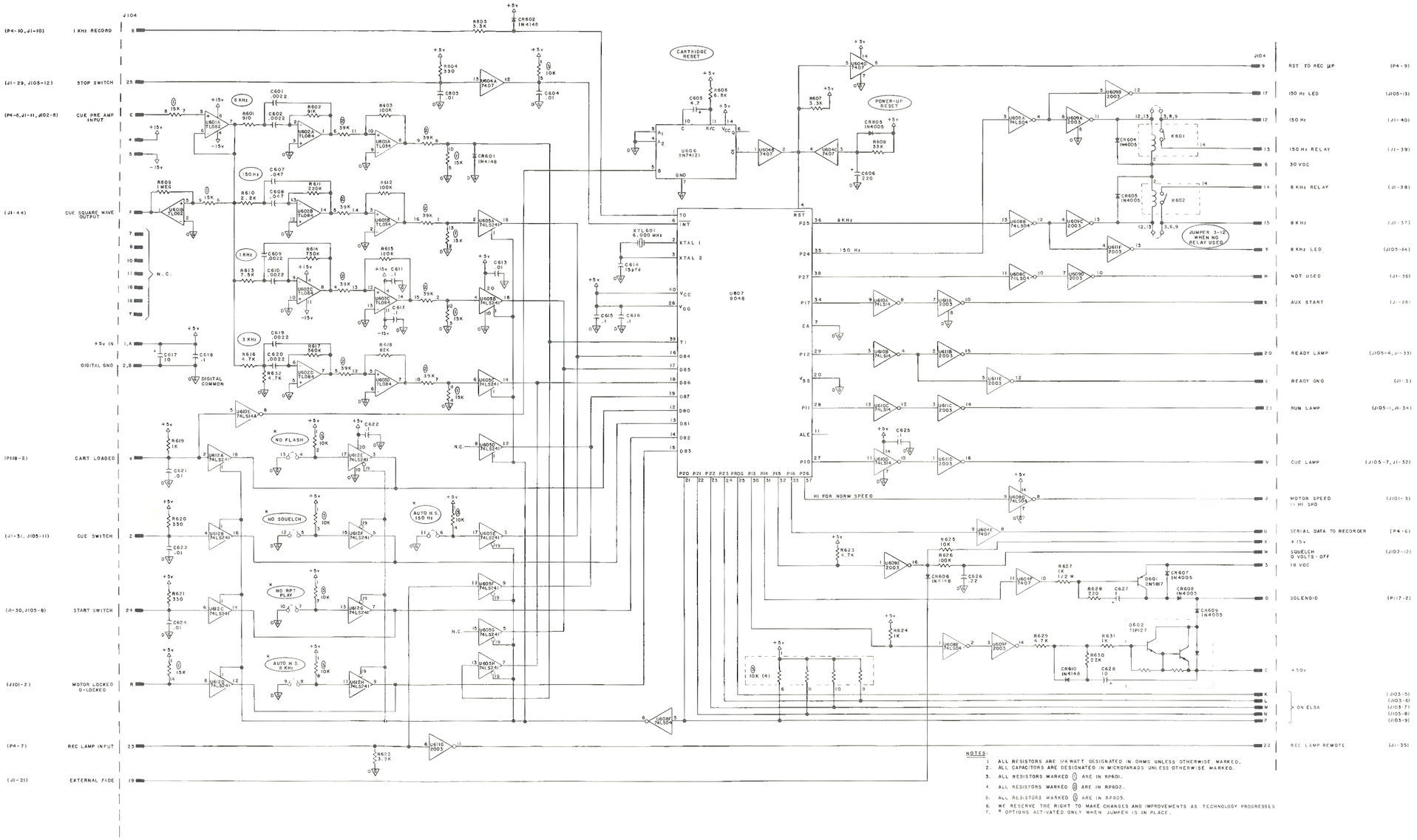
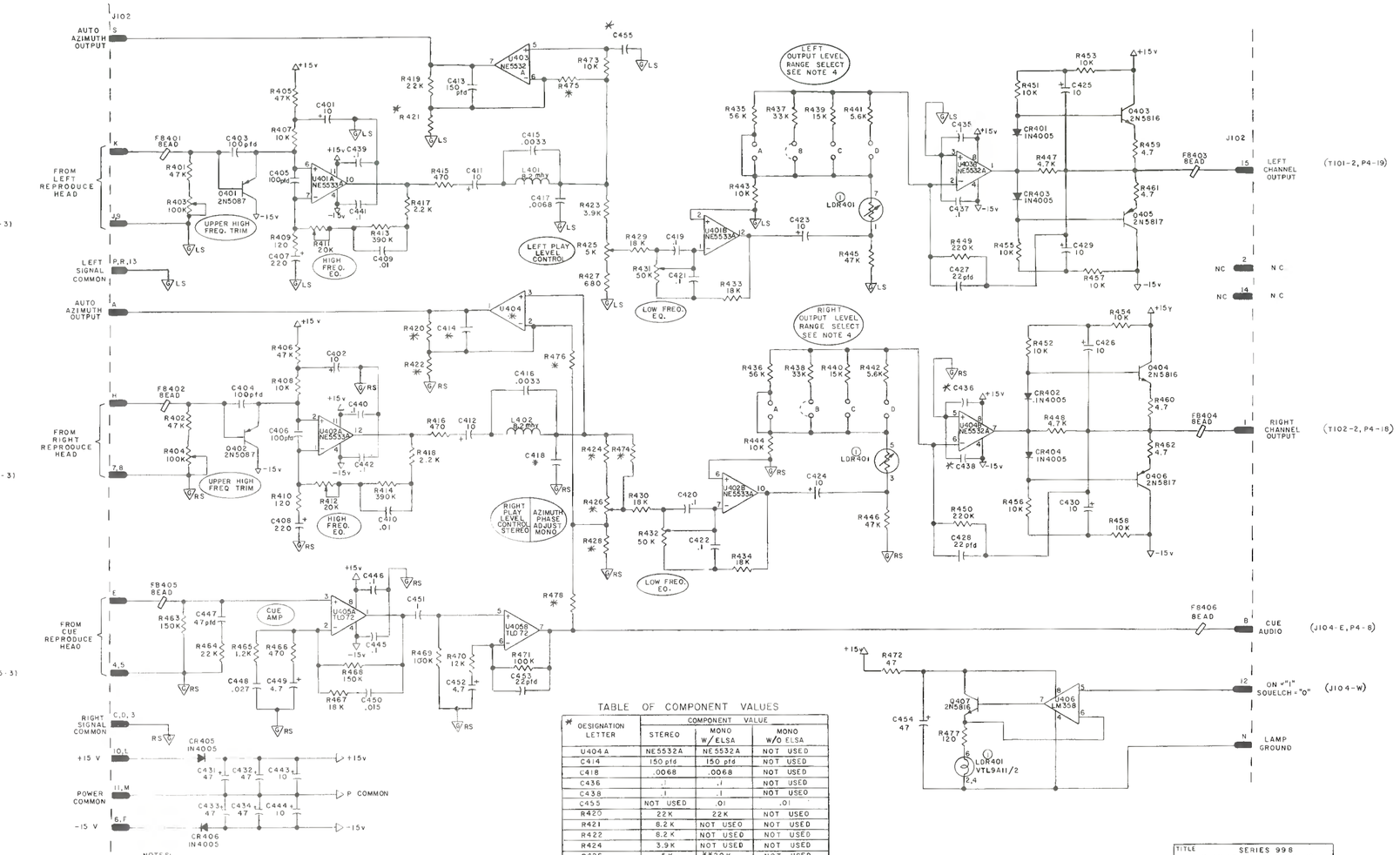



**Figure 6-9**




NOTES:

1. ALL LDR401 (1) SECTIONS ARE CONTAINED IN A SINGLE DEVICE.
2. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. AUDIO OUTPUT RANGE PER STRAP OPTION
   - A. -18 TO -1 dBm
   - B. -10 TO +7 dBm
   - C. -5 TO +12 dBm
   - D. +1 TO +18 dBm
5. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

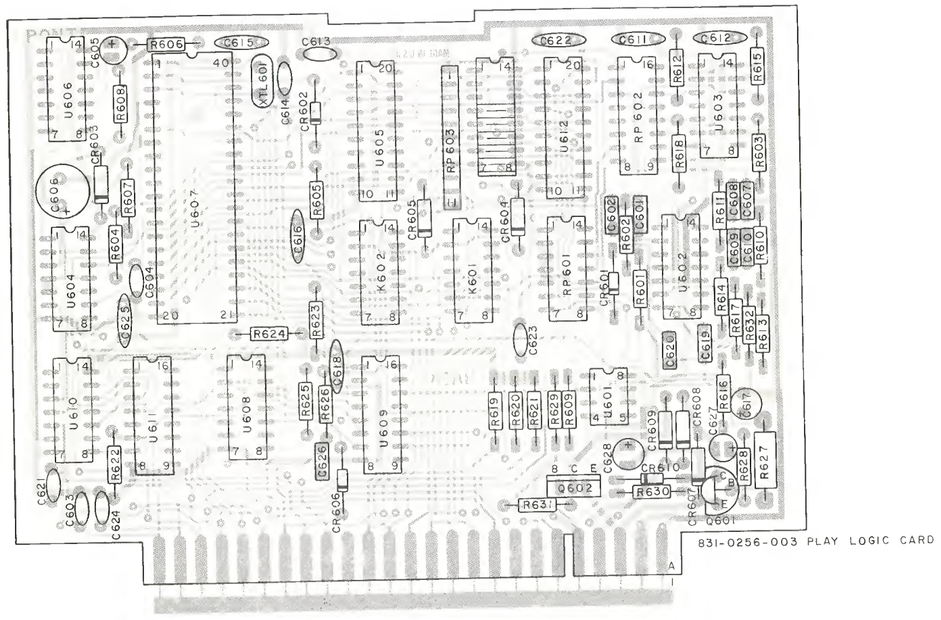
TABLE OF COMPONENT VALUES

| * DESIGNATION LETTER | COMPONENT VALUE | | |
|---|---|---|---|
| | STEREO | MONO W/ELSA | MONO W/O ELSA |
| U404 A | NE5532A | NE5532A | NOT USED |
| C414 | 150 pfd | 150 pfd | NOT USED |
| C418 | .0068 | .0068 | NOT USED |
| C436 | .1 | .1 | NOT USED |
| C438 | .1 | .1 | NOT USED |
| C455 | NOT USED | .01 | .01 |
| R420 | 22K | 22K | NOT USED |
| R421 | 8.2K | NOT USED | NOT USED |
| R422 | 8.2K | NOT USED | NOT USED |
| R424 | 3.9K | NOT USED | NOT USED |
| R426 | 5K | **20K | NOT USED |
| R428 | 680 | NOT USED | NOT USED |
| R475 | NOT USED | 22K | 22K |
| R476 | NOT USED | 22K | NOT USED |
| R474 | NOT USED | 10 | NOT USED |
| R478 | NOT USED | 10 | NOT USED |

** FACTORY PRESET FOR HEADS SHIPPED WITH UNIT

| TITLE | SERIES 998 PLAY AND CUE AMP CARD SCHEMATIC | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 895-0257-005 | |
| | DRAWING NUMBER | REV. |

**Figure 6-4**




| TITLE: SERIES 998 PLAY LOGIC CARD OVERLAY | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0256-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-10**

## 998 PLAY LOGIC CARD
## (ASSEMBLY 831-0256-003)

### ## CAPACITORS

| | | | |
|---|---|---|---|
| C601 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C602 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C603 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C604 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C605 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C606 | 695-2106-013 | 1 | 220 UFD 6.3V ALUM |
| C607 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C608 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C609 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C610 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C611 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C612 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C613 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C614 | 686-0011-000 | 1 | 15 PFD 1000V DISC |
| C615 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C616 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C617 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C618 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C619 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C620 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C621 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C622 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C623 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C624 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C625 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C626 | 680-2963-033 | 1 | .22 UFD 63V POLY |
| C627 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C628 | 695-1335-013 | 1 | 10 UFD 35V ALUM |

### ## DIODES

| | | | |
|---|---|---|---|
| CR601 | 575-0014-000 | 1 | 1N4148 |
| CR602 | 575-0014-000 | 1 | 1N4148 |
| CR603 | 575-0007-050 | 1 | 1N4005 |
| CR604 | 575-0007-050 | 1 | 1N4005 |
| CR605 | 575-0007-050 | 1 | 1N4005 |
| CR606 | 575-0014-000 | 1 | 1N4148 |
| CR607 | 575-0007-050 | 1 | 1N4005 |
| CR608 | 575-0007-050 | 1 | 1N4005 |
| CR609 | 575-0007-050 | 1 | 1N4005 |
| CR610 | 575-0014-000 | 1 | 1N4148 |

### ## RELAYS

| | | | | | |
|---|---|---|---|---|---|
| K601 | 480-0007-000 | 1 | 24V SPDT | TERTIARY | (OPTIONAL) |
| K602 | 480-0007-000 | 1 | 24V SPDT | TERTIARY | (OPTIONAL) |

### ## TRANSISTORS

| | | | |
|---|---|---|---|
| Q601 | 590-0018-010 | 1 | 2N5817 PNP |
| Q602 | 590-0032-000 | 1 | TIP127 PNP DARL |

### ##RESISTORS

| | | | |
|---|---|---|---|
| R601 | 630-0062-000 | 1 | 910 OHM |
| R602 | 630-0110-000 | 1 | 91K |
| R603 | 630-0111-000 | 1 | 100K |
| R604 | 630-0051-000 | 1 | 330 OHM |
| R605 | 630-0075-000 | 1 | 3.3K |
| R606 | 630-0083-000 | 1 | 6.8K |
| R607 | 630-0075-000 | 1 | 3.3K |
| R608 | 630-0099-000 | 1 | 33K |
| R609 | 630-0135-000 | 1 | 1 MEG |
| R610 | 630-0071-000 | 1 | 2.2K |
| R611 | 630-0119-000 | 1 | 220K |
| R612 | 630-0111-000 | 1 | 100K |
| R613 | 630-0084-000 | 1 | 7.5K |
| R614 | 630-0132-000 | 1 | 750K |
| R615 | 630-0111-000 | 1 | 100K |
| R616 | 630-0079-000 | 1 | 4.7K |
| R617 | 630-0129-000 | 1 | 560K |
| R618 | 630-0109-000 | 1 | 82K |
| R619 | 630-0063-000 | 1 | 1K |
| R620 | 630-0051-000 | 1 | 330 OHM |
| R621 | 630-0051-000 | 1 | 330 OHM |
| R622 | 630-0075-000 | 1 | 3.3K |
| R623 | 630-0079-000 | 1 | 4.7K |
| R624 | 630-0063-000 | 1 | 1K |
| R625 | 630-0087-000 | 1 | 10K |
| R626 | 630-0111-000 | 1 | 100K |
| R627 | 630-0263-000 | 1 | 1K 1/2 WATT |
| R628 | 630-0047-000 | 1 | 220 OHM |
| R629 | 630-0079-000 | 1 | 4.7K |
| R630 | 630-0095-000 | 1 | 22K |
| R631 | 630-0063-000 | 1 | 1K |
| R632 | 630-0079-000 | 1 | 4.7K |

### ## RESISTOR PACKS

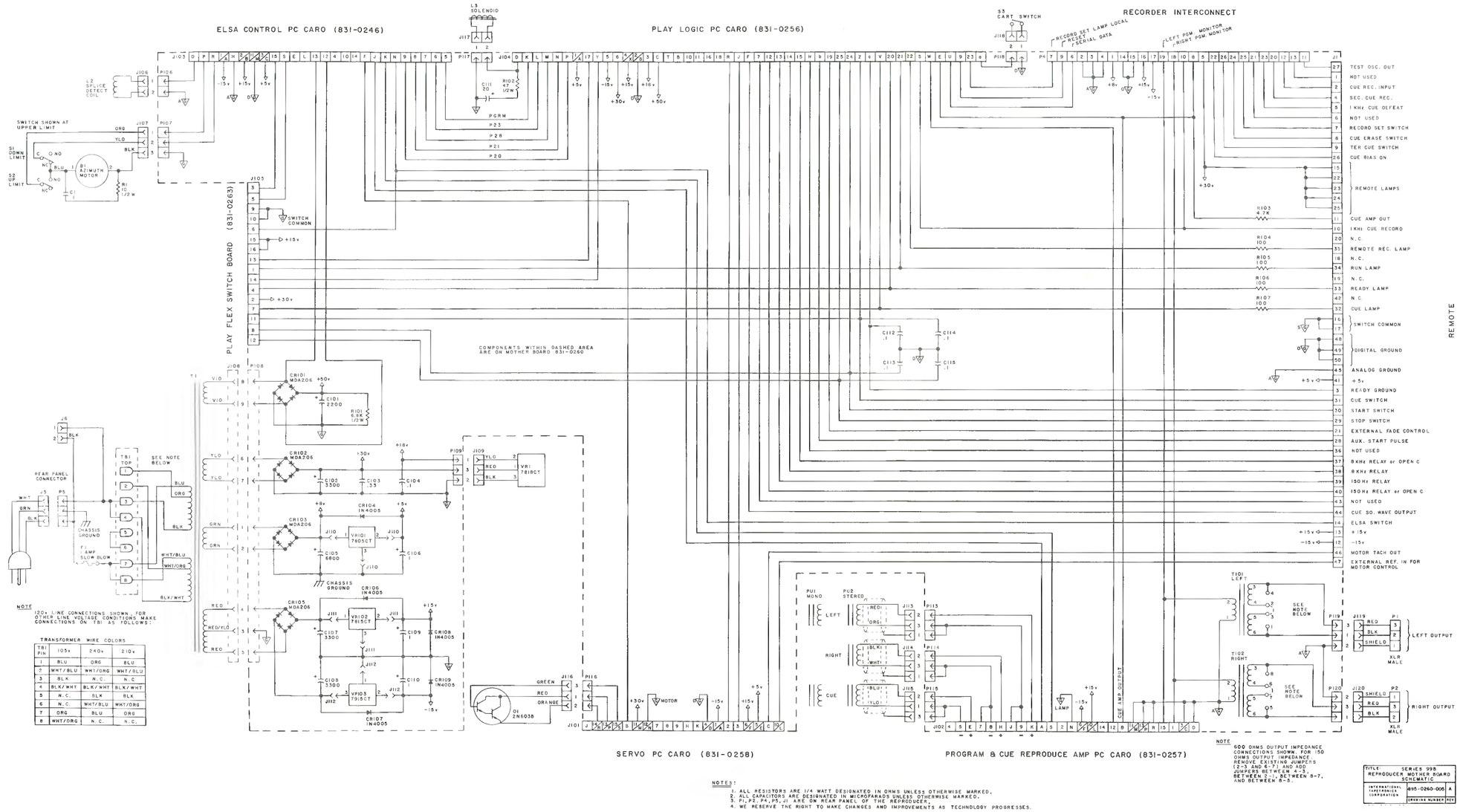
| | | | |
|---|---|---|---|
| RP601 | 631-0027-000 | 1 | 15K SEPERATE DIP (7 RESISTORS) |
| RP602 | 631-0026-000 | 1 | 39K SEPARATE DIP (8 RESISTORS) |
| RP603 | 631-0029-000 | 1 | 10K COMMON PIN SIP (10 RESISTORS) |

### ## INTEGRATED CIRCUITS

| | | | |
|---|---|---|---|
| U601 | 606-0013-000 | 1 | TL082 |
| U602 | 606-0015-000 | 1 | TL084 |
| U603 | 606-0015-000 | 1 | TL084 |
| U604 | 607-0015-000 | 1 | 7407 |
| U605 | 607-0075-000 | 1 | 74LS241 |
| U606 | 607-0008-000 | 1 | 74121 |
| U607 | 610-0006-010 | 1 | 8748 U-PROCESSOR 6 MHZ (PROGRAMMED FOR PLAY) |
| U608 | 607-0026-000 | 1 | 74LS04 |
| U609 | 609-0008-000 | 1 | ULN2003A |
| U610 | 607-0022-000 | 1 | 74LS14 |
| U611 | 609-0008-000 | 1 | ULN2003A |
| U612 | 607-0075-000 | 1 | 74LS241 |

### ## MISCELLANEOUS

| | | | |
|---|---|---|---|
| XTL601 | 418-0008-000 | 1 | CRYSTAL, 6.000 MHZ |
| | 613-0015-000 | 5 | JUMPER, DIP PROGRAM |
| | 613-0001-000 | 1 | SOCKET, TRANSISTOR TO-92 |
| | 613-0017-000 | 1 | SOCKET, 40 PIN DIP |
| | 613-0020-000 | 2 | SOCKET, 20 PIN DIP |
| | 613-0009-000 | 4 | SOCKET, 16 PIN DIP |
| | 613-0008-000 | 9 | SOCKET, 14 PIN DIP |
| | 613-0007-000 | 1 | SOCKET, 8 PIN DIP |
| | 323-0001-011 | 1 | CARD PULL, PLAY CTL |
| | 325-0256-003 | 1 | PCB, PLAY LOGIC CARD 998 |




NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
3. P1, P2, P4, P5, J1 ARE ON REAR PANEL OF THE REPRODUCER.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

NOTE
120v. LINE CONNECTIONS SHOWN. FOR OTHER LINE VOLTAGE CONDITIONS MAKE CONNECTIONS ON TB1 AS FOLLOWS:

TRANSFORMER WIRE COLORS

| TB1 PIN | 105v | 240v | 210v |
|---|---|---|---|
| 1 | BLU | ORG | BLU |
| 2 | WHT/BLU | WHT/ORG | WHT/BLU |
| 3 | BLK | N.C. | N.C. |
| 4 | BLK/WHT | BLK/WHT | BLK/WHT |
| 5 | N.C. | BLK | BLK |
| 6 | N.C. | WHT/BLU | WHT/ORG |
| 7 | ORG | BLU | ORG |
| 8 | WHT/ORG | N.C. | N.C. |

NOTE
600 OHMS OUTPUT IMPEDANCE CONNECTIONS SHOWN. FOR 150 OHMS OUTPUT IMPEDANCE, REMOVE EXISTING JUMPERS (2-3 AND 6-7) AND ADD JUMPERS BETWEEN 2-1 AND 3-4, BETWEEN 6-5 AND 7-8, AND BETWEEN 8-9.

**Figure 6-11**

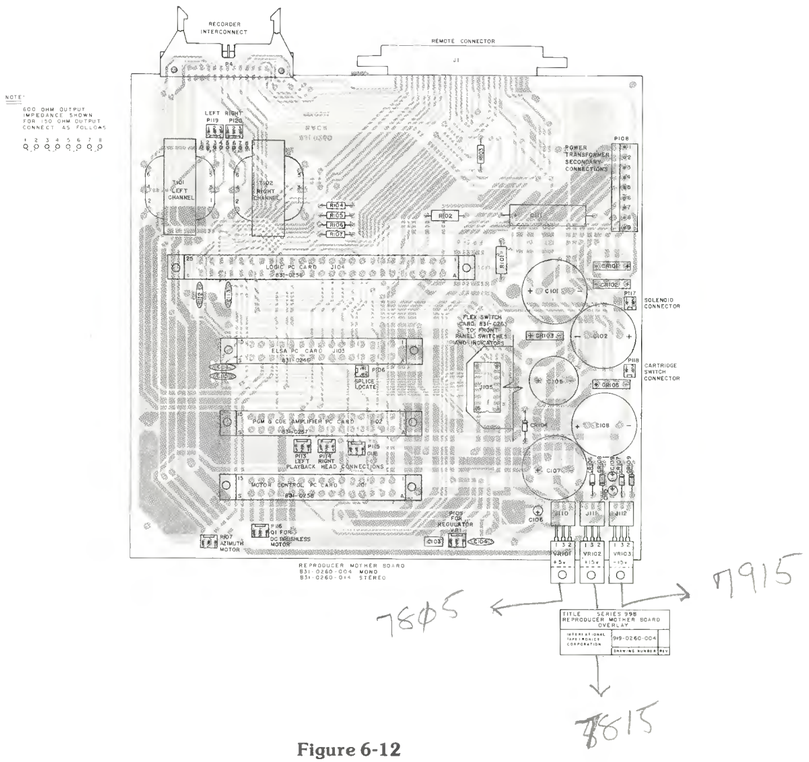
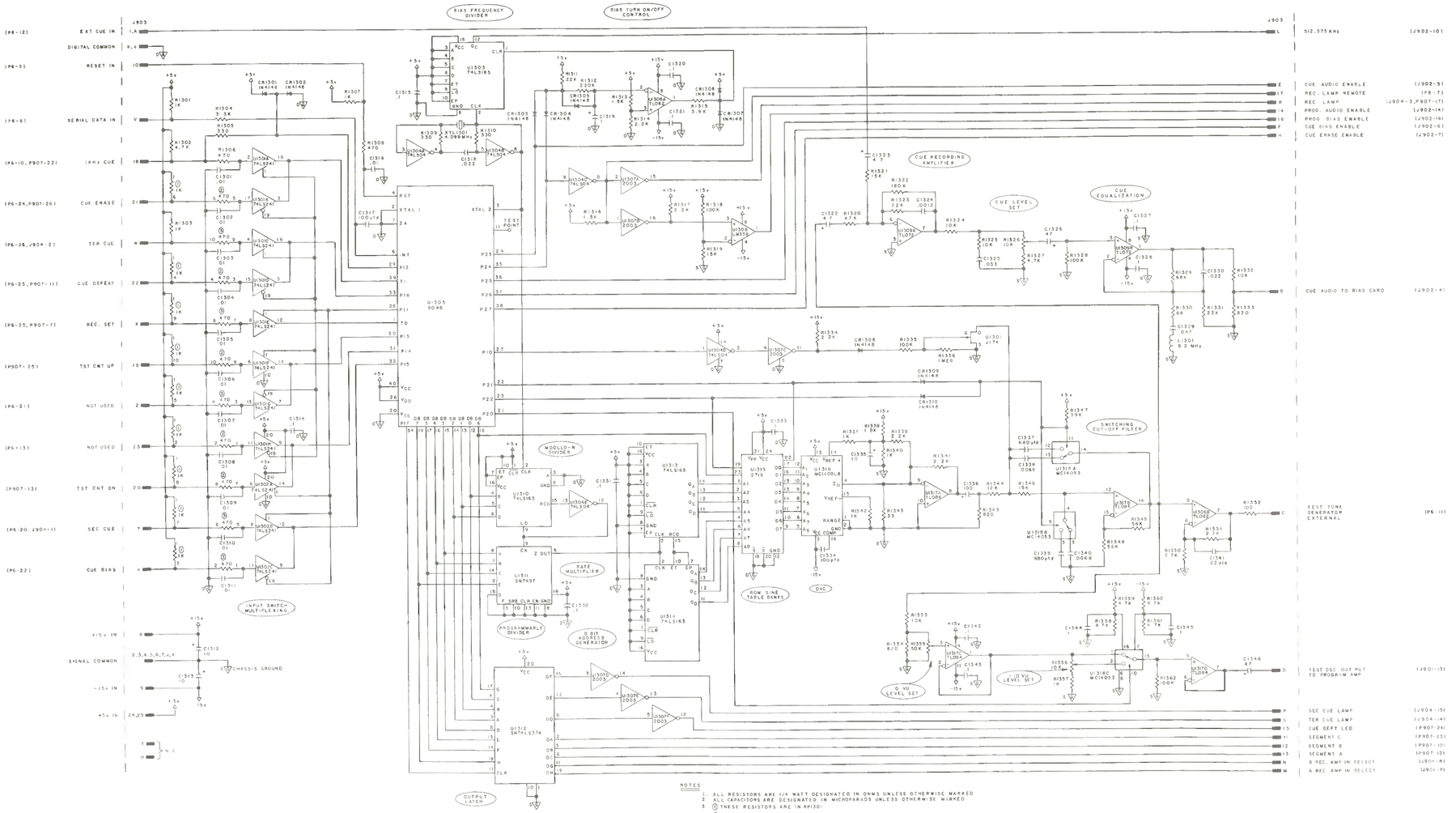



**Figure 6-12**

99B PLAY MOTHER BOARD - STEREO
(ASSEMBLY 831-0260-014)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ## CAPACITORS | | | | | | | |
| C101 | 687-0011-000 | 1 | 2200 UFD 63V | 382-0040-000 | 4 | KEY, CARD EDGE | (AMP 530687-1) |
| C102 | 687-0010-000 | 1 | 3300 UFD 50V | 382-0041-000 | 2 | KEY, POLORIZING | (FOR 380-0066-000) |
| C103 | 680-3163-033 | 1 | .33 UFD 63V POLY | 380-0066-000 | 1 | HEADER, 26 POS(SCOTCH FLEX 3429-1302)(INTERCON) | |
| C104 | 686-0009-000 | 1 | .1 UFD 25V DISC | 443-0022-000 | 2 | MOUNT, 4 WAY ADHESIVE (PANDUIT APMM-M-C) | |
| C105 | 687-0012-000 | 1 | 6800 UFD 16V | 325-0260-004 | 1 | PCB, PLAY MOTHER BOARD 99B | |
| C106 | 694-0005-000 | 1 | 1 UFD 35V TANTALUM | | | | |
| C107 | 687-0010-000 | 1 | 3300 UFD 50V | | | | |
| C108 | 687-0010-000 | 1 | 3300 UFD 50V | | | | |
| C109 | 694-0005-000 | 1 | 1 UFD 35V TANTALUM | | | | |
| C110 | 694-0005-000 | 1 | 1 UFD 35V TANTALUM | | | | |
| C111 | 696-0210-000 | 1 | 20 UFD 100V AXIAL | | | | |
| C112 | 686-0009-000 | 1 | .1 UFD 25V DISC | | | | |
| C113 | 686-0009-000 | 1 | .1 UFD 25V DISC | | | | |
| C114 | 686-0009-000 | 1 | .1 UFD 25V DISC | | | | |
| C115 | 686-0009-000 | 1 | .1 UFD 25V DISC | | | | |
| ## DIODES | | | | | | | |
| CR101 | 575-0022-000 | 1 | MDA206 BRIDGE | | | | |
| CR102 | 575-0022-000 | 1 | MDA206 BRIDGE | | | | |
| CR103 | 575-0022-000 | 1 | MDA206 BRIDGE | | | | |
| CR104 | 575-0007-050 | 1 | 1N4005 | | | | |
| CR105 | 575-0022-000 | 1 | MDA206 BRIDGE | | | | |
| CR106 | 575-0007-050 | 1 | 1N4005 | | | | |
| CR107 | 575-0007-050 | 1 | 1N4005 | | | | |
| CR108 | 575-0007-050 | 1 | 1N4005 | | | | |
| CR109 | 575-0007-050 | 1 | 1N4005 | | | | |
| ## RESISTORS | | | | | | | |
| R101 | 630-0283-000 | 1 | 6.8K 1/2W | | | | |
| R102 | 626-0231-000 | 1 | 47 OHM 1/2W CARBON COMP | | | | |
| R103 | 630-0079-000 | 1 | 4.7K | | | | |
| R104 | 630-0039-000 | 1 | 100 OHM | | | | |
| R105 | 630-0039-000 | 1 | 100 OHM | | | | |
| R106 | 630-0039-000 | 1 | 100 OHM | | | | |
| R107 | 630-0039-000 | 1 | 100 OHM | | | | |
| ## TRANSFORMERS | | | | | | | |
| T101 | 532-0007-000 | 1 | TRANSFORMER, AUDIO OUTPUT | (LEFT) | | | |
| T102 | 532-0007-000 | 1 | TRANSFORMER, AUDIO OUTPUT | (RIGHT) | | | |
| ## MISCELLANEOUS ITEMS | | | | | | | |
| | 380-0062-000 | 3 | SOCKET, 3 PIN REGULATOR (MOLEX 10-18-2031) | | | | |
| J101 | 380-0063-000 | 1 | SOCKET, 15 POS EDGE (AMP MP-530655-4)(SERVO) | | | | |
| J102 | 380-0063-000 | 1 | SOCKET, 15 POS EDGE (AMP MP-530655-4)(PLAY AMP) | | | | |
| J103 | 380-0063-000 | 1 | SOCKET, 15 POS EDGE (AMP MP-530655-4)(ELSA) | | | | |
| J104 | 380-0064-000 | 1 | SOCKET, 25 POS EDGE (AMP MP-530655-8)(PLAY CON) | | | | |
| J105 | 613-0009-000 | 1 | SOCKET, 16 PIN DIP (FLEX. SW. BOARD) | | | | |
| J1 | 380-0065-000 | 1 | RECEPTACLE, 50 POS (AMP 552130-1)(REMOTE) | | | | |
| P106 | 376-0041-000 | 1 | WAFER, 2 POS W/LOCK GOLD (MOLEX) (SPLICE DET.) | | | | |
| P107 | 376-0032-000 | 1 | WAFER, 3 POS LOCK (MOLEX 22-27-2043)(AZ. MOTOR) | | | | |
| P108 | 376-0035-000 | 1 | WAFER, 9 POS LOCK (MOLEX 09-50-1094)(POWER XFMR) | | | | |
| P109 | 376-0032-000 | 1 | WAFER, 3 POS LOCK (MOLEX 22-27-2043)(+18V REG.) | | | | |
| P113 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD (MOLEX) (L-HEAD) | | | | |
| P114 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD (MOLEX) (P-HEAD) | | | | |
| P115 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD (MOLEX) (CUE HEAD) | | | | |
| P116 | 376-0032-000 | 1 | WAFER, 3 POS LOCK(MOLEX 22-27-2043)(MOTOR TRANS.) | | | | |
| P117 | 376-0031-000 | 1 | WAFER, 2 POS LOCK (MOLEX 22-27-2042)(SOLENOID) | | | | |
| P118 | 376-0031-000 | 1 | WAFER, 2 POS LOCK (MOLEX 22-27-2042)(CART. SW.) | | | | |
| P119 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD (MOLEX 22-2) (L-OUT) | | | | |
| P120 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD (MOLEX 22-2) (R-OUT) | | | | |
| | 382-0039-000 | 1 | LOCK, VERTICAL BAIL MOUNT (AMP 552562-1) | | | | |
| | 350-0205-000 | 2 | SCREW, 2-56 X 3/8 PP HD (P4 MTG.) | | | | |
| | 359-0021-000 | 2 | WASHER, FIBER NO. 2 | | | | |
| | 370-0201-000 | 2 | NUT, HEX 2-56 X 3/16 | | | | |




NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED
3. ① THESE RESISTORS ARE IN RP130!
4. ② THESE RESISTORS ARE IN RP1302
5. ③ THESE RESISTORS ARE IN RP1303.
6. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

Figure 6-21

99B RECORD LOGIC CARD
(ASSEMBLY 831-0261)

## CAPACITORS

| | | | |
|---|---|---|---|
| C1301 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1302 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1303 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1304 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1305 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1306 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1307 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1308 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1309 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1310 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1311 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1312 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1313 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1314 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1315 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1316 | 686-0007-000 | 1 | .01 UFD 50V DISC |
| C1317 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C1318 | 680-1763-033 | 1 | .022 UFD 63V POLY |
| C1319 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C1320 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1321 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1322 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1323 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1324 | 680-0201-033 | 1 | .0012 UFD 100V POLY |
| C1325 | 680-1963-033 | 1 | .033 UFD 63V POLY |
| C1326 | 695-1716-013 | 1 | 47 UFD 16V ALUM |
| C1327 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1328 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1329 | 680-2163-033 | 1 | .047 UFD 63V POLY |
| C1330 | 680-1763-033 | 1 | .022 UFD 63V POLY |
| C1331 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1332 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1333 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1334 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C1335 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1336 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1337 | 678-0763-033 | 1 | 680 PFD 63V POLYPROP |
| C1338 | 680-1101-033 | 1 | .0068 UFD 100V POLY |
| C1339 | 678-0763-033 | 1 | 680 PFD 63V POLYPROP |
| C1340 | 680-1101-033 | 1 | .0068 UFD 100V POLY |
| C1341 | 677-0008-000 | 1 | 22 PFD 300V SILVER MICA |
| C1342 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1343 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1344 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1345 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1346 | 695-1716-013 | 1 | 47 UFD 16V ALUM |

## DIODES

| | | | |
|---|---|---|---|
| CR1301 | 575-0014-000 | 1 | 1N4148 |
| CR1302 | 575-0014-000 | 1 | 1N4148 |
| CR1303 | 575-0014-000 | 1 | 1N4148 |
| CR1304 | 575-0014-000 | 1 | 1N4148 |
| CR1305 | 575-0014-000 | 1 | 1N4148 |
| CR1306 | 575-0014-000 | 1 | 1N4148 |
| CR1307 | 575-0014-000 | 1 | 1N4148 |
| CR1308 | 575-0014-000 | 1 | 1N4148 |
| CR1309 | 575-0014-000 | 1 | 1N4148 |
| CR1310 | 575-0014-000 | 1 | 1N4148 |

## INDUCTORS

| | | | |
|---|---|---|---|
| L1301 | 512-0004-000 | 1 | 8.2 MHY |

## TRANSISTORS

| | | | |
|---|---|---|---|
| Q1301 | 596-0002-010 | 1 | J174 J-FET |

## RESISTORS

| | | | |
|---|---|---|---|
| R1301 | 630-0063-000 | 1 | 1K |
| R1302 | 630-0079-000 | 1 | 4.7K |
| R1303 | 630-0063-000 | 1 | 1K |
| R1304 | 630-0075-000 | 1 | 3.3K |
| R1305 | 630-0051-000 | 1 | 330 OHM |
| R1306 | 630-0055-000 | 1 | 470 OHM |
| R1307 | 630-0063-000 | 1 | 1K |

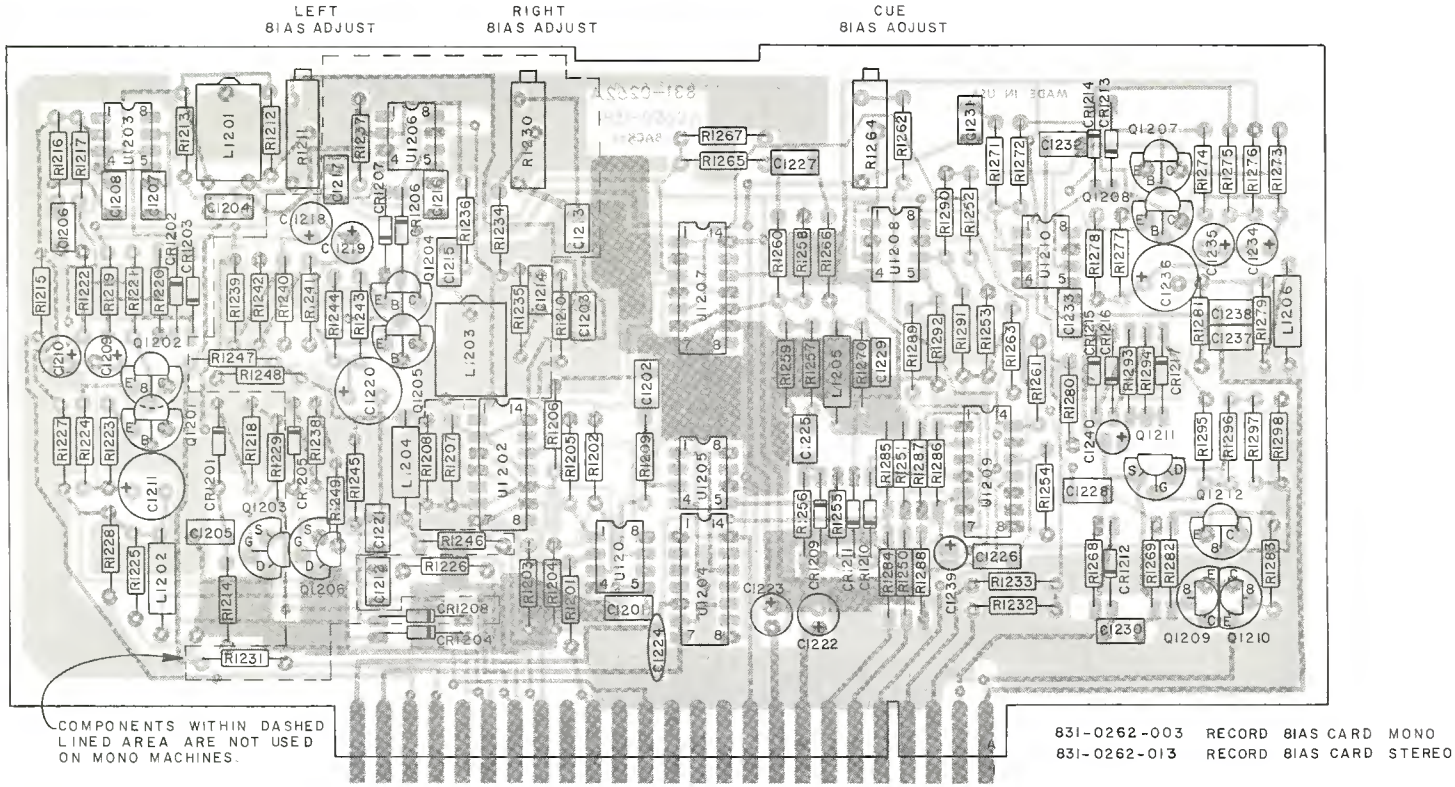



**Figure 6-20**

RECORD BIAS CARD - STEREO
(ASSEMBLY 831-0262-013)

| | | | |
|---|---|---|---|
| ## CAPACITORS | | | |
| C1201 | 680-2963-033 | 1 | .22 UFD 63V POLY |
| C1202 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1203 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1204 | 678-0863-033 | 1 | 820 PFD 63V POLYPROP |
| C1205 | 680-2963-033 | 1 | .22 UFD 63V POLY |
| C1206 | 680-0201-033 | 1 | .0012 UFD 100V POLY |
| C1207 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1208 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1209 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1210 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1211 | 695-1925-013 | 1 | 100 UFD 25V ALUM |
| C1212 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1213 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1214 | 678-0863-033 | 1 | 820 PFD 63V POLYPROP |
| C1215 | 680-0201-033 | 1 | .0012 UFD 100V POLY |
| C1216 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1217 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1218 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1219 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1220 | 695-1925-013 | 1 | 100 UFD 25V ALUM |
| C1221 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1222 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1223 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1224 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1225 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1226 | 680-2963-033 | 1 | .22 UFD 63V POLY |
| C1227 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1228 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1229 | 678-0563-033 | 1 | 470 PFD 63V POLYPROP |
| C1230 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1231 | 680-0201-033 | 1 | .0012 UFD 100V POLY |
| C1232 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1233 | 680-2563-033 | 1 | .1 UFD 63V POLY |
| C1234 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1235 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1236 | 695-1735-013 | 1 | 47 UFD 35V ALUM |
| C1237 | 680-2363-033 | 1 | .068 UFD 63V POLY |
| C1238 | 680-1363-033 | 1 | .01 UFD 63V POLY |
| C1239 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C1240 | 695-0750-013 | 1 | 1 UFD 50V ALUM |

| | | | |
|---|---|---|---|
| ## DIODES | | | |
| CR1201 | 575-0014-000 | 1 | 1N4148 |
| CR1202 | 575-0014-000 | 1 | 1N4148 |
| CR1203 | 575-0014-000 | 1 | 1N4148 |
| CR1204 | 575-0014-000 | 1 | 1N4148 |
| CR1205 | 575-0014-000 | 1 | 1N4148 |
| CR1206 | 575-0014-000 | 1 | 1N4148 |
| CR1207 | 575-0014-000 | 1 | 1N4148 |
| CR1208 | 575-0014-000 | 1 | 1N4148 |
| CR1209 | 575-0014-000 | 1 | 1N4148 |
| CR1210 | 575-0014-000 | 1 | 1N4148 |
| CR1211 | 575-0014-000 | 1 | 1N4148 |
| CR1212 | 575-0014-000 | 1 | 1N4148 |
| CR1213 | 575-0014-000 | 1 | 1N4148 |
| CR1214 | 575-0014-000 | 1 | 1N4148 |
| CR1215 | 575-0014-000 | 1 | 1N4148 |
| CR1216 | 575-0014-000 | 1 | 1N4148 |
| CR1217 | 575-0014-000 | 1 | 1N4148 |

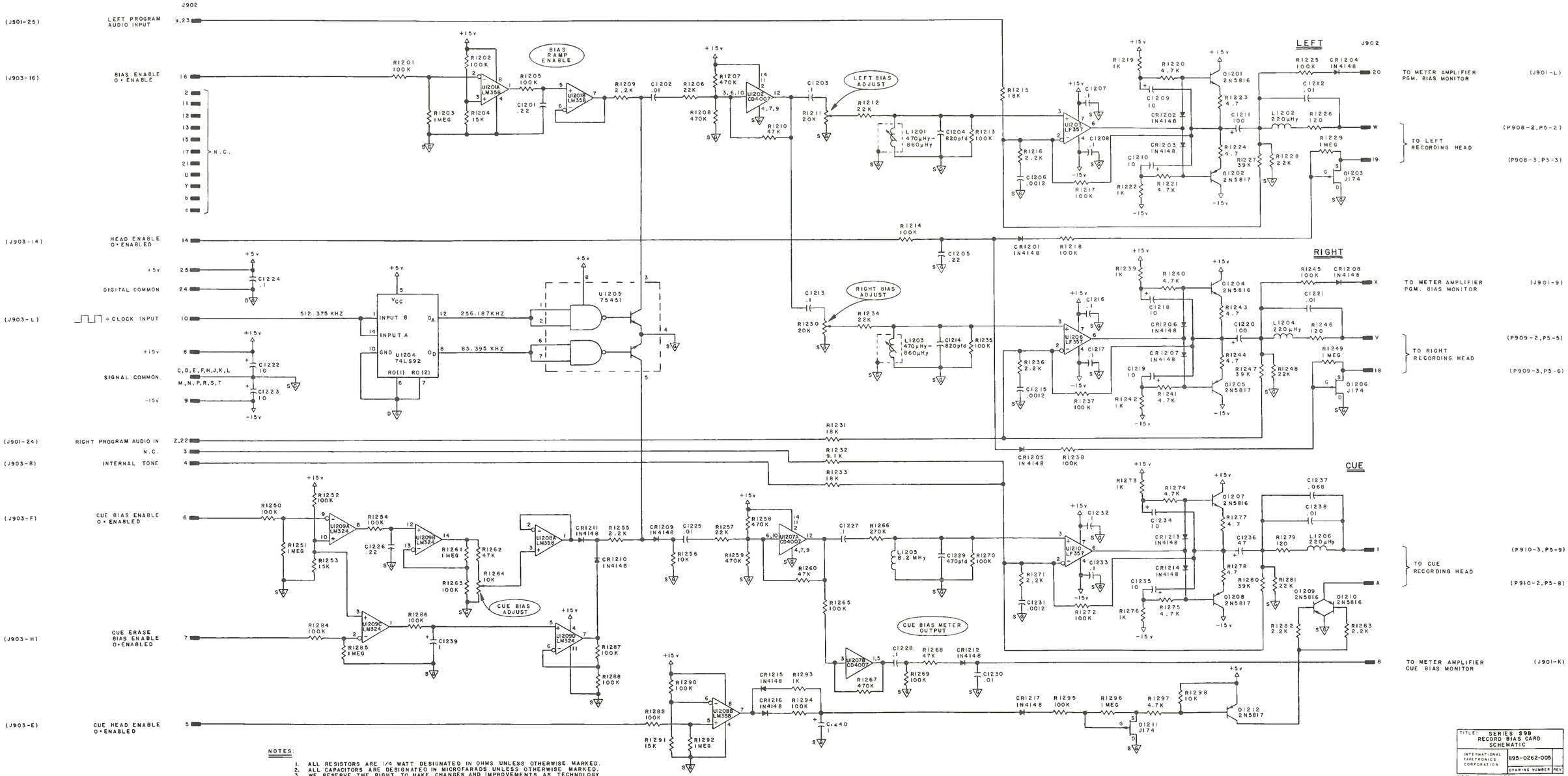
| | | | | |
|---|---|---|---|---|
| ## INDUCTORS | | | | |
| L1201 | 513-0006-000 | 1 | INDUCTOR, VARIABLE | (470-860 UHY) |
| L1202 | 512-0006-000 | 1 | 220 UHY | |
| L1203 | 513-0006-000 | 1 | INDUCTOR, VARIABLE | (470-860 UHY) |
| L1204 | 512-0006-000 | 1 | 220 UHY | |
| L1205 | 512-0004-000 | 1 | 8.2 MHY | |
| L1206 | 512-0006-000 | 1 | 220 UHY | |

| | | | | |
|---|---|---|---|---|
| ## TRANSISTORS | | | | |
| Q1201 | 590-0017-010 | 1 | 2N5816 NPN | |
| Q1202 | 590-0018-010 | 1 | 2N5817 PNP | |
| Q1203 | 596-0002-010 | 1 | J174 J-FET | |
| Q1204 | 590-0017-010 | 1 | 2N5816 NPN | |
| Q1205 | 590-0018-010 | 1 | 2N5817 PNP | |
| Q1206 | 596-0002-010 | 1 | J174 J-FET | |
| Q1207 | 590-0017-010 | 1 | 2N5816 NPN | |
| Q1208 | 590-0018-010 | 1 | 2N5817 PNP | |
| Q1209 | 590-0017-010 | 1 | 2N5816 NPN | |
| Q1210 | 590-0017-010 | 1 | 2N5816 NPN | |
| Q1211 | 596-0002-010 | 1 | J174 J-FET | |
| Q1212 | 590-0018-010 | 1 | 2N5817 PNP | |

| | | | | |
|---|---|---|---|---|
| ##RESISTORS | | | | |
| R1201 | 630-0111-000 | 1 | 100K | |
| R1202 | 630-0111-000 | 1 | 100K | |
| R1203 | 630-0135-000 | 1 | 1 MEG | |
| R1204 | 630-0091-000 | 1 | 15K | |
| R1205 | 630-0111-000 | 1 | 100K | |
| R1206 | 630-0095-000 | 1 | 22K | |
| R1207 | 630-0127-000 | 1 | 470K | |
| R1208 | 630-0127-000 | 1 | 470K | |
| R1209 | 630-0071-000 | 1 | 2.2K | |
| R1210 | 630-0103-000 | 1 | 47K | |
| R1211 | 636-0031-000 | 1 | 20K POT | (L BIAS ADJ.) |
| R1212 | 630-0095-000 | 1 | 22K | |
| R1213 | 630-0111-000 | 1 | 100K | |
| R1214 | 630-0111-000 | 1 | 100K | |
| R1215 | 630-0093-000 | 1 | 18K | |
| R1216 | 630-0071-000 | 1 | 2.2K | |
| R1217 | 630-0111-000 | 1 | 100K | |
| R1218 | 630-0111-000 | 1 | 100K | |
| R1219 | 630-0063-000 | 1 | 1K | |
| R1220 | 630-0079-000 | 1 | 4.7K | |
| R1221 | 630-0079-000 | 1 | 4.7K | |
| R1222 | 630-0063-000 | 1 | 1K | |
| R1223 | 630-0007-000 | 1 | 4.7 OHM | |
| R1224 | 630-0007-000 | 1 | 4.7 OHM | |
| R1225 | 630-0111-000 | 1 | 100K | |
| R1226 | 630-0041-000 | 1 | 120 OHM | |
| R1227 | 630-0101-000 | 1 | 39K | |
| R1228 | 630-0095-000 | 1 | 22K | |
| R1229 | 630-0135-000 | 1 | 1 MEG | |
| R1230 | 636-0031-000 | 1 | 20K POT | (R BIAS ADJ.) |
| R1231 | 630-0093-000 | 1 | 18K | |
| R1232 | 630-0086-000 | 1 | 9.1K | |
| R1233 | 630-0093-000 | 1 | 18K | |
| R1234 | 630-0095-000 | 1 | 22K | |
| R1235 | 630-0111-000 | 1 | 100K | |
| R1236 | 630-0071-000 | 1 | 2.2K | |
| R1237 | 630-0111-000 | 1 | 100K | |
| R1238 | 630-0111-000 | 1 | 100K | |
| R1239 | 630-0063-000 | 1 | 1K | |
| R1240 | 630-0079-000 | 1 | 4.7K | |
| R1241 | 630-0079-000 | 1 | 4.7K | |
| R1242 | 630-0063-000 | 1 | 1K | |
| R1243 | 630-0007-000 | 1 | 4.7 OHM | |
| R1244 | 630-0007-000 | 1 | 4.7 OHM | |
| R1245 | 630-0111-000 | 1 | 100K | |
| R1246 | 630-0041-000 | 1 | 120 OHM | |
| R1247 | 630-0101-000 | 1 | 39K | |
| R1248 | 630-0095-000 | 1 | 22K | |
| R1249 | 630-0135-000 | 1 | 1 MEG | |
| R1250 | 630-0111-000 | 1 | 100K | |
| R1251 | 630-0135-000 | 1 | 1 MEG | |
| R1252 | 630-0111-000 | 1 | 100K | |
| R1253 | 630-0091-000 | 1 | 15K | |
| R1254 | 630-0111-000 | 1 | 100K | |
| R1255 | 630-0071-000 | 1 | 2.2K | |
| R1256 | 630-0087-000 | 1 | 10K | |
| R1257 | 630-0095-000 | 1 | 22K | |
| R1258 | 630-0127-000 | 1 | 470K | |
| R1259 | 630-0127-000 | 1 | 470K | |
| R1260 | 630-0103-000 | 1 | 47K | |
| R1261 | 630-0135-000 | 1 | 1 MEG | |
| R1262 | 630-0103-000 | 1 | 47K | |
| R1263 | 630-0111-000 | 1 | 100K | |
| R1264 | 636-0028-000 | 1 | 10K POT | (CUE BIAS ADJ.) |
| R1265 | 630-0111-000 | 1 | 100K | |
| R1266 | 630-0121-000 | 1 | 270K | |
| R1267 | 630-0127-000 | 1 | 470K | |
| R1268 | 630-0103-000 | 1 | 47K | |
| R1269 | 630-0111-000 | 1 | 100K | |
| R1270 | 630-0111-000 | 1 | 100K | |
| R1271 | 630-0071-000 | 1 | 2.2K | |
| R1272 | 630-0111-000 | 1 | 100K | |
| R1273 | 630-0063-000 | 1 | 1K | |
| R1274 | 630-0079-000 | 1 | 4.7K | |
| R1275 | 630-0079-000 | 1 | 4.7K | |
| R1276 | 630-0063-000 | 1 | 1K | |
| R1277 | 630-0007-000 | 1 | 4.7 OHM | |
| R1278 | 630-0007-000 | 1 | 4.7 OHM | |
| R1279 | 630-0041-000 | 1 | 120 OHM | |
| R1280 | 630-0101-000 | 1 | 39K | |
| R1281 | 630-0095-000 | 1 | 22K | |
| R1282 | 630-0071-000 | 1 | 2.2K | |
| R1283 | 630-0071-000 | 1 | 2.2K | |
| R1284 | 630-0111-000 | 1 | 100K | |
| R1285 | 630-0135-000 | 1 | 1 MEG | |
| R1286 | 630-0111-000 | 1 | 100K | |
| R1287 | 630-0111-000 | 1 | 100K | |
| R1288 | 630-0111-000 | 1 | 100K | |
| R1289 | 630-0111-000 | 1 | 100K | |
| R1290 | 630-0111-000 | 1 | 100K | |
| R1291 | 630-0091-000 | 1 | 15K | |
| R1292 | 630-0135-000 | 1 | 1 MEG | |
| R1293 | 630-0063-000 | 1 | 1K | |
| R1294 | 630-0111-000 | 1 | 100K | |
| R1295 | 630-0111-000 | 1 | 100K | |
| R1296 | 630-0135-000 | 1 | 1 MEG | |
| R1297 | 630-0079-000 | 1 | 4.7K | |
| R1298 | 630-0087-000 | 1 | 10K | |

| | | | |
|---|---|---|---|
| ##INTEGRATED CIRCUITS | | | |
| U1201 | 606-0007-000 | 1 | LM358 |
| U1202 | 608-0030-000 | 1 | 4007 |
| U1203 | 606-0018-000 | 1 | LF357 |
| U1204 | 607-0038-000 | 1 | 74LS92 |
| U1205 | 607-0009-000 | 1 | 75451 |
| U1206 | 606-0018-000 | 1 | LF357 |
| U1207 | 608-0030-000 | 1 | 4007 |
| U1208 | 606-0007-000 | 1 | LM358 |
| U1209 | 606-0006-000 | 1 | LM324 |
| U1210 | 606-0018-000 | 1 | LF357 |

| | | | |
|---|---|---|---|
| ##MISCELLANEOUS | | | |
| | 613-0001-000 | 12 | SOCKET, TRANSISTOR TO-92 |
| | 613-0008-000 | 4 | SOCKET, 14 PIN DIP |
| | 613-0007-000 | 6 | SOCKET, 8 PIN DIP |
| | 323-0001-061 | 1 | CARD PULL, BIAS AMP |
| | 325-0262-003 A | 1 | PCB, RECORD BIAS CARD 99B |




NOTES:

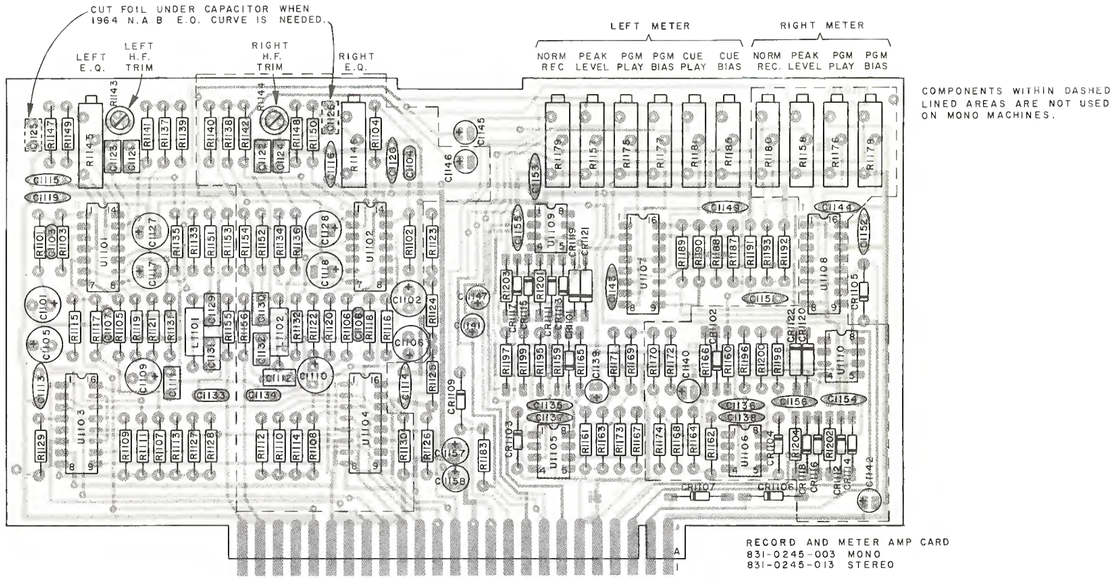
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
3. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

TITLE: SERIES 98 RECORD BIAS CARD SCHEMATIC

INTERNATIONAL TAPETRONICS CORPORATION | 895-0262-005 | DRAWING NUMBER | REV

SDT OCT. 6, 1981

**Figure 6-19**




DESIGNATION LETTERS NOT USED

| | | |
|---|---|---|
| RI182 | CI148 | CRI108 |
| RI184 | CI150 | CRI110 |
| RI186 | | |
| RI194 | | |

| TITLE: SERIES 998 RECORD AND METER AMP CARD OVERLAY | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0245-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-18**

| | | | |
|---|---|---|---|
| CR1116 | 575-0014-000 | 1 | 1N4148 |
| CR1117 | 575-0014-000 | 1 | 1N4148 |
| CR1118 | 575-0014-000 | 1 | 1N4148 |
| CR1119 | 577-0010-000 | 1 | 1N4738A 8.2V ZENER 1W |
| CR1120 | 577-0010-000 | 1 | 1N4738A 8.2V ZENER 1W |
| CR1121 | 577-0010-000 | 1 | 1N4738A 8.2V ZENER 1W |
| CR1122 | 577-0010-000 | 1 | 1N4738A 8.2V ZENER 1W |
| ## INDUCTORS | | | |
| L1101 | 512-0004-000 | 1 | 8.2 MHY |
| L1102 | 512-0004-000 | 1 | 8.2 MHY |
| ## RESISTORS | | | |
| R1101 | 630-0063-000 | 1 | 1K |
| R1102 | 630-0063-000 | 1 | 1K |
| R1103 | 630-0091-000 | 1 | 15K |
| R1104 | 630-0091-000 | 1 | 15K |
| R1105 | 630-0087-000 | 1 | 10K |
| R1106 | 630-0087-000 | 1 | 10K |
| R1107 | 630-0063-000 | 1 | 1K |
| R1108 | 630-0063-000 | 1 | 1K |
| R1109 | 630-0111-000 | 1 | 100K |
| R1110 | 630-0111-000 | 1 | 100K |
| R1111 | 630-0111-000 | 1 | 100K |
| R1112 | 630-0111-000 | 1 | 100K |
| R1113 | 630-0111-000 | 1 | 100K |
| R1114 | 630-0111-000 | 1 | 100K |
| R1115 | 630-0079-000 | 1 | 4.7K |
| R1116 | 630-0079-000 | 1 | 4.7K |
| R1117 | 630-0083-000 | 1 | 6.8K |
| R1118 | 630-0083-000 | 1 | 6.8K |
| R1119 | 630-0101-000 | 1 | 39K |
| R1120 | 630-0101-000 | 1 | 39K |
| R1121 | 630-0063-000 | 1 | 1K |
| R1122 | 630-0063-000 | 1 | 1K |
| R1123 | 630-0079-000 | 1 | 4.7K |
| R1124 | 630-0079-000 | 1 | 4.7K |
| R1125 | 630-0079-000 | 1 | 4.7K |
| R1126 | 630-0079-000 | 1 | 4.7K |
| R1127 | 630-0119-000 | 1 | 220K |
| R1128 | 630-0119-000 | 1 | 220K |
| R1129 | 630-0079-000 | 1 | 4.7K |
| R1130 | 630-0079-000 | 1 | 4.7K |
| R1131 | 630-0099-000 | 1 | 33K |
| R1132 | 630-0099-000 | 1 | 33K |
| R1133 | 630-0099-000 | 1 | 33K |
| R1134 | 630-0099-000 | 1 | 33K |
| R1135 | 630-0089-000 | 1 | 12K |
| R1136 | 630-0089-000 | 1 | 12K |
| R1137 | 630-0083-000 | 1 | 6.8K |
| R1138 | 630-0083-000 | 1 | 6.8K |
| R1139 | 630-0075-000 | 1 | 3.3K |
| R1140 | 630-0075-000 | 1 | 3.3K |
| R1141 | 630-0081-000 | 1 | 5.6K |
| R1142 | 630-0081-000 | 1 | 5.6K |
| R1143 | 636-0043-000 | 1 | 500 OHM POT (L-16 KHZ TRIM) |
| R1144 | 636-0043-000 | 1 | 500 OHM POT (R-16 KHZ TRIM) |
| R1145 | 636-0028-000 | 1 | 10K POT (L-HIGH EQ.) |
| R1146 | 636-0028-000 | 1 | 10K POT (R-HIGH EQ.) |
| R1147 | 630-0096-000 | 1 | 9.1K |
| R1148 | 630-0096-000 | 1 | 9.1K |
| R1149 | 630-0111-000 | 1 | 100K |
| R1150 | 630-0111-000 | 1 | 100K |
| R1151 | 630-0047-000 | 1 | 220 OHM |
| R1152 | 630-0047-000 | 1 | 220 OHM |
| R1153 | 630-0071-000 | 1 | 2.2K |
| R1154 | 630-0071-000 | 1 | 2.2K |
| R1155 | 630-0061-000 | 1 | 820 OHM |
| R1156 | 630-0061-000 | 1 | 820 OHM |
| R1157 | 636-0029-000 | 1 | 50K POT (L-PEAK LEVEL SET) |
| R1158 | 636-0029-000 | 1 | 50K POT (R-PEAK LEVEL SET) |
| R1159 | 630-0079-000 | 1 | 4.7K |
| R1160 | 630-0079-000 | 1 | 4.7K |
| R1161 | 630-0110-000 | 1 | 91K |
| R1162 | 630-0110-000 | 1 | 91K |
| R1163 | 630-0087-000 | 1 | 10K |
| R1164 | 630-0087-000 | 1 | 10K |
| R1165 | 630-0057-000 | 1 | 560 OHM |
| R1166 | 630-0057-000 | 1 | 560 OHM |
| R1167 | 630-0069-000 | 1 | 1.8K |
| R1168 | 630-0069-000 | 1 | 1.8K |
| R1169 | 630-0097-000 | 1 | 27K |
| R1170 | 630-0097-000 | 1 | 27K |
| R1171 | 630-0071-000 | 1 | 2.2K |
| R1172 | 630-0071-000 | 1 | 2.2K |
| R1173 | 630-0135-000 | 1 | 1 MEG |
| R1174 | 630-0135-000 | 1 | 1 MEG |
| R1175 | 636-0029-000 | 1 | 50K POT (L-PROGRAM LEVEL SET) |
| R1176 | 636-0029-000 | 1 | 50K POT (R-PROGRAM LEVEL SET) |
| R1177 | 636-0032-000 | 1 | 500K POT (L-PGM BIAS LEVEL SET) |
| R1178 | 636-0032-000 | 1 | 500K POT (R-PGM BIAS LEVEL SET) |
| R1179 | 636-0029-000 | 1 | 50K POT (L-RECORD LEVEL SET) |
| R1180 | 636-0029-000 | 1 | 50K POT (R-RECORD LEVEL SET) |
| R1181 | 636-0029-000 | 1 | 50K POT (CUE PLAY LEVEL SET) |
| R1182 | XXX-XXXX-XXX | | NOT USED |
| R1183 | 630-0039-000 | 1 | 100 OHM |
| R1184 | XXX-XXXX-XXX | | NOT USED |
| R1185 | 636-0032-000 | 1 | 500K POT (CUE BIAS LEVEL SET) |
| R1186 | XXX-XXXX-XXX | | NOT USED |
| R1187 | 630-0071-000 | 1 | 2.2K |
| R1188 | 630-0119-000 | 1 | 220K |
| R1189 | 630-0119-000 | 1 | 220K |
| R1190 | 630-0119-000 | 1 | 220K |
| R1191 | 630-0079-000 | 1 | 4.7K |
| R1192 | 630-0079-000 | 1 | 4.7K |
| R1193 | 630-0071-000 | 1 | 2.2K |
| R1194 | XXX-XXXX-XXX | | NOT USED |
| R1195 | 630-0115-000 | 1 | 150K |
| R1196 | 630-0115-000 | 1 | 150K |
| R1197 | 630-0069-000 | 1 | 1.8K |
| R1198 | 630-0069-000 | 1 | 1.8K |
| R1199 | 630-0111-000 | 1 | 100K |
| R1200 | 630-0111-000 | 1 | 100K |
| R1201 | 630-0091-000 | 1 | 15K |
| R1202 | 630-0091-000 | 1 | 15K |
| R1203 | 630-0095-000 | 1 | 22K |
| R1204 | 630-0095-000 | 1 | 22K |
| ## INTEGRATED CIRCUITS | | | |
| U1101 | 606-0016-000 | 1 | TL074 |
| U1102 | 606-0016-000 | 1 | TL074 |
| U1103 | 608-0004-000 | 1 | 4052B |
| U1104 | 608-0004-000 | 1 | 4052B |
| U1105 | 606-0013-000 | 1 | TL082 |
| U1106 | 606-0013-000 | 1 | TL082 |
| U1107 | 608-0021-000 | 1 | 4051 |
| U1108 | 608-0021-000 | 1 | 4051 |
| U1109 | 606-0017-000 | 1 | TL081 |
| U1110 | 606-0017-000 | 1 | TL081 |
| ## MISCELLANEOUS | | | |
| | 613-0009-000 | 4 | SOCKET, 16 PIN DIP |
| | 613-0008-000 | 2 | SOCKET, 14 PIN DIP |
| | 613-0007-000 | 4 | SOCKET, 8 PIN DIP |
| | 323-0001-051 | 1 | CARD PULL, REC AMP |
| | 325-0245-003 | 1 | PCB, RECORD AND METER AMP 998 |

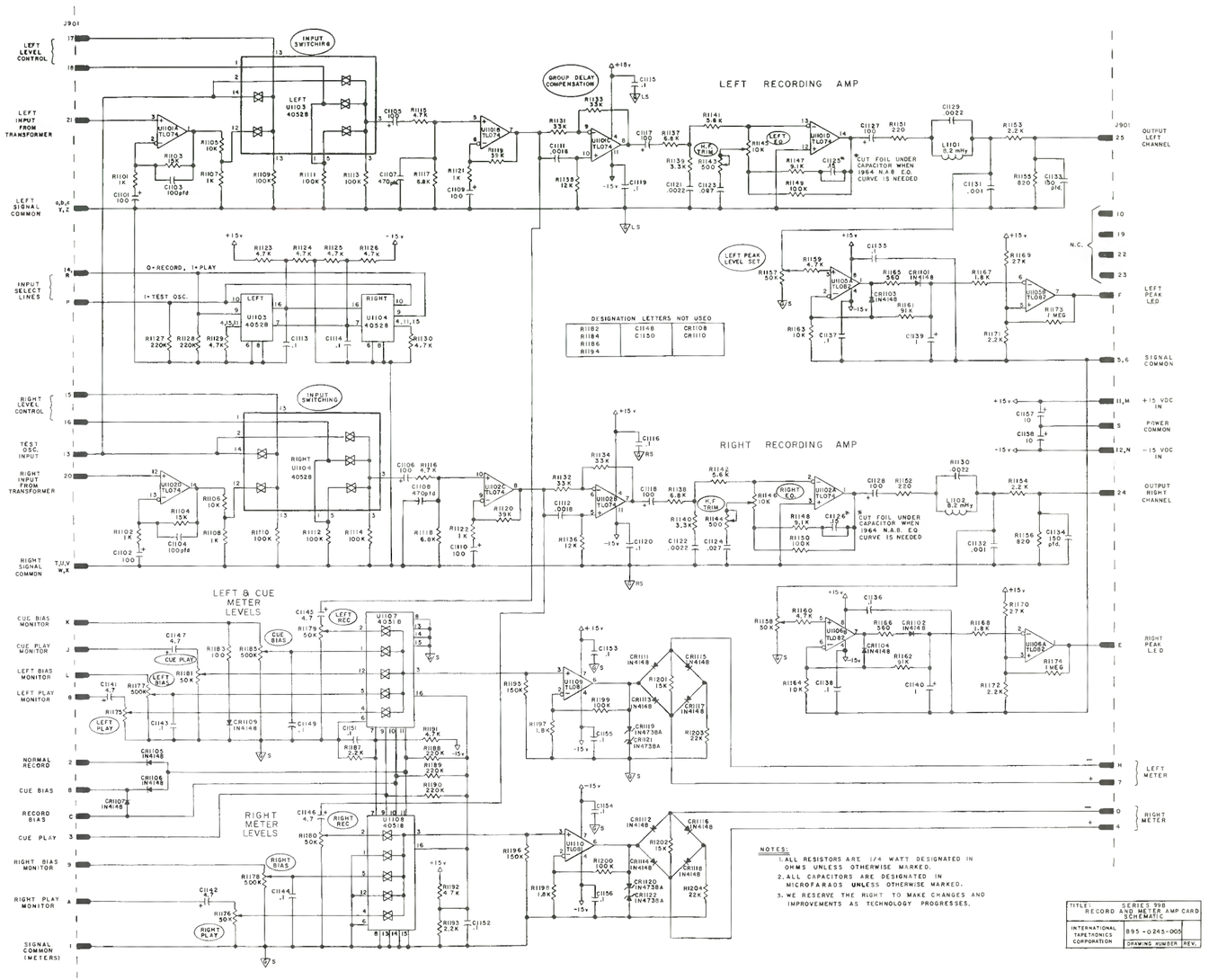
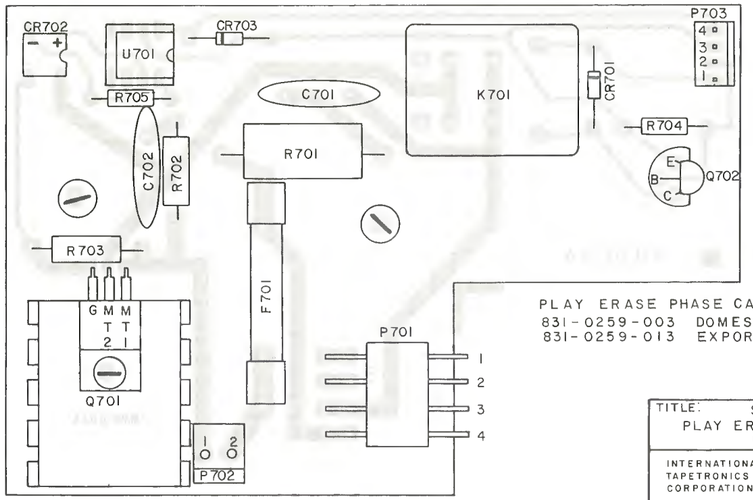



**Figure 6-17**

99B RECORD AND METER AMP CARD - STEREO
(ASSEMBLY 831-0245-013)

| | | | |
|---|---|---|---|
| ## CAPACITORS | | | |
| C1101 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1102 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1103 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C1104 | 677-0001-000 | 1 | 100 PFD 300V SILVER MICA |
| C1105 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1106 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1107 | 678-0563-033 | 1 | 470 PFD 63V POLYPROP |
| C1108 | 678-0563-033 | 1 | 470 PFD 63V POLYPROP |
| C1109 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1110 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1111 | 680-0401-033 | 1 | .0018 UFD 100V POLY |
| C1112 | 680-0401-033 | 1 | .0018 UFD 100V POLY |
| C1113 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1114 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1115 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1116 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1117 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1118 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1119 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1120 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1121 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C1122 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C1123 | 680-1863-033 | 1 | .027 UFD 63V POLY |
| C1124 | 680-1863-033 | 1 | .027 UFD 63V POLY |
| C1125 | 680-2763-033 | 1 | .15 UFD 63V POLY(FOR 1964 NAB EQ. ONLY) |
| C1126 | 680-2763-033 | 1 | .15 UFD 63V POLY(FOR 1964 NAB EQ. ONLY) |
| C1127 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1128 | 695-1910-013 | 1 | 100 UFD 10V ALUM |
| C1129 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C1130 | 680-0501-033 | 1 | .0022 UFD 100V POLY |
| C1131 | 680-0101-033 | 1 | .001 UFD 100V POLY |
| C1132 | 680-0101-033 | 1 | .001 UFD 100V POLY |
| C1133 | 677-0006-000 | 1 | 150 PFD 300V SILVER MICA |
| C1134 | 677-0006-000 | 1 | 150 PFD 300V SILVER MICA |
| C1135 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1136 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1137 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1138 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1139 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C1140 | 695-0750-013 | 1 | 1 UFD 50V ALUM |
| C1141 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1142 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1143 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1144 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1145 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1146 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1147 | 695-1135-013 | 1 | 4.7 UFD 35V ALUM |
| C1148 | XXX-XXXX-XXX | | NOT USED |
| C1149 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1150 | XXX-XXXX-XXX | | NOT USED |
| C1151 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1152 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1153 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1154 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1155 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1156 | 686-0009-000 | 1 | .1 UFD 25V DISC |
| C1157 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| C1158 | 695-1335-013 | 1 | 10 UFD 35V ALUM |
| ## DIODES | | | |
| CR1101 | 575-0014-000 | 1 | 1N4148 |
| CR1102 | 575-0014-000 | 1 | 1N4148 |
| CR1103 | 575-0014-000 | 1 | 1N4148 |
| CR1104 | 575-0014-000 | 1 | 1N4148 |
| CR1105 | 575-0014-000 | 1 | 1N4148 |
| CR1106 | 575-0014-000 | 1 | 1N4148 |
| CR1107 | 575-0014-000 | 1 | 1N4148 |
| CR1108 | XXX-XXXX-XXX | | NOT USED |
| CR1109 | 575-0014-000 | 1 | 1N4148 |
| CR1110 | XXX-XXXX-XXX | | NOT USED |
| CR1111 | 575-0014-000 | 1 | 1N4148 |
| CR1112 | 575-0014-000 | 1 | 1N4148 |
| CR1113 | 575-0014-000 | 1 | 1N4148 |
| CR1114 | 575-0014-000 | 1 | 1N4148 |
| CR1115 | 575-0014-000 | 1 | 1N4148 |

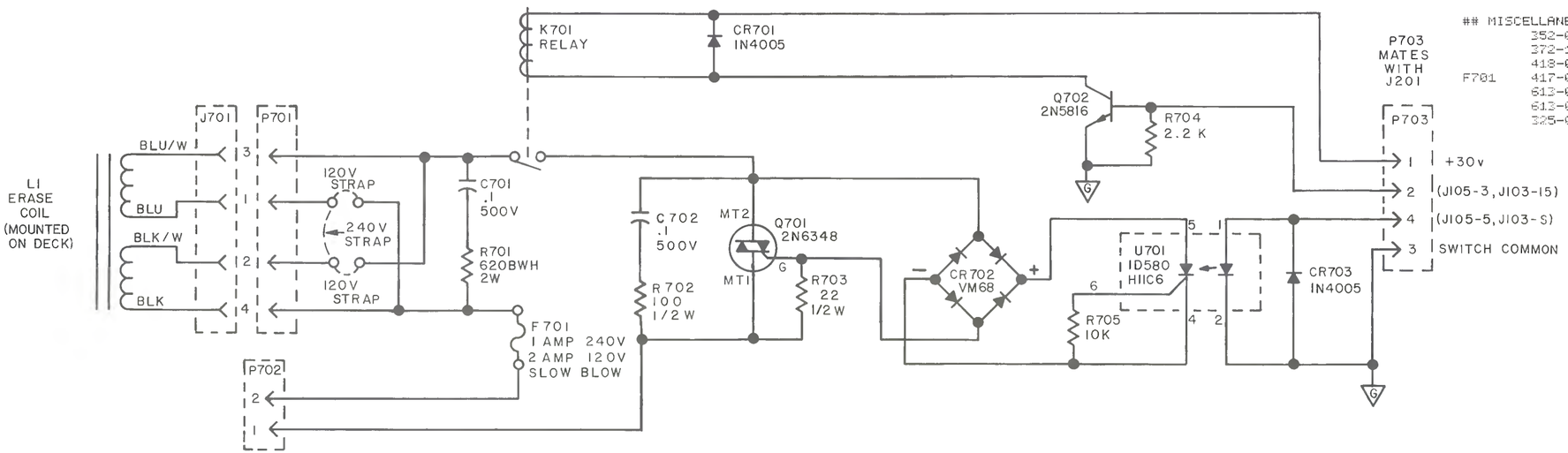



| TITLE: SERIES 99B PLAY ERASE PHASE CARD OVERLAY | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0259-002 | |
| | DRAWING NUMBER | REV |

Figure 6-15

99B PLAY PHASE CARD (DOMESTIC)
(ASSEMBLY 831-0259-003)

| | | | |
|---|---|---|---|
| ## CAPACITORS | | | |
| C701 | 686-0001-000 | 1 | .1 UFD 500V DISC |
| C702 | 686-0001-000 | 1 | .1 UFD 500V DISC |
| ## RESISTORS | | | |
| R701 | 628-0092-000 | 1 | 620 OHM 2W BWH |
| R702 | 626-0239-000 | 1 | 100 OHM 1/2W CARBON COMP. |
| R703 | 626-0223-000 | 1 | 22 OHM 1/2W CARBON COMP. |
| R704 | 630-0071-000 | 1 | 2.2K |
| R705 | 630-0087-000 | 1 | 10K |
| ## DIODES | | | |
| CR701 | 575-0007-050 | 1 | 1N4005 |
| CR702 | 575-0015-000 | 1 | 1A 600V BRIDGE (VARO VM68) |
| CR703 | 575-0007-050 | 1 | 1N4005 |
| ## TRANSISTORS | | | |
| Q701 | 584-0002-000 | 1 | 2N6348A TRIAC (MOTOROLA) |
| Q702 | 590-0017-010 | 1 | 2N5816 NPN |
| ## RELAY | | | |
| K701 | 480-0008-000 | 1 | 24VDC DPDT |
| ## SOCKETS & PLUGS | | | |
| | 613-0007-000 | 1 | SOCKET, 8 PIN DIP |
| | 613-0001-000 | 1 | SOCKET, TRANSISTOR TO-92 |
| P701 | 376-0048-000 | 1 | HEADER, POST 4 POS W/LOCK (ERASE COIL) |
| P702 | 376-0036-000 | 1 | WAFER, 2 POS W/LOCK (MOLEX) (AC IN) |
| P703 | 376-0037-000 | 1 | WAFER, 4 POS W/LOCK (MOLEX) (FLEX. SW. CARD) |
| ## INTEGRATED CIRCUIT | | | |
| U701 | 585-0002-000 | 1 | IC, OPTO SCR (GE H11C6) |
| ## MISCELLANEOUS | | | |
| | 352-0003-000 | 1 | SCREW, NYLON 4-40 X 1/4 RD HD |
| | 372-1104-000 | 1 | NUT, NYLON 4-40 X 1/4 HEX (SMITH 2554) |
| | 418-0002-000 | 2 | CLAMP, FUSE PCB (LITTLEFUSE 102068) |
| F701 | 417-0007-000 | 1 | FUSE, 2 AMP SB |
| | 613-0006-000 | 1 | HEAT SINK, (THERMALLOY 6106-B14) |
| | 613-0014-000 | 1 | INSULATOR, MICA |
| | 325-0259-003 | 1 | PCB, ERASE PHASE CARD 99B |




| TITLE: SERIES 99B PLAY ERASE PHASE CARD SCHEMATIC | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 895-0259-003 | |
| | DRAWING NUMBER | REV |

Figure 6-16

NOTES:

1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
3. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

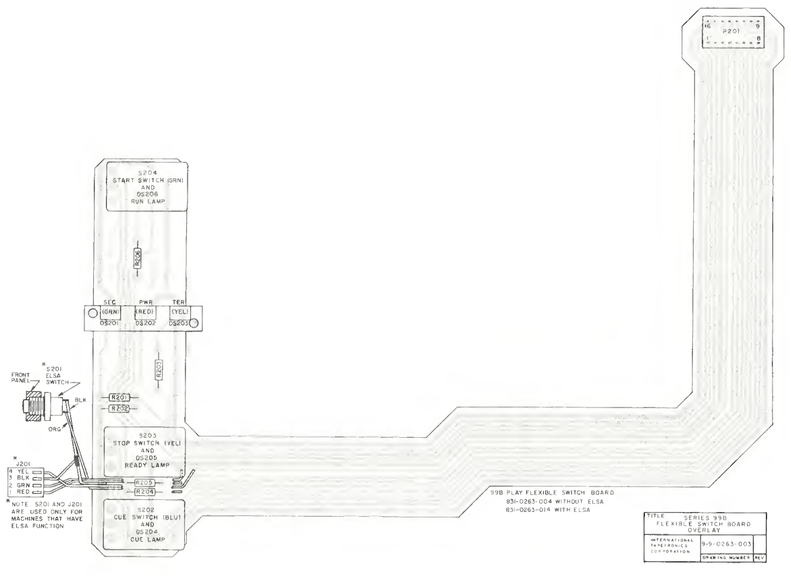
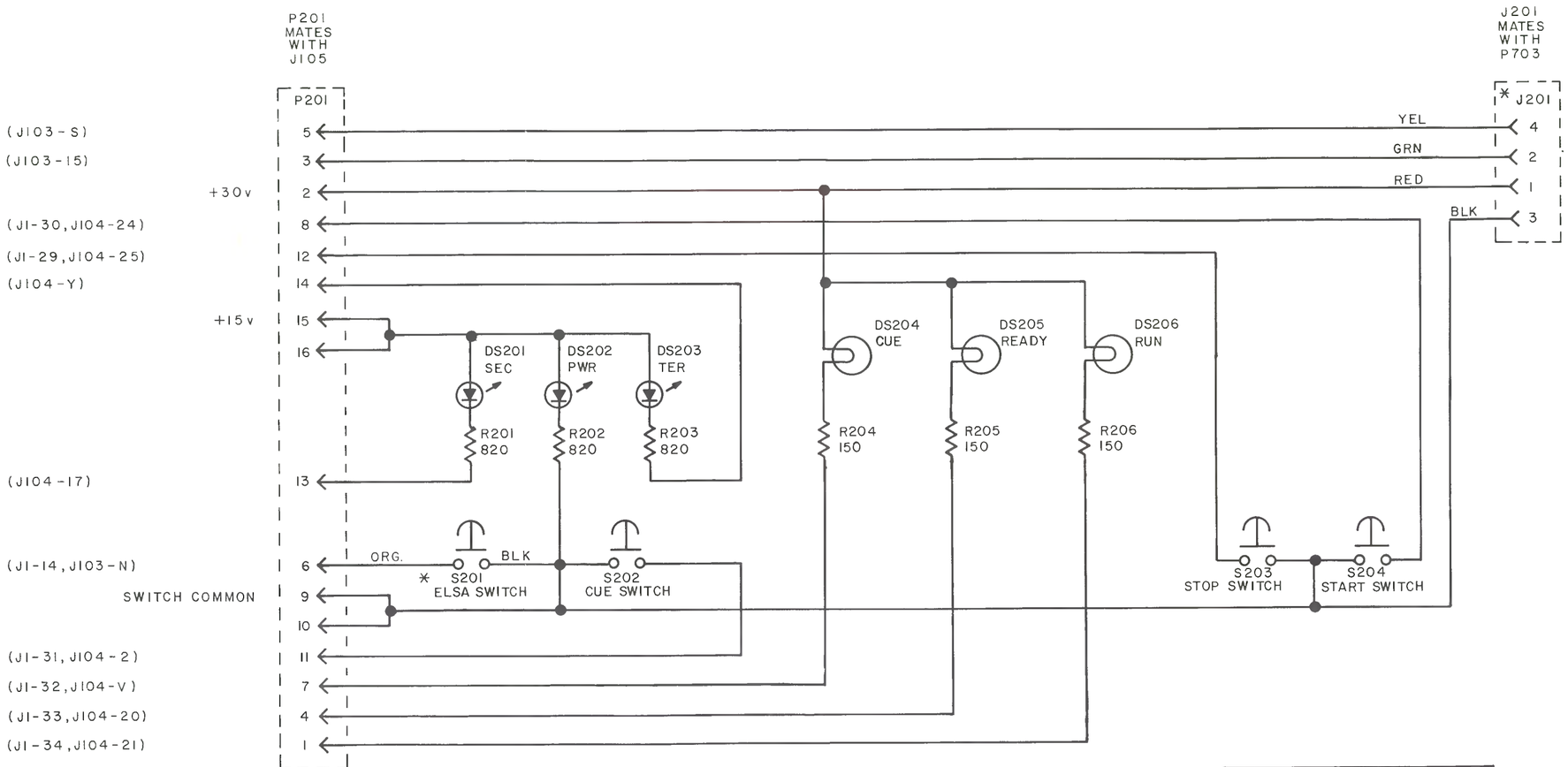



**Figure 6-14**

99B PLAY FLEXIBLE SWITCH BOARD W/ELSA
(ASSEMBLY 831-0263-014)

| | | | |
|---|---|---|---|
| ## RESISTORS | | | |
| R201 | 630-0061-000 | 1 | 820 OHM |
| R202 | 630-0061-000 | 1 | 820 OHM |
| R203 | 630-0061-000 | 1 | 820 OHM |
| R204 | 630-0043-000 | 1 | 150 OHM |
| R205 | 630-0043-000 | 1 | 150 OHM |
| R206 | 630-0043-000 | 1 | 150 OHM |
| ## DISPLAYS | | | |
| DS201 | 575-0021-000 | 1 | LED, GREEN (MONSANTO MV52124) (SECONDARY CUE) |
| DS202 | 575-0019-000 | 1 | LED, RED (MONSANTO MV57124) (POWER) |
| DS203 | 575-0020-000 | 1 | LED, YELLOW (MONSANTO MV53124) (TERTIARY CUE) |
| DS204 | 415-0010-000 | 1 | LAMP, NO.85 (MICROSWITCH AML91LA85) (CUE) |
| DS205 | 415-0010-000 | 1 | LAMP, NO.85 (MICROSWITCH AML91LA85) (READY) |
| DS206 | 415-0010-000 | 1 | LAMP, NO.85 (MICROSWITCH AML91LA85) (RUN) |
| ##SOCKET AND PLUG | | | |
| J201 | 380-0074-000 | 1 | HOUSING, 4 POS W/LOCK (MOLEX 22-01-2045)(PHASE) |
| | 382-0044-000 | 4 | TERMINAL, CRIMP (MOLEX 08-50-0114) |
| P201 | 378-0034-000 | 1 | PLUG, DIP 16 POS CA-16P-02 (PLAY MOTHER BOARD) |
| ## SWITCHES | | | |
| S202 | 391-0019-000 | 1 | SWITCH, PUSH (X65893-AML) (CUE) |
| S203 | 391-0019-000 | 1 | SWITCH, PUSH (X65893-AML) (STOP) |
| S204 | 391-0019-000 | 1 | SWITCH, PUSH (X65893-AML) (START) |
| ## MISCELLANEOUS | | | |
| | 404-0028-000 | 1 | LENS, YELLOW AML51-F10Y (STOP SWITCH) |
| | 404-0029-000 | 1 | LENS, GREEN AML51-F10G (START SWITCH) |
| | 404-0031-000 | 1 | LENS, BLUE AML51-F10B (CUE SWITCH) |
| | 428-0002-000 | 1 | WIRE, NO.22 S/T RED |
| | 428-0003-000 | 2 | WIRE, NO.22 S/T BLACK |
| | 428-0005-000 | 1 | WIRE, NO.22 S/T YELLOW |
| | 428-0006-000 | 1 | WIRE, NO.22 S/T GREEN |
| | 428-0008-000 | 1 | WIRE, NO.22 S/T ORANGE |
| | 325-0263-004 | 1 | PCB, PLAY FLEXIBLE SWITCH CARD W/ELSA 99B |

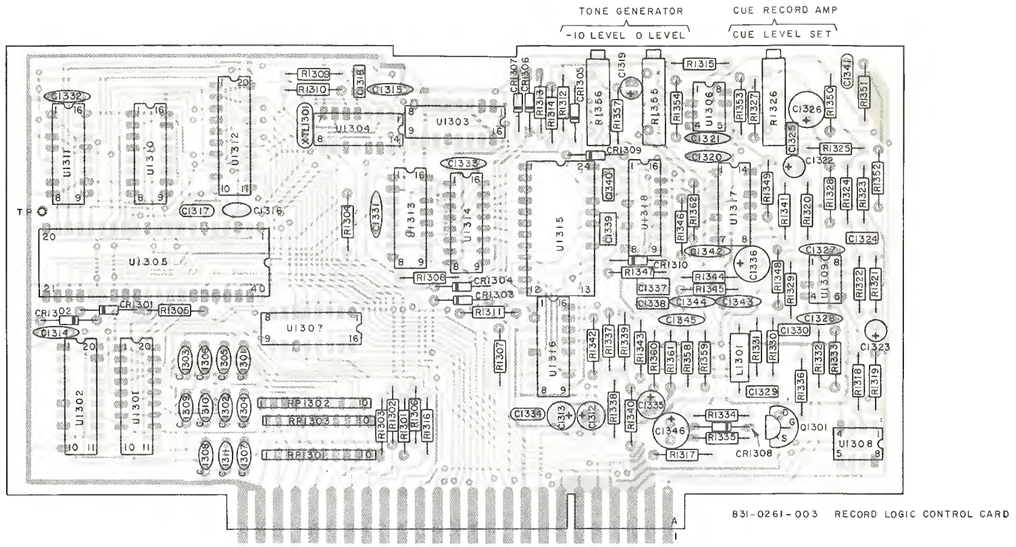



NOTES:

1. * S201 AND J201 ARE USED ONLY FOR MACHINES THAT HAVE ELSA FUNCTION. S201 IS MOUNTED ON FRONT PANEL.
2. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

| TITLE: SERIES 99B FLEXIBLE SWITCH BOARD SCHEMATIC | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 895-0263-003 | |
| | DRAWING NUMBER | REV. |

**Figure 6-13**




| TITLE: SERIES 998 RECORD LOGIC CONTROL CARD OVERLAY | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 819-0261-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-22**

| | | | | |
|---|---|---|---|---|
| R1308 | 630-0055-000 | 1 | 470 OHM | |
| R1309 | 630-0051-000 | 1 | 330 OHM | |
| R1310 | 630-0051-000 | 1 | 330 OHM | |
| R1311 | 630-0095-000 | 1 | 22K | |
| R1312 | 630-0119-000 | 1 | 220K | |
| R1313 | 630-0069-000 | 1 | 1.8K | |
| R1314 | 630-0071-000 | 1 | 2.2K | |
| R1315 | 630-0077-000 | 1 | 3.9K | |
| R1316 | 630-0067-000 | 1 | 1.5K | |
| R1317 | 630-0071-000 | 1 | 2.2K | |
| R1318 | 630-0111-000 | 1 | 100K | |
| R1319 | 630-0091-000 | 1 | 15K | |
| R1320 | 630-0103-000 | 1 | 47K | |
| R1321 | 630-0091-000 | 1 | 15K | |
| R1322 | 630-0117-000 | 1 | 180K | |
| R1323 | 630-0095-000 | 1 | 22K | |
| R1324 | 630-0087-000 | 1 | 10K | |
| R1325 | 630-0087-000 | 1 | 10K | |
| R1326 | 636-0028-000 | 1 | 10K POT | (CUE LEVEL SET) |
| R1327 | 630-0079-000 | 1 | 4.7K | |
| R1328 | 630-0111-000 | 1 | 100K | |
| R1329 | 630-0107-000 | 1 | 68K | |
| R1330 | 630-0035-000 | 1 | 68 OHM | |
| R1331 | 630-0095-000 | 1 | 22K | |
| R1332 | 630-0087-000 | 1 | 10K | |
| R1333 | 630-0061-000 | 1 | 820 OHM | |
| R1334 | 630-0071-000 | 1 | 2.2K | |
| R1335 | 630-0111-000 | 1 | 100K | |
| R1336 | 630-0135-000 | 1 | 1 MEG | |
| R1337 | 630-0063-000 | 1 | 1K | |
| R1338 | 630-0069-000 | 1 | 1.8K | |
| R1339 | 630-0071-000 | 1 | 2.2K | |
| R1340 | 630-0063-000 | 1 | 1K | |
| R1341 | 630-0071-000 | 1 | 2.2K | |
| R1342 | 630-0063-000 | 1 | 1K | |
| R1343 | 630-0027-000 | 1 | 33 OHM | |
| R1344 | 630-0089-000 | 1 | 12K | |
| R1345 | 630-0061-000 | 1 | 820 OHM | |
| R1346 | 630-0091-000 | 1 | 15K | |
| R1347 | 630-0101-000 | 1 | 39K | |
| R1348 | 630-0105-000 | 1 | 56K | |
| R1349 | 630-0105-000 | 1 | 56K | |
| R1350 | 630-0073-000 | 1 | 2.7K | |
| R1351 | 630-0073-000 | 1 | 2.7K | |
| R1352 | 630-0039-000 | 1 | 100 OHM | |
| R1353 | 630-0087-000 | 1 | 10K | |
| R1354 | 630-0061-000 | 1 | 820 OHM | |
| R1355 | 636-0029-000 | 1 | 50K POT | (INT. OSC. ZERO LEVEL SET) |
| R1356 | 636-0028-000 | 1 | 10K POT | (INT. OSC. -10DB LEVEL SET) |
| R1357 | 630-0063-000 | 1 | 1K | |
| R1358 | 630-0079-000 | 1 | 4.7K | |
| R1359 | 630-0079-000 | 1 | 4.7K | |
| R1360 | 630-0079-000 | 1 | 4.7K | |
| R1361 | 630-0079-000 | 1 | 4.7K | |
| R1362 | 630-0111-000 | 1 | 100K | |
| ## RESISTOR PACKS | | | | |
| RP1301 | 631-0003-000 | 1 | 1K R-PACK, SIP 9R COMMON | |
| RP1302 | 631-0028-000 | 1 | 470 OHM R-PACK, SIP 5R INDEP. | |
| RP1303 | 631-0028-000 | 1 | 470 OHM R-PACK, SIP 5R INDEP. | |
| ## INTEGRATED CICRUITS | | | | |
| U1301 | 607-0075-000 | 1 | 74LS241 | |
| U1302 | 607-0075-000 | 1 | 74LS241 | |
| U1303 | 607-0027-000 | 1 | 74LS163 | |
| U1304 | 607-0026-000 | 1 | 74LS04 | |
| U1305 | 610-0006-020 | 1 | 8748 U-PROCESSOR 4 MHZ (PROGRAMMED FOR REC.) | |
| U1306 | 606-0013-000 | 1 | TL082 | |
| U1307 | 609-0008-000 | 1 | ULN2003 | |
| U1308 | 606-0007-000 | 1 | LM358 | |
| U1309 | 606-0014-000 | 1 | TL072 | |
| U1310 | 607-0027-000 | 1 | 74LS163 | |
| U1311 | 607-0032-000 | 1 | 7497 | |
| U1312 | 607-0033-000 | 1 | 74LS374 | |
| U1313 | 607-0027-000 | 1 | 74LS163 | |
| U1314 | 607-0027-000 | 1 | 74LS163 | |
| U1315 | 604-0004-000 | 1 | 2716 EPROM 2K X 8 24 PIN | |
| U1316 | 609-0024-000 | 1 | MC1408L8, 8 BIT D/A CONVERTER | |
| U1317 | 606-0015-000 | 1 | TL084 | |
| U1318 | 608-0028-000 | 1 | 4053 | |
| ##MISCELLANEOUS | | | | |
| XTL1301 | 448-0003-000 | 1 | CRYSTAL, 4.0990 MHZ | |
| | 613-0001-000 | 1 | SOCKET, TRANSISTOR TO-92 | |
| | 613-0017-000 | 1 | SOCKET, 40 PIN DIP | |
| | 613-0019-000 | 1 | SOCKET, 24 PIN DIP | |
| | 613-0020-000 | 3 | SOCKET, 20 PIN DIP | |
| | 613-0009-000 | 8 | SOCKET, 16 PIN DIP | |
| | 613-0008-0000 | 2 | SOCKET, 14 PIN DIP | |
| | 613-0007-000 | 3 | SOCKET, 8 PIN DIP | |
| | 323-0001-071 | 1 | CARD PULL, REC CTL | |
| | 325-0261-003 | 1 | PCB, RECORDER LOGIC CARD S99B | |

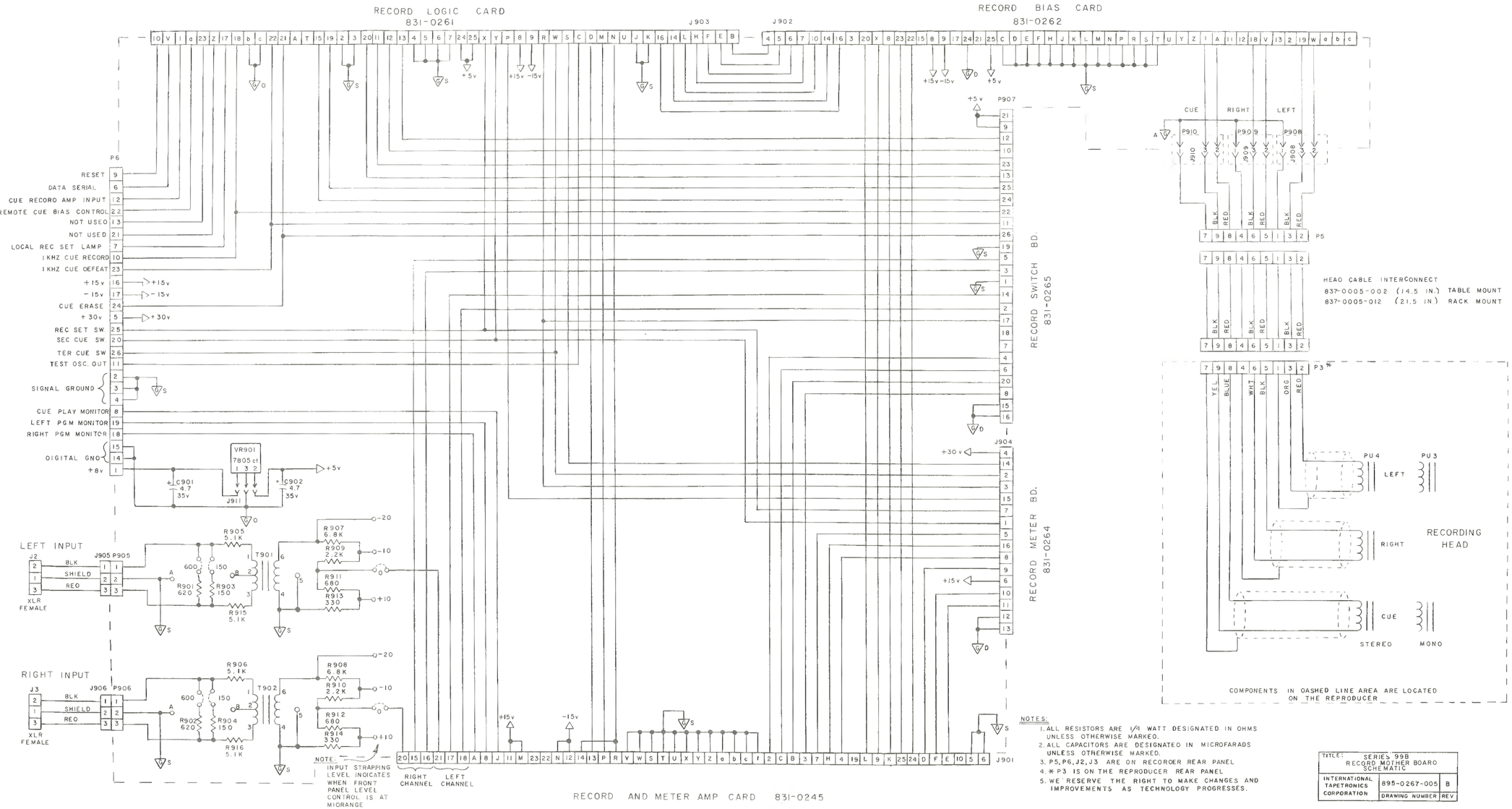



**Figure 6-23**

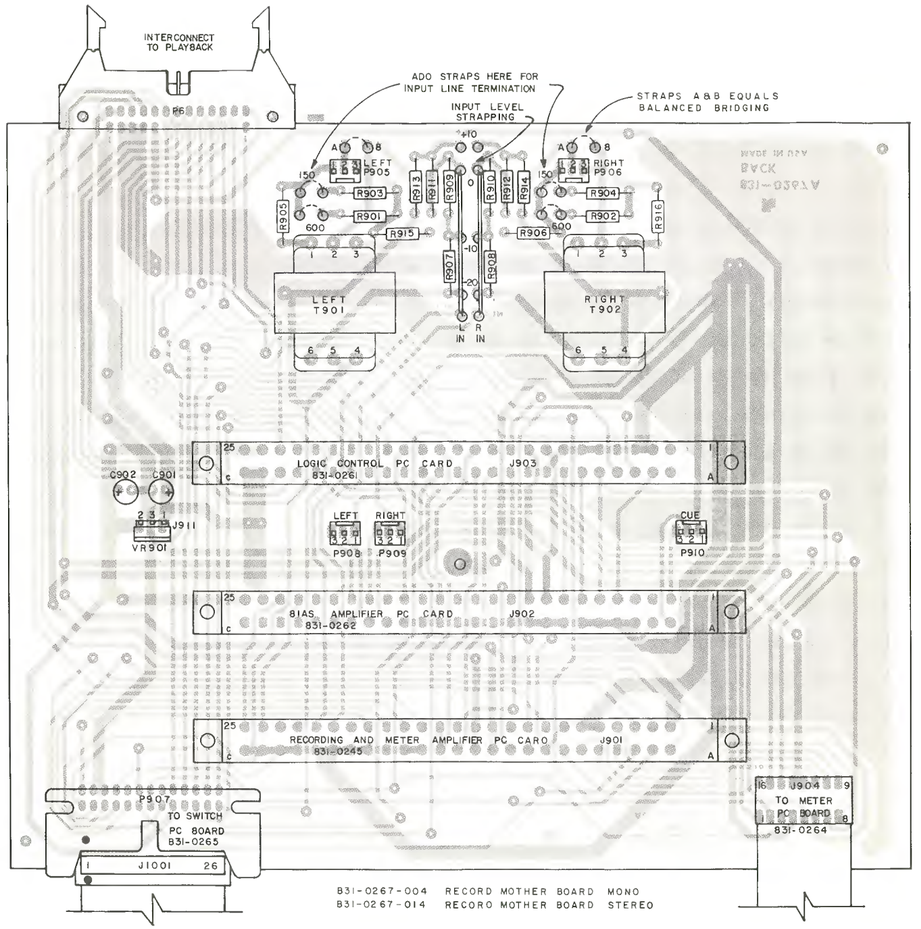
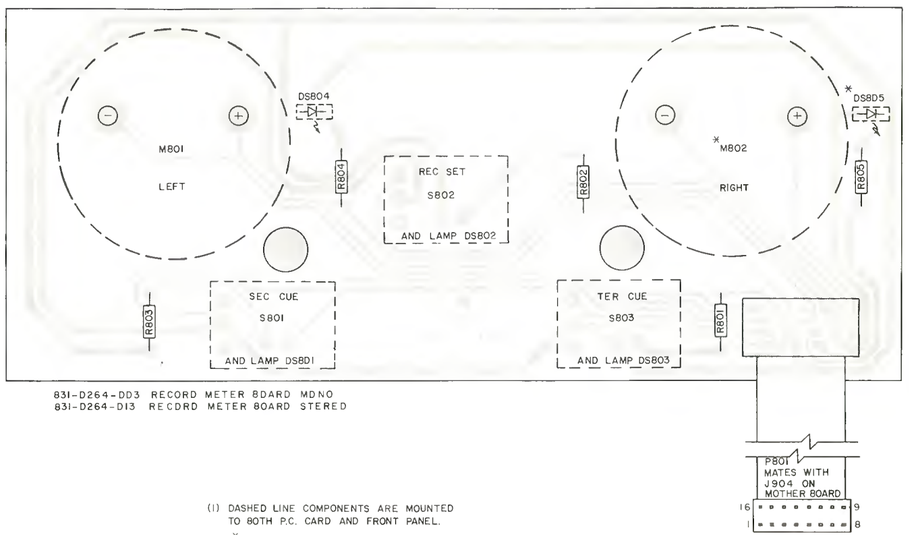



**Figure 6-24**

99B RECORD MOTHER BOARD - STEREO
(ASSEMBLY 831-0267-014)

| | | | |
|---|---|---|---|
| ## CAPACITORS | | | |
| C901 | 694-0003-000 | 1 | 4.7 UFD 35V TANTALUM |
| C902 | 694-0003-000 | 1 | 4.7 UFD 35V TANTALUM |
| ## RESISTORS | | | |
| R901 | 630-0058-000 | 1 | 620 OHM |
| R902 | 630-0058-000 | 1 | 620 OHM |
| R903 | 630-0043-000 | 1 | 150 OHM |
| R904 | 630-0043-000 | 1 | 150 OHM |
| R905 | 630-0080-000 | 1 | 5.1K |
| R906 | 630-0080-000 | 1 | 5.1K |
| R907 | 630-0083-000 | 1 | 6.8K |
| R908 | 630-0083-000 | 1 | 6.8K |
| R909 | 630-0071-000 | 1 | 2.2K |
| R910 | 630-0071-000 | 1 | 2.2K |
| R911 | 630-0059-000 | 1 | 680 OHM |
| R912 | 630-0059-000 | 1 | 680 OHM |
| R913 | 630-0051-000 | 1 | 330 OHM |
| R914 | 630-0051-000 | 1 | 330 OHM |
| R915 | 630-0080-000 | 1 | 5.1K |
| R916 | 630-0080-000 | 1 | 5.1K |
| ## TRANSFORMERS | | | |
| T901 | 532-0010-000 | 1 | TRANSFORMER, AUDIO INPUT (LEFT) |
| T902 | 532-0010-000 | 1 | TRANSFORMER, AUDIO INPUT (RIGHT) |
| ## MISCELLANEOUS | | | |
| J901 | 380-0064-000 | 1 | SOCKET, 25 POS CARD EDGE (AMP) (REC AMP) |
| J902 | 380-0064-000 | 1 | SOCKET, 25 POS CARD EDGE (AMP) (BIAS AMP) |
| J903 | 380-0064-000 | 1 | SOCKET, 25 POS CARD EDGE (AMP) (REC LOGIC) |
| J904 | 613-0009-000 | 1 | SOCKET, 16 PIN DIP (METER BOARD) |
| P905 | 376-0032-000 | 1 | WAFER, 3 POS LOCK (MOLEX 22-27-2031) (L-INPUT) |
| P906 | 376-0032-000 | 1 | WAFER, 3 POS LOCK (MOLEX 22-27-2031) (R-INPUT) |
| P907 | 380-0067-000 | 1 | HEADER, 26 POS(SCOTCHFLEX 3493-1002)(SW. BOARD) |
| P908 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD(MOLEX 22-29-2031)(L-HD) |
| P909 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD(MOLEX 22-29-2031)(R-HD) |
| P910 | 376-0033-000 | 1 | WAFER, 3 POS LOCK GOLD(MOLEX 22-29-2031)(C-HD) |
| J911 | 380-0062-000 | 1 | SOCKET, 3 PIN (MOLEX 10-18-2031) (POS 5V REG) |
| P6 | 380-0066-000 | 1 | HEADER, 26 POS(SCOTCHFLEX 3429-1302)(INTERCON.) |
| | 382-0041-000 | 2 | KEY, POLARIZING (FOR 380-0066-000) |
| | 350-0205-000 | 2 | SCREW, 2-56 X 3/8 PP HD ZP |
| | 359-0021-000 | 2 | WASHER, FIBER NO. 2 |
| | 370-0201-000 | 2 | NUT, HEX 2-56 X 1/16 |
| | 382-0040-000 | 3 | KEY, CARD EDGE (AMP 520687-1) |
| | 428-0015-000 | 2 | WIRE, WHITE/TEFLON INSULATED NO. 22 SOLID |
| | 225-0267-004 | 1 | PCB, RECORDER MOTHER BOARD 99B |



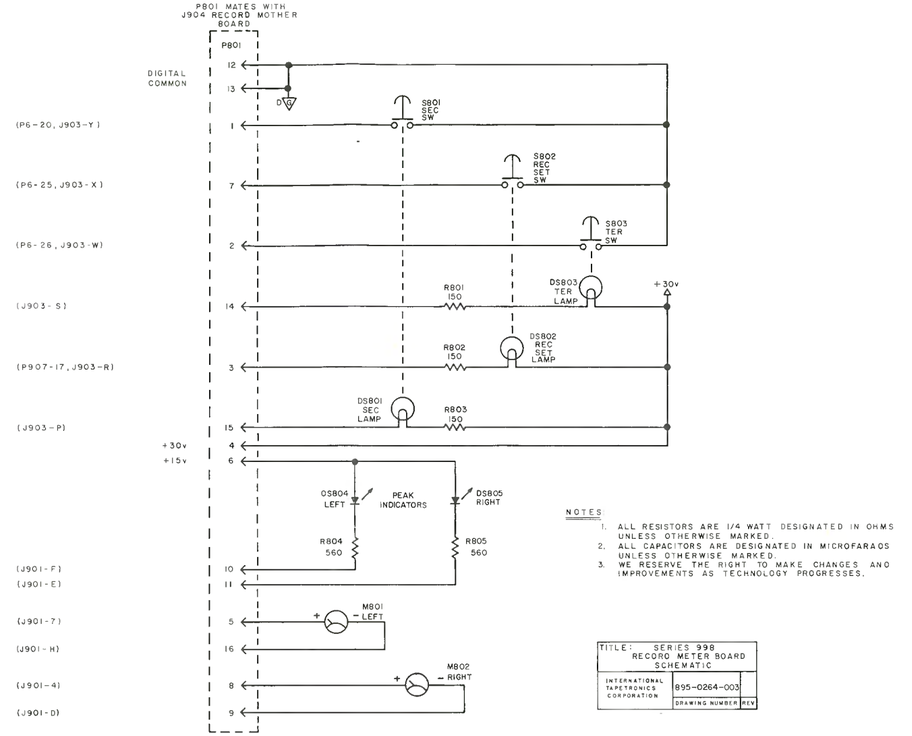

831-D264-DD3 RECORD METER BOARD MONO
831-D264-D13 RECORD METER BOARD STEREO

(1) DASHED LINE COMPONENTS ARE MOUNTED TO BOTH P.C. CARD AND FRONT PANEL.

(2) * NOT USED ON MONO MACHINES.

| | | |
|---|---|---|
| TITLE: SERIES 998 RECORD METER BOARD OVERLAY | | |
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0264-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-25**




NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
3. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

| | | |
|---|---|---|
| TITLE: SERIES 998 RECORD METER BOARD SCHEMATIC | | |
| INTERNATIONAL TAPETRONICS CORPORATION | 895-0264-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-26**

998 RECORD METER BOARD - STEREO
(ASSEMBLY 831-0264-013)

| | | | | |
|---|---|---|---|---|
| ## RESISTORS | | | | |
| R801 | 630-0043-000 | 1 | 150 OHM | |
| R802 | 630-0043-000 | 1 | 150 OHM | |
| R803 | 630-0043-000 | 1 | 150 OHM | |
| R804 | 630-0057-000 | 1 | 560 OHM | |
| R805 | 630-0057-000 | 1 | 560 OHM | |
| ## SWITCHES, DISPLAYS, LENS | | | | |
| S801 | 391-0019-000 | 1 | SWITCH, PUSH MOMENTARY | (SECONDARY CUE) |
| S802 | 391-0019-000 | 1 | SWITCH, PUSH MOMENTARY | (RECORD SET) |
| S803 | 391-0019-000 | 1 | SWITCH, PUSH MOMENTARY | (TERTIARY CUE) |
| DS801 | 415-0010-000 | 1 | LAMP, NO. 85 24 VOLT | (SECONDARY CUE) |
| DS802 | 415-0010-000 | 1 | LAMP, NO. 85 24 VOLT | (RECORD SET) |
| DS803 | 415-0010-000 | 1 | LAMP, NO. 85 24 VOLT | (TERTIARY CUE) |
| DS804 | 575-0019-000 | 1 | LED, RED | (LEFT PEAK) |
| DS805 | 575-0019-000 | 1 | LED, RED | (RIGHT PEAK) |
| | 404-0030-000 | 1 | LENS, RED | (RECORD SET) |
| | 404-0031-000 | 1 | LENS, BLUE | (SECONDARY CUE) |
| | 404-0032-000 | 1 | LENS, WHITE | (TERTIARY CUE) |

| | | | | |
|---|---|---|---|---|
| ## METERS | | | | |
| M801 | 554-0004-001 A | 1 | METER, VU SCALE | (LEFT) |
| M802 | 554-0004-001 A | 1 | METER, VU SCALE | (RIGHT) |
| ## MISCELLANEOUS | | | | |
| P801 | 837-0014-002 A | 1 | MTR CD TO MOTHER BD RIBBON CA99R | |
| | 428-0002-000 | 2 | WIRE, NO. 22 S/T RED | |
| | 428-0003-000 | 2 | WIRE, NO. 22 S/T BLACK | |
| | 441-0001-010 | 4 | TUBING, SHRINK 1/8 X 3/4 | |
| | 360-1013-000 | 4 | WASHER, NO. 10 | |
| | 370-0403-000 | 8 | NUT, 4-40 | |
| | 370-1001-000 | 8 | NUT, 10-32 | |
| | 325-0264-003 | 1 | PCB, RECORD METER BOARD 99B | |

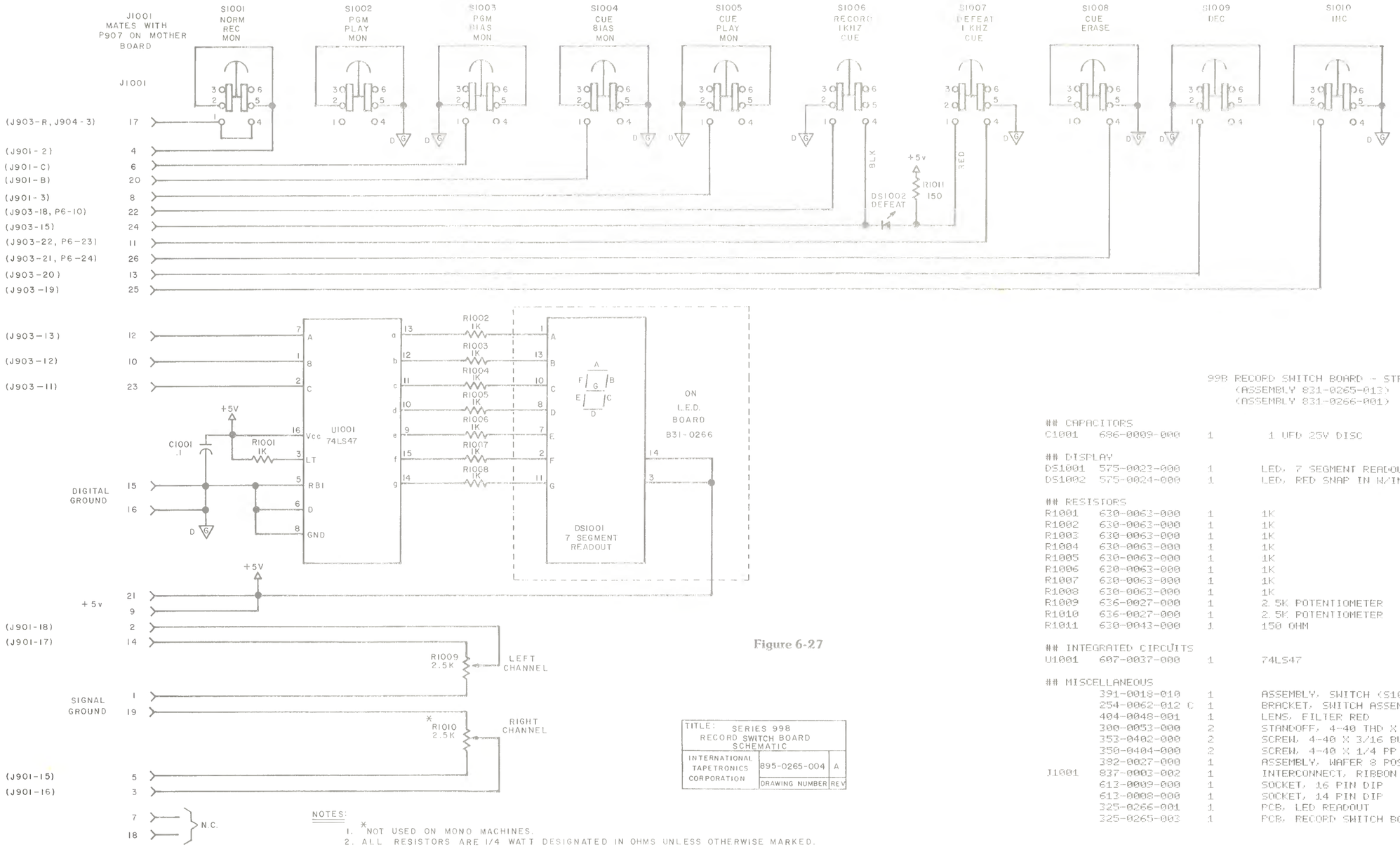



Figure 6-27

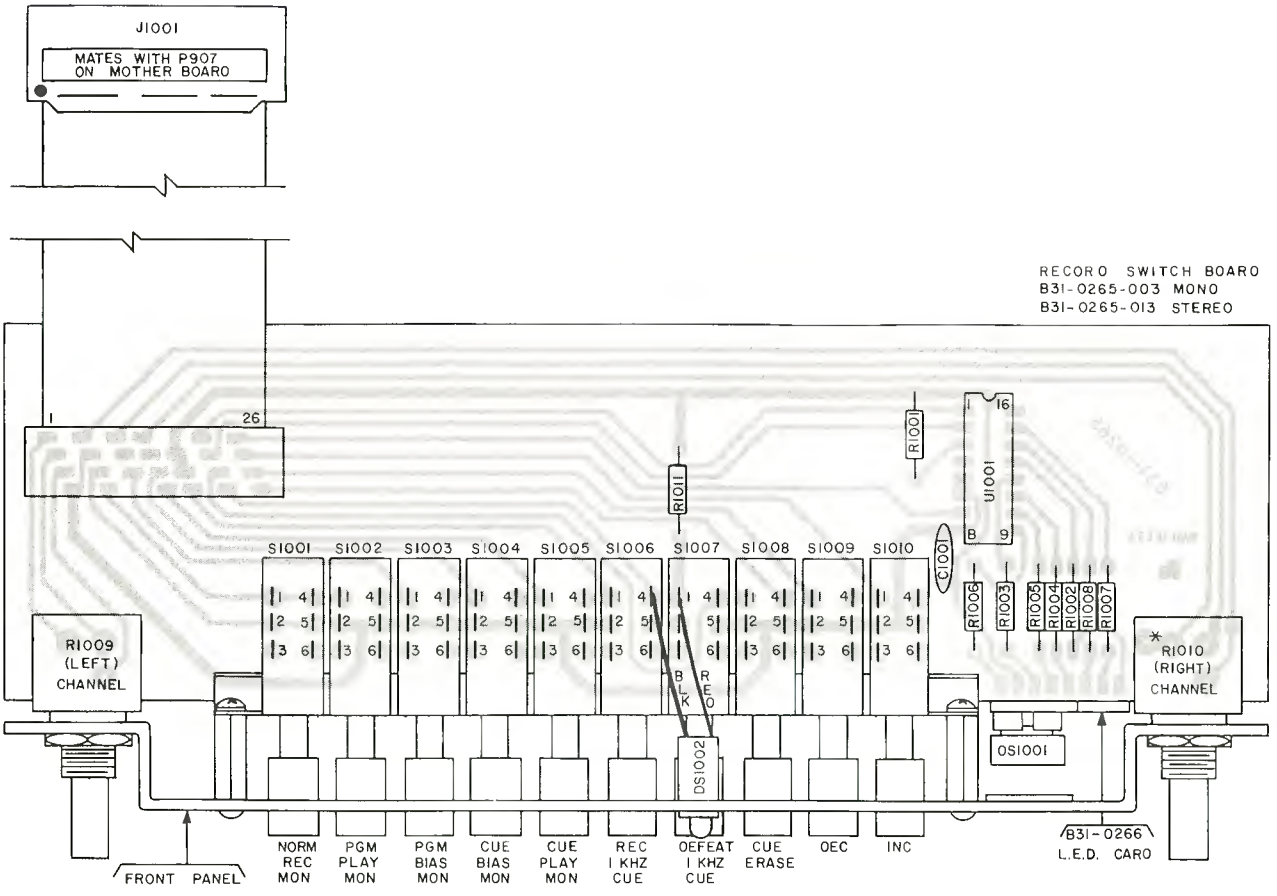
| TITLE: SERIES 998 RECORD SWITCH BOARD SCHEMATIC | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 895-0265-004 | A |
| | DRAWING NUMBER | REV. |

NOTES:

1. * NOT USED ON MONO MACHINES.
2. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

998 RECORD SWITCH BOARD - STEREO
(ASSEMBLY 831-0265-013)
(ASSEMBLY 831-0266-001)

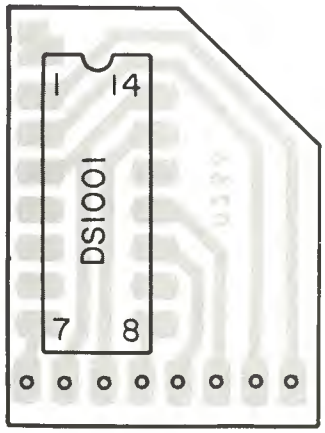
| | | | |
|---|---|---|---|
| **## CAPACITORS** | | | |
| C1001 | 686-0009-000 | 1 | 1 UFD 25V DISC |
| **## DISPLAY** | | | |
| DS1001 | 575-0023-000 | 1 | LED, 7 SEGMENT READOUT |
| DS1002 | 575-0024-000 | 1 | LED, RED SNAP IN W/INS. WIRE LEADS |
| **## RESISTORS** | | | |
| R1001 | 630-0063-000 | 1 | 1K |
| R1002 | 630-0063-000 | 1 | 1K |
| R1003 | 630-0063-000 | 1 | 1K |
| R1004 | 630-0063-000 | 1 | 1K |
| R1005 | 630-0063-000 | 1 | 1K |
| R1006 | 630-0063-000 | 1 | 1K |
| R1007 | 630-0063-000 | 1 | 1K |
| R1008 | 630-0063-000 | 1 | 1K |
| R1009 | 636-0027-000 | 1 | 2.5K POTENTIOMETER (LEFT) |
| R1010 | 636-0027-000 | 1 | 2.5K POTENTIOMETER (RIGHT) |
| R1011 | 630-0043-000 | 1 | 150 OHM |
| **## INTEGRATED CIRCUITS** | | | |
| U1001 | 607-0037-000 | 1 | 74LS47 |
| **## MISCELLANEOUS** | | | |
| | 391-0018-010 | 1 | ASSEMBLY, SWITCH (S1001-S1010) (SCHADOW) |
| | 254-0062-012 C | 1 | BRACKET, SWITCH ASSEMBLY |
| | 404-0048-001 | 1 | LENS, FILTER RED |
| | 300-0053-000 | 2 | STANDOFF, 4-40 THD X 3/16 HEX X 1/2 |
| | 353-0402-000 | 2 | SCREW, 4-40 X 3/16 BUTTON HD ALLEN |
| | 350-0404-000 | 2 | SCREW, 4-40 X 1/4 PP HD ZP |
| | 392-0027-000 | 1 | ASSEMBLY, WAFER 8 POS (AMP 87465-1) |
| J1001 | 837-0003-002 | 1 | INTERCONNECT, RIBBON CABLE (MOTHER BOARD) |
| | 613-0009-000 | 1 | SOCKET, 16 PIN DIP |
| | 613-0008-000 | 1 | SOCKET, 14 PIN DIP |
| | 325-0266-001 | 1 | PCB, LED READOUT |
| | 325-0265-003 | 1 | PCB, RECORD SWITCH BOARD 998 |




*NOT USED ON MONO MACHINES

| TITLE: SERIES 99B RECORD SWITCH BOARD OVERLAY | | |
|---|---|---|
| INTERNATIONAL TAPETRONICS CORPORATION | 919-0265-003 | |
| | DRAWING NUMBER | REV |

**Figure 6-28**




831-0266-001 L.E.D. BOARD

**Figure 6-29**

# 99B RECORD CHASSIS - STEREO

| | | | |
|---|---|---|---|
| ## FRONT PANEL | | | |
| | 281-0045-074 D | 1 | PANEL, FRONT |
| | 333-0008-002 A | 1 | DOOR, RECORD AMP. |
| | 280-0036-002 | 1 | NAME PLATE, SWITCH ASSEMBLY |
| | 282-0010-001 | 2 | PIN, DOWEL 1/8 X 1/2 |
| | 301-0046-000 | 2 | SPRING .120 X 3/4 X .018 WIRE |
| | 355-0402-000 | 4 | SCREW, 4-40 X 1/8 SOCK SET CUP PT |
| | 350-0410-000 | 4 | SCREW, 4-40 X 3/8 PF HD ZP (SW. PLATE MTG.) |
| | 315-0015-011 | 2 | KNOB |
| | 284-0016-000 | 2 | PLUG, HOLE 9/16 (HEYCO F-562) |
| | 328-0004-003 | 1 | INLAY, FRONT PANEL 99R |
| ## REAR PANEL | | | |
| | 281-0048-064 H | 1 | PANEL, REAR |
| J2 | 380-0041-000 | 1 | SOCKET, XLR FEMALE PANEL(SWITCHCRAFT D3F)(LEFT) |
| J3 | 380-0041-000 | 1 | SOCKET, XLR FEMALE PANEL(SWITCHCRAFT D3F) RIGHT |
| | 350-0427-000 | 4 | SCREW, 4-40 X 3/16 PF HD ZP |
| J905 | 380-0070-000 | 1 | HOUSING, 3 POS W/LOCK (MOLEX 22-01-2035) (LEFT) |
| J906 | 380-0070-000 | 1 | HOUSING, 3 POS W/LOCK (MOLEX 22-01-2035) RIGHT |
| | 382-0044-000 | 6 | TERMINAL, CRIMP (MOLEX 08-50-0114) |
| | 429-0006-000 | 2 | CABLE, SHIELD PR(BELDEN 9451) |
| | 441-0004-010 | 4 | TUBING, SHRINK 1/8 X 3/16 BLACK |
| | 429-0006-000 | 2 | WIRE, 2 COND. SHIELDED TWISTED PAIR # 22 AWG |
| | 380-0073-000 | 1 | RECEPTACLE, 9 POS S0 FLANGE (AMP 206486-1) |
| | 382-0049-000 | 9 | PIN, 20-24 AWG (FOR 380-0073-000) (AMP 66506-4) |
| | 350-0410-000 | 4 | SCREW, 4-40 X 3/8 PF HD ZP |
| | 370-0403-000 | 4 | NUTS, KEPS 4-40 X 1/4 HEX ZP |
| J908 | 380-0070-000 | 1 | HOUSING, 3 POS W/LOCK (MOLEX 22-01-2035) (LEFT) |
| J909 | 380-0070-000 | 1 | HOUSING, 3 POS W/LOCK (MOLEX 22-01-2035) RIGHT |
| J910 | 380-0070-000 | 1 | HOUSING, 3 POS W/LOCK (MOLEX 22-01-2035) (CUE) |
| | 382-0045-000 | 9 | PIN, GOLD (MOLEX 08-55-0102) |
| | 429-0006-000 | 3 | CABLE, SHIELDED PR (BELDEN 9451) |
| | 441-0040-000 | 2 | TUBING, SHRINK 1/8 X 1 BLUE (CUE) |
| | 441-0002-000 | 2 | TUBING, SHRINK 1/8 X 1 RED (LEFT) |
| | 441-0003-000 | 2 | TUBING, SHRINK 1/8 X 1 WHITE (RIGHT) |
| ## SIDE PANELS AND TRIM | | | |
| | 281-0042-054 D | 2 | PANEL, SIDE |
| | 350-0629-000 | 12 | SCREW, 6-32 X 7/16 PF HD ZP |
| | 328-0006-003 A | 2 | INLAY, SIDE PANEL 99B |
| ## BOTTOM COVER | | | |
| | 265-0058-003 | 1 | COVER, BOTTOM |
| | 311-0009-000 | 4 | FEET, GRAY |
| | 350-0628-000 | 4 | SCREW, 6-32 X 3/8 PF HD ZP |
| | 370-0501-000 | 4 | NUT, HEX 6-32 X 1/4 ZP |
| | 350-0602-000 | 1 | SCREW, 6-32 X 1/4 PF HD ZP |
| ## TOP COVER | | | |
| | 265-0057-003 | 1 | COVER, TOP |
| | 254-0096-001 | 1 | BRACKET, TOP COVER LATCH |
| | 275-0003-000 | 1 | NILATCH BUSHING |
| | 275-0004-000 | 1 | NILATCH PLUNGER |
| | 320-0004-000 | 2 | RIVET, 1/8 X .275 BLIND - STEEL STEM PULL |
| ## CHASSIS INTERIOR | | | |
| | 309-0015-012 D | 1 | BRACE, MOTHER BD AND SHIELD |
| | 309-0016-012 E | 1 | BRACE, FRONT |
| | 300-0093-001 | 1 | SPACER, 6 X 1/4 X 3/16 L |
| | 365-0601-000 | 1 | WASHER, NO. 6 INTERIOR TOOTH |
| VR901 | 605-0012-000 | 1 | 7805CT (POS 5V REGULATOR) |
| | 613-0014-000 | 1 | INSULATOR, MICA |
| | 352-0004-000 | 1 | SCREW, NYLON 6-32 X 1/4 RD HD |
| | 280-0002-000 | 1 | LABEL, SERIAL NO. |
| | 280-0011-001 A | 1 | NAMEPLATE, PATENT NUMBER |

| | | | |
|---|---|---|---|
| ## CARD COVER SHIELD | | | |
| | 297-0027-013 | 1 | SHIELD, CARD COVER (SILK SCREENED) |
| | 350-0602-000 | 3 | SCREW, 6-32 X 1/4 PF HD 82 DEG. |
| ## HEAD CABLE INTERCONNECT | | | |
| | 378-0036-000 | 2 | PLUG, 9 POS (AMP 206485-1) |
| | 382-0045-000 | 2 | CLAMP, CABLE (AMP 206-358-1) |
| | 382-0048-000 | 18 | TERMINAL, (AMP 66504-4) |
| | 429-0006-000 | 3 | CABLE, SHIELDED PR (BELDEN 9451) |
| | 441-0014-000 | 1 | TUBING, VINYL 3/8 ID BLACK |
| | 441-0010-010 | 6 | TUBING, TEFLON 3/4 IN. |
| ## RECORD TO PLAY INTERCONNECT RIBBON CABLE | | | |
| | 837-0004-002 F | 1 | INTERCONNECT RIBBON, REC. TO PLAY |
| ## MISCELLANEOUS | | | |
| | 897-0081-000 | 8 | ETHAFOAM, WHITE |
| | 897-0088-000 | 1 | CARTON |
| | 897-0089-000 | 2 | SLOTTED SHEET, TOP & BOTTOM |
| | 897-0090-000 | 1 | TAPED TUBE, INNER CARTON |
| | 897-0091-000 | 1 | SLOTTED SHEET, TAPED TUBE INSERT |
| | 897-0104-000 | 2 | BUFFER, SIDE |
| | 378-0018-000 | 2 | PLUG, XLR STRAIGHT MALE (SWITCHCRAFT A3M) |

# SECTION VII. MAINTENANCE

## VII. MAINTENANCE

### A. GENERAL

International Tapetronics Corporation has designed the Series 99B cartridge machine with high reliability and minimum required maintenance as primary design goals. A minimum amount of mechanical and electrical maintenance, when performed on a regular basis, will allow the user to realize optimum performance and trouble free operation.

Permanently lubricated and sealed ball bearings used in the DC servo motor require no lubrication. Any attempts to oil bearing may cause premature failure due to migration of oil into the copper windings and ultimate breakdown of the insulation material.

Sintered bronze bearings used in the cross shaft assembly, are also permanently lubricated and therefore require no maintenance. A specially designed TEFLON® coated solenoid plunger eliminates the need for any lubrication of it. As in the case of the motor bearings, any attempt to oil or lubricate this assembly will ultimately cause damage and poor operation.

### B. MECHANICAL

1. **Daily**
   - -ITC recommends daily inspection (and cleaning if necessary) of the heads primarily when the machines are used in heavy production. Use a cotton swab dipped in isopropyl alcohol. Weekly cleaning will suffice under less rigorous use.
2. **Weekly**
   - -Capstan shaft and pressure roller - clean with a cloth dipped in isopropyl alcohol for maximum pulling characteristics, lowest flutter and overall best speed accuracy. Remove all traces of tape lubricant and tape oxide.
3. **Monthly**
   - -Pressure roller pressure solenoid adjustment, see Section III.
   - -Check playback and recording head azimuth as outlined in Section III.

### C. ELECTRICAL

1. **Monthly**
   - -Degauss all heads and tape guides carefully following instructions included with the degausser used.
2. **Every Six Months**
   - -Check and adjust playback high frequency equalization as outlined in Section V, B.
   - -Check and adjust program recording bias and program bias meter calibration as outlined in Section V, C.
   - -Check and adjust high frequency equalization as outlined in Section V, C.
   - -Cue recording bias and cue bias meter calibration - Section V, C.
   - -Cue master level control - Section V, C.
   - -Splice detector sensitivity - Section V, B.

### D. Recommended Tools, Gauges, and Tests

1. Hand Tools-
   An assortment of hand tools common to an electrical shop including a temperature-regulated soldering station. A 3/8" and 9/16" open-end wrench are required for solenoid adjustments. A 1/16" Allen hex wrench is required for head adjustments.
2. Test Equipment-
   Oscilloscope, with 10:1 test probes;
   High impedance voltmeter;
   Audio oscillator;
   Flutter meter capable of measuring DIN WTD flutter;
   Frequency meter; and
   Logic probe.
3. Gauges-
   These may be ordered from ITC:
   ITC gauge 830-0027-021, a capstan shaft locator gauge; and
   ITC gauge 830-0032-031, a pressure roller pressure gauge.

4. Miscellaneous-
   Set of test extender PC Boards
   831-0181-002 15 pin double-sided
   831-0182-003 25 pin double-sided
   (for play logic)
   831-0183-003 25 pin double-sided
   (for the Recorder
   Chassis)

E. Test Tapes

Test tapes should be carefully chosen to suit your particular needs. However, we caution that the use of a particular test tape may indicate performance slightly different from that of the factory setup. ITC uses commonly available test tapes in an effort to adjust each machine to a known in-field standard.

1. Purchase tapes loaded into a cartridge "shell" of the same type you normally use in your machine.
2. Use only ONE test tape throughout your cartridge system. This insures accurate and repeatable head adjustments and frequency responds from machine to machine.
3. Use the same test tape to perform head alignment and frequency response. If one cartridge is used for head phasing (azimuth) and a different cartridge is used for frequency response adjustments, errors will result.
4. Store tapes in a cool, dry, non-magnetic environment.
5. Discard a test tape when it begins to show signs of high frequency deterioration.

# SECTION VIII. WARRANTY

International Tapetronics Corporation (ITC) warrants to Purchaser that the equipment sold is free of defects of workmanship or material and conforms to the specifications referred to or set out herein. This warranty, applying only to the user, extends from date of shipment for a period of two years. In the case of equipment leased from ITC, this warranty is extended to the full three year term of the lease. No claim shall be maintained hereunder unless written notice is received by Seller within thirty days after the discovery of the facts giving rise to the claim. The sole or exclusive liability of Seller for breach of warranty shall be to refund the purchase price of the item sold, or at its option, to replace or repair the item or part concerned FOB its factory, or such other place as it may designate. ITC's liability shall arise only if Purchaser causes the defective part or item to be delivered to ITC for inspection upon ITC's request at Purchaser's expense. This warranty shall not be effective if the alleged defect is due to maltreatment, exposure, excessive moisture or any other use of the equipment other than the use for which the manufacturer prescribed.

No warranties expressed or implied shall be applicable to any equipment sold hereunder, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements in this paragraph contained. In no event shall International Tapetronics Corporation have any liability for consequential damages, or for loss, damage, or expense directly or indirectly arising from the use of the products, or any inability to use them either separate or in combination with other equipment or materials, or from any other cause.

ITC's warranty is given solely to the original user and only to the extent above described. No dealer or agent is authorized to make any other or additional guaranty or warranty.