TECHNICAL MANUAL
890-0028-010

- DELTA SERIES -

BROADCAST CARTRIDGE RECORDER/REPRODUCER SYSTEM

INCLUDING:

DELTA I
DELTA II
DELTA III
DELTA IV

(Rev. 6-84)

INTERNATIONAL TAPETRONICS CORPORATION
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PREFACE

International Tapetronics Corporation/3M 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 a 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.

Should you discover any errors or omissions, or wish to contribute any recommendations, please send us your comments. We will be most appreciative.

All ITC Equipment is covered by one or more of the following patents: 3,801,043; 3,800,323; 3,809,329; 3,869,719; 3,833,925; 3,932,887; 3,942,189; 4,105,934; 4,040,114; 4,142,221; 4,221,316; 4,101,937; D248,393; 4,153,918; 4,219,167; 4,096,533; D255,793; 4,158,868; 4,978,709; 4,193,103; 4,271,440.

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SECTION I — INTRODUCTION/SPECIFICATIONS

A. GENERAL DESCRIPTION

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

A major guideline used during the development of the Delta Series was the December, 1975 NAB Standards for cartridge tape recordings and reproductions. Those standards have been met and, in many cases, improved upon.

The Delta Series is built on a modular basis in which the playback transport electronics and the recording electronics are each housed in separate units. Individually, the Delta Series consists of four units. These may be mixed or matched to suit individual needs: The Delta I, a single deck reproducer only, for AA size cartridges; the Delta II, a single deck reproducer only, for AA, BB and CC size cartridges; the Delta III, a three deck reproducer for AA size cartridges; and the Delta IV, a Record Amplifier that may be added to any of the other Delta components. The compact 1/3 rack width design allows the use of several Delta units side by side. This allows great flexibility in mounting the Delta Series. It also makes the addition of a recorder unit to an existing reproducer a simple task. All subassemblies such as amplifiers, control circuits, power supplies, front and rear panels, and head assemblies 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 Delta Series 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 microadjust head assembly. A roller material which pulls better with less pressure is standard.

The pressure roller solenoid provides for stable tape travel path and minimal tape overshoot. The solenoid plunger is coated with a dry lubricant bonded to the metal surface, insuring years of trouble-free performance.

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. This prevents interaction between any of the three adjustments. The unique "criss-cross" azimuth arms internal to the head block allow for very precise azimuth adjustment. Steel pivots combined with the "criss-cross" azimuth arms permit very fine azimuth adjustments. The entire head module can be removed without destroying previous adjustments.

Accurate tape cartridge positioning allows best performance from mechanical design improvements. ITC has designed a cartridge positioning system which assures precise, rigid alignment of tape and head, even when cartridge insertion is hurried or somewhat careless.

Electronically, the Delta Series incorporates many standard features made possible by microprocessor technology. The cue tones are generated and detected digitally, and crystal referenced for long term frequency stability. Cue tones include Primary, Secondary, and Tertiary as standard. A two speed, standard 7.5 IPS and 22.5 IPS high speed cue, crystal locked DC brushless servo motor provides high quality flutter performance and reduces heat.

A specially designed reproduce head, coupled with a long life recording head, contribute to frequency response which equals open reel quality. High frequency bias and a unique bias and program mixing amplifier combine to reduce intermodulation distortion. Only the magnetic tape and cartridge become the limiting factors. All Delta units are shipped with input and output transformers as standard. A unique circuit design allows for the removal of all transformers so the Delta units may be operated in a true differential input and balanced transformerless (active) output configuration.

Programmable logic allows using the secondary, tertiary, or both cue tones to send the machine into high speed recue. A flashing front panel indicator shows that a cart has played, whether it stops automatically, or is manually stopped by the operator. High speed end of message recue is standard on Delta I and Delta II. All Delta units feature user selectable input and output impedances and levels, and are easily field convertible. Reproducers may be converted to record/reproducers at any time. All units are readily convertible from stereo to mono and vice-versa.

State of the art components and design are used in the recording amplifier to improve square wave performance and transient response. Meters may be

used to monitor input, output, program, cue bias and cue playback. These functions are selectable from the front panel. Input monitoring (REC) is automatically switched to output monitoring (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.

Delta Features

Mechanical

- Compact size — 1/3 rack width, 12" deep (DI, II, IV)
  13" deep (D III)
  Height 5-9/16" (DI, II, IV)
  10-15/32" (D III)
- Modular construction
- Styling similar to Series 99 — neutral colors
- 1/2" deck assembly — tool plate aluminum — anodized
- Extruded side, front, and rear panel
- New headblock — stable, compact, allows precision adjustment
- Improved cart guides
- Electrically Controlled Bottoming Solenoid
- Capstan motor — DC Servo, brushless with ball bearings. Crystal referenced — can be strapped for 3-3/4, 7-1/2, 15 IPS
- XLR connectors for inputs/outputs
- Vinyl clad and polycarbonate surfaces for lasting finish and ease of cleaning
- Universal rack mounting
- On DIII, all 3 decks are removable
- Extensive use of mumetal shielding
- Long life, high quality switches — bifurcated wiping contacts
- All front panel switches illuminated using 5 volt long life bulbs

Electrical

- Toroidal power transformer
- Extended life, open face cylindrical heads
- Common P.C. cards for D-I, II, & III
- Microprocessor control
- State of the art audio using TLO Series and 5500 Series (5532, 34) opamps
- Electronically balanced input/output. Can be used with or without x-formers (input can be bridging)
- Hi-speed recue standard on D-I, II
- Full 3 cue tone operation standard
- Either 150 Hz or 8 kHz cue detectors can be strapped to initiate hi-speed cue
- Audio muting
- Non-repeat indicator w/start lock-out
- Flashing record lamp for rec set w/1 kHz disabled
- On D-IV — front panel access to:
  1. Normal record (input)
  2. Program play (output)
  3. 1 kHz defeat (electronically latched)
  4. 1 kHz add (timed tone)
  5. Front panel actuation of test metering mode:
     a. cue play/cue bias
     b. program bias
- ICs and transistors socketed
- Soldermask on pcbs (both sides)
- Power supplies regulated
- Full remote controls including lamps
- Detachable line cord
- Stappable input level ranges
- Cart high speed cueing standard (Cue switch mutes unless held depressed)
- DIV is universal recording amplifier for use with DI, DII, and bottom deck of DIII
- All playbacks are field convertible to stereo
- Motor and control electronics (servo) are one assembly — eliminates field matching)
- High frequency crystal referenced bias (120 kHz)
- Auxiliary start pulse

B. DELTA SPECIFICATIONS

1. Power Specification

   A. 105 to 132 VAC or 210 to 264 VAC
   B. 50/60 Hz
   C. Power Consumption
      1. Delta I — 50 VA Typical, 65 VA Maximum
      2. Delta II — 50 VA Typical, 65 VA Maximum

3. Delta III 120 VA Typical
   135 VA Maximum
4. Delta VI 5 VA Typical
   10 VA Maximum

2. Tape Speed

   A. 3-3/4 IPS, (9.5 cm/s);
   7-1/2 IPS, (19 cm/s);
   15 IPS, (38 cm/s);
   B. High speed recue — 22.5 IPS (57 cm/s), nominal

3. Capstan Motor

   A. Direct drive capstan
   (10.0 mm diameter capstan shaft)
   B. Brushless DC servo motor
   C. D-I, D-II and D-III; electrolyzed stainless steel shaft
   D. Permanently lubricated ball bearings

4. Record/Play Flutter

   A. Record/Play maximum
   0.15% DIN WTD at 7.5 IPS.
   B. Play maximum
   0.12% DIN WTD at 7.5 IPS.
   Tape cartridge length 3-1/2 minutes

5. Speed Accuracy

   A. Better than +/- 0.2%

6. Audio Output Configuration and Audio Impedance

   A. Transformer coupled
   Strappable for 150 ohm or 600 ohm (load impedance) operation (source impedance is 50 ohms or 275 ohms respectively)
   B. Transformerless output

   (Source impedance is 150 ohms as factory supplied; only for electronically balanced output, no transformers)

7. Audio Output Level

   A. +18 dBm (at 1 kHz) for .5% THD or less, amp distortion
   (W/XFMR); +22 dBm transformerless clip level
   B. Variable from 0 level to +18 dBm (Ref. 1 kHz at 160 nWb/m) (Continously variable, "useable" range -18 dBm to +18 dBm)

8. Distortion

   A. Amplifier Distortion: Reproducer: 0.2% or less total harmonic distortion, at 0 dBm @ 1 kHz; 0.5% or less THD at +18 dBm @ 1 kHz.
   B. System Distortion: Reproducer: 1.5% or less total harmonic distortion, 0.5% or less third harmonic distortion. Specification by 1975 NAB standards.

9. Noise

   A. Signal to Noise: Measured with bias/no signal; ScotchCart in place with virgin tape at 7.5 IPS.

Mono	Stereo
54 dB (or better)	52 dB (or better)

   B. Signal to Noise: No tape running; ScotchCart in place.

Mono	Stereo
56 dB (or better)	54 dB (or better)

   C. Squelch Noise — 70 dB or better.
   D. Reference level of measurements 250 nWb/m at 1 kHz recorded signal

10. Cross Talk

    Measured at 1 kHz. (1975 NAB Standards)
    -50 dB Min. separation between program channels

11. Frequency Response

    A. +/- 2.0 dB from 50 Hz — 16 kHz
    B. R/P 0 dB reference; 250 nWb/m at 1 kHz (ScotchCart Tape)

12. Equalization

    A. 1975 NAB cartridge machine standard — adjustable for CCIR (Pot. adjustment)
    B. Customer option/component reloading in field 7.5 IPS only — 1964 NAB equalization
    C. Fixed low frequency equalization; adjustable high frequency equalization

13. Head Configuration — NAB, Mono/Stereo

14. Cue Signals

    A. NAB primary cue 1 kHz
    B. NAB secondary cue 150 Hz
    C. NAB tertiary cue 8 kHz
    D. Open collector sinking signal (Ground switching) available upon sensing secondary or tertiary cue tones maximum volts 25V, max-

imum current 200 ma, saturation volts 0.7V at 200 ma

E. Cue detect open relay contacts available upon sensing secondary or tertiary cue tones.

Secondary and Tertiary cue detect normally open relay SPDT*

*Contact ratings — 1A at 25V DC, 0.5A at 100V AC (resistive)

Initial contact resistance 100m ohms maximum at 6 volts, 0.5A

Operate time 5 msec maximum (including contact bounce, at rated voltage)

Release time 10 msec maximum (including contact bounce)

Life expectancy—Mechanical: 5×10^6 operations minimum
Electrical: 300×10^3 operations minimum
At 25V DC, 1A resistive 200×10^3 operations minimum at 100V AC, 0.5A resistive

Not to be used with inductive loads

15. Logging Signals

A. Not internal to machine
B. Cue audio input and cue audio output available for external use.

Cue Audio Input — Source impedance: 10K ohms or less. Volts in.: .5V +/- .25V RMS @ 3.5* kHz

Cue Audio Output — Load impedance: 47K ohms or greater. Volts Out: 500mv +/- .25V RMS @ 1 kHz, 150 Hz, 3.5 kHz* 8 kHz

*-10 dBm referenced to 0 dBm @ 160 nWb/m

16. Audio Input Level

A. -18 dBm to +18 dBm
B. 2 range control straps on record amp: -6 dBm/+6 dBm center-range
C. Front panel potentiometer range 0 to at least +12 dB — referenced to each strap

17. Audio Input Configuration

A. Input XFMR is normally supplied for 20K ohm balanced bridging
B. Strappable for 600 ohms or 150 ohms terminating
C. Electronically balanced bridging 20K ohms

18. Metering (D-IV)/Function Switches

A. Front panel switch selection for monitoring (left to right positions on front panel)
1. Meter Rec — monitor input level to recorder — switches automatically to "Meter Play" (monitor output level from playback) when machine is not set to record
2. Meter Play — Monitor output level
3. 1 kHz Defeat — Prevents the 1 kHz tone from automatically being recorded on the cue track when recording. This mode is indicated when the record set lamp flashes.
4. 1 kHz Add — Places a 1 kHz tone on the tape for a duration of 0.625 seconds when the playback is in the run mode. It is not necessary to hold the 1 kHz record button depressed for the duration of the tone.

B. Internal Meter Switch — Two position slide switch on record amp/meter board — activates only when meter rec and meter play buttons are in "out" position.
1. Cue play/cue bias — Slide switch in the "left" position for cue functions and record bias;
Cue Play — Left Meter
Cue Bias — Right Meter
2. Record Bias — Slide switch in the "right" position for program bias functions
Left Program Bias — Left Meter
Right Program Bias — Right Meter

19. Bias Amplifier

A. 119.3 kHz Bias Frequency, Crystal referenced

20. Tape Capacity

A. NAB sizes A and AA (Delta I & Delta III)
B. NAB sizes A, AA, B and C (Delta II)

21. Start Time

A. Typically 100 milliseconds
(Timing dependent upon solenoid air damp adjustment)

22. Stop Time

A. Audio squelch stop time typically 2 msec — Tape stop time typically less than 100 msec
B. Tape travel varies according to:
1. Type of cartridge
2. Length of tape

23. Ambient operating temperature range

A. 10-50 degrees C (50-122 degrees F)

24. Manual and Remote Controls

A. All front panel indicators and controls (except program bias and cue track metering)
B. Play remotes available via play remote connector
C. Record remote functions (except metering) available via record remote connector.

25. External Connectors

A. XLR audio connectors
B. Jones remote connectors
C. Interconnect between play and recorder to carry audio and microprocessor control lines
D. Plug-in line cord

26. Mounting

A. Table top standard
B. Rack mount (optional rack mount hardware)

27. Dimensions

A.	Width	Depth**	Height*
Delta I	5 9/16"; 14.1 cm	12"; 30.5 cm	5 7/32"; 13.3 cm
Delta II	11 1/8"; 28.3 cm	12"; 30.5 cm	5 7/32"; 13.3 cm
Delta III	5 9/16"; 14.1 cm	13"; 33 cm	10 15/32"; 26.6 cm
Delta IV	5 9/16"; 14.1 cm	12"; 30.5 cm	5 7/32"; 13.3 cm

*Add 1/3" for feet.
**All machines require 3½" additional depth at rear for interconnection.

B. Single height rack assembly (for use with the Delta I, II, and IV): requires 7" vertical height
C. Double height rack assembly (for use with all machines): requires 12¼" vertical height

28. Weight (typical)

A. Delta I 22 lbs.; 10.0 kg
B. Delta II 26 lbs.; 11.8 kg
C. Delta III 37 lbs.; 16.8 kg
D. Delta IV 13 lbs.; 5.9 kg
E. Total shipping weight (including connectors, instruction book, etc.) less than 50 lbs.; 22.5 kg.

SECTION II — INSTALLATION AND OPERATION

A. UNPACKING, HANDLING AND PRE-INSTALLATION CHECKOUT

Note: External connectors, power cord, and interconnect cable, if applicable, are packed separately in the unit carton. Remove these and place with the unit. Retain all packing material for damage claim or reshipment purposes. Claims for damage should be filed with the carrier no later than 10 days after receipt.

Place the unit in an area suitable for maintenance. Remove the top and bottom covers and make a physical inspection of the unit. **Note:** The main power fuse is in a packet taped to the bottom cover. Remove the packet and install the fuse in the rear panel fuseholder.

All units, except D-III, have a protective foam sheet to hold the PCB's in place. Also, all reproducers have protective foam around the motor. Remove the foam and place it with the other packing material.

Unplug and reseat the PCB's to insure connection. Inspect all internal connectors to make sure they are securely fastened and properly seated.

Review the final inspection tags to insure that this unit meets your in-house standards for equalization, levels and tape type. Finally, make a note in your companies' permanent records of the date of receipt, model and serial numbers. You may need this information for future reference.

B. INSTALLATION

The Delta Series is designed in incremental sizes for convenient installation into existing spaces. Three basic "sizes" are designed on a UNIT size of 5-7/32" high (without feet) by 5-9/16" wide. Therefore, three single UNIT widths may be installed side by side in a standard 19" rack opening. Likewise, two single UNIT height machines may be stacked next to a double unit height component. The preceding illustration demonstrates the unit concept.

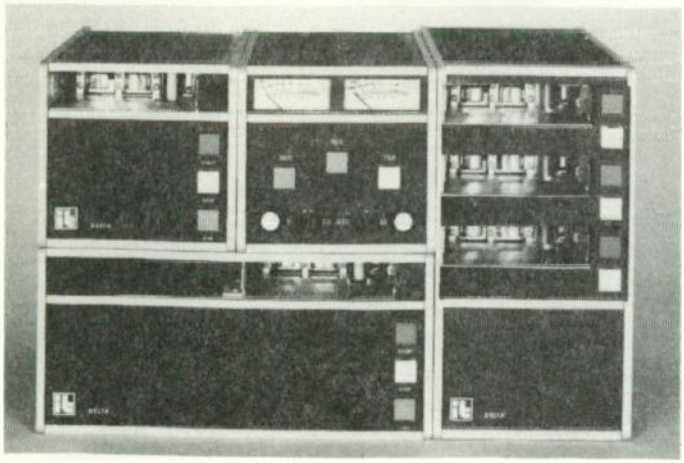


Figure 2-1

ITC Delta Series machines are designed as a very flexible, high performance cartridge system. Reproducers may be interconnected to recording amplifiers with a single cable. The four units of the Delta system allow user flexibility previously unachievable in a cartridge system. They may be mixed or matched to perform a variety of tasks. The following table lists the four Delta system units and their primary useage.

Delta I	Single Deck Reproducer, "AA" size cartridges only;
Delta II	Single Deck Reproducer, "AA" or "BB" or "CC" sized cartridges;
Delta III	Three Deck Reproducer, "AA" size cartridge only;
Delta IV	Record Amplifier, may be used with Deltas I, II, or III.

Available as an option, the Universal Rack Mount URM-0001 allows the user to install Delta system units in any configuration for existing 19" racks. Variations in the rack mount design are discussed in the URM-0001 instruction sheet.

—SPECIAL CONSIDERATION FOR COOLING—

The Delta Series is designed using state of the art microprocessor and analog technology. Due to the compactness of the units, and the high density packaging, these units generate heat that must not be allowed to accumulate. Adequate ambient air circulation is required in order to prevent premature heat related failures. As a general rule, no forced air cooling is required, except in D III, **unless** the units will be installed in a fully enclosed housing. It is normal for these units to radiate heat through the tops and this air must be allowed to escape. Likewise, ventilation holes in the tops and bottoms should not be restricted. Vertical stacking of Delta units should pose no problems so long as the ventilation holes are not blocked. Desk-mounted units should not have their feet removed for this

reason. Rack-mounted units may be installed without their lids. The URM-0001 Universal Rack Mount kit provides for air circulation through the units.

FORCED AIR COOLING — DELTA III UNITS

Delta III units incorporate very densely packed high-speed electronics on four major printed circuit boards. To provide maximum features, premium performance and compact size, the electronics were designed to be space efficient. This required close component to component and board to board spacing. his compact design required supplemental aid to convection cooling.

The Delta III utilizes an internal miniature cooling fan to augment natural cooling. This fan is mounted below and to the rear of the center panel. It blows air upward across the four printed circuit boards and out through the top. The fan motor operates from low voltage DC and is variable speed. Fan speed, and hence, air volume, is controllable by a trimpot. This is accessible through a small hole in the rear panel of the machine.

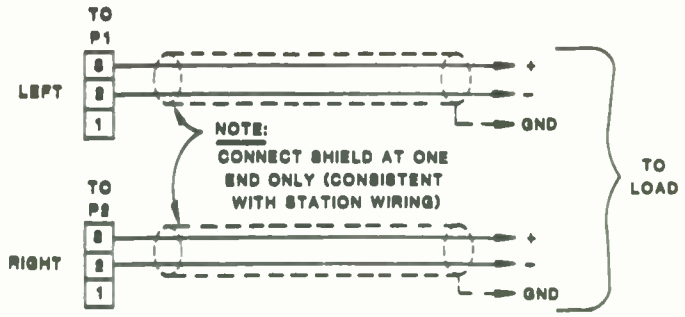
The fan type has been carefully selected to provide adequate cooling at slow rotor speeds. Typical fan noise is less than the noise produced by tape being pulled through a cartridge. The slow fan speed also prevents abnormal dust or dirt buildup, as less airborne particulate matter is drawn into the unit.

Fan speed is factory adjusted to provide ample cooling for most applications. Should more or less air flow be required, customers may adjust fan speed. Units mounted in enclosures, such as fabricated housings , may require increased fan speed. Units mounted above other heat-producing equipment may also require increased ventilation.

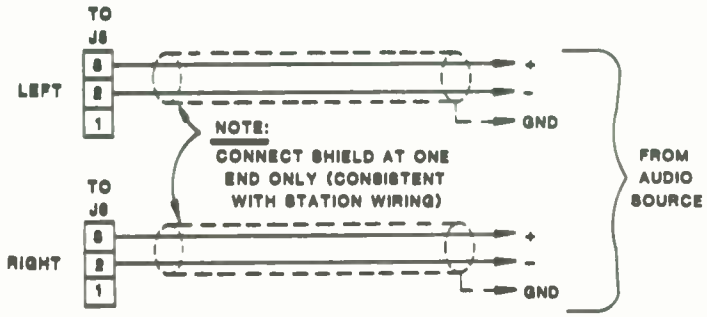
It should be noted that, if the forced air flow is reduced, internal ambient heat will rise. Delta Series components are high quality and temperature-rated higher than the expected heat rise. Life expectancy of all components, such as electrolytic capacitors, may be shortened by reducing the forced air flow. This is true if the components are operated under higher than normal heat for extended periods of time. Therefore, if at all possible, ITC recommends the use of the Delta III internal forced air system for optimum performance and maximum longevity of components.

C. EXTERNAL AUDIO CONNECTIONS

All Delta Series units are shipped with standard input and output transformers installed. Inputs and outputs are via 3-pin XLR-type connectors, on the



REPRODUCER AUDIO OUTPUT CONNECTIONS



RECORDER AUDIO INPUT CONNECTIONS

Figure 2-2

rear panels of respective Delta units. Pin connections are "universal": Pin 1 is ground, Pins 2 and 3 are the balanced pair.

Should transformerless operation be desired, transformer PCB removal is accomplished by turning the small screwdriver slot in the center of each XLR connector counterclockwise approximately 1/8 turn, then removing the board from the rear of the connector. The audio leads on the PCB may be transferred directly to the XLR socket pins. All Delta Series units provide balanced active, transformerless design and may be used in this configuration as desired.

An appropriate combination of plugs and sockets is provided with each Delta Series unit for connecting audio inputs and outputs. Refer to Figures 2-3, 2-4, and 2-5 for 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 2-2 shows a proper method of connection for the playback output lines.

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 audio phase reversals.

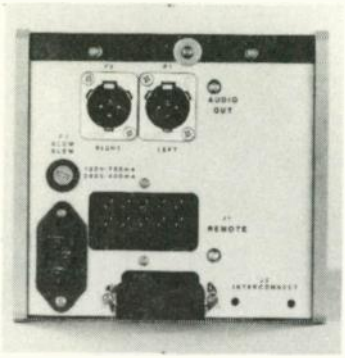


Figure 2-3: DELTA I & II REAR PANEL

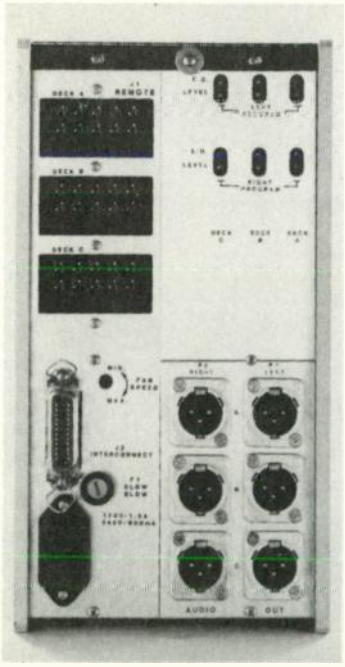


Figure 2-4: DELTA III REAR PANEL

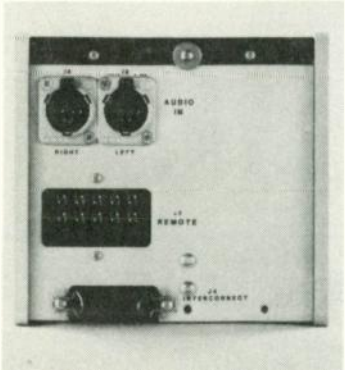


Figure 2-5: DELTA IV REAR PANEL

D. EXTERNAL REMOTE CONTROL CONNECTIONS

Remote control for Delta Series units is via rear panel female Jones type connectors. The pin-out connections listed below indicate typical remote control functions. Figures 2-6 and 2-7 illustrate many of the common remotes used and the proper method for making the connections.

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

All switches shown are momentary action, single pole. Typical switching current is 15 ma. at a maximum of 5 VDC.

DELTA I, II, III REPRODUCER REMOTE CONNECTOR

Pin #	Function
1	Logic Common, Switch Common
2	Remote Start (Run Ground)
3	Remote Cue Switch
4	Remote Cue Lamp
5	Remote Stop (Stop Ground)
6	Remote Run Lamp (Ground)
7	Remote Ready Lamp (Ground) — follows ready lamp function, when lamp is at ground. When lamp is on, signal is at ground. When lamp is off, the open collector transistor is off. **CAUTION:** ready ground follows condition of front panel ready lamp. If ready lamp is strapped to flash ready ground will change states synchronous with front panel ready lamp. Maximum open circuit voltage 25 VDC, maximum current at 200 ma.
8	+5 Volts
9	Auxiliary Start Pulse — 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.
10	Secondary Cue Relay (Open Collector) — 200 ma. switching current (sinking), maximum 25 VDC open circuit voltage, switches to ground upon sensing of secondary cue.
11	Secondary Cue Relay (Normally Open)
12	Tertiary Cue Relay (Open Collector) — switches to ground upon sensing of tertiary cue.
13	Tertiary Cue Relay (Normally Open)
14	Cue Audio Output — Nominal voltage is .5V RMS.
15	Cue Audio Ground

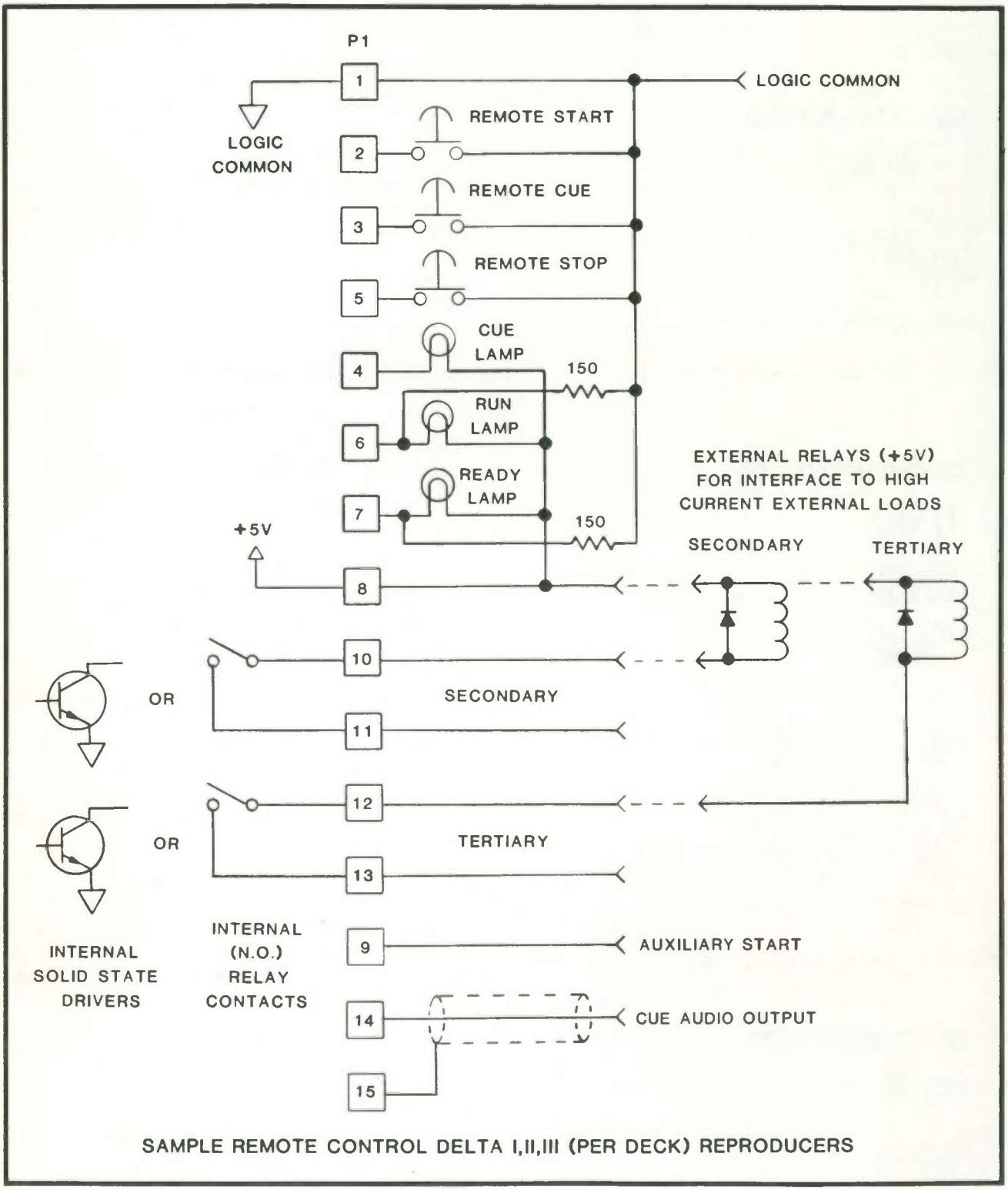


Figure 2-6

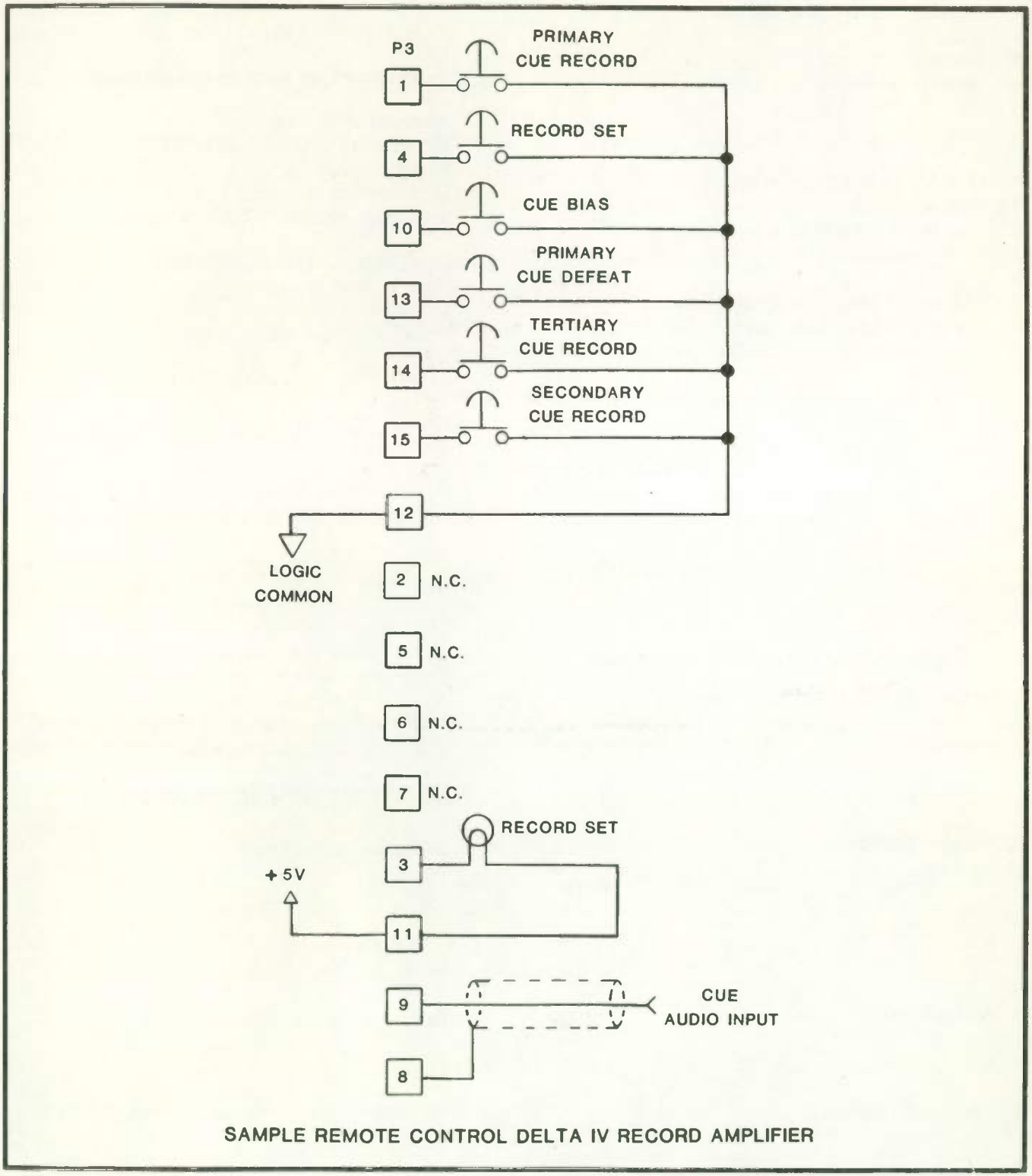


Figure 2-7

DELTA IV RECORD AMPLIFIER REMOTE CONNECTOR

Pin #	Function
1	Primary (1 kHz) Cue Record
2	N.C.
3	Record Set Lamp
4	Record Set Switch
5	N.C.
6	N.C.
7	N.C.
8	Cue Audio Input Common
9	Cue Audio Input
10	Cue Bias (Remote Cue Record Switch)
11	+5 V Regulated
12	Logic Common
13	Primary (1 kHz) Cue Tone Defeat
14	Tertiary (8 kHz) Cue Tone Record Switch
15	Secondary (150 Hz) Cue Tone Record Switch

It should be noted that, when Delta Series units are used to replace existing cartridge machines, exchange of remote lamps will be required if the Delta +5 VDC power supply is used as a source for lamp voltage. Stations using the popular T-1 3/4 based lamps in remote indicators may replace them with **5 volt versions**. Lamps are driven in an open collector fashion and should not exceed 140 ma. at 5 volts.

CONTROL/REMOTES SPECIFICATIONS

'A. **Remote Switch Lines — Active Low**

Logic '0' Max	Logic '1' Min	Max. Current Logic '0'
0.8V	2V	17 ma.

B. **Remote Lamps**

Max. Volts	Max. Current	Saturation Volts
5.0V	140 ma.	0.7V Max. @ 240 ma.

C. **Audio Lines**

	Load Impedance	Volts Out
Cue Audio Output	4.7K ohms or greater	500 mV ± .25V RMS @ 1 kHz, 150 Hz, 3.5 kHz, 8 kHz

D. **External Power Supply**

	Max. Current Draw	Volts/ Regulation
+5 Volts	540 ma (9 lamps)	+5V ± 5%

E. **Remote Cue Tone Switched Lines**

Auxiliary Start Pulse
Time Duration 0.1 sec. @ ± 10%
Max Volts 25V
Max Current 200 ma
Saturation Volts 0.7V Max @ 300ma

Cue Detect or Open Collector
Max Volts 25 V
Max Current 200 ma
Saturation Volts 0.7V Max @ 300ma

Cue Detect or Normally Open Relay SPDT

Contact Ratings — 1A at 24V DC, 0.5A at 100V AC (Resistive)

Operate Time 5 msec Maximum (Including contact bounce, at rated voltage)

Release Time 10 msec Maximum (Including contact bounce)

Life Expectancy —
Mechanical: 5×10^6 Operations Minimum
Electrical: 300×10^3 Operations Minimum @ 24V DC, 1A Resistive
100×10^3 Operations Minimum @ 100V AC, .05A Resistive

DO NOT USE WITH INDUCTIVE LOADS

Recorder Audio Lines

	Load Impedance	Volts In
Cue Audio Input Remote	10K Ohms or less	.5V ± .25V RMS @ 3.5 kHz

Recorder External Power Supply

	Max. Current Draw	Volts/ Regulation
+5 Volts (Regulated)	60ma (1 lamp)	+5V ± 5%

E. 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 the factory after cartridge has played and cued. For optional operation of the Ready function, see SECTION II F. Operational Options.
3. Start Switch — Active whenever the cartridge deck is in Ready or CUE mode.
4. Run Lamp — On when in RUN mode.
5. 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 the duration the switch is held.
6. Cue Lamp — On when in CUE mode.
7. Record Set Switch — Active only in the READY mode. When pressed, program audio signals are switched into the recording amplifier circuit. Pressing START causes the recording process to begin.
8. Record Set Lamp — A visual indication showing that the machine is either ready to record or in the process of recording. This lamp will flash if the 1 kHz cue record defeat has been activated.
9. 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 microprocessor. The switch is active in a playback or recording mode. The 1 kHz cue detector is automatically defeated as the 1 kHz tone is being recorded.
10. 1 kHz Cue Defeat — Active only in a READY mode (no tape running — READY and RECORD lamps on). When pressed, this mode is indicated by a flashing record set lamp.
11. Secondary Cue Switch — Active in either record or playback modes. Used to record a secondary (150 Hz) cue tone on the cue track. A remote switching signal occurs in the playback unit 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. Jumper provided on Play Card to defeat high-speed cue if desired.
12. Tertiary Cue Switch — Active in either record or playback modes. Used to record a tertiary (8 kHz) cue tone. A remote switching signal occurs in the playback unit upon sensing of the tone. Reproducers can be programmed (jumper optional) to initiate high-speed recue at the end of tertiary tone rather than secondary tone, if desired. Jumpers are located on the Reproduce Amplifier/Cue Detect Card.

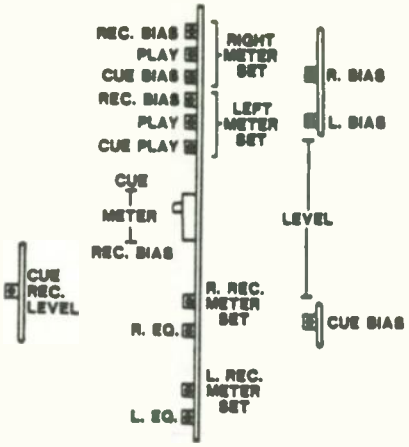


Figure 2-8

13. Meter Monitoring — The two front-panel switches, REC and PLAY, are used in conjunction with the internal two-position slide switch (mounted on the top edge of the Record and Meter Amp board) in order to monitor the various machine functions. The following explanation describes the metered indication as related to switch position and Record Amplifier mode:

Meter Switch Actuated	Indicates: Left Meter	Right Meter
REC Depressed Machine in "Record Set" Mode, Recording	Left Program input level	Right Program input level
REC Depressed Machine in Reproduce Mode, playing tape	Left Program output level	Right Program output level
PLAY Depressed, Machine in either Record or Reproduce Modes	Left Program output level	Right Program output level
NEITHER PLAY or REC Depressed, Slide switch in "CUE" position	Cue Play	Cue Bias
Slide switch in "REC BIAS" position	Left Program Bias	Right Program Bias

*NOTE: When both REC and PLAY meter switches are simultaneously depressed, the metering circuits will "default", and indicate the same meter function indicated when only the REC switch is depressed.

F. OPERATIONAL OPTIONS

Delta Series units may be operationally configured to perform various tasks depending on your specific needs. Special functions are outlined below:

1. READY LAMP FLASH — The ready lamp may be programmed to flash, giving a visual indication of a cartridge that has been stopped. A fast flash indicates a cartridge that has been stopped by the operator using the Stop Switch. A slow flash indicates a cartridge has stopped by the 1 kHz cue tone. When units are programmed to flash, the flashing Ready may be "reset" to continuous Ready by momentarily pressing the Stop switch. This jumper is located on the Reproduce Logic Board.

Jumper	Flash Option
"IN"	Not Active
"OUT"	Active

2. REPEAT PLAY LOCKOUT — This programmable option inhibits playing the same cartridge twice in a row. In other words, once a cartridge has played and stopped, it may not be restarted until it is removed from the deck, and reinserted. This prevents replay of the same program material. This jumper is located on the Reproduce Logic Board.

Jumper	Repeat Play Lockout
"IN"	Enabled
"OUT"	Disabled

3. E.O.M. HIGH SPEED RECUE — May be jumpered so that neither, either, or both the secondary (150 Hz) and tertiary (8 kHz) cue tone detectors cause the end-of-message high speed recue to occur. This jumper is located on the Play Amp and Cue Detector Board.
4. REPRODUCE AMPLIFIER LEVEL — Provides output level range for preservation of best signal-to-noise.
5. REPRODUCE OUTPUT IMPEDANCE — 600 ohms, balanced transformer is standard. Refer to mainframe schematics for information regarding 150 ohm balanced.
6. BALANCED TRANSFORMERLESS (ACTIVE) OUTPUT — All Delta Series units may be operated in a transformerless (active) output stage configuration for improved transient response. The high slew rate of the output stages may be utilized to provide the best possible audio response, in particular at the extreme ends of the audio band.

   When output transformers are removed, DC isolation between the Delta output stage and connected equipment should be maintained. This is accomplished by inserting a 220 mfd nonpolarized capacitor in each output leg, (+) and (-). ITC provides an assembly to readily convert any Delta Series output to balanced transformerless.

   Delta I, II Audio Output Board

   831-0252-003 Mono, w/transformer
   831-0252-013 Stereo, w/transformer
   831-0252-023 Mono, w/o transformer
   831-0252-033 Stereo, w/o transformer

   Delta III Audio Output Board

   831-0254-003 Mono, w/transformer
   831-0254-013 Stereo, w/transformer
   831-0254-023 Mono, w/o transformer
   831-0254-033 Stereo, w/o transformer
7. RECORDER INPUT IMPEDANCE — 20 K ohms bridging is standard. The input may be terminated by a 150 ohm or 600 ohm resistor by adding a jumper to each input channel. The D-IV mainframe has this jumper already in place. Refer to the Delta IV input transformer board drawings for exact location.
8. INPUT LEVEL STRAPPING — Input straps are provided to select the nominal input level range, to insure best overall signal-to-noise is preserved, and to set the nominal position of the front panel level controls. Jumpers are located in the Delta IV mainframe.
9. DIFFERENTIAL (TRANSFORMERLESS, BALANCED) INPUT — Input transformers (standard) may be removed in order to operate the Delta IV record amplifier in a true differential input configuration. High performance op-amp record amplifier input sections permit this user option. When operating in the differential input mode, users should be cautious to insure that no DC potential, or AC ground loops exist before attempting connection. Removal of the input transformer eliminates the DC protection characteristics (isolation) offered by the transformer. Once the transformers have been removed, wire jumpers

W1305, W1306, W1307, and W1308 are installed providing input directly to the Record Amplifier differential input.

10. SERVO MOTOR SPEED — Delta units are shipped to operate at NAB standard speed of 7.5 IPS. Units may be field modified to run at 3.75 IPS or 15 IPS by moving the motor speed select jumper located on the Reproduce Logic PCB. Refer to the Reproduce Logic Board schematic and parts layout drawings for jumper location and use information.

SECTION III — MECHANICAL ADJUSTMENTS

A. IMPORTANT CONSIDERATIONS

The rugged mechanics built into Delta Series cartridge machines are designed to provide extremely reliable and long-term operation with 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 interrelated. Therefore, if a complete check of all mechanical adjustments is required, start at the beginning of this section and follow the proper sequence.

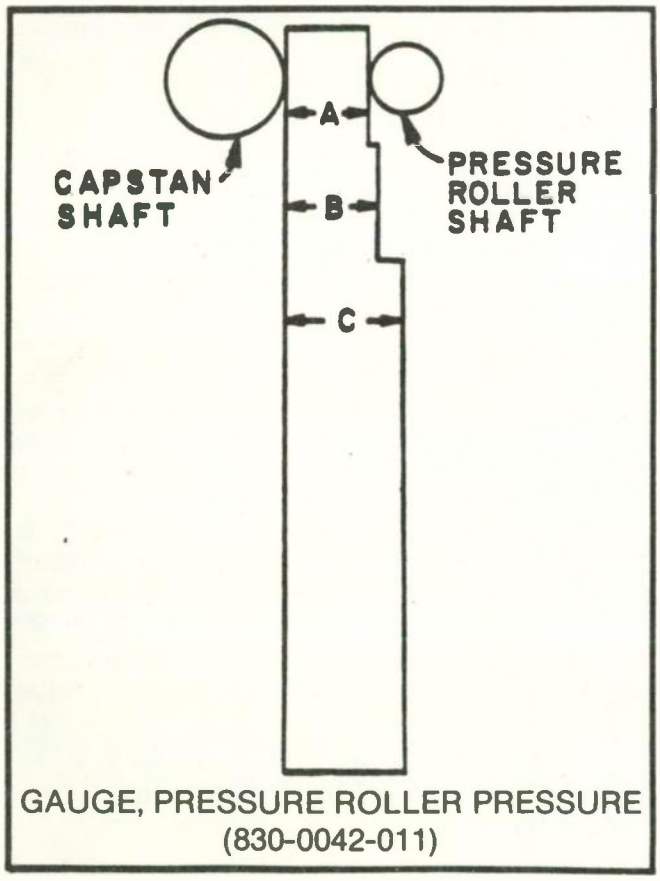


Figure 3-1

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

The pressure roller pressure gauge, 830-0042-011 has been designed exclusively for use in the ITC Delta Series. 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. 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.

Dimension "C" is a low-tolerance dimension, and should never be used to measure any mechanical parameter in the Delta Series. Its prime function is as a handle and may be held at this point or at any place along its length.

B. PRESSURE ROLLER SHAFT/CAPSTAN SHAFT (MOTOR) POSITION

The following adjustments are 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 #830-0043-001) and the pressure roller pressure gauge (ITC Part #830-0042-011) are required for the following procedure.

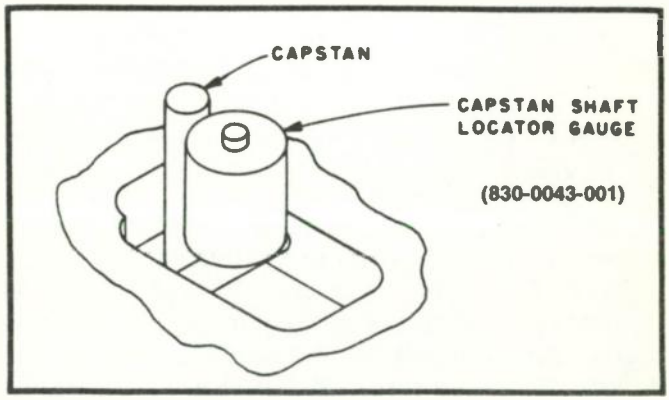


Figure 3-2

Procedure for Delta I and II Units

1. Remove the pressure roller and place the special locator gauge (830-0043-011) over the pressure roller shaft as illustrated in Figure 3-2. Manually move the gauge up to (against) the capstan shaft. Check to see that the gauge surface lies flat against the capstan shaft. If not, loosen the motor mounting screws, and gently move the motor until the gauge surface and the motor shaft are "flat" against each other.

2. Carefully tighten the motor mounting screws while making certain that the motor locating gauge remains parallel to the capstan shaft. Also insure that the pressure roller shaft and motor shaft are directly in line with each other centering on the deck plate hole. This is the proper position of the pressure roller shaft as related to the capstan shaft.
3. Remove the gauge 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.

NOTE: Motor locating in Delta III models is always referenced to the center bulkhead, and motor location is relatively fixed. Therefore, manipulation of the sliding deck adjustment screws is required to insure proper motor shaft-to-pressure roller shaft parallelism. **The following procedure applies to Delta III units only:**

C. PROCEDURE FOR DELTA III DECK ADJUSTMENT

This procedure should be used when a motor or deck has been replaced.

1. Remove all decks from the mainframe.
2. Starting with the bottom deck, remove the pressure roller and place the special locator gauge (830-0043-001) over the pressure roller shaft as illustrated in Figure 3-2.
3. Insert the bottom deck into the bottom slot.
4. Secure the deck by tightening the capture screw which is accessible through the front trim piece center hole. Remove the right-hand side panel inlay for ease of set up.
5. Using the opening in the right side panel, manually press in the solenoid plunger until the gauge is placed against the capstan shaft. Observe if the gauge surface indicates the two shafts to be parallel or nonparallel. If nonparallel, observe whether the gap is at the top or bottom of the gauge. A gap at the bottom of the gauge indicates the deck is too far out and needs to be moved into the mainframe, closer to the motor shaft. Likewise, a gap at the top of the gauge indicates the deck should be moved away from the motor shaft.
6. Deck penetration into the mainframe is determined by a 10-32 set screw, for each deck, located in the motor mounting plate. These screws are immediately adjacent to the tapped holed used by the deck capture screws. Decks must be removed from the frame to adjust the penetration set screws. Turning the set screw clockwise allows the deck to move **closer** to the motor shaft. Turning the set screw counter-clockwise moves the deck **away** from the motor shaft. By observing the "gap" indicated by the gauge in the previous step, an indication of deck penetration will be given. Adjust the deck penetration set screws so that the gauge indicates parallelism of the capstan shaft and pressure roller shaft of each deck. When proper deck penetration is established for all three decks, pressure rollers may be replaced, and the deck capture screws secured.

Delta III motors utilize a unitized construction technique whereby the windings, rotor, shaft, and shaft top bearing are all contained in a single-piece precision casting. This technique allows for precision alignment of the shaft to the top bearing and motor bearing. The entire assembly is bolted to the machine by screws mounting through the rear of the center bulkhead. The center bulkhead forms a precision mounting plate for the motor from the rear, as well as an extremely rigid center and side brace for the mainframe. Replacement of motors in Delta III units, when necessary, will include the "top" bearing, and its support block. Since the Delta III motor has only two bearings, the shaft "top" bearing, its block, and the vertical support member gallows is considered part of the motor. The precision casting and subsequent machining of the gallows allows the use of a high grade motor bearing at the top of the capstan shaft.

SPECIAL SERVICE NOTE: Delta Series transports utilize a SPDT deck switch. The unused terminal (normally closed) may be shorted to chassis ground in order to put the deck into a powered READY condition. This facilitates pressure roller pressure adjustments, etc., to be made without having a cartridge loaded.

D. PRESSURE ROLLER PRESSURE/SOLENOID ADJUSTMENT

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, apply power to the machine. Holding the cart sensing switch closed, press the start switch.
2. With the solenoid engaged and the plunger bottomed, place gauge 1st step — (Dimension A) end between the pressure roller shaft and capstan shaft. (See Figure 3-3.)

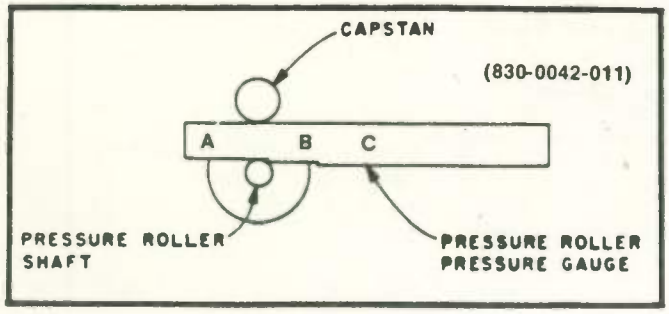


Figure 3-3

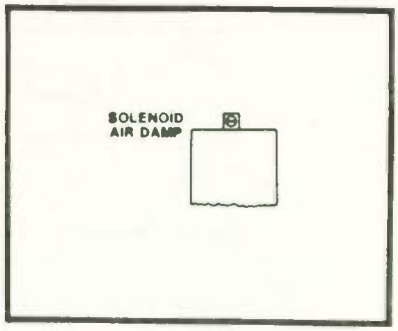


Figure 3-4

NOTE: On Delta III units, use the access opening in the right-hand side panel.

3. The 2nd step — (Dimension B) section (see Figure 3-1) should not slip through. If it does, loosen the clevis screw lock nut and rotate the plunger counterclockwise until the 2nd step — (Dimension B) will not slip through. If the 1st step — (Dimension A) end of the gauge will not slip through, the plunger is to be rotated clockwise until it will slip through easily.
4. Once this setting has been obtained, tighten the 10-32 clevis lock nut.

E. SOLENOID DAMPENING ADJUSTMENT

Figure 3-4 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 Delta Series machines and 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. Cartridge guide alignment can be achieved by using a specially marked cartridge as illustrated in Figure 3-5. Use a point or scriber and mark a cartridge as shown.

Refer now to Figure 3-6 in which the cartridge is shown in its properly aligned position. If the alignment cartridge does not position as illustrated, loosen **(do not remove)** the mounting screws on the right hand cartridge guide. Position the cartridge and

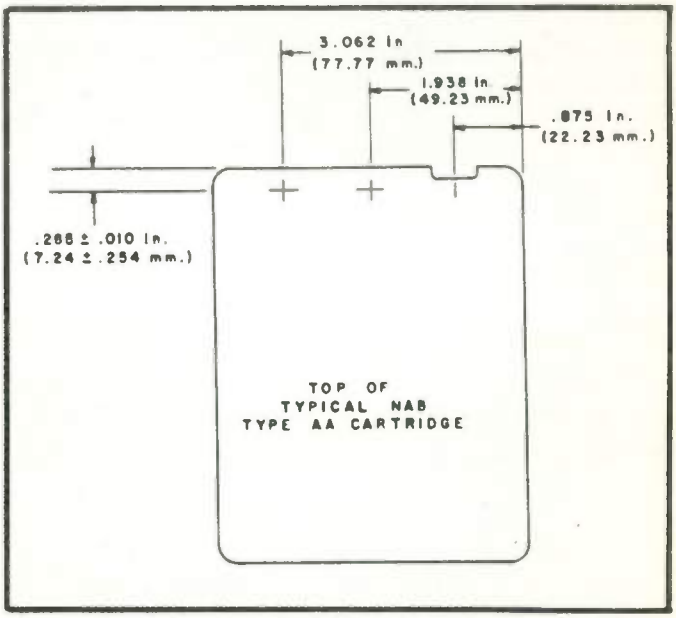


Figure 3-5

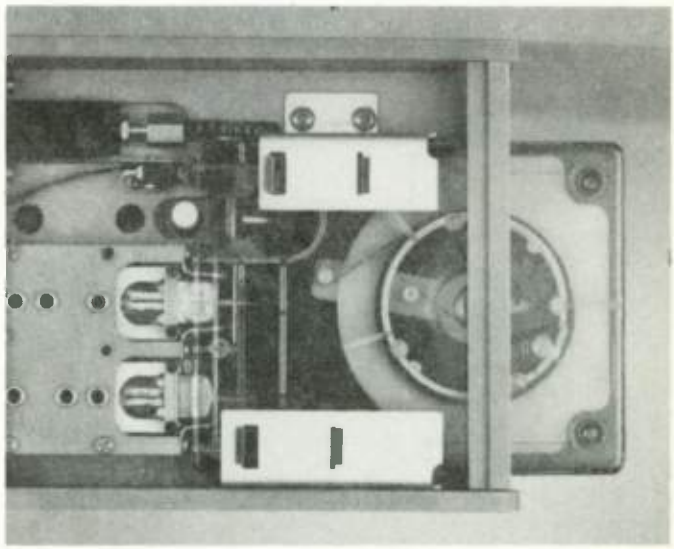


Figure 3-6

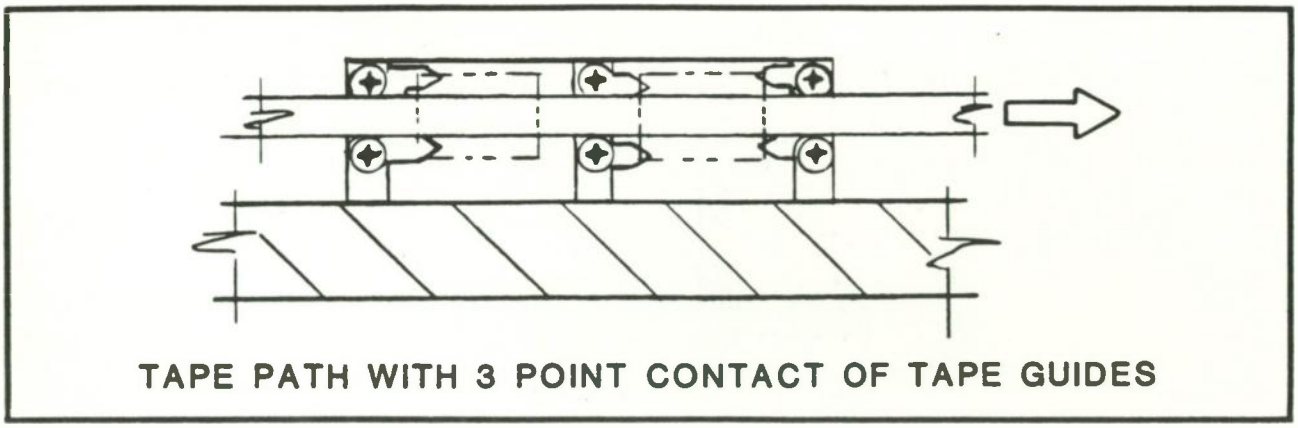


Figure 3-7

right-hand cartridge guide (by holding them tightly together) 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. Tighten down the right hand cartridge guide mounting screws, making sure it does not move or change positions.

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.

NOTE: It is very important that this alignment be made as accurately as possible, and that it be consistent with 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 B and C before proceeding.

G. TAPE GUIDE ADJUSTMENTS

This set-up procedure provides for a very precise adjustment of the distance between the "tangs" of the tape guides. It also sets up a three-point contact area between the guides and the tape. The mechanical stress of tape edges is minimized while affording a very closely controlled tape path across the heads (Figure 3-7). ITC advises that **all** cartridge machines within your system would benefit from this set-up procedure, due to the increased accuracy in setting up guidance.

The precision ground set-up gauge, 830-0041-022, allows the user to set the tape guide tangs to a typical tape slit width.

1. The head shield must be removed before beginning guide adjustment. After removing the shield, reinsert the right hand flat head screw and spacer, and retighten to secure the head block to the deck.

2. With the gauge flat on the deck surface, as for height adjustment, begin adjustment of the left (entry) tape guide:
   a) Loosen the guide mounting screws.

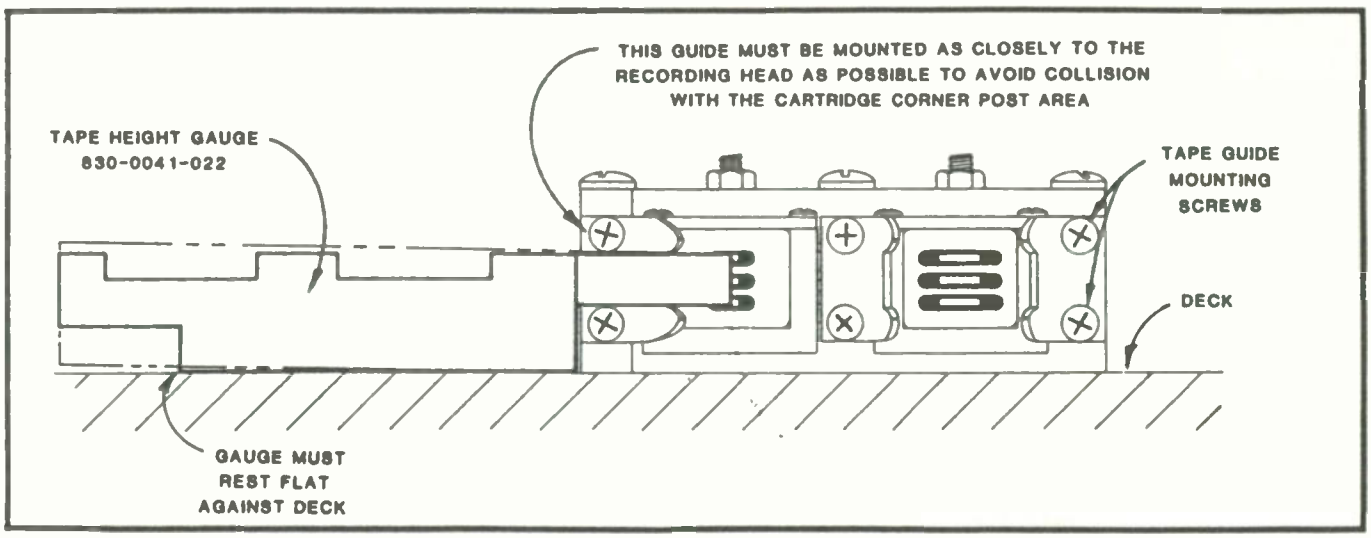


Figure 3-8

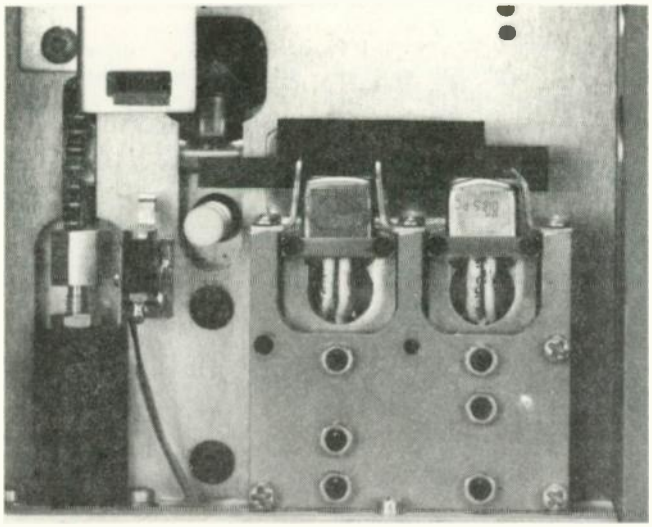


Figure 3-9

b) Insert the gauge straight into the guide **only as far as the face of the head.** Insure that the gauge remains flat against the deck.

c. Move the guide upwards so that the bottom tang just touches the gauge.

d) Tighten the mounting screws and then re-check adjustment with the gauge.

e) Repeat "a" through "d" for the right (exit) guide.

3. Upon completion of Step 2 (set-up for entry and exit tape guides), you are now ready to adjust the center tape guide.

a) Loosen the center guide mounting screws.

b) Position the gauge into the guides with the cut-out areas toward the heads. (Figure 3-9.)

c) Adjust the center guide so the top tang touches the gauge, then tighten the mounting screws.

d) Recheck your adjustments by returning the gauge to the position for head height set-up. **The gauge should not** penetrate the center tape guide if it is adjusted properly.

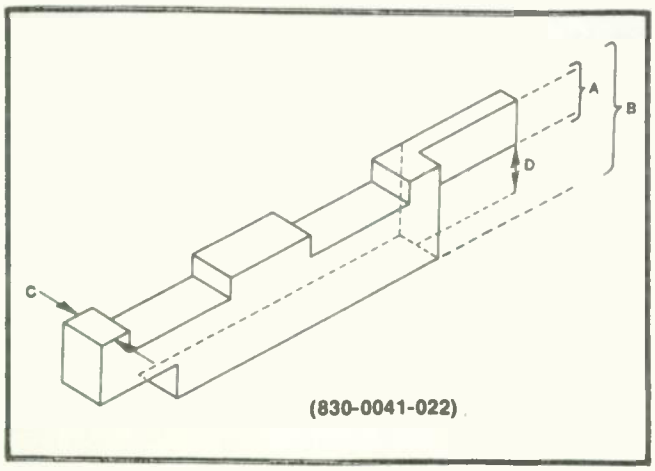


Figure 3-10

Use of the 830-0041-022 Gauge for Tape Guide and Head Height Adjustment

A = Measures tape width at the head face

B = Measures tape height at the head face

C = Nominal tape slit width

D = Height from deck plate to bottom tang inside surface of entry and exit tape guide

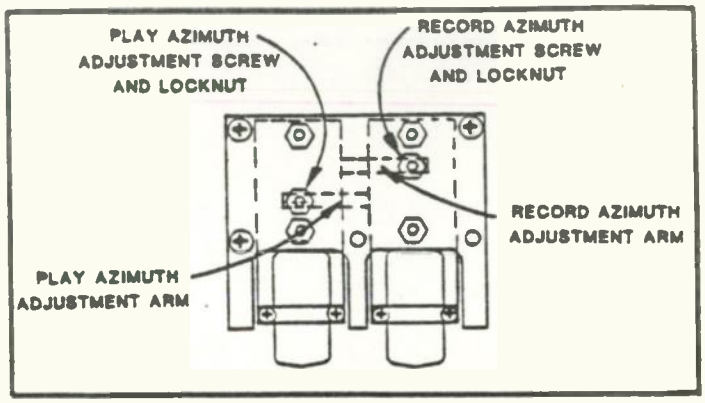


Figure 3-11

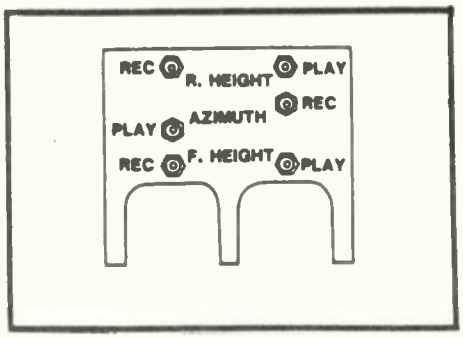


Figure 3-12

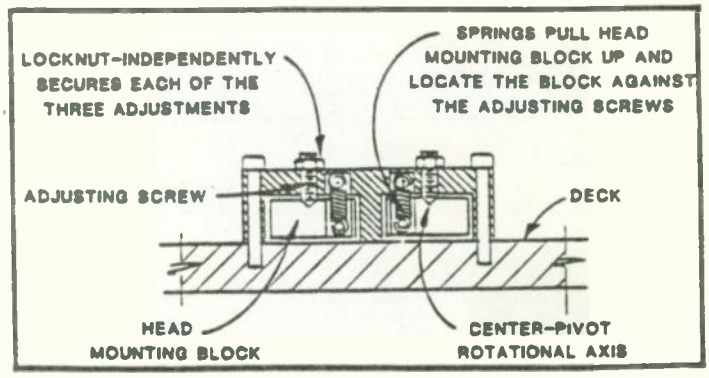


Figure 3-13

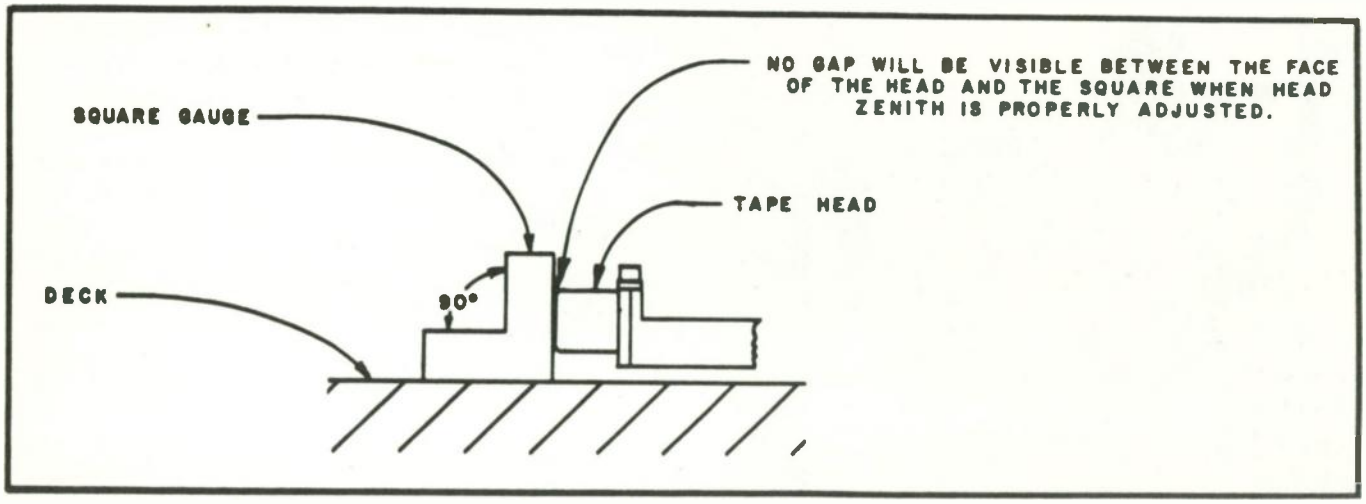


Figure 3-14

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 3-14. The gauge must be demagnetized before making adjust

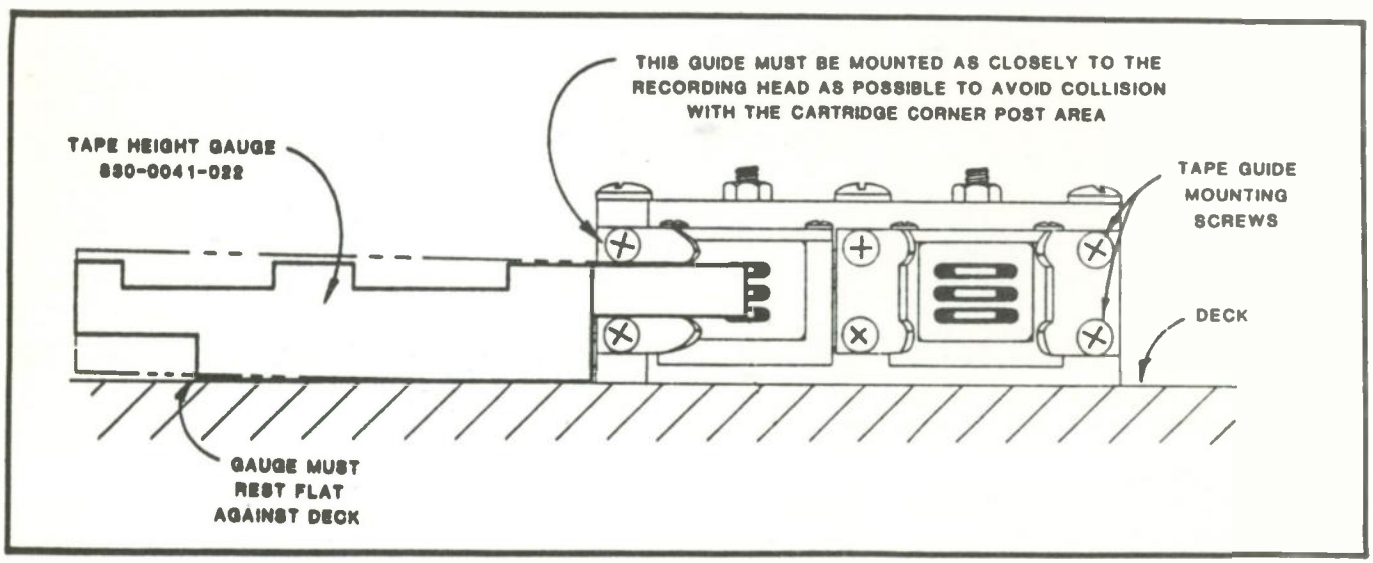


Figure 3-15

ments. 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 3-15.
   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 even with the upper edge of the gauge. 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.

Special Note

It is important to note that the location of the Azimuth adjustment screw is offset considerably from the head it adjusts. The Record Head azimuth screw is physically located in between the two zenith screws directly to the rear of the **Play** head. Likewise, the Play head azimuth screw is located in between the two zenith screws located behind the Record head. The compact design of the Delta Series allowed the azimuth arms to be "crossed" in order to maintain the maximum length of the pivoting section to be contained in a very small area. When adjusting Record or Play head azimuth, make certain the appropriate azimuth control screw is used.

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 as shown in Figure 3-11 to produce maximum output level.
   d. Carefully tighten the lock nut while 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. Use a tone generator to generate 14.5 kHz and adjust the Normal Record Level to -10 VU.
   d. Start the recorder and adjust the record azimuth set screw on the record head to produce maximum output level.
   e. Carefully tighten the lock nut observing the voltmeter to insure that no change in output level occurs.

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 dropouts, especially at the higher frequencies. Most common causes of these problems are:

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

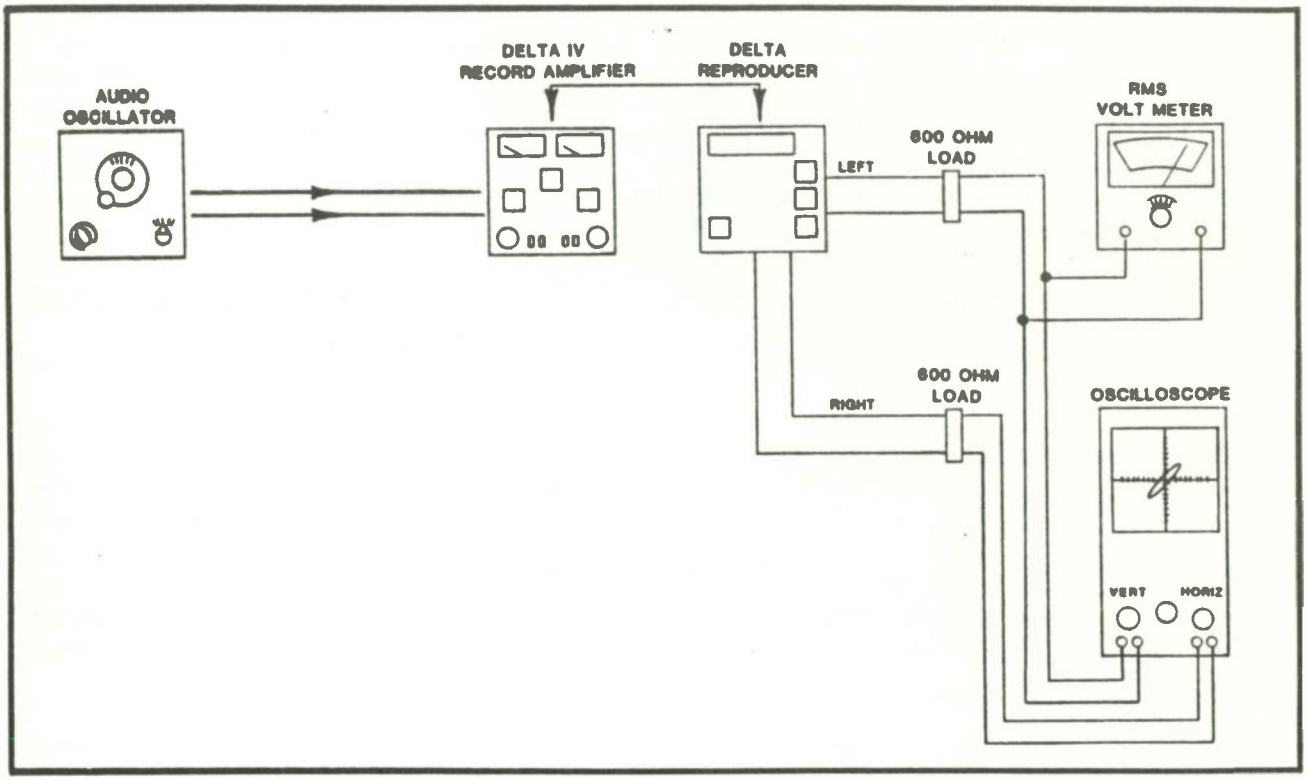


Figure 3-16

reproducer in a system.)

3. Improper tape guidance (skew) either within the cartridge or through the tape guide system.

ITC has provided the best features possible to assist in the proper guidance of tape outside of the cartridge. Three adjustable tape guides, heavy-duty microadjustable patented head module, and the use of "dummy" heads in Reproduce only machines, lead to consistent guidance of the tape through the head assembly. Gauges are made available for maintaining accurate adjustment and maintenance of these assemblies. These are measures taken by ITC to aid 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. They do, however, provide the basis for satisfactory results using a minimum of equipment and skill:

1. Master Reproduce Head Azimuth — See "Special Note" in preceding section, regarding the unique location of the Azimuth adjustment screws.
   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 R109 for 0 dBm output. Now connect the voltmeter to the right channel output and adjust right gain control R110 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 the direction and degree 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 settings 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.

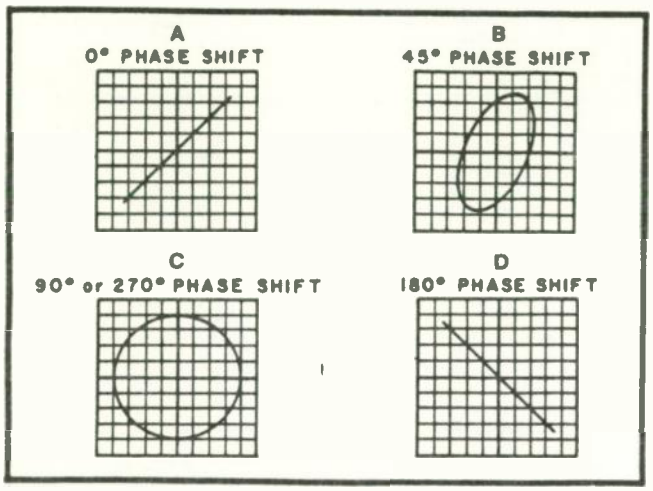


Figure 3-17

f. Connect the vertical input to the same right channel output. 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 3-17 (a) 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 3-17 (a) through (d). 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 counterclockwise back to the "0" position.

i. Allow the tape to continue through the various frequencies. Observe 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. Connect a tone generator to both inputs, and inject a 14.5 kHz tone 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 frequency of the tone generator to 50 Hz. Slowly increase the tone frequency while observing the phase rotation on the scope display.

If phase error or reversal begins to occur, slowly adjust the azimuth screw of the recording head only to retain minimum phase shift pattern. Because the frequency continues to increase, each azimuth adjustment with succeeding tones tends to "fine-tune" the head assembly for a very accurate alignment. Repeat this procedure again and observe the results. When the 14.5 kHz tone occurs, hold it continuously. Tighten the azimuth lock nut while making certain that the phase does not change.

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 Section III, J-1, above.

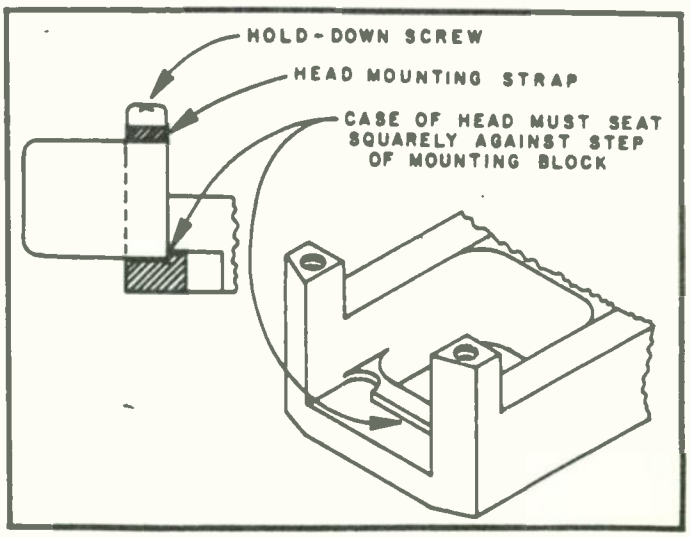


Figure 3-18

K. HEAD REPLACEMENT

ITC cartridge machines utilize strap-mount type heads to provide quick and easy installation, Figure 3-18.

1. Loosen the two screws in the head mounting strap.
2. Remove the old head and insert a new one.
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.

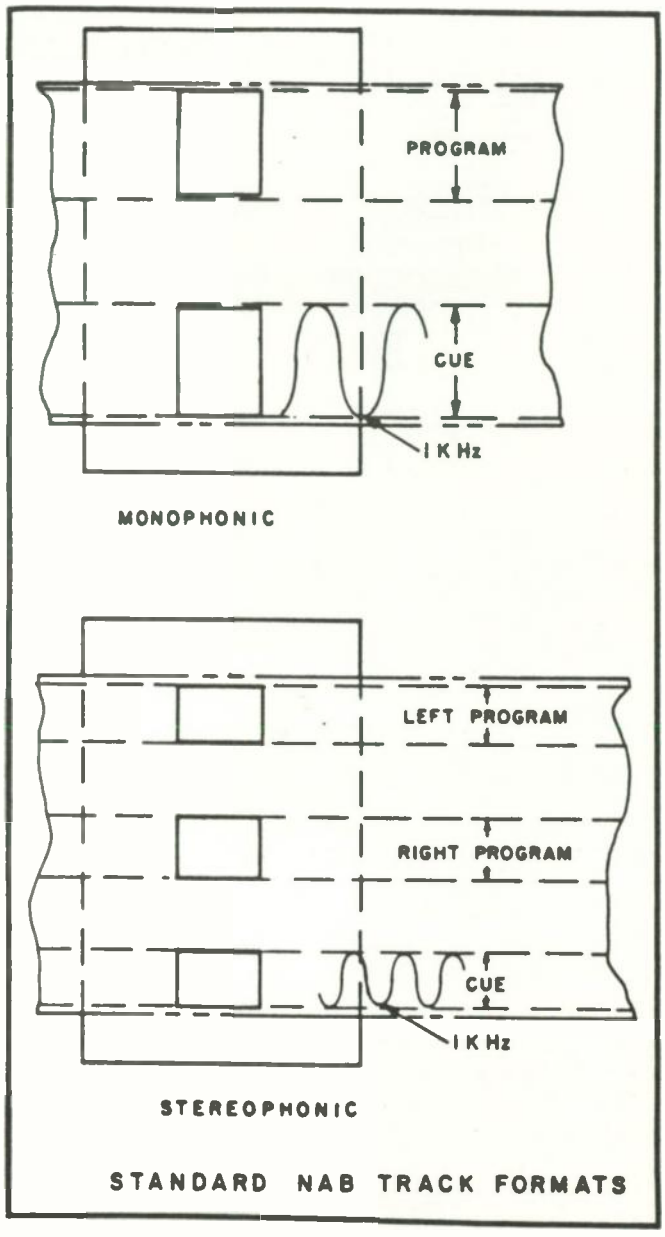


Figure 3-19

SECTION 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. **Errors in mechanical adjustments cause errors in electrical adjustments. This occurs due to the interdependence of the two systems.** 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 motor duty cycle test point, Pin 9 of P301 on the motor control board.
   b. Adjust R313 so that an approximate 70% duty cycle is observed on the scope display. This adjustment must be made with a tape cartridge running in the transport. See Figure 5-1. Slight variations in the duty cycle will be observed as the controller compensates for rotational nonlinearities of the motor.
2. Program Playback Amplifier
   a. Program level — The output level is factory adjusted to 0 dBm while reproducing an NAB 1 kHz reference tone (160 nWm). R109 is the mono level control and left channel of stereo. R110 is used for right channel level control. See PC card overlay — Section VI. If an output level lower than -10 dBm is required, an external pad should 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 the Record Amplifier Meter calibration section.
   b. High Frequency Equalization — High frequency equalization controls R107 (left or mono) and R108 (right channel) are used to adjust 10 kHz so that it matches the 1 kHz level established earlier on the test tape.
3. Cue Detect Sensitivity

   Cue tone detection in Delta Series reproducers is performed by a digital detector. Cue tones recorded in accordance with NAB standards for frequency and level tolerance will operate the Delta digital cue detector. No adjustments are required.

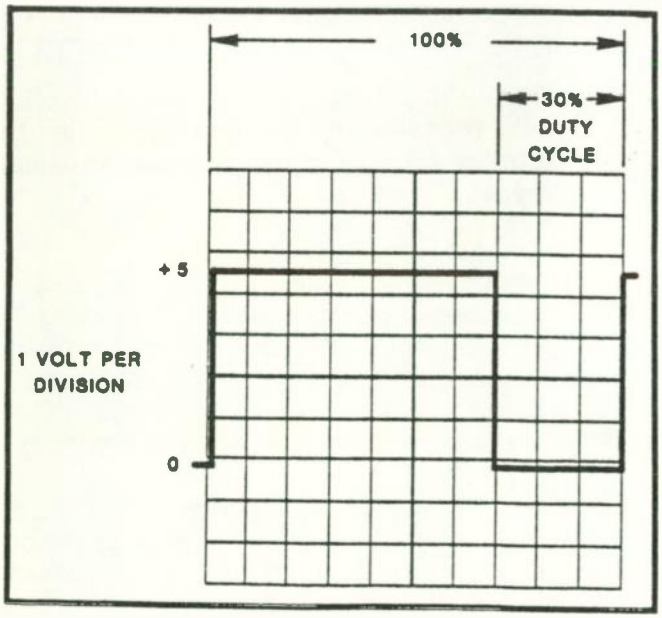


Figure 5-1

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 to obtain optimum signal-to-noise and front panel level control positioning.
   b. Refer to the Record and Meter Amplifier card drawing found in Section VI.
   c. As shipped from ITC, the input strap is connected for a 0 dBm input level range. The "0" correspondence to a 0 VU meter reading when the level control is at its approximate mid-range position.

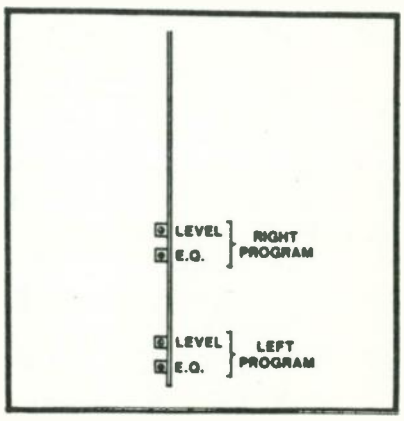


Figure 5-2

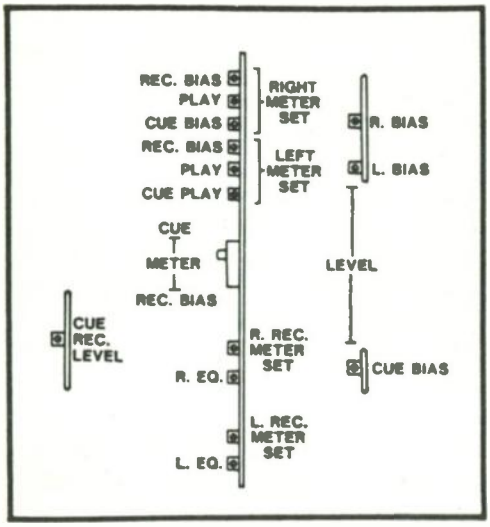


Figure 5-3

d. To accommodate lower input reference levels, connect wire jumper W1001 (and W1002 for stereo) as indicated on the Record and Meter amplifier board drawing.

2. Program Record Bias

NOTE: This procedure adjusts Program Recording Bias according to generally accepted practice for commonly available tape formulations. The procedure yields acceptable record performance (noise, distortion, and frequency response) on many of the tape oxide formulations available. However, this adjustment may vary slightly from one tape formulation to another, and exact procedure should be determined by consulting the **tape** manufacturer.

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 with a high impedance voltmeter, begin recording a 10 kHz tone at an indicated -10 VU level (front panel meter). Be certain the cartridge selected is typical of the type to be used in the machine; especially the type of magnetic tape.

c. Turn R1107 (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 in a clockwise direction until the average level of the tone decreases 2 dB.

d. Repeat this procedure on the right channel, using R1108 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 test tone generator to 1 kHz and set the front panel indicated Record level to -10 VU.

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

d. Set the test tone generator to 10 kHz and observe the level on the external voltmeter. If the 10 kHz level differs from the 1 kHz tone level, adjust R1005 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 R1006.

4. Cue Bias

a. Swap the left program playback head cable with the cue playback head cable.

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 the cue bias potentiometer R1131, 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 and a 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 first be properly equalized from a calibration tape in order to make this adjustment.

5. Cue Master Level

The cue oscillator tones are generated by the microprocessor and are digitally controlled. The microprocessor determines the correct frequency and level. Therefore, there is only one control to adjust the cue oscillator circuitry. This control sets the levels of all other cue tones in proper relationship to the primary (1 kHz) tone.

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 ouput level as the 1 kHz refer-

ence tone (160 nWb/m) used on the 1975 NAB standard alignment tape.

c. If cue level adjustment is required, turn trimmer R1231, located on the Recorder Logic Control PC Board, until the Primary cue tone is equal to the NAB standard reference tone of 1 kHz at 160 nWb/m.

NAB Cue Tone Level Standards (1976)
Referenced to 160 nWb/m

	Nominal	Minimum	Maximum
1 kHz	0	-3	+1
150 Hz	+6	+3	+7
8 kHz	-10	-13	-9

d. Return the left program playback and cue playback head cables back to their original locations.

6. Meter Calibration

The following adjustments are made with multiturn potentiometers located on the Record/Meter Amp PC Board. Potentiometers are identified on the small sticker applied to the underside of the top cover (lid).

a. Program Play
—Select the 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 nWb/m recorded level — 1975 standard). Adjust R1019 for a 0 VU indication.
—Repeat this procedure for the right channel if the machine is stereo. Use R1015 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.
—Select the REC meter switch position and observe the level(s).
—Use R1022 to obtain a 0 VU indication for the left channel (mono).
—Use R1018 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 R1020 for a 0 VU reading on the left channel meter.
—Repeat this same procedure for the right channel using trimmer R1016.

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 potentiometer R1017 for a 0 VU reading on the front panel meter (right meter).

e. Cue Play*
—Select the CUE PLAY meter switch.
—Insert and 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.
—Adjust R1021 to calibrate the Cue play metering to read 0 VU.

*__NOTE:__ Since the Delta IV features combination metering of Cue Bias and Cue Play, pay particular attention to Cue Bias indication on one meter, simultaneous with Cue Reproduce levels indicated on the other. Refer to the metering chart in Section II for details.

SECTION VI — PRINCIPLES OF OPERATION

A. POWER SUPPLY SYSTEMS

1. Reproducers

Delta Series components utilize multiple voltage power supplies to operate the solenoids, amplifiers, logic and lamps. Main AC power is connected to the unit via the power cord and a rear-panel instrumentation-type connector. The power is routed through a fuse holder capable of using either American 3-AG sized fuses, or 5 x 20 mm fuses commonly used in Europe. A dual primary toroidal power transformer is mounted inside the mainframe, and may be used on either 120 volt AC, or 240 volt AC mains. Mains voltage selection is accomplished by wiring the primaries in parallel (120 VAC) or Series (240 VAC). All units may be operated on either 50 Hz or 60 Hz voltages.

Transformer secondary number 1, Orange-Black-Orange, supplies low voltage AC to the full wave rectifier: (DI & DII — CR 512, CR 513; DIII — CR 705, CR 706) and is filtered by the input capacitor, a 15,000 mfd electrolytic. DC voltage at this point is approximately +14 VDC This voltage is passed to the rear panel for further use in the Record Amplifier and to a 7805 voltage regulator. Regulator ouput is +5 VDC It is used for operation of the logic circuits, illumination of internal lamps, and is available at the rear panel for use with external lamps as well.

Secondary number 2, Red-Yellow-Red, runs the amplifier power supplies. Medium voltage AC is supplied to full wave bridge rectifier: (DI & DII —CR 508, 509, 510, 511; DIII — CR 715, 716, 717, 718). The bridge outputs both + and - voltages. These voltages, approximately ±30 volts, are fed to two 2200 mfd filter capacitors (6800 in Delta III units) and then to two 15 volt regulators, one +15 volt 7815 and one -15 volt 7915. The regulated ±15 volt supply voltages are used to run amplifiers in the reproducers.

Unregulated DC supplying the 5 volt and ±15 volt supplies is routed through the rear panel interconnect for supplying **separate** regulators used in the Delta IV Record Amplifier.

2. Record Amplifiers

Unregulated DC from the reproducer (+14 volts, and ±30 volts) is brought in via the interconnect cable and the rear panel connector. Record Amplifier power supplies are similar to those used in the reproducers. Unregulated DC is supplied to three IC voltage regulators, a 7805, 7815, and 7915, and connected to their respective loads. The +5 volt supply operates the logic and lamps, while the ±15 volts supply is used in analog circuits.

It is important to remember when servicing that failure of one supply may affect other supplies even though they have separate regulators and filters. It should also be noted that a low-voltage/high current condition will be created if the toroid transformer "top mounting plate" is electrically connected to ground. Toroid transformers are highly efficient devices and radiate little heat or field when in operation. Irrespective of this, an appreciation of their operating characteristics will facilitate servicing.

TYPICAL VOLTAGE AND CURRENT REQUIREMENTS

	DC Current In Milliamperes		
	+15V	-15V	+5V
Delta I, II			
Motor	700		
Motor Control			60
Play Logic			500
Lamps			300
Cue Amplifiers	45	45	
Play Amplifiers	135	135	
Relays			180
Total	880	180	1040
Delta III			
Motor	700		
Motor Control			60
Play Logic			500
Lamps			300
Cue Amplifiers	135	135	
Play Amplifiers	405	405	
Relays			540
Totals	1240	540	1520
Delta IV			
Lamps			180
Record Logic			218
Amplifiers	225	225	
Total	225	225	398

Currents indicated are "typical," and will vary from machine to machine, depending on model variations, accessory loading, and external conditions.

B. REPRODUCE AMPLIFIER AND AUDIO OUTPUT

Reproduce Amplifier cards loaded for stereo utilize two identical audio circuits. Therefore only one audio channel will be discussed for simplicity. Connections to the input stage are via ferrite beads and terminate into the head loading circuit R101, C101, and the base of Q101. Q101 is an input buffer stage which electrically isolates the reproduce head from U101 during power up and power down. The collector connects to -15 VDC. The emitter connects to +15 VDC via an RC decoupling (filtering) network consisting of RP101 and C103. The buffer stage prevents any DC voltage transients appearing at U101 pin 3 during power up/down from reaching and magnetizing the head.

U101 is the head preamp and high frequency equalizer. This stage has high gain and utilizes a low noise 5534AN opamp IC. High frequency gain is controled by R107 in the feedback loop. Changing equalization standards is accomplished by changing the value of R105. Preamp output is nominally +2 dBm at 1 kHz referenced to 160 nWb/m flux level. Audio output level is set by R109, at the output of this stage.

Audio is AC coupled to the analog switch, U107, via C111. U107, a 4052 BC CMOS switch is powered by ±7.5 volts which is obtained by dividing down the on-board ±15 VDC supplies. Audio enters the switch on pin 11, and exits on pin 13 (pins 4 and 3 for the right channel). R115 and R116 resistors control the gates of U107. During "mute," U107 pin 9 is pulled low, and no audio passes. Muting logic "low" is supplied by the play microprocessor.

Audio from the analog switch is routed to half of U103 as a driver for the phase inverter half of U105. It is a combination medium-gain 23 dB buffer. Audio from U103 is phase inverted in U105 and routed to the second half (-) input of U105, while being routed directly to U103. The audio appearing on the inputs of U103 and U105 are 180° out of phase. Feedback for the output stages is cross coupled via other RP107 sections. In a transformer-coupled output, the output amplifiers are DC coupled to the transformer primary. When operating in a balanced-transformerless output configuration, output audio is AC coupled via a 220 mfd nonpolar capacitor in each output leg. Should the output become unbalanced with one side shorted to ground, the cross-coupled feedback compensates for the grounded condition. It "adjusts" the gain of the remaining functioning output section.

C. PLAY LOGIC

The play logic is the heart of the machine, in that all activity of the machine is monitored and controlled by the on-board microprocessor. Delta Series units utilize an 8-bit processor with 1K ROM. All machine functions are programmed into software contained in the memory. The Play Logic card contains the microprocessor clock, input multiplexers, output buffers, and divider chains for motor control. The motor circuits will be discussed in a later section.

Clock frequency for the play processor is 5.22350 MHz, and is crystal controlled. The processor contains internal clock driver circuits and will operate from a crystal attached directly to pins 2 and 3. C219 and C220 form a portion of the oscillator circuit.

All Delta Series Play Logic cards contain hardware and software to be used in **ANY** Delta reproducer. A single deck Delta I play logic board may be directly replaced by a three deck Delta III board, and vice-versa. Delta I units use the input and output circuitry designated for the BOTTOM deck of a Delta III logic card. Inputs and outputs to the logic board are via the PCB edge connector. This occurs where it interfaces with the front panel switches and lamps, internal control lines to other circuits, and to the two rear panel connectors for Remote Control and interface with the add-on Delta IV Record amplifier. Due to its utility design, it is practical for a station to have a spare play logic board to be used for backing up several Delta model playback machines in service.

The Delta system uses active low logic. Ground going signals activate the various logic functions. Data inputs to the processor are via U203, a 16-bit multiplexing gate, and U204, an 8-bit multiplexing gate. Logic inputs to the multiplexers are held logic "HI" by 330 ohm pullups in RP201 and 1K ohm in RP202, 203 and 204. In addition, external input lines are debounced with .1 mfd capacitors to ground. The combination of the 330 ohm "hard" pullup, and the .1 mfd debounce capacitors make the Delta logic relatively noise immune.

A low input from the cart switch, pin 19 of the edge connector, causes the processor to execute a software "cart loaded" sequence. The processor outputs a low on pin 34, READY, which provides a low output at pin 5 of U209, a 75451 peripheral driver. This low causes the ready lamp to illuminate, giving the operator a visual indication the cart is correctly loaded and the processor is prepared for the start sequence. Pressing the START switch pulls pin 21 of U203 low, which outputs a signal to the processor via pins 11, 13, 14, and 15. Once the processor recognizes this condition, it outputs a low on pin 31, U201, to unmute the audio; a low on pin 30 to energize the

solenoid; and a low on pin 33 to turn on the RUN lamp. Likewise, the "READY" line goes high to extinguish the READY lamp. The processor also outputs a 100 millisecond low on pin 29, the AUX START pulse line. This line is a user line and may be used to remote start or reset an auxiliary piece of equipment such as a turntable or timer. All other circuits in the Delta logic work in a similar manner.

IC's on the logic board are bypassed with .1 mfd capacitors. An on-board 47 mfd electrolytic is used to decouple the +5 volt coming in from the power supply. At power up, the microprocessor is reset by a pulse from PIN7 of U217. This pin will stay "low" for a brief time after power up until voltage comparator U217 toggles as the +14V power supply initializes.

During machine operation, U201 pin 11, (ALE), outputs a pulse train that is 1/15th the master clock frequency. This pin is used as the master clock for the servo motor circuits and may be used as a convenient test point.

Software contained in the U201 processor is unique. It is used in single deck reproducers, three deck reproducers and on the record logic board as well. Support hardware for the processor on the Record Logic board is **significantly** different than that of the Play Logic board, but the software in the microprocessor contains both the playback and recorder programs. For this reason, a single Delta microprocessor chip may be used as a spare for either record or play logic boards.

User selectable jumpers on the play logic board enable the selection of several operational variations. Jumpers W202 and W203 select motor speed. Units are shipped with speed set normal motor/tape speed at 7.5 IPS. Jumper W202 selects 3.75 IPS, and Jumper W203 selects 15 IPS. These will be discussed in greater detail in the section for Motor and Servo Amplifier. All Delta units utilize DC servo motors which generate very little heat or electrical noise, and are designed for continuous duty. Therefore, no clear advantages are known in having the motor run "intermittent" duty, other than a very slight improvement of control room ambient mechanical noise. Jumpers W206 and W207 select the flashing READY lamp and repeat play lockout features.

Since the processor software is interchangeable between Play and Record logic boards, a system had to be devised whereby the processor "knows" which software to use. Pin 39, the T1 pin is used to electrically signal the processor which software to use. In reproducers, pin 39 is held "low" by U204 pin 6. In recorders, this pin is held "high" by a pullup to +5 volts. The processor uses this pin to recognize which software sections to use.

D. RECORD LOGIC

The Record Logic PCB is located in the Delta IV Record Amplifier chassis, and executes and monitors all recording functions. Although it functions separately from the play processor and logic circuits, data transfer between it and the play processor is required for orderly machine functions. Serial data is transferred into the Record processor via pin 12 from the reproducer, and out on pin 27. This allows a logical "handshake" between the two processors as they attend to their respective duties. The data they exchange is serial, digital logic level, and in a unique "language." Data exchange is ongoing during the various machine functions. Due to complexity it will not be discussed in detail.

Logical inputs from the front panel and remote connector are inputted on pins 3 through 14 of U1210. As in the Play Logic, all digital circuits are "Active Low." Since the processor uses software programs common to the Play Logic processor, pin 39 of U1201 is pulled up to $+V_{CC}$ to identify to the processor that it is being used on a Record Logic board. See the discussion regarding this in the Play Logic section. Other specific functions of the Record logic will be detailed according to major circuit function.

Power-up reset is performed by U217 on the Play Logic Board. Pin 4 of U1201 will be held low for a short period of time after power-up until U217 toggles. The "low" condition on pin 4 of U1201 causes the processor to reset itself to a programmed starting point, and causes all outputs to be set to a predetermined state.

Processor clock functions are similar to those discussed for the play processor with the exception that a crystal frequency of 3.579 MHz is used.

The processor ALE line, pin 11 of U1201, outputs a pulse train that is 1/15th the master clock frequency. The ALE frequency, 238.6 kHz, is variously divided by U1203, U1204, and U1205, then gated by U1206A, U1206B, U1206C, and U1206D to output a pulse train to the bias and cue generator circuits.

Bias Generation

The ALE frequency is fed into U1204 pin 1, divided by two, and output via pin 3, U1204 to the bias gate U1206A, pin 1. When the processor calls for bias, U1206A pin 2 is pulled low, and enables the output U1206A pin 3 to provide 119.3 kHz square waves to Q1201. Simultaneously, processor U1201 pin 22 goes low, enabling the bias ramp circuit U1208B. The result is a fast ramp "on" of bias occurring at the board edge connector pin 8. This square wave signal (119.3 kHz) is routed to the bias card for

further signal conditioning and ultimately to the record heads.

Cue Tone Generation

The ALE frequency fed to U1204 pin 1 (as above) is divided by 16 and output at U1204 pin 6 at a frequency of 14,914 Hz. This is fed to U1205 pin 4, and routed through two sequential divide-by-ten circuits. This divide-by-100 outputs a square wave on Pin 13, U1205, at a frequency of 149.14 Hz. It is routed to U1206B pin 4. The processor logic line (low during 150 Hz tone generation) is fed to pin 5 of U1206. When the processor logic is "low" on pin 5, U1206B pin 6 outputs the 149.14 Hz square wave into U1209C. U1209C and D comprise a 4-pole low pass filter with an approximate 24 db per decade slope. This filter sharply attenuates the "harmonic" content of the square wave so that the output, pin 14 of U1209D is a virtual sine wave. This signal is AC coupled to U1208A which is a variable gain buffer/mixer and provides "audio" to the cue circuits on the bias board.

1 kHz and 8 kHz cue tones are generated in a similar manner. The ALE signal 238.6 kHz, is routed to U1203 pin 6, a divide by 15. The output, 15,909 Hz, is routed to U1204 pin 13, which outputs a 7954.5 Hz after a divide by two, and a 994.3 Hz after a divide by 16. These, of course, become the 8 kHz, and 1 kHz cue tones after appropriate filtering. The control of these tones is provided by processor ports on U1201, pins 37, and 35 and are "gated" on or off by the processor. All three cue tones are actively mixed at the input of U1208A. R1231, located in the U1208A feedback circuit, is used to adjust the Master cue tone levels. The proper level relationship between the three cue tones is set by fixed resistors. An "extra" input to the cue audio circuit is provided via a rear-panel connector pin so that external sources, such as F.S.K. generators may be connected to the Delta IV Record Amplifier. This audio is AC coupled through C1223 and mixed with the other cue signals at the input of U1208A.

Head Control

The record processor executes an electronic on or off for the program and cue record heads. This is done to minimize any bias turn on or turn off transients being introduced onto tape. The logic lines are pins 23 and 24 of U1201 and they go "low" to turn on their respective tracks. These logic lines are connected to the output of the bias amplifier circuit, where the head control transistors are located.

E. CUE TONE DETECTOR

The digital cue tone detector is located on the reproduce amplifier board. The detector system consists of an equalized preamplifier, a fixed gain buffer stage, four band-pass filters, a microprocessor, logic outputs to the relay drivers, and logic outputs to the transport control microprocessor.

Audio from the play head cue track is fed into a high gain fixed equalization preamplifier, U108. It is coupled to the second half of U108, which increases signal level and drives the four band-pass filters. Three of these filters are center-tuned for the NAB cue tone frequencies of 1 kHz, 150 Hz, and 8 kHz. A fourth section is band-tuned to 3 kHz and is used to detect the 1 kHz cue tone when the deck is in "High Speed." Each filter outputs one of four sections to component U110. These squaring circuits in turn are routed to separate inputs of the microprocessor. Programs in the cue detect microprocessor contain the necessary memory routines to "measure" the frequency of the incoming signals from the squaring circuits. Depending on the frequency, the cue detect microprocessor outputs logic "1" or logic "0" to the appropriate support devices.

Logic outputs from the cue detect microprocessor drive the transport logic (1 kHz and 3 kHz tones), and the output peripheral drivers (150 Hz and 8 kHz tones). U112 provides the drive for 150 Hz and 8 kHz relays. Logic (for EOM signaling) and 1 kHz "STOP" outputs directly from microprocessor U111.

A user selectable jumper enables either, neither, or both the 150 Hz and 8 kHz cue tones to engage the End of Message (EOM) sequence. This consists of: 1) muting the audio; 2) switching the motor to high speed; and 3) enabling the 3 kHz cue detector via a processor input (low) at pin 13 of the card edge connector. Jumpers are used to provide an open-collector output (to ground) upon detection of the 150 Hz or 8 kHz cue tones.

F. MOTOR CONTROL AND MOTOR

The motor and motor control circuits comprise a high precision crystal referenced electro-mechanical tape drive system. The motor circuits are mounted on a small printed circuit board adjacent to the motor.

The motor is DC operated. It has an integral 120 pole tachometer and tachometer ring located inside the bottom of the rotor. There are 3 Hall-effect sensors located mechanically 120 degrees apart. They are used for sensing the rotating position of the rotor/shaft, and a 3-phase Y connected stator. Connection to the control circuit is via a multiple conductor mass-termination type connector, which provides all operating DC voltages and signals.

Clock reference frequencies are determined by user-programmable dividers located on the Play Logic board. The output reference square wave frequency is divided down from the microprocessor master clock via the ALE line from the processor (1/15th the clock master frequency), U213 and U216, a pair of dividers. The output of U216, pins 3 and 12, is a square wave which serves as the motor clock reference, and drives U215, a phase comparator.

Simultaneously, the motor-mounted tachometer outputs an analog signal to U301C, a high gain squaring circuit and low pass filter. This signal is fed to the base of Q301, which forms an open collector type driver that outputs a square wave pulse train back to pin 1 of U215 on the play logic board.

U215 pin 9 receives the clock reference pulse train, while pin 1 receives the pulse train from the motor tachometer circuit. U215 is a dual one-shot which outputs an approximate 5 micro-second pulse on each output (pin 5 for the reference oscillator, and pin 13 for the motor tachometer). U215 is active high, and outputs pulses to U214, a bi-directional 4 bit shift register. Tach pulses from U215 pin 13 shifts a high from Q_A to Q_B, Q_B to Q_C, Q_C to Q_D. Reference clock pulses from U215 pin 5 shifts a low to Q_D, Q_D to Q_C, Q_C to Q_B, Q_B to Q_A. This action produces an output from U214 that represents an "error" signal representing the difference between the reference frequency and the tachometer frequency. This output, pin 2 and 12 of U214 is low when the reference frequency is greater than the tach frequency. It is high when the tach frequency is greater than the reference frequency. When the motor (tachometer) is running at the correct speed, U214 pins 2 and 12 output a square wave pulse train equal in frequency to the reference frequency and at an approximate 70% duty cycle. This pulse is equal to the phase difference between the reference pulses and the tachometer pulses. This signal is outputted to the microprocessor for monitoring the motor condition and also outputted back to the motor control card for further conditioning.

Duty cycle pulses from the Play Logic board are routed to U301A on the motor control board, which is configured as a low pass filter (LPF). The output of the LPF is a DC voltage that is proportional to the motor's Duty Cycle.

In a similar manner, tachometer square waves from the output of U301C are filtered heavily and routed via R315 to the inverting input of U301D. DC from the LPF is routed to the noninverting input of U301D where the two signals are combined. U301D performs multiple functions, but primarily functions as a summing amplifier for DC levels from the tachometer and duty cycle circuits. The outputs of U301D is a DC level that is the sum of the input voltages. It is used to set the nominal operating current of the motor stator drivers Q302, Q303, and Q304. R327 provides motor current sense feedback via the emitters of commutation transistors Q306, Q308, and Q310. This allows U301D to monitor activity in the motor windings and limit current, remove high frequency switching transients, and provide smoother commutation. The emitter of Q306, Q308, and Q310 are located .1 ohms above ground by R328. This allows accurate current flow monitoring via R327 back to U301D, and serves as a motor fault detector. The fault detector shuts off the amplifier circuits should the motor stall or fail, and provides the necessary "feedback" required to start the motor at each inital power-up. Motor "fault" detector is performed by U301B.

Operation

1. Normal

Tach signal is filtered by R306, CR301 and C302. This position voltage DC level is compared to a fixed voltage set by R307 and R308 by U301B. When the motor is running, the output of U301B, is at the positive supply. This provides the duty cycle adjust potentiometer R313 with the proper voltage.

2. Fault

When the tach signal is lost, U301B will swing to the negative supply rail. This action causes a negative voltage level to be fed to the negative input of U301D via R313. This forces the output of U301D to a higher positive voltage which prohibits current to the drive transistors.

3. Power Up

C303 serves to disable the fault detector during power up by holding the comparator, U301B, to a positive output state.

Commutation logic is controlled by three Hall-effect devices located internal to the motor, 120 degrees apart. As the motor rotates, the Hall-effect devices output a low to U302 A, B, or C, depending upon the degree of rotation. These, in turn, sequentially turn on drivers Q302, Q303, and Q304 via commutation logic U303A, B, C, and D, and U304A, B, C, and D.

The motor utilizes a 3 phase "Y" connected floating common stator. These are driven by commutation transistors Q305, Q306, Q307, Q308, Q309, and Q310. Each winding uses a pair of transistors, one for positive current flow and one for negative current flow. Positive current is defined as from the end of the leg to the center of the "Y." Because of the three windings, and the pair of commutation transistors for each leg, and a total of six current paths through the windings, a total of twelve commutation "strokes" per revolution is achieved.

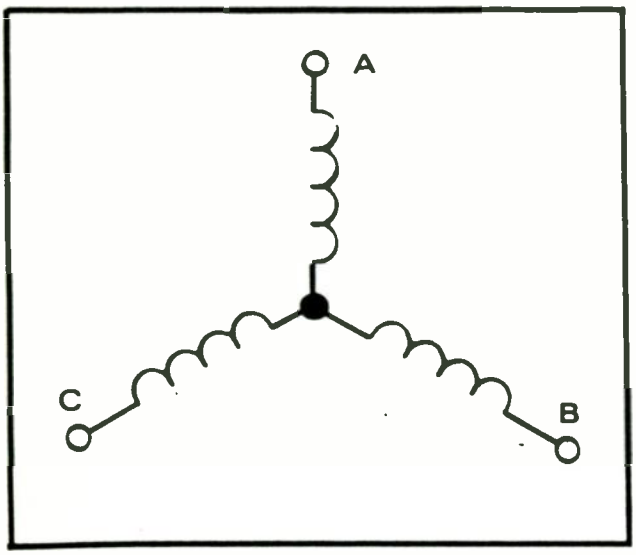


Figure 6-1

Electrical Degree	"Positive" I	"Negative" I
0° - 60°	A	B
60° - 120°	A	C
120° - 180°	B	C
180° - 240°	B	A
240° - 300°	C	A
300° - 360°	C	B

G. SOLENOID CONTROL

Run voltage for solenoid operation is provided by rectification of the mains AC voltage in a full wave bridge: DI & DII — CR501, 502, 503, 504; DIII —CR701, 702, 703, 704. High level DC is fed via R501 (DIII-R701, 708, 715) to the solenoid, then returns to the collectors of Q1 and Q501 (DIII-Q703 & 704; Q707 & 708; Q711 & 712), configured as Darlington pairs. Solenoid control (a low-going signal, 5-volt logic level) is originated by the Play Logic board. The processor produces a logic "0" which turns on U501 (DIII-U701, 702, 703) through inverter U205B, allowing Q1 and Q501 (DIII-Q703 & 704; Q707 & 708; Q711 & 712) to saturate, pulling in the solenoid. A logic "1", inverted by U205B, turns off U501 (DIII-U701, 702, 703) and turns on Q502 (DIII-Q702, 706, 710), thereby shunting the base supply current for Q1 and Q501 (DIII-Q703 & 704; Q707 & 708; Q711 & 712), causing them to turn off and the solenoid to drop out.

H. RECORD AMPLIFIER

Recording amplifiers for left and right channels are identical, and therefore only the left (mono) recording amplifier will be discussed. Audio from the rear panel XLR connector and transformer is routed to differenetial input amplifier U1001. Nominal input level is set to +6 dBm, but may be set to -6 dBm by installing W1001 wire jumper. This jumper changes the stage gain by adding a 3.3K resistor, R1001, to the circuit. U1001 (third section) is a summing amplifier that provides differential input summing and acts as a buffer/driver for the front panel level control. Audio is AC coupled to the front panel level controls, and then to equalization amplifer U1001 (fourth section). High frequency equalization is done in the feedback circuit of this stage, and is controlled by R1005. C1009 is factory loaded to provide 1964 NAB record equalization, but is shorted by wire jumper W1003 for 1976 NAB equalization. Audio output from this amplifier is routed to the Bias PC card.

I. METER AMPLIFIER

Metering functions internal to the Delta Series are monitored by an electronically switched amplifier and rectifier located on the Record Amplifier PC card. Monitored signals from various circuits are routed to an analog switch U1003 via calibration potentiometers R1015 through R1022. U1003 is a dual 4 input CMOS analog switch that is selectively controlled by the two front panel meter switches and the on-board slide switch S1001.

The selected signal is outputted to the meter amplifier U1004 and then to the full wave meter bridge CR1001, 1003, 1005, and 1007. The resulting signal is fed to the front panel meter for mechanical display. The right channel circuit is similar and will not be discussed.

J. BIAS AMPLIFIER

Program and cue record circuits utilize a common source of bias. The bias frequency originates as a square wave from the Record microprocessor clock and is divided down to 119.3 kHz on the Record Logic PC board. The square waves require filtering before they may be used as bias (sine waves) at the record head. Two sections of U1101 comprise a low pass filter which sharply attenuates the harmonic content of the square wave, so that the output is a low distortion sine wave at 119.3 kHz. The signal is then AC coupled to the bias level potentiometers R1107, R1108, and R1131 for use by the left, right, and cue head drivers.

Cue tones from the Record Logic card are fed to U1104 by way of C1125 and R1132. U1104 is the cue head driver, where bias and audio are summed.

Summing of audio and bias signals at the virtual ground (–) input of U1104 eliminates the need for an audio bias trap. The ouput of U1104 is bias-plus-audio. Q1103 controls "turn-on." Cue head enable logic originates at the Record microprocessor, and a low at the PCB edge connector pin 5 initiates the sequence.

One section of U1101 is an integrator, which ramps the head switch slowly on and off. The RC combination C1102 and R1102 determine the head on/off transition time, and CR1102 provides the necessary steering for the gate of Q1103. Another section of U1101 is the program head integrator, and functions in a like manner.

Program audio is routed to the head driver U1102 from the program recording amplifier. Its operation is very similar to that of U1104 (cue), except for an additional circuit function. C1107 and R1113 provide phase shift at audio frequencies, a form of group delay compensation. U1102 is unity gain at all frequencies. However, as input frequencies increase, the ouput signal leads the input signal in phase. This group delay is used to compensate for a lagging phase shift which occurs in the playback system. It is caused by the combined effects of the reproduce head, equalizers, and others. The net result is the complex high speed signals may be more accurately recorded and reproduced. The right program channel is identical, and it will not be discussed.

Record heads are parallel resonated via C1115, C1116, and C1130.

SECTION VII - ELECTRICAL DRAWINGS

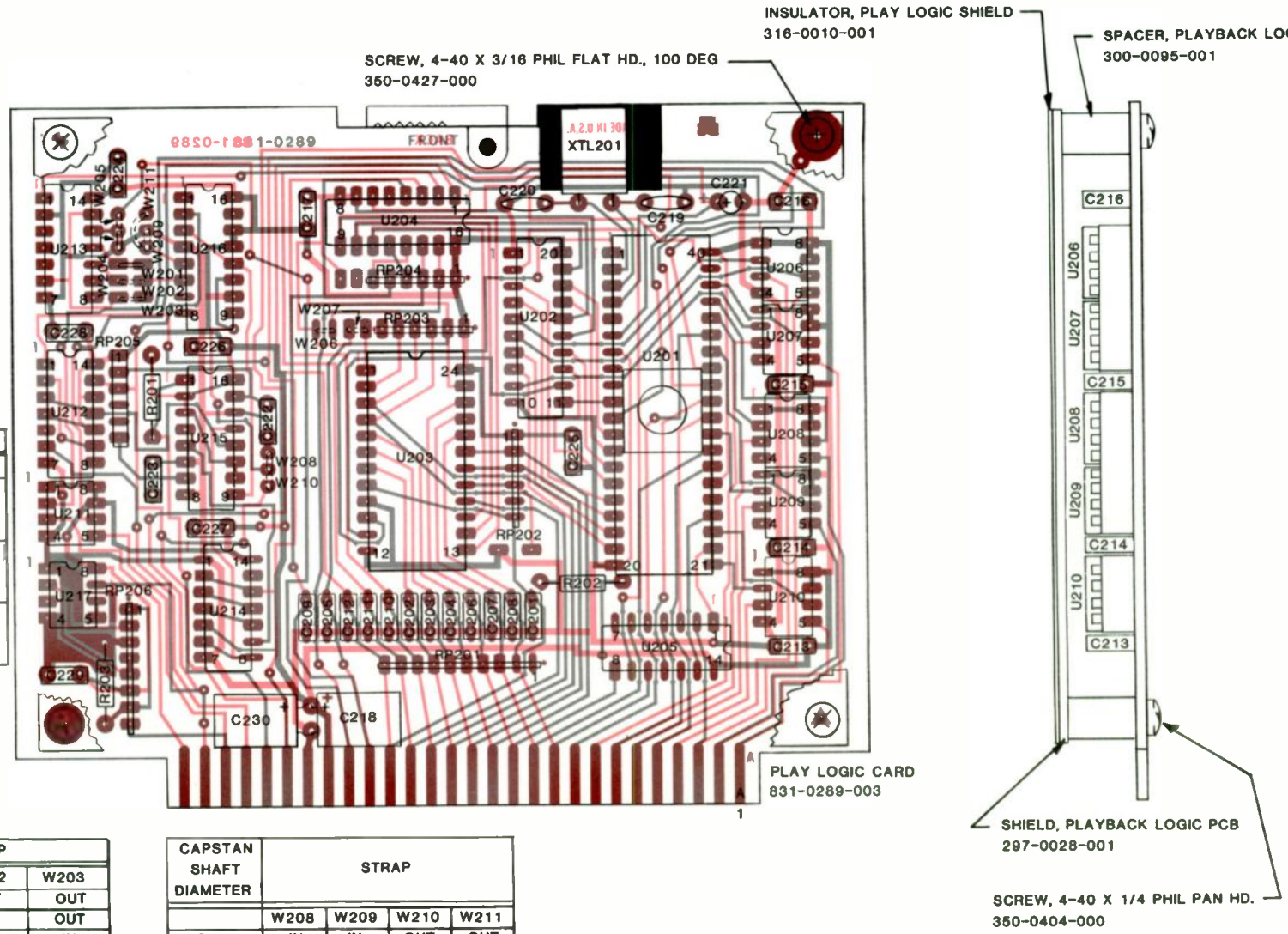
REPRODUCE LOGIC BOARD 831-0289

PARTS LIST

#	FLASHING READY WITHOUT START LOCKOUT		
#	7.5 IPS TAPE SPEED, CONTINUOUS RUN VERSION		
#	CAPACITORS		
C201	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C202	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C203	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C204	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C205	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C206	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C207	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C208	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C209	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C210	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C211	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C212	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C213	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C214	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C215	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C216	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C217	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C218	1	695-1910-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 10V
C219	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C220	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C221	1	694-0005-000	CAPACITOR, TANTALUM, 1 UFD., 35 V, 20%, RADIAL
C222	1	680-0101-033	CAPACITOR, POLYESTER FILM, .001 UFD., 100V, 5%
C223	1	680-0101-033	CAPACITOR, POLYESTER FILM, .001 UFD., 100V, 5%
C224	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C225	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C226	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C227	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C228	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C229	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C230	1	695-1910-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 10V
#	RESISTORS		
R201	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R202	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R203	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
#	RESISTOR NETWORKS		
RP201	1	631-0007-000	RESISTOR, ARRAY, COMMON SIP, 9R, 330 OHM, 2%
RP202	1	631-0025-000	RESISTOR, ARRAY, COMMON SIP, 5R, 1K, 2%
RP203	1	631-0025-000	RESISTOR, ARRAY, COMMON SIP, 5R, 1K, 2%
RP204	1	631-0025-000	RESISTOR, ARRAY, COMMON SIP, 5R, 1K, 2%
RP205	1	631-0023-000	RESISTOR, ARRAY, COMMON SIP, 5R, 10K, 2%
RP206	1	631-0041-000	RESISTOR, ARRAY, COMMON SIP, 4R, 10K, 2%
#	SOCKETS		
U201	1	613-0017-000	SOCKET, IC, 40 PIN, DIP
U202	1	613-0020-000	SOCKET, IC, 20 PIN, DIP
U203	1	613-0019-000	SOCKET, IC, 24 PIN, DIP
U204	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U205	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U206,7	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U208,9	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U210	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U211	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U212	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U213	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U214	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U215	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U216	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U217	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
#	SEMI-CONDUCTORS		
U201	1	610-0006-000	IC, MICROPROCESSOR, EPROM
U202	1	607-0033-000	IC, 74LS374, 8 BIT LATCH
U203	1	607-0018-000	IC, 74150, 1 OF 16 MULTIPLEXER
U204	1	607-0025-000	IC, 74LS151, 8-INPUT MULTIPLEXER
U205	1	607-0049-000	IC, 74LS05, HEX INVERTER WITH OPEN COLLECTOR OUT
U206	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U207	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U208	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U209	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U210	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U211	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U212	1	607-0024-000	IC, 74LS74, DUAL D FLIP-FLOP WITH EAR & PRESET
U213	1	607-0045-000	IC, 74LS393, DUAL 4 BIT BINARY COUNTER
U214	1	607-0035-000	IC, 74LS95, 4 BIT SHIFT REGISTER
U215	1	607-0034-000	IC, 74LS123, DUAL RETRIG. MONOSTABLE W/CLEAR
U216	1	608-0033-000	IC, MC14526B, PROGRAMMABLE BINARY DIVIDE-BY-N
U217	1	609-0025-000	IC, LM311N, VOLTAGE COMPARATOR
#	STRAPPING		
W201	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W202	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W203	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W204	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W205	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W206	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W207	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W208	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W209	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W210	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W211	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
#	MISCELLANEOUS		
XTL201	1	448-0010-000	CRYSTAL, 5.22350 MHz.
	1	325-0289-003	CARD, PLAYBACK LOGIC
	1	323-0003-001	CARD PULL, DELTAS
	1	282-0046-000	PIN, ROLL, 1/16 X 3/16
	1	280-0024-000	LABEL, EPROM WINDOW
	1	297-0028-001	SHIELD, PLAYBACK LOGIC PCB DI,DIII
	4	300-0095-001	SPACER, PLAYBACK LOGIC PCB, TAPPED 4-40 X .250
	4	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP
	4	350-0404-000	SCREW, 4-40 X 1/4 PHIL PAN ZP
	1	316-0010-001	INSULATOR, PLAY LOGIC SHIELD, FROM 316-0008-000

FIGURE 7 - 1

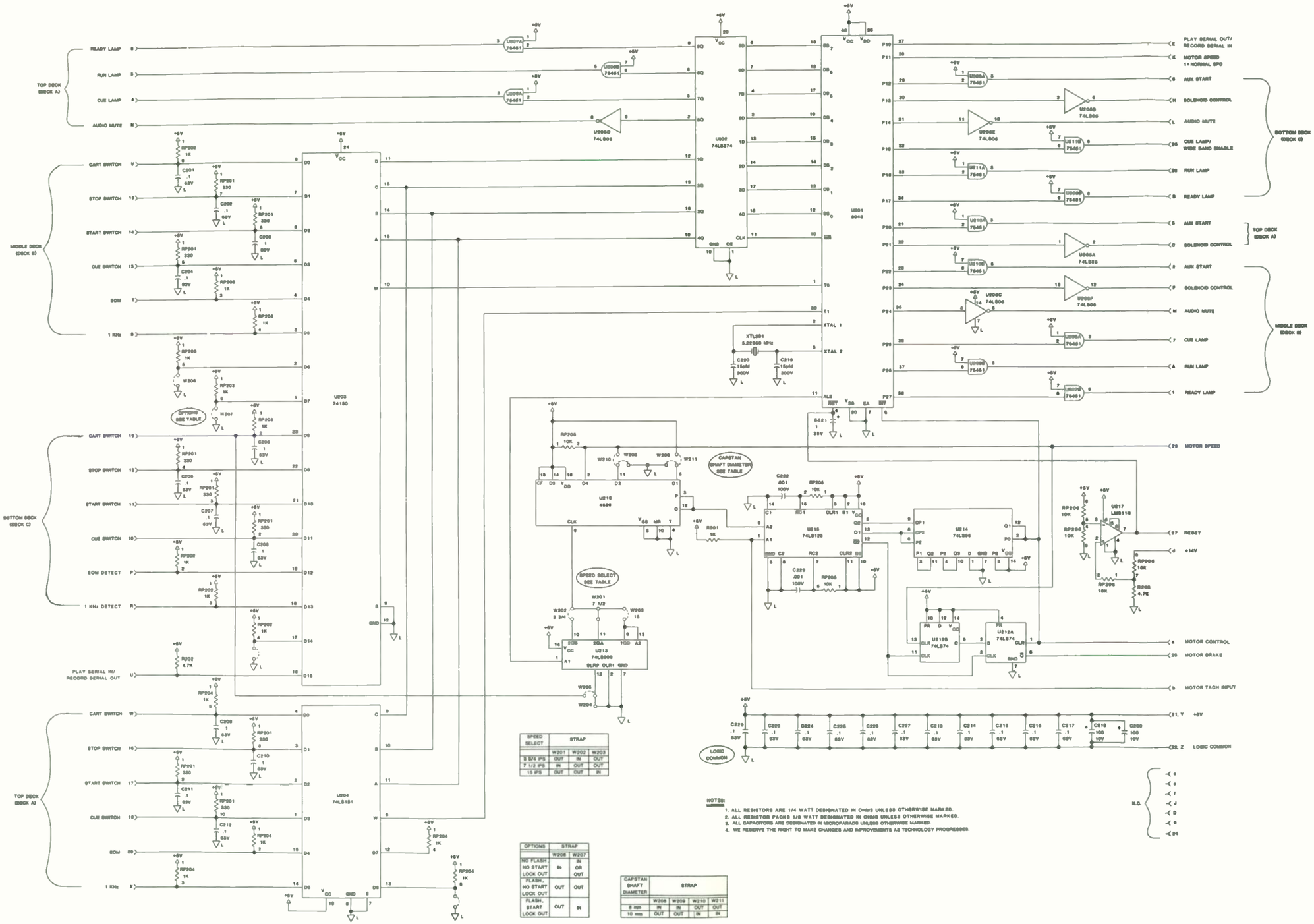
831-0289
DELTA I, II, III REPRODUCE LOGIC BOARD
LAYOUT



OPTIONS	STRAP	
	W206	W207
NO FLASH, NO START LOCK OUT	IN	IN OR OUT
FLASH, NO START LOCK OUT	OUT	OUT
FLASH, START LOCK OUT	OUT	IN

IPS	STRAP		
	W201	W202	W203
7 1/2	IN	OUT	OUT
3 3/4	OUT	IN	OUT
15	OUT	OUT	IN

CAPSTAN SHAFT DIAMETER	STRAP			
	W208	W209	W210	W211
8 mm	IN	IN	OUT	OUT
10 mm	OUT	OUT	IN	IN



SPEED SELECT	STRAP		
	W201	W202	W203
3 3/4 IPS	OUT	IN	OUT
7 1/2 IPS	IN	OUT	OUT
15 IPS	OUT	OUT	IN

OPTIONS	STRAP	
	W206	W207
NO FLASH NO START LOCK OUT	IN	IN OR OUT
FLASH, NO START LOCK OUT	OUT	OUT
FLASH, START LOCK OUT	OUT	IN

CAPSTAN SHAFT DIAMETER	STRAP			
	W208	W209	W210	W211
8 mm	IN	IN	OUT	OUT
10 mm	OUT	OUT	IN	IN

NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL RESISTOR PACKS 1/8 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.

FIGURE 7-2

831-0289
DELTA I, II, III REPRODUCE LOGIC BOARD SCHEMATIC

REPRODUCE AMPLIFIER & CUE DETECT BOARD 831-0294

PARTS LIST

\# STEREO, 1975 EQ.
\# OPEN COLLECTOR OUTPUTS WITH 150 HZ EOM VERSION

\# CAPACITORS

C101	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD, 300 V
C102	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD, 300 V
C103	1	695-1335-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 10 UFD., 35 V
C104	1	695-1335-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 10 UFD., 35 V
C105	1	695-2106-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 220 UFD, 6.3 V
C106	1	695-2106-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 220 UFD, 6.3 V
C107	1	680-1101-033	CAPACITOR, POLYESTER FILM, .0068 UFD., 100 V, 5%
C108	1	680-1101-033	CAPACITOR, POLYESTER FILM, .0068 UFD., 100 V, 5%
C109			NOT USED
C110			NOT USED
C111	1	695-1335-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 10 UFD., 35 V
C112	1	695-1335-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 10 UFD., 35 V
C113	1	677-0005-000	CAPACITOR, SILVER MICA, 47 PFD., 300 V
C114	1	677-0005-000	CAPACITOR, SILVER MICA, 47 PFD., 300 V
C115	1	677-0012-000	CAPACITOR, SILVER MICA, 820 PFD., 100V
C116	1	695-1335-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 10 UFD, 35 V
C117	1	680-1563-033	CAPACITOR, POLYESTER FILM, .015 UFD., 63V 5%
C118	1	677-0008-000	CAPACITOR, SILVER MICA, 22 PFD., 300 V
C119	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C120	1	680-1363-033	CAPACITOR, POLYESTER FILM, .01 UFD., 63V 5%
C121	1	680-1763-033	CAPACITOR, POLYESTER FILM, .022 UFD., 63V 5%
C122	1	680-1763-033	CAPACITOR, POLYESTER FILM, .022 UFD., 63V 5%
C123	1	680-0701-033	CAPACITOR, POLYESTER FILM, .0033 UFD., 100V 5%
C124	1	680-0701-033	CAPACITOR, POLYESTER FILM, .0033 UFD., 100V 5%
C125	1	680-0301-033	CAPACITOR, POLYESTER FILM, .0015 UFD., 100V, 5%
C126	1	680-0301-033	CAPACITOR, POLYESTER FILM, .0015 UFD., 100V, 5%
C127	1	678-0363-033	CAPACITOR, POLYPROPYLENE, 330 PFD., 63V 5%
C128	1	678-0563-033	CAPACITOR, POLYPROPYLENE, 470 PFD., 63V 5%
C129	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C130	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C131			NOT USED
C132	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C133	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C134	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C135	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C136	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C137	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C138	1	680-2563-033	CAPACITOR, POLYESTER FILM, -10 UFD., 63V 5%
C139	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C140	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C141	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C142	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C143	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C144	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C145	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C146	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C147	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C148	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C149	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C150	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C151	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C152			NOT USED
C153	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD., 300V
C154	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD., 300V
C155	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD., 300V
C156	1	677-0001-000	CAPACITOR, SILVER MICA, 100 PFD., 300V

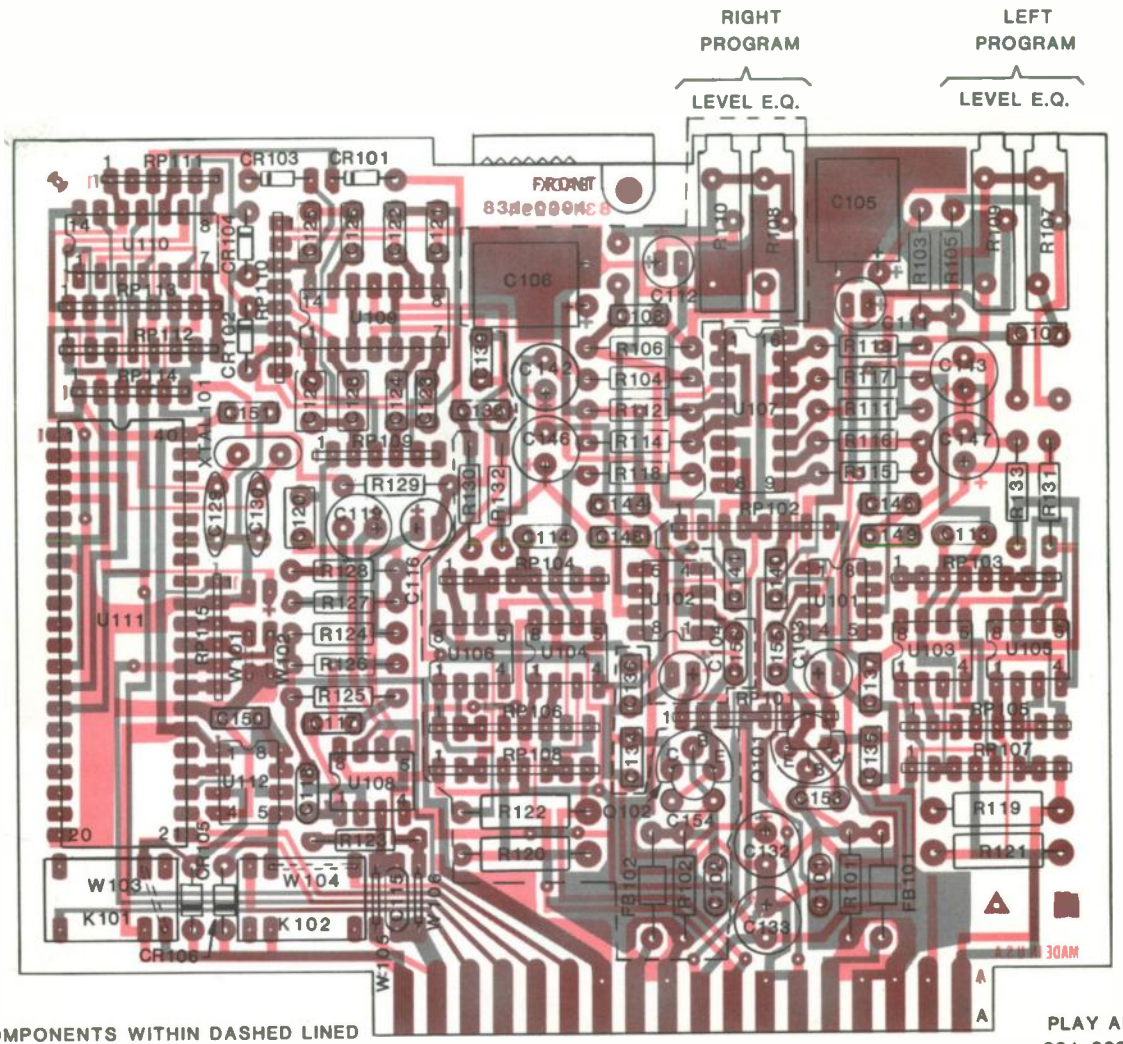
\# RESISTOR NETWORKS

RP101	1	631-0032-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 47K, 2%
RP102	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP103	1	631-0032-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 47K, 2%
RP104	1	631-0032-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 47K, 2%
RP105	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP106	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP107	1	631-0036-001	RESISTOR, NETWORK, SEP. SIP, CUSTOM, 4.7K/5.6K/4
RP108	1	631-0036-001	RESISTOR, NETWORK, SEP. SIP, CUSTOM, 4.7K/5.6K/4
RP109	1	631-0039-000	RESISTOR, ARRAY, COMMON SIP, 5R, 4.7K, 2%
RP110	1	631-0040-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 470K, 2%
RP111	1	631-0039-000	RESISTOR, ARRAY, COMMON SIP, 5R, 4.7K, 2%
RP112	1	631-0032-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 47K, 2%
RP113	1	631-0032-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 47K, 2%
RP114	1	631-0039-000	RESISTOR, ARRAY, COMMON SIP, 5R, 4.7K, 2%
RP115	1	631-0039-000	RESISTOR, ARRAY, COMMON SIP, 5R, 4.7K, 2%

\# RESISTORS

R101	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R102	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R103	1	630-0033-000	RESISTOR, CARBON FILM, 56 OHM, 1/4 W, 5%
R104	1	630-0033-000	RESISTOR, CARBON FILM, 56 OHM, 1/4 W, 5%
R105	1	630-0131-000	RESISTOR, CARBON FILM, 680K OHM, 1/4 W, 5%
R106	1	630-0131-000	RESISTOR, CARBON FILM, 680K OHM, 1/4 W, 5%
R107	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R108	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R109	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R110	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R111	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4 W, 5%
R112	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4 W, 5%
R113	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4 W, 5%
R114	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4 W, 5%
R115	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R116	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R117	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4 W, 5%
R118	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4 W, 5%
R119	1	630-0236-000	RESISTOR, CARBON FILM, 75 OHM, 1/2 W, 5%
R120	1	630-0236-000	RESISTOR, CARBON FILM, 75 OHM, 1/2 W, 5%
R121	1	630-0236-000	RESISTOR, CARBON FILM, 75 OHM, 1/2 W, 5%
R122	1	630-0236-000	RESISTOR, CARBON FILM, 75 OHM, 1/2 W, 5%
R123	1	630-0115-000	RESISTOR, CARBON FILM, 150K OHM, 1/4 W, 5%
R124	1	630-0055-000	RESISTOR, CARBON FILM, 470 OHM, 1/4 W, 5%
R125	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R126	1	630-0115-000	RESISTOR, CARBON FILM, 150K OHM, 1/4 W, 5%
R127	1	630-0057-000	RESISTOR, CARBON FILM, 560 OHM, 1/4 W, 5%
R128	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R129	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R130	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R131	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R132	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R133	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%

# SOCKETS			
Q101	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q102	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
U101	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U102	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U103	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U104	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U105	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U106	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U107	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U108	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U109	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U110	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U111	1	613-0017-000	SOCKET, IC, 40 PIN, DIP
U112	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
# SEMI-CONDUCTORS			
Q101	1	590-0031-000	TRANSISTOR, 2N5087 PNP, LOW NOISE
Q102	1	590-0031-000	TRANSISTOR, 2N5087 PNP, LOW NOISE
U101	1	606-0024-000	IC, NE5534AN, LOW NOISE, SINGLE AUDIO OP AMP
U102	1	606-0024-000	IC, NE5534AN, LOW NOISE, SINGLE AUDIO OP AMP
U103	1	606-0021-000	IC, NE5532N, DUAL AUDIO OP AMP
U104	1	606-0021-000	IC, NE5532N, DUAL AUDIO OP AMP
U105	1	606-0021-000	IC, NE5532N, DUAL AUDIO OP AMP
U106	1	606-0021-000	IC, NE5532N, DUAL AUDIO OP AMP
U107	1	608-0004-000	IC, MC14052BC, CMOS DUAL 4-1 MULTIPLEX W/DECODE
U108	1	606-0014-000	IC, TLO72CP, DUAL BI-FET OP AMP
U109	1	606-0015-000	IC, TLO84CP, QUAD BI-FET OP AMP
U110	1	609-0002-000	IC, LM339N, QUAD VOLTAGE COMPARATOR
U111	1	610-0006-000	IC, MICROPRECESSOR, EPROM
U112	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
CR101	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR102	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR103	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR104	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR105	1	575-0007-000	DIODE, 1N4005
CR106	1	575-0007-000	DIODE, 1N4005
# MISCELLANEOUS			
FB101	1	516-0001-000	BEAD, FERRITE, W/LEADS 57-3425
FB102	1	516-0001-000	BEAD, FERRITE, W/LEADS 57-3425
W101	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W102	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W103	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W104	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W105	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W106	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
K101	1	480-0011-000	RELAY, 5 VOLT
K102	1	480-0011-000	RELAY, 5 VOLT
	1	325-0294-003	CARD, REPRODUCE AND CUE AMPLIFIER
	1	323-0003-001	CARD PULL, DELTAS
	1	282-0046-000	PIN, ROLL, 1/16 X 3/16
XTAL101	1	448-0009-000	CRYSTAL, 3.579 MHZ
	1	280-0024-000	LABEL, EPROM WINDOW



COMPONENTS WITHIN DASHED LINED AREA NOT USED IN MONO MACHINES

PLAY AMP & CUE DETECTOR CARD
831-0294-003 MONO
831-0294-013 STEREO

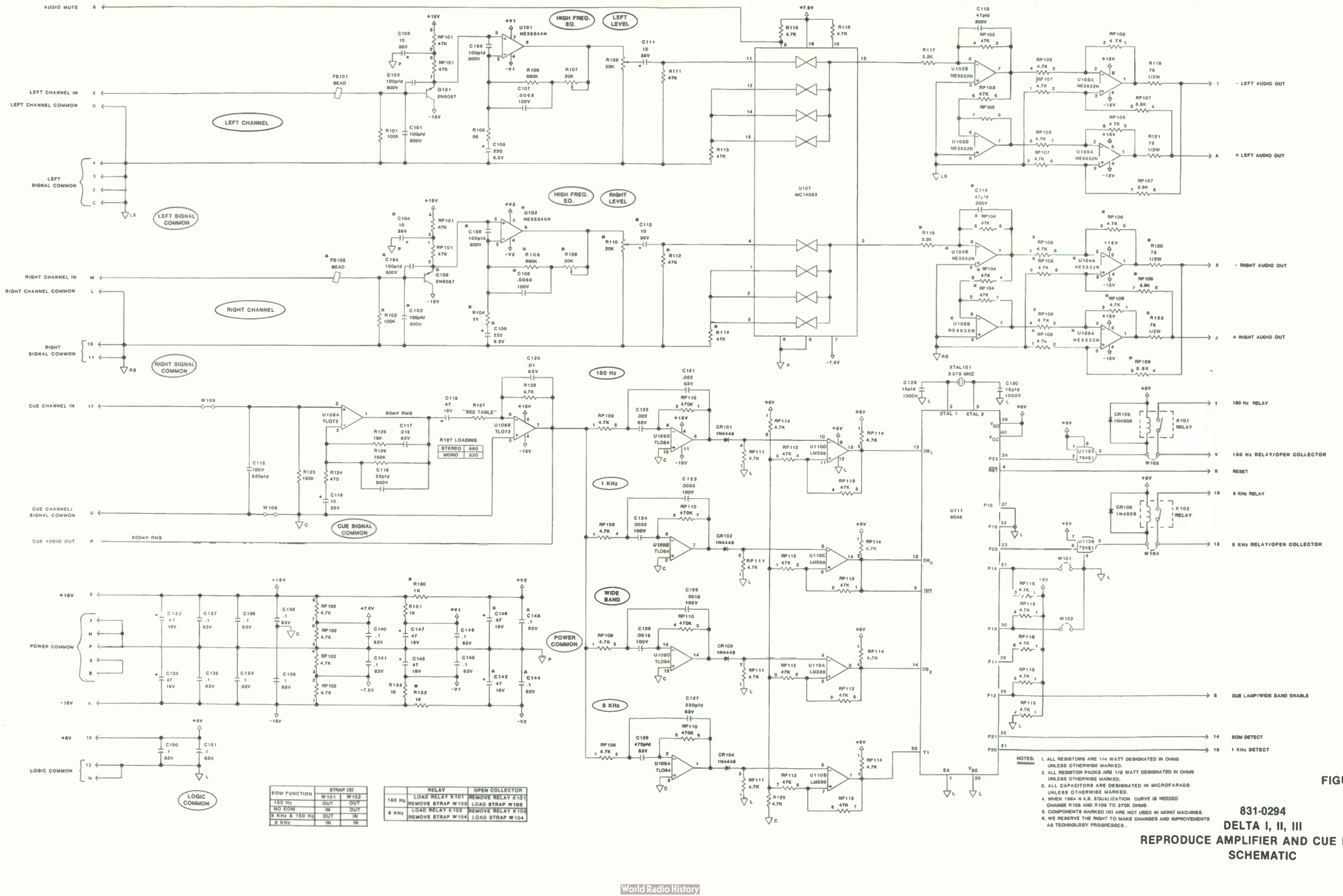
WHEN 1964 N.A.B. EQUALIZATION CURVE IS NEEDED CHANGE R105 AND R106 TO 270K OHMS.

EOM FUNCTION	STRAP (S)	
	W101	W102
150 Hz	OUT	OUT
NO EOM	IN	OUT
8 KHz & 150 Hz	OUT	IN
8 KHz	IN	IN

	RELAY	OPEN COLLECTOR
150 Hz	LOAD RELAY K101	REMOVE RELAY K101
	REMOVE STRAP W103	LOAD STRAP W103
8 KHz	LOAD RELAY K102	REMOVE RELAY K102
	REMOVE STRAP W104	LOAD STRAP W104

FIGURE 7 - 3

831-0294
DELTA I, II, III
REPRODUCE AMPLIFIER AND CUE DETECT BOARD
LAYOUT



EOM FUNCTION	STRAP (S)	
	W101	W102
150 Hz	OUT	OUT
NO EOM	IN	OUT
8 KHz & 150 Hz	OUT	IN
8 KHz	IN	IN

	RELAY	OPEN COLLECTOR
150 Hz	LOAD RELAY K101	REMOVE RELAY K101
	REMOVE STRAP W103	LOAD STRAP W105
8 KHz	LOAD RELAY K102	REMOVE RELAY K102
	REMOVE STRAP W104	LOAD STRAP W104

NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL RESISTOR PACKS ARE 1/8 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. WHEN 1964 N.A.B. EQUALIZATION CURVE IS NEEDED CHANGE R106 AND R108 TO 270K OHMS.
5. COMPONENTS MARKED (N) ARE NOT USED IN MONO MACHINES.
6. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 7 - 4

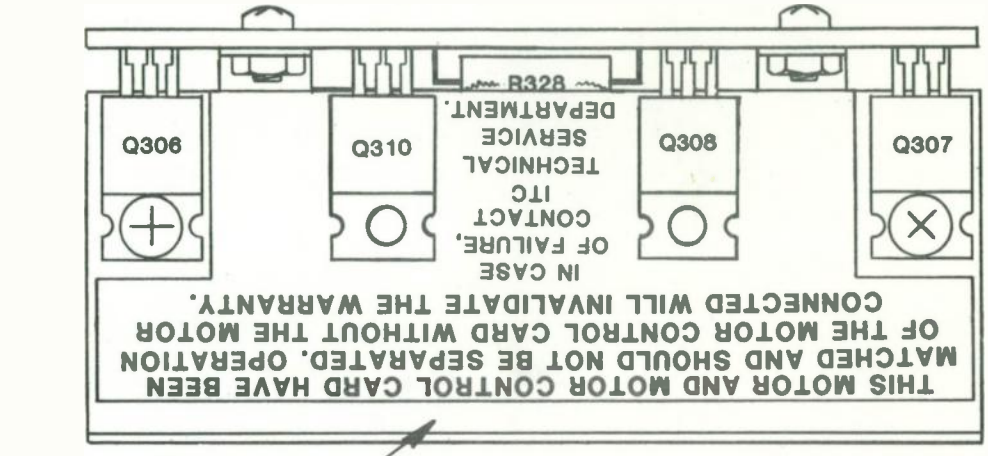
831-0294
DELTA I, II, III
REPRODUCE AMPLIFIER AND CUE DETECT SCHEMATIC

DELTA I, II, III MOTOR CONTROL BOARD 831-0270

PARTS LIST

#			
CAPACITORS			
C301	1	694-0005-000	CAPACITOR, TANTALUM, 1 UFD., 35 V, 20%, RADIAL
C302	1	680-2963-033	CAPACITOR, POLYESTER FILM, .22 UFD, 63 V, 5%
C303	1	694-0005-000	CAPACITOR, TANTALUM, 1 UFD., 35 V, 20%, RADIAL
C304	1	680-2963-033	CAPACITOR, POLYESTER FILM, .22 UFD, 63 V, 5%
C305	1	680-1363-033	CAPACITOR, POLYESTER FILM, .01 UFD., 63V, 5%
C306	1	680-3363-033	CAPACITOR, POLYESTER FILM, .47 UFD., 63V, 5%
C307	1	680-3363-033	CAPACITOR, POLYESTER FILM, .47 UFD., 63V, 5%
C308	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C309	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C310	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C311	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C312	1	698-1335-013	CAPACITOR, ALUM. ELECTROLYTIC, 10 UFD, 35V
RESISTORS NETWORKS			
RP301	1	631-0025-000	RESISTOR, ARRAY, COMMON SIP, 5R, 1K, 2%
RP302	1	631-0033-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 22K, 2%
RESISTORS			
R301	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R302	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R303	1	630-0001-000	RESISTOR, CARBON FILM, 2.7 OHM1/4W, 5%
R304	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R305	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R306	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R307	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R308	1	630-0123-000	RESISTOR, CARBON FILM, 330K OHM, 1/4W, 5%
R309	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R310	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R311	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R312	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R313	1	636-0046-000	POTENTIOMETER, 10K OHM, PC SERIES 268
R314	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R315	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R316	1	630-0123-000	RESISTOR, CARBON FILM, 330K OHM, 1/4W, 5%
R317	1	630-0071-000	RESISTOR, CARBON FILM, 2.2K OHM, 1/4 W, 5%
R318	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R319	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R320	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R321	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R322	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R323	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R324	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R325	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R326	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R327	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R328	1	628-0001-000	RESISTOR, WW, 0.1 OHM, 2 W, 5%, BWH
R329	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%

#			
TRANSISTORS			
Q301	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q302	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q303	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q304	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q305	1	590-0035-000	TRANSISTOR, TIP125, PNP, DARLINGTON, POWER
Q306	1	590-0034-000	TRANSISTOR, TIP120, NPN, DARLINGTON, POWER
Q307	1	590-0035-000	TRANSISTOR, TIP125, PNP, DARLINGTON, POWER
Q308	1	590-0034-000	TRANSISTOR, TIP120, NPN, DARLINGTON, POWER
Q309	1	590-0035-000	TRANSISTOR, TIP125, PNP, DARLINGTON, POWER
Q310	1	590-0034-000	TRANSISTOR, TIP120, NPN, DARLINGTON, POWER
DIODES			
CR301	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR302	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR303	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR304	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR305	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR306	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR307	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR308	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR309	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR310	1	575-0032-000	DIODE, POWER 3A, 200 VOLT MR 502
INTEGRATED CIRCUITS			
U301	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U302	1	607-0063-000	IC, 74LS86, QUAD 2 INPUT EXCLUSIVE OR
U303	1	607-0036-000	IC, 74LS02, QUAD 2 INPUT NOR
U304	1	607-0050-000	IC, 74LS08, QUAD 2 INPUT AND
MISCELLANEOUS			
Q301-4	4	613-0004-001	PAD, TRANSISTOR, #7717-137N
U301-4	4	613-0008-000	SOCKET, IC, 14 PIN, DIP
Q305-7,9	4	613-0041-000	INSULATOR, TO-220, THERMALLOY, SIL-PAD 400
	2	352-0008-000	SCREW, NYLON, 6-32 X 5/16, SLOTTED, RD. HD.
	2	372-1105-000	NUT, NYLON, HEX, 6-32 X .305 X 7/64
	2	350-0404-000	SCREW, 4-40 X 1/4, PHIL PAN ZP
	2	370-0403-000	NUT, 4-40 X 1/4, KEPS HEX, STEEL, NP
	1	325-0270-003	BOARD, MOTOR CONTROL
P301	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101
P302	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101



MOTOR CONTROL BOARD
MOUNTING BRACKET
254-0100-012

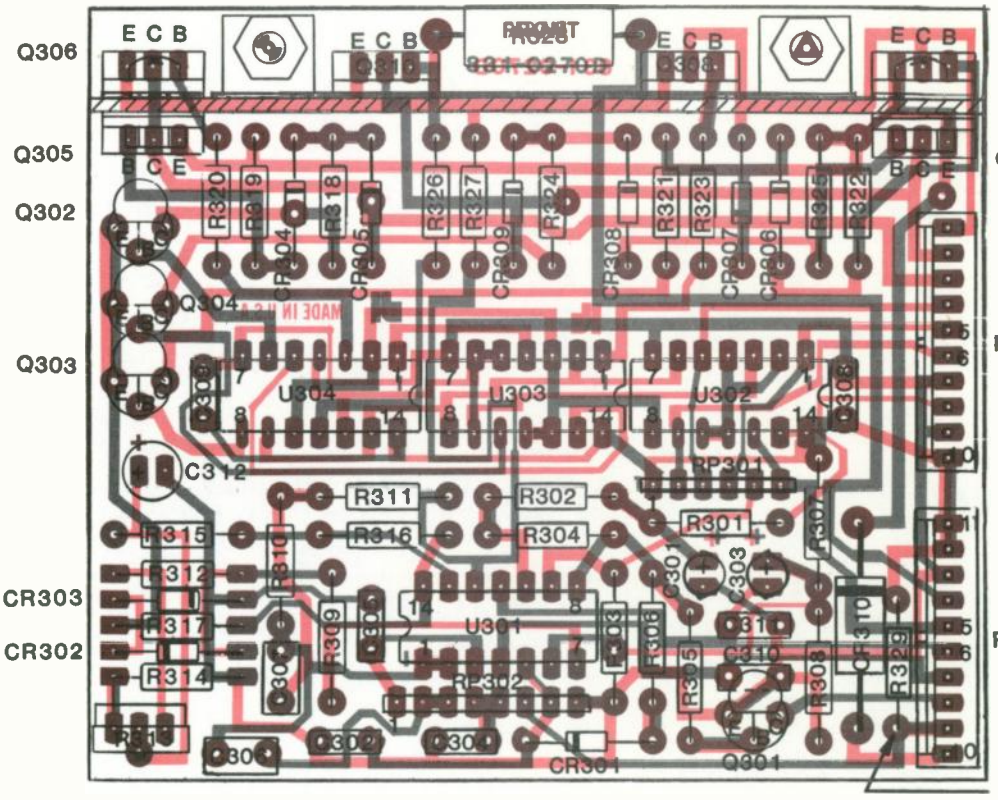
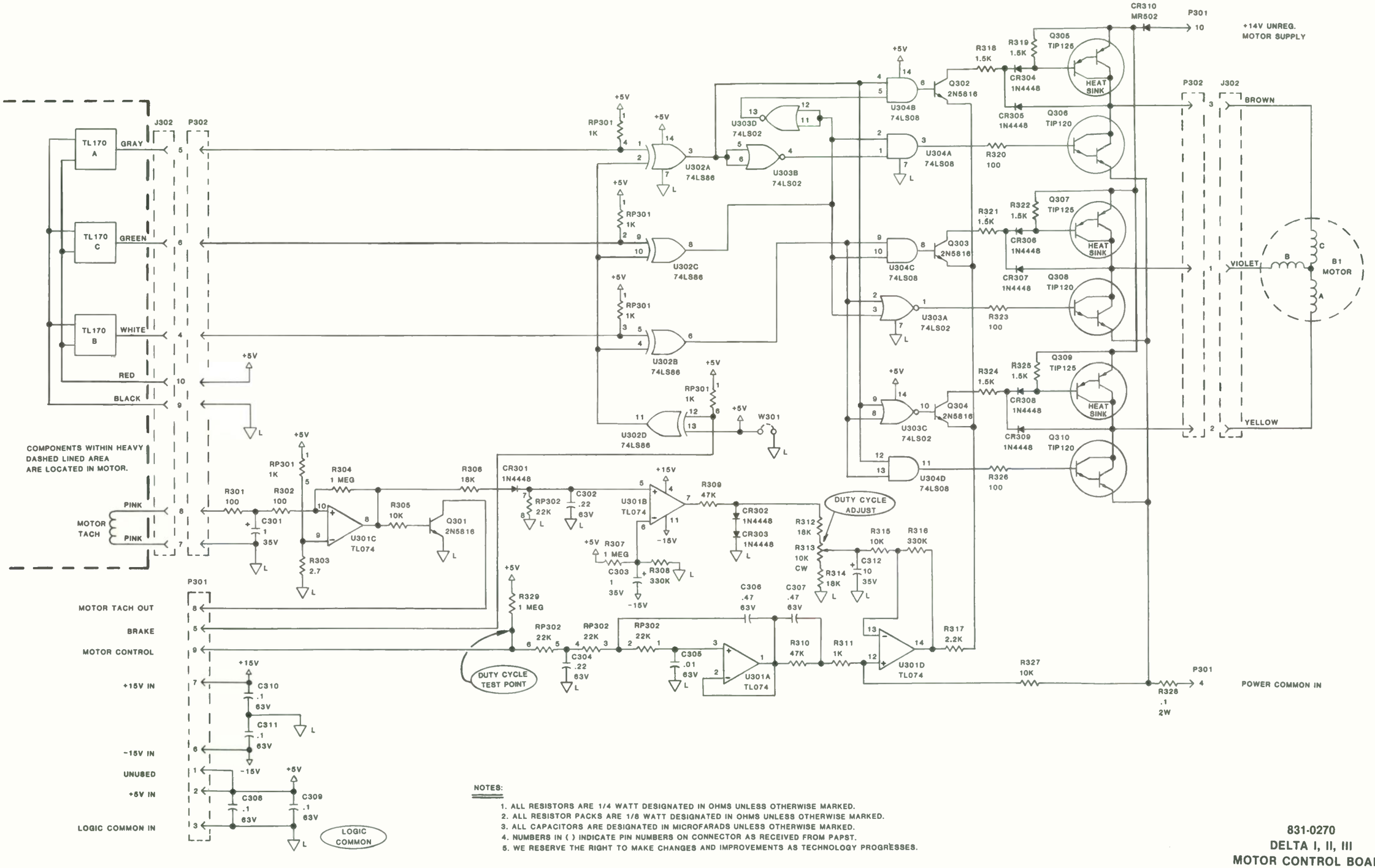


FIGURE 7-5

831-0270
DELTA I, II, III
MOTOR CONTROL BOARD
LAYOUT



NOTES:

1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL RESISTOR PACKS ARE 1/8 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED.
4. NUMBERS IN ( ) INDICATE PIN NUMBERS ON CONNECTOR AS RECEIVED FROM PAPST.
5. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

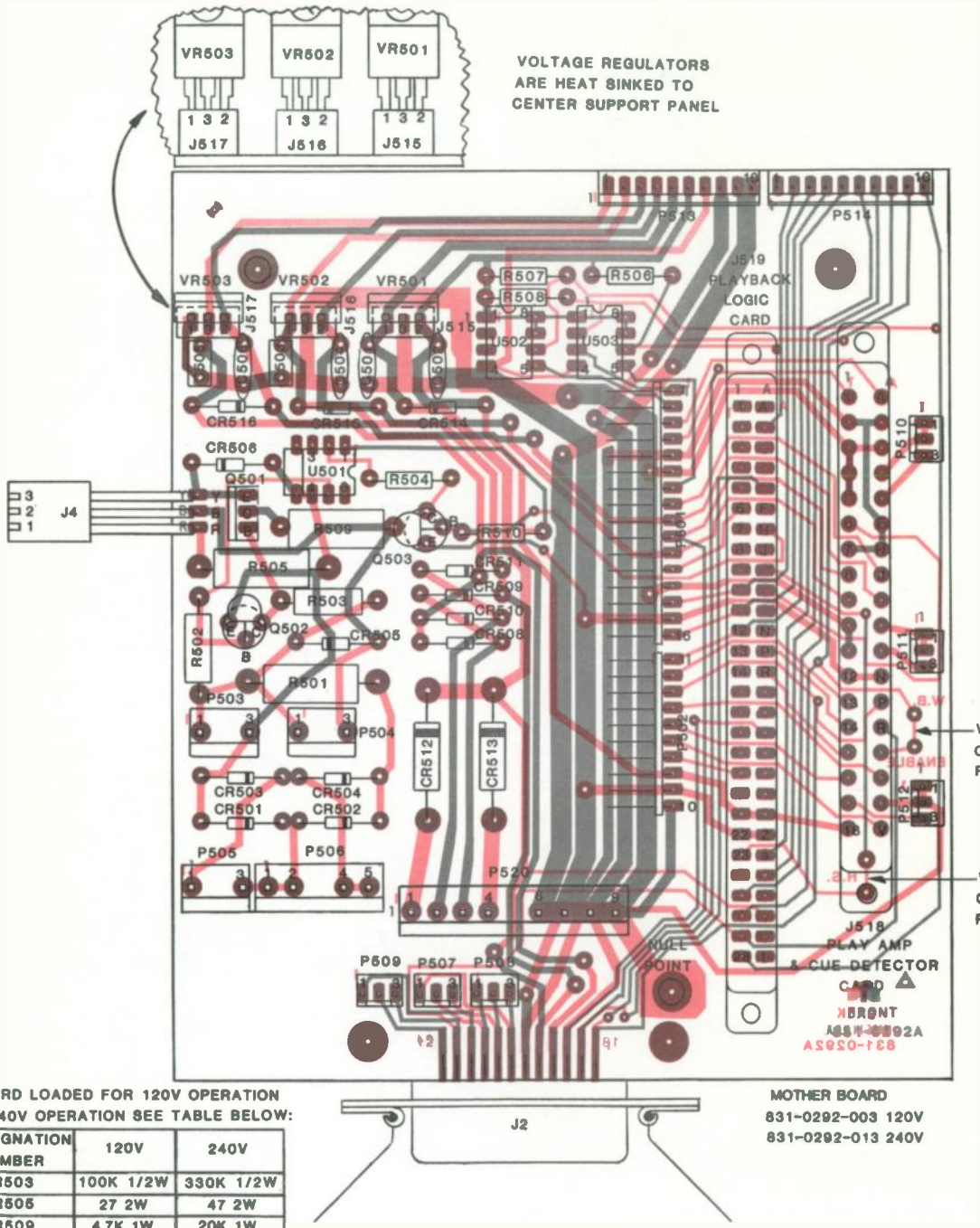
FIGURE 7 - 6

831-0270
DELTA I, II, III
MOTOR CONTROL BOARD
SCHEMATIC

DELTA I, II MOTHERBOARD 831-0292

PARTS LIST

# STEREO, 120 VOLT VERSION			
# CAPACITORS			
C501	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C502	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C503	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
C504	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C505	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
C506	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
# DIODES			
CR501	1	575-0007-000	DIODE, 1N4005
CR502	1	575-0007-000	DIODE, 1N4005
CR503	1	575-0007-000	DIODE, 1N4005
CR504	1	575-0007-000	DIODE, 1N4005
CR505	1	575-0007-000	DIODE, 1N4005
CR506	1	577-0011-000	DIODE, ZENER, 1N5231B
CR507			NOT USED
CR508	1	575-0007-000	DIODE, 1N4005
CR509	1	575-0007-000	DIODE, 1N4005
CR510	1	575-0007-000	DIODE, 1N4005
CR511	1	575-0007-000	DIODE, 1N4005
CR512	1	575-0032-000	DIODE, POWER 3A, 200 VOLT MR 502
CR513	1	575-0032-000	DIODE, POWER 3A, 200 VOLT MR 502
CR514	1	575-0007-000	DIODE, 1N4005
CR515	1	575-0007-000	DIODE, 1N4005
CR516	1	575-0007-000	DIODE, 1N4005
# RESISTORS			
R501	1	628-0057-000	RESISTOR, WW, 22 OHM, 2 W, BWH
R502	1	630-0323-000	RESISTOR, CARBON FILM, 330K OHM, 1/2 W 5%
R503	1	630-0311-000	RESISTOR, CARBON FILM, 100K OHM, 1/2 W 5%
R504	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4 W, 5%
R505	1	628-0059-000	RESISTOR, WW, 27 OHM, 2 W, BWH
R506	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R507	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R508	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R509	1	626-0479-000	RESISTOR, CARBON COMP., 4.7K OHM, 1 W
R510	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W 5%
# INTEGRATED CIRCUITS & TRANSISTORS			
U501	1	585-0010-000	OPTO-ISOLATER, H11A2
U502	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U503	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
Q501	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q502	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q503	1	590-0017-000	TRANSISTOR, 2N5816, NPN
VR501	1	605-0012-000	VOLTAGE REGULATOR, MC7805CT, +5V, TO220 PLASTIC
VR502	1	605-0010-000	VOLTAGE REGULATOR, MC7815CT, +15V, TO220 PLASTIC
VR503	1	605-0011-000	VOLTAGE REGULATOR, MC7915CT, -15V, TO220 PLASTIC
# SOCKETS			
U501	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U502	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U503	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
# CONNECTORS			
J2	1	380-0134-000	CONNECTOR, 24 PIN, W/LOCKING BAIL, FEMALE
J4	1	837-0069-002	CABLE, TIP 50 TO MOTHER BOARD
J515	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J516	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J517	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J518	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
J519	1	380-0144-000	CONNECTOR, PC CARD EDGE, DUAL 28, 0.125, SOLDER
P501	1	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE
P502	1	376-0066-000	WAFER, 10 PIN, (HFAS100-10)
P503	1	376-0061-000	WAFER, 3 POS, LOCKING, KK156
P504	1	376-0061-000	WAFER, 3 POS, LOCKING, KK156
P505	1	376-0061-000	WAFER, 3 POS, LOCKING, KK156
P506	1	376-0067-000	WAFER, 5 PIN, HLSS156-5
P507	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P508	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P509	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P510	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P511	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P512	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P513	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101
P514	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101
P520	1	376-0068-000	WAFER, 9 PIN, HLSS156-9
# PC BOARD & CHASSIS			
	1	325-0292-003	BOARD, MOTHER, DELTA I & II
W501	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W502	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
	2	613-0004-001	PAD, TRANSISTOR
	1	352-0004-000	SCREW, NYLON, 6-32 X 1/4, SLOTTED RD. HD.



NOTE:
W501 & W502 MUST BE CUT AT THE SAME TIME FOR PROPER OPERATION OF CUE DETECTORS WHEN HIGH SPEED OPERATION IS DEFEATED.

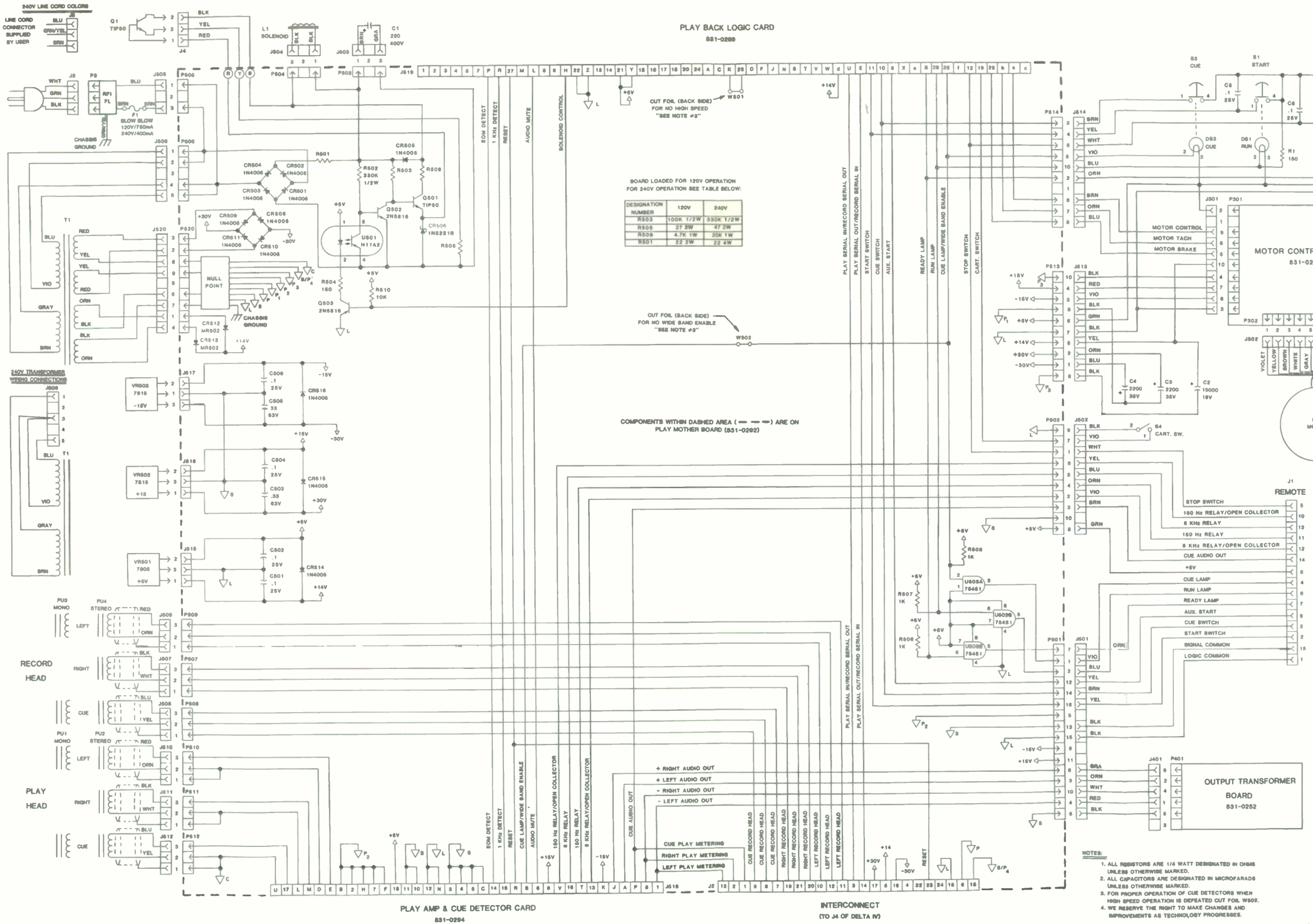
BOARD LOADED FOR 120V OPERATION
FOR 240V OPERATION SEE TABLE BELOW:

DESIGNATION NUMBER	120V	240V
R503	100K 1/2W	330K 1/2W
R505	27 2W	47 2W
R509	4.7K 1W	20K 1W
R501	22 2W	22 4W

MOTHER BOARD
831-0292-003 120V
831-0292-013 240V

FIGURE 7 - 7

831-0292
DELTA I, II MOTHERBOARD
LAYOUT



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. FOR PROPER OPERATION OF CUE DETECTORS WHEN HIGH SPEED OPERATION IS DEFEATED CUT FOIL W502.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 7 - 8

831-0292
DELTA I, II MOTHERBOARD
SCHEMATIC AND INTERCONNECT DIAGRAM

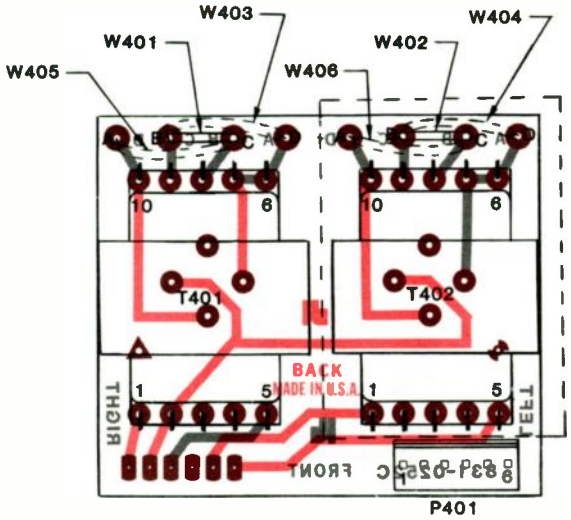
DELTA I, II OUTPUT TRANSFORMER BOARD 831-0252

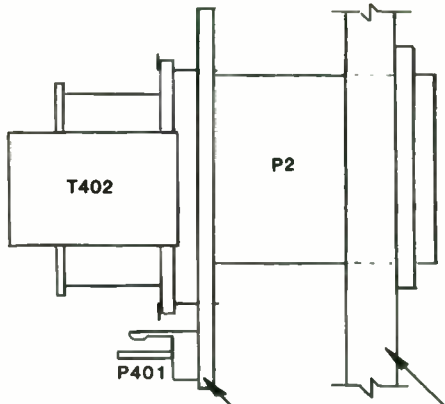
PARTS LIST

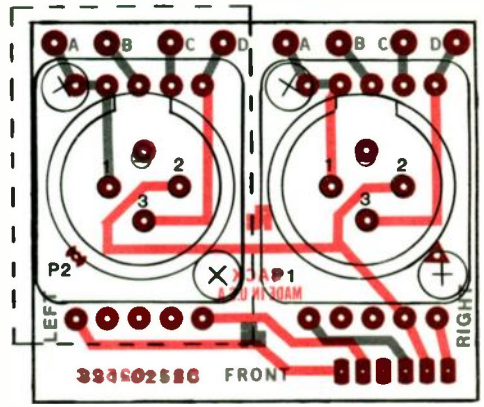
	1	325-0252-003	BOARD, AUDIO OUTPUT TRANSFORMER
#	TRANSFORMERS		
T401	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T402	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
#	OUTPUT STRAPPING		
W401	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W402	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W403	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W404	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W405	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W406	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
#	CONNECTORS		
P1	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
J401	1	376-0058-000	WAFER, 6 POS., LOCKING, #22-27-2061
	CAPACITORS (TRANSFORMERLESS)		
C401	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD
C402	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD
C403	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD
C404	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD

FIGURE 7 - 9

831-0252
DELTA I, II OUTPUT TRANSFORMER
BOARD LAYOUT



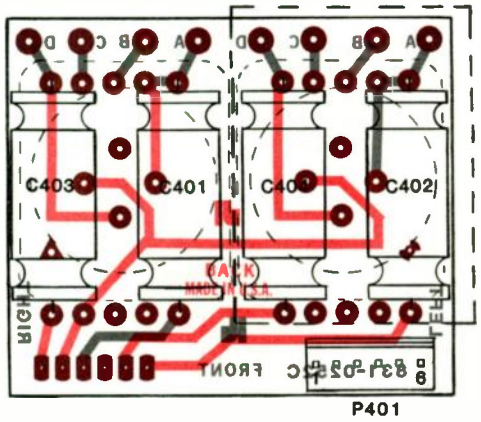




COMPONENTS WITHIN DASHED LINED AREAS
NOT USED IN MONO MACHINES

P. C. BOARD
831-0252

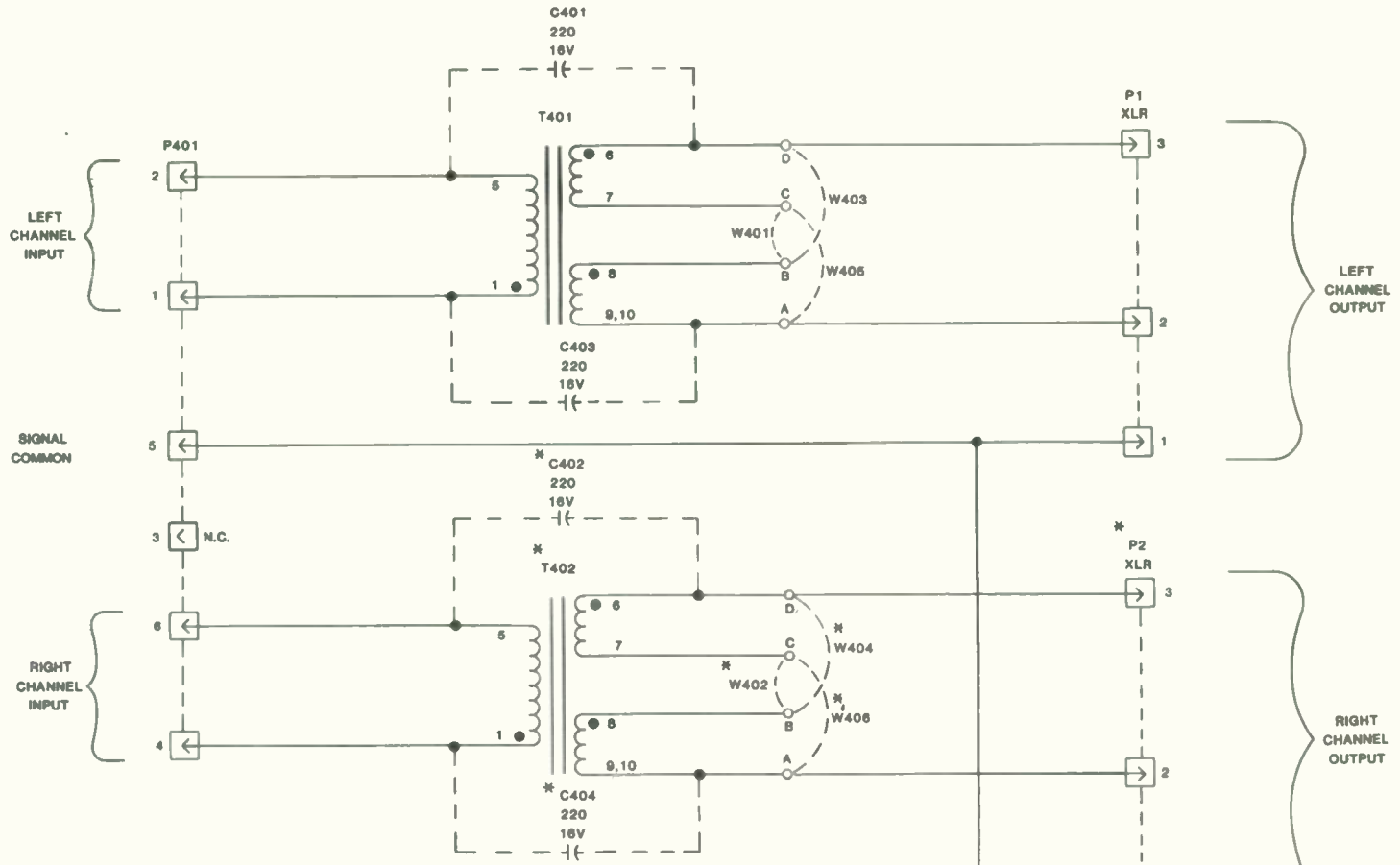
REAR PANEL
281-0097-023



IMPEDANCE TABLE

IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS LOAD IMPEDANCE	WITH TRANSFORMER (S)	
	STRAP (S)	
	W401 (BC)	W402 (BC)
150 OHMS LOAD IMPEDANCE	W403 (BD) & W405 (AC)	W404 (BD) & W406 (AC)
600 OHMS LOAD IMPEDANCE (75 OHMS DRIVING POINT IMPEDANCE)	TRANSFORMERLESS	
	CAPACITORS	
	C401 C403	C402 C404

DELTA I OUTPUT TRANSFORMER BOARD
831-0252-003 MONO WITH TRANSFORMER
831-0252-013 STEREO WITH TRANSFORMERS
831-0252-023 MONO WITHOUT TRANSFORMER
831-0252-033 STEREO WITHOUT TRANSFORMERS



IMPEDANCE TABLE

IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS LOAD IMPEDANCE	WITH TRANSFORMER (S)	
	STRAP (S)	
	W401 (BC)	W402 (BC)
150 OHMS LOAD IMPEDANCE	W403 (BD) & W405 (AC)	W404 (BD) & W406 (AC)
600 OHMS LOAD IMPEDANCE (75 OHMS DRIVING POINT IMPEDANCE)	TRANSFORMERLESS	
	CAPACITORS	
	C401 C403	C402 C404

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. COMPONENTS MARKED (*) ARE NOT USED IN MONO MACHINES.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

831-0252
DELTA I, II OUTPUT TRANSFORMER BOARD
SCHEMATIC

FIGURE 7 - 10

DELTA III POWER COMPONENTS BOARD 831-0297

PARTS LIST

\# 120 VOLT VERSION

\# RESISTORS

R701	1	628-0057-000	RESISTOR, WW, 22 OHM, 2 W, BWH
R702	1	630-0323-000	RESISTOR, CARBON FILM, 330K OHM, 1/2W, 5%
R703	1	630-0311-000	RESISTOR, CARBON FILM, 100K OHM, 1/2W, 5%
R704	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4 W, 5%
R705	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R706	1	626-0479-000	RESISTOR, CARBON COMP., 4.7K OHM, 1W
R707	1	628-0059-000	RESISTOR, WW, 27 OHM, 2 W, BWH
R708	1	628-0057-000	RESISTOR, WW, 22 OHM, 2 W, BWH
R709	1	630-0323-000	RESISTOR, CARBON FILM, 330K OHM, 1/2W, 5%
R710	1	630-0311-000	RESISTOR, CARBON FILM, 100K OHM, 1/2W, 5%
R711	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4W, 5%
R712	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4W, 5%
R713	1	626-0479-000	RESISTOR, CARBON COMP., 4.7K OHM, 1W
R714	1	628-0059-000	RESISTOR, WW, 27 OHM, 2 W, BWH
R715	1	628-0057-000	RESISTOR, WW, 22 OHM, 2 W, BWH
R716	1	630-0323-000	RESISTOR, CARBON FILM, 330K OHM, 1/2W, 5%
R717	1	630-0311-000	RESISTOR, CARBON FILM, 100K OHM, 1/2W, 5%
R718	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4W, 5%
R719	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4W, 5%
R720	1	626-0479-000	RESISTOR, CARBON COMP., 4.7K OHM, 1W
R721	1	628-0059-000	RESISTOR, WW, 27 OHM, 2 W, BWH
R722	1	630-0047-000	RESISTOR, CARBON FILM, 220 OHM, 1/4W, 5%
R723	1	636-0001-000	POTENTIOMETER, 1K, 1/2W, PC FLAT

\# DIODES

CR701	1	575-0007-000	DIODE, 1N4005
CR702	1	575-0007-000	DIODE, 1N4005
CR703	1	575-0007-000	DIODE, 1N4005
CR704	1	575-0007-000	DIODE, 1N4005
CR705	1	575-0032-000	DIODE, POWER 3A, 200 VOLT MR 502
CR706	1	575-0032-000	DIODE, POWER 3A, 200 VOLT MR 502
CR707	1	575-0007-000	DIODE, 1N4005
CR708	1	575-0007-000	DIODE, 1N4005
CR709	1	577-0011-000	DIODE, ZENER, 1N5231B
CR710	1	575-0007-000	DIODE, 1N4005
CR711	1	575-0007-000	DIODE, 1N4005
CR712	1	577-0011-000	DIODE, ZENER, 1N5231B
CR713	1	575-0007-000	DIODE, 1N4005
CR714	1	575-0007-000	DIODE, 1N4005
CR715	1	575-0007-000	DIODE, ZENER, 1N5231B
CR716	1	575-0007-000	DIODE, 1N4005
CR717	1	575-0007-000	DIODE, 1N4005
CR718	1	575-0007-000	DIODE, 1N4005
CR719	1	575-0007-000	DIODE, 1N4005

\# TRANSISTORS

U701	1	585-0010-000	OPTO-ISOLATER, H11A2
U702	1	585-0010-000	OPTO-ISOLATER, H11A2
U703	1	585-0010-000	OPTO-ISOLATER, H11A2
Q701	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q702	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q703	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q704	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q705	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q706	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q707	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q708	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q709	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q710	1	590-0017-000	TRANSISTOR, 2N5816, NPN
Q711	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q712	1	590-0033-000	TRANSISTOR, TIP50, NPN, POWER

\# CONNECTORS

J704	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J705	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J706	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
P701	1	376-0058-000	WAFER, 6 POS., LOCKING, 22-23-2061
P702	1	376-0065-000	WAFER, 3 POS., LOCKING, HLSS100-3

\# MISCELLANEOUS

C701	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
	1	325-0297-003	BOARD, POWER COMPONENTS DIII
U701-3	3	613-0007-000	SOCKET, IC, 8 PIN, DIP
	6	613-0004-001	PAD, TRANSISTOR
	1	613-0014-000	INSULATOR, TO220
	1	350-0615-000	SCREW, 6-32 X 1 3/8 PHIL.,PAN HD., ZP
	1	352-0004-000	SCREW, NYLON, 6-32 X 1/4 RD. HD.
	1	300-0101-000	SPACER, NYLON, 1", SELF-LOCKING
	1	300-0102-000	SPACER, NYLON, #6 X 1/4 X 1

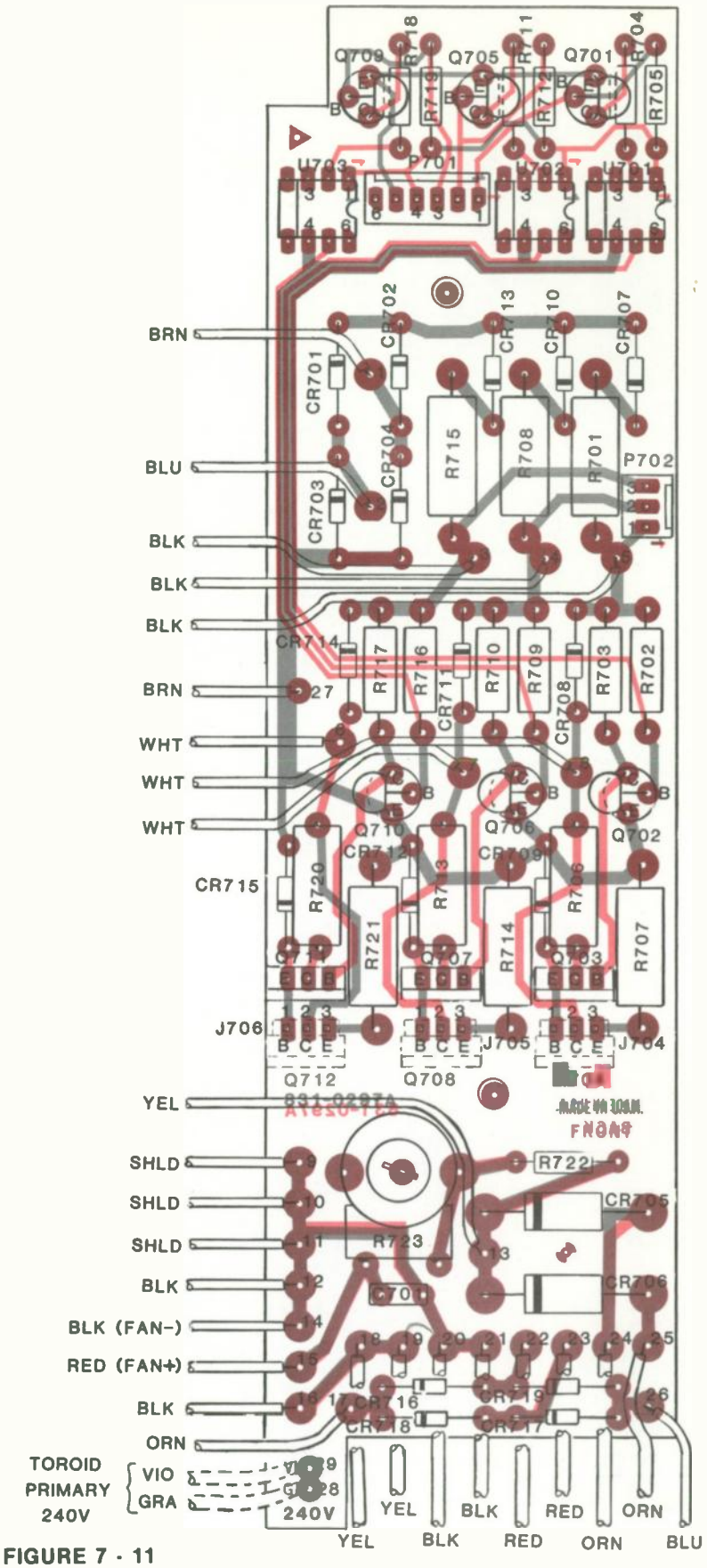


FIGURE 7 - 11

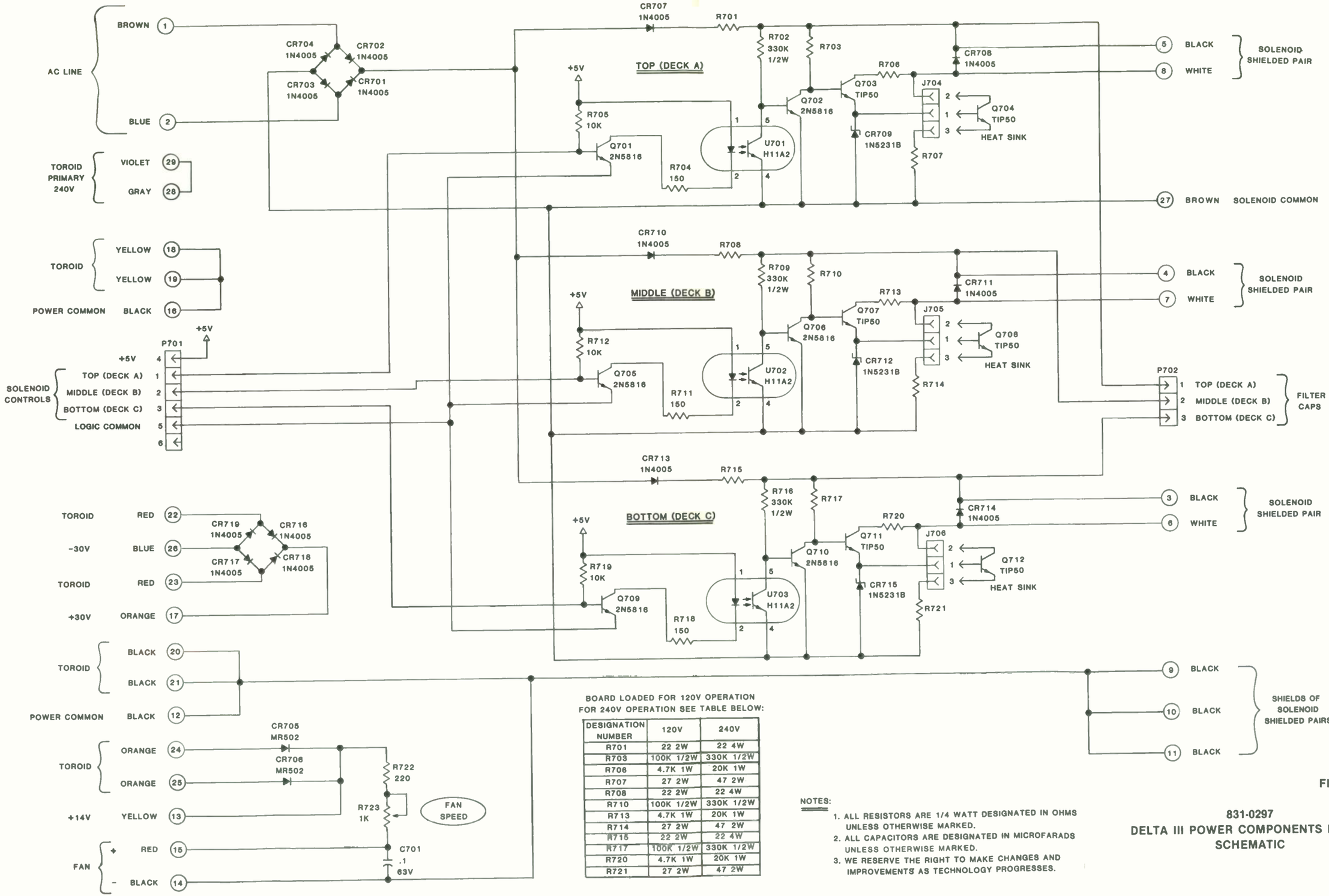
831-0297
DELTA III POWER COMPONENTS BOARD
LAYOUT

BOARD LOADED FOR 120V OPERATION
FOR 240V OPERATION SEE TABLE BELOW:

DESIGNATION NUMBER	120V	240V
R703	100K	330K
R706	4.7K	20K
R707	27	47
R710	100K	330K
R713	4.7K	20K
R714	27	47
R717	100K	330K
R720	4.7K	20K
R721	27	47

DELTA III POWER COMPONENTS BOARD
831-0297-003 DOMESTIC 120V
831-0297-013 EXPORT 240V

1 BLK
1 Yel OL



BOARD LOADED FOR 120V OPERATION
FOR 240V OPERATION SEE TABLE BELOW:

DESIGNATION NUMBER	120V	240V
R701	22 2W	22 4W
R703	100K 1/2W	330K 1/2W
R706	4.7K 1W	20K 1W
R707	27 2W	47 2W
R708	22 2W	22 4W
R710	100K 1/2W	330K 1/2W
R713	4.7K 1W	20K 1W
R714	27 2W	47 2W
R715	22 2W	22 4W
R717	100K 1/2W	330K 1/2W
R720	4.7K 1W	20K 1W
R721	27 2W	47 2W

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.

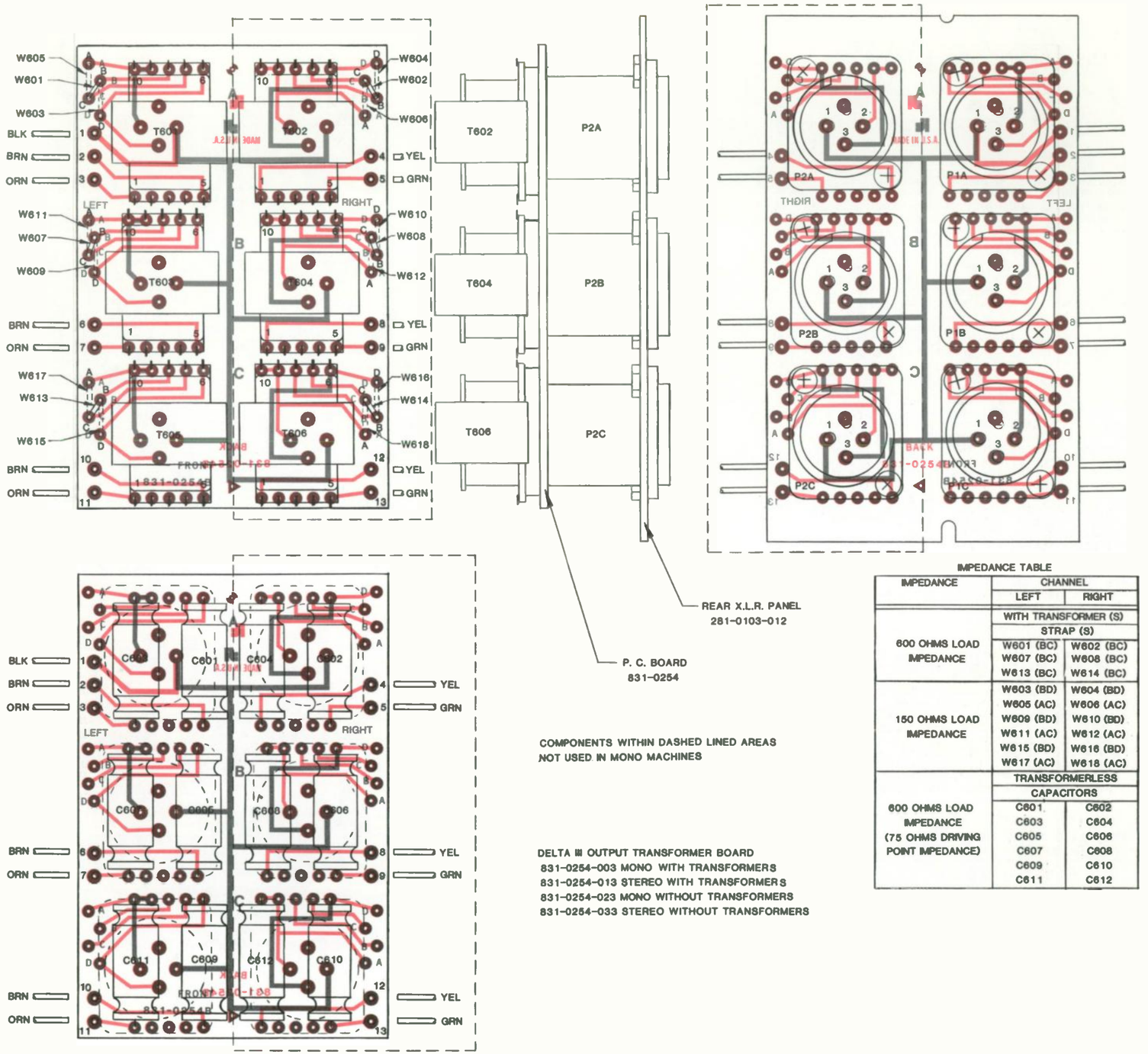
FIGURE 7 - 12

831-0297
DELTA III POWER COMPONENTS BOARD SCHEMATIC

DELTA III OUTPUT TRANSFORMER BOARD 831-0254

PARTS LIST

#	TRANSFORMERS		
T601	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T602	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T603	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T604	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T605	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
T606	1	532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724
#	CONNECTORS		
P1A	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2A	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P1B	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2B	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P1C	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2C	1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
#	OUTPUT STRAPPING		
W601	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W602	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W603	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W604	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W605	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W606	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W607	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W608	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W609	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W610	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W611	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W612	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W613	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W614	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W615	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W616	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W617	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W618	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
#	CAPACITORS (TRANSFORMERLESS)		
C601	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C602	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C603	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C604	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C605	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C606	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C607	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C608	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C609	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C610	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C611	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
C612	1	697-0001-000	CAPACITOR, ELECTROLYTIC, NON-POLAR, 220 UFD 16V
#	MISCELLANEOUS		
	1	325-0254-003	BOARD, AUDIO OUTPUT TRANSFORMER DIII
	13	382-0019-000	PIN, MALE, PCB, #R62-3



IMPEDANCE TABLE

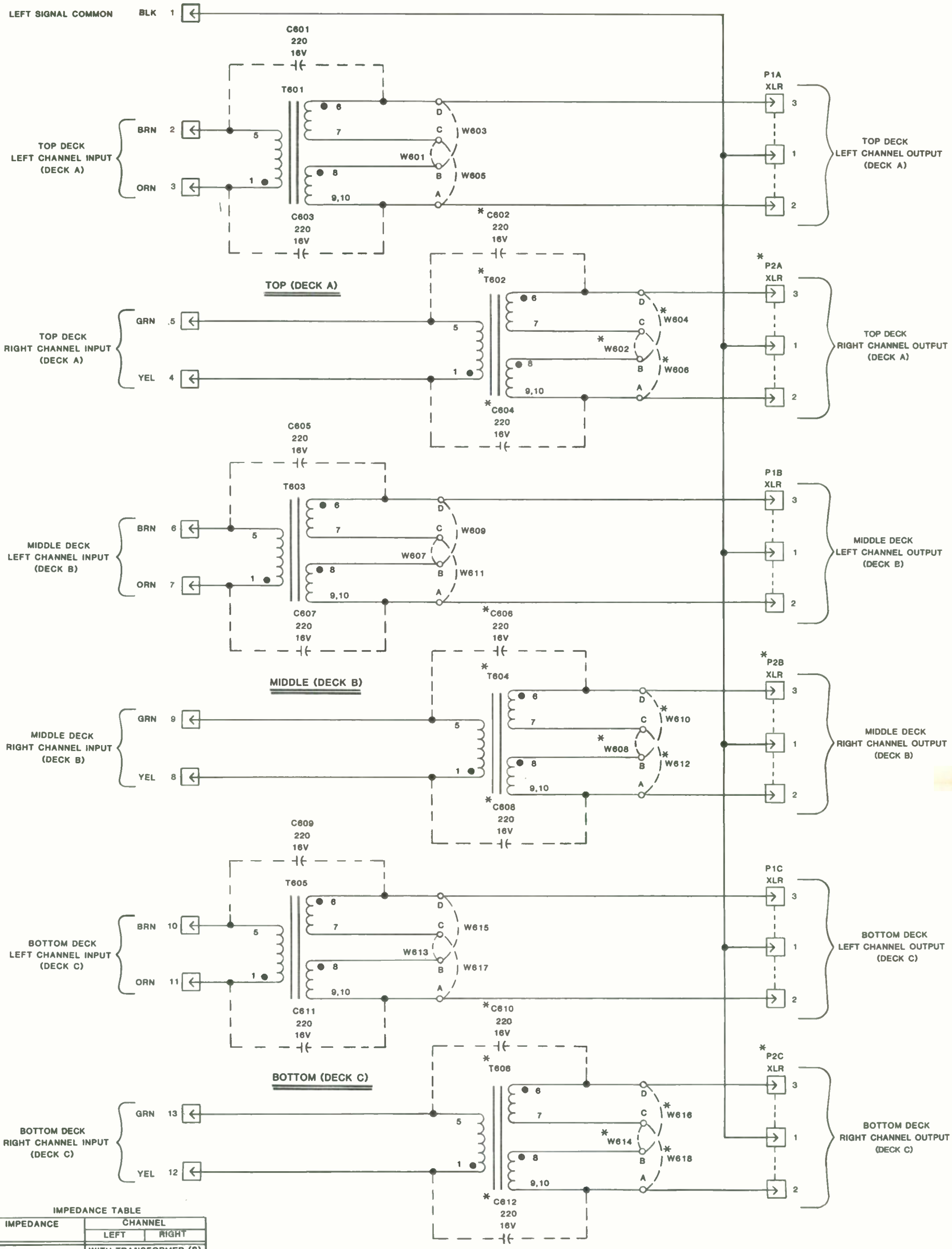
IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS LOAD IMPEDANCE	WITH TRANSFORMER (S) STRAP (S)	
	W601 (BC)	W602 (BC)
	W607 (BC)	W608 (BC)
	W613 (BC)	W614 (BC)
150 OHMS LOAD IMPEDANCE	W603 (BD)	W604 (BD)
	W605 (AC)	W606 (AC)
	W609 (BD)	W610 (BD)
	W611 (AC)	W612 (AC)
	W615 (BD)	W616 (BD)
	W617 (AC)	W618 (AC)
600 OHMS LOAD IMPEDANCE (75 OHMS DRIVING POINT IMPEDANCE)	TRANSFORMERLESS CAPACITORS	
	C601	C602
	C603	C604
	C605	C606
	C607	C608
	C609	C610
	C611	C612

COMPONENTS WITHIN DASHED LINED AREAS NOT USED IN MONO MACHINES

DELTA III OUTPUT TRANSFORMER BOARD
831-0254-003 MONO WITH TRANSFORMERS
831-0254-013 STEREO WITH TRANSFORMERS
831-0254-023 MONO WITHOUT TRANSFORMERS
831-0254-033 STEREO WITHOUT TRANSFORMERS

FIGURE 7 - 13

831-0254
DELTA III OUTPUT
TRANSFORMER BOARD
LAYOUT



IMPEDANCE TABLE

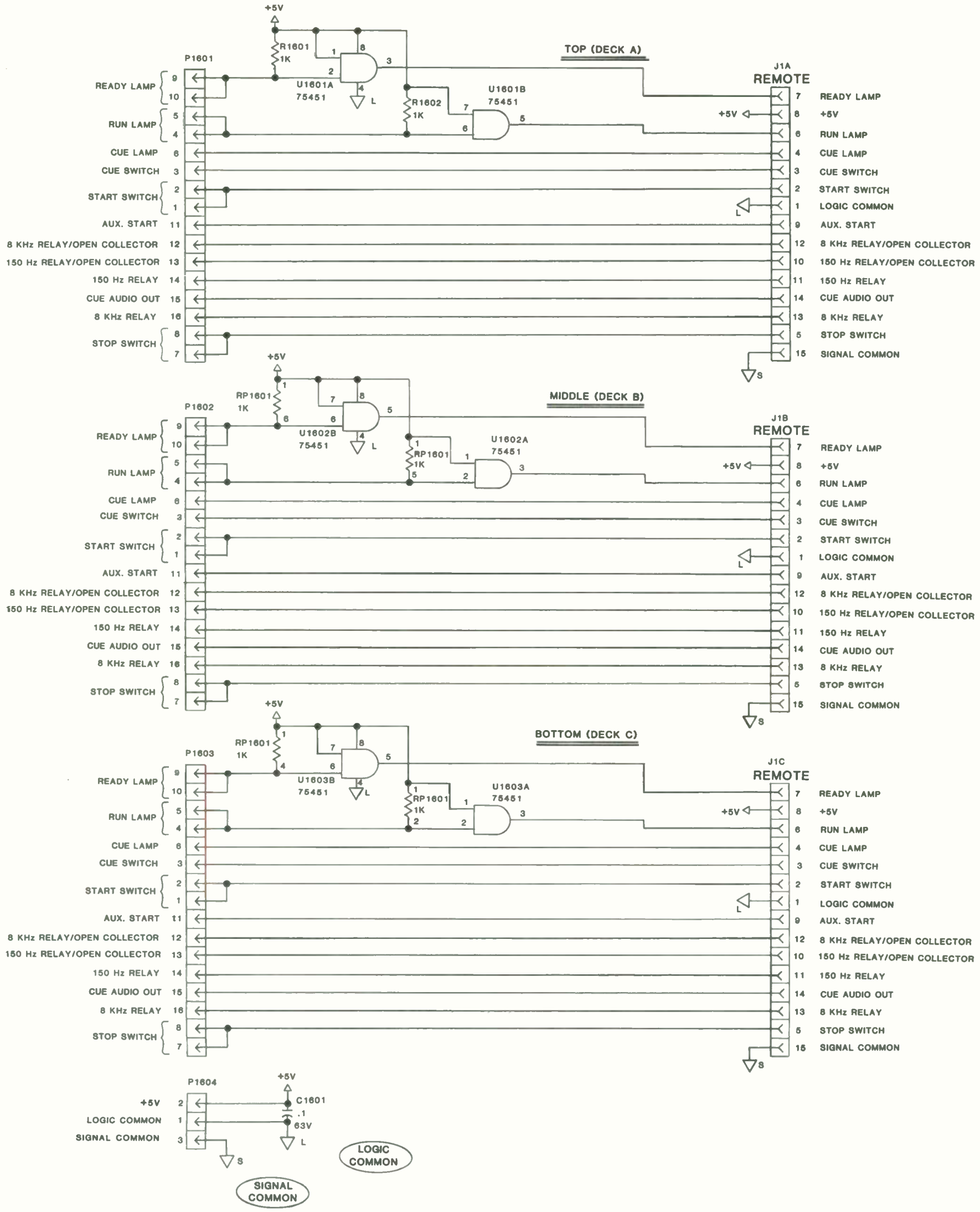
IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS LOAD IMPEDANCE	WITH TRANSFORMER (S) STRAP (S)	
	W601 (BC)	W602 (BC)
	W607 (BC)	W608 (BC)
	W613 (BC)	W614 (BC)
150 OHMS LOAD IMPEDANCE	W603 (BD)	W604 (BD)
	W605 (AC)	W606 (AC)
	W609 (BD)	W610 (BD)
	W611 (AC)	W612 (AC)
	W615 (BD)	W616 (BD)
	W617 (AC)	W618 (AC)
600 OHMS LOAD IMPEDANCE (75 OHMS DRIVING POINT IMPEDANCE)	TRANSFORMERLESS CAPACITORS	
	C601	C602
	C603	C604
	C605	C606
	C607	C608
	C609	C610
	C611	C612

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. COMPONENTS MARKED (*) ARE NOT USED IN MONO MACHINES.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES

831-0254
DELTA III OUTPUT TRANSFORMER
BOARD SCHEMATIC

FIGURE 7 - 14

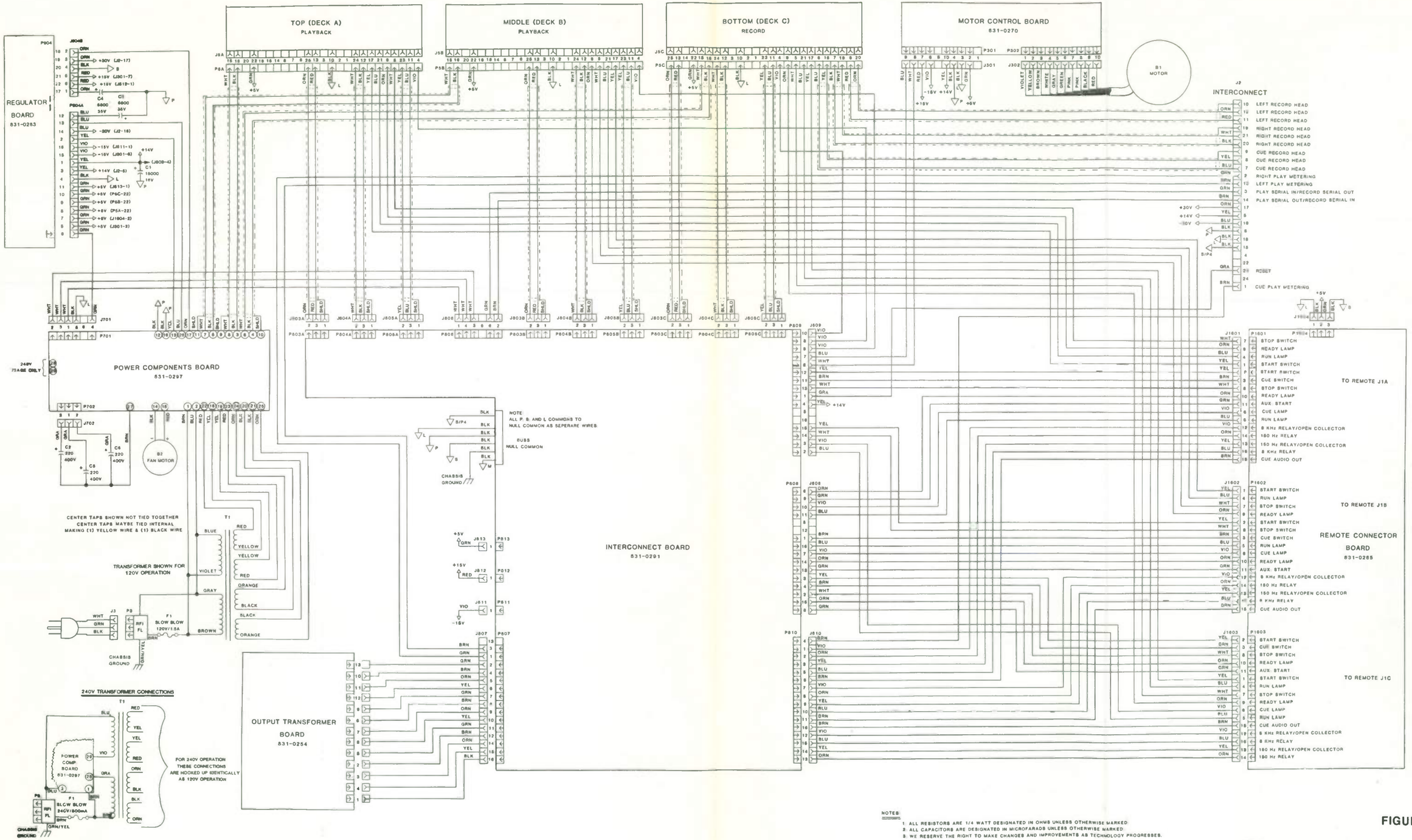


NOTES:

1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL RESISTOR PACKS ARE 1/8 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.

FIGURE 7 - 20

831-0285-003
DELTA III REMOTE CONNECTOR
BOARD SCHEMATIC

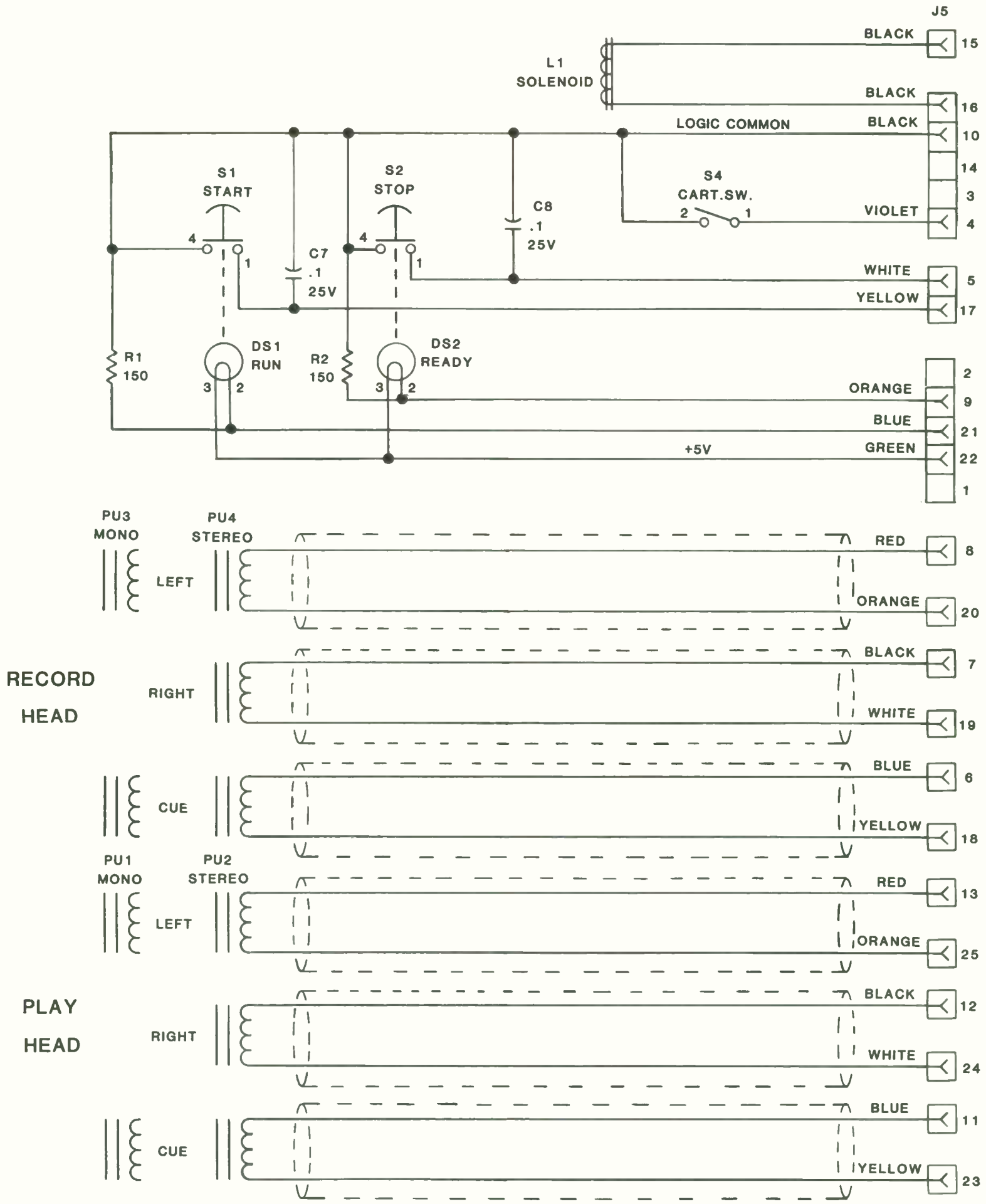


NOTES:

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 7 · 21

DELTA III MAINFRAME
WIRING SCHEMATIC



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. THE RECORD HEAD PU3 OR PU4 IS ON THE BOTTOM DECK AND USED ONLY IN DELTA III RECORD VERSION MACHINES.
4. S3 INSTALLED ONLY ON DELTA I & DELTA II MACHINES. CUE PROVISION ON DELTA III ONLY AVAILABLE AT THE REMOTE CONTROL CONNECTOR J1.
5. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

DELTA III DECK WIRING SCHEMATIC

FIGURE 7 - 22

DELTA IV RECORD LOGIC & CUE TONE GENERATOR BOARD 831-0290

PARTS LIST

#	CAPACITORS		
C1201	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1202	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1203	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1204	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1205	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1206	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1207	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C1208	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C1209	1	686-0011-000	CAPACITOR, CERAMIC, 15 PFD., 1000 WDC, 20%
C1210	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1211	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1212	1	680-0501-033	CAPACITOR, POLYESTER FILM, .0022 UFD., 100V, 5%
C1213	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1214	1	680-1963-033	CAPACITOR, POLYESTER FILM, .033 UFD, 63 V, 5%
C1215	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V 5%
C1216	1	680-0501-033	CAPACITOR, POLYESTER FILM, .0022 UFD., 100V, 5%
C1217	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1218	1	680-1963-033	CAPACITOR, POLYESTER FILM, .033 UFD, 63 V, 5%
C1219	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1220	1	680-0501-033	CAPACITOR, POLYESTER FILM, .0022 UFD., 100V, 5%
C1221	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1222	1	680-1963-033	CAPACITOR, POLYESTER FILM, .033 UFD, 63 V, 5%
C1223	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1224	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1225	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1226	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1227	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1228	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1229	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1230	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1231	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1232	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1233	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1234	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1235	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1236	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1237	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
#	RESISTOR NETWORKS		
RP1201	1	631-0007-000	RESISTOR, ARRAY, COMMON SIP, 9R, 330 OHM, 2%
#	RESISTORS		
R1201	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1202	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R1203	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R1204	1	630-0091-000	RESISTOR, CARBON FILM, 15K OHM, 1/4 W, 5%
R1205	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1206	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1207	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1208	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R1209	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R1210	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R1211	1	630-0107-000	RESISTOR, CARBON FILM, 68K OHM, 1/4/W, 5%
R1212	1	630-0095-000	RESISTOR, CARBON FILM, 22K OHM, 1/4 W, 5%
R1213	1	630-0095-000	RESISTOR, CARBON FILM, 22K OHM, 1/4 W, 5%
R1214	1	630-0095-000	RESISTOR, CARBON FILM, 22K OHM, 1/4 W, 5%
R1215	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R1216	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R1217	1	630-0065-000	RESISTOR, CARBON FILM, 1.2K OHM, 1/4 W, 5%
R1218	1	630-0053-000	RESISTOR, CARBON FILM, 390 OHM, 1/4 W, 5%
R1219	1	630-0053-000	RESISTOR, CARBON FILM, 390 OHM, 1/4 W, 5%
R1220	1	630-0053-000	RESISTOR, CARBON FILM, 390 OHM, 1/4 W, 5%
R1221	1	630-0082-000	RESISTOR, CARBON FILM, 6.2K OHM, 1/4 W, 5%
R1222	1	630-0083-000	RESISTOR, CARBON FILM, 6.8K OHM, 1/4 W, 5%
R1223	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R1224	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4W, 5%
R1225	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4W, 5%
R1226	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4W, 5%
R1227	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1228	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R1229	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1230	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1231	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1232	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
#	SOCKETS		
Q1201	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
U1201	1	613-0017-000	SOCKET, IC, 40 PIN, DIP
U1202,7	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1203	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1204	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1205	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1206	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1208	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1209	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1210	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
#	SEMI-CONDUCTORS		
Q1201	1	596-0004-000	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
U1201	1	610-0006-000	IC, MICROPROCESSOR, EPROM
U1202	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1203	1	608-0033-000	IC, MC14526B, PROGRAMMABLE BINARY DIVIDE-BY-N
U1204	1	607-0045-000	IC, 74LS393, DUAL 4 BIT BINARY COUNTER
U1205	1	607-0079-000	IC, 74LS390, DUAL DECADE COUNTER
U1206	1	607-0054-000	IC, 74LS32, QUAD 2 INPUT OR
U1207	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1208	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U1209	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U1210	1	608-0027-000	IC, MC14050BCP, BUFFER/DRIVER
CR1201	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
#	MISCELLANEOUS		
	1	325-0290-003	CARD, RECORD LOGIC & CUE TONE GENERATION
	1	323-0003-001	CARD PULL, DELTAS
	1	282-0046-000	PIN, ROLL, 1/16 X 3/16
XTL1201	1	448-0009-000	CRYSTAL, 3.579 MHZ.

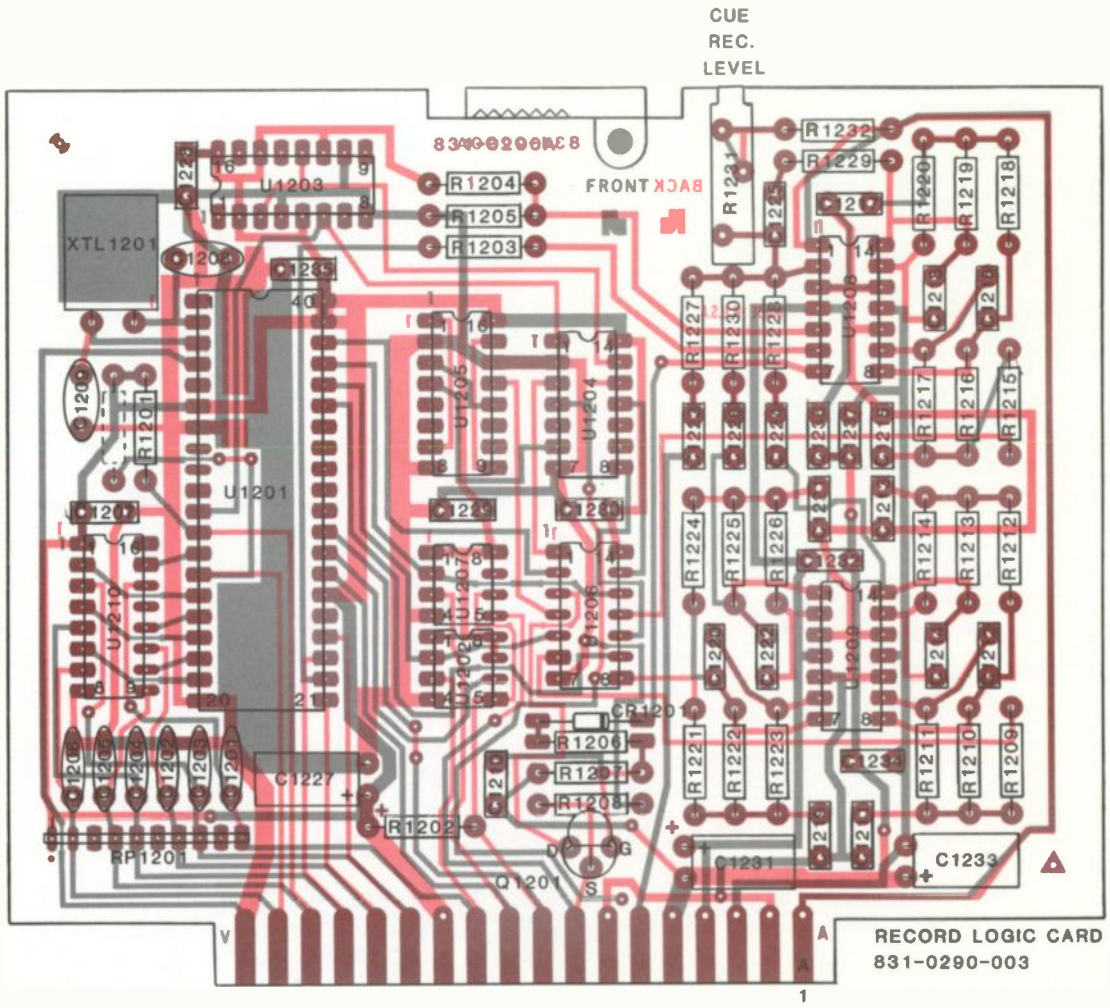
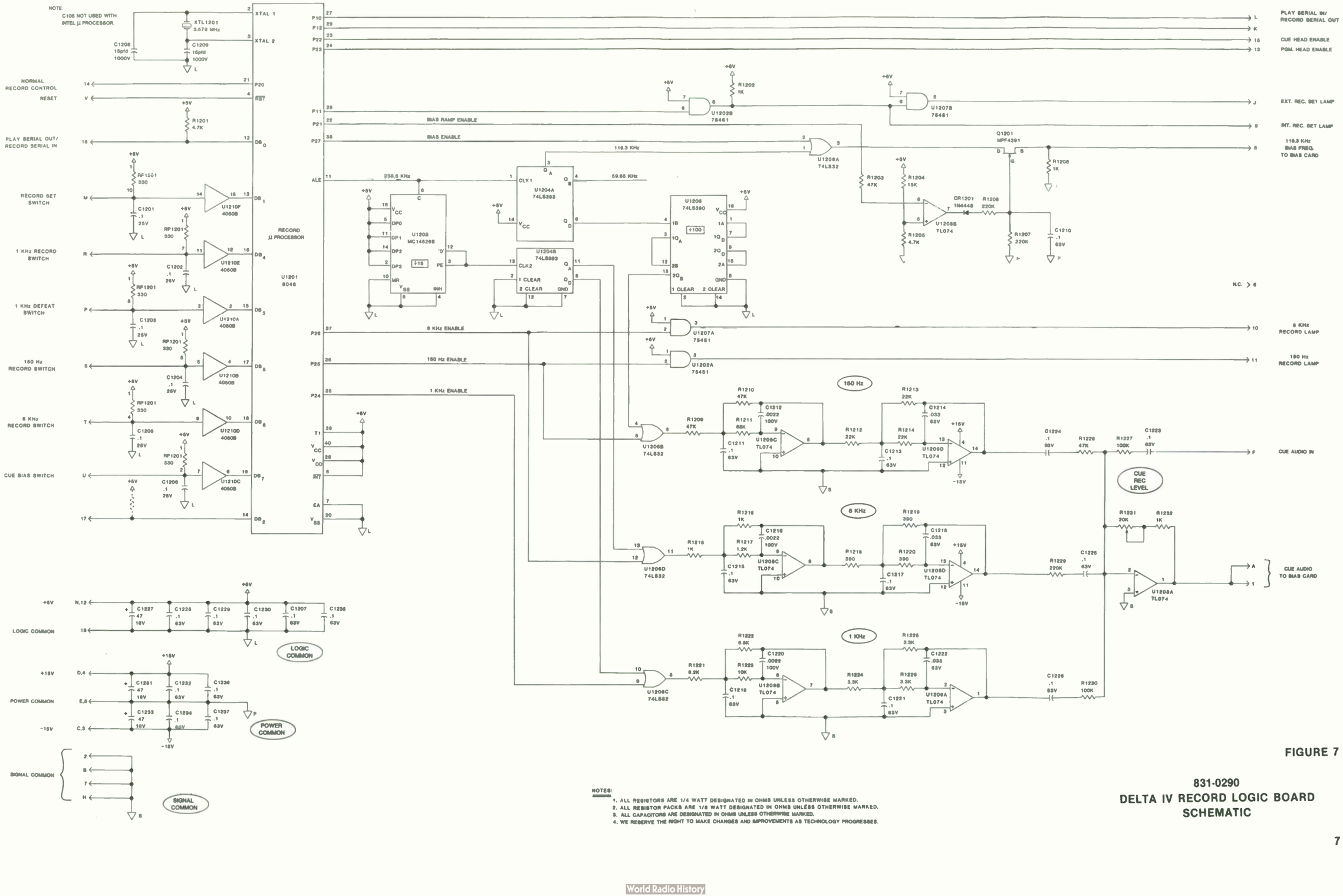


FIGURE 7 - 23

831-0290
DELTA IV RECORD LOGIC CARD
OVERLAY



NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
2. ALL RESISTOR PACKS ARE 1/8 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
3. ALL CAPACITORS ARE DESIGNATED IN OHMS UNLESS OTHERWISE MARKED.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 7 - 24

831-0290
DELTA IV RECORD LOGIC BOARD SCHEMATIC

DELTA IV RECORD & METER AMPLIFIER BOARD 831-0251

PARTS LIST

#		CAPACITORS	
C1001	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1002	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1003	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V
C1004	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V
C1005	1	695-1135-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 4.7 UFD., 35V
C1006	1	695-1135-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 4.7 UFD., 35V
C1007	1	680-1563-033	CAPACITOR, POLYESTER FILM, .015 UFD., 63V, 5%
C1008	1	680-1563-033	CAPACITOR, POLYESTER FILM, .015 UFD., 63V, 5%
C1009	1	680-2363-033	CAPACITOR, POLYESTER FILM, .068 UFD., 63V, 5%
C1010	1	680-2363-033	CAPACITOR, POLYESTER FILM, .068 UFD., 63V, 5%
C1011	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1012	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1013	1	695-1135-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 4.7 UFD., 35V
C1014	1	695-1135-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 4.7 UFD., 35V
C1015	1	695-1135-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 4.7 UFD., 35V
C1016	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1017	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1018	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C1019	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V
C1020	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1021	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1022	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1023	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%

#		RESISTORS	
R1001	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4W, 5%
R1002	1	630-0075-000	RESISTOR, CARBON FILM, 3.3K OHM, 1/4W, 5%
R1003	1	630-0101-000	RESISTOR, CARBON FILM, 39K OHM, 1/4W, 5%
R1004	1	630-0101-000	RESISTOR, CARBON FILM, 39K OHM, 1/4W, 5%
R1005	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1006	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1007	1	630-0051-000	RESISTOR, CARBON FILM, 330 OHM, 1/4W, 5%
R1008	1	630-0051-000	RESISTOR, CARBON FILM, 330 OHM, 1/4W, 5%
R1009	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R1010	1	630-0093-000	RESISTOR, CARBON FILM, 18K OHM, 1/4 W, 5%
R1011	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1012	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1013	1	630-0047-000	RESISTOR, CARBON FILM, 220 OHM, 1/4 W, 5%
R1014	1	630-0047-000	RESISTOR, CARBON FILM, 220 OHM, 1/4 W, 5%
R1015	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1016	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1017	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1018	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1019	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1020	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1021	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1022	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1023	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1024	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1025	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1026	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1027	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1028	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1029	1	630-0091-000	RESISTOR, CARBON FILM, 15K OHM, 1/4 W, 5%
R1030	1	630-0091-000	RESISTOR, CARBON FILM, 15K OHM, 1/4 W, 5%
R1031	1	630-0127-000	RESISTOR, CARBON FILM, 470K OHM, 1/4 W, 5%

#		RESISTOR NETWORKS	
RP1001	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1002	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1003	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1004	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1005	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1006	1	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K, 2%
RP1007	1	631-0033-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 22K, 2%

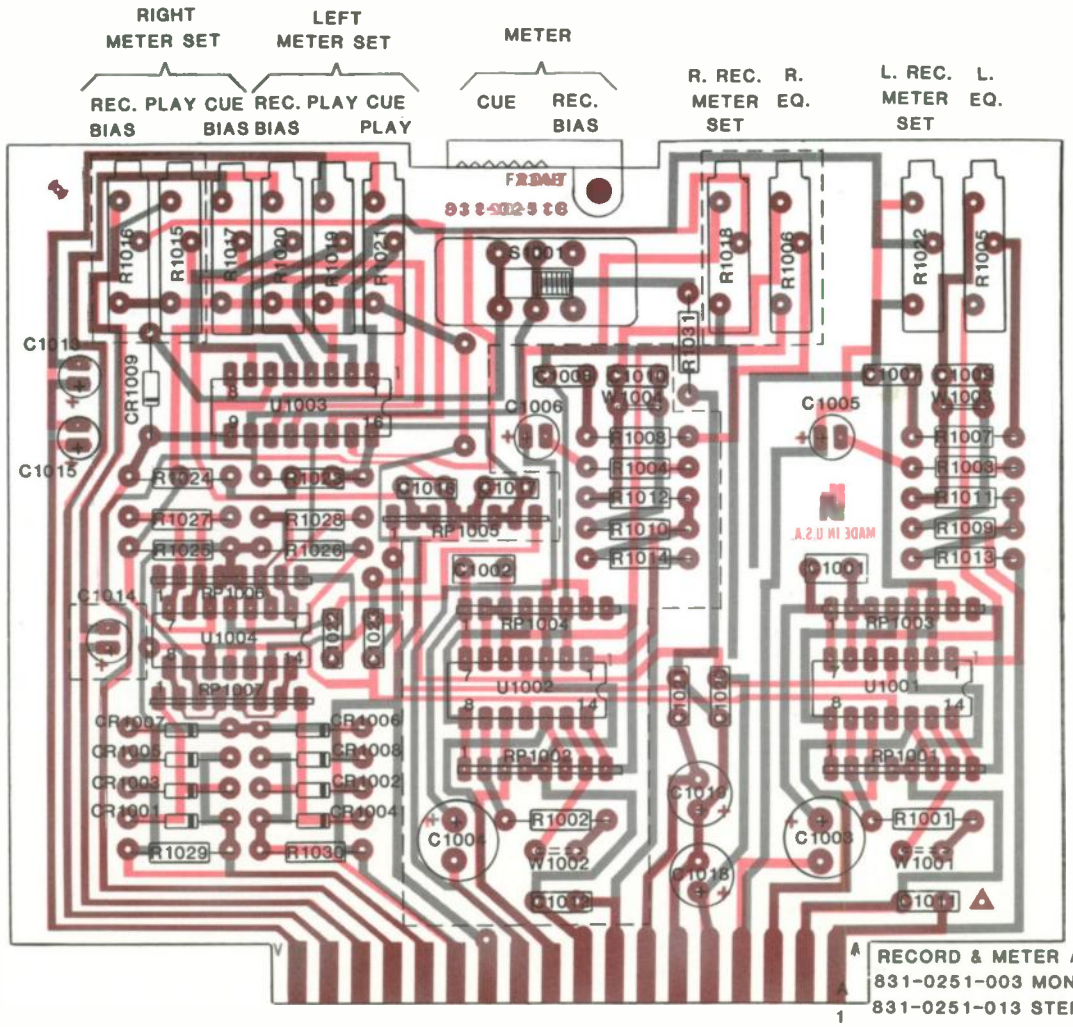
#		SEMICONDUCTORS	
U1001	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U1002	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U1003	1	608-0004-000	IC, MC14052BC, CMOS DUAL 4-1 MULTIPLEX W/DECODE
U1004	1	606-0015-000	IC, TLO84CP, QUAD BI-FET OP AMP
CR1001	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1002	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1003	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1004	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1005	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1006	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1007	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1008	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1009	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448

#		SOCKETS	
U1001	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1002	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1003	1	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1004	1	613-0008-000	SOCKET, IC, 14 PIN, DIP

#		MISCELLANEOUS	
W1001	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1002	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1003	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1004	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
S1001	1	402-0003-000	SWITCH, MINITURE SLIDE, DPDT, P.C. MOUNT
	1	325-0251-003	CARD, RECORD AND METER AMP
	1	323-0003-001	CARD PULL, DELTAS
	1	282-0046-000	PIN, ROLL, 1/16 X 3/16

FIGURE 7 - 25

831-0251
DELTA IV RECORD & METER
AMP CARD OVERLAY



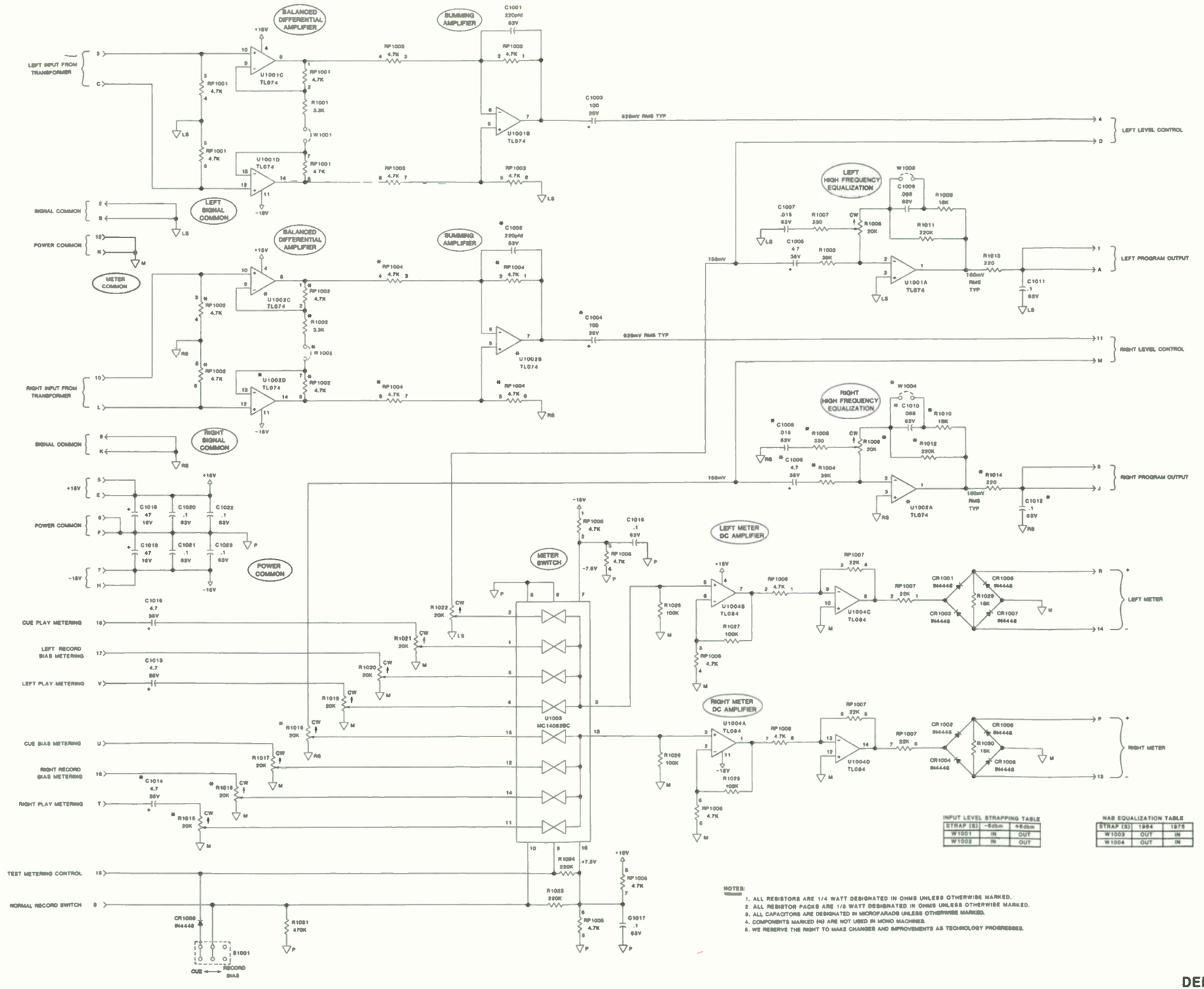
INPUT LEVEL STRAPPING TABLE

STRAP (S)	-6dbm	+6dbm
W1001	IN	OUT
W1002	IN	OUT

NAB EQUALIZATION TABLE

STRAP (S)	1964	1975
W1003	OUT	IN
W1004	OUT	IN

COMPONENTS WITHIN DASHED LINED AREAS
NOT USED IN MONO MACHINES.



INPUT LEVEL STRAPPING TABLE		
STRAP (S)	-8dbm	+4dbm
W1001	IN	OUT
W1002	IN	OUT

NAB EQUALIZATION TABLE		
STRAP (S)	1964	1975
W1003	OUT	IN
W1004	OUT	IN

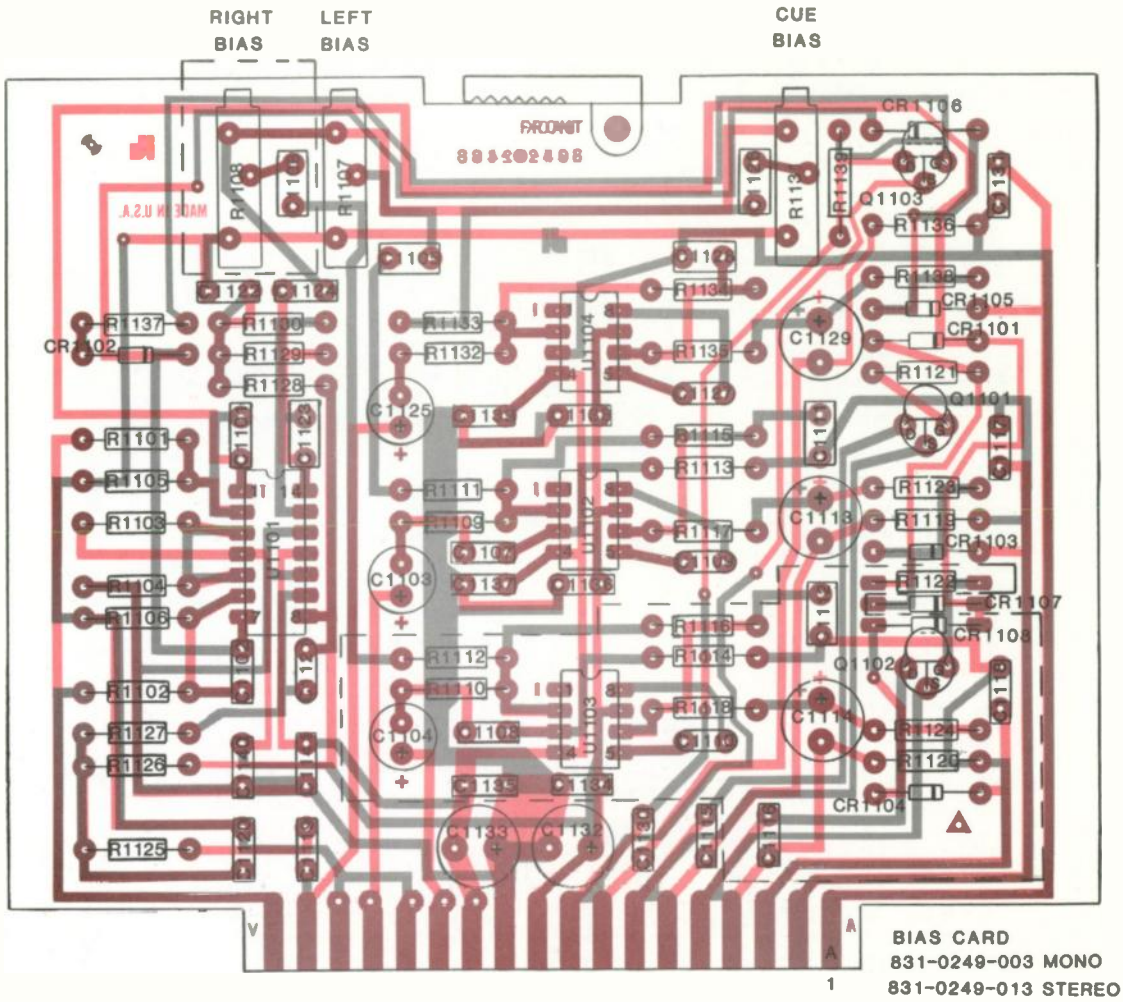
FIGURE 7 - 26

831-0251
DELTA IV RECORD AND METER AMPLIFIER BOARD SCHEMATIC

DELTA IV BIAS AMPLIFIER BOARD 831-0249

PARTS LIST

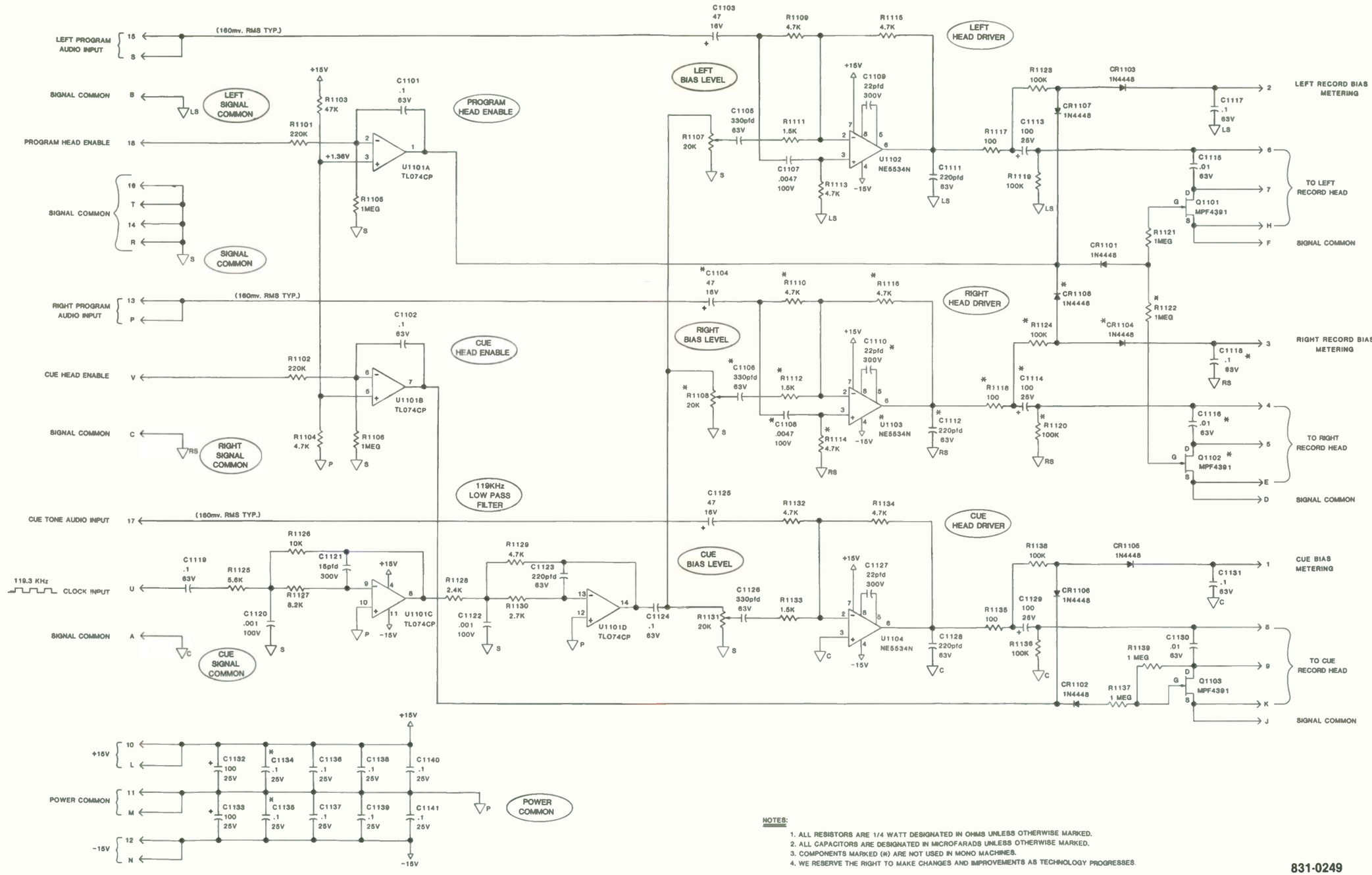
#			
CAPACITORS			
C1101	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1102	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1103	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1104	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1105	1	678-0363-033	CAPACITOR, POLYPROPYLENE, 330 PFD., 63V, 5%
C1106	1	678-0363-033	CAPACITOR, POLYPROPYLENE, 330 PFD., 63V, 5%
C1107	1	680-0901-033	CAPACITOR, POLYESTER FILM, .0047 UFD., 100V, 5%
C1108	1	680-0901-033	CAPACITOR, POLYESTER FILM, .0047 UFD., 100V, 5%
C1109	1	677-0008-000	CAPACITOR, SILVER MICA, 22 PFD., 300V
C1110	1	677-0008-000	CAPACITOR, SILVER MICA, 22 PFD., 300V
C1111	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1112	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1113	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V,
C1114	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V,
C1115	1	680-1363-033	CAPACITOR, POLYESTER FILM, .01 UFD., 63V, 5%
C1116	1	680-1363-033	CAPACITOR, POLYESTER FILM, .01 UFD., 63V, 5%
C1117	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1118	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1119	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1120	1	680-0101-033	CAPACITOR, POLYESTER FILM, .001 UFD., 100V, 5%
C1121	1	677-0013-000	CAPACITOR, SILVER MICA, 15 PFD, 300V
C1122	1	680-0101-033	CAPACITOR, POLYESTER FILM, .001 UFD., 100V, 5%
C1123	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1124	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1125	1	695-1716-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 47 UFD., 16V,
C1126	1	678-0363-033	CAPACITOR, POLYPROPYLENE, 330 PFD., 63V, 5%
C1127	1	677-0008-000	CAPACITOR, SILVER MICA, 22 PFD., 300V
C1128	1	678-0163-033	CAPACITOR, POLYPROPYLENE, 220 PFD., 63V, 5%
C1129	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V,
C1130	1	680-1363-033	CAPACITOR, POLYESTER FILM, .01 UFD., 63V, 5%
C1131	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1132	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V,
C1133	1	695-1925-013	CAPACITOR, ALUMINUM ELECTROLYTIC, 100 UFD., 25V,
C1134	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1135	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1136	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1137	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1138	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1139	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1140	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
C1141	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
RESISTORS			
R1101	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1102	1	630-0119-000	RESISTOR, CARBON FILM, 220K OHM, 1/4W, 5%
R1103	1	630-0103-000	RESISTOR, CARBON FILM, 47K OHM, 1/4W, 5%
R1104	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1105	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R1106	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R1107	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1108	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1109	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1110	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1111	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1112	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1113	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1114	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1115	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1116	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1117	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R1118	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R1119	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1120	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1121	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R1122	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R1123	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1124	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1125	1	630-0081-000	RESISTOR, CARBON FILM, 5.6K OHM, 1/4 W, 5%
R1126	1	630-0087-000	RESISTOR, CARBON FILM, 10K OHM, 1/4 W, 5%
R1127	1	630-0085-000	RESISTOR, CARBON FILM, 8.2K OHM, 1/4 W, 5%
R1128	1	630-0072-000	RESISTOR, CARBON FILM, 2.4K OHM, 1/4 W, 5%
R1129	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1130	1	630-0073-000	RESISTOR, CARBON FILM, 2.7K OHM, 1/4 W, 5%
R1131	1	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1132	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1133	1	630-0067-000	RESISTOR, CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1134	1	630-0079-000	RESISTOR, CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1135	1	630-0039-000	RESISTOR, CARBON FILM, 100 OHM, 1/4W, 5%
R1136	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1137	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
R1138	1	630-0111-000	RESISTOR, CARBON FILM, 100K OHM, 1/4 W, 5%
R1139	1	630-0135-000	RESISTOR, CARBON FILM, 1M OHM, 1/4 W, 5%
SEMICONDUCTORS			
CR1101	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1102	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1103	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1104	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1105	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1106	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1107	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
CR1108	1	575-0031-000	DIODE, SMALL SIGNAL 1N4448
Q1101	1	596-0004-000	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
Q1102	1	596-0004-000	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
Q1103	1	596-0004-000	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
U1101	1	606-0016-000	IC, TLO74CP, QUAD BI-FET OP AMP
U1102	1	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP
U1103	1	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP
U1104	1	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP
SOCKETS			
Q1101	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q1102	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q1103	1	613-0004-001	PAD, TRANSISTOR, #7717-137N
U1101	1	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1102	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1103	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1104	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
MISCELLANEOUS			
	1	325-0249-003	CARD, BIAS D-IV
	1	323-0003-001	CARD PULL, DELTAS
	1	282-0046-000	PIN, ROLL, 1/16 X 3/16



COMPONENTS WITHIN DASHED LINED AREAS
NOT USED IN MONO MACHINES.

FIGURE 7 - 27

831-0249
DELTA IV BIAS AMPLIFIER BOARD
LAYOUT



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. COMPONENTS MARKED (*) ARE NOT USED IN MONO MACHINES.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 7 - 28

831-0249
DELTA IV BIAS AMPLIFIER BOARD
SCHEMATIC

DELTA IV MOTHERBOARD 831-0293

PARTS LIST

	1	325-0293-003	BOARD, MOTHER DIV
#	WIRING		
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
#	CONNECTORS		
J4	1	380-0134-000	CONNECTOR, 24 PIN, W/LOCKING BAIL, FEMALE
J1408	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J1409	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J1410	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J1411	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
J1412	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
J1413	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
P1401	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101
P1402	1	376-0047-000	WAFER, 10 POS., LOCKING, KK100, #22-27-2101
P1403	1	376-0058-000	WAFER, 6 POS., LOCKING, #22-27-2061
P1404	1	376-0057-000	WAFER, 16 POS., LOCKING, #22-27-2161
P1405	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P1406	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P1407	1	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
#	VOLTAGE REGULATORS		
VR1401	1	605-0012-000	VOLTAGE REGULATOR, MC7805CT, +5V, TO220 PLASTIC
VR1402	1	605-0010-000	VOLTAGE REGULATOR, MC7815CT, +15V, TO220 PLASTIC
VR1403	1	605-0011-000	VOLTAGE REGULATOR, MC7915CT, -15V, TO220 PLASTIC
	3	613-0014-000	INSULATOR, TO-220
	3	352-0004-000	SCREW, 6-32 X 1/4, NYLON, SLOTTED, R. HD.
#	CAPACITORS		
C1401	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1402	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1403	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1404	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
C1405	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD., 25V
C1406	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
#	DIODES		
CR1401	1	575-0007-000	DIODE, 1N4005
CR1402	1	575-0007-000	DIODE, 1N4005
CR1403	1	575-0007-000	DIODE, 1N4005

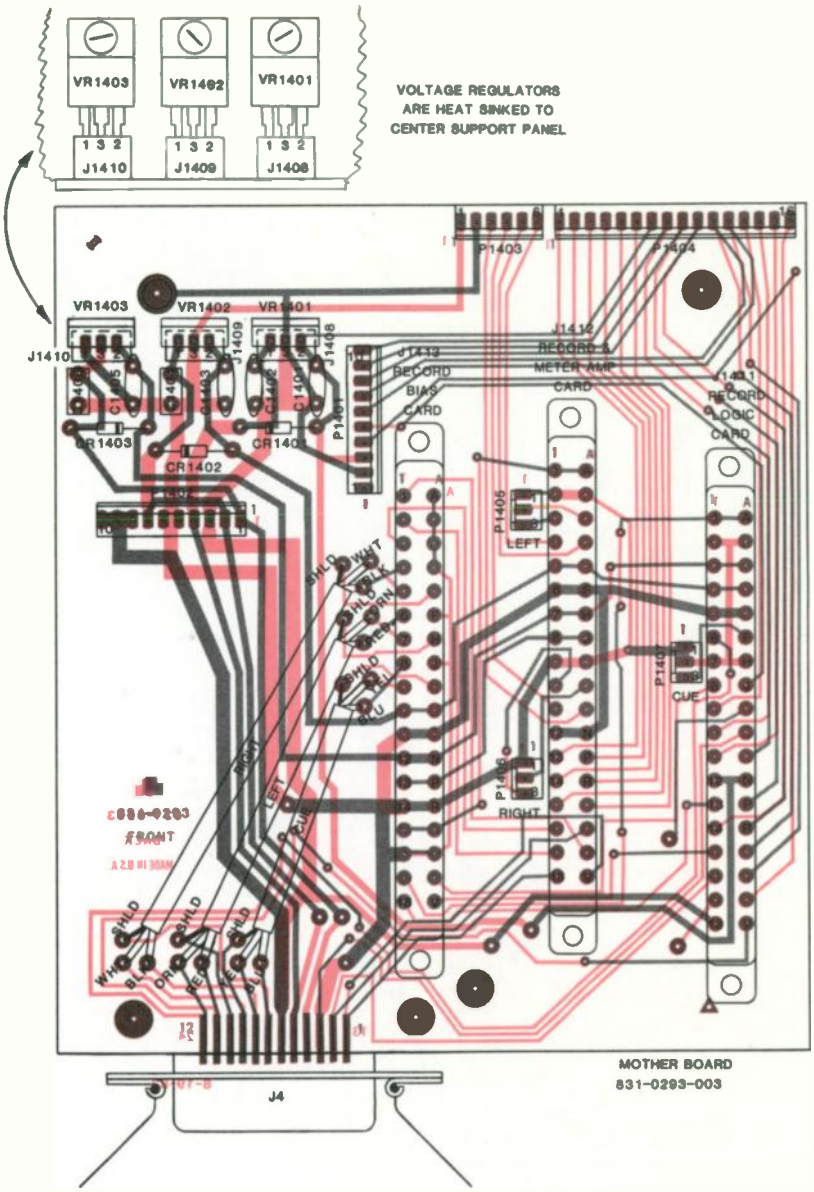


FIGURE 7 - 29

831-0293
DELTA IV MOTHERBOARD
LAYOUT

RECORD LOGIC CARD
831-0290

J3 REMOTE
J1407
YELLOW
BLUE
J1401
CUE BIAS SWITCH BRN
EXT. REC. BET LAMP RED
150 Hz RECORD SWITCH VIO
RECORD BET SWITCH ORN
8 KHz RECORD SWITCH GRA
1 KHz DEFEAT SWITCH WHT
1 KHz RECORD SWITCH YEL
+5V GRN
LOGIC COMMON BLK

P1407
P1401
CUE AUDIO IN
CUE BIAS SWITCH
EXT. REC. BET LAMP

J1411
PLAY SER. IN/REC. SER. OUT
PLAY SER. OUT/REC. SER. IN
1 KHz RECORD SWITCH
1 KHz DEFEAT SWITCH
NORMAL RECORD CONTROL
8 KHz RECORD LAMP
BIT. REC. BET LAMP
150 Hz RECORD LAMP
8 KHz RECORD SWITCH
RECORD SET SWITCH
150 Hz RECORD SWITCH

P1404
BIT. REC. BET LAMP
8 KHz RECORD LAMP
TEST METERING CONTROL
NORMAL RECORD CONTROL
NORMAL RECORD SWITCH
1 KHz DEFEAT SWITCH
1 KHz RECORD SWITCH
+ LEFT METER
- LEFT METER
+ RIGHT METER
- RIGHT METER

J1604
S1502 REC RECORD
S1501 REC SET
S1503 TER RECORD
DS1502 REC LAMP
DS1501 REC LAMP
DS1503 TER LAMP
S1507 REC METER
S1506 PLAY METER
S1505 1K DEFEAT
S1504 1 KHz ADD
M1501 LEFT
M1502 RIGHT

LEFT REC LEVEL
RIGHT REC LEVEL
J1405
R1502 2.5K
R1501 2.5K

P1403
RIGHT LEVEL CONTROL
RIGHT LEVEL CONTROL
LEFT LEVEL CONTROL
LEFT LEVEL CONTROL

VR1403 7915 -15V
VR1402 7815 +15V
VR1401 7805 +5V
C1405 .1 25V
C1406 .33 63V
C1403 .1 25V
C1404 .33 63V
C1401 .1 25V
C1402 .1 25V
CR1403 1N4005
CR1402 1N4005
CR1401 1N4005
CHASSIS GROUND

COMPONENTS WITHIN DASHED AREA (— — —) ARE ON RECORD MOTHER BOARD (831-0282)

RESET
CUE HEAD ENABLE
POM. HEAD ENABLE
118.8 KHz BIAS FREQ. TO BIAS CARD
CUE AUDIO TO BIAS CARD

PLAY/RECORD INTERCONNECT CABLE
837-0035-002
J4
PLAY SERIAL OUT/RECORD SERIAL IN
PLAY SERIAL IN/RECORD SERIAL OUT
POWER COMMON
SIGNAL/POWER 4 COMMON
LOGIC COMMON
+14V
-30V
+30V
CUE PLAY METERING
RIGHT PLAY METERING
LEFT PLAY METERING
ORANGE
WHITE
ORANGE
ORANGE
BLUE
GREEN
BLACK
BLUE
BLACK
WHITE
BLUE
GREEN
BROWN
RED
ORANGE
BLACK
WHITE
BLUE
YELLOW
BLACK
RED
BLUE
RED
BLACK

COMPONENTS IN DASHED LINED AREA ARE LOCATED ON THE REPRODUCER.
J2
PU4 STEREO
PU3 MONO
RED
BRN
LEFT
BLK
WHT
RIGHT
BLU
YEL
CUE
RECORD HEAD

J1402
P1402
YEL
BLU
ORN
BLK
BLK
BLK
C1503 3300 35V
C1501 2200 35V
C1502 2200 35V

TO DELTA IV INPUT TRANSFORMER BOARD (831-0272) LEFT CHANNEL
J1406
P1406
RED
ORANGE
SHIELD
LEFT INPUT
LEFT INPUT

TO DELTA IV INPUT TRANSFORMER BOARD (831-0272) RIGHT CHANNEL
J1406
P1406
SHIELD
WHITE
BLACK
RIGHT INPUT
RIGHT INPUT

TEST METERING CONTROL
NORMAL RECORD SWITCH
+ LEFT METER
- LEFT METER
+ RIGHT METER
- RIGHT METER
RIGHT LEVEL CONTROL
RIGHT LEVEL CONTROL
LEFT LEVEL CONTROL
LEFT LEVEL CONTROL
CUE PLAY METERING
RIGHT PLAY METERING
LEFT PLAY METERING

LEFT PROGRAM OUTPUT
RIGHT PROGRAM OUTPUT
RIGHT RECORD BIAS METERING
LEFT RECORD BIAS METERING
CUE BIAS METERING

J1412
J1413

RECORD & METER AMP CARD
831-0261

RECORD BIAS CARD
831-0249

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 7 - 30

831-0293
DELTA IV MOTHERBOARD
SCHEMATIC

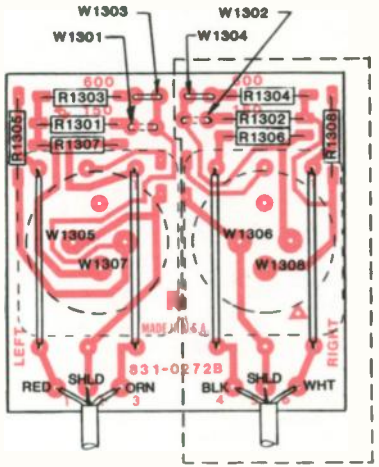
DELTA IV INPUT TRANSFORMER BOARD 831-0272

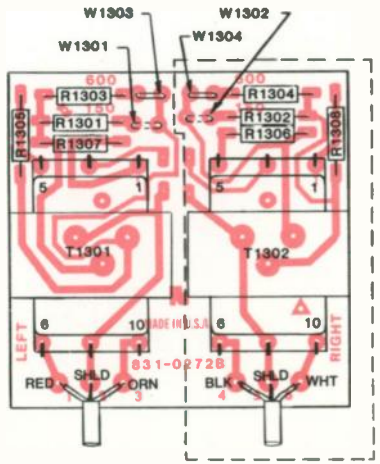
PARTS LIST

#			
# RESISTORS			
R1301	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4 W, 5%
R1302	1	630-0043-000	RESISTOR, CARBON FILM, 150 OHM, 1/4 W, 5%
R1303	1	630-0058-000	RESISTOR, CARBON FILM, 620 OHM, 1/4W, 5%
R1304	1	630-0058-000	RESISTOR, CARBON FILM, 620 OHM, 1/4W, 5%
R1305	1	630-0080-000	RESISTOR, CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1306	1	630-0080-000	RESISTOR, CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1307	1	630-0080-000	RESISTOR, CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1308	1	630-0080-000	RESISTOR, CARBON FILM, 5.1K OHM, 1/4 W, 5%
# TRANSFORMERS			
T1301	1	532-0010-000	TRANSFORMER, AUDIO INPUT +28 DBM AM 10226
T1302	1	532-0010-000	TRANSFORMER, AUDIO INPUT +28 DBM AM 10226
# CONNECTORS			
J5	1	380-0140-000	SOCKET, XLR, P.C. MOUNT (FEMALE) NC3FD-V
J6	1	380-0140-000	SOCKET, XLR, P.C. MOUNT (FEMALE) NC3FD-V
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J1405	1	380-0070-000	HOUSING, 3 POS., LOCKING, 22-01-2035
	1	441-0010-010	TUBING, TEFLON, #16, EXTRA THIN
	2	441-0002-010	TUBING, SHRINK, 1/8", RED
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J1406	1	380-0070-000	HOUSING, 3 POS.,/LOCKING, 22-01-2035
	1	441-0010-010	TUBING, TEFLON, #16, EXTRA THIN
	2	441-0003-010	TUBING, SHRINK, 1/8", WHITE
# STRAPPING			
W1301	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1302	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1303	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1304	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1305	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1306	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1307	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
W1308	1	427-0003-000	BUS WIRE, SOLID, #24 AWG (QTY. IN 1/2 INCH)
# MISCELLANEOUS			
	1	325-0272-003	BOARD, AUDIO INPUT TRANSFORMER DIV

FIGURE 7 - 31

831-0272
DELTA IV INPUT TRANSFORMER BOARD
LAYOUT





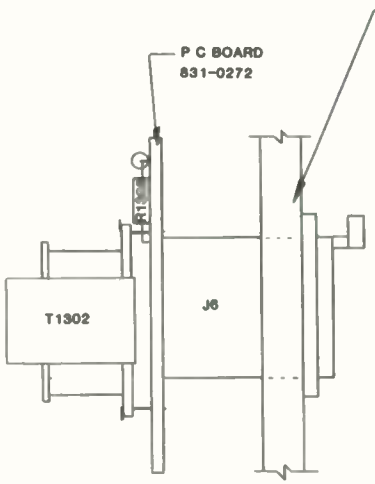
INPUT TRANSFORMER BOARD
831-0272-003 MONO WITH TRANSFORMER
831-0272-013 STEREO WITH TRANSFORMERS
831-0272-023 MONO WITHOUT TRANSFORMER
831-0272-033 STEREO WITHOUT TRANSFORMERS

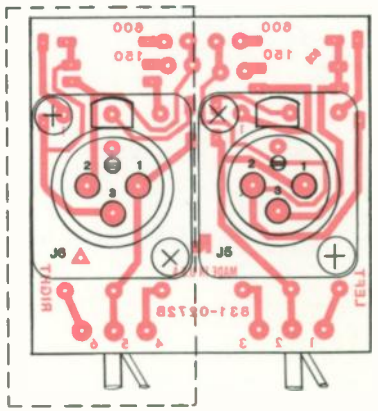
IMPEDANCE TABLE

IMPEDANCE	STRAP (S)	
	LEFT	RIGHT
20K OHMS BALANCED BRIDGING	NONE	NONE
150 OHMS	W1301	W1302
600 OHMS	W1303	W1304

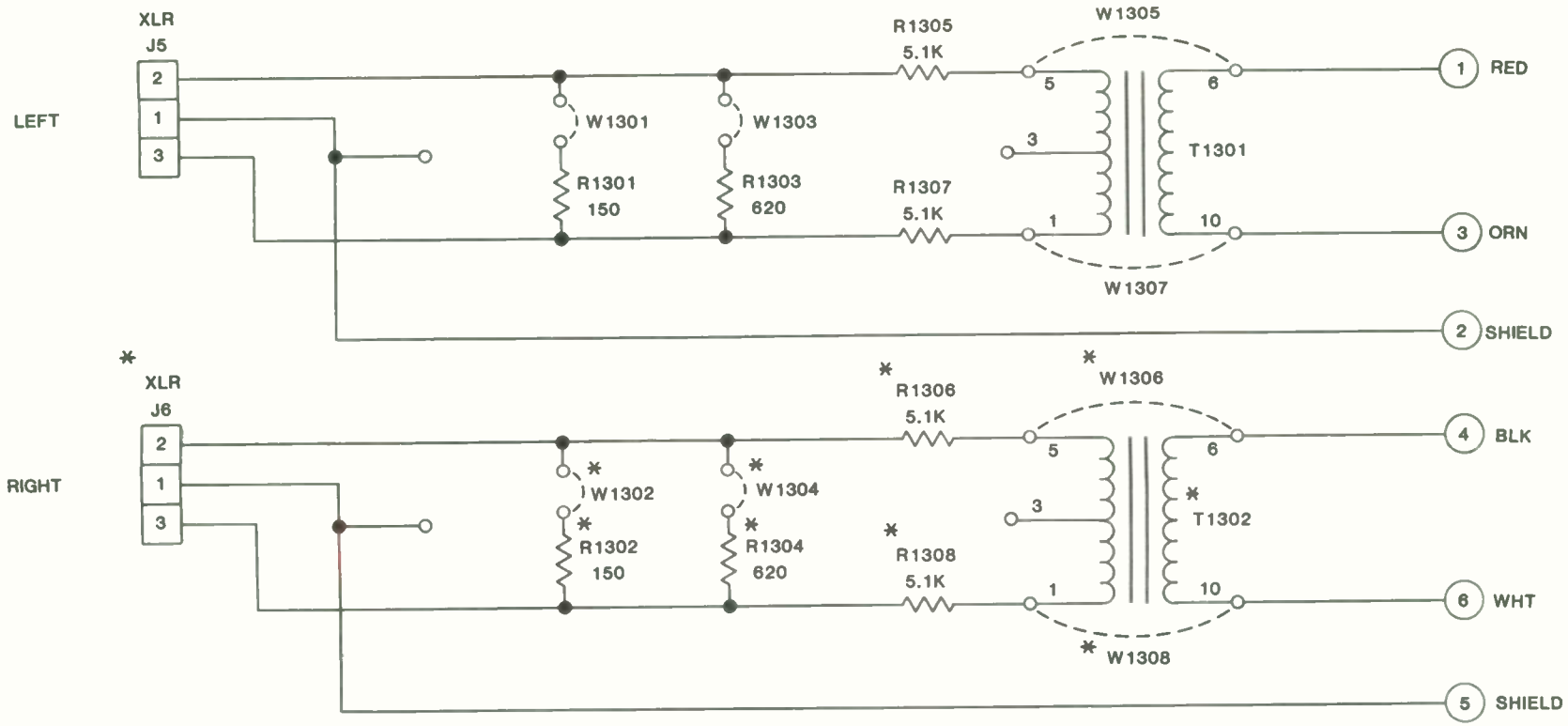
TRANSFORMER / TRANSFORMERLESS

CONDITION	STRAP (S)	
	LEFT	RIGHT
TRANSFORMER	NONE	NONE
TRANSFORMERLESS	W1305	W1306
	W1307	W1308





COMPONENTS WITHIN DASHED LINED AREAS
NOT USED IN MONO MACHINES



IMPEDANCE TABLE

IMPEDANCE	STRAP (S)	
	LEFT	RIGHT
20K OHMS BALANCED BRIDGING	NONE	NONE
150 OHMS	W1301	W1302
600 OHMS	W1303	W1304

TRANSFORMER / TRANSFORMERLESS

CONDITION	STRAP (S)	
	LEFT	RIGHT
TRANSFORMER	NONE	NONE
TRANSFORMERLESS	W1305	W1306
	W1307	W1308

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. COMPONENTS MARKED (*) ARE NOT USED IN MONO MACHINES.
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

831-0272
DELTA IV INPUT TRANSFORMER BOARD
SCHEMATIC

FIGURE 7 - 32

SECTION VIII — MAINTENANCE

A. GENERAL

International Tapetronics Corporation/3M has designed the Delta Series 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 the bearings 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. 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 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.
4. Every Six Months
   —Inspect internal electronics and mechanics for dirt or dust build up. As necessary, use an air gun or dry paint brush to clean the units' interior. CLEAN MACHINES LAST LONGER.

C. ELECTRICAL

1. Monthly
   —Degauss all heads and tape guides carefully following instructions included in the degausser used.
2. Every Six Months
   —Check and adjust playback high frequency equalization.
   —Check and adjust program recording bias and program bias meter calibration.
   —Check and adjust high frequency equalization.
   —Cue recording bias and cue bias meter calibration.
   —Cue master level control.

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 830-0043-001, a capstan shaft locator gauge;
   ITC gauge 830-0042-011, a pressure roller pressure gauge; and
   ITC gauge 830-0041-022, a head height and tape guide gap adjustment gauge.
4. Miscellaneous—
   Set of test extender PC boards
   831-0276-003 18 pin double-sided for Delta IV
   831-0277-003 18 pin double-sided for Record Logic Cards
   831-0278-003 18 pin double-sided for Record and Meter Amp Cards
   831-0279-003 18 pin double-sided for Play/Cue cards

831-0280-003 28 pin double-sided for Play Logic cards

E. TEST TAPES

Test tapes should be carefully chosen to suit your particular needs. ITC cautions 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.

We will be glad to discuss test tape requirements. Should you have questions or need assistance in choosing the correct format, call ITC Technical Service.

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 response 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, instability, or non-repeatable performance.

SECTION IX — WARRANTY

International Tapetronics Corporation/3M 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 original 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/3M 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.

SECTION X - PARTS LISTS

DELTA I,II MECHANICAL PARTS LIST - BY ASSEMBLY

LEFT SIDE PANEL			
	1	281-0106-013	PANEL, SIDE, LEFT HAND-SAND BLASTED DI
	5	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK
	1	328-0015-002	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE
LEFT CARTRIDGE HOLD DOWN			
	1	272-0034-012	GUIDE, CARTRIDGE HOLD-DOWN, LEFT-CLEAR ANODIZE
	2	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP
	2	301-0050-001	SPRING, CART GUIDE
RIGHT SIDE PANEL			
	1	281-0105-013	PANEL, SIDE, RIGHT HAND-SAND BLASTED DI
	5	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK
	1	328-0015-002	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE
ADD POWER TRANSFORMER			
T1	1	526-0020-003	TRANSFORMER, TOROID POWER DI
	1	283-0084-013	PLATE, TOROID MOUNTING-SAND BLASTED
	1	350-1037-000	SCREW, 10-32 X 1-3/4, BINDING HD., SLOTTED BRASS
	1	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP
	1	297-0036-002	SHIELD, TOROID DI,II
	2	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.
	1	300-0099-000	SPACER, 6-32 X 1/4 X 1/4 LONG, HEX, MALE/FEMALE,
WIRE HARNESS .... DELTA I 12/28/82			
J301	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0
J401	1	380-0150-000	HOUSING, 6 POS, MTA-100, 26 AWG, 640442-6
J501	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J502	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J503	1	380-0152-000	HOUSING, 3 POS, MTA-156, 26 AWG
J504	1	380-0154-000	HOUSING, 3 POS., MTA-156, 24 AWG
J505	1	380-0152-000	HOUSING, 3 POS, MTA-156, 26 AWG
J506A	1	380-0153-000	HOUSING, 5 POS, MTA-156
J506B	1	380-0155-000	HOUSING, 4 POS., MTA-156, 24 AWG
J513	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0
J514	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0
CENTER SUPPORT			
	1	283-0081-813	PLATE, CENTER SUPPORT-SAND BLASTED DI
	2	300-0099-000	SPACER, 6-32 X 1/4 X 1/4 LONG, HEX, MALE/FEMALE,
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
ADD SOLENIOD / CLEVIS ASSY			
L1	1	477-0020-001	SOLENOID, 110 V, 1.5" DIA. 3827
	2	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.
	2	365-0601-000	WASHER, #6, INTERNAL LOCK, ZP
	1	264-0001-001	CLEVIS SCREW
	1	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP
	1	277-0001-041	CHAIN, SPROCKET, 21 LINKS
	1	301-0005-001	SPRING, .207 DIA. (MW) X 1-9/16 (INSIDE HK) X .3C
	1	282-0001-001	PIN, ROLL, 1/16 X 5/16
ATTACH VOLTAGE REGULATORS			
	3	613-0014-000	INSULATOR, TO-220
	3	352-0004-000	SCREW, 6-32 X 1/4, NYLON, SLOTTED, R. HD.

ADD GROUNDING LUG			
	1	350-1038-000	SCREW, 10-32 X 1/2, PHIL., PAN HD
	1	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP
	5	375-0008-000	TERMINAL, #10, BENT, LOCKING
MOUNT CENTER SUPPORT TO DECK			
	1	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.
DECK W/CROSS SHAFT & CLAMP			
	1	267-0025-024	DECK-BRUSHED & CLEAR ANODIZED DI
	2	251-0001-051	BEARING, SLEEVE .3135 ID. X .377 OD. X 1/4 LENGTH
	1	296-0046-001	SHAFT, CROSS, DECK
	1	297-0009-001	SHIELD, LOWER HEAD
	1	262-0023-012	CLAMP, CROSS SHAFT-VIBRA BOWL
	1	282-0041-000	PIN, ROLL, 1/16 X 3/8
	1	296-0004-001	SHAFT, PRESSURE ROLLER
ADD PRESSURE ROLLER			
	1	291-0018-001	ROLLER, PRESSURE, 534AV, 60
	1	359-0025-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .003
	1	359-0026-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .004
	1	359-0027-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .005
	1	359-0028-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .007
	1	289-0002-000	RING, RETAINING, PRESSURE ROLLER SHAFT
	1	360-1005-010	WASHER, 13/64 ID. X 7/16 OD. X .015 THICK, NP
	1	359-0006-001	WASHER, NYLON, .010 X .480 OD X .193 ID
RIGHT CARTRIDGE HOLD DOWN			
	1	272-0033-012	GUIDE, CARTRIDGE HOLD-DOWN, RIGHT-CLEAR ANODIZE
	1	301-0050-001	SPRING, CART GUIDE
	2	350-0620-000	SCREW, 6-32 X 1/4, PHIL, TRUSS HD.
CART SWITCH MOUNTING			
	1	254-0097-001	BRACKET, MICRO SWITCH MOUNTING
	2	350-0604-000	SCREW, 6-32 X 1/4, PHILL, PAN, HD., ZP
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.
	2	370-0201-000	NUT, HEX, 2-56 X 3/16
S4	1	392-0009-000	SWITCH, SNAP ACTION E63-00R, SIMULATED ROLLER
HEAD ASSEMBLY WO/HEADS & CABLES			
	1	270-0010-813	FRAME, HEAD BLOCK SUPPORT-SAND BLASTED
	4	301-0054-000	SPRING, .041 WIRE, .439 LONG, 14LBS @ .572 EXTENS
	4	282-0045-000	PIN, ROLL, 5/64 DIA. X 1 3/8 LONG BLK
	1	272-0038-012	GUIDE, TAPE, LEFT HAND-VIBRA BOWL
	2	272-0039-012	GUIDE, TAPE, CENTER & RIGHT HAND-VIBRA BOWL
	6	350-0403-000	SCREW, 4-40 X 3/16, PHIL PAN ZP
	2	303-0001-001	STRAP, HEAD MOUNTING
	4	350-0307-000	SCREW, 3-48 X 5/8, PHILL., FILL., HD.
	4	355-0813-000	SCREW, 8-32 X 1/2, SOCKET, SET, CONE POINT
	2	355-0814-000	SCREW, 8-32 X 1/2, SOCKET, SET, OVAL POINT
	6	370-0801-000	HEX NUT, 8-32 X 1/4 X 3/32 THICK
	1	350-0606-000	SCREW, 6-32 X 5/8, PHIL., FLAT HD., 100 DEG
	1	350-0649-000	SCREW, 6-32 X 1 1/8, PHIL., FLAT HD., 100 DEG
	3	350-0644-000	SCREW, 6-32 X 1, PHIL., FILL. HD.
	2	300-0098-001	SPACER, HEAD SHIELD
	1	297-0034-001	SHIELD, UPPER HEAD DI,II,III

	1	253-0088-013	BLOCK, RIGHT HEAD MOUNTING-VIBRA-BOWL
	1	253-0089-013	BLOCK, LEFT HEAD MOUNTING-VIBRA BOWL
	2	282-0031-000	PIN, ROLL, 1/8 DIA., X 1 LONG
ADD HEADS			
PU2	1	504-0041-002	HEAD, MCL, STEREO PLAY, MODEL S-PL
PU4	1	504-0037-002	HEAD, RECORD, 3-QT, 100 UH
ADD PLAY HEAD CABLES			
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0002-010	TUBING, SHRINK, 1/8", RED
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0003-010	TUBING, SHRINK, 1/8", WHITE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0040-010	TUBING, SHRINK, 1/8", BLUE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
ADD CAN CAPACITORS & MOTOR SHIELD			
	1	297-0032-003	SHIELD, BOTTOM DECK
C1	1	698-0014-000	CAPACITOR, ELECTROLYTIC, 220 UFD. 400 V (CAN)
C2	1	698-0015-000	CAPACITOR, ELECTROLYTIC, 15000 UFD. 16 V (CAN)
C3	1	698-0013-000	CAPACITOR, ELECTROLYTIC, 2200 UFD. 35 V (CAN)
C4	1	698-0013-000	CAPACITOR, ELECTROLYTIC, 2200 UFD. 35 V (CAN)
	6	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.
ADD MOTOR + CONTROL CARD			
	2	350-0407-000	SCREW, 4-40 X 5/16 PHIL PAN ZP
B1	1	455-0004-003 C	MOTOR, SERVO, PAPST (SP)
	1	380-0124-000	HOUSING, 10 POS., W/LOCKING RAMP, KK100, #22-01-2
	10	382-0044-000	TERMINAL, CRIMP, 08-50-0114
	2	353-1018-000	SCREW, 10-32 X 3/4, BH, SOCKET CAP, BLACK
FRONT PANEL			
	1	281-0099-014	PANEL, FRONT-SAND BLASTED DI
	2	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK
	1	280-0044-002	NAMEPLATE, STUDDED, ITC LOGO, BLACK PLASTIC
	1	282-0010-011	PIN, DOWEL, 1/8 DIA. X 5/8 LONG
	1	364-0002-000	RETAINER, .187 STUD, .50 LONG X .38 WIDE X .017 T
	1	328-0017-001	INLAY, TOP FRONT PANEL, POLYCARBONATE DI,II
	1	328-0016-001	INLAY, BOTTOM FRONT PANEL, POLYCARBONATE DI
S1	1	391-0023-000	SWITCH, PUSH, 05-62125
S2	1	391-0023-000	SWITCH, PUSH, 05-62125
S3	1	391-0023-000	SWITCH, PUSH, 05-62125
	1	404-0059-000	LENS, YELLOW, FOR 05-62125 80-050606
	1	404-0060-000	LENS, GREEN, FOR 05-62125 80-050604
	1	404-0062-000	LENS, BLUE, FOR 05-62125
DS1	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150
DS2	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150
DS3	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150
REAR PANEL			
	1	281-0097-013	PANEL, REAR-SAND BLASTED DI
ATTACH TOROID MOUNTING PLATE			
	2	350-0612-000	SCREW, 6-32 X 7/16, PHIL., PAN, ZP
ADD AC RECEPTICLE			
P3	1	380-0072-000	RECEPTACLE, LINE CORD 17252
	1	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	1	375-0003-000	TERMINAL, # 4, BENT, LOCKING
	1	370-0402-000	NUT, 4-40X1/4, HEX, CAD. PLTD.
	1	350-0415-000	SCREW, 4-40 X 1/2, PHIL., PAN HD., NP
ADD RECORD HEAD CABLES			
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0002-010	TUBING, SHRINK, 1/8", RED
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0003-010	TUBING, SHRINK, 1/8", WHITE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-020	TUBING, SHRINK, 3/32 X 7/16 LONG, WHITE
	1	441-0040-010	TUBING, SHRINK, 1/8", BLUE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
ADD REMOTE CONNECTOR			
J1	1	380-0004-000	SOCKET, 15 PIN, CHASSIS MOUNT, S-3315AB
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP
ADD FUSE HOLDER			
F1	1	418-0005-000	FUSE HOLDER, LOW PROFILE, FEU 031.1673
	1	418-0006-000	FUSE CARRIER, 3AG, GREY, 031.1666
ADD COVER LATCH .AND. GUIDES			
	1	350-0419-000	SCREW, 4-40 X 3/4, PHIL, PAN, STEEL, ZP
	1	360-0404-000	WASHER, FLAT, #4 X 1/2 OD. X .032 THICK, STEEL
	1	370-0402-000	NUT, 4-40X1/4, HEX, CAD. PLTD.
	1	301-0055-000	SPRING, COMP., .180 OD. X 1/2 LONG X .022 MUSIC
	1	441-0034-011	TUBING, TEFLON, #10 X 27/32, THIN WALL
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.

ADD BAIL HARDWARE

1	382-0039-000	BAIL LOCK FOR CHAMP SERIES, #552562-1
2	350-0413-000	SCREW, 4-40 X 7/16, PHILL., PAN, HD.
2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP
1	417-0012-000	FUSE, CARTRIDGE (3AG) .75 AMP, 125V, TIME DELAY
1	433-0004-000	LINE CORD, 17250, 117V

FINAL DRESS ... COVERS & LABELS

1	265-0062-002	COVER, TOP, DI,IV
1	280-0045-003	LABEL, POTENTIOMETER & HEAD DI
1	046-0014-000	LABEL, TRANSFORMER WIRE CONNECTION
1	280-0022-001	LABEL, LINE VOLTAGE
1	280-0002-000	LABEL, SERIAL NUMBER
1	280-0011-001	LABEL, PATENT NUMBER
1	280-0056-000	LABEL, PRE-INSTALLATION WARNING

BOTTOM COVER W/FEET

1	265-0061-003	COVER, BOTTOM, DI,IV
3	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP
4	350-0628-000	SCREW, 6-32 X 3/8, PHIL FLAT HD., 100 DEG.
4	370-0602-000	NUT, KEPS, 6-32 X 1/4, ZP
4	311-0039-000	FEET, RUBBER, F6B (MEDIUM), BLACK
1	046-0012-000	INSTRUCTION BOOK
2	378-0019-000	PLUG, 3-PIN, STRAIGHT, FEMALE XLR
1	378-0003-000	PLUG, 15 PIN, CABLE CLAMP & LATCH, P-3315-CCT-L

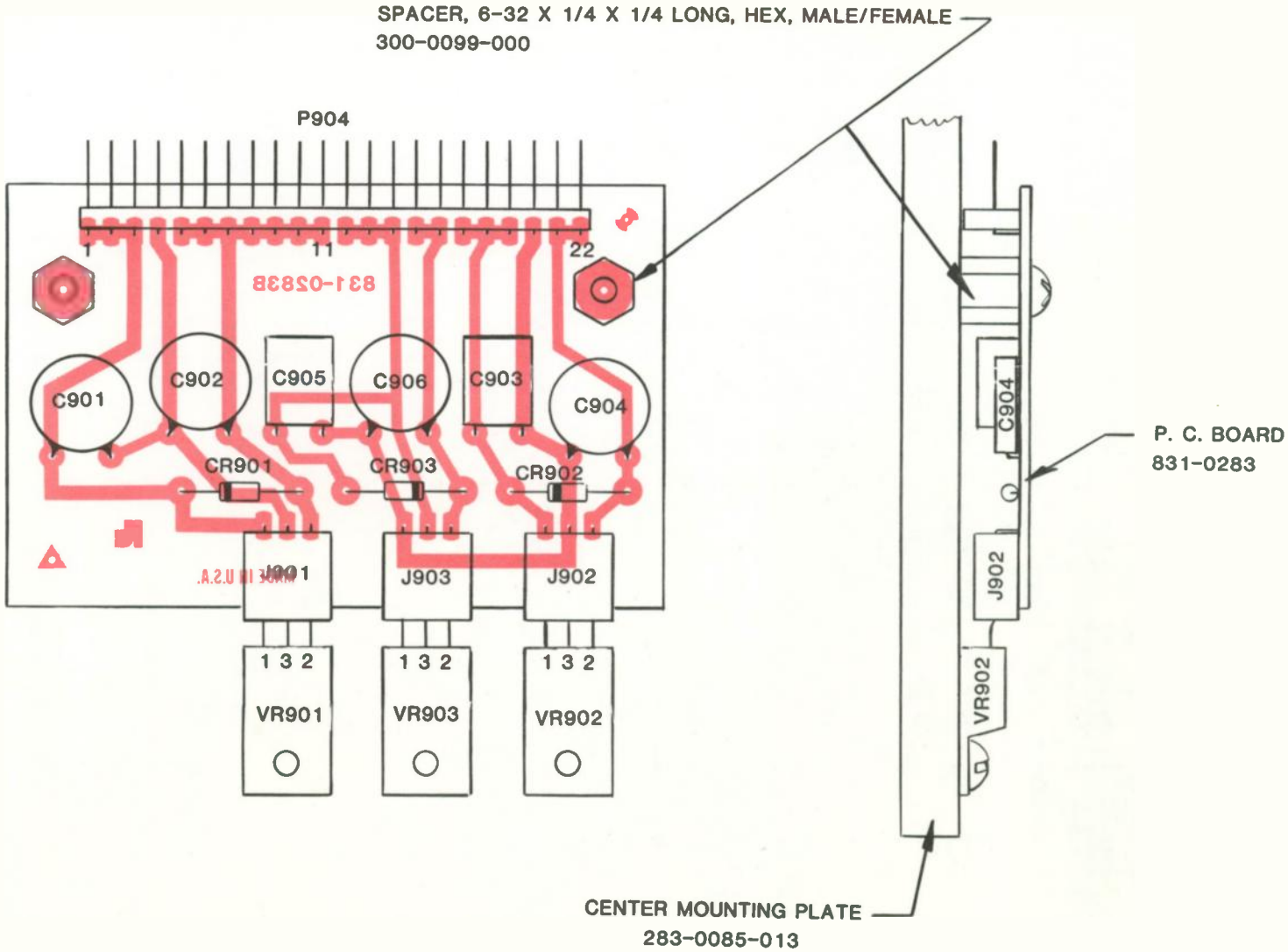
DELTA III REGULATOR BOARD 831-0283

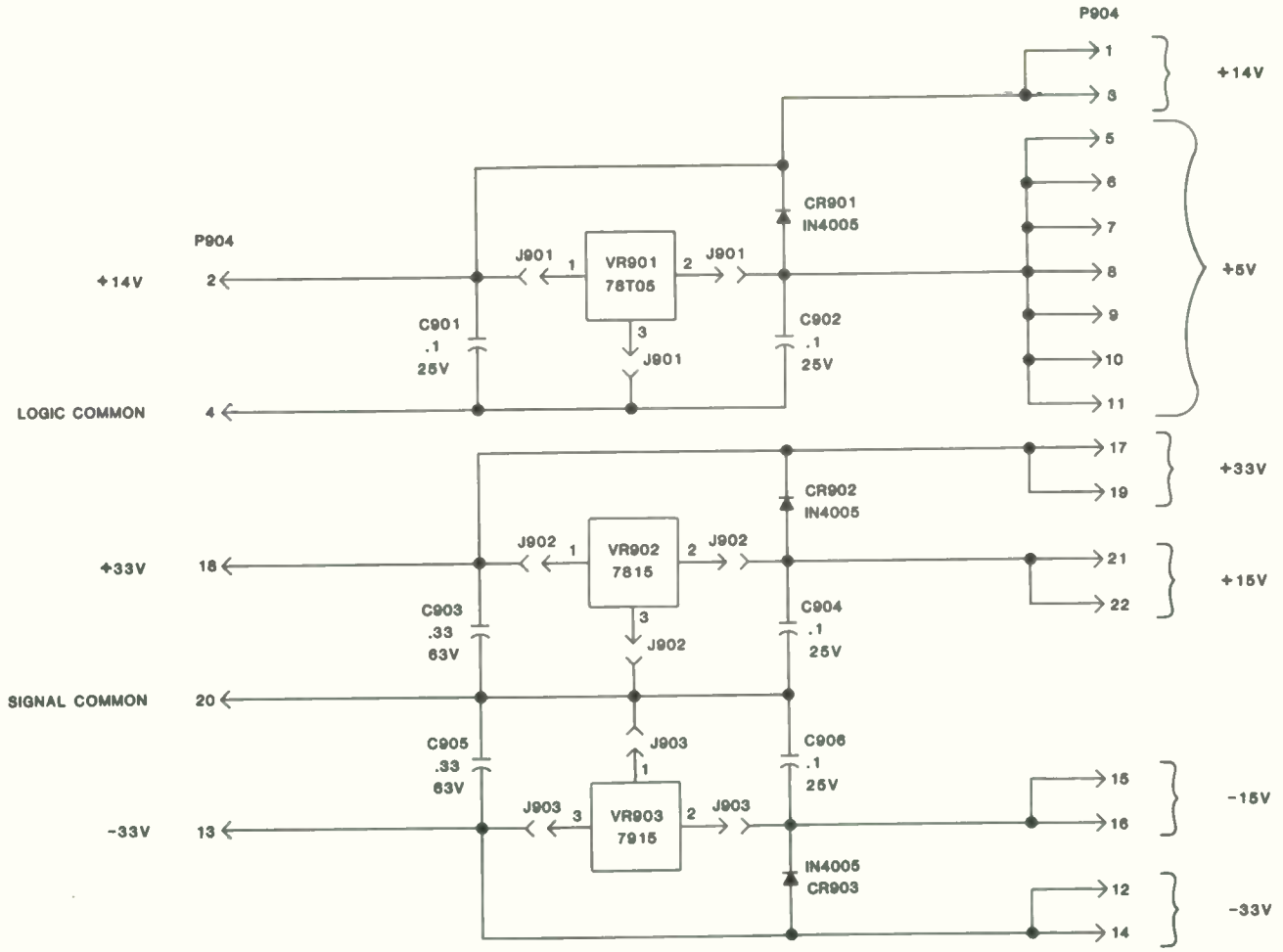
PARTS LIST

#	DIODES		
CR901	1	575-0007-000	DIODE, 1N4005
CR902	1	575-0007-000	DIODE, 1N4005
CR903	1	575-0007-000	DIODE, 1N4005
#	CAPACITORS		
C901	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD, 25V
C902	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD, 25V
C903	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
C904	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD, 25V
C905	1	680-3163-033	CAPACITOR, POLYESTER FILM, .33 UFD., 63V, 5%
C906	1	686-0009-000	CAPACITOR, CERAMIC, .1 UFD, 25V
#	VOLTAGE REGULATORS @ MOUNTING HARDWARE		
VR901	1	605-0012-000	VOLTAGE REGULATOR, MC7805CT, +5V, TO220 PLASTIC
VR902	1	605-0010-000	VOLTAGE REGULATOR, MC7815CT, +15V, TO220 PLASTIC
VR903	1	605-0011-000	VOLTAGE REGULATOR, MC7915CT, -15V, TO220 PLASTIC
J901	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J902	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J903	1	380-0062-000	SOCKET, 3 PIN, 10-18-2031
	3	613-0014-000	INSULATOR, TO-220
	3	352-0004-000	SCREW, 6-32 X 1/4, NYLON, SLOTTED, R. HD.
#	CONNECTORS		
P904	1	376-0069-000	WAFER, 22 POS., HFAS100-22
#	MISCELLANEOUS		
	1	325-0283-003	BOARD, REGULATOR DIII
	2	300-0099-000	SPACER, 6-32 X 1/4 X 1/4 LONG, HEX, MALE/FEMALE
	2	350-0604-000	SCREW, 6-32 X 1/4, PHILL, PAN, HD., ZP

FIGURE 7 - 15

831-0283
DELTA III REGULATOR BOARD
LAYOUT





NOTES:

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

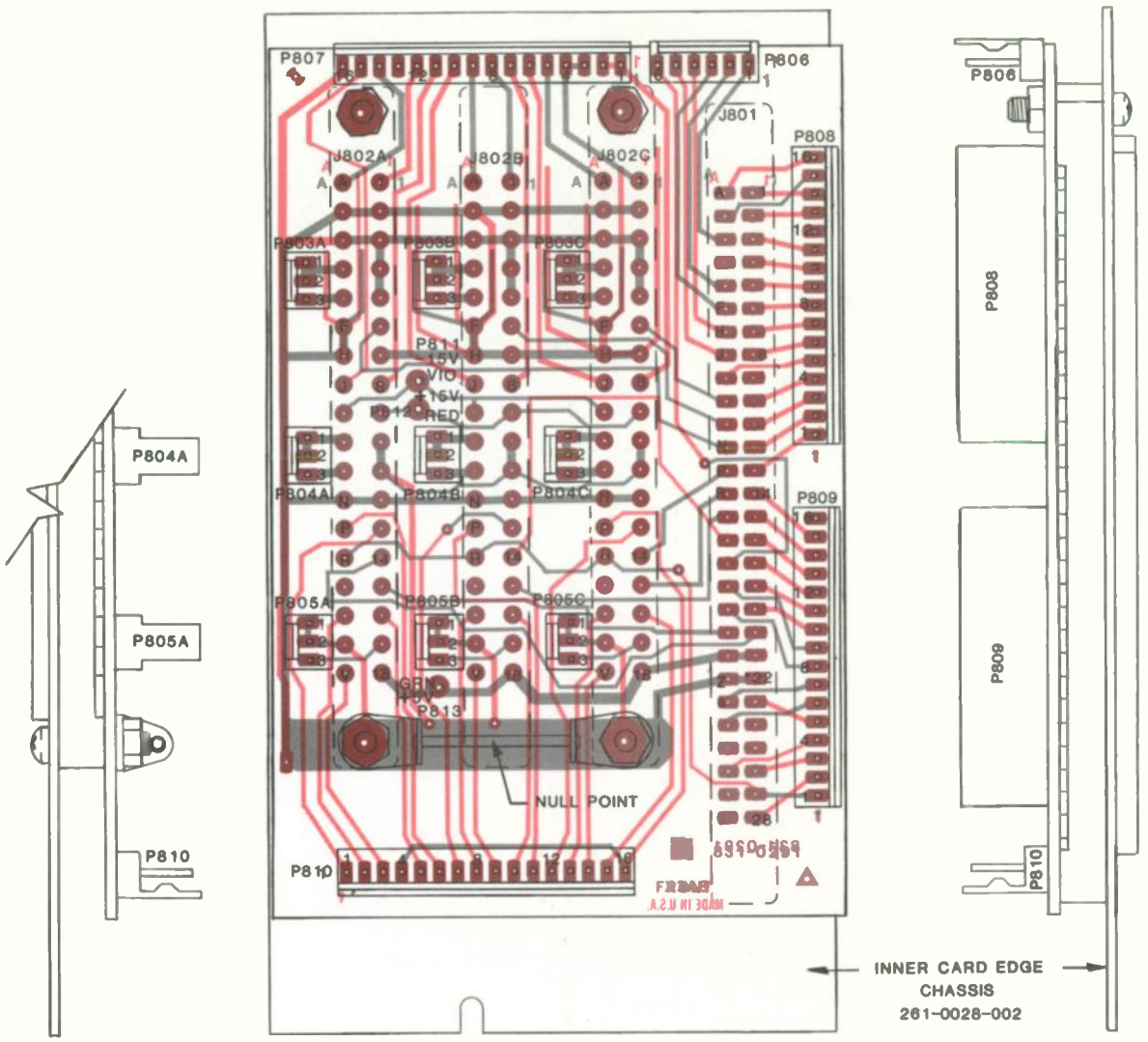
FIGURE 7 - 16

831-0283
DELTA III REGULATOR BOARD
SCHEMATIC

DELTA III INTERCONNECT BOARD 831-0291

PARTS LIST

# CONNECTORS			
J801	1	380-0144-000	CONNECTOR, PC CARD EDGE, DUAL 28, 0.125, SOLDER
J802A	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
J802B	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
J802C	1	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER
P803A-B-C	3	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P804A-B-C	3	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P805A-B-C	3	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P806	1	376-0058-000	WAFER, 6 POS., LOCKING, #22-23-2061
P807	1	376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P808	1	376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P809	1	376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P810	1	376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P811-13	3	382-0019-000	PIN, MALE, PCB, #R62-3
# MISCELLANEOUS			
	1	325-0291-003	BOARD, INTERCONNECT DIII
	4	350-0417-000	SCREW, 4-40 X 5/8, PHIL, PAN, ZP
	4	370-0403-000	NUT, 4-40 X 1/4, KEPS HEX, STEEL, NP
	2	375-0003-000	TERMINAL, #4, BENT, LOCKING



DELTA III INTERCONNECT BOARD
831-0291-003

FIGURE 7 - 17

831-0291
DELTA III INTERCONNECT BOARD
LAYOUT

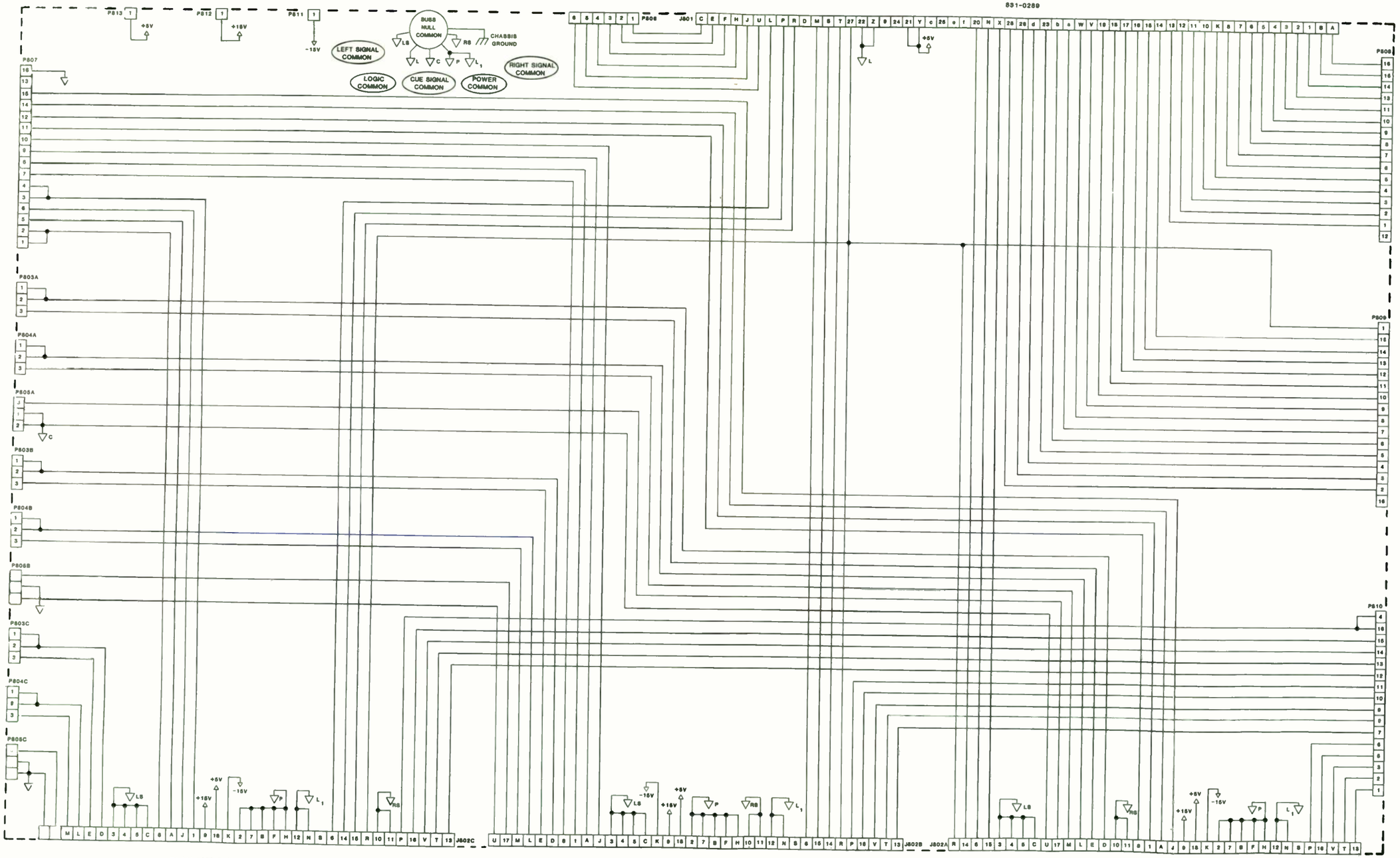


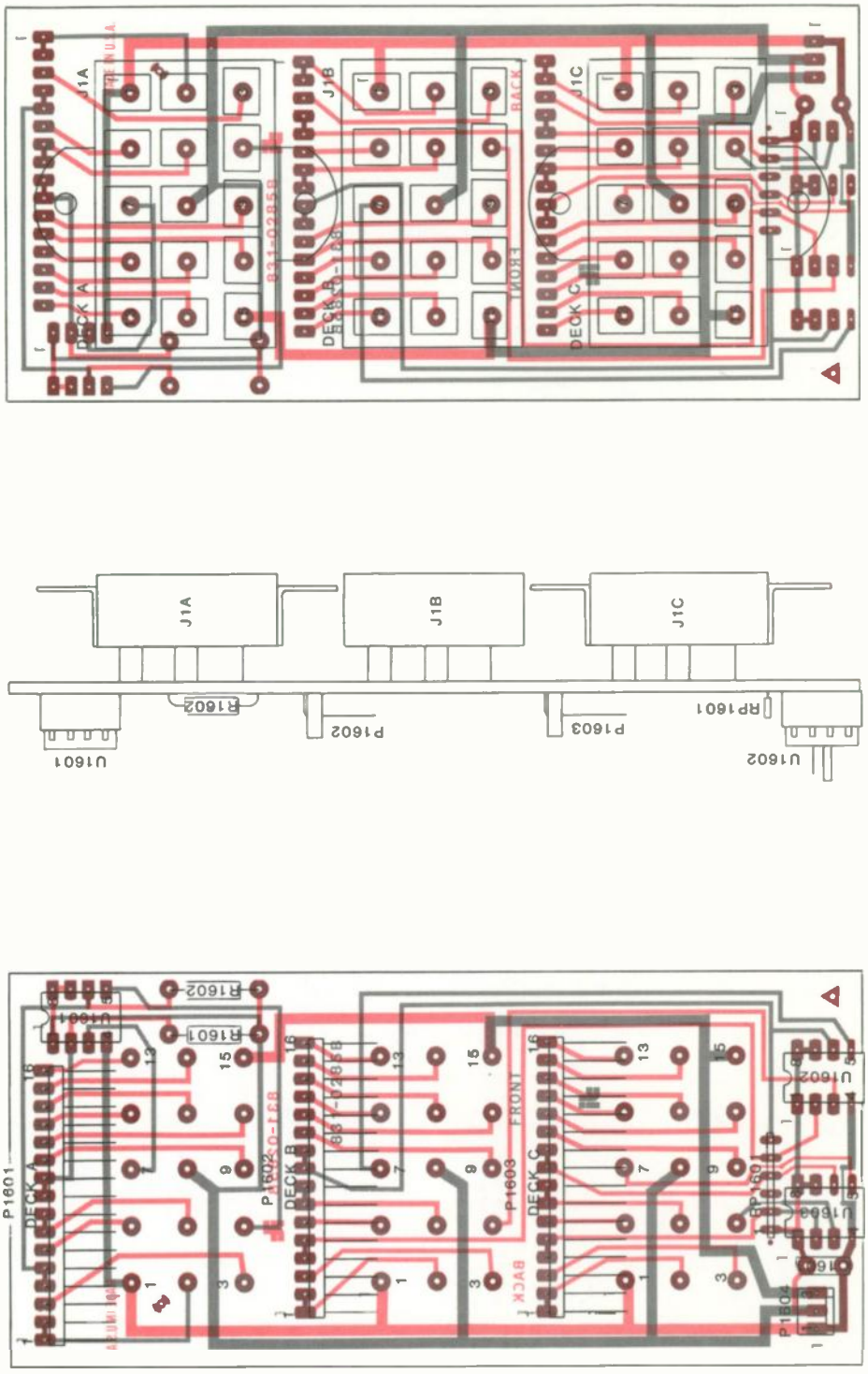
FIGURE 7 - 18

831-0291
DELTA III INTERCONNECT BOARD
SCHEMATIC

DELTA III REMOTE CONNECTOR BOARD 831-0285

PARTS LIST

# CAPACITORS			
C1601	1	680-2563-033	CAPACITOR, POLYESTER FILM, .10 UFD., 63V, 5%
# RESISTOR NETWORKS			
RP1601	1	631-0025-000	RESISTOR, ARRAY, COMMON SIP, 5R, 1K, 2%
# RESISTORS			
R1601	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
R1602	1	630-0063-000	RESISTOR, CARBON FILM, 1K OHM, 1/4 W, 5%
# INTEGRATED CIRCUITS			
U1601	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1602	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1603	1	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
# SOCKETS			
U1601	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1602	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1603	1	613-0007-000	SOCKET, IC, 8 PIN, DIP
# CONNECTORS			
J1A	1	380-0045-000	SOCKET, 15 PIN, PC MOUNT S6-3315-ABT
J1B	1	380-0157-000	SOCKET, 15 PIN, PC MOUNT S6-3315-LAB
J1C	1	380-0045-000	SOCKET, 15 PIN, PC MOUNT S6-3315-ABT
P1601	1	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE
P1602	1	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE
P1603	1	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE
P1604	1	376-0065-000	WAFER, LOCKING, 3 POS.
# MISCELLANEOUS			
	1	325-0285-003	BOARD, REMOTE CONNECTOR, DIII



DELTA III REMOTE CONNECTOR BOARD
831-0285-003

FIGURE 7 - 19

831-0285-003
DELTA III REMOTE CONNECTOR BOARD
LAYOUT

DELTA III MECHANICAL PARTS LIST - BY ASSEMBLY

	LEFT SIDE PANEL			
	1	281-0108-014	PANEL, SIDE, LEFT HAND-SAND BLASTED DIII	
	13	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK	
	1	328-0020-003	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE	D
	LEFT CARTRIDGE HOLD DOWN			
	3	272-0034-812	GUIDE, CARTRIDGE HOLD-DOWN, LEFT-CLEAR ANODIZE	
	6	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP	
	6	301-0050-001	SPRING, CART GUIDE	
	RIGHT SIDE PANEL			
	1	281-0109-014	PANEL, SIDE, RIGHT HAND-SAND BLASTED DIII	
	12	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK	
	1	328-0020-003	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE	D
	1	283-0085-813	PLATE, CENTER MOUNTING-SAND BLASTED DIII	
	ADD DECK CONNECTORS			
J5A	1	378-0059-000	PLUG, SUBMINITURE D, 25 POS, MALE, FLOAT MOUNT	
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.	
J5B	1	378-0059-000	PLUG, SUBMINITURE D, 25 POS, MALE, FLOAT MOUNT	
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.	
J5C	1	378-0059-000	PLUG, SUBMINITURE D, 25 POS, MALE, FLOAT MOUNT	
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.	
	ADD CAPACITORS (WITH BRACKETS)			
C1	1	698-0011-000	CAPACITOR, ELECTROLYTIC, 6800 UFD. 35 V (CAN) LKD	
C2	1	698-0011-000	CAPACITOR, ELECTROLYTIC, 6800 UFD. 35 V (CAN) LKD	
C3	1	698-0015-000	CAPACITOR, ELECTROLYTIC, 15000 UFD. 16 V (CAN) LK	
C4	1	698-0014-000	CAPACITOR, ELECTROLYTIC, 220 UFD. 400 V (CAN) LKD	
C5	1	698-0014-000	CAPACITOR, ELECTROLYTIC, 220 UFD. 400 V (CAN) LKD	
C6	1	698-0014-000	CAPACITOR, ELECTROLYTIC, 220 UFD. 400 V (CAN) LKD	
	10	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.	
	ADD DECK SET SCREWS			
	3	355-1008-000	SCREW, 10-32 X 1/2, SOCKET SET CUP POINT WITH NYL	
	DECK W/CROSS SHAFT, CLAMP & PRESSURE ROLLER			
	1	267-0026-024	DECK-BRUSHED & CLEAR ANODIZED DIII	
	2	251-0001-051	BEARING, SLEEVE .3135 ID. X .377 OD. X 1/4 LENGTH	
	1	296-0046-001	SHAFT, CROSS, DECK	
	1	297-0029-001	SHIELD, LOWER HEAD DIII	
	1	262-0023-012	CLAMP, CROSS SHAFT-VIBRA BOWL	
	1	282-0041-000	PIN, ROLL, 1/16 X 3/8	
	1	296-0004-001	SHAFT, PRESSURE ROLLER	
	DECK ADDITIONS			
	2	350-0404-000	SCREW, 4-40 X 1/4 PHIL PAN ZP	
	1	380-0137-000	SOCKET, SUBMINITURE D, 25 POS., FEMALE, STANDARD	
	1	350-0819-000	SCREW, 8-32 X 6", SLOTTED ROUND HD., (1-1/2" OF T	
	1	254-0099-011	BRACKET, SOLENOID MOUNTING-CLEAR CHROMATE	
	2	350-0610-000	SCREW, 6-32 X 3/8, PHIL, FH, ZP, 82 DEG.	

ADD PRESSURE ROLLER			
1	291-0018-001	ROLLER, PRESSURE, 534AV, 60	
1	359-0025-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .003	
1	359-0026-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .004	
1	359-0027-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .005	
1	359-0028-000	WASHER, NYLON, 5/16 ID. X 1/2 OD. X .007	
1	289-0002-000	RING, RETAINING, PRESSURE ROLLER SHAFT	
1	360-1005-010	WASHER, 13/64 ID. X 7/16 OD. X .015 THICK, NP	
1	359-0006-001	WASHER, NYLON, .010 X .480 OD X .193 ID	
ADD SOLENOID/CLEVIS ASSY			
2	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.	
2	365-0601-000	WASHER, #6, INTERNAL LOCK, ZP	
1	477-0020-001	SOLENOID, 110 V, 1.5" DIA. 3827	
1	264-0001-001	CLEVIS SCREW	
1	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP	
1	277-0001-041	CHAIN, SPROCKET, 21 LINKS	
1	301-0005-001	SPRING, .207 DIA. (MW) X 1-9/16 (INSIDE HK) X .30	
1	282-0001-001	PIN, ROLL, 1/16 X 5/16	
RIGHT CARTRIDGE HOLD DOWN			
1	272-0033-012	GUIDE, CARTRIDGE HOLD-DOWN, RIGHT-CLEAR ANODIZE	
1	301-0050-001	SPRING, CART GUIDE	
1	350-0620-000	SCREW, 6-32 X 1/4, PHIL, TRUSS HD.	
CART SWITCH MOUNTING			
1	254-0097-001	BRACKET, MICRO SWITCH MOUNTING	
2	350-0604-000	SCREW, 6-32 X 1/4, PHILL, PAN, HD., ZP	
2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.	
2	370-0201-000	NUT, HEX, 2-56 X 3/16	
1	392-0009-000	SWITCH, SNAP ACTION E63-00R, SIMULATED ROLLER	
HEAD ASSEMBLY W/O HEADS & CABLES			
1	270-0010-813	FRAME, HEAD BLOCK SUPPORT-SAND BLASTED	
4	301-0054-000	SPRING, .041 WIRE, .439 LONG, 14LBS @ .572 EXTENS	
4	282-0045-000	PIN, ROLL, 5/64 DIA. X 1 3/8 LONG BLK	
1	272-0038-012	GUIDE, TAPE, LEFT HAND-VIBRA BOWL	
2	272-0039-012	GUIDE, TAPE, CENTER & RIGHT HAND-VIBRA BOWL	
6	350-0403-000	SCREW, 4-40 X 3/16, PHIL PAN ZP	
2	303-0001-001	STRAP, HEAD MOUNTING	
4	350-0307-000	SCREW, 3-48 X 5/8, PHILL., FILL., HD.	
4	355-0813-000	SCREW, 8-32 X 1/2, SOCKET, SET, CONE POINT	
2	355-0814-000	SCREW, 8-32 X 1/2, SOCKET, SET, OVAL POINT	
6	370-0801-000	HEX NUT, 8-32 X 1/4 X 3/32 THICK	
1	350-0606-000	SCREW, 6-32 X 5/8, PHIL., FLAT HD., 100 DEG	
2	350-0644-000	SCREW, 6-32 X 1, PHIL., FILL. HD.	
1	350-0643-000	SCREW, 6-32 X 7/8, PHIL., FILLISTER HD.	
1	350-0649-000	SCREW, 6-32 X 1 1/8, PHIL., FLAT HD., 100 DEG	
2	300-0098-001	SPACER, HEAD SHIELD	
1	297-0034-001	SHIELD, UPPER HEAD DI,II,III	
1	253-0088-013	BLOCK, RIGHT HEAD MOUNTING-VIBRA-BOWL	
1	253-0089-013	BLOCK, LEFT HEAD MOUNTING-VIBRA BOWL	
2	282-0031-000	PIN, ROLL, 1/8 DIA., X 1 LONG	

	ADD HEADS		
PU2	1	504-0041-002	HEAD, MCL, STEREO PLAY, MODEL S-PL
PU4	1	504-0037-002	HEAD, RECORD, 3-QT, 100 UH
	ADD PLAY HEAD CABLES		
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0002-000	
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0003-000	
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0040-000	
	ADD RECORD HEAD CABLES		
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0002-000	
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0003-000	
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	2	382-0018-000	CLIP, HEAD LEAD
	2	441-0029-010	
	1	441-0040-000	
	ADD FRONT PANEL WITH CONTROLS		
	1	281-0107-023	PANEL, FRONT DECK-BLACK ANODIZED
	2	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK
	1	284-0018-000	PLUG, 1/4" HOLE, BLACK, DP-250
	2	391-0023-000	SWITCH, PUSH, 05-62125
	1	404-0059-000	LENS, YELLOW, FOR 05-62125 80-050606
	1	404-0060-000	LENS, GREEN, FOR 05-62125 80-050604
	2	415-0013-000	LAMP, MINITURE 5 VOLT 3150
	LOWER PANEL		
	1	281-0101-012	PANEL, FRONT-SAND BLASTED DIII
	1	328-0018-001	INLAY, FRONT PANEL, POLYCARBONATE DIII
	1	280-0044-002	NAMEPLATE, STUDDED, ITC LOGO, BLACK PLASTIC
	1	364-0002-000	RETAINER, .187 STUD, .50 LONG X .38 WIDE X .017 T
	UPPER BRACE		
	1	304-0021-012	SUPPORT, FRONT TOP-SANDBLASTED DIII
	1	328-0019-001	INLAY, FRONT TOP SUPPORT,POLYCARBONATE DIII
	P.C. CARD GUIDES		
	1	272-0035-013	GUIDE, TOP P.C. CARD-SAND BLASTED DIII
	1	350-0419-000	SCREW, 4-40 X 3/4, PHIL, PAN, STEEL, ZP
	1	360-0404-000	WASHER, FLAT, #4 X 1/2 OD. X .032 THICK, STEEL ZP
	1	370-0402-000	NUT, 4-40X1/4, HEX, CAD. PLTD.
	1	301-0055-000	SPRING, COMP., .180 OD. X 1/2 LONG X .022 MUSIC W
	1	441-0034-011	TUBING, TEFLON, #10 X 27/32, THIN WALL
	1	272-0036-013	GUIDE, MIDDLE P.C. CARD-SAND BLASTED DIII
	1	463-0005-000	FAN, MINIATURE DC, V463M, 12V DIII
	4	344-0301-000	SCREW, 3mm X 10mm LONG, SLOTTED PAN HEAD
	P.C. CARD CHASSIS		
	1	261-0028-002	CHASSIS, INNER DIII
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	BOTTOM GUIDE		
	1	272-0037-013	GUIDE, P.C. CARD, BOTTOM DIII -SAND BLASTED
T1	1	526-0021-003	TRANSFORMER, TOROID POWER DIII
	1	350-1037-000	SCREW, 10-32 X 1-3/4, BINDING HD., SLOTTED BRASS
	ADD MOTOR		
B1	1	455-0005-004	MOTOR, SERVO, PAPST (3D)
	1	380-0124-000	HOUSING, 10 POS., W/LOCKING RAMP, KK100, #22-01-2
	10	382-0044-000	TERMINAL, CRIMP, 08-50-0114
	1	297-0030-002	SHIELD, MOTOR DIII
	2	353-1018-000	SCREW, 10-32 X 3/4, BH, SOCKET CAP, BLACK
	2	350-0404-000	SCREW, 4-40 X 1/4 PHIL PAN ZP
	2	350-0404-000	SCREW, 4-40 X 1/4 PHIL PAN ZP
	AUDIO OUTPUT PANEL		
	1	281-0103-002	PANEL, REAR, XLR DIII
	12	350-0411-000	SCREW, 4-40 X 3/8, PF HD. 82 DEG., ZP
	12	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	1	281-0102-813	PANEL, REAR-SILKSCREENED DIII
	ATTACH REMOTE CONNECTOR PCB		
	4	350-0604-000	SCREW, 6-32 X 1/4, PHILL, PAN, HD., ZP
	3	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	ADD AC RECEPTICLE		
P3	1	380-0072-000	RECEPTACLE, LINE CORD 17252
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP
	ADD FUSE HOLDER		
F1	1	418-0005-000	FUSE HOLDER, LOW PROFILE, FEU 031.1673
	1	418-0006-000	FUSE CARRIER, 3AG, GREY, 031.1666
	1	284-0018-000	PLUG, 1/4" HOLE, BLACK, DP-250
	ADD RECORDER INTERFACE CONNECTOR		
J2	1	380-0134-000	CONNECTOR, 24 PIN W/LOCKING BAIL (FEMALE) 57-4024
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.
	2	370-0201-000	NUT, HEX, 2-56 X 3/16

	ADD RECORD HEAD CABLES		
	3	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	3	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	3	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	ADD PLAY HEAD CABLES		
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J803A	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J803B	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0006-000	CABLE, SHIELDED, RED-ORANGE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J803C	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J804A	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J804B	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0007-000	CABLE, SHIELDED, WHITE-BLACK
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J804C	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J805A	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J805B	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD
J805C	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035
#	STEREO VERSION		
J806	1	380-0150-000	HOUSING, 6 POS, MTA-100, 26 AWG, 640442-6
J807	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J808	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J809	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J810	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J301	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0
J811	1	382-0011-000	PIN, FEMALE
J812	1	382-0011-000	PIN, FEMALE
J813	1	382-0011-000	PIN, FEMALE
J601	13	382-0011-000	PIN, FEMALE
J1601	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J1602	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J1603	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6
J1604	1	380-0156-000	HOUSING, 3 POS., MTA-100, 26 AWG
	1	417-0009-000	FUSE, CARTRIDGE (3AG) 1.5 AMP, 125V TIME DELAY
	1	433-0004-000	LINE CORD, 17250, 117V

FINAL DRESS			
	1	265-0059-812	COVER, P.C. CARD-SILK SCREENED DIII
	1	280-0046-003	LABEL, HEAD & SOLENIOD DIII
	1	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.
	1	265-0063-002	COVER, TOP DIII
	1	046-0014-000	LABEL, TRANSFORMER WIRE CONNECTION
	1	280-0022-001	LABEL, LINE VOLTAGE
	1	280-0002-000	LABEL, SERIAL NUMBER
	1	280-0011-001	LABEL, PATENT NUMBER
	1	280-0048-001	LABEL, AMPLIFIER TO DECK IDENTIFICATION (A TOP)
	1	280-0049-001	LABEL, AMPLIFIER TO DECK IDENTIFICATION (B MID)
	1	280-0050-001	LABEL, AMPLIFIER TO DECK IDENTIFICATION (C BOT)
	3	280-0051-002	LABEL, DECK IDENTIFICATION
	1	280-0056-000	LABEL, PRE-INSTALLATION WARNING
BOTTOM W/FEET			
	1	265-0064-003	COVER, BOTTOM DIII
	3	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP
	1	350-0628-000	SCREW, 6-32 X 3/8, PHIL FLAT HD., 100 DEG.
	4	370-0602-000	NUT, KEPS, 6-32 X 1/4, ZP
	4	311-0039-000	FEET, RUBBER, F6B (MEDIUM), BLACK
PACK			
	1	049-0006-000	INSTRUCTION BOOK DIII
	6	378-0019-000	PLUG, 3-PIN, STRAIGHT, FEMALE XLR
	3	378-0003-000	PLUG, 15 PIN, CABLE CLAMP & LATCH, P-3315-CCT-L

DELTA IV MECHANICAL PARTS LIST - BY ASSEMBLY

LEFT SIDE PANEL				
	1	281-0106-013	PANEL, SIDE, LEFT HAND-SAND BLASTED	DI
	5	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK	
	1	328-0015-002	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE	D
RIGHT SIDE PANEL				
	1	281-0105-013	PANEL, SIDE, RIGHT HAND-SAND BLASTED	DI
	5	353-0603-000	SCREW, 6-32 X 1/4, SOCKET, BUTTON HD., BLACK	
	1	328-0015-002	INLAY, RIGHT & LEFT SIDE PANEL, POLYCARBONATE	D
J1401	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0	
J1402	1	380-0151-000	HOUSING, 10 POS, MTA-100, 26 AWG, 1-640442-0	
J1403	1	380-0150-000	HOUSING, 6 POS, MTA-100, 26 AWG, 640442-6	
J1404	1	380-0148-000	HOUSING, 16 POS, MTA-100, 26 AWG, 1-640442-6	
ADD CUE INPUT CABLE				
	1	507-0008-000	CABLE, SHIELDED, YELLOW-BLUE	
	3	382-0045-000	TERMINAL, CRIMP, FOR KK100 W/GOLD	
J1407	1	380-0070-000	HOUSING, 3 POS/LOCKING, 22-01-2035	
	2	441-0040-000	PART NOT IN LIBRARY !!!!	
	1	441-0010-010	TUBING, TEFLON, #16, EXTRA THIN	
	1	283-0082-013	PLATE, CENTER SUPPORT-SAND BLASTED	DIV
ADD CAPACITORS (WITH BRACKETS)				
C1501	1	698-0013-000	CAPACITOR, ELECTROLYTIC, 2200 UFD. 35 V (CAN)	LKD
C1502	1	698-0013-000	CAPACITOR, ELECTROLYTIC, 2200 UFD. 35 V (CAN)	LKD
C1503	1	698-0012-000	CAPACITOR, ELECTROLYTIC, 3300 UFD. 35 V (CAN)	LKD
	4	350-0624-000	SCREW, 6-32 X 5/16, PHIL., FILL. HD.	
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.	
	1	281-0100-034	PANEL, FRONT-SAND BLASTED	DIV
	2	282-0010-011	PIN, DOWEL, 1/8 DIA. X 5/8 LONG	
MOUNT LEVEL CONTROLS				
R1501	1	636-0044-000	POTENTIOMETER, 2.5K OHM, SINGLE TURN, SOLDER, #72	
R1502	1	636-0044-000	POTENTIOMETER, 2.5K OHM, SINGLE TURN, SOLDER, #72	
	2	254-0101-011	BRACKET, POT MOUNTING-VIBRA BOWL	DIV
	2	350-0426-000	SCREW, 4-40 X 5/16, INT SEMS, PHIL., PAN, ZP	
MOUNT METER SWITCHES				
S1504,7	1	391-0025-000	SWITCH ASSEMBLY	
	2	350-0205-000	SCREW, 2-56 X 3/8, PHILL., PAN, HD.	
	2	370-0201-000	NUT, HEX, 2-56 X 3/16	
ADD METER MOUNT SCREW & INLAY (WITH LETTERING)				
	1	350-0418-000	SCREW, 4-40 X 5/8, PHIL., FLAT HD. 82 DEG	
	1	328-0021-002	INLAY, FRONT PANEL, POLYCARBONATE	DIV
	1	328-0022-001	INLAY, TOP FRONT PANEL, POLYCARBONATE	DIV

ADD METERS				
M1501	1	554-0002-000	METER, VU	
	2	375-0008-000	TERMINAL, #10, BENT, LOCKING	
	2	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP	
M1502	1	554-0002-000	METER, VU	
	2	375-0008-000	TERMINAL, #10, BENT, LOCKING	
	2	370-1001-000	NUT, 10-32 X 3/8, HEX, ZP	
	1	254-0103-011	BRACKET, METER MOUNTING-VIBRA BOWL	DIV
	1	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP	
ADD CONTROL SWITCHS				
S1501	1	391-0023-000	SWITCH, PUSH, 05-62125	
	1	404-0062-000	LENS, BLUE, FOR 05-62125	
DS1501	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150	
S1502	1	391-0023-000	SWITCH, PUSH, 05-62125	
	1	404-0061-000	LENS, RED, FOR 05-62125 80-050603	
DS502	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150	
S1503	1	391-0023-000	SWITCH, PUSH, 05-62125	
	1	404-0063-000	LENS, WHITE, FOR 05-62125 80-050602	
DS1503	1	415-0013-000	LAMP, MINITURE 5 VOLT 3150	
	1	281-0098-013	PANEL, REAR-SAND BLASTED	DIV
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.	
ADD REMOTE CONNECTOR				
J5	1	380-0004-000	SOCKET, 15 PIN, CHASSIS MOUNT, S-3315AB	
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.	
	2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP	
ADD COVER LATCH AND GUIDES				
	1	350-0419-000	SCREW, 4-40 X 3/4, PHIL, PAN, STEEL, ZP	
	1	360-0404-000	WASHER, FLAT, #4 X 1/2 OD. X .032 THICK, STEEL ZP	
	1	370-0402-000	NUT, 4-40X1/4, HEX, CAD. PLTD.	
	1	301-0055-000	SPRING, COMP., .180 OD. X 1/2 LONG X .022 MUSIC W	
	1	441-0034-011	TUBING, TEFLON, #10 X 27/32, THIN WALL	
	2	350-0433-000	SCREW, 4-40 X 5/16, PHIL., FILL. HD.	
ADD MOTHER BOARD SUPPORT				
	1	304-0026-011	SUPPORT, MOTHER BOARD, VIBRA BOWL	DIV
	2	350-0413-000	SCREW, 4-40 X 7/16, PHILL., PAN, HD.	
	2	300-0099-000	SPACER, 6-32 X 1/4 X 1/4 LONG, HEX, MALE/FEMALE,	
	1	350-0403-000	SCREW, 4-40 X 3/16, PHIL PAN ZP	
ADD BAIL HARWARE				
	1	382-0039-000	BAIL LOCK FOR CHAMP SERIES, #552562-1	
	2	350-0413-000	SCREW, 4-40 X 7/16, PHILL., PAN, HD.	
	2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP	
ADD AUDIO INPUT ASSEMBLY				
	4	350-0411-000	SCREW, 4-40 X 3/8, PF HD. 82 DEG., ZP	
	1	837-0035-002	RECORDER-PLAYBACK INTERFACE HARNESS	
	2	378-0058-000	CONNECTOR, 24 PIN, W/HOUSING, MALE, 57-30240	

FINAL DRESS

1	265-0062-002	COVER, TOP, DI,IV
1	280-0047-003	LABEL, POTENTIOMETER DIV
1	280-0002-000	LABEL, SERIAL NUMBER
1	280-0011-001	LABEL, PATENT NUMBER
1	280-0055-001	LABEL, IB REFERENCE

BOTTOM W/FEET

1	265-0061-003	COVER, BOTTOM, DI,IV
3	350-0427-000	SCREW, 4-40 X 3/16 PHIL FLAT HD., 100 DEG., ZP
4	350-0628-000	SCREW, 6-32 X 3/8, PHIL FLAT HD., 100 DEG.
4	370-0602-000	NUT, KEPS, 6-32 X 1/4, ZP
4	311-0039-000	FEET, RUBBER, F6B (MEDIUM), BLACK

ADD LEVEL CONTROL KNOBS

1	315-0018-002	KNOB, LEVEL CONTROL, DIV
1	315-0018-002	KNOB, LEVEL CONTROL, DIV

PACK

1	380-0041-000	SOCKET, 3 PIN, FLANGE, FEMALE, D3F
1	380-0041-000	SOCKET, 3 PIN, FLANGE, FEMALE, D3F
1	378-0003-000	PLUG, 15 PIN, CABLE CLAMP & LATCH, P-3315-CCT-L

SECTION XI - CHANGE INFORMATION

To maintain the finest possible equipment performance, ITC is constantly working to incorporate new technology and improvements into our products. Occasionally, due to scheduling and printing conflicts, these changes may not be immediately included in instruction manuals. Change information which is not yet a permanent part of the manual will be noted in the following section.

ERRATA

Due to the time schedules involved in printing this Technical Manual, several errors or omissions were noted after the book went to press. These are noted on the following sheets with appropriate notations.

Although we have attempted to locate all errors, some may still exist. If you discover any discrepancies, please contact ITC/3M Technical Service.

032483/MH

Electrical Errata

P.C.B. NUMBER

831-0248 General: All resistor packs are 1/8 watt, designated in ohms

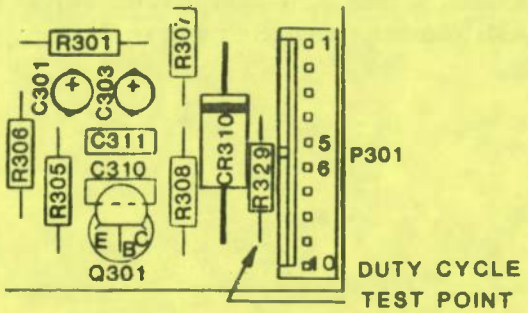
Overlay: "C110" should read "C210"

831-0249 Schematic: "C1110" is 22 mfd, @ 300V

831-0250 Schematic: "CR704" should read "CR701"
"CR701" should read "CR704"

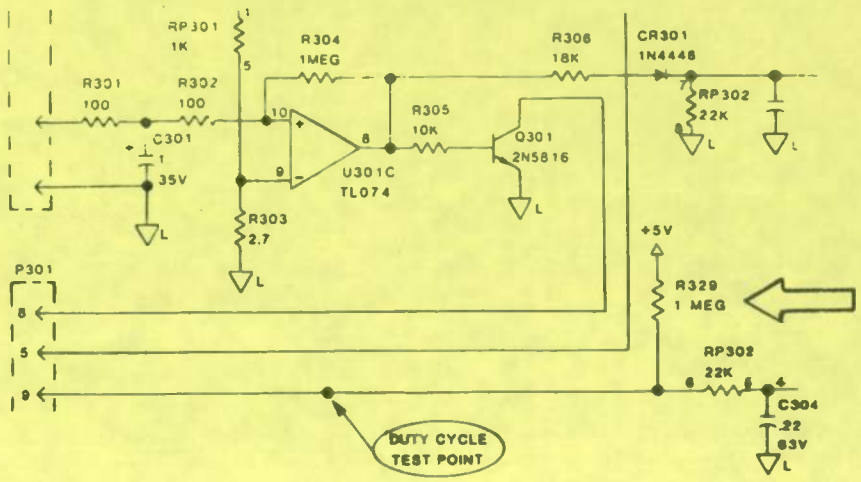
831-0270 Overlay: P301 has been reversed. Pin 1 should read Pin 10; Pin 2 should read Pin 9; etc.

Add 1 Megohm resistor R329.



Schematic: P301 has been reversed. Pin 1 should read Pin 10; Pin 2 should read Pin 9; etc.

Add 1 Megohm resistor R329.



032483/MH

P.C.B. NUMBER		
831-0271	General:	All resistor packs are 1/8 watt, designated in ohms.
	Schematic:	"R1205," "R1207," "R1208," and "C1210" are tied to signal common.
831-0272	Schematic:	Pin 2 out should read Pin 3. Pin 3 out should read Pin 2. Pin 5 out should read Pin 6. Pin 6 out should read Pin 5.
831-0274	Schematic:	Cart switch (S4), the control line is Pin 1. The common side is pin 2.
831-0283	Schematic:	Pin 2 should read pin 7. Pin 7 should read pin 2.
831-0285	General:	All resistor packs are 1/8 watt and designated in ohms.
	Schematic:	"U1303B" should read "U1603B"
Drawing # 893-0124-005 Interconnect Schematic:		Power Component Board 831-0250. Pin 14 should read Pin 15. Pin 15 should read Pin 14.

032483/MH

Mechanical Errata

Delta I and II Mechanical Parts List

Heads: PU3 504-0037-002 Head, Record, 3-QT 100 uH
Should read, PU 4 504-0037-002 Head, Record, 3-QT 100 uH.

Front Panel: Add C5 686-0009-000 .1 mfd 25v ceramic capacitor

C6 686-0009-000 .1 mfd 25v ceramic capacitor

Used on start and stop switches to reduce audio pops.

Delta III Mechanical Parts List

* 2	391-0023-000	Switch, Push 05-62125
	Should read	
S1 1	391-0023-000	Switch, Push 05-62125
S2 1	391-0023-000	Switch, Push 05-62125
* 2	415-0013-000	Lamp, Miniture 5 volt (3150)
	Should read	
DS1 1	415-0014-000	Lamp, Miniture 5 volt (3150)
DS2 1	415-0013-000	Lamp, Miniture 5 volt (3150)

032483/MH

INTERNATIONAL TAPETRONICS CORPORATION/3M
2425 SOUTH MAIN STREET
POST OFFICE BOX 241
BLOOMINGTON, ILLINOIS 61701
TELEPHONE (309) 828-1381
TWX 510-352-2500 ITC BLMG

MAINTENANCE PARTS PRICE LIST FOR: DELTA

THIS PRICE LIST IS PROVIDED FOR YOUR CONVENIENCE. THESE PARTS ARE NORMALLY AVAILABLE FROM OUR STOCK, AS MAINTENANCE OR REPAIR ITEMS. BECAUSE OUR SELLING PRICE IS BASED ON OUR ACTUAL COSTS, YOU MAY FIND THAT SOME ITEMS MAY BE PURCHASED LOCALLY AT COMPARABLE OR LOWER COST THAN FROM ITC.

ALL PRICES ARE SUBJECT TO REVIEW AND CHANGE WITHOUT NOTICE. PLEASE RETAIN THIS LIST FOR PART NUMBER REFERENCE. PRICES LISTED ARE F.O.B. BLOOMINGTON, ILLINOIS. PRICES WILL VARY OUTSIDE TERRITORIAL U.S.

MINIMUM ORDER $20.00.

STOCK NUMBER	DESCRIPTION	PRICE
CAPACITORS		
694-0005-000	CAPACITOR, 1 MFD, 35V TANTALUM	.50 EA
695-1335-013	CAPACITOR ALUM 10 MFD @ 35V	.30 EA
695-1716-013	CAPACITOR ALUM 47 MFD 16V	.40 EA
695-2106-013	CAPACITOR, 220 MFD 6.3V ALUM	.50 EA
697-0001-000	CAPACITOR, 220 MFD, 16V NON-POLARIZED	4.50 EA
698-0011-000	CAPACITOR ELECTROLYTIC 6800 UFD 35 V	8.25 EA
698-0012-000	CAPACITOR ELECTROLYTIC 3300 UFD 35V	4.75 EA
698-0013-000	CAPACITOR ELEC 2200 UFD 35 V	3.50 EA
698-0014-000	CAPACITOR ELEC 220 UFD 400 V	8.25 EA
CONNECTORS / CABLES		
378-0003-000	PLUG, 15 PIN MALE REMOTE CONNECTOR	4.50 EA
378-0018-000	PLUG XLR MALE	3.50 EA
378-0019-000	PLUG XLR FEMALE	4.00 EA
837-0035-002	CABLE RECORD TO PLAY INTERCONNECT DELTA	63.00 EA
DIODES / RECTIFIERS		
575-0007-050	DIODE, 1N4005 .500 CENTERS	.30 EA
575-0031-000	DIODE, SMALL SIGNAL 1N4448	.10 EA
575-0032-000	DIODE, POWER 3A, 200 V MR502	.70 EA
HEADS		
504-0001-000	HEAD, DUMMY	5.50 EA
504-0033-002	HEAD, MONO REPRODUCE (ITC CYLINDRICAL DESIGN)	66.00 EA
504-0036-002	HEAD, MONO RECORD 2 CHANNEL (ITC CYLINDRICAL DESIGN)	67.50 EA
504-0037-002	HEAD, STEREO RECORD (3 CHANNEL) MCL (SERIES 99,SERIES 99B,DELTA)	140.00 EA

DELTA

STOCK NUMBER	DESCRIPTION	PRICE
HEADS		
504-0041-002	HEAD, STEREO REPRODUCE MCL A33-07 (ITC CYLINDRICAL DESIGN) (REPLACES 504-0034-002)	149.00 EA
INDUCTORS		
532-0010-000	TRANSFORMER, AUDIO INPUT MR 671-0781	16.50 EA
532-0011-000	TRANSFORMER, AUDIO OUTPUT AM-9724	12.25 EA
INTEGRATED CIRCUITS		
585-0008-000	OPTO-ISOLATER, PHOTO H11B1	2.70 EA
605-0010-000	IC VOLTAGE REGULATOR MC7815CT +15 VOLT	2.40 EA
605-0011-000	IC VOLTAGE REGULATOR MC7915CT -15 VOLT	3.25 EA
605-0012-000	IC VOLTAGE REGULATOR MC7805CT +5 VOLT; REPLACES 605-0005-000	2.40 EA
606-0014-000	IC OP AMP TL072CP	2.40 EA
606-0015-000	IC TL084	3.75 EA
606-0016-000	IC TL074	4.25 EA
606-0021-010	IC NE 5532 AN	6.00 EA
606-0023-000	IC NE5534N SINGLE AUDIO OP AMP	4.00 EA
606-0024-000	IC NE5534AN LOW NOISE SINGLE AUDIO OP AM	2.40 EA
607-0009-000	IC SN 75451P	1.00 EA
607-0018-000	IC 74150, 1 OF 16 MULTIPLEXER	3.75 EA
607-0024-000	IC 74LS74 DUAL D FLIP-FLOP W/CLEAR&PRESE	1.10 EA
607-0025-000	IC 74LS151 8-INPUT MULTIPLEXER	1.20 EA
607-0033-000	IC SN74LS374N	4.25 EA
607-0034-000	IC SN74LS123N	2.00 EA
607-0035-000	IC SN74LS95N	1.60 EA
607-0036-000	IC SN74LS02N	.90 EA
607-0045-000	IC 74LS393 DUAL 4 BIT BINARY COUNTER	2.60 EA
607-0049-000	IC 74LS05 HEX INV. W/OPEN COLLECT OUTPUT	.70 EA
607-0050-000	IC 74LS08	.80 EA
607-0054-000	IC 74LS32 QUAD 2 INPUT OR	.80 EA
607-0063-000	IC 74LS86	.90 EA
607-0079-000	IC 74LS390	2.60 EA
608-0004-000	IC MC14052BC	2.90 EA
608-0033-000	IC MC14526B PROG BINARY DIVIDE-BY-N COUN	4.00 EA
609-0002-000	IC LM339	1.40 EA
610-0006-000	MICROPROCESSOR 8748 PROGRAMMABLE (MUST SPECIFY SOFTWARE REVISION CODE)	55.00 EA
MAJOR ASSEMBLIES		
832-1112-200	SOLENOID ASSEMBLY D-I 110V	53.00 EA
832-1136-000	POWER TRANSFORMER W/CONNECTOR D-I	36.00 EA

MINIMUM ORDER $20.00

STOCK NUMBER	DESCRIPTION	PRICE
MAJOR ASSEMBLIES		
832-1148-000	HEAD MOUNTING BLOCK DELTA W/O HEADS	87.75 EA
MISCELLANEOUS PARTS		
265-0061-003	COVER BOTTOM DI & DIV	10.00 EA
265-0062-002	COVER TOP DI & DIV	7.50 EA
265-0063-002	COVER TOP DIII	10.00 EA
265-0064-003	COVER BOTTOM DIII	7.50 EA
272-0033-012	GUIDE CART HOLD DOWN RH CLEAR ANODIZED	2.00 EA
272-0034-012	GUIDE CART HOLD DOWN LH CLEAR ANODIZED	2.00 EA
272-0038-012	GUIDE TAPE LH TUMBLED DI, II, III	1.30 EA
272-0039-012	GUIDE TAPE CENTER & RH TUMBLED DI,II,III	1.10 EA
284-0012-000	PLUG 5/8 HOLE BLACK	.10 EA
284-0018-000	HOLE PLUG 1/4" BLACK HEYCO DP-250	.10 EA
297-0034-001	SHIELD UPPER HEAD DELTA	6.25 EA
301-0050-001	SPRING, CARTRIDGE GUIDE (3-POINT SYS.)	.40 EA
315-0018-002	KNOB, LEVEL CONTROL	3.00 EA
418-0005-000	FUSE HOLDER, LOW PROFILE	2.20 EA
433-0004-000	LINE CORD, BELDEN 17250 117VAC	7.00 EA
448-0009-000	CRYSTAL, 3.579 MHZ.	5.00 EA
448-0010-000	CRYSTAL, 5.22350 MHZ.	5.00 EA
554-0002-000	METER, VU MODUTEC	40.50 EA
613-0001-000	SOCKET, TRANSISTOR	.60 EA
613-0007-000	IC SOCKET 8 PIN DIP	.50 EA
613-0008-000	IC SOCKET 14 PIN DIP	.50 EA
613-0009-000	IC SOCKET 16 PIN DIP	.60 EA
613-0017-000	IC SOCKET 40 PIN DIP	1.50 EA
613-0019-000	IC SOCKET 24 PIN DIP	.70 EA
613-0020-000	IC SOCKET 20 PIN IN LINE	.80 EA
MOTORS		
455-0004-013	CAPSTAN MOTOR DC SERVO D-I W/CONNECTOR	183.00 EA
455-0005-014	CAPSTAN MOTOR DC SERVO D-III W/CONNECTOR	295.00 EA
OPTIONS, ACCESSORIES, SERVICE AIDS		
830-0041-022	GAUGE TAPE GUIDE/HEAD HEIGHT (REPLACES 830-0022-021)	30.00 EA
830-0042-011	GAUGE PRESSURE ROLLER PRESSURE 60 DUROMETER ROLLERS	30.00 EA
830-0043-001	GAUGE CAPSTAN SHAFT LOCATOR-60 DUROMETER PRESSURE ROLLERS	28.50 EA
831-0276-003	PCB TEST EXTENDER 18-PIN DOUBLE SIDE FOR DELTA BIAS AMP	25.00 EA
831-0277-003	PCB TEST EXTENDER 18-PIN DOUBLE SIDE FOR DELTA RECORD LOGIC	24.00 EA
831-0278-003	PCB TEST EXTENDER 18-PIN DOUBLE SIDE FOR DELTA REC/METER AMP	24.00 EA

STOCK NUMBER	DELTA DESCRIPTION	PRICE
OPTIONS, ACCESSORIES, SERVICE AIDS		
831-0279-003	PCB TEST EXTENDER 18-PIN DOUBLE SIDE FOR DELTA PLAY/CUE AMP	24.00 EA
831-0280-003	PCB TEST EXTENDER 28-PIN DOUBLE SIDE FOR DELTA PLAY LOGIC	26.00 EA
878-0089-010	URM-0001 UNIVERSAL RACK MOUNT KIT	100.00 EA
878-0091-000	DRESS PANEL, URM-0001, 1/3 RACK WIDTH	15.00 EA
890-0028-000	DELTA TECHNICAL MANUAL	10.00 EA
PRINTED CIRCUIT BOARDS		
831-0248-003	PCB REPRODUCER LOGIC DELTA	178.50 EA
831-0249-003	PCB BIAS AMPLIFIER DELTA MONO	93.00 EA
831-0249-013	PCB BIAS AMPLIFIER DELTA STEREO	113.50 EA
831-0251-003	PCB RECORD AND METER AMPLIFIER DELTA MONO	98.50 EA
831-0251-013	PCB RECORD AND METER AMPLIFIER DELTA STEREO	128.00 EA
831-0252-003	PCB AUDIO OUTPUT MONO D-I W/TRANSFORMER	34.00 EA
831-0252-013	PCB AUDIO OUTPUT STEREO D-I W/TRANSFORMERS	55.50 EA
831-0252-023	PCB AUDIO OUTPUT MONO D-I TRANSFORMERLESS	35.00 EA
831-0252-033	PCB AUDIO OUTPUT STEREO D-I TRANSFORMERLESS	54.00 EA
831-0254-003	PCB AUDIO OUTPUT MONO D-III W/TRANSFORMERS	71.00 EA
831-0254-013	PCB AUDIO OUTPUT STEREO D-III W/TRANSFORMERS	130.00 EA
831-0254-023	PCB AUDIO OUTPUT MONO D-III TRANSFORMERLESS	74.00 EA
831-0254-033	PCB AUDIO OUTPUT STEREO D-III TRANSFORMERLESS	136.00 EA
831-0270-003	PCB MOTOR CONTROL/SERVO AMP DELTA	103.00 EA
831-0271-003	PCB RECORDER LOGIC DELTA	151.00 EA
831-0272-003	PCB AUDIO INPUT MONO DELTA	46.00 EA
831-0272-013	PCB AUDIO INPUT STEREO DELTA	86.00 EA
831-0273-003	PCB INTERCONNECT D-III	125.00 EA
831-0274-003	PCB MOTHERBOARD D-I 110V	154.00 EA
831-0282-003	PCB RECORD MOTHERBOARD DELTA	171.00 EA
831-0283-003	PCB VOLTAGE REGULATOR D-III	41.00 EA
831-0285-003	PCB REMOTE CONNECTOR D-III	53.00 EA
831-0286-003	PCB PLAY AMP MONO/CUE DETECT DELTA	224.00 EA
831-0286-013	PCB PLAY AMP STEREO/CUE DETECT DELTA	273.00 EA
RESISTORS		
628-0184-000	RESISTOR WIRE WOUND 470 OHM 5 1/4 WATT	1.30 EA
628-0191-000	RESISTOR WW 100 OHM 5-1/4 W	2.30 EA

STOCK NUMBER	DELTA DESCRIPTION	PRICE
RESISTORS		
628-0192-000	RESISTOR WW 13K OHM 5-1/4 W	2.40 EA
636-0031-000	POTENTIOMETER 20K	2.10 EA
SWITCHES, LAMPS, LENSES		
391-0023-000	SWITCH, PUSH	6.50 EA
392-0009-000	ROLLER SWITCH SNAP ACTION	3.25 EA
404-0059-000	LENS, YELLOW	1.00 EA
404-0060-000	LENS, GREEN	1.00 EA
404-0061-000	LENS, RED	1.00 EA
404-0062-000	LENS, BLUE	1.00 EA
404-0063-000	LENS, WHITE	1.00 EA
415-0013-000	LAMP MINIATURE 5 VOLT #3150	1.00 EA
TRANSISTORS		
590-0017-010	TRANSISTOR GES 5816	.30 EA
590-0031-000	TRANSISTOR 2N5087 PNP LOW NOISE	.70 EA
590-0033-000	TRANSISTOR, NPN, POWER TIP50	2.10 EA
590-0034-000	TRANSISTOR TIP120	1.80 EA
590-0035-000	TRANSISTOR TIP125	2.10 EA
596-0004-000	TRANSISTOR MPF 4391 J-FET N-CHANNEL	1.10 EA