"DELTA"

TECHNICAL MANUAL

(890-0028-020)

(Rev. 9/85)

"Today's Most Popular Cartridge Machines"

From
"The Leader in Reliability and Service"

International Tapetronics Corporation/3M
2425 South Main Street
P.O. Box 241
Bloomington, Illinois 61702-0241

3M

Preface

International Tapetronics Corporation/3M manuals are written with the intent of assisting the reader/user towards a better understanding of ITC equipment. Please read through this manual and familiarize yourself with the various procedures and tests necessary to keep your equipment in top operating condition. It is advisable to keep the manual in a convenient and readily accessable area near the machine.

Our test procedures are designed to allow adjustment by users for accurate and repeatable results; while yielding performance within specifications.

Should you discover any errors or omissions, or wish to comment on the manual or equipment, your input will be greatly appreciated. Forward any suggestions or recommendations to the Technical Documentation Coordinator; c/o ITC Technical Service department.

Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be re-required to correct the interference.

Warranty

International Tapetronics Corporation/3M

Warranty Conditions: There are no warranties, expressed or implied including the warranties of merchantability and fitness for use, beyond those stated herein.

International Tapetronics Corporation/3M, hereinafter referred to as ITC, warrants its products to be free from defects in workmanship and material under normal and proper use for the periods specified below. ITC assumes no obligation to repair or replace equipment which has been subject to maltreatment, misapplication, exposure or excessive moisture, improper maintenence or installation, negligence or accident, or had its serial number or any part thereof altered, defaced or removed. These warranties apply only to the original user. No dealer or agent is authorized to make any other or additional guaranty or warranty.

The sole or exclusive liability of ITC shall be to replace or repair the product as it may designate. **ITC assumes no liability for consequential damages or for any other loss, damage or expense, directly or indirectly arising from the use of its products.** In order to obtain warranty service ITC may require Purchaser to deliver the item to ITC at Purchaser's expense.

NEW EQUIPMENT: Warranted to be free from defects in workmanship and material, and conform to the specifications referred to or set out herein, for a period of two (2) years from date of shipment.

REFURBISHED EQUIPMENT: Warranted to be free from defects in workmanship and material, and conform to the specifications referred to or set out herein, for a period of two (2) years from date of shipment.

REPAIRED EQUIPMENT/REPLACEMENT PARTS: Warranted to be free from defects in workmanship and material for a period of ninety (90) days from date of shipment.

USED EQUIPMENT: Warranty time-period determined at time of sale.

Equipment Return Policy

When return of ITC equipment or components is necessary, please follow the procedure outlined in this bulletin. These four easy steps will insure prompt attention for your equipment.

1. Call the ITC Technical Service Department for return authorization and assistance. We must know that your equipment is coming and what the problem is before we can help. Unexpected or unidentified equipment is subject to delays of days or weeks since only properly documented material can be processed. Also, many problems can be diagnosed and rectified without actually returning the equipment, thereby saving you the expense of shipping and downtime!

2. Let us know who you are by writing a brief note listing the problem, your name, call letters or company name, address, phone number and who you spoke with at ITC. Enclose this note with the equipment. Also, make sure that your return address is visible on the outside of the carton.

3. **Package the equipment securely!** ITC is not responsible for shipping damage. If possible, use the original packing material. (Replacement packing material is available from ITC.)

4. Ship the equipment, prepaid, via a traceable mode of transportation; UPS, air express or air freight. Parcel Post and Air Mail are not traceable. Do not ship collect unless prior arrangements have been made. ITC recommends that you insure your shipment. Our Technical Service or Customer Service staff can assist with declared values for insurance purposes.

We continually strive to make available the finest in technical support and service for our products. Your help in making this possible is appreciated.

Call Toll-Free 800-447-0414. From Alaska, Hawaii and Illinois, call collect 309-828-1381.

Table Of Contents

List Of Illustrations

List Of Tables

Section I Introduction & Specifications

INTRODUCTION

This manual describes the installation, operation and maintenence of the DELTA family of audio tape cartridge machines from International Tapetronics Corporation/3M. The DELTA family consists of:

DELTA I: MONO or STEREO single-deck reproducer; plays AA size carts.

DELTA II: MONO or STEREO single-deck reproducer; plays AA, BB or CC size carts.

DELTA III: MONO or STEREO triple-deck reproducer; plays AA size carts.

DELTA IV: MONO or STEREO recording amplifier for all other DELTA units; single-deck size for rack mounting or mix & match table-top mounting.

ITC cartridge machines are designed and built for rugged use, with minimal required effort needed for normal servicing.

DELTA series units utilize a crystal-referenced, DC brushless capstan motor and bottoming solenoid for stable flutter & speed accuracy. A toroidal power transformer significantly reduces heat and minimizes radiated electromagnetic fields. Also, a patented head mounting module provides precise adjustment and alignment for tape contact.

Access for adjustments and routine servicing is made via an easily removable top cover. Subassemblies such as amplifiers, control circuitry, power supplies, front/rear panels and head assemblies are all plug or bolt in place, making service access convenient.

SPECIFICATIONS:

Power-
A. 105-132 VAC Or 210-264 VAC
B. 50/60 Hz

Power Consumption-
DI/DII: 50 VA Typical; 65 VA Maximum.
DIII: 120 VA Typical; 135 VA Maximum.
DIV : 5 VA Typical; 10 VA Maximum.

Tape Speed-
A. 7.5 IPS (19 cm/s) Standard
B. 3.75 IPS (9.5 cm/s) Strappable Option
C. 15 IPS (38 cm/s) Strappable Option

Speed Accuracy-
Better Than +/- 0.2%

Capstan Motor-
A. Direct Drive
B. DC Brushless
C. Electrolyzed, Non-Magnetic, Stainless Steel Shaft.
D. Permanently Lubricated Ball Bearings
E. Crystal Referenced, Phase-Locked Controller

Record/Play Flutter-
A. Play Maximum: 0.12% DIN Weighted @ 7.5 IPS
B. Rec/Play Maximum: 0.15% DIN Weighted @ 7.5 IPS

Audio Output Configuration-
A. Transformer Coupled Standard
B. Balanced Transformerless Operation Available Via Field Conversion

Audio Output Impedances-
A. 600 Ohm Standard Termination Impedance (275 Ohm Source Impedance)
B. 150 Ohm Optional Termination Impedance Via Strap Change (50 Ohm Source Impedance)
C. Transformerless Output: 150 Ohm Source Impedance

Audio Output Level-
A. +18 dBm Before Clipping Into 600 Ohm Load
B. +22 dBm Transformerless Clip Level
C. Variable From 0 Level To +18 dBm (Referenced To 1 kHz At 160 nWb/m). Continuously Variable "Useable" Range Of -18 dBm To +18 dBm.

Distortion-*
System: 1.5% Or Less THD. (Tape Dependent)

Noise-

A.* Signal-To-Noise: No Tape Running; ScotchCart Cartridge In Place.

MONO	STEREO
62 dB	60 dB
(Or Better)	(Or Better)

B.* Signal-To-Noise: Measured With Bias/ No Signal; Input Shorted; Virgin Cartridge.

MONO	STEREO
60 dB	58 dB
(Or Better)	(Or Better)

C. Squelch Noise-
70 dB Or Better

-Noise Measurements Are 20 Hz-20 kHz Bandlimited, Unweighted-

Crosstalk (System)-*
-50 dB Minimum Separation Between Any Two Channels.

Frequency Response-*
Record/Playback: +/- 2.0 dB, 50 Hz - 16kHz

Equalization-
A. 1975 NAB: Factory Standard
B. 1964 NAB: Field Convertible, Via Jumper
C. CCIR: Field Convertible

Adjustments: High Frequency Via Potentiometer

Head Configuration-
NAB Standard: Mono Play; Stereo Play; Mono R/P; Stereo R/P

Cue Signals- (Conform To NAB Specification)
A. NAB Primary Cue: 1 kHz
B. NAB Secondary Cue: 150 Hz
C. NAB Tertiary Cue: 8 kHz
D. External Cue:
1. Cue Record Logging Input-
Source Impedance: 10K Ohms or less
Volts In: 0.5V +/- .25V RMS
2. Cue Reproduce Audio Output-
Load Impedance: 47K Ohms or greater
Volts Out: 0.5V +/- .25V RMS

Audio Input Sensitivity-
  A. Line Input: 0 dBm nominal

     Input Range: -18 dBm To +18 dBm
     (Strappable For -6 dBm Or +6 dBm Center Range)

Audio Input Configuration-
  A. Transformer Coupled:
     1. 20K Ohm Bridging Standard
     2. Strappable For 150/600 Ohms Terminating Impedance
  B. Transformerless Balanced Available

Metering-
  A. Monitors Input Level To The Recorder;
     Automatically Switches To Playback When
     Not Recording; Manually Switchable For
     Record/Play/Bias/Cue.
  B. Taut Band Movement With VU Type "A" Scale

Bias-
  119.3 kHz, Crystal Referenced

Cartridge Size-
  DI/DIII: NAB A & AA
  DII: NAB A & AA, B & C

Start Time-
  100 ms Typical. (Dependent On Solenoid Air-Damp
  Adjustment.

Stop Time-
  Less Than 100 ms Typical.
  (Tape Travel Varies According To Type Of Cartridge
   And Length Of Tape)

Ambient Operating Temperature Range-
  10 To 50 Degrees C. (50 To 122 Degrees F.)

Storage Temperature Range-
  -40 To +85 Degrees C. (-40 To +185 Degrees F.)

Manual And Remote Controls-
  A. All Front Panel Indicators And Controls
     (Except Program Bias & Cue Track Monitoring)
  B. Play Remotes Available Via Play Remote
     Connector
  C. Record Remote Functions (Except Metering)
     Available Via Record Remote Connectors

External Connectors-
  A. XLR Audio Connectors
  B. D Subminiature Remote Connectors

Mounting-
A. Table-Top Standard
B. Rack-Mount Optional With URM-0001 Rack-Mount Kit (Three Units May Mount Side-By-Side)

Dimensions-

A. Width:
DI: 14.1 cm (5 9/16")
DII: 28.3 cm (11 1/8")
DIII: 14.1 cm (5 9/16")
DIV: 14.1 cm (5 9/16")

B. Depth:
DI: 30.5 cm (12.00")
DII: 30.5 cm (12.00")
DIII: 33 cm (13.00")
DIV: 30.5 cm (12.00")

C. Height:
DI: 13.3 cm (5 7/32")
DII: 13.3 cm (5 7/32")
DIII: 26.6 cm (10 15/32")
DIV: 13.3 cm (5 7/32")
Add 1 cm (.375") for feet.

Note: All Machines Require 8.75 cm (3 1/2") Additional Depth At Rear For Interconnection

Weight-(Typical)
DI: 10.0 kg (22 lbs.)
DII: 11.8 kg (26 lbs.)
DIII: 16.8 kg (37 lbs.)
DIV: 5.9 kg (13 lbs.)
Total Shipping Weight: Less Than 22.5 kg (50 lbs)

---

* Note: Items Indicated (*) Are Specified Using A ScotchCart ® Broadcast Cartridge At A Reference Level Of 1 kHz At 250 nWb/m.

International Tapetronics Corporation/3M Reserves The Right To Change Products And Specifications Without Notice.

Section II Installation & Operation

UNPACKING, HANDLING & PRE-INSTALLATION CHECKOUT

Fully unpack the unit, retaining all packing material. Place the unit in an area suitable for servicing. Visually inspect the chassis and covers for signs of freight damage. This inspection is necessary in order to determine if a damage claim is warranted.

Occasionally, damage is hidden and not readily apparent on external examination. The top cover should be removed by pulling back on the spring-loaded fastener located on the rear brace and sliding the cover back and off of the unit. Inspect all internal components for signs of hidden damage.

If damage is discovered--DO NOT POWER UP THE UNIT! Personal injury or further damage to the machine may occur. When a machine is damaged in shipment, please follow this procedure:

---

1. Call the ITC Customer Service department to inform them of the damage.

2. Describe the damage, how it was discovered and whether the delivering carrier has been informed. We can assist in determining what forms need to be submitted for a claim.

3. Do not repack the machine or dispose of any packing material until an inspection has been made by the delivering carrier or a representative.

After is is determined that the unit has not been damaged in shipment, check all internal connectors and other assemblies to make sure that nothing has been shaken loose or come unplugged. Review the following checklist to verify that your unit came with the correct connection/power parts and that they are correct for your type of installation. (Tables 2-1 & 2-2)

Table 2-1 DI/II/III

Unit Type	Description	Part Number
	-Line Cord-	
120V	North American plug, molded, with ground lug	433-0004-000
240V	240V type pigtail provided for customer installed connector	433-0005-000
	240V Color Code for Leads:	
	Brown = Live Conductor	
	Blue = Neutral Conductor	
	Green w/Yellow Stripe = Ground	
	-Fuse Carrier-	
120V	3AG size fuse carrier. (Grey)	418-0006-000
240V	5mm x 20mm fuse carrier. (Black)	418-0007-000
120/240V	Fuse holder, low-profile	418-0005-000
	-Fuse-	
120V	DI/DII: 3AG, .75 A 125V, time-delay	417-0012-000
	DIII: 3AG, 800 mA 125V, time-delay	417-0009-000
240V	DI/DII: 5mm x 20mm, 400 mA 250V, slo-blo	417-0018-000
	DIII: 5mm x 20mm, 800 mA 250V, slo-blo	417-0014-000
	-Audio Output Connectors-	
120/240V	DI/DII: 3-Pin XLR Female plug MONO--Quantity 1, STEREO--Quantity 2.	378-0019-000
	DIII: 3-Pin XLR Female plug MONO--Quantity 3, STEREO--Quantity 6.	378-0019-000
	-Remote Connectors-	
120/240V	DI/DII: 15-Pin plug Quantity 1.	378-0062-000
	DIII: 15-Pin plug Quantity 3.	378-0062-000
	-Miscellaneous-	
	Technical manual	890-0028-020

Table 2-2 DIV

Unit Type	Description	Part Number
	-Audio Input Connectors-	
	3-Pin XLR Male plug..... MONO--Quantity 1, STEREO--Quantity 2.	378-0018-000
	-Remote Connectors-	
	15-Pin plug..... Quantity 1.	378-0062-000
	-Cables-	
	Interconnect cable.....	837-0035-002

Operational Checkout

Prior to actual installation, it is advisable to perform a short, operational check on the unit:

1. With the top cover removed, plug the unit in and check to make sure that the motor is running. No front panel lamps will be illuminated.

2. Insert a blank tape cartridge into the machine. The yellow (READY/STOP) lamp will be illuminated. This indicates that the power supplies and microprocessor are functional.

3. Press the green (RUN/START) button. The green lamp will come on, the yellow lamp will go out, the solenoid plunger will pull in and tape will be pulled.

4. Press the blue (CUE) button. (This button is only on DELTA I & DELTA II units.) The green lamp will go out and the blue lamp will be illuminated. Simultaneously, the motor will speed up.

5. Press the yellow button. The green lamp will go out, the solenoid plunger will release and the tape will stop. The yellow lamp will be flashing.

6. Remove the cartridge from the machine. The yellow lamp will go out. Unplug the unit.

If the motor fails to run or if any of the lamps fail to illuminate, check connections to make sure that nothing has come loose. The lamps may be checked by removing the switch lens (pull straight forward) and reseating the bulb.

Factory Setup

Factory setup procedures call for adjusting and testing this unit to prevailing industry standards. Because of this, the unit's final setup standards may be different than those already in use at your facility. Therefore, a careful check of this machine may be in order to insure that the unit conforms to your needs. We make every possible effort to insure the accuracy of our factory adjustments and presume that certain setup conditions exist at your facility. These conditions include, but are not limited to input level, output level, record fluxivity, equalization, tape type, cartridge type, etc. Please check the unit's final inspection tag and the Specifications section of this manual for setup information. Finally, make note in your company's permanent records of the date of receipt and the model/serial numbers. You may need this information for future reference.

CAUTION: For Record/Reproduce units only. DO NOT connect a record unit to a reproduce unit while power is applied. Interconnection of units should be done only when power is removed. Failure to do this may cause damage to internal logic or power supply circuits.

INSTALLATION

Machine Installation

TABLE TOP: Your DELTA cart machine was shipped from the factory as a table-top unit. The DELTA family was designed as an incremental Unit system. Up to three (3) single UNIT height machines may be mounted on top of each other. DELTA machines may be mounted to provide a compact and versatile system as illustrated by Figure 2-1. Units should not be fully enclosed unless additional ventilation is provided by external sources. (See VENTILATION) In addition, units should not be placed on top of equipment producing large amounts of heat.

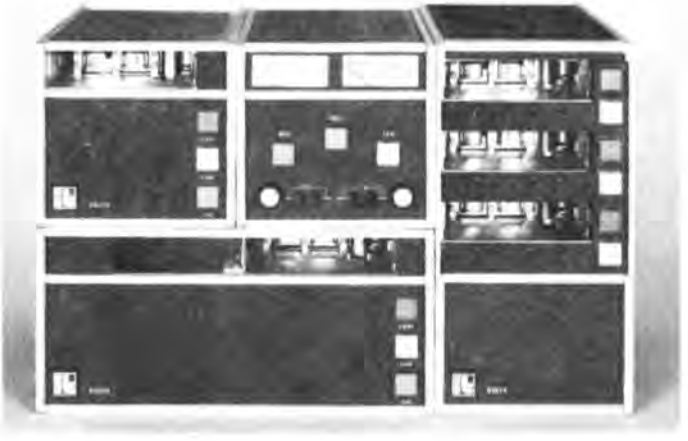


Fig. 2-1

RACK MOUNTING: DELTA cart machines may be rack mounted. Three (3) single-width units will fit side-by-side in a standard 19" rack opening. ITC makes available a universal rack mounting kit and filler panel as options. Please refer to Table 2-3 for ordering information.

Table 2-3

Description	Part Number
URM-0001 Universal Rack Mount.	878-0089-010
1/3 Rack Width Filler Panel.	878-0091-000

To prepare the unit for rack mounting, remove all four (4) feet and the top cover. Place these parts in a storage area for use if needed again.

CAUTION

Rack mounted units are installed without covers and must have their power disconnected

during removal from or installation into the rack frame.

Ventilation

The unit's top cover, and the URM-0001 (rack mount), have holes to allow normally generated heat to dissipate without allowing debris to fall into the chassis. No forced air cooling is needed (See Special Note For DELTA III Units) unless the unit is to be installed in a fully closed, unventilated housing. If a fully closed housing is used, a ventilating fan should be installed to draw heat away from the unit. Also, check air-flow from the fan and install a filter, if needed, to prevent excess dust from being drawn into the cart machine.

CAUTION

Do not block the top cover holes, or those of the URM-0001 by placing material on top the unit. Abnormal heat buildup will cause component life to be considerably shortened.

-SPECIAL NOTE ON DELTA III UNIT VENTILATION-

Because of the highly compact nature of this triple-deck unit, there is a miniature cooling fan installed inside all DELTA III units. This provides heat and dust dissipation for the densely packed componentry. The fan is mounted below and to the rear of the center panel.

The fan operates from low-voltage DC current. Fan speed is variable by turning a trimpot accessible through a small hole in the rear panel. The factory-set speed is adequate for most applications. If the unit is to be installed in a fully closed housing, more fan speed may be necessary. The unit should not be operated without the fan regardless of the type of installation. Component life will suffer greatly from abnormal heat buildup.

Typical fan noise is less than that produced by tape being pulled through a cartridge.

EXTERNAL AUDIO/REMOTE CONTROL CONNECTIONS

Inputs/Outputs

All DELTA units are shipped with standard input and output transformers installed. Inputs and outputs are made via 3-pin XLR-type connectors on the rear panel. Pin connections are "universal": Pin #1 is GROUND, Pins #2 & #3 are the balanced pair.

Should transformerless operation be desired, please refer to the Jumpers & Straps part of this section. DELTA I, II & IV units may be converted to transformerless operation by jumper strap modification on PCB's. DELTA III units require removal of the transformers and insertion of capacitors, or purchase of a properly loaded replacement PCB from ITC.

Cabling

ITC recommends that only shielded, twisted pair cable be used for input/output connections. In some remote audio output applications, unshielded cable may be tolerated if necessary, but this is not recommended.

Hookup

+(plus) and -(minus) signs on audio connections are indications of proper (stereo) phase relationship only and do not reflect DC voltage potential. It is necessary to connect the +(plus) lines of both channels to the corresponding +(plus), or equivalent terminal of the terminating equipment. This will prevent audio phase reversals (mono sum errors).

Remotes

Remote control for DELTA series machines is provided by 15-Pin D-Subminiature connectors located on the rear panel. Tables 2-4 and 2-5 outline the remote connector pin functions.

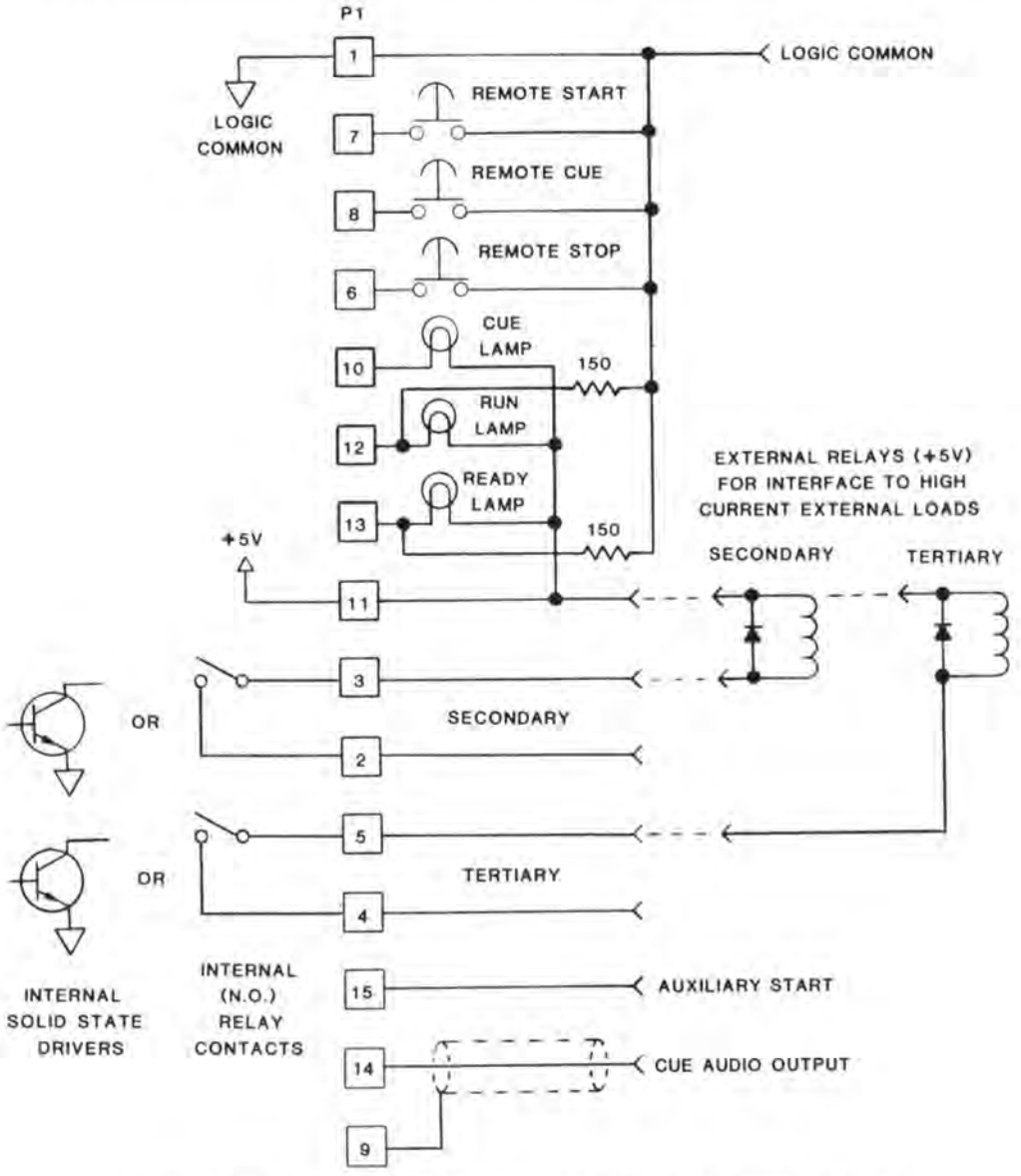
Table 2-4

Reproducer (DI/DII/DIII) Remote Connector

Pin #	Function
1	Logic Common, Switch Common
2	Secondary Cue Relay (Normally Open)
3	Secondary Cue Relay (Open Collector)- 200 mA switching current (sinking), maximum 25 VDC open circuit voltage, switches to ground upon sensing of secondary tone.
4	Tertiary Cue Relay (Normally Open)
5	Tertiary Cue Relay (Open Collector)- Switches to ground upon sensing of tertiary cue.
6	Remote Stop (Stop Ground)
7	Remote Start (Run Ground)
8	Remote Cue Switch
9	Cue Audio Ground
10	Remote Cue Lamp
11	+5 Volts NOTE: Use of this power supply in external applications should be limited to low-current, non-inductive loads. This is the same power supply that operates machine logic, and is subject to the influence of externally connected devices.
12	Remote Run Lamp (Ground)
13	Remote Ready Lamp (Ground)- Follows ready lamp function, when lamp is at ground. When lamp is off, the open collector transistor is off. CAUTION: Ready ground follows the condition of the front panel ready lamp. If the ready lamp is strapped to flash, ready ground will change states synchronous with the front panel ready lamp. Maximum open circuit voltage is 25 VDC; Maximum current at 200 mA.

14.....Cue Audio Output-
(Nominal voltage is .5V RMS)

15.....Auxiliary Start Pulse-
Open collector momentary (100 msec) pulse to ground upon start of cartridge. May be used to start an external clock or timer. Maximum 25 VDC open circuit voltage at 200 mA.



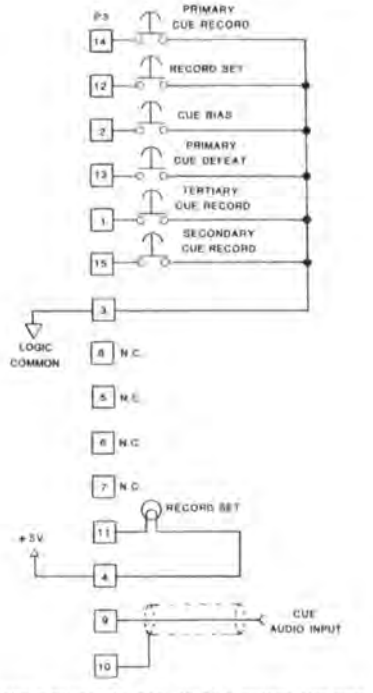
SAMPLE REMOTE CONTROL DELTA I,II,III (PER DECK) REPRODUCERS

Fig. 2-2

Table 2-5

Recorder (DIV) Remote Connector

Pin #	Function
1	8 kHz Cue Record Switch (Tertiary)
2	Cue Bias (Remote Cue Record Switch)
3	Logic Common
4	+5 Volts Regulated NOTE: Use of this power supply in external applications should be limited to low-current, non-inductive loads. This is the same power supply that operates machine logic, and is subject to the influence of externally connected devices.
5	N.C.
6	N.C.
7	N.C.
8	N.C.
9	Cue Audio Input
10	Cue Audio Input Common
11	Remote Record Set Lamp
12	Remote Record Set Switch
13	1 kHz Cue Tone Defeat (Primary)
14	1 kHz Cue Record Switch (Primary)
15	150 Hz Cue Record Switch (Secondary)



SAMPLE REMOTE CONTROL DELTA IV RECORD AMPLIFIER

Fig.2-3

Grounding & Shielding

Proper grounding and shielding techniques are important in insuring safe and noise-free operation. Fig. 2-4 illustrates a common installation technique for the prevention of audio (hum) ground loops. Notice that all third-lug connections must be made through this studio's AC power distribution system. This technique allows the mixer ground bus to become the central grounding point for all equipment in the studio.

CAUTION: The third (ground) lug should not be removed due to the increased potential for a shock hazard.

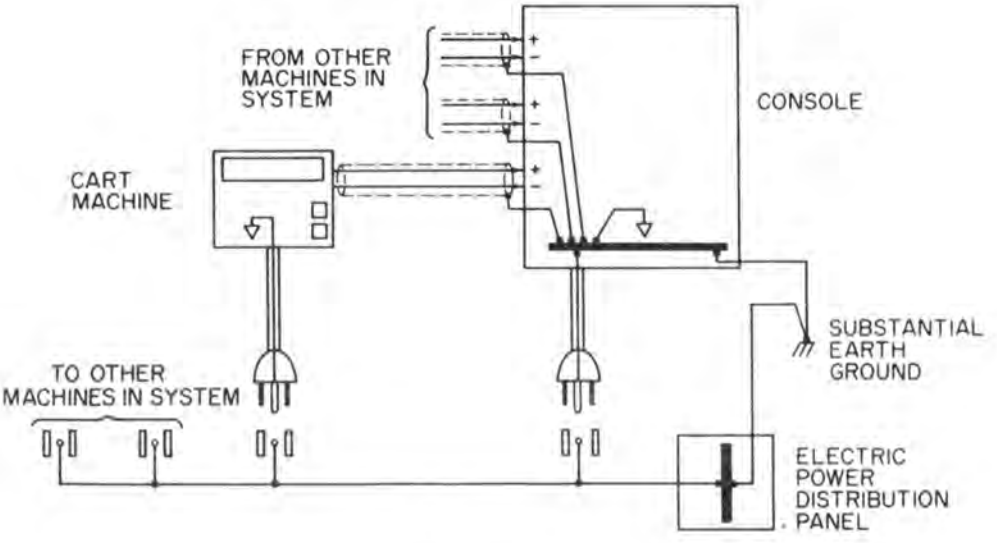
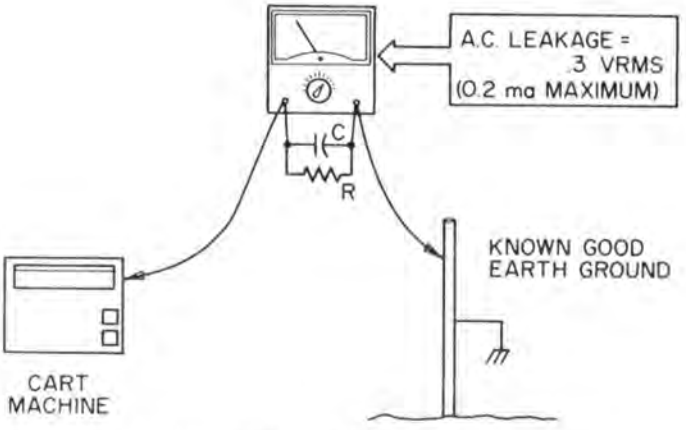


Fig. 2-4

AC Leakage Test

AC leakage currents in the system, between chassis components of properly connected and operating equipment, will be minimized. In any new equipment installation, AC leakage currents must be measured. **Leakage of more than 200 microamps indicates a potentially hazardous condition that must not be left unremedied!**

Use an AC voltmeter of 5000 Ohms per volt, or greater, and build a parallel circuit consisting of a 1500 Ohm, 10 Watt resistor and a .15 mfd capacitor, connected as shown in Figure 2-5.



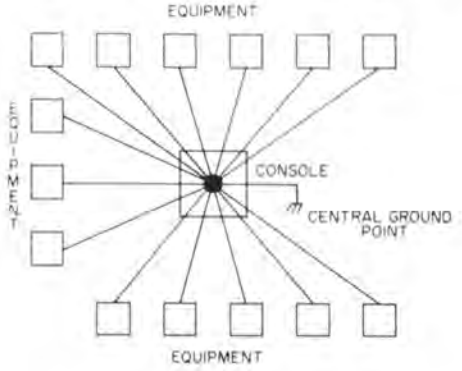
COURTESY OF E.I.A. CONSUMER ELECTRONICS SYSTEMS TECHNICIAN SAFETY GUIDELINES (7-84)

Sample AC Leakage Test

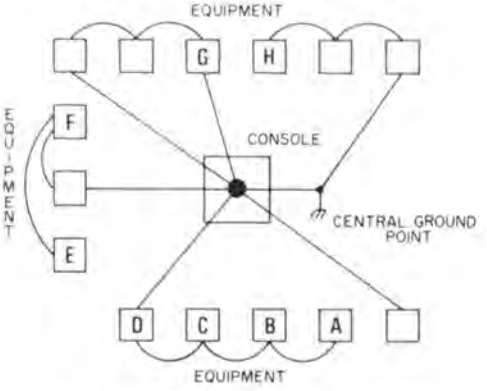
Fig. 2-5

Measure the voltage between a known good earth ground and an exposed metallic part on the chassis of the equipment under test. **Voltage measured must not exceed .3V RMS,** (corresponding to 0.2 mA AC). **ANY value exceeding this limit must be considered a potential shock hazard and should be remedied immediately.**

The studio construction technique shown in Fig. 2-4 is sometimes called "Spoke", or "Hub and Spoke" construction. In this technique, the mixer is always considered to be the electrical "Hub" of the studio, with all other equipment connected to the mixer in a "Spoke"



CORRECT GROUNDING TECHNIQUE, SHOWING CONSOLE/MIXER AS THE CENTRAL GROUND POINT



INCORRECT GROUNDING TECHNIQUES, SHOWING MIXED SCHEMES, INCLUDING LOOPING AND UNSUBSTANTIATED GROUNDS. SHOCK HAZARDS AND GROUND LOOP POTENTIAL IS HIGH.

Fig. 2-6

fashion. All grounding is referenced to the mixer (Console) as is power distribution. Correct and incorrect grounding techniques are illustrated in Fig. 2-6.

Leakage current measurements between machine A and the mixer will usually reveal a serious ground fault because of the long route back to the mixer. The ACTUAL route is A to B to C to D, then back to the mixer before true ground is achieved.

Similarly, leakage current between machines E and H is significant due to its equally lengthy route.

Function Modification

JUMPERS & STRAPS
(Special Functions)

As noted in the Controls & Indicators section, DELTA series machines are factory configured for standard operation. All standard configuration machines also have the ability to be reconfigured via jumper and strap changes for special operation to meet the needs of your particular installation.

Reproducer Options:

Flashing Ready Lamp

1. START LOCK OUT/1 kHz FLASH (yellow lamp): Unless otherwise specified when ordered, the READY (Stop) lamp will flash slowly when a cartridge plays through to the 1 kHz cue tone and stops. If a cartridge has been stopped manually, by pressing the STOP button, the READY lamp will flash quickly. The "flashing ready" may be reset to continuous ready by momentarily pressing the STOP switch. To disable the "flashing READY" on cue up or manual stop, install jumper W206 on the Reproduce Logic PCB.

Repeat-Play Lockout

As supplied from the factory, a cartridge that has played through to the 1 kHz cue tone and stopped may be replayed by pressing the START button. To prevent accidental replay of the same cartridge, enable the repeat play lock-out by installing W207 on the reproduce PCB.

NOTE: If W206 is selected for a "No Flash" condition, W207 will NOT enable the "Start

Lock Out". Please refer to Figure 2-7 and Table 2-6 for exact interrelationship of straps.

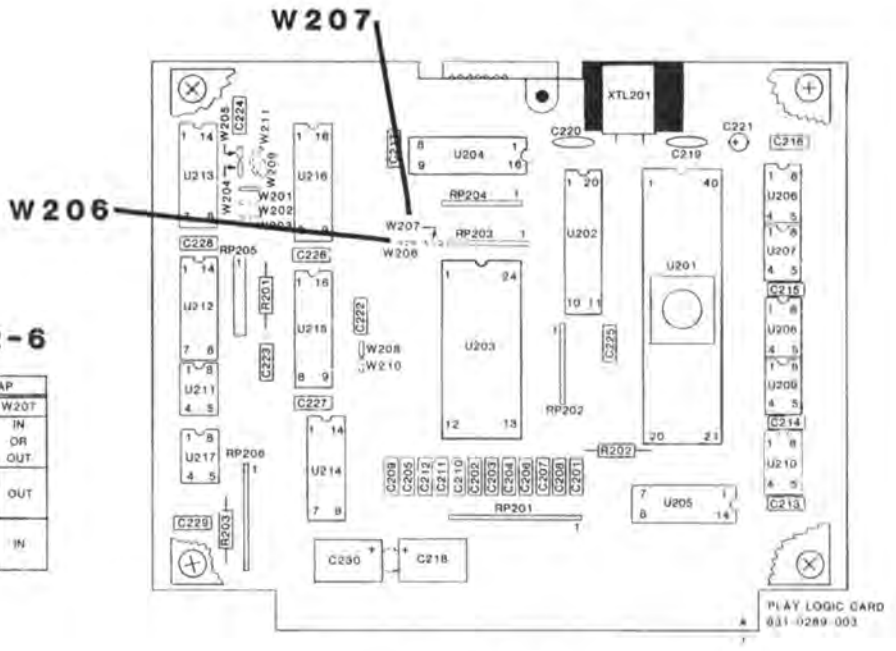


Fig. 2-7

Table 2-6

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

Secondary/ Tertiary

2. 150 Hz/8 kHz HIGH-SPEED RECUE/AUDIO MUTE: As supplied from the factory, a 150 Hz Secondary cue tone will cause audio to mute at

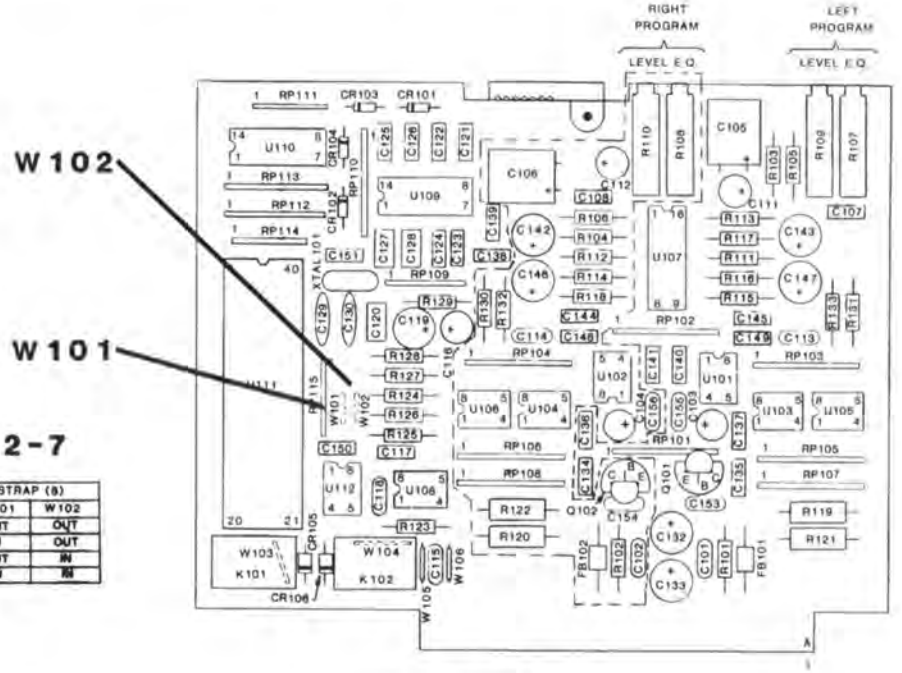


Fig. 2-8

Table 2-7

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

Recue/Audio Mute

the trailing edge of the tone and the cartridge will recue at high-speed. Additionally, an 8 kHz Tertiary tone may be substituted for or used in conjunction with the 150 Hz tone to provide audio mute/high-speed recue via jumper change. Both tones may be disabled via jumper change. These jumpers are located on the Reproduce Amplifier & Cue Detect PCB. Refer to Figure 2-8 and Table 2-7 for exact jumper location and strap change instructions.

Relay/ Open Collector

3. RELAY/OPEN COLLECTOR OPERATION: Unless otherwise specified when ordered, operation of the 150 Hz or 8 kHz cue tones is controlled by internal relay contacts. Open collector operation is available via internal solid state drivers by removing relays and making strap changes. The relays and straps are located on the Reproduce Amplifier & Cue Detect PCB. Refer to Figure 2-9 and Table 2-8 for exact location and relay/jumper change instructions.

Fig. 2-9

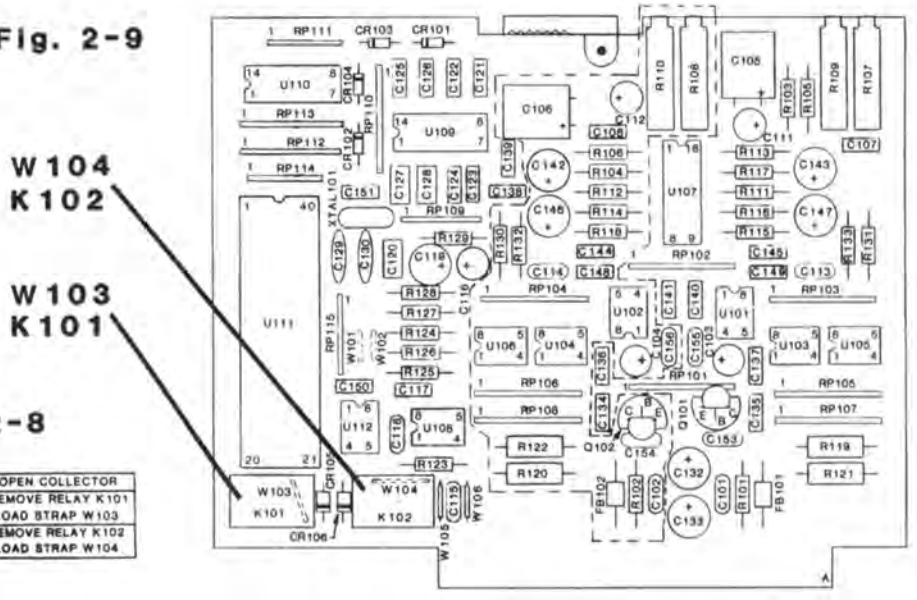


Table 2-8

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

Output Impedance

4. REPRODUCER OUTPUT IMPEDANCE: Unless otherwise specified when ordered, all DELTA series reproducers are supplied from the factory with 600 OHMS balanced, transformer coupled output. 150 OHM balanced, transformer coupled output is available by making strap changes on the DI/DII or DIII Output Transformer PCBs. Refer to Figure 2-10 (Table 2-9) or Figure 2-11 (Table 2-10) for exact location and strap change instructions.

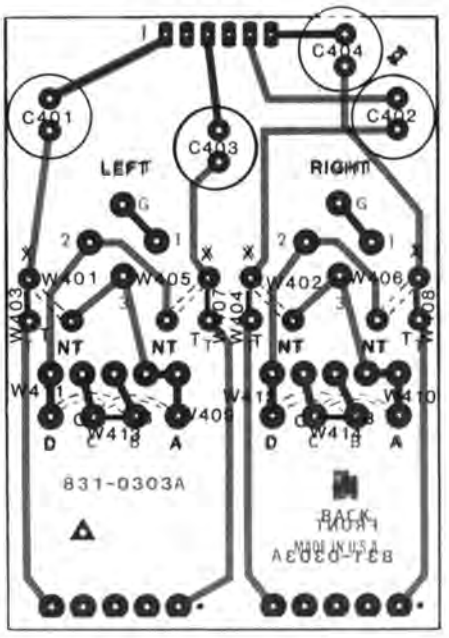


Fig. 2-10

Table 2-9

IMPEDANCE TABLE

LOAD IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W413 (BC)	W404 (XT) W408 (XT) W414 (BC)
150 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W409 (AC) W411 (BD)	W404 (XT) W408 (XT) W410 (AC) W412 (BD)

NOTE: 1. STRAPS W403, W404, W407, W408, W413 AND W414 ARE FOILS AND MUST BE CUT AS REQUIRED.
2. IF FOIL OR WIRE STRAP IS NOT LISTED IN TABLE BLOCK, IT MUST BE REMOVED.

Fig. 2-11

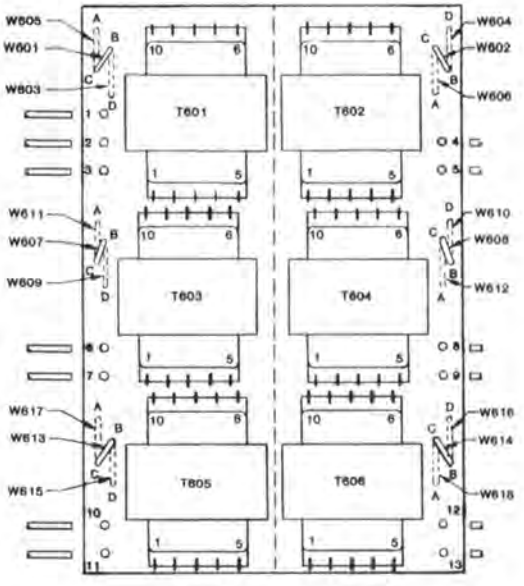


Table 2-10

IMPEDANCE TABLE

IMPEDANCE	CHANNEL	
	LEFT	RIGHT
	WITH TRANSFORMER (S)	
	STRAP (S)	
600 OHMS LOAD IMPEDANCE	W601 (BC) W607 (BC) W613 (BC)	W602 (BC) W608 (BC) W614 (BC)
150 OHMS LOAD IMPEDANCE	W603 (BD) W605 (AC) W609 (BD) W611 (AC) W615 (BD) W617 (AC)	W604 (BD) W606 (AC) W610 (BD) W612 (AC) W616 (BD) W618 (AC)

Transformerless Operation Reproducer

5. REPRODUCER BALANCED TRANSFORMERLESS (ACTIVE) OUTPUT: All DELTA aeries reproducers may be reconfigured to operate in a transformerless (active) output state. DI/DII units may be reconfigured via strap change on the Output Transformer PCB. DIII units require removal of output tramsformers and installation of isolation capacitors.

DI/DII Change: Refer to Figure 2-12 and Table 2-11 for exact location and strap change instructions.

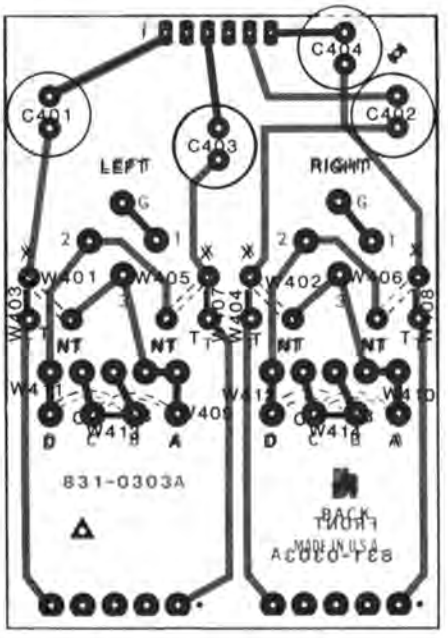


Fig. 2-12

Table 2-11

IMPEDANCE TABLE

LOAD IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS W/O TRANSFORMER (S) (75 OHMS DRIVING POINT IMPEDANCE)	W401 (XNT) W405 (XNT)	W402 (XNT) W406 (XNT)

DIII Change: Output transformers must be removed from the DIII Output Transformer PCB. When output reansformers are removed, DC isolation between the DIII output stage and connected equipment should be maintained. To do so, insert a 220 mfd, non-polarized capacitor in each output leg, (+) and (-). Refer to Figure 2-13 and Table 2-12 for exact location and transformer/capacitor changes.

Fig. 2-13

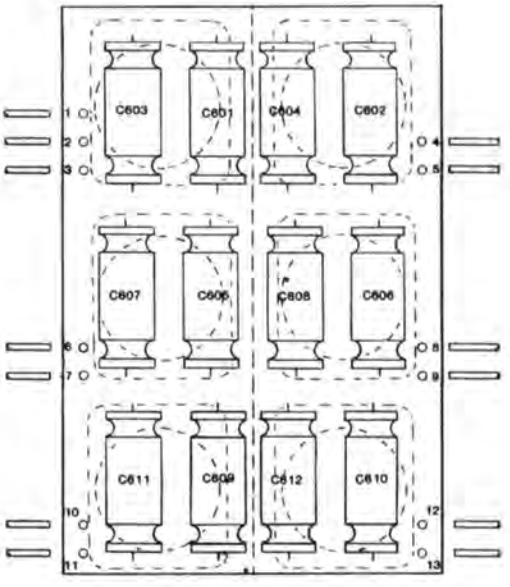


Table 2-12

IMPEDANCE TABLE

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

NOTE: ITC provides PCB assemblies to readily convert a DIII to balanced transformerless operation. Refer to Table 2-13 for ordering information.

Table 2-13

DIII Audio Output PCBs

MONO w/Transformer..... 831-0254-003
STEREO w/Transormer.....831-0254-013
MONO w/o Transformer.....831-0254-023
STEREO w/o Transformer.....831-0254-033

Motor

6. SERVO MOTOR:

A. Motor Speed: Standard motor speed is set at 7 1/2 IPS unless otherwise specified. Units may be changed to operate at 3 3/4 IPS or 15 IPS by installing jumpers located on the Reproduce Logic PCB. Refer to Figure 2-14 and Table 2-14 for exact location and jumper change instructions.

B. Capstan Shaft Diameter: Standard capstan shaft diameter is 10 mm. In cases where it becomes necessary to install a motor with an 8 mm diameter shaft, make a strap change on the Reproduce Logic PCB. Figure 2-14, Table 2-15.

Table 2-14

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

Table 2-15

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

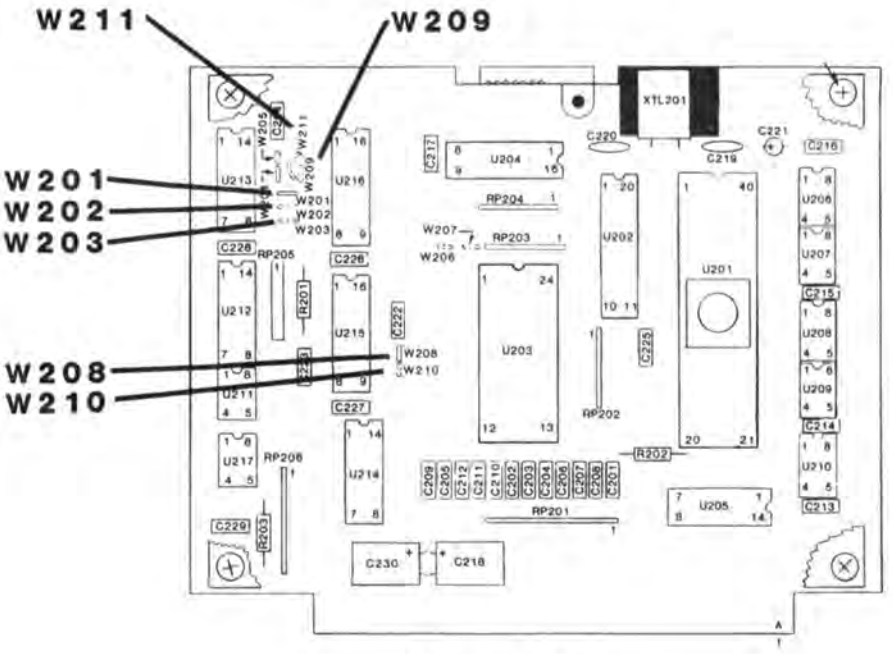


Fig. 2-14

Equalization

7. EQUALIZATION: Unless otherwise specified when ordered, DELTA machines are setup to the 1975 NAB Standard for equalization. Equalization may be changed to either 1964 NAB Standard or CCIR equalization as follows:

A. 1964 NAB Standard: Refer to Figure 2-15. Change R105 and R106 on the Reproduce Amplifier & Cue Detect PCB from 680K OHM, 1/4w carbon film resistors to 270K OHM, 1/4w carbon film resistors. Remove strap W1003 (and W1004 if the unit is STEREO) on the Record & Meter Amplifier PCB. Figure 2-16 & Table 2-17.

B. CCIR equalization: Potentiometers R107/R108 on the Reproduce Amplifier & Cue Detect PCB and R1005/R1006 on the Record & Meter Amplifier PCB control record equalization for this adjustment. Figure 2-15 & Figure 2-16.

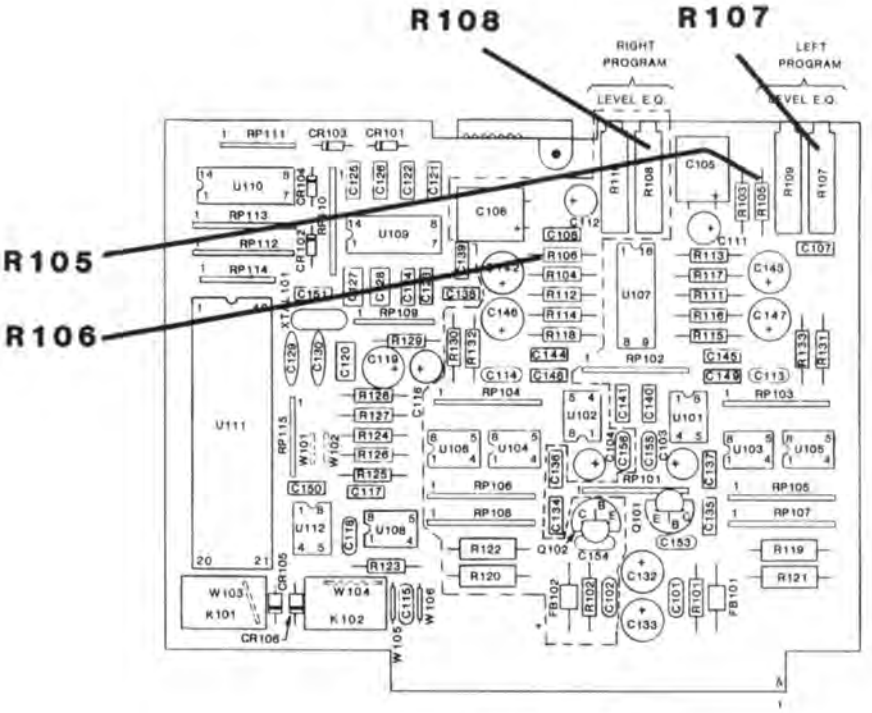


Fig. 2-15

Table 2-17

NAB EQUALIZATION TABLE

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

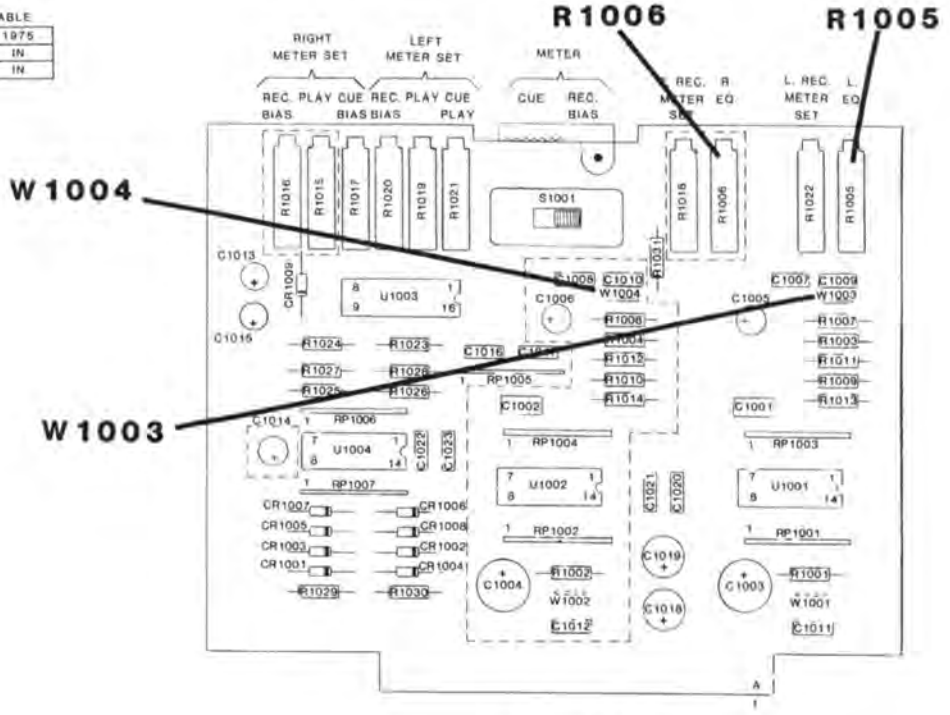


Fig. 2-16

Recorder Changes:

Input Impedance

1. RECORDER INPUT IMPEDANCE: DELTA IV recorders are shipped from the factory with 20K OHMs balanced bridging input standard. The input may be terminated with either 150 or 600 OHMs by making jumper changes on the Record Mother PCB. Refer to Figure 2-17 and Table 2-18 for exact location and jumper change instructions.

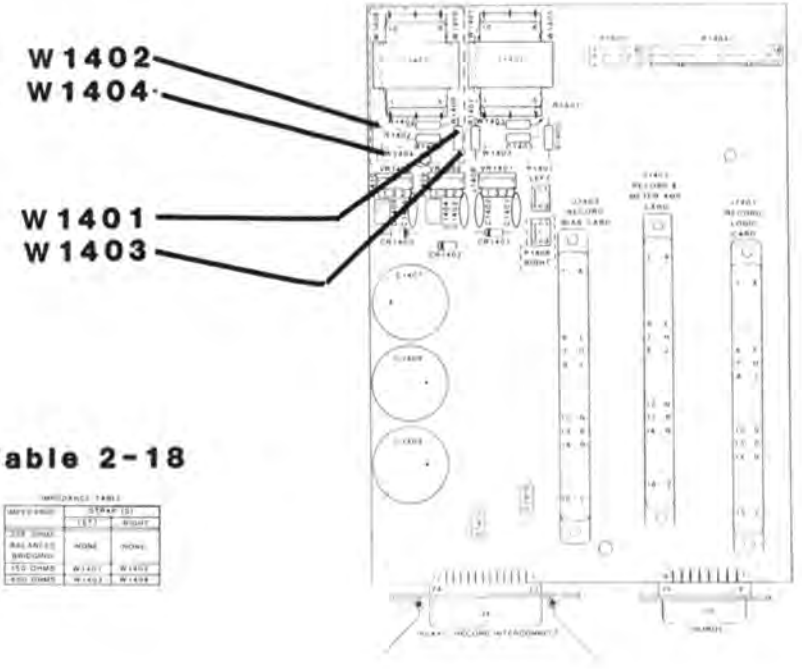


Table 2-18

IMPEDANCE TABLE		
IMPEDANCE	STRAP (S)	
	LEFT	RIGHT
20K OHMS	NONE	NONE
BALANCED BRIDGING		
150 OHMS	W1401	W1403
600 OHMS	W1402	W1404

Fig. 2-17

Transformerless Operation Recorder

2. BALANCED TRANSFORMERLESS (DIFFERENTIAL) INPUT: Input for the DELTA IV is balanced, transformer coupled as shipped from the factory. Transformerless operation may be obtained by adding straps located on the Record Mother PCB. Refer to Figure 2-18 and Table 2-19 for exact location and jumper change instructions.

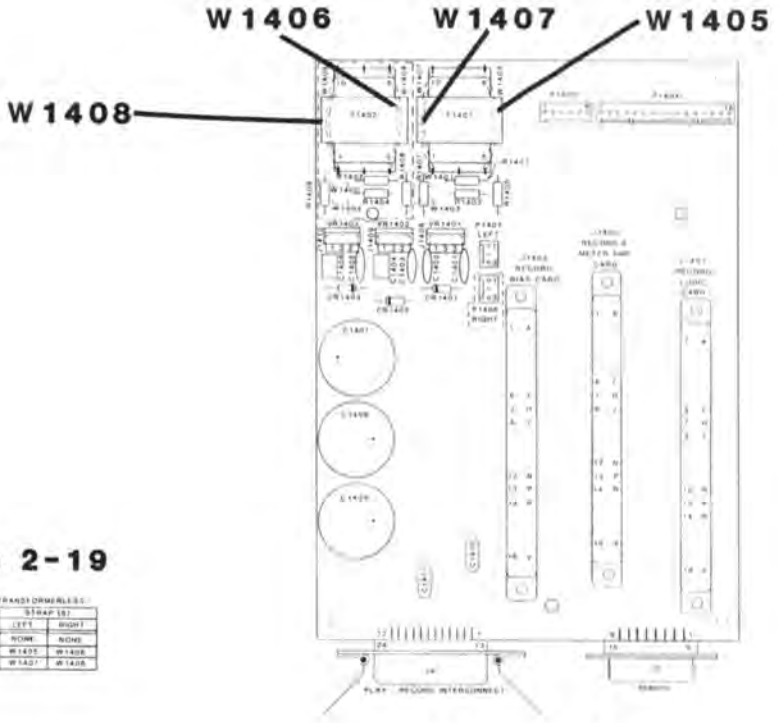


Fig. 2-18

Table 2-19

CONDITION	STRAP (S)	
	LEFT	RIGHT
TRANSFORMER	NONE	NONE
TRANSFORMERLESS	W1401	W1408
	W1407	W1405

3. AUDIO INPUT LEVEL: Front panel potentiometers on the recorder are factory set so that the center of range is +6 dBm. This may be changed to -6 dBm by making a strap change on the Record & Meter Amplifier PCB. Figure 2-19 and Table 2-20. Front panel potentiometer range is 0 to at least +12 dB, referenced to each strap.

Fig. 2-19

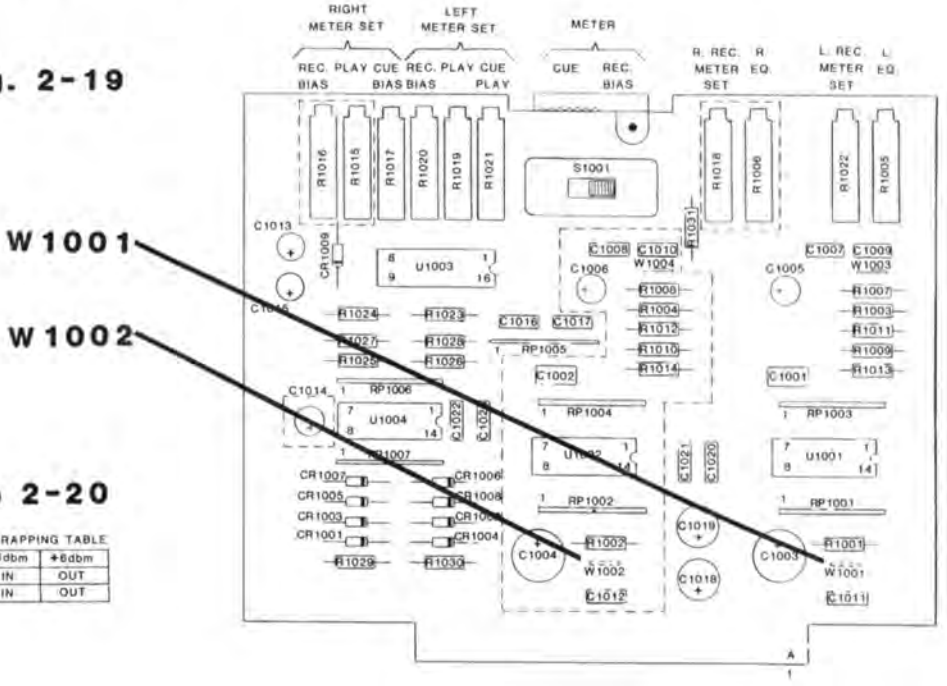


Table 2-20

INPUT LEVEL STRAPPING TABLE

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

CONTROLS & INDICATORS

Front Panel - Reproducers:

Stop/READY

1. STOP switch (READY - yellow lens): Active when a cartridge is properly loaded. Will override all other machine functions regardless of mode.

2. READY (Stop) lamp: Illuminated when a cartridge has been properly loaded. Flashes slowly after the 1 kHz Primary cue tone is detected and the cart has recued. Flashes quickly when the cart is stopped manually, indicating that the cart has not automatically recued.

Start/RUN

3. START switch (RUN - green lens): Active when the unit is in the READY mode, (yellow lamp on) or in CUE mode. Pressing the START switch will initiate the recording process when the unit is in the RECORD SET mode, (red & yellow lamps on).

4. RUN (Start) lamp: Illuminated during the RUN mode. Flashes during 150 Hz Secondary cue tone detection.

Cue

5. Cue Switch (CUE - blue lens): Used for high-speed cue and audio mute from STOP, START, or RECORD modes (Cancels RECORD SET). Pressing CUE while in high-speed mode causes audio to turn ON for the duration the switch is held. Note: Not available on DIII units.

6. Cue lamp: Illuminated when in CUE mode.

Front Panel- Recorder

Record Set

1. RECORD SET switch (REC- red lens): Active only in the READY mode, (yellow lamp on). When pressed, program audio is switched into the recording amplifier circuit. Pressing the START button will then cause the recording process to begin.

2. RECORD SET (REC) lamp: Illuminated when the machine is in the RECORD SET mode or actually in the process of recording. This lamp will flash if the 1 kHz cue tone defeat has been activated.

1 kHz Cue

3. 1 kHz Cue Record: When the machine is placed into a RECORD SET mode and then the START button is pushed, a 1 kHz (Primary) cue tone is automatically recorded. This is internally controlled by the recorder. Additionally, there are two (2) front panel switches (Black) which allow the operator to control the 1 kHz tone as follows:

A. 1 kHz Cue Record (ADD): This switch is active in either the playback or recording modes. The operator may record a 1 kHz cue tone at any time, (as in the case of editing), by momentarily depressing the 1 kHz ADD switch. The length of the tone is automatically controlled by the microprocessor. The internal 1 kHz cue tone detector is automatically momentarily defeated when the ADD button is pushed.

B. 1 kHz Cue DEFEAT: This switch is active only when the unit is in RECORD SET mode, (READY-yellow and REC-red lamps on). Pressing this switch will DEFEAT the automatic 1 kHz record function and cause the red REC lamp to flash. If recording on more than one cartridge, the 1 kHz DEFEAT must be activated for each cartridge.

150 Hz Cue

4. Secondary (150 Hz) Cue switch (SEC - blue lens): This switch is active in either the playback or recording modes. When recording, an operator may press the SEC button and record a 150 Hz Secondary cue tone. During playback, a recorded 150 Hz tone will signal the reproducer to initiate high-speed recue. This fuction may be defeated if desired by performing a jumper operation detailed in the Jumpers & Straps portion of this section.

8 kHz Cue

5. Tertiary (8 kHz) Cue switch (TER - white lens): This switch is active in either the playback or recording modes. When recording, an operator may press the TER button and record an 8 kHz Tertiary cue tone. Reproducers can be programmed via jumper change to initiate high-speed recue from the 8 kHz tone rather than the 150 Hz Secondary tone. Refer to the Jumpers & Straps portion of this section for details on performing the strap changes.

Meters

6. Meter Monitoring: Both meters are controlled by two (2) front panel switches (Black) labeled REC and PLAY. These switches work in conjunction with and internal slide switch located on the Record & Meter Amp PCB. Refer to Table 2-21 for switch functions.

NOTE: The internal slide switch is active ONLY when NEITHER the REC or PLAY front panel switch is depressed. The slide switch has two positions: Toward the rear panel = "Cue" position; Toward the front panel = "Rec Bias" position.

Table 2-21

Meter Switch/ Machine Status	Meter Indication: Left Meter	Right Meter
REC depressed; machine recording tape.....	Left program input level.	Right program input level.
REC depressed; machine reproducing 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; internal slide switch in "CUE" position...	Cue Play	Cue Bias
Neither PLAY or REC depressed; internal slide switch in "REC BIAS" position.....	Left program bias	Right program bias

Section III Adjustments & Alignment

Your DELTA cartridge machine is designed and built for reliable, long-term operation. As with any electromechanical device, various factors such as severity of use, ambient temperature, vibration and normal wear contribute to diminished performance.

With proper attention paid to operating conditions, and a little routine maintenence, your machine will provide many years of trouble-free service.

The following sections describe adjustment and alignment procedures needed to assure optimum operation of mechanical and electrical assemblies. Please read through these sections carefully and familiarize yourself with the workings of the machine.

These procedures are designed to be performed using ITC gauges and fixtures. Use of gauges and fixtures other than those specified may lead to incorrect alignment or less than optimum performance.

Adjustments may be performed individually as needed, or as part of a regular service schedule.

However, due to the interrelationship of these procedures, a complete check of all assemblies requires that you follow, in order, the sequence of adjustments in this section. Failure to follow this sequence could result in misalignment and less than optimum performance!

Review the following checkliat to make aure that you have the correct tools and materials to do the job.

Table 3-1 ADJUSTMENT TOOL CHECKLIST

1. Gauges:
   - A. Capstan Shaft Locator Gauge
     ITC #830-0043-001 *
   - B. Pressure Roller Pressure Gauge
     ITC #830-0042-011 *
   - C. Tape Guide Height Gauge
     ITC #830-0041-022 *
   - D. Zenith Gauge
     ITC #830-0026-022 *

2. Tools:
   - A. 5/64" Long-arm Hex Wrench
   - B. 1/8" Hex Wrench or Driver
   - C. 1/4" Open-end or Box Wrench
   - D. Phillips-head Screwdrivers:
     1. #0 bit
     2. #1 bit
   - E. Small Flat-blade Screwdriver
   - F. Needle-nose Pliers
   - G. Razor Knife, Scribe or Sharp Awl
   - H. Ruler--accurate to 1/32".

3. Test Tapes:
   - A. NAB Standard Azimuth and Spot Frequency Aligment Tape. (MONO or STEREO, dependent on unit type)
   - B. 3.5 Minute Blank Cartridge-Known To Have Good Operating Characteriatica. (Use the same type as in normal daily cart library. Needed for Recorder unita only.)

4. Test Equipment:
   - A. Oscilloscope
   - B. Audio Oscillator-(Capable of producing 0 dBm into a 600 Ohm termination.)
   - C. 600 Ohm Termination
   - D. RMS Voltmeter-(Capable of reading dBm.)
   - E. Clip Leads

* Available from ITC.

NOTE: Many of the following procedures require a 600 Ohm termination. A simple 600 Ohm terminating resistor may be made by paralleling two 1200 Ohm, 1/2 watt, 5% resistors.

TOP COVER REMOVAL:
The top cover is held in place by a spring loaded fastener located in the middle of the rear chassis support bar (Figure 3-1). To remove the cover, pull back on the fastener and slide the cover out and off of the unit.

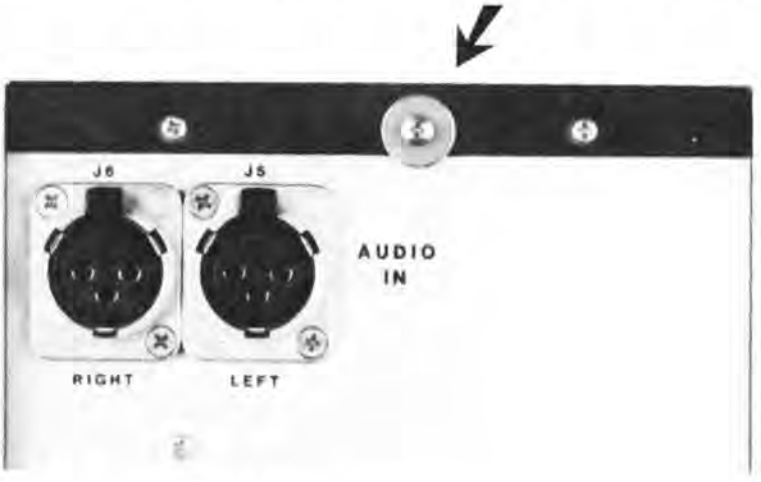


Fig. 3-1

CAUTION

CAUTION: These adjustments require contact with the capstan shaft, which can be easily damaged. DO NOT FORCE gauges into position or allow the capstan shaft to become bound by a gauge. To do so will risk both shaft finish and straightness of the shaft.

1. Motor (Capstan Shaft) Location:

(Required when a motor is removed or replaced)

The purpose of this adjustment is to insure that the pressure roller shaft and the motor shaft remain absolutely parallel to each other during operation. Shaft parallelism is a critical requirement. Its establishment insures that no tape skewing occurs.

A. DELTA I/II Motor Positioning:

With power OFF, loosen (do not remove) the two motor mounting screws (Figure 3-2). Remove the

pressure roller by gently unfastening the "E" clip, nylon washer, pressure roller and metal washer. (Figure 3-3)

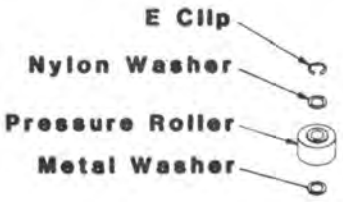


Fig. 3-3

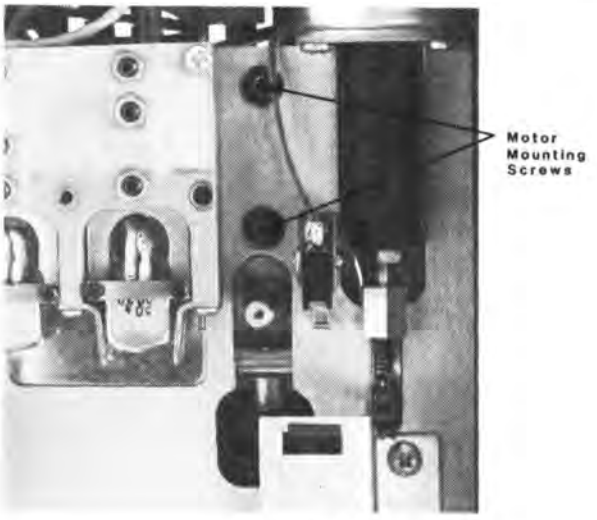


Fig. 3-2

Place the capstan shaft locator gauge over the pressure roller shaft as illustrated in Figure 3-4.

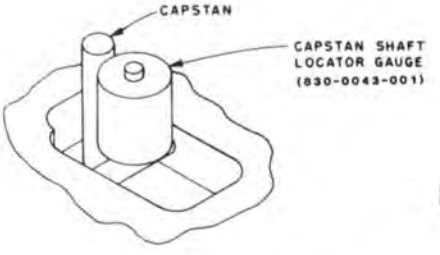


Fig. 3-4

Move the gauge up against the capstan shaft and carefully observe the gauge surface as it mates with the capstan surface. The gauge surface should lie flush against the capstan shaft. If not, gently move the motor until both surfaces are completely flush against each other. (See Figure 3-5).

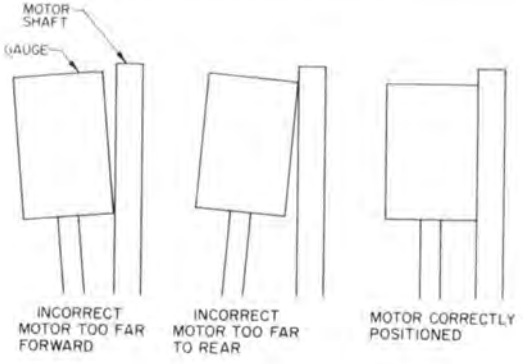


Fig. 3-5

As noted in the first paragraph, the capstan shaft (and the locator gauge) must remain parallel to the pressure roller shaft. To insure parallelism, the capstan shaft and pressure roller shaft must remain directly in line with each other. (See Figure 3-6). Also, as illustrated, the centerline of each shaft must be an equal distance from the right-hand side panel, setting up 90 degree angles at each corner.

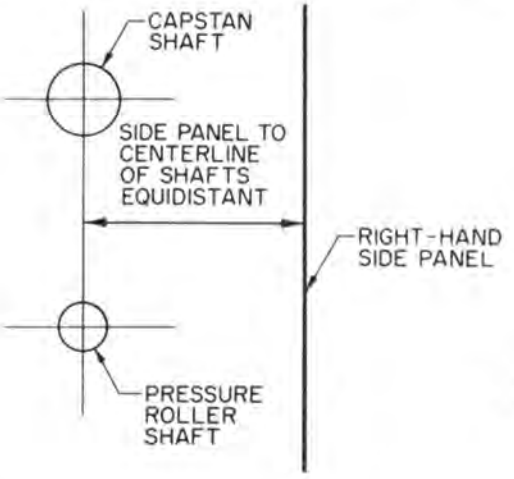


Fig. 3-6

Once the gauge and both shafts are correctly positioned, carefully tighten the motor mounting screws, making sure that neither shaft nor gauge change position. After tightening the screws, remove the gauge and reinstall the pressure roller by reversing the order of removal.

B. DELTA III Motor Positioning:

Note: Motor location in DIII models is always referenced to the center bulkhead. Motor location is relatively fixed. When adjustment is necessary, manipulation of the sliding decks is required. This procedure should only be performed when either a motor or deck is replaced. Once the procedure is completed, it should not be necessary to perform it again.

On each deck front panel there is a plastic hole plug which covers the deck capture screw. Remove the hole plug for each deck, loosen the capture screws and remove all decks. (The capture screws are held in the deck by the front panel and cannot fall out.)

Through the open front of the unit, observe the center bulkhead and the three holes used by the deck capture screws. Immediately adjacent to each hole is a 10-32 set screw which controls penetration of the deck into the frame. These will be used later on in the procedure if adjustment is needed.

Remove the right hand side panel inlay by unscrewing the four fasteners located in each corner. The side panel itself is not to be removed. There are three holes in the side panel which allow access to the decks.

Starting with the bottom deck, remove the pressure roller and place the Capstan Shaft Locator gauge over the pressure roller shaft as previously illustrated in Figure 3-4. Reinsert the deck into the bottom slot and secure it to the bulkhead with the deck capture screw.

Using the opening in the right hand side panel, manually press in the solenoid plunger until the gauge contacts the capstan shaft. Visually check to see if the gauge surface and capstan shaft surface indicate that the two shafts are parallel. (Refer to Figure 3-5) If the two shafts are not parallel, check to see if the gap between the shafts is at the top or bottom of the gauge surface. A gap at the top indicates that the deck is too far out and needs to be moved into the mainframe, closer to the capstan shaft. Conversely, a gap at the bottom of the gauge indicates that the deck is too far inside the mainframe and needs to be moved out, away from the capstan shaft.

If adjustment is necessary, loosen the deck capture screw and remove the deck. As mentioned earlier, the 10-32 set screws mounted on the bulkhead control deck penetration. Turning the set screws CLOCKWISE will move the decks CLOSER to the capstan shaft. Turning the set screws COUNTER-CLOCKWISE will move the decks AWAY from the capstan shaft. Depending on the gauge reading observed with the deck in place, adjust the set screw for proper deck penetration until the guage indicates that the pressure roller shaft and capstan shaft are parellel.

Repeat this procedure for the middle and top decks. Once all decks are properly adjusted,

replace the pressure rollers, reinstall the decks and secure the deck capture screws. This ends the adjustment procedure.

Note:
DELTA III motors use a unitized construction technique whereby the windings, rotor, shaft and shaft top bearing are all contained in a single-piece precision casting. This allows for precise 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 bulkhead forms a precision mounting plate for the motor from the rear, and provides a very rigid center and side brace for the mainframe.

Replacement of DELTA III motors, when necessary, will include the shaft top bearing and its support block. Since the motor has only two bearings, the shaft top bearing and the center support "gallows" are considered part of the motor.

2. Pressure Roller Pressure Adjustment:

(NOTE: Required after parts replacement, but should be performed as routine maintenence.)

DELTA units utilize a high-voltage, bottoming-plunger solenoid. This design requires that the solenoid plunger bottom against the stop seat and remain there during the entire tape driving operation. Accurate and repeatable adjustment of the pressure roller mechanism is assured because of its definite location against a rigid, fixed mechanical member. Refer to Figure 3-7 for an illustration of a properly bottomed plunger.

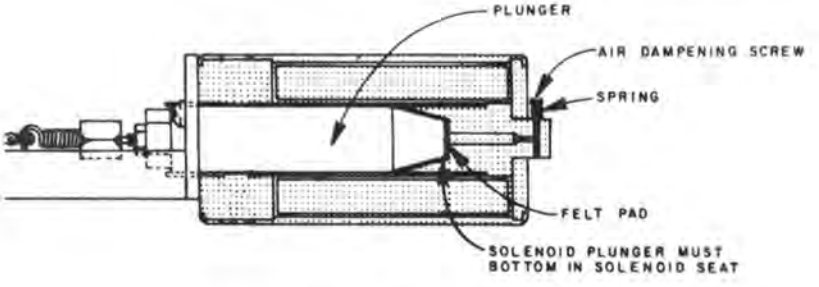


Fig. 3-7

The Pressure Roller Pressure gauge is used in the same manner as that of a "feeler" gauge or a "Go-No Go" type fixture. Refer to Figure 3-8 for gauge dimensions. Step "A" indicates OPTIMUM pressure roller pressure. Step "B" indicates LOW pressure roller pressure.

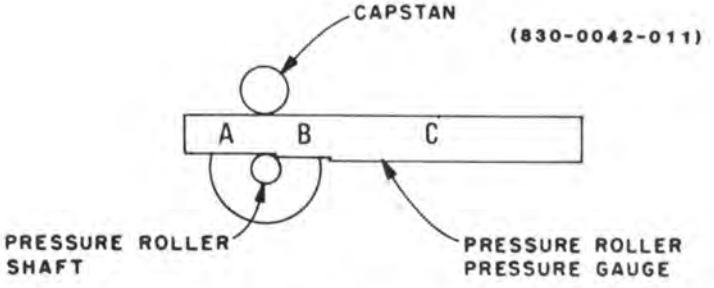


Fig. 3-8

Step "C" is simply a handle and has no measurement function. You may hold the gauge at any point on Step "C".

With power ON, hold the cartridge sensing switch closed, Figure 3-9, and press the START switch to engage the solenoid. Make sure that the solenoid plunger has bottomed and stays bottomed throughout this procedure. Use a rubber band or plastic twist-tie to hold the cartridge sensing switch closed.

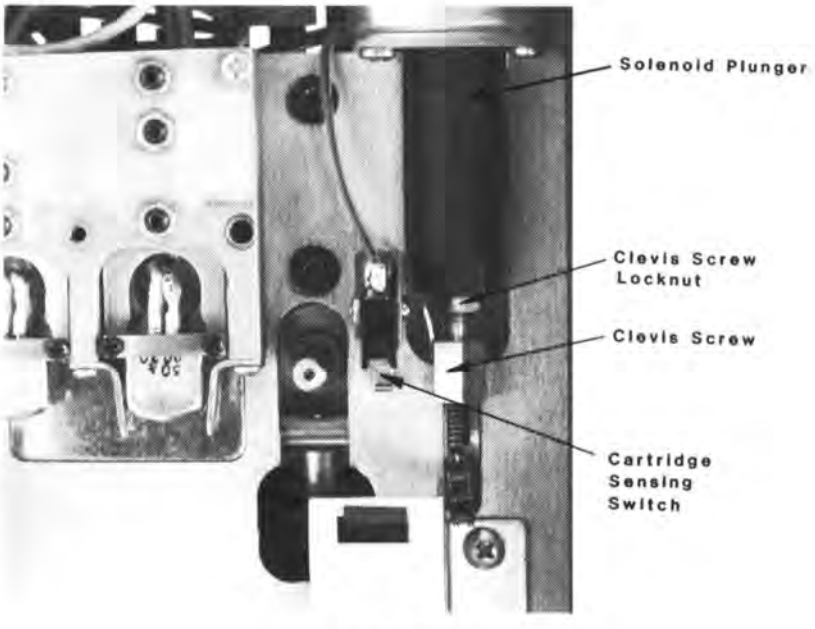


Fig. 3-9

Insert Step "A" of the gauge between the capstan shaft and the pressure roller shaft, as shown in Figure 3-8, stopping at Step "B".

(Note: In DELTA III units, remove the right hand side panel inlay and use the three side panel openings for access.)

Step "A" should slip between the shafts without being forced. If not, loosen (do not remove) the clevis screw locknut, (Figure 3-9), and rotate the solenoid plunger CLOCKWISE until Step "A" slips through. Conversely, Step "B" should not slip between the shafts. If it does, rotate the solenoid plunger COUNTERCLOCKWISE until Step "B" cannot slip through.

Once pressure roller pressure has been adjusted, tighten the clevis screw lock nut, taking care not to disturb any of your previous adjustments. Remove the gauge.

3. Solenoid Air-Damping Adjustment:

The speed and noise of solenoid operation is determined by the rate at which air flows through a small hole in the solenoid seat. Optimum adjustment of the air damp screw is achieved when a suitable balance between speed and noise is obtained.

Since speed and noise are directly related, the fastest operation of the solenoid usually results in the most noise. Therefore, this adjustment is made to provide a suitable balance between speed and noise, without compromising the operation of either.

Adjustment of airflow is accomplished by using a #0 bit Phillips screwdriver to turn the solenoid air-damp screw. Figure 3-10. The screw is turned CLOCKWISE for increased damping and COUNTER-CLOCKWISE for less.

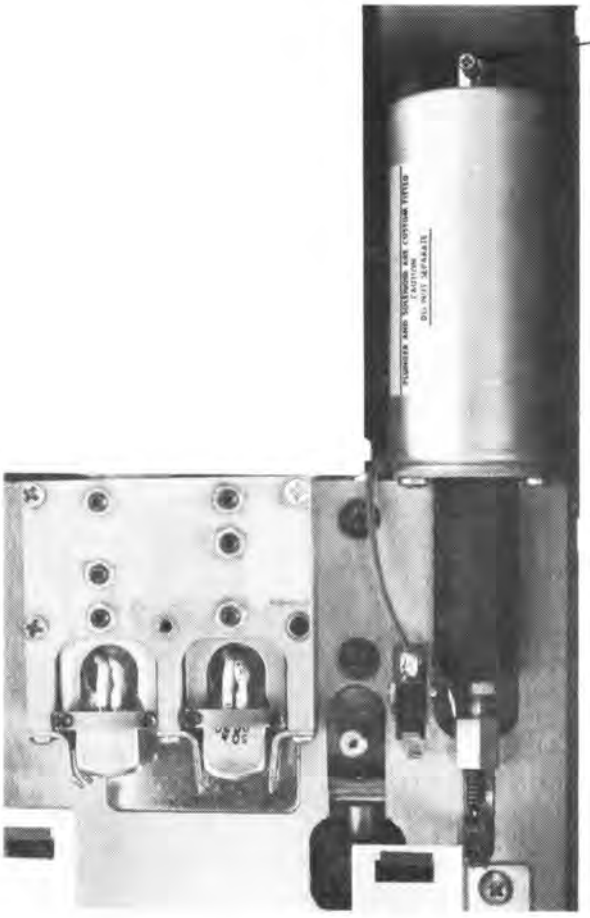


Fig. 3-10

4. Cartridge Guide Adjustment:

Optimum performance from cartridge machines and your tape cartridges can only be realized if the cartridge is positioned accurately and consistantly each time it is inserted.

Figure 3-11 illustrates key indexing points by which cartridge location is measured. These markings correspond to NAB mechanical specifications for broadcast cartridge systems, and should correspond to your own system adjustments.

A mechanical reference cartridge may be constructed by using these measurements as a guide. Scribe index lines on a cartridge body, using a razor knife, awl or other sharp instrument, and an accurate measure such as a machinist's ruler.

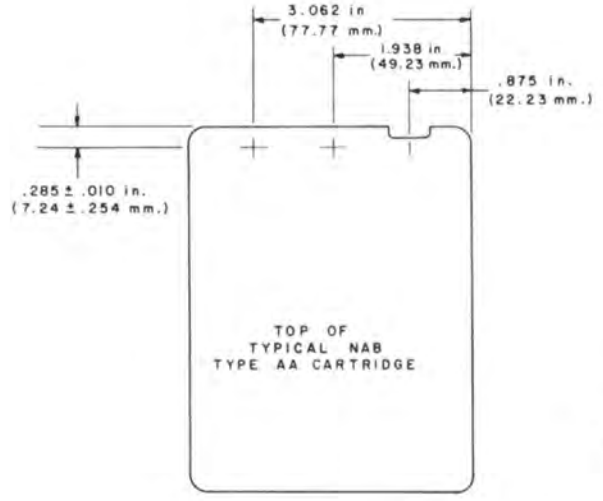


Fig. 3-11

Proper cartridge positioning is achieved when the following criteria are met:

1. The cartridge face is snugly and squarely located against the head block.

2. The heads are centered in each cartridge head opening.

3. The pressure roller shaft is centered in the cart's pressure roller keyway when the solenoid is engaged.

4. The right-hand cartridge guide is snug and square against the cartridge body right-hand side. See Figure 3-12.

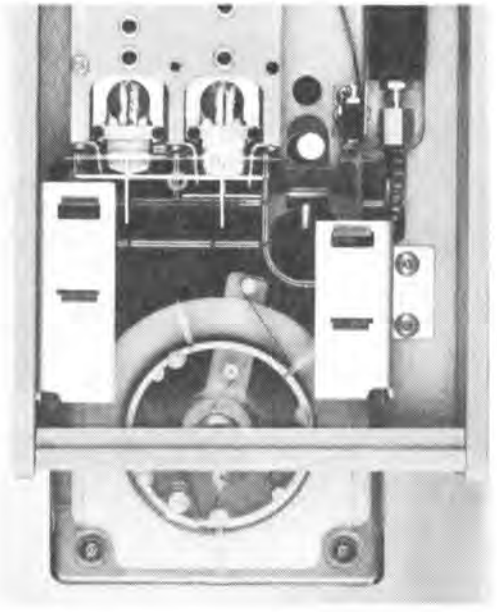


Fig. 3-12

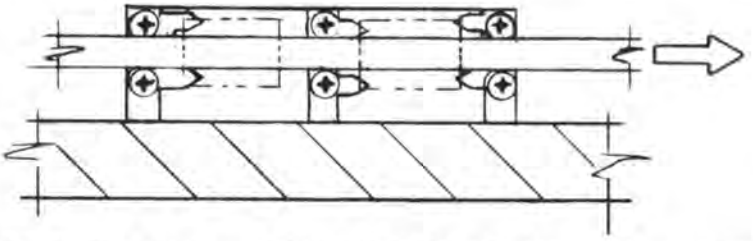
Be certain that the front edge of the cartridge seats firmly and squarely against the tape guide screws. When all four (4) of the above mentioned criteria are met, tighten down the right hand cartridge guide mounting screws, insuring that the cartridge and cartridge guide do not move or change positions.

Position the left hand cartridge guide parallel to the right hand guide and check to see that the two springs are compressed equally and that the cartridge is reasonably snug but not bound by the guides.

Remove the cartridge and reinsert it. If the cartridge does not position correctly, repeat the alignment procedure.

5. Tape Guide Adjustment:

This procedure provides precise adjustment of the tape guide "tangs" and establishes a 3-point contact area between the guides and the tape. The result is a very closely controlled tape path across the heads. Figure 3-13.



TAPE PATH WITH 3 POINT CONTACT OF TAPE GUIDES

Fig. 3-13

All cartridge machines in your system would benefit greatly from this setup procedure.

Remove the head shield before beginning guide adjustment. After the shield is removed, secure the head block to the deck by reinstalling the right hand head shield screw and spacer. Make sure that the screw is tight and the head block does not move. Figure 3-14.

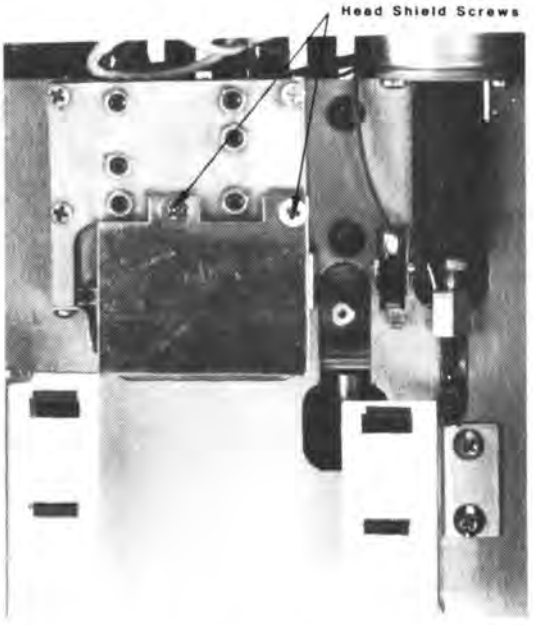


Fig. 3-14

Place the tape guide height gauge flat on the deck, as shown in Figure 3-15.

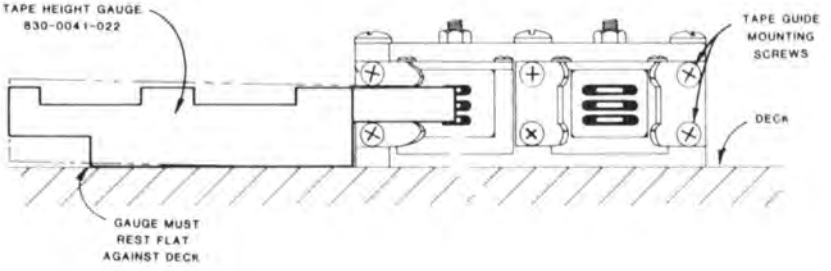


Fig. 3-15

Adjust the tape guides in the following manner:

Left (Entry) Guide: Loosen (do not remove) the guide mounting screws. Insert the gauge straight into the guide ONLY AS FAR AS THE FACE OF THE HEAD. Move the guide upward so that the bottom guide tang just touches the bottom of the gauge. Tighten the mounting screws and recheck your adjustment with the gauge.

Right (Exit) Guide: Same as the Left tape guide procedure.

Center Guide: Loosen (do not remove) the center guide mounting screws. Reposition the gauge as shown in Figure 3-16, with the cut-

out areas facing the heads. Adjust the center guide so that the top guide tang just touches the gauge, then tighten the mounting screws.

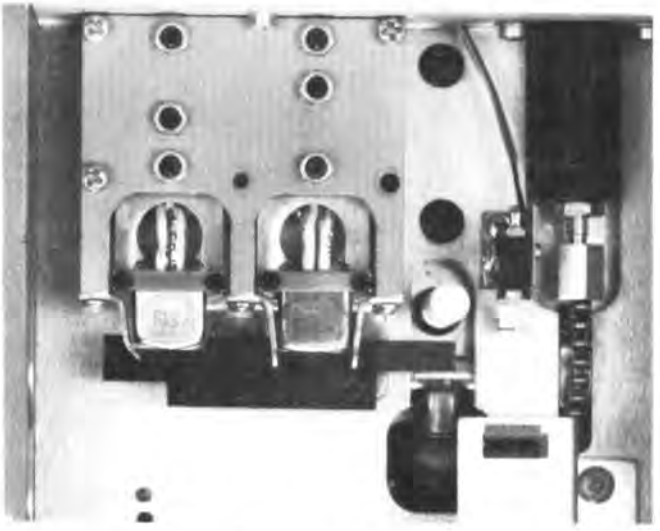


Fig. 3-16

Note: The following adjustment procedures require the use of various test equipment. Figure 3-17 illustrates a typical test equipment hookup.

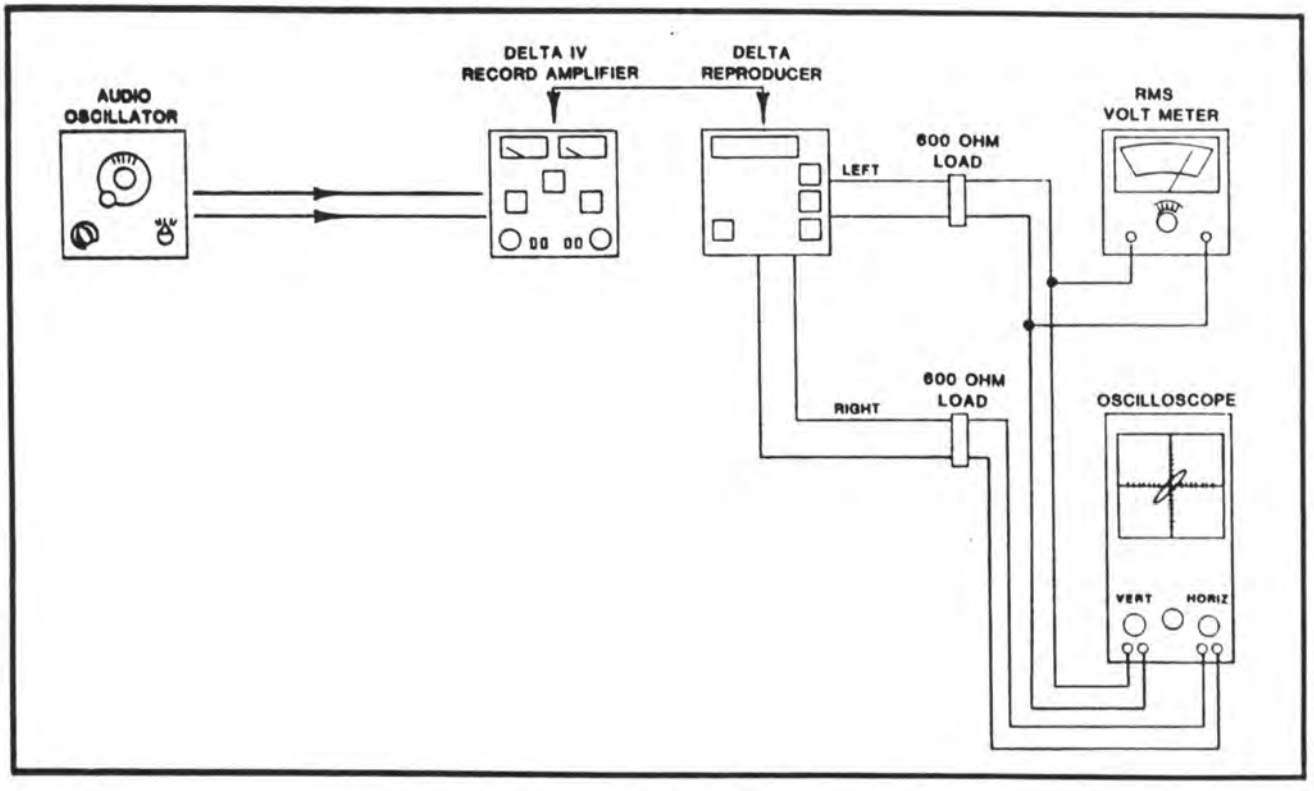


Fig. 3-17

6. Reproduce Head Height & Zenith Adjustment:

CAUTION

Caution: Demagnetize all gauges and tools BEFORE making any adjustments. Be especially careful to avoid scratching the head faces during adjustment.

Connect a 600 Ohm termination to the Left (MONO) channel reproduce output and connect the voltmeter across this termination. (For STEREO units, add the second termination to the Right channel reproduce output.)

Figure 3-18 shows the location of the heads and adjustment screws on the head mounting block. Make sure that you locate the correct screw for each adjustment.

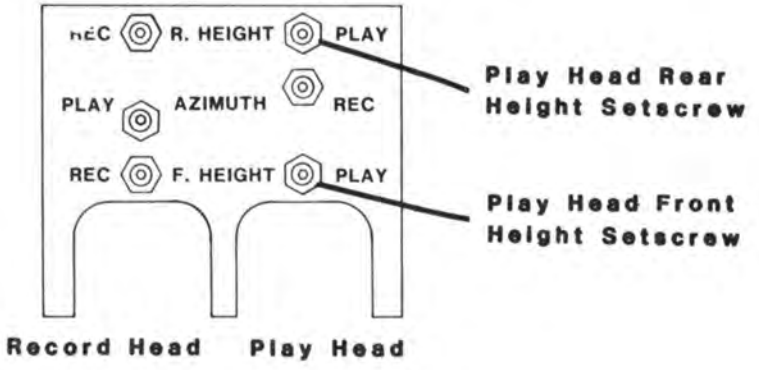


Fig. 3-18

Loosen (do not remove) the reproduce (PLAY) head Front & Rear Height setscrew locknuts. Place the Tape Height gauge on the deck and position it in front ofthe Play head as shown in Figure 3-19.

Fig. 3-19

Rough-In Head Height

Alternately adjust, in equal amounts, the Play Front & Rear Height setscrews until the nose of the gauge is approximately centered between the top of the upper head pole piece and the bottom of the lower head pole piece.

Head Zenith

Position the Zenith gauge, (or any gauge known to be completely square.), near the face of the head and alternately adjust the Play Front & Rear Height setscrews until the face of the head is parallel to the gauge and perpendicular to the deck surface. Move the Zenith gauge gently up against the face of the Play head. Be very careful to avoid any scratching. If the head is perpendicular to the deck, there will be no gap visible between the gauge and the head face. If a gap is visible, slowly adjust, independently and in equal amounts, the Play Front & Rear Height setscrews until no gap exists.

Final Height Adjustment

Final height adjustment is made by electrically measuring the machine's audio output level while playing a standard alignment tape and making fine adjustments to head height. This procedure insures that the head pole pieces are aligned with, and centered on the magnetic tracks of the tape. Adjustments are made to head height by turning the Front and Rear Height setscrews small but equal amounts in the same direction. Since adjustments to the Front or Rear Height setscrews may introduce a Zenith error, Zenith and fine Height adjustments may require repeated, alternating adjustment until no further improvements in either may be made.

At this point, demagnetize the heads and the head block assembly to avoid any stray magnetization.

Insert a standard alignment tape and start the machine in the RUN mode. While monitoring audio output level on the voltmeter, adjust the Play Front & Rear Height setscrews in small but equal amounts for maximum output as indicated on the meter. Recheck the head Zenith, and readjust if necessary, before tightening the setscrew locknuts. Once all measurements and readings are optimized, carefully tighten the setscrew locknuts. Stop the cartridge and remove it. This ends the adjustment.

7. Dummy Head Adjustment:

In reproduce only machines, a "dummy" head is installed in place of the recording head to maintain constant tension on the tape. This helps minimize wow & flutter and improves tape guidance. "Dummy" heads that have developed significant wear patterns should be replaced.

Loosen (do not remove) the "dummy" head Front & Rear Height setscrew locknuts, (Figure 3-20). Place the Tape Height gauge on the deck and position it in front of the "dummy" head as done for the reproduce head in Figure 3-19.

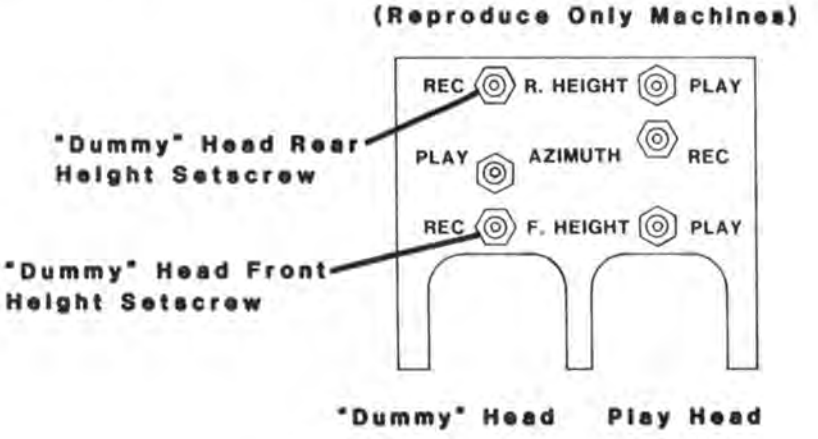


Fig. 3-20

Adjust the "dummy" head Front Height setscrew until the nose of the gauge is approximately centered between the top and bottom of the head. Position the Zenith gauge, or any gauge known to be completely square, near the face of the head and adjust the "dummy" head Rear Height setscrew until the face of the head is parallel to the gauge and perpendicular to the deck surface.

Carefully tighten the locknuts and remove the gauge. This ends the adjustment.

8. Reproduce Head Azimuth Adjustments:

NOTE: The azimuth adjustment screws are considerably offset from the heads that they adjust. Refer to Figure 3-21 for location of these screws.

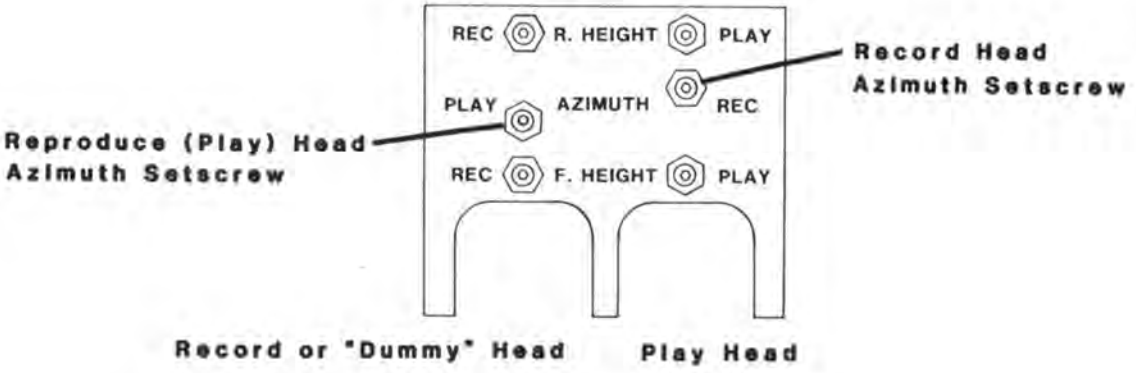


Fig. 3-21

A. Mono Azimuth:

Connect a 600 Ohm termination to the Left (MONO) reproduce amplifier output terminals. Connect the voltmeter across this termination.

Insert a standard Mono azimuth alignment tape and start the machine in the RUN mode.

Loosen (do not remove) the reproduce (Play) head azimuth setscrew locknut and adjust the setscrew for maximum output at 12.5 kHz. Hold maximum output and carefully tighten the locknut. Monitor the voltmeter to insure that no output level change occurs as the locknut is tightened.

This ends the procedure. Stop the machine and remove the cartridge. Leave all equipment connected and proceed to Step #9, Reproduce Amp Output Level Adjustment.

B. Stereo Azimuth (Phase):

SPECIAL NOTE FOR STEREO HEAD AZIMUTH

2-track stereo recording/reproducing performance is subject to several mechanical inaccuracies which contribute to phase shift in simultaneously monitored reproducer outputs. In stereo systems these phase shifts are generally not noticable in the final reproduction. However, in cases where monophonic "dubbing" or channel summing is desired, phase shifts cause serious amplitude variations or dropouts. This is especially true at higher frequencies. The most common causes of this problem 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 in any reproducer within a system)
3. Improper tape guidance (skew) either within the cartridge or through the tape guide systems.

The preferred method of adjusting for STEREO azimuth (phase) utilizes an oscilloscope for accurate phase relationship measurement and alignment. This is the method recommended by ITC for best results.

Attach 600 Ohm terminations to the Left and Right channel reproduce outputs. Connect the horizontal input of an oscilloscope to the Right channel output.

Connect the vertical input of the scope to the Left (MONO) channel machine output. Adjust the scope's horizontal & vertical gain to provide an in-phase Lissajous display.

Allow the alignment tape to run to the 1 kHz frequency section. A scope pattern such as that illustrated by Figure 3-22A should appear. If a pattern such as Figure 3-22D appears, reverse the polarity of the scope horizontal input leads.

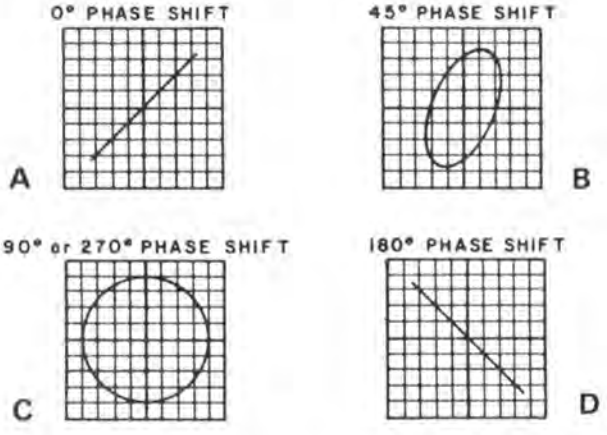


Fig. 3-22

Allow the alignment tape to run to the 8 kHz section while monitoring the scope to determine if any phase shift occurs. If phase shift is observed, loosen (do not remove) the reproduce (Play) head azimuth setscrew locknut

and adjust the setscrew in the opposite direction to that in which phase shift occured. Do not tighten the locknut.

Continue running the tape through the various frequencies and monitor the scope to insure that minimal phase errors occur at any frequency. It is normal for small shift "jitters" to occur at the higher frequencies. Your final setting will be based on best AVERAGE results.

At 16 kHz, make a final adjustment to the setscrew for the best possible reading. Do not tighten the locknut.

Rerun the alignment tape through ALL frequencies one more time to insure that minimal errors occur at any frequency. If an error exists, repeat the entire procedure.

When the best possible results are consistently obtained, carefully tighten the locknut while monitoring the scope to make sure that best overall results in phase reading are maintained.

This ends the oscilloscope procedure. Remove the cartridge and disconnect the scope. Leave the termination resistors in place. Proceed to Step #9, Reproduce Amp Output Level Adjustment.

IMPORTANT

Substitute Method For STEREO Azimuth

This procedure is to be used ONLY when an oscilloscope is not available. Satisfactory results may be obtained using this method, but without the accuracy in phase alignment provided by a scope.

Attach 600 Ohm terminations to the Left (MONO) and Right channel outputs. Connect the voltmeter across the Left channel termination.

Insert the alignment tape, (1 kHz reference "0" level), and start the machine in the RUN mode. Locate the Left (MONO) channel level control potentiometer (R109) on the Reproduce Amplifier & Cue Detect PCB and adjust it for 0 dBm output. Figure 3-23.

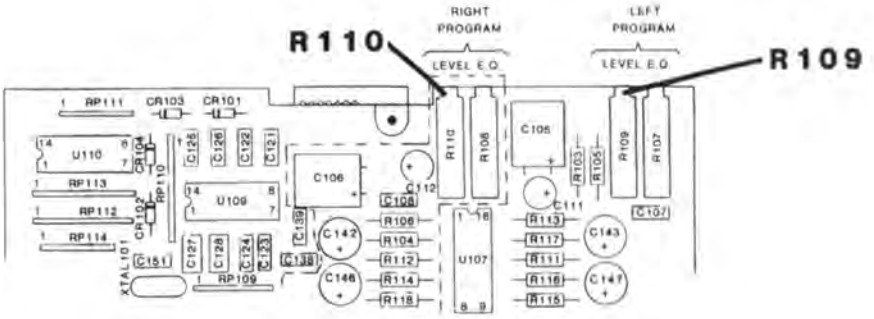


Fig. 3-23

Move the voltmeter leads to the Right channel ouput. Adjust the Right channel level control potentiometer (R110) for 0 dBm output. Move the voltmeter leads back to the Left (MONO) channel ouput. Loosen (do not remove) the reproduce (Play) head azimuth setscrew locknut.

Adjust the setscrew for a maximum output reading on the voltmeter at 12.5 kHz. Using the hex wrench handle as a guide, note the physical position of the setscrew. (A small piece of tape will suffice for marking the position.) Leave the wrench in place.

Move the voltmeter leads to the Right channel output and slowly adjust the setscrew to determine which direction INCREASES output. Continue adjusting the setscrew for increasing output until a maximum reading is obtained.

Once again, note the position of the setscrew by using the hex wrench handle as a guide. Mark the position. Compare this position with that of the Left channel adjustment and slowly readjust the setscrew to the midpoint between the two marks. This setting will provide AVERAGE azimuth for both channels.

This ends the procedure. Remove the cartridge. Leave all equipment connected.

9. Reproduce Amp Output Level Adjustment:

Standard output level is factory set to 0 dBm while reproducing a 1 kHz reference tone at 250 nWb/m. On the Reproduce Amplifier & Cue Detect PCB, potentiometer R109 controls Left (MONO) channel level and R110 controls Right channel level. Figure 3-24.

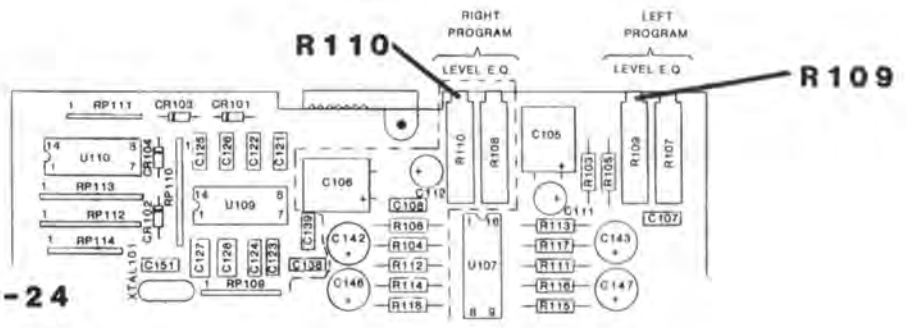


Fig. 3-24

Note: Whenever a reproduce output level adjustment is made, a corresponding adjustment to the Program Play meter calibration must be made. See Recorder Adjustments, Step #7 for this adjustment. Also, if a reproduce output level lower that -10 dBm is required, an external pad should be added in order to maintain optimum signal-to-noise performance.

Connect a 600 Ohm termination to the Left (MONO) channel reproduce output. (For STEREO units, add the second 600 Ohm termination to the Right channel output.) Connect the voltmeter across this termination.

Insert a reproduce alignment tape and start the machine in the RUN mode. Adjust R109 for 0 dBm output at 1 kHz. If this is a STEREO unit, move the voltmeter leads to the Right channel and repeat the procedure, using R110.

This ends the procedure. Stop the alignment tape and remove it. Leave all equipment connected.

10. Reproduce Amp Equalization Adjustment:

Connect a 600 Ohm termination to the Left (MONO) reproduce output. (For STEREO units, add a second termination to the Right channel output. Connect a voltmeter across this termination.

Potentiometers R107 & R108 control high frequency equalization for the Left (MONO)and Right channels respectively. Figure 3-25.

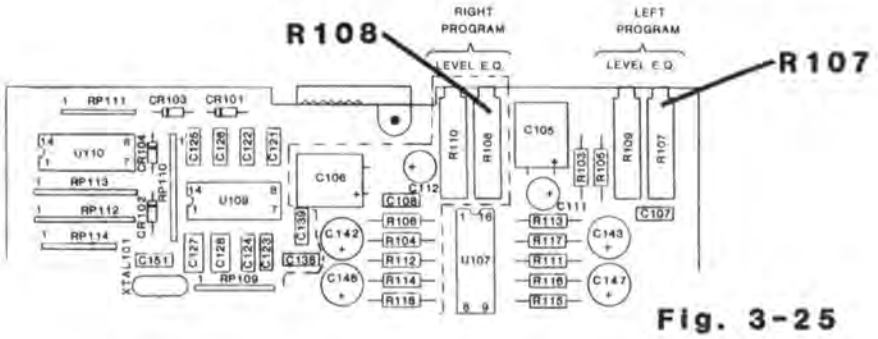


Fig. 3-25

Insert the reproduce alignment tape and start the machine in the RUN mode. Adjust R107 for 0 dBm (+/-2dBm) output at 12.5 kHz and 16 kHz. For STEREO units, move the voltmeter leads to the Right channel output and repeat the procedure, using R108.

This ends the procedure.

Since reproduce amplifier adjustments are, to a degree interrelated, the equalizer adjustments will usually require that a small readjustment be made for the reproducer output levels. At this point, repeat the Reproduce Amp Output Level Adjustment procedure. (Step #9).

11. Servo Motor Duty Cycle:

Refer to Figure 3-26. Pin 9 of P301 is the duty cycle test point and R313 controls the duty cycle.

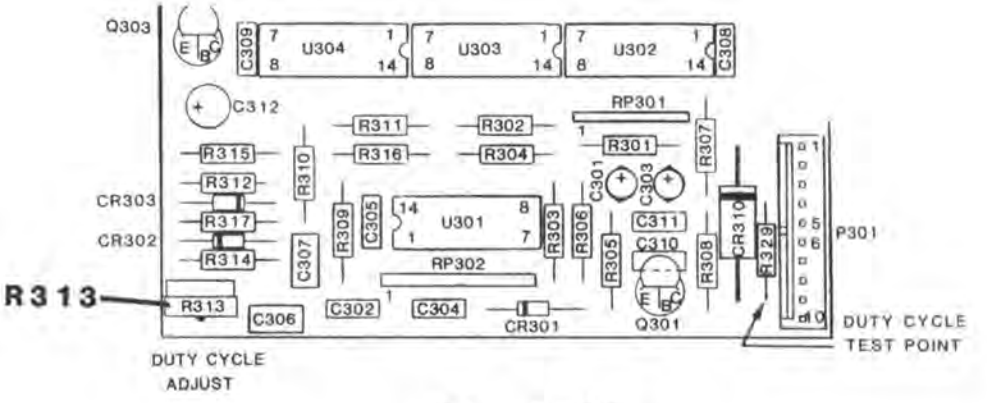


Fig. 3-26

Attach an oscilloscope test probe to Pin 9 of P301. Insert a blank cartridge into the machine and press the RUN switch. Observe the scope display. The servo motor duty cycle should appear as a 70% cycle, as illustrated by Figure 3-27. If adjustment is needed, turn R313 until the scope display equals Figure 3-27. This ends the procedure.

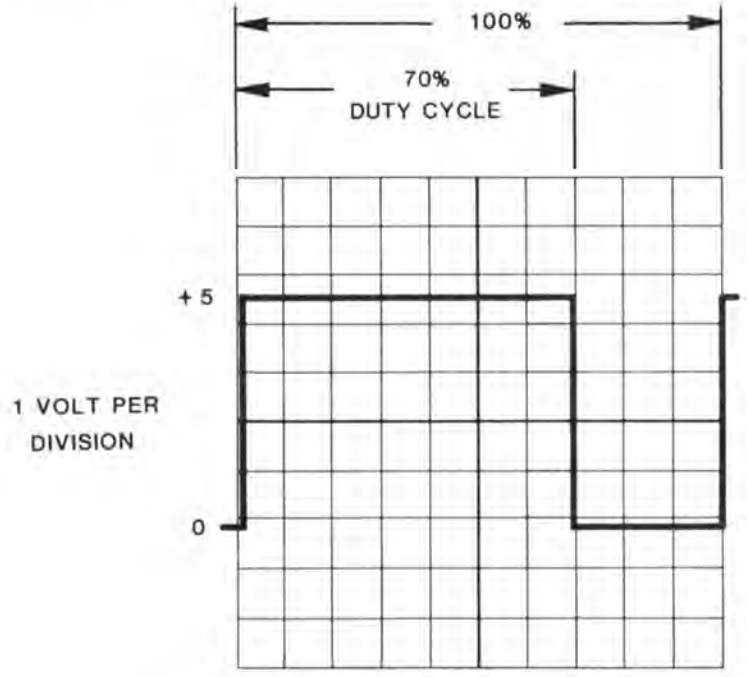


Fig. 3-27

12. Reproduce Cue Detect Sensitivity:

Cue detection is digitally controlled and will operate from cue tones recorded in accordance with NAB standards for frequency and level tolerance. Cue detector sensitivity is designed around "standard" parameters of 1 kHz cue tones at 160 nWb/m, using NAB format head tracks. Cue tones recorded outside of NAB level limits may cause improper cue detector operation. Resistor R127 on the Reproduce Amplifier & Cue Detect PCB may require changing, depending on your master cue record level. Refer to Figure 3-28 and Table 3-2 for exact location and component loading information.

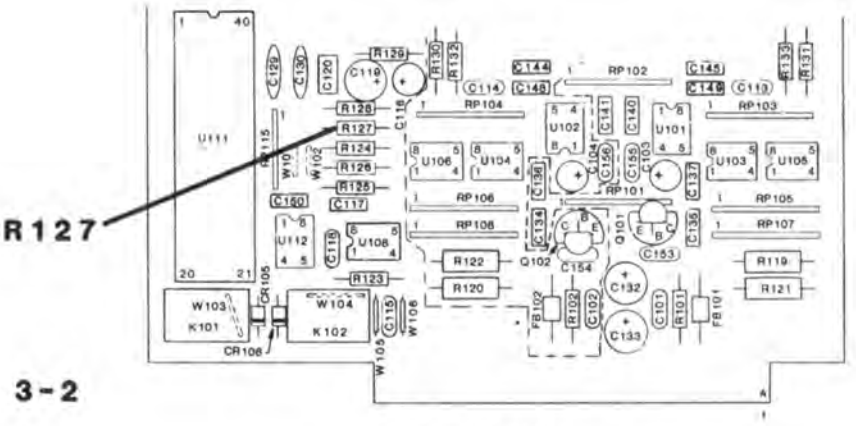


Fig. 3-28

Table 3-2

R127 LOADING

STEREO	560
MONO	820

RECORDER ADJUSTMENTS

Adjustments to the recorder section should only be performed AFTER all reproducer adjustments have been completed. Failure to complete the reproducer section first may result in recorder misalignment. Recorder adjustments may be made individually as needed, or as part of a regular maintenance schedule.

CAUTION

1. Record Head Height & Zenith Adjustment:

Caution: Demagnetize all gauges and tools BEFORE making any adjustments. Be especially careful to avoid scratching the head face during adjustment.

Connect a 600 Ohm termination to the Left (MONO) channel reproduce output and connect the voltmeter across this termination. Connect an appropriate termination to the recorder Line input and connect an audio oscillator across this termination.

Figure 3-29 shows the location of the heads and adjustment screws on the head mounting block.

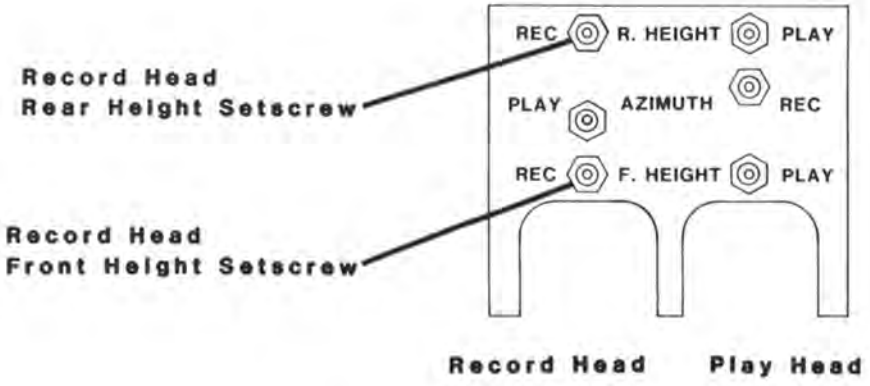


Fig. 3-29

Loosen (do not remove) the record (Rec) Front and Rear Height setscrew locknuts. Place the Tape Guide Height gauge on the deck and position it in the record head tape guide as shown in Figure 3-30.

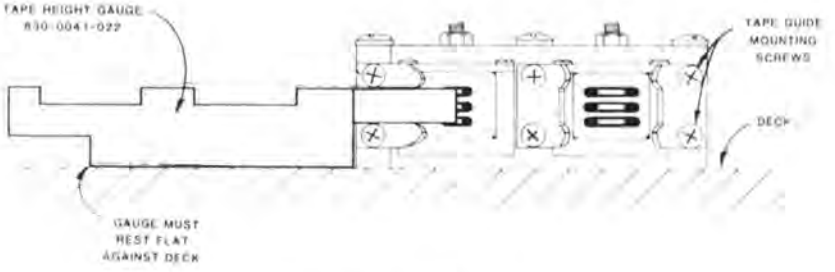


Fig. 3-30

Rough-In Head Height

Alternately adjust, in equal amounts, the record Front & Rear Height setscrews until the nose of the gauge is approximately centered between the top of the upper head pole piece and the bottom of the lower head pole piece.

Head Zenith

Position the Zenith gauge, (or any gauge known to be completely square.), near the face of the head and alternately adjust the record Front & Rear Height setscrews until the face of the head is parallel to the gauge and perpendicular to the deck surface. Move the Zenith gauge gently up against the face of the record head. Be very careful to avoid any scratching. If the head is perpendicular to the deck, there will be no gap visible between the gauge and the head face. If a gap is visible, slowly adjust, independently and in equal amounts, the record Front & Rear Height setscrews until no gap exists.

Final Height Adjustment

Final height adjustment is made by electrically measuring the machine's audio output level while recording a reference tone and making fine adjustments to record head height. This procedure depends on accurately adjusted PLAY head height, which was done in an earlier procedure. Adjustments are made to head height by turning the Front and Rear Height setscrews small but equal amounts in the same direction. Since adjustments to the Front or Rear Height setscrews may introduce a Zenith error, Zenith and fine Height adjustments may require repeated, alternating adjustment until no further improvements in either may be made.

At this point, demagnetize the heads and the head block assembly to avoid any stray magnetization.

Set the audio oscillator to 1 kHz, insert a blank 3.5 minute cartridge and start the machine in the RECORD mode. While monitoring the audio output level on the voltmeter, adjust the Record Front & Rear Height setscrews in small but equal amounts for maximum output as indicated on the meter. Recheck the head Zenith, and readjust if necessary, before tightening the setscrew locknuts. Once all measurements and readings are optimized, carefully tighten the setscrew locknuts. Stop the cartridge and remove it. This ends the adjustment.

2. Record Head Azimuth Adjustment:

IMPORTANT

Note: Changes in azimuth for the record head can result in apparent errors in all reproducers within a given system. Any change in azimuth of the record head should be done ONLY AFTER all adjustments are carefully checked and the reproduce head is correctly azimuth aligned.

Attach 600 Ohm terminations to the reproduce Left (MONO) and Right channel outputs and connect an oscilloscope across the terminations. Attach 600 Ohm terminations to both recorder inputs and connect an audio oscillator across the terminations.

Set the oscillator output to -10 dBm. Insert a blank 3.5 minute cartridge, place the unit into RECORD SET mode, and adjust the front panel record Level knob for a VU meter reading of -10 dB. Start the machine in the RECORD mode.

Loosen (do not remove) the record head Azimuth setscrew locknut (Figure 3-31) and adjust the setscrew for a maximum amplitude reading on the scope display. The scope gains may be adjusted in equal amounts to increase amplitude of the display if necessary.

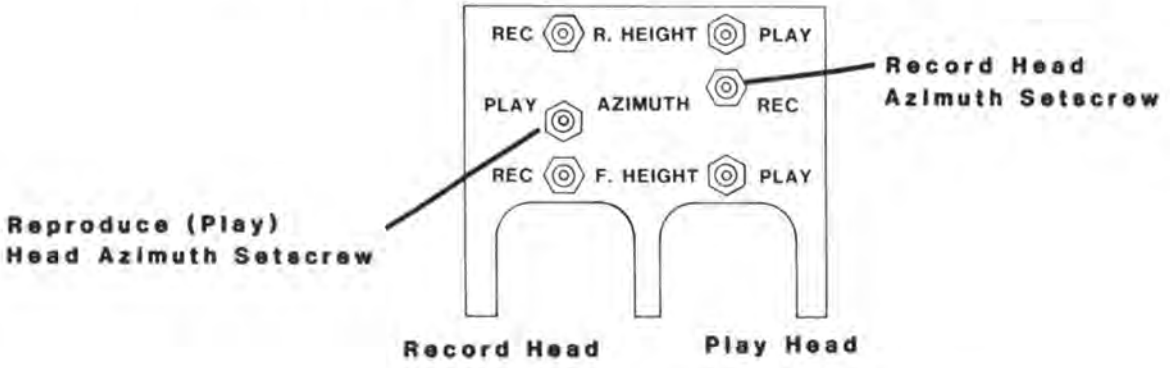


Fig. 3-31

Set the frequency of the audio oscillator to 50 Hz. Slowly increase tone frequency while observing the scope display to determine if any phase shift occurs. If phase shift does occur, adjust the setscrew in the opposite direction to that in which phase shift occured.

As the frequencies continue to increase, each subsequent azimuth adjustment will "fine-tune" the head assembly for accurate alignment and best overall results. At 16 kHz make a final adjustment for the best possible reading. Do not tighten the setscrew locknut yet.

Repeat the procedure again and observe the scope pattern at all frequencies to determine if any phase shifting occurs. Once best overall results are consistently obtained, carefully tighten the setscrew locknut while monitoring the scope to insure that no change occurs.

This ends the procedure. Stop the cartridge and remove it. Leave all test equipment connected.

3. Program Record Bias Adjustment:

IMPORTANT

Note: This procedure will adjust program recording bias according to generally accepted standards for commonly available tape formulations. The object is acceptable recording performance, (ie; noise, distortion and frequency response), from many of the tape oxide formulations in current use. However, due to the wide variety of tape formulations available, recommended bias setting may differ from one tape formulation to the next. For more exact recording bias adjustment, consult the specifications provided by the tape manufacturer.

Attach a 600 Ohm termination to the reproduce Left (MONO) channel output and connect the voltmeter across this termination. Attach an appropriate termination to the recorder LINE input and connect an audio oscillator across this termination.

Insert a blank 3.5 minute cartridge and start the machine in the RECORD mode. Adjust the audio oscillator output to 10 kHz at -10 dBm as indicated on the front panel meter.

Locate R1107 on the Bias Amplifier PCB, Figure 3-32, and adjust it for a maximum (peak) output reading on the external voltmeter.

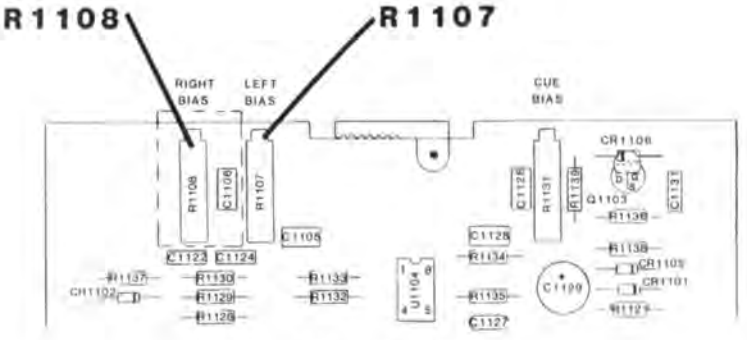


Fig. 3-32

Continue to adjust R1107 clockwise until the voltmeter indicates 2 dB below the peak reading. Repeat this procedure for the Right channel, using R1108.

This ends the procedure.

4. Cue Record Bias Adjustment:

Note: This procedure adjusts Cue Bias according to generally accepted practice for commonly available tape formulations, and yields acceptable performance. However, this adjustment may vary slightly from one tape formulation to another.

Connect a 600 Ohm termination to the Left (MONO) channel output and attach a voltmeter across this termination. Exchange the cue play and the Left (MONO) program play head leads so that the cue track audio information may be reproduced through the normal program amplifier as follows:

On the reproduce Mother PCB disconnect the Left (MONO) channel input (J510). Move the cue reproduce head lead connector (J512) to the Left (MONO) channel input connector (P510).

Insert a blank 3.5 minute cartridge and start the machine in the RECORD mode. Press the Tertiary (8 kHz) cue switch and record a continuous 8 kHz tone. Locate R1131 which controls cue bias on the Bias Amp PCB. Figure 3-33.

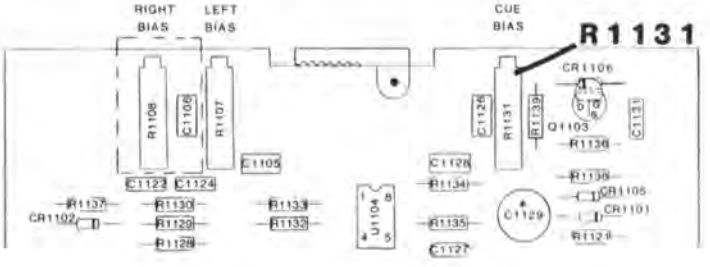


Fig. 3-33

Using the voltmeter to monitor the audio being recorded on the cue track through the Left (MONO) channel reproduce amplifier, adjust R1131 for a maximum (peak) output reading. Continue adjusting R1131 clockwise, (beyond peak reading), until the voltmeter reads -1 dB.

Now, alternately record a Primary (1 kHz) and Tertiary (8 kHz) cue tone. The 8 kHz 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. Adjust R1131 until this level relationship is achieved.

This ends the procedure.

If you are continuing to the Cue Master Level adjustment, leave the head leads in their present position. Otherwise, return the leads to their ORIGINAL position.

5. Cue Record Master Level Adjustment:

The cue oscillator tones are generated by the microprocessor and are digitally controlled. The microprocessor determines the correct frequency. 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.

DELTA cue detect circuits are designed to detect NAB cue tones recorded at 160 nWb/m. **If your machine is setup for program record levels other than 160 nWb/m, it is imperative that you understand the level differences between your normal program tracks and the standard fluxivity of the cue track.** Since this adjustment procedure utilizes conventional program amplifiers to measure cue track fluxivity, you must calculate any differences that exist in dB, and compensate accordingly.

If your program track is setup to produce 0 dBm output at 160 nWb/m, proper cue track adjustment will also produce 0 dBm output. If your program track is setup to produce 0 dBm output at 250 nWb/m, proper cue track adjustment will produce -4 dBm output. If your program track is setup to produce 0 dBm output at 185 nWb/m, proper cue track adjustment will produce -.5 dBm output.

Table 3-3
Level Relationship Table

Program Track Calibration		Correct Cue Track Calibration
0 dBm Output At: 250 nWb/m	equals	-4 dBm Output at 160 nWb/m
0 dBm Output At: 185 nWb/m	equals	-.5 dBm Output at 160 nWb/m

It is critical that the cue record track level adjustment be carefully made to 160 nWb/m. Otherwise improper cue detector operation may result.

The Primary cue tone must playback at the same relative output level as the 1 kHz reference tone (160 nWb/m) used on the 1975 NAB standard alignment tape.

Connect the voltmeter to the cue audio output (J1, Pins 9 & 14). Use the 1 kHz cue record function on the DELTA IV front panel to record short 1 kHz tone bursts. These tone bursts will be indicated on the voltmeter. Adjust R1231, located on the Recorder Logic PCB- Figure 3-34, for a 500 mV RMS reading on the voltmeter.

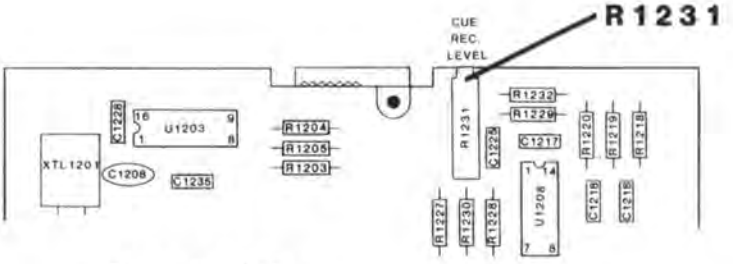


Fig. 3-34

Verify that your adjustment is correct by alternatly recording 150 Hz and 8 kHz cue tones. All three cue tones should provide approximately equal readings on the voltmeter. Note that minor variations in the 8 kHz reading may be adjusted by "tweaking" the cue bias control for "flattest" performance as indicated on the voltmeter.

This end the procedure.

Note: An alternate method of setting the cue record master level would be to swap the Left (MONO) program reproduce head leads with the cue track head leads and use the program record and reproduce amplifiers to record and monitor the cue tones. This method allows continuous recording and reproducing of tones without interaction from the cue detect circuitry. When the reproduce amplifier is adjusted to produce 0 dBm output at 160 nWb/m, a properly adjusted cue record circuit will also produce 0 dBm output at 1 kHz.

6. Program Record Equalization:

Connect a 600 Ohm termination to the Left (MONO) channel reproduce output and attach a voltmeter across this termination. Connect a second 600 Ohm termination to the recorder LINE input and attach an audio oscillator across this termination.

Adjust the audio oscillator for an output of 1 kHz at -10 dBm. Insert a blank 3.5 minute cartridge into the machine and press RECORD and START in order. Adjust the audio oscillator output level for a -10 dBm indication on the machine's output, as measured by the voltmeter. Locate potentiometer R1005, which controls Left (MONO) channel record equalization on the Record & Meter Amp PCB. Figure 3-35.

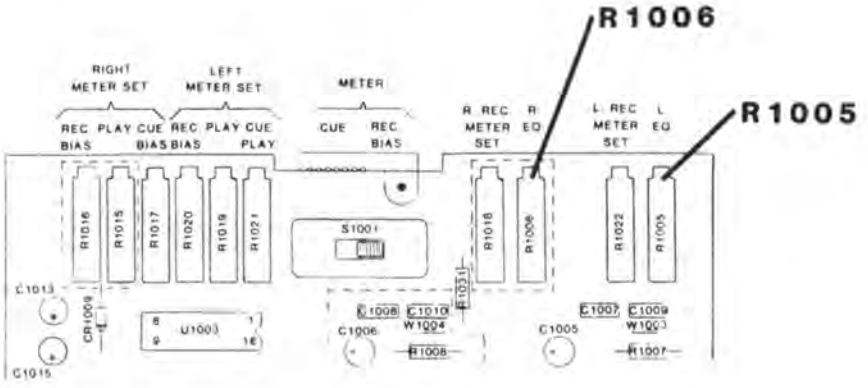


Fig. 3-35

Switch the audio oscillator output to 10 kHz and adjust R1005 for a -10dBm indication on the voltmeter. Compare the 1 kHz and 10 kHz voltmeter readings by switching the audio oscillator frequency back and forth. If necessary, readjust R1005 to produce a -10 dBm output level at 1 kHz and 10 kHz as measured on the voltmeter.

Slowly move the audio oscillator frequency upward to 15 kHz and evaluate the voltmeter readings. If a difference of more than +/- 2 dB in response occurs, it may indicate that a readjustment in bias is necessary. Excessive bias (overbias) causes losses at high frequencies. Likewise, underbias causes peaked response at high frequencies.

Adjustments should be made for flattest overall response from 1 kHz to 16 kHz.
Repeat this procedure for the Right channel, using R1006.

This ends the procedure.

7. Meter Calibration:

The following adjustments will be made using the two (2) recorder front panel meter switches (Black) marked REC and PLAY, in conjunction with an internal slide switch located on the Record & Meter Amplifier PCB. Adjustment potentiometers are also located on the Record & Meter Amp PCB. All adjustments should be performed in the order shown.

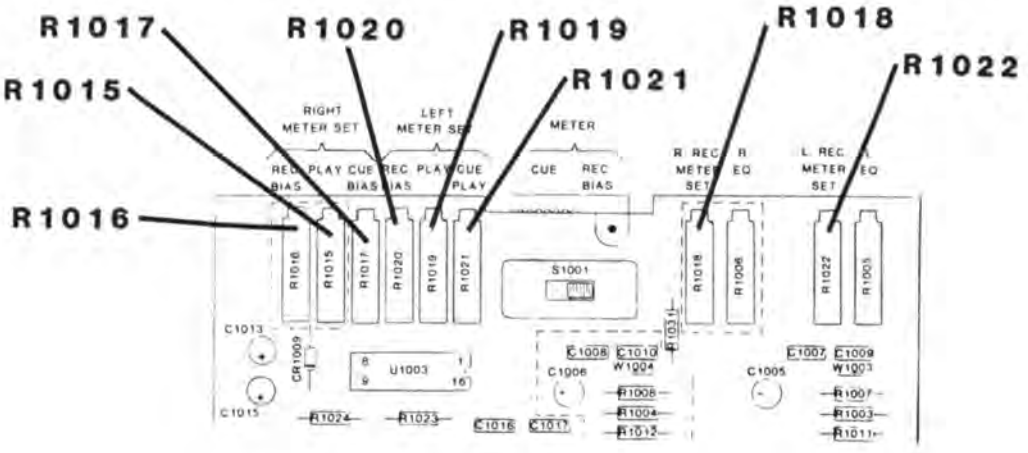


Fig. 3-36

A. Program Play:

Depress the front panel PLAY meter switch. Connect a 600 ohm termination across both program playback output terminals.

Insert a 0 reference level tape (1 kHz, recorded on your master recorder) and press the START button. Adjust R1019 (Figure 3-36) for 0 VU indication.

If the unit is STEREO, repeat this procedure using R1015 for calibrating the Right program meter for 0 VU.

B. Normal Record:

Depress the PLAY meter switch. Insert a blank cartridge and place the machine into the record mode while recording a 1 kHz tone.

Adjust the front panel level controls for a 0 VU indication on the (Play) meters.

Depress the REC meter switch and adjust R1022 to obtain a 0 VU indication for the Left (MONO) channel meter. Repeat the procedure using R1018 for the Right channel meter.

C. Program Bias:
Configure the meters for reading Program Bias by having NEITHER front panel meter switch depressed, and moving the internal slide switch to the Rec. Bias (forward) position. Figure 3-36.

Insert a blank cartridge, press the RECORD SET (red) and START (green) buttons. Adjust the Left (MONO) program bias trimmer R1020 for a 0 VU reading on the Left channel meter.

Repeat this procedure for the Right channel, using trimmer R1016.

D. Cue Bias:
Configure the meters for reading Cue Bias by having NEITHER front panel meter switch depressed, and moving the internal slide switch to the CUE position.

Insert a blank cartridge and press the START (green) button.

Press the TER (tertiary-white) cue switch and adjust trimmer R1017 for a 0 VU reading on the Right front panel meter.

E. Cue Play:
Leave the metering switches configured as for CUE BIAS meter calibration.

Insert a blank cartridge and press the START (green) button.

Press the 1 kHz cue record (Black-ADD) switch and obaerve meter deflection on the Left front panel meter. A meter deflection of approximately 3/4 second in length will be observed. The point at which the meter aettlea in the last 1/4 aecond ia the point at which 0 VU should be calibrated. Adjust trimmer R1021 to calibrate CUE PLAY metering to 0 VU.

HEAD REPLACEMENT

CAUTION

CAUTION: Demagnetize all tools and fixtures BEFORE beginning any work on or near the heads.

ITC Cartridge machines use strap-mount type heads, facilitating quick and easy replacement.

Remove the head shield by unscrewing the two shield screws and spacers. Figure 3-37. Secure the head block by reinstalling the right hand shield screw and spacer.

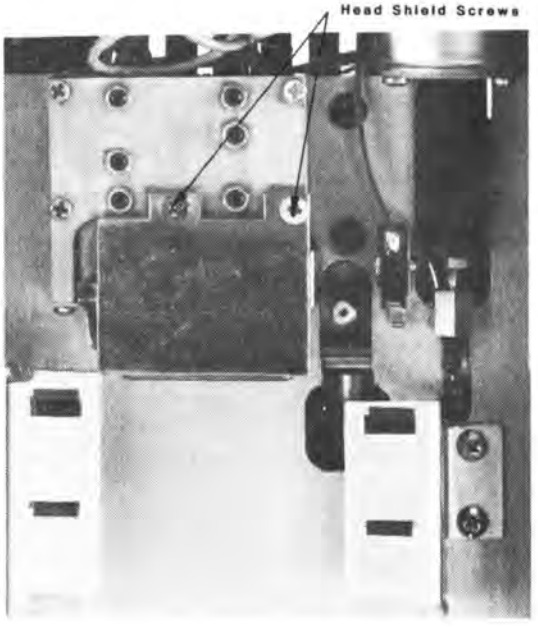


Fig. 3-37

Remove the two screws holding the head strap in place. Figure 3-38.

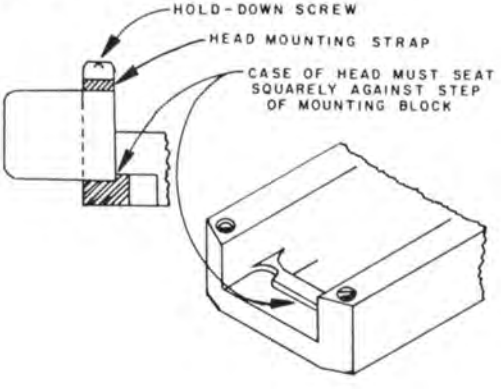
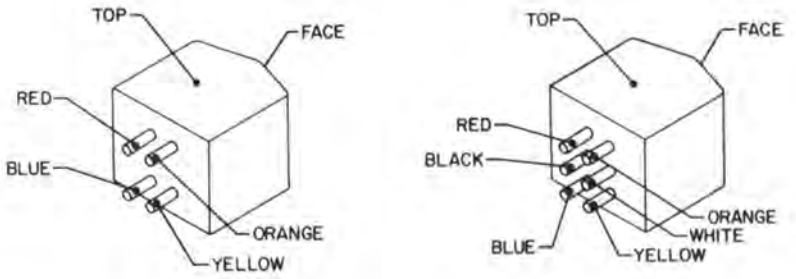


Fig. 3-38

CAUTION

CAUTION: Use extreme care when disconnecting and reconnecting head cables. The head pins can be broken off and the pin sockets on the head cable can be bent if excessive side pressure is exerted.

Disconnect and remove the old head. Install the new head and reconnect the cables. (See Figure 3-39 for the cable lead color arrangement.)



MONO HEAD STEREO HEAD

Fig. 3-39

Remount and fasten the head strap. Remove the right hand head shield screw and spacer from the head block, remount the head shield and reinstall both screws and spacers.

This ends the procedure.

Note: A COMPLETE check of alignment IS necessary after a head is disconnected and/or replaced.

Section IV Routine Maintenance

In addition to performing adjustments and alignments described in Section III, a regular maintenence program will aid overall machine operation an help prevent potential problems. We recommend that you make the following information part of your complete maintenence schedule.

Motor Lubrication

The motor contains permanently lubricated ball bearings which require NO further lubrication. Any attempt to oil these bearings may cause premature motor failure due to migration of oil into the windings and ultimately, breakdown of the insulation material.

The cross shaft assembly contains permanently lubricated, sintered bronze bearings. The solenoid plunger is coated with a friction-reducing, self-lubricating material. As with the motor bearings, any attempt to oil these parts will cause damage, poor performance and possibly complete failure.

Head Cleaners

ITC recommends using ONLY isopropyl alcohol for head cleaning. After cleaning, all surfaces should be dryed thoroughly before machine operation is begun again. The use of cleaners containing organic-based solvents such as acetone or ketone can severely damage or destroy rubber or plastic parts and other components.

The use of aerosol propellants for head cleaning is discouraged. This is due to the high likelihood of the cleaner being blown into motor bearing assemblies and degrading or destroying bearing lubricants.

---

1. Mechanical Maintenence Schedule:

Daily-

-Inspect and, if necessary, clean the heads with a cotton swab dipped in isopropyl alcohol.

-Clean the capstan shaft and pressure roller with a clean cloth dipped in isopropyl alcohol. (Be careful not to allow any alcohol

to drip down into the motor.) Remove all traces of tape lubricant and tape oxide.

Weekly or Monthly-
(Dependent on machine usage)
-Check pressure roller pressure/solenoid adjustment. (See Section III)
-Check reproduce and record head azimuth. (See Section III)

Biannualy-
-Inspect all internal assemblies for dirt or dust buildup. If cleaning is needed, use a soft, dry brush to remove the buildup. Note: In some cases an air-gun or blower may be used for cleaning, but care should be exercised so that no debris if forced into adjacent parts.

2. Electrical Maintenance Schedule:

Daily or Weekly-
(Dependent on machine usage)
-Degauss all heads and tape guides, carefully following the instructions for degausser use.

Biannualy-
-Check and adjust reproduce and record high frequency equalization.
-Check and adjust program recording bias and program bias meter calibration.
-Check and adjust record bias and cue bias calibration.
(All adjustments in Section III)

SECTION V — ELECTRICAL DRAWINGS

REPRODUCE LOGIC PCB 831-0289
PARTS LIST
(9/85)

REPRODUCE LOGIC PC CARD
(Assembly #831-0289-003)

CAPACITORS

C201	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C202	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C203	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C204	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C205	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C206	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C207	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C208	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C209	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C210	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C211	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C212	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C213	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C214	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C215	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C216	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C217	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C218	695-1910-013	ALUMINUM ELECTROLYTIC, 100 ufd, 10V
C219	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C220	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C221	694-0005-000	TANTALUM, 1 ufd, 35 V, 20%, RADIAL
C222	680-0101-033	POLYESTER FILM, .001 ufd, 100V, 5%
C223	680-0101-033	POLYESTER FILM, .001 ufd, 100V, 5%
C224	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C225	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C226	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C227	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C228	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C229	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C230	695-1910-033	ALUMINUM ELECTROLYTIC, 100 ufd, 10V

RESISTORS

R201	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R202	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R203	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%

RESISTOR NETWORKS

RP201	631-0007-000	COMMON SIP, 9R, 330 OHM, 2%
RP202	631-0025-000	COMMON SIP, 5R, 1K, 2%
RP203	631-0025-000	COMMON SIP, 5R, 1K, 2%
RP204	631-0025-000	COMMON SIP, 5R, 1K, 2%
RP205	631-0023-000	COMMON SIP, 5R, 10K, 2%
RP206	631-0041-000	COMMON SIP, 4R, 10K, 2%

SOCKETS

U201	613-0017-000	SOCKET, IC, 40 PIN, DIP
U202	613-0020-000	SOCKET, IC, 20 PIN, DIP
U203	613-0019-000	SOCKET, IC, 24 PIN, DIP
U204	613-0009-000	SOCKET, IC, 16 PIN, DIP
U205	613-0008-000	SOCKET, IC, 14 PIN, DIP
U206,7	613-0009-000	SOCKET, IC, 16 PIN, DIP
U208,9	613-0009-000	SOCKET, IC, 16 PIN, DIP
U210	613-0007-000	SOCKET, IC, 8 PIN, DIP
U211	613-0007-000	SOCKET, IC, 8 PIN, DIP
U212	613-0008-000	SOCKET, IC, 14 PIN, DIP
U213	613-0008-000	SOCKET, IC, 14 PIN, DIP
U214	613-0008-000	SOCKET, IC, 14 PIN, DIP
U215	613-0009-000	SOCKET, IC, 16 PIN, DIP
U216	613-0009-000	SOCKET, IC, 16 PIN, DIP
U217	613-0007-000	SOCKET, IC, 8 PIN, DIP

SEMI-CONDUCTORS

U201	610-0011-000	MICROPROCESSOR, EPROM 8749
U202	607-0033-000	74LS374, 8 BIT LATCH
U203	607-0018-000	74150, 1 OF 16 MULTIPLEXER
U204	607-0025-000	74LS151, 8-INPUT MULTIPLEXER
U205	607-0049-000	74LS05, HEX INVERTER WITH OPEN COLLECTOR
U206	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U207	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U208	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U209	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U210	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U211	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U212	607-0024-000	74LS74, DUAL D FLIP-FLOP WITH EAR & PRESET
U213	607-0045-000	74LS393, DUAL 4 BIT BINARY COUNTER
U214	607-0035-000	74LS95, 4 BIT SHIFT REGISTER
U215	607-0034-000	74LS123, DUAL RETRIG. MONOSTABLE W/CLEAR
U216	608-0033-000	MC14526B, PROGRAMMABLE BINARY DIVIDE-BY-N
U217	609-0025-000	LM311N, VOLTAGE COMPARATOR

STRAPPING

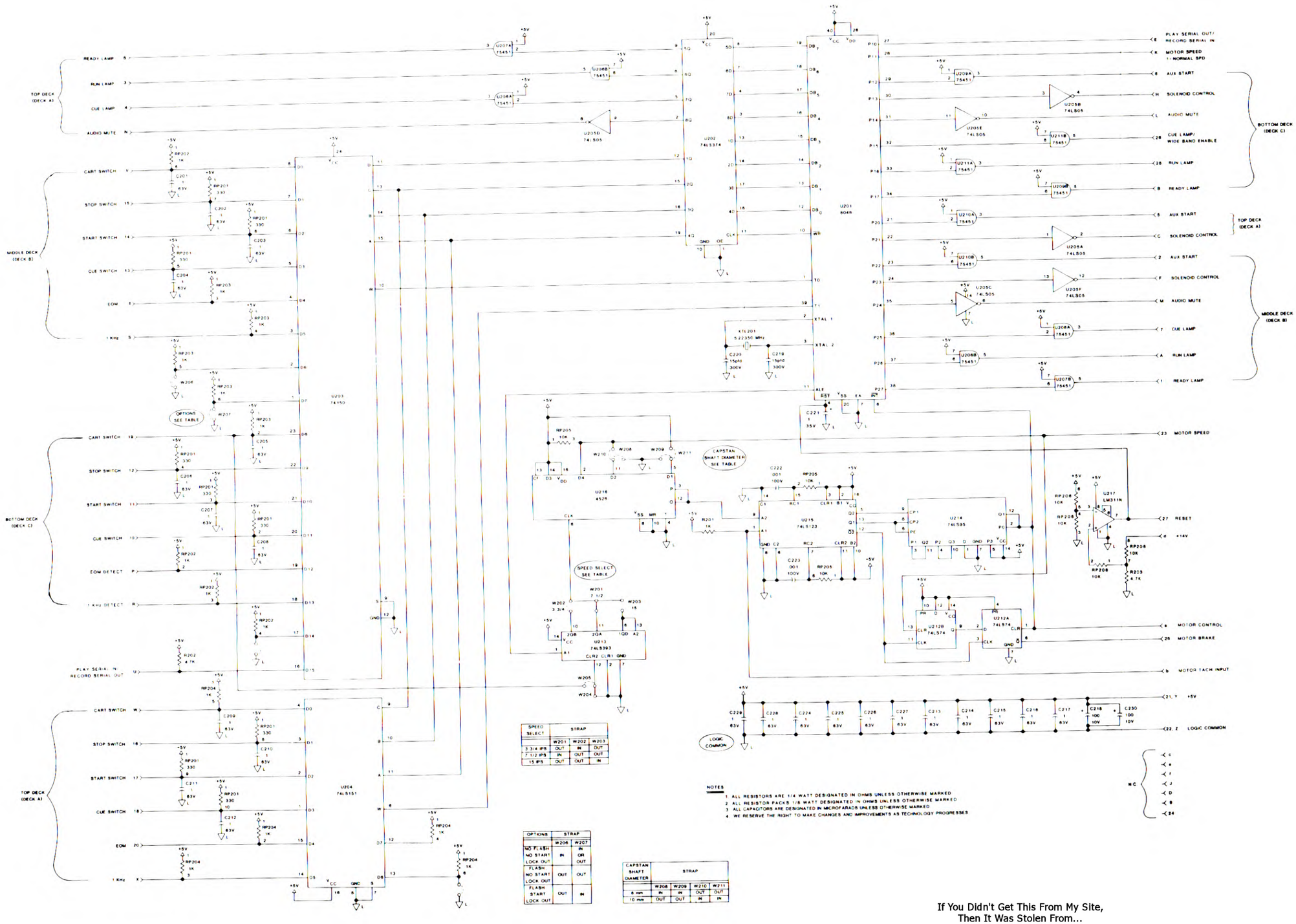
W201	427-0003-000	BUS WIRE, SOLID, #24 AWG
W202	427-0003-000	BUS WIRE, SOLID, #24 AWG
W203	427-0003-000	BUS WIRE, SOLID, #24 AWG
W204	427-0003-000	BUS WIRE, SOLID, #24 AWG
W205	427-0003-000	BUS WIRE, SOLID, #24 AWG
W206	427-0003-000	BUS WIRE, SOLID, #24 AWG
W207	427-0003-000	BUS WIRE, SOLID, #24 AWG
W208	427-0003-000	BUS WIRE, SOLID, #24 AWG
W209	427-0003-000	BUS WIRE, SOLID, #24 AWG
W210	427-0003-000	BUS WIRE, SOLID, #24 AWG
W211	427-0003-000	BUS WIRE, SOLID, #24 AWG

MISCELLANEOUS

XTL201	448-0010-000	CRYSTAL, 5.22350 MHZ.
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 316-0008-00(

FIGURE 5-1

831-0289
REPRODUCE LOGIC PCB
OVERLAY



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
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

FIGURE 5-2

831-0289
REPRODUCE LOGIC PCB
SCHEMATIC

REPRODUCE AMPLIFIER & CUE DETECT PCB 831-0294
PARTS LIST
(9/85)

REPRODUCE AMPLIFIER & CUE DETECTOR PCB
(Assembly #831-0294-003)

CAPACITORS

C101	677-0001-000	SILVER MICA, 100 pfd, 300 V
C102	677-0001-000	SILVER MICA, 100 pfd, 300 V
C103	695-1335-013	ALUMINUM ELECTROLYTIC, 10 ufd, 35 V
C104	695-1335-013	ALUMINUM ELECTROLYTIC, 10 ufd, 35 V
C105	695-2106-013	ALUMINUM ELECTROLYTIC, 220 ufd, 6.3 V
C106	695-2106-013	ALUMINUM ELECTROLYTIC, 220 ufd, 6.3 V
C107	680-1101-033	POLYESTER FILM, .0068 ufd, 100 V, 5%
C108	680-1101-033	POLYESTER FILM, .0068 ufd, 100 V, 5%
C109		NOT USED
C110		NOT USED
C111	695-1335-013	ALUMINUM ELECTROLYTIC, 10 ufd, 35 V
C112	695-1335-013	ALUMINUM ELECTROLYTIC, 10 ufd, 35 V
C113	677-0005-000	SILVER MICA, 47 pfd, 300 V
C114	677-0005-000	SILVER MICA, 47 pfd, 300 V
C115	677-0012-000	SILVER MICA, 820 pfd, 100V
C116	695-1335-013	ALUMINUM ELECTROLYTIC, 10 ufd, 35 V
C117	680-1563-033	POLYESTER FILM, .015 ufd, 63V 5%
C118	677-0008-000	SILVER MICA, 22 pfd, 300 V
C119	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C120	680-1363-033	POLYESTER FILM, .01 ufd, 63V 5%
C121	680-1763-033	POLYESTER FILM, .022 ufd, 63V 5%
C122	680-1763-033	POLYESTER FILM, .022 ufd, 63V 5%
C123	680-0701-033	POLYESTER FILM, .0033 ufd, 100V 5%
C124	680-0701-033	POLYESTER FILM, .0033 ufd, 100V 5%
C125	680-0301-033	POLYESTER FILM, .0015 ufd, 100V, 5%
C126	680-0301-033	POLYESTER FILM, .0015 ufd, 100V, 5%
C127	678-0363-033	POLYPROPYLENE, 330 pfd, 63V 5%
C128	678-0563-033	POLYPROPYLENE, 470 pfd, 63V 5%
C129	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C130	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C131		NOT USED
C132	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C133	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C134	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C135	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C136	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C137	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C138	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C139	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C140	680-2563-033	POLYESTER FILM, .10 ufd, 63V 5%
C141	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C142	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C143	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C144	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C145	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C146	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C147	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C148	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C149	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C150	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C151	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C151	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C152		NOT USED
C153	677-0001-000	SILVER MICA, 100 pfd, 300V
C154	677-0001-000	SILVER MICA, 100 pfd, 300V
C155	677-0001-000	SILVER MICA, 100 pfd, 300V
C156	677-0001-000	SILVER MICA, 100 pfd, 300V
C157	677-0004-000	SILVER MICA, 300 pfd, 300V
C158	677-0004-000	SILVER MICA, 300 pfd, 300V
C159	677-0004-000	SILVER MICA, 300 pfd, 300V

RESISTOR NETWORKS

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

RESISTORS

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

SOCKETS

Q101	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q102	613-0004-001	PAD, TRANSISTOR, #7717-137N
U101	613-0007-000	SOCKET, IC, 8 PIN, DIP
U102	613-0007-000	SOCKET, IC, 8 PIN, DIP
U103	613-0007-000	SOCKET, IC, 8 PIN, DIP

U104	613-0007-000	SOCKET, IC, 8 PIN, DIP
U105	613-0007-000	SOCKET, IC, 8 PIN, DIP
U106	613-0007-000	SOCKET, IC, 8 PIN, DIP
U107	613-0009-000	SOCKET, IC, 16 PIN, DIP
U108	613-0007-000	SOCKET, IC, 8 PIN, DIP
U109	613-0008-000	SOCKET, IC, 14 PIN, DIP
U110	613-0008-000	SOCKET, IC, 14 PIN, DIP
U111	613-0017-000	SOCKET, IC, 40 PIN, DIP
U112	613-0007-000	SOCKET, IC, 8 PIN, DIP

TRANSISTORS

Q101	590-0031-000	2N5087 PNP, LOW NOISE
Q102	590-0031-000	2N5087 PNP, LOW NOISE

SEMICONDUCTORS

U101	606-0024-000	NE5534AN, LOW NOISE, SINGLE AUDIO OP AMP
U102	606-0024-000	NE5534AN, LOW NOISE, SINGLE AUDIO OP AMP
U103	606-0021-000	NE5532N, DUAL AUDIO OP AMP
U104	606-0021-000	NE5532N, DUAL AUDIO OP AMP
U105	606-0021-000	NE5532N, DUAL AUDIO OP AMP
U106	606-0021-000	NE5532N, DUAL AUDIO OP AMP
U107	608-0004-000	MC14052BC, CMOS DUAL 4-1 MULTIPLEX W/DECODE
U108	606-0014-000	TL072CP, DUAL BI-FET OP AMP
U109	606-0015-000	TL084CP, QUAD BI-FET OP AMP
U110	609-0002-000	LM339N, QUAD VOLTAGE COMPARATOR
U111	610-0011-000	MICROPROCESSOR, EPROM 8749
U112	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER

DIODES

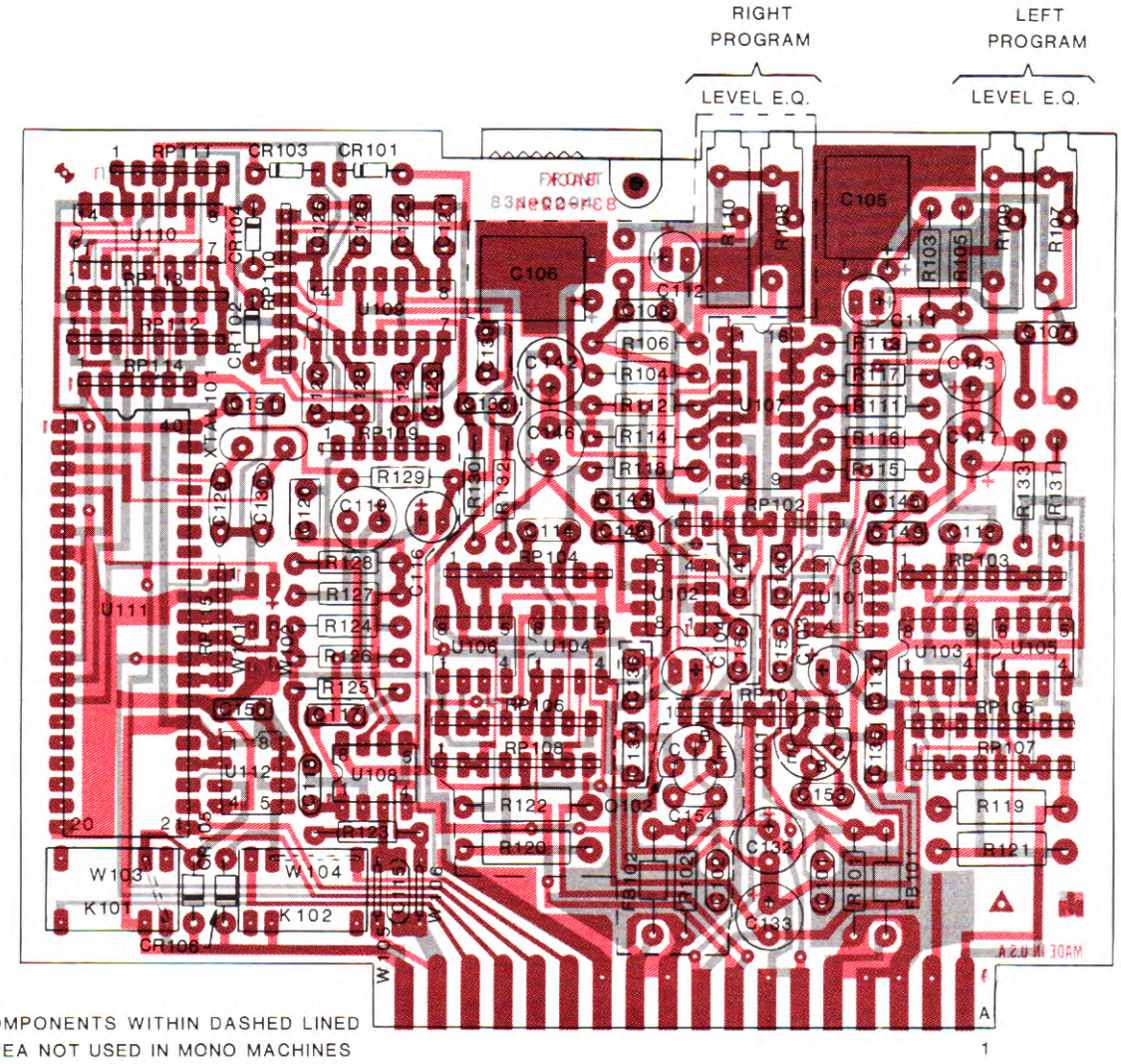
CR101	575-0031-000	SMALL SIGNAL 1N4448
CR102	575-0031-000	SMALL SIGNAL 1N4448
CR103	575-0031-000	SMALL SIGNAL 1N4448
CR104	575-0031-000	SMALL SIGNAL 1N4448
CR105	575-0007-000	1N4005
CR106	575-0007-000	1N4005

STRAPPING

W101	427-0003-000	BUS WIRE, SOLID, #24 AWG
W102	427-0003-000	BUS WIRE, SOLID, #24 AWG
W103	427-0003-000	BUS WIRE, SOLID, #24 AWG
W104	427-0003-000	BUS WIRE, SOLID, #24 AWG
W105	427-0003-000	BUS WIRE, SOLID, #24 AWG
W106	427-0003-000	BUS WIRE, SOLID, #24 AWG

MISCELLANEOUS

FB101	516-0001-000	BEAD, FERRITE, W/LEADS 57-3425
FB102	516-0001-000	BEAD, FERRITE, W/LEADS 57-3425
K101	480-0011-000	RELAY, 5 VOLT
K102	480-0011-000	RELAY, 5 VOLT
	323-0003-001	CARD PULL
	282-0046-000	PIN, ROLL, 1/16 X 3/16
XTAL101	448-0009-000	CRYSTAL, 3.579 MHZ
	280-0024-000	LABEL, EPROM WINDOW



COMPONENTS WITHIN DASHED LINED AREA NOT USED IN MONO MACHINES

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

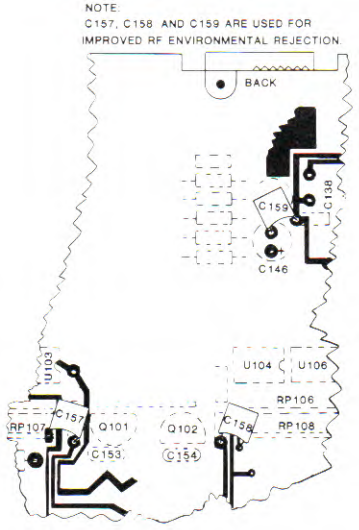
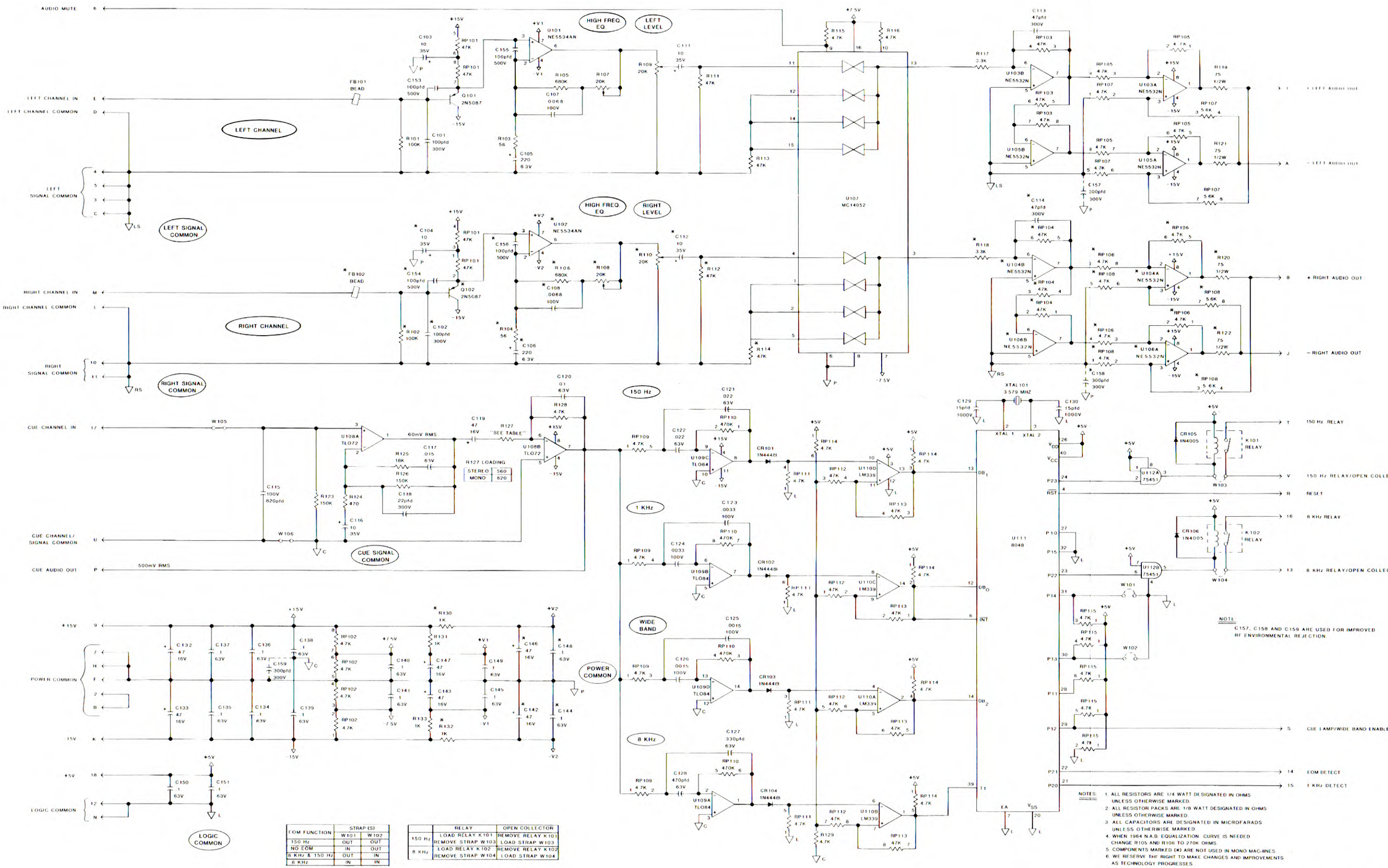


FIGURE 5-3

831-0294
REPRODUCE AMPLIFIER & CUE DETECT PCB (9/85)
OVERLAY



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

R127 LOADING

STEREO	560
MONO	820

NOTE:
C157, C158 AND C159 ARE USED FOR IMPROVED RF ENVIRONMENTAL REJECTION.

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 R105 AND R106 TO 270K OHMS.
5. COMPONENTS MARKED (*) ARE NOT USED IN MONO MACHINES.
6. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 5-4

831-0294
(9/85) REPRODUCE AMPLIFIER & CUE DETECT PCB SCHEMATIC

MOTOR CONTROL PCB 831-0270
PARTS LIST
(9/85)

DELTA I,II,III SERVO MOTOR CONTROL BOARD
(Assembly #831-0270-003)

CAPACITORS

C301	694-0005-000	TANTALUM, 1 ufd, 35V, 20% RADIAL
C302	680-2963-033	POLYESTER FILM, .22 ufd, 63V, 5%
C303	694-0005-000	TANTALUM, 1 ufd, 35V, 20%, RADIAL
C304	680-2963-033	POLYESTER FILM, .22 ufd, 63V, 5%
C305	680-1363-033	POLYESTER FILM, .01 ufd, 63V, 5%
C306	680-3363-033	POLYESTER FILM, .47 ufd, 63V, 5%
C307	680-3363-033	POLYESTER FILM, .47 ufd, 63V, 5%
C308	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C309	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C310	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C311	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C312	695-1335-013	ALUM. ELECTROLYTIC, 10 ufd, 35V, 5%

RESISTOR NETWORKS

RP301	631-0025-000	COMMON SIP, 5R, 1K, 2%
RP302	631-0033-000	SEPARATE SIP, 4R, 22K, 2%

RESISTORS

R301	630-0039-000	CARBON FILM, 100 OHM, 1/4W, 5%
R302	630-0039-000	CARBON FILM, 100 OHM, 1/4W, 5%
R303	630-0001-000	CARBON FILM, 2.7 OHM, 1/4W, 5%
R304	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R305	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R306	630-0093-000	CARBON FILM, 18K OHM, 1/4 W, 5%
R307	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R308	630-0123-000	CARBON FILM, 330K OHM, 1/4W, 5%
R309	630-0103-000	CARBON FILM, 47K OHM, 1/4W, 5%
R310	630-0103-000	CARBON FILM, 47K OHM, 1/4W, 5%
R311	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R312	630-0093-000	CARBON FILM, 18K OHM, 1/4 W, 5%
R313	636-0046-000	POTENTIOMETER, 10K OHM, PC SERIES 268
R314	630-0089-000	CARBON FILM, 12K OHM, 1/4 W, 5%
R315	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R316	630-0123-000	CARBON FILM, 330K OHM, 1/4W, 5%
R317	630-0061-000	CARBON FILM, 820 OHM, 1/4 W, 5%
R318	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R319	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R320	630-0039-000	CARBON FILM, 100 OHM, 1/4W, 5%
R321	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R322	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R323	630-0039-000	CARBON FILM, 100 OHM, 1/4W, 5%
R324	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R325	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R326	630-0039-000	CARBON FILM, 100 OHM, 1/4W, 5%
R327	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R328	628-0001-000	WIRE WOUND, 0.1 OHM, 2 W, 5%, BWH
R329	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%

TRANSISTORS

Q301	590-0017-010	GES5816, NPN
Q302	590-0017-010	GES5816, NPN
Q303	590-0017-010	GES5816, NPN
Q304	590-0017-010	GES5816, NPN
Q305	590-0035-000	TIP125, PNP, DARLINGTON, POWER
Q306	590-0034-000	TIP120, NPN, DARLINGTON, POWER
Q307	590-0035-000	TIP125, PNP, DARLINGTON, POWER
Q308	590-0034-000	TIP120, NPN, DARLINGTON, POWER
Q309	590-0035-000	TIP125, PNP, DARLINGTON, POWER
Q310	590-0034-000	TIP120, NPN, DARLINGTON, POWER

DIODES

CR301	575-0031-000	SMALL SIGNAL [1N4448]
CR302	575-0031-000	SMALL SIGNAL [1N4448]
CR303	575-0031-000	SMALL SIGNAL [1N4448]
CR304	575-0031-000	SMALL SIGNAL [1N4448]
CR305	575-0031-000	SMALL SIGNAL [1N4448]
CR306	575-0031-000	SMALL SIGNAL [1N4448]
CR307	575-0031-000	SMALL SIGNAL [1N4448]
CR308	575-0031-000	SMALL SIGNAL [1N4448]
CR309	575-0031-000	SMALL SIGNAL [1N4448]
CR310	575-0033-000	POWER 3A, 600 VOLT [MR 506]

INTEGRATED CIRCUITS

U301	606-0016-000	TL074CP, QUAD BI-FET OP AMP
U302	607-0063-000	74LS86, QUAD 2 INPUT EXCLUSIVE OR
U303	607-0036-000	74LS02, QUAD 2 INPUT NOR
U304	607-0050-000	74LS08, QUAD 2 INPUT AND

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, THERMALLOY, TO-220
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

MISCELLANEOUS

2	352-0008-000	SCREW, 6-32 X 5/16, NYLON, SLOTTED, RD. HD.
2	372-1105-000	NUT, 6-32 X .305 X 7/64, NYLON, HEX
2	350-0404-000	SCREW, 4-40 X 1/4 PHIL PAN ZP
2	370-0403-000	NUT, 4-40X1/4, KEPS HEX, STEEL, NP
1	280-0060-002	LABEL, MOTOR CONTROL SHIELD
1	254-0100-012	BRACKET, MOTOR CONTROL BOARD MOUNTING

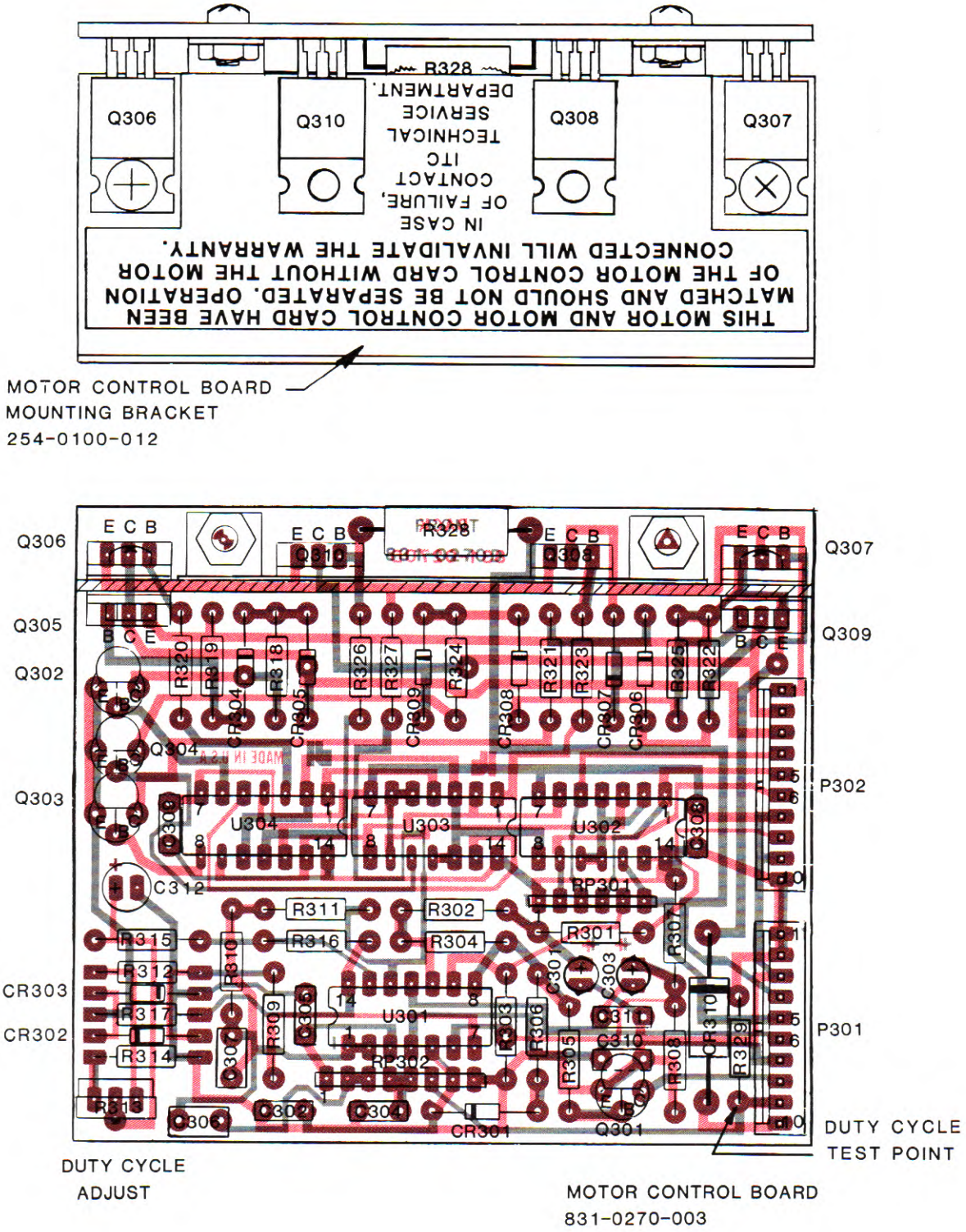
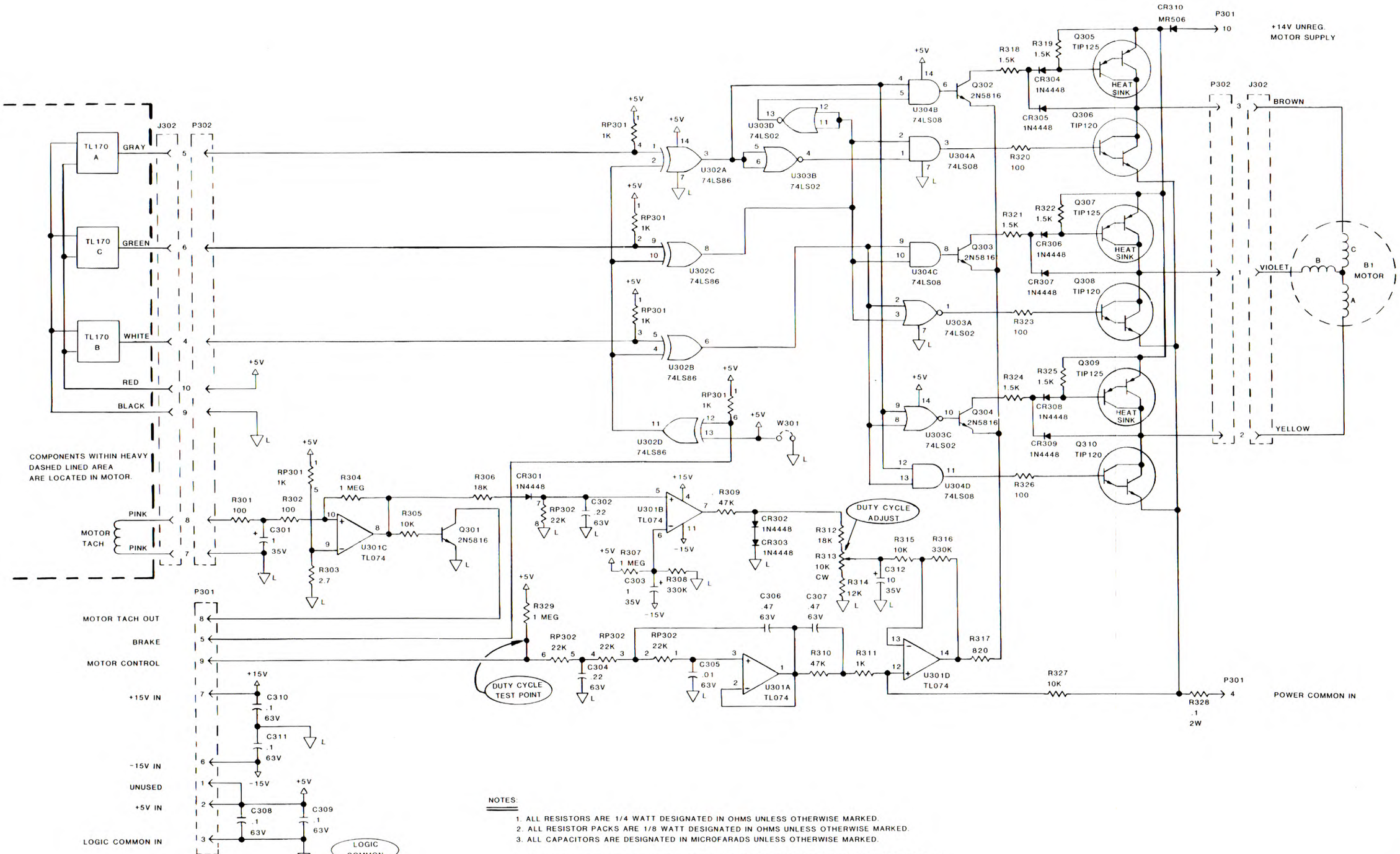


FIGURE 5-5

831-0270 MOTOR CONTROL PCB 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 MICROFARADS UNLESS OTHERWISE MARKED.

WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES.

FIGURE 5-6

831-0270
MOTOR CONTROL PCB SCHEMATIC

DELTA I—II MOTHERBOARD 831-0302
PARTS LIST
(9/85)

DELTA I/II MOTHER BOARD
(Assembly #831-0302-003)

CAPACITORS

C501	698-0020-000	ALUMINUM ELECTROLYTIC, PC MT., 220 ufd, 400V
C502	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C503	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C504	698-0016-000	ALUMINUM ELECTROLYTIC, PC MT., 2200 ufd, 35V
C505	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C506	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C507	698-0016-000	ALUMINUM ELECTROLYTIC, PC MT., 2200 ufd, 35V
C508	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C509	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C510	698-0017-000	ALUMINUM ELECTROLYTIC, PC MT., 15,000 ufd, 16V

DIODES

CR501	575-0007-000	1N4005
CR502	575-0007-000	1N4005
CR503	575-0007-000	1N4005
CR504	575-0007-000	1N4005
CR505	575-0007-000	1N4005
CR506	577-0011-000	ZENER, 1N5231B
CR507	575-0007-000	1N4005
CR508	575-0007-000	1N4005
CR509	575-0007-000	1N4005
CR510	575-0007-000	1N4005
CR511	575-0033-000	POWER, 3A 600V, MR506
CR512	575-0033-000	POWER, 3A 600V, MR506
CR513	575-0007-000	1N4005
CR514	575-0007-000	1N4005
CR515	575-0007-000	1N4005

RESISTORS

R501	628-0193-000	WIREWOUND, 22 OHM, 4 W, BWH
R502	CARBON COMP.,	SEE TABLE ON SCHEMATIC FOR VALUES
R503	CARBON COMP.,	SEE TABLE ON SCHEMATIC FOR VALUES
R504	630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R505	WIREWOUND,	SEE TABLE ON SCHEMATIC FOR VALUES
R506	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R507	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R508	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R509	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%

INTEGRATED CIRCUITS & TRANSISTORS

U501	585-0014-000	OPTO-ISOLATER, MOC8204
U502	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U503	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
Q501	590-0033-000	TRANSISTOR, TIP50, NPN, POWER
Q502	590-0017-000	TRANSISTOR, 2N5816

VOLTAGE REGULATORS

VR501	605-0012-000	MC7805CT, +5V, TO220 PLASTIC
VR502	605-0010-000	MC7815CT, +15V, TO220 PLASTIC
VR503	605-0011-000	MC7915CT, -15V, TO220 PLASTIC

SOCKETS

U501	613-0007-000	SOCKET, IC, 8 PIN, DIP
U502	613-0007-000	SOCKET, IC, 8 PIN, DIP
U503	613-0007-000	SOCKET, IC, 8 PIN, DIP

CONNECTORS

J1	380-0167-000	CONNECTOR, 15 PIN D-SUBMINIATURE PC MT.
J2	380-0134-000	CONNECTOR, 24 PIN, W/LOCKING BAIL, FEMALE
J514	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J515	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J516	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J517	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J518	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156
J519	380-0165-000	DUAL CONNECTOR, 28 PIN, EARLESS
P501	376-0058-000	HEADER, 6 POS., LOCKING, .100, 22-23-2061
P502	376-0047-000	WAFER, 10 POS., LOCKING, 22-27-2101
P503	376-0047-000	WAFER, 10 POS., LOCKING, 22-27-2101
P504	376-0061-011	WAFER, 3 POS., LOCKING, KK156
P505	376-0061-000	WAFER, 3 POS., LOCKING, KK156
P506	376-0067-000	WAFER, 5 POS., HLSS156-5
P507	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P508	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P509	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P510	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P511	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P512	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P513	376-0075-000	HEADER, 6 POS., LOCKING, .156

MISCELLANEOUS

W501	427-0003-000	BUS WIRE, SOLID, #24 AWG
W502	427-0003-000	BUS WIRE, SOLID, #24 AWG
	613-0004-001	PAD, TRANSISTOR

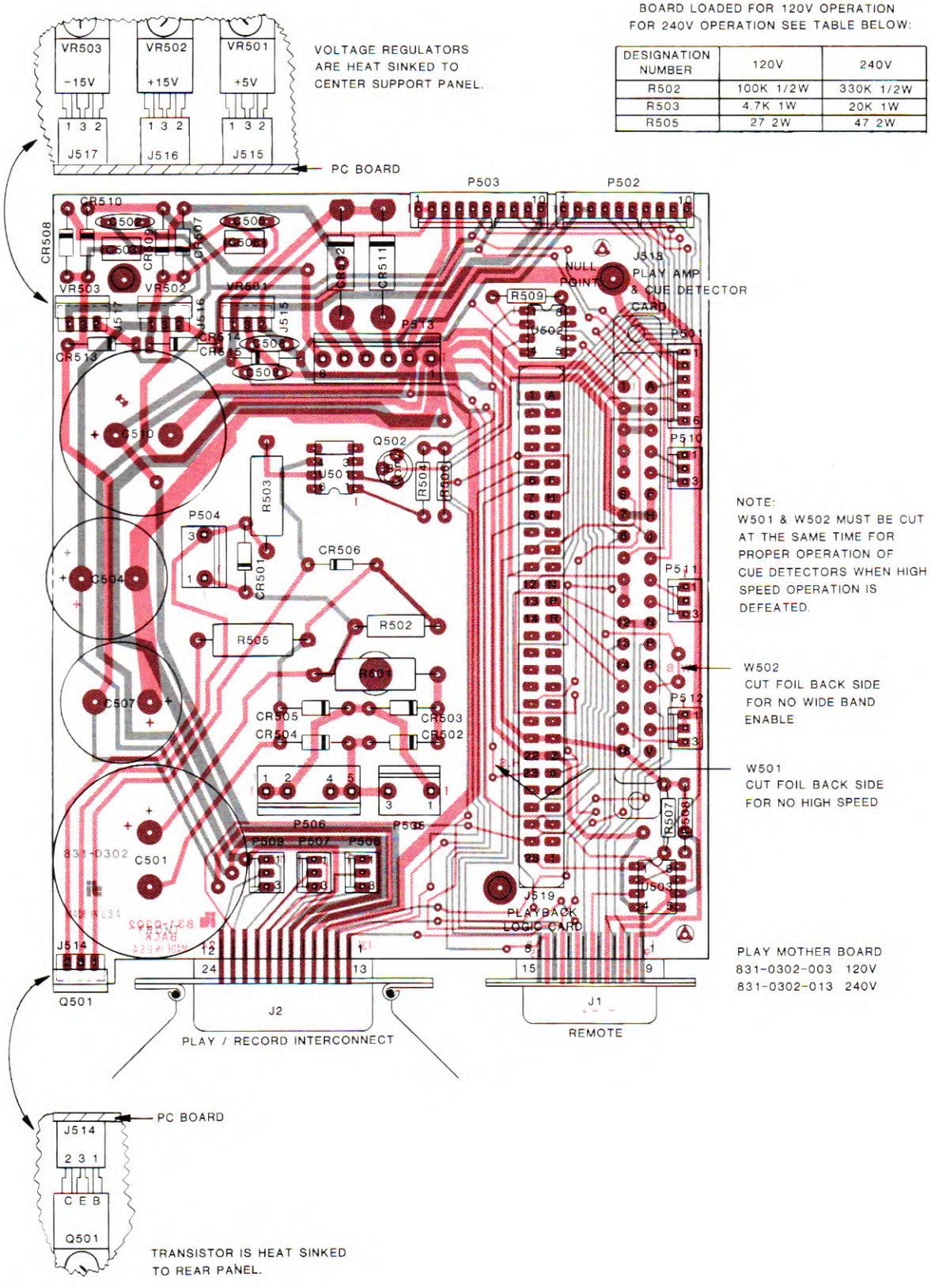
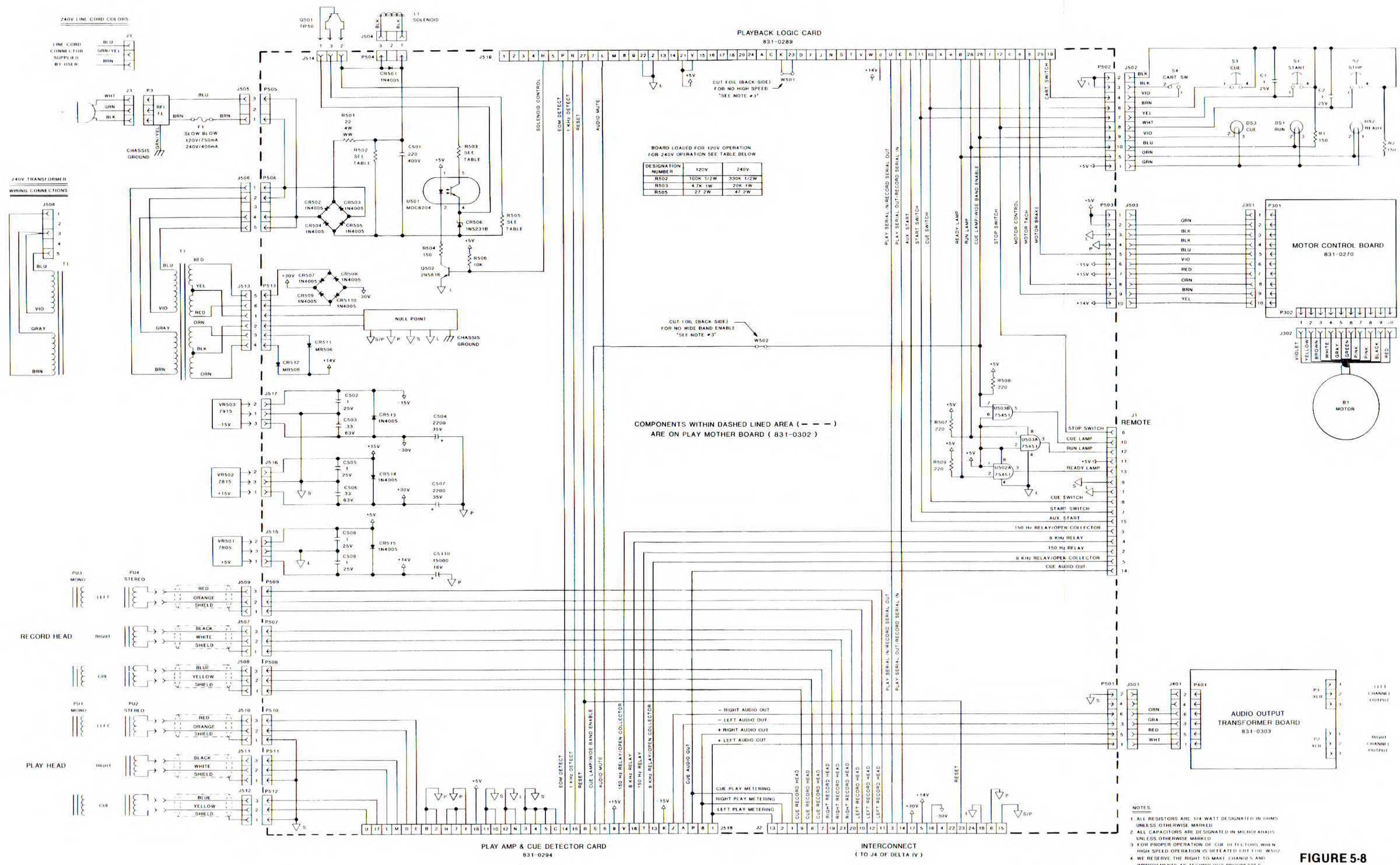


FIGURE 5-7

831-0302
DELTA I—II MOTHERBOARD
OVERLAY



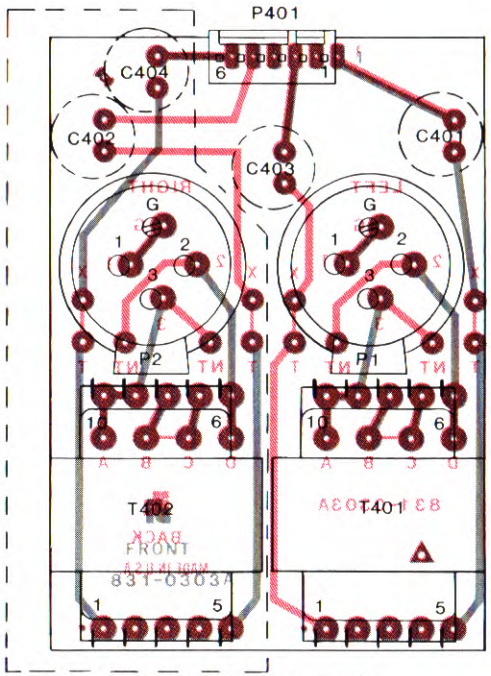
NOTES:
1. ALL RESISTORS ARE 1/4 WATT DESIGNATED IN OHMS UNLESS OTHERWISE MARKED
2. ALL CAPACITORS ARE DESIGNATED IN MICROFARADS UNLESS OTHERWISE MARKED
3. FOR PROPER OPERATION OF CUE DETECTORS WHEN HIGH SPEED OPERATION IS DEFEATED CUT FOIL W502
4. WE RESERVE THE RIGHT TO MAKE CHANGES AND IMPROVEMENTS AS TECHNOLOGY PROGRESSES

FIGURE 5-8
831-0302
DELTA I—II MOTHERBOARD SCHEMATIC

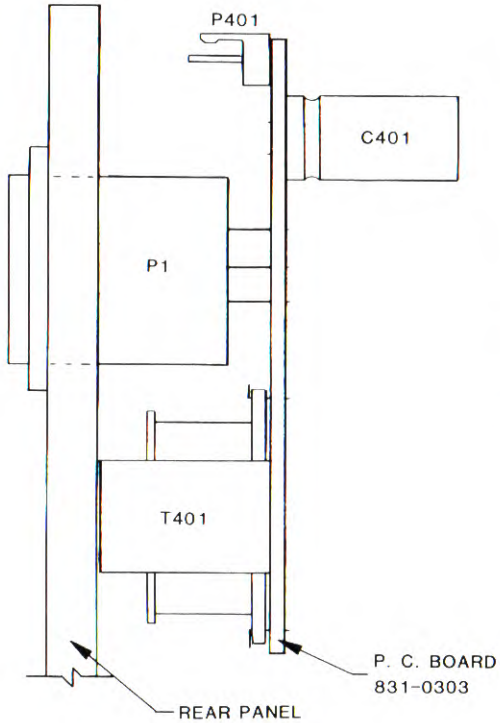
DELTA I—II OUTPUT TRANSFORMER PCB 831-0303
PARTS LIST

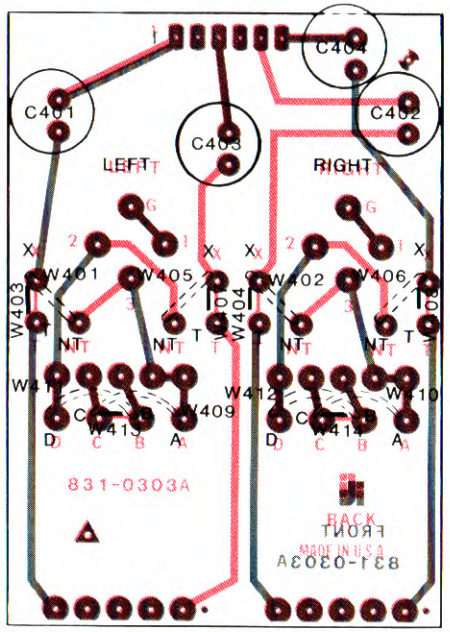
DELTA I/II AUDIO OUTPUT PCB
(Assembly #831-0303-013)

TRANSFORMERS		
T401	532-0011-000	TRANSFORMER, AUDIO OUTPUT [AM-9724]
T402	532-0011-000	TRANSFORMER, AUDIO OUTPUT [AM-9724]
STRAPPING		
W401	427-0003-000	BUS WIRE, SOLID, #24 AWG
W402	427-0003-000	BUS WIRE, SOLID, #24 AWG
W403	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
W404	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
W405	427-0003-000	BUS WIRE, SOLID, #24 AWG
W406	427-0003-000	BUS WIRE, SOLID, #24 AWG
W407	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
W408	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
W409	427-0003-000	BUS WIRE, SOLID, #24 AWG
W410	427-0003-000	BUS WIRE, SOLID, #24 AWG
W411	427-0003-000	BUS WIRE, SOLID, #24 AWG
W412	427-0003-000	BUS WIRE, SOLID, #24 AWG
W413	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
W414	xxx-xxxx-xxx	PCB FOIL, (See Table For Function)
CONNECTORS		
P1	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P401	376-0058-000	WAFER, 6 POS., LOCKING, #22-27-2061
CAPACITORS (TRANSFORMERLESS)		
C401	697-0002-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C402	697-0002-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C403	697-0002-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C404	697-0002-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V



COMPONENTS WITHIN DASHED LINES
NOT USED IN MONO MACHINES.

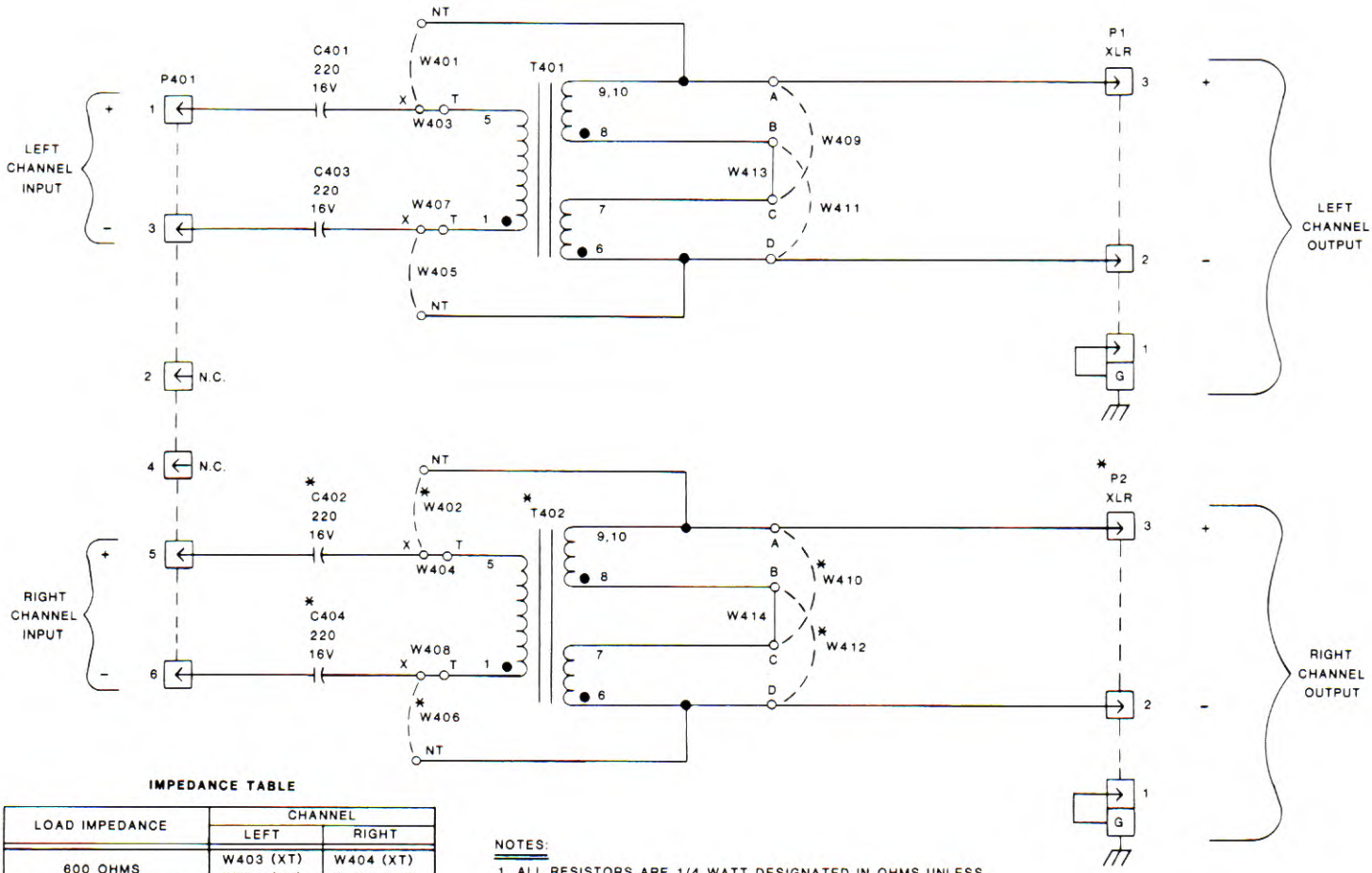




IMPEDANCE TABLE

LOAD IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W413 (BC)	W404 (XT) W408 (XT) W414 (BC)
150 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W409 (AC) W411 (BD)	W404 (XT) W408 (XT) W410 (AC) W412 (BD)
600 OHMS W/O TRANSFORMER (S) (75 OHMS DRIVING POINT IMPEDANCE)	W401 (XNT) W405 (XNT)	W402 (XNT) W406 (XNT)

NOTE: 1. STRAPS W403, W404, W407, W408, W413 AND W414 ARE FOILS AND MUST BE CUT AS REQUIRED.
2. IF FOIL OR WIRE STRAP IS NOT LISTED IN TABLE BLOCK, IT MUST BE REMOVED.



IMPEDANCE TABLE

LOAD IMPEDANCE	CHANNEL	
	LEFT	RIGHT
600 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W413 (BC)	W404 (XT) W408 (XT) W414 (BC)
150 OHMS W/ TRANSFORMER (S)	W403 (XT) W407 (XT) W409 (AC) W411 (BD)	W404 (XT) W408 (XT) W410 (AC) W412 (BD)
600 OHMS W/O TRANSFORMER (S) (75 OHMS DRIVING POINT IMPEDANCE)	W401 (XNT) W405 (XNT)	W402 (XNT) W406 (XNT)

NOTE: 1. STRAPS W403, W404, W407, W408, W413 AND W414 ARE FOILS AND MUST BE CUT AS REQUIRED.
2. IF FOIL OR WIRE STRAP IS NOT LISTED IN TABLE BLOCK, IT MUST BE REMOVED.

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

FIGURE 5-10

831-0303
DELTA I—II OUTPUT TRANSFORMER PCB SCHEMATIC

DELTA III POWER COMPONENTS PCB 831-0297
PARTS LIST
(9/85)

DELTA III POWER COMPONENTS PCB
(Assembly #831-0297-003)

RESISTORS			
R701		628-0193-000	WIREWOUND, 22 OHM, 4 W, BWH
R702		630-0323-000	CARBON FILM, 330K OHM, 1/2 W, 5%
R703		630-0311-000	CARBON FILM, 100K OHM, 1/2 W, 5%
R704		630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R705		630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R706		626-0479-000	CARBON COMP., 4.7K OHM, 1 W
R707		628-0059-000	WIREWOUND, 27 OHM, 2 W, BWH
R708		628-0193-000	WIREWOUND, 22 OHM, 4 W, BWH
R709		630-0323-000	CARBON FILM, 330K OHM, 1/2 W, 5%
R710		630-0311-000	CARBON FILM, 100K OHM, 1/2 W, 5%
R711		630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R712		630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R713		626-0479-000	CARBON COMP., 4.7K OHM, 1 W
R714		628-0059-000	WIREWOUND, 27 OHM, 2 W, BWH
R715		628-0193-000	WIREWOUND, 22 OHM, 4 W, BWH
R716		630-0323-000	CARBON FILM, 330K OHM, 1/2 W, 5%
R717		630-0311-000	CARBON FILM, 100K OHM, 1/2 W, 5%
R718		630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R719		630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R720		626-0479-000	CARBON COMP., 4.7K OHM, 1 W
R721		628-0059-000	WIREWOUND, 27 OHM, 2 W, BWH
R722		630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R723		636-0001-000	POTENTIOMETER, 1K OHM, 1/2 W, PC FLAT
DIODES			
CR701		575-0007-000	1N4005
CR702		575-0007-000	1N4005
CR703		575-0007-000	1N4005
CR704		575-0007-000	1N4005
CR705		575-0033-000	POWER, 3A 600V, MR 506
CR706		575-0033-000	POWER, 3A 600V, MR 506
CR707		575-0007-000	1N4005
CR708		575-0007-000	1N4005
CR709		577-0011-000	ZENER, 1N5231B
CR710		575-0007-000	1N4005
CR711		575-0007-000	1N4005
CR712		577-0011-000	ZENER, 1N5231B
CR713		575-0007-000	1N4005
CR714		575-0007-000	1N4005
CR715		575-0007-000	ZENER, 1N5231B
CR716		575-0007-000	1N4005
CR717		575-0007-000	1N4005
CR718		575-0007-000	1N4005
CR719		575-0007-000	1N4005

TRANSISTORS			
U701		585-0010-000	OPTO-ISOLATER, H11A2
U702		585-0010-000	OPTO-ISOLATER, H11A2
U703		585-0010-000	OPTO-ISOLATER, H11A2
Q701		590-0017-010	2N5816
Q702		590-0017-010	2N5816
Q703		590-0033-000	TIP50, NPN, POWER
Q704		590-0033-000	TIP50, NPN, POWER
Q705		590-0017-010	2N5816
Q706		590-0017-010	2N5816
Q707		590-0033-000	TIP50, NPN, POWER
Q708		590-0033-000	TIP50, NPN, POWER
Q709		590-0017-010	2N5816
Q710		590-0017-010	2N5816
Q711		590-0033-000	TIP50, NPN, POWER
Q712		590-0033-000	TIP50, NPN, POWER
CONNECTORS			
J704		380-0062-000	SOCKET, 3 PIN, 10-18-2031
J705		380-0062-000	SOCKET, 3 PIN, 10-18-2031
J706		380-0062-000	SOCKET, 3 PIN, 10-18-2031
P701		376-0058-000	WAFER, 6 POS., LOCKING, 22-23-2061
P702		376-0065-000	WAFER, 3 POS., LOCKING, HLSS100-3
MISCELLANEOUS			
C701		680-2563-033	CAPACITOR, POLYESTER FILM, .10 ufd, 63V, 5%
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

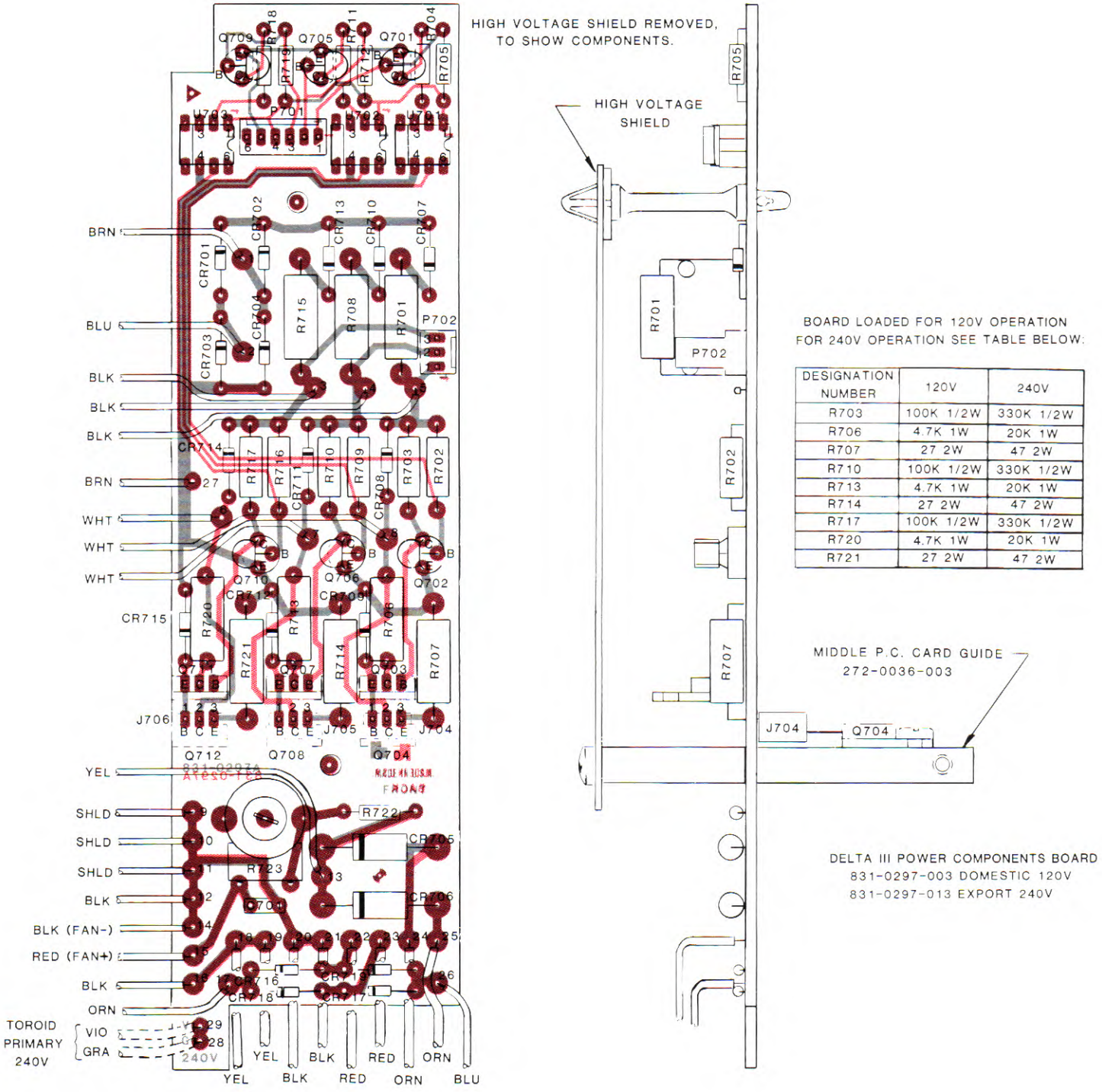
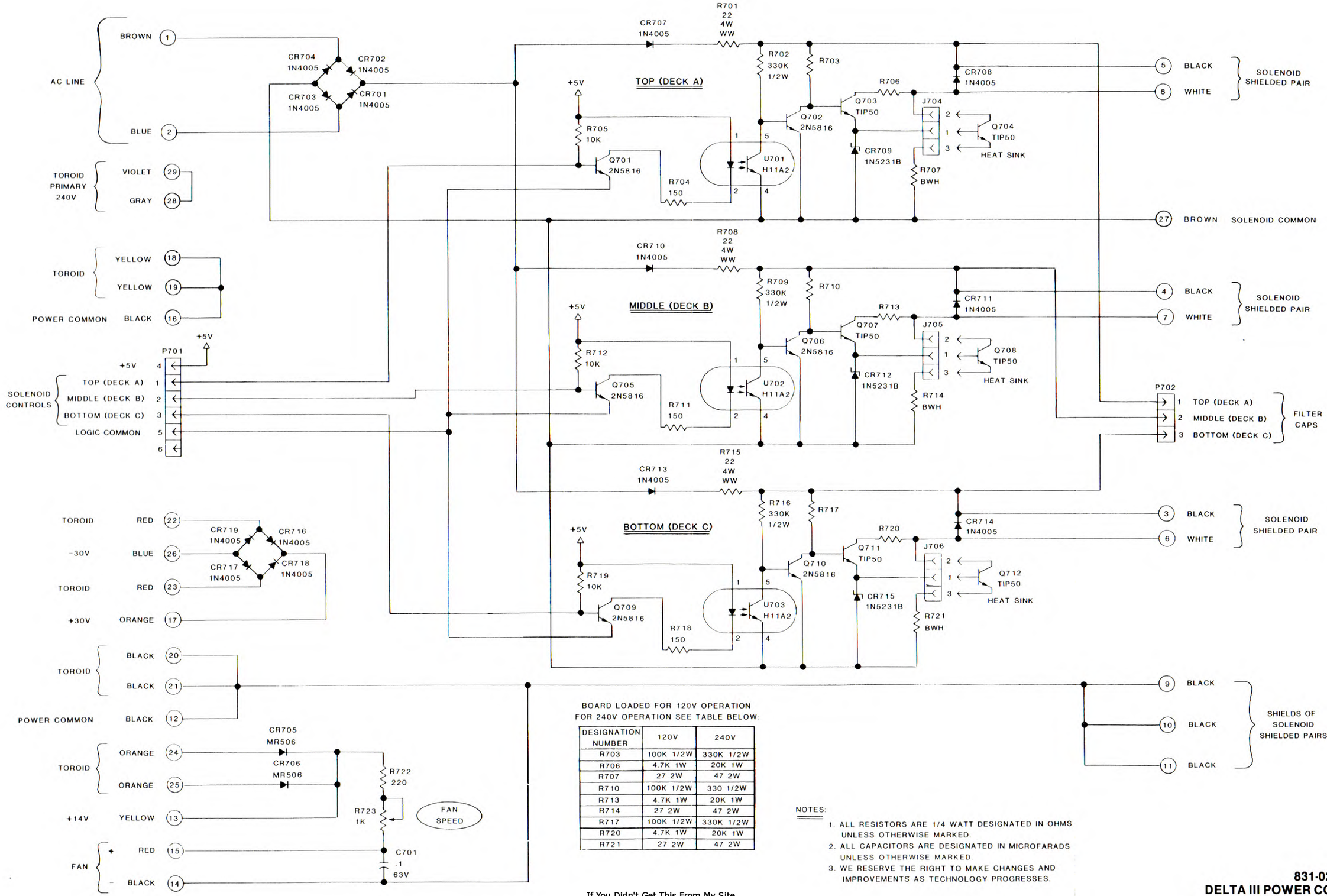


FIGURE 5-11

831-0297
DELTA III POWER COMPONENTS PCB OVERLAY



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

DESIGNATION NUMBER	120V	240V
R703	100K 1/2W	330K 1/2W
R706	4.7K 1W	20K 1W
R707	27 2W	47 2W
R710	100K 1/2W	330 1/2W
R713	4.7K 1W	20K 1W
R714	27 2W	47 2W
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 5-12

831-0297
DELTA III POWER COMPONENTS PCB SCHEMATIC

DELTA III OUTPUT TRANSFORMER PCB 831-0254
PARTS LIST

DELTA III AUDIO OUTPUT PCB
(Assembly #831-0254-013)

TRANSFORMERS

T601	532-0011-000	AUDIO OUTPUT AM-9724
T602	532-0011-000	AUDIO OUTPUT AM-9724
T603	532-0011-000	AUDIO OUTPUT AM-9724
T604	532-0011-000	AUDIO OUTPUT AM-9724
T605	532-0011-000	AUDIO OUTPUT AM-9724
T606	532-0011-000	AUDIO OUTPUT AM-9724

CONNECTORS

P1A	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2A	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P1B	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2B	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P1C	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V
P2C	378-0057-000	CONNECTOR, XLR 3 PIN (MALE) #NC 3MD-V

STRAPPING

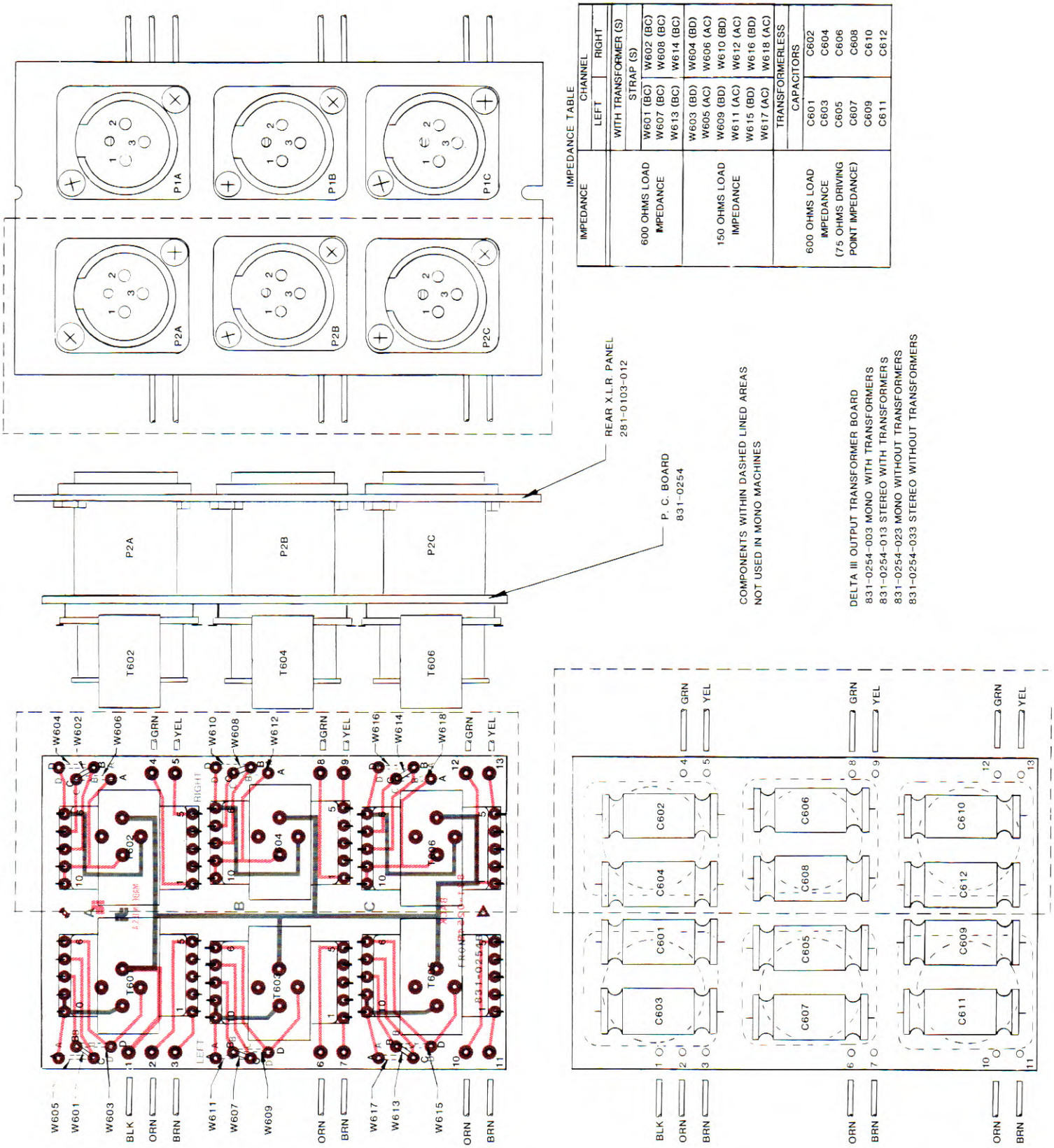
W601	427-0003-000	BUS WIRE, SOLID, #24 AWG
W602	427-0003-000	BUS WIRE, SOLID, #24 AWG
W603	427-0003-000	BUS WIRE, SOLID, #24 AWG
W604	427-0003-000	BUS WIRE, SOLID, #24 AWG
W605	427-0003-000	BUS WIRE, SOLID, #24 AWG
W606	427-0003-000	BUS WIRE, SOLID, #24 AWG
W607	427-0003-000	BUS WIRE, SOLID, #24 AWG
W608	427-0003-000	BUS WIRE, SOLID, #24 AWG
W609	427-0003-000	BUS WIRE, SOLID, #24 AWG
W610	427-0003-000	BUS WIRE, SOLID, #24 AWG
W611	427-0003-000	BUS WIRE, SOLID, #24 AWG
W612	427-0003-000	BUS WIRE, SOLID, #24 AWG
W613	427-0003-000	BUS WIRE, SOLID, #24 AWG
W614	427-0003-000	BUS WIRE, SOLID, #24 AWG
W615	427-0003-000	BUS WIRE, SOLID, #24 AWG
W616	427-0003-000	BUS WIRE, SOLID, #24 AWG
W617	427-0003-000	BUS WIRE, SOLID, #24 AWG
W618	427-0003-000	BUS WIRE, SOLID, #24 AWG

CAPACITORS (TRANSFORMERLESS)

C601	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C602	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C603	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C604	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C605	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C606	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C607	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C608	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C609	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C610	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C611	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V
C612	697-0001-000	ELECTROLYTIC, NON-POLAR, 220 ufd, 16V

MISCELLANEOUS

	325-0254-003	PCB, AUDIO OUTPUT TRANSFORMER DIII
13	382-0019-000	PIN, MALE, PCB, #R62-3

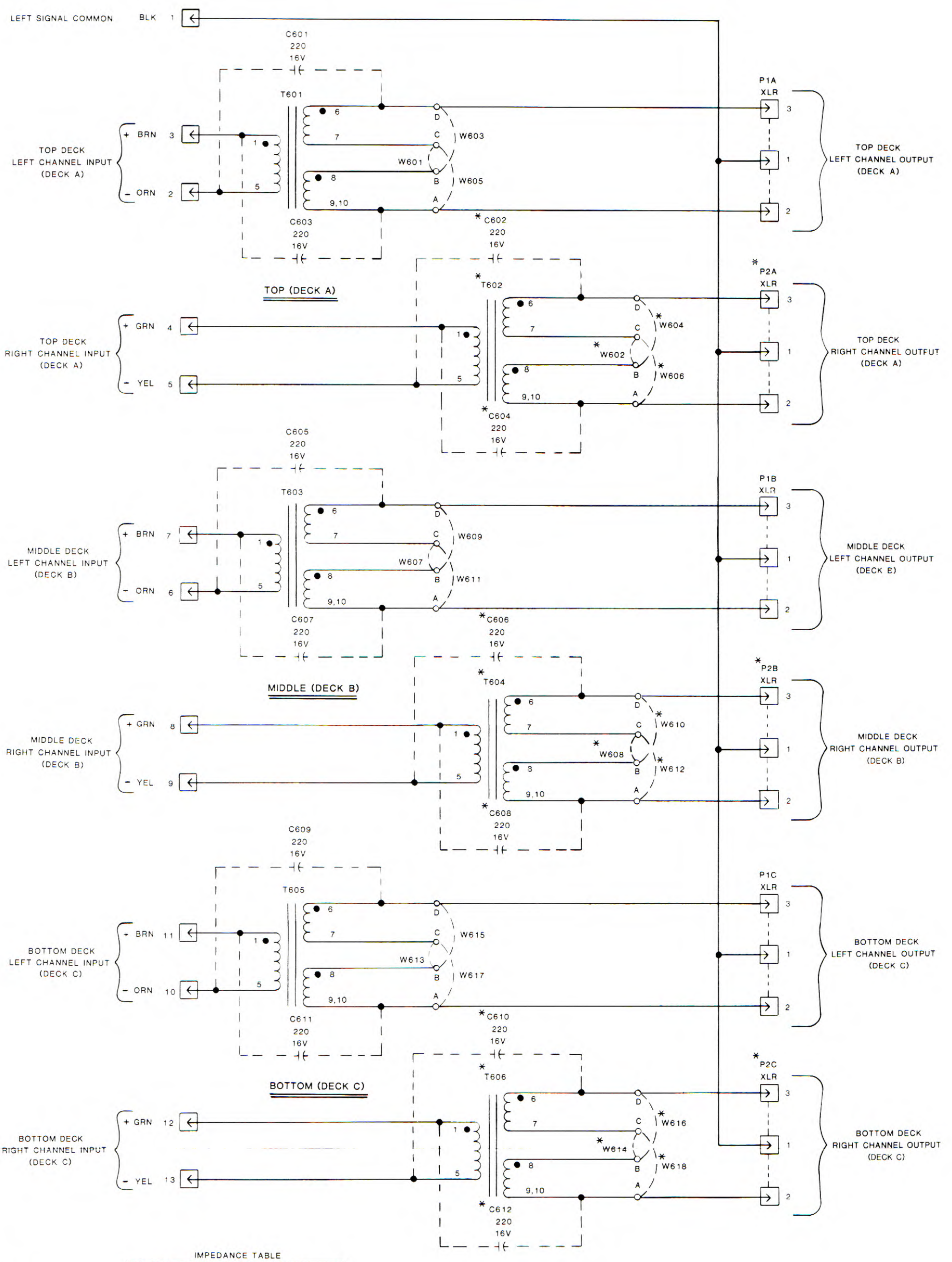


IMPEDANCE TABLE

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

FIGURE 5-13

831-0254
DELTA III OUTPUT TRANSFORMER PCB OVERLAY



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

FIGURE 5-14
831-0254
DELTA III OUTPUT TRANSFORMER PCB SCHEMATIC

DELTA III REGULATOR PCB 831-0283
PARTS LIST
(9/85)

DELTA III REGULATOR PCB
(Assembly #831-0283-003)

DIODES			
CR901		575-0007-000	1N4005
CR902		575-0007-000	1N4005
CR903		575-0007-000	1N4005
CAPACITORS			
C901		686-0009-000	CERAMIC DISC, .1 ufd, 25V
C902		686-0009-000	CERAMIC DISC, .1 ufd, 25V
C903		680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C904		686-0009-000	CERAMIC DISC, .1 ufd, 25V
C905		680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C906		686-0009-000	CERAMIC DISC, .1 ufd, 25V
VOLTAGE REGULATORS @ MOUNTING HARDWARE			
VR901		605-0020-000	VOLTAGE REGULATOR, MC78T05CT, +5V, TO220
VR902		605-0010-000	VOLTAGE REGULATOR, MC7815CT, +15V, TO220
VR903		605-0011-000	VOLTAGE REGULATOR, MC7915CT, -15V, TO220
	3	613-0014-000	INSULATOR, TO-220
	3	352-0004-000	SCREW, 6-32 X 1/4, NYLON, SLOTTED, R. HD.
CONNECTORS			
P904		376-0069-000	WAFER, 22 POS., HFAS100-22
J901		380-0062-000	SOCKET, 3 PIN, 10-18-2031
J902		380-0062-000	SOCKET, 3 PIN, 10-18-2031
J903		380-0062-000	SOCKET, 3 PIN, 10-18-2031
MISCELLANEOUS			
	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, PHIL., PAN HD.,

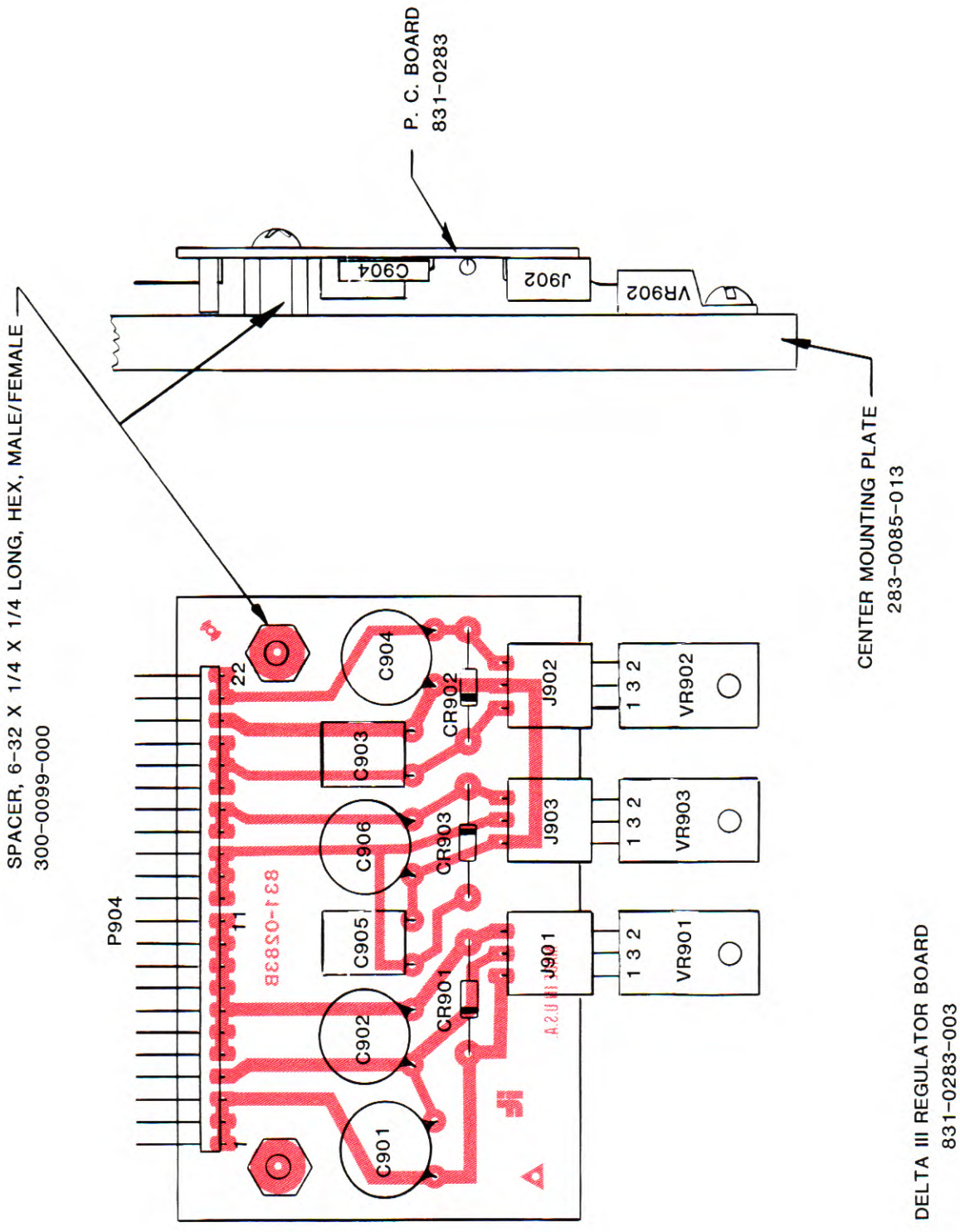
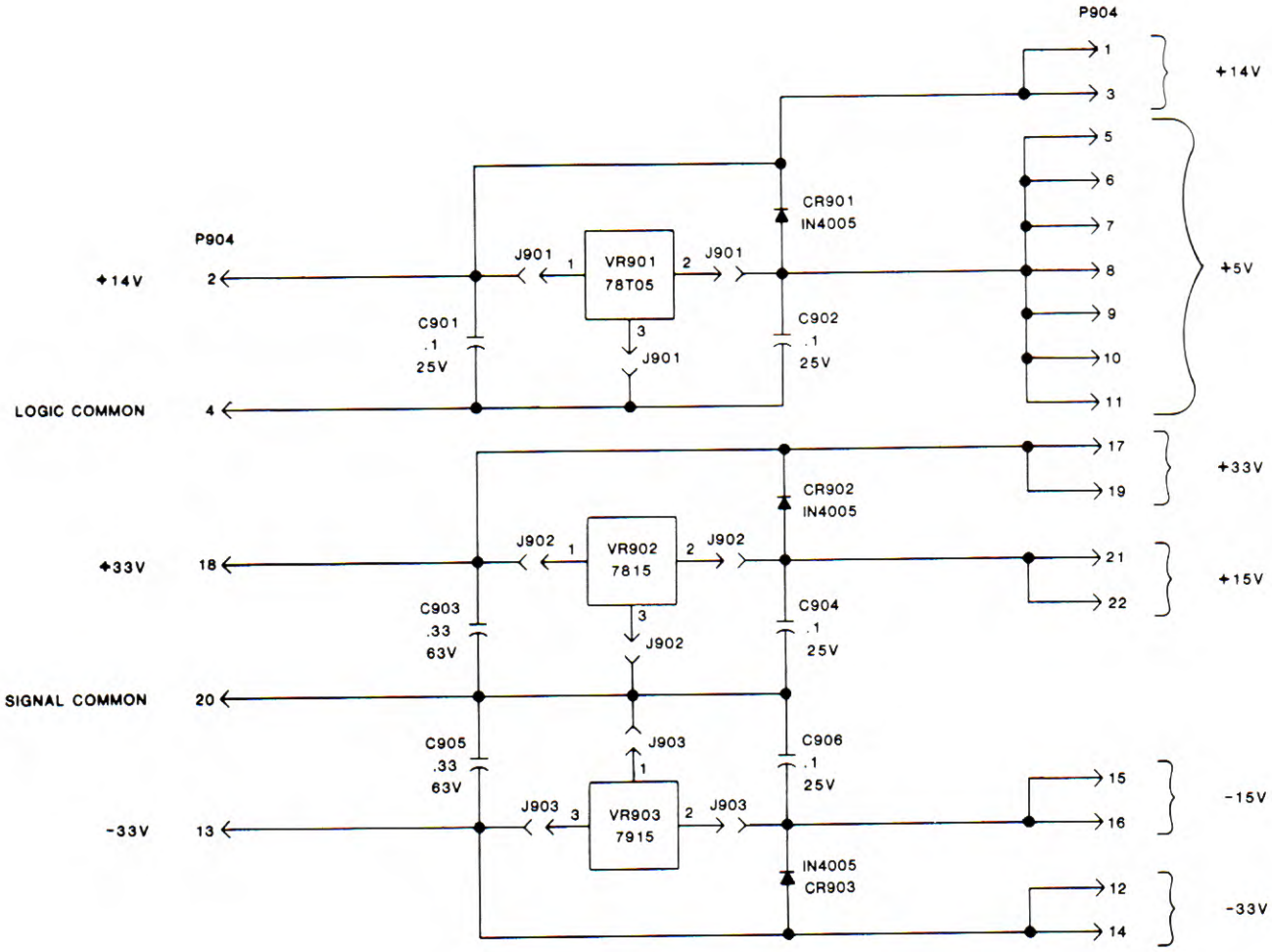


FIGURE 5-15

831-0283
DELTA III REGULATOR PCB
OVERLAY



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 5-16

831-0283
DELTA III REGULATOR PCB
SCHEMATIC

DELTA III INTERCONNECT PCB 831-0291
PARTS LIST

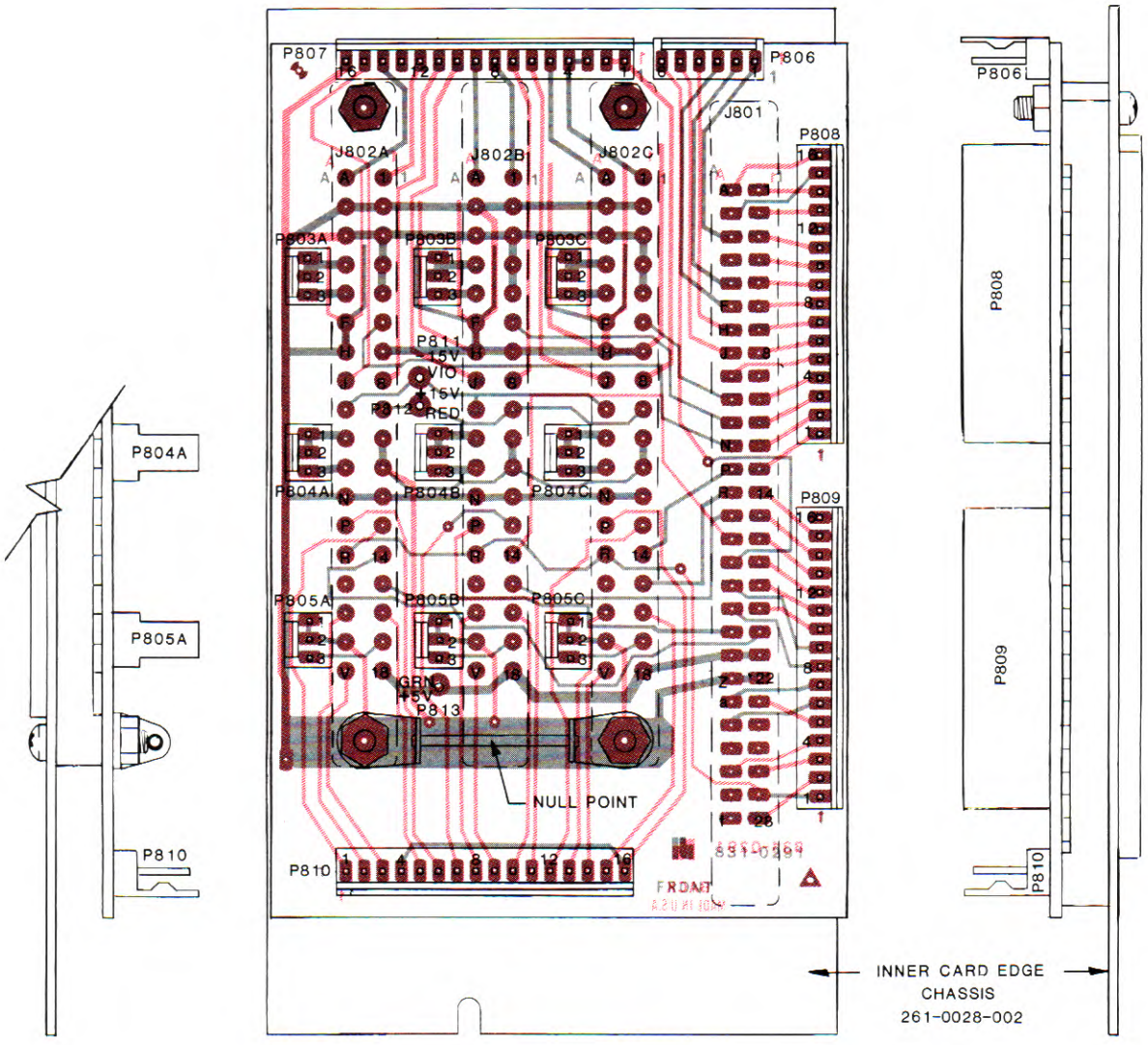
DELTA III INTERCONNECT PCB
(Assembly #831-0291-003)

CONNECTORS

J801		380-0144-000	CONNECTOR, PC CARD EDGE, DUAL 28, 0.125
J802A		380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156
J802B		380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156
J802C		380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156
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		376-0058-000	WAFER, 6 POS., LOCKING, #22-23-2061
P807		376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P808		376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P809		376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P810		376-0057-000	WAFER, 16 POS., LOCKING, #22-23-2161
P811-13	3	382-0019-000	PIN, MALE, PCB, #R62-3

MISCELLANEOUS

	325-0291-003	PCB, 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

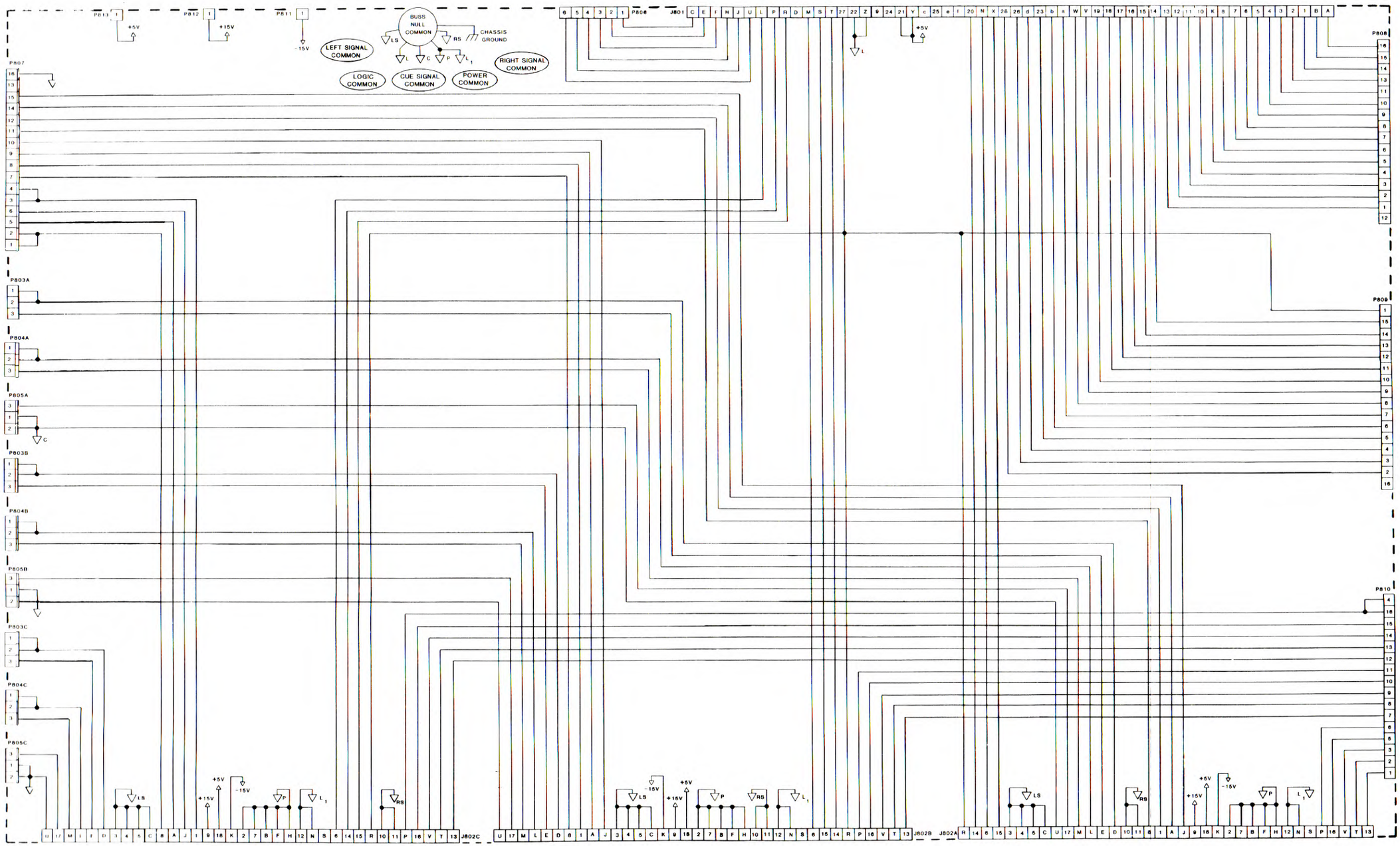


DELTA III INTERCONNECT BOARD
831-0291-003

FIGURE 5-17

831-0291
DELTA III INTERCONNECT PCB OVERLAY

PLAY BACK LOGIC CARD
831-0288



PLAY AMP & CUE DETECTOR CARD
BOTTOM (DECK C)
831-0294

PLAY AMP & CUE DETECTOR CARD
MIDDLE (DECK B)
831-0294

PLAY AMP & CUE DETECTOR CARD
TOP (DECK A)
831-0294

FIGURE 5-18

831-0291
DELTA III INTERCONNECT PCB
SCHEMATIC

DELTA III REMOTE CONNECTOR PCB 831-0311
PARTS LIST

DIII REMOTE CONNECTOR BOARD
(Assembly #831-0311-003)

CAPACITORS		
C1601	686-0009-000	CERAMIC DISC, .1 ufd, 25V
RESISTORS		
R1601	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R1602	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R1603	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R1604	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R1605	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
R1606	630-0047-000	CARBON FILM, 220 OHM, 1/4 W, 5%
INTEGRATED CIRCUITS		
U1601	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U1602	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
U1603	607-0009-000	75451, DUAL PERIPHERAL AND DRIVER
CONNECTORS & SOCKETS		
U1601	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1602	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1603	613-0007-000	SOCKET, IC, 8 PIN, DIP
J1A	380-0172-000	SOCKET, 15-PIN D-SUBMINIATURE HDP-20 (AMP #745057-3)
J1B	380-0172-000	SOCKET, 15-PIN D-SUBMINIATURE HDP-20 (AMP #745057-3)
J1C	380-0172-000	SOCKET, 15-PIN D-SUBMINIATURE HDP-20 (AMP #745057-3)
P1601	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE (22-23-2161)
P1602	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE (22-23-2161)
P1603	376-0059-000	WAFER, NON-LOCKING, 16 POS., RIGHT ANGLE (22-23-2161)
P1604	376-0065-000	WAFER, LOCKING, 3 POS. (HLSS100-3)
MISCELLANEOUS		
	325-0311-003	PCB, REMOTE CONNECTOR, DIII

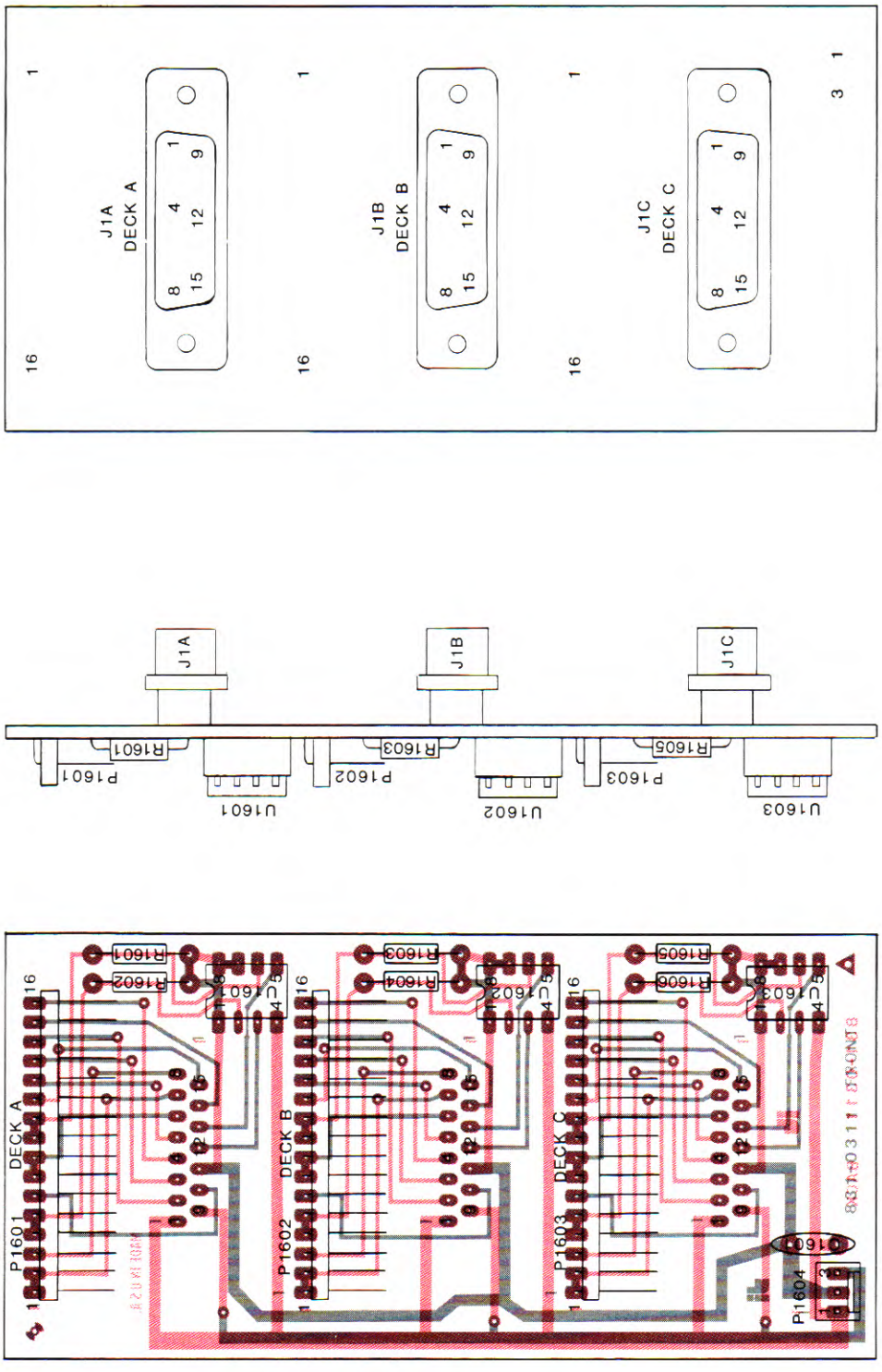
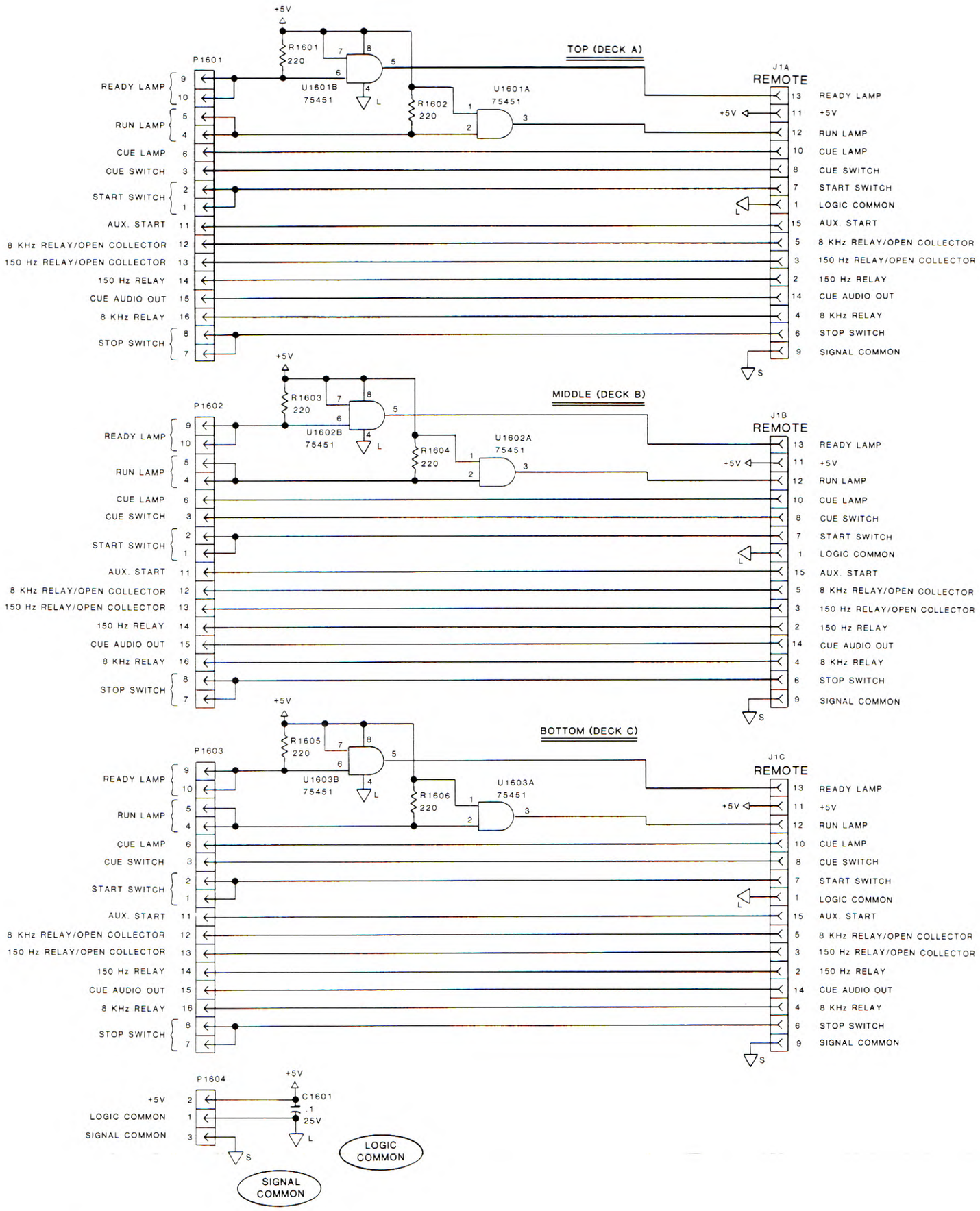


FIGURE 5-19

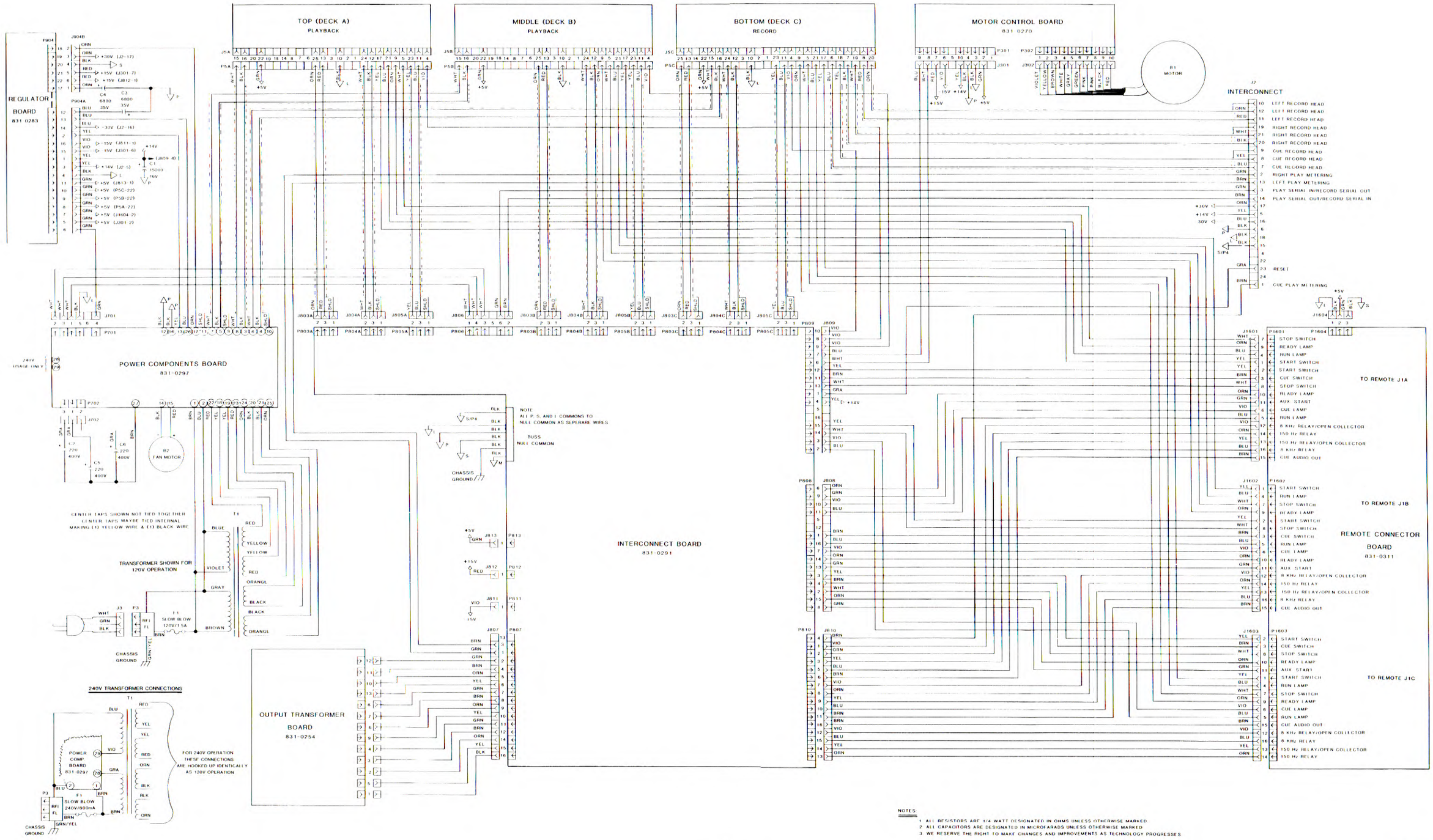
831-0311
DELTA III REMOTE CONNECTOR PCB
OVERLAY



NOTES:

1. ALL RESISTORS ARE 1/4 WATT AND 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.

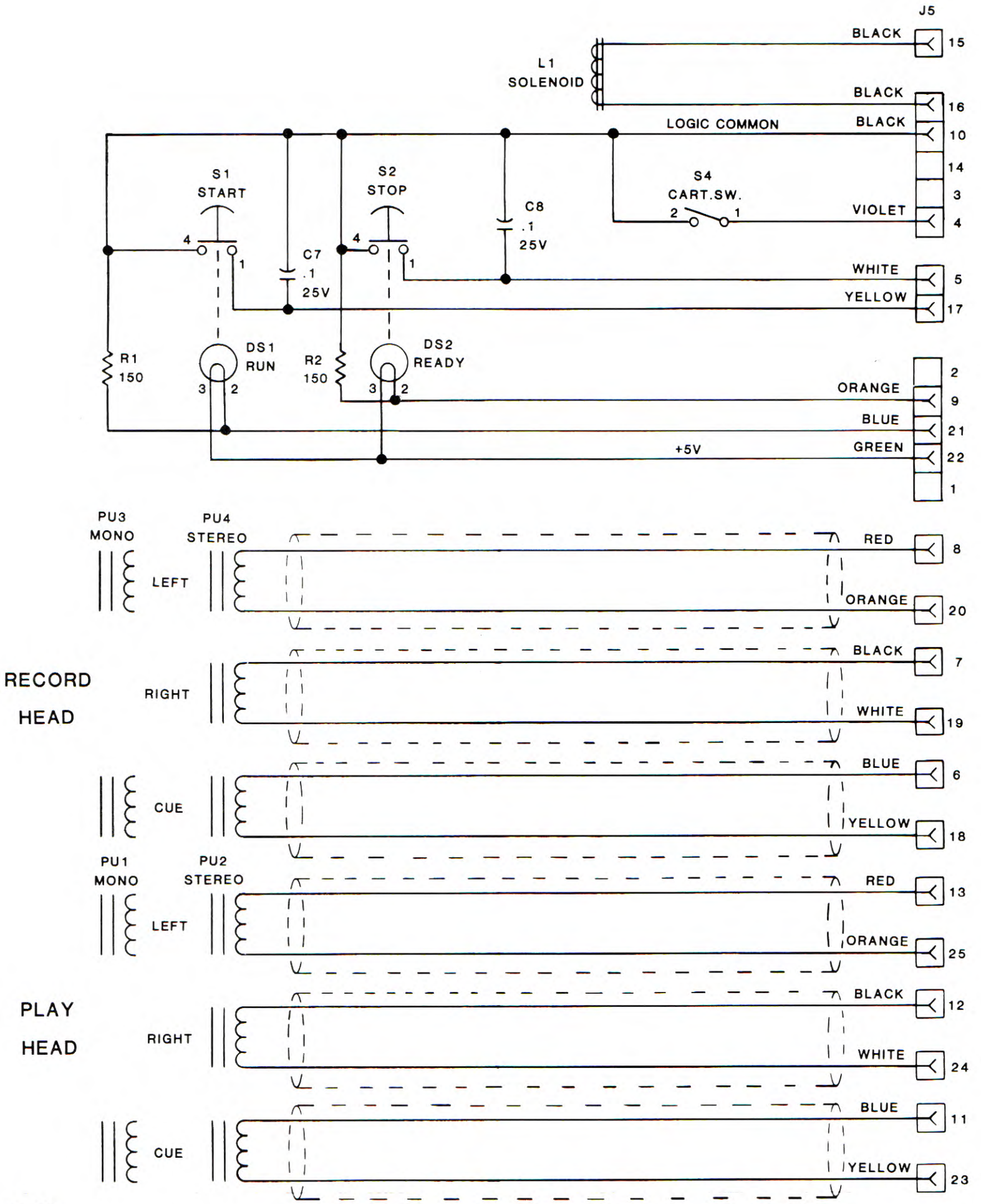
FIGURE 5-20
831-0311
DELTA III REMOTE CONNECTOR PCB SCHEMATIC



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 5-21

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.

FIGURE 5-22
DELTA III DECK
WIRING SCHEMATIC

DELTA IV RECORD LOGIC PCB 831-0290
PARTS LIST

RECORDER LOGIC CONTROL PC CARD
(Assembly #831-0271-003)

CAPACITORS

C1201	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1202	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1203	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1204	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1205	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1206	686-0009-000	CERAMIC DISC, .1 ufd, 25V
C1207	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1208	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C1209	686-0011-000	CERAMIC DISC, 15 pfd, 1000V, 20%
C1210	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1211	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1212	680-0501-033	POLYESTER FILM, .0022 ufd, 100V, 5%
C1213	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1214	680-1963-033	POLYESTER FILM, .033 ufd, 63V, 5%
C1215	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1216	680-0501-033	POLYESTER FILM, .0022 ufd, 100V, 5%
C1217	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1218	680-1963-033	POLYESTER FILM, .033 ufd, 63 V, 5%
C1219	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1220	680-0501-033	POLYESTER FILM, .0022 ufd, 100V, 5%
C1221	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1222	680-1963-033	POLYESTER FILM, .033 ufd, 63 V, 5%
C1223	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1224	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1225	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1226	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1227	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C1228	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1229	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1230	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1231	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C1232	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1233	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V
C1234	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1235	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1236	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1237	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%

RESISTOR NETWORKS

RP1201	631-0007-000	RESISTOR, ARRAY, COMMON SIP, 9R, 330 OHM, 2%

RESISTORS

R1201	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1202	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R1203	630-0103-000	CARBON FILM, 47K OHM, 1/4 W, 5%
R1204	630-0091-000	CARBON FILM, 15K OHM, 1/4 W, 5%
R1205	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1206	630-0119-000	CARBON FILM, 220K OHM, 1/4 W, 5%
R1207	630-0119-000	CARBON FILM, 220K OHM, 1/4 W, 5%
R1208	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R1209	630-0103-000	CARBON FILM, 47K OHM, 1/4 W, 5%
R1210	630-0103-000	CARBON FILM, 47K OHM, 1/4 W, 5%
R1211	630-0107-000	CARBON FILM, 68K OHM, 1/4/ W, 5%
R1212	630-0095-000	CARBON FILM, 22K OHM, 1/4 W, 5%
R1213	630-0095-000	CARBON FILM, 22K OHM, 1/4 W, 5%
R1214	630-0095-000	CARBON FILM, 22K OHM, 1/4 W, 5%
R1215	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R1216	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%
R1217	630-0065-000	CARBON FILM, 1.2K OHM, 1/4 W, 5%
R1218	630-0053-000	CARBON FILM, 390 OHM, 1/4 W, 5%
R1219	630-0053-000	CARBON FILM, 390 OHM, 1/4 W, 5%
R1220	630-0053-000	CARBON FILM, 390 OHM, 1/4 W, 5%
R1221	630-0082-000	CARBON FILM, 6.2K OHM, 1/4 W, 5%
R1222	630-0083-000	CARBON FILM, 6.8K OHM, 1/4 W, 5%
R1223	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R1224	630-0075-000	CARBON FILM, 3.3K OHM, 1/4 W, 5%
R1225	630-0075-000	CARBON FILM, 3.3K OHM, 1/4 W, 5%
R1226	630-0075-000	CARBON FILM, 3.3K OHM, 1/4 W, 5%
R1227	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1228	630-0103-000	CARBON FILM, 47K OHM, 1/4 W, 5%
R1229	630-0119-000	CARBON FILM, 220K OHM, 1/4 W, 5%
R1230	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1231	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1232	630-0063-000	CARBON FILM, 1K OHM, 1/4 W, 5%

SOCKETS

Q1201	613-0004-001	PAD, TRANSISTOR, #7717-137N
U1201	613-0017-000	SOCKET, IC, 40 PIN, DIP
U1202,7	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1203	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1204	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1205	613-0009-000	SOCKET, IC, 16 PIN, DIP
U1206	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1208	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1209	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1210	613-0009-000	SOCKET, IC, 16 PIN, DIP

SEMICONDUCTORS

Q1201	596-0004-000	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
U1201	610-0011-000	MICROPROCESSOR, EPROM, 8749
U1202	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1203	608-0033-000	IC, MC14526B, PROGRAMMABLE BINARY DIVIDE-BY-N COUNTER
U1204	607-0045-000	IC, 74LS393, DUAL 4 BIT BINARY COUNTER
U1205	607-0079-000	IC, 74LS390, DUAL DECADE COUNTER
U1206	607-0054-000	IC, 74LS32, QUAD 2 INPUT OR
U1207	607-0009-000	IC, 75451, DUAL PERIPHERAL AND DRIVER
U1208	606-0016-000	IC, TL074CP, QUAD BI-FET OP AMP
U1209	606-0016-000	IC, TL074CP, QUAD BI-FET OP AMP
U1210	608-0027-000	IC, MC14050BCP, BUFFER/DRIVER
CR1201	575-0031-000	DIODE, SMALL SIGNAL (1N4448)

MISCELLANEOUS

	325-0271-003	PCB, RECORD LOGIC & CUE TONE GENERATION
	323-0003-001	CARD PULL, DELTAS
	282-0046-000	PIN, ROLL, 1/16 X 3/16
XTL1201	448-0009-000	CRYSTAL, 3.579 MHZ.

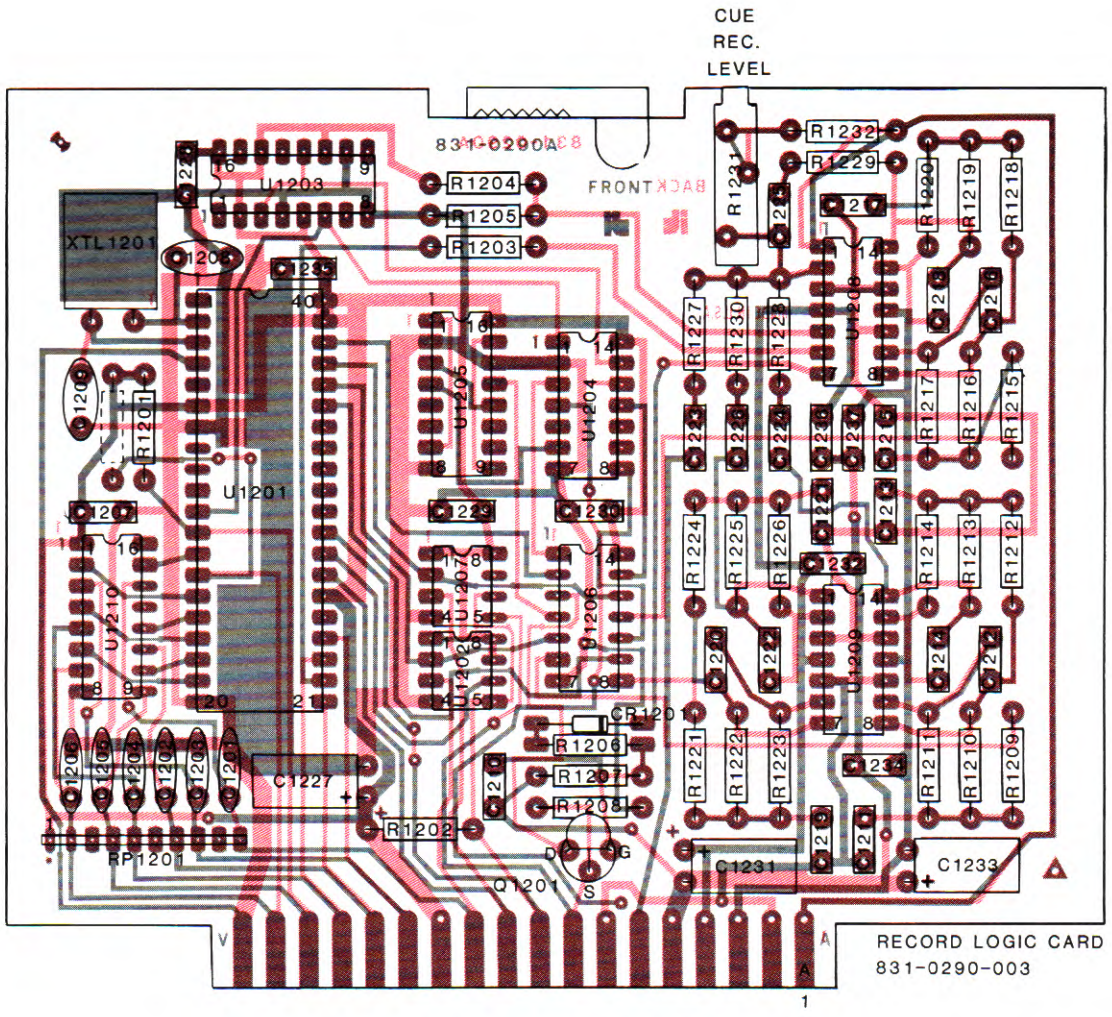
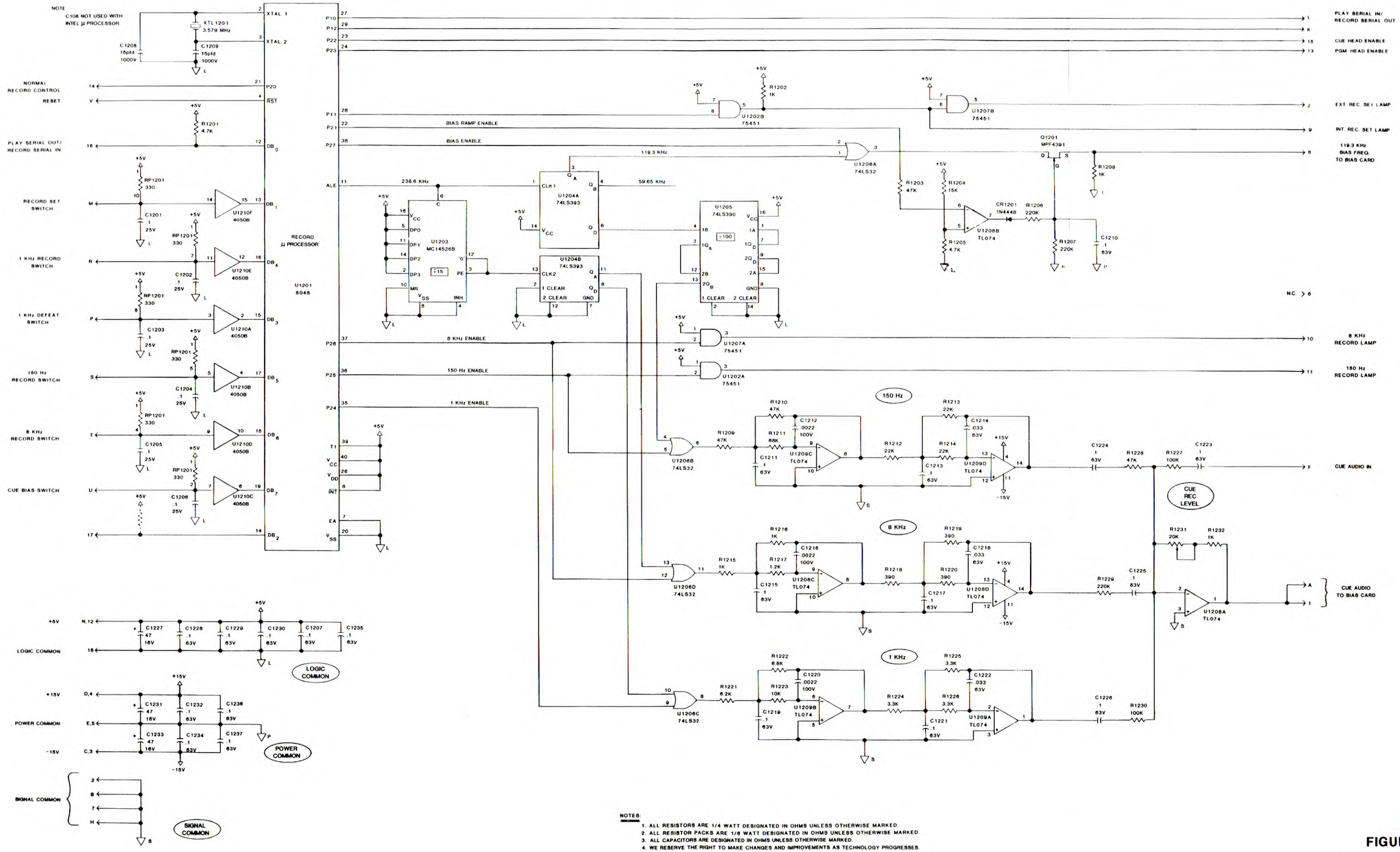


FIGURE 5-23

831-0290
DELTA IV RECORD LOGIC PCB
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 5-24

831-0290
DELTA IV RECORD LOGIC PCB SCHEMATIC

DELTA IV RECORD & METER AMPLIFIER PCB 831-0251
PARTS LIST
(9/85)

RECORD AND METER AMPLIFIER PCB
(Assembly #831-0251-003)

CAPACITORS

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

RESISTORS

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

RESISTOR NETWORKS

RP1001	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1002	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1003	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1004	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1005	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1006	631-0030-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 4.7K OHM
RP1007	631-0033-000	RESISTOR, ARRAY, SEPARATE SIP, 4R, 22K OHM

SEMICONDUCTORS

U1001	606-0016-000	IC, TL074CP, QUAD BI-FET OP AMP
U1002	606-0016-000	IC, TL074CP, QUAD BI-FET OP AMP
U1003	608-0004-000	IC, MC14052BC, CMOS DUAL 4-1 MULTIPLEX
U1004	606-0015-000	IC, TL084CP, QUAD BI-FET OP AMP

DIODES

CR1001	575-0031-000	SMALL SIGNAL [1N4448]
CR1002	575-0031-000	SMALL SIGNAL [1N4448]
CR1003	575-0031-000	SMALL SIGNAL [1N4448]
CR1004	575-0031-000	SMALL SIGNAL [1N4448]
CR1005	575-0031-000	SMALL SIGNAL [1N4448]
CR1006	575-0031-000	SMALL SIGNAL [1N4448]
CR1007	575-0031-000	SMALL SIGNAL [1N4448]
CR1008	575-0031-000	SMALL SIGNAL [1N4448]
CR1009	575-0031-000	SMALL SIGNAL [1N4448]

SOCKETS

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

STRAPPING

W1001	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1002	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1003	427-0002-000	BUS WIRE, SOLID, #22 AWG
W1004	427-0002-000	BUS WIRE, SOLID, #22 AWG

MISCELLANEOUS

S1001	402-0003-000	SWITCH, MINITURE SLIDE, DPDT, P.C. MOUNT
	323-0003-001	CARD PULL, DELTAS
	282-0046-000	PIN, ROLL, 1/16 X 3/16

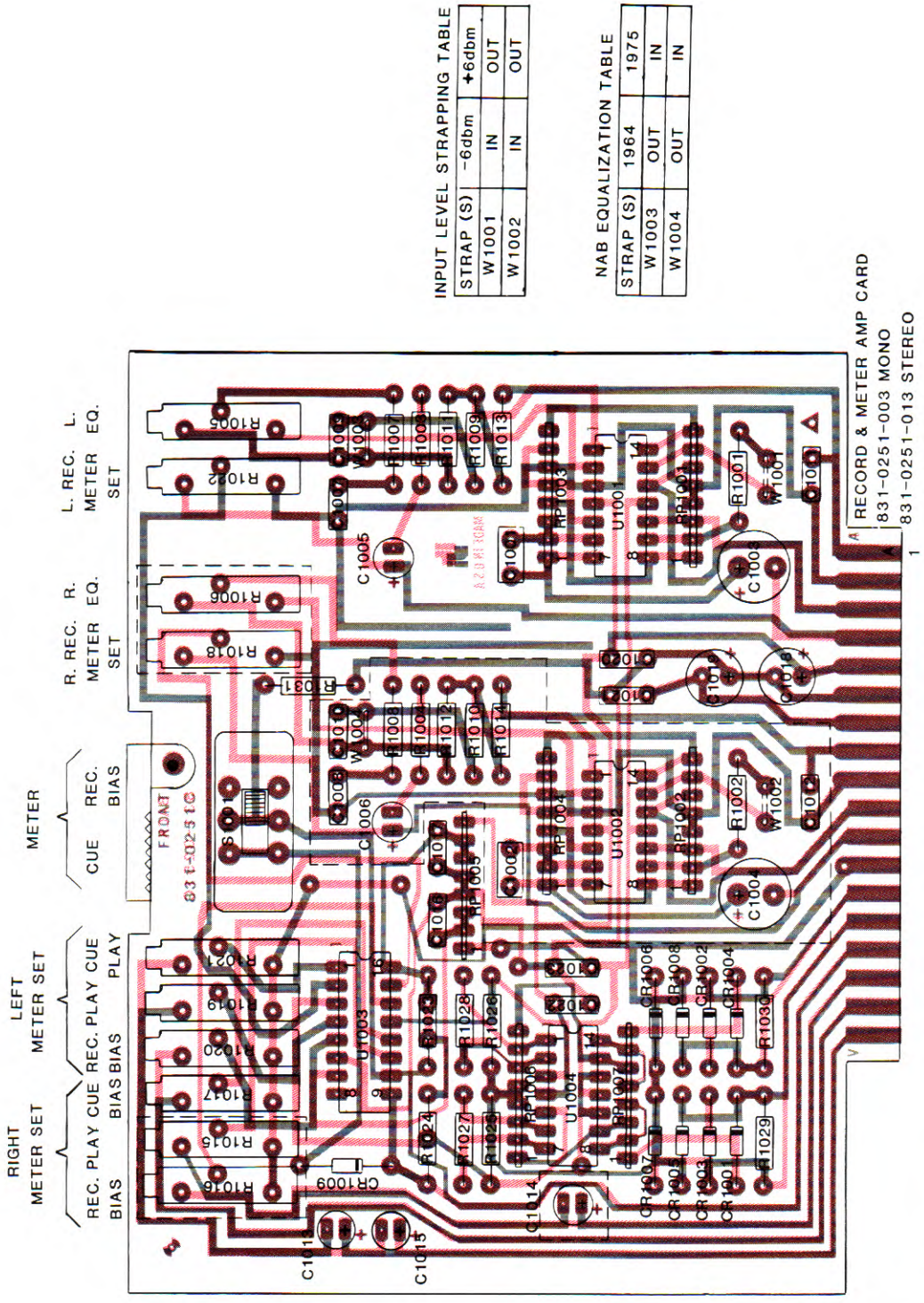
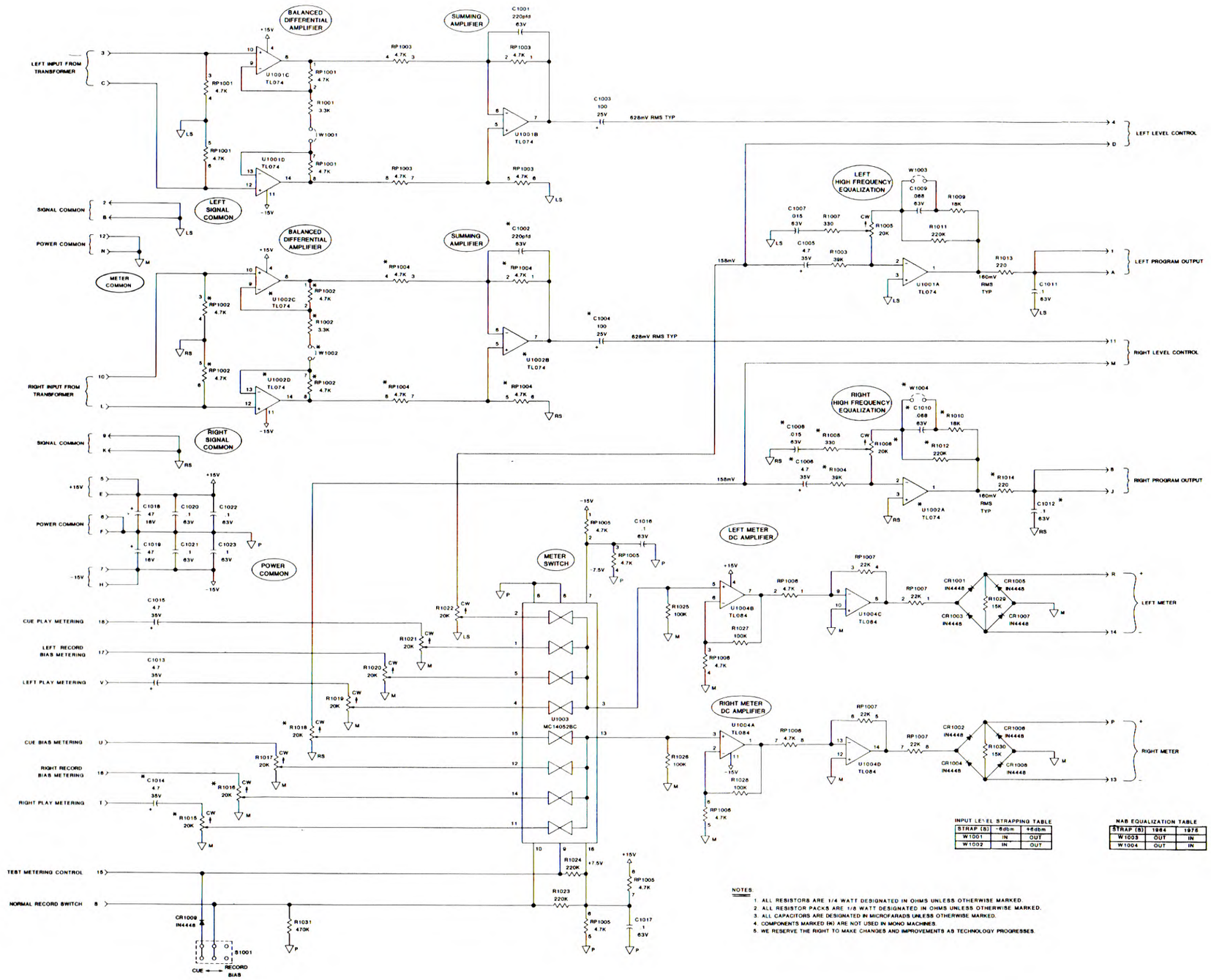


FIGURE 5-25

831-0251
DELTA IV RECORD & METER AMPLIFIER PCB OVERLAY



INPUT LEVEL STRAPPING TABLE

STRAP (S)	-8dbm	+4dbm
W1001	IN	OUT
W1002	IN	OUT

NAB EQUALIZATION TABLE

STRAP (S)	1964	1976
W1003	OUT	IN
W1004	OUT	IN

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

FIGURE 5-26

831-0251
DELTA IV RECORD & METER AMPLIFIER PCB SCHEMATIC

DELTA IV BIAS AMPLIFIER PCB 831-0249
PARTS LIST

DELTA IV .... BIAS CARD
(Assembly #831-0249-003)

CAPACITORS

C1101	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1102	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1103	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V,
C1104	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V,
C1105	678-0363-033	POLYPROPYLENE, 330 pfd, 63V, 5%
C1106	678-0363-033	POLYPROPYLENE, 330 pfd, 63V, 5%
C1107	680-0901-033	POLYESTER FILM, .0047 ufd, 100V, 5%
C1108	680-0901-033	POLYESTER FILM, .0047 ufd, 100V, 5%
C1109	677-0008-000	SILVER MICA, 22 pfd, 300V
C1110	677-0008-000	SILVER MICA, 22 pfd, 300V
C1111	678-0163-033	POLYPROPYLENE, 220 pfd, 63V, 5%
C1112	678-0163-033	POLYPROPYLENE, 220 pfd, 63V, 5%
C1113	695-1925-013	ALUMINUM ELECTROLYTIC, 100 ufd, 25V,
C1114	695-1925-013	ALUMINUM ELECTROLYTIC, 100 ufd, 25V,
C1115	680-1363-033	POLYESTER FILM, .01 ufd, 63V, 5%
C1116	680-1363-033	POLYESTER FILM, .01 ufd, 63V, 5%
C1117	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1118	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1119	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1120	680-0101-033	POLYESTER FILM, .001 ufd, 100V, 5%
C1121	677-0013-000	SILVER MICA, 15 pfd, 300V
C1122	680-0101-033	POLYESTER FILM, .001 ufd, 100V, 5%
C1123	678-0163-033	POLYPROPYLENE, 220 pfd, 63V, 5%
C1124	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1125	695-1716-013	ALUMINUM ELECTROLYTIC, 47 ufd, 16V,
C1126	678-0363-033	POLYPROPYLENE, 330 pfd, 63V, 5%
C1127	677-0008-000	SILVER MICA, 22 pfd, 300V
C1128	678-0163-033	POLYPROPYLENE, 220 pfd, 63V, 5%
C1129	695-1925-013	ALUMINUM ELECTROLYTIC, 100 ufd, 25V,
C1130	680-1363-033	POLYESTER FILM, .01 ufd, 63V, 5%
C1131	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1132	695-1925-013	ALUMINUM ELECTROLYTIC, 100 ufd, 25V,
C1133	695-1925-013	ALUMINUM ELECTROLYTIC, 100 ufd, 25V,
C1134	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1135	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1136	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1137	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1138	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1139	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1140	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%
C1141	680-2563-033	POLYESTER FILM, .10 ufd, 63V, 5%

RESISTORS

R1101	630-0119-000	CARBON FILM, 220K OHM, 1/4 W, 5%
R1102	630-0119-000	CARBON FILM, 220K OHM, 1/4 W, 5%
R1103	630-0103-000	CARBON FILM, 47K OHM, 1/4 W, 5%
R1104	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1105	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R1106	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R1107	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1108	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1109	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1110	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1111	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1112	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1113	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1114	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1115	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1116	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1117	630-0039-000	CARBON FILM, 100 OHM, 1/4 W, 5%
R1118	630-0039-000	CARBON FILM, 100 OHM, 1/4 W, 5%
R1119	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1120	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1121	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R1122	630-0135-000	CARBON FILM, 1M OHM, 1/4 W, 5%
R1123	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1124	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1125	630-0081-000	CARBON FILM, 5.6K OHM, 1/4 W, 5%
R1126	630-0087-000	CARBON FILM, 10K OHM, 1/4 W, 5%
R1127	630-0085-000	CARBON FILM, 8.2K OHM, 1/4 W, 5%
R1128	630-0072-000	CARBON FILM, 2.4K OHM, 1/4 W, 5%
R1129	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1130	630-0073-000	CARBON FILM, 2.7K OHM, 1/4 W, 5%
R1131	636-0031-000	POTENTIOMETER, 20K OHM, MULTI-TURN, 3006P-1-203
R1132	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1133	630-0067-000	CARBON FILM, 1.5K OHM, 1/4 W, 5%
R1134	630-0079-000	CARBON FILM, 4.7K OHM, 1/4 W, 5%
R1135	630-0039-000	CARBON FILM, 100 OHM, 1/4 W, 5%
R1136	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%
R1137	630-0131-000	CARBON FILM, 680K OHM, 1/4 W, 5%
R1138	630-0111-000	CARBON FILM, 100K OHM, 1/4 W, 5%

DIODES

CR1101	575-0031-000	SMALL SIGNAL [1N4448]
CR1102	575-0031-000	SMALL SIGNAL [1N4448]
CR1103	575-0031-000	SMALL SIGNAL [1N4448]
CR1104	575-0031-000	SMALL SIGNAL [1N4448]
CR1105	575-0031-000	SMALL SIGNAL [1N4448]
CR1106	575-0031-000	SMALL SIGNAL [1N4448]
CR1107	575-0031-000	SMALL SIGNAL [1N4448]
CR1108	575-0031-000	SMALL SIGNAL [1N4448]

SEMICONDUCTORS

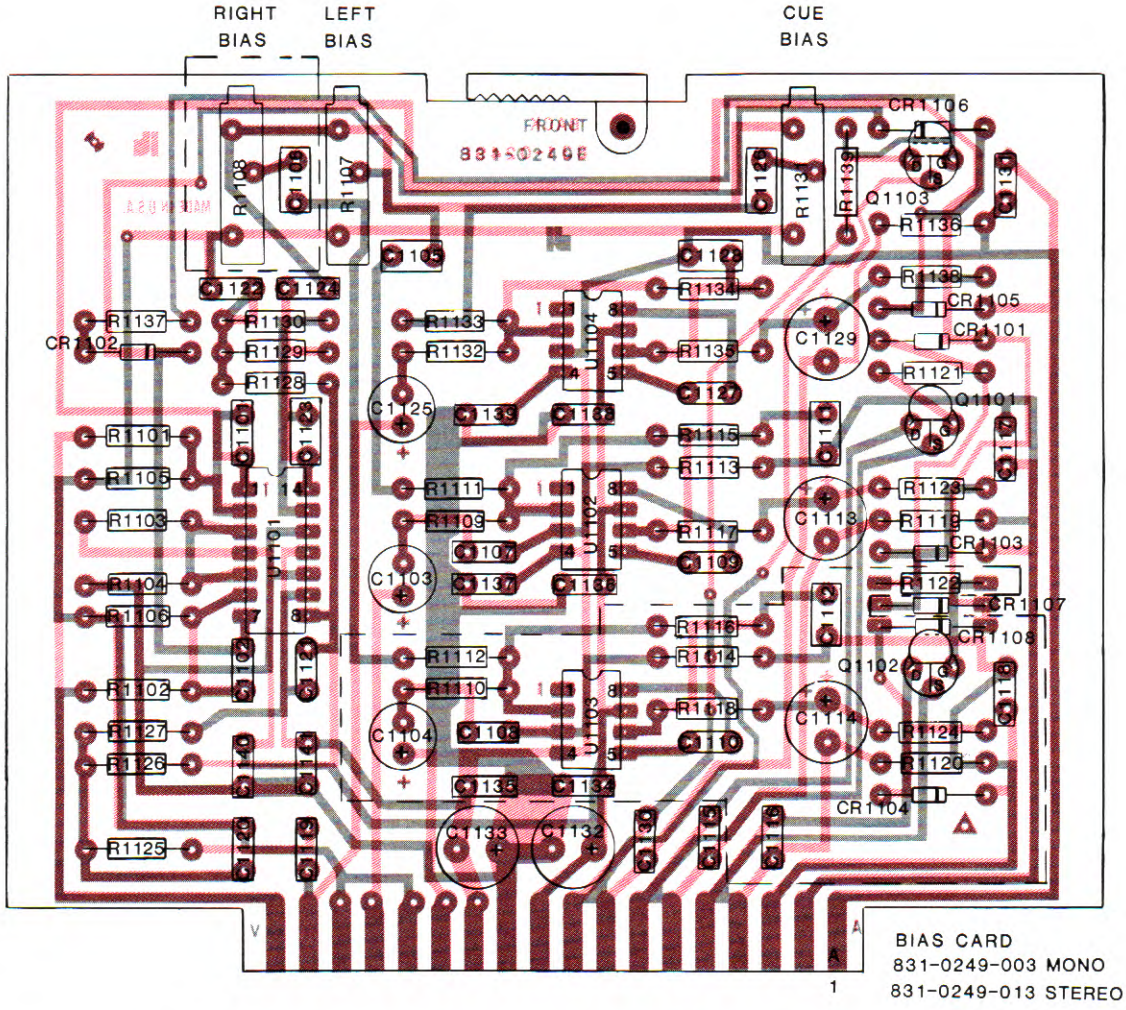
Q1101	596-0004-010	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
Q1102	596-0004-010	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
Q1103	596-0004-010	TRANSISTOR, MPF 4391, J-FET, N-CHANNEL
U1101	606-0016-000	IC, TL074CP, QUAD BI-FET OP AMP
U1102	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP
U1103	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP
U1104	606-0023-000	IC, NE5534N, SINGLE AUDIO OP AMP

SOCKETS

Q1101	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q1102	613-0004-001	PAD, TRANSISTOR, #7717-137N
Q1103	613-0004-001	PAD, TRANSISTOR, #7717-137N
U1101	613-0008-000	SOCKET, IC, 14 PIN, DIP
U1102	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1103	613-0007-000	SOCKET, IC, 8 PIN, DIP
U1104	613-0007-000	SOCKET, IC, 8 PIN, DIP

MISCELLANEOUS

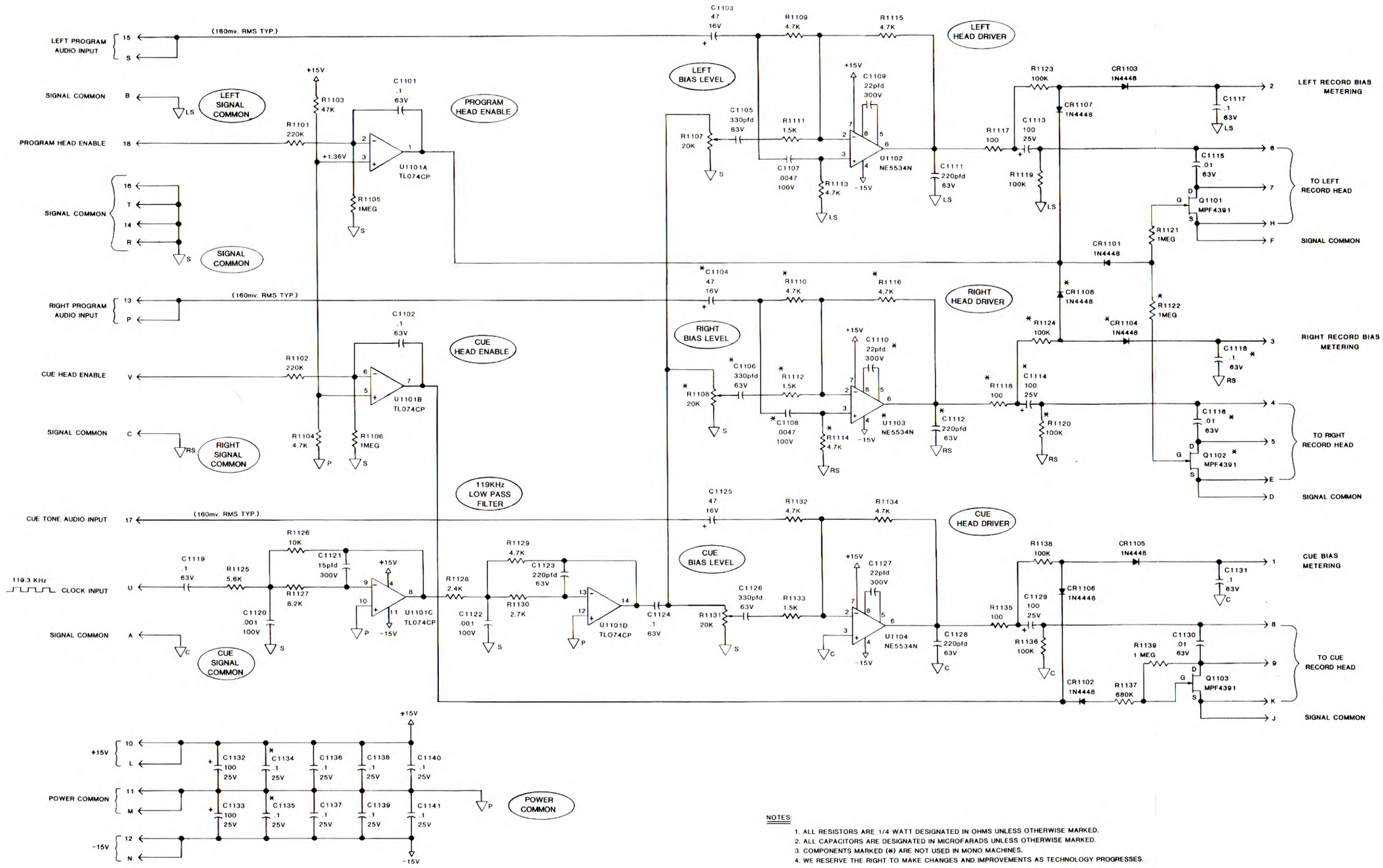
325-0249-003	PCB, BIAS
323-0003-001	CARD PULL, DELTAS
282-0046-000	PIN, ROLL, 1/16 X 3/16



COMPONENTS WITHIN DASHED LINED AREAS
NOT USED IN MONO MACHINES.

FIGURE 5-27

831-0249
DELTA IV BIAS AMPLIFIER PCB OVERLAY



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 5-28

831-0249
(9/85) DELTA IV BIAS AMPLIFIER PCB SCHEMATIC

DELTA IV MOTHERBOARD 831-0304
PARTS LIST

DIV MOTHER BOARD
(Assembly #831-0304-013)

CONNECTORS & SOCKETS

J3	380-0167-000	CONNECTOR, 15 PIN D-SUBMINIATURE, PC MT.
J4	380-0145-000	CONNECTOR, 24 PIN, W/LOCKING BAIL
J1401	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER T
J1402	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER T
J1403	380-0143-000	CONNECTOR, PC CARD EDGE, DUAL 18, 0.156, SOLDER T
J1408	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J1409	380-0062-000	SOCKET, 3 PIN, 10-18-2031
J1410	380-0062-000	SOCKET, 3 PIN, 10-18-2031
P1404	376-0057-000	WAFER, 16 POS., LOCKING, #22-27-2161
P1405	376-0058-000	WAFER, 6 POS., LOCKING, #22-27-2061
P1406	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031
P1407	376-0033-000	WAFER, 3 POS., LOCKING, GOLD, #22-29-2031

VOLTAGE REGULATORS (Mounted on Center Support Plate)

VR1401	605-0012-000	MC7805CT, +5V, TO220 PLASTIC
VR1402	605-0010-000	MC7815CT, +15V, TO220 PLASTIC
VR1403	605-0011-000	MC7915CT, -15V, TO220 PLASTIC
3	613-0041-000	INSULATOR, THERMALLOY, TO-220
3	352-0004-000	SCREW, 6-32 X 1/4, NYLON, SLOTTED, R. HD.

CAPACITORS

C1401	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1402	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1403	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1404	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1405	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1406	680-3163-033	POLYESTER FILM, .33 ufd, 63V, 5%
C1407	698-0016-000	ALUMINUM ELECTROLYTIC, 2200 ufd, 35V
C1408	698-0016-000	ALUMINUM ELECTROLYTIC, 2200 ufd, 35V
C1409	698-0018-000	ALUMINUM ELECTROLYTIC, 3300 ufd, 16V
C1410	677-0003-000	SILVER MICA, 300 pfd, 300V
C1411	677-0003-000	SILVER MICA, 300 pfd, 300V

DIODES

CR1401	575-0007-000	1N4005
CR1402	575-0007-000	1N4005
CR1403	575-0007-000	1N4005

RESISTORS

R1401	630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R1402	630-0043-000	CARBON FILM, 150 OHM, 1/4 W, 5%
R1403	630-0058-000	CARBON FILM, 620 OHM, 1/4 W, 5%
R1404	630-0058-000	CARBON FILM, 620 OHM, 1/4 W, 5%
R1405	630-0080-000	CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1406	630-0080-000	CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1407	630-0080-000	CARBON FILM, 5.1K OHM, 1/4 W, 5%
R1408	630-0080-000	CARBON FILM, 5.1K OHM, 1/4 W, 5%

TRANSFORMERS

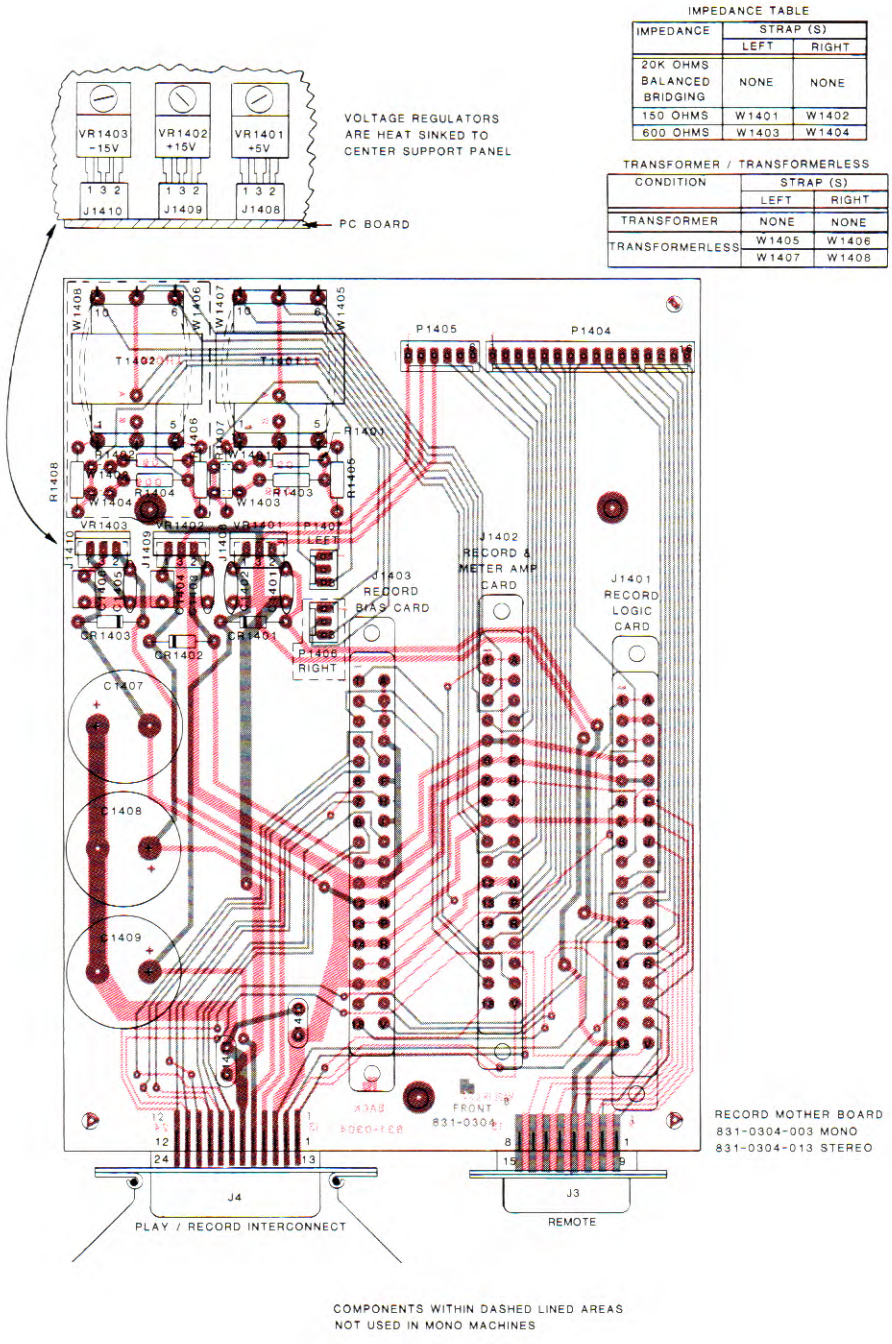
T1401	532-0010-000	AUDIO INPUT, AM10226
T1402	532-0010-000	AUDIO INPUT, AM10226

STRAPPING

W1401	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1402	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1403	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1404	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1405	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1406	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1407	427-0003-000	BUS WIRE, SOLID, #22 AWG
W1408	427-0003-000	BUS WIRE, SOLID, #22 AWG

MISCELLANEOUS

	325-0304-013	PCB, MOTHER, DIV



IMPEDANCE TABLE

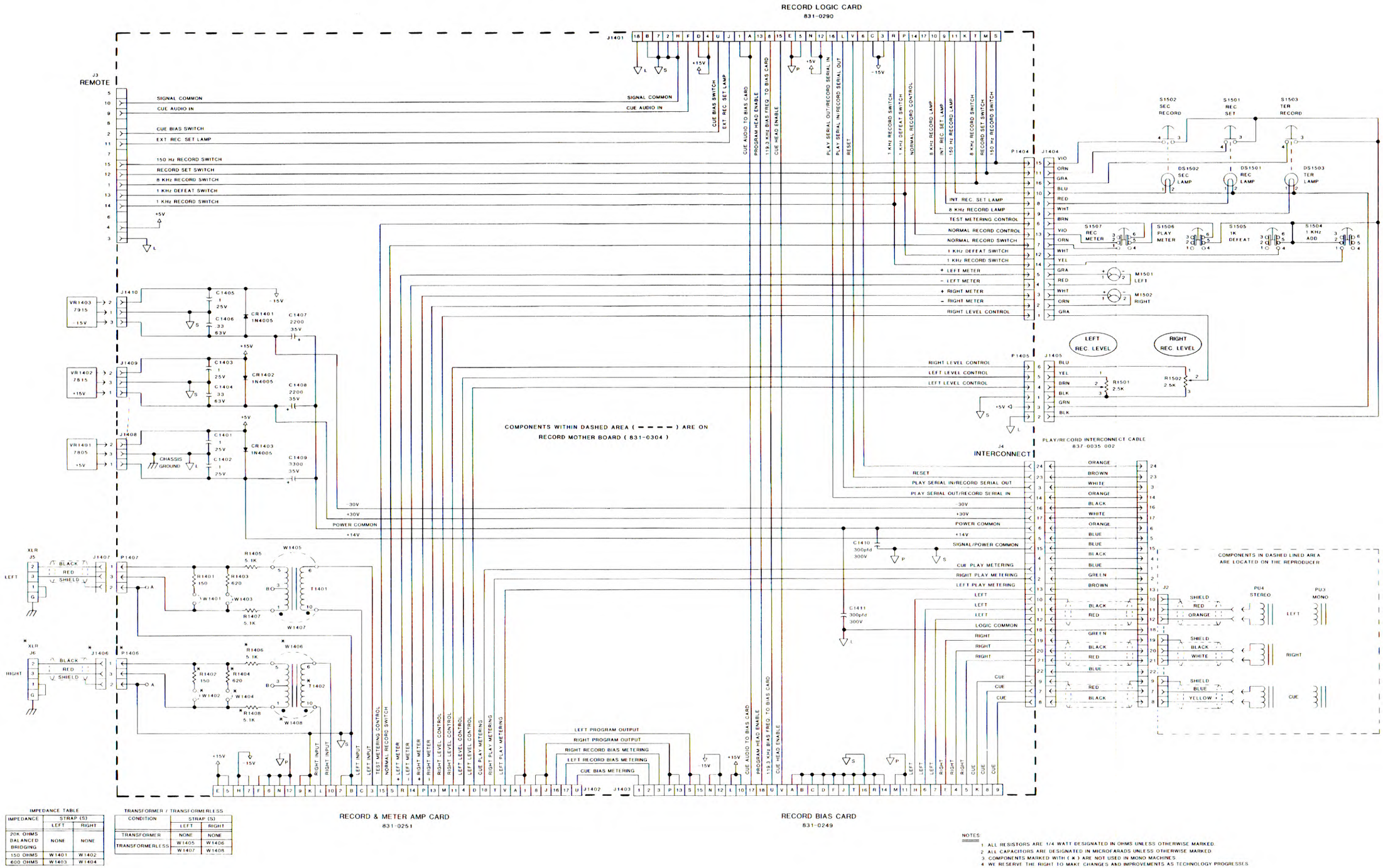
IMPEDANCE	STRAP (S)	
	LEFT	RIGHT
20K OHMS BALANCED BRIDGING	NONE	NONE
150 OHMS	W1401	W1402
600 OHMS	W1403	W1404

TRANSFORMER / TRANSFORMERLESS

CONDITION	STRAP (S)	
	LEFT	RIGHT
TRANSFORMER	NONE	NONE
TRANSFORMERLESS	W1405	W1406
	W1407	W1408

FIGURE 5-29

831-0304
DELTA IV MOTHERBOARD
OVERLAY



IMPEDANCE TABLE

IMPEDANCE	STRAP (S)	
	LEFT	RIGHT
20K OHMS BALANCED BRIDGING	NONE	NONE
150 OHMS	W1401	W1402
600 OHMS	W1403	W1404

TRANSFORMER / TRANSFORMERLESS

CONDITION	STRAP (S)	
	LEFT	RIGHT
TRANSFORMER	NONE	NONE
TRANSFORMERLESS	W1405	W1406
	W1407	W1408

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

FIGURE 5-30

831-0304
DELTA IV MOTHERBOARD
SCHEMATIC

SECTION VI · MECHANICAL PARTS LISTS

DELTA I/II MECHANICAL PARTS LIST

SERVO MOTOR

Part Number		Description
832-1006-010		Assembly, Servo Motor w/Controller
455-0006-073		Motor, Servo, 10mm Shaft
350-0404-000	(2)	Screw, 4-40 x 1/4 Phil. Pan ZP
831-0270-003		PCB Assembly, Motor Control
837-0079-002		Cable, Motor Control Interconnect DI/II
353-1018-000	(2)	Screw, 10-32 x 3/4 Button Hd., Socket, Black

SIDE PANELS

272-0034-012		Guide, LH Cart Hold-Down, Anodized
301-0050-001	(2)	Cartridge Guide Spring
281-0106-023		LH Side Panel, DI/II/IV, Coated
350-0427-000	(2)	Screw, 4-40 x 3/16 Phil. Flat Hd. 100 Deg.
281-0126-023		RH Side Panel, DI/II/IV, Coated
350-0612-000	(2)	Screw, 6-32 x 7/16 Phil. Pan ZP
350-0624-000		Screw, 6-32 x 5/16 Phil. Fillister ZP
301-0058-001		Spring, Solenoid Return, Cad. Plate
353-0603-000	(12)	Screw, 6-32 x 1/4 Button Hd., Socket, Black
441-0003-000		Tubing, Shrinkable, 1/8" White

Note: RH Cart Guide & Spring Are Part Of The Deck Assembly.

837-0078-002		Cable, Audio Output Interconnect DI/II

DECK

254-0097-001		Bracket, Microswitch Mtg.
350-0604-000	(4)	Screw, 6-32 x 1/4 Phil. Pan ZP
392-0009-000		Switch, Snap-Action, Simulated Roller
350-0205-000	(2)	Screw, 2-56 x 3/8 Phil. Pan ZP
370-0201-000	(2)	Nut, Hex, 3/16 x 2-56 x 1/16 ZP
350-0620-000	(2)	Screw, 6-32 x 1/4 Phil. Truss ZP
297-0043-003	(2)	Shield, Bottom Deck, 8/10 mm
272-0033-012		Guide, RH Cart Hold-Down, Anodized
301-0050-001		Cartridge Guide Spring
267-0029-024		Deck, Anodized, DI
267-0027-024		Deck, Anodized, DII
251-0001-051	(2)	Bearing, Sleeve .377 x .3135 x 1/4
296-0046-001		Cross Shaft, Deck DI/II/III
297-0009-001		Shield, Lower Head
262-0023-012		Clamp, Cross Shaft
359-0037-001		Washer, Mylar .315 ID x 1/2 OD x .003 THK
359-0037-011		Washer, Mylar .315 ID x 1/2 OD x .004 THK
359-0037-021		Washer, Mylar .315 ID x 1/2 OD x .005 THK
359-0037-031		Washer, Mylar .315 ID x 1/2 OD x .007 THK
282-0041-000		Roll Pin 1/16 x 3/8
296-0004-001		Shaft, Pressure Roller
353-0603-000		Screw, 6-32 x 1/4 Button Hd., Socket

PRESSURE ROLLER ASSEMBLY

359-0006-001		Washer, Nylon .480 OD x .193 ID x .010 Thk
291-0018-001		Roller, Pressure
360-1005-010		Washer, Pressure Roller Shaft, Nickel Plate
289-0002-000		Ring, Retainer, "E" Shaft, Steel
300-0098-001		Spacer, Head Shield
297-0034-001		Shield, Upper Head
350-0606-000		Screw, 6-32 x 5/16 Phil. Flat Hd. 100 Degree

FRONT PANEL

630-0043-000	(2)	Resistor, 150 Ohm, 1/4 w, 5%
686-0009-000	(2)	Capacitor, Ceramic Disc, .1 ufd, 25V
281-0099-024		DI Front Panel, Coated
281-0114-024		DII Front Panel, Coated
282-0010-011		Dowel Pin 1/8 x 5/8
328-0016-001		Inlay, Bottom Front Panel, Polycarbonate DI
328-0025-002		Inlay, Bottom Front Panel, Polycarbonate DII
280-0044-002		Nameplate, Logo
328-0017-001		Inlay, Top Front Panel, Polycarbonate DI/DII
328-0024-001		Inlay, Top Left Front Panel, DII
364-0002-000		Nameplate Retainer
832-1001-040		Switch Assembly, Yellow
391-0023-000		Switch, Pushbutton
415-0013-000		Lamp, Miniature, 5V
404-0059-011		Lens, Yellow, Dimpled
832-1001-050		Switch Assembly, Green
391-0023-000		Switch, Pushbutton
415-0013-000		Lamp, Miniature, 5V
404-0060-000		Lens, Green
832-1001-060		Switch Assembly, Blue
391-0023-000		Switch, Pushbutton
415-0013-000		Lamp, Miniature, 5V
404-0062-000		Lens, Blue
837-0077-003		Cable Harness, DI/II Switch Assembly

CENTER PLATE & SOLENOID

283-0092-013		Plate, Center Support, DI
283-0089-014		Plate, Center Support, DII
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
350-0624-000	(2)	Screw, 6-32 x 5/16 Phil. Fillister Hd.
352-0004-000	(3)	Screw, Nylon 6-32 x 1/4 Slotted Round Hd.
605-0010-000		Regulator, 7815CT
605-0011-000		Regulator, 7915CT
605-0012-000		Regulator, MC78T05CT
613-0041-000	(3)	Insulator, Thermally, TO220
477-0025-002	117V	Solenoid, Bottoming 117V
477-0026-002	240V	Solenoid, Bottoming 240V
441-0034-000		Tubing, Teflon #10 Lightweight
380-0147-000		Housing, 3 Pos. MTA-156
443-0004-000		Cable Tie
382-0104-000		Housing For 3-Pin MTA

CLEVIS/SOLENOID

832-1003-000		Clevis Assembly
837-0023-011		Solenoid Chain Assembly
277-0001-001		Chain, Solenoid Linkage, 19 Links
301-0036-000		Spring, Extension
264-0001-001		Screw, Clevis - Solenoid Linkage
282-0001-001		Pin, Spring 1/16 x 5/16 Black
370-1001-000		Nut, Hex 10-32 x 3/8 ZP

TRANSFORMER

283-0095-013		Plate, Toroid Mounting
344-0501-000		Screw, M5 x 40 mm, Phil. Flat Hd. 90 Degree
832-1660-090		Toroid Transformer Assembly w/Connectors
380-0153-000		Housing, 5 Pin MTA-156
380-0164-000		Housing, 6-Pin MTA-156
382-0105-000		Cover for 5-Pin MTA
382-0110-000		Cover For 6-Pin MTA
526-0023-004		Transformer, Toroid, Shielded

REAR PANEL

417-0012-000	117V	Fuse, Cartridge, 3AG, .75 Amp 125V Time-Delay
418-0006-000	117V	Fuse Carrier, 3AG, Grey
417-0018-000	240V	Fuse, Cartridge, 5mm x 20mm, 400 mA 250V Slo-Blo
418-0007-000	240V	Fuse Carrier, 5mm x 20mm Black
350-0406-000	(4)	Screw, 4-40 x 1/4 Phil. Flat Hd., 82 Degree
281-0123-013		Panel, DI Rear
281-0117-024		Panel, DII Rear
328-0028-003		Inlay, DI Rear Panel
328-0029-004		Inlay, DII Rear Panel
418-0005-000		Fuse Holder, Low-Profile
539-0003-000		Filter, RFI, Compact, w/IEC Connector Package
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
370-0402-000		Nut, Hex 4-40 x 1/4 ZP
375-0003-000		Terminal, #4, Bent, Locking ZP
352-0004-000		Screw, Nylon 6-32 x 1/4 Slotted Round Hd.
590-0033-000		Transistor, Power, NPN, TIP50
613-0041-000		Insulator, Thermally, TO220
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
350-0434-001		Screw, Cover Latch
360-0405-000		Washer, #4 x 5/8 OD x .062, Flat Steel
301-0055-000		Spring, Compression .180 OD x 1/2 LG x .022
370-0402-000		Nut, Hex 4-40 x 1/4 ZP

HEADS/CABLES

504-0037-002	Head, STEREO Record
504-0041-002	Head, STEREO Play
504-0033-002	Head, MONO Record
504-0036-002	Head, MONO Play
504-0001-000	Head, "Dummy" (Play Only units)
837-0039-002	Cable, Audio Head, Left (MONO)
837-0040-002	Cable, Audio Head, Right
837-0041-002	Cable, Audio Head, CUE
837-0042-002	Cable, Record Head, Left (MONO)
837-0043-002	Cable, Record Head, Right
837-0044-002	Cable, Record Head, CUE

HEAD BLOCK ASSEMBLY

300-0098-001		Spacer, Head Shield
350-0644-000	(3)	Screw, 6-32 x 1 Phil. Fillister Hd.
350-0649-000		Screw, 6-32 x 1 1/8 Phil. Flat Hd. 100 Degree
270-0010-013		Frame, Head Block Support
301-0054-000	(6)	Spring, .041 Wire x .439 Long 14 lbs. Ext.
282-0045-000	(6)	Roll Pin, 5/64 Dia. x 1 3/8 Long, Black
272-0038-012		Tape Guide, LH
272-0039-012		Tape Guide, RH
272-0039-012		Tape Guide, Center
303-0001-001	(2)	Strap, Head Mounting
350-0308-000	(4)	Screw, 3-48 x 5/8 Phil. Pan Hd.
350-0403-000	(6)	Screw, 4-40 x 3/16 Phil. Pan Hd.
355-0813-000	(4)	Screw, 8-32 x 1/2 Socket Set, Cone Point
355-0814-000	(2)	Screw, 8-32 x 1/2 Socket Set, Oval Point
370-0801-000	(6)	Nut, Hex 8-32 x 1/4 x 3/32 Thk.
253-0088-013		Block, Head Mounting, RH
282-0031-000		Roll Pin, 1/8 x 1
253-0089-013		Block, Head Mounting, LH
282-0031-000		Roll Pin, 1/8 x 1

COVERS

265-0061-003		Cover, Bottom, DI
265-0068-004		Cover, Bottom, DII
311-0039-000	(4)	Feet, Rubber, Medium, Black
350-0608-000	(4)	Screw, 6-32 x 3/8 Phil. Pan Hd. ZP
370-0602-000	(4)	Nut, KEPS, 6-32 x 1/4, Small OD, Steel ZP
265-0062-002		Cover, Top, DI
265-0067-003		Cover, Top, DII
328-0010-002	(2)	Inlay, RH & LH Side
353-0402-000	(3)	Screw, 4-40 x 3/16 Button Hd., Socket Cap

EXTERNAL CONNECTORS/MISCELLANEOUS

378-0019-000		Plug, 3 Pin Female
378-0062-000		Plug, 15 Pin D-Subminature
382-0108-000		Housing, Cable Clamp & Pin Connector
433-0004-000	117V	Cord, Line
433-0005-000	240V	Cord, Line
890-0028-020		Technical Manual

DELTA III MECHANICAL PARTS LIST

SERVO MOTOR

Part Number		Description
832-1352-020		Assembly, Servo Motor w/Controller
382-0102-000		Cover, For 10 Pin MTA
297-0030-002		Shield, Motor, DIII
350-0404-000	(4)	Screw, 4-40 x 1/4 Button Hd., Socket Cap
455-0005-044		Motor, Servo, 10mm Shaft
831-0270-003		PCB Assembly, Motor Control
353-1018-000		Screw, 10-32 x 3/4 Button Hd., Socket Cap

FRONT PANEL/BRACES

304-0021-022		Support, Front Top
328-0019-001		Inlay, Front Top Support
353-0604-000	(2)	Screw, 6-32 x 3/8 Button Hd., Socket Cap
280-0044-002		Nameplate, Logo
281-0101-022		Panel, Front, DIII
328-0018-001		Inlay, Front Panel, Polycarbonate
364-0002-000		Retainer, .187 Stud x .50 Long x .38 Wide x .017 Thk
353-0604-000	(2)	Screw, 6-32 x 3/8 Button Hd., Socket Cap
281-0109-024		Panel, Side RH
353-0604-000	(12)	Screw, 6-32 x 3/8 Button Hd., Socket Cap

PRESSURE ROLLER ASSEMBLY

289-0002-000	(3)	Ring, Retainer, "E" Shaft, Steel
291-0018-001	(3)	Roller, Pressure
359-0006-001	(3)	Washer, Nylon, .480 OD x .193 ID x .010 Thk.
360-1005-010	(3)	Washer, Pressure Roller Shaft, Nickel Plate

DECK

350-0819-000		Screw, 8-32 x 6 Slotted Round Hd., 1 1/2 Thread
350-0404-000	(2)	Screw, 4-40 x 1/4 Phil. Pan Hd. ZP
353-0604-000	(2)	Screw, 6-32 x 3/8 Button Hd., Socket
443-0005-000	(7)	Cable Tie, 4"
443-0022-000	(2)	Mount, Adhesive, 4-Way

-NOTE: EACH OF THE FOLLOWING IS QUANTITY PER DECK:-

251-0001-051	(2)	Bearing, Sleeve .377 x .3135 x 1/4
262-0023-012		Clamp, Cross Shaft
267-0026-024		Deck, Anodized, DIII
282-0041-000		Roll Pin, 1/16 x 3/8
296-0004-001		Shaft, Pressure Roller
296-0046-001		Cross Shaft, Deck DI/II/III
297-0029-001		Shield, Lower Head
359-0037-001		Washer, Mylar .315 ID x 1/2 OD x .003 Thk
359-0037-011		Washer, Mylar .315 ID x 1/2 OD x .004 Thk
359-0037-021		Washer, Mylar .315 ID x 1/2 OD x .005 Thk
359-0037-031		Washer, Mylar .315 ID x 1/2 OD x .007 Thk
272-0033-012		Guide, RH Cart Hold-Down, Anodized
301-0050-001		Spring, Cartridge Guide
350-0062-000	(2)	Screw, 6-32 x 1/4 Phil. Truss Hd. ZP
254-0097-001		Bracket, Microswitch Mtg.
350-0205-000	(2)	Screw, 2-56 x 3/8 Phil. Pan Hd. ZP
350-0604-000	(2)	Screw, 6-32 x 1/4 Phil. Pan Hd. ZP
370-0201-000	(2)	Nut, Hex 3/16 x 2-56 x 1/16 ZP
392-0009-000		Switch, Snap-Action, Simulated Roller
254-0099-011		Bracket, Solenoid Mtg.
301-0058-001		Spring, Solenoid Return
350-0610-000	(2)	Screw, 6-32 x 3/8 Phil. Flat Hd. 82 Degree
350-0624-000	(2)	Screw, 6-32 x 5/16 Phil. Fillister Hd. ZP
365-0601-000	(2)	Lockwasher, #6 Internal Tooth ZP

SOLENOID/CLEVIS

477-0025-002	117V	Solenoid, Bottoming
477-0026-002	240V	Solenoid, Bottoming
832-1003-000		Clevis Assembly
264-0001-001		Clevis Screw, Solenoid Linkage
837-0023-011		Solenoid Chain Assembly, 19 Links
282-0001-001		Pin, Spring 1/16 x 5/16 Black
370-1001-000		Nut, Hex 10-32 x 3/8 ZP

DECK FRONT PANEL/SWITCHES

281-0107-023		Panel, Front Deck, Black Anodized
441-0011-000		Tubing, Teflon #8
630-0043-000	(2)	Resistor, Carbon Film, 150 Ohm, 1/4 w, 5%
686-0009-000	(2)	Capacitor, Ceramic Disc, .1 ufd, 25V
391-0023-000		Switch, Push
415-0013-000		Lamp, Miniature, 5V
404-0059-011		Lens, Yellow, Dimpled
391-0023-000		Switch, Push
415-0013-000		Lamp, Miniature, 5V
404-0060-000		Lens, Green

-END QUANTITY PER DECK-

HEADS/CABLES

504-0001-000	(2)	Head, "Dummy" (Qty. 3 on Playback Only Units)
504-0037-002		Head, STEREO Record
504-0041-002	(3)	Head, STEREO Play
504-0033-002	(3)	Head, MONO Play
837-0049-002	(3)	Cable, Head to Deck, LEFT- Red/Orange
837-0050-002	(3)	Cable, Head to Deck, RIGHT- Black/White
837-0051-002	(3)	Cable, Head to Deck, CUE- Yellow/Blue
		(Note: Add one of each cable if Deck C is a Record/Play dec

HEAD BLOCK ASSEMBLY

-NOTE: EACH OF THE FOLLOWING IS QUANTITY PER DECK-

300-0098-001	(2)	Spacer, Head Shield
350-0606-000		Screw, 6-32 x 5/16 Phil. Flat Hd. ZP
350-0614-000		Screw, 6-32 x 7/8 Phil. Pan Hd. ZP
350-0637-000	(2)	Screw, 6-32 x 1 Phil. Pan Hd. ZP
350-0649-000		Screw, 6-32 x 1 1/8 Phil. Flat Hd. 100 Degree ZP
270-0010-013		Frame, Head Block Support
301-0054-000	(4)	Spring, .041 Wire x .439 Long, 14 lbs. Extension
282-0045-000	(4)	Roll Pin, 5/64 x 1 3/8, Black
272-0038-012		Tape Guide, LH
272-0039-012	(2)	Tape Guide, RH & Center
303-0001-001	(2)	Strap, Head Mtg.
350-0308-000	(4)	Screw, 3-48 x 5/8 Phil. Pan Hd. ZP
350-0403-000	(6)	Screw, 4-40 x 3/16 Phil. Pan Hd. ZP
355-0813-000	(4)	Screw, 8-32 x 1/2 Socket Set, Cone Point
355-0814-000	(2)	Screw, 8-32 x 1/2 Socket Set, Oval Ponit
370-0801-000	(6)	Nut, Hex 8-32 x 1/4 x 3/32

253-0088-013		Block, Head Mtg., RH
282-0031-000		Roll Pin, 1/8 x 1
253-0089-013		Block, Head Mtg., LH
282-0031-000		Roll Pin, 1/8 x 1

-END QUANTITY PER DECK-

CENTER PLATE + HARNESSES

433-0005-000	(6)	Cable Tie, 4"
283-0085-013		Plate, Center Mtg.
300-0099-000	(2)	Spacer, 6-32 x 1/4 x 1/4 Hex, Male/Female
352-0004-000	(3)	Screw, Nylon 6-32 x 1/4 Slotted Round Hd.
355-1008-000	(3)	Screw, 10-32 x 1/2 Socket Set, Cup Point w/Nylock Inser
605-0010-000		Regulator, 7815CT
605-0011-000		Regulator, 7915CT
605-0012-000		Regulator, MC78T05CT
613-0041-000	(3)	Insulator, Thermally, TO220
353-0604-000	(3)	Screw, 6-32 x 3/8 Button Hd., Socket
350-0205-000	(6)	Screw, 2-56 x 3/8 Phil. Pan Hd. ZP
698-0011-000	(2)	Capacitor, Aluminum Electrolytic, 6800 ufd, 35V
698-0014-000	(3)	Capacitor, Aluminum Electrolytic, 220 ufd, 400V
698-0015-000		Capacitor, Aluminum Electrolytic, 15000 ufd, 6V
350-0624-000	(10)	Screw, 6-32 x 5/16 Phil. Filliater Hd. ZP
375-0003-000	(2)	Terminal, #4, Bent, Locking ZP
382-0011-000	(16)	Pin, Female, Transformer
441-0029-010	(16)	Tubing, Shrink, White
837-0048-002		Solenoid Cable, Deck A, Black/White 14 1/2"
837-0048-012		Solenoid Cable, Deck B, Black/White 12"
837-0048-022		Solenoid Cable, Deck C, Black/White 11"
380-0134-000		Connector, 24 Pin w/Lock, Female
837-0058-002		Cable, Record Input
837-0059-002		Cable, Record Input
837-0060-002		Cable, Record Input
378-0059-000		Plug, D-Subminiature, 15 Pin, Male
837-0045-002		Cable, LEFT, Amp to Deck A, Red/Orange
837-0046-002		Cable, RIGHT, Amp to Deck A, Black/White
837-0047-002		Cable, CUE, Amp to Deck A, Blue/Yellow
378-0059-000		Plug, D-Subminiature, 15 Pin, Male
837-0045-012		Cable, LEFT, Amp to Deck B & C, Red/Orange
837-0046-012		Cable, RIGHT, Amp to Deck B & C, Black/White
837-0047-012		Cable, CUE, Amp to Deck B & C, Blue/Yellow

INTERNAL CHASSIS/FAN/TRANSFORMER

272-0035-013		PCB Guide, Top
272-0036-013		PCB Guide, Center
344-0301-000	(4)	Screw, 3mm x 10mm Slotted Pan Hd.
352-0004-000	(3)	Screw, Nylon 6-32 x 1/4 Slotted Round Hd.
463-0005-000		Fan, Miniature Cooling, 12VDC
590-0033-000	(3)	Transistor, Power, NPN TIP50
613-0041-000	(3)	Insulator, Thermally, TO220
272-0041-013		PCB Guide, Bottom
295-0005-000		Disc, Toroid Mtg.
350-1041-000		Screw, 10-32 x 1 3/4 Slotted Pan Hd., Stainless Steel
359-0034-000	(2)	Pad, Rubber, 89mm (For Toroid)
526-0021-003		Transformer, Toroidal, Power
353-0604-000	(6)	Screw, 6-32 x 3/8 Button Hd., Socket
261-0028-002		Chassis, DIII Inner
350-0417-000	(4)	Screw, 4-40 x 5/8 Phil. Pan Hd. ZP
370-0403-000	(4)	Nut, KEPS 4-40 x 1/4, Hex ZP

LH SIDE PANEL/CART GUIDES

281-0108-024		Panel, LH Side

-NOTE: EACH OF THE FOLLOWING IS QUANTITY PER DECK-

272-0034-012		Guide, LH Cart Hold-Down
301-0050-001	(4)	Spring, Cartridge Guide
350-0427-000	(6)	Screw, 4-40 x 3/16 Phil. Flat Hd. 100 Degree ZP
301-0055-000		Spring, Compression .180 OD x 1/2 Long x .022 Music Wir
350-0434-001		Screw, Cover Latch
360-0406-000		Washer, #4 x 1/2 OD x .062 Flat, Steel ZP
370-0402-000		Nut, Hex 4-40 x 1/4 ZP

-END QUANTITY PER DECK-

REAR PANEL

417-0009-000	117V	Fuse, Cartridge, 3AG, 1.5 Amp 125V Time-Delay
417-0014-000	240V	Fuse, Cartridge, 5mm x 20mm, 800 mA 250V Slo-Blo
418-0006-000	117V	Fuse Carrier, 3AG Grey
418-0007-000	240V	Fuse Carrier, 5mm x 20mm Black
281-0130-013		Panel, Rear
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
370-0403-000	(2)	Nut, KEPS 4-40 x 1/4 Hex ZP
375-0003-000		Terminal, #4, Bent, Locking ZP
418-0005-000		Fuse Holder, Low-Profile
428-0009-000		Wire, Hookup, Brown
428-0048-000		Wire, Hookup, 22 AWG Green/Yellow
441-0004-010	(4)	Tubing, Shrink 3/16 x 3/4 Black
441-0020-000		Tubing, Teflon #14, Very Thin Wall
539-0003-000		Filter, Compact RFI w/IEC Connector Package
297-0039-002		Shield, High Voltage (For Power Components PCB)
300-0101-000		Spacer, Nylon, Self-Locking, PCB Support 1"
300-0102-000		Spacer, Nylon, #6 x 1/4 OD x 1
350-0615-000		Screw, 6-32 x 1 3/8 Phil. Pan Hd. ZP
350-0205-000	(2)	Screw, 2-56 x 3/8 Phil. Pan Hd. ZP
370-0201-000	(2)	Nut, Hex 3/16 x 2-56 x 1/16 ZP
441-0004-010	(2)	Tubing, Shrink 3/16 x 3/4 Black
350-0433-000	(3)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
281-0103-012		Panel, Rear X.L.R. Connector
350-0411-000	(12)	Screw, 4-40 x 3/8 Phil. Flat Hd. 82 Degree ZP
370-0403-000	(12)	Nut, KEPS 4-40 x 1/4 Hex ZP
272-0040-001		Guide, Fan Adjust

COVERS

265-0064-003		Cover, Bottom
311-0039-000	(4)	Feet, Rubber, Medium, Black
350-0611-000	(4)	Screw, 6-32 x 1/2 Phil. Pan Hd ZP
353-0402-000	(3)	Screw, 4-40 x 3/16 Button Hd., Socket Cap, Black
360-0606-011	(4)	Washer, (For Feet), .75 OD x .187 ID x .16 Thk
370-0602-000	(4)	Nut, KEPS, 6-32 x 1/4, Small OD, Steel ZP
265-0063-002		Cover, Top
284-0018-000	(3)	Hole Plug, 1/4" Heyco #DP-250
328-0011-003	(2)	Inlay, RH & LH Side Panel
353-0402-000	(4)	Screw, 4-40 x 3/16 Button Hd., Socket Cap, Black
297-0034-001	(3)	Shield, Upper Head
265-0059-012		Cover, Rear PC Card

EXTERNAL CONNECTORS/MISCELLANEOUS

433-0004-000	117V	Cord, Line
433-0005-000	240V	Cord, Line
378-0019-000		Plug, 3 Pin Female
378-0062-000		Plug, 15 Pin D-Subminiature
382-0108-000		Housing, Cable Clamp & Pin Connector
890-0028-020		Technical Manual

DELTA IV MECHANICAL PARTS LIST

SIDE PANELS

281-0136-023		RH Side Panel, DI/II/IV, Coated
353-0603-000	(10)	Screw, 6-32 x 1/4 Button Hd., Socket Cap, Black
281-0106-023		LH Side Panel, DI/II/IV, Coated
300-0099-000	(2)	Spacer, 6-32 x 1/4 x 1/4, Male/Female
350-0403-000		Screw, 4-40 x 3/16 Phil. Pan Hd. ZP

FRONT PANEL

315-0018-002	(2)	Knob, Level Control
372-1102-000	(2)	Nut, Hex, Steel, Locking, 3/8-32, 1/2 x 3/32
636-0044-000	(2)	Potentiometer, 2.5K Ohm, Single-Turn
832-1400-300		DIV Meter Switch Assembly w/Bracket
254-0101-011	(2)	Bracket, Potentiometer Mounting
350-0205-000	(2)	Screw, 2-56 x 3/8 Phil. Pan Hd. ZP
365-0201-000	(2)	Lockwasher, #2 x .035 x .020, Medium Split
370-0201-000	(2)	Nut, Hex 3/16 x 2-56 x 1/16 ZP
391-0025-000		Switch Assembly
254-0103-011	(2)	Bracket, Meter Mounting
350-0426-000	(2)	Screw, 4-40 x 5/16 Internal SEMS, Phil. Pan Hd. ZP
370-0403-000	(2)	Nut, KEPS 4-40 x 1/4, Hex ZP
281-0100-044		Panel, Front, DIV
282-0010-011	(2)	Dowel Pin, 1/8 x 5/8
328-0021-022		Inlay, Bottom Front Panel, DIV
328-0022-001		Inlay, Top Front Panel, DIV
350-0418-000		Screw, 4-40 x 5/8 Phil. Flat Hd. 82 Degree ZP
370-1001-000	(4)	Nut, Hex 10-32 x 3/8 ZP
375-0008-000	(4)	Terminal, #10, Bent, Locking
554-0002-000	(2)	Meter, Modutec
832-1001-020		Switch Assembly, Red
391-0023-000		Switch, Push
404-0061-000		Lens, Red
415-0013-000		Lamp, Miniature, 5V
832-1001-060		Switch Assembly, Blue
391-0023-000		Switch, Push
404-0062-000		Lens, Blue
415-0013-000		Lamp, Miniature, 5V
832-1001-090		Switch Assembly, White
391-0023-000		Switch, Push
404-0063-000		Lens, White
415-0013-000		Lamp, Miniature, 5V

CENTER SUPPORT w/REGULATORS

283-0087-013		Plate, Center Support, DIV
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
352-0004-000	(3)	Screw, Nylon 6-32 x 1/4 Slotted Round Hd.
605-0010-000		Regulator, 7815CT
605-0011-000		Regulator, 7915CT
605-0012-000		Regulator, MC78T05CT
613-0041-000	(3)	Insulator, Thermally, TO220

REAR PANEL

350-0406-000	(4)	Screw, 4-40 x 1/4 Phil. Flat Hd. 82 Degree ZP
837-0082-002	(2)	Cable, Audio Input w/XLR
837-0082-012		Cable, Audio Input w/o XLR
281-0125-013		Panel, Rear, DIV
328-0030-003		Inlay, Rear Panel
304-0026-011		Support, Motherboard
350-0413-000	(2)	Screw, 4-40 x 7/16 Phil. Pan Hd. ZP
301-0055-000		Spring, Compression .180 OD x 1/2 Long x .022 Music Wir
350-0433-000	(2)	Screw, 4-40 x 5/16 Phil. Fillister Hd.
350-0434-001		Screw, Cover Latch
360-0405-000		Washer, #4 x 5/8 OD x .062, Steel, Flat ZP
370-0402-000		Nut, Hex 4-40 x 1/4 ZP

COVERS

265-0061-003		Cover, Bottom, DIV
311-0039-000	(4)	Feet, Rubber, Medium, Black
350-0608-000	(4)	Screw, 6-32 x 3/8 Phil. Pan Hd. ZP
370-0602-000	(4)	Nut, KEPS 6-32 x 1/4, Hex, Small OD, Steel ZP
265-0062-002		Cover, Top, DIV
353-0402-000	(3)	Screw, 4-40 x 3/16 Button Hd. Socket Cap, Black
328-0010-002	(2)	Inlay, RH & LH Side Panel

EXTERNAL CONNECTORS/MISCELLANEOUS

378-0018-000	Plug, 3 Pin Male
284-0012-000	Hole Plug, 5/8" Black
378-0062-000	Plug, 15 Pin D-Subminiature Connector
382-0108-000	Housing, Cable Clamp & Pin Connector
837-0035-002	Cable, Record/Play Interconnect
890-0028-020	Technical Manual (Packed w/Playback Unit on Record/Play packages)

SECTION VII — 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.