

Effective: September 2002

Supersedes I.L. 40-220 dated March 1989

(|) Denotes Change Since Previous Issue

Type LCB II Relay Modules (with DIN Connectors)



Printed circuit modules should not be removed or inserted while the LCB is energized. Failure to observe this precaution can result in an undesired tripping output and/or component damage. In addition, modules should not be interchanged between relays without rechecking calibration.

These instructions contain a brief description, schematic, component location and bill of material for the following LCB Modules:

ALS-1	Analog Logic Power Supply
DTD	Demodulator/Time Delay
MD	Modulator/Demodulator
IFDT-1/2	Audio Dual Tone Interface
IFO-1/2	Fiber Optic Interface
RELAY	Relay Sensing Logic
DTT	Direct Transfer Trip
AXLM	Auxiliary Logic
ARTM-1/2	AR Trip Logic

All integrated circuits used on the modules are sensitive to and can be damaged by the discharge of static electricity. Electrostatic discharge precautions should be observed when handling modules or individual components.

1.0 CONSTRUCTION

The LCB modules are designed for insertions into a 3 rack unit LCB chassis. Module terminations are provided by means of a terminal connector.

Following a tabulation of the module widths and number of connector terminals.

Module Name	Module Location Widths	No. Connector Terminals
ALS-1	2	32
DTD	1	32
MD	1	32
IFDT-1/2	1	32
IFO-1/2	1	32
RELAY	1.75	32
DTT	1	32
AXLM	1	32
ARTM-1/2	3	32

NOTE: 1 module location width equals 1.2 inches.

2.0 MODULE APPLICATION/ DESCRIPTION

2.1 ALS-1 ANALOG LOGIC POWER SUPPLY

The ALS-1 power supply covered in other instructions provides $\pm 15\text{Vdc}$ to power the LCB relay. Units are available for 48, 125 or 250Vdc station batteries. This module is covered by a separate I.L. 41-830.12.

2.2 DTD – DEMODULATOR AND TIME DELAY

The DTD module is used only for 3 terminal line applications and contains a demodulator for the second channel and a channel delay equalization circuit (TD) to compensate for possible different delays in the two channels.

All possible contingencies which may arise during installation, operation or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding this particular installation, operation or maintenance of this equipment, the local ABB Inc. representative should be contacted.

2.3 MD – MODULATOR/DEMODULATOR

The MD module contains both the modulator and demodulator for transmission and detection of the LCB communicated signal.

The modulator generates the 1.7 KHz carrier signal and contains the circuitry to provide the modulation of the carrier signal based on the sequence output voltage from the RELAY module. In turn, the modulated output connects to the channel interface for transmission to the remote terminal.

The demodulator receives its information for the respective channel interface (audio or optical) and reconstructs the remote LCB signal.

2.4 IFDT – AUDIO DUAL TONE INTERFACE

The IFDT module contains the circuitry to provide both the transmit and receive isolated interface with the user's audio tone equipment or equivalent.

The transmitter provides adjustable output for proper coordination with the communication medium.

In the receive portion, input level sensitivity is adjustable and stabilized with an AGC circuit. Detection circuits are employed for high and low level, excessive noise to signal levels, frequency translation and missing cycle periods.

For 3 terminal line applications, two channel interface modules are required.

2.5 IFO – OPTICAL INTERFACE

The IFO module contains the circuitry to provide both the transmit and receive interface to fiber optic cable.

The IFO has various versions depending on transmit power, optical wavelength (850 or 1300 nm) and optical connectors (SMA or ST).

The standard transmitter consists of a fiber optic LED emitter mounted on a bracket extending to the rear of the module.

The High Power Output Transmitter contains a Fiber Optic Edge Emitting LED mounted on the IFO module. The LED assembly has a "PIGTAIL" with the ST connector mating with the bulkhead connector mounted on a bracket.

For the receive portion, a bulkhead connector mounted on

the same bracket as the emitter provides a means for connection of the receive fiber optic cable. From this connector, a larger core fiber connects to a fiber optic PIN photodiode detector in a shielded receiver circuit. Following the detection, the receiver employs an AGC circuit, low level and missing cycle detection.

For 3 terminal line applications, two channel interface modules are required.

2.6 RELAY – RELAY SENSING

The RELAY module contains the circuitry to generate, compare and determine trip for the LCB current differential system relaying quantities. Included are: a sequence network with independent sensitivity selection for positive (P), negative (N) and zero (Z), adjustable system pickup setting (T DIAL), adjustable channel delay equalizer, comparison circuits for the local versus remote quantities, trip detection and channel monitoring functions.

2.7 DTT – DIRECT TRANSFER TRIP

The DTT module is used as an option to provide a direct transfer trip function utilizing the same channel as that employed for normal LCB relaying.

For tripping, the LCB system utilizes the ARTM-2 module, which provides 2 AR relays, with one dedicated for direct transfer trip.

2.8 AXLM – AUXILIARY LOGIC

The AXLM module is used to provide auxiliary logic, timing, indication and input/output features associated with the LCB relay system. Such features include electrical target reset, trip desensitizing on breaker closing, overcurrent trip options on loss of channel(s), and sustained loss of channel monitoring and indication.

2.9 ARTM-1/2 – AR TRIP MODULE

The ARTM-1, single trip, or ARTM-2 double trip (for use with direct transfer trip option), module provides the final AR contact tripping output for the LCB relay system. Block of tripping and indication during the dc power up/down as well as provision for manual reset are also provided on this module.

3.0 MODULE REFERENCE INFORMATION (REFER TO IL 41-830.12)

ALS-1 Module – (Refer to I.L. 41-830.12)
 Style 1615C51: G01 - 48Vdc
 G02 - 125 Vdc
 G03 - 250 Vdc

DTD Module – Style 1609C38G02

Internal Schematic: 1355D47
 Component Location: 1609C38
 Chassis Location: POS. C

MD Module – Style 1609C38G01

Internal Schematic: 1355D39
 Component Location: 1609C38
 Chassis Location: POS. D

IFDT Module – Style 1609C39G01

Internal Schematic: 1355D40
 Component Location: 1609C39
 Chassis Location: POS. F (Channel 1)
 POS. E (Channel 2)

IFO Module (Standard) –

Style 1609C40G01	(850NM/SMA)
Style 1609C40G02	(1300NM/SMA)
Style 1609C40G03	(850NM/ST)
Style 1609C40G04	(1300NM/ST)
Internal Schematic:	1355D41
Component Location:	1499B44
Chassis Location:	POS. F (Channel 1) POS. E (Channel 2)

IFO Module (High Power) –

Style 1609C96G01 (1300NM/ST)	
Internal Schematic:	1355D70
Component Location:	1609C96
Chassis Location:	POS. F (Channel 1) POS. E (Channel 2)

RELAY Module – Style 1609C41G01

Internal Schematic: 1355D42
 Component Location: 1609C41
 Chassis Location: POS. G

DTT Module – Style 1609C42G01 (2 Term.)
 Style 1609C42G02 (3 Term.)

Internal Schematic: 1355D43
 Component Location: 1609C42
 Chassis Location: POS. K

AXLM Module – Style 1609C43G01

Internal Schematic: 1355D44
 Component Location: 1609C43
 Chassis Location: POS. L

ARTM-1 Module – Style 1609C44G01

(No Transfer Trip)
 Internal Schematic: 1355D45
 Component Location: 1499B49
 Chassis Location: POS. M

ARTM-2 Module –

Style 1609C44G02 (Main assembly)
 Style 1581C27G01 (Sub-assembly)

(Transfer Trip)
 Internal Schematic: 1355D45
 Component Location:
 1499B49 (Main assembly)
 1484B32 (Sub-assembly)
 Chassis Location: POS. M

4.0 RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable spare modules or components can be furnished to the customers who are equipped for doing repair work. When ordering parts (components, modules, etc.) always give the complete catalog number and appropriate ABB style number(s).

ATTACHMENTS

A. Internal Schematics

Figure	Module	Drawing
1	DTD	1355D47
2	MD	1355D39
3	IFDT	1355D40
4	IFO (Standard)	1355D41
5	IFO (High Power)	1355D70
6	RELAY	1355D42
7	DTT	1355D43
8	AXLM	1355D44
9	ARTM-1/2	1355D45

B. Component Locations

Figure	Module	Drawing
10	MD/DTD	1609C38
11	IFDT	1609C39
12	IFO (Standard)	1499B44
13	IFO (High Power)	1609C96
14	RELAY	1609C41
15	DTT	1609C42
16	AXLM	1609C43
17	ARTM-1 (main assembly)	1499B49
18	ARTM-2 (sub-assembly)	1484B32

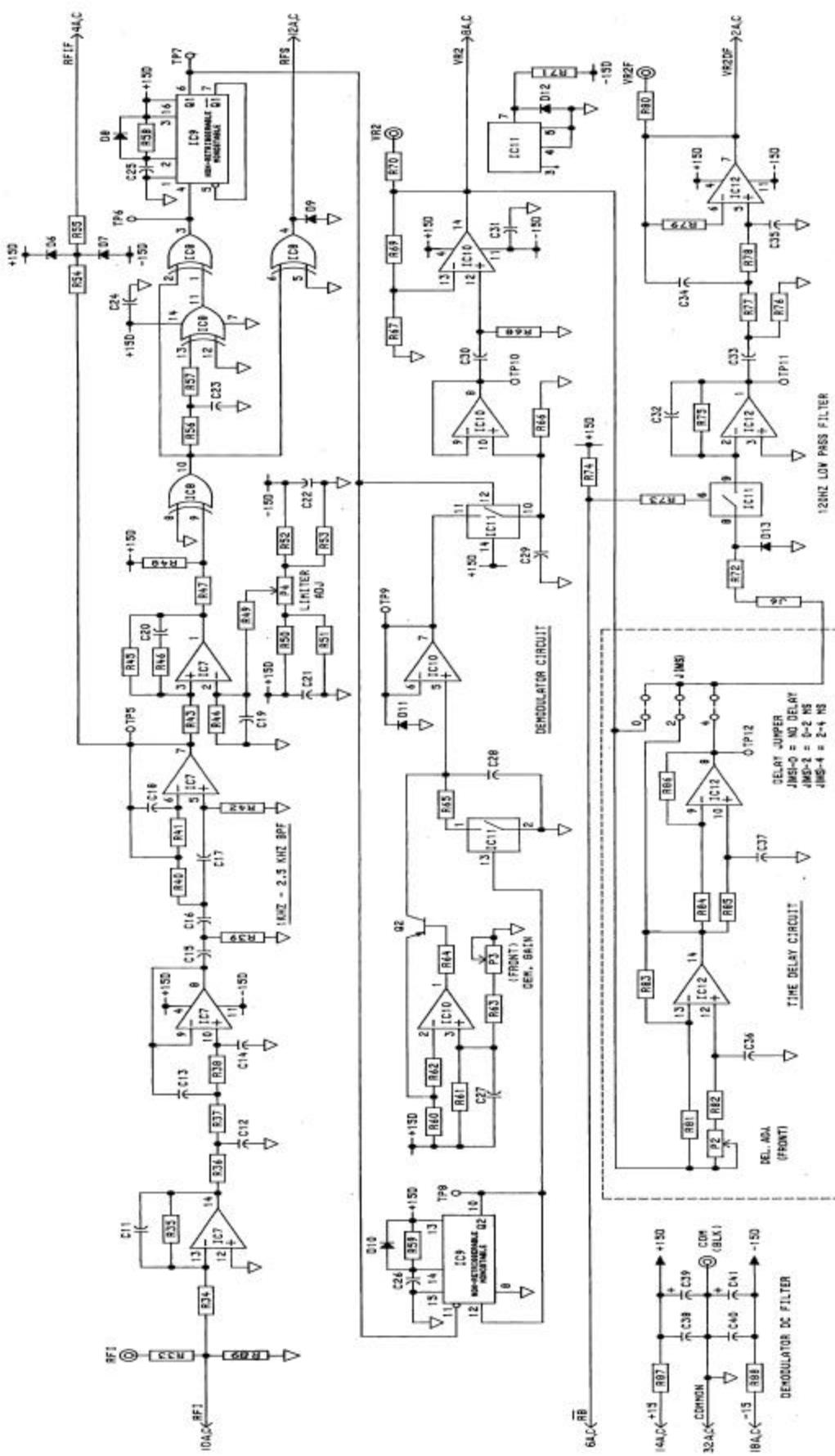


Figure 1: Internal Schematic DTD Module

Sub 3
1355D47

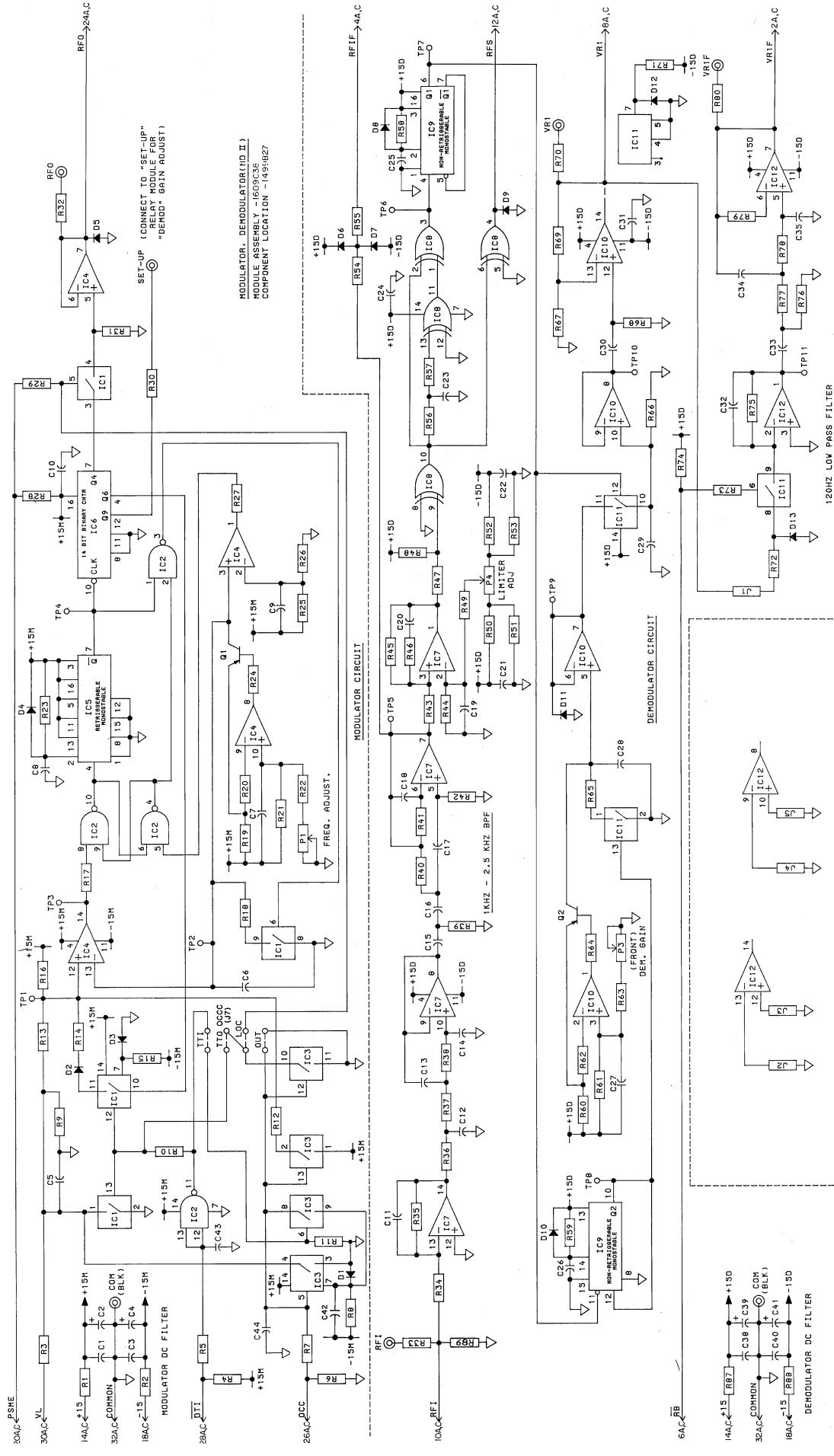
CAPACITOR	STYLE
C11 - 0.1 MFD 200V + -5% MET-POLY CARB	3534A68H02
C12 - 0.15 MFD 200V + -2% MET-POLY CARB	3534A68H05
C13 - 0.01 MFD 200V + -5% MET-POLY CARB	3534A68H02
C14 - 2.70 PF 500V + -2% MICA	762A757H01
C15 - 0.022 MFD 100V + -2% MET-POLY CARB	3533A53H01
C16 - 0.01 MFD 200V + -5% MET-POLY CARB	3534A68H02
C17 - 0.01 MFD 200V + -5% MET-POLY CARB	3534A68H02
C18 - 0.1 MFD 200V + -5% MET-POLY CARB	3534A68H03
C19 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H03
C20 - 1.0 PF 500V + -5% MICA	763A209H03
C21 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H03
C22 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H03
C23 - 4.7 PF 500V + -2% MICA	763A209H17
C24 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H08
C25 - 6.0 PF 500V + -2% MICA	661A84H10
C26 - 0.01 MFD 200V + -1% MET-POLY CARB	3534A68H01
C27 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H01
C28 - 5.100 PF 500V + -2% MICA	187A584H05
C29 - 5.100 PF 500V + -2% MICA	187A584H05
C30 - 4.7 MFD 100V + -5% MET-POLY CARB	350A84H03
C31 - 1.0 MFD 100V + -5% MET-POLY CARB	3533A53H02
C32 - 0.1 MFD 200V + -2% MET-POLY CARB	3533A53H02
C33 - 1.0 MFD 100V + -5% MET-POLY CARB	3534A68H02
C34 - 0.47 MFD 100V + -5% MET-POLY CARB	3533A53H02
C35 - 0.01 MFD 200V + -2% MET-POLY CARB	3534A68H04
C36 - 0.012 MFD 200V + -5% MET-POLY CARB	3534A68H03
C37 - 0.01 MFD 200V + -5% MET-POLY CARB	3534A68H03
C38 - 0.1 MFD 100V + -5% MET-POLY CARB	880A363H01
C39 - 1.0 MFD 35V + -20% TANTALUM	3534A68H08
C40 - 0.1 MFD 100V + -5% MET-POLY CARB	880A363H01
C41 - 1.0 MFD 35V + -20% TANTALUM	880A363H01

RESISTOR	STYLE
R33 - 3.01K 1/8W 1% METAL FILM	3535A38H47
R34 - 20K 1/8W 1% METAL FILM	3535A38H30
R35 - 20K 1/8W 1% METAL FILM	3535A38H58
R36 - 3.92K 1/8W 1% METAL FILM	3532A38H58
R37 - 1.21K 1/8W 1% METAL FILM	3532A38H09
R38 - 1.21K 1/8W 1% METAL FILM	3532A38H09
R39 - 8.25K 1/4W 1% METAL FILM	3532A38H89
R40 - 301K 1/8W 1% METAL FILM	3532A38H47
R41 - 301K 1/8W 1% METAL FILM	3532A38H47
R42 - 10K 1/8W 1% METAL FILM	3535A37H01
R43 - 10K 1/8W 1% METAL FILM	3535A37H01
R44 - 1MEG 1/4W 1% METAL FILM	3535A37H39
R45 - 15M 5% CARB 1/2W	187A2290H40
R46 - 51.1K 1/8W 1% METAL FILM	3535A37H01
R47 - 51.1K 1/8W 1% METAL FILM	3535A37H69
R48 - 10K 1/8W 1% METAL FILM	3535A37H01
R49 - 10K 1/8W 1% METAL FILM	3535A37H01
R50 - 15K 1/8W 1% METAL FILM	3535A37H18
R51 - 30.1 OHM 1/8W 1% METAL FILM	3535A42H47
R52 - 15K 1/8W 1% METAL FILM	3535A42H18
R53 - 30.0K 1/8W 1% METAL FILM	3535A42H47
R54 - 10K 1/8W 1% METAL FILM	3535A37H01
R55 - 51.1K 1/8W 1% METAL FILM	3535A37H01
R56 - 51.1K 1/8W 1% METAL FILM	3535A37H69
R57 - 10K 1/8W 1% METAL FILM	3535A37H01
R58 - 100K 1/8W 1% METAL FILM	3533A38H01
R59 - 15K 1/8W 1% METAL FILM	3535A37H18
R60 - 30.1K 1/8W 1% METAL FILM	3535A37H47
R61 - 15K 1/8W 1% METAL FILM	3535A37H01
R62 - 86.6K 1/8W 1% METAL FILM	3535A37H18
R63 - 51.1 OHM 1/4W 1% METAL FILM	010116171270
R64 - 10.0 OHM 1/4W 1% METAL FILM	91614841151
R65 - 50M 1/4W 1% METAL OXIDE CERMET	187A640H24
R66 - 13.3K 1/8W 1% METAL FILM	3532A38H05
R67 - 11.0K 1/8W 1% METAL FILM	3532A38H13
R68 - 7.50K 1/8W 1% METAL FILM	3535A38H85
R69 - 3.01K 1/4W 1% METAL FILM	3535A38H47
R70 - 3.01K 1/4W 1% METAL FILM	3535A38H47
R71 - 3.01K 1/4W 1% METAL FILM	3535A38H30
R72 - 10K 1/8W 1% METAL FILM	3535A37H01
R73 - 51.1K 1/8W 1% METAL FILM	3535A37H69
R74 - 100K 1/8W 1% METAL FILM	3532A38H01
R75 - 15.0K 1/8W 1% METAL FILM	3532A38H18
R76 - 7.5K 1/8W 1% METAL FILM	3535A37H85
R77 - 7.5K 1/8W 1% METAL FILM	3535A37H85
R78 - 3.01K 1/8W 1% METAL FILM	3532A38H30
R79 - 3.01K 1/8W 1% METAL FILM	3535A38H47
R80 - 2.00K 1/8W 1% METAL FILM	3532A38H30
R81 - 1K 1/8W 1% METAL FILM	3532A38H01
R82 - 2.00K 1/8W 1% METAL FILM	3532A38H30
R83 - 1K 1/8W 1% METAL FILM	3532A38H30
R84 - 20.0K 1/8W 1% METAL FILM	3532A38H30
R85 - 100K 1/8W 1% METAL FILM	3532A38H01
R86 - 2.00K 1/8W 1% METAL FILM	3532A38H30
R87 - 2.7 OHM 1/2W SX CARB	187A2290H31
R88 - 1.0K 1/8W 1% SX CARB	187A2290H31
R89 - 1.0K 1/8W 1% SX CARB	RND022FQ49

INT CKT	STYLE
D06 - 1N645A 225V	837A692H03
D07 - 1N645A 225V	836A928H03
D08 - 1N4148 75V	836A928H06
D09 - 1N4148 75V	836A928H06
D10 - 1N4148 75V	836A928H06
D11 - 1N4148 75V	836A928H06
D12 - 1N4148 75V	836A928H06
D13 - 1N4148 75V	836A928H06
TLO74IJ QUAD OP AMP	3527A90H01
IC08 - MC14070BAL QUAD EXCLUSIVE OR	3527A90H01
IC09 - MC14538BAL DUAL PREC MONO MULTIVIB	3527A90H01
IC10 - TLO74IJ QUAD OP AMP	3527A90H01
IC11 - MC14066BAL QUAD BILATERAL SWITCH	3527A90H01
IC12 - TLO74IJ QUAD OP AMP	3528A90H06

POT	LINK	STYLE	LINK	STYLE
P02 - 100K 3/4W 20% TRIMPOT	3527A30H07	3532A54H01		
P03 - 20K 3/4W + -10% TRIMPOT	3527A30H04			
P04 - 600 OHM 3/4W + -10% TRIMPOT	3527A30H02			

Figure 1a: Internal Schematic DTD Module



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I355D39

Figure 2: Internal Schematic MD Module

CAPACITOR	
C01	1.00 MFD 100V + ⁻ 5% MET-POLY CARB
C02	1.00 MFD 35V + ⁻ 5% TANTALUM CARB
C03	1.00 MFD 35V + ⁻ 5% MET-POLY CARB
C04	1.00 MFD 35V + ⁻ 20% TANTALUM CARB
C05	0.022 MFD 100V + ⁻ 2% MET-POLY CARB
C06	100PF 100V + ⁻ 5% MET-POLY CARB
C07	1.00 MFD 100V + ⁻ 5% MET-POLY CARB
C08	610PF 500V + ⁻ 5% MICA
C09	1.00 MFD 100V + ⁻ 5% MET-POLY CARB
C10	1.00 MFD 100V + ⁻ 5% MET-POLY CARB
C11	0.01 MFD 200V + ⁻ 5% MET-POLY CARB
C12	0.015 MFD 200V + ⁻ 5% MET-POLY CARB
C13	0.01 MFD 200V + ⁻ 5% MET-POLY CARB
C14	270PF 500V + ⁻ 5% MET-POLY CARB
C15	0.022 MFD 100V + ⁻ 2% MICA
C16	0.001 MFD 200V + ⁻ 5% MET-POLY CARB
C17	0.001 MFD 200V + ⁻ 5% MET-POLY CARB
C18	0.01 MFD 200V + ⁻ 5% MET-POLY CARB
C19	0.01 MFD 500V + ⁻ 5% MET-POLY CARB
C20	1.0 MFD 100V + ⁻ 5% MICA
C21	0.001 MFD 100V + ⁻ 5% MET-POLY CARB
C22	0.001 MFD 500V + ⁻ 5% MET-POLY CARB
C23	47PF 500V + ⁻ 5% MICA
C24	0.1 MFD 1000V + ⁻ 2% MET-POLY CARB
C25	0.1 MFD 500V + ⁻ 5% MICA
C26	0.01 MFD 200V + ⁻ 5% MET-POLY CARB
C27	0.1 MFD 100V + ⁻ 5% MET-POLY CARB
C28	0.1 MFD 100V + ⁻ 5% MET-POLY CARB
C29	5100PF 500V + ⁻ 2% MICA
C30	0.47 MFD 1000V + ⁻ 5% MET-POLY CARB
C31	0.1 MFD 1000V + ⁻ 5% MET-POLY CARB
C32	0.1 MFD 200V + ⁻ 5% MET-POLY CARB
C33	0.1 MFD 1000V + ⁻ 5% MET-POLY CARB
C34	0.47 MFD 200V + ⁻ 5% MET-POLY CARB
C35	0.01 MFD 900V + ⁻ 2% MET-POLY CARB
C36	0.1 MFD 1000V + ⁻ 5% MET-POLY CARB
C37	10.0 MFD 35V + ⁻ 20% TANTALUM CARB
C40	1.0 MFD 100V + ⁻ 20% TANTALUM CARB
C42	0.1 MFD 500V + ⁻ 20% MONO CERAMIC
C43	0.05 MFD 100V + ⁻ 20% CERAMIC
C44	0.047 MFD 100V, ±10%, ±10%, MET-POLY

STYLE

3534A63SH03

3534A63SH01

3534A63SH04

3534A63SH02

3534A63SH05

3534A63SH06

3534A63SH07

3534A63SH08

3534A63SH09

3534A63SH10

3534A63SH11

3534A63SH12

3534A63SH13

3534A63SH14

3534A63SH15

3534A63SH16

3534A63SH17

3534A63SH18

3534A63SH19

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3534A63SH213

3534A63SH214

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3534A63SH220

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3534A63SH227

3534A63SH228

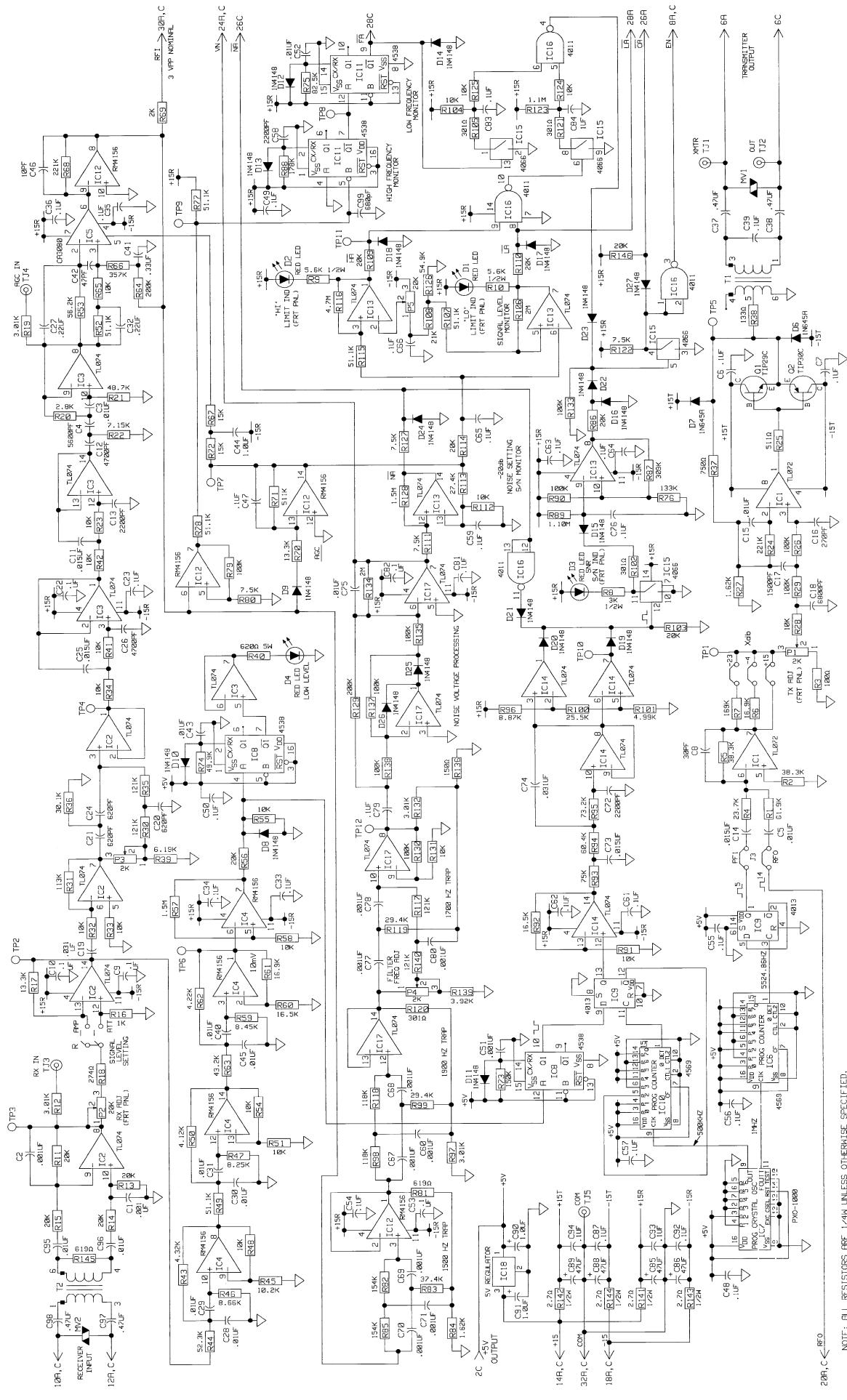
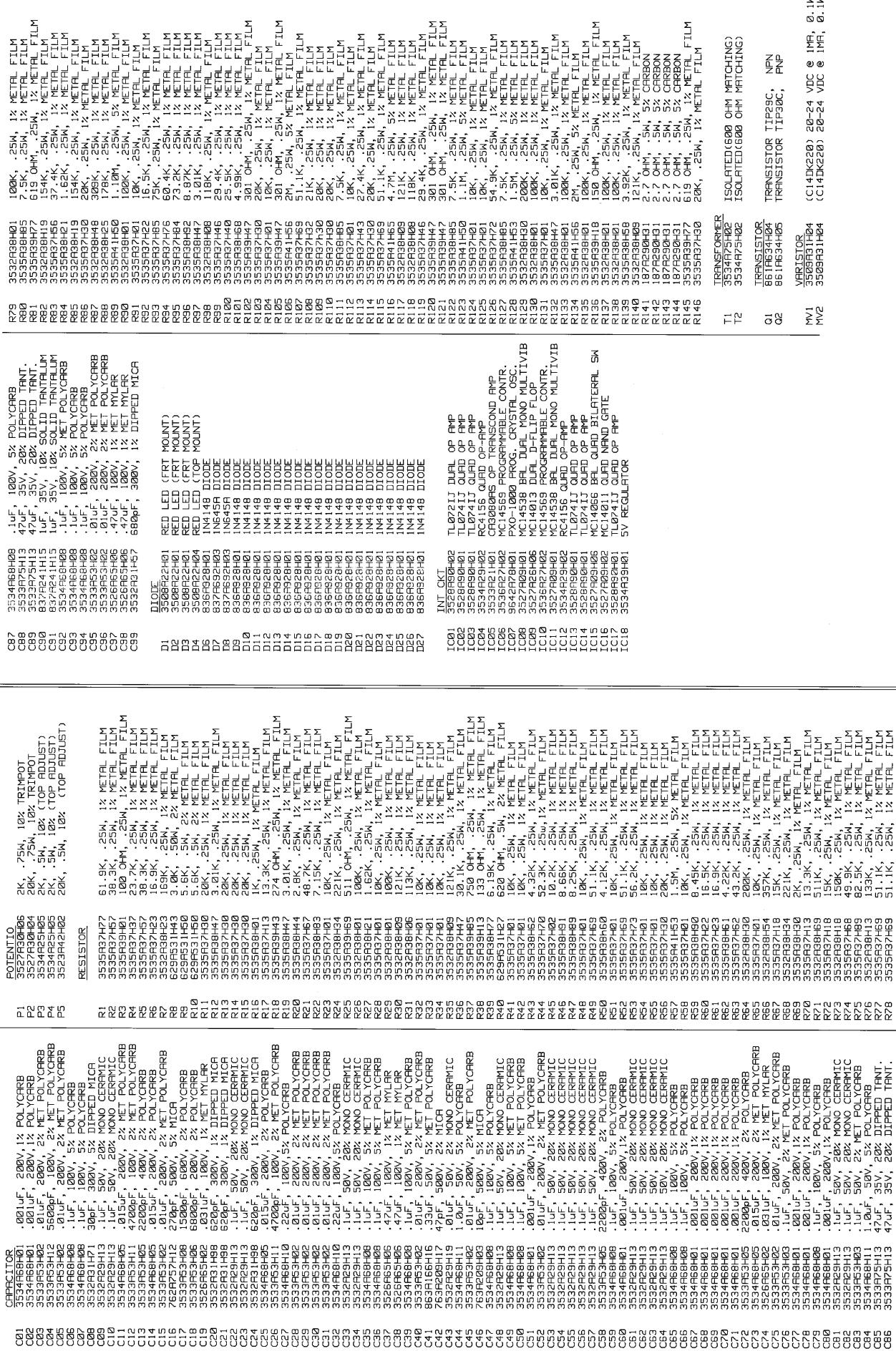


Figure 3: Internal Schematic IFDT Module

**Sub 6
I355D40**

Figure 3a: Internal Schematic IFDT Module



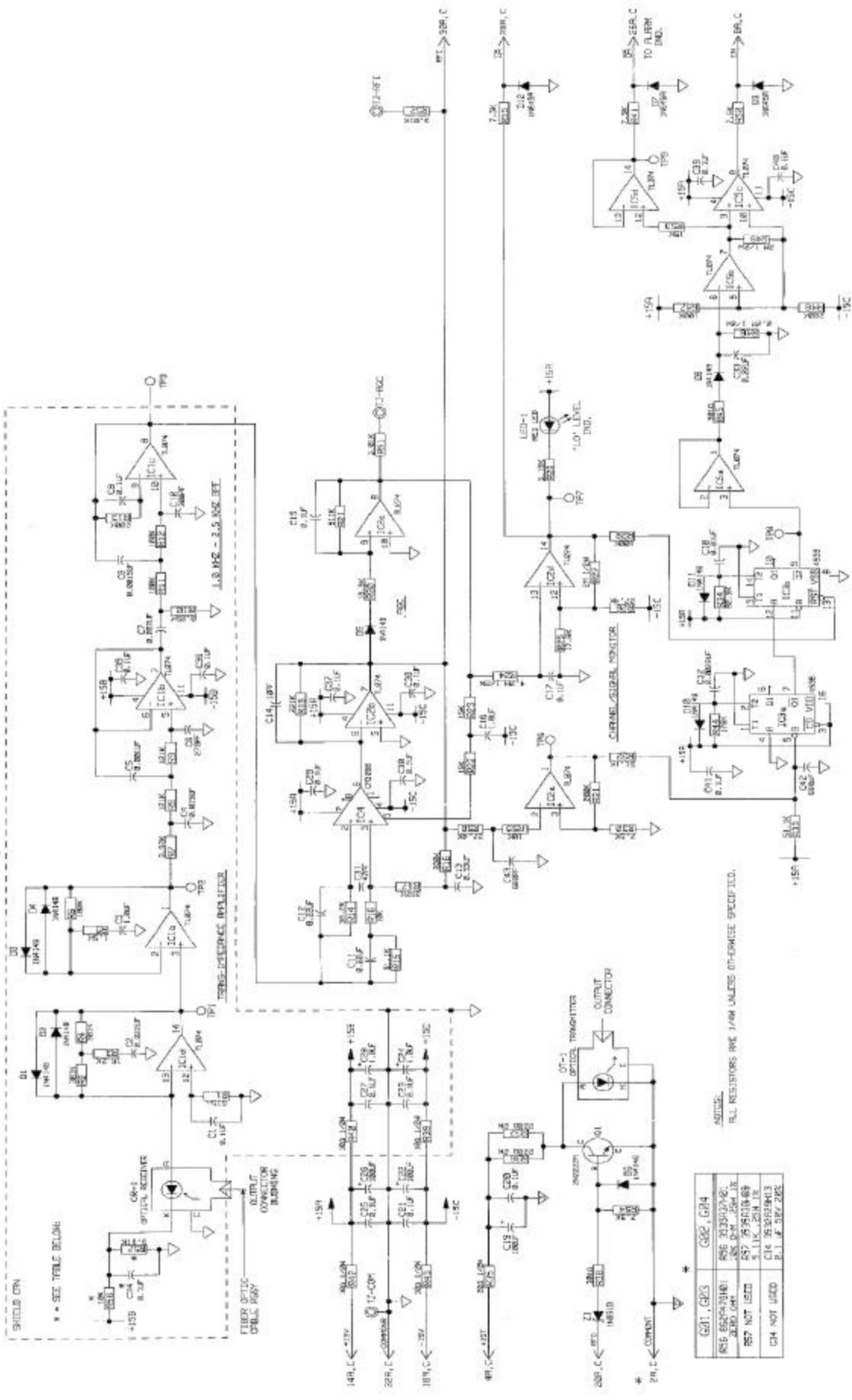


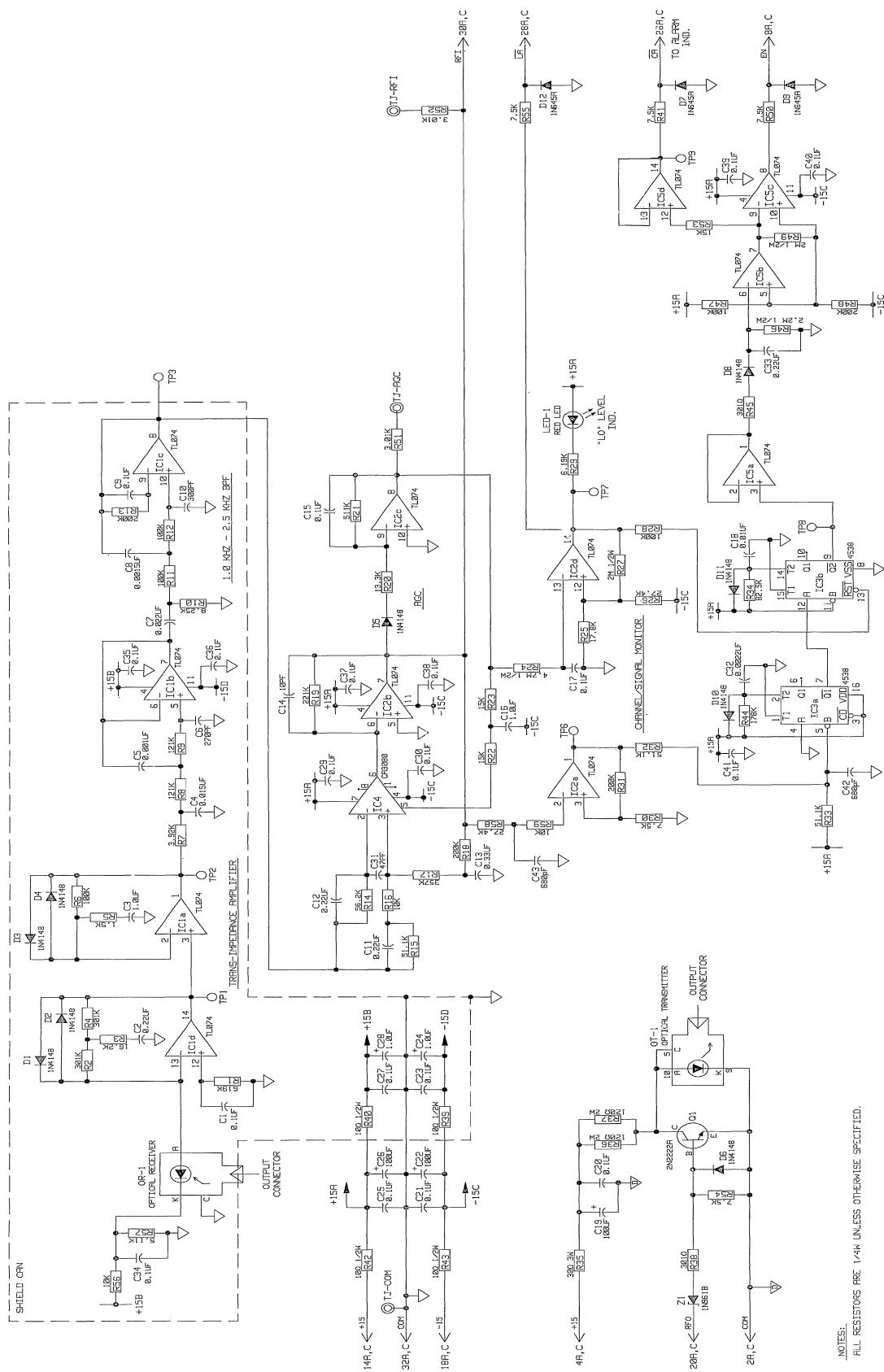
Figure 4: Internal Schematic IFO Module (Standard)

COMP-LOC	CAPACITORS	DESCRIPTION	STYLE	GROUP	COMP-FLOC		INT. O.K.TS.	COMP-LOC	COMP-FLOC	DESCRIPTION	RESISTORS	COMP-LOC	COMP-FLOC	DESCRIPTION	STYLE	COMP-LOC	COMP-FLOC	DESCRIPTION
					C1	TLC74U QUAD OP AMP		C1	TLC74U QUAD OP AMP				C1	TLC74U QUAD OP AMP		C1	TLC74U QUAD OP AMP	
C1	1 MFD 10V + .5% MET-POLY CARB	3534ABSHD8	ALL		I015 MFD 10V + .5% MET-POLY CARB	3534ABSHC1	ALL	I015 MFD 10V + .5% MET-POLY CARB	3534ABSHC1	ALL		R1	610K 25W 1% METAL FILM		R1	352BA9H01	ALL	352BA9H01
C2	100PF 50V + .2% MET-POLY CARB	3534ABSHG1	ALL		I015 MFD 200V + .2% MET-POLY CARB	3534ABSHG1	ALL	I015 MFD 200V + .2% MET-POLY CARB	3534ABSHG1	ALL		R2	301K 25W 1% METAL FILM		R2	352BA9H01	ALL	352BA9H01
C3	10UF 50V + .5% MET-POLY CARB	3534ABSHH1	ALL		I015 MFD 50V + .5% MET-POLY CARB	3534ABSHH1	ALL	I015 MFD 50V + .5% MET-POLY CARB	3534ABSHH1	ALL		R3	162K 25W 1% METAL FILM		R3	353BA9H47	ALL	353BA9H47
C4	100PF 50V + .1% MET-POLY CARB	7524TA57H12	ALL		I015 MFD 50V + .1% MET-POLY CARB	7524TA57H12	ALL	I015 MFD 50V + .1% MET-POLY CARB	7524TA57H12	ALL		R4	301K 25W 1% METAL FILM		R4	353BA9H47	ALL	353BA9H47
C5	270PF 50V + .25% MICA	3533AS51H01	ALL		I015 MFD 50V + .25% MICA	3533AS51H01	ALL	I015 MFD 50V + .25% MICA	3533AS51H01	ALL		R5	1.530K 25W 1% METAL FILM		R5	353BA9H47	ALL	353BA9H47
C6	10PF 50V + .2% MET-POLY CARB	3533AS51H02	ALL		I015 MFD 50V + .2% MET-POLY CARB	3533AS51H02	ALL	I015 MFD 50V + .2% MET-POLY CARB	3533AS51H02	ALL		R6	10K 25W 1% METAL FILM		R6	353BA9H47	ALL	353BA9H47
C7	10PF 50V + .1% MET-POLY CARB	3533AS51H03	ALL		I015 MFD 50V + .1% MET-POLY CARB	3533AS51H03	ALL	I015 MFD 50V + .1% MET-POLY CARB	3533AS51H03	ALL		R7	312K 25W 1% METAL FILM		R7	353BA9H47	ALL	353BA9H47
C8	100PF 50V + .5% MET-POLY CARB	3533AS51H04	ALL		I015 MFD 50V + .5% MET-POLY CARB	3533AS51H04	ALL	I015 MFD 50V + .5% MET-POLY CARB	3533AS51H04	ALL		R8	121K 25W 1% METAL FILM		R8	353BA9H47	ALL	353BA9H47
C9	1.1MFD 10V + .5% MET-POLY CARB	3533AS51H05	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H05	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H05	ALL		R9	121K 25W 1% METAL FILM		R9	353BA9H47	ALL	353BA9H47
C10	300PF 50V + .2% MICA	1373A54H49	ALL		I015 MFD 10V + .2% MICA	1373A54H49	ALL	I015 MFD 10V + .2% MICA	1373A54H49	ALL		R10	83.5K 25W 1% METAL FILM		R10	353BA9H47	ALL	353BA9H47
C11	22 MFD 100V + .4% MET-POLY CARB	3533AS51H10	ALL		I015 MFD 100V + .4% MET-POLY CARB	3533AS51H10	ALL	I015 MFD 100V + .4% MET-POLY CARB	3533AS51H10	ALL		R11	10K 25W 1% METAL FILM		R11	353BA9H47	ALL	353BA9H47
C12	22 MFD 100V + .5% MET-POLY CARB	8534156H11	ALL		I015 MFD 100V + .5% MET-POLY CARB	8534156H11	ALL	I015 MFD 100V + .5% MET-POLY CARB	8534156H11	ALL		R12	20K 25W 1% METAL FILM		R12	353BA9H47	ALL	353BA9H47
C13	10PF 50V + .5% MICA	101PF 500V + .2%	ALL		I015 MFD 100V + .5% MICA	101PF 500V + .2%	ALL	I015 MFD 100V + .5% MICA	101PF 500V + .2%	ALL		R13	10K 25W 1% METAL FILM		R13	353BA9H47	ALL	353BA9H47
C14	10 PF 500V + .5% MICA	101PF 100V + .1%	ALL		I015 MFD 100V + .5% MICA	101PF 100V + .1%	ALL	I015 MFD 100V + .5% MICA	101PF 100V + .1%	ALL		R14	56.1K 25W 1% METAL FILM		R14	353BA9H47	ALL	353BA9H47
C15	1.1MFD 100V + .5% MET-POLY CARB	3533AS51H11	ALL		I015 MFD 100V + .5% MET-POLY CARB	3533AS51H11	ALL	I015 MFD 100V + .5% MET-POLY CARB	3533AS51H11	ALL		R15	51.1K 25W 1% METAL FILM		R15	353BA9H47	ALL	353BA9H47
C16	1.1MFD 100V + .5% MET-POLYCARB	3533AS51H12	ALL		I015 MFD 100V + .5% MET-POLYCARB	3533AS51H12	ALL	I015 MFD 100V + .5% MET-POLYCARB	3533AS51H12	ALL		R16	10K 25W 1% METAL FILM		R16	353BA9H47	ALL	353BA9H47
C17	1.1MFD 100V + .5% MET-POLYCARB	3533AS51H13	ALL		I015 MFD 100V + .5% MET-POLYCARB	3533AS51H13	ALL	I015 MFD 100V + .5% MET-POLYCARB	3533AS51H13	ALL		R17	38.7K 25W 1% METAL FILM		R17	353BA9H47	ALL	353BA9H47
C18	100 MFD 200V + .25% METAL TANTALUM	3533AS51H14	ALL		I015 MFD 200V + .25% METAL TANTALUM	3533AS51H14	ALL	I015 MFD 200V + .25% METAL TANTALUM	3533AS51H14	ALL		R18	200K 25W 1% METAL FILM		R18	353BA9H47	ALL	353BA9H47
C19	100 MFD 35V + .25% METAL TANTALUM	860A45H01	ALL		I015 MFD 35V + .25% METAL TANTALUM	860A45H01	ALL	I015 MFD 35V + .25% METAL TANTALUM	860A45H01	ALL		R19	22.1K 25W 1% METAL FILM		R19	353BA9H47	ALL	353BA9H47
C20	100 MFD 10V + .5% MET-POLY CARB	3533AS51H15	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H15	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H15	ALL		R20	15.3K 25W 1% METAL FILM		R20	353BA9H47	ALL	353BA9H47
C21	1.1MFD 100V + .5% MET-POLY CARB	8737244H15	ALL		I015 MFD 100V + .5% MET-POLY CARB	8737244H15	ALL	I015 MFD 100V + .5% MET-POLY CARB	8737244H15	ALL		R21	51.1K 25W 1% METAL FILM		R21	353BA9H47	ALL	353BA9H47
C22	1.1MFD 10V + .25% TANTALUM	3533AS51H16	ALL		I015 MFD 10V + .25% TANTALUM	3533AS51H16	ALL	I015 MFD 10V + .25% TANTALUM	3533AS51H16	ALL		R22	15K 25W 1% METAL FILM		R22	353BA9H47	ALL	353BA9H47
C23	1.1MFD 10V + .5% MET-POLY CARB	3533AS51H17	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H17	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H17	ALL		R23	15K 25W 1% METAL FILM		R23	353BA9H47	ALL	353BA9H47
C24	1.1MFD 10V + .5% MET-POLY CARB	3533AS51H18	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H18	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H18	ALL		R24	4.7M 25W 1% CARBON FILM		R24	353BA9H47	ALL	353BA9H47
C25	1.1MFD 10V + .5% MET-POLY CARB	3533AS51H19	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H19	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H19	ALL		R25	1.2K 25W 1% METAL FILM		R25	353BA9H47	ALL	353BA9H47
C26	47PF 50V + .25% MICA	7634G59H77	ALL		I015 MFD 10V + .5% MET-POLY CARB	7634G59H77	ALL	I015 MFD 10V + .5% MET-POLY CARB	7634G59H77	ALL		R26	2.7K 25W 1% METAL FILM		R26	353BA9H47	ALL	353BA9H47
C27	47PF 50V + .25% MICA	3533AS51H20	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H20	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H20	ALL		R27	2.0K 25W 1% METAL FILM		R27	353BA9H47	ALL	353BA9H47
C28	47PF 50V + .25% MICA	860A45H02	ALL		I015 MFD 10V + .5% MET-POLY CARB	860A45H02	ALL	I015 MFD 10V + .5% MET-POLY CARB	860A45H02	ALL		R28	1.00K 25W 1% METAL FILM		R28	353BA9H47	ALL	353BA9H47
C29	47PF 50V + .25% MICA	3533AS51H21	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H21	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H21	ALL		R29	6.1K 25W 1% METAL FILM		R29	353BA9H47	ALL	353BA9H47
C30	47PF 50V + .25% MICA	3533AS51H22	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H22	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H22	ALL		R30	7.50K 25W 1% METAL FILM		R30	353BA9H47	ALL	353BA9H47
C31	47PF 50V + .25% MICA	3533AS51H23	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H23	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H23	ALL		R31	2.00K 25W 1% METAL FILM		R31	353BA9H47	ALL	353BA9H47
C32	47PF 50V + .25% MICA	3533AS51H24	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H24	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H24	ALL		R32	5.1K 25W 1% METAL FILM		R32	353BA9H47	ALL	353BA9H47
C33	47PF 50V + .25% MICA	3533AS51H25	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H25	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H25	ALL		R33	5.1K 25W 1% METAL FILM		R33	353BA9H47	ALL	353BA9H47
C34	47PF 50V + .25% MICA	3533AS51H26	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H26	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H26	ALL		R34	5.1K 25W 1% METAL FILM		R34	353BA9H47	ALL	353BA9H47
C35	47PF 50V + .25% MICA	3533AS51H27	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H27	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H27	ALL		R35	5.1K 25W 1% METAL FILM		R35	353BA9H47	ALL	353BA9H47
C36	47PF 50V + .25% MICA	3533AS51H28	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H28	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H28	ALL		R36	5.1K 25W 1% METAL FILM		R36	353BA9H47	ALL	353BA9H47
C37	47PF 50V + .25% MICA	3533AS51H29	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H29	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H29	ALL		R37	5.1K 25W 1% METAL FILM		R37	353BA9H47	ALL	353BA9H47
C38	47PF 50V + .25% MICA	3533AS51H30	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H30	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H30	ALL		R38	5.1K 25W 1% METAL FILM		R38	353BA9H47	ALL	353BA9H47
C39	47PF 50V + .25% MICA	3533AS51H31	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H31	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H31	ALL		R39	5.1K 25W 1% METAL FILM		R39	353BA9H47	ALL	353BA9H47
C40	47PF 50V + .25% MICA	3533AS51H32	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H32	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H32	ALL		R40	5.1K 25W 1% METAL FILM		R40	353BA9H47	ALL	353BA9H47
C41	47PF 50V + .25% MICA	3533AS51H33	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H33	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H33	ALL		R41	5.1K 25W 1% METAL FILM		R41	353BA9H47	ALL	353BA9H47
C42	680PF 300V + .2% DIPPED MICA	3533AS51H34	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H34	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H34	ALL		R42	5.1K 25W 1% METAL FILM		R42	353BA9H47	ALL	353BA9H47
C43	680PF 300V + .2% DIPPED MICA	3533AS51H35	ALL		I015 MFD 10V + .5% MET-POLY CARB	3533AS51H35	ALL	I015 MFD 10V + .5% MET-POLY CARB	3533AS51H35	ALL		R43	5.1K 25W 1% METAL FILM		R43	353BA9H47	ALL	353BA9H47

Figure 4a: Internal Schematic IFO Module (Standard)

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1355D41

Figure 5: Internal Schematic IFO Module (High Power)

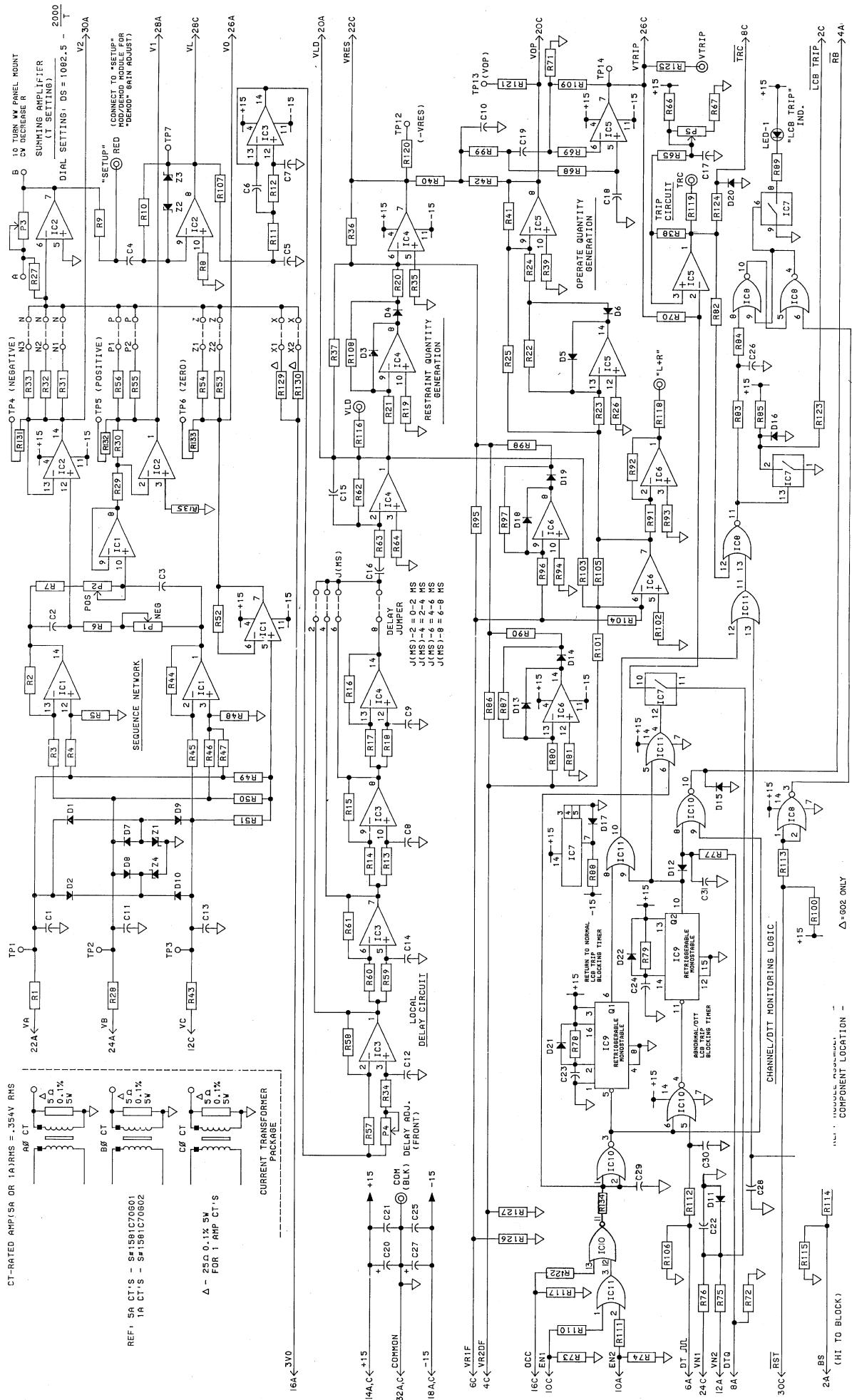


COMP LOC	DESCRIPTION	STYLE
C01	.1 MFD 100V +5% MET-POLY CARB	35334R6B1H28
C02	.022 MFD 100V +2% MET-POLY CARB	3533R5G31H21
C03	.1 MFD 50V +5% MET-POLY CARB	3534R6B1H11
C04	.001 MFD 200V +2% MET-POLY CARB	3534R6B1H05
C05	.022 MFD 100V +12% MET-POLY CARB	3534R6B1H01
C06	.270 PF 500V +2% MET-POLY CARB	262A725J1H12
C07	.022 MFD 100V +2% MICA CARB	3533A5S31H2
C08	.0015 MFD 500V +2% MET-POLY CARB	3533A5S31H02
C09	.1 MFD 100V +5% MET-POLY CARB	3533A5S31H08
C10	.300 PF 500V +2% MICA CARB	187F5B41H29
C11	.22 MFD 100V +2% MICA CARB	3533A5S31H09
C12	.22 MFD 100V +5% MET-POLY CARB	3533A5S31H10
C13	.33 MFD 50V +5% MET-POLY CARB	863A16S1H16
C14	.10 PF 500V +5% MICA CARB	763A22B91H23
C15	.1 MFD 100V +5% MET-POLY CARB	3534R6B1H28
C16	.1 MFD 500V +5% MET-POLY CARB	3534R6B1H11
C17	.1 MFD 100V +5% MET-POLY CARB	3534R6B1H02
C18	.01 MFD 35V +2% MET-POLY CARB	3533A5S31H02
C19	.100 MFD 35V +20% TANTALUM	880R36S1H21
C20	.1 MFD 100V +5% MET-POLY CARB	3534R6B1H29
C21	.100 MFD 35V +20% TANTALUM	680R35S1H21
C22	.1 MFD 100V +5% MET-POLY CARB	3534R6B1H02
C23	.1 MFD 35V +20% TANTALUM	63A241H15
C24	.1 MFD 100V +5% MET-POLY CARB	3533A5S31H05
C25	.1 MFD 35V +20% MET-POLY CARB	3534R6B1H01
C26	.100 MFD 35V +20% TANTALUM	880R36S1H01
C27	.1 MFD 100V +5% MET-POLY CARB	837F24J1H15
C28	.1 MFD 35V +20% TANTALUM	3534R6B1H02
C29	.1 MFD 100V +5% MET-POLY CARB	837F24J1H15
C30	.1 MFD 100V +5% MET-POLY CARB	763A22B91H11
C31	.47 PF 500V +2% MICA	3532A2B91H06
C32	.0022 MFD 400V +2% MET-POLY CARB	3533A5S31H05
C33	.22 MFD 100V +2% MET-POLY CARB	3534A5S31H01
C34	.1 MFD 50V 20K CERAMIC	3532A2B91H11
C35	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C36	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C37	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C38	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C39	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C40	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C41	.1 MFD 50V 20K CERAMIC	3532A2B91H13
C42	.680 PF 3000V +2% DIPPED MICA	3532A2B91H57
C43	.680 PF 3000V +2% DIPPED MICA	3533A5S1H01
DIODE-LEDs DESCRIPTION		
LED1	RED LED (EDGE MOUNT) 550-0426	STYLE
D1	LYTEL ST PIN PHOTO DIODE 0673-001	9647637H08
OT1	LASERTRON QLED 1300SM-501	9647A35H04

COMP LOC	DESCRIPTION	STYLE
R1	.25W 1% METAL FILM	3532A2B91H28
R2	.16W .25W 1% METAL FILM	3532A2B91H21
R3	.25W 1% METAL FILM	3532A2B91H21
R4	.100K .25W 1% METAL FILM	3532A2B91H18
R5	.100K .25W 1% METAL FILM	3532A2B91H18
R6	.392K .25W 1% METAL FILM	3533A5S1H58
R7	.121K .25W 1% METAL FILM	3532A2B91H29
R8	.825K .25W 1% METAL FILM	3532A2B91H29
R9	.100K .25W 1% METAL FILM	3532A2B91H29
R10	.100K .25W 1% METAL FILM	3532A2B91H29
R11	.200K .25W 1% METAL FILM	3532A2B91H29
R12	.200K .25W 1% METAL FILM	3532A2B91H29
R13	.56W .25W 1% METAL FILM	3532A2B91H29
R14	.15K .25W 1% METAL FILM	3533A5S1H58
R15	.51.1K .25W 1% METAL FILM	3533A5S1H58
R16	.10K .25W 1% METAL FILM	3533A5S1H58
R17	.357K .25W 1% METAL FILM	3533A5S1H58
R18	.201K .25W 1% METAL FILM	3533A5S1H58
R19	.201K .25W 1% METAL FILM	3533A5S1H58
R20	.13.3K .25W 1% METAL FILM	3533A5S1H13
R21	.15K .25W 1% METAL FILM	3533A5S1H18
R22	.200K .25W 1% METAL FILM	3533A5S1H18
R23	.47W .25W 5% CARBON FILM	3533A5S1H65
R24	.17.8K .25W 1% METAL FILM	3533A5S1H25
R25	.22.4K .25W 1% METAL FILM	3533A5S1H25
R26	.22.4K .25W 1% METAL FILM	3533A5S1H25
R27	.100K .25W 1% METAL FILM	3532A2B91H30
R28	.100K .25W 1% METAL FILM	3532A2B91H01
R29	.6.19K .25W 1% METAL FILM	3532A2B91H27
R30	.7.50K .25W 1% METAL FILM	3533A5S1H35
R31	.200K .25W 1% METAL FILM	3533A5S1H30
R32	.51.1K .25W 1% METAL FILM	3533A5S1H30
R33	.51.1K .25W 1% METAL FILM	3533A5S1H30
R34	.92.5K .25W 1% WIRE WOUND	763A26S1H39
R35	.92.5K .25W 1% METAL FILM	763A26S1H39
R36	.120 OHM 2W 5% MOLEND COMP	187A29H02H05
R37	.120 OHM 2W 5% MOLEND COMP	187A29H02H05
R38	.10 OHM .5W 5% FIXED COMP	187A29H04H07
R39	.10 OHM .5W 5% FIXED COMP	187A29H04H07
R40	.7.50K .25W 1% METAL FILM	3533A5S1H30
R41	.10 OHM .5W 5% FIXED COMP	187A29H04H07
R42	.10 OHM .5W 5% FIXED COMP	187A29H04H07
R43	.12.8K .25W 1% METAL FILM	3532A2B91H01
R44	.30.1 OHM .25W 5% CARBON FILM	3532A2B91H01
R45	.2.2W OHM .25W 5% CARBON FILM	3532A2B91H01
R46	.1.02K .25W 1% METAL FILM	3532A2B91H01
R47	.2.02K .25W 1% METAL FILM	3532A2B91H01
R48	.2W .25W 1% METAL FILM	3532A2B91H01
R50	.7.50K .25W 1% METAL FILM	3533A5S1H45
R51	.3.01K .25W 1% METAL FILM	3533A5S1H47
R53	.7.50K .25W 1% METAL FILM	3533A5S1H18
R55	.10K .25W 1% METAL FILM	3533A5S1H05
R57	.5.11K .25W 1% METAL FILM	3535A5S1H69
R58	.2.4K .25W 1% METAL FILM	3535A5S1H69
R59	.12K .25W 1% METAL FILM	3535A5S1H69

COMP LOC	DESCRIPTION	STYLE
Q1	2N2222A NPN 40V 0.8A 0.4W	3532A2B91H05
Z1	1N5818 10V 5% 400mA	186H29H01

Figure 5a: Internal Schematic IFO Module (High Power)



Sub 7
1355D42

CAPACITOR		STYLE	RESISTOR		STYLE	DIODE		STYLE	DIAL		STYLE	INT CKT		STYLE	DIODE		STYLE	LED-1		RED LED (EDGE MOUNT)	
C01	MFD 100V +5% MET-POLY CARB	353468H01	R001	30.0 OHM 2% 1/2W METAL GLAZE	R101	2.0K 1V SW 1% METAL FILM	R102	75K 1V SW 1% METAL FILM	R103	353468H11											
C02	0.02 MFD 200V +2% MET-POLY CARB	353468H02	R002	10K 1V SW 1% METAL FILM	R104	2.0K 1V SW 1% METAL FILM	R105	353468H10	R106	353468H15											
C03	1.0 MFD 50V +5% MET-POLY CARB	353468H03	R003	30K 1V SW 1% METAL FILM	R107	2.0K 1V SW 1% METAL FILM	R108	353468H14	R109	353468H15											
C04	1.0 MFD 50V +5% MET-POLY CARB	353468H04	R004	.01K 1V SW 1% METAL FILM	R110	2.0K 1V SW 1% METAL FILM	R111	353468H10	R112	353468H15											
C05	.1-17 MFD 100V +5% MET-POLY CARB	353468H05	R005	.01K 1V SW 1% METAL FILM	R113	2.0K 1V SW 1% METAL FILM	R114	353468H10	R115	353468H15											
C06	.017 MFD 100V +5% MET-POLY CARB	353468H06	R006	.01K 1V SW 1% METAL FILM	R116	2.0K 1V SW 1% METAL FILM	R117	353468H10	R118	353468H15											
C07	.01 MFD 200V +2% MET-POLY CARB	353468H07	R007	.11K 1V SW 1% METAL FILM	R119	2.0K 1V SW 1% METAL FILM	R120	353468H10	R121	353468H15											
C08	.01 MFD 200V +2% MET-POLY CARB	353468H08	R008	.10K 1V SW 1% METAL FILM	R122	2.0K 1V SW 1% METAL FILM	R123	353468H10	R124	353468H15											
C09	.01 MFD 200V +2% MET-POLY CARB	353468H09	R009	.10K 1V SW 1% METAL FILM	R125	2.0K 1V SW 1% METAL FILM	R126	353468H10	R127	353468H15											
C10	10MFD 350V +5% MET-POLY CARB	353468H10	R010	.10K 1V SW 1% METAL FILM	R128	2.0K 1V SW 1% METAL FILM	R129	353468H10	R130	353468H15											
C11	1NF 100V +5% MET-POLY CARB	353468H11	R011	.10K 1V SW 1% METAL FILM	R131	2.0K 1V SW 1% METAL FILM	R132	353468H10	R133	353468H15											
C12	1.0NF 100V +5% MET-POLY CARB	353468H12	R012	.10K 1V SW 1% METAL FILM	R134	2.0K 1V SW 1% METAL FILM	R135	353468H10	R136	353468H15											
C13	1.0NF 100V +5% MET-POLY CARB	353468H13	R013	.10K 1V SW 1% METAL FILM	R137	2.0K 1V SW 1% METAL FILM	R138	353468H10	R139	353468H15											
C14	.006 MFD 200V +2% MET-POLY CARB	353468H14	R014	.20K 1V SW 1% METAL FILM	R140	2.0K 1V SW 1% METAL FILM	R141	353468H10	R142	353468H15											
C15	.047 MFD 100V +5% MET-POLY CARB	353468H15	R015	.20K 1V SW 1% METAL FILM	R143	2.0K 1V SW 1% METAL FILM	R144	353468H10	R145	353468H15											
C16	.047 MFD 100V +5% MET-POLY CARB	353468H16	R016	.20K 1V SW 1% METAL FILM	R146	2.0K 1V SW 1% METAL FILM	R147	353468H10	R148	353468H15											
C17	.1 MFD 100V +5% MET-POLY CARB	353468H17	R017	.20K 1V SW 1% METAL FILM	R149	2.0K 1V SW 1% METAL FILM	R150	353468H10	R151	353468H15											
C18	.1 MFD 50V +2% MET-POLY CARB	353468H18	R018	.10K 1V SW 1% METAL FILM	R152	2.0K 1V SW 1% METAL FILM	R153	353468H10	R154	353468H15											
C19	.1 MFD 50V +2% MET-POLY CARB	353468H19	R019	.10K 1V SW 1% METAL FILM	R155	2.0K 1V SW 1% METAL FILM	R156	353468H10	R157	353468H15											
C20	10MFD 350V +5% MET-POLY CARB	353468H20	R020	.10K 1V SW 1% METAL FILM	R158	2.0K 1V SW 1% METAL FILM	R159	353468H10	R160	353468H15											
C21	1.0NF 100V +5% MET-POLY CARB	353468H21	R021	.10K 1V SW 1% METAL FILM	R161	2.0K 1V SW 1% METAL FILM	R162	353468H10	R163	353468H15											
C22	51.0 MFD 50V +5% MET-POLY CARB	353468H22	R022	.20K 1V SW 1% METAL FILM	R164	2.0K 1V SW 1% METAL FILM	R165	353468H10	R166	353468H15											
C23	.1 MFD 50V +2% MET-POLY CARB	353468H23	R023	.10K 1V SW 1% METAL FILM	R167	2.0K 1V SW 1% METAL FILM	R168	353468H10	R169	353468H15											
C24	.1 MFD 50V +2% MET-POLY CARB	353468H24	R024	.10K 1V SW 1% METAL FILM	R170	2.0K 1V SW 1% METAL FILM	R171	353468H10	R172	353468H15											
C25	0.47 MFD 200V +5% MET-POLY CARB	353468H25	R025	.10K 1V SW 1% METAL FILM	R173	2.0K 1V SW 1% METAL FILM	R174	353468H10	R175	353468H15											
C26	0.47 MFD 200V +5% MET-POLY CARB	353468H26	R026	.10K 1V SW 1% METAL FILM	R176	2.0K 1V SW 1% METAL FILM	R177	353468H10	R178	353468H15											
C27	1.0NF 350V +5% MET-POLY CARB	353468H27	R027	.10K 1V SW 1% METAL FILM	R179	2.0K 1V SW 1% METAL FILM	R180	353468H10	R181	353468H15											
C28	1.0NF 350V +5% MET-POLY CARB	353468H28	R028	.10K 1V SW 1% METAL FILM	R182	2.0K 1V SW 1% METAL FILM	R183	353468H10	R184	353468H15											
C29	1.0MFD 100V +20% CERAMIC	353468H29	R029	.10K 1V SW 1% METAL FILM	R185	2.0K 1V SW 1% METAL FILM	R186	353468H10	R187	353468H15											
C30	100PF 100V +20% CERAMIC	353468H30	R030	.10K 1V SW 1% METAL FILM	R188	2.0K 1V SW 1% METAL FILM	R189	353468H10	R190	353468H15											
C31	100PF 100V +20% DURA MICA	353468H31	R031	.10K 1V SW 1% METAL FILM	R191	2.0K 1V SW 1% METAL FILM	R192	353468H10	R193	353468H15											
DIODE		STYLE	DIODE		STYLE	DIODE		STYLE	DIAL		STYLE	INT CKT		STYLE	DIODE		STYLE	LED-1		RED LED (EDGE MOUNT)	
D01	1N615A 22.5V	R032	1N615A 22.5V	R033	1N615A 22.5V	R034	1N615A 22.5V	R035	1N615A 22.5V	R036	1N615A 22.5V	R037	1N615A 22.5V	R038	1N615A 22.5V	R039	1N615A 22.5V	R040	1N615A 22.5V	R041	1N615A 22.5V
D02	1N4148 75V	R042	1N4148 75V	R043	1N4148 75V	R044	1N4148 75V	R045	1N4148 75V	R046	1N4148 75V	R047	1N4148 75V	R048	1N4148 75V	R049	1N4148 75V	R050	1N4148 75V	R051	1N4148 75V
D03	1N4148 75V	R052	1N4148 75V	R053	1N4148 75V	R054	1N4148 75V	R055	1N4148 75V	R056	1N4148 75V	R057	1N4148 75V	R058	1N4148 75V	R059	1N4148 75V	R060	1N4148 75V	R061	1N4148 75V
D04	1N4148 75V	R062	1N4148 75V	R063	1N4148 75V	R064	1N4148 75V	R065	1N4148 75V	R066	1N4148 75V	R067	1N4148 75V	R068	1N4148 75V	R069	1N4148 75V	R070	1N4148 75V	R071	1N4148 75V
D05	1N4148 75V	R072	1N4148 75V	R073	1N4148 75V	R074	1N4148 75V	R075	1N4148 75V	R076	1N4148 75V	R077	1N4148 75V	R078	1N4148 75V	R079	1N4148 75V	R080	1N4148 75V	R081	1N4148 75V
D06	1N4148 75V	R082	1N4148 75V	R083	1N4148 75V	R084	1N4148 75V	R085	1N4148 75V	R086	1N4148 75V	R087	1N4148 75V	R088	1N4148 75V	R089	1N4148 75V	R090	1N4148 75V	R091	1N4148 75V
D07	1N4148 75V	R092	1N4148 75V	R093	1N4148 75V	R094	1N4148 75V	R095	1N4148 75V	R096	1N4148 75V	R097	1N4148 75V	R098	1N4148 75V	R099	1N4148 75V	R100	1N4148 75V	R101	1N4148 75V
D08	1N4148 75V	R102	1N4148 75V	R103	1N4148 75V	R104	1N4148 75V	R105	1N4148 75V	R106	1N4148 75V	R107	1N4148 75V	R108	1N4148 75V	R109	1N4148 75V	R110	1N4148 75V	R111	1N4148 75V
D09	1N4148 75V	R112	1N4148 75V	R113	1N4148 75V	R114	1N4148 75V	R115	1N4148 75V	R116	1N4148 75V	R117	1N4148 75V	R118	1N4148 75V	R119	1N4148 75V	R120	1N4148 75V	R121	1N4148 75V
D10	1N4148 75V	R122	1N4148 75V	R123	1N4148 75V	R124	1N4148 75V	R125	1N4148 75V	R126	1N4148 75V	R127	1N4148 75V	R128	1N4148 75V	R129	1N4148 75V	R130	1N4148 75V	R131	1N4148 75V
D11	1N4148 75V	R132	1N4148 75V	R133	1N4148 75V	R134	1N4148 75V	R135	1N4148 75V	R136	1N4148 75V	R137	1N4148 75V	R138	1N4148 75V	R139	1N4148 75V	R140	1N4148 75V	R141	1N4148 75V
D12	1N4148 75V	R142	1N4148 75V	R143	1N4148 75V	R144	1N4148 75V	R145	1N4148 75V	R146	1N4148 75V	R147	1N4148 75V	R148	1N4148 75V	R149	1N4148 75V	R150	1N4148 75V	R151	1N4148 75V
D13	1N4148 75V	R152	1N4148 75V	R153	1N4148 75V	R154	1N4148 75V	R155	1N4148 75V	R156	1N4148 75V	R157	1N4148 75V	R158	1N4148 75V	R159	1N4148 75V	R160	1N4148 75V	R161	1N4148 75V
D14	1N4148 75V	R162	1N4148 75V	R163	1N4148 75V	R164	1N4148 75V	R165	1N4148 75V	R166	1N4148 75V	R167	1N4148 75V	R168	1N4148 75V	R169	1N4148 75V	R170	1N4148 75V	R171	1N4148 75V
D15	1N4148 75V	R172	1N4148 75V	R173	1N4148 75V	R174	1N4148 75V	R175	1N4148 75V	R176	1N4148 75V	R177	1N4148 75V	R178	1N4148 75V	R179	1N4148 75V	R180	1N4148 75V	R181	1N4148 75V
D16	1N4148 75V	R182	1N4148 75V	R183	1N4148 75V	R184	1N4148 75V	R185	1N4148 75V	R186	1N4148 75V	R187	1N4148 75V	R188	1N4148 75V	R189	1N4148 75V	R190	1N4148 75V	R191	1N4148 75V
D17	1N4148 75V	R192	1N4148 75V	R193	1N4148 75V	R194	1N4148 75V	R195	1N4148 75V	R196	1N4148 75V	R197	1N4148 75V	R198	1N4148 75V	R199	1N4148 75V	R200	1N4148 75V	R201	1N4148 75V
D18	1N4148 75V	R202	1N4148 75V	R203	1N4148 75V	R204	1N4148 75V	R205	1N4148 75V	R206	1N4148 75V	R207	1N4148 75V	R208	1N4148 75V	R209	1N4148 75V	R210	1N4148 75V	R211	1N4148 75V
D19	1N4148 75V	R212	1N4148 75V	R213	1N4148 75V	R214	1N4148 75V	R215	1N4148 75V	R216	1N4148 75V										

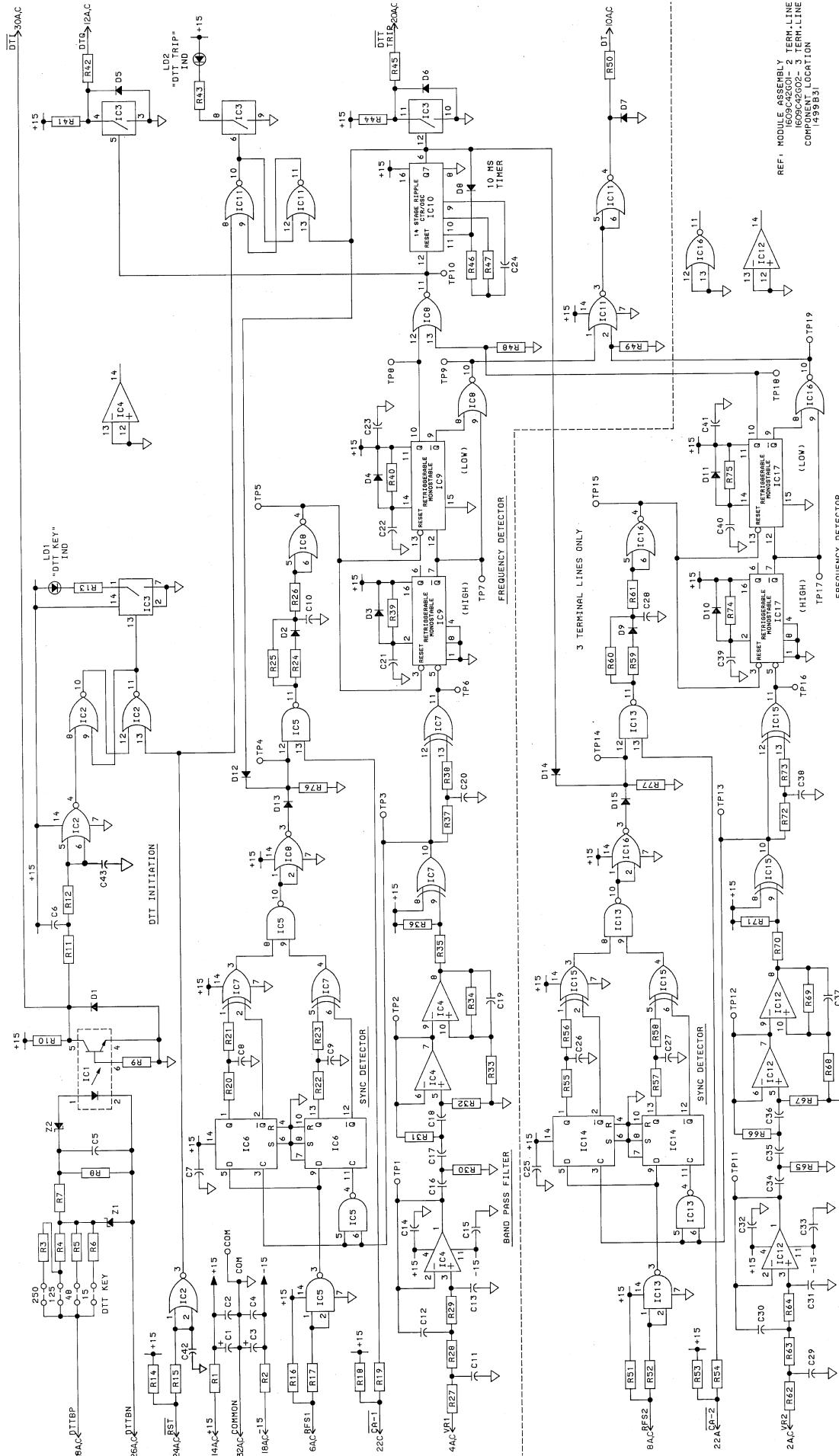
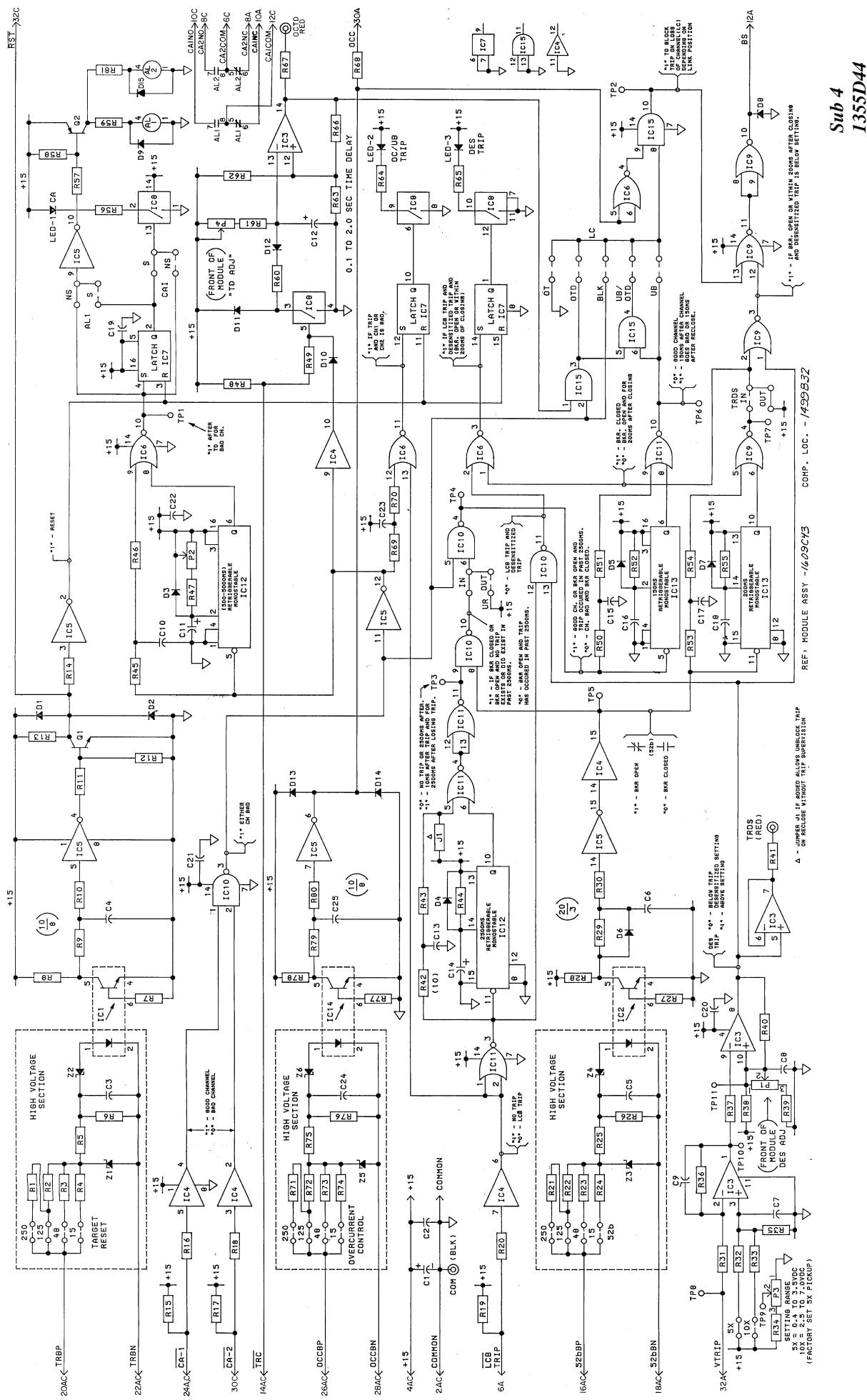


Figure 7: Internal Schematic DTT Module

CAPACITOR		GROUPS 1_2		GROUPS *	
STYLE	TYPE	DIODE	DIODE	STYLE	STYLE
C01 10 MFD 35V +5% TANTALUM	692253JH02	L001	RED LED (EDGE MOUNT)	3508A22H01	14
C02 0.1 MFD 10V +5% MET-POLYCARB	3532453JH02	L002	RED LED (EDGE MOUNT)	3508A22H01	14
C03 10 NF 10V +5% MET-POLYCARB	3532453JH02	R01	2.7 OHM 1/2W 5X CARBON	187220H01	11
C04 0.1 MFD 10V +5% MET-POLYCARB	3532453JH02	R02	2.7 OHM 1/2W 5X CARBON	187220H01	11
C05 0.1 MFD 10V +5% MET-POLYCARB	3532453JH02	R03	20K 1/2W 5X CARBON	185202H08	11
C06 0.1 MFD 10V +5% MET-POLYCARB	3532453JH02	R04	20K 2W 5X CARBON	185202H08	11
C07 0.1 MFD 10V +5% MET-POLYCARB	3532453JH02	R05	6.8K 2W 5X CARBON	185202H08	11
C08 0.015 MFD 20V +5% MET-POLYCARB	353246JH05	R06	430 OHM 1/2W 25 METAL GLAZE	649951H047	11
C09 0.015 MFD 20V +5% MET-POLYCARB	353246JH05	R07	430 OHM 1/2W 25 METAL GLAZE	649951H047	11
C10 0.022 MFD 50V +5% MET-POLYCARB	3532455JH01	R08	3.0K 1/2W 1X METAL FILM	649951H23	11
C11 66940PF 50V +2% POLYSTY	7027A57PH03	R09	30.1K 1/2W 1X METAL FILM	649951H23	11
C12 5100 PF 50V +2% MICA	117753JH05	R10	55.1K 1/2W 1X METAL FILM	649951H23	11
C13 1500 PF 50V +2% MICA	117753JH05	R11	10K 1/2W 1X METAL FILM	649951H23	11
C14 0.1 MFD 50V +20% CERAMIC	3532252JH13	R12	55.1K 1/2W 1X METAL FILM	649951H23	11
C15 0.1 MFD 50V +20% CERAMIC	3532252JH13	R13	10K 1/2W 1X METAL FILM	649951H23	11
C16 66940PF 50V +20% POLYSTY	7027A57PH03	R14	10K 1/2W 1X METAL FILM	649951H23	11
C17 3000 PF 50V +2% MICA	117753JH05	R15	10K 1/2W 1X METAL FILM	649951H23	11
C18 3000 PF 50V +2% MICA	117753JH05	R16	10K 1/2W 1X METAL FILM	649951H23	11
C19 20 PF 300V +5% MICA	353232JH47	R17	55.1K 1/2W 1X METAL FILM	649951H23	11
C20 510 PF 300V +5% MICA	681454H10	R18	55.1K 1/2W 1X METAL FILM	649951H23	11
C21 0.016 MFD 200V +2X MET-POLYCARB	3533353JH06	R19	3.0K 1/2W 1X METAL FILM	649951H23	11
C22 0.015 MFD 200V +2X MET-POLYCARB	3533225JH13	R20	10K 1/2W 1X METAL FILM	649951H23	11
C23 0.015 MFD 200V +2X MET-POLYCARB	3533225JH13	R21	10K 1/2W 1X METAL FILM	649951H23	11
C24 0.001 MFD 200V +2X MET-POLYCARB	3533454H02	R22	10K 1/2W 1X METAL FILM	649951H23	11
C25 0.1 MFD 50V +20% CERAMIC	3532322JH13	R23	10K 1/2W 1X METAL FILM	649951H23	11
C26 0.01 MFD 50V +20% CERAMIC	3532322JH13	R24	10K 1/2W 1X METAL FILM	649951H23	11
C27 0.01 MFD 50V +20% CERAMIC	3532322JH13	R25	20K 1/2W 1X METAL FILM	649951H23	11
C28 0.01 MFD 50V +20% CERAMIC	3532322JH13	R26	10K 1/2W 1X METAL FILM	649951H23	11
C29 0.01 MFD 50V +20% CERAMIC	3532322JH13	R27	6.1K 1/2W 1X METAL FILM	649951H23	11
C30 0.01 MFD 50V +20% CERAMIC	3532322JH13	R28	150K 1/2W 1X METAL FILM	649951H23	11
C31 0.01 MFD 50V +20% CERAMIC	3532322JH13	R29	10K 1/2W 1X METAL FILM	649951H23	11
C32 0.01 MFD 50V +20% CERAMIC	3532322JH13	R30	10K 1/2W 1X METAL FILM	649951H23	11
C33 0.01 MFD 50V +20% CERAMIC	3532322JH13	R31	92.5K 1/2W 1X METAL FILM	3532A3H09	11
C34 66,700 PF 50V +25% POLYSTY	353572A2H65	R32	30K 1/2W 1X METAL FILM	3532A3H09	11
C35 3000 PF 500V +2% MICA	3532323JH54	R33	10K 1/2W 1X METAL FILM	3532A3H09	11
C36 3000 PF 500V +2% MICA	3532323JH54	R34	28K 1/2W 1X METAL FILM	3532A3H09	11
C37 20 PF 300V +5% MICA	3532323JH47	R35	10K 1/2W 1X METAL FILM	3532A3H09	11
C38 510 PF 500V +2% MICA	681454H10	R36	55.1K 1/2W 1X METAL FILM	3532A3H09	11
C39 0.0168 MFD 200V +2X MET-POLYCARB	353258JH05	R37	55.1K 1/2W 1X METAL FILM	3532A3H09	11
C40 150 PF 500V +2% MICA	117753JH05	R38	10K 1/2W 1X METAL FILM	3532A3H09	11
C41 0.1 MFD 50V +20% CERAMIC	353258JH05	R39	10K 1/2W 1X METAL FILM	3532A3H09	11
C42 0.015 MFD 100V ±20% CERAMIC	353258JH05	R40	10K 1/2W 1X METAL FILM	3532A3H09	11
C43 0.05MF 100V ±20% CERAMIC	18A4663H02	R41	10K 1/2W 1X METAL FILM	3532A3H09	11
DIODE		STYLE		STYLE	
D01 1N4148 75V	96A6322PH02	R42	10K 1/2W 1X METAL FILM	3532A3H09	11
D02 1N4148 75V	96A6322PH02	R43	55.1K 1/2W 1X METAL FILM	3532A3H09	11
D03 1N4148 75V	96A6322PH02	R44	55.1K 1/2W 1X METAL FILM	3532A3H09	11
D04 1N4148 75V	96A6322PH02	R45	55.1K 1/2W 1X METAL FILM	3532A3H09	11
D05 1N4148 75V	96A6322PH02	R46	55.1K 1/2W 1X METAL FILM	3532A3H09	11
D06 1N4148 75V	96A6322PH02	R47	43.2K 1/2W 1X METAL FILM	3532A3H09	11
D07 1N4148 75V	96A6322PH02	R48	10K 1/2W 1X METAL FILM	3532A3H09	11
D08 1N4148 75V	96A6322PH02	R49	10K 1/2W 1X METAL FILM	3532A3H09	11
D09 1N4148 75V	96A6322PH02	R50	10K 1/2W 1X METAL FILM	3532A3H09	11
D10 1N4148 75V	96A6322PH02	R51	55.1K 1/2W 1X METAL FILM	3532A3H09	11
D11 1N4148 75V	96A6322PH02	R52	10K 1/2W 1X METAL FILM	3532A3H09	11
D12 1N4148 75V	96A6322PH02	R53	10K 1/2W 1X METAL FILM	3532A3H09	11
D13 1N4148 75V	96A6322PH02	R54	10K 1/2W 1X METAL FILM	3532A3H09	11
D14 1N4148 75V	96A6322PH02	R55	10K 1/2W 1X METAL FILM	3532A3H09	11
D15 1N4148 75V	96A6322PH02	R56	10K 1/2W 1X METAL FILM	3532A3H09	11
INT CKT		STYLE		STYLE	
I01 4N35 OPTICAL COUPLED	711957JH04	R57	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I02 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R58	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I03 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R59	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I04 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R60	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I05 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R61	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I06 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R62	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I07 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R63	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I08 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R64	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I09 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R65	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I10 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R66	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I11 MC14103BAL QUAD 2-INPUT NOR	353270A9H05	R67	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I12 TL0711J QUAD OP AMP	353270A9H05	R68	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I13 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R69	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I14 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R70	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I15 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R71	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I16 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R72	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I17 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R73	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I18 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R74	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I19 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R75	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I20 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R76	1.1K 1/3W 1X METAL FILM	3532A3H09	04
I21 MC4011BAL QUAD 2-INPUT NOR	353270A9H05	R77	1.1K 1/3W 1X METAL FILM	3532A3H09	04

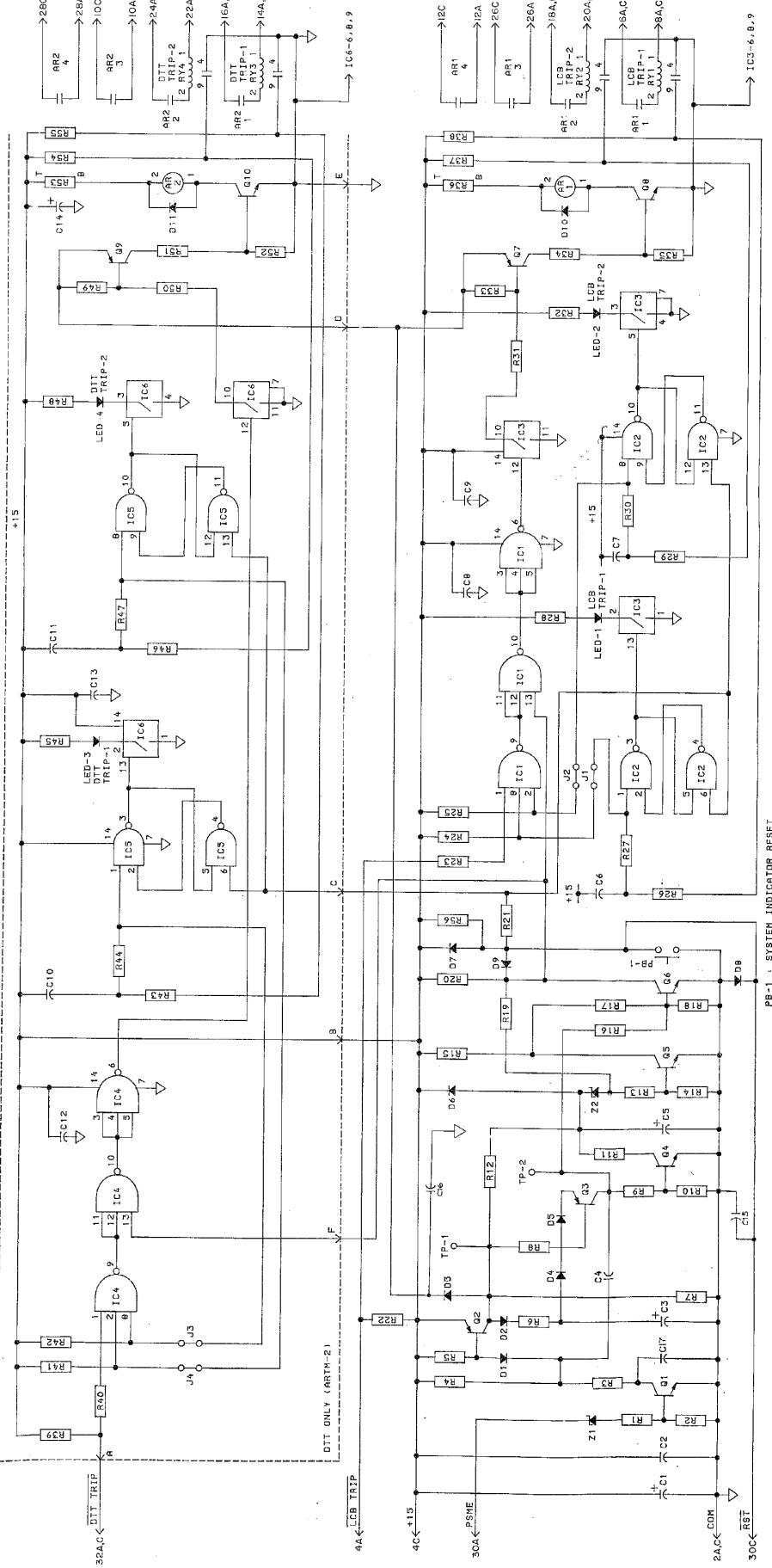
Figure 7a: Internal Schematic DTT Module



COMPONENT	STYLE	DESCRIPTION
C01	10 μ F D 35V + -5% TANTALUM	
C02	1.5 MFD 35V + -5% MET-POLY CRRB	892-5346H12
C03	1.5 MFD 35V + -5% MET-POLY CRRB	892-5346H12
C04	.22 MFD 100V + -5% MET-POLY CRRB	893-1684H10
C05	.10 MFD 50V + -5% MET-POLY CRRB	893-1684H10
C06	.33 MFD 100V + -5% MET-POLY CRRB	893-1684H11
C07	.10 MFD 100V + -5% MET-POLY CRRB	893-1684H11
C08	.08 MFD 100V + -5% MET-POLY CRRB	893-1684H08
C09	.021 MFD 100V + -5% MET-POLY CRRB	893-1684H08
C10	.152 PF 35V + -5% MET-POLY CRRB	893-1684H21
C11	.68 MFD 35V + -5% TANTALUM	893-1684H21
C12	6.8 MFD 35V + -5% TANTALUM	893-1684H21
C13	6.8 MFD 35V + -5% TANTALUM	893-1684H21
C14	1.5 MFD 35V + -5% TANTALUM	893-1684H21
C15	1.5 MFD 35V + -5% TANTALUM	893-1684H21
C17	.10 MFD 50V + -5% MET-POLY CRRB	893-1684H10
C18	.10 MFD 20V + -5% MET-POLY CRRB	893-1684H10
C19	.10 MFD 20V + -5% MET-POLY CRRB	893-1684H10
C20	.10 MFD 20V + -5% MET-POLY CRRB	893-1684H10
C21	.022 MFD 100V + -5% MET-POLY CRRB	893-1684H21
C22	.022 MFD 100V + -5% MET-POLY CRRB	893-1684H21
C23	.022 MFD 100V + -5% MET-POLY CRRB	893-1684H21
C24	.022 MFD 100V + -5% MET-POLY CRRB	893-1684H21
C25	.022 MFD 100V + -5% MET-POLY CRRB	893-1684H21
D01	1N4558	INT DIODE
D02	1N4558	INT DIODE
D03	1N4558	INT DIODE
D04	1N4558	INT DIODE
D05	1N4558	INT DIODE
D06	1N4558	INT DIODE
D08	1N4558	INT DIODE
D09	1N4558	INT DIODE
D10	1N4558	INT DIODE
D11	1N4558	INT DIODE
D12	1N4558	INT DIODE
D13	1N4558	INT DIODE
D14	1N4558	INT DIODE
D15	1N4558	INT DIODE

COMPONENT	STYLE	DESCRIPTION
R01	20K 2N + -5% CARBON	185A02H58
R02	20K 2N + -5% CARBON	185A02H58
R03	6.8K OHM 1/2W + 2% METAL GLAZE	185A02H58
R04	4.3K OHM 1/2W + 2% METAL GLAZE	185A02H58
R05	3.0K 1/2W + 2% METAL GLAZE	185A02H58
R07	1.5K 1/4W 12 METAL FILM	185A02H58
R08	26.7K 1/8W 12 METAL FILM	185A02H58
R09	45.3K 1/8W 12 METAL FILM	185A02H58
R10	1.0K 1/8W 12 METAL FILM	185A02H58
R12	2K 2W + -5% CARBON	185A02H58
R13	15K 1BW 12 METAL FILM	185A02H58
R14	10K 1BW 12 METAL FILM	185A02H58
R15	51.1K 1BW 12 METAL FILM	185A02H58
R16	51.1K 1BW 12 METAL FILM	185A02H58
R18	50K 1BW 12 METAL FILM	185A02H58
R20	1.0K 1BW 12 METAL FILM	185A02H58
R21	12K 1BW 12 METAL FILM	185A02H58
R22	12K 1BW 12 METAL FILM	185A02H58
R23	12K 1BW 12 METAL FILM	185A02H58
R24	1.0K 1BW 12 METAL FILM	185A02H58
R25	57.6K 12 METAL FILM	185A02H58
R29	1.0K 1BW 12 METAL FILM	185A02H58
R30	1.0K 1BW 12 METAL FILM	185A02H58
R31	34.8K 1BW 12 METAL FILM	185A02H58
R32	30.4K 1BW 12 METAL FILM	185A02H58
R33	1.0K 1BW 12 METAL FILM	185A02H58
R35	24.9K 1BW 12 METAL FILM	185A02H58
R37	1.0K 1BW 12 METAL FILM	185A02H58
R38	8.25K 12 METAL FILM	185A02H58
R39	2.43K 12 METAL FILM	185A02H58
R40	2.43K 12 METAL FILM	185A02H58
R41	1.0K 1BW 12 METAL FILM	185A02H58
R42	1.0K 1BW 12 METAL FILM	185A02H58
R43	1.0K 1BW 12 METAL FILM	185A02H58
R44	3.65K 12 METAL FILM	185A02H58
R45	1.0K 1BW 12 METAL FILM	185A02H58
R47	1.0K 1BW 12 METAL FILM	185A02H58
R48	1.0K 1BW 12 METAL FILM	185A02H58
R49	5.0K 1BW 12 METAL FILM	185A02H58
R50	1.0K 1BW 12 METAL FILM	185A02H58
R51	1.0K 1BW 12 METAL FILM	185A02H58
R52	1.0K 1BW 12 METAL FILM	185A02H58
R53	1.0K 1BW 12 METAL FILM	185A02H58
R54	1.0K 1BW 12 METAL FILM	185A02H58
R55	2.0K 1BW 12 METAL FILM	185A02H58
R56	.02K 1BW 12 METAL FILM	185A02H58
R57	4.39K 12 METAL FILM	185A02H58
R58	1.50M 1BW 12 METAL FILM	185A02H58
R59	1.0K 1BW 12 METAL FILM	185A02H58
R60	9.29K 1BW 12 METAL FILM	185A02H58
R62	2.0K 1BW 12 METAL FILM	185A02H58
R64	3.21K 12 METAL FILM	185A02H58
R65	3.0K 1BW 12 METAL FILM	185A02H58
R67	3.0K 1BW 12 METAL FILM	185A02H58
R68	1K 1BW 12 METAL FILM	185A02H58
R69	5.1K 1BW 12 METAL FILM	185A02H58
R70	1.0K 1BW 12 METAL FILM	185A02H58
R71	2.0K 1BW 12 METAL FILM	185A02H58
R72	1.0K 1BW 12 METAL FILM	185A02H58
R73	4.39K 12 METAL FILM	185A02H58
R74	4.39K 12 METAL FILM	185A02H58
R75	3.0K 1BW 12 METAL FILM	185A02H58
R77	1.0K 1BW 12 METAL FILM	185A02H58
R78	5.1K 1BW 12 METAL FILM	185A02H58
R80	1.0K 1BW 12 METAL FILM	185A02H58
INT CKT	STYLE	
I001	4N55 OPTICAL COUPLER	
I002	1N5215 JFET COUPLES	
I004	MC42010P HEX BUFFER/INVERTER	
I005	MC42010P QUAD 2-IN-1 INPUT NOR	
I006	MC42010P QUAD NOR LATCH SWITCH	
I008	MC42011P QUAD 2-IN-1 INPUT NOR	
I010	MC42011P QUAD 2-IN-1 INPUT NOR	
I011	MC42011P QUAD 2-IN-1 INPUT NOR	
I012	MC42011P QUAD MONO MULTIVIB	
I013	MC42011P QUAD PSE	
I015	MC42011P QUAD 2-IN-1 INPUT AND	
I020	774-4593H01	
I021	774-4593H01	
I024	352-4593H01	
I025	352-4593H01	
I026	352-4593H01	
I027	352-4593H01	
I028	352-4593H01	
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I030	352-4593H01	
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I201	352-4593H01	
I202	352-4593H01	
I203	352-4593H01	
I204	352-4593H01	
I205	352-4593H01	
I206	352-4593H01	
I207	352-4593H01</td	

Figure 9: Internal Schematic ARTM-1 and 2 Module



REF.1 MODULE ASSEMBLY - 1603C44G01 - ARTM-1.
1603C44G02 - ARTM-2.
COMPONENT LOC. - 158-C27801 - ARTM-2 SUB-ASSEMBLY
- 149-B639 - ARTM-1 -
- 148-B632 - ARTM-2

1609C44G01 & 1609C44G02

PART NAME	DESCRIPTION	STYLE	PART NAME	ITEM	ITEM
AR-1	RELAY	1-6 OHM COIL, 10V, NA	AR2	AR UNIT	1.6 OHM COIL, 10V, NA
C1	CAPACITOR	.100 MFD, .35V, +20% TANTALUM	C10	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C2	CAPACITOR	.01 MFD, .35V, +20% MET-POLY CARB	C11	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C3	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C12	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C4	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C13	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C5	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C14	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C6	CAPACITOR	.013 MFD, .100V, +5% MET-POLY CARB	D11	DIODE	1N8816
C7	CAPACITOR	.1 MFD 100V, +5% MET-POLY CARB	I14	IC	HC4013BAL TRIPLE 3 INPUT NAND
C8	CAPACITOR	.013 MFD, .100V, +5% MET-POLY CARB	I15	IC	MK1406BAL QUAD BILATERAL SWITCH
C9	CAPACITOR	.033 MFD, .100V, +5% MET-POLY CARB	I16	IC	0 OHM
C15	CAX, CAY, CAY2	.220PF, .000V, +5% DIPPED CARB	J03	JUPPER	0 OHM
C17	CAPACITOR	.220PF, .000V, +5% DIPPED CARB	J04	JUPPER	RED LED (EDGE MOUNT)
D1	DIODE	1N6454	J05	LED3	RED LED (EDGE MOUNT)
D2	DIODE	1N6454	J06	LED4	RED LED (EDGE MOUNT)
D3	DIODE	1N6454	Q9	TRANSISTOR	2N2907A PNP
D4	DIODE	1N6454	D4	VTHRO	D4-VTHRO NPN
D5	DIODE	1N6454	R39	RESISTOR	51.1K 1/4W 1% METAL FILM
D7	DIODE	1N6454	R40	RESISTOR	10K 1/4W 1% METAL FILM
D8	DIODE	1N6454	R41	RESISTOR	51.1K 1/4W 1% METAL FILM
D9	DIODE	1N6454	R42	RESISTOR	51.1K 1/4W 1% METAL FILM
D10	DIODE	1N6454	R43	RESISTOR	10K 1/4W 1% METAL FILM
I1	INT. CKT	MC14012BAL TRIPLE 3 INPUT NAND	R44	RESISTOR	51.1K 1/4W 1% METAL FILM
I2	INT. CKT	MC14013BAL QUAD BILATERAL SWITCH	R45	RESISTOR	10K 1/4W 1% METAL FILM
I3	INT. CKT	MC1406BAL QUAD BILATERAL SWITCH	R46	RESISTOR	51.1K 1/4W 1% METAL FILM
J1	JUPPER	0 OHM	R47	RESISTOR	3.01K 1/4W 1% METAL FILM
J2	JUPPER	0 OHM	R48	RESISTOR	5.62K 1/4W 1% METAL FILM
LED-1	DIODE	RED LED (EDGE MOUNT)	R50	RESISTOR	3.01K 1/4W 1% METAL FILM
LED-2	DIODE	RED LED (EDGE MOUNT)	R51	RESISTOR	3.01K 1/4W 1% METAL FILM
P5-1	SWITCH	PUSHBUTTON	R52	RESISTOR	3.01K 1/4W 1% METAL FILM, WIRE WOUND
Q1	TRANSISTOR	2N2222A PNP	R53	RESISTOR	22.4 OHM 25W +5% W/W
Q2	TRANSISTOR	2N2222A PNP	R54	RESISTOR	15K 1/4W 1% METAL FILM
Q3	TRANSISTOR	2N2222A PNP	R55	RESISTOR	15K 1/4W 1% METAL FILM
Q4	TRANSISTOR	2N2222A, PNP	RY3	REED RELAY	.5 AMP DC PICKUP, FORM A
Q5	TRANSISTOR	2N2222A, PNP	RY4	REED RELAY	.5 AMP DC PICKUP, FORM A
Q6	TRANSISTOR	2N2222A, PNP			
Q7	TRANSISTOR	2N2222A, PNP			
Q8	TRANSISTOR	DN40VHO NPN			

R1	RESISTOR	1K 1/4W 1% METAL FILM	B18A19H48
R2	RESISTOR	3.01K 1/4W 1% METAL FILM	B18A19H48
R3	RESISTOR	5.01K 1/4W 1% METAL FILM	B18A19H48
R4	RESISTOR	5.01K 1/4W 1% METAL FILM	B18A19H48
R5	RESISTOR	100 OHM 1/4W METAL FILM	B18A19H48
R6	RESISTOR	20K 1/4W METAL FILM	B18A20H74
R7	RESISTOR	20K 1/4W METAL FILM	B18A20H74
R8	RESISTOR	1K 1/4W METAL FILM	B18A20H74
R9	RESISTOR	1K 1/4W METAL FILM	B18A20H74
R10	RESISTOR	20K 1/4W METAL FILM	B18A20H74
R11	RESISTOR	10 OHM 1/2W +5% CARBON	B18A20H91
R12	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R13	RESISTOR	1K 1/4W METAL FILM	B18A19H48
R14	RESISTOR	20K 1/4W METAL FILM	B18A20H91
R15	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R16	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R17	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R18	RESISTOR	20K 1/4W METAL FILM	B18A20H91
R19	RESISTOR	1K 1/4W METAL FILM	B18A20H91
R20	RESISTOR	1K 1/4W METAL FILM	B18A20H91
R21	RESISTOR	1K 1/4W METAL FILM	B18A20H91
R22	RESISTOR	51.1K 1/4W METAL FILM	B18A20H91
R23	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R24	RESISTOR	51.1K 1/4W METAL FILM	B18A20H91
R25	RESISTOR	51.1K 1/4W METAL FILM	B18A20H91
R26	RESISTOR	51.1K 1/4W METAL FILM	B18A20H91
R27	RESISTOR	10K 1/4W METAL FILM	B18A20H91
R28	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R29	RESISTOR	5.01K 1/4W METAL FILM	B18A20H91
R30	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R31	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R32	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R33	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R34	RESISTOR	3.01K 1/4W METAL FILM	B18A20H91
R35	RESISTOR	22.4 OHM 25W +5% WIREWOUND	B18A19H48
R36	RESISTOR	15K 1/4W 1% METAL FILM	B18A20H91
R37	RESISTOR	5.0K 1/4W 1% METAL FILM	B18A20H91
R38	RESISTOR	5.0K 1/4W 1% METAL FILM	B18A20H91
R39	RESISTOR	5.0K 1/4W 1% METAL FILM	B18A20H91
R40	RESISTOR	5.0K 1/4W 1% METAL FILM	B18A20H91
RY-1	REED RELAY	.5 AMP DC PICKUP, FORM A	144262501
RY-2	REED RELAY	.5 AMP DC PICKUP, FORM A	144262501
Z1	ZENER	1N5335B 6.8V 500 MW	862A888107
Z2	ZENER	1N960B 9.1V 500 MW	196A79710

158IC27GO1

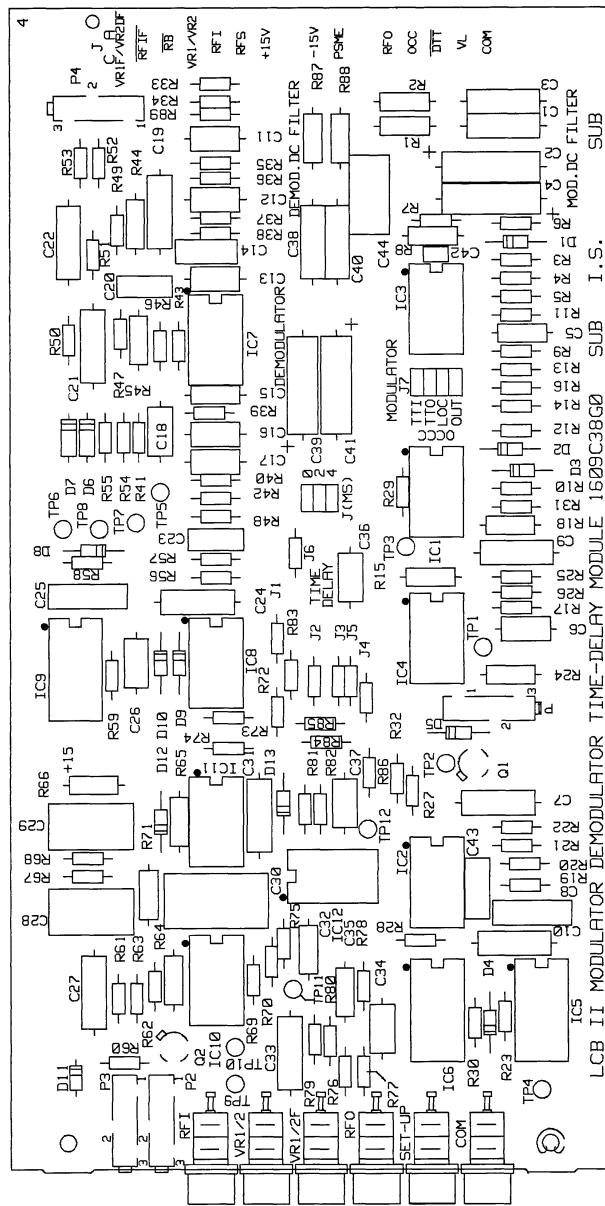
PART NAME	DESCRIPTION	STYLE	PART NAME	ITEM	ITEM
AR-1	RELAY	1-6 OHM COIL, 10V, NA	AR2	AR UNIT	1.6 OHM COIL, 10V, NA
C1	CAPACITOR	.100 MFD, .35V, +20% TANTALUM	C10	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C2	CAPACITOR	.01 MFD, .35V, +20% MET-POLY CARB	C11	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C3	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C12	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C4	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C13	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C5	CAPACITOR	.017 MFD, .35V, +20% TANTALUM	C14	CAPACITOR	.033 MFD, 100V, +5% MET-POLY CARB
C6	CAPACITOR	.013 MFD, .100V, +5% MET-POLY CARB	D11	DIODE	1N8816
C7	CAPACITOR	.1 MFD 100V, +5% MET-POLY CARB	I14	IC	HC4013BAL TRIPLE 3 INPUT NAND
C8	CAPACITOR	.013 MFD, .100V, +5% MET-POLY CARB	I15	IC	MK1406BAL QUAD BILATERAL SWITCH
C9	CAPACITOR	.033 MFD, .100V, +5% MET-POLY CARB	I16	IC	0 OHM
C15	CAX, CAY, CAY2	.220PF, .000V, +5% DIPPED CARB	J03	JUPPER	0 OHM
C17	CAPACITOR	.220PF, .000V, +5% DIPPED CARB	J04	JUPPER	RED LED (EDGE MOUNT)
D1	DIODE	1N6454	J05	LED3	RED LED (EDGE MOUNT)
D2	DIODE	1N6454	J06	LED4	RED LED (EDGE MOUNT)
D3	DIODE	1N6454	Q9	TRANSISTOR	2N2907A PNP
D4	DIODE	1N6454	D4	VTHRO	D4-VTHRO NPN
D5	DIODE	1N6454	R39	RESISTOR	51.1K 1/4W 1% METAL FILM
D7	DIODE	1N6454	R40	RESISTOR	10K 1/4W 1% METAL FILM
D8	DIODE	1N6454	R41	RESISTOR	51.1K 1/4W 1% METAL FILM
D9	DIODE	1N6454	R42	RESISTOR	51.1K 1/4W 1% METAL FILM
D10	DIODE	1N6454	R43	RESISTOR	10K 1/4W 1% METAL FILM
I1	INT. CKT	MC14012BAL TRIPLE 3 INPUT NAND	R44	RESISTOR	10K 1/4W 1% METAL FILM
I2	INT. CKT	MC14013BAL QUAD BILATERAL SWITCH	R45	RESISTOR	51.1K 1/4W 1% METAL FILM
I3	INT. CKT	MC1406BAL QUAD BILATERAL SWITCH	R46	RESISTOR	51.1K 1/4W 1% METAL FILM
J1	JUPPER	0 OHM	R47	RESISTOR	3.01K 1/4W 1% METAL FILM
J2	JUPPER	0 OHM	R48	RESISTOR	3.01K 1/4W 1% METAL FILM
LED-1	DIODE	RED LED (EDGE MOUNT)	R49	RESISTOR	3.01K 1/4W 1% METAL FILM
LED-2	DIODE	RED LED (EDGE MOUNT)	R50	RESISTOR	3.01K 1/4W 1% METAL FILM
P5-1	SWITCH	PUSHBUTTON	R51	RESISTOR	3.01K 1/4W 1% METAL FILM
Q1	TRANSISTOR	2N2222A PNP	R52	RESISTOR	22.4 OHM 25W +5% W/W
Q2	TRANSISTOR	2N2222A PNP	R53	RESISTOR	15K 1/4W 1% METAL FILM
Q3	TRANSISTOR	2N2222A PNP	R54	RESISTOR	15K 1/4W 1% METAL FILM
Q4	TRANSISTOR	2N2222A, PNP	RY3	REED RELAY	.5 AMP DC PICKUP, FORM A
Q5	TRANSISTOR	2N2222A, PNP	RY4	REED RELAY	.5 AMP DC PICKUP, FORM A
Q6	TRANSISTOR	2N2222A, PNP			
Q7	TRANSISTOR	2N2222A, PNP			
Q8	TRANSISTOR	DN40VHO NPN			

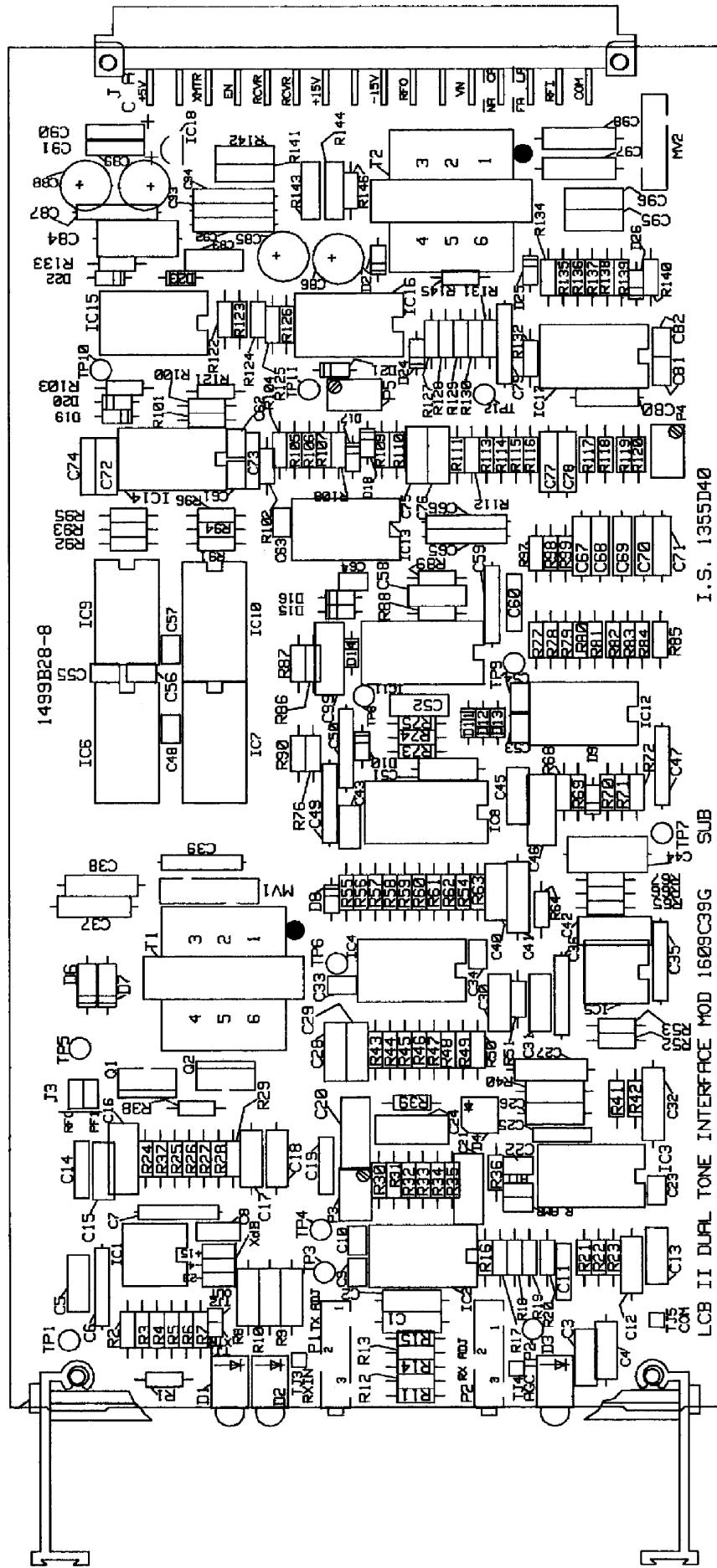
Sub 3
135D45

Figure 9a: Internal Schematic ARTM-I and 2 Module

Figure 10: Component Location MD/DTD Module

Sub 9
1609C38





Sub 9
1609C39

Figure 11: Component Location IFDT Module

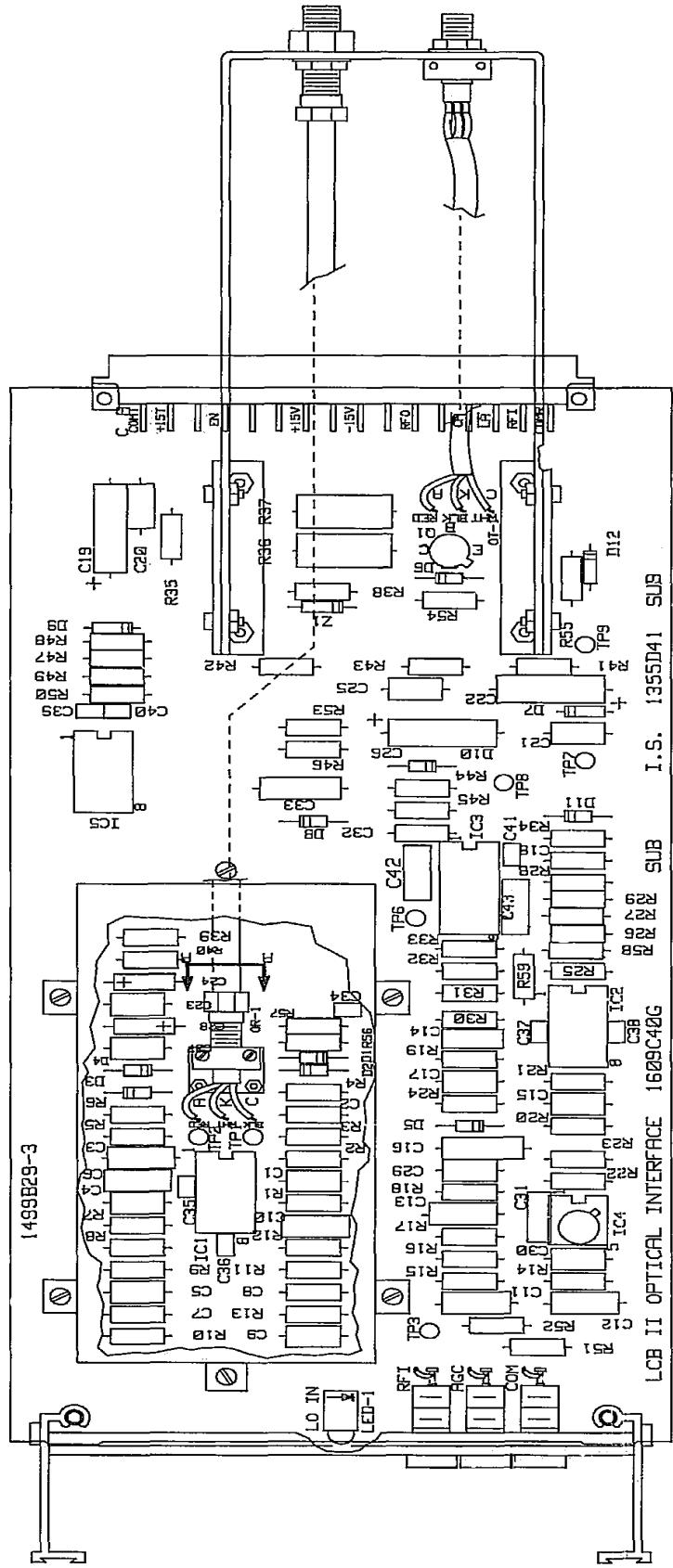


Figure 12: Component Location IFO (Standard) Module

Sub 2
1499B44

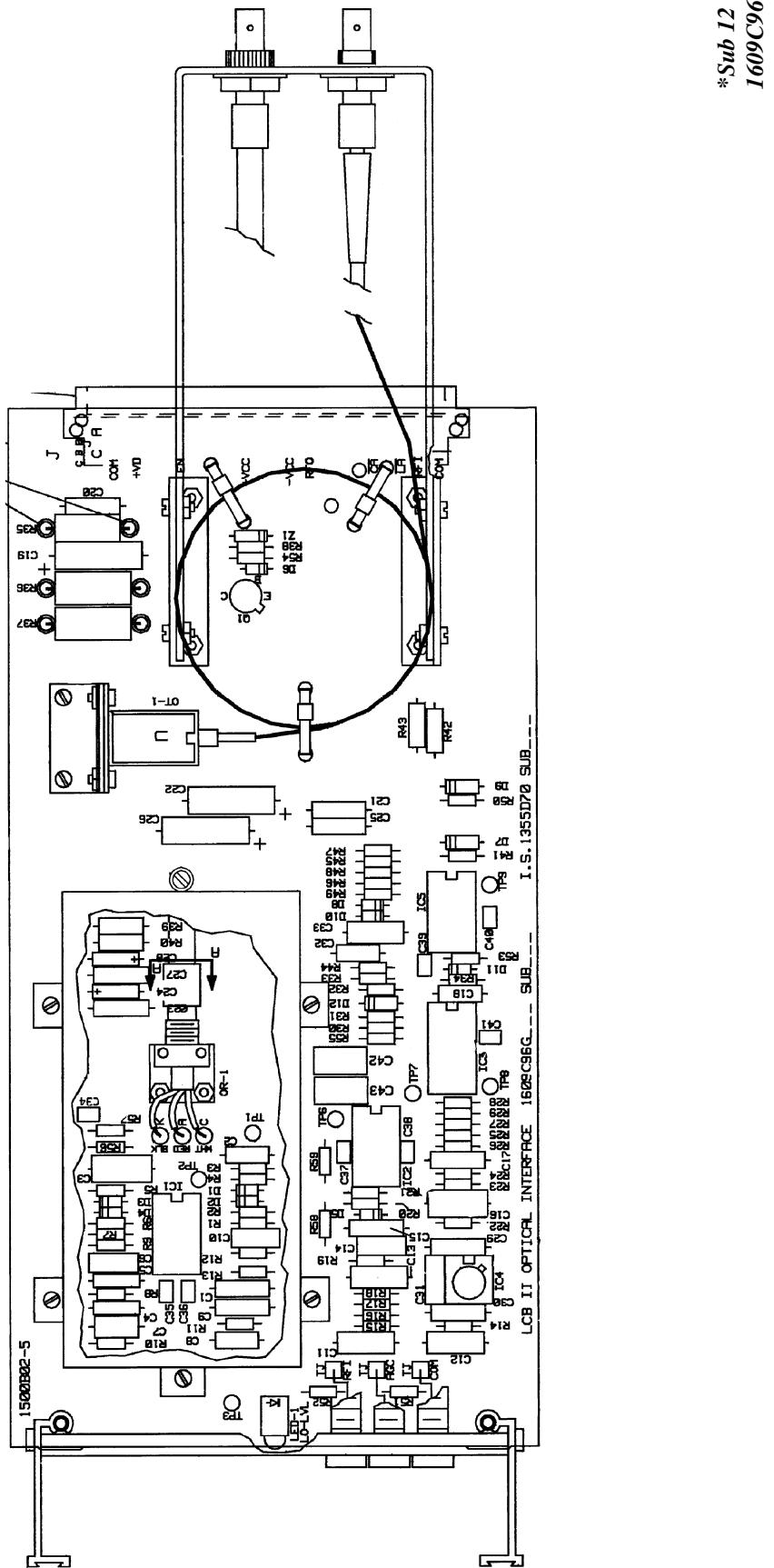
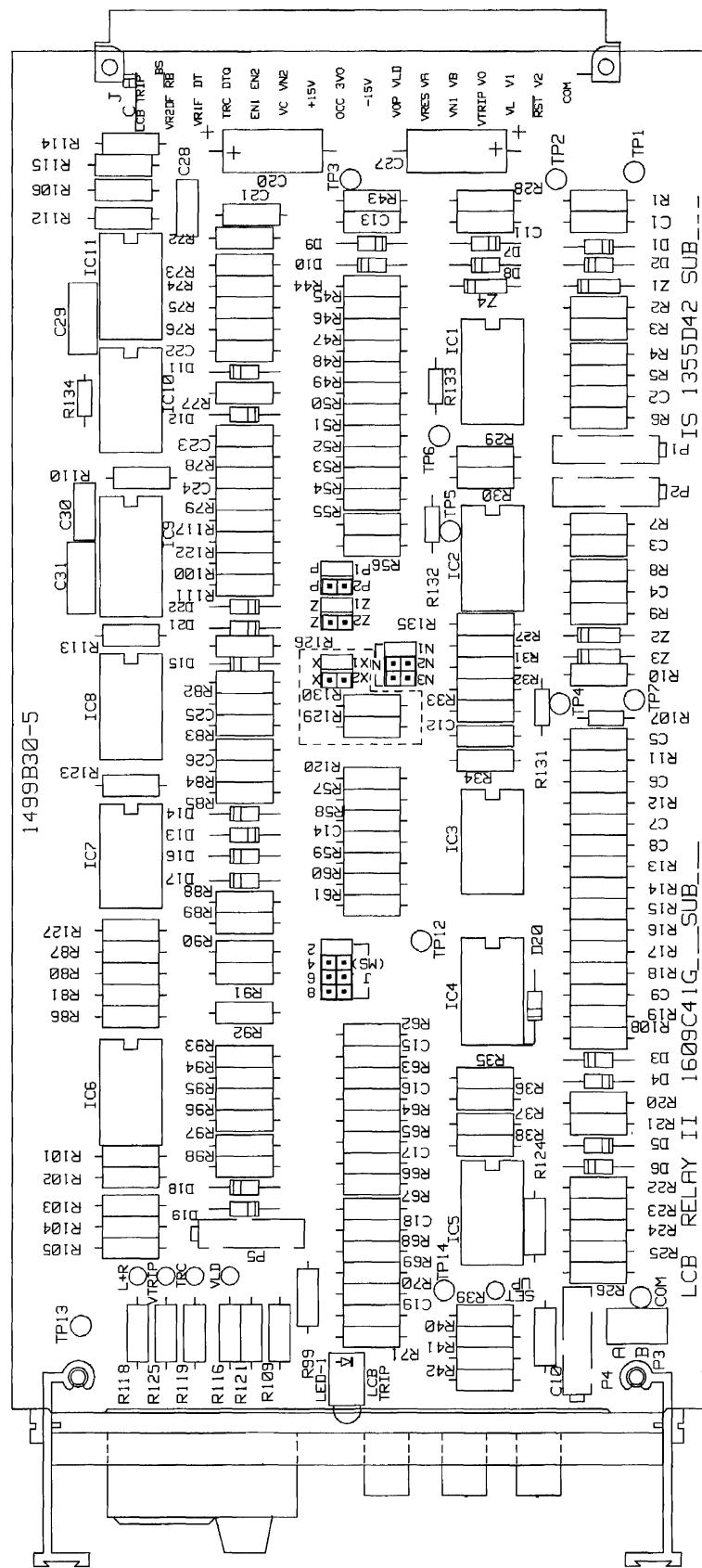


Figure 13: Component Location IFO (High Power) Module

Figure 14: Component Location Relay Module

Sub 13
1609C41



Sub 6
1609C42

Figure 15: Component Location DTT Module

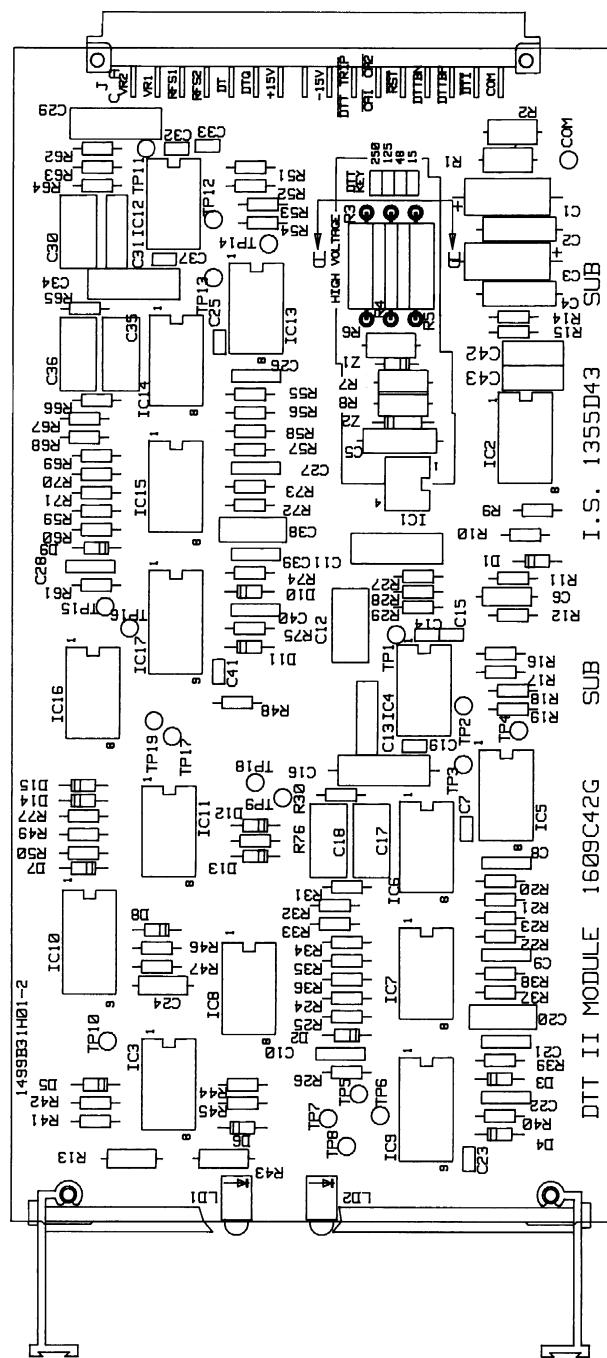
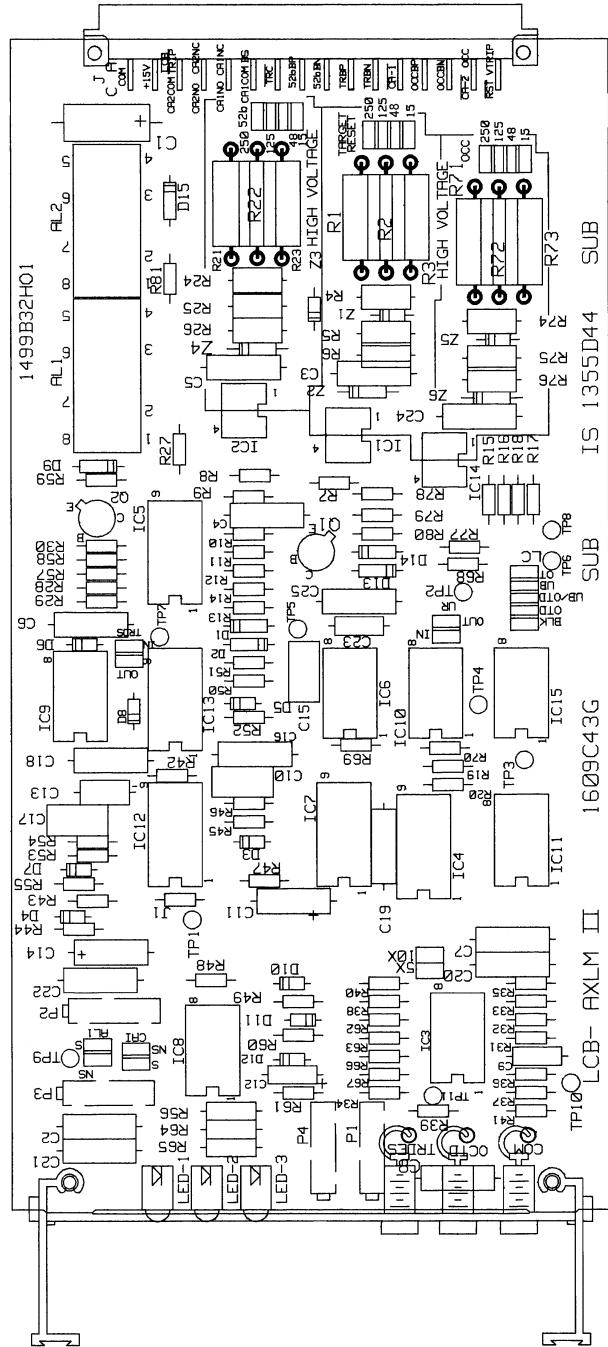


Figure I6: Component Location ALXM Module



Sub 2
1499B49

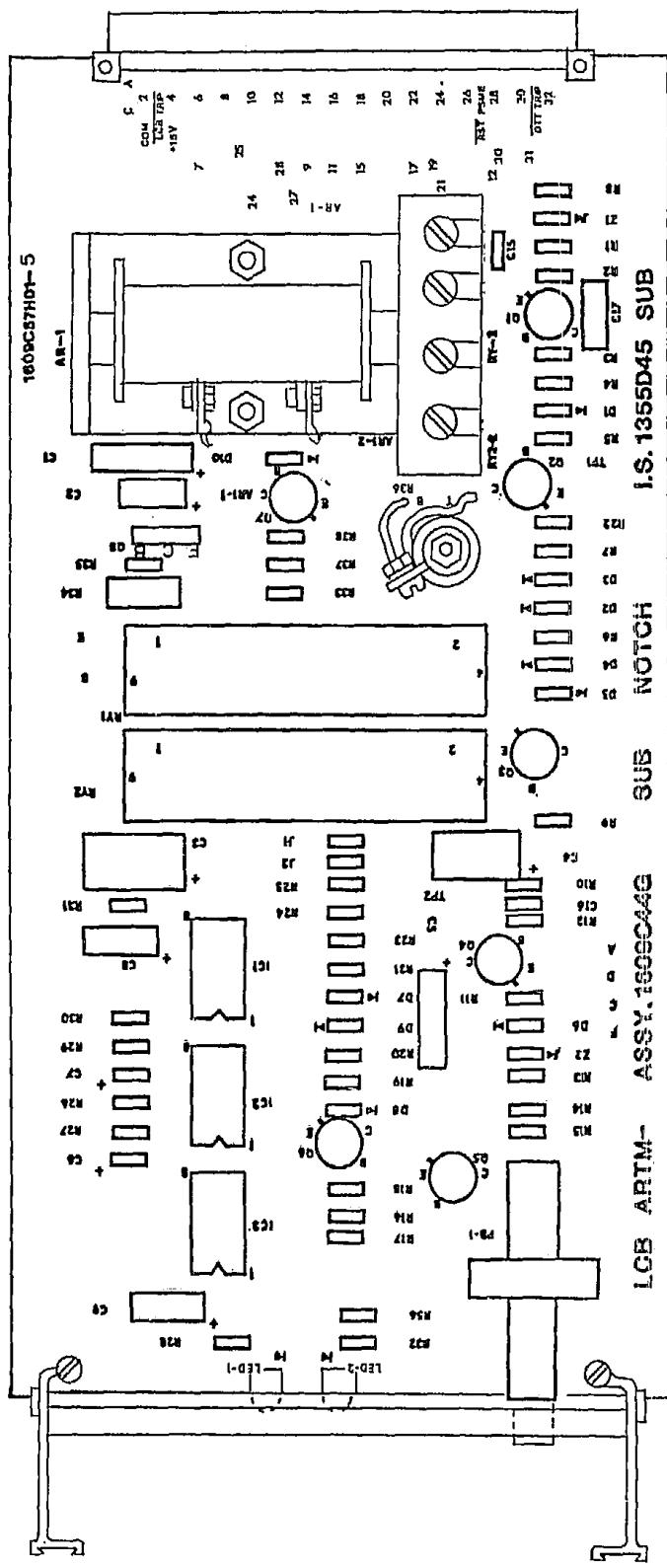
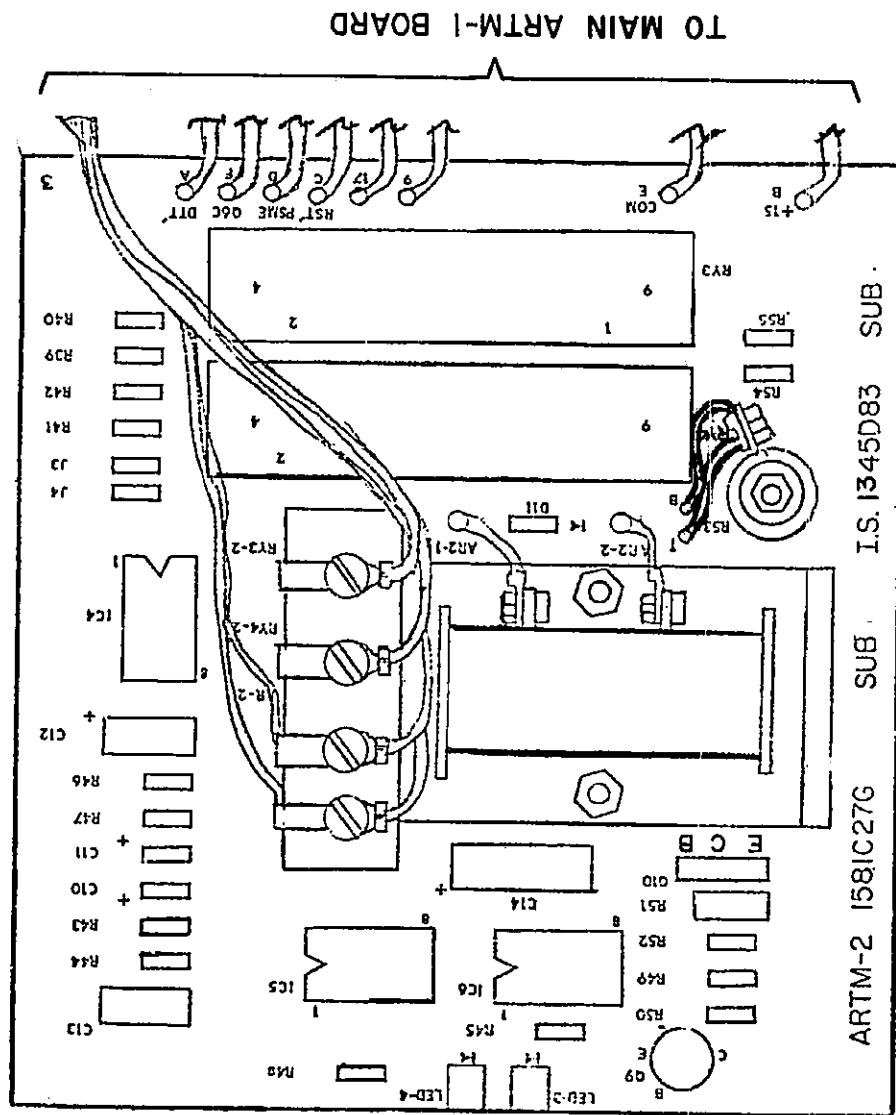


Figure 17: Component Location ARTM-I Module

Figure 18: Component Location ARTM-2 Module



NOTES



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