



## Type LCB II Relay Modules

Effective: September 1985  
NEW INFORMATION

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

DTD	Demodulator/Time Delay
MD	Modulator/Demodulator
IFT-1/2	Audio 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 possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of these modules do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

**CAUTION:** 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 re-checking calibration.

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.

### 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 is a tabulation of the module widths and number of connector terminals.

Module Name	Module Location Widths	No. Connector Terminals
ALS	2	18
DTD	1	18
MD	1	18
IFT-1/2	1	18
IFO-1/2	1	18
RELAY	1.75	35
DTT	1	18
AXLM	1	18
ARTM-1/2	3	22

NOTE: 1 module location width equals 1.2 inches.

### MODULE APPLICATION/DESCRIPTION

#### ALS – Analog Logic Power Supply

The ALS power supply covered in other instructions provides +/-15Vdc to power the LCB relay. Units are available for 48, 125 or 250 Vdc station batteries. This module is covered by I.L. 41-830.11.

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### **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.

### **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 from the respective channel interface (audio or optical) and reconstructs the remote LCB signal.

### **IFT – Audio Tone Interface**

The IFT 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, and missing cycle periods.

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

### **IFO – Optical Interface**

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

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

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.

### **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.

### **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.

### **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.

**ARTM-1/2 – AR Trip Module**

- 1 (One AR)
- 2 (Two AR)

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

**MODULE REFERENCE INFORMATION****DTD Module – Style 1603C76G02**

Internal Schematic: 1351D96  
Component Location: 1493B67  
Chassis Location: POS. C

**MD Module – Style 1603C76G01**

Internal Schematic: 1351D95  
Component Location: 1493B67  
Chassis Location: POS. D

**IFT Module – Style 1603C80G01**

Internal Schematic: 1351D98  
Component Location: 1493B70  
Chassis Location: POS. F  
(Channel 1)  
POS. E  
(Channel 2)

**IFO Module – Style 1605C05G01 (SMA)  
Style 1605C05G02 (Optimate)**

Internal Schematic: 1352D88  
Component Location: 1494B65  
Chassis Location: POS. F  
(Channel 1)  
POS. E  
(Channel 2)

**Relay Module – Style 1603C78G01**

Internal Schematic: 1351D97  
Component Location: 1493B69  
Chassis Location: POS. G

**DTT Module – Style 1603C84G01 (2 Term)  
Style 1603C84G02 (3 Term)**

Internal Schematic: 1352D01  
Component Location: 1493B72  
Chassis Location: POS. K

**AXLM Module – Style 1603C82G01**

Internal Schematic: 1351D99  
Component Location: 1493B72  
Chassis Location: POS. L

**ARTM-1 Module – Style 1581C25G01**

Internal Schematic: 1345D83  
Component Location: 1484B31  
Chassis Location: POS. M  
(NOTE: Subassembly Style is 1581C25G03)

**ARTM-2 Module – Style 1581C25G02**

Internal Schematic: 1345D83  
Component Location: 1484B32  
Chassis Location: POS. M  
(NOTE: Subassembly Style is 1581C27G01)

**RENEWAL PARTS**

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to those customers who are equipped for doing the repair work. When ordering parts, always give the complete nameplate data, and style numbers from the electrical parts list.

**ATTACHMENTS****A. Internal Schematics**

Figure	Module	Drawing
1	DTD	1351D96
2	MD	1351D95
3	IFT	1351D98
4	IFO	1352D88
5	RELAY	1351D97
6	DTT	1352D01
7	AXLM	1351D99
8	ARTM-1/2	1345D83

**B. Component Locations**

Figure	Module	Drawing
9	MD/DTD	1493B67
10	IFT	1493B70
11	IFO	1494B65
12	RELAY	1493B69
13	DTT	1493B72
14	AXLM	1493B71
15	ARTM-1	1484B31
16	ARTM-2	1484B32

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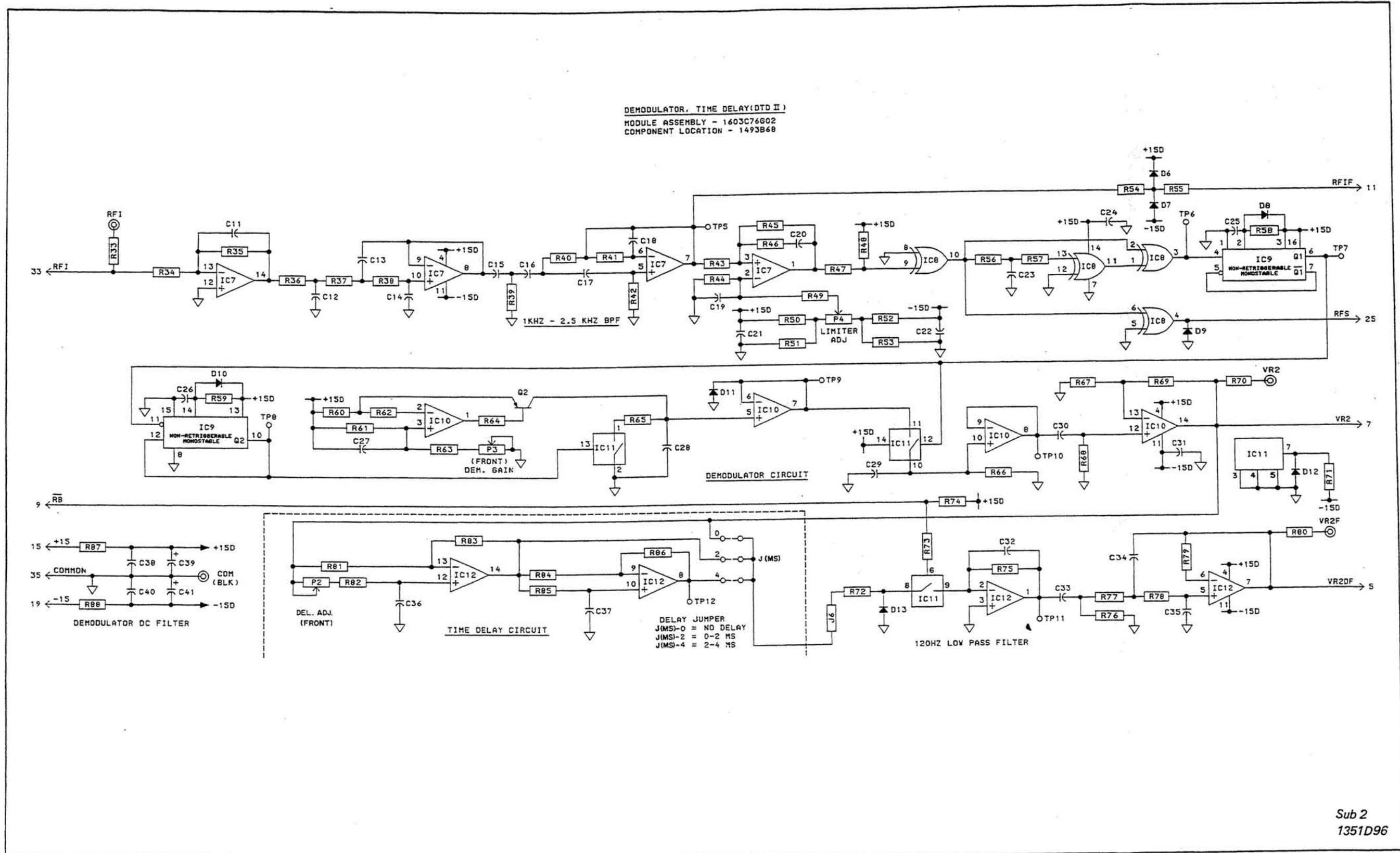


Fig. 1. DTD Internal Schematic (Sheet 1 of 2)

CAPACITOR		STYLE	RESISTOR		LINK	STYLE
					J(MS)	BLUE CLIP LINK
C11	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02	R33	3.01K 1/8W 1% METAL FILM		3532A54H01
C12	.015 MFD 200V +-2% MET-POLY CARB	3534A68H05	R34	20K 1/8W 1% METAL FILM		
C13	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02	R35	20K 1/8W 1% METAL FILM		
C14	270 PF 500V +-2% MICA	762A757H12	R36	3.92K 1/8W 1% METAL FILM		
C15	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01	R37	121K 1/8W 1% METAL FILM		
C16	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02	R38	121K 1/8W 1% METAL FILM		
C17	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02	R39	8.25K 1/4W 1% METAL FILM		
C18	.01 MFD 200V +-5% MET-POLY CARB	3534A68H03	R40	92.5K 1/8W 1% METAL FILM		
C19	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R41	301K 1/8W 1% METAL FILM		
C20	10 PF 500V +-5% MICA	763A209H03	R42	301K 1/8W 1% METAL FILM		
C21	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R43	10K 1/8W 1% METAL FILM		
C22	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R44	1 MEG 1/4W 1% METAL FILM		
C23	47 PF 500V +-2% MICA	763A209H17	R45	15M 5% CARB 1/2W		
C24	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R46	100K 1/8W 1% METAL FILM		
C25	510 PF 500V +-2% MICA	861A846H10	R47	51.1K 1/8W 1% METAL FILM		
C26	.001 MFD 200V +-1% MET-POLY CARB	3534A68H01	R48	51.1K 1/8W 1% METAL FILM		
C27	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R49	10K 1/8W 1% METAL FILM		
C28	5100 PF 500V +-2% MICA	187A584H05	RE0	15K 1/8W 1% METAL FILM		
C29	5100 PF 500V +-2% MICA	187A584H05	R51	30.1 OHM 1/8W 1% METAL FILM		
C30	.47 MFD 100V +-5% MET-POLY CARB	3508A89H03	R52	15K 1/8W 1% METAL FILM		
C31	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R53	30.1 OHM 1/8W 1% METAL FILM		
C32	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R54	10K 1/8W 1% METAL FILM		
C33	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R55	10K 1/8W 1% METAL FILM		
C34	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07	R56	51.1K 1/8W 1% METAL FILM		
C35	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R57	10K 1/8W 1% METAL FILM		
C36	.012 MFD 200V +-5% MET-POLY CARB	3534A68H04	R58	15K 1/8W 1% METAL FILM		
C37	.01 MFD 200V +-5% MET-POLY CARB	3534A68H03	R59	100K 1/8W 1% METAL FILM		
C38	.01 MFD 100V +-5% MET-POLY CARB	3534A68H08	R60	15K 1/8W 1% METAL FILM		
C39	100 MFD 35V +-20% TANTALUM	880A363H01	R61	30.1K 1/8W 1% METAL FILM		
C40	0.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R62	15K 1/8W 1% METAL FILM		
C41	100 MFD 35V +-20% TANTALUM	880A363H01	R63	866K 1/8W 1% METAL FILM		
DIODE			R64	511 OHM 1/4W 1% METAL FILM		
D06	1N645A 225V	837A692H03	R65	100 OHM 1/4W 1% METAL FILM		
D07	1N645A 225V	837A692H03	R66	51N 10% 1/2W CARBON		
D08	1N4148 75V	836A928H06	R67	133K 1/8W 1% METAL FILM		
D09	1N4148 75V	836A928H06	R68	110K 1/8W 1% METAL FILM		
D10	1N4148 75V	836A928H06	R69	750K 1/8W 1% METAL FILM		
D11	1N4148 75V	836A928H06	R70	3.01K 1/8W 1% METAL FILM		
D12	1N4148 75V	836A928H06	R71	3.01K 1/4W 1% METAL FILM		
D13	1N4148 75V	836A928H06	R72	200K 1/8W 1% METAL FILM		
INT CKT			R73	10K 1/8W 1% METAL FILM		
IC07	TL074IJ QUAD OP AMP	3528A90H01	R74	51.1K 1/8W 1% METAL FILM		
IC08	MC14070BAL QUAD EXCLUSIVE OR	3527A26H01	R75	100K 1/8W 1% METAL FILM		
IC09	MC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01	R76	150K 1/8W 1% METAL FILM		
IC10	TL074IJ QUAD OP AMP	3528A90H01	R77	75K 1/8W 1% METAL FILM		
IC11	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06	R78	75K 1/8W 1% METAL FILM		
IC12	TL074IJ QUAD OP AMP	3528A90H01	R79	301K 1/8W 1% METAL FILM		
POT			R80	3.01K 1/8W 1% METAL FILM		
P02	100K 3/4W 20% TRIMPOT	3527A30H07	R81	200K 1/8W 1% METAL FILM		
P03	20K 3/4W +-10% TRIMPOT	3527A30H04	R82	1K 1/8W 1% METAL FILM		
P04	500 OHM 3/4W +-10% TRIMPOT	3527A30H02	R83	200K 1/8W 1% METAL FILM		
TRANSISTOR			R84	200K 1/8W 1% METAL FILM		
Q02	2N3799 PNP	3527A33H01	R85	100K 1/8W 1% METAL FILM		
			R86	200K 1/8W 1% METAL FILM		
			R87	2.7 OHM 1/2W 5% CARB		
			R88	2.7 OHM 1/2W 5% CARB		

Sub 2  
1351D96

Fig. 1. DTD Internal Schematic (Sheet 2 of 2)

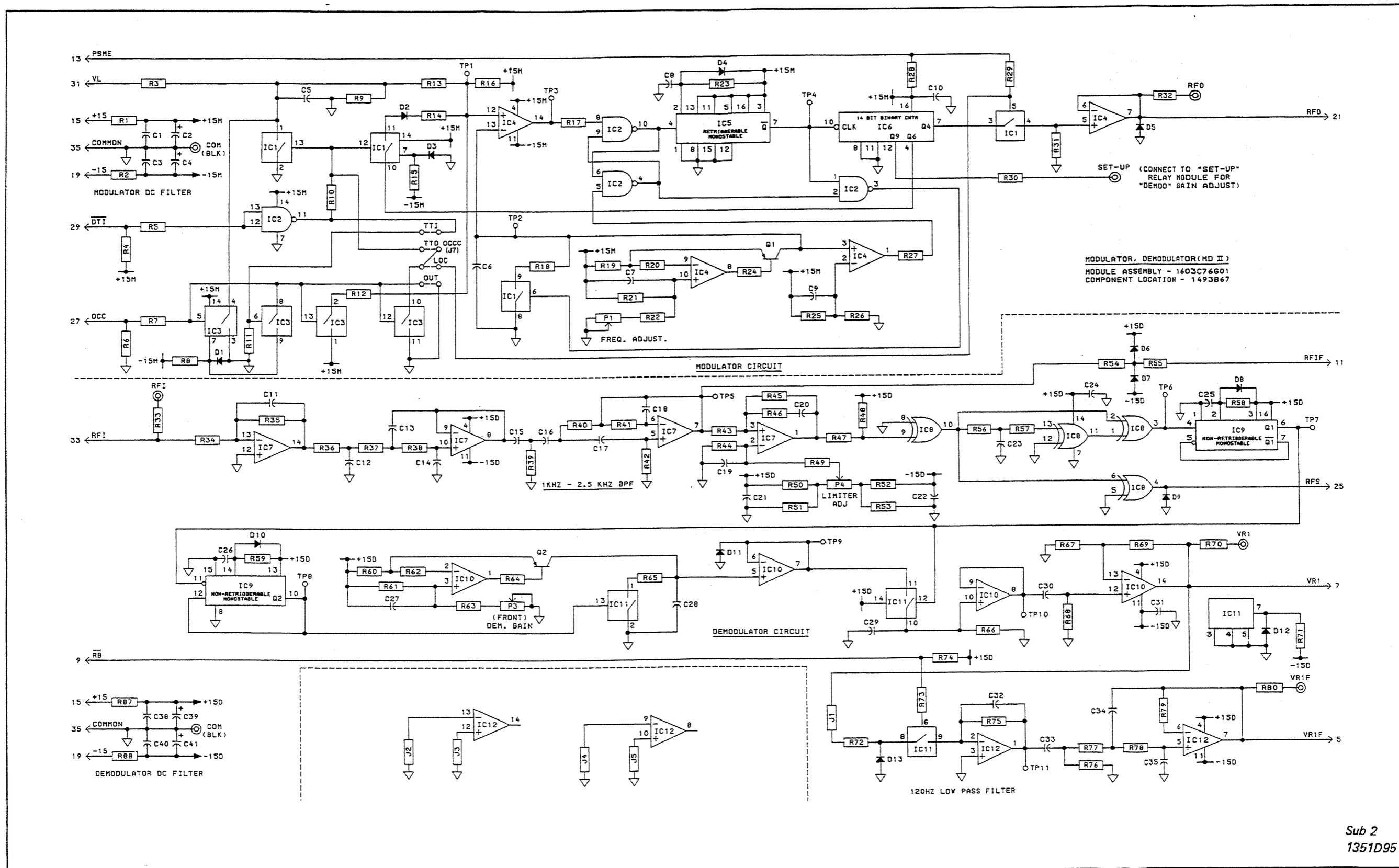


Fig. 2. MD Internal Schematic (Sheet 1 of 2)

CAPACITOR		STYLE
C01	.1 MFD 100V +-5% MET-POLY CARB	3534A68H09
C02	100 MFD 35V +-20% TANTALUM	880A363H01
C03	.1 MFD 100V +-5% MET-POLY CARB	3534A68H09
C04	100 MFD 35V +-20% TANTALUM	880A363H01
C05	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01
C06	.001 MFD 200V +-1% MET-POLY CARB	3534A68H01
C07	.1 MFD 100V +-5% MET-POLY CARB	3534A68H09
C08	510 PF 500V +-2% NICA	861A846H10
C09	.1 MFD 100V +-5% MET-POLY CARB	3534A68H09
C10	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C11	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C12	.015 MFD 200V +-2% MET-POLY CARB	3534A68H05
C13	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C14	270 PF 500V +-2% NICA	762A757H12
C15	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01
C16	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C17	.001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C18	.01 MFD 200V +-5% MET-POLY CARB	3534A68H03
C19	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C20	10 PF 500V +-5% NICA	763A209H03
C21	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C22	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C23	47 PF 500V +-2% NICA	763A209H17
C24	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C25	510 PF 500V +-2% NICA	861A846H10
C26	.001 MFD 200V +-1% MET-POLY CARB	3534A68H01
C27	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C28	5100 PF 500V +-2% NICA	187A584H05
C29	5100 PF 500V +-2% NICA	187A584H05
C30	.47 MFD 100V +-5% MET-POLY CARB	3508A89H03
C31	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C32	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02
C33	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C34	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07
C35	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02
C38	.01 MFD 100V +-5% MET-POLY CARB	3534A68H08
C39	100 MFD 35V +-20% TANTALUM	880A363H01
C40	0.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C41	100 MFD 35V +-20% TANTALUM	880A363H01

DIODE		STYLE
D01	1N4148 75V	836A928H06
D02	1N4148 75V	836A928H06
D03	1N4148 75V	836A928H06
D04	1N4148 75V	836A928H06
D05	1N4148 75V	836A928H06
D06	1N645A 225V	837A692H03
D07	1N645A 225V	837A692H03
D08	1N4148 75V	836A928H06
D09	1N4148 75V	836A928H06
D10	1N4148 75V	836A928H06
D11	1N4148 75V	836A928H06
D12	1N4148 75V	836A928H06
D13	1N4148 75V	836A928H06

INT CKT		STYLE
IC01	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC02	MC14011BAL QUAD-2 INPUT NAND	3527A09H02
IC03	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC04	TL074IJ QUAD OP AMP	3528A90H01
IC05	MC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC06	MC14020BAL 14 BIT BINARY COUNTER	3527A09H09
IC07	TL074IJ QUAD OP AMP	3528A90H01
IC08	MC14070BAL QUAD EXCLUSIVE OR	3527A26H01
IC09	MC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC10	TL074IJ QUAD OP AMP	3528A90H01
IC11	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC12	TL074IJ QUAD OP AMP	3528A90H01

POT		STYLE
P01	20K 3/4W +-10% TRIMPOT	3527A30H04
P03	20K 3/4W +-10% TRIMPOT	3527A30H04
P04	500 OHM 3/4W +-10% TRIMPOT	3527A30H02

TRANSISTOR		STYLE
Q01	2N3799 PNP	3527A33H01
Q02	2N3799 PNP	3527A33H01

RESISTOR		STYLE
R01	2.7 OHM 1/2W 5% CARBON	187A290H31
R02	2.7 OHM 1/2W 5% CARBON	187A290H31
R03	162K 1/8W 1% METAL FILM	3532A38H21
R04	51.1K 1% 1/8W METAL FILM	3535A37H69
R05	10K 1/8W 1% METAL FILM	3535A37H01
R06	100K 1/8W 1% METAL FILM	3532A38H01
R07	10K 1/8W 1% METAL FILM	3535A37H01
R08	3.01K 1/4W 1% METAL FILM	848A819H94
R09	75K 1/8W 1% METAL FILM	3535A37H85
R10	51.1K 1/8W 1% METAL FILM	3535A37H69
R11	51.1K 1/8W 1% METAL FILM	3535A37H69
R12	274K 1/8W 1% METAL FILM	3532A38H43
R13	100K 1/8W 1% METAL FILM	3532A38H01
R14	93.1K 1/8W 1% METAL FILM	3535A37H94
R15	3.01K 1/4W 1% METAL FILM	848A819H94
R16	140K 1/8W 1% METAL FILM	3532A38H15
R17	51.1K 1% 1/8W METAL FILM	3535A37H69
R18	100 OHM 1% 1/4W METAL FILM	848A819H51
R19	9.09K 1/8W 1% METAL FILM	3535A38H95
R20	15 K 1/8W 1% METAL FILM	3535A37H18
R21	30.1K 1/8W 1% METAL FILM	3535A37H47
R22	110K 1/8W 1% METAL FILM	3532A38H05
R23	15 K 1/8W 1% METAL FILM	3535A37H18
R24	511 OHM 1/4W 1% METAL FILM	848A819H20
R25	150K 1% 1/8W METAL FILM	3532A38H18
R26	10K 1/8W 1% METAL FILM	3535A37H01
R27	51.1K 1/8W 1% METAL FILM	3535A37H69
R28	100K 1/8W 1% METAL FILM	3532A38H01
R29	51.1K 1/8W 1% METAL FILM	3535A37H69
R30	100K 1/8W 1% METAL FILM	3532A38H01
R31	150K 1/8W 1% METAL FILM	3532A38H18
R32	3.01K 1/8W 1% METAL FILM	3535A38H47
R33	3.01K 1/8W 1% METAL FILM	3535A38H47
R34	20K 1/8W 1% METAL FILM	3535A37H30
R35	20K 1/8W 1% METAL FILM	3535A37H30
R36	3.92K 1/8W 1% METAL FILM	3535A38H58
R37	121K 1/8W 1% METAL FILM	3532A38H09
R38	121K 1/8W 1% METAL FILM	3532A38H09
R39	8.25K 1/4W 1% METAL FILM	3535A38H89
R40	82.5K 1/8W 1% METAL FILM	3535A37H89
R41	301K 1/8W 1% METAL FILM	3532A38H47
R42	301K 1/8W 1% METAL FILM	3532A38H47
R43	10K 1/8W 1% METAL FILM	3535A37H01
R44	1 MEG 1/4W 1% METAL FILM	848A822H39
R45	15M 5% CARB 1/2W	187A290H40
R46	100K 1/8W 1% METAL FILM	3532A38H01
R47	51.1K 1/8W 1% METAL FILM	3535A37H69
R48	51.1K 1/8W 1% METAL FILM	3535A37H69
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	3535A37H18
R53	30.1 OHM 1/8W 1% METAL FILM	3535A42H47
R54	10K 1/8W 1% METAL FILM	3535A37H01
R55	10K 1/8W 1% METAL FILM	3535A37H01
R56	51.1K 1/8W 1% METAL FILM	3535A37H69
R57	10K 1/8W 1% METAL FILM	3535A37H01
R58	15K 1/8W 1% METAL FILM	3535A37H18
R59	100K 1/8W 1% METAL FILM	3532A38H01
R60	15K 1/8W 1% METAL FILM	3535A37H18
R61	30.1K 1/8W 1% METAL FILM	3535A37H47
R62	15K 1/8W 1% METAL FILM	3535A37H18
R63	866K 1/8W 1% METAL FILM	3535A37H91
R64	511 OHM 1/4W 1% METAL FILM	848A819H20
R65	100 OHM 1/4W 1% METAL FILM	848A819H51
R66	511 10% 1/2W CARBON	187A290H24
R67	153K 1/8W 1% METAL FILM	3532A38H13
R68	110K 1/8W 1% METAL FILM	3532A38H05
R69	750K 1/8W 1% METAL FILM	3532A38H85
R70	3.01K 1/8W 1% METAL FILM	3535A38H47
R71	3.01K 1/4W 1% METAL FILM	848A819H94
R72	200K 1/8W 1% METAL FILM	3532A38H30
R73	10K 1/8W 1% METAL FILM	3535A37H01
R74	51.1K 1/8W 1% METAL FILM	3535A37H69
R75	100K 1/8W 1% METAL FILM	3532A38H01
R76	150K 1/8W 1% METAL FILM	3532A38H18
R77	75K 1/8W 1% METAL FILM	3535A37H85
R78	75K 1/8W 1% METAL FILM	3535A37H85
R79	301K 1/8W 1% METAL FILM	3532A38H47
R80	3.01K 1/8W 1% METAL FILM	3535A38H47
R87	2.7 OHM 1/2W 5% CARB	187A290H31
R88	2.7 OHM 1/2W 5% CARB	187A290H31

LINK		STYLE
J7 (OCCC)	BLUE CLIP LINK	3532A54H01

Sub 2  
1351D95

Fig. 2. MD Internal Schematic (Sheet 2 of 2)



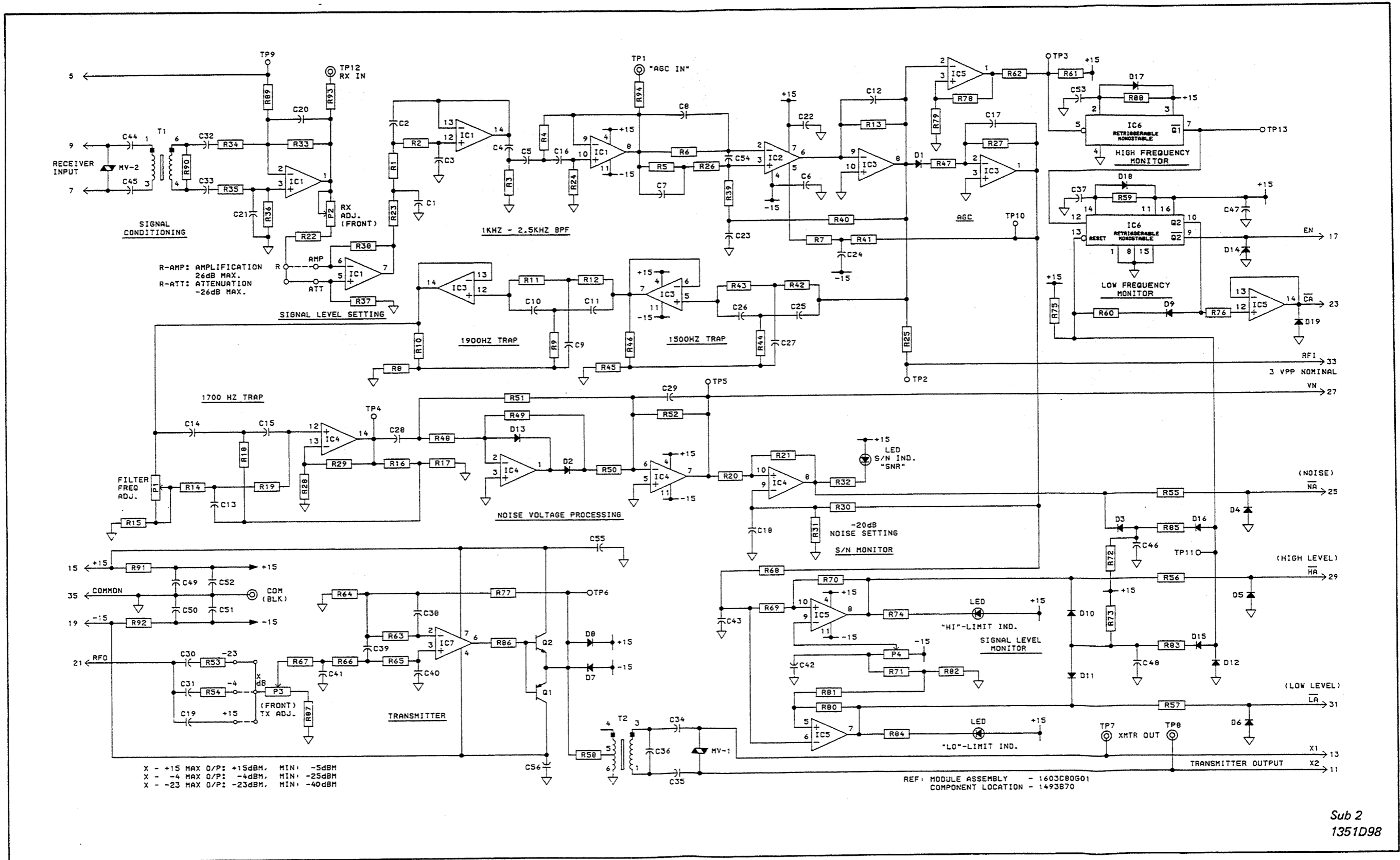


Fig. 3. IFT Internal Schematic (Sheet 1 of 2)

CAPACITOR	STYLE
C01	.015 MFD 200V +-2% MET-POLY CARB 3534A68H05
C02	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C03	270 PF 500V +-5% MICA 762A757H12
C04	.022 MFD 100V +-2% MET-POLY CARB 3533A53H01
C05	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C06	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C07	.22 MFD 100V +-5% MET-POLY CARB 3534A68H10
C08	.22 MFD 100V +-5% MET-POLY CARB 3534A68H10
C09	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C10	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C11	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C12	10 PF 500V +-5% MICA 762A299H03
C13	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C14	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C15	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C16	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C17	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C18	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C19	.33 MFD 50V +-5% MET-POLY CARB 863A16A114
C20	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C21	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C22	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C23	.33 MFD 50V +-5% MET-POLY CARB 863A16A114
C24	1.0 MFD 50V +-5% MET-POLY CARB 3534A68H11
C25	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C26	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C27	.001 MFD 200V +-1% MET-POLY CARB 3534A68H01
C28	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C29	.01 MFD 200V +-5% MET-POLY CARB 3534A68H03
C30	.0033 MFD 400V +-2% MET-POLY CARB 3533A53H04
C31	.033 MFD 100V +-5% MET-POLY CARB 3534A68H06
C32	.01 MFD 200V +-5% MET-POLY CARB 3534A68H03
C33	.01 MFD 200V +-5% MET-POLY CARB 3534A68H03
C34	.47 MFD 100V +-5% MET-POLY CARB 3508A99H03
C35	.47 MFD 100V +-5% MET-POLY CARB 3508A99H03
C36	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C37	.01 MFD 200V +-2% MET-POLY CARB 3533A53H02
C38	.01 MFD 200V +-5% MET-POLY CARB 3534A68H03
C39	.0015 MFD 600V +-2% MET-POLY CARB 3533A53H08
C40	270 PF 500V +-5% MICA 762A757H12
C41	.0048 MFD 200V 2X MET-POLY CARB 3533A53H06
C42	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C43	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C44	.47 MFD 100V +-5% MET-POLY CARB 3508A99H03
C45	.47 MFD 100V +-5% MET-POLY CARB 3508A99H03
C46	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C47	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C48	.56 MFD 50V +-5% MET-POLY CARB 3534A68H12
C49	100 MFD 35V +-20% TANTALUM 880A363H01
C50	100 MFD 35V +-20% TANTALUM 880A363H01
C51	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C52	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C53	.0022 MFD 2X 400V MET-POLY CARB 3533A53H05
C54	47 PF 500V +-2% MICA 763A209H17
C55	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08
C56	.1 MFD 100V +-5% MET-POLY CARB 3534A68H08

DIODE	STYLE
D01	1N4148 75V 836A928H06
D02	1N4148 75V 836A928H06
D03	1N4148 75V 836A928H06
D04	1N645A 225V 837A692H03
D05	1N645A 225V 837A692H03
D06	1N645A 225V 837A692H03
D07	1N645A 225V 837A692H03
D08	1N645A 225V 837A692H03
D09	1N4148 75V 836A928H06
D10	1N4148 75V 836A928H06
D11	1N4148 75V 836A928H06
D12	1N4148 75V 836A928H06
D13	1N4148 75V 836A928H06
D14	1N645A 225V 837A692H03
D15	1N4148 75V 836A928H06
D16	1N4148 75V 836A928H06
D17	1N4148 75V 836A928H06
D18	1N4148 75V 836A928H06
D19	1N4148 75V 836A928H06

INT CKT	STYLE
IC01	TL0741J QUAD OP AMP 3528A99H01
IC02	CAS080AS OP TRANSCOND AMP 3533A21H01
IC03	TL0741J QUAD OP AMP 3528A99H01
IC04	TL0741J QUAD OP AMP 3528A99H01
IC05	TL0741J QUAD OP AMP 3528A99H01
IC06	MC14558 BAL DUAL PREC MONO MULTIVIB 3527A09H01
IC07	OP27GZ PREC LOW NOISE OP AMP 3533A97H01

DIODE	STYLE
LED-MI RED LED (EDGE MOUNT)	3508A22H01
LED-LO RED LED (EDGE MOUNT)	3508A22H01
LED-SN RED LED (EDGE MOUNT)	3508A22H01

VARIATOR	STYLE
MV01	20-24 VDC @ 1 MA, 106 JOULES 0.1W 3509A31H04
MV02	20-24 VDC @ 1 MA, 106 JOULES 0.1W 3509A31H04

POT	STYLE
P01	2K 3/4W +-10% TRIMPOT 3527A30H06
P02	20K 3/4W +-10% TRIMPOT 3527A30H04
P03	2K 3/4W +-10% TRIMPOT 3527A30H06
P04	20K 3/4W 10% TRIMPOT 3527A30H04

TRANSISTOR	STYLE
Q01	2N2905A PNP 762A672H10
Q02	2N2219A NPN 762A672H11

LINK	STYLE
R	BLUE CLIP LINK 3532A54H01
X	BLUE CLIP LINK 3532A54H01

RESISTOR	STYLE
R01	121K 1/4W 1% METAL FILM 848A821H50
R02	121K 1/4W 1% METAL FILM 848A821H50
R03	8.25K 1/4W 1% METAL FILM 848A821H50
R04	82.5K 1% 1/4W METAL FILM 848A821H34
R05	51.1K 1/4W 1% METAL FILM 848A821H14
R06	56.2K 1% 1/4W METAL FILM 848A821H18
R07	15K 1/4W 1% METAL FILM 848A820H62
R08	5.01K 1% 1/4W METAL FILM 848A819H94
R09	28.7K 1% 1/4W METAL FILM 848A821H89
R10	301 OHM 1% 1/4W METAL FILM 848A818H57
R11	115K 1/4W 1% METAL FILM 848A821H48
R12	115K 1/4W 1% METAL FILM 848A821H48
R13	221K 1% 1/4W METAL FILM 848A821H75
R14	121K 1/4W 1% METAL FILM 848A821H50
R15	3.92K 1% 1/4W METAL FILM 848A820H66
R16	3.01K 1% 1/4W METAL FILM 848A819H64
R17	150 OHM 1/4W 1% METAL FILM 848A818H68
R18	30.1K 1% 1/4W METAL FILM 848A820H91
R19	121K 1/4W 1% METAL FILM 848A821H50
R20	7.5K 1/4W 1% METAL FILM 848A820H33
R21	1.5M 1% 1/4W METAL FILM 848A822H56
R22	274 OHM 1/4W 1% METAL FILM 848A818H53
R23	3.92K 1% 1/4W METAL FILM 848A820H06
R24	301K 1/4W METAL FILM 848A821H88
R25	2K 1% 1/4W METAL FILM 848A819H77
R26	10K 1/4W 1% METAL FILM 848A820H45
R27	511K 1/4W 1% METAL FILM 848A822H11
R28	10K 1/4W 1% METAL FILM 848A820H45
R29	100K 1/4W 1% METAL FILM 848A821H42
R30	27.4K 1/4W 1% METAL FILM 848A820H87
R31	10K 1/4W 1% METAL FILM 348A820H45
R32	6.2K 2% 1/2W METAL FILM 629A531H51
R33	20K 1% 1/4W METAL FILM 848A820H74
R34	20K 1% 1/4W METAL FILM 848A820H74
R35	20K 1% 1/4W METAL FILM 848A820H74
R36	20K 1% 1/4W METAL FILM 848A820H74
R37	1K 1% 1/4W METAL FILM 848A819H48
R38	15.3K 1% 1/4W METAL FILM 848A820H57
R39	357K 1% 1/4W METAL FILM 848A821H95
R40	200K 1% 1/4W METAL FILM 848A821H71
R41	15K 1/4W 1% METAL FILM 848A820H62
R42	150K 1% 1/4W METAL FILM 848A821H59
R43	150K 1% 1/4W METAL FILM 848A821H59
R44	37.4K 1% 1/4W METAL FILM 848A821H01
R45	1.62K 1% 1/4W METAL FILM 848A819H68
R46	619 OHM 1% 1/4W METAL FILM 848A819H28
R47	13.3K 1% 1/4W METAL FILM 848A820H57
R48	100K 1/4W 1% METAL FILM 848A821H42
R49	100K 1/4W 1% METAL FILM 848A821H42
R50	100K 1/4W 1% METAL FILM 848A821H42
R51	200K 1% 1/4W METAL FILM 848A821H71
R52	2 MEC 5X 1/2W CARBON 187A290H30
R53	178K 1% 1/4W METAL FILM 848A821H66
R54	17.8K 1% 1/4W METAL FILM 848A820H69
R55	7.5K 1/4W 1% METAL FILM 848A820H33
R56	7.5K 1/4W 1% METAL FILM 848A820H33
R57	7.5K 1/4W 1% METAL FILM 848A820H33
R58	153 OHM 1% 1/4W METAL FILM 848A821H63
R59	82.5K 1% 1/4W METAL FILM 848A821H53
R60	511K 1% 1/4W METAL FILM 848A822H11
R61	51.1K 1/4W 1% METAL FILM 848A821H14
R62	51.1K 1/4W 1% METAL FILM 848A821H14
R63	221K 1% 1/4W METAL FILM 848A821H75
R64	1.62K 1% 1/4W METAL FILM 848A819H68
R65	100K 1/4W 1% METAL FILM 848A821H42
R66	100K 1/4W 1% METAL FILM 848A821H42
R67	10K 1/4W 1% METAL FILM 848A820H45
R68	20K 1% 1/4W METAL FILM 848A820H74
R69	51.1K 1/4W 1% METAL FILM 848A821H14
R70	4.7 MEC 5X 1/2W CARBON 187A290H28
R71	20K 1% 1/4W METAL FILM 848A820H74
R72	2 MEC 5X 1/2W CARBON 187A290H30
R73	2 MEC 5X 1/2W CARBON 187A290H30
R74	6.2K 2% 1/2W METAL FILM 629A531H51
R75	2 MEC 5X 1/2W CARBON 187A290H30
R76	15K 1/4W 1% METAL FILM 848A821H66
R77	750 OHM 1% 1/4W METAL FILM 848A819H28
R78	100K 1/4W 1% METAL FILM 848A821H42
R79	7.5K 1/4W 1% METAL FILM 848A820H33
R80	2 MEC 5X 1/2W CARBON 187A290H30
R81	51.1K 1/4W 1% METAL FILM 848A821H14
R82	56.2K 1% 1/4W METAL FILM 848A821H18
R83	301K 1% 1/4W METAL FILM 848A821H88
R84	6.2K 2% 1/2W METAL FILM 629A531H51
R85	301K 1% 1/4W METAL FILM 848A821H88
R86	511 OHM 1% 1/4W METAL FILM 848A819H20
R87	100 OHM 1% 1/4W METAL FILM 848A818H51
R88	178K 1% 1/4W METAL FILM 848A821H66
R89	10K 1/4W 1% METAL FILM 848A820H45
R90	619 OHM 1% 1/4W METAL FILM 848A819H28
R91	2.7 OHM 1/2W 5% CARBON 187A290H31
R92	2.7 OHM 1/2W 5% CARBON 187A290H31
R93	3.01K 1% 1/4W METAL FILM 848A819H94
R94	3.01K 1% 1/4W METAL FILM 848A819H94

TRANSP	STYLE
T01	MT26-PC(600 OHM MATCHING) 3534A75H01
T02	MT26-PC(600 OHM MATCHING) 3534A75H01

Sub 2  
1351D98

Fig. 3. IFT Internal Schematic (Sheet 2 of 2)

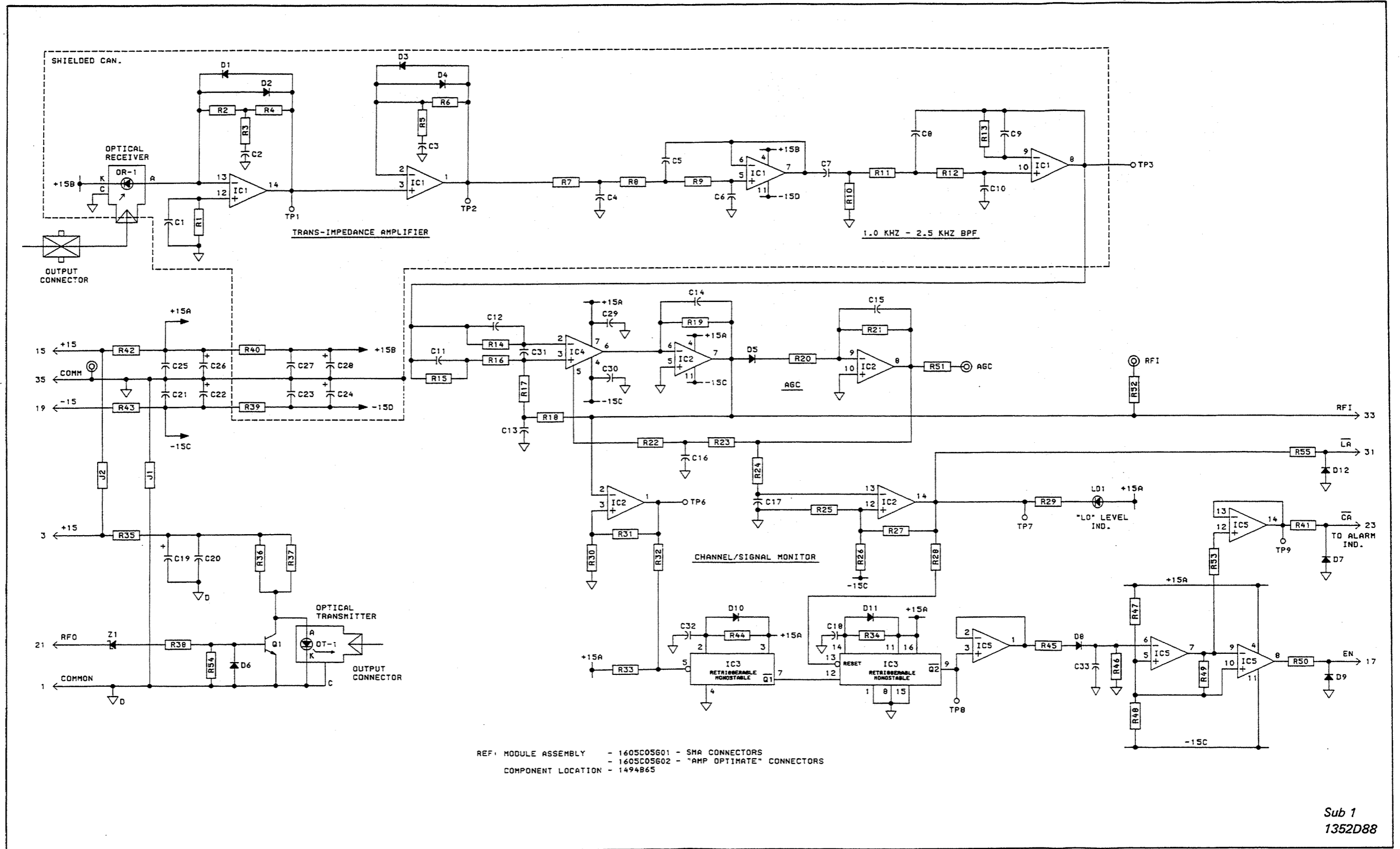


Fig. 4. IFO Internal Schematic (Sheet 1 of 2)

Sub 1  
1352D88

ITEM	PART NAME	DESCRIPTION	STYLE NO.	ITEM	PART NAME	DESCRIPTION	STYLE NO.
C01	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R01	RESISTOR	619K 1/4W 1% METAL FILM	848A822H19
C02	CAPACITOR	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01	R02	RESISTOR	301K 1/4W 1% METAL FILM	848A821H88
C03	CAPACITOR	1.0 MFD 50V +-5% MET-POLY CARB	3534A68H11	R03	RESISTOR	16.2K 1/4W 1% METAL FILM	848A820H65
C04	CAPACITOR	.015 MFD 100V +-2% MET-POLY CARB	3534A68H05	R04	RESISTOR	301K 1/4W 1% METAL FILM	848A821H88
C05	CAPACITOR	.001 MFD 200V +-1% MET-POLY CARB	3534A68H01	R05	RESISTOR	1.5K 1% 1/4W METAL FILM	848A819H65
C06	CAPACITOR	270 PF 500V +-2% MICA	762A757H12	R06	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
C07	CAPACITOR	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01	R07	RESISTOR	3.92K 1/4W 1% METAL FILM	848A820H06
C08	CAPACITOR	.0015 MFD 600V +-2% MET-POLY CARB	3533A53H08	R08	RESISTOR	121K 1/4W 1% METAL FILM	848A821H50
C09	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R09	RESISTOR	121K 1/4W 1% METAL FILM	848A821H50
C10	CAPACITOR	300 PF 500V +-2% MICA	187A584H09	R10	RESISTOR	8.25K 1/4W 1% METAL FILM	848A820H37
C11	CAPACITOR	.22 MFD 100V +-5% MET-POLY CARB	3534A68H10	R11	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
C12	CAPACITOR	.22 MFD 100V +-5% MET-POLY CARB	3534A68H10	R12	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
C13	CAPACITOR	.33 MFD 50V +-5% MET-POLY CARB	863A166H16	R13	RESISTOR	200K 1/4W 1% METAL FILM	848A821H71
C14	CAPACITOR	10 PF 500V +-5% MICA	763A209H03	R14	RESISTOR	56.2K 1/4W 1% METAL FILM	848A821H18
C15	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R15	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
C16	CAPACITOR	1.0 MFD 50V +-5% MET-POLY CARB	3534A68H11	R16	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
C17	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R17	RESISTOR	357K 1% 1/4W METAL FILM	848A821H95
C18	CAPACITOR	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R18	RESISTOR	200K 1/4W 1% METAL FILM	848A821H71
C19	CAPACITOR	100 MFD 35V +-20% TANTALUM	880A363H01	R19	RESISTOR	221K 1% 1/4W METAL FILM	848A821H75
C20	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R20	RESISTOR	13.3K 1% 1/4W METAL FILM	848A820H57
C21	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R21	RESISTOR	511K 1/4W 1% METAL FILM	848A822H11
C22	CAPACITOR	100 MFD 35V +-20% TANTALUM	880A363H01	R22	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
C23	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R23	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
C24	CAPACITOR	1 MFD 35V +-10% TANTALUM	837A241H15	R24	RESISTOR	4.7 MEG 5% 1/2W CARBON	187A290H28
C25	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R25	RESISTOR	17.8K 1% 1/4W METAL FILM	848A820H69
C26	CAPACITOR	100 MFD 35V +-20% TANTALUM	880A363H01	R26	RESISTOR	27.4K 1% 1/4W METAL FILM	848A820H87
C27	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R27	RESISTOR	2.0 MEG 5% 1/2W CARBON	187A290H30
C28	CAPACITOR	1 MFD 35V +-10% TANTALUM	837A241H15	R28	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
C29	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R29	RESISTOR	6.19K 1/4W 1% METAL FILM	848A820H25
C30	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R30	RESISTOR	7.5K 1/4W 1% METAL FILM	848A820H33
C31	CAPACITOR	47 PF 500V +-2% MICA	763A209H17	R31	RESISTOR	200K 1/4W 1% METAL FILM	848A821H71
C32	CAPACITOR	.0022 MFD 2% 400V MET-POLY CARB	3533A53H05	R32	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
C33	CAPACITOR	.22 MFD 100V +-5% MET-POLY CARB	3534A68H10	R33	RESISTOR	82.5K 1% 1/4W METAL FILM	848A821H34
D01	DIODE	1N4148 75V	836A928H06	R34	RESISTOR	20 OHM 1/2W 5% CARBON	187A290H08
D02	DIODE	1N4148 75V	836A928H06	R35	RESISTOR	220 OHM 2W 5% MOLD. COMP.	185A207H11
D03	DIODE	1N4148 75V	836A928H06	R36	RESISTOR	220 OHM 2W 5% MOLD. COMP.	185A207H11
D04	DIODE	1N4148 75V	836A928H06	R37	RESISTOR	301 OHM 1% 1/4W METAL FILM	848A818H97
D05	DIODE	1N4148 75V	836A928H06	R38	RESISTOR	10 OHM 1/2W +-5% CARBON	187A290H01
D06	DIODE	1N4148 75V	836A928H06	R39	RESISTOR	10 OHM 1/2W +-5% CARBON	187A290H01
D07	DIODE	1N645A 225V	837A692H03	R40	RESISTOR	10 OHM 1/2W +-5% CARBON	187A290H01
D08	DIODE	1N4148 75V	836A928H06	R41	RESISTOR	7.5K 1/4W 1% METAL FILM	848A820H33
D09	DIODE	1N645A 225V	837A692H03	R42	RESISTOR	10 OHM 1/2W +-5% CARBON	187A290H01
D10	DIODE	1N4148 75V	836A928H06	R43	RESISTOR	10 OHM 1/2W +-5% CARBON	187A290H01
D11	DIODE	1N4148 75V	836A928H06	R44	RESISTOR	178K 1/4W 1% METAL FILM	848A821H66
D12	DIODE	1N645A 225V	837A692H03	R45	RESISTOR	301 OHM 1% 1/4W METAL FILM	848A818H97
IC01	INT CKT	TLO741J QUAD OP AMP MULTIVIB	3528A90H01	R46	RESISTOR	2.2 MEG 5% 1/2W CARBON	187A290H26
IC02	INT CKT	TLO741J QUAD OP AMP MULTIVIB	3528A90H01	R47	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
IC03	INT CKT	HC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01	R48	RESISTOR	200K 1/4W 1% METAL FILM	848A821H71
IC04	INT CKT	CA3080AS OP TRANSCOND AMP	3533A21H01	R49	RESISTOR	2.0 MEG 5% 1/2W CARBON	187A290H30
IC05	INT CKT	TLO741J QUAD OP AMP	3528A90H01	R50	RESISTOR	7.5K 1/4W 1% METAL FILM	848A820H33
LED-1	DIODE	RED LED (EDGE MOUNT)	3508A22H01	R51	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
Δ OR-1	DIODE	SPX-4692-002 SPECTRONICS DETECTOR	3534A77H02	R52	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
Δ OT-1	DIODE	SPX-4689-004 SPECTRONICS EMITTER	3534A77H01	R53	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
Δ FOC	CABLE	100/140 UM 9 INCH FIBER OPTIC CABLE	1586C73G01	R54	RESISTOR	7.5K 1/4W 1% METAL FILM	848A820H33
□ OR-1	DIODE	HFD 3804-2 HONEYWELL DETECTOR	9644A71H02	R55	RESISTOR	7.5K 1/4W 1% METAL FILM	848A820H33
□ OT-1	DIODE	HFE 4800-4 HONEYWELL EMITTER	9644A71H01	Q01	TRANSISTOR	2N2222A, NPN	762A672H15
□ FOC	CABLE	100/140 UM 9 INCH FIBER OPTIC CABLE	1604C71G01	Z01	DIODE	1N961B 10V 5% 400MW	186A797H07

Δ= FOR G02 ONLY  
 □= FOR G01 ONLY

Sub 1  
 1352D88

Fig. 4. IFO Internal Schematic (Sheet 2 of 2)

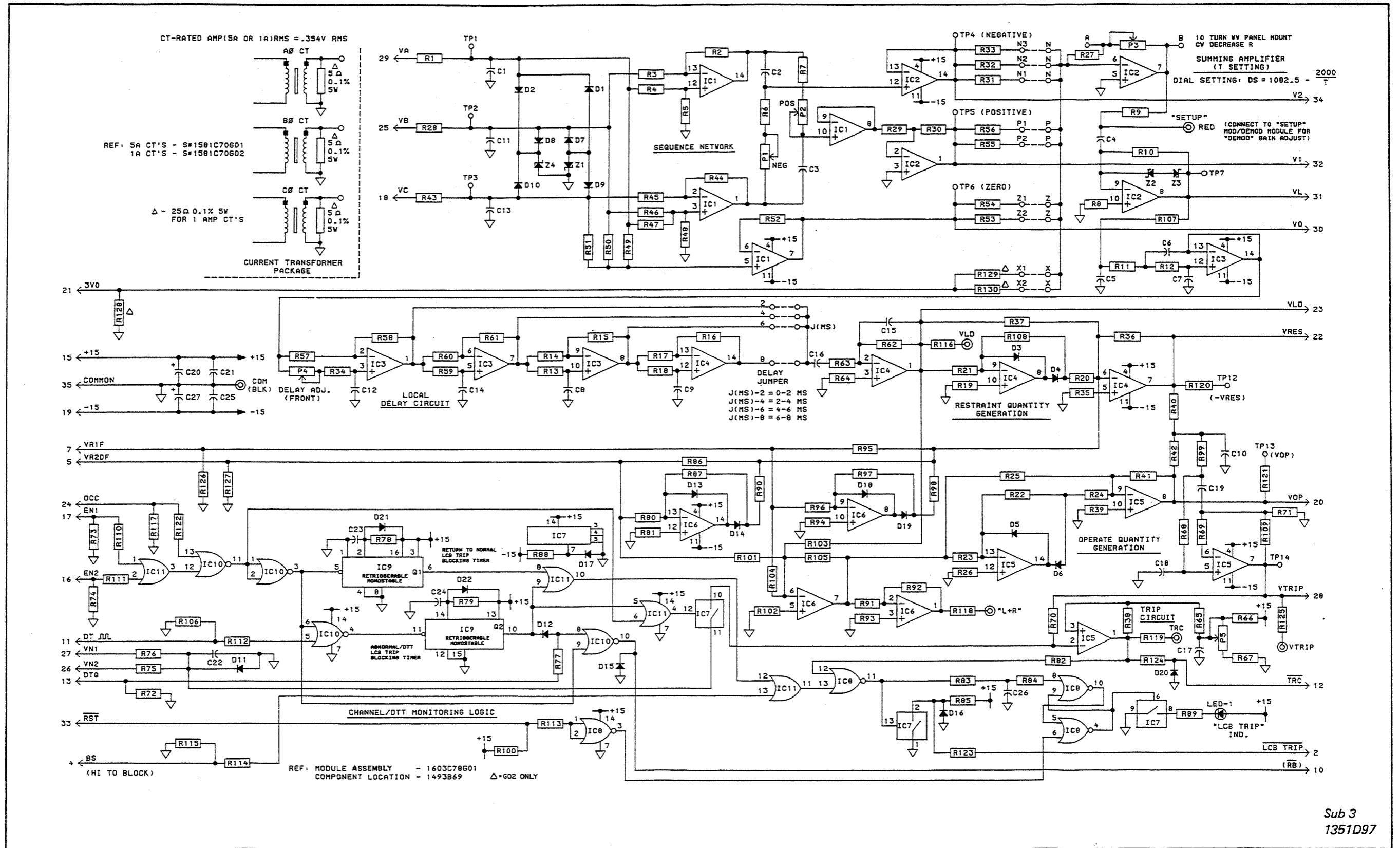


Fig. 5. Relay Internal Schematic (Sheet 1 of 2)

Sub 3  
1351D97

CAPACITOR		STYLE	RESISTOR		STYLE
C01	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R001	300 OHM 2% 1/2W METAL GLAZE	629A531H19
C02	.022 MFD 100V +-2% MET-POLY CARB	3533A53H01	R002	100K 1/8W 1% METAL FILM	3532A38H01
C03	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R003	301K 1/4W .1% METAL FILM	3534A73H01
C04	1.0 MFD 50V +-5% MET-POLY CARB	3534A68H11	R004	301K 1/4W .1% METAL FILM	3534A73H01
C05	.1 MFD 50V +-2% MET-POLY CARB	3533A53H03	R005	100K 1/8W 1% METAL FILM	3532A38H01
C06	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07	R006	178K 1/8W 1% METAL FILM	3532A38H25
C07	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R007	115K 1/8W 1% METAL FILM	3532A38H07
C08	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R008	100K 1/8W 1% METAL FILM	3532A38H01
C09	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R009	100K 1/8W 1% METAL FILM	3532A38H01
C10	.22 MFD 100V 5% MET-POLY CARB	3534A68H10	R010	100K 1/8W 1% METAL FILM	3532A38H01
C11	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R011	75K 1% 1/8W METAL FILM	3535A37H85
C12	.012 MFD 200V +-5% MET-POLY CARB	3534A68H04	R012	75K 1% 1/8W METAL FILM	3535A37H85
C13	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R013	100K 1/8W 1% METAL FILM	3532A38H01
C14	.01 MFD 200V +-2% MET-POLY CARB	3533A53H02	R014	200K 1% 1/8W METAL FILM	3532A38H30
C15	.0068 MFD 200V +-2% MET-POLY CARB	3533A53H06	R015	200K 1% 1/8W METAL FILM	3532A38H30
C16	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07	R016	200K 1% 1/8W METAL FILM	3532A38H30
C17	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R017	200K 1% 1/8W METAL FILM	3532A38H30
C18	.1 MFD 50V +-2% MET-POLY CARB	3533A53H03	R018	100K 1/8W 1% METAL FILM	3532A38H01
C19	.15 MFD 100V +-5% MET-POLY CARB	3534A68H09	R019	100K 1/8W 1% METAL FILM	3532A38H01
C20	10 MFD 35V +-5% TANTALUM	862A530H12	R020	100K 1/8W 1% METAL FILM	3532A38H01
C21	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R021	200K 1% 1/8W METAL FILM	3532A38H30
C22	510 PF 500V +-2% MICA	861A842H11	R022	200K 1% 1/8W METAL FILM	3532A38H30
C23	.1 MFD 50V +-2% MET-POLY CARB	3533A53H03	R023	200K 1% 1/8W METAL FILM	3532A38H01
C24	.1 MFD 50V +-2% MET-POLY CARB	3533A53H03	R024	100K 1/8W 1% METAL FILM	3532A38H01
C25	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08	R025	200K 1/8W 1% METAL FILM	3532A38H30
C26	.0047 MFD 200V +-5% NYLAR	3502A55H09	R026	100K 1/8W 1% METAL FILM	3532A38H01
C27	10 MFD 35V +-5% TANTALUM	862A530H12	R027	8.25K 1/4W 1% METAL FILM	848A820H37
			R028	300 OHM 2% 1/2W METAL GLAZE	629A531H19
			R029	100K 1/8W 1% METAL FILM	3532A38H01
			R030	100K 1/8W 1% METAL FILM	3532A38H01
			R031	4.32K 1/4W 1% METAL FILM	848A820H10
			R032	4.55K 1/4W 1% METAL FILM	848A820H12
			R033	4.99K 1/4W 1% METAL FILM	848A820H16
			R034	1K 1% 1/4W METAL FILM	848A819H48
			R035	24.3K 1/8W 1% METAL FILM	3535A37H38
			R036	100K 1/8W 1% METAL FILM	3532A38H01
			R037	200K 1% 1/8W METAL FILM	3532A38H30
			R038	2.0 MEG 5% 1/2W CARBON	187A290H38
			R039	51.1K 1/8W 1% METAL FILM	3535A37H69
			R040	61.9K 1/8W 1% METAL FILM	3535A37H77
			R041	200K 1% 1/8W METAL FILM	3532A38H30
			R042	61.9K 1/8W 1% METAL FILM	3535A37H77
			R043	300 OHM 2% 1/2W METAL GLAZE	629A531H19
			R044	200K 1% 1/8W METAL FILM	3532A38H30
			R045	301K 1/4W .1% METAL FILM	3534A73H01
			R046	301K 1/4W .1% METAL FILM	3534A73H01
			R047	301K 1/4W .1% METAL FILM	3534A73H01
			R048	100K 1/8W 1% METAL FILM	3532A38H01
			R049	301K .1% 1/4W METAL FILM	3534A73H01
			R050	301K .1% 1/4W METAL FILM	3534A73H01
			R051	301K .1% 1/4W METAL FILM	3534A73H01
			R052	100K 1/8W 1% METAL FILM	3532A38H01
			R053	806 OHM 1/4W 1% METAL FILM	848A819H39
			R054	412 OHM 1/4W 1% METAL FILM	848A819H11
			R055	20K 1% 1/8W METAL FILM	3535A37H30
			R056	10K 1/8W 1% METAL FILM	3535A37H01
			R057	200K 1% 1/8W METAL FILM	3532A38H30
			R058	200K 1% 1/8W METAL FILM	3532A38H30
			R059	100K 1/8W 1% METAL FILM	3532A38H01
			R060	200K 1% 1/8W METAL FILM	3532A38H30
			R061	200K 1% 1/8W METAL FILM	3532A38H30
			R062	150K 1% 1/8W METAL FILM	3532A38H18
			R063	301K 1/8W 1% METAL FILM	3532A38H47
			R064	150K 1% 1/8W METAL FILM	3532A38H18
			R065	10K 1/8W 1% METAL FILM	3535A37H01
			R066	15K 1/8W 1% METAL FILM	3535A37H18
			R067	100 OHM 1% 1/8W METAL FILM	3535A39H01
			R068	50.1K 1% 1/8W METAL FILM	3535A37H47
			R069	162K 1% 1/8W METAL FILM	3532A38H21
			R070	9.11K 1/4W 1% METAL FILM	848A820H17
			R071	2K 1% 1/8W METAL FILM	3535A38H30
			R072	200K 1/8W 1% METAL FILM	3532A38H30
			R073	100K 1/8W 1% METAL FILM	3532A38H01
			R074	100K 1/8W 1% METAL FILM	3532A38H01
			R075	150K 1% 1/8W METAL FILM	3532A38H18
			R076	150K 1% 1/8W METAL FILM	3532A38H18
			R077	100K 1/8W 1% METAL FILM	3532A38H01
			R078	221K 1% 1/8W METAL FILM	3532A38H34
			R079	221K 1% 1/8W METAL FILM	3532A38H34
			R080	200K 1/8W 1% METAL FILM	3532A38H30
			R081	100K 1% 1/8W METAL FILM	3532A38H01
			R082	100K 1/8W 1% METAL FILM	3532A38H01
			R083	200K 1% 1/8W METAL FILM	3532A38H30
			R084	10K 1/8W 1% METAL FILM	3535A37H01
			R085	10K 1/8W 1% METAL FILM	3535A37H01
			R086	200K 1% 1/8W METAL FILM	3532A38H30
			R087	200K 1% 1/8W METAL FILM	3532A38H30
			R088	5.01K 1/4W 1% METAL FILM	848A819H94
			R089	5.01K 1/4W 1% METAL FILM	848A819H94
			R090	100K 1/8W 1% METAL FILM	3532A38H01
			R091	200K 1/8W 1% METAL FILM	3532A38H30
			R092	200K 1/8W 1% METAL FILM	3532A38H30
			R093	100K 1/8W 1% METAL FILM	3532A38H01
			R094	100K 1/8W 1% METAL FILM	3532A38H01
			R095	200K 1% 1/8W METAL FILM	3532A38H30
			R096	200K 1% 1/8W METAL FILM	3532A38H30
			R097	200K 1% 1/8W METAL FILM	3532A38H30
			R098	100K 1/8W 1% METAL FILM	3532A38H01
			R099	100K 1/8W 1% METAL FILM	3532A38H01
			R100	51.1K 1/8W 1% METAL FILM	3535A37H69

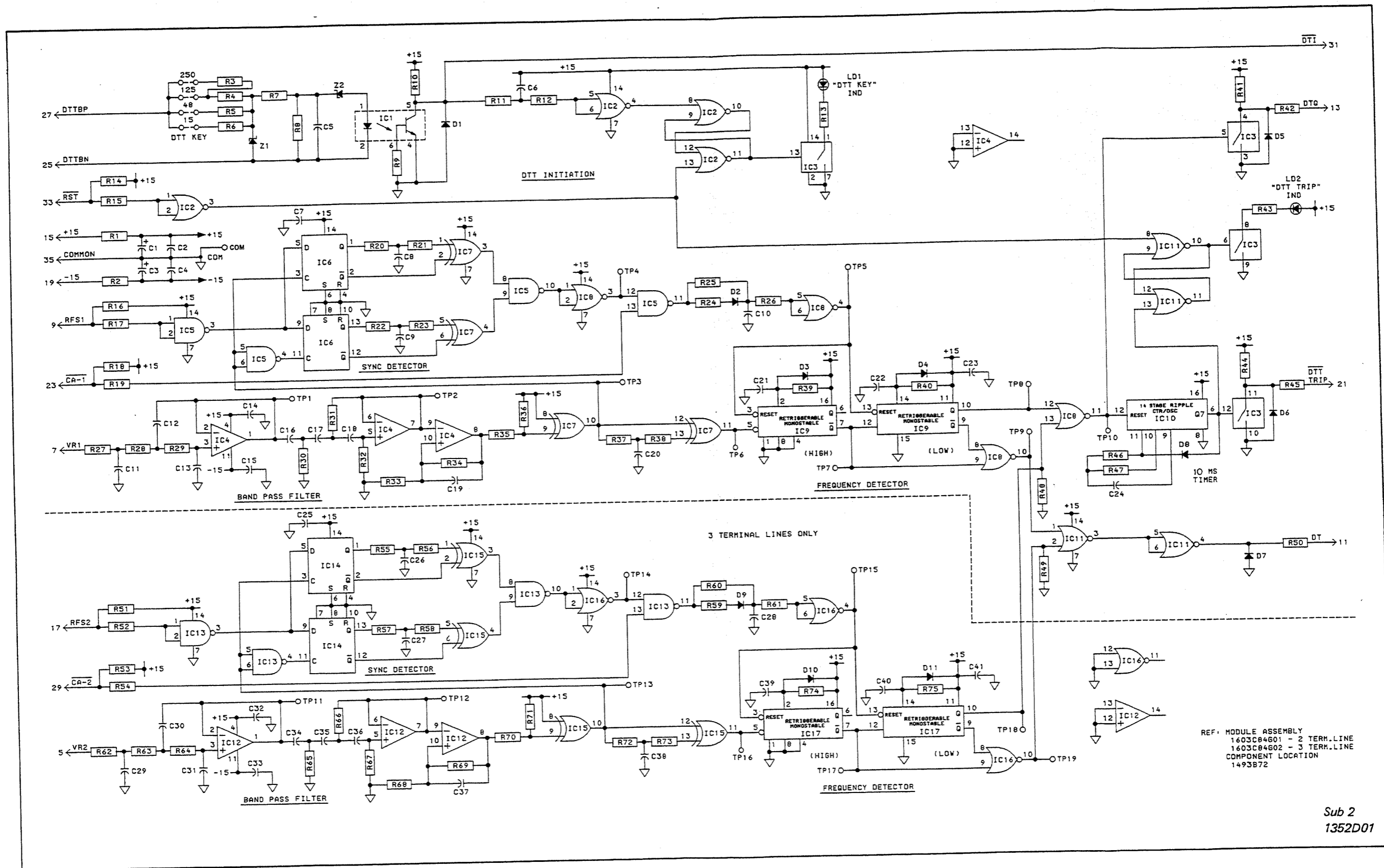
ZENER	STYLE
Z01	1N759A 12V 5% 400 MW
Z02	1N961B 15V 5% 400 MW
Z03	1N961B 15V 5% 400 MW
Z04	1N759A 12V 5% 400 MW

LINK	STYLE
J(MS)	BLUE CLIP LINK
N	BLUE CLIP LINK
P	BLUE CLIP LINK
Z	BLUE CLIP LINK
X	BLUE CLIP LINK

R101	200K 1/8W 1% METAL FILM	3532A38H30
R102	75K 1% 1/8W METAL FILM	3535A37H85
R103	200K 1% 1/8W METAL FILM	3532A38H30
R104	200K 1% 1/8W METAL FILM	3532A38H30
R105	100K 1% 1/8W METAL FILM	3532A38H15
R106	100K 1% 1/8W METAL FILM	3532A38H01
R107	9.09K 1% 1/8W METAL FILM	3535A38H93
R108	200K 1% 1/8W METAL FILM	3532A38H30
R109	162K/8W 1% METAL FILM	3535A37H21
R110	10K 1/8W 1% METAL FILM	3535A37H01
R111	10K 1/8W 1% METAL FILM	3535A37H01
R112	10K 1/8W 1% METAL FILM	3535A37H01
R113	10K 1/8W 1% METAL FILM	3535A37H01
R114	10K 1/8W 1% METAL FILM	3535A37H01
R115	100K 1/8W 1% METAL FILM	3532A38H01
R116	3.01K 1% 1/8W METAL FILM	3535A38H47
R117	100K 1/8W 1% METAL FILM	3532A38H01
R118	3.01K 1% 1/8W METAL FILM	3535A38H47
R119	3.01K 1% 1/8W METAL FILM	3535A38H47
R120	3.01K 1% 1/8W METAL FILM	3535A38H47
R121	3.01K 1% 1/8W METAL FILM	3535A38H47
R122	10K 1/8W 1% METAL FILM	3535A37H01
R123	499 OHM 1/2W 1% METAL FILM	848A819H19
R124	7.5K 1/8W 1% METAL FILM	3535A38H85
R125	3.01K 1/8W 1% METAL FILM	3535A38H47

Sub 3  
1351D97

Fig. 5. Relay Internal Schematic (Sheet 2 of 2)



REF. MODULE ASSEMBLY  
 1603C84601 - 2 TERH.LINE  
 1603C84602 - 3 TERH.LINE  
 COMPONENT LOCATION  
 1493B72

Sub 2  
 1352D01

Fig. 6. DTT Internal Schematic (Sheet 1 of 2)

CAPACITOR			DIODE			RESISTOR			ZENER		
STYLE	GROUPS 1 2		STYLE	GROUPS 1 2		STYLE	GROUPS 1 2		STYLE	GROUPS 1 2	
C01 10 MFD 35V +-5% TANTALUM	11	862A530H12	L001 RED LED (EDGE MOUNT)	11	350A22H01				Z01 1N4747A 20V 1W 5X	11	849A487H01
C02 0.1 MFD 100V +-5% MET-POLYCARB	11	3534A68H05	L002 RED LED (EDGE MOUNT)	11	350A22H01			Z02 1N752A 5.6V 400MW 5X	11	186A797H12	
C03 10 MFD 35V +-5% TANTALUM	11	862A530H12									
C04 0.1 MFD 100V +-5% MET-POLYCARB	11	3534A68H05									
C05 0.047 MFD 100V +-5% MET-POLYCARB	11	3534A68H07									
C06 0.022 MFD 100V +-2% MET-POLYCARB	11	3533A53H01									
C07 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C08 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C09 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C10 0.022 MFD 100V +-2% MET-POLYCARB	11	3533A53H01									
C11 66900PF 50V +-2% POLYSTY	11	3537A23H65									
C12 5100 PF 500V +-2% MICA	11	187A584H05									
C13 1500 PF 500V +-2% MICA	11	762A757H03									
C14 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C15 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C16 66900PF 50V +-2% POLYSTY	11	3537A23H65									
C17 3000 PF 500V +-2% MICA	11	3532A31H54									
C18 3000 PF 500V +-2% MICA	11	3532A31H54									
C19 20 PF 300V +-5% MICA	11	3532A31H47									
C20 510 PF 500V +-2% MICA	11	861A046H10									
C21 0.0066 MFD 200V +-2% MET-POLYCARB	11	3533A53H06									
C22 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C23 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C24 0.001UF, 200V, ±5% MET-POLYCARB	11	3534A68H02									
C25 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C26 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C27 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C28 0.022 MFD 100V +-2% MET-POLYCARB	11	3533A53H01									
C29 66,900 PF 50V +-2% POLYSTY	11	3537A23H65									
C30 5100 PF 500V +-2% MICA	11	187A584H05									
C31 1500 PF 500V +-2% MICA	11	762A757H03									
C32 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C33 0.1 MFD 50V +-20% CERAMIC	11	3532A29H13									
C34 66,900 PF 50V +-2% POLYSTY	11	3537A23H65									
C35 3000 PF 500V +-2% MICA	11	3532A31H54									
C36 3000 PF 500V +-2% MICA	11	3532A31H54									
C37 20 PF 300V +-5% MICA	11	3532A31H47									
C38 510 PF 500V +-2% MICA	11	861A046H10									
C39 0.0066 MFD 200V +-2% MET-POLYCARB	11	3533A53H06									
C40 0.015 MFD 200V +-2% MET-POLYCARB	11	3534A68H05									
C41 0.1 MFD 50V 20% CERAMIC	11	3532A29H13									
D01 1N4148 75V	11	836A928H06									
D02 1N4145 75V	11	836A928H06									
D03 1N4148 75V	11	836A928H06									
D04 1N4145 75V	11	836A928H06									
D05 1N4148 75V	11	836A928H06									
D06 1N4148 75V	11	836A928H06									
D07 1N4148 75V	11	836A928H06									
D08 1N4148 75V	11	836A928H06									
D09 1N4148 75V	11	836A928H06									
D10 1N4148 75V	11	836A928H06									
D11 1N4148 75V	11	836A928H06									
I001 4N35 OPTICAL COUPLER	11	7748936H01									
I002 MC14001BAL QUAD 2-INPUT NOR	11	3533A17H01									
I003 MC14066BAL QUAD BILATERAL SWITCH	11	3527A09H06									
I004 TL0741J QUAD OP AMP	11	3528A90H01									
I005 MC14011BAL QUAD 2-INPUT NAND	11	3527A09H02									
I006 MC14013BAL DUAL D FLIP FLOP	11	3527A26H06									
I007 MC14070BAL QUAD EXCLUSIVE OR	11	3527A26H01									
I008 MC14001BAL QUAD 2-INPUT NOR	11	3533A17H01									
I009 MC14538BAL DUAL PREC MONO MULTIVIB	11	3527A09H01									
I010 CD4060BF BIN RIPPLE CNTR/DIV/OSC	11	3527A09H05									
I011 MC14001BAL QUAD 2-INPUT NOR	11	3533A17H01									
I012 TL0741J QUAD OP AMP	11	3528A90H01									
I013 MC14011BAL QUAD 2-INPUT NAND	11	3527A09H02									
I014 MC14013BAL DUAL D FLIP FLOP	11	3527A26H06									
I015 MC14070BAL QUAD EXCLUSIVE OR	11	3527A26H01									
I016 MC14001BAL QUAD 2-INPUT NOR	11	3533A17H01									
I017 MC14538BAL DUAL PREC MONO MULTIVIB	11	3527A09H01									
R01 2.7 OHM 1/2W 5% CARBON	11	187A290H31									
R02 2.7 OHM 1/2W 5% CARBON	11	187A290H31									
R03 20K 2W 5% CARBON	11	185A207H5B									
R04 20K 2W 5% CARBON	11	185A207H5B									
R05 6.8K 2W 5% CARBON	11	185A207H47									
R06 430 OHM 1/2W 2% METAL GLAZE	11	629A531H23									
R07 430 OHM 1/2W 2% METAL GLAZE	11	629A531H23									
R08 8.2K 1/2W 2% METAL GLAZE	11	629A531H54									
R09 750K 1/8W 1% METAL FILM	11	3532A38H85									
R10 30.1K 1/8W 1% METAL FILM	11	3535A37H47									
R11 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R12 10K 1/8W 1% METAL FILM	11	3535A37H01									
R13 3.01K 1/4W 1% METAL FILM	11	848A819H94									
R14 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R15 10K 1/8W 1% METAL FILM	11	3535A37H01									
R16 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R17 10K 1/8W 1% METAL FILM	11	3535A37H01									
R18 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R19 10K 1/8W 1% METAL FILM	11	3535A37H01									
R20 100K 1/8W 1% METAL FILM	11	3532A38H01									
R21 100K 1/8W 1% METAL FILM	11	3532A38H01									
R22 100K 1/8W 1% METAL FILM	11	3532A38H01									
R23 100K 1/8W 1% METAL FILM	11	3532A38H01									
R24 1K 1/8W 1% METAL FILM	11	3535A38H01									
R25 200K 1/8W 1% METAL FILM	11	3532A38H30									
R26 10K 1/8W 1% METAL FILM	11	3535A37H01									
R27 6.19K 1/8W 1% METAL FILM	11	3535A38H77									
R28 150K 1/8W 1% METAL FILM	11	3532A38H18									
R29 100K 1/8W 1% METAL FILM	11	3532A38H01									
R30 8.25K 1/8W 1% METAL FILM	11	3535A38H09									
R31 82.5K 1/8W 1% METAL FILM	11	3535A37H89									
R32 301K 1/8W 1% METAL FILM	11	3532A38H47									
R33 100K 1/8W 1% METAL FILM	11	3532A38H01									
R34 232K 1/8W 1% METAL FILM	11	3532A38H36									
R35 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R36 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R37 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R38 51.1K 1/8W 1% METAL FILM	11	3535A37H69									
R39 100K 1/8W 1% METAL FILM	11	3532A38H01									
R40 121K 1/8W 1% METAL FILM	11	3532A38H09									
R41 30.1K 1/8W 1% METAL FILM	11	3535A37H47									
R42 511 OHM 1/8W 1% METAL FILM	11	3535A39H69									
R43 3.01K 1/4W 1% METAL FILM	11	848A819H94									
R44 30.1K 1/8W 1% METAL FILM	11	3535A37H47									
R45 511 OHM 1/8W 1% METAL FILM	11	3535A39H69									
R46 432K 1/8W 1% METAL FILM	11	3532A38H62									
R47 43.2K 1/8W 1% METAL FILM	11	3535A37H62									
R48 100K 1/8W 1% METAL FILM	11	3532A38H01									
R49 100K 1/8W 1% METAL FILM	11	3532A38H01									
R50 511 OHM 1/8W 1% METAL FILM	11	3535A39H69									
R51 51.1K 1/8W 1% METAL FILM	11	3535A37H69									



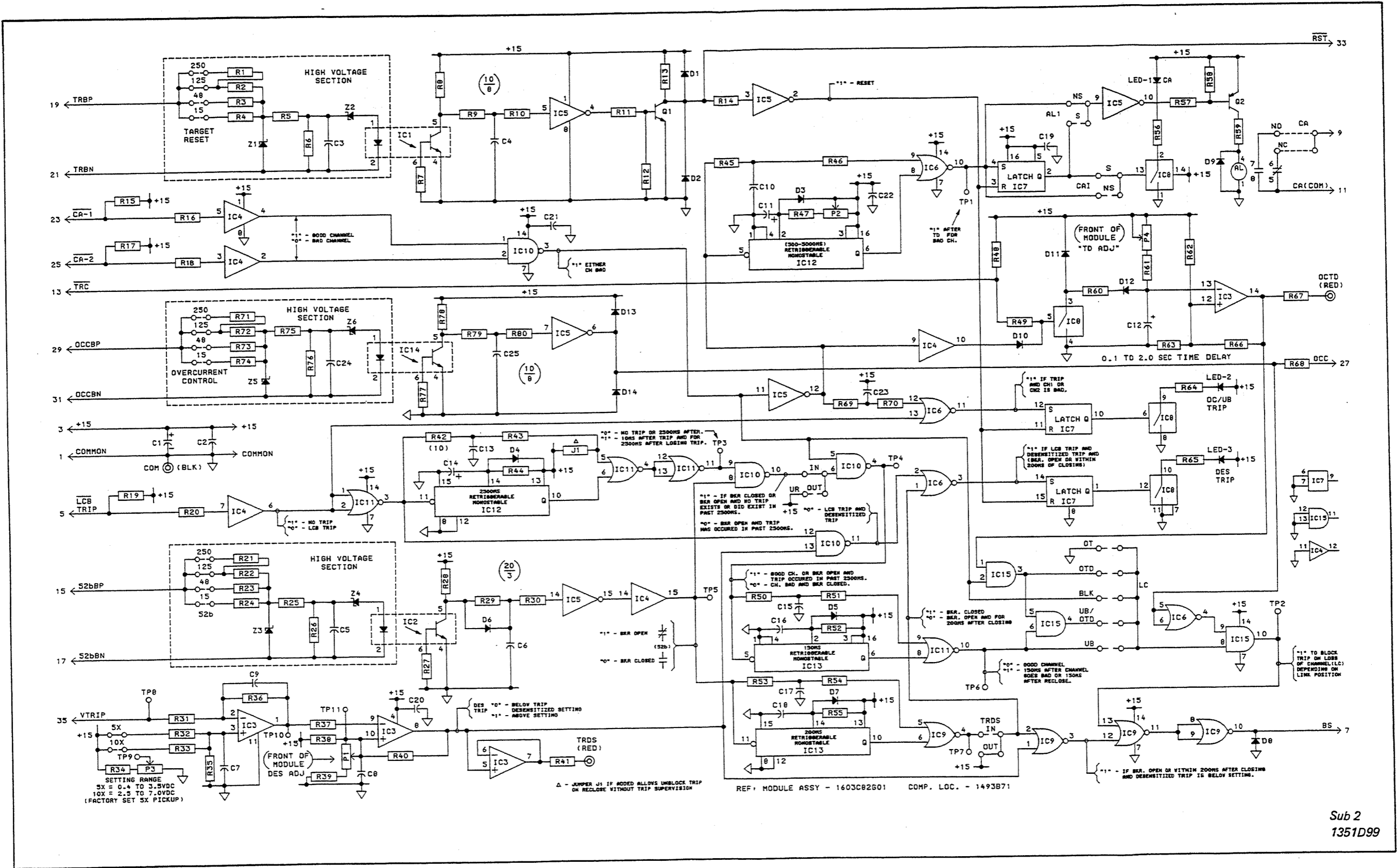


Fig. 7. AXLM Internal Schematic (Sheet 1 of 2)

Sub 2  
1351D99

CAPACITOR	STYLE
C01	10 MFD 35V +-5Z TANTALUM 862A530H12
C02	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C03	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C04	.22 MFD 100V +-5Z MET-POLY CARB 353A468H10
C05	1.0 MFD 50V +-5Z MET-POLY CARB 353A468H11
C06	.33 MFD 50V +-5Z MET-POLY CARB 863A166H16
C07	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C08	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C09	801 MFD 200V +-5Z MET-POLY CARB 861A846H25
C10	150 PF 500V +2Z MICA 184A661H21
C11	6.8 MFD 35V +-5Z TANTALUM 184A661H21

C12	6.8 MFD 35V 5Z TANTALUM 184A661H21
C13	.15 MFD 100V +-5Z MET-POLY CARB 353A468H09
C14	6.8 MFD 35V +-5Z TANTALUM 184A661H21
C15	150 PF 500V +2Z MICA 861A846H25
C16	1.0 MFD 50V +-5Z MET-POLY CARB 353A468H11
C17	150 PF 500V +2Z MICA 861A846H25
C18	1.0 MFD 50V +-5Z MET-POLY CARB 353A468H11
C19	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C20	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C21	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C22	.1 MFD 100V +-5Z MET-POLY CARB 353A468H08
C23	.022 MFD 100V 2X MET-POLY CARB 353A468H08
C24	.1 MFD 100V 5Z MET-POLY CARB 353A468H08
C25	.22 MFD 100V 5Z MET-POLY CARB 353A468H10

DIODE	STYLE
D01	1N645A 225V 837A652H03
D02	1N645A 225V 837A652H03
D03	1N4148 75V 836A928H06
D04	1N4148 75V 836A928H06
D05	1N4148 75V 836A928H06
D06	1N4148 75V 836A928H06
D07	1N4148 75V 836A928H06
D08	1N4148 75V 836A928H06
D09	1N645A 225V 837A652H03
D10	1N4148 75V 836A928H06
D11	1N4148 75V 836A928H06
D12	1N4148 75V 836A928H06
D13	1N645A 225V 837A652H03
D14	1N645A 225V 837A652H03

INT CKT	STYLE
IC01	4N35 OPTICAL COUPLER 774B936H01
IC02	4N35 OPTICAL COUPLER 774B936H01
IC03	TL074IJ QUAD OP AMP 352B890H01
IC04	MC14050BAL HEX BUFFER 3527A26H04
IC05	MC14049BAL HEX INV/BUFFER 3527A26H05
IC06	MC14001BAL QUAD 2-INPUT NOR 3533A17H01
IC07	MC14043BAL QUAD NOR RS LATCH 3527A09H07
IC08	MC14066BAL QUAD BILATERAL SWITCH 3527A09H06
IC09	MC14001BAL QUAD 2-INPUT NOR 3533A17H01
IC10	MC14011BAL QUAD-2 INPUT NAND 3527A09H02
IC11	MC14001BAL QUAD 2-INPUT NOR 3533A17H01
IC12	MC14538BAL DUAL PREC MONO MULTIVIB 3527A09H01
IC13	MC14538BAL DUAL PREC MONO MULTIVIB 3527A09H01
IC14	4N35 OPTICAL COUPLER 774B936H01
IC15	MC14001BAL QUAD 2-INPUT AND 3533A15H05

DIODE	STYLE
LED 1	RED LED (EDGE MOUNT) 3508A22H01
LED 2	RED LED (EDGE MOUNT) 3508A22H01
LED 3	RED LED (EDGE MOUNT) 3508A22H01

POT	STYLE
P01	20K 3/4W +-10Z TRIMPOT 3527A30H04
P02	1 MEG 3/4W +-10Z TRIMPOT 3527A30H11
P03	20K 3/4W +-10Z TRIMPOT 3527A30H04
P04	250K 3/4W 10Z TRIMPOT 3527A30H10

TRANSISTOR	STYLE
Q01	2N2222A, NPN 762A672H15
Q02	2N2907A, PNP 762A672H17

RESISTOR	STYLE
R01	20K 2W +-5Z CARBON 185A207H58
R02	20K 2W +-5Z CARBON 185A207H58
R03	6.8K 2W +-5Z CARBON 185A207H47
R04	430 OHM 1/2W +-2Z METAL GLAZE 629A531H23
R05	430 OHM 1/2W +-2Z METAL GLAZE 629A531H23
R06	8.2K 1/2W +-2Z METAL GLAZE 629A531H54
R07	1 MEG 1/4W 1Z METAL FILM 848A822H39
R08	15K 1/8W 1Z METAL FILM 3535A37H18
R09	51.1K 1/8W 1Z METAL FILM 3535A37H69
R10	10K 1/8W 1Z METAL FILM 3535A37H01
R11	4.99K 1/8W 1Z METAL FILM 3535A38H68
R12	2K 1Z 1/8W METAL FILM 3535A38H30
R13	15K 1/8W 1Z METAL FILM 3535A37H18
R14	10K 1/8W 1Z METAL FILM 3535A37H01
R15	51.1K 1/8W 1Z METAL FILM 3535A37H69
R16	10K 1/8W 1Z METAL FILM 3535A37H01
R17	51.1K 1/8W 1Z METAL FILM 3535A37H69
R18	10K 1/8W 1Z METAL FILM 3535A37H01
R19	51.1K 1/8W 1Z METAL FILM 3535A37H69
R20	10K 1/8W 1Z METAL FILM 3535A37H01
R21	20K 2W +-5Z CARBON 185A207H58
R22	20K 2W +-5Z CARBON 185A207H58
R23	6.8K 2W +-5Z CARBON 185A207H47
R24	430 OHM 1/2W +-2Z METAL GLAZE 629A531H23
R25	430 OHM 1/2W +-2Z METAL GLAZE 629A531H23
R26	8.2K 1/2W +-2Z METAL GLAZE 629A531H54
R27	1 MEG 1/4W 1Z METAL FILM 848A822H39
R28	15K 1/8W 1Z METAL FILM 3535A37H18
R29	51.1K 1/8W 1Z METAL FILM 3535A37H69
R30	10K 1/8W 1Z METAL FILM 3535A37H01
R31	10K 1/8W 1Z METAL FILM 3535A37H01
R32	34.8K 1/8W 1Z METAL FILM 3535A37H53
R33	20K 1Z 1/8W METAL FILM 3535A37H30
R34	30.1K 1Z 1/8W METAL FILM 3535A37H47
R35	10K 1Z 1/8W METAL FILM 3535A37H01
R36	24.9K 1Z 1/8W METAL FILM 3535A37H39
R37	10K 1Z 1/8W METAL FILM 3535A37H01
R38	8.25K 1Z 1/8W METAL FILM 3535A38H89
R39	2.43K 1Z 1/8W METAL FILM 3535A38H38
R40	221K 1Z 1/8W METAL FILM 3532A38H34
R41	3.01K 1Z 1/8W METAL FILM 3535A38H47
R42	100K 1/8W 1Z METAL FILM 3532A38H01
R43	10K 1/8W 1Z METAL FILM 3535A37H01
R44	365K 1/8W 1Z METAL FILM 3532A38H55
R45	100K 1/8W 1Z METAL FILM 3532A38H01
R46	10K 1/8W 1Z METAL FILM 3535A37H01
R47	10K 1/8W 1Z METAL FILM 3535A37H01
R48	51.1K 1/8W 1Z METAL FILM 3535A37H69
R49	10K 1/8W 1Z METAL FILM 3535A37H01
R50	100K 1/8 1Z METAL FILM 3532A38H01
R51	10K 1/8W 1Z METAL FILM 3535A37H01
R52	150K 1/8W 1Z METAL FILM 3532A38H18
R53	100K 1/8W 1Z METAL FILM 3532A38H01
R54	10K 1/8W 1Z METAL FILM 3535A37H01
R55	200K 1/8W 1Z METAL FILM 3532A38H30
R56	3.01K 1Z 1/4W METAL FILM 848A819H94
R57	4.99K 1/4W 1Z METAL FILM 848A820H16
R58	2K 1Z 1/4W METAL FILM 848A819H77
R59	150 OHM 1/2W +-2Z METAL GLAZE 629A531H12
R60	2K 1/8W 1Z METAL FILM 3535A38H30
R61	9.09K 1/8W 1Z METAL FILM 3535A38H93
R62	200K 1/8W 1Z METAL FILM 3532A38H30
R63	200K 1/8W 1Z METAL FILM 3532A38H30
R64	3.01K 1Z 1/4W METAL FILM 848A819H94
R65	3.01K 1Z 1/4W METAL FILM 848A819H94
R66	100K 1/8W 1Z METAL FILM 3532A38H01
R67	3.01K 1/8W 1Z METAL FILM 3535A38H47
R68	1K 1/8W 1Z METAL FILM 3535A38H01
R69	51.1K 1/8W 1Z METAL FILM 3535A37H69
R70	10K 1/8W 1Z METAL FILM 3535A37H01
R71	20K 2W 5Z CARBON 185A207H58
R72	20K 2W 5Z CARBON 185A207H58
R73	6.8K 2W 5Z CARBON 185A207H47
R74	430 OHM 1/2W 2Z METAL GLAZE 629A531H23
R75	430 OHM 1/2W 2Z METAL GLAZE 629A531H23
R76	8.2K 1/2W 2Z METAL GLAZE 629A531H54
R77	1 MEG 1/4W 1Z METAL FILM 848A822H39
R78	15K 1/2W 1Z METAL FILM 3535A37H18
R79	51.1K 1/8W 1Z METAL FILM 3535A37H69
R80	10K 1/8W 1Z METAL FILM 3535A37H01

ZENER	STYLE
Z01	1N4747A 20V 1W 5Z 849A487H01
Z02	1N752A 5.6V 400MW 5Z 186A797H12
Z03	1N4747A 20V 1W 5Z 849A487H01
Z04	1N752A 5.6V 400MW 5Z 186A797H12
Z05	1N4747A 20V 1W 5Z 849A487H01
Z06	1N752A 5.6V 400MW 5Z 186A797H12

RELAY	STYLE
AL01	AROHAT TYPE STE - 1 FORM C 148A633H01

LINK	STYLE
TR	BLUE CLIP LINK 3532A54H01
OCC	BLUE CLIP LINK 3532A54H01
S2A	BLUE CLIP LINK 3532A54H01
SW/IOX	BLUE CLIP LINK 3532A54H01
TRDS	BLUE CLIP LINK 3532A54H01
LC	BLUE CLIP LINK 3532A54H01
CAT	BLUE CLIP LINK 3532A54H01
AL1	BLUE CLIP LINK 3532A54H01
CA	BLUE CLIP LINK 3532A54H01
UR	BLUE CLIP LINK 3532A54H01

Fig. 7. AXLM Internal Schematic (Sheet 2 of 2)

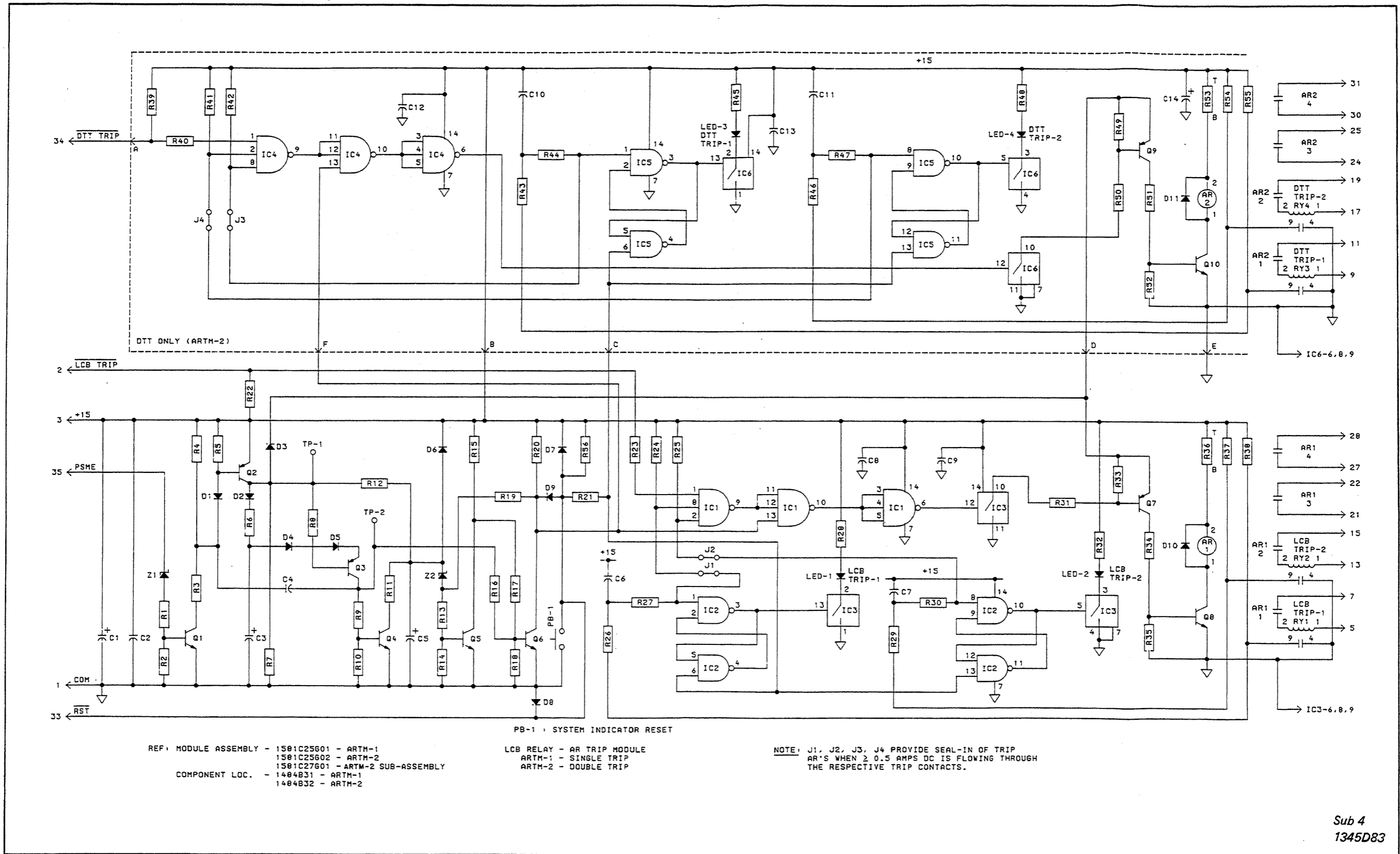


Fig. 8. ARTM-1/2 Internal Schematic (Sheet 1 of 2)

1581C25G03

ITEM	PART NAME	DESCRIPTION	STYLE
AR-1	RELAY	1.6 OHM COIL, 10W, 4A	408C845G44
C1	CAPACITOR	100 MFD, 35V, +-20% TANTALUM	880A363H01
C2	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C3	CAPACITOR	.47 MFD, 35V, +-20% TANTALUM	184A661H03
C4	CAPACITOR	.47 MFD, 200V, +-10% MYLAR	188A669H01
C5	CAPACITOR	100 MFD, 35V, +-20% TANTALUM	880A363H01
C6	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	3534A68H06
C7	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	3534A68H06
C8	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C9	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
D1	DIODE	1N645A	837A692H03
D2	DIODE	1N645A	837A692H03
D3	DIODE	1N4818	188A342H06
D4	DIODE	1N645A	837A692H03
D5	DIODE	1N645A	837A692H03
D6	DIODE	1N645A	837A692H03
D7	DIODE	1N645A	837A692H03
D8	DIODE	1N645A	837A692H03
D9	DIODE	1N645A	837A692H03
D10	DIODE	1N4818	188A342H06
IC1	INT CKT	MC14023BAL TRIPLE 3 INPUT NAND	3527A26H03
IC2	INT CKT	MC14011BAL QUAD-2 INPUT NAND	3527A09H02
IC3	INT CKT	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
J1	JUMPER	0 OHM	862A478H01
J2	JUMPER	0 OHM	862A478H01
LED-1	DIODE	RED LED (EDGE MOUNT)	3508A22H01
LED-2	DIODE	RED LED (EDGE MOUNT)	3508A22H01
PB-1	SWITCH	PUSHBUTTON	1444C63H01
Q1	TRANSISTOR	2N2222A, NPN	762A672H15
Q2	TRANSISTOR	2N2907A PNP	762A672H17
Q3	TRANSISTOR	2N2907A PNP	762A672H17
Q4	TRANSISTOR	2N2222A, NPN	762A672H15
Q5	TRANSISTOR	2N2222A, NPN	762A672H15
Q6	TRANSISTOR	2N2222A, NPN	762A672H15
Q7	TRANSISTOR	2N2907A PNP	762A672H17
Q8	TRANSISTOR	MJE205, NPN, PWR	3502A22H01
R1	RESISTOR	1K, 1% 1/4W METAL FILM	848A819H48
R2	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R3	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R4	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R5	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R6	RESISTOR	100-OHM 1% 1/4W METAL FILM	848A818H51
R7	RESISTOR	20K 1% 1/4W METAL FILM	848A820H74
R8	RESISTOR	20K 1% 1/4W METAL FILM	848A820H74
R9	RESISTOR	1K, 1% 1/4W METAL FILM	848A819H48
R10	RESISTOR	20K 1% 1/4W METAL FILM	848A820H74
R11	RESISTOR	10 OHM, 1/2W, +-5% CARBON	187A290H01
R12	RESISTOR	30.1K 1% 1/4W METAL FILM	848A820H91
R13	RESISTOR	1K, 1% 1/4W METAL FILM	848A819H48
R14	RESISTOR	20K 1% 1/4W METAL FILM	848A820H74
R15	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R16	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R17	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R18	RESISTOR	20K 1% 1/4W METAL FILM	848A820H74
R19	RESISTOR	100K 1/4W 1% METAL FILM	848A821H42
R20	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R21	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R22	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R23	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R24	RESISTOR	511K 1/4W 1% METAL FILM	848A822H11
R25	RESISTOR	511K 1/4W 1% METAL FILM	848A822H11
R26	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R27	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R28	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R29	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R30	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R31	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R32	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R33	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H21
R34	RESISTOR	330 OHMS, +-5% 3W, WIREWOUND	762A679H02
R35	RESISTOR	1K, 1% 1/4W METAL FILM	848A819H48
R36	RESISTOR	22.4-OHM 25W +-5% WIREWOUND	0ND1297H41
R37	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
R38	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
R39	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H21
RY-1	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01
RY-2	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01
Z1	ZENER	1N5235B 6.8V 5% 500 MW	862A288H07
Z2	ZENER	1N960B 9.1V 5% 400 MW	186A797H10

1581C27G01

ITEM	PART NAME	DESCRIPTION	STYLE
AR2	AR UNIT	1.6 OHM COIL, 10W, 4A	408C845G44
C10	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	3534A68H06
C11	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	3534A68H06
C12	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C13	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C14	CAPACITOR	100 MFD, 35V, +-20% TANTALUM	880A363H01
D11	DIODE	1N4818	188A342H06
IC4	INT CKT	MC14023BAL TRIPLE 3 INPUT NAND	3527A26H03
IC5	INT CKT	MC14011BAL QUAD-2 INPUT NAND	3527A09H02
IC6	INT CKT	MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
J03	JUMPER	0 OHM	862A478H01
J04	JUMPER	0 OHM	862A478H01
LED3	DIODE	RED LED (EDGE MOUNT)	3508A22H01
LED4	DIODE	RED LED (EDGE MOUNT)	3508A22H01
Q9	TRANSISTOR	2N2907A PNP	762A672H17
Q10	TRANSISTOR	MJE205, NPN, PWR.	3502A22H01
R39	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R40	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R41	RESISTOR	511K 1/4W 1% METAL FILM	848A822H11
R42	RESISTOR	511K 1/4W 1% METAL FILM	848A822H11
R43	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R44	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R45	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R46	RESISTOR	51.1K 1/4W 1% METAL FILM	848A821H14
R47	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R48	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R49	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H21
R50	RESISTOR	3.01K 1% 1/4W METAL FILM	848A819H94
R51	RESISTOR	330 OHMS, +-5% 3 WATTS, WIRE WOUND	762A679H02
R52	RESISTOR	1K, 1% 1/4W METAL FILM	848A819H48
R53	RESISTOR	22.4-OHM 25W +-5% W	0ND1297H41
R54	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
R55	RESISTOR	15K 1/4W 1% METAL FILM	848A820H62
RY3	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01
RY4	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01

Sub 4  
1345D83

Fig. 8. ARTM-1/2 Internal Schematic (Sheet 2 of 2)



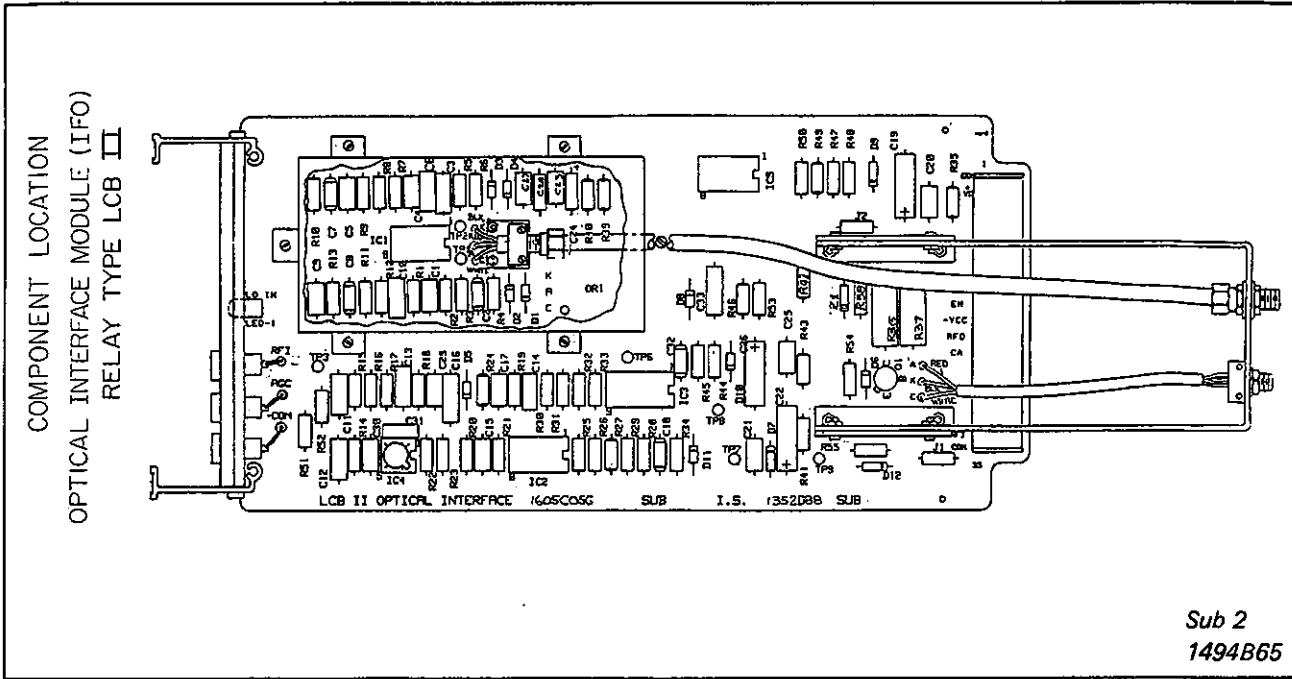


Fig. 11. IFO Component Locations

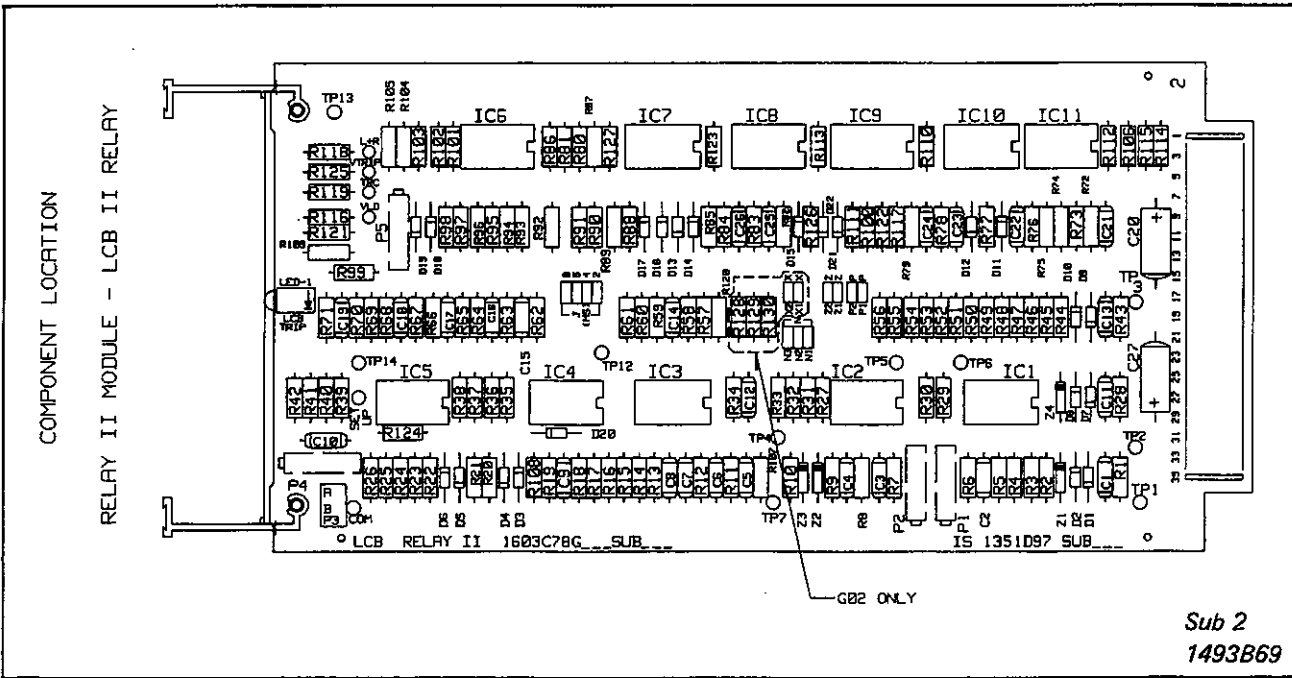


Fig. 12. Relay Component Locations

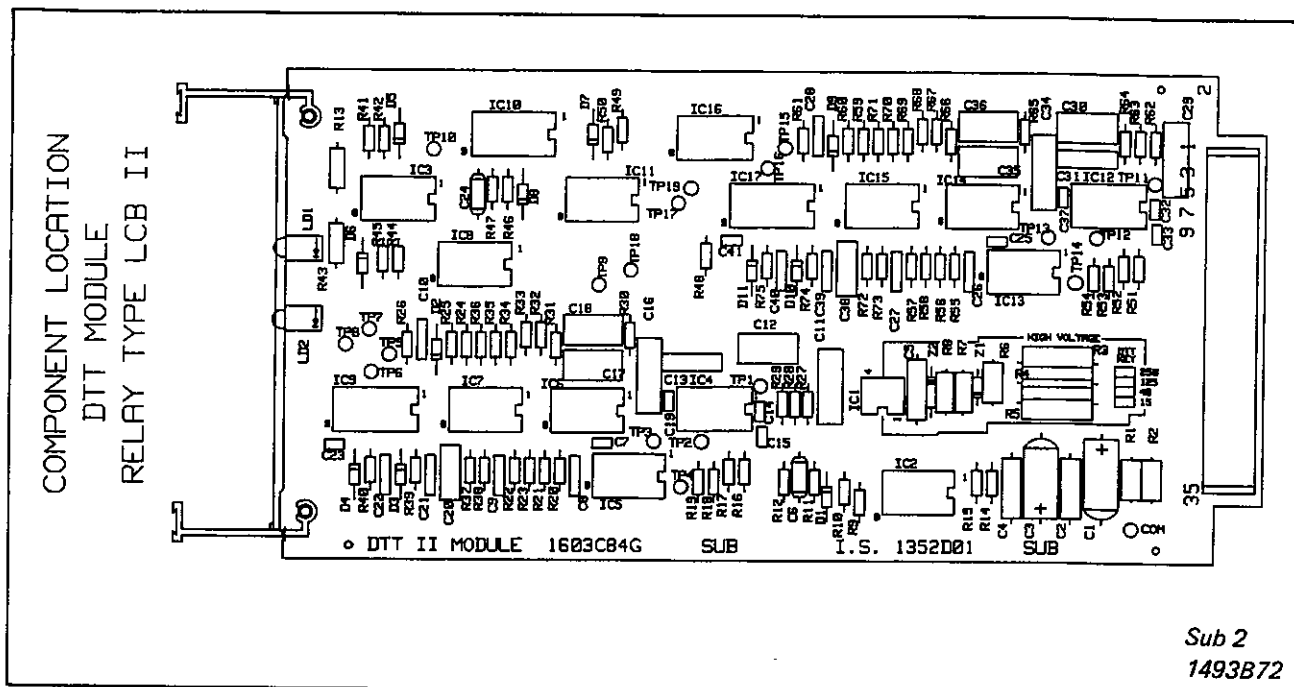


Fig. 13. DTT Component Locations

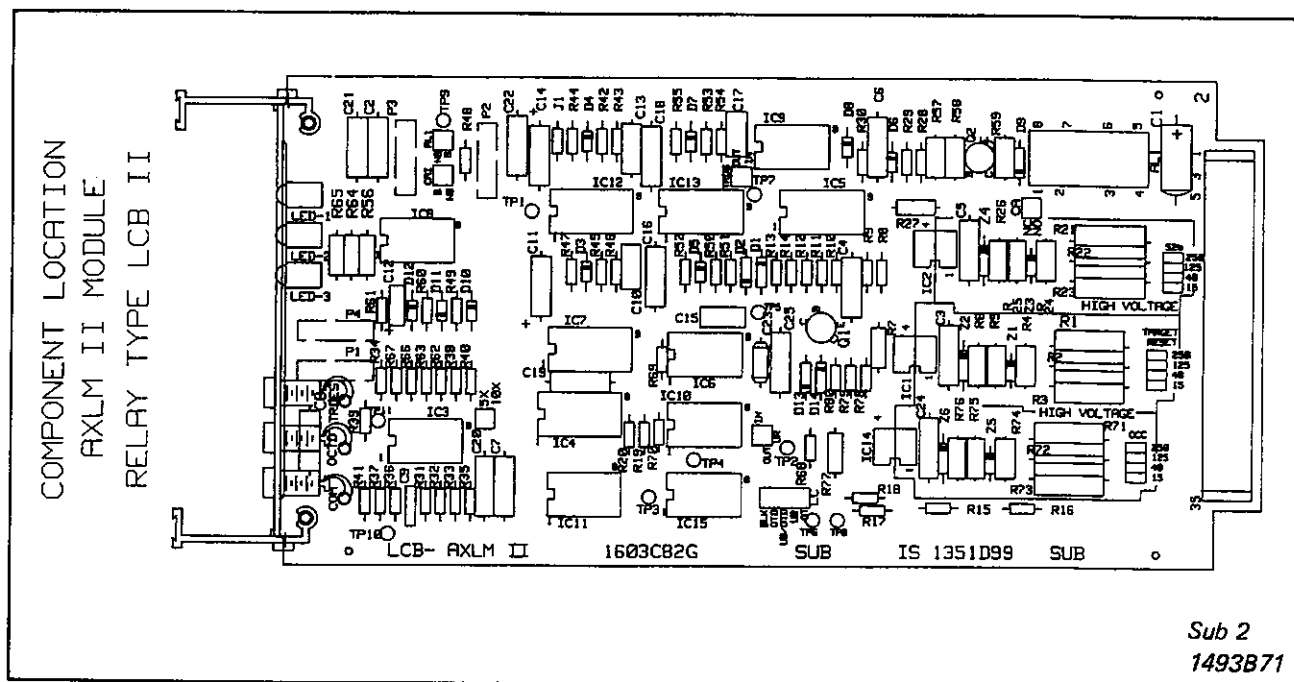


Fig. 14. AXLM Component Locations







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