



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.

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 Power T&D Company Inc. representative should be contacted.

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 $\pm 15\text{Vdc}$ 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.

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

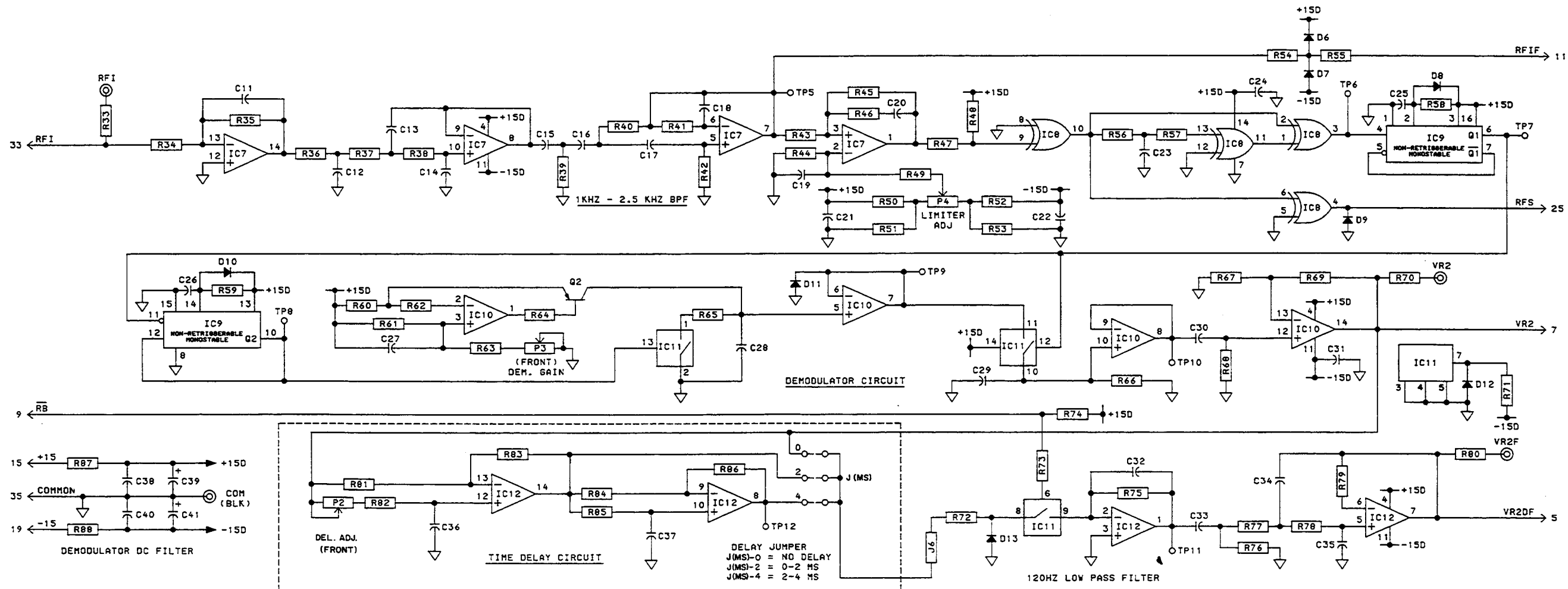
A. Internal Schematics

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

DEMODULATOR, TIME DELAY (DTD II)
MODULE ASSEMBLY - 1603C76602
COMPONENT LOCATION - 1493B68



CAPACITOR	STYLE
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	3533A52H01
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	763A259H03
C21 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C22 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C23 47 PF 500V +-2% NICA	763A259H17
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	107A684H05
C29 5100 PF 500V +-2% NICA	107A684H05
C30 .47 MFD 100V +-5% MET-POLY CARB	3530A89H03
C31 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C32 .01 MFD 200V +-2% MET-POLY CARB	3533A52H02
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	3533A52H02
C36 .012 MFD 200V +-5% MET-POLY CARB	3534A68H04
C37 .01 MFD 200V +-5% MET-POLY CARB	3534A68H03
C38 10.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C39 100 MFD 35V +-20% TANTALUM	800A342H01
C40 0.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C41 100 MFD 35V +-20% TANTALUM	800A342H01

DIODE	STYLE
D66 1N445A 225V	837A692H03
D67 1N445A 225V	837A692H03
D68 1N4148 75V	836A928H06
D69 1N4148 75V	836A928H06
D10 1N4148 75V	836A928H06
D11 1N4148 75V	836A928H06
D12 1N4148 75V	836A928H06
D13 1N4148 75V	836A928H06

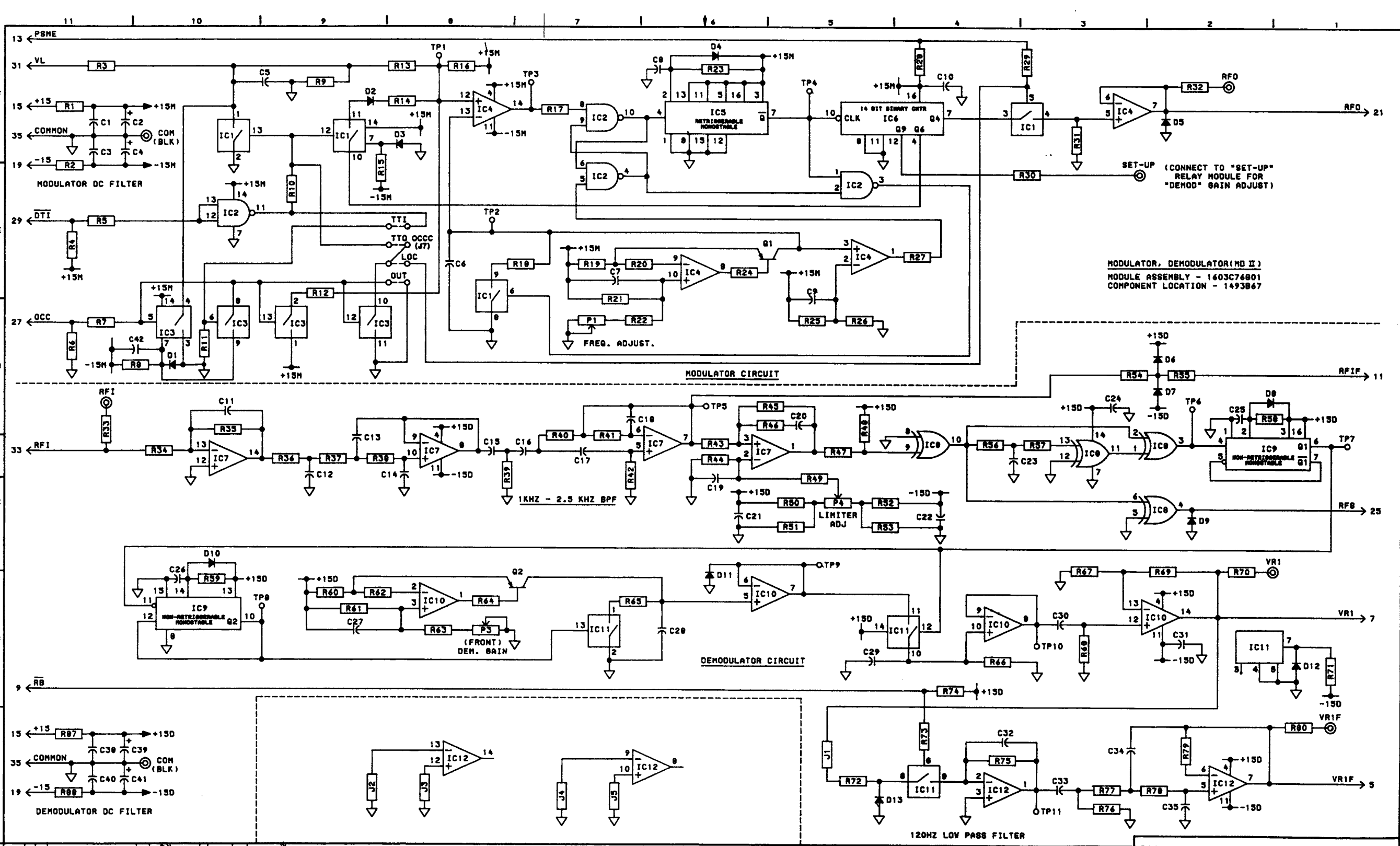
INT CKT	STYLE
IC87 TL074IJ QUAD OP AMP	3528A99H01
IC88 MC14070BAL QUAD EXCLUSIVE OR	3527A26H01
IC89 MC14538BAL DUAL PREC MONO MULTIVIB	3527A87H01
IC10 TL074IJ QUAD OP AMP	3528A99H01
IC11 MC14066BAL QUAD BILATERAL SWITCH	3527A87H06
IC12 TL074IJ QUAD OP AMP	3528A99H01

POT	STYLE
P02 100K 3/4W 20% TRIMPOT	3527A30H07
P03 20K 3/4W +-10% TRIMPOT	3527A30H04
P04 500 OHM 3/4W +-10% TRIMPOT	3527A30H02

TRANSISTOR	STYLE
Q02 2N3799 PNP	3527A33H01

RESISTOR	STYLE
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	3535A38H08
R37 121K 1/8W 1% METAL FILM	3532A38H09
R38 121K 1/8W 1% METAL FILM	3532A38H09
R39 0.25K 1/4W 1% METAL FILM	3535A37H09
R40 82.5K 1/8W 1% METAL FILM	3535A37H09
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 NEG 1/4W 1% METAL FILM	848A822H39
R45 150 5% CARB 1/2W	107A290H40
R46 100K 1/8W 1% METAL FILM	3535A37H01
R47 51.1K 1/8W 1% METAL FILM	3535A37H49
R48 51.1K 1/8W 1% METAL FILM	3535A37H49
R49 10K 1/8W 1% METAL FILM	3535A37H01
R50 15K 1/8W 1% METAL FILM	3535A37H10
R51 30.1 OHM 1/8W 1% METAL FILM	3535A42H47
R52 10K 1/8W 1% METAL FILM	3535A37H10
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	3535A37H49
R57 10K 1/8W 1% METAL FILM	3535A37H01
R58 10K 1/8W 1% METAL FILM	3535A37H10
R59 100K 1/8W 1% METAL FILM	3532A38H01
R60 15K 1/8W 1% METAL FILM	3535A37H10
R61 30.1K 1/8W 1% METAL FILM	3535A37H47
R62 15K 1/8W 1% METAL FILM	3535A37H10
R63 800K 1/8W 1% METAL FILM	800A342H01
R64 0.11 OHM 1/4W 1% METAL FILM	840A817H20
R65 100 OHM 1/4W 1% METAL FILM	840A817H01
R66 500 1/8W 1% METAL FILM	107A640H24
R67 133K 1/8W 1% METAL FILM	3532A38H13
R68 110K 1/8W 1% METAL FILM	3532A38H05
R69 750K 1/8W 1% METAL FILM	3532A38H05
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	3535A37H49
R75 100K 1/8W 1% METAL FILM	3532A38H01
R76 150K 1/8W 1% METAL FILM	3532A38H10
R77 75K 1/8W 1% METAL FILM	3535A37H05
R78 75K 1/8W 1% METAL FILM	3535A37H05
R79 301K 1/8W 1% METAL FILM	3532A38H47
R80 3.01K 1/8W 1% METAL FILM	3535A38H47
R81 200K 1/8W 1% METAL FILM	3532A38H30
R82 1K 1/8W 1% METAL FILM	3535A38H01
R83 200K 1/8W 1% METAL FILM	3532A38H30
R84 200K 1/8W 1% METAL FILM	3532A38H30
R85 100K 1/8W 1% METAL FILM	3532A38H01
R86 200K 1/8W 1% METAL FILM	3532A38H30
R87 2.7 OHM 1/2W 5% CARB	107A290H31
R88 2.7 OHM 1/2W 5% CARB	107A290H31

LINK	STYLE
J(M00) BLUE CLIP LINK	3532A84H01



CAPACITOR	STYLE
C01 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C02 100 MFD 35V +-25% TANTALUM	880A363H01
C03 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C04 100 MFD 35V +-25% TANTALUM	880A363H01
C05 .022 MFD 100V +-25% MET-POLY CARB	3534A68H08
C06 .001 MFD 200V +-1% MET-POLY CARB	3534A68H01
C07 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C08 510 PF 500V +-25% NICA	861A846H10
C09 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C10 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C11 .001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C12 .015 MFD 200V +-25% MET-POLY CARB	3534A68H05
C13 .001 MFD 200V +-5% MET-POLY CARB	3534A68H02
C14 270 PF 500V +-25% NICA	762A757H12
C15 .022 MFD 100V +-25% MET-POLY CARB	3534A68H01
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	763A289H03
C21 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C22 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C23 47 PF 500V +-25% NICA	763A289H17
C24 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C25 510 PF 500V +-25% NICA	861A846H10
C26 .001 MFD 200V +-1% MET-POLY CARB	3534A68H01
C27 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C28 5100 PF 500V +-25% NICA	107A859H05
C29 5100 PF 500V +-25% NICA	107A859H05
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	3534A68H02
C33 .1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C34 .047 MFD 100V +-5% MET-POLY CARB	3534A68H07
C35 .01 MFD 200V +-25% MET-POLY CARB	3534A68H02
C36 .0.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C39 100 MFD 35V +-25% TANTALUM	880A363H01
C40 0.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C41 100 MFD 35V +-25% TANTALUM	880A363H01
C42 0.1 MFD 50V +-20% MONO. CERAMIC	3532A38H13

DIODE	STYLE
D01 1N4148 75V	836A928H06
D02 1N4148 75V	836A928H06
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 1N4148 75V	836A928H06
D10 1N4148 75V	836A928H06
D11 1N4148 75V	836A928H06
D12 1N4148 75V	836A928H06
D13 1N4148 75V	836A928H06

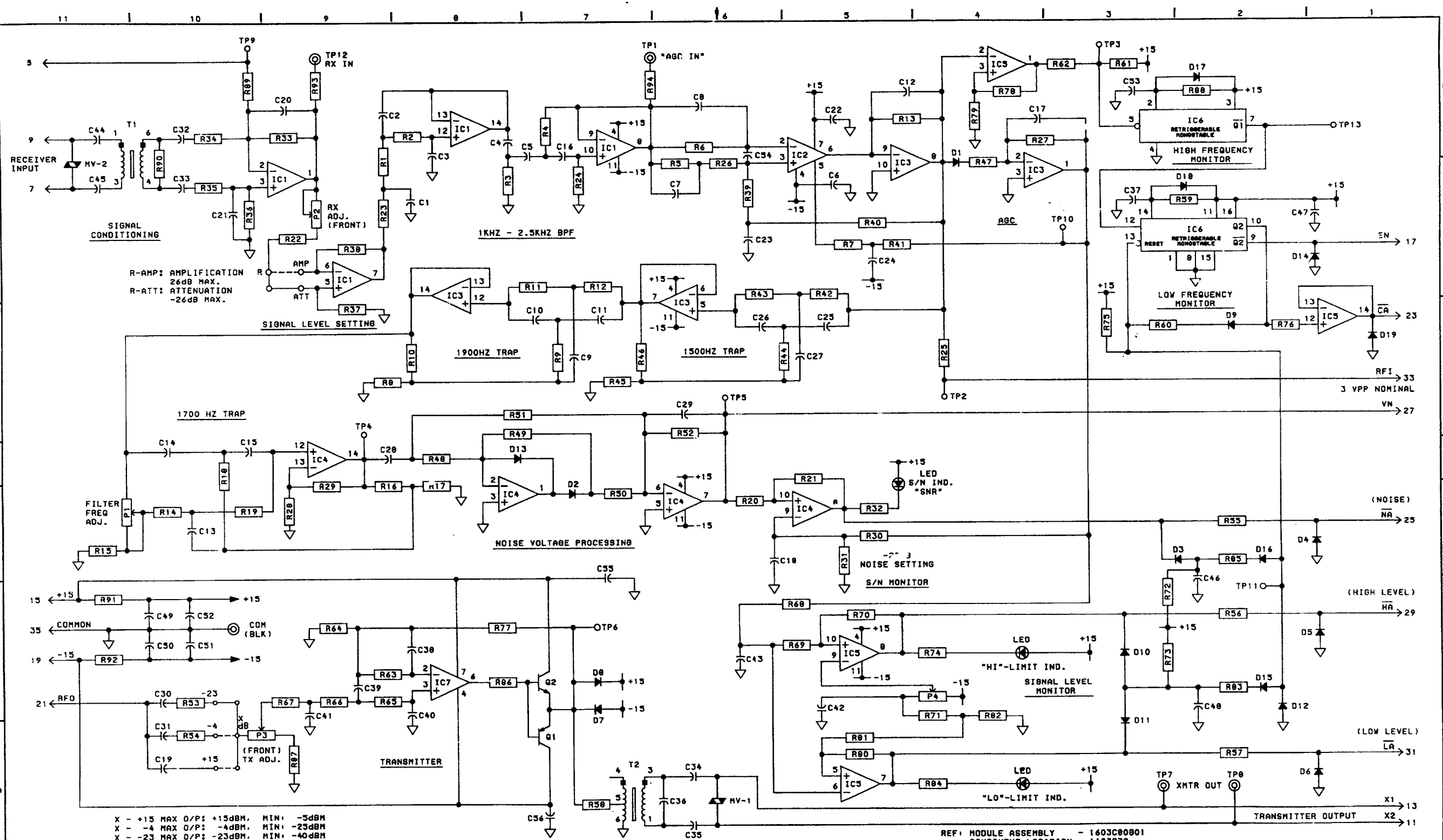
INT CKT	STYLE
IC01 MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC02 MC14011BAL QUAD-2 INPUT NAND	3527A09H02
IC03 MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC04 TL0741J QUAD OP AMP	3528A90H01
IC05 MC14580BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC06 MC14920BAL 14 BIT BINARY COUNTER	3527A09H09
IC07 TL0741J QUAD OP AMP	3528A90H01
IC08 MC14070BAL QUAD EXCLUSIVE OR	3527A24H01
IC09 MC14530BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC10 TL0741J QUAD OP AMP	3528A90H01
IC11 MC14066BAL QUAD BILATERAL SWITCH	3527A09H06
IC12 TL0741J QUAD OP AMP	3528A90H01

POT	STYLE
P01 20K 3/4W +-10% TRIMPOT	3527A38H04
P03 20K 3/4W +-10% TRIMPOT	3527A38H04
P04 500 OHM 3/4W +-10% TRIMPOT	3527A38H02

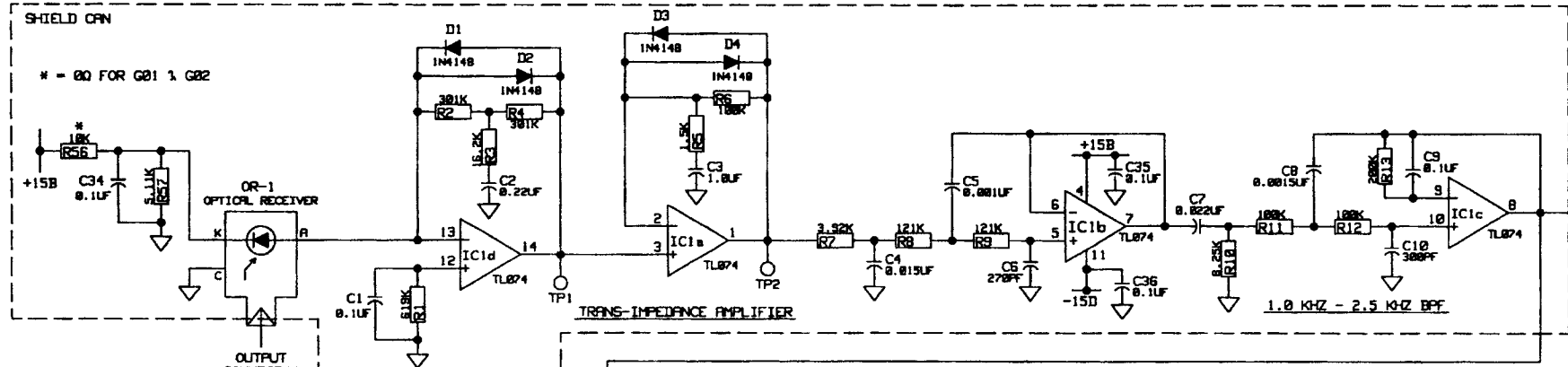
TRANSISTOR	STYLE
Q01 2N3799 PNP	3527A13H01
Q02 2N3799 PNP	3527A13H01

RESISTOR	STYLE
R01 2.7 OHM 1/2W 5% CARBON	107A290H31
R02 2.7 OHM 1/2W 5% CARBON	107A290H31
R03 100K 1/8W 1% METAL FILM	3532A38H21
R04 51.1K 1% 1/8W METAL FILM	3536A37H49
R05 10K 1/8W 1% METAL FILM	3536A37H01
R06 100K 1/8W 1% METAL FILM	3532A38H01
R07 10K 1/8W 1% METAL FILM	3536A37H01
R08 1.5K 1/2W 2% METAL FILM	848A819H20
R09 75K 1/8W 1% METAL FILM	3536A37H05
R10 51.1K 1/8W 1% METAL FILM	3536A37H49
R11 51.1K 1/8W 1% METAL FILM	3536A37H49
R12 270K 1/8W 1% METAL FILM	3532A38H40
R13 100K 1/8W 1% METAL FILM	3532A38H01
R14 93.1K 1/8W 1% METAL FILM	3536A37H49
R15 3.01K 1/4W 1% METAL FILM	848A819H20
R16 140K 1/8W 1% METAL FILM	3532A38H15
R17 51.1K 1% 1/8W METAL FILM	3536A37H49
R18 100 OHM 1% 1/4W METAL FILM	848A819H51
R19 0.075K 1/8W 1% METAL FILM	3536A38H06
R20 15 K 1/8W 1% METAL FILM	3536A37H10
R21 30.1K 1/8W 1% METAL FILM	3536A37H47
R22 110K 1/8W 1% METAL FILM	3532A38H05
R23 15 K 1/8W 1% METAL FILM	3536A37H10
R24 511 OHM 1/4W 1% METAL FILM	848A819H20
R25 150K 1% 1/8W METAL FILM	3532A38H10
R26 10K 1/8W 1% METAL FILM	3536A37H01
R27 51.1K 1/8W 1% METAL FILM	3536A37H49
R28 100K 1/8W 1% METAL FILM	3532A38H01
R29 51.1K 1/8W 1% METAL FILM	3536A37H49
R30 100K 1/8W 1% METAL FILM	3532A38H01
R31 150K 1/8W 1% METAL FILM	3532A38H10
R32 3.01K 1/8W 1% METAL FILM	3536A38H47
R33 3.01K 1/8W 1% METAL FILM	3536A38H47
R34 20K 1/8W 1% METAL FILM	3536A37H30
R35 20K 1/8W 1% METAL FILM	3536A37H30
R36 3.92K 1/8W 1% METAL FILM	3536A38H58
R37 121K 1/8W 1% METAL FILM	3532A38H09
R38 121K 1/8W 1% METAL FILM	3532A38H09
R39 0.25K 1/4W 1% METAL FILM	3536A38H09
R40 82.5K 1/8W 1% METAL FILM	3536A37H09
R41 301K 1/8W 1% METAL FILM	3532A38H47
R42 301K 1/8W 1% METAL FILM	3532A38H47
R43 10K 1/8W 1% METAL FILM	3536A37H01
R44 1 MEG 1/4W 1% METAL FILM	848A819H20
R45 15M 5% CARB 1/2W	107A290H46
R46 100K 1/8W 1% METAL FILM	3532A38H01
R47 51.1K 1/8W 1% METAL FILM	3536A37H49
R48 51.1K 1/8W 1% METAL FILM	3536A37H49
R49 10K 1/8W 1% METAL FILM	3536A37H01
R50 10K 1/8W 1% METAL FILM	3536A37H10
R51 30.1 OHM 1/8W 1% METAL FILM	3536A42H47
R52 15K 1/8W 1% METAL FILM	3536A37H10
R53 30.1 OHM 1/8W 1% METAL FILM	3536A42H47
R54 10K 1/8W 1% METAL FILM	3536A37H01
R55 10K 1/8W 1% METAL FILM	3536A37H01
R56 51.1K 1/8W 1% METAL FILM	3536A37H49
R57 10K 1/8W 1% METAL FILM	3536A37H01
R58 15K 1/8W 1% METAL FILM	3536A37H10
R59 100K 1/8W 1% METAL FILM	3532A38H01
R60 15K 1/8W 1% METAL FILM	3536A37H10
R61 30.1K 1/8W 1% METAL FILM	3536A37H47
R62 15K 1/8W 1% METAL FILM	3536A37H10
R63 800K 1/8W 1% METAL FILM	800A87H01
R64 511 OHM 1/4W 1% METAL FILM	848A819H20
R65 100 OHM 1/4W 1% METAL FILM	848A819H51
R66 50M 1/4W 1% METAL OXIDE CERMET	107A290H24
R67 133K 1/8W 1% METAL FILM	3532A38H13
R68 110K 1/8W 1% METAL FILM	3532A38H05
R69 750K 1/8W 1% METAL FILM	3532A38H05
R70 3.01K 1/8W 1% METAL FILM	3536A38H47
R71 3.01K 1/4W 1% METAL FILM	848A819H49
R72 200K 1/8W 1% METAL FILM	3532A38H38
R73 10K 1/8W 1% METAL FILM	3536A37H01
R74 51.1K 1/8W 1% METAL FILM	3536A37H49
R75 100K 1/8W 1% METAL FILM	3532A38H01
R76 150K 1/8W 1% METAL FILM	3532A38H10
R77 75K 1/8W 1% METAL FILM	3536A37H05
R78 75K 1/8W 1% METAL FILM	3536A37H05
R79 501K 1/8W 1% METAL FILM	3532A38H47
R80 3.01K 1/8W 1% METAL FILM	3536A38H47
R81 2.7 OHM 1/2W 5% CARB	107A290H31
R82 2.7 OHM 1/2W 5% CARB	107A290H31

LINK	STYLE
J7 (0000) BLUE CLIP LINK	3538A84H01

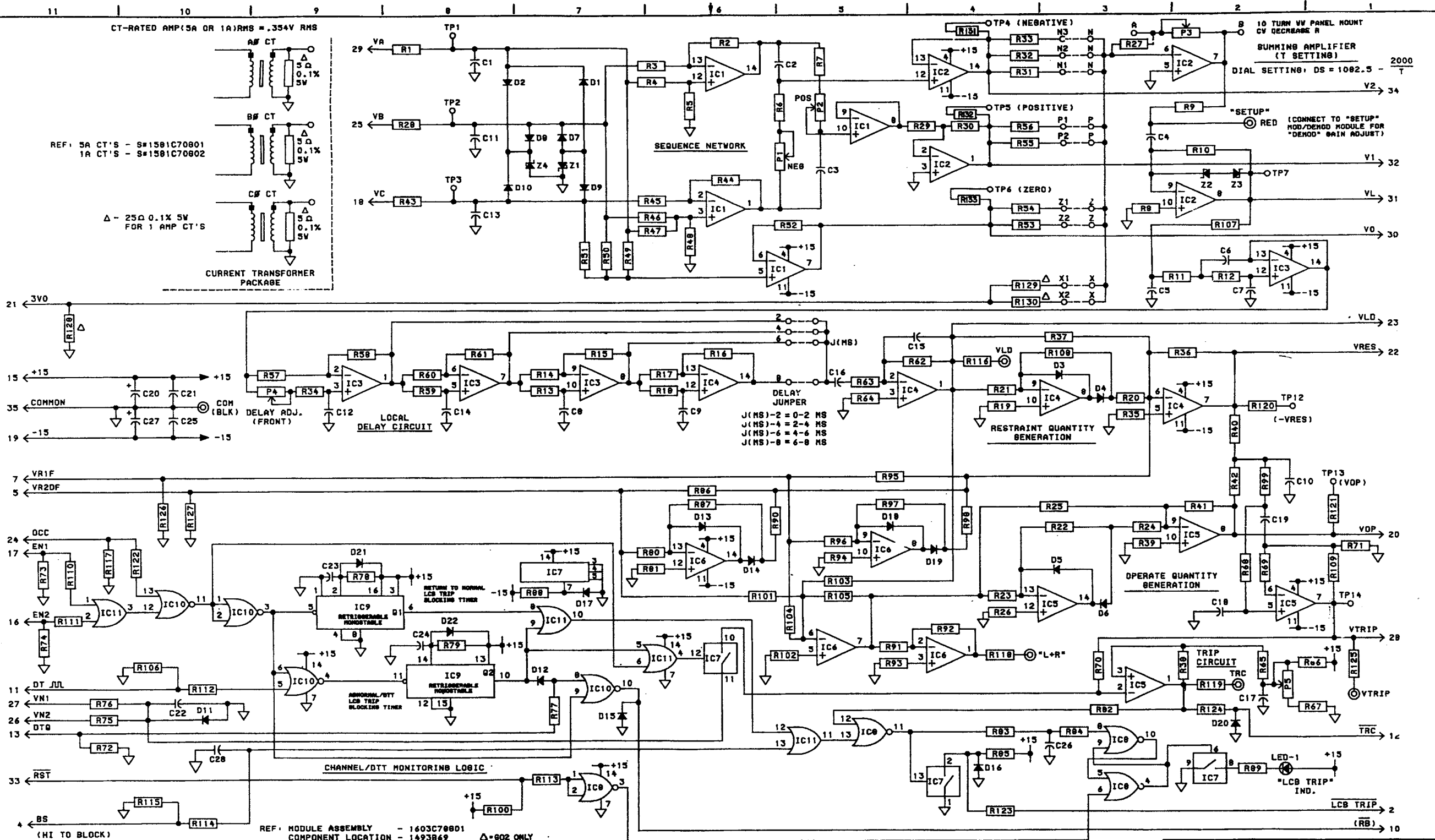


X - +15 MAX O/P: +15dBm, MIN: -5dBm
X - -4 MAX O/P: -4dBm, MIN: -25dBm
X - -23 MAX O/P: -23dBm, MIN: -40dBm



NOTES:
ALL RESISTORS ARE 1/4W UNLESS OTHERWISE SPECIFIED.

DRAWING ROUTING CODE	4	1					A			P					A	A		
	A	P	V	F	33	34	35	36	37	38	39	40	41	42	43	44	45	46



1351097

CAPACITOR STYLE

C01	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C02	.022 MFD 100V +-2% MET-POLY CARB	3534A68H01
C03	.01 MFD 250V +-5% MET-POLY CARB	3534A68H02
C04	1.0 MFD 50V +-5% MET-POLY CARB	3534A68H11
C05	1 MFD 50V +-5% MET-POLY CARB	3534A68H03
C06	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07
C07	.01 MFD 250V +-5% MET-POLY CARB	3534A68H02
C08	.01 MFD 250V +-5% MET-POLY CARB	3534A68H02
C09	.01 MFD 250V +-5% MET-POLY CARB	3534A68H02
C10	.22 MFD 100V 5% MET-POLY CARB	3534A68H10
C11	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C12	.012 MFD 200V +-5% MET-POLY CARB	3534A68H04
C13	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C14	.01 MFD 200V +-5% MET-POLY CARB	3534A68H02
C15	.0048 MFD 200V +-5% MET-POLY CARB	3534A68H06
C16	.047 MFD 100V +-5% MET-POLY CARB	3534A68H07
C17	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C18	.1 MFD 50V +-5% MET-POLY CARB	3534A68H03
C19	.15 MFD 100V +-5% MET-POLY CARB	3534A68H09
C20	10 MFD 35V +-5% TANTALUM	862A853H12
C21	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C22	510 PF 500V +-2% NICA	861A844H10
C23	.1 MFD 50V +-2% MET-POLY CARB	3534A68H03
C24	.1 MFD 50V +-2% MET-POLY CARB	3534A68H03
C25	.1 MFD 100V +-5% MET-POLY CARB	3534A68H08
C26	.0047 MFD 200V +-5% NYLON	3502A85H09
C27	10 MFD 35V +-5% TANTALUM	862A853H12
C28	270 PF, 500V, 2%, DOR-NICA	788A787H12

DIODE STYLE

D01	1N4148A 225V	837A692H03
D02	1N4148A 225V	837A692H03
D03	1N4148 75V	836A928H06
D04	1N4148 75V	836A928H06
D05	1N4148 75V	836A928H06
D06	1N4148 75V	836A928H06
D07	1N4148A 225V	837A692H03
D08	1N4148A 225V	837A692H03
D09	1N4148A 225V	837A692H03
D10	1N4148A 225V	837A692H03
D11	1N4148 75V	836A928H06
D12	1N4148 75V	836A928H06
D13	1N4148 75V	836A928H06
D14	1N4148 75V	836A928H06
D15	1N4148A 225V	837A692H03
D16	1N4148A 225V	837A692H03
D17	1N4148A 75V	836A928H06
D18	1N4148A 75V	836A928H06
D19	1N4148A 75V	836A928H06
D20	1N4148A 225V	837A692H03
D21	1N4148 75V	836A928H06
D22	1N4148 75V	836A928H06

DIAL STYLE

DIAL	DIGITAL DIAL	3509A12H03
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INT CXT STYLE

IC01	TL0741J QUAD OP AMP	3528A98H01
IC02	TL0741J QUAD OP AMP	3528A98H01
IC03	TL0741J QUAD OP AMP	3528A98H01
IC04	TL0741J QUAD OP AMP	3528A98H01
IC05	TL0741J QUAD OP AMP	3528A98H01
IC06	TL0741J QUAD OP AMP	3528A98H01
IC07	MC1406BAL QUAD BILATERAL SWITCH	3527A98H06
IC08	MC1401BAL QUAD 2-INPUT NOR	3533A17H01
IC09	MC1453BAL DUAL PREC MONO MULTIVIB	3527A98H01
IC10	MC1401BAL QUAD 2-INPUT NOR	3533A17H01
IC11	MC1401BAL QUAD 2-INPUT OR	3533A17H01

DIODE STYLE

LED-1	RED LED (EDGE MOUNT)	3508A22H01
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POT STYLE

P01	100K 3/4W 10% TRIMPOT	3527A30H07
P02	100K 3/4W 10% TRIMPOT	3527A30H07
P03	100K 2W 10% TURN EX PREC POT	3509A13H04
P04	100K 3/4W 10% TRIMPOT	3527A30H07
P05	1K 3/4W 10% TRIMPOT	3527A30H09

RESISTOR STYLE

R001	300 OHM 2% 1/2W METAL GLAZE	629A531H19
R002	100K 1/2W 1% METAL FILM	3532A38H01
R003	301K 1/4W 1% METAL FILM	3534A73H01
R004	301K 1/4W 1% METAL FILM	3534A73H01
R005	100K 1/2W 1% METAL FILM	3532A38H01
R006	170K 1/2W 1% METAL FILM	3532A38H06
R007	110K 1/2W 1% METAL FILM	3532A38H07
R008	100K 1/2W 1% METAL FILM	3532A38H01
R009	100K 1/2W 1% METAL FILM	3532A38H01
R010	100K 1/2W 1% METAL FILM	3532A38H01
R011	75K 1% 1/2W METAL FILM	3534A73H06
R012	75K 1% 1/2W METAL FILM	3534A73H06
R013	100K 1/2W 1% METAL FILM	3532A38H01
R014	200K 1% 1/2W METAL FILM	3532A38H30
R015	200K 1% 1/2W METAL FILM	3532A38H30
R016	200K 1% 1/2W METAL FILM	3532A38H30
R017	200K 1% 1/2W METAL FILM	3532A38H30
R018	100K 1/2W 1% METAL FILM	3532A38H01
R019	100K 1/2W 1% METAL FILM	3532A38H01
R020	100K 1/2W 1% METAL FILM	3532A38H01
R021	200K 1% 1/2W METAL FILM	3532A38H30
R022	200K 1% 1/2W METAL FILM	3532A38H30
R023	200K 1% 1/2W METAL FILM	3532A38H30
R024	100K 1/2W 1% METAL FILM	3532A38H01
R025	200K 1/2W 1% METAL FILM	3532A38H30
R026	100K 1/2W 1% METAL FILM	3532A38H01
R027	0.25K 1/4W 1% METAL FILM	848A828H37
R028	300 OHM 2% 1/2W METAL GLAZE	629A531H19
R029	100K 1/2W 1% METAL FILM	3532A38H01
R030	100K 1/2W 1% METAL FILM	3532A38H01
R031	4.32K 1/4W 1% METAL FILM	848A828H10
R032	4.63K 1/4W 1% METAL FILM	848A828H12
R033	4.99K 1/4W 1% METAL FILM	848A828H16
R034	1K 1% 1/4W METAL FILM	848A819H48
R035	2.0K 1/2W 1% METAL FILM	3532A38H30
R036	100K 1/2W 1% METAL FILM	3532A38H01
R037	200K 1% 1/2W METAL FILM	3532A38H30
R038	2.0 MEG 5% 1/2W CARBON	107A290H30
R039	51.1K 1/2W 1% METAL FILM	3534A73H09
R040	61.9K 1/2W 1% METAL FILM	3534A73H77
R041	100K 1/2W 1% METAL FILM	3532A38H01
R042	41.9K 1/2W 1% METAL FILM	3534A73H77
R043	300 OHM 2% 1/2W METAL GLAZE	629A531H19
R044	200K 1% 1/2W 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 1/2W 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 1/2W 1% METAL FILM	3532A38H01
R053	80K OHM 1/4W 1% METAL FILM	848A819H39
R054	112 OHM 1/4W 1% METAL FILM	848A819H11
R055	20K 1% 1/2W METAL FILM	3534A73H01
R056	10K 1/2W 1% METAL FILM	3534A73H01
R057	200K 1% 1/2W METAL FILM	3532A38H30
R058	200K 1% 1/2W METAL FILM	3532A38H30
R059	100K 1/2W 1% METAL FILM	3532A38H01
R060	200K 1% 1/2W METAL FILM	3532A38H30
R061	200K 1% 1/2W METAL FILM	3532A38H30
R062	150K 1% 1/2W METAL FILM	3532A38H10
R063	301K 1/2W 1% METAL FILM	3532A38H47
R064	150K 1% 1/2W METAL FILM	3532A38H10
R065	10K 1/2W 1% METAL FILM	3534A73H01
R066	15K 1/2W 1% METAL FILM	3534A73H01
R067	100 OHM 1% 1/2W METAL FILM	3534A73H01
R068	30.1K 1% 1/2W METAL FILM	3534A73H47
R069	1.5K 1% 1/4W 1% METAL FILM	3534A73H01
R070	2K 1% 1/2W METAL FILM	3532A38H30
R071	200K 1/2W 1% METAL FILM	3532A38H30
R072	100K 1/2W 1% METAL FILM	3532A38H01
R073	100K 1/2W 1% METAL FILM	3532A38H01
R074	100K 1/2W 1% METAL FILM	3532A38H01
R075	150K 1% 1/2W METAL FILM	3532A38H10
R076	150K 1% 1/2W METAL FILM	3532A38H10
R077	100K 1/2W 1% METAL FILM	3532A38H01
R078	442K 1% 1/2W METAL FILM	3532A38H43
R079	442K 1% 1/2W METAL FILM	3532A38H43
R080	200K 1/2W 1% METAL FILM	3532A38H30
R081	100K 1% 1/2W METAL FILM	3532A38H01
R082	100K 1/2W 1% METAL FILM	3532A38H01
R083	200K 1% 1/2W METAL FILM	3532A38H30
R084	10K 1/2W 1% METAL FILM	3534A73H01
R085	10K 1/2W 1% METAL FILM	3534A73H01
R086	200K 1% 1/2W METAL FILM	3532A38H30
R087	200K 1% 1/2W METAL FILM	3532A38H30
R088	3.01K 1/4W 1% METAL FILM	848A819H04
R089	3.01K 1/4W 1% METAL FILM	848A819H04
R090	100K 1/2W 1% METAL FILM	3532A38H01
R091	200K 1/2W 1% METAL FILM	3532A38H30
R092	200K 1/2W 1% METAL FILM	3532A38H30
R093	100K 1/2W 1% METAL FILM	3532A38H01
R094	100K 1/2W 1% METAL FILM	3532A38H01
R095	200K 1% 1/2W METAL FILM	3532A38H30
R096	200K 1% 1/2W METAL FILM	3532A38H30
R097	200K 1% 1/2W METAL FILM	3532A38H30
R098	100K 1/2W 1% METAL FILM	3532A38H01
R099	100K 1/2W 1% METAL FILM	3532A38H01
R100	51.1K 1/2W 1% METAL FILM	3534A73H09

ZENER STYLE

Z01	1N759A 12V 5% 400 MW	837A693H01
Z02	1N914B 10V 5% 400 MW	106A797H07
Z03	1N914B 10V 5% 400 MW	106A797H07
Z04	1N759A 12V 5% 400 MW	837A693H01

LINK STYLE

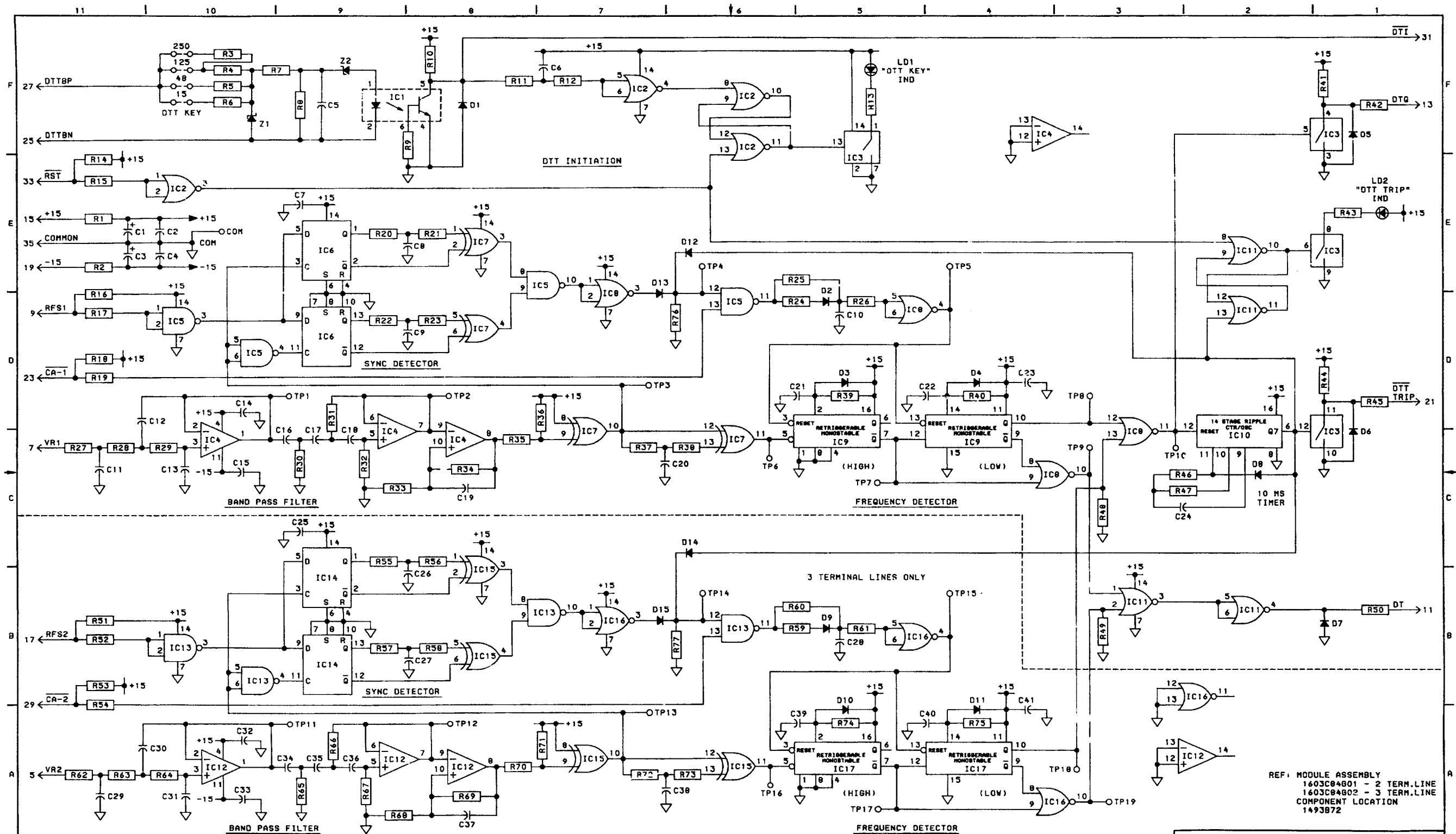
N (MM)	BLUE CLIP LINK	3532A54H01
N	BLUE CLIP LINK	3532A54H01
P	BLUE CLIP LINK	3532A54H01
E	BLUE CLIP LINK	3532A54H01
X	BLUE CLIP LINK	3532A54H01

RESISTOR STYLE

R101	200K 1/2W 1% METAL FILM	3532A38H30
R102	75K 1% 1/2W METAL FILM	3534A73H06
R103	200K 1% 1/2W METAL FILM	3532A38H30
R104	75K 1% 1/2W METAL FILM	3532A38H30
R105	140K 1% 1/2W METAL FILM	3532A38H10
R106	100K 1% 1/2W METAL FILM	3532A38H01
R107	9.09K 1% 1/2W METAL FILM	3534A73H07
R108	200K 1% 1/2W METAL FILM	3532A38H30
R109	16.2K/50W 1% METAL FILM	3534A73H21
R110	10K 1/2W 1% METAL FILM	3534A73H01
R111	10K 1/2W 1% METAL FILM	3534A73H01
R112	10K 1/2W 1% METAL FILM	3534A73H01
R113	10K 1/2W 1% METAL FILM	3534A73H01
R114	10K 1/2W 1% METAL FILM	3534A73H01
R115	100K 1/2W 1% METAL FILM	3532A38H01
R116	3.01K 1% 1/2W METAL FILM	3534A73H01
R117	100K 1/2W 1% METAL FILM	3532A38H01
R118	3.01K 1% 1/2W METAL FILM	3534A73H01
R119	3.01K 1% 1/2W METAL FILM	3534A73H01
R120	3.01K 1% 1/2W METAL FILM	3534A73H01
R121	3.01K 1% 1/2W METAL FILM	3534A73H01
R122	10K 1/2W 1% METAL FILM	3534A73H01
R123	499 OHM 1/2W 1% METAL FILM	848A819H19
R124	7.5K 1/2W 1% METAL FILM	3534A73H06
R125	3.01K 1/2W 1% METAL FILM	3534A73H01

RESISTOR STYLE

R126	30.1K 1/4W 1% METAL FILM	3534A73H47
R127	30.1K 1/4W 1% METAL FILM	3534A73H47
R128	30.1K 1/4W 1% METAL FILM	3534A73H47
R129	4.15K 1/4W 1% METAL FILM	848A819H11
R130	20.0K 1/4W 1% METAL FILM	3534A73H00
R131	3.01K 1/4W 1% METAL FILM	3534A73H47
R132	3.01K 1/4W 1% METAL FILM	3534A73H47
R133	3.01K 1/4W 1% METAL FILM	3534A73H47



1352D01

CAPACITOR	STYLE	GROUPS *	
		1	2
C01	10 MFD 35V +-5% TANTALUM	862A830H12	11
C02	0.1 MFD 100V +-5% MET-POLYCARB	3534A68H08	11
C03	10 MFD 35V +-5% TANTALUM	862A830H12	11
C04	0.1 MFD 100V +-5% MET-POLYCARB	3534A68H08	11
C05	0.047 MFD 100V +-5% MET-POLYCARB	3534A68H07	11
C06	0.022 MFD 100V +-2% MET-POLYCARB	3533A63H01	11
C07	0.1 MFD 50V +-20% CERAMIC	3532A29H13	11
C08	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	11
C09	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	11
C10	0.022 MFD 100V +-2% MET-POLYCARB	3533A53H01	11
C11	66900PF 50V +-2% POLYSTY	3532A23H45	11
C12	5100 PF 500V +-2% NICA	187A584H05	11
C13	1500 PF 500V +-2% NICA	762A757H03	11
C14	0.1 MFD 50V +-20% CERAMIC	3532A29H13	11
C15	0.1 MFD 50V +-20% CERAMIC	3532A29H13	11
C16	66900PF 50V +-2% POLYSTY	3537A23H45	11
C17	3000 PF 500V +-2% NICA	3532A31H54	11
C18	3000 PF 500V +-2% NICA	3532A31H47	11
C19	20 PF 300V +-5% NICA	861A846H10	11
C20	510 PF 500V +-2% NICA	3533A53H06	11
C21	0.0066 MFD 200V +-2% MET-POLYCARB	3534A68H05	11
C22	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	11
C23	0.1 MFD 50V +-20% CERAMIC	3532A29H13	11
C24	66900PF 50V +-2% POLYSTY	3537A23H45	11
C25	0.1 MFD 50V +-20% CERAMIC	3532A29H13	01
C26	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	01
C27	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	01
C28	0.022 MFD 100V +-2% MET-POLYCARB	3537A23H45	01
C29	66,900 PF 50V +-2% POLYSTY	187A584H05	01
C30	5100 PF 500V +-2% NICA	762A757H03	01
C31	1500 PF 500V +-2% NICA	3532A29H13	01
C32	0.1 MFD 50V +-20% CERAMIC	3532A29H13	01
C33	0.1 MFD 50V +-20% CERAMIC	3537A23H45	01
C34	66,900 PF 50V +-2% POLYSTY	3532A31H54	01
C35	3000 PF 500V +-2% NICA	3532A31H54	01
C36	3000 PF 500V +-2% NICA	3532A31H47	01
C37	20 PF 300V +-5% NICA	861A846H10	01
C38	510 PF 500V +-2% NICA	3533A53H06	01
C39	0.0066 MFD 200V +-2% MET-POLYCARB	3534A68H05	01
C40	0.015 MFD 200V +-2% MET-POLYCARB	3534A68H05	01
C41	0.1 MFD 50V 20% CERAMIC	3532A29H13	01

DIODE	STYLE		
D01	1N4148 75V	836A928H06	11
D02	1N4148 75V	836A928H06	11
D03	1N4148 75V	836A928H06	11
D04	1N4148 75V	836A928H06	11
D05	1N4148 75V	836A928H06	11
D06	1N4148 75V	836A928H06	11
D07	1N4148 75V	836A928H06	11
D08	1N4148 75V	836A928H06	11
D09	1N4148 75V	836A928H06	01
D10	1N4148 75V	836A928H06	01
D11	1N4148 75V	836A928H06	01
D12	1N4148 75V	836A928H06	11
D13	1N4148 75V	836A928H06	11
D14	1N4148 75V	836A928H06	01
D15	1N4148 75V	836A928H06	01

INT CKT	STYLE		
IC01	4N35 OPTICAL COUPLER	77189Z6H01	11
IC02	HC1401B3AL QUAD 2-INPUT NOR	3533A17H01	11
IC03	HC1404B3AL QUAD BILATERAL SWITCH	3527A09H06	11
IC04	TL0741J QUAD OP AMP	3528A90H01	11
IC05	HC1401B3AL QUAD 2-INPUT NAND	3527A09H02	11
IC06	HC1401B3AL DUAL D FLIP FLOP	3527A26H06	11
IC07	HC1407B3AL QUAD EXCLUSIVE OR	3527A26H01	11
IC08	HC1400B3AL QUAD 2-INPUT NOR	3533A17H01	11
IC09	HC1400B3AL DUAL PREC MONO MULTIVIB	3527A09H01	11
IC10	CD4060B2F BIN RPPLE CNTR/DIV/OSC	3527A09H06	11
IC11	HC1400B3AL QUAD 2-INPUT NOR	3533A17H01	11
IC12	TL0741J QUAD OP AMP	3528A90H01	01
IC13	HC1401B3AL QUAD 2-INPUT NAND	3527A09H02	01
IC14	HC1401B3AL DUAL D FLIP FLOP	3527A26H06	01
IC15	HC1407B3AL QUAD EXCLUSIVE OR	3527A26H01	01
IC16	HC1400B3AL QUAD 2-INPUT NOR	3533A17H01	01
IC17	HC1403B3AL DUAL PREC MONO MULTIVIB	3527A09H01	01

DIODE	STYLE		
L001	RED LED (EDGE MOUNT)	3508A22H01	11
L002	RED LED (EDGE MOUNT)	3508A22H01	11

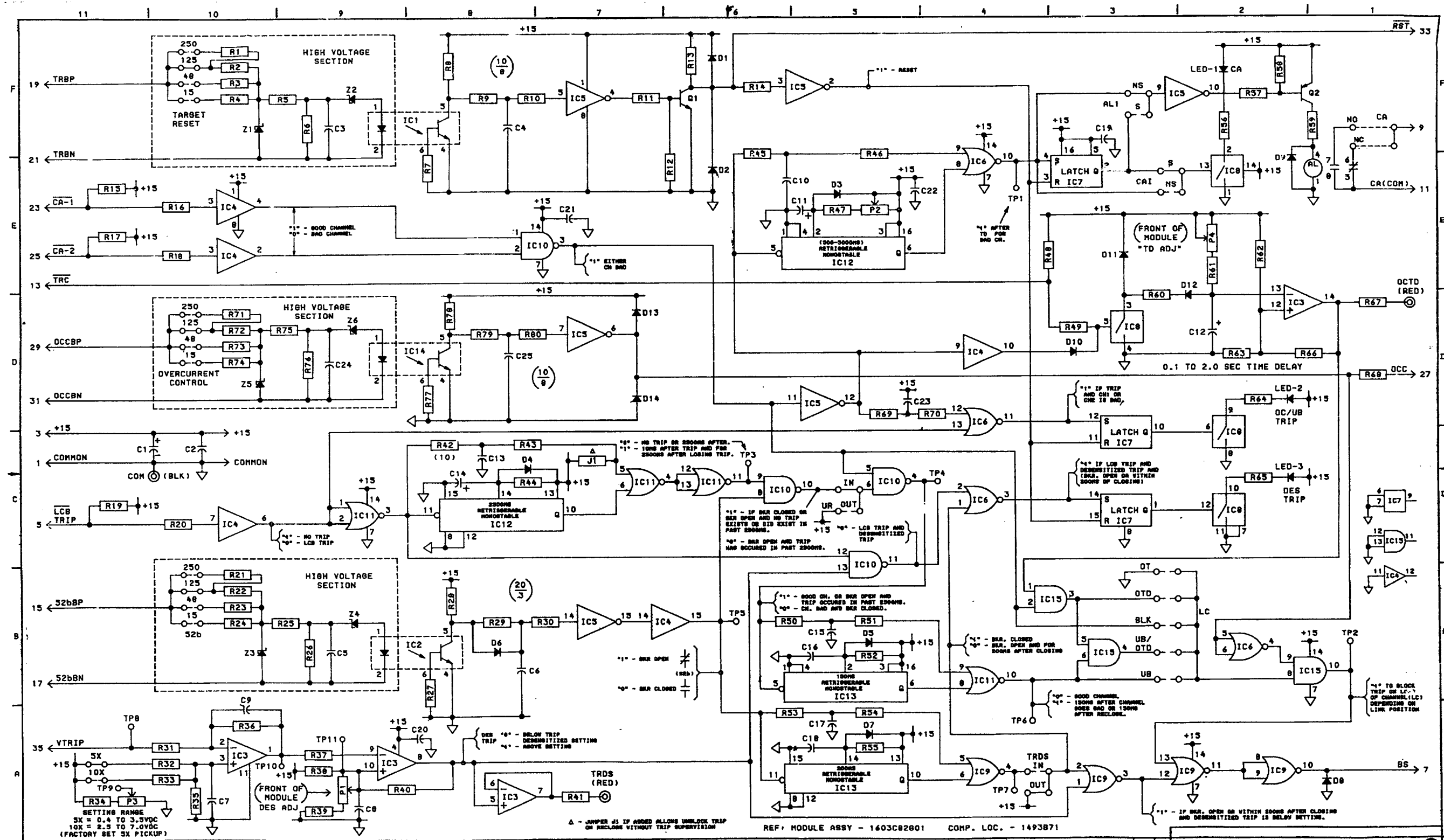
RESISTOR	STYLE		
R01	2.7 OHM 1/2W 5% CARBON	187A290H31	11
R02	2.7 OHM 1/2W 5% CARBON	187A290H31	11
R03	20K 2W 5% CARBON	185A207H00	11
R04	20K 2W 5% CARBON	185A207H00	11
R05	4.9K 2W 5% CARBON	185A207H47	11
R06	430 OHM 1/2W 2% METAL GLAZE	629A631H23	11
R07	430 OHM 1/2W 2% METAL GLAZE	629A631H23	11
R08	8.2K 1/2W 2% METAL GLAZE	629A631H54	11
R09	750K 1/8W 1% METAL FILM	3532A38H05	11
R10	30.1K 1/8W 1% METAL FILM	3535A37H47	11
R11	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R12	10K 1/8W 1% METAL FILM	3535A37H01	11
R13	3.01K 1/4W 1% METAL FILM	846A819H94	11
R14	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R15	10K 1/8W 1% METAL FILM	3535A37H01	11
R16	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R17	10K 1/8W 1% METAL FILM	3535A37H01	11
R18	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R19	10K 1/8W 1% METAL FILM	3535A37H01	11
R20	100K 1/8W 1% METAL FILM	3532A38H01	11
R21	100K 1/8W 1% METAL FILM	3532A38H01	11
R22	100K 1/8W 1% METAL FILM	3532A38H01	11
R23	100K 1/8W 1% METAL FILM	3532A38H01	11
R24	1K 1/8W 1% METAL FILM	3535A38H01	11
R25	200K 1/8W 1% METAL FILM	3532A38H30	11
R26	10K 1/8W 1% METAL FILM	3535A37H01	11
R27	6.19K 1/8W 1% METAL FILM	3535A38H77	11
R28	150K 1/8W 1% METAL FILM	3532A38H10	11
R29	100K 1/8W 1% METAL FILM	3532A38H01	11
R30	0.25K 1/8W 1% METAL FILM	3535A38H09	11
R31	82.5K 1/8W 1% METAL FILM	3535A37H09	11
R32	301K 1/8W 1% METAL FILM	3532A38H47	11
R33	100K 1/8W 1% METAL FILM	3532A38H01	11
R34	257K 1/8W 1% METAL FILM	3535A38H45	11
R35	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R36	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R37	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R38	51.1K 1/8W 1% METAL FILM	3535A37H49	11
R39	100K 1/8W 1% METAL FILM	3532A38H01	11
R40	121K 1/8W 1% METAL FILM	3532A38H49	11
R41	30.1K 1/8W 1% METAL FILM	3535A37H47	11
R42	511 OHM 1/8W 1% METAL FILM	3535A39H49	11
R43	3.01K 1/4W 1% METAL FILM	846A819H94	11
R44	30.1K 1/8W 1% METAL FILM	3535A37H47	11
R45	511 OHM 1/8W 1% METAL FILM	3535A39H49	11
R46	432K 1/8W 1% METAL FILM	3532A38H42	11
R47	43.2K 1/8W 1% METAL FILM	3535A37H42	11
R48	100K 1/8W 1% METAL FILM	3532A38H01	11
R49	100K 1/8W 1% METAL FILM	3532A38H01	11
R50	511 OHM 1/8W 1% METAL FILM	3535A39H49	11
R51	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R52	10K 1/8W 1% METAL FILM	3535A37H01	01
R53	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R54	10K 1/8W 1% METAL FILM	3535A37H01	01
R55	100K 1/8W 1% METAL FILM	3532A38H01	01
R56	100K 1/8W 1% METAL FILM	3532A38H01	01
R57	100K 1/8W 1% METAL FILM	3532A38H01	01
R58	100K 1/8W 1% METAL FILM	3532A38H01	01
R59	1K 1/8W 1% METAL FILM	3535A38H01	01
R60	200K 1/8W 1% METAL FILM	3532A38H30	01
R61	10K 1/8W 1% METAL FILM	3535A37H01	01
R62	6.19K 1/8W 1% METAL FILM	3535A38H77	01
R63	150K 1/8W 1% METAL FILM	3532A38H10	01
R64	100K 1/8W 1% METAL FILM	3532A38H01	01
R65	0.25K 1/8W 1% METAL FILM	3535A38H09	01
R66	82.5K 1/8W 1% METAL FILM	3535A37H09	01
R67	301K 1/8W 1% METAL FILM	3532A38H47	01
R68	100K 1/8W 1% METAL FILM	3532A38H01	01
R69	257K 1/8W 1% METAL FILM	3532A38H45	01
R70	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R71	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R72	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R73	51.1K 1/8W 1% METAL FILM	3535A37H49	01
R74	100K 1/8W 1% METAL FILM	3532A38H01	01
R75	121K 1/8W 1% METAL FILM	3532A38H49	01
R76	10K 1/8W 1% METAL FILM	3535A37H01	11
R77	10K 1/8W 1% METAL FILM	3535A37H01	01

ZENER	STYLE		
Z01	1N4747A 28V 1W 5%	849A487H01	11
Z02	1N752A 5.6V 400MW 5%	186A777H12	11

LINK		
DTT KEY	BLUE CLIP LINK	3532A84H01

* GROUP 1 IS 2 TERMINAL LINES
GROUP 2 IS 3 TERMINAL LINES

DRAWING ROUTING CODE	A	P	V	F	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
PART NAME	APPR TYPE	PART DESCRIPTION	SUB																



6601951

CAPACITOR	STYLE
C01 10 MFD 35V +-5% TANTALUM	862A53H12
C02 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C03 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C04 .22 MFD 100V +-5% MET-POLY CARB	353A68H10
C05 1.0 MFD 50V +-5% MET-POLY CARB	353A68H11
C06 .33 MFD 50V +-5% MET-POLY CARB	863A156H11
C07 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C08 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C09 .001 MFD 200V +-5% MET-POLY CARB	353A68H02
C10 150 PF 500V +2% NICA	861A846H25
C11 6.8 MFD 35V +-5% TANTALUM	18A661H21

C12 6.8 MFD 35V 5% TANTALUM	18A661H21
C13 .15 MFD 100V +-5% MET-POLY CARB	353A68H09
C14 6.8 MFD 35V +-5% TANTALUM	18A661H21
C15 150 PF 500V +2% NICA	861A846H25
C16 1.0 MFD 50V +-5% MET-POLY CARB	353A68H11
C17 150 PF 500V +2% NICA	861A846H25
C18 1.0 MFD 50V +-5% MET-POLY CARB	353A68H11
C19 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C20 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C21 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C22 .1 MFD 100V +-5% MET-POLY CARB	353A68H08
C23 .022 MFD 100V 2% MET-POLY CARB	353A68H01
C24 .1 MFD 100V 5% MET-POLY CARB	353A68H08
C25 .22 MFD 100V 5% MET-POLY CARB	353A68H10

DIODE	STYLE
D01 1N645A 225V	837A692H03
D02 1N645A 225V	837A692H03
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	837A692H03
D10 1N4148 75V	836A928H06
D11 1N4148 75V	836A928H06
D12 1N4148 75V	836A928H06
D13 1N645A 225V	837A692H03
D14 1N645A 225V	837A692H03

INT CKT	STYLE
IC01 AN35 OPTICAL COUPLER	77A8936H01
IC02 AN35 OPTICAL COUPLER	77A8936H01
IC03 TL074J QUAD OP AMP	352A09H01
IC04 MC1405BAL HEX BUFFER	3527A26H04
IC05 MC1405BAL HEX INV/BUFFER	3527A26H05
IC06 MC1401BAL QUAD 2-INPUT NOR	3533A17H01
IC07 MC1404BAL QUAD NOR RS LATCH	3527A09H07
IC08 MC1406BAL QUAD BILATERAL SWITCH	3527A09H06
IC09 MC1401BAL QUAD 2-INPUT NOR	3533A17H01
IC10 MC1401BAL QUAD 2-INPUT NAND	3527A09H02
IC11 MC1401BAL QUAD 2-INPUT NOR	3533A17H01
IC12 MC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC13 MC14538BAL DUAL PREC MONO MULTIVIB	3527A09H01
IC14 AN35 OPTICAL COUPLER	77A8936H01
IC15 MC1401BAL QUAD 2-INPUT AND	3537A15H05

DIODE	STYLE
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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 +-10% TRIIMPOT	3527A30H04
P02 1 MEG 3/4W +-10% TRIIMPOT	3527A30H11
P03 20K 3/4W +-10% TRIIMPOT	3527A30H04
P04 250K 3/4W 10% TRIIMPOT	3527A30H10

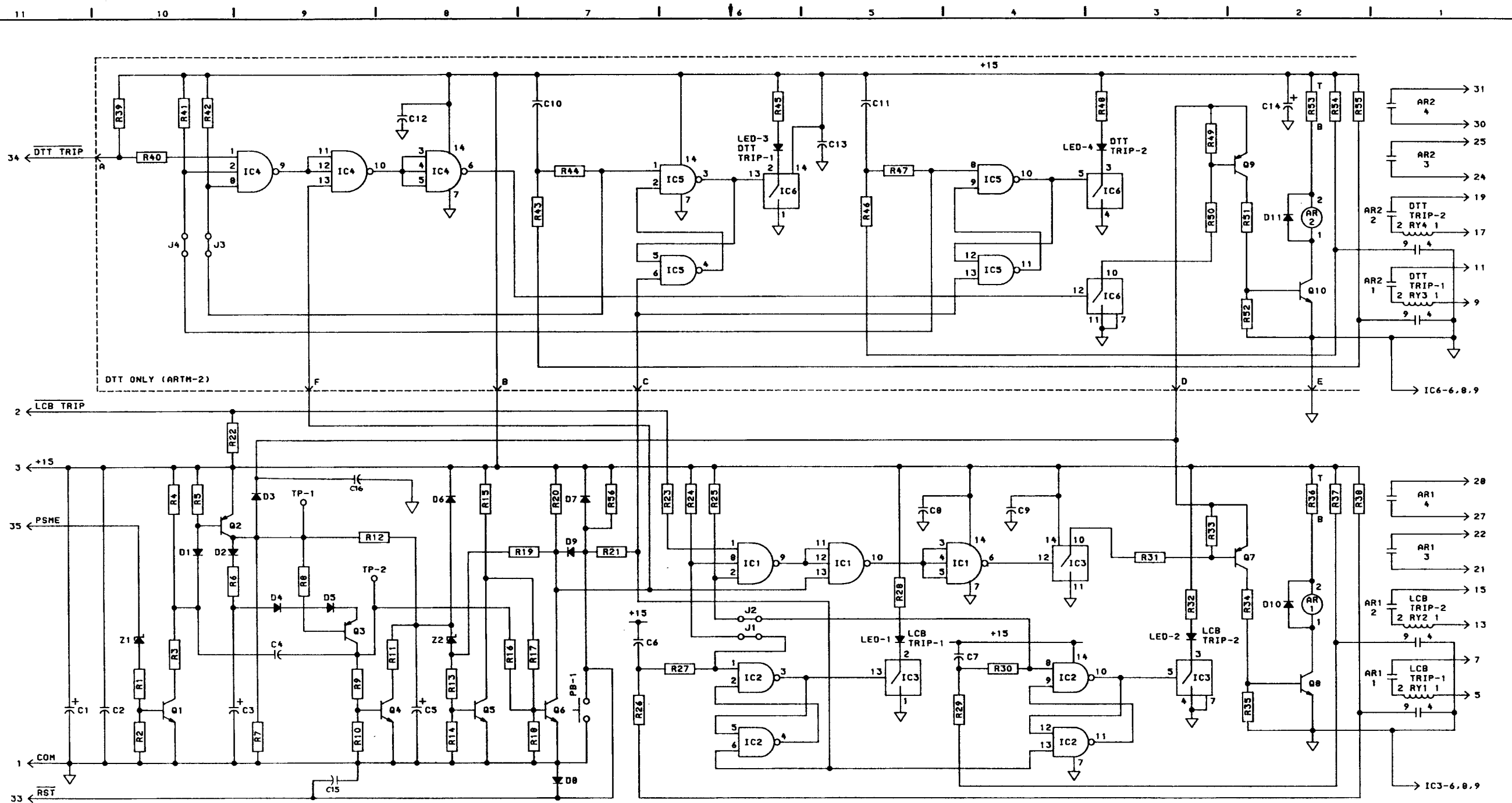
TRANSISTOR	STYLE
Q01 2N2222A, NPN	762A672H15
Q02 2N2907A, PNP	762A672H17

RESISTOR	STYLE
R01 20K 2W +-5% CARBON	185A207H58
R02 20K 2W +-5% CARBON	185A207H58
R03 6.8K 2W +-5% CARBON	185A207H47
R04 430 OHM 1/2W +-2% METAL GLAZE	629A531H23
R05 430 OHM 1/2W +-2% METAL GLAZE	629A531H23
R06 8.2K 1/2W +-2% METAL GLAZE	629A531H54
R07 1 MEG 1/4W 1% METAL FILM	848A822H39
R08 27.6K 1/8W 1% METAL FILM	3535A37H42
R09 48.3K 1/8W 1% METAL FILM	3535A37H64
R10 10K 1/8W 1% METAL FILM	3535A37H01
R11 4.99K 1/8W 1% METAL FILM	3535A38H68
R12 2K 1% 1/8W METAL FILM	3535A38H30
R13 15K 1/8W 1% METAL FILM	3535A37H18
R14 10K 1/8W 1% METAL FILM	3535A37H01
R15 51.1K 1/8W 1% METAL FILM	3535A37H69
R16 10K 1/8W 1% METAL FILM	3535A37H01
R17 51.1K 1/8W 1% METAL FILM	3535A37H69
R18 10K 1/8W 1% METAL FILM	3535A37H01
R19 51.1K 1/8W 1% METAL FILM	3535A37H69
R20 10K 1/8W 1% METAL FILM	3535A37H01
R21 20K 2W +-5% CARBON	185A207H58
R22 20K 2W +-5% CARBON	185A207H58
R23 6.8K 2W +-5% CARBON	185A207H47
R24 430 OHM 1/2W +-2% METAL GLAZE	629A531H23
R25 430 OHM 1/2W +-2% METAL GLAZE	629A531H23
R26 8.2K 1/2W +-2% METAL GLAZE	629A531H54
R27 1 MEG 1/4W 1% METAL FILM	848A822H39
R28 15K 1/8W 1% METAL FILM	3535A37H18
R29 57.6K 1% 1/8W METAL FILM	3535A37H74
R30 10K 1/8W 1% METAL FILM	3535A37H01
R31 10K 1/8W 1% METAL FILM	3535A37H01
R32 34.8K 1/8W 1% METAL FILM	3535A37H53
R33 20K 1% 1/8W METAL FILM	3535A37H70
R34 30.1K 1% 1/8W METAL FILM	3535A37H47
R35 1% 1/8W METAL FILM	3535A37H01
R36 24.9K 1% 1/8W METAL FILM	3535A37H39
R37 10K 1% 1/8W METAL FILM	3535A37H01
R38 8.25K 1% 1/8W METAL FILM	3535A38H69
R39 2.43K 1% 1/8W METAL FILM	3535A38H38
R40 221K 1% 1/8W METAL FILM	3532A38H34
R41 3.01K 1% 1/8W METAL FILM	3535A38H47
R42 100K 1/8W 1% METAL FILM	3532A38H01
R43 10K 1/8W 1% METAL FILM	3535A37H01
R44 365K 1/8W 1% METAL FILM	3532A38H55
R45 100K 1/8W 1% METAL FILM	3532A38H01
R46 10K 1/8W 1% METAL FILM	3535A37H01
R47 10K 1/8W 1% METAL FILM	3535A37H01
R48 51.1K 1/8W 1% METAL FILM	3535A37H65
R49 10K 1/8W 1% METAL FILM	3535A37H01
R50 100K 1/8 1% METAL FILM	3532A38H01
R51 10K 1/8W 1% METAL FILM	3535A37H01
R52 150K 1/8W 1% METAL FILM	3532A38H18
R53 100K 1/8W 1% METAL FILM	3532A38H01
R54 10K 1/8W 1% METAL FILM	3535A37H01
R55 200K 1/8W 1% METAL FILM	3532A38H30
R56 3.01K 1% 1/4W METAL FILM	848A819H94
R57 4.99K 1/4W 1% METAL FILM	848A820H16
R58 2K 1% 1/4W METAL FILM	848A819H77
R59 150 OHM 1/2W +-2% METAL GLAZE	629A531H12
R60 2K 1/8W 1% METAL FILM	3535A38H30
R61 9.09K 1/8W 1% METAL FILM	3535A38H93
R62 200K 1/8W 1% METAL FILM	3532A38H30
R63 200K 1/8W 1% METAL FILM	3532A38H30
R64 3.01K 1% 1/4W METAL FILM	848A819H94
R65 3.01K 1% 1/4W METAL FILM	848A819H94
R66 100K 1/8W 1% METAL FILM	3532A38H01
R67 3.01K 1/8W 1% METAL FILM	3535A38H47
R68 1K 1/8W 1% METAL FILM	3535A38H01
R69 51.1K 1/8W 1% METAL FILM	3535A37H69
R70 10K 1/8W 1% METAL FILM	3535A37H01
R71 20K 2W 5% CARBON	185A207H58
R72 20K 2W 5% CARBON	185A207H58
R73 6.8K 2W 5% CARBON	185A207H47
R74 430 OHM 1/2W 2% METAL GLAZE	629A531H23
R75 430 OHM 1/2W 2% METAL GLAZE	629A531H23
R76 8.2K 1/2W 2% METAL GLAZE	629A531H54
R77 1 MEG 1/4W 1% METAL FILM	848A822H39
R78 15K 1/2W 1% METAL FILM	3535A37H18
R79 51.1K 1/8W 1% METAL FILM	3535A37H69
R80 10K 1/8W 1% METAL FILM	3535A37H01

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

RELAY	STYLE
AL01 AROMAT TYPE STE - 1 FORM C	148A033H01

LINK		STYLE
74	BLUE CLIP LINK	3632A54H01
0CC	BLUE CLIP LINK	3632A54H01
52X	BLUE CLIP LINK	3632A54H01
5X/10X	BLUE CLIP LINK	3632A54H01
1WDS	BLUE CLIP LINK	3632A54H01
LC	BLUE CLIP LINK	3632A54H01
CAI	BLUE CLIP LINK	3632A54H01
AL1	BLUE CLIP LINK	3632A54H01
CA	BLUE CLIP LINK	3632A54H01
UR	BLUE CLIP LINK	3632A54H01



REF: MODULE ASSEMBLY - 1501C25801 - ARTH-1
 1501C25802 - ARTH-2
 1501C27601 - ARTH-2 SUB-ASSEMBLY
 COMPONENT LOC. - 1404B31 - ARTH-1
 1404B32 - ARTH-2

LCB RELAY - AR TRIP MODULE
 ARTH-1 - SINGLE TRIP
 ARTH-2 - DOUBLE TRIP

NOTE: J1, J2, J3, J4 PROVIDE SEAL-IN OF TRIP
 AR'S WHEN 2.0 AMP DC IS FLOWING THROUGH
 THE RESPECTIVE TRIP CONTACTS.

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	353A68H06
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	353A68H06
C7	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	353A68H06
C8	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	353A68H06
C9	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	353A68H06
C15	CAPACITOR	.033 MFD 100V, +-5% MET POLY CARB	353A68H06
C16	CAPACITOR	.033 MFD 100V, +-5% MET POLY CARB	353A68H06
D1	DIODE	1N645A	837A692H03
D2	DIODE	1N645A	837A692H03
D3	DIODE	1N4818	188A342H04
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	188A342H04
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	D44VHIO NPN	3532A45H09
R1	RESISTOR	1K, 1/4W 1% METAL FILM	848A820H45
R2	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R3	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R4	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R5	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R6	RESISTOR	100-OHM 1/4W 1% METAL FILM	848A820H45
R7	RESISTOR	20K 1/4W 1% METAL FILM	848A820H45
R8	RESISTOR	20K 1/4W 1% METAL FILM	848A820H45
R9	RESISTOR	1K, 1/4W 1% METAL FILM	848A820H45
R10	RESISTOR	20K 1/4W 1% METAL FILM	848A820H45
R11	RESISTOR	10 OHM, 1/2W, +-5% CARBON	187A290H01
R12	RESISTOR	30.1K 1/4W 1% METAL FILM	848A820H45
R13	RESISTOR	1K, 1/4W 1% METAL FILM	848A820H45
R14	RESISTOR	20K 1/4W 1% METAL FILM	848A820H45
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 1/4W 1% METAL FILM	848A820H45
R19	RESISTOR	100K 1/4W 1% METAL FILM	848A820H45
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	848A820H45
R23	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R24	RESISTOR	511K 1/4W 1% METAL FILM	848A820H45
R25	RESISTOR	511K 1/4W 1% METAL FILM	848A820H45
R26	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R27	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R28	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R29	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R30	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R31	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R32	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R33	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H45
R34	RESISTOR	330 OHMS, +-5% 3W, WIREWOUND	762A679H02
R35	RESISTOR	1K, 1/4W 1% METAL FILM	848A820H45
R36	RESISTOR	22-0-OHM 25W +-5% WIREWOUND	0401297H01
R37	RESISTOR	15K 1/4W 1% METAL FILM	848A820H45
R38	RESISTOR	15K 1/4W 1% METAL FILM	848A820H45
R56	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H45
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	353A68H06
C11	CAPACITOR	.033 MFD, 100V, +-5% MET-POLY CARB	353A68H06
C12	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	353A68H06
C13	CAPACITOR	.1 MFD 100V +-5% MET-POLY CARB	353A68H06
C14	CAPACITOR	100 MFD, 35V, +-20% TANTALUM	880A363H01
D11	DIODE	1N5398	188A342H04
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	D44VHIO NPN	3532A45H09
R39	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R40	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R41	RESISTOR	511K 1/4W 1% METAL FILM	848A820H45
R42	RESISTOR	511K 1/4W 1% METAL FILM	848A820H45
R43	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R44	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R45	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R46	RESISTOR	51.1K 1/4W 1% METAL FILM	848A820H45
R47	RESISTOR	10K 1/4W 1% METAL FILM	848A820H45
R48	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R49	RESISTOR	5.62K, 1/4W, 1% METAL FILM	848A820H45
R50	RESISTOR	3.01K 1/4W 1% METAL FILM	848A820H45
R51	RESISTOR	330 OHMS, +-5% 3 WATTS, WIRE WOUND	762A679H02
R52	RESISTOR	1K, 1/4W 1% METAL FILM	848A820H45
R53	RESISTOR	22-0-OHM 25W +-5% W	0401297H01
R54	RESISTOR	15K 1/4W 1% METAL FILM	848A820H45
R55	RESISTOR	15K 1/4W 1% METAL FILM	848A820H45
RY3	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01
RY4	REED RELAY	.5 AMP DC PICKUP, FORM A	1442C62G01

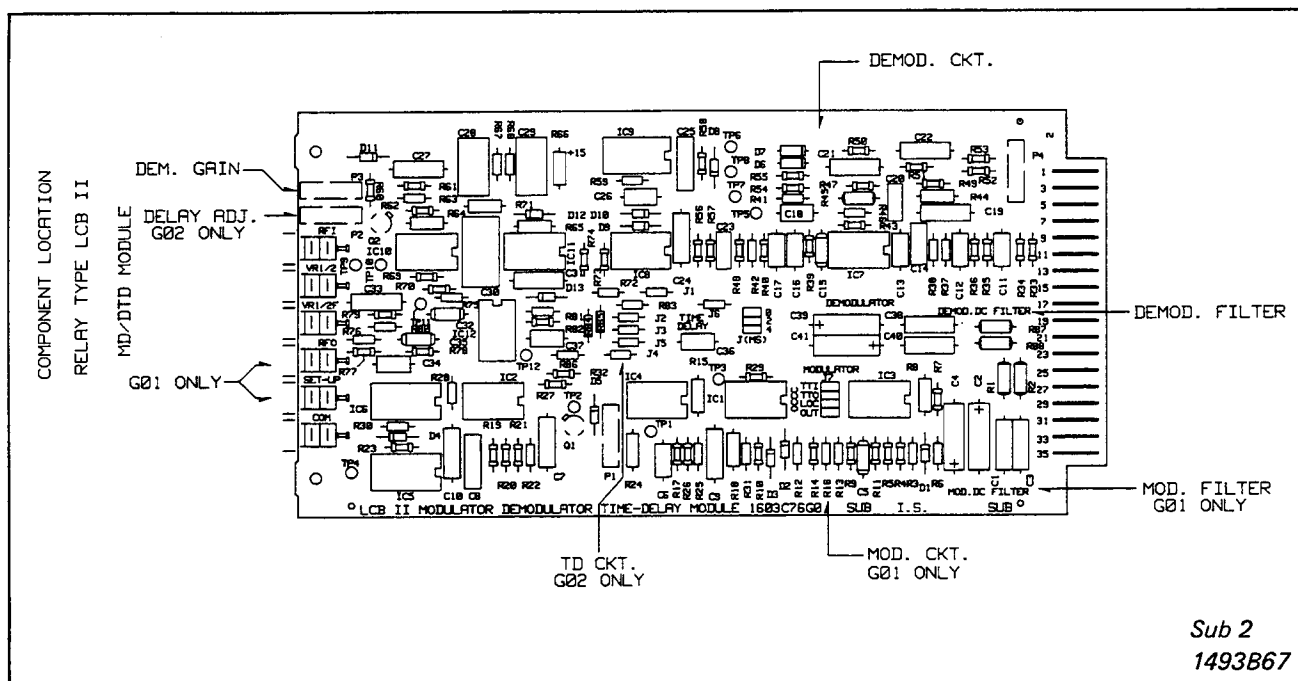


Fig. 9. MD/DTD Component Locations

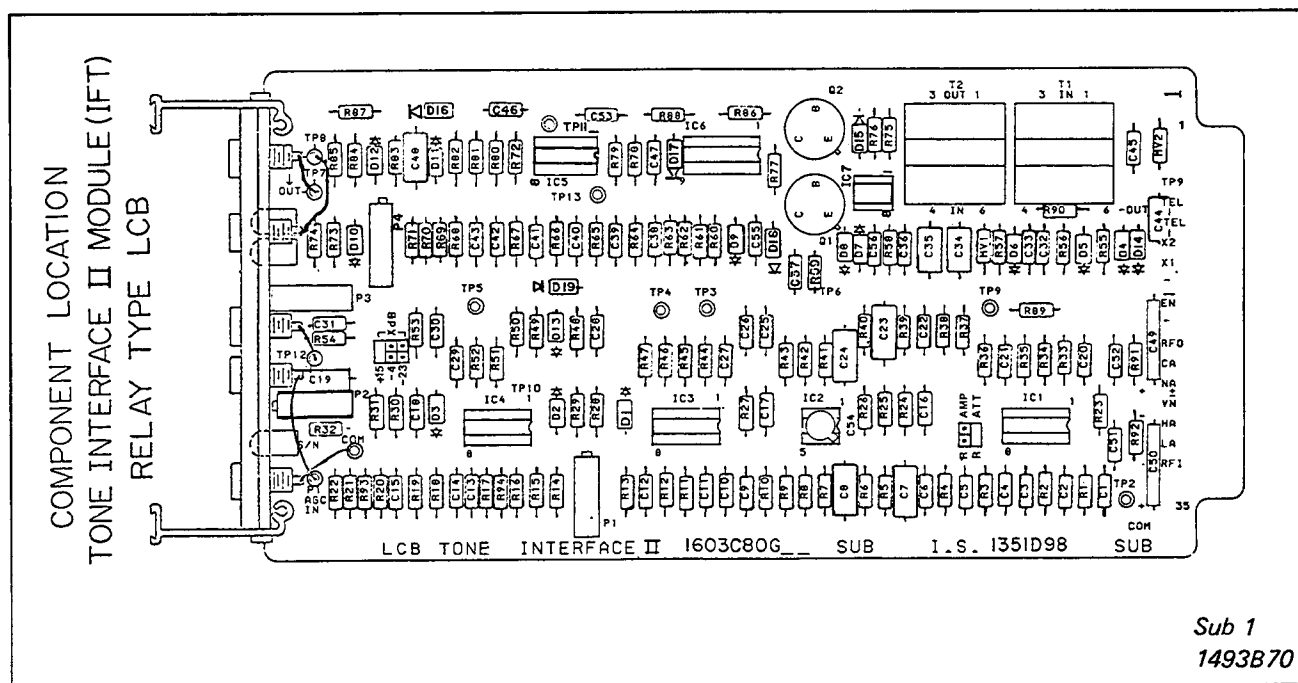


Fig. 10. IFT Component Locations

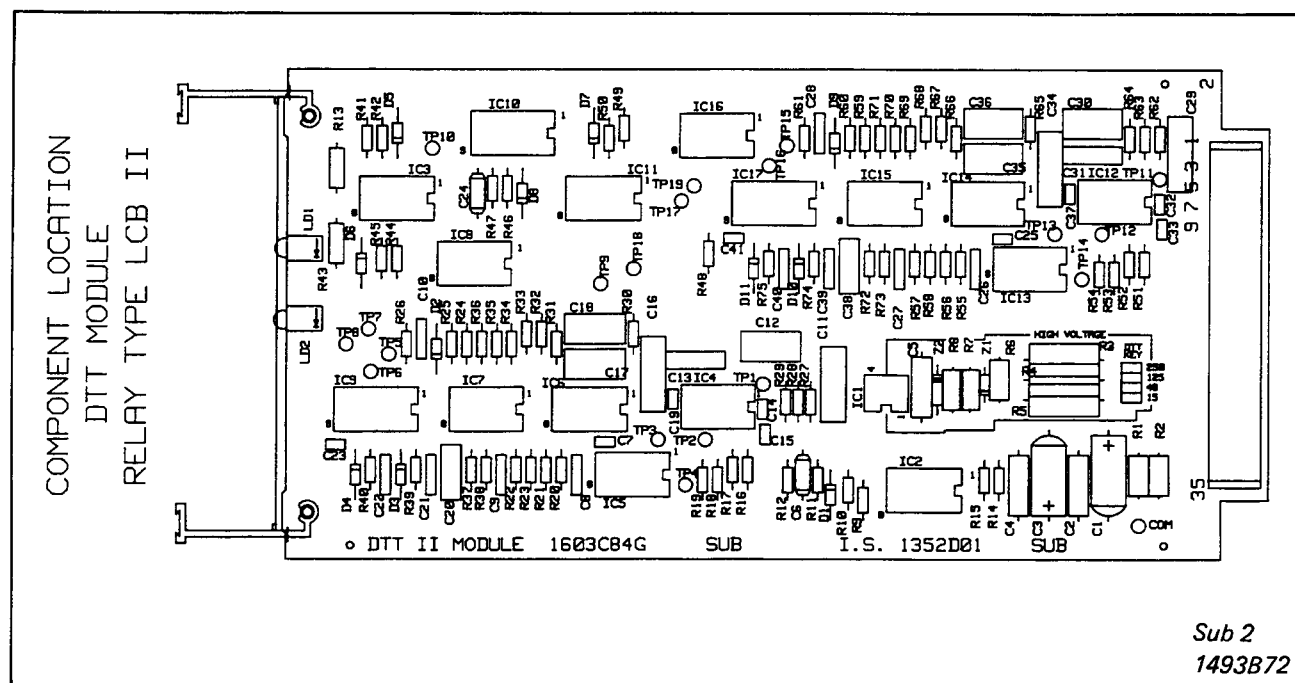


Fig. 13. DTT Component Locations

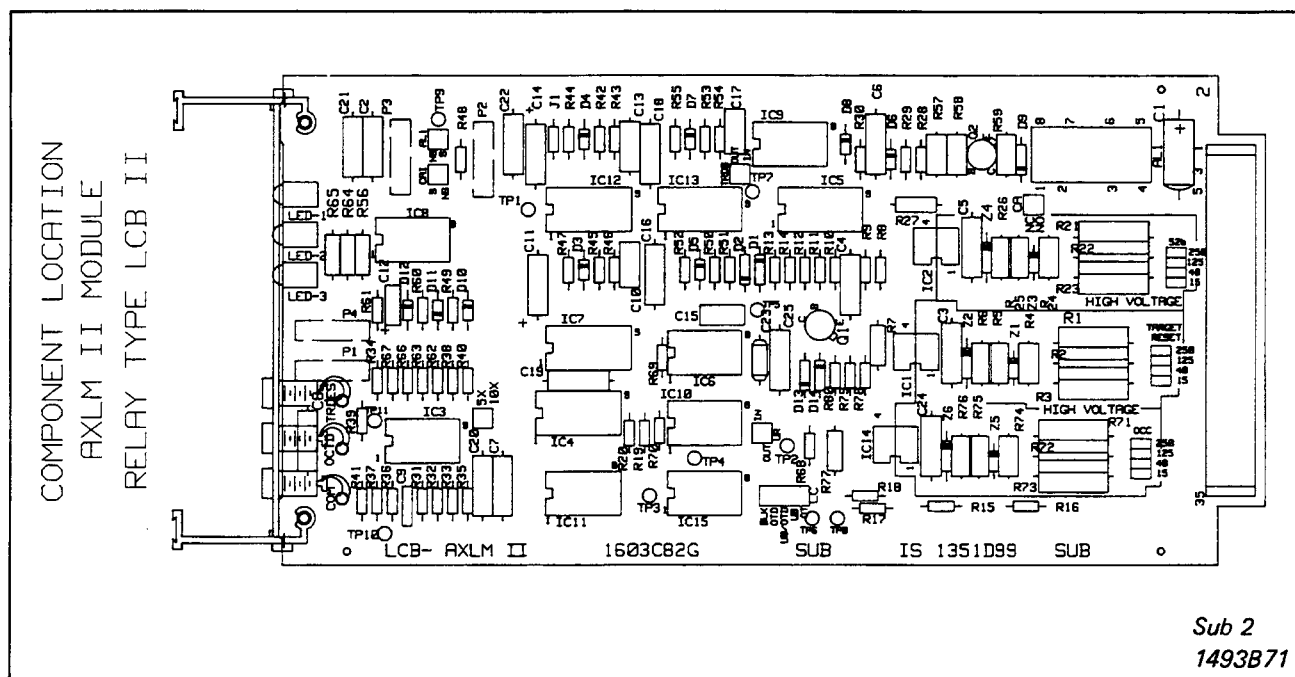


Fig. 14. AXLM Component Locations

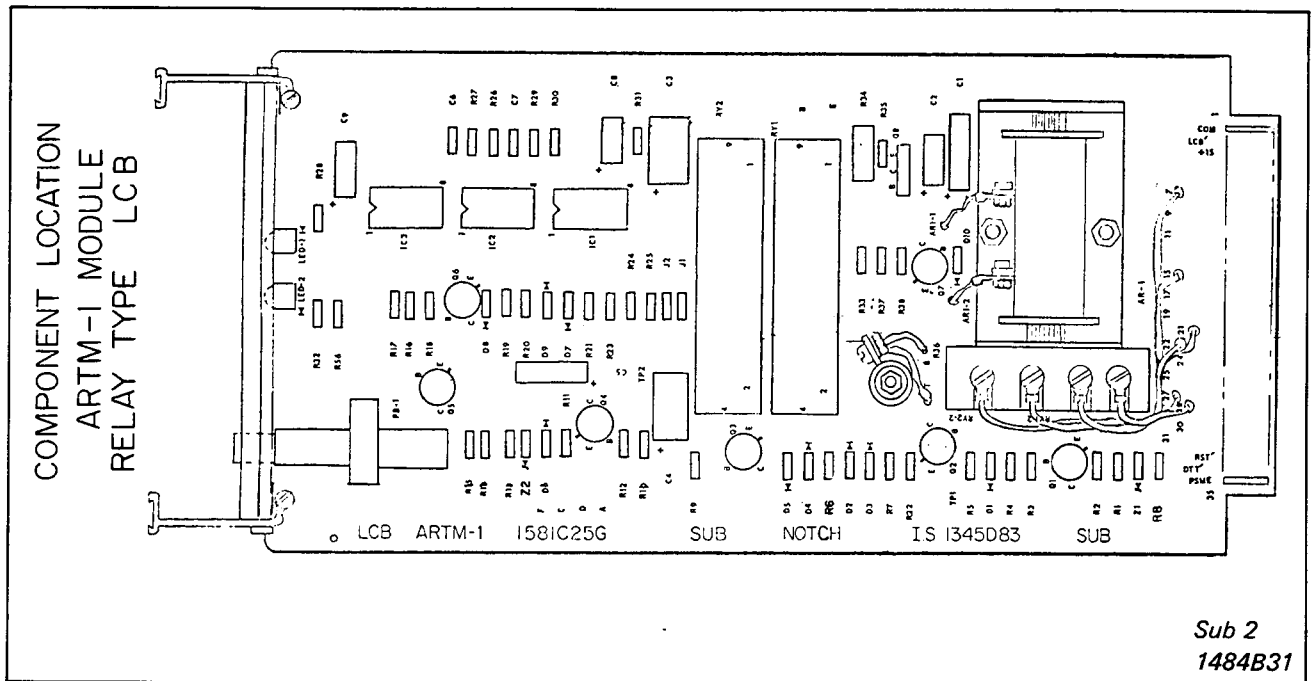


Fig. 15. ARTM-1 Component Locations

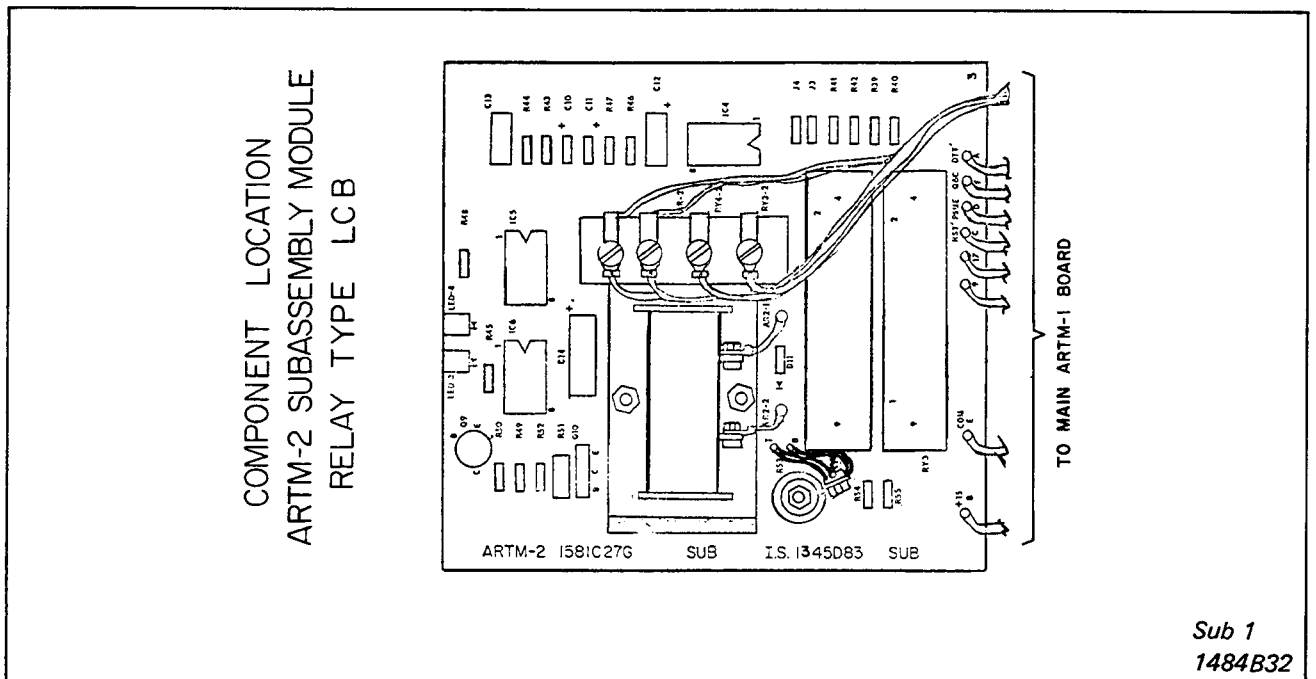


Fig. 16. ARTM-2 Component Locations

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