

Ref.: XXXXX

OPERATION & MAINTENANCE MANUAL
FOR
U-9353 UPCONVERTER

JANUARY 2001

CUSTOMER

MAXXXXXU
114525E
Rev.A

The suffix XXXXX following part numbers in this manual is a unique number assigned at time of order.

This number should be referred to in all correspondence and all referrals to spare parts.

The reference number is XXXXX.

The AC voltage has been set to XXX VAC.

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SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

1.1.1 PHYSICAL

The physical configuration of the U-9353 Upconverter is shown in Figures 1-1 through 1-3. The main chassis houses all RF components, control circuitry and power supplies.

The converter chassis is 19" x 22" x 3.5" panel height. Slides are provided for mounting in a standard 19" (EIA) equipment rack.

The following items are found on the front of the converter:

- A. On/Off Power Switch (A1A2)
- B. LO Out-of-Lock LEDs
- C. Memory, Store Key
- D. Memory, Recall Key
- E. Display
- F. Gain Adjustment Potentiometer
- G. Data Entry Keypad
- H. Remote Mode Select Key

The following items are found on the rear of the converter:

- A. RF Input Connector (J1)
- B. IF Output Connector (J2)
- C. Summary Alarm Connector (J3)
- D. Remote Interface Connector (J6)
- E. Redundancy Switch Connector (J7)
- F. Address Select Switch
- G. AC Voltage Input
- H. Fuse, 2.0A for 120VAC, 1.0A for 220VAC
- I. Fan (A1A5)
- J. Ground Lug
- K. LO Frequency/Power Monitors
- L. LO Phase Lock Voltage Test Points
- M. DC Voltage Test Points

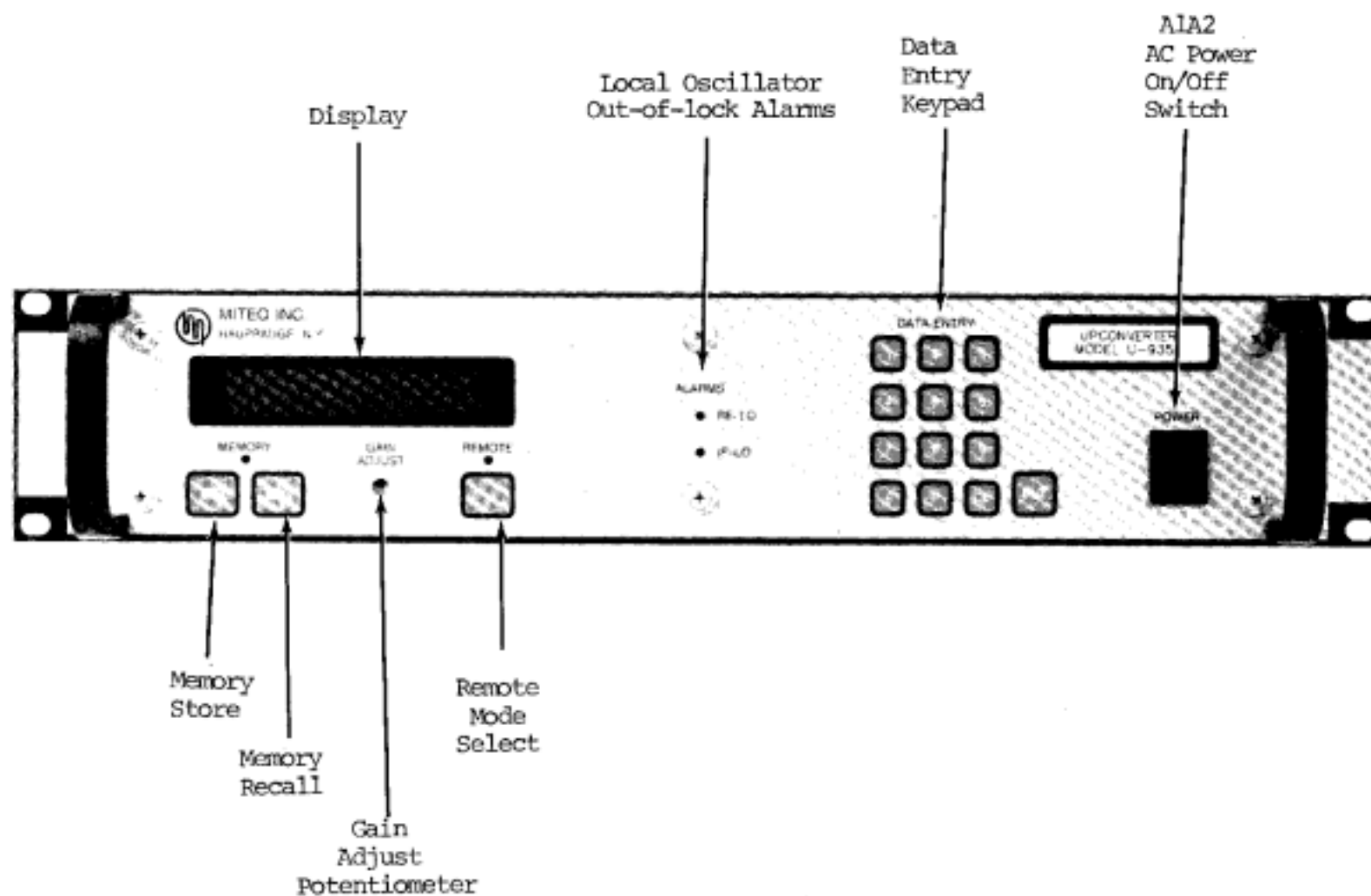


Figure 1-1. Front View, U-9353 Upconverter

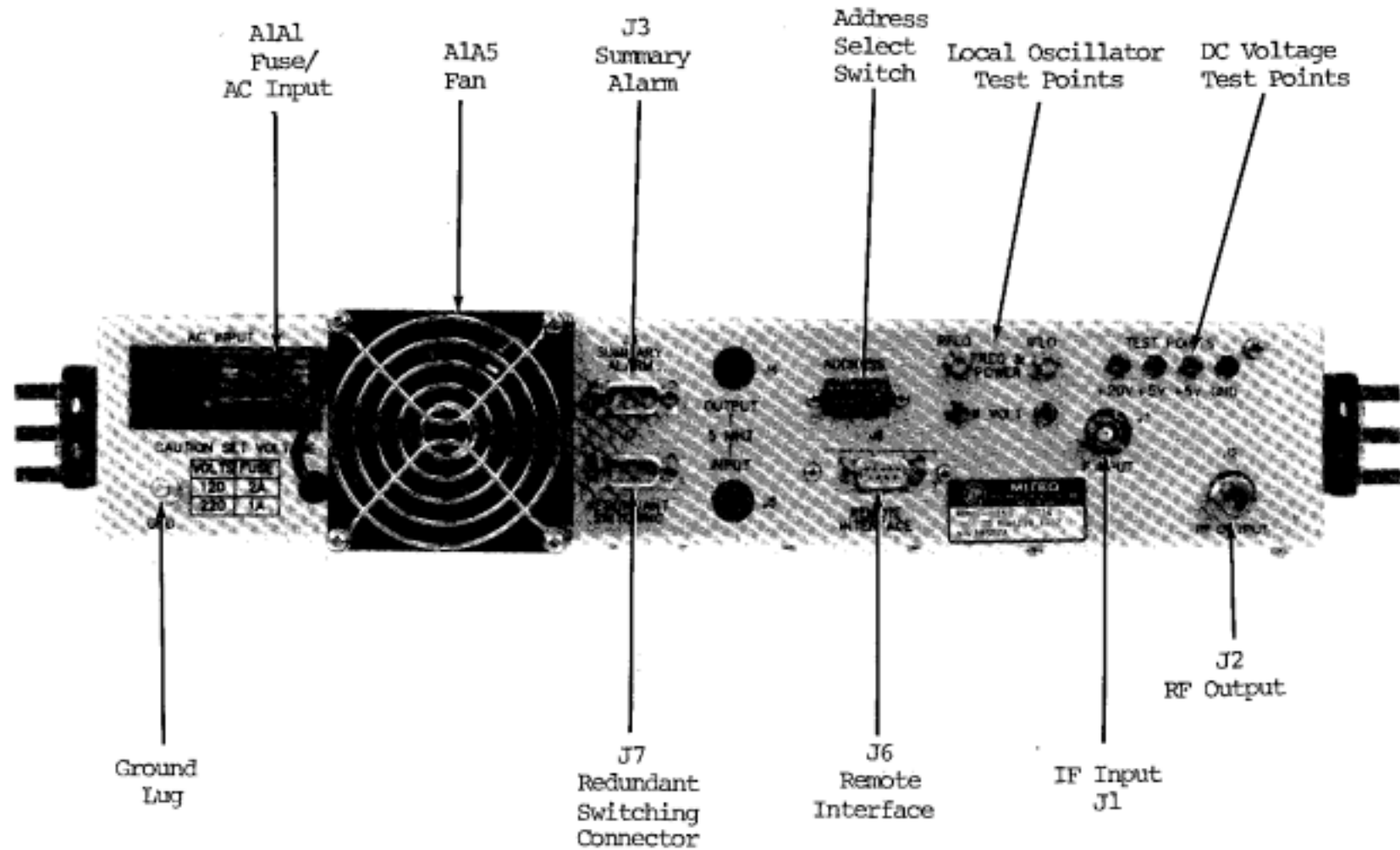


Figure 1-2. Rear View, U-9353 Upconverter

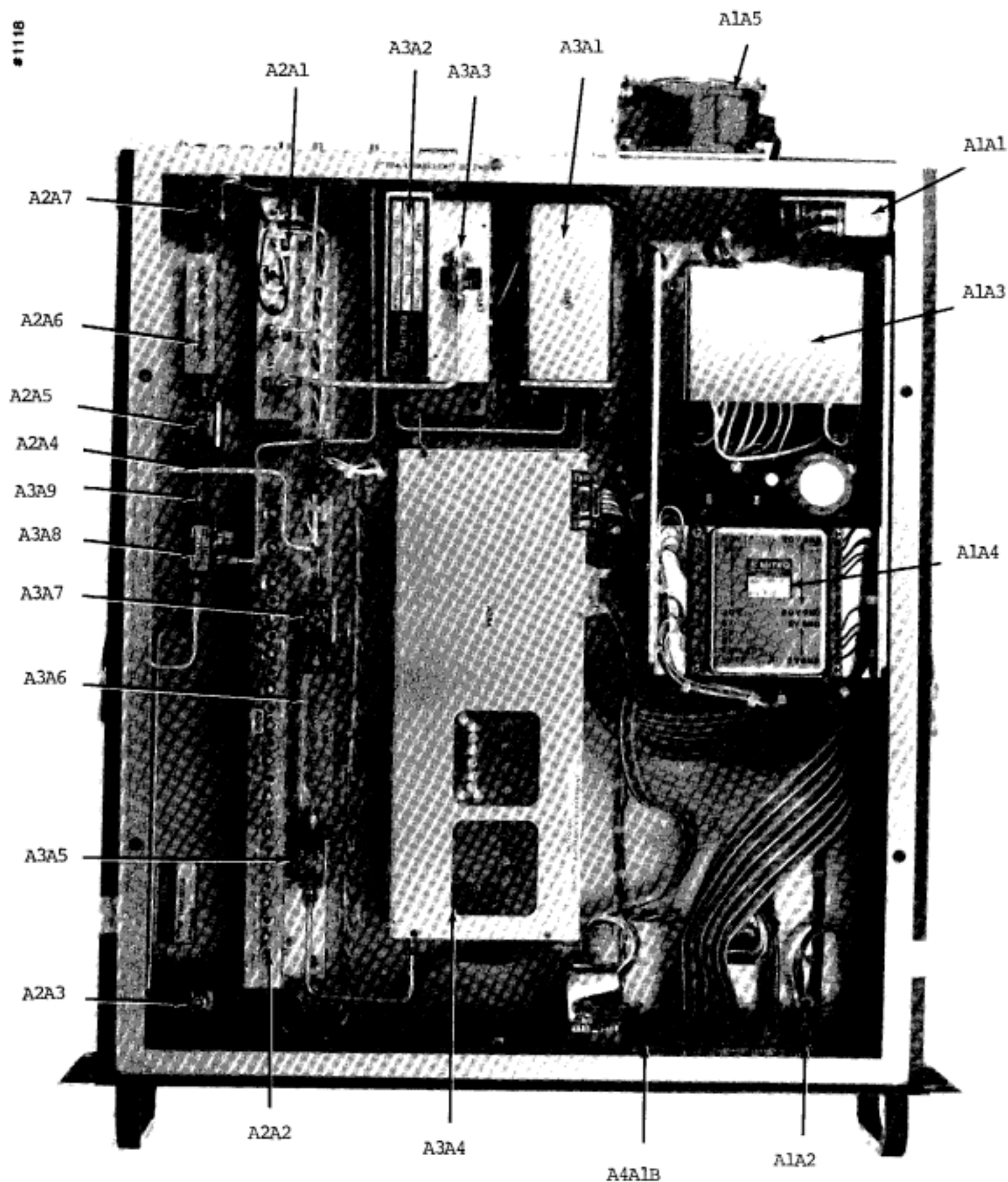


Figure 1-3. Interior View, U-9353 Upconverter

1.1.2 FUNCTIONAL

The MITEQ 9300 Series Converter combines a state of the art communications converter with microprocessor-controlled digital circuitry to provide flexibility and convenience for the station operator.

The converter translates the 70 ± 20 MHz frequency band to the 5.845-6.425 GHz output frequency band. Phase noise, amplitude flatness, group delay, and spurious outputs have been given optimum consideration to provide the user with a transparent frequency conversion for all video and data applications.

RF frequency may be selected from the front panel in 125 kHz increments. Non-volatile memory allows the operator to store up to thirty channel frequencies.

Remote operation is available via the RS485 (serial) interface. The status of the converter's functions and alarms may also be read through the remote interface (optional). Device address is selectable at the rear panel.

Relays are provided for summary alarm output which may be used for monitoring at a remote console and for redundant switching.

AC voltage input is selectable at the rear panel (100, 120, 220, 230/240VAC).

1.2 EQUIPMENT CHARACTERISTICS

1.2.1 PHYSICAL

- A. Weight: 30 pounds nominal
- B. Overall Dimensions: 19" x 22" x 3.5" panel height
- C. Signal Input Connector (J1): BNC female
- D. Signal Output Connector (J2): N female
- E. Summary Alarm Connector (J3): DE-9P
- F. Remote Interface Connector (J6) -
 - 1. RS485/RS422: DE-9S
 - 2. RS232: DB-25P
 - 3. Contact Closure: DB-25S
 - 4. GPIB: IEEE-488 receptacle
- G. Redundancy Switch Connector (J7): DE-9P

1.2.2 FUNCTIONAL

- A. Gain, Frequency Response -
 - 1. Input Frequency: 70 $\pm$ 20 MHz
 - 2. Output Frequency: 5.845-6.425 GHz
 - 3. Gain: 11 dB nominal

Gain Option No.	Nominal Converter Gain (dB)
11A	20
11B	30

- 4. Amplitude Response: $\pm$ 20 MHz at 0.5 dB
 $\pm$ 18 MHz at 0.4 dB
- 5. Gain Adjustment: 6 dB nominal (no options)
30 dB minimum (Option 3C)

- B. Group Delay (± 18 MHz) -
1. Standard -
 - a. Linear: 0.03 ns/MHz
 - b. Parabolic: 0.01 ns/MHz
 - c. Ripple: 1 ns peak-to-peak
 2. Option 5A: 1 ns peak-to-peak total group delay
- C. VSWR -
1. Input: 26 dB return loss/75 ohms
(50 ohms optional)
 2. Output: 20 dB return loss/50 ohms
- D. Third Order Intermodulation: For two inband signals at an output level of -20 dBm, intermodulation products 50 dBc minimum
(Option 11A output level -10 dBm)
(Option 11B output level -5 dBm)
- E. Spurious -
1. Dependent: -65 dBc
 2. Independent:
 - 80 dBm inband (no options)
 - 70 dBm inband (Option 11A)
 - 60 dBm inband (Option 11B)
- F. Frequency Selection: 5.845-6.425 GHz
in 125 kHz increments
1. Channel Memories: 30 (non-volatile)
- G. Primary Power: Selectable at the rear panel
(100, 120, 220, 230/240VAC)

H. Rear Panel Test Points -

1. RF LO Phase Voltage: Variable with frequency
2. IF LO Phase Voltage: 10 $\pm$ 2V
3. RF LO Frequency/Power Test Point: -15 dBm minimum,
4745-5325 MHz
4. IF LO Frequency/Power Test Point: -15 dBm minimum,
1030 MHz
5. DC Voltage Test Points: +20 $\pm$ 0.5V
+5.2 $\pm$ 0.1V
+5.2 $\pm$ 0.1V

I. Summary Alarm Connector (J3) Pin Designations -

1. DC Power Status -
 - a. Normal: 1-2 open, 2-3 closed
 - b. Fault: 1-2 closed, 2-3 open
2. Summary Alarm -
 - a. Normal: 4-5 open, 5-6 closed
DC Power Normal and
Local Oscillators In-Lock and
LO Level Normal (Option 8 Only)
 - b. Alarm: 4-5 closed, 5-6 open
DC Power Fault or
Local Oscillator(s) Out-of-Lock or
LO Level Low (Option 8 Only)

J. Redundancy Switch Connector (J7) Pin Designations -

1. Normal: 1-2 open, 2-3 closed
DC Power Normal and
Local Oscillators In-Lock and
LO Level Normal (Option 8 Only)
2. Alarm: 1-2 closed, 2-3 open
DC Power Fault or
Local Oscillator(s) Out-of-Lock or
LO Level Low (Option 8 Only)

1.3 EQUIPMENT REQUIRED

1.3.1 EQUIPMENT SUPPLIED

Table 1-1 lists the equipment supplied with each system.

TABLE 1-1
EQUIPMENT SUPPLIED

ITEM	DESCRIPTION	QUANTITY
1	Model U-9353 Upconverter	1
2	Grant SS-168NT Slides	1 Pair
3	AC Voltage Line Cord	1
4	DE-9S Connector	2
5	Remote Interface Connector	1

1.3.2 EQUIPMENT REQUIRED BUT NOT SUPPLIED

Table 1-2 lists the equipment required for periodic maintenance and calibration of the converter.

TABLE 1-2
TEST EQUIPMENT REQUIRED BUT NOT SUPPLIED

ITEM	DESCRIPTION	QUANTITY
1	Wiltron 6648A Sweep Generator (10 MHz-20 GHz)	2
2	Wiltron 560A Scalar Network Analyzer	1
3	Hewlett Packard 8495B/8494B Step Attenuator (0-81 dB)	1
4	Wiltron 60N50 VSWR Bridge (10-2000 MHz)	1
5	Wiltron 64A50 VSWR Bridge (2-8 GHz)	1
6	Wiltron 69A50 VSWR Bridge (8-18 GHz)	1
7	W and G RM4 Radio Link Measuring Set	1
8	Hewlett Packard 8566B Spectrum Analyzer	1
9	Hewlett Packard 8970 Noise Figure Meter	1
10	EIP 545A Microwave Frequency Counter	1
11	Hewlett Packard 436A Power Meter	1
12	Hewlett Packard 8405A Vector Voltmeter	1
13	Phillips PM3215 Oscilloscope	1
14	Compaq Portable Computer	1
15	SEL 488-2000, RS232 to IEEE-488 Adapter	1
16	Fluke 6160B Reference Synthesizer	1
17	Beckman 3050 Digital Multi Meter	1

SECTION 2

INSTALLATION

2.1 UNPACKING, STORAGE, RESHIPMENT

Carefully open the shipping container and remove the equipment. Weight of the converter is approximately 30 pounds. Inspect the equipment thoroughly and report any damage.

If the equipment is to be stored, it should be wrapped in plastic and kept in a clean, dry place.

If the equipment is to be reshipped for any reason, wrap in heavy plastic and ship in a heavy (275 lb. test) double-wall carton. At least three inches of a solid packing material should be used on all sides of the converter. The carton should be marked to indicate that it contains fragile electronic equipment.

2.2 MOUNTING

The converter chassis is 19" x 22" x 3.5" panel height. Slides are provided for mounting in a standard 19" (EIA) equipment rack. The converter should be securely mounted.

2.3 TURN-ON PROCEDURE

After mounting, make all external connections per Table 2-1. Refer to Section 1 for the physical configuration of the converter.

Apply power to the converter using the front panel power On/Off switch.

Allow one half hour minimum for oven warm-up in the internal crystal oscillator.

All LO fault lights should be off.

System is now operational.

TABLE 2-1
EXTERNAL CONNECTIONS

DESIGNATION	DESCRIPTION
Power Cord	Attach power cord to AC socket of converter.
IF Input	Connect IF input to J1 of converter.
RF Output	Connect RF output to J2 of converter.
Summary Alarm	Connect the summary alarm to J3 of converter.
Redundancy Switch	Connect redundancy switching to J7 of converter.
Remote Control	Connect the remote interface to J6 of converter.
Ground Lug	Be sure that the converter is well grounded.

SECTION 3

OPERATION

3.1 INTRODUCTION

The following paragraphs describe the controls, adjustments and procedures for turn-on, operation, emergency operation and shut down of the converter.

3.2 CONTROLS

3.2.1 EXTERNAL CONTROLS (Figures 1-1, 1-2 and 3-1)

- A. On/Off switch (A1A2) applies AC power to the converter
- B. Fuse (A1A1) 2.0A for 100 and 120 VAC, 1.0A for 220 and 230/240 VAC
- C. AC Power Selection (A1A1)

Voltage input is selected using a card located below the fuse on the AC input connector. The selected voltage input is indicated on the installed card. To change the voltage input, pull the card out and replace it with the desired voltage facing out. The card can be used to set the AC input voltage to 100, 120, 220, or 230/240 VAC.

- D. Gain Control

The front panel potentiometer provides 6 dB minimum of gain control. If Option 3C is ordered the front panel potentiometer will provide a minimum of 30 dB gain control.

- E. Data Entry Section

The keyboard is used for all numeric entry into the converter. A tone will sound for data entry error. There are two keys on the keyboard in addition to the standard numeric keypad and decimal point:

1. "CL" - This key is used to clear the LCD display.
2. "ENT" - This key is used to terminate commands.

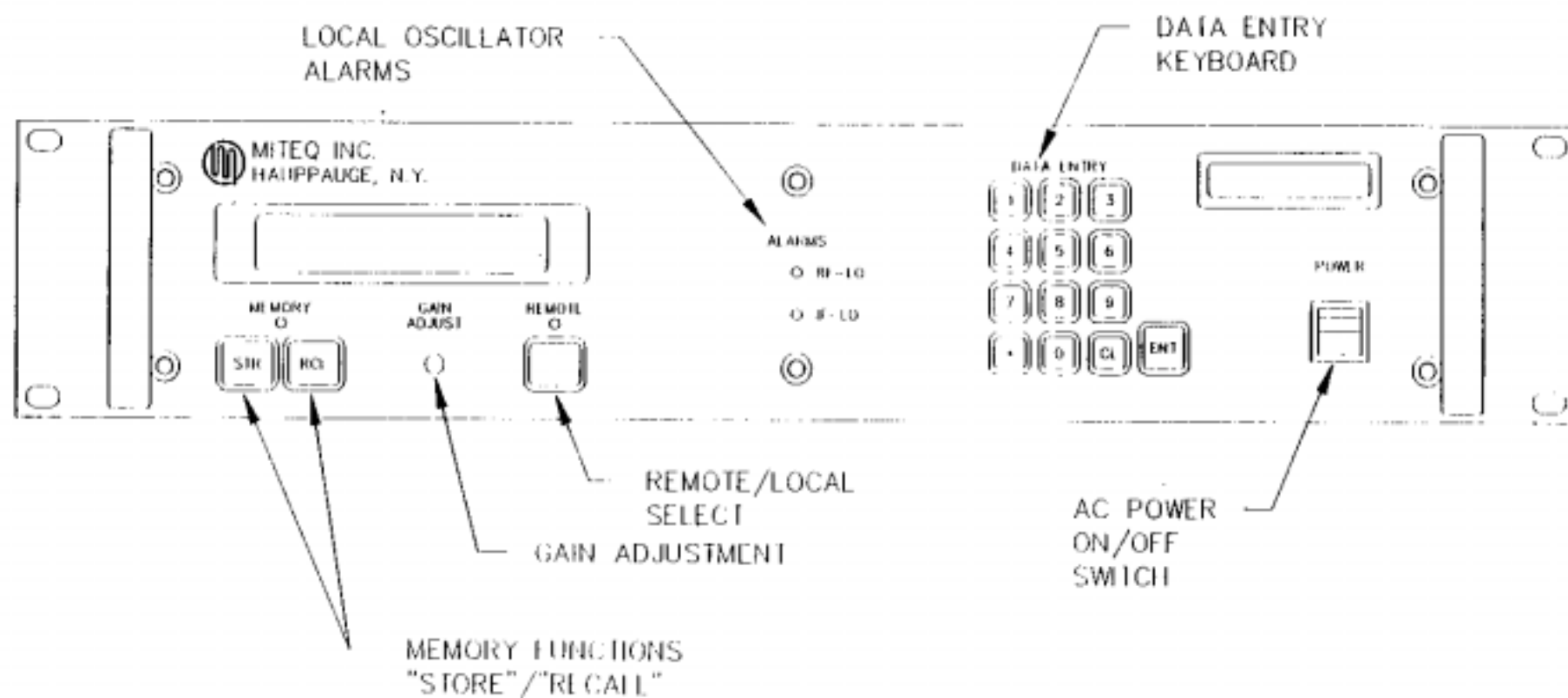


FIG. 1
FRONT PANEL LAYOUT
9300 SERIES

F. Remote Mode Select Switch

When remote control is installed, the front panel "REMOTE" switch selects either Local (front panel) or Remote mode of operation.

G. Channel Memory

The converter has thirty memories for frequency settings numbered 00 to 29.

3.2.2 INTERNAL CONTROLS (Figure 1-3)

A. Power Supply Voltage Adjustment

Adjustment of the DC power supplies within the specified tolerances may be made using an insulated tuning tool (refer to Section 4.3.4 and Appendix) after removal of the power supply cover.

3.3 OPERATING PROCEDURE

3.3.1 LOCAL OPERATION (See Figure 3-1)

When remote control is installed, the front panel "REMOTE" switch selects either Local (front panel) or Remote mode of operation.

Depressing the "REMOTE" panel switch will place the converter in the remote operation mode. A LED on the panel will light to indicate remote mode. Commands are accepted through the rear panel remote interface connector (J6). All front panel function and data entry keys (except "REMOTE") are disabled and if pressed, will cause the error tone to sound.

To return to local operation, depress the "REMOTE" panel switch again. The LED on the panel will not be lit to indicate local mode. All command inputs are from the front panel. The unit will not accept instructions through the remote interface connector (J6) but will report frequency, mode and status.

3.3.1.1 Set Frequency

To set the frequency of the converter:

- A. Enter the desired frequency (in MHz) using the numbered keys and the decimal point.
- B. Press "ENT".

3.3.1.2 Channel Memory

The converter has thirty memories for frequency settings numbered 00 to 29.

To store a frequency in memory:

- A. Enter the desired frequency (in MHz) using the numbered keys and the decimal point.
- B. Press "STR" and enter the memory number using the numbered keys (two digits). The "MEMORY" LED will be on during the key sequence.

To recall a frequency from memory:

- A. Press "RCL".
- B. Enter the memory number using the numbered keys (two digits). The "MEMORY" LED will be on during the key sequence.

3.3.2 REMOTE OPERATION

When remote control is installed, the front panel "REMOTE" switch selects either Local (front panel) or Remote mode of operation (see Section 3.3.1).

3.3.2.1 RS422/485 Protocol

All transmissions are multi-byte sequences beginning with a header byte and ending with a trailer byte and checksum byte. The transmitted bytes are all ASCII printable characters in the range of 20H to 7EH.

Data transmission format is a 10 bit sequence consisting of 1 start, 7 data, 1 parity and 1 stop bit. Odd or Even parity is set from the rear panel "ADDRESS" DIP switch. All characters, including the checksum character, are checked for parity. If any character in the message has a parity, framing or overrun error, the entire message is ignored and no response is made by the converter.

All messages addressed to the converter are normally acknowledged with a response message. Before sending the response message a converter configured for RS422A will check for no activity on the communication bus for a period of at least one character time. If the bus is active, the response message will be cancelled. This allows a controller to rapidly update a number of devices on the communication bus without having to wait for a response. When using this method (available only for RS422A) the following restrictions apply:

- Minimum frequency update period is 100 msecs.
- Multiple commands may not be sent without waiting for a response from each command.

The converter continually monitors the communications bus and will accept all commands addressed to it even when in Local mode. When in Local mode, receipt of any commands other than Status All or Status Faults will be ignored and the converter will respond with an error code.

3.3.2.2 Data Transfer

The general message format is as follows:

HEADER - DEVICE ADDRESS - COMMAND/ERROR CODE -
PARAMETERS (if required) - TRAILER - CHECKSUM

The response time from Command to acknowledge is 100 ms. maximum.

Since all bytes are ASCII printable characters, a compatible terminal may be used to control the converter or monitor traffic on the communication bus.

3.3.2.2.1 Header Byte

The Header byte is 7BH, ASCII character "{".

3.3.2.2.2 Device Address Byte

The Device Address may take on the values from 40H to 5FH (32 possible addresses).

3.3.2.2.3 Command/Error Codes

Command Codes

<u>Code</u>	<u>ASCII Character</u>	<u>Function</u>
46H	F	Frequency Set
4DH	M	Mute
41H	A	Status All
3FH	?	Status Faults

Error Codes

<u>Code</u>	<u>ASCII Character</u>	<u>Function</u>
61H	a	Command not recognized
62H	b	Illegal parameter or parameter out of range
63H	c	Unit in Local mode
64H	d	Busy

3.3.2.2.4 Parameter Bytes

Parameters are numeric characters which are sent MSD first, LSD last. Non-numeric parameters such as ",", ".", or values beyond the range of the converter will be rejected and cause the converter to respond with error code "b".

3.3.2.2.5 Trailer Byte

The Trailer byte is 7DH, ASCII character "}".

3.3.2.2.6 Checksum Byte

The Checksum byte is the sum modulo 95 of all message characters beginning with the header byte up to and including the trailer byte.

The value 32 is subtracted from each character value before taking the modulo 95 sum. The value 32 is added to the final sum to obtain the Checksum value. All values are in decimal.

$$\text{Checksum} = \text{Mod} [(\text{character value} - 32), 95] + 32$$

3.3.2.3 Command Codes

The following paragraphs describe each of the command codes.

3.3.2.3.1 Frequency Code = F

The Frequency command requires a 7 or 8 digit parameter which sets the frequency of the converter in kHz. Assuming no error conditions, the converter is immediately set to the frequency.

Remote Command Sequence (8 Digit): F14000500
(7 Digit): F3705000
Converter Response: F

3.3.2.3.2 Mute Code = M

The Mute command requires no parameters. The output of the converter is muted until a Frequency command is received.

Remote Command Sequence: M
Converter Response: M

3.3.2.3.3 Status All Code = A

The Status All command requires no parameters. The converter responds in both Local and Remote mode with the converter frequency, remote/local status, mute status and component fault status.

Remote Command: A
Converter Response: AFffffffffL1Mm?abcdef
A = Status All indicator
F = Frequency indicator
ffffffff(f): 7 or 8 digit ASCII numeric character indicating frequency. MSD transmitted first, LSD last.
L = Local/Remote indicator
l = "0" or "1" ASCII numeric character
0 = Local
1 = Remote
M = Mute indicator
m = "0" or "1" ASCII numeric character
0 = Mute off
1 = Mute on
? = Component Fault Status indicator
a-f = "0" or "1" ASCII numeric character
0 = No fault
1 = Fault

a through f indicate the status of the six component fault lines.

3.3.2.3.4 Status Faults Code = ? (Optional)

The Status Faults command requires no parameters. The converter responds in both Local and Remote mode with the component fault status.

Remote Command: ?
Converter Response: ?abcdef

?: Component Fault Status indicator
a-f: "0" or "1" ASCII numeric character
 0 = No fault
 1 = Fault

a through f indicate the status of the six component fault lines.

a Synthesizer Alarm
b LOA Alarm
c LOB Alarm
d Power Supply Alarm
e L01 Level Detect
f L02 Level Detect

3.3.2.4 Device Address/Baud Rate Selection

The device address is set with a DIP switch on the rear panel. S1, 2, 3, 4 and 5 select the 5 LSBs of the address in binary (switch off = "1", switch on = "0", S1 = LSB.) The two MSBs are permanently set to "10" and not available to the user.

The baud rate and parity are selected with switches S6, 7 and 8 in the following code (switch off = "1", switch on = "0").

<u>S8</u>	<u>S7</u>	<u>Baud Rate</u>
0	0	1200
0	1	2400
1	0	4800
1	1	9600

<u>S6</u>	<u>Parity</u>
0	Even
1	Odd

3.3.2.5 Programming Examples

The converter address is 41H (ASCII code A). The following are typical commands and responses showing the ASCII printable characters.

- A. Set the frequency to 3725.000 MHz

<u>Controller Command</u>	<u>Converter Response</u>
{AF3725000}0	{AF}a or possible error code {Ac}~

- B. Status Faults Command - response indicates the synthesizer alarm is in a fault condition.

<u>Controller Command</u>	<u>Converter Response</u>
{A?}Z	{A?100000}

3.3.2.6 Remote Interface Connector

RS422/485* -

J6-1	Ground
-3	Data Out -
-5	Data In -
-7	Data Out +
-9	Data In +

* For RS485 two wire party line operation DATA IN + must be externally wired to DATA OUT +, and DATA IN - externally wired to DATA OUT -.

RS232 -

J6-1	Ground
-2	TX Data
-3	RCV Data
-4	RTS
-5	CTS
-7	Ground

Contact Closure -

J6-1	F14
-2	F08
-3	F05
-4	F02
-5	F01
-6	COM
-10	F06
-11	F10
-12	F12
-13	F15
-14	F16
-15	F04
-16	F03
-17	F09
-23	F07
-24	F13
-25	F11

IEEE-488 -

IEEE-488 compatible 24 contact connector (receptacle).

3.3.2.7 RS422/485 Bus Termination (See Figure 3-2)

Jumper selectable, 120 ohm termination resistors are connected across the DATA IN +/- and DATA OUT +/- terminals. Installing E1 places the resistor across the DATA OUT terminals and installing E2 places the resistor across the DATA IN terminals.

3.3.2.8 Contact Closure Control

Inputs to the rear panel interface connector (J6) are continuously scanned for momentary closures. When a closure is detected the converter will tune to 1 of 16 pre-selected frequencies stored in memory locations 01 through 16. This operation requires the converter to be in remote operation modes. Momentary connection of F"nn" to COM will cause the converter to tune to the frequency stored in memory location "nn".

3.3.2.9 IEEE-488 Control

The 9300 Series Converter performs the basic Talker and Listener functions as specified in IEEE Standard 488. It is also capable of sending a Service Request to the IEEE-488 controller and will respond with a status word when the Serial Poll Enable message is received.

3.3.2.9.1 Device Address/Service Request Enable

The device address is set with the ADDRESS DIP switch on the rear panel. S1, 2, 3, 4 and 5 select the address assignment in binary (switch off = "1", on = "0", S1 = LSB). Switch 8 enables the Service Request feature (switch off = disabled, on = enabled). S6, 7 are spares.

The Service Request feature is only available in converters equipped with the Status Alarm Readout option.

3.3.2.9.2 Data Input Messages

The messages to and from the converter are ASCII character strings terminated with CR, LF and EOI.

3.3.2.9.2.1 Frequency Set

The Frequency Set message sets the converter to the specified frequency in kHz and also unmutes the converter.

F14000500	(8 digit)
F3700125	(7 digit)

3.3.2.9.2 Data Input Messages Cont'd.

3.3.2.9.2.2 Mute

The Mute message mutes the RF output of the converter.

M

3.3.2.9.2.3 Set/Store Frequency in Channel nn

This message is similar to the Frequency Set message. It sets the converter to the specified frequency in kHz, unmutes the converter and stores the frequency in channel memory "nn".

S01F14000125 (8 digit frequency stored in Channel 01)
S25F3712500 (7 digit frequency stored in Channel 25)

3.3.2.9.2.4 Recall Frequency from Channel nn

This message sets the converter to the frequency previously stored in channel memory "nn". It also unmutes the converter.

C05 (Recall frequency stored in Channel 05)

3.3.2.9.2.5 Data Format

These messages determine the converter's response when it is addressed to talk by the IEEE-488 Controller. A Data Format message remains in effect until another one is received. DF is the power on default format.

3.3.2.9.2.6 Frequency Format

<u>Data Format</u>	<u>Converter Response</u>
DF	FfffffffffLlMm

F = Frequency indicator
ffffffff(f) = 7 or 8 digit converter frequency in kHz

L = Local/Remote indicator
l = 0 = Local, 1 = Remote

M = Mute indicator
m = 0 = mute off, 1 = mute on

3.3.2.9.2 Data Input Messages Cont'd.

3.3.2.9.2.7 Status Faults Format

<u>Data Format</u>	<u>Converter Response</u>
D?	?abcdef

? = Status indicator
a-f = 0 = no fault, 1 = fault

a through f indicate the status of the six component fault lines

- a Synthesizer Alarm
- b LOA Alarm
- c LOB Alarm
- d Power Supply Alarm
- e L01 Level Detect
- f L02 Level Detect

The Status Alarm readout option is required for this format.

3.3.2.9.2.8 Status All Format

<u>Data Format</u>	<u>Converter Response</u>
DA	FfffffffffLlMm?abcdef

The DA format is a combination of the DF and D? formats. The Status Alarm readout option is required.

3.3.2.9.2.9 Channel Format

<u>Data Format</u>	<u>Converter Response</u>
DCnn	CnnFfffffffff

The DCnn format returns the frequency stored in channel nn (00-29). It has no effect on the frequency output of the converter.

3.3.2.9.2 Data Input Messages Cont'd.

3.3.2.9.2.10 Service Request

The converter will issue a service request (activate the SRQ line) when one of the status alarm lines indicate a failure. The IEEE-488 Controller responds by sending the SPE message (Serial Poll) and addresses the unit to talk. The converter responds with the following message:

<u>Bit No.</u>							
7	6	5	4	3	2	1	0
0	1	0	0	0	S2	S1	S0

The S"n" bits indicate in binary code which component fault line caused the service request (a = 0, b = 1, c = 2, etc.).

The IEEE-488 Controller may perform a Serial Poll without a service request being generated by the converter (the request may have been generated from another device on the bus). In this case, the response will be the same message (the data field will be the same as the last status word sent) however, bit 6 will be at "0".

3.3.3 EMERGENCY OPERATION

In the event of a failure in converter components, refer to Section 5.3 to determine possible cause/remedies.

3.3.4 SHUTDOWN PROCEDURE

The converter is completely shut down when the AC power is removed.

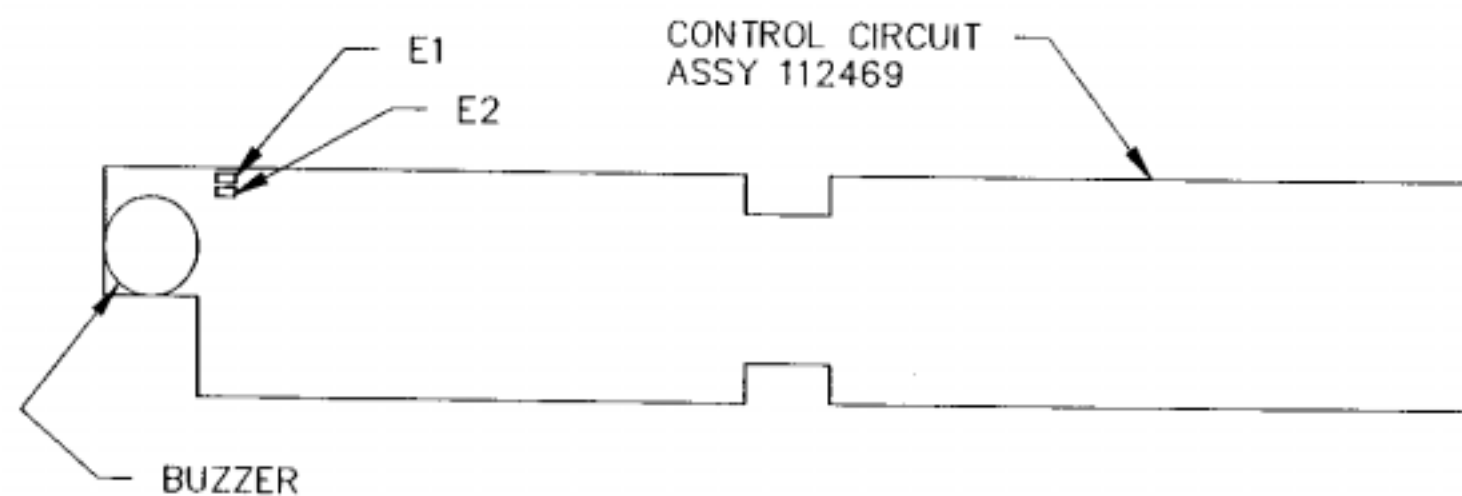


FIG. 2

RS422/485 BUS TERMINATION JUMPERS
9300 SERIES

SECTION 4

PRINCIPLES OF OPERATION

4.1 INTRODUCTION

The following paragraphs provide information on the principles of operation of the MITEQ Model U-9353 Upconverter. Overall functional operation of the system is discussed in Paragraph 4.2 and detailed principles of operation for the individual subassemblies are presented in Paragraph 4.3.

4.2 FUNCTIONAL DESCRIPTION

The converter translates a 40 MHz frequency band at 70 MHz to the 5.845-6.425 GHz output frequency band. A double conversion system is used (see Figure 4-1).

The input signal is fed to a well-matched upconverter module. If Option 2B is ordered, a coupled output port is included in the module to provide an IF test point at the rear panel of the converter. If the converter is ordered with Option 5, the signal passes through a group delay equalizer which is included in the module. The input signal is fed through a PIN diode attenuator, providing gain control for the system, amplified and fed to a mixer which converts the input signal to the second IF frequency. The signal is then amplified again and output from the module.

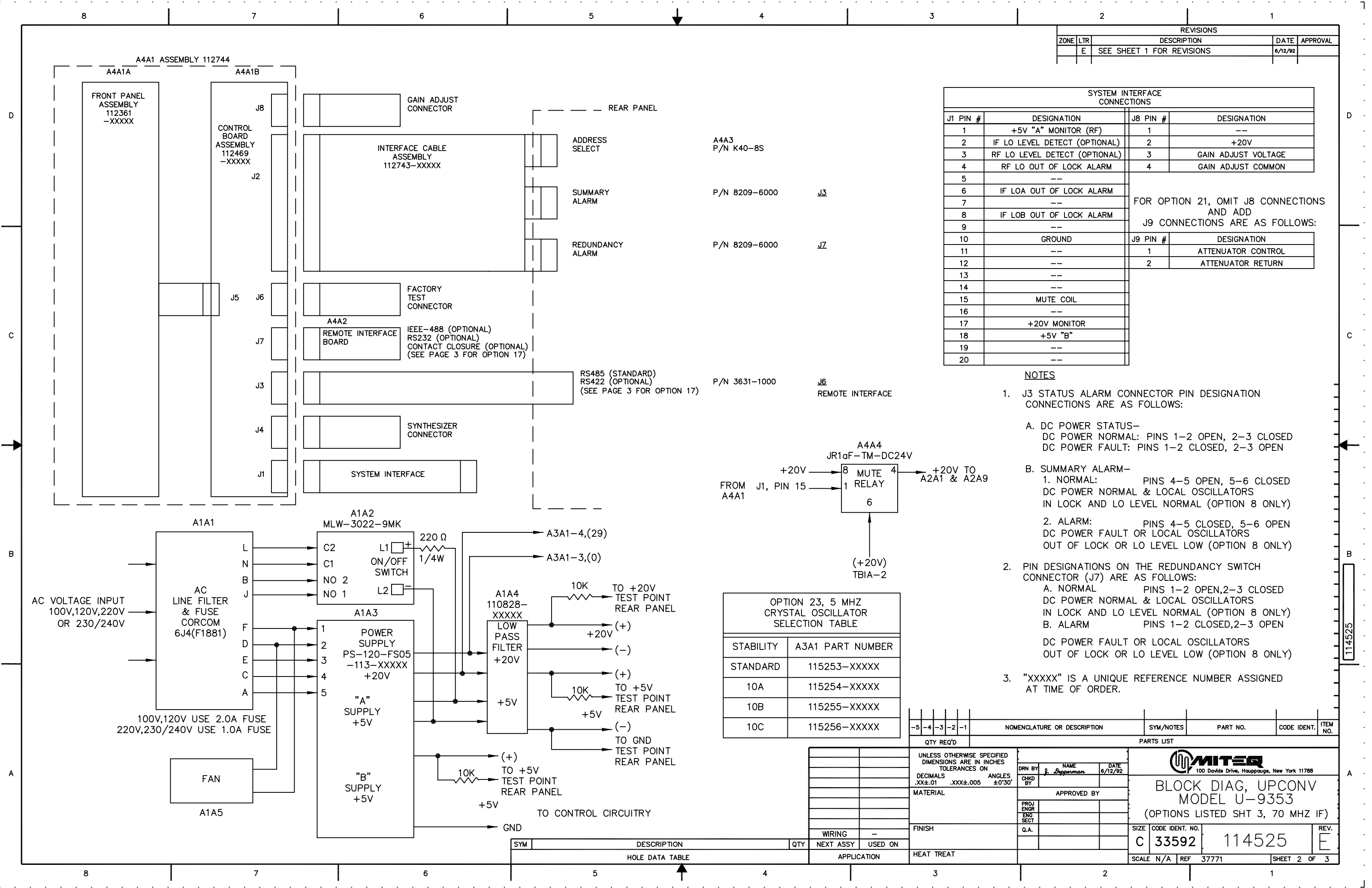
The output of the converter module is fed to a filter which rejects out-of-band signals resulting from the first conversion, including rejection of local oscillator signal. The signal is then fed to the second mixer which translates the signal frequency to the output frequency band.

The output of the second mixer is filtered for rejection of out-of-band signals. An optional output amplifier (Option 11) may be used to increase the output level of the converter.

The reference source for the local oscillator chains is a dual output high stability oven-controlled crystal oscillator at 5 MHz.

The first local oscillator is a phase locked source which is locked to the 5 MHz reference.

The second local oscillator is a synthesized frequency source which is locked to the 5 MHz reference.



REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	E	SEE SHEET 1 FOR REVISIONS	6/12/92	

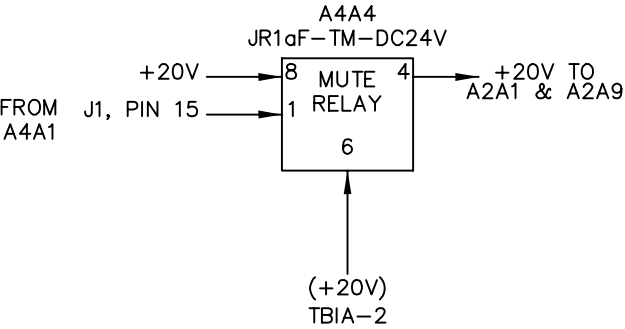
SYSTEM INTERFACE CONNECTIONS			
J1 PIN #	DESIGNATION	J8 PIN #	DESIGNATION
1	+5V "A" MONITOR (RF)	1	--
2	IF LO LEVEL DETECT (OPTIONAL)	2	+20V
3	RF LO LEVEL DETECT (OPTIONAL)	3	GAIN ADJUST VOLTAGE
4	RF LO OUT OF LOCK ALARM	4	GAIN ADJUST COMMON
5	--	FOR OPTION 21, OMIT J8 CONNECTIONS AND ADD J9 CONNECTIONS ARE AS FOLLOWS:	
6	IF LOA OUT OF LOCK ALARM		
7	--		
8	IF LOB OUT OF LOCK ALARM		
9	--		
10	GROUND	J9 PIN #	DESIGNATION
11	--	1	ATTENUATOR CONTROL
12	--	2	ATTENUATOR RETURN
13	--		
14	--		
15	MUTE COIL		
16	--		
17	+20V MONITOR		
18	+5V "B"		
19	--		
20	--		

NOTES

1. J3 STATUS ALARM CONNECTOR PIN DESIGNATION CONNECTIONS ARE AS FOLLOWS:

A. DC POWER STATUS—
DC POWER NORMAL: PINS 1–2 OPEN, 2–3 CLOSED
DC POWER FAULT: PINS 1–2 CLOSED, 2–3 OPEN

B. SUMMARY ALARM—
1. NORMAL: PINS 4–5 OPEN, 5–6 CLOSED
DC POWER NORMAL & LOCAL OSCILLATORS IN LOCK AND LO LEVEL NORMAL (OPTION 8 ONLY)
2. ALARM: PINS 4–5 CLOSED, 5–6 OPEN
DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK OR LO LEVEL LOW (OPTION 8 ONLY)
2. PIN DESIGNATIONS ON THE REDUNDANCY SWITCH CONNECTOR (J7) ARE AS FOLLOWS:
A. NORMAL PINS 1–2 OPEN, 2–3 CLOSED
DC POWER NORMAL & LOCAL OSCILLATORS IN LOCK AND LO LEVEL NORMAL (OPTION 8 ONLY)
B. ALARM PINS 1–2 CLOSED, 2–3 OPEN
DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK OR LO LEVEL LOW (OPTION 8 ONLY)
3. "XXXXX" IS A UNIQUE REFERENCE NUMBER ASSIGNED AT TIME OF ORDER.



OPTION 23, 5 MHZ CRYSTAL OSCILLATOR SELECTION TABLE	
STABILITY	A3A1 PART NUMBER
STANDARD	115253-XXXXX
10A	115254-XXXXX
10B	115255-XXXXX
10C	115256-XXXXX

SYM	DESCRIPTION	QTY
	HOLE DATA TABLE	

WIRING	—
NEXT ASSY	USED ON
APPLICATION	HEAT TREAT

-5	-4	-3	-2	-1	NOMENCLATURE OR DESCRIPTION	SYM/NOTES	PART NO.	CODE IDENT.	ITEM NO.	
QTY REQ'D					PARTS LIST					
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON					DRN BY	NAME	DATE	 100 Davids Drive, Hauppauge, New York 11788 BLOCK DIAG, UPCONV MODEL U-9353 (OPTIONS LISTED SHT 3, 70 MHZ IF)		
DECIMALS .XX±.01		ANGLES ±0°30'		CHKD BY	J. Suppeman	6/12/92				
MATERIAL					APPROVED BY					
					PROJ ENGR					
					ENG SECT					
					Q.A.					
FINISH					SIZE	CODE IDENT. NO.				REV.
					C	33592	114525			E
HEAT TREAT					SCALE	N/A	REF			37771

4.3 SUBSYSTEMS AND COMPONENTS FUNCTIONAL DESCRIPTION

4.3.1 SIGNAL PATH

4.3.1.1 Upconverter Module (A2A1)

Part Number: UMD675-70-1100-XXXXX

Description: Upconverter Module

Function: Provide a well matched system input, frequency translation, gain and gain control.

Design: Integrated assembly

Specifications -

A. Frequency -

1. Input: 50-90 MHz
2. Output: 1100 $\pm$ 20 MHz
3. LO: 1030 MHz at +10 dBm

B. Gain: 19 dB nominal

C. Input VSWR: 26 dB/75 ohms
(50 ohms with Option 15)

D. Output VSWR: 23 dB/50 ohms

E. Power Output
(1 dB Compression): +6 dBm

F. DC Voltage: +20 volts

G. Gain Control: 6 dB minimum
(30 dB with Option 3C)

H. IF Monitor Output
(Option 2B): -20 dBc nominal

I. Local Oscillator
Monitor Output: -20 dBc nominal

J. Connectors -

1. Input: BNC female
2. LO/Output: SMA female
3. DC: Solder filter

4.3.1.2 Filter, Isolator (A2A2, A2A3)

A2A2 -

Description: Filter
Part Number: FLT-110054-1.1-XXXXX
Function: IF passband, out-of-band rejection
Design: Eight pole rod combline bandpass

Specifications -

- A. Frequency: 1100 $\pm$ 20 MHz
- B. Insertion Loss: 1.0 dB
- C. Input/Output VSWR: 25 dB
- D. Parabolic Group Delay: 4 nsec $\pm$ 20 MHz
- E. Rejection: 75 dB $\pm$ 70 MHz

A2A3 -

Description: Isolator
Part Number: 113942-4

Specifications -

- A. Frequency: 1100 $\pm$ 50 MHz
- B. Insertion Loss: 0.5 dB
- C. Input/Output VSWR: 1.1:1
- D. Isolation: 23 dB minimum
- E. Connectors: SMA female

4.3.1.3 Mixer, Second Conversion (A2A4)

Part Number: M30-1.1-6.1-XXXXX
Function: Frequency translation
Design: Double balanced

Specifications -

- A. Input Frequency: 1100 $\pm$ 20 MHz
- B. Output Frequency: 5.845-6.425 GHz
- C. LO Frequency: 4745-5325 MHz
- D. Conversion Loss: 6.5 dB nominal
- E. LO Power: +10 dBm
- F. Isolation -
 - 1. LO/Output: 20 dB
 - 2. LO/Input: 20 dB
- G. Power Output
(1 dB Compression): -5 dBm minimum
- H. Connectors -
 - 1. Input: SMA male
 - 2. Output: SMA male
 - 3. LO: SMA female

4.3.1.4 Output Isolators, Filter (A2A5, A2A6, A2A7)

A2A5, A2A7 -

Description: Isolator
Part Number: 111907-3, 111907-4

Specifications -

- A. Frequency: 5.845-6.425 GHz
- B. Insertion Loss: 0.25 dB
- C. Input/Output VSWR: 1.15:1
- D. Isolation: 23 dB minimum
- E. Connectors: SMA female input
N female output (111907-3)
SMA female output(111907-4)

A2A6 -

Description: Filter
Part Number: FLT-112387-XXXXX
Function: Rejection of out-of-band mixer products
Design: Six pole combline

Specifications -

- A. Frequency: 5.845-6.425 GHz
- B. Insertion Loss: 0.4 dB
- C. Flatness: 0.2 dB peak-to-peak
- D. VSWR Input/Output: 1.2:1
- E. Connectors -
 - 1. Input: SMA male
 - 2. Output: SMA male

4.3.1.4.1 Option 11 - Output Amplifier

Description: Amplifier
Part Number: 112862-XXXXX (Option 11A)
 112763-XXXXX (Option 11B)
Function: Increase system output level
Design: GaAs FET

Specifications -

- A. Frequency: 5.845-6.425 GHz
- B. Gain -
 - 1. Option 11A: 10 dB nominal
 - 2. Option 11B: 20 dB nominal
- C. Input/Output VSWR: 2:1
- D. Power Output
(1 dB Compression): +13 dBm
- E. DC Voltage: +20 volts
- F. Connectors -
 - 1. Input: SMA male
 - 2. Output: SMA male
 - 3. DC: Solder filter

An additional isolator may be inserted between the output filter and the Option 11 output amplifier.

4.3.2 LOCAL OSCILLATOR

4.3.2.1 5 MHz Reference (A3A1)

Part Number: 115249-XXXXX

The dual output 5 MHz crystal oscillator is a highly stable precision crystal oscillator enclosed in a proportionally-controlled oven housing.

The specifications of the crystal oscillator are:

- A. Frequency: 5.000000 MHz
- B. Power Outputs: 0±3 dBm
- C. DC Power -
 - 1. Warm-Up: +20V/150 mA
 - 2. Normal: +20V/70 mA stabilized at 25°C
- D. Oven Stabilization Time: 20 minutes (25°C)
- E. Connectors -
 - 1. RF: SMA female
 - 2. DC: Solder filter

Refer to the index for description and data sheets for higher stability reference sources when installed (Option 10).

4.3.2.2 960 MHz Phase Lock Source (A3A2)

Part Number: DPL0-5-1030-20P-XXXXX

Alternate Part Number: 115162-1030-XXXXX

The phase lock source consists of:

1. Fundamental VTO (1030 MHz)
2. Frequency divider ($\div 206$)
3. Phase detector
4. Phase lock alarm circuit

A functional block diagram is shown in Figure 4-2.

A sample of the VTO is directed through the frequency divider and then to the phase detector. The input reference frequency is also fed to the phase detector.

When the input reference frequency and divided VTO frequency differ only in phase, the phase detector output is a DC voltage proportional to the phase difference between these two signals. A frequency difference between the two signals results in a sweep voltage which is applied to the voltage-tuned capacitor of the VTO. As the VTO is being swept through its frequency range, comparison of frequency is made in the phase detector. When the divided VTO frequency is at the same frequency as the input reference, the sweep is disabled and the VTO is locked to the input reference.

The specifications for the phase lock source are:

- | | |
|----------------------|--|
| A. Frequency Output: | 1030 MHz |
| B. Frequency Input: | 5 MHz |
| C. Power Output: | +12 dBm nominal |
| D. Power Input: | 0 $\pm$ 3 dBm |
| E. DC Power: | +20V at 300 mA, +5V at 500 mA |
| F. Phase Voltage TP: | 10 $\pm$ 2V "in-lock", +1 or +19V
"out-of-lock" |
| G. Connectors - | |
| 1. RF: | SMA female |
| 2. DC: | Solder filter |

A fixed attenuator follows the phase lock source and is used to provide level adjustment.

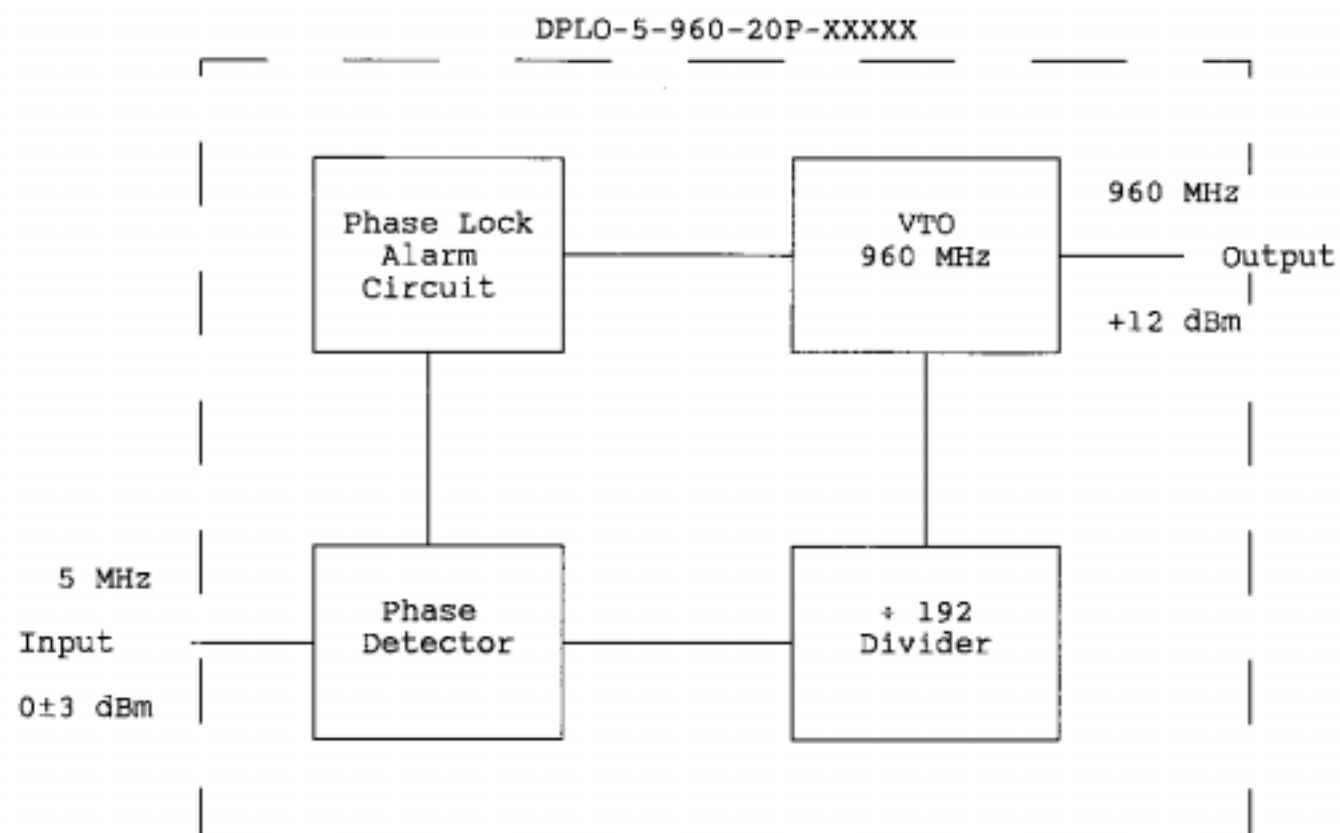


Figure 4-2. Block Diagram, 960 MHz Phase Lock Source (A3A2)

4.3.2.3 Second Local Oscillator

4.3.2.3.1 Frequency Synthesizer (A3A4)

The microwave frequency synthesizer incorporates multiple loop, digital phase locking techniques to produce an RF output frequency in steps of 125 kHz. Phase lock loop bandwidths are adjusted for best overall phase noise performance.

Due to the complexity of the microwave synthesizer, it is recommended that all service be referred to the factory.

The specifications for the synthesized source are:

- A. Frequency Output: 4745-5325 MHz
- B. Frequency Input: 5 MHz
- C. Power Output: +13 dBm minimum
- D. Power Input: 0 ± 3 dBm
- E. DC Power: +20V at 1.0A, +5V at 1.5A
- F. Phase Lock TP: DC voltage variable with frequency
- G. Connectors -

- 1. RF: SMA female
- 2. DC: "D" connector

<u>Function</u>	<u>Pin</u>
+20V	1, 6
+5V	4, 8
Ground	5, 9
Phase Voltage	2
Alarm	3
3. Control:	Ribbon cable

4.3.2.3.2 Second Local Oscillator Chain (A3A5 to A3A9)

A3A5, A3A7 -

Description: Isolator
Part Number: 111907-5

Specifications -

- A. Frequency: 4.72-5.325 GHz
- B. Insertion Loss: 0.25 dB
- C. Input/Output VSWR: 1.15:1
- D. Isolation: 23 dB minimum
- E. Connectors: SMA female

A3A6 -

Description: Filter
Part Number: FLT-112386-XXXXX
Function: Out-of-band rejection
Design: Six pole combline

Specifications -

- A. Frequency: 4.745-5.325 GHz
- B. Insertion Loss: 0.3 dB
- C. Input/Output VSWR: 1.2:1
- D. Parabolic Group Delay: 1 nsec/500 MHz
- E. Connectors: SMA male

A3A8 -

Description: Coupler
Part Number: 117525-5

Specifications -

A. Frequency: 4-8 GHz

B. Insertion Loss: 0.5 dB

C. Input/Output VSWR: 1.2:1

D. Coupled Output: 20 dBc

E. Connectors -

1. Input: SMA female

2. Output: SMA female

3. Coupled Output: SMA female

A3A9 -

Description: Fixed Attenuator
Part Number: 114779-
Function: Gain adjustment

Specifications -

A. Insertion Loss: 3 dB nominal

B. Connectors -

1. Input: SMA male

2. Output: SMA female

4.3.3 CONVERTER CONTROLLER

The Converter Controller board contains the microcomputer and analog circuitry necessary to control the LCD display, accept data from the front panel keys, control the frequency synthesizer, monitor status signals from the critical converter components, control the muting and alarm relays and provide a remote bus interface (e.g. RS485).

The microcomputer is designed with a microprocessor which contains on-chip RAM, a serial port and an I/O port. Program memory is stored in an EPROM. Additional RAM is located on a peripheral IC along with extra I/O ports and a timer. The I/O ports read the rear panel DIP switch for address and baud rate selection (remote bus option only), control the "MEMORY" and "REMOTE" front panel LEDs, control the muting and alarm relays and monitor the analog status alarm circuitry. The on-chip timer is used as a gated oscillator to sound the buzzer.

The I/O port on the microprocessor controls the LCD controller chips, stores and recalls data from the EEPROMs (non volatile memory) and sends serial data to the frequency synthesizer via the interface ICs. When the remote bus option is used, the microprocessor on-chip serial I/O port is used with the interface ICs to provide an RS422/485 interface.

Front panel keys are monitored by the keyboard encoder. The keys are scanned at a periodic rate and an interrupt is generated whenever a key is pressed. Key debouncing and multiple key lockout are also provided in the chip.

The power monitor IC performs three functions. It generates a power-on reset pulse whenever power is turned on. As a power monitor, it continuously monitors the +5V power supply and generates a reset signal if the supply drops below 4.5V. It also contains a watch dog timer which must be periodically reset by the microprocessor. Failure to do so indicates a circuit failure and causes a reset pulse to be generated.

The analog section monitors signal levels from the critical converter components and outputs to the microcomputer whenever a fault level has been reached. Fault levels for the power supplies are fixed while others such as the LO level detect are adjusted with trim pots. A separate relay, DC alarm, is controlled from the output of the power supply monitor circuitry. The two front panel alarm LEDs, "RF-LO" and "IF-LO", are controlled from the analog circuitry.

4.3.4 POWER SUPPLY, LOW PASS FILTER

The complete manual for the power supply is given in Appendix A.

MITEQ Part Number: PS120-FS05-113-XXXXX
Power One Part Number: FS05-113

The power supply is divided into three sections:

- A. +5.2 volts for the Converter Controller only
Voltage Setting Tolerance: ± 0.10 volts
- B. +5.2 volts for the converter's RF components
Voltage Setting Tolerance: ± 0.10 volts
- C. +20 volts for the converter's RF components
Voltage Setting Tolerance: ± 0.25 volts

Overvoltage protection is included for all sections of the power supply.

A low pass filter (A1A4) follows the RF component sections of the power supply to aid in the rejection of power supply noise. A balanced configuration is used with a series inductor and shunt electrolytic capacitor. Voltage is set and monitored after the low pass filter and is supplied to all system components with the exception of the crystal reference oscillator heater circuit. The heater circuit derives DC power before the low pass filter.

SECTION 5

MAINTENANCE

5.1 INTRODUCTION

This section includes information and instructions for periodic monitoring of converter performance, and information for troubleshooting, alignment and adjustment of the converter in case of converter malfunction.

5.2 PREVENTIVE MAINTENANCE

The converter is a completely solid state design. Normal periodic inspection for cleanliness and mechanical integrity should be made in accordance with standard procedures.

To prevent long and costly downtime of the converter periodic monitoring of the overall converter performance parameters that are most indicative of individual converter component performance is necessary. A log should be maintained that provides a permanent record of converter operation and compares it to factory provided data. By doing so, any long term degradation, erratic or abnormal performance can be detected early. The overall converter performance parameters that are most indicative of individual system component performance and encompass all system components for correct overall converter performance are converter gain and local oscillator frequencies.

Any excessive change in converter gain indicates a malfunction in the local oscillator and/or signal channel and/or in the power supply. Any excessive frequency change indicates malfunction in phase locking to the reference oscillator.

5.2.1 DC VOLTAGE

Connect the digital voltmeter to the DC test points on the rear panel. If voltage is beyond tolerance (see Section 4.3.4), reset power supply (refer to Appendix and Figure 1-3), using the tuning adjustment on the power supply.

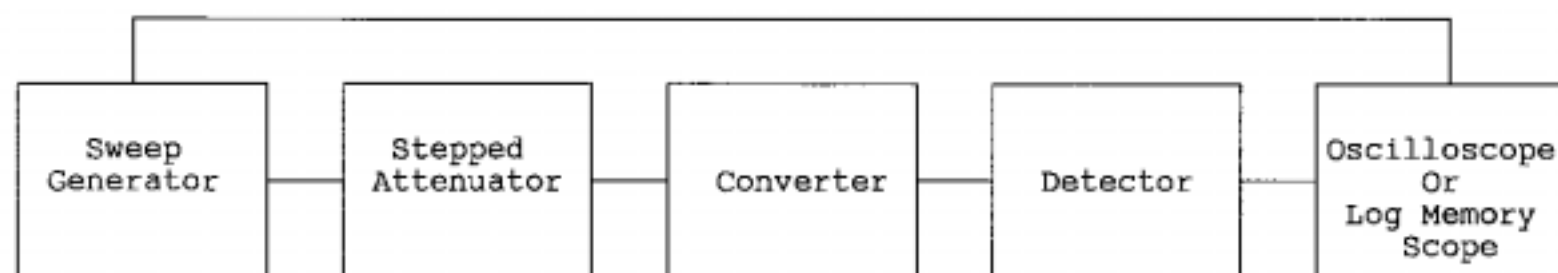


Figure 5-1. Test Setup for Gain, Gain Ripple and Frequency Response Measurement

5.2.2 GAIN OF THE CONVERTER

The following procedure is to be followed for gain measurements. Connect the test equipment as shown in Figure 5-1. Set the sweeper to cover the required input frequency range. Set the attenuator on the log memory scope to 000 and memorize the input reference. Connect the converter into the test setup.

Record the gain and frequency response of the converter.

The gain of the converter should be periodically monitored to reveal deviations which would indicate possible malfunction.

5.2.3 FREQUENCY MEASUREMENT

Frequency accuracy of the converter is determined by the reference source used. Frequency may be monitored at the rear panel L0 test points.

5.2.4 LOCAL OSCILLATOR PHASE LOCK TEST POINT (Phase Voltage)

The phase lock test point (phase voltage) of the phase lock source indicates proper locking conditions and frequency for the basic voltage-tuned oscillator. The following voltages will be observed at 25°C ambient:

- | | |
|---------|---|
| A. L01: | 10 $\pm$ 2 volts "in lock"
1 volt or 18 volts
"out-of-lock" |
| B. L02: | Variable with frequency |

Due to the nature of multiple loop frequency synthesizers, the test point may not always indicate an out-of-lock state. The front panel LED represents a summary of the individual phase lock loop alarms.

Data on test point voltage should be recorded in a log and compared to the original data in order that changes in data as a function of time can be observed.

5.3 CORRECTIVE MAINTENANCE

If the converter malfunctions during normal use or if the tests in Section 5.2 reveal excessive discrepancies in converter gain or local oscillator frequency or test point voltage, isolation and correction of the malfunction becomes necessary.

While it is difficult to fully anticipate and describe all possible failure modes in a complicated electronic system, this manual contains sufficient information in the form of theory of operation and diagrams to enable an experienced technician to isolate and remove the malfunctioning module. In addition, power supply failures can be corrected on the station level.

5.3.1 POWER SUPPLY MALFUNCTION

If the fault is detected in the power supply, remove the power supply protective cover. Check AC voltage input to the power supply. With the help of the power supply schematics in Appendix A, isolate the malfunctioning component.

5.3.2 LOCAL OSCILLATOR

To isolate the malfunctioning component in the local oscillator chain, Section 4.3.2 should first be carefully studied for theory of operation. The following voltage check should be performed before proceeding.

Check DC voltages to phase lock oscillators. A scope (AC coupled) should be applied to voltage line to measure power supply ripple (refer to Appendix for specifications). If incorrect voltage or excessive ripple is observed, refer to Paragraph 5.3.1 for a power supply check.

Power level of the input reference should be checked. Required input reference power level for phase lock sources is 0 ± 3 dBm. If the reference source is significantly off frequency, the phase lock source may not be able to lock to it. Frequency of the reference should be 5.000000 MHz.

Assuming an "in-lock" condition at the correct output frequency, check output power. If unit is out of specification or above procedures fail to rectify the problem, it is recommended that unit be returned for factory repair.

5.3.3 CONVERTER, SIGNAL CHAIN

The components in the signal chain can be checked against the individual specifications listed in Section 4.3.

TABLE 5-1

PARTS LIST - U-9353 UPCONVERTER

ITEM NUMBER	SYMBOL NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
1	A1A1	Corcom	6J4 (F1881)	AC Line Filter
2	A1A2	Kaiheiki	MLW-3022-9MK	On/Off Switch
3	A1A3	MITEQ	PS120-FS05-113-XXXXX	Power Supply
4	A1A4	MITEQ	110828-XXXXX	Low Pass Filter
5	A1A5	Rotron	SU2A5	Fan
6	A2A1	MITEQ	UMD675-70-1100-XXXXX	Upconverter Module
7	A2A2	MITEQ	FLT-110054-1.1-XXXXX	Bandpass Filter
8	A2A3	MITEQ	113942-4	Isolator
9	A2A4	MITEQ	M30-1.1-6.1-XXXXX	Balanced Mixer
10	A2A5	MITEQ	111907-4	Isolator
11	A2A6	MITEQ	FLT-112387-XXXXX	Bandpass Filter
12	A2A7	MITEQ	111907-3	Isolator
13	A3A1	MITEQ	115249-XXXXX	Crystal Oscillator
14	A3A2*	MITEQ	DPLO-5-1030-20P-XXXXX	Phase Lock Source
15	*Alternate	MITEQ	115162-1030-XXXXX	Phase Lock Source
16	A3A3, A9	MITEQ	114779-	Isolator, SAT
17	A3A4*	MITEQ	PLSM-4.7-5.3-125KS-XXXXX	Synthesizer
18	*Alternate	MITEQ	114866-XXXXX	Synthesizer
19	A3A5, A7	MITEQ	111907-5	Isolator
20	A3A6	MITEQ	FLT-112386-XXXXX	Bandpass Filter
21	A3A8	MAC Technology	117525-5	Directional Coupler
22	A4A1	MITEQ	112744	A4A1 Assembly
23	A4A1-A	MITEQ	112361-XXXXX	Front Panel Assembly
24	A4A1-B	MITEQ	112469-XXXXX	Control Board Assembly
25	A4A3	TLC	K40-8S	Address Select
26	A4A4	Aromat	JR1aF-TM-DC24V	Mute Relay
27	J3	3M	8209-6000	Summary Alarm Connector
28	J6	3M	3631-1000	Remote Interface Connector
29	J7	3M	8209-6000	Redundancy Alarm Connector

XXXXX represents a unique number assigned at time of order.

114525E

TABLE 5-1 (Cont.)

PARTS LIST - U-9353 UPCONVERTER

ITEM NUMBER	SYMBOL NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
30		MITEQ	112825	Chassis, 17" x 20" x 3.06"
31		MITEQ	112361	Front Panel
32		MITEQ	114522	RF Tray
33		MITEQ	111404-2	Crystal Mounting, A3A1
34		MITEQ	8220-A-0440	4-40 x 1/4" Hex Spacers 1" Long
35		MITEQ	106505-4	Isolator Mounting Bracket, A3A5, A3A7 (2)
36		MITEQ	106505-8	Isolator Mounting Bracket, A2A5, A2A7, A2A8 (3)
			OPTION 2A	
37	A2A10	Mac Technology	C3205-20	Directional Coupler
38	A2A11	MITEQ	111907-4	Ferrite Isolator
			OPTION 2B	
39	A2A1	MITEQ	UMD6C75-70-1100-XXXXX	Upconverter Module
			OPTION 3C	
40	A2A1	MITEQ	UMD3075-70-1100-XXXXX	Upconverter Module
			OPTION 5A	
41	A2A1	MITEQ	UMD675-70-1100-5A-XXXXX	Upconverter Module
			OPTION 8	
42	A3A8	MITEQ	CD-4753-XXXXX	Coupler Detector
43	A3A10	MITEQ	CD-1030-XXXXX	Coupler Detector
			OPTION 10A	
44	A3A1	MITEQ	115250-XXXXX	Crystal Oscillator
			OPTION 10B	
45	A3A1	MITEQ	115251-XXXXX	Crystal Oscillator

TABLE 5-1 (Cont.)

PARTS LIST - U-9353 UPCONVERTER

ITEM NUMBER	SYMBOL NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
46	A3A1	MITEQ	OPTION 10C 115252-XXXXX	Crystal Oscillator
47	A2A8	MITEQ	OPTION 11A 111907-4	Isolator
48	A2A9	MITEQ	112862-XXXXX	Amplifier
49	A2A8	MITEQ	OPTION 11B 111907-4	Isolator
50	A2A9	MITEQ	112763-XXXXX	Amplifier
51	A2A1	MITEQ	OPTION 15 UMD650-70-1100-XXXXX	Upconverter Module
52	A4A2	MITEQ	OPTION 17C 113643-XXXXX	Remote Control RS232
53	A4A2	MITEQ	OPTION 17D 113564-XXXXX	Remote Control With Contact Closure
54	A4A2	MITEQ	OPTION 17F 113632-XXXXX	Remote Control IEEE-488

SECTION 6

DIAGRAMS

6.1 INTRODUCTION

This section contains the overall wiring diagram and schematics for the U-9353 Upconverter.

TABLE 6-1

LIST OF DIAGRAMS

FIG. NO.	DESCRIPTION	PAGE
6-1	Wiring Diagram	6-2
6-2	Schematic Diagram, Converter Controller 9300 Series (A4A1B)	6-12
6-3	Assembly Diagram, Converter Controller 9300 Series (A4A1B)	6-14

WIRE RUN SHEET
9300 SERIES UPCONVERTER

MODEL: U-9353

BLOCK DIAGRAM: 114525E

FROM: AC LINE FILTER A1A1		
DESIGNATION	COLOR	TO
L	80	A1A2-C2
N	89	A1A2-C1
B	80	A1A2-NO 2
J	89	A1A2-NO 1
F	80	A1A3-1
D	89	A1A3-2
E	80	A1A3-3
C	89	A1A3-4
A	80	A1A3-5

FROM: POWER ON/OFF SWITCH A1A2		
DESIGNATION	COLOR	TO
C-1	89	A1A1-N
C-2	80	A1A1-L
NO-1	89	A1A1-J
NO-2	80	A1A1-B
L-1	45	A1A4 TB1-A (SW LED)
L-2	0	A1A4 TB1-B (5V GND)

118142C

FROM: POWER SUPPLY A1A3		
DESIGNATION	COLOR	TO
1	80, 0	A1A1-F, A1A5
2	89, 0	A1A1-D, A1A5
3	80	A1A1-E
4	89	A1A1-C
5	80	A1A1-A
+5V"A"	5	A4A1B-J1-1, A1A4 (5V Post) X2
5V"A" RTN	05	A1A4 (5V GND Post) X2
+5V"B"	59, 95	A4A1B J1-18, +5V"B" T.P.
5V"B" RTN	04	A4A1B J1-10
+20V	29 20	A1A4 (20V) X2, A4A1B J1-17 A3A1 Term. 4/A4A4 Term 8
20V RTN	0, 0	A1A4 (20V GND Post) X2, A3A1, Term-3/A4A4 GND Lug

FROM: LOW PASS FILTER AND TERMINAL STRIP A1A4		
DESIGNATION	COLOR	TO
+20V INPUT	29 x 2	A1A3 +20V TERMINAL POST
20V GROUND	0 x 2	A1A3 20V RTN TERM. POST
+5V "A" INPUT	5 x 2	A1A3 +5V TERMINAL POST
5V "A" GROUND	05 x 2	A1A3 5V RTN TERM. POST
TB1-A +20V T.P.	92	+20V TEST POINT
TB1-A +20V SECTION	29	A3A2 (+20V)
TB1-A +20V SECTION	29	A3A4 Conn. PIN #1
TB1-A +20V SECTION	29	A3A4 Conn. PIN #6
TB1-A +20V SECTION	29	A4A4 Terminal #6
TB1-A +20V SECTION	29	***A3A13 (+20V)
TB1-A +20V SECTION	29	**A4A5 TERMINAL #2
TB1-A +20V SECTION		
TB1-A +5V T.P.	95	+5V "A" TEST POINT
TB1-A SW. LED	45	A1A2-L1
TB1-A +5V SECTION	5	A3A2 (+5V)
TB1-A +5V SECTION	5	A3A4 Conn. PIN #4
TB1-A +5V SECTION	5	A3A4 Conn. PIN #8
TB1-B 20V GND SECT	0	A3A2 (GND)
TB1-B 20V GND SECT	0	A3A4 Conn. PIN #9
TB1-B 20V GND SECT	0	A4A4 (GND LUG)
TB1-B 20V GND SECT	0	***A3A13 (GND)
TB1-B 20V GND SECT	0	**A4A5 TERMINAL #5
TB1-B 5V GND SECT	05	A3A2 (GND)
TB1-B 5V GND SECT	05	A3A4 Conn. PIN #5

**OPTION 23C ONLY

***OPTION 23D ONLY

FROM: LOW PASS FILTER AND TERMINAL STRIP A1A4 (CONTD.)		
DESIGNATION	COLOR	TO
TB1-B 5V GND SECT		
TB1-B 5V GND SECT		
TB1-B 5V GND SECT		

FROM: FAN A1A5		
DESIGNATION	COLOR	TO
E1	0	A1A3-1
E2	0	A1A3-2

FROM: DC TEST POINTS		
DESIGNATION	COLOR	TO
+20 VOLTS	92	A1A4 (+20V SECT) T.P.
+5 VOLTS "A"	95	A1A4 (+5V SECT) T.P.
+5 VOLTS "B"	95	A1A3 (+5V B)
20V & 5V"A" GND	0	A1A4 (20V GND & 5V GND) (SECTIONS)
RF LO VOLTAGE	19	A3A4 Conn. PIN #2
IF LO VOLTAGE	69	A3A2 (LOCK T.P.)

RF TRAY CONNECTOR				
DESIGNATION	PIN	COLOR	FROM	TO
+20V OR MUTE (MOD)	1	96	A2A1 (+20V)	A4A4 Term. #4
+20V OR MUTE	2	96	*A2A9 (+20V)	A4A4 TERM #4
RED	3	2	A2A1 (+20V)	A4A1B-J8-PIN 2
WHITE (GC)	4	9	A2A1 (G.C.)	A4A1B-J8-PIN 3
BLACK (GC)	5	0	A2A1 GND	A4A1B-J8-PIN 4
20V GND	6	0	A2A1 (GND)	A4A4 GND Lug
20V GND	7	0	*A2A9 (GND)	A4A4 GND LUG.
SHEILDED GROUND	9	0	A2A1 (GND)	Chassis GND

MUTE RELAY A4A4		
DESIGNATION	COLOR	TO
1	9	A4A1B J1-15
4	96	A2A1, *A2A9. (+20V)
6	29	A1A4 (+20V SECTION)
8	20	A1A3 (+20V POST)
GND LUG	0	A2A1 GND, A1A4 (20V GND) A1A3 20V GND, *A2A9 (GND)

*OPTION 11 ONLY

FROM: IF MODULE A2A1		
DESIGNATION	COLOR	TO
+20 VOLTS	96	A4A4 TERM. #4
+20 VOLTS	2	A4A1B-J8 PIN #2
GROUND	0	A4A4 (GND Lug)
GAIN CONTROL	9	A4A1B-J8 PIN #3
GROUND	0	A4A1B J8 PIN #4 & Cable Shield

FROM: *AMPLIFIER A2A9		
DESIGNATION	COLOR	TO
+20 VOLTS	96	A4A4 TERM #4
GROUND	0	A4A4 (GND LUG)

*OPTION 11 ONLY

FROM: CRYSTAL OSCILLATOR A3A1		
DESIGNATION	COLOR	TO
+20 VOLTS (OSC)	20	A1A3 (+20V POST)
+20 VOLTS (HTR)		
GROUND	0	A1A3 (20V GND)

FROM: PHASE LOCK SOURCE A3A2		
DESIGNATION	COLOR	TO
+20 VOLTS	29	A1A4 (+20V SECT)
GROUND	0	A1A4 (20V GND)
LOCK TEST POINT	69	I.F. VOLT
EXTERNAL LED-A	93	A4A1B J1-PIN 6
EXTERNAL LED-K	0	A1A4 (20V GND SECT)
+5 VOLTS	5	A1A4 (+5V SECT)

FROM: FREQUENCY SYNTHESIZER A3A4			
DESIGNATION	PIN	COLOR	TO
+20 VOLTS	1	29	A1A4 (+20V SECT)
TEST POINT	2	19	R.F. VOLT
ALARM LED	3	91	A4A1B J1-PIN 4
+5 VOLTS	4	5	A1A4 (+5V SECT)
5 VOLT GROUND	5	05	A1A4 (5V GND)
+20 VOLTS	6	29	A1A4 (+20V SECT)
N/C	7		
+5 VOLTS	8	5	A1A4 (+5V SECT)
20 VOLT GROUND	9	0	A1A4 (20V GND)

GAIN ADJUST POTENTIOMETER			
DESIGNATION	COLOR	FROM	TO
C.W.	2	A4A1B J8 PIN 2	A2A1 (+20V)
C.T.	9	A4A1B J8 PIN 3	A2A1 (G.C)
C.C.W	0	A4A1B J8 PIN 4	A2A1 (GND)

FROM: 9300 SERIES CONTROL BOARD A4A1B			
DESIGNATION	J1 PIN	COLOR	TO
+5V"A" MON. (RF)	1	5	A1A3 (+5V POST)
IF LO LEVEL DET.	2		
RF LO LEVEL DET.	3		
RF LO ALARM	4	91	A3A4 Conn. PIN #3
IF LOA ALARM	6	93	A3A2 (ANODE EXT. LED)
TTL SWITCH CONT.	7		
IF LOB ALARM	8		
GROUND	10	04	A1A3 (5V"B" GND)
MUTE COIL	15	9	A4A4 TERM #1
+20V MONITOR	17	29	A1A3 (+20V POST)
+5V "B"	18	59	A1A3 (+5V"B" POST)
DESIGNATION	J8 PIN	COLOR	TO
+20 VOLTS	2	2	A2A1 (+20V)
GAIN ADJ. VOLTAGE	3	9	A2A1 G.C.
GAIN ADJ. COMMON	4	0	A2A1 GND
DESIGNATION	J9 PIN	COLOR	TO
ATTEN. CONTROL	1		
ATTEN. RETURN	2		

SHEET FOR OPTION: 8, 21 ONLY.

FROM:*****DIGITAL CONTROL ATTENUATOR A4A1B-J9			
DESIGNATION	COLOR	FROM	TO
ATTEN. CONTROL	9	A4A1B J9 PIN 1	A2A1 (G.C)
ATTEN. RETURN	0	A4A1B J9 PIN 2	A2A1 (GND)

FROM: 9300 SERIES CONTROL BOARD A4A1B			
DESIGNATION	J1 PIN	COLOR	TO
+5V"A" MON. (RF)	1	5	A1A3 (+5V POST)
IF LO LEVEL DET.	2	9	**** A3A10 LEVEL DETECTOR TERM.
RF LO LEVEL DET.	3	9	****A3A8 LEVEL DETECTOR TERM.
RF LO ALARM	4	91	A3A4 Conn. PIN #3
IF LOA ALARM	6	93	A3A2 (ANODE EXT. LED)
TTL SWITCH CONT.	7		
IF LOB ALARM	8		
GROUND	10	04	A1A3 (5V"B" GND)
MUTE COIL	15	9	A4A4 TERM #1
+20V MONITOR	17	29	A1A3 (+20V POST)
+5V "B"	18	59	A1A3 (+5V"B" POST)
DESIGNATION	J8 PIN	COLOR	TO
+20 VOLTS	2	2	A2A1 (+20V)
GAIN ADJ. VOLTAGE	3	9	A2A1 G.C.
GAIN ADJ. COMMON	4	0	A2A1 GND
DESIGNATION	***** J9 PIN	COLOR	TO
***** ATTEN. CONTROL	1	9	A2A1 (G.C.)
ATTEN. RETURN	2	0	A2A1 (GND)

*****OPTION 8 ONLY

*****OPTION 21 ONLY

FROM: ****COUPLER A3A8		
DESIGNATION	COLOR	TO
RF-LO LEVEL ALARM TERMINAL	9	A4A1B J1-3

FROM: ****COUPLER A3A10		
DESIGNATION	COLOR	TO
IF-LO LEVEL ALARM TERMINAL	9	A4A1B J1-2

**** OPTION 8 ONLY

FROM: ***AUTOMATIC REFERENCE SWITCH A3A13		
DESIGNATION	COLOR	TO
+20 VOLTS	29	A1A4 (+20V SECT)
GROUND	0	A1A4 (20V GND SECT)

***OPTION 23D ONLY.

OPTION 23C

FROM: **INT/EXT. REFERENCE SW. A4A5		
DESIGNATION	COLOR	TO
1	29	**A3A12 (+)
2	29	A1A4 (+20V SECT)
3		
4	0	**A3A12 (-)
5	0	A1A4 (20V GND SECT)
6		

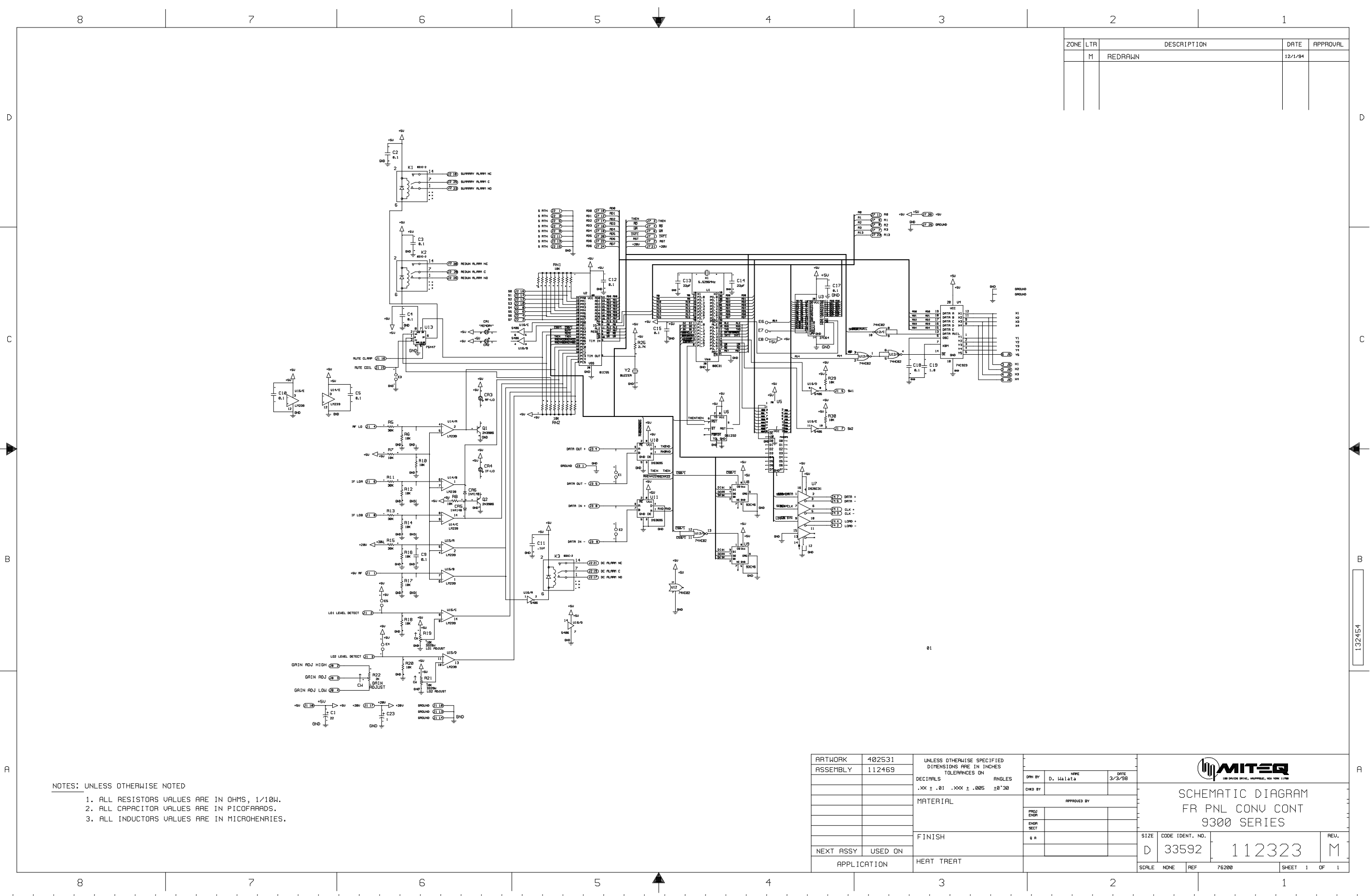
FROM: **COAXIAL SWITCH A3A12		
DESIGNATION	COLOR	TO
+	29	A4A5 TERMINAL #1
-	0	A4A5 TERMINAL #4

SW
FOR REFERENCE ONLY

■ 1	4 ■
■ 2	5 ■
■ 3	6 ■

REAR VIEW

**OPTION 23C ONLY



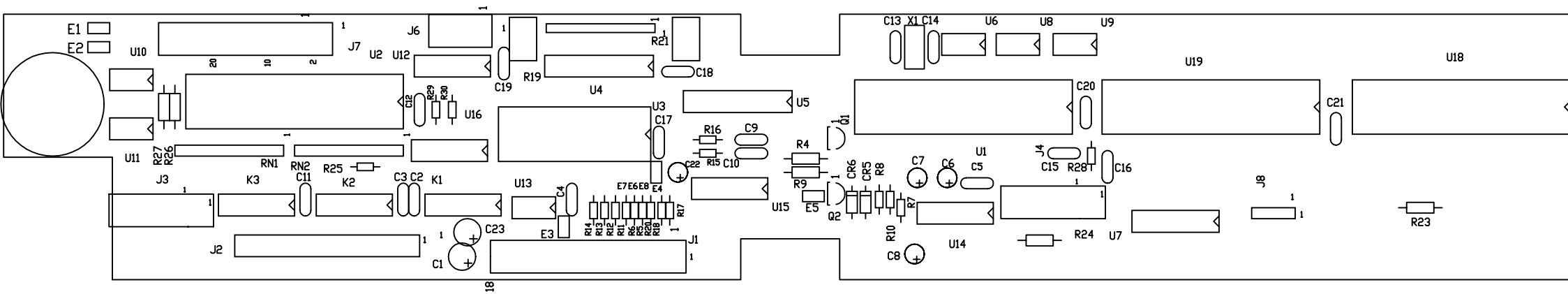
- NOTES: UNLESS OTHERWISE NOTED
1. ALL RESISTORS VALUES ARE IN OHMS, 1/10W.
 2. ALL CAPACITOR VALUES ARE IN PICOFARADS.
 3. ALL INDUCTORS VALUES ARE IN MICROHENRIES.

ARTWORK	402531	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON		DATE 3/2/98		NAME D. Walata		APPROVED BY		REV. M	
ASSEMBLY	112469										
		DECIMALS	ANGLES								
		.XX ± .01	.XXX ± .005	±9°30							
		MATERIAL									
		FINISH									
NEXT ASSY	USED ON	HEAT TREAT									
APPLICATION											
SIZE	CODE IDENT. NO.	SHEET 1 OF 1		REV.							
D	33592	112323									
SCALE	NONE	REF	76200	SHEET 1 OF 1							



SCHEMATIC DIAGRAM
FR PNL CONV CONT
9300 SERIES

- J MOVE RY3 AND J4 .05 ON X
ADDED CONNECTION U6 PIN6 -U10 PIN3
INCREASED ALL PAD SIZE
K REV:ARTWORK U18-20 W/GND.
CLEAR +5V FROM INT LYR, REVISED SILKSCREEN
ON WIRING SIDE, INCR MTG PAD.
L ADDED J7 PIN 3
M SHT 3: REVISED HOLE COUNT NEAR POT



SCHEMATIC	112323
ARTWORK	402531

D. LoCicero

4-10-90

ASSY/DRILLING
FRONT PANEL
CONTROLLER

112469

ORIGINAL**POWER SUPPLY DATA SHEET**DWG # 5666111/R

DEC 04 1986

WORK ORDER _____ MODEL FS05-113 QUANTITY _____ DATE _____CUSTOMER MITEQ TESTED BY: _____ Q.C. _____

PARAMETER	TEST RESULTS	ACCEPTANCE LIMITS	TEST RESULTS	ACCEPTANCE LIMITS	TEST RESULTS	ACCEPTANCE LIMITS	TEST RESULTS	ACCEPTANCE LIMITS
LINE REG. 110 - 132 VAC		$\leq 20\text{mV}$		$\leq 5\text{mV}$		$\leq 5\text{mV}$		
0-100% LOAD REG. AT 110VAC		$\leq 20\text{mV}$		$\leq 5\text{mV}$		$\leq 5\text{mV}$		
CURRENT LIMIT AT 132VAC		.4 TO 4.6 AMPS		.4 TO 4.6 AMPS		2 TO 2.5 AMPS		
SHORT CIRCUIT CURRENT AT 132VAC		0.5 TO 1.3 AMPS		0.5 TO 1.3 AMPS		0.25 TO 0.75 AMP		
RIPPLE CONTENT P/P		$\leq 5\text{mV}$		$\leq 5\text{mV}$		$\leq 5\text{mV}$		
OVP TRIP POINT		22.5 TO 25.5 VDC		5.7 TO 6.7 VDC		5.7 TO 6.7 VDC		
DROP OUT VAC		$\leq 108\text{VAC}$ $+20.03 \pm .03\text{VDC}$		$\leq 108\text{VAC}$		$\leq 108\text{VAC}$		
OUTPUT AT 115VAC FULL LOAD	_____ V @ 3.3 AMPS	$+20 \pm .05\text{VDC}$ @ 3.3 AMPS	_____ V @ 3.3 AMPS	$+5.025 \pm .025\text{VDC}$ @ 3.3 AMPS	_____ V @ 1.5 AMPS	$+5.025 \pm .025\text{VDC}$ @ 1.5 AMPS		

NOTE:

1.) TEST PER PSTS-01.

REVISIONS

ECO	LTR	DESCRIPTION	DATE	APPROVED
—	N/R	RELEASED TO PROD	12-7-86	

APPROVALS

DATE

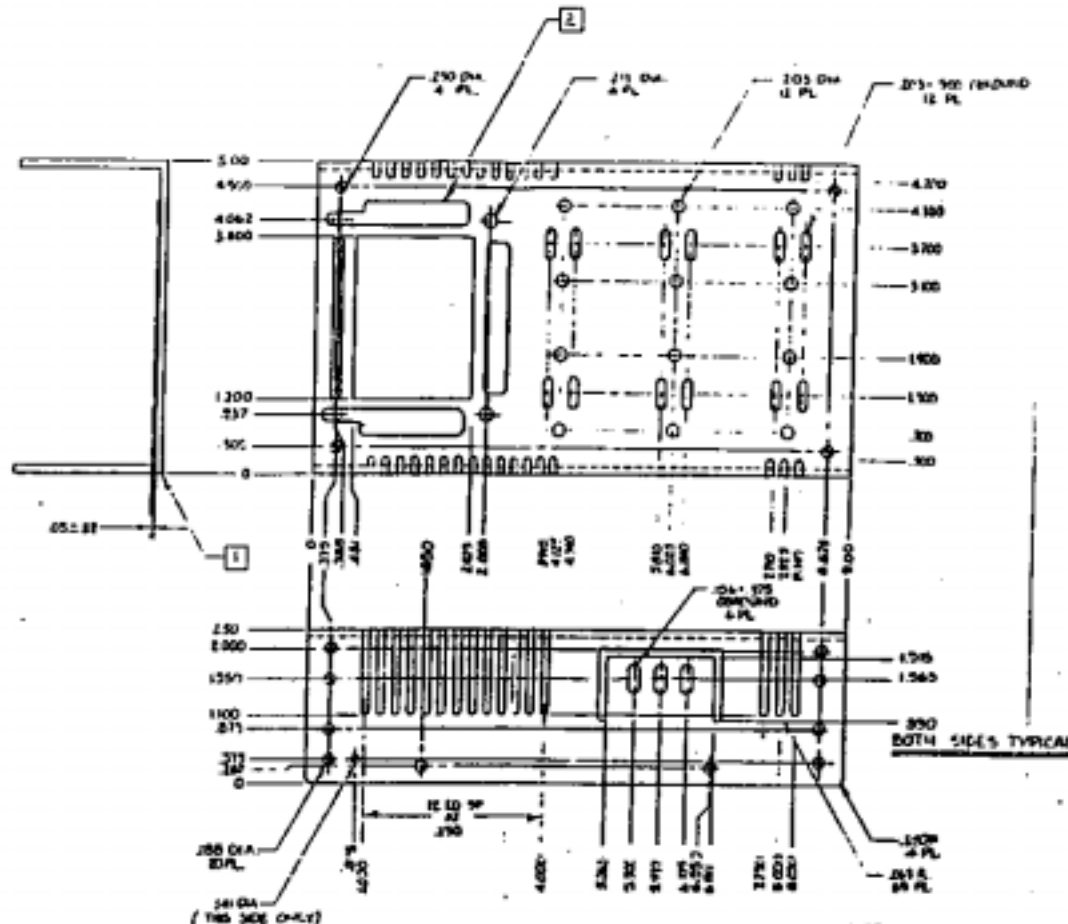
DRAWN: <u>ADAM K. GILCHRIST</u>	6-8-86
CHECKED: <u>ADAM K. GILCHRIST</u>	12-3-86
APPVD: <u>ADAM K. GILCHRIST</u>	12-3-86

 **Power-One**
D.C. POWER SUPPLIES

SHEET 1 OF 1

ORIGINAL

LC 11 1985



BOTH SIDES TYPICAL

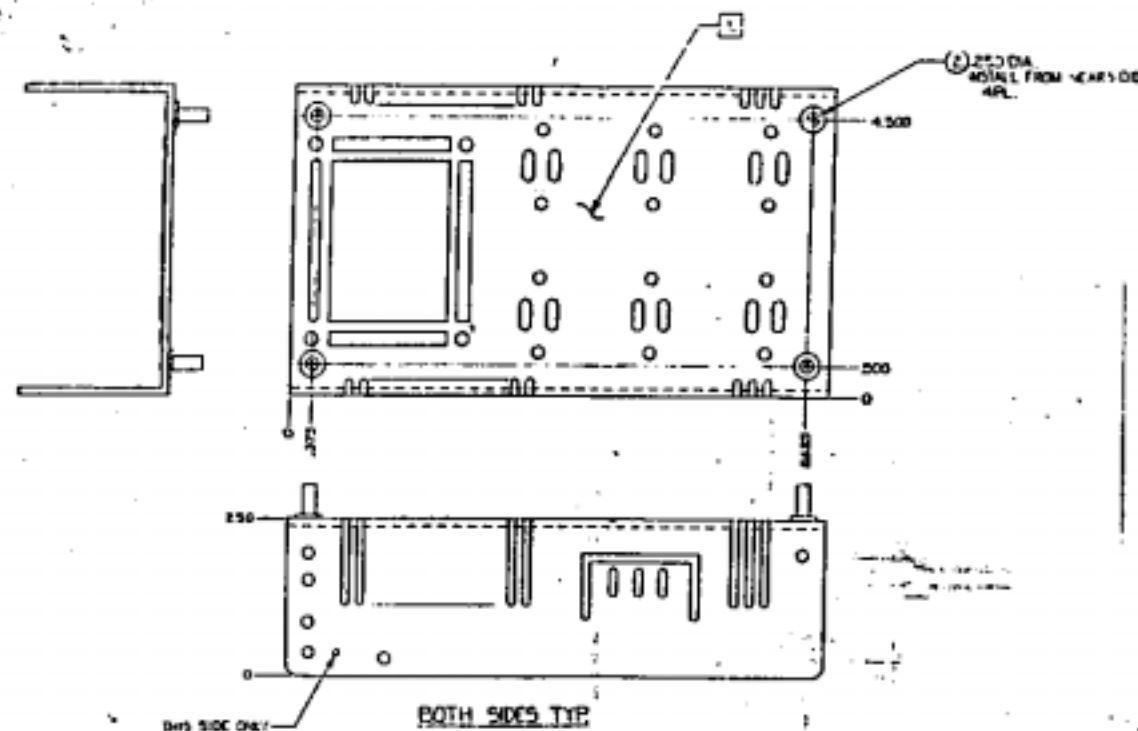
2 USE RIDGE DIE TO FORM (LOCATE FROM XPMR MFG HOLES)

LEADER 1		QZ-100-MM ALMA ALLDY		4:00 - 10:30	
DATE		TIME OF DAY		PAGE NO.	
REMARKS: 20-20 JULY 68		PARTIAL		TYPE WEP-ONE	
CLEAR ANNOUCE		CHASSIS			
DO NOT SCALE OR PNEC		D 544/27		53670'	

REV	DATE	BY	CHKD	APPD
1	1100-1014			
2	1100-1014			
3	1100-1014			
4	1100-1014			

ORIGINAL

NOV 04 1985



4	2	X3507	STANDOFF, 832 x V2	504-21724
1	1	1100-1014	CHASSIS, FROG	411-55610
REV	DATE	BY	CHKD	APPD
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100	1100-1014			

2. SUBTRACTOR FOR THE SUBTRACTOR AND SUBTRACTOR

(1) SHAKESCREEN BEARING ATTACH WERE USED

1.000-1014-1014

3

7

6

5

6

3

2

1

ORIGINAL

DEC 04 1986

TO BE SILKSCREENED IN BLACK INK

CONTRACT NO.		power-one A.C. POWER SUPPLIES	
APPROVALS		DATE	
DESIGNED BY: <i>[Signature]</i>		6-19-86	
CHECKED BY: <i>[Signature]</i>		11-3-86	
ISSUED BY: <i>[Signature]</i>		11-3-86	
CHASSIS SILKSCREEN		MODEL NO. FS05-113	
SIZE NO. OF PCS. 1		DWG. NO. A56662	
REV. N/R		REV. N/R	
SCALE 1:1		SHEET 1 of 1	
REVISIONS			
ECO	LTR	DESCRIPTION	DATE
---	N/R	RELEASED TO PRODUCTION	3/11/87
APPROVED		DATE	
[Signature]		3/11/87	

power-one A.C. POWER SUPPLIES FS05-113

OUTPUT: +20VDC AT 3.3AMPS W/OVP
 A + 5VDC AT 3.3AMPS W/OVP
 B + 5VDC AT 1.5AMPS W/OVP

Q3

AC INPUT		47-63Hz			
FOR USE AT	100	120	220	230/240	
JUMPER	1A3/1A3	2A3	2A3	2A3	
APPLY AC	1A3/1A3	1A3	1A3	1A3	
MAX CURRENT/ FUSE RATING	2 AMPS/ 250V	1 AMP/ 250V	1 AMP/ 250V	1 AMP/ 250V	

Q2



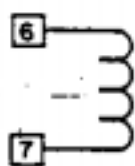
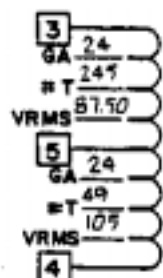
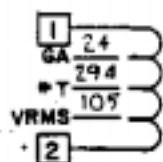
EXTERNAL FUSE REQUIRED
 EXT

MADE IN USA

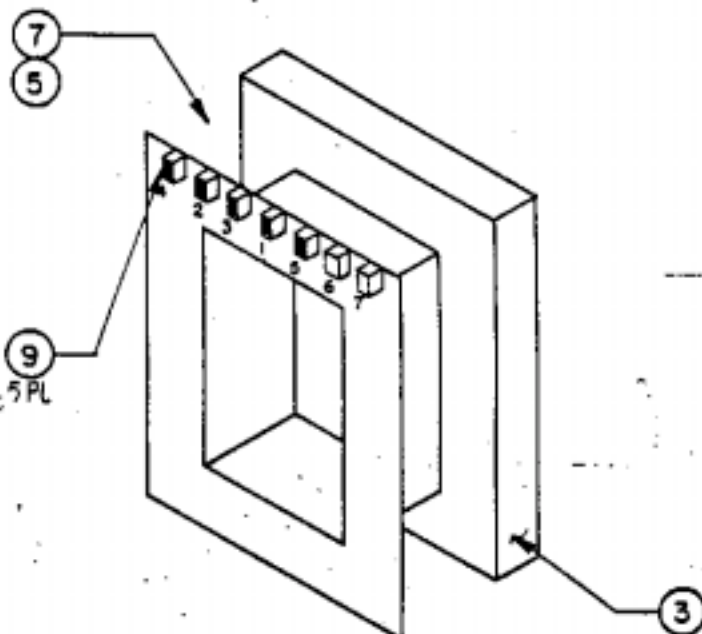
ORIGINAL

MAY 01 1986

WINDING NUMBER	1	2	3	4	REVISIONS			
WIRE-GAUGE, TYPE	24 NLZ	24 NLZ			LTR	DESCRIPTIONS	DATE	APPD
PART NUMBER	260-0141	260-10141			A	RELEASE TO PROD.	3/14/82	AT
TOTAL TURNS	294	294			B	INC. ECO 866B	4/11/83	AT
TAP	-	49						
LEAD NUMBERS	1-2	3-5-4						
INT. BOBBIN WIDTH	.651	.651						



SCHEMATIC



10			
9	5 EA.	TERMINALS	250-50417
8			
7	.75 FT.	TAPE	240-20967
6			
5	.5809 LBS.	WIRE # 24 NLZ	260-10141
4			
3	1 EA.	BOBBIN, EI 125 x 1.60	200-50477
2			
1			

ITEM	QUANTITY	DESCRIPTION	STD. PART NO.
------	----------	-------------	---------------

INPUT: 100/120/220/240 VAC $\pm 10\%$ $\pm 13\%$
47-63 HZ

POWER-ONE
A.C. POWER SUPPLIES

(805) 484-2806
740 CALLE PLANO
CAMARILLO, CA. 93010

TITLE

TRANSFORMER
PRIMARY - SUB ASSEMBLY

NOTES:

	APPROVALS	DATE	SIZE	IDENT. NO.	DWG. NO.	REV
CP323	DRAWN <i>Don Vanden</i>	5/15/81				
HN24/28	CHECKED <i>7/12/81</i>	8/26/81				
HN12/15	ENG. APPD. <i>Don Vanden</i>	9/21/81				
HN7	APPROVED		B	54407	50633	B

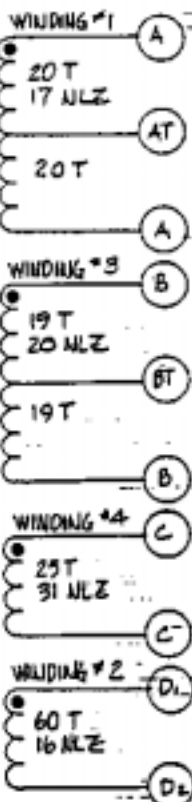
USED ON

MFG. APPD. *7/1/81* SCALE

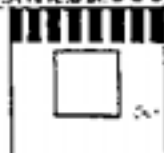
SHEET 1 OF 1

FILL FACTOR : 87 %

R	ECO	DESCRIPTION	DATE	APPR
NR		RELEASED TO PRODUCTION	7-7-78	JHM



DATA B B C C D2



6 Q.R. NOT SHOWN ON THE LABEL. LEADS TO BE TERMINATED AS SHOWN.

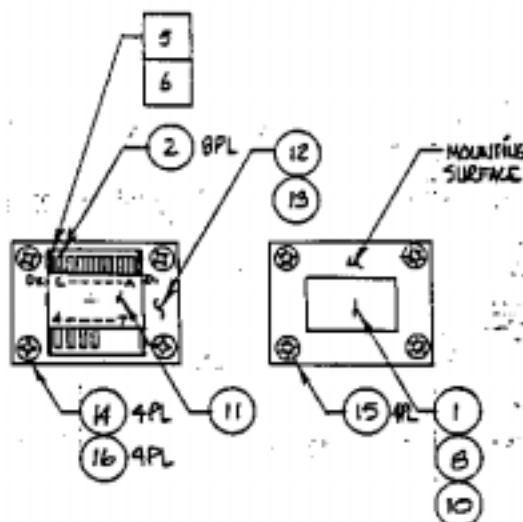
5 D1, D2 TO BE CURLED SELF-LEADS.

- 4. VARNISH PER PSO1001.
- 3. MARK PER PSO1002.
- 2. TAPE PER PSO1004.
- 1. MANUFACTURE PER POWER-ONE WORKMANSHIP STD. 53857.

NOTES:

17	.0798 LBS	WIRE, 20 NLZ	260-1013
16	4	WASHER	391-1020
15	4	NUT, PRESS	340-1029
14	4	SCREW, 8-32 x 2/8"	353-2129
13	.076 LBS.	LAMINATION KEEPER	280-1017
12	4.00 LBS.	LAMINATION, M19, 24GA	231-1016
11	1	LABEL PLATE	274-506
10	1	HOUSING	200-504
9	1	SECONDARY COIL	092-766
8	1	PRIMARY COIL	091-506
7	.0043 LBS.	WIRE, 31 NLZ	260-1014
6	.1676 LBS	WIRE, 17 NLZ	260-1013
5	.3176 LBS.	WIRE, 16 NLZ	260-1013
4	—	TAPE .043" LEAD-OUT	240-207
3	—	TAPE .095"	240-207
2	8	TERMINAL SECONDARY	250-504
1	1	BOBBIN, EI 125 X 1.6	200-504
		SECONDARY COIL	092-766

APPLY 105 VAC AT TERMINALS 1;2



DEC 04 1986

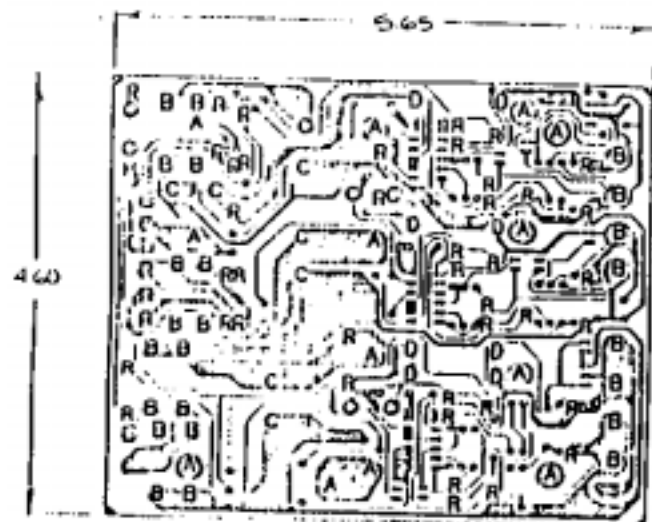
HY POT		VOLTAGE RATIO TEST-PRIMARY TERMS				ITEM	QTY	DESCRIPTION	P/N
TERMS	VOLTS	TERM	VOLT	TERM	VOLT	TERMS	VOLT	APPROVALS	DATE
PRI-PRI	500 VAC	3-5	87.50	C-C	8.92			Ray Redman	8-18-78
PRI-SEC	3750 VAC	3-4	105	D1-D2	21.42				7-2-78
PRI-GND	3750 VAC	A-AT	7.14						12-2-78
SEC-GND	1500 VAC	A-A	14.28						12-2-78
		E-BT	6.78						
		3-8	13.57						

USED ON: ES05-113
 TITLE: TRANSFORMER
 DWS NO. 56663
 SCALE: — SHEET 1 OF 1

CONFIDENTIAL

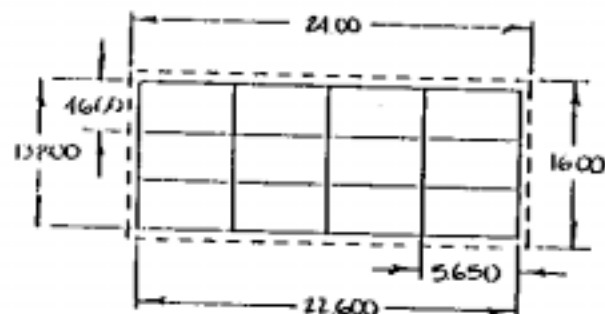
DEC 04 1986

REVISIONS				
ECO	REV	DESCRIPTION	DATE	APPROVED
1	1	RELEASE TO PRODUCTION		



HOLE LEGEND	
IDENT.	QTY.
A	13
B	24
C	11
D	8
E	5
H	1/0
R	45
J	---
K	---
L	---
M	---

FOR HOLE DIA.
REFER TO DWG. 16328



3 MANUFACTURE PER M-I SPECIFICATION (P50100).

[2] ALL IN-MARKED HOLES TO BE "H" HOLES.

1. FOR PWB HARDWARE, SEE APPROPRIATE
PWB. 1-112.

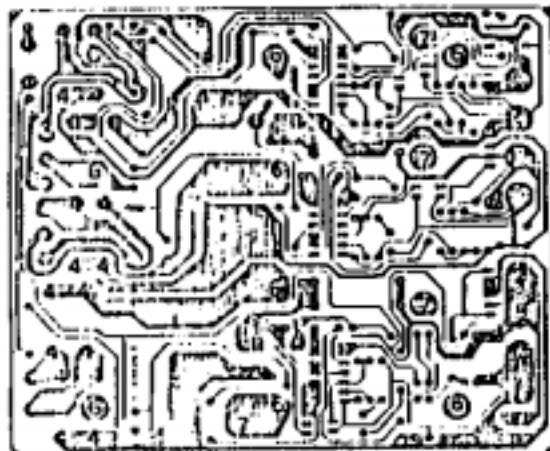
NOTES: UNLESS OTHERWISE SPECIFIED

.0033		1	C63 BLK EPOXY GASK, 1/10 OZ TR 1		509-21674
QTY	REQD	ITEM	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	PURCHASING SHEET (1/10)
PARTS LIST					
TOLERANCE .01 - .010 XXX - .010			APPROVALS	DATE	POWER-ONE CANAMKLO, CALIF. 93018 (805) 941-8808
DRAWN			DATE	DATE	
CHECKED			DATE	DATE	
APPROVED			DATE	DATE	
MATERIAL			TITLE		
SEE ITEM 1			PWB. DRILL 1		
FINISH			This drawing and specifications, herein, are the property of POWER ONE INC. and shall not be reproduced or copied or used in whole or in part as the basis for the manufacture or sale of items		
NEXT ASST	E509-113		USED ON		
SHEET		CODE	54407	DRAWING NO.	56664
					NIR

ORIGINAL

DEC 04 1986

REVISIONS		DESCRIPTION	DATE	APPROVED
ECO	118	RELEASE TO 17/1/18/1		



IDENT	QTY	POWER-ONE P/N	DESCRIPTION	INSTALLATION
1	8	502-10227	EYELET 0.010D x .155L	FARSIDE
2	8	503-10998	TERM DUAL TUR MACH	FARSIDE
3	—	503-13596	TERM SGL TUR ROLLED NO O.D x .204 LONG	FARSIDE
4	16	503-10224	TERM DUAL TURRET .180 O.D x .320 LONG	FARSIDE
5	—	503-10222	TERMINAL NO FASTON	FARSIDE
6	9	504-10223	STANDOFF, THRU 3/16 L	NEAR SIDE
7	4	504-10223	STANDOFF, THRU 3/16 L	FARSIDE
8	—	504-20119	SPACER, 6 CLEAR x .188	FARSIDE
9	—	502-20602	CAP EYELETS	NEAR SIDE
10	—	312-10226	FUSE CLIP	FARSIDE
11	6	901-21242	CAGE JACK	NEAR SIDE
12	—	504-21317	STANDOFF, CAP	FARSIDE
13	—	901-21322	CAGE JACK (DIODE, SCR)	NEAR SIDE
14				
15				

1		1		FIBER		506 56664	
QTY	REQD	ITEM	PART OR IDENTIFYING NO.	DRAWING TITLE OR DESCRIPTION		PART NUMBER	
				518 PART 180			
PARTS LIST							
TOLERANCE .XX + .000 .XXX + .010		APPROVALS		DATE		POWER-ONE	
DRAWN		CHECKED		11/12/86		CAMARON, CALW 8301	
MATERIAL		ENG APP'D		11/12/86		(800) 444-3400	
FINISH		APPROVED		11/12/86			
		MFG APP'D		11/12/86			
		This drawing and specifications, herein, are the property of POWER-ONE INC. and shall not be reproduced or copied or used in whole or in part as the basis for the manufacture or sale of items without written permission.					
FS05-113		SIZE		ENCL IDENT NO		DRAWING NO.	
NEXT ASST		C		54407		56665	
USED ON						N1	
APPLICATION		DO NOT SCALE DRAWING		SHEET 1		SHEET 1 OF 1	

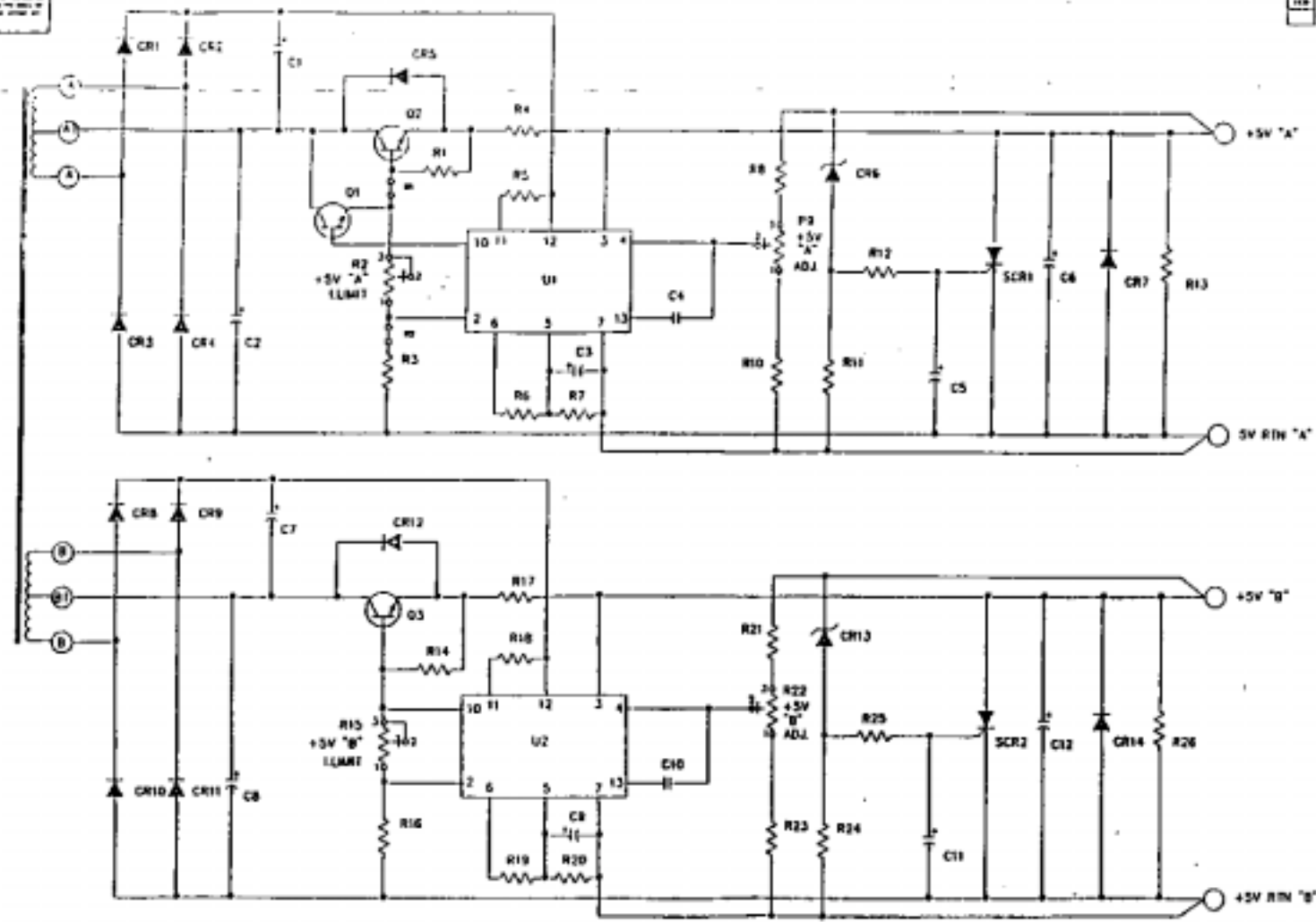
NOTES: UNLESS OTHERWISE SPECIFIED

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REV	DATE	DESCRIPTION	BY	APP
1	11/17/66	SCHEMATIC		

ORIGINAL

DEC 04 1966



1 FOR PARTS LIST SEE P. 156666 - 11
 1 FOR PARTS LIST SEE P. 156666 - 11

NOTES: UNLESS OTHERWISE SPECIFIED

LAST REFERENCE DESIGNATION USED			
Q1	Q2	Q3	Q4
Q1	Q2	Q3	Q4
REF. DESIGNATION NOT USED			

ITEM	QTY	UNIT	DESCRIPTION
1	1	PCB	PCB 156666-11
2	1	PCB	PCB 156666-11
3	1	PCB	PCB 156666-11
4	1	PCB	PCB 156666-11

DESIGNATION		POWER-ONE	
PART NO.		54407	
REV.		1	
DATE		11/17/66	
BY		56666	
CHECKED		56666	
APPROVED		56666	
TITLE		SCHEMATIC	



Power-One
Schematic
54407
56666
DO NOT SCALE (Drawing)

power-one
D.C. POWER SUPPLIES

SHEET | **OF 4**

REV.
A

USED ON: FS05-113

APPROVALS

DATE _____

DATE _____

DRAWN: Geo-T. Gromley 8-11-86 ENG. APPD. Math. M. Jones 12-3-86

CHECKED: <i>[Signature]</i>	17-3-81	APPROVED:
-----------------------------	---------	-----------

NOTE:

1. FOR SCHEMATIC, SEE DWG.#56666.

ORIGINAL

MAR 12 1987

REVISIONS

[illegible]

PARTS LIST

 **power-one**
D.C. POWER SUPPLIES

DWG. NO. PL. 56666-101

SHEET 2 OF 4

REV.
SEE
SHT. 1

ITEM NO.	NOTE	QTY REQD	POWER ONE STD PART NO.	DESCRIPTION.	VENDOR NO.	REF. DES.
1		1	505-56665	PRINTED WIRING BOARD	BD*56664	A1
2						
3		3	154-20020	POTENTIOMETER, 2K		R9,22,37
4		3	154-20937	POTENTIOMETER, 500 Ω		R2,15,32
5						
6		1	158-10077	RESISTOR, .12 Ω , 2W, 5%, M.O.		R4
7		3	158-10081	.39 Ω , 2W, M.O.		R17,28,30
8		3	150-20307	6.8 Ω , 1/4W, C.F.		R12,25,39
9		4	-20327	47 Ω		R5,11,18,24
10		3	-20343	220 Ω		R13,26,34
11		2	-20356	750 Ω		R8,21
12		4	-20364	1.6K		R1,3,14,16
13		4	-20368	24K		R29,31,38,40
14		6	-20372	3.6K		R6,7,10,19,20,23
15		4	150-20375	RESISTOR 4.7K, 1/4W, 5%, C.F.		R33,36,41,42
16						
17		0	—	RESISTOR —		R35
18		1	151-10370	RESISTOR, 1.6K, 1/2W, 5%, C.F.		R27

MAR 12 1987

PARTS LIST



DWG. NO. PL. 56666-101

SHEET 3 OF 4

REV.
SEE
SHT. 1

ITEM NO.	NOTE	QTY REQD	POWER ONE STD PART NO.	DESCRIPTION.	VENDOR NO.	REF. DES.
19		3	130-10287	I.C. VOLTAGE REGULATOR	μA723	U1,2,3
20						
21		REF.	171-10262	TRANSISTOR, NPN, TO-3	2N3055	Q2,3,5
22		1	172-10247	TRANSISTOR, NPN, TO-92	2N2219	Q1
23		1	172-20771	TRANSISTOR, NPN, TO-220	TIP29A	Q4
24						
25		3	160-10258	SCR, 3A, 30V	S0303LS3	SCR 1,2,3
26						
27		1	120-20954	FUSE, PICO, 1A, 125V		F1
28						
29		11	111-10251	DIODE, 1A, 200V	1N4003	CR 1,2,5,7,8,9,12, 14,15,20,25
30		2	4-10252	4 3A, 100V	1N5401	CR 10,11
31		6	4-10256	6A, 50V	MR750	CR 3,4,16,17,18,19
32		2	111-20058	0.2A, 100V	1N4448	CR 21,22
33		2	112-10006	ZENER, 5.6V	1N752A	CR 6,13
34		1	112-10285	DIODE ZENER, 24V	1N970B	CR 24
35		0	—	DIODE ZENER MAR 12 1987	—	CR 23
36						

PARTS LIST

power-one
D.C. POWER SUPPLIES

DWG. NO. PL.56666-101

SHEET 4 OF 4

REV.
SEE
SHT. 1

ITEM NO.	NOTE	QTY REQD	POWER ONE STD PART NO.	DESCRIPTION.	VENDOR NO.	REF. DES.
37		6	101-10114	CAPACITOR, ELECT., 10uf/25V		C3,5,9,11,15,17
38		1	-20932	4700uf/16V		C8
39		1	-20933	10,000uf/16V		C2
40		1	-21731	7400uf/63V		C14
41		6	101-21987	ELECT, 220uf/35V		C1,6,7,12,13,18
42		2	104-10093	FILM, .001uf/100V		C4,10
43		1	105-10089	CAPACITOR, CERAMIC, 470pf/1K		C16
44						
45		3	321-10679	I.C. SOCKET, 14 PIN		FOR: U1,2,3,1
46		4	352-10218	SCREW 6-32X 5/16"		FOR Q4, SCRI, 2,3
47						
48		1	261-20002	JUMPER, .250", 22 AWG, TEFL		W1
49		1	261-20555	JUMPER, 1.00", 22 AWG, TEFL		W2
50		1	916-55490	WIRE UL1429 16GA, WHITE, 3 1/2"		D(1)
51		1	916-21033	WIRE UL1429 16GA, WHITE, 5 1/2"		D(2)
52		3	916-54958	WIRE UL1429 16GA, WHITE, 3 1/2"		A, AT, A
53		3	914-21284	WIRE UL1429 20GA, WHITE, 3 1/2"		B, BT, B
54		2	914-21065	WIRE UL1429 20GA, BLACK, 5 1/2"		C, C

DATE IN _____

QTY. _____

DUE DATE _____

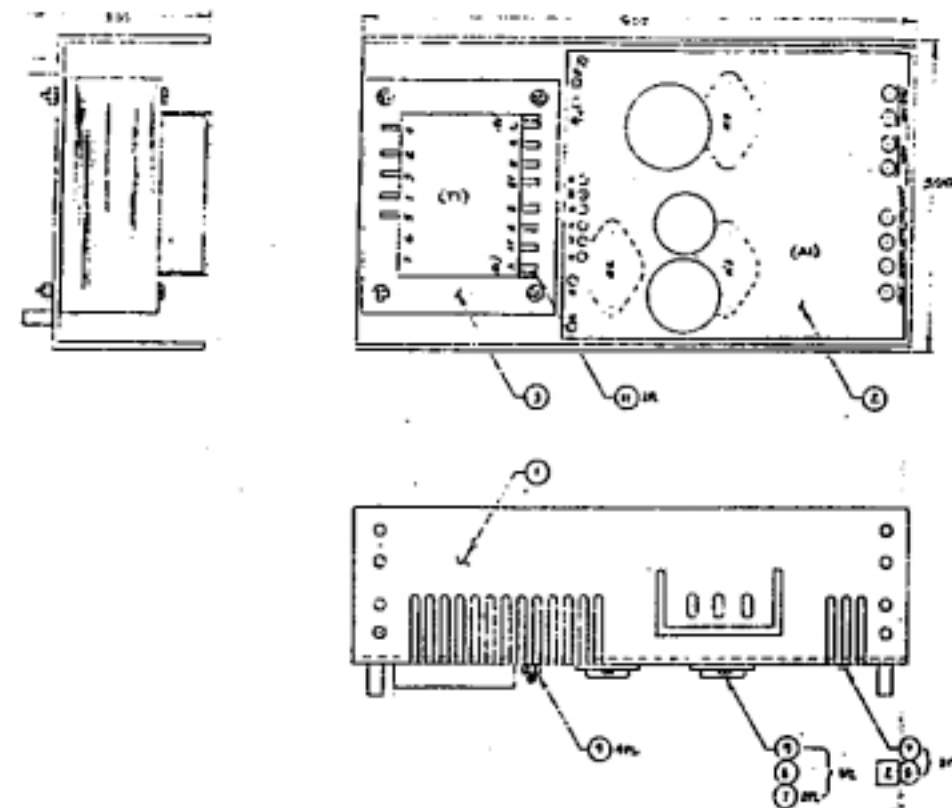
[illegible]

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REVISIONS
REV. 1
REV. 2
REV. 3
REV. 4
REV. 5
REV. 6
REV. 7
REV. 8
REV. 9
REV. 10

ORIGINAL

DEC 04 1966



NOTES: 1. REFER TO DRAWING 54407 FOR DIMENSIONS AND TOLERANCES.
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FOR PARTS LIST, SEE P/L 54407-1

PARTS LIST		REVISIONS		DATE		BY		CHECKED		APPROVED	
1	TRANSFORMER	1	1	1	1	1	1	1	1	1	1
2	CAPACITORS	1	1	1	1	1	1	1	1	1	1
3	DIODE BRIDGE	1	1	1	1	1	1	1	1	1	1
4	FUSE	1	1	1	1	1	1	1	1	1	1
5	TERMINAL BLOCK	1	1	1	1	1	1	1	1	1	1
6	COOLING FAN	1	1	1	1	1	1	1	1	1	1
7	MOUNTING BRACKET	1	1	1	1	1	1	1	1	1	1
8	SCREW	1	1	1	1	1	1	1	1	1	1
9	NUT	1	1	1	1	1	1	1	1	1	1
10	WASHER	1	1	1	1	1	1	1	1	1	1

POWER-ONE		ASSEMBLY, POWER SUPPLY	
DATE	54407	REVISED	54407
BY	1	BY	1
CHECKED	1	CHECKED	1
APPROVED	1	APPROVED	1

PARTS LIST



DWG
NO. PL. 56660-101

SHEET 1 OF 2

REV.
N/R

TITLE: ASSEMBLY, POWER SUPPLY

USED ON: FS05-1.13

APPROVALS

DATE _____

DATE _____

DRAWN: Roy Rodriguez

11-18-86

ENG. APPD.

17-3-86

CHECKED: *[Signature]*

12-386

APPROVED:

NOTE: 1, FOR ASSEMBLY, SEE DWG. #56660.

WIRING TABLE

WIRING TABLE	
FROM	TO
A1 - A	T1 - A
A1 - AT	T1 - AT
A1 - B	T1 - B
A1 - BT	T1 - BT
A1 - C	T1 - C
A1 - D(1)	T1 - D1
A1 - D(2)	T1 - D2

ORIGINAL

DEC 04 1986

REVISIONS

ECO	LET	DESCRIPTION	DATE	APPD
—	H/R	RELEASED TO PRODUCTION	7-9-80	[Signature]

PARTS LIST



DWG. NO. PL. 56660-101

SHEET 2 OF 2

REV.
SEE
SHT. 1

ITEM NO.	NOTE	QTY REQD	POWER ONE STD PART NO.	DESCRIPTION.	VENDOR NO.	REF. DES.
1		1	412 - 56662	CHASSIS W/SILKSCREEN	59670/55938	
2		1	081 - 56666-101	P.W.B. ASSEMBLY	BD# 56664	A1
3		1	082 - 56663	TRANSFORMER		T1
4		3	171 - 10262	TRANSISTOR, NPN, TO-3	2N3055	Q2,3,5
5		3	320 - 10288	INSULATOR, MICA, TO-3		
6		3	320 - 10290	INSULATOR, MCNABB, TO-3		
7		9	350 - 10206	SCREW, B.H., 6-32 X 7/16"		
8		3	391 - 20185	SHOULDER WASHER		
9		4	340 - 10603	NUT, KEP, # 8		
10						
11		125FT	360 - 22203	SLEEVING, 3/8" DIA, CUT 3/4" LONG, 2 PL		FOR: D1, D2
12						
13						
14						
15						
16						
17						
18						

DEC 9 1960