OPERATION AND MAINTENANCE MANUAL FOR UPCONVERTER MODEL

U-9696-3

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FOR UPCONVERTER MODEL

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The following options have been supplied with the converter:

_____ Option 2A: RF Signal Monitor Output.
_____ Option 4: 140 ±40 MHz IF Frequency.
_____ Option 5A: Group Delay Equalization, 70 ±20 MHz.
_____ Option 5B: Group Delay Equalization, 140 ±40 MHz.
_____ Option 10A: High Stability Frequency Reference.
_____ Option 10B: High Stability Frequency Reference.
_____ Option 10C: High Stability Frequency Reference.
_____ Option 15: 50 Ohm IF Impedance.
_____ Option 17A: RS422 Remote Interface.
_____ Option 17B: RS485 Remote Interface (Standard).
_____ Option 17C: RS232 Remote Interface.
_____ Option 17D: Contact Closure Remote Interface.
_____ Option 17F: IEEE-488 Interface.
_____ Option 17G: Remote Control with BCD Contact Closure
_____ Option 23D: Automatic Internal/External 5 MHz Reference Selection.
_____ Option 23F: Automatic Internal/External 5 MHz Reference Selection, Reference Output.

The MITEQ reference number is:_____

DU96963D
130514C/131228B
Rev. D

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SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION

1.1.1 PHYSICAL

The physical configuration of the 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 1.75" 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:

- On/Off Power Switch (A1A2)
- Setup Store Key
- Setup Recall Key
- LCD Display
- Function Select Key
- Data Entry Keypad
- Remote Mode Select Key
- Alarm LED/Alarm Display Key
- Voltage Monitor/Format Function Key

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

- IF Input Connector (J1)
- IF Signal Monitor Output (J1A)
- RF Output Connector (J2)
- RF Signal Monitor Output (Option 2A only)
- Summary Alarm Connector (J3)
- Remote Interface Connector (J6)
- Redundancy Switch Connector (J7)
- Remote Interface Connector (J10) (Options 17A, 17B only)
- Reference Frequency Adjust
- AC Voltage Input/Fuse
- Ground Lug
- External Reference Input Connector (J5), (Option 23D only)
- Reference Output Connector (J11), (Option 23F only)

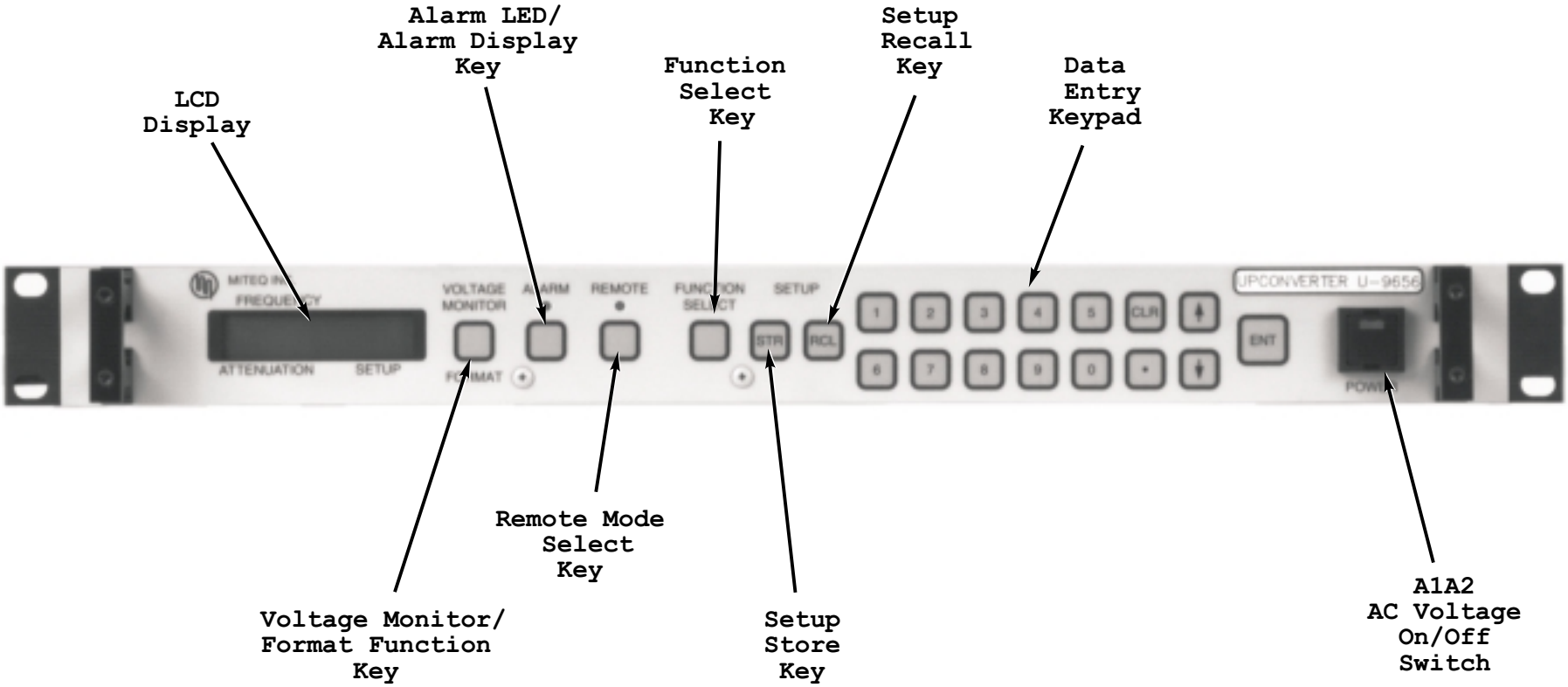


Figure 1-1. Front View, 9600 Series Converter

#6694

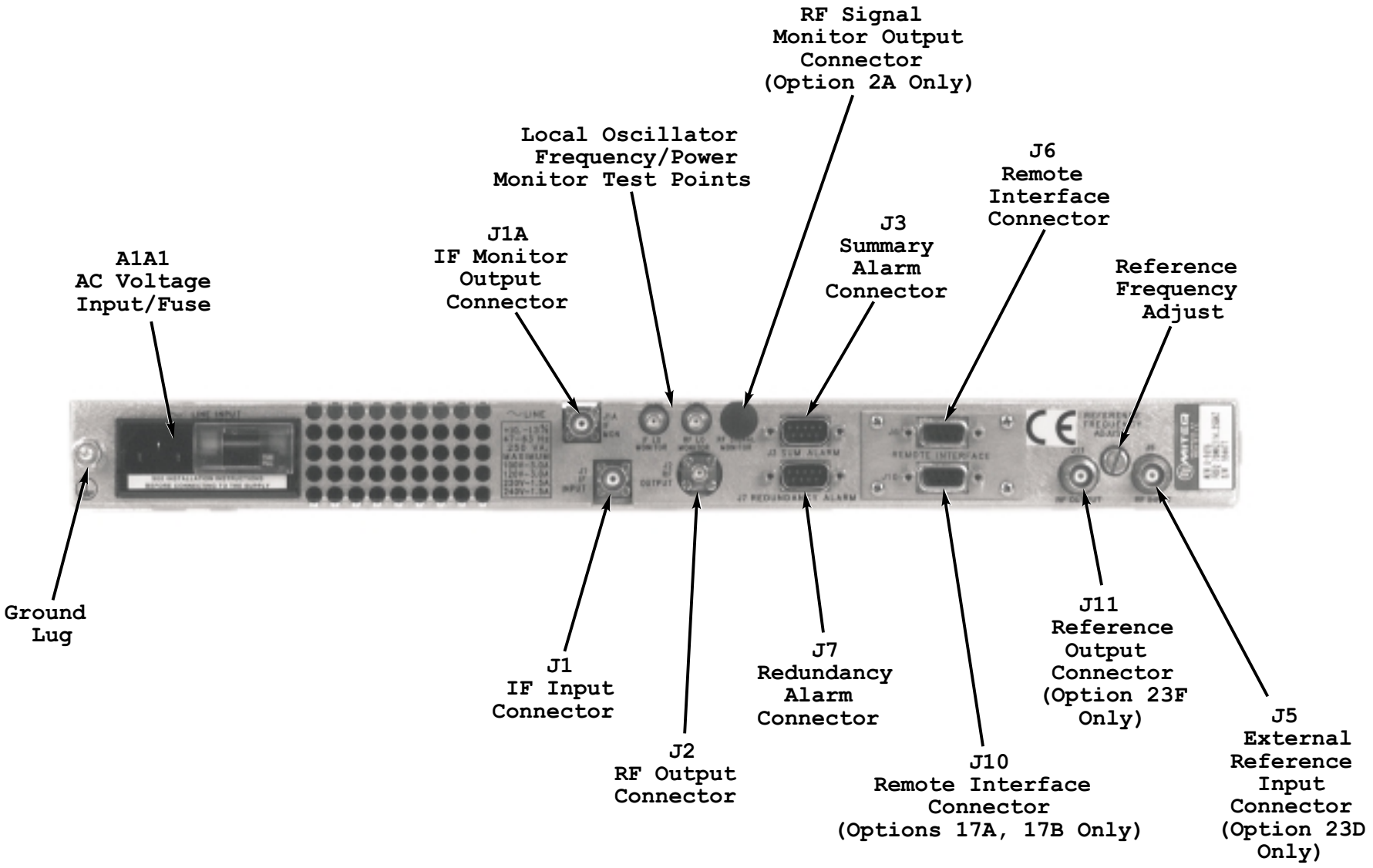


Figure 1-2. Rear View, 9600 Series Upconverter

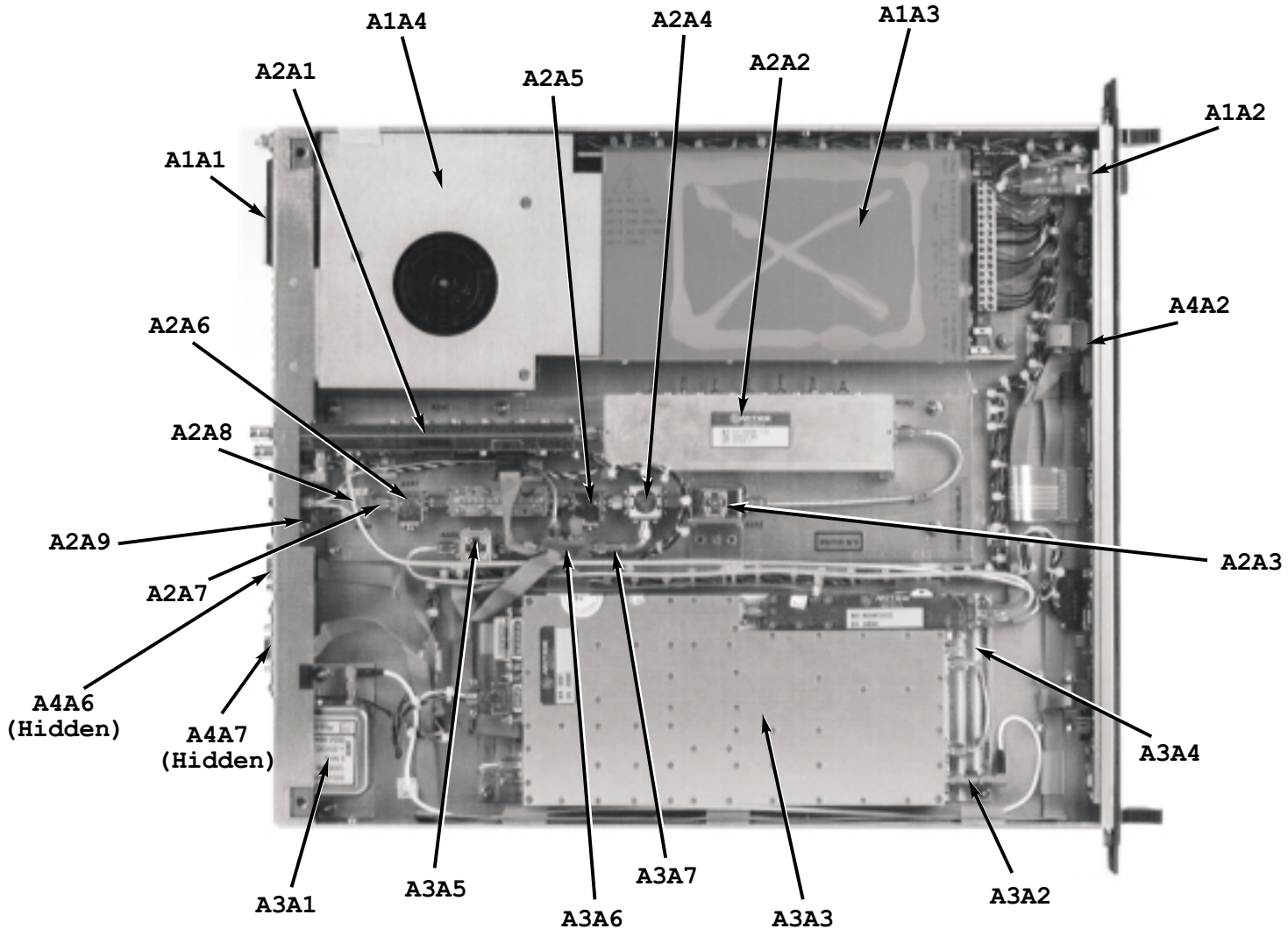


Figure 1-3. Interior View, U-9696-3 Upconverter

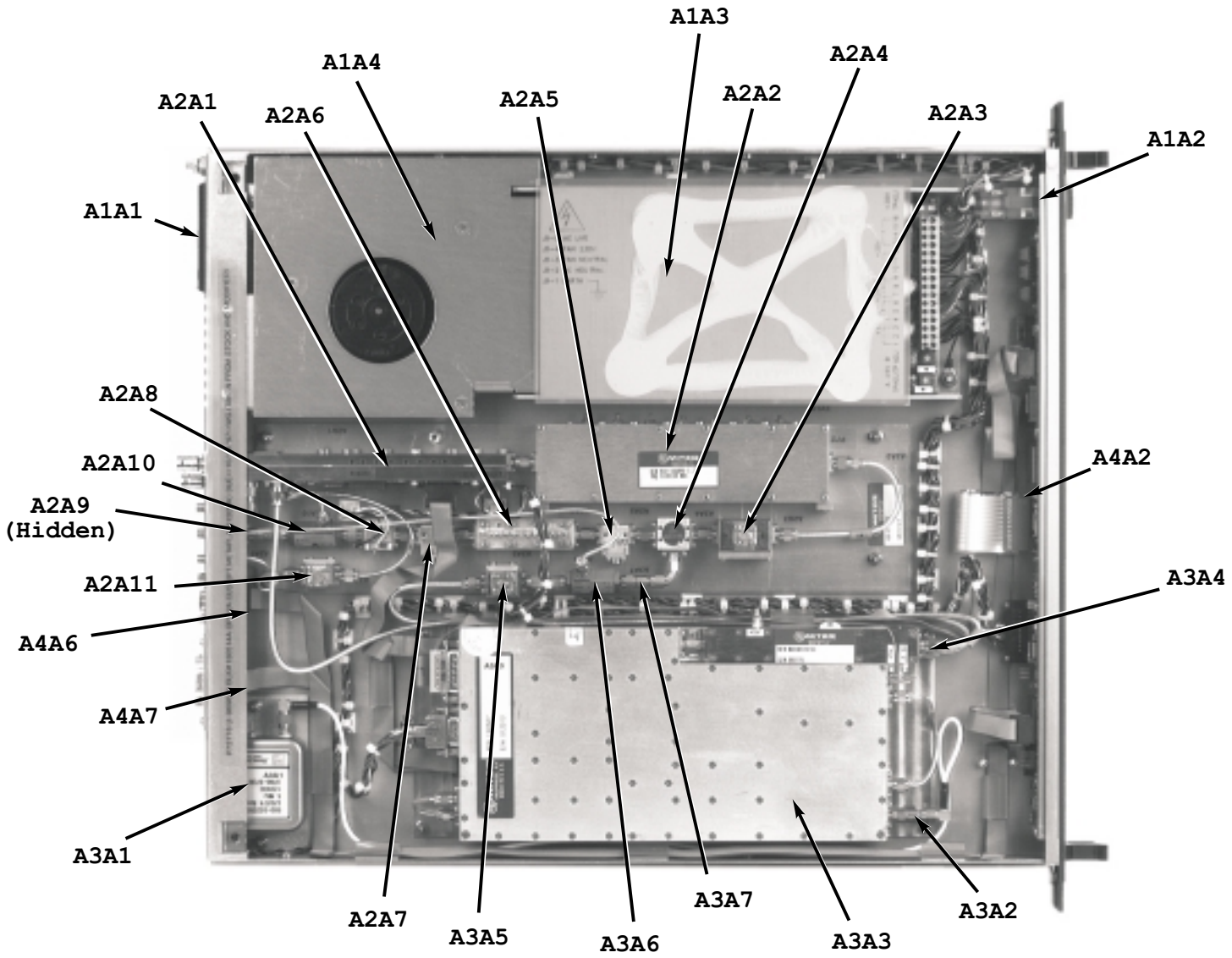


Figure 1-4. Interior View, U-9696-3 Upconverter (Option 2A)

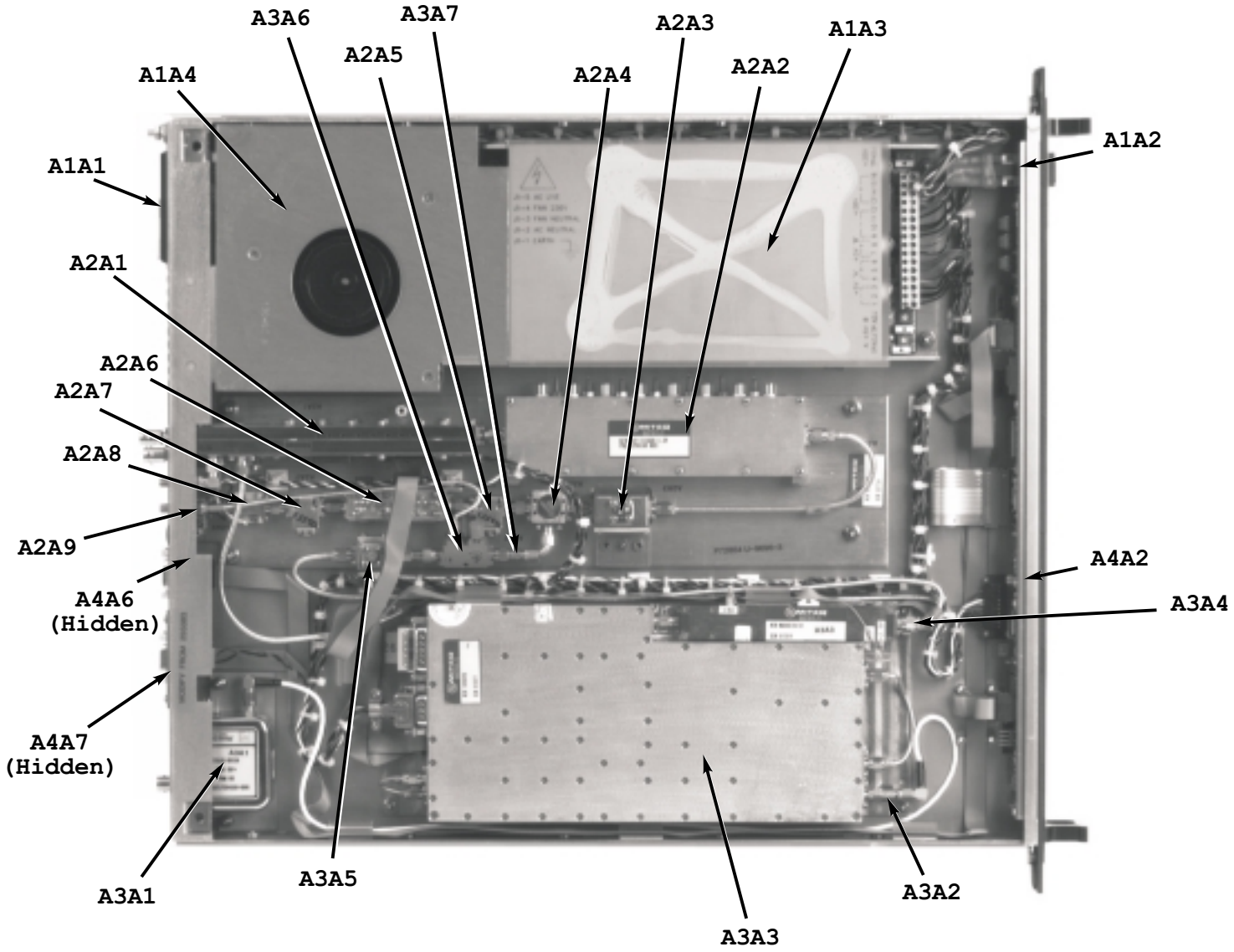


Figure 1-5. Interior View, U-9696-3 Upconverter (Option 23D)

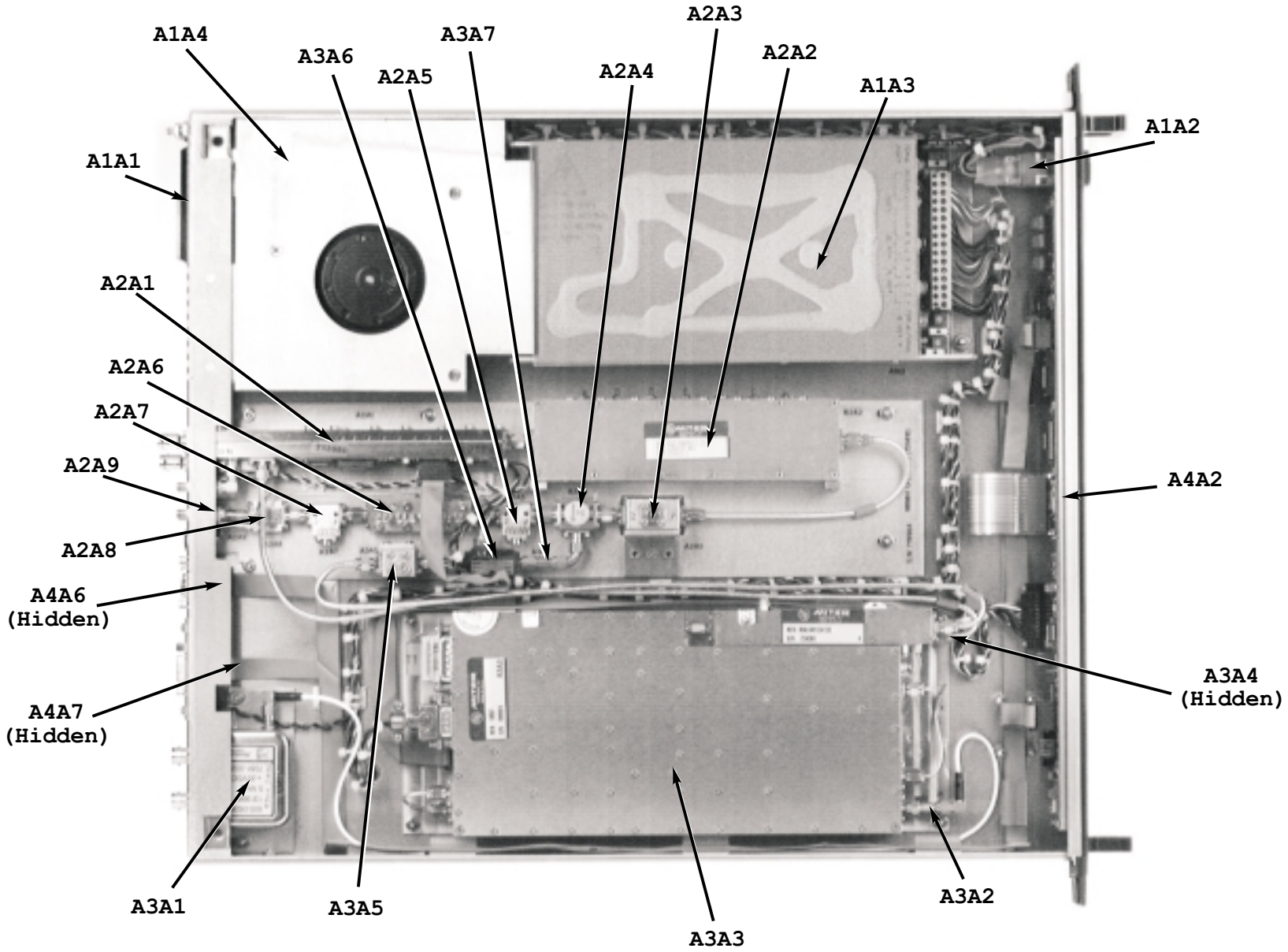


Figure 1-6. Interior View, U-9696-3 Upconverter (Option 23F)

1.1.2 FUNCTIONAL

The MITEQ 9600 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 upconverter translates the IF Input frequency band to the RF 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. Attenuation may be selected in 0.2 dB steps. Non-volatile memory allows the operator to store up to thirty-two channel frequencies.

Remote operation and converter status are available via the remote interface.

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, 230/240 VAC).

1.2 EQUIPMENT CHARACTERISTICS

1.2.1 PHYSICAL

A.	Weight:	20 pounds nominal
B.	Overall Dimensions:	19" x 22" x 1.75" panel height
C.	IF Input Connector (J1):	BNC female
D.	RF Output Connector (J2) -	
	1. RF Outputs Above 10 GHz:	SMA female
	2. RF Outputs Below 10 GHz:	N female
E.	IF Signal Monitor Output Connector (J1A):	BNC female
F.	Summary Alarm Connector (J3):	DE-9P
G.	Redundancy Switch Connector (J7):	DE-9P
H.	RF Signal Monitor Output Connector:	SMA female
I.	LO Frequency/Power Monitor Test points:	SMA female
J.	Remote Interface Connector (J6) -	
	1. RS485/RS422:	DE-9S
	2. RS232:	DB-25P
	3. Contact Closure:	DB-25S
	4. IEEE-488:	IEEE 488 receptacle
	5. BCD Contact Closure:	DB-25S
K.	Remote Interface Connector (J10), (RS485/RS422 only):	DE-9S
L.	External Reference Input Connector (J5), (Option 23D only):	BNC female
M.	Reference Output Connector (J11), (Option 23F only):	BNC female

1.2.2 FUNCTIONAL

A. Gain, Frequency Response -

1.	Input Frequency:	70 ±20 MHz 140 ±40 MHz (Option 4)
2.	Output Frequency:	13.75-14.5 GHz
3.	Gain:	26 dB nominal
4.	Amplitude Response	
	a. 70 MHz IF:	±20 MHz at 0.5 dB ±18 MHz at 0.4 dB
	b. 140 MHz IF (Option 4):	76 MHz at 0.75 dB
5.	Gain Adjustment:	30 dB
6.	Gain Adjustment Step Size:	0.2 dB

B. 70 MHz IF Group Delay (±18 MHz) -

1.	Standard -	
	a. Linear:	0.03 ns/MHz
	b. Parabolic:	0.01 ns/MHz^2
	c. Ripple:	1 ns peak-to-peak
2.	Option 5A:	1 ns peak-to-peak total group delay

C. 140 MHz IF Group Delay (±36 MHz) -

1.	Standard -	
	a. Linear:	0.025 ns/MHz
	b. Parabolic:	0.0035 ns/MHz^2
	c. Ripple:	1 ns peak-to-peak
2.	Option 5B:	2 ns peak-to-peak total group delay

D. Return Loss -

1.	Input -	
	a. 70 MHz IF:	26 dB/75 ohms (50 ohms optional)
	b. 140 MHz IF (Option 4):	20 dB/75 ohms (50 ohms optional)
2.	Output:	20 dB/50 ohms

E. Third Order Intermodulation: For two inband signals at an output level of -10 dBm, intermodulation products 60 dBc minimum.

F. Noise Figure: 25 dB maximum

G.	Image Rejection:	80 dB maximum
H.	Spurious -	
	1. Dependent:	-60 dBc
	2. Independent:	-75 dBm inband
I.	Frequency Selection Step Size:	125 kHz
J.	Primary Power:	Selectable at the rear panel (100, 120, 220, 230/240VAC)
K.	Test Points/Monitors -	
	1. LO Phase Voltage:	Variable with frequency
	2. RF LO Monitor -	
	a. Frequency:	12530-13280 MHz 12460-13210 MHz (Option 4)
	b. Power:	-10 dBm nominal
	3. IF LO Monitor -	
	a. Frequency:	1150 MHz
	b. Power:	-10 dBm nominal
	4. DC Voltages -	
	a. +20V:	+20 ±0.5V
	b. +5V"A":	+5.2 ±0.1V
	c. +5V"B":	+5.2 ±0.1V
	5. IF Signal Monitor Output:	-20 dBc
	6. RF Signal Monitor (Option 2A):	-20 dBc
L.	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
	b. Alarm:	4-5 closed, 5-6 open DC Power Fault or Local Oscillator(s) Out-of-Lock

M. Redundancy Switch Connector (J7) Pin Designations -

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

N. Frequency Stability of Internal 5 MHz Reference -

1.	Standard:	$\pm 2 \times 10^{-8}$, 0° to +50°C 5×10^{-9}/day, Fixed Temperature
2.	Option 10A:	$\pm 1 \times 10^{-8}$, 0° to +50°C 5×10^{-9}/day, Fixed Temperature
3.	Option 10B:	$\pm 5 \times 10^{-9}$, 0° to +50°C 1×10^{-9}/day, Fixed Temperature
4.	Option 10C:	$\pm 2 \times 10^{-9}$, 0° to +50°C 1×10^{-9}/day, Fixed Temperature

O. Typical Phase Noise -

Offset	dBc/Hz
10 Hz	-48
100 Hz	-67
1 kHz	-77
10 kHz	-83
100 kHz	-93
1 MHz	-103

P. Upconverter Mute: 60 dB with summary alarm or operator generated command.

Q. External 5 MHz Reference Input (Option 23D only): 5 MHz, +4±3 dBm

R. 5 MHz Reference Output (Option 23F only): 5 MHz, +4±3 dBm

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	Upconverter	1
2	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 6747A Swept Frequency Synthesizer	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 87A50-1 VSWR Bridge (2-18 GHz)	1
6	Anritsu ME538M Microwave Link Analyzer	1
7	Hewlett Packard 8566B Spectrum Analyzer	1
8	Hewlett Packard 8970 Noise Figure Meter	1
9	Beckman 3050 Digital Multi-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	Hewlett Packard 11740 Phase Noise Test Set	1

SECTION 2

INSTALLATION

2.1 UNPACKING, STORAGE, RESHIPMENT

Carefully open the shipping container and remove the equipment. Weight of the converter is approximately 20 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 1.75" 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 necessary external connections as 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.

System is now operational.

TABLE 2-1

EXTERNAL CONNECTIONS

1	Attach power cord to AC socket (A1A1).
2	Connect IF input to J1.
3	Connect RF output to J2.
4	Connect IF Monitor output to J1A.
5	Connect the summary alarm to J3.
6	Connect redundancy switching to J7.
7	Connect the remote interface to J6.
8	Be sure that the converter is well grounded.
9	Connect External Reference Input to J5 (Option 23D).
10	Connect Reference Output to J11 (Option 23F).

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 and 1-2)

A. On/Off switch (A1A2) applies AC power to the converter

B. Fuse (A1A1): 3.0A for 100/120 VAC, 1.5A for 220/230/240 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. Frequency Adjustment of Crystal Oscillator

The frequency of the local oscillator can be monitored at the "Freq/Power Monitor" test point. Adjustments in frequency can be made by adjusting a tunable capacitor in the reference source, accessible from the rear panel of the converter (refer to Figure 1-2). Adjustment should be made at room temperature after one half hour of warm-up time. A cover screw is used to seal the tuning port of the crystal oscillator. The cover screw must be removed in order to access the tuning port.

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 Figure 1-3, Section 4.3.4 and Appendix).

3.3 LOCAL OPERATION (See Figure 1-3)

The front panel "REMOTE" key selects either Local (LED off) or Remote mode (LED on). The mode alternates with each key press. Remote mode locks out the front panel and allows control of the converter only from the remote bus. Converter status can still be monitored locally. Any attempt to alter converter settings while in Remote mode causes the error tone to sound and will be ignored. In Local mode the converter is controlled from the front panel. The cursor is present only in the local mode.

3.3.1 FREQUENCY

To set the frequency of the converter:

A. Using the "FUNCTION SELECT" key, locate the cursor in the frequency field.

B. With the cursor in the frequency field enter the desired frequency (in MHz) using the numbered keys and the decimal point.

C. Press "ENT".

3.3.2 ATTENUATION

To set the attenuation of the converter:

A. Using the "FUNCTION SELECT" key, locate the cursor in the attenuation field.

B. Enter the desired attenuation (0.2 dB steps) using the numbered keys and the decimal point.

C. Press "ENT".

D. The up and down arrow keys may also be used to step the attenuation in 0.2 dB steps. The "up" arrow will increase attenuation and the "down" arrow will decrease attenuation. If the key is held, the attenuation will continue to change until the key is released or the limit is reached.

3.3.3 CHANNEL MEMORY

The converter has thirty-two memory locations numbered 00 to 31. Each location stores a frequency and an attenuation setting together.

To store a setup in memory:

A. Enter the desired frequency (in MHz) using the numbered keys and the decimal point. Press "ENT" only to tune the converter to the displayed frequency, otherwise, press "FUNCTION SELECT" to move the cursor into the attenuation field.

B. Enter the desired attenuation (0.2 dB steps) using the numbered keys and the decimal point. Press "ENT" only to set the converter to displayed attenuation.

C. Press "STR" and enter the memory number using the numbered keys (two digits). The cursor will be in the setup field during this key sequence.

D. Press "ENT" to set the converter to these values. If "ENT" is not pressed the display will time-out after approximately five seconds and return to the current converter settings.

To recall a setup from memory:

A. Press "RCL".

B. Enter the memory number using the numbered keys (two digits). The cursor will be in the setup field during this key sequence. The stored values will appear in their respective fields in the display.

C. Press "ENT" to set the converter to these values. If "ENT" is not pressed the display will time-out after approximately five seconds and return to the current converter settings.

3.3.4 ALARM STATUS

If any alarms exist at any time, the red alarm LED will light. Alarm status can be examined in both Local and Remote modes.

To examine converter alarm status:

A. Press "ALARM".

B. The alarm status will be displayed for approximately five seconds, or as long as the "ALARM" key is held, after which the display will return to the current converter settings.

3.3.5 DC VOLTAGES

DC voltages can be examined in both Local and Remote modes.

To examine DC voltages:

A. Press "VOLTAGE MONITOR/FORMAT". The power supply voltages will be displayed until another key is pressed.

B. Press "VOLTAGE MONITOR/FORMAT" again to examine the phase voltages.

C. Press any other key to prompt the display to resume its normal display.

3.3.6 LOCAL MUTE FUNCTION

To mute the converter (if applicable):

A. Press "STR" and enter the digits "99" using the numbered keys. The word "MUTED" will appear in place of "MHz" in the frequency field.

To unmute the converter (if applicable):

A. Press "RCL" and enter the digits "99" using the numbered keys. The word "MHz" will reappear in place of "MUTED" in the frequency field provided no alarms exist.

3.3.7 CONTRAST ADJUST

To adjust the contrast for viewing angle:

A. Press "STR" followed by "FUNCTION SELECT".

B. Press and hold either arrow key. Pressing the up arrow darkens the display; pressing the down arrow lightens the display.

C. Press any other key to return the display to normal operation. The display will time-out and resume normal operation after approximately five seconds if no key is pressed.

3.3.8 SUMMARY ALARM

A summary alarm condition exists when one or more of the component faults (para.3.4.2.2.4) indicate a failure. For upconverters, the mute function will be activated and the word "MUTED" will appear in place of "MHz" in the frequency field. The summary alarm, when activated, overrides an UNMUTE command and will automatically be cleared when all components return to the normal condition.

3.3.9 REMOTE COMMUNICATION FORMAT

The remote communication format can be examined in both Local and Remote modes.

To examine the remote communication format:

A. Press "VOLTAGE MONITOR/FORMAT" twice. The remote communications format will be displayed.

B. The remote communication format will be displayed for approximately five seconds, or as long as the "VOLTAGE MONITOR/FORMAT" key is held, after which the display will time-out and resume normal operation.

To change the remote communication format:

A. Hold down the "VOLTAGE MONITOR/FORMAT" key during power-up of the converter.

B. Use the arrow keys to vary each parameter and the "ENT" to set each parameter.

C. To resume normal operation cycle the converter power off and on.

3.3.10 INTERNAL/EXTERNAL REFERENCE INDICATION (Optional)

Normally, an external reference frequency is supplied to the converter. In the absence of this reference, the converter automatically switches to the internal reference. The selection of the internal reference is indicated on the front panel by the presence of the letter "I" following the frequency parameter on the front panel display. When an external reference is detected, the letter "E" will appear on the front panel display.

3.4 REMOTE OPERATION

3.4.1 DEVICE ADDRESS/BAUD RATE/PARITY SELECTION

To change the remote communication format:

A. Hold down the "VOLTAGE FORMAT/MONITOR" key during power-up of the converter.

B. Use the arrow keys to vary each parameter and the "ENT" key to set each parameter.

C. To resume normal operation cycle the converter power off and on.

3.4.1.1 Address Selection

Use the arrow keys to scan through the valid addresses and the "ENT" key to select the desired address.

3.4.1.2 Baud Rate Selection (Not applicable for IEEE-488)

Use the arrow keys to scan through the available baud rates and the "ENT" key to select the desired baud rate. Available baud rates are: 300, 600, 1200, 2400, 4800, 9600, 19.2K.

3.4.1.3 Parity Selection (Not applicable for IEEE-488)

Use the arrow keys to select odd, even or no parity.

3.4.2 RS422/485/232 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 7AH.

Data transmission format is a 10-bit sequence consisting of one start, seven data, one parity, and one stop bit or one start, eight data and one stop bit. To set Odd or Even parity see paragraph 3.4.1.3. 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 RS422 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 canceled. 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 RS422) the following restrictions apply:

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

The converter continually monitors the communication 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.

3.4.2.1 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.

3.4.2.1.1 Header Byte

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

3.4.2.1.2 Device Address Byte

There are thirty-two possible addresses. The valid device address range is from 40H to 5FH.

3.4.2.1.3 Command/Error Codes

Command Codes		
Code	ASCII Character	Function
46H	F	Frequency Set
54H	T	Attenuation Set
45H	E	Memory Store
53H	S	Memory Store & Set
4CH	L	Memory Recall
52H	R	Memory Recall & Set
4DH	M	Mute
55H	U	Unmute
41H	A	Status All
3FH	?	Status Faults
43H	C	Combination Command
Error Codes		
Code	ASCII Character	Function
61H	a	Command not recognized
62H	b	Illegal parameter or parameter out-of-range
63H	c	Unit in Local mode
64H	d	Busy

3.4.2.1.4 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".

3.4.2.1.5 Trailer Byte

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

3.4.2.1.6 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.

Checksum = Mod [(character value - 32), 95] + 32

3.4.2.2 Command Codes

The following paragraphs describe each of the command codes.

3.4.2.2.1 Frequency Code = F

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

Remote Command Sequence: Fffffff(f)
Converter Response: F

3.4.2.2.2 Mute Code = M (if applicable)

The Mute command requires no parameters. The converter output is muted until a Frequency or Unmute command is received.

Remote Command Sequence: M
Converter Response: M

3.4.2.2.3 Status All Code = A

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

Remote Command: A
Converter Response: AFffffff(f)TtttLIIiMm?abcdef

A: Status All indicator

F: Frequency indicator
fffffff(f): Seven or eight digit ASCII numeric character indicating frequency in kHz.

T: Attenuation indicator
ttt: Attenuation in 0.2 dB steps (decimal point omitted)

L: Local/Remote indicator
l: "0" or "1" ASCII numeric character
0 = Local
1 = Remote

I: IF indicator
i: For single IF units: 0

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.

3.4.2.2.4 Status Faults Code = ?

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 LO1 Level Detect or
Optional External Reference Indicator
(0 = External Reference, 1 = Internal Reference)
f LO2 Level Detect

3.4.2.2.5 Attenuation Code = T

The Attenuation command requires a three digit parameter which sets the attenuation of the converter in 0.2 dB steps. The converter attenuation is immediately set without affecting Mute status.

Remote Command Sequence: Tttt
Converter Response: T

T: Attenuation indicator
ttt: Attenuation (0.2 dB steps, decimal point omitted)

3.4.2.2.5.1 Attenuation Increment Code = TINC

The Attenuation Increment command requires no parameters. This commend increments the attenuation (reduces the gain) of the converter by its step size of 0.2 dB. The converter attenuation is immediately adjusted without affecting Mute status.

Remote Command Sequence: TINC
Converter Response: T

TINC = Attenuation Increment Indicator

3.4.2.2.5.2 Attenuation Decrement Code = TDEC

The Attenuation Decrement command requires no parameters. This commend decrements the attenuation (increases the gain) of the converter by its step size of 0.2 dB. The converter attenuation is immediately adjusted without affecting Mute status.

Remote Command Sequence: TDEC
Converter Response: T

TDEC = Attenuation Decrement Indicator

3.4.2.2.6 Unmute Code = U

The Unmute command requires no parameters. It will activate the converter's output unless a fault condition exists.

Remote Command Sequence: U
Converter Response: U

3.4.2.2.7 Store Code = E

The store command stores the specified frequency and attenuation stored in the selected memory location. The actual setting of the converter is not changed.

Remote Command Sequence: EnnFffffffff(f)Ttttli
Converter Response: E

E: Store indicator
nn: Two digit ASCII numeric character indicating a memory location.

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

I: IF indicator
i: "0" No IF selection available

3.4.2.2.8 Store and Set Code = S

The Store and Set command performs the same function as the Store command and also sets the converter to the specified frequency, and attenuation. The converter Mute status is not affected.

Remote Command Sequence: SnnFffffffff(f)TtttIi
Converter Response: S

S: Store and Set indicator
nn: Two digit ASCII numeric character indicating a memory location

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

I: IF indicator
i: "0" No IF selection available

3.4.2.2.9 Recall Code = L

The Recall command returns the frequency and attenuation stored in the selected memory location. The actual setting of the converter is not changed.

Remote Command Sequence: Lnn
Converter Response: LnnFffffffff(f)TtttIi

L: Recall indicator
nn: Two digit ASCII numeric character indicating a memory location.

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

I: IF indicator
i: "0" No IF selection available

3.4.2.2.10 Recall and Set Code = R

The Recall and Set command performs the same function as the Recall command and also sets the converter to the specified frequency and attenuation without affecting the Mute status.

Remote Command Sequence: Rnn
Converter Response: RnnFffffff(f)TtttIi

R: Recall indicator
nn: Two digit memory location (see E command)

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

I: IF indicator
i: "0" No IF selection available)

3.4.2.2.11 Combination Frequency and Attenuation Set Code = C

The Combination Frequency and Attenuation Set command sets both frequency and attenuation without affecting the Mute status.

Remote Command Sequence: CFffffff(f)Tttt
Converter Response: C

C: Combination Command indicator

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

3.4.2.3 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 12500.500 MHz

Controller Command	Converter Response
{AF12500500}0	{AF}a or possible error code
	{Ac}~

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

Controller Command	Converter Response
{A?}Z	{A?100000}\

3.4.2.4 RS422/485 Bus Terminations

A jumper selectable, 120 ohm termination resistor is 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.

3.4.3 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 one of sixteen pre-tuned frequency and attenuation settings stored in memory locations 01 through 16. This operation requires the converter to be in Remote operation mode.

Momentarily connecting F"nn" to COM will cause the converter to tune to the frequency stored in memory location "nn".

Two Form C status contacts are also provided. The first indicates whether the converter is in Local or Remote mode. The second acknowledges a valid contact closure is present while in remote mode, or indicates that the remote interface is idle (either in local mode or no valid remote closure is being asserted).

3.4.3.1 BCD Contact Closure Control

This interface allows the user to remotely set the converter to one of thirty-one stored settings. These settings are user defined and stored in memory locations 01 through 31 while the unit is in the Local mode. While in Remote mode, inputs to the rear panel interface connector (J6) are continuously scanned for momentary closures. When a valid closure combination is detected the converter will tune to one of thirty-one pre-tuned frequency, attenuation and IF (if applicable) settings. The cable supervision line must be active (connected to ground) in order for a closure to be recognized. Command and status logic is active low.

The command and status bits are represented in Binary Coded Decimal format. Momentarily connecting the appropriate weighted bits for a stored setting to COM (Gnd) will cause the converter to assert the settings stored in that memory location. The status bits will indicate the recognition of a valid command by asserting the appropriate weighted bits.

3.4.4 IEEE-488 CONTROL

The 9600 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.

3.4.4.1 Device Address/Service Request Enable

To change the device address, hold down the "FORMAT" key during power-up of the converter. Use the arrow keys to scroll through available addresses and the "ENT" to set the address. Use the arrow keys to toggle enable/disable of the Service Request feature. To resume normal operation cycle the converter power.

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

3.4.4.2 Data Input Messages

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

3.4.4.2.1 Frequency Set

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

Fffffff(f)

F: Frequency indicator
fffffff(f): Seven or eight digit converter frequency in kHz

3.4.4.2.2 Mute

The Mute message mutes the RF output of the converter. The output of the converter is muted until a Frequency or Unmute command is received.

M

3.4.4.2.3 Attenuation Set

The Attenuation Set message sets the converter attenuation in 0.2 dB steps. The converter Mute status is not affected.

Tttt

T: Attenuation indicator
ttt: Attenuation in 0.2 dB steps, decimal point omitted

3.4.4.2.3.1 Attenuation Increment Code = TINC

The Attenuation Increment message increments the attenuation (reduces the gain) of the converter by its step size of 0.2 dB. The converter attenuation is immediately adjusted without affecting Mute status.

TINC
TINC = Attenuation Increment indicator

3.4.4.2.3.2 Attenuation Decrement Code = TDEC

The Attenuation Decrement message decrements the attenuation (increases the gain) of the converter by its step size of 0.2 dB. The converter attenuation is immediately adjusted without affecting Mute status.

TDEC
TDEC = Attenuation Decrement indicator

3.4.4.2.4 Recall Frequency and Attenuation from Channel nn

This message sets the converter to the frequency and attenuation previously stored in channel memory "nn". The converter Mute status is not affected.

Remote Command Sequence: Rnn or Cnn

R or C: Recall and set indicator
nn: Two digit ASCII numeric character indicating a memory location.

C05 (Recall frequency and attenuation stored in Channel 05)

3.4.4.2.5 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.

3.4.4.2.6 Frequency Format

Data Format	Converter Response
DF	Fffffff(f)TtttLIIiMm

F: Frequency indicator
fffffff(f): Seven or eight digit converter frequency in kHz

T: Attenuation indicator
ttt: attenuation in 0.2 dB steps

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

I: IF indicator
i: for single IF units: 0

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

3.4.4.2.7 Status Faults Format

Data Format	Converter Response
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 LO1 Level Detect or
Optional External Reference Indicator
(0 = External Reference, 1 = Internal Reference)
f LO2 Level Detect

3.4.4.2.8 Status All Format

Data Format	Converter Response
DA	Fffffff(f)TtttLIIiMm?abcdef

The DA format is a combination of the DF and D? formats.

3.4.4.2.9 Channel Format

Data Format	Converter Response
DCnn	CnnFffffffff(f)TtttIi

The DCnn format returns the frequency and attenuation stored in channel nn (00-31). The actual converter settings are not changed.

3.4.4.2.10 Unmute

The Unmute message activates the converter's output unless a fault condition exists.

U

3.4.4.2.11 Store

The Store message stores the specified frequency and attenuation in the selected memory location. The actual converter settings are not changed.

EnnFffffffff(f)TtttIi

E: Store indicator
nn: Two digit ASCII numeric character indicating a memory location.

F: Frequency indicator
fffffff(f): Seven or eight digit converter frequency in kHz

T: Attenuation indicator
ttt: Three digit attenuation setting in 0.2 dB steps, decimal point omitted

I: IF indicator
i: For single IF units = 0

3.4.4.2.12 Store and Set

The Store and Set command performs the same function as the Store command and also sets the converter to the specified frequency and attenuation. The converter Mute status is not affected.

SnnFffffff(f)TtttIi

S: Store and Set indicator
nn: Two digit ASCII numeric character indicating a memory location.

F: Frequency indicator
fffffff(f): Seven or eight digit converter frequency in kHz

T: Attenuation indicator
ttt: Three digit attenuation setting in 0.2 dB steps, decimal point omitted

I: IF indicator
i: For single IF units = 0

3.4.4.2.13 Combination Frequency and Attenuation Set Code = C

The Combination Frequency and Attenuation Set command sets both frequency and attenuation with one command. The converter Mute status is not affected.

Remote Command Sequence: CFffffff(f)Tttt

C: Combination Command indicator

F: Frequency indicator
fffffff(f): Seven or eight digit frequency

T: Attenuation indicator
ttt: Three digit attenuation

3.4.4.2.14 Service Request

The converter will issue a service request (activate the SRQ line) when one of the status alarm lines indicates 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

Bit No.							
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".

3.4.5 TRI-BAND LOCK OUT CONTACT CLOSURE (Tri-band Upconverter only)

Inputs to the rear panel interface connector (J8) are continuously scanned for a valid band selection. A band is selected by connecting "BANDn" to "COM". When a valid band is selected, the converter will tune to the last frequency that was set for that band. Local and/or Remote frequency settings will only be allowed within the selected band. Local frequency settings outside the selected band will result in a response of "b" - parameter out of range. One and only one band may be selected at any time. No band or more that one band selected is an error condition that will MUTE the converter and will block all Local and/or Remote frequency settings.

Tri-band Lock Out Interface Connector (DB9S)

J8-1	BAND1
-6	BAND2
-2	BAND3
-8	COM

3.4.6 REMOTE INTERFACE CONNECTOR

RS422/485*

J6 and/or J10-1	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 -.

RS232C

J6-1	Ground
-2	TX Data
-3	RCV Data
-7	Ground

Contact Closure (DB25S)

Commands		Status Indicator contacts	
J6-1	Setup 14	J6-7	Remote
-2	Setup 08	-8	Common
-3	Setup 05	-9	Local
-4	Setup 02	Remote:	J6-7 - J6-8 closed
-5	Setup 01		J6-9 - J6-8 open
-6	COM	Local:	J6-9 - J6-8 closed
-10	Setup 06		J6-7 - J6-8 open
-11	Setup 10		
-12	Setup 12	J6-18	Acknowledge
-13	Setup 15	-19	Common
-14	Setup 16	-20	Idle
-15	Setup 04	Active:	J6-18 - J6-19 closed
-16	Setup 03		J6-20 - J6-19 open
-17	Setup 09	Idle:	J6-20 - J6-19 closed
-23	Setup 07		J6-18 - J6-19 open
-24	Setup 13		
-25	Setup 11		

IEEE-488

IEEE-488 compatible 24 contact connector (receptacle).

BCD Contact Closure (DB25S) -

Commands (BCD)		Status Indicator Contacts (BCD)	
J6-6	1 LSB	J6-1	1 LSB
-19	2	-14	2
-7	4	-2	4
-20	8	-15	8
-8	10	-3	10
-21	20 MSB	-16	20
-23	RTN (Ground)		
-18	RTN (Ground)		
-9	Cable Supervision (Enables remote operation when tied low)		
-10	RTN (Ground)		

Example: To select the settings stored in Memory Location 31, J6 Pins 21, 8 and 6 must be asserted low while the unit is in Remote mode and the cable supervision bit is asserted low. Upon recognition and acceptance of this command J6 Pins 16, 3 and 1 will go low. These status bits will remain valid until either the cable supervision bit is disconnected, the unit is put into Local mode, or another valid command is accepted.

3.5 EMERGENCY OPERATION

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

3.6 SHUTDOWN PROCEDURE

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

SECTION 4

PRINCIPLES OF OPERATION

4.1 INTRODUCTION

The following paragraphs provide information on the principles of operation of the 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 Upconverter translates the 70 ±20 MHz (or 140 ±40 MHz) frequency band to the 13.75-14.5 GHz output frequency band. A double conversion system is used (see Figure 4-1).

The input signal is fed to the upconverter module. In the upconverter module a fixed attenuator is used to provide a good match at the input. The signal is fed to a PIN diode attenuator which provides gain control for the system. A low noise amplifier is followed by a mixer which converts the input signal to the second IF frequency. The signal is then filtered, amplified, and output from the converter module. 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 also included in the module.

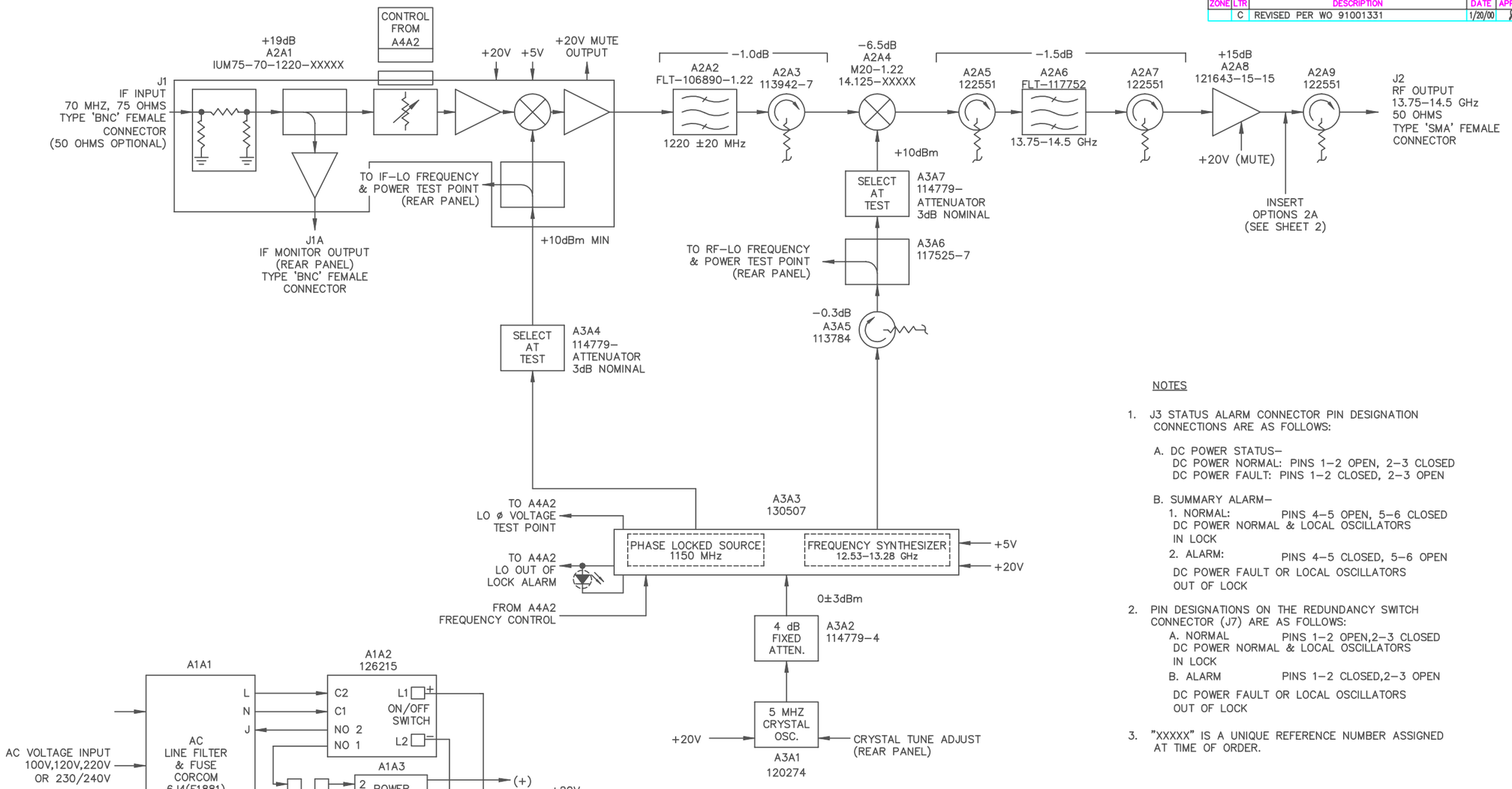
The upconverter module is followed by a bandpass filter which rejects any unwanted signals. The signal is fed to a mixer which converts the signal to the output frequency band by use of a synthesized local oscillator signal. The signal is then filtered and amplified before being output from the system.

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

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

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

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	C	REVISED PER WO 91001331	1/20/00	JGX



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
      2. ALARM: PINS 4-5 CLOSED, 5-6 OPEN
         DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK

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
   B. ALARM PINS 1-2 CLOSED,2-3 OPEN
      DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK

3. "XXXXX" IS A UNIQUE REFERENCE NUMBER ASSIGNED AT TIME OF ORDER.

SYM	DESCRIPTION	QTY	NEXT ASSY	USED ON
	HOLE DATA TABLE		APPLICATION	

-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 DECIMALS .XX±.01 .XXX±.005 ANGLES ±0°30'

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	ZZ	5/7/97
CHKD BY	JGX	1/29/00
APPROVED BY		
PROJ ENGR	A. Bolt	1/31/00
ENG SECT		
Q.A.		

MITEQ
100 Davids Drive, Hauppauge, New York 11788

BLOCK DIAGRAM
UPCONVERTER
U-9696-3

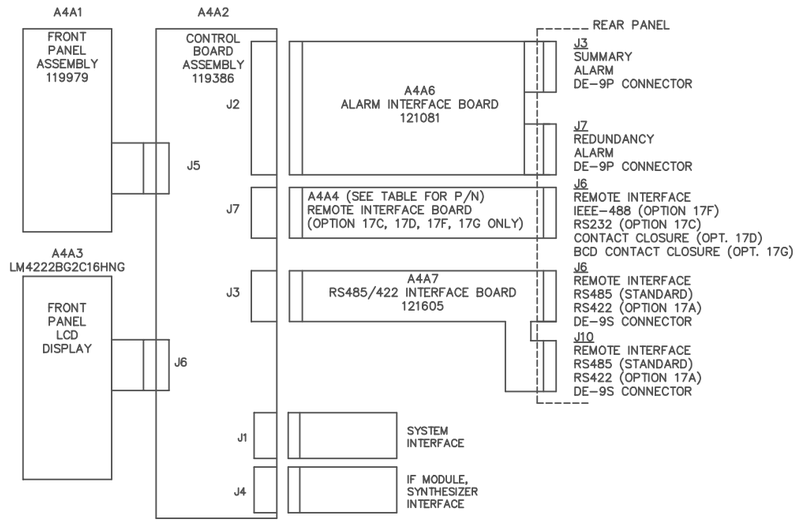
SIZE	CODE IDENT. NO.		REV.
D	33592	130514	C
SCALE	REF 25S363	SHEET 1 OF 2	

130514

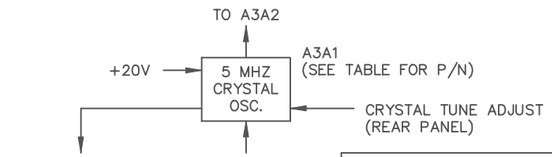
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	C	REVISED PER WO 91001331	1/20/00	JBK

OPTIONS TABLE

2A	SIGNAL MONITOR – RF	SEE INSERT 2A, SHEET 2 & 1 ADD A2A10, P/N 117525–7 ADD A2A11, P/N 122551
10A	HIGHER STABILITY FREQUENCY REFERENCE $\pm 1 \times 10^{-8}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120275
10B	HIGHER STABILITY FREQUENCY REFERENCE $\pm 5 \times 10^{-9}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120276
10C	HIGHER STABILITY FREQUENCY REFERENCE $\pm 2 \times 10^{-9}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120277
15	50 OHM IF IMPEDANCE	CHANGE A2A1 P/N TO IUM50–70–1220–XXXXX
17A	REMOTE CONTROL RS422	OMIT A4A4 REMOTE INTERFACE BOARD, ADD CABLE BETWEEN J3A OF A4A2 AND J6, J10
17C	REMOTE CONTROL RS232	ADD A4A4 REMOTE INTERFACE BOARD P/N 121527 ADD CABLE FROM A4A4 TO J6, OMIT J10
17D	REMOTE CONTROL WITH CONTACT CLOSURE	ADD A4A4 REMOTE INTERFACE BOARD P/N 121529 ADD CABLE FROM A4A4 TO J6, OMIT J10
17F	REMOTE CONTROL WITH IEEE–488	ADD A4A4 REMOTE INTERFACE BOARD P/N 121531 ADD CABLE FROM A4A4 TO J6, OMIT J10
17G	REMOTE CONTROL WITH BCD CONTACT CLOSURE	ADD A4A4 REMOTE INTERFACE BOARD P/N 123716 ADD CABLE FROM A4A4 TO J6, OMIT J10
23D	AUTOMATIC REFERENCE SELECTION	SEE INSERT 23D, SHEET 2, SEE TABLE FOR A3A1 P/N
23F	AUTO. REF. SELECTION, REFERENCE OUTPUT	SEE INSERT 23F, SHEET 2, SEE TABLE FOR A3A1 P/N



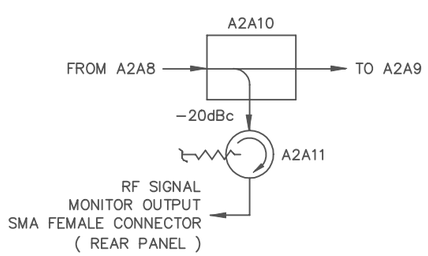
OPTION 23F



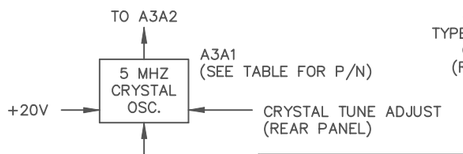
FOR OPTION 23F, 5 MHZ CRYSTAL OSCILLATOR SELECTION TABLE:	
STABILITY	A3A1 PART NUMBER
STANDARD	131994
10A	131995
10B	131996
10C	131997

SYSTEM INTERFACE CONNECTIONS	
J1 PIN #	DESIGNATION
1	GROUND
2	––
3	GROUND
4	––
5	GROUND
6	IF LOB OUT OF LOCK ALARM
7	+5V "B"
8	––
9	+5V "A" MONITOR
10	––
11	+20V
12	––
13	RF LO OUT OF LOCK ALARM
14	––
15	IF LOA OUT OF LOCK ALARM
16	IF LO PHASE VOLTAGE
17	––
18	RF LO PHASE VOLTAGE

OPTION 2A



OPTION 23D



FOR OPTION 23D, 5 MHZ CRYSTAL OSCILLATOR SELECTION TABLE:	
STABILITY	A3A1 PART NUMBER
STANDARD	129102
10A	129103
10B	129104
10C	129105

SYM	DESCRIPTION	QTY	NEXT ASSY	USED ON
HOLE DATA TABLE			APPLICATION	

–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
DECIMALS .XX±.01 .XXX±.005 ANGLES ±0°30'

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	ZS	5/7/97
CHKD BY	JBK	1/29/00
APPROVED BY		
PROJ ENGR	A. Bell	1/31/00
ENG SECT		
Q.A.		

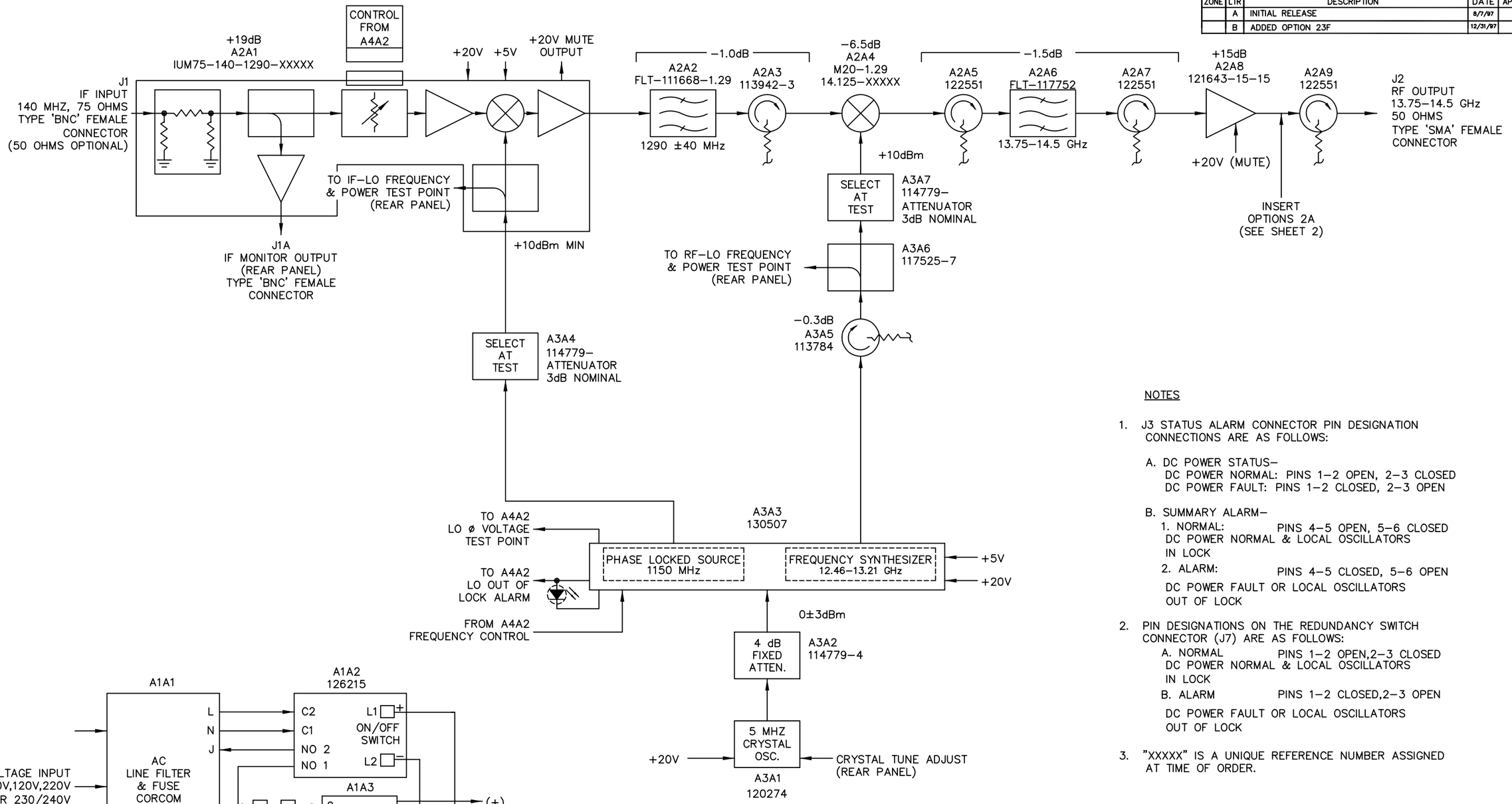
MITEQ
100 Davids Drive, Hauppauge, New York 11788

BLOCK DIAGRAM
UPCONVERTER
U–9696–3

SIZE	CODE IDENT. NO.		REV.
D	33592	130514	C
SCALE	REF 25S363	SHEET 2 OF 2	

130514

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	A	INITIAL RELEASE	8/7/97	
	B	ADDED OPTION 23F	12/31/97	



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
      2. ALARM: PINS 4-5 CLOSED, 5-6 OPEN
         DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK

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
   B. ALARM PINS 1-2 CLOSED,2-3 OPEN
      DC POWER FAULT OR LOCAL OSCILLATORS OUT OF LOCK

3. "XXXXX" IS A UNIQUE REFERENCE NUMBER ASSIGNED AT TIME OF ORDER.

SYM	DESCRIPTION	QTY	NEXT ASSY	USED ON
	HOLE DATA TABLE		APPLICATION	

-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
DECIMALS .XX±.01 .XXX±.005 ANGLES ±0°30'

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	J. Belt	8/7/97
CHKD BY		
APPROVED BY		
PROJ ENGR		
ENG SECT		
Q.A.		

MITEQ
100 Davids Drive, Hauppauge, New York 11788

BLOCK DIAG. UPCONV U-9696-3 OPT. 4: 140 MHz IF FREQ.

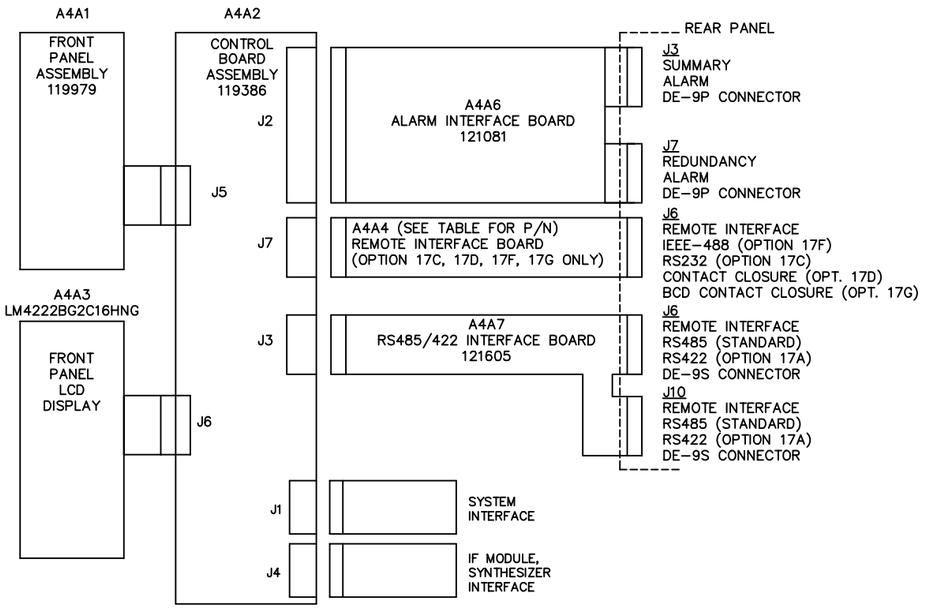
SIZE	CODE IDENT. NO.		REV.
C	33592	131228	B
SCALE	REF 72854	SHEET 1 OF 2	

131228

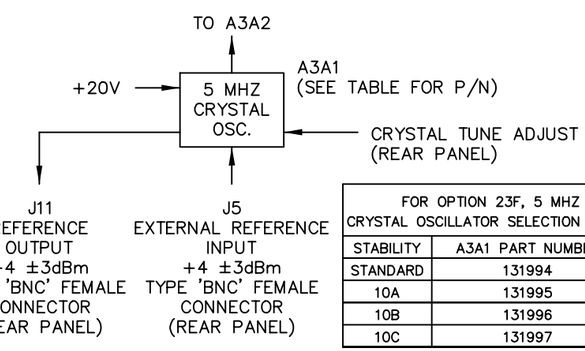
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	B	SEE SHEET 1	12/31/97	

OPTIONS TABLE

2A	SIGNAL MONITOR – RF	SEE INSERT 2A, SHEET 2 & 1 ADD A2A10, P/N 117525–7 ADD A2A11, P/N 111896
10A	HIGHER STABILITY FREQUENCY REFERENCE $\pm 1 \times 10^{-8}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120275
10B	HIGHER STABILITY FREQUENCY REFERENCE $\pm 5 \times 10^{-9}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120276
10C	HIGHER STABILITY FREQUENCY REFERENCE $\pm 2 \times 10^{-9}$ (0 TO 50°C)	CHANGE A3A1 P/N TO 120277
15	50 OHM IF IMPEDANCE	CHANGE A2A1 P/N TO IUM50–140–1290–XXXXX
17A	REMOTE CONTROL RS422	OMIT A4A4 REMOTE INTERFACE BOARD, ADD CABLE BETWEEN J3A OF A4A2 AND J6, J10
17C	REMOTE CONTROL RS232	ADD A4A4 REMOTE INTERFACE BOARD P/N 121527 ADD CABLE FROM A4A4 TO J6, OMIT J10
17D	REMOTE CONTROL WITH CONTACT CLOSURE	ADD A4A4 REMOTE INTERFACE BOARD P/N 121529 ADD CABLE FROM A4A4 TO J6, OMIT J10
17F	REMOTE CONTROL WITH IEEE–488	ADD A4A4 REMOTE INTERFACE BOARD P/N 121531 ADD CABLE FROM A4A4 TO J6, OMIT J10
17G	REMOTE CONTROL WITH BCD CONTACT CLOSURE	ADD A4A4 REMOTE INTERFACE BOARD P/N 123716 ADD CABLE FROM A4A4 TO J6, OMIT J10
23D	AUTOMATIC REFERENCE SELECTION	SEE INSERT 23D, SHEET 2, SEE TABLE FOR A3A1 P/N
23F	AUTO. REF. SELECTION, REFERENCE OUTPUT	SEE INSERT 23F, SHEET 2, SEE TABLE FOR A3A1 P/N



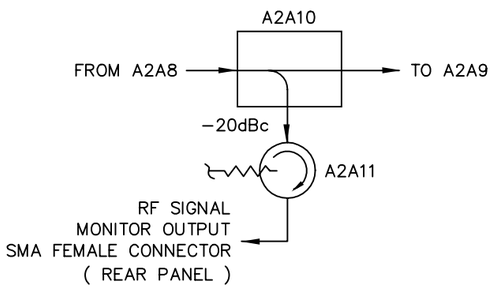
OPTION 23F



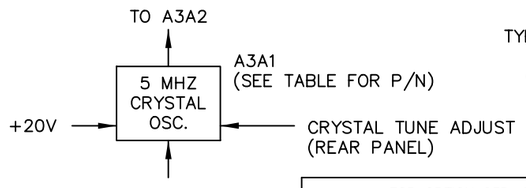
FOR OPTION 23F, 5 MHZ CRYSTAL OSCILLATOR SELECTION TABLE:	
STABILITY	A3A1 PART NUMBER
STANDARD	131994
10A	131995
10B	131996
10C	131997

SYSTEM INTERFACE CONNECTIONS	
J1 PIN #	DESIGNATION
1	GROUND
2	––
3	GROUND
4	––
5	GROUND
6	IF LOB OUT OF LOCK ALARM
7	+5V "B"
8	––
9	+5V "A" MONITOR
10	––
11	+20V
12	––
13	RF LO OUT OF LOCK ALARM
14	––
15	IF LOA OUT OF LOCK ALARM
16	IF LO PHASE VOLTAGE
17	––
18	RF LO PHASE VOLTAGE

OPTION 2A



OPTION 23D



FOR OPTION 23D, 5 MHZ CRYSTAL OSCILLATOR SELECTION TABLE:	
STABILITY	A3A1 PART NUMBER
STANDARD	129102
10A	129103
10B	129104
10C	129105

SYM	DESCRIPTION	QTY	NEXT ASSY	USED ON
	HOLE DATA TABLE		APPLICATION	

–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
DECIMALS .XX±.01 .XXX±.005 ANGLES ±0°30'

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	J. Bell	8/7/97
CHKD BY		
APPROVED BY		
PROJ ENGR		
ENG SECT		
Q.A.		

MITEQ
100 Davids Drive, Hauppauge, New York 11788

BLOCK DIAG. UPCONV U–9696–3 OPT. 4: 140 MHz IF FREQ.

SIZE	CODE IDENT. NO.		REV.
C	33592	131228	B
SCALE	REF 72854	SHEET 2 OF 2	

131228

4.3 SUBSYSTEMS AND COMPONENTS FUNCTIONAL DESCRIPTION

4.3.1 SIGNAL PATH

4.3.1.1 Upconverter Module (A2A1)

Specifications -

A.	Frequency -	
1.	Input:	70 ±20 MHz 140 ±40 MHz (Option 4)
2.	Output:	1220 ±20 MHz 1290 ±40 MHz (Option 4)
3.	LO:	1150 MHz at +10 dBm
B.	Gain:	19 dB nominal
C.	Input Return Loss:	26 dB/75 ohms 20 dB/75 ohms (Option 4) (50 ohms with Option 15)
D.	Output Return Loss:	23 dB/50 ohms
E.	Power Output (1 dB Compression):	+6 dBm minimum
F.	DC Voltage:	+20 volts +5 volts
G.	Gain Control:	30 dB minimum
H.	IF Monitor Output:	-20 dBc nominal

4.3.1.2 Filter, Isolator (A2A2, A2A3)

A2A2 -

Description: Filter

Specifications -

A.	Frequency:	1220 ±20 MHz 1290 ±40 MHz (Option 4)
B.	Insertion Loss:	0.5 dB
C.	Input/Output VSWR:	1.2:1

A2A3 -

Description: Isolator

Specifications -

A.	Frequency:	1220 ±20 MHz 1290 ±40 MHz (Option 4)
B.	VSWR Input/Output:	1.15:1
C.	Isolation:	23 dB minimum

4.3.1.3 Mixer (A2A4)

Description: Mixer

Specifications -

A.	Input Frequency:	1220 ±20 MHz 1290 ±40 MHz (Option 4)
B.	Output Frequency:	13.75-14.5 GHz
C.	LO Frequency:	12530-13280 MHz 12460-13210 MHz (Option 4)
D.	Conversion Loss:	6.5 dB nominal
E.	LO Power:	+10 dBm
F.	Isolation -	
	1. LO/Output:	20 dB minimum
	2. LO/Input:	20 dB minimum
G.	Power Output (1 dB Compression):	-5 dBm minimum

4.3.1.4 Output Filter, Isolators, Amplifier (A2A5 to A2A9)

A2A5, A2A7, A2A9 -

Description: Isolator

Specifications -

A.	Frequency:	13.75-14.5 GHz
B.	VSWR Input/Output:	1.15:1
C.	Isolation:	23 dB minimum

A2A6 -

Description: Filter

Specifications -

A.	Frequency:	13.75-14.5 GHz
B.	Insertion Loss:	0.5 dB
C.	Input/Output VSWR:	1.2:1

A2A8 -

Description: Amplifier

Specifications -

A.	Frequency:	13.75-14.5 GHz
B.	Gain:	15 dB
C.	Input/Output VSWR:	2:1
D.	Power Output (1 dB Compression):	+11 dBm

4.3.2 LOCAL OSCILLATOR

4.3.2.1 5 MHz Reference (A3A1)

The 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 Output:	0±3 dBm (Two ports)
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.	Frequency Stability -	
	1. Standard:	$\pm 2 \times 10^{-8}$, 0° to +50°C 5×10^{-9}/day, Fixed Temperature
	2. Option 10A:	$\pm 1 \times 10^{-8}$, 0° to +50°C 5×10^{-9}/day, Fixed Temperature
	3. Option 10B:	$\pm 5 \times 10^{-9}$, 0° to +50°C 1×10^{-9}/day, Fixed Temperature
	4. Option 10C:	$\pm 2 \times 10^{-9}$, 0° to +50°C 1×10^{-9}/day, Fixed Temperature

A fixed attenuator (A3A2) follows the crystal oscillator and is used for level adjustment.

4.3.2.1.1 Reference Option 23D

The Crystal Oscillator Module (A3A1) is configured with a crystal oscillator, detection circuitry and an SPDT switch. If an External Reference Input (J5) is supplied at a level of +4±3 dBm, the SPDT selects the externally supplied reference for the output of the Crystal Oscillator Module. If the External Reference Input level drops below a nominal threshold level +0.5 dBm, the SPDT automatically switches the Crystal Oscillator output to the internal oscillator.

4.3.2.1.2 Reference Option 23F

The Crystal Oscillator Module (A3A1) is configured with a crystal oscillator, detection circuitry and an SPDT switch. If an External Reference Input (J5) is supplied at a level of +4±3 dBm, the SPDT selects the externally supplied reference for the output of the Crystal Oscillator Module. If the External Reference Input level drops below a nominal threshold level +0.5 dBm, the SPDT automatically switches the Crystal Oscillator output to the internal oscillator.

One output of the crystal oscillator module is supplied to the phase locked source and the second output is fed to the rear panel.

4.3.2.2 Phase Lock Source/Frequency Synthesizer (A3A3)

This unit consists of a fixed frequency phase lock source and a microwave frequency synthesizer.

The microwave frequency synthesizer incorporates multiple loop, digital phase locking techniques. 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 combined unit are:

A.	Frequency Input:	5 MHz
B.	Power Input:	0±3 dBm
C.	DC Power:	+20V at 1.0A, +5V at 1.5A
D.	Phase Lock TP:	DC voltage variable with frequency

The specifications for the phase lock source are:

A.	Frequency Output:	1150 MHz
B.	Power Output:	+12 dBm nominal

A fixed attenuator (A3A4) follows the phase lock source and is used to provide level adjustment.

The specifications for the synthesized source are:

A.	Frequency Output:	12530-13280 MHz 12460-13210 MHz (Option 4)
B.	Power Output:	+13 dBm minimum

An isolator (A3A5) and fixed attenuator (A3A7) follow the synthesizer. The isolator provides load isolation and the attenuator is used to provide level adjustment. A coupler (A3A6) is used to provide a rear panel test point frequency/power monitor of the synthesizer output.

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, control the 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.

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.

4.3.4 POWER SUPPLY

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

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: ±0.5 volts

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

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 overall performance parameters that are most indicative of individual 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. The overall performance parameters that are most indicative of system component 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

DC voltages for the converter are monitored on the front 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. A set of power supply test points is available on the power supply, these test points can be used if the front panel display is malfunctioning.

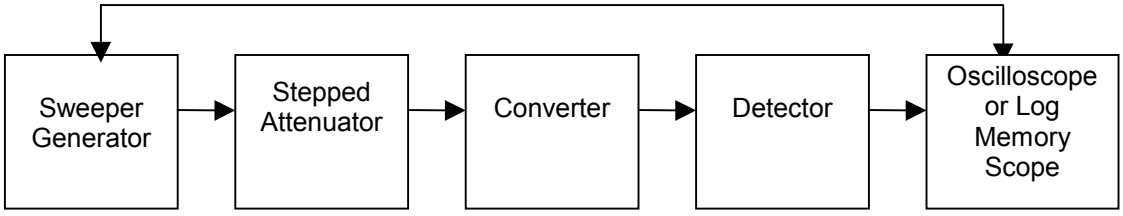


Figure 5-1. Test Setup for Gain Response Measurement

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 front panel LO test points.

5.2.4 LOCAL OSCILLATOR PHASE VOLTAGE

Local Oscillator phase voltages are monitored on the front panel. The 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. LO: 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 alarm 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 so 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-9696-3 UPCONVERTER

ITEM	"A" NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
1	A1A1	Corcom	6J4(F1881)	AC Line Filter
2	A1A2	MITEQ	126215	On/Off Switch
3	A1A3	MITEQ	121897	Power Supply
4	A1A4	Globe Motors	A24-B12A-15W3-000	Fan
5	A2A1	MITEQ	IUM75-70-1220-XXXXX	Upconverter Module
		MITEQ	*IUM75-140-1290-XXXXX	Upconverter Module
			OPTION 15	
		MITEQ	IUM50-70-1220-XXXXX	Upconverter Module
		MITEQ	*IUM50-140-1290-XXXXX	Upconverter Module
6	A2A2	MITEQ	FLT-106890-1.22	Bandpass Filter
		MITEQ	*FLT-111668-1.29	Bandpass Filter
7	A2A3	MITEQ	113942-7	Isolator
		MITEQ	*113942-3	Isolator
8	A2A4	MITEQ	M20-1.22-14.125-XXXXX	Balanced Mixer
		MITEQ	*M20-1.29-14.125-XXXXX	Balanced Mixer
9	A2A5	MITEQ	122551	Isolator
10	A2A6	MITEQ	FLT-117752	Filter
11	A2A7	MITEQ	122551	Isolator
12	A2A8	MITEQ	121643-15-15	Amplifier
13	A2A9	MITEQ	122551	Isolator
			OPTION 2A	
14	A2A10	MITEQ	117525-7	Directional Coupler
15	A2A11	MITEQ	122551	Isolator
		MITEQ	*111896	Isolator
16	A3A1	MITEQ	120274	Crystal Oscillator
			OPTION 10A	
		MITEQ	120275	Crystal Oscillator
			OPTION 10B	
		MITEQ	120276	Crystal Oscillator
			OPTION 10C	
		MITEQ	120277	Crystal Oscillator

TABLE 5-1

PARTS LIST - U-9696-3 UPCONVERTER

ITEM	"A" NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
			OPTION 23D	
		MITEQ	129102	Crystal Oscillator
			OPTIONS 23D & 10A	
		MITEQ	129103	Crystal Oscillator
			OPTIONS 23D & 10B	
		MITEQ	129104	Crystal Oscillator
			OPTIONS 23D & 10C	
		MITEQ	129105	Crystal Oscillator
			OPTION 23F	
		MITEQ	131994	Crystal Oscillator
			OPTIONS 23F & 10A	
		MITEQ	131995	Crystal Oscillator
			OPTIONS 23F & 10B	
		MITEQ	131996	Crystal Oscillator
			OPTIONS 23F & 10C	
		MITEQ	131997	Crystal Oscillator
17	A3A2	MITEQ	114779-4	Fixed Attenuator
18	A3A3	MITEQ	130507	Phase Lock Source/Freq. Synthesizer
19	A3A4	MITEQ	114779-	SAT Attenuator
20	A3A5	MITEQ	113784	Isolator
21	A3A6	MITEQ	117525-7	Directional Coupler
22	A3A7	MITEQ	114779-	SAT Attenuator
23	A4A1	MITEQ	119979	Front Panel Assembly
24	A4A2	MITEQ	119386	Control Board Assembly
25	A4A3	Varitronics	LM4222BG2C16HNG	Display
			OPTION 17C	
26	A4A4	MITEQ	121527	RS232 Control Board
			OPTION 17D	
		MITEQ	121529	Contact Closure Control Board
			OPTION 17F	
		MITEQ	121531	IEEE 488 Control Board

TABLE 5-1

PARTS LIST - U-9696-3 UPCONVERTER

ITEM	"A" NUMBER	MANUFACTURER	PART NUMBER	DESCRIPTION
			OPTION 17G	
		MITEQ	123716	BCD Contact Closure Control Bd.
27	A4A6	MITEQ	121081	Alarm Interface Board
28	A4A7	MITEQ	121605	RS485/422 Interface Board

XXXXX represents a unique number assigned at time of order. 130514C/131228B

*Indicates part number for converters supplied with Option 4, 140 MHz IF Frequency.

SECTION 6

DIAGRAMS

6.1 INTRODUCTION

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

TABLE 6-1

LIST OF DIAGRAMS

DASH NO.	APPLICATION	
	NEXT ASSY	USED ON

REVISIONS				
LTR	DESCRIPTION	DATE	APPROVED Q.C.	DEP
A	INITIAL RELEASE	5/9/97	TO	2S

THIS DRAWING INCOMPLETE WITHOUT ECN'S

LTR																														
SHEET																														
LTR																														
SHEET	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	6
LTR	A	A	A	A	A																									
SHEET	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	3

ALL PAGES ARE OF ORIGINAL ISSUE (A) EXCEPT AS NOTED.

CONTR NO.

PREP BY T. Brennan	5/9/97
CHK BY T. Brennan	5/9/97
ENGR (PROJ)	
APPROVAL (Q.C.)	
APPROVAL (DEPT.)	

MITEQ
HAUPPAUGE, N.Y. 11788-8000

WIRING DIAGRAM
U-9696-3
UPCONVERTER

SIZE	CODE IDENT NO.	
A	33592	130599

SCALE | 259363 | SHEET 1 OF 6

WIRE RUN SHEET

UPCONVERTER.
MODEL: U-9696-3 **BLOCK DIAGRAM:130514**

FROM: AC LINE FILTER A1A1		
DESIGNATION	COLOR	TO
L	80 OR 1	A1A2 - C2
N	89 OR 6	A1A2 - C1
J	80 OR 1	A1A2 - NO2
F	80 OR 1	A1A3 - 5
D	80 OR 1	A1A3 - 4
E	80 OR 1	A1A4 - E1

FROM: POWER ON/OFF SWITCH A1A2		
DESIGNATION	COLOR	TO
C1	89 OR 6	A1A1 - N
C2	80 OR 1	A1A1 - L
NO-1	89 OR 6	A1A3 - 2
NO-2	80 OR 1	A1A1 - J
L1	45	A1A3 TB1 - TERM 4-6
L2	0	A1A3 TB1 - TERM 1-3

FROM: FAN A1A4		
DESIGNATION	COLOR	TO
E1	0	A1A1 - E
E2	0	A1A3 - TERM 3

FROM: POWER SUPPLY A1A3		
DESIGNATION	COLOR	TO
TERM #2	89 OR 6	A1A2 - NO-1
TERM #3	80 OR 1	A1A1 - E
TERM #4	89 OR 6	A1A1 - D
TERM #5	80 OR 1	A1A1 - F
+5V"A" TB1 - TERM 4-6	5	A4A2 J1-9
+5V"B" TB1 - TERM - 8	59	A4A2 J1-7
+5V"B" RTN-TB1-TERM - 7	04	A4A2 J1-1
+20V TB1 - TERM 13-16	20	A3A1 - PIN-4
+20V RTN TB1-TERM 9-12	0	A3A1 - PIN-3

FROM: FREQUENCY SYNTHESIZER A3A3		
DESIGNATION	COLOR	TO
+20V (PIN-1)	29	A1A3 TB1 - TERM 13-16
PH VOLT T.P.(PIN-2)	19	A4A2 PIN-18
RF ALARM LED (PIN-3)	91	A4A2 PIN-13
+5V (PIN-4)	5	A1A3 TB1 - TERM 4-6
+5V RTN (PIN-5)	05	A1A3 TB1 - TERM 1-3
+20V (PIN-6)	29	A1A3 TB1 - TERM 13-16
+5V (PIN-8)	5	A1A3 TB1 - TERM 4-6
+20V RTN (PIN-9)	0	A1A3 TB1 - TERM 9-12

(24 AWG WIRE) FROM: IF MODULE (INPUT) A2A1		
DESIGNATION	COLOR	TO
+20V (J1-3)	29	A1A3 +20V TERM 13-16
+20V (J1-5)	29	A1A3 +20V TERM 13-16
+5V (J1-1)	5	A1A3 +5V TERM 4-6
+20V RTN (J1-4)	0	A1A3 +20V RTN TERM 9-12
+20V RTN (J1-6)	0	A1A3 +20V RTN TERM 9-12
+5V RTN (J1-2)	05	A1A3 +5V RTN TERM 1-3
FROM: IF MODULE A2A1-J3.		
DESIGNATION	COLOR	TO
J3 PIN-3	96	A2A8 (+) TERM.
J3 PIN-4	0	A2A8 (-) TERM.

FROM: CRYSTAL OSCILLATOR A3A1		
DESIGNATION	COLOR	TO
+20V (PIN-4)	20	A1A3 TB1 - TERM 13-16
+20 RTN (PIN-3)	0	A1A3 TB1 - TERM 9-12

FROM: CONTROL BOARD A4A2			
DESIGNATION	JI-PIN	COLOR	TO
+5V "A" MONITOR(RF)	9	5	A1A3 TB1 - TERM 4-6
IF-LO PH VOLT T.P.			
RF-LO PH VOLT T.P.	18	19	A3A3 (PIN-2)
IF LOA OUT OF LK ALM			
IF-LOB OUT OF LK ALM	6		
RF-LO OUT OF LOCK ALM	13	91	A3A3 (PIN-3)
+5V "B" GROUND	1	04	A1A3 TB1 - TERM - 7
+20V RTN	3	0	A1A3 TB1 - TERM 13-16
+5V RTN	5	05	A1A3 TB1 - TERM 1-3
+20V	11	29	A1A3 TB1 - TERM 13-16
+5V "B"	7	59	A1A3 TB1 - TERM - 8

FROM: POWER SUPPLY TERMINAL STRIP A1A3		
DESIGNATION	COLOR	TO
+20V TB1 - TERM 13-16	29	A3A3 (PIN-1)
+20V TB1 - TERM 13-16	29	A3A3 (PIN-6)
+20V TB1 - TERM 13-16	29	A2A1 CONN J1-3
+20V TB1 - TERM 13-16	29	A4A2 (PIN-11)
+20V RTN TB1-TERM 9-12	0	A4A2 (PIN-3)
+20V RTN TB1-TERM 9-12	0	A3A3 (PIN-9)
+20V RTN TB1-TERM 9-12	0	A2A1 CONN J1-4
+5V TB1 - TERM 4-6	5	A3A3 (PIN-4)
+5V TB1 - TERM 4-6	5	A3A3 (PIN-8)
+5V TB1 - TERM 4-6	5	A2A1 CONN J1-1
+5V TB1 - TERM 4-6	45	A1A2 - L1
+5V RTN TB1-TERM 1-3	05	A3A3 (PIN-5)
+5V RTN TB1-TERM 1-3	05	A2A1 CONN J1-2
+5V RTN TB1-TERM 1-3	05	A4A2 (PIN-5)
+5V RTN TB1-TERM 1-3	0	A1A2 - L2
+20V TB1 - TERM 13-16	29	A2A1 CONN J1-5
+20V RTN TB1-TERM 9-12	0	A2A1 CONN J1-6

FROM: AMPLIFIER A2A8.		
DESIGNATION	COLOR	TO
(+) TERM	96	A2A1 J3 PIN-3
(-) TERM	0	A2A1 J3 PIN-4

DASH NO.	APPLICATION	
	NEXT ASSY	USED ON

REVISIONS				
LTR	DESCRIPTION	DATE	APPROVED Q.C.	APPROVED DEPT.
A	INITIAL RELEASE	5/25/97	TB	25

THIS DRAWING INCOMPLETE WITHOUT ECN'S

LTR																														
SHEET																														
LTR																														
SHEET	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
LTR	A	A	A	A	A																									
SHEET	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

ALL PAGES ARE OF ORIGINAL ISSUE (A) EXCEPT AS NOTED.

CONTR NO.

PREP BY T Brennan 5/25/97

CHK BY T. Brennan 5/25/97

ENGR (PROJ)

APPROVAL (Q.C.)

APPROVAL (DEPT.)

MITEQ INC. HAUPPAUGE, N.Y. 11788-3000

WIRING DIAGRAM
U-9696-3
UPCONVERTER OPT. 4: 140 MHz IF FREQ.

SIZE	CODE IDENT NO.	
A	33592	131314

SCALE	7285 4	SHEET 1 OF 6

WIRE RUN SHEET

UPCONVERTER.
MODEL: U-9696-3 **BLOCK DIAGRAM: 131228**
OPT 4: 140 MHz IF FREQ.

FROM: AC LINE FILTER A1A1		
DESIGNATION	COLOR	TO
L	80 OR 1	A1A2 - C2
N	89 OR 6	A1A2 - C1
J	80 OR 1	A1A2 - NO2
F	80 OR 1	A1A3 - 5
D	80 OR 1	A1A3 - 4
E	80 OR 1	A1A4 - E1

FROM: POWER ON/OFF SWITCH A1A2		
DESIGNATION	COLOR	TO
C1	89 OR 6	A1A1 - N
C2	80 OR 1	A1A1 - L
NO-1	89 OR 6	A1A3 - 2
NO-2	80 OR 1	A1A1 - J
L1	45	A1A3 TB1 - TERM 4-6
L2	0	A1A3 TB1 - TERM 1-3

FROM: FAN A1A4		
DESIGNATION	COLOR	TO
E1	0	A1A1 - E
E2	0	A1A3 - TERM 3

FROM: POWER SUPPLY A1A3		
DESIGNATION	COLOR	TO
TERM #2	89 OR 6	A1A2 - NO-1
TERM #3	80 OR 1	A1A1 - E
TERM #4	89 OR 6	A1A1 - D
TERM #5	80 OR 1	A1A1 - F
+5V"A" TB1 - TERM 4-6	5	A4A2 J1-9
+5V"B" TB1 - TERM - 8	59	A4A2 J1-7
+5V"B" RTN-TB1-TERM - 7	04	A4A2 J1-1
+20V TB1 - TERM 13-16	20	A3A1 - PIN-4
+20V RTN TB1-TERM 9-12	0	A3A1 - PIN-3

FROM: FREQUENCY SYNTHESIZER A3A3		
DESIGNATION	COLOR	TO
+20V (PIN-1)	29	A1A3 TB1 - TERM 13-16
PH VOLT T.P.(PIN-2)	19	A4A2 PIN-18
RF ALARM LED (PIN-3)	91	A4A2 PIN-13
+5V (PIN-4)	5	A1A3 TB1 - TERM 4-6
+5V RTN (PIN-5)	05	A1A3 TB1 - TERM 1-3
+20V (PIN-6)	29	A1A3 TB1 - TERM 13-16
+5V (PIN-8)	5	A1A3 TB1 - TERM 4-6
+20V RTN (PIN-9)	0	A1A3 TB1 - TERM 9-12

(24 AWG WIRE) FROM: IF MODULE (INPUT) A2A1		
DESIGNATION	COLOR	TO
+20V (J1-3)	29	A1A3 +20V TERM 13-16
+20V (J1-5)	29	A1A3 +20V TERM 13-16
+5V (J1-1)	5	A1A3 +5V TERM 4-6
+20V RTN (J1-4)	0	A1A3 +20V RTN TERM 9-12
+20V RTN (J1-6)	0	A1A3 +20V RTN TERM 9-12
+5V RTN (J1-2)	05	A1A3 +5V RTN TERM 1-3
FROM: IF MODULE A2A1-J3.		
DESIGNATION	COLOR	TO
J3 PIN-3	96	A2A8 (+) TERM.
J3 PIN-4	0	A2A8 (-) TERM.

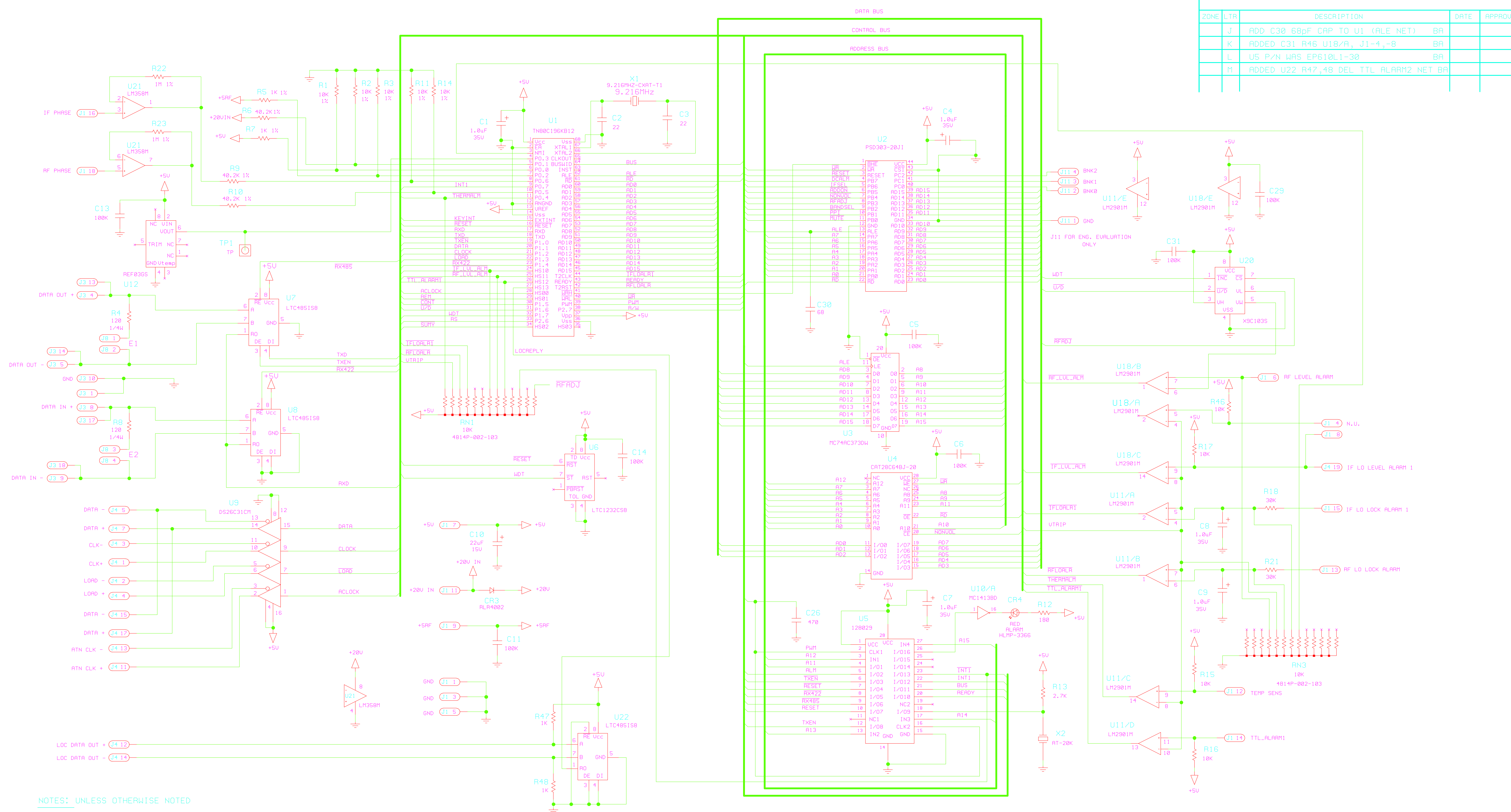
FROM: CRYSTAL OSCILLATOR A3A1		
DESIGNATION	COLOR	TO
+20V (PIN-4)	20	A1A3 TB1 - TERM 13-16
+20 RTN (PIN-3)	0	A1A3 TB1 - TERM 9-12

FROM: CONTROL BOARD A4A2			
DESIGNATION	JI-PIN	COLOR	TO
+5V "A" MONITOR(RF)	9	5	A1A3 TB1 - TERM 4-6
IF-LO PH VOLT T.P.			
RF-LO PH VOLT T.P.	18	19	A3A3 (PIN-2)
IF LOA OUT OF LK ALM			
IF-LOB OUT OF LK ALM	6		
RF-LO OUT OF LOCK ALM	13	91	A3A3 (PIN-3)
+5V "B" GROUND	1	04	A1A3 TB1 - TERM - 7
+20V RTN	3	0	A1A3 TB1 - TERM 13-16
+5V RTN	5	05	A1A3 TB1 - TERM 1-3
+20V	11	29	A1A3 TB1 - TERM 13-16
+5V "B"	7	59	A1A3 TB1 - TERM - 8

FROM: POWER SUPPLY TERMINAL STRIP A1A3		
DESIGNATION	COLOR	TO
+20V TB1 - TERM 13-16	29	A3A3 (PIN-1)
+20V TB1 - TERM 13-16	29	A3A3 (PIN-6)
+20V TB1 - TERM 13-16	29	A2A1 CONN J1-3
+20V TB1 - TERM 13-16	29	A4A2 (PIN-11)
+20V RTN TB1-TERM 9-12	0	A4A2 (PIN-3)
+20V RTN TB1-TERM 9-12	0	A3A3 (PIN-9)
+20V RTN TB1-TERM 9-12	0	A2A1 CONN J1-4
+5V TB1 - TERM 4-6	5	A3A3 (PIN-4)
+5V TB1 - TERM 4-6	5	A3A3 (PIN-8)
+5V TB1 - TERM 4-6	5	A2A1 CONN J1-1
+5V TB1 - TERM 4-6	45	A1A2 - L1
+5V RTN TB1-TERM 1-3	05	A3A3 (PIN-5)
+5V RTN TB1-TERM 1-3	05	A2A1 CONN J1-2
+5V RTN TB1-TERM 1-3	05	A4A2 (PIN-5)
+5V RTN TB1-TERM 1-3	0	A1A2 - L2
+20V TB1 - TERM 13-16	29	A2A1 CONN J1-5
+20V RTN TB1-TERM 9-12	0	A2A1 CONN J1-6

FROM: AMPLIFIER A2A8.		
DESIGNATION	COLOR	TO
(+) TERM	96	A2A1 J3 PIN-3
(-) TERM	0	A2A1 J3 PIN-4

ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	J	ADD C30 68pF CAP TO U1 (ALE NET) BA		
	K	ADDED C31 R46 U18/A, J1-4,-8 BA		
	L	U5 P/N WAS EP610L1-30 BA		
	M	ADDED U22 R47,48 DEL TTL ALARM2 NET BA		



NOTES: UNLESS OTHERWISE NOTED

1. ALL RESISTORS VALUES ARE IN OHMS, 1/8W.
2. ALL CAPACITOR VALUES ARE IN PICOFARADS.
3. ALL INDUCTORS VALUES ARE IN MIRCOHENRIES.
4. J1 P/N IS A TSM-110-01-DV-P (SAMTECH).
5. J2, J3 AND J4 P/N'S ARE 104549-2 (AMP).
6. J5 P/N IS 929400-01-12 (3M).
7. J6 IS THE MOUNTING FOR A DENSITRON LCD.
8. J7 P/N IS 104549-5 (AMP).
9. J8 AND J11 P/N'S ARE TSM-104-01-T-SV-P (SAMTEC).
10. J9 AND J10 P/N'S ARE TSM-103-01-T-SV-P (SAMTEC).

ARTWORK	403418
ASSEMBLY	119386
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON
DECIMALS .XX ± .01 .XXX ± .005 ANGLES ±0°30

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	J.KLEPPER	5/21/92
CHKD BY		
APPROVED BY		
PROJ ENGR		
ENGR SECT		
Q A		

MITEQ 100 DAVIDS DRIVE, HAUPPAUGE, NEW YORK 11788

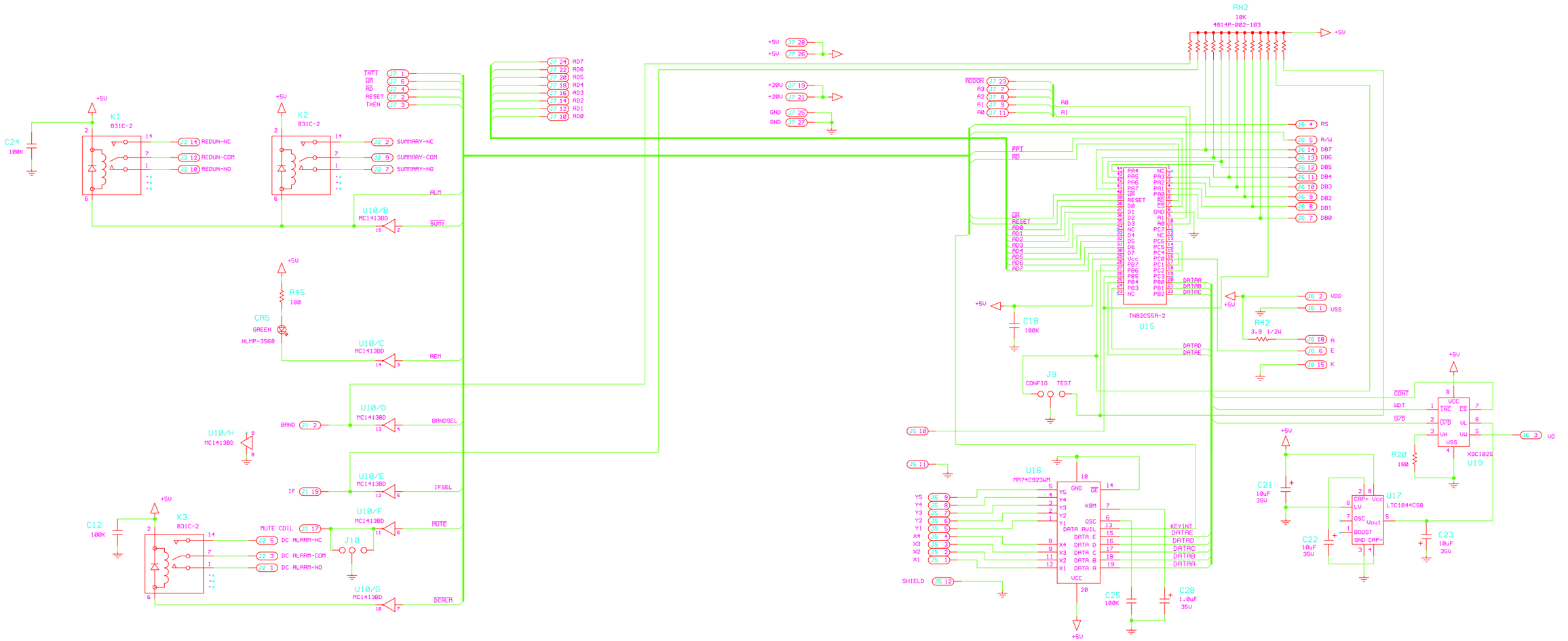
SCHEMATIC DIAGRAM
SLIMLINE FRONT
PANEL CONTROLLER

SIZE	CODE IDENT. NO.		REV.
D	33592	119385	M

SCALE NONE REF 25R004 SHEET 1 OF 2

01

ZONE	LTR	DESCRIPTION	DATE	APPROVAL
	M	SEE SHEET 1 FOR REVISIONS		

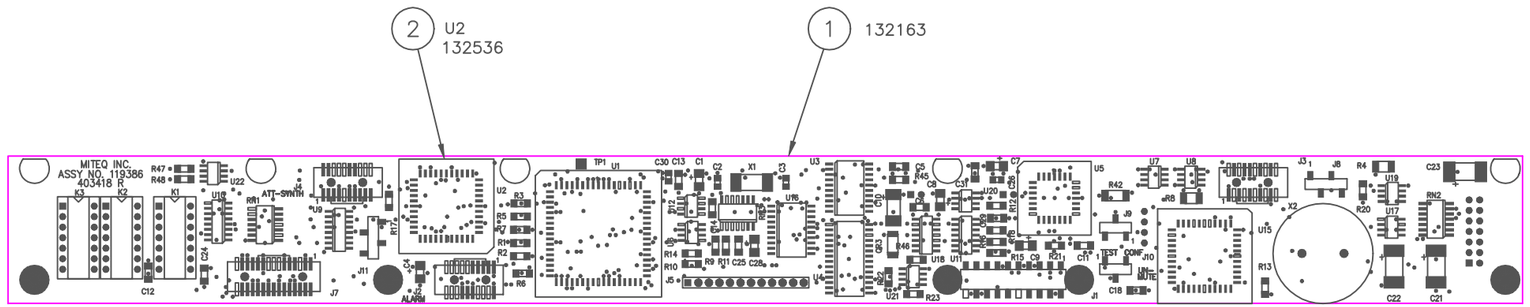


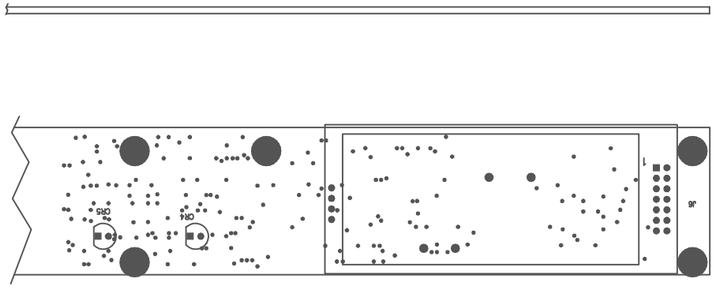
ARTWORK	403418	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON		MITEQ 100 DAVIS DRIVE, HAUPPAUGE, NEW YORK 11788
ASSEMBLY	119385	DECIMALS .XX ± .01 .XXX ± .005	ANGLES ±0°30	SCHEMATIC DIAGRAM SLIMLINE FRONT PANEL CONTROLLER
		MATERIAL	DRN BY J.KLEPPER 5/21/92	
			CHKD BY	APPROVED BY
		FINISH	PROJ ENGR	
			ENGR SECT	
NEXT ASSY	USED ON	HEAT TREAT	Q A	
APPLICATION				SIZE D · CODE IDENT. NO. 33592 · 119385 · REV. M
				SCALE NONE · REF 25R004 · SHEET 2 OF 2

02

119385

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
	T	CHANGE REF DES U2 WAS XU2	12/15/98	S. Walata





119386

−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
DECIMALS .XX±.01 .XXX±.005 ANGLES ±0°30'

MATERIAL

FINISH

HEAT TREAT

	NAME	DATE
DRN BY	J.C.	5/21/92
CHKD BY	S. Walata	3/4/99
APPROVED BY		
PROJ ENGR		
ENG SECT		
Q.A.		

NEXT ASSY	USED ON
	132163
APPLICATION	

MITEQ
100 Davids Drive, Hauppauge, New York 11788

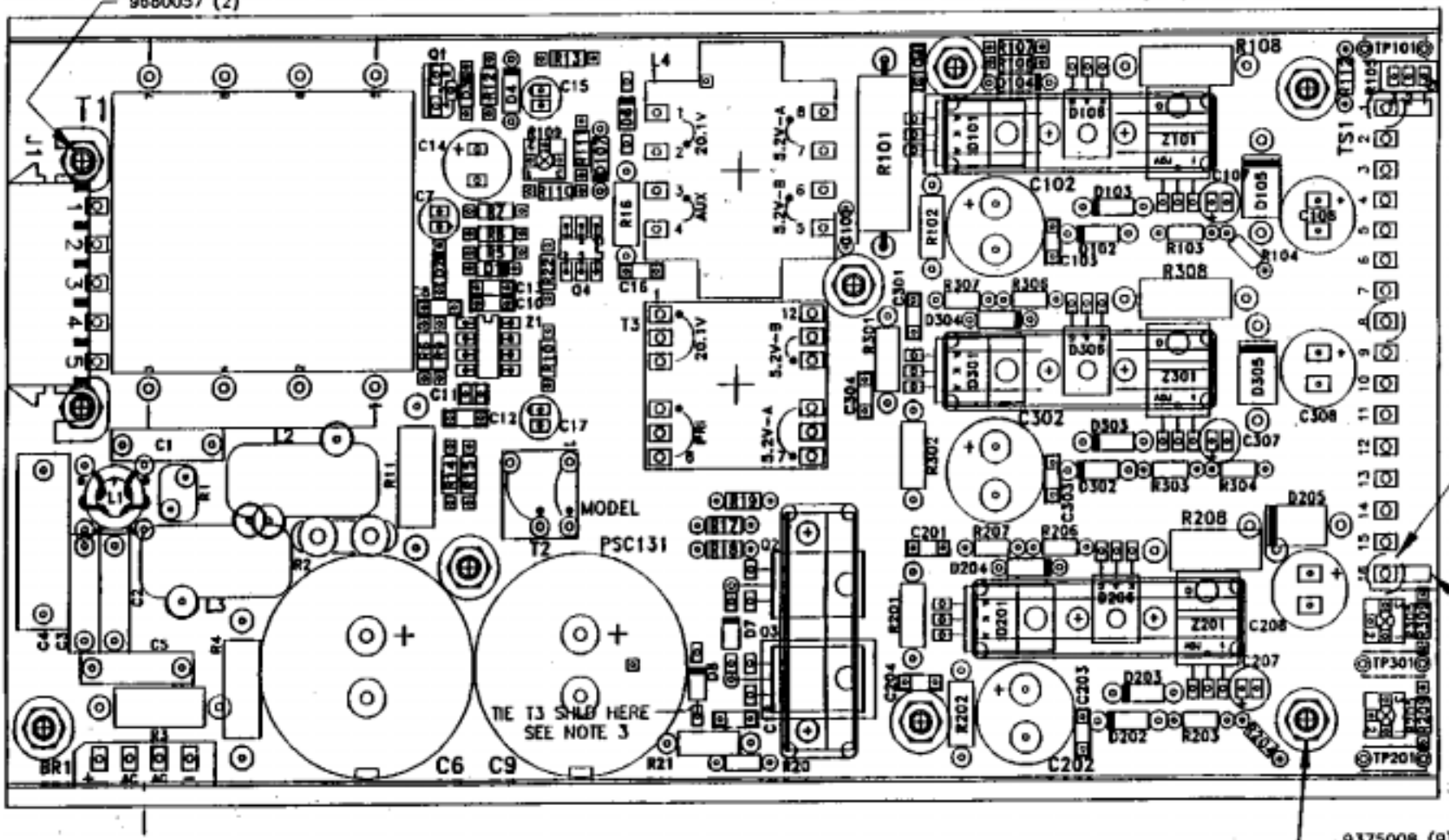
ASSEMBLY, SLIMLINE FRONT PANEL CONTROLLER

SIZE	CODE IDENT. NO.		REV.
C	33592	119386	T

SCALE | REF 25R004 | SHEET 1 OF 1

NOTES:
1. INSTALL 670128 TMNLS (2) FOR R2.
2. SOLDER COPPER FOIL (Z101,201,301) TO PCB BEFORE INSTALLING R108,208,308.
3. TIE T3 SHLD TO D8 LEAD AS SHOWN.
4. MOUNT BR1 TO CHASSIS WITH: 9116105,9306005,9406005,9446005, APPLY 111001 BETWEEN CHASSIS AND PART.

REVISIONS			
SYM	DESCRIPTION	DATE	APPR
1	PSC ISSUED	10/07/93	CMC



TYPICAL (3) PLACES

TOLERANCES: (UNLESS OTHERWISE SPECIFIED) .XX = ± .02 .XXX = ± .005	NEXT ASSY	USED ON	NEXT ASSY/FINAL ASSY
	APPLICATION		QTY REQD

ASSEMBLY DRAWING

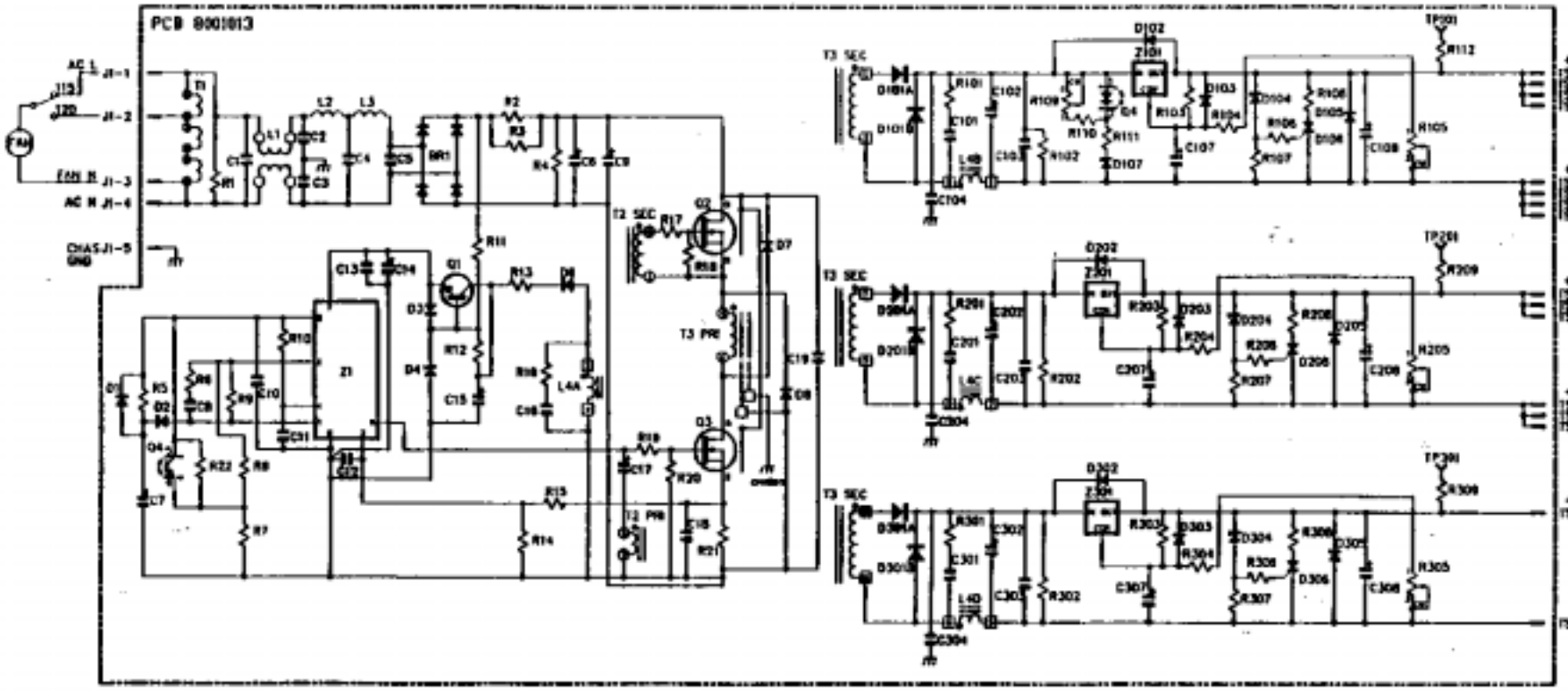
MAIN PCB

MODEL PSC131

POWER SUPPLY CONCEPTS, INC.
840 JUPITER PARK DRIVE
UNITS 103-104
JUPITER, FL 33458

SIZE	FSCM NO:	DRAWING NUMBER
C	0ENK6	8011013
SCALE:		SHEET 1 OF 1

NOTES:
1. REF: MITEQ SPEC 120897
2 REF: PSC OUTLINE DRAWING 872101



LAST CIRCUIT REF NOS USED: C19, D8, L4, Q4, R22, T3, Z1.
LAST CIRCUIT REF NOS USED: C109, D107, L102, R112, Z101.
LAST CIRCUIT REF NOS USED: C209, D204, L202, R209, Z201.
LAST CIRCUIT REF NOS USED: C309, D304, L302, R309, Z301.

POWER SUPPLY SCHEMATIC

121897 BILL OF MATERIALS REV. 2 11/12/93

ASSY	ITEM	QTY	SYMBOL	PART NUMBER	DESCRIPTION
8011013	31	1	R01	1714311	VARISTOR V430ZA05
8011013	32	1	R02	1723001	THERMISTOR SS10005
8011013	27.1	1	R03	1312207	RES W.W. 3W 5% 22R
8011013	15	1	R04	1161603	RES. MOX 2W 5% 160K
8011013	8	3	R05,18,21	1015603	RES. CARB 1/4W 5% 560K
8011013	5	1	R06	1011501	RES. CARB 1/4W 5% 1K5
8011013	23.1	1	R07	1203011	RES. M.FILM 1/4W 1% RN55D 3K01
8011013	20.1	1	R08	1201212	RES. M.FILM 1/4W 1% 12K1
8011013	3	1	R09	1011003	RES. CARB 1/4W 5% 100K
8011013	19.1	1	R10	1201002	RES. M.FILM 1/4W 1% 10K0
8011013	17	1	R101	1176807	RES. MOX 3W 5% 68ð
8011013	11	1	R102	1032201	RES. CARB 1/2W 5% 2K2
8011013	22	1	R103	1202370	RES. M.FILM 1/4W 1% 237ð
8011013	24	1	R104	1203321	RES. M.FILM 1/4W 1% 3K32
8011013	33	1	R105	1755001	RES VAR 25T 500ð TYPE 3296W
8011013	1	3	R106,206,306	1011000	RES. CARB 1/4W 5% 100R
8011013	2	3	R107,207,307	1011001	RES. CARB 1/4W 5% 1K0
8011013	28.1	3	R108,208,308	1312209B	RES W.W. 3W 5% 0R22ð
8011013	29	1	R109	1671000	RES. VAR 1T 100ð 3323P
8011013	16	1	R11	1165602	RES. MOX 2W 5% 56K
8011013	18	1	R110	1201000	RES. M.FILM 1/4W 1% RN55D 100R
8011013	25.1	1	R111	1204750	RES. M.FILM 1/4W 1% RN55D 475R
8011013	2	1	R12	1011001	RES. CARB 1/4W 5% 1K0
8011013	4	3	R13,17,19	1011007	RES. CARB 1/4W 5% 10R
8011013	6	1	R14	1013301	RES. CARB 1/4W 5% 3K3
8011013	9	1	R15	1016800	RES. CARB 1/4W 5% 680R
8011013	13	1	R16	103TBD	RES. CARB 1/2W 5% TBD
8011013	10	2	R201,301	1031000	RES. CARB 1/2W 5% 100R
8011013	12	2	R202,302	1033900	RES. CARB 1/2W 5% 390R
8011013	26	2	R203,303	1205900	RES. M.FILM 1/4W 1% 590ð
8011013	21.1	2	R204,304	1201621	RES. M.FILM 1/4W 1% 1K62
8011013	30	2	R205,305	1675000	RES. VAR 1T 500ð 3323P
8011013	14.1	1	R21	1145009	RES. MOX 1W 5% 0.5ð

ASSY	ITEM	QTY	SYMBOL	PART NUMBER	DESCRIPTION
8011013	7	1	R22	1015102	RES. CARB 1/4W 5% 51K
8011013	40.1	4	C01,02,03,05	2121030	CAP 0.01M 250VAC-X2
8011013	41	4	C04,105,205, 305	2122240	CAP 0.22M 250VAC
8011013	38	2	C06,09	2012273	CAP 220M 400V TYPE LLQ
8011013	37.1	6	C07,15,17, 107,207,307	2012261	CAP 22M 35V TYPE UKL
8011013	45	1	C08	2231011	CAP 100PF 200V CK
8011013	49	1	C10	2232232	CAP 0.022M 100V CK
8011013	43	1	C101	2202710	CAP 270PF 1KV DISC DD271(5GAT27)
8011013	36.1	1	C102	2011083	CAP 1000M 50V TYPE SME
8011013	47	6	C103,104,203 204,303,304	2231041	CAP 0.1M 100V 10% CK
8011013	52	3	C106,206,306	2235620	CAP 5600PF 200V 10% CK
8011013	35	3	C108,208,308	2011082	CAP 1000M 35V TYPE SME
8011013	44	1	C11	2224770	CAP 470PF 100V NPO
8011013	51	1	C12	2233911	CAP 390PF 200V CK
8011013	50	5	C13,18,105, 205,305	2233341	CAP 0.33M 50V 10% CK06
8011013	34	1	C14	2011070	CAP 100M 35V
8011013	46	1	C16	2231030	CAP 0.01M 200V 10% CK
8011013	42	1	C19	2201040	CAP 0.1M 500V DISC
8011013	48	2	C201,301	2232223	CAP 2200PF 200V CK
8011013	39.1	2	C202,302	2013380	CAP 3300M 16V TYPE SME
8011013	54	1	Z01	254405	I.C. UC2844J 8 PIN MINIDIP
8011013	53	3	Z101,201,301	239350	I.C. LIN REGULATOR (TO-220) LM350BT
8011013	55	1	Z102	290066	I.C. MOC8102
8011013	67	1	BR01	373623	RECT BR 8A KBU806
8011013	56	3	D01,02,03	310120	DIODE 1N4148
8011013	60	1	D04	352200	ZENER REGULATOR 1N968B
8011013	57	3	D06,07,08	317623	RECT 1A MUR160
8011013	66	1	D101A,B	373420	RECT BR 8A MUR1640CT
8011013	59	6	D102,103,202 203,302,303	339510	DIODE 1N4001

ASSY	ITEM	QTY	SYMBOL	PART NUMBER	DESCRIPTION
8011013	63	1	D104	352757	ZENER REGULATOR 1N958B
8011013	58	3	D105,205,305	337120	DIODE 1N5402
8011013	64	3	D106,206,306	367511	SCR C106F (TO-126 STYLE 2)
8011013	61	1	D107	352220B	ZENER REGULATOR 1N969B JAN TX
8011013	65	2	D201A,B;		
			301A,B	373220	RECT BR-8A MUR1620CT
8011013	62	2	D204,304	352240	ZENER REGULATOR 1N970B
8011013	68	1	Q01	415006	TSTR MJE182
8011013	69	2	Q02,03	454102	FET 2SK950 ***STATIC SENS. DEVICE****
8011013	73	1	J01	690009	PCB HORIZONTAL HEADER,.250 P.,5 WAY
8011013	72	3	TP01,02,03	672015	TEST JACK PCB
8011013	79	1	L01	749008	INDUCTOR, COMMON MODE PSC113
8011013	76	2	L02,03	729030	INDUCTOR PSC127
8011013	77	1	L04	729060	INDUCTOR O/P COMBO PSC131
8011013	74	1	T01	709061	TRANSFORMER SIGNAL P/N LP 120-100
8011013	78	1	T02	739033	DRIVE XF PSC116
8011013	75	1	T03	719044	TRANSFORMER,FFD CONV PSC127
8011013	80.1	1-		8001013	PCB-PSC131
8011013	81	0	REF DWG	8011013	ASSY DWG-PCB PSC131
8711011	84	0	REF DWG	8741011	CIRCUIT DIAGRAM PSC131