XTS-200C Outdoor Solid State Amplifier Operation and Installation Manual

Document Number: MN5-0281-202
Revision: D
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3550 Bassett Street
Santa Clara, CA 95054 USA
408-213-3000 Phone • 408-213-3001 Fax
www.xicomtech.com

ISO 9001

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About this manual

This manual provides operators and technicians with a set of tools for operating and maintaining the Outdoor Unit Family of Xicom Solid State Power Amplifiers.

This Prefix contains a Table of Contents that applies to the entire manual and a Record of Changes page that applies only to this Prefix.

Each Chapter has its own Part Number, Revision Level, Record of Changes page, Table of Contents, List of Figures, and List of Tables.

Chapter One — Provides an overview of the manual; delineates who should use the manual; how to contact Xicom Technology.

Chapter Two — Describes safety information that pertains to Xicom Technology products. It also provides information about Warnings, Cautions and Notes that are found throughout the manual.

Chapter Three — Provides general installation information, communication interface switch settings and cable pinouts.

Chapter Four — Provides the operating instructions for the power amplifier.

Chapter Five — Provides communication protocols used with Xicom Technology amplifiers

Chapter Six — Provides the information necessary to update the amplifier firmware and describes the preventive maintenance requirements for Xicom Technology power amplifiers.

Chapter Seven — Provides information regarding service and repair of Xicom Technology power amplifiers, including instructions on obtaining RMA (Return Maintenance Authorization) Numbers.

List of Abbreviations, Acronyms, and CE Symbols — Lists the abbreviations, acronyms, and CE symbols that may be found in Xicom Technology documentation.

Appendices — The Appendices provide operators and technicians with information and specifications that are specific to their particular version of Xicom Technology Power Amplifier.

Who should use this manual

This manual is designed for use by trained operators and technicians who have a thorough knowledge of satellite transmitting and receiving equipment.

Persons using this manual should familiarize themselves with the information in the Appendices before reading the main sections.

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	01/10/2005	ALCjr
A	12787	Original Release	02/09/2005	ALCjr
B	13848	Added MNC-0000-041 to TOC	03/30/2006	SL
C	14805	Update Table of Contents	05/22/2007	SL
D	15730	Update Table of Contents	08/16/2007	ALCjr

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List of Abbreviations, Acronyms, and CE Symbols

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
A	9735	Original Release	04/17/2002	A.L. Crozier, Jr.
A1	10179	Add numerous abbreviations	08/21/2002	A.L. Crozier, Jr.
A2	10646	Add more abbreviations; CE symbols	01/14/2003	A.L. Crozier, Jr.
A3	11044	Add more abbreviations	05/15/2003‘	A.L. Crozier, Jr.
A4	11802	Add more abbreviations	01/13/2004	A.L. Crozier, Jr.
A5	12050	Add more abbreviations	03/19/2004	A.L. Crozier, Jr.
A6	12808	Add more abbreviations	02/23/2005	A.L. Crozier, Jr.
A7	14758	Correct entries and add new entries	09/08/2006	ALCJr

List of Abbreviations, Acronyms, and CE Symbols

References

The following documents are used as reference material for this chapter:

- International Standard ISO-7000: 1989. *Graphical symbols for use on equipment — Index and synopsis*
- International Standard CEI/IEC 60417-2: 1998. *Graphical symbols for use on equipment — Part 2: Symbol originals*
- Society of Exploration Geophysicist. 1980. *The SI Metric System of Units And SEG Tentative Standard*.
- The American Society of Mechanical Engineers. November 1999. *ASME Y14.38-1999. Abbreviations and Acronyms*.
- Wachal, Robert S. 1999. *Abbreviations Dictionary: A practical compilation of today's acronyms and abbreviations*. Boston/New York: Hougton Mifflin Company.
- Franklin Covey. 1999. *Franklin Covey Style Guide: FOR BUSINESS AND TECHNICAL COMMUNICATION, THIRD EDITION.*

Abbreviations and Acronyms

Abbreviation or Acronym	Definition
AC	alternating current
ack	Acknowledgement
ad	analog-to-digital
ADC	analog-to-digital converter
AFC	automatic frequency control
AGC	automatic gain control
ALC	automatic level control
amp (A)	ampere
amphr	ampere-hour
ampl	amplifier
anlg	analog
ant	antenna
ATP	Acceptance Test Procedure
AVC	automatic volume control
BA	buffer amplifier

Abbreviation or Acronym	Definition
BDELIM	band elimination
BIT	binary digit
bmw	beamwidth
btry	battery
BUC	Block Upconverter
buz	buzzer
bw	bandwidth
°C	degree Celsius
cal	calibration
CATE	computer aided test equipment
CB	component board
CCTWT	Coupled Cavity Traveling Wave Tube
commsat	communications satellite
CPU	central processing unit
CRC	Cyclic Redundancy Check
CTRF	center frequency
CTS	Clear to Send
CW	continuous wave
DA	digital-to-analog
DAC	digital-to-analog converter
dB	Decibel
dBc	Decibels referenced to carrier
dBI	Decibels referenced to Amperes or Decibels referenced to Isotropic Gain
dBm	decibels referenced to one milliwatt
dBW	decibels referenced to Watts
DC	direct current
DCD	Date Carrier Detect
deg	degree
dgtl	digital
distn	distortion
DSR	Data Send Ready
DTR	Data Terminal Ready
Ef	filament voltage
EIK	Extended Interaction Klystron
Ek	cathode voltage
EMI	electromagnetic interference
ETX	End of Transmission

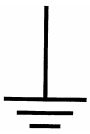
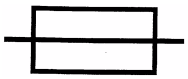
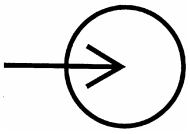
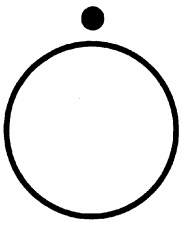
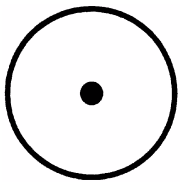
Abbreviation or Acronym	Definition
Ew	helix voltage
°F	degree Fahrenheit
F	farad
FAT	First Article Test
FET	field-effect transistor
FGIPA	Fixed Gain Intermediate Power Amplifier
freq	frequency
FTD	Filament Time Delay (TWTA, KPA)
G	Giga (one billion)
GHz	Giga Hertz
H	henry
Hi-pot	Process using a high voltage power supply to verify high voltage insulation leakage.
HPA	High Power Amplifier
HV	High Voltage
Hz	Hertz
IC	integrated circuit
IESS	Intelsat Earth Station Standards
IF	Intermediate Frequency
I/P	Input
inv	inverter
IPA	Intermediate Power Amplifier
IrDA	Infrared Data Association
Iw	helix current
k	kilo (one thousand)
K	cathode
kg	kilogram
kHz	kilo Hertz
KMT	Klystron Microwave Tube
KPA	Klystron Power Amplifier
kV	kilo Volt
kVAH	kilovolt-ampere hour
kVAHM	kilovolt-ampere hour meter
kVAM	kilovolt-ampere meter
kW	kilo Watt
kWHM	kilowatt-hour meter
LC	inductance-capacitance
LCD	liquid crystal display

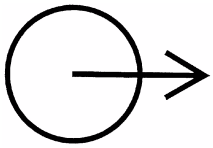
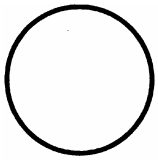
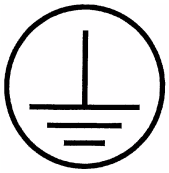
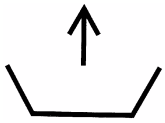
Abbreviation or Acronym	Definition
LDA	Line Driver Amplifier
LED	Light Emitting Diode
LO	Local Oscillator
LPA	Low Power Amplifier
M	Mega (million)
M&C	Monitor and Control
mA	milli Ampere
MSDC	Multistage Depressed Collector
MHz	Mega Hertz
miprcs	microprocessor
MPS	Modular Power Supply
MSDC	Multi-Stage Depressed Collector
MSL	mean sea level
MTBF	mean time between failures
MTTR	mean time to repair
mV	milli Volt
MW	Mega Watt
mW	milli Watt
NAK	negative acknowledgement
oc	overcurrent
ODU	Outdoor Unit
OEM	other equipment manufacturer
O/P	Output
ovv	over voltage
PBIT	parity bit
PCB	printed circuit board
PF	power factor
PFC	power factor correction
PS	power supply
PSU	power supply unit
PWM	pulse-width modulation
pwr	Power
RF	Radio Frequency
RFU	RF Unit
RMA	Returned Material Authorization
RMS	root mean square (.707)
RTS	Ready to Send

Abbreviation or Acronym	Definition
RU	In a standard 19-inch rack, a set of four mounting holes spaced as follows: .625 inches between holes 1, 2, and 3. .5 inches between holes three and four. RU = 1.75 inches.
RXD	Received Data
SLIN	Linearizer with an integrated variable gain SSA
SSA	Solid State Amplifier
SSPA	Solid State Power Amplifier
STDBY	Standby
STX	Start of Transmission
TD	Time Delay (SSPA)
TEC	Thermal Electric Cooling. This is a technique used to regulate the operating temperature environment of a device.
TPS	Test Performance Sheet
TWT	Traveling Wave Tube
TWTA	Traveling Wave Tube Amplifier
TXD	Transmitted Data
UMBC	umbilical cord
undc	undercurrent
UPS	uninterrupible power supply
VAC	Volts alternating current
VDC	Volts direct current
VGA	variable gain amplifier
VGIPA	Variable Gain Intermediate Power Amplifier
VPC	Variable Phase Combiner
VSWR	voltage standing wave ratio
W	Watt
wg	waveguide
Wh	watthour
WHM	watthour meter
wm	watt meter
wtrg	with respect to ground
wtrc	with respect to cathode
wtrprf	waterproof
wtrtt	watertight
WV	working voltage
XFMR	Transformer

Abbreviation or Acronym	Definition
XMIT	Transmit
XT	Xicom Technology Analog Outdoor Amplifier
XTC	Xicom Technology Controller
XTD	Xicom Technology Digital Outdoor Amplifier
XTK	Xicom Technology Klystron Amplifier
XTKD	Xicom Technology Klystron Amplifier with Flat Display
XTKH	Xicom Technology Klystron High Efficiency Amplifier — Flat Display with Multistage Depressed Collector
XTPS	Xicom Technology Power Supply
XTRD	Xicom Technology Rack Mount Digital Amplifier
XTRD-LDA	Xicom Technology Rack Mount Line Driver Amplifier
XTRS	Xicom Technology Solid State Rack Mount Amplifier
XTS	Xicom Technology Solid State Outdoor Amplifier
XTU	Xicom Technology Outdoor Amplifier with Block Upconverter

CE Symbols

Symbol	Definition
	Alternating Current (AC)
	CE Marking symbol for equipment and documentation meeting European Quality Standards.
	Earth Ground
	Fuse
	Input
	Local
	OFF for a part of equipment
	ON for a part of equipment

Symbol	Definition
	Output
	Power OFF
	Power ON
	Protective Earth Ground
	Remote
	Reset
	Transmitted Power Monitor

Overview

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/02/2002	A.L. Crozier, Jr.
A	9869	Original Release	06/05/2002	A.L. Crozier, Jr.
B	10033	Update to reflect amplifier improvement	08/05/2002	A.L. Crozier, Jr.
C	10359	Update Contacting Xicom Technology paragraph	10/14/2002	A.L. Crozier, Jr.

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Overview

Product Overview

This manual is for the Xicom Technology Solid State ODU Power Amplifier with microprocessor control. The ODU may be mounted on an antenna or other outdoor location without the need for an additional watertight enclosure. The standard amplifier consists of:

- a SSPA (Solid State Power Amplifier).
- a SSA (Solid State Amplifier) driver.
- a forward power monitor.
- a reverse power monitor.
- a Power Supply.
- an M&C (Monitor & Control) system.
- serial control interfaces (COM1 and COM2).
- a forced air cooling system.

The following options are available:

- a Block Upconverter.
- a 1:1 redundant waveguide switch controller.
- a 1+1 controller.

The COM1 interface is RS-232 only; the COM2 interface is configured for RS-422/RS-485 operation. There are hardwired summary fault and external interlock circuits available for user defined functions.

Refer to Figure 1, on page 4 for a typical block diagram of the Power Amplifier.

Refer to Appendix titled *Specifications* for the details of your amplifier. Refer to the appendix titled *Interconnect Drawings* for specific diagrams of your amplifier.

Control and Status Interface

The amplifier is controlled from an external controller or M&C system. Refer to the Operation and Communication and Protocol Chapters to operate the power amplifier in the Remote Mode.

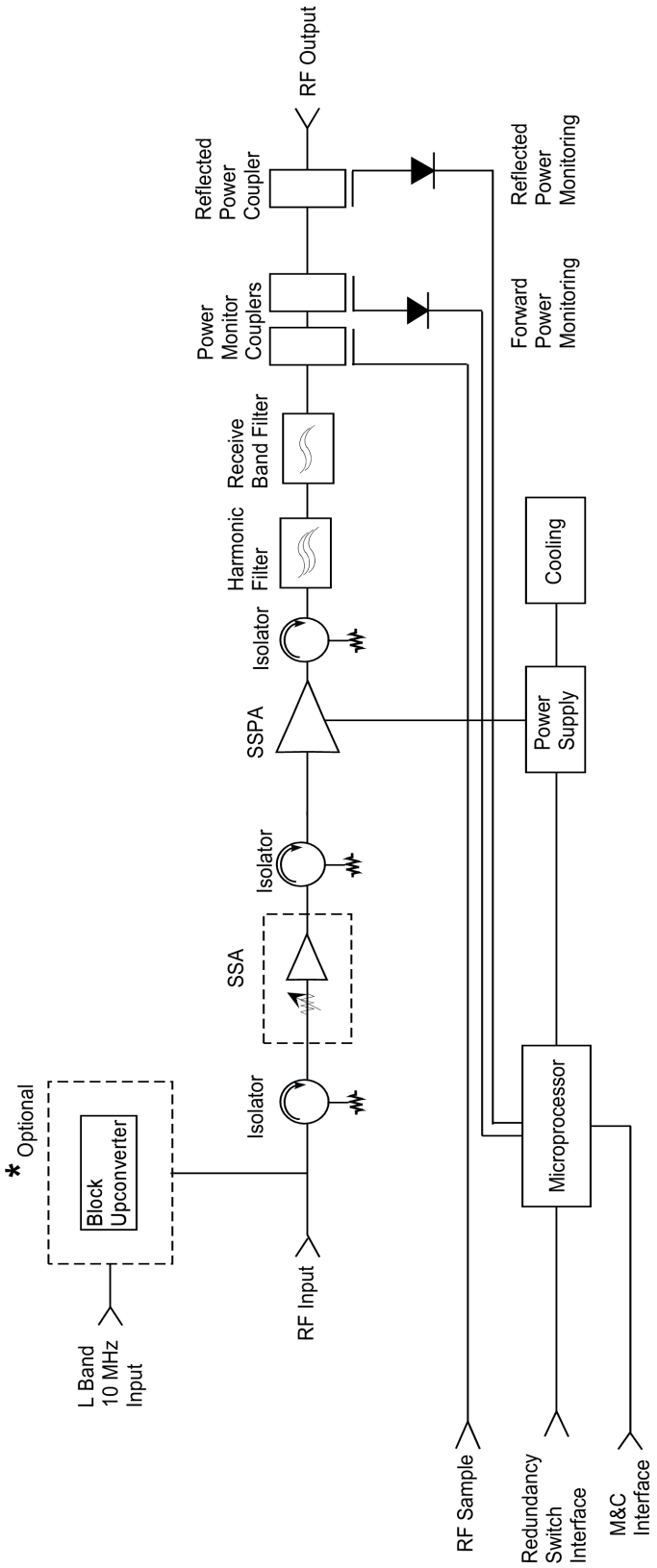

Figure 1, Typical Solid State Power Amplifier ODU Antenna Mount Block Diagram

Physical Characteristics

Refer to Appendix titled *Mechanical Drawings* for the Physical Characteristic Specifications of your amplifier.

The Xicom Solid State ODUs are air cooled where the outside cooling air does not pass through the SSPA and power supply enclosure. The SSPA and power supply are conduction cooled. They are mounted on a finned aluminum plate. A fan pushes outside air through the fins keeping moist cooling air separate from the electronics and power supply.

The power supply is field replaceable. See the appendix titled *Mechanical Drawings* for a detailed drawing illustrating removal. The appendix titled *SSPA Power Supply Removal Procedure* contains step by step instructions for removing the power supply module.

Environmental Specifications

Table 1, Environmental Specifications, lists the typical amplifier environmental specifications.

Refer to the appendix titled *Specifications* for the environmental specifications unique to your amplifier.

The amplifier is designed to operate in rain and snow. However, in high snow load conditions it is advisable to provide a snow shroud to prevent a buildup of snow at the air inlet causing a blockage that will reduce air flow.

Table 1, Environmental Specifications

Parameter	Specification
NON-OPERATING TEMPERATURE RANGE	-50°C to +70°C
OPERATING TEMPERATURE RANGE	-40°C to +50°C
ALTITUDE	10,000 feet MSL maximum (2 °C/1000 ft derating)
SHOCK AND VIBRATION	Normal transportation
COOLING	Forced air

Specifications

Refer to the Appendix titled *Specifications* for the specifications of your amplifier.

Contacting Xicom Technology

Assistance

If you need to contact Xicom Technology for assistance with your product you may use one of the following:

Address:

Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054 USA

Telephone: 408-213-3000
Facsimile: 408-213-3001

www.xicomtech.com

Technical Support —
email: support@xicomtech.com
Telephone: 408-213-3109 (24 Hours)
Facsimile: 408-213-3107

Sales: sales@xicomtech.com

Feedback

Xicom technology wants to receive customer feedback concerning the format, content and accuracy of the documentation that is shipped with the products. We also want customers to submit comments and suggestions or request assistance in solving problems with any of our products.

Please access our web site at http://www.xicomtech.com and click on Customer Feedback Forms to go to the Customer Feedback Page. You may download the appropriate form and submit your requests and comments using the forms on this page.

Safety/Sicherheit

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/02/2002	A.L. Crozier, Jr.
A	9869	Original Release	06/05/2002	A.L. Crozier, Jr.
B	12217	Add Fuse and Power Receptacle Warnings	05/18/2004	A.L. Crozier, Jr.
C	12707	Added German Translation	12/03/2004	A.L. Crozier, Jr.

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Paragraph Title — Page Number

Safety/Sicherheit

General Information

This chapter identifies the safety requirements to be applied when performing any of the procedures specified in this manual. It is the responsibility of the user to follow all applicable safety regulations when using this manual. This chapter contains safety summaries consisting of general safety and health precautions.

Summaries

Description

Equipment of this nature has inherent hazards. Only trained Operators and Service Personnel should work on or operate this equipment.

The general safety requirements identified in this chapter are applicable to anyone doing the procedures included in this manual.

Warnings, Cautions, and Notes

Warnings, cautions, and notes are used in these procedures to alert the user to special conditions regarding safety or correct performance of a particular step or steps. They are placed immediately prior to the procedural step to which they apply, or immediately prior to the procedure itself if they apply to the entire procedure.

Warnings and cautions are constructed in three parts or sentences. First, the hazard is stated; second, the correct action to be performed is stated; and, third, the result of failing to comply with the action is stated. Notes, however, can be in any form necessary to convey the needed information. The definitions below show how warnings, cautions, and notes are used.

WARNING — A procedure, technique, restriction, etc., if not followed exactly, ***could result in injury or death*** to personnel.

WARNING

This symbol denotes an ELECTRICAL SHOCK HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from electrical shock.

WARNING

This symbol denotes a RADIO FREQUENCY BURN HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from radio frequency burns.

WARNING

This symbol denotes a LADDER FALL HAZARD WARNING in a procedure step and is used whenever death or injury to personnel could result from improper use of a ladder.

WARNING

This symbol denotes a GENERAL HAZARD WARNING in a procedural step and is used whenever death or injury to personnel could result from improper preparation or performance.

Caution — A procedure, technique, restriction, etc., if not followed exactly, ***could result in damage*** to equipment.

Caution

This symbol denotes a CAUTION in a procedural step. A CAUTION is used whenever equipment damage could result if the procedure is not correctly followed.

Note — A procedure, technique, restriction, special interest, etc., that requires emphasis or consideration for the performance of a procedural step or steps.

Note

This symbol denotes a NOTE in a procedural step. A NOTE is used whenever emphasis or consideration for the performance of a procedural step or steps is necessary.

General Warnings and Cautions

High Voltage Hazards

WARNING

Some models of the Solid State ODU use external fuses that utilize neutral fusing. Personnel servicing or maintaining equipment should be thoroughly familiar with safety precautions related to DOUBLE POLE/ NEUTRAL FUSING. Failure to comply could result in serious injury or death.

WARNING

The Solid State ODU power amplifier is not equipped with internal safety interlock switches. Turn OFF primary power and disconnect power cord before removing amplifier enclosure cover. Failure to comply could result in serious injury or death.

WARNING

The power amplifier uses high voltage that may be lethal if contacted. When the amplifier's power supply cover is removed multiple high voltage points are exposed. Use extreme care when operating the amplifier with the cover removed. Failure to comply could result in serious injury or death.

WARNING

The AC Prime Power receptacle on the Solid State ODU should be located close to a socket outlet and be

easily accessible to service personnel. Failure to comply could result in serious injury or death.

WARNING

To prevent electrical shock the amplifier should not be operated with the cover removed unless service personnel are thoroughly familiar with its operation and are experienced with high voltage. Failure to comply could result in serious injury or death.

WARNING

When required to measure voltages in a High Voltage Power Supply:

- turn the equipment OFF.
- use shorting probe to ensure capacitors are discharged.
- ensure meter probes are properly insulated and capable of handling voltages of 1 kv or more.
- attach probes using one hand.
- ensure probes are not touching other contacts.

Failure to comply could result in serious injury or death.

Ladder Hazards

WARNING

When required to use a ladder ensure that:

- the ground in the area where the ladder will be used is free of objects that could cause the ladder to be unstable.
- You have read and understand ALL the labels that are affixed to the ladder.
- you are wearing all appropriate safety equipment such as hard hat, safety harness, etc.

Failure to comply could result in serious injury or death.

RF Radiation Hazards

WARNING

The power amplifier is capable of generating high power microwave radiation that can cause bodily harm. Prior to operation ensure that:

- the technician assigned to perform the maintenance does not wear a pacemaker.
- all the microwave connections are securely fastened.
- that there is no microwave leakage.

Failure to comply could result in serious injury or death.

Caution

Never operate the amplifier with an open waveguide. The waveguides and Solid State Amplifier should always be terminated into a load capable of dissipating full RF power. Failure to comply could result in equipment damage.

Sicherheit

Allgemeine Information

Dieses Kapitel benennt die Sicherheitsanforderungen, die bei der Durchführung jedes der in diesem Handbuch spezifizierten Verfahren zu befolgen sind. Der Benutzer des Handbuches ist bei dessen Verwendung für die Befolgung aller zutreffenden Sicherheitsbestimmungen verantwortlich. Dieses Kapitel enthält aus Allgemeinsicherheit und Gesundheitsschutz bestehende Sicherheitszusammenfassungen.

Zusammenfassungen

Beschreibung

Gerät dieser Art birgt inhärente Gefahren. Das Gerät sollte nur von ausgebildetem Bedienungs- und Wartungspersonal betrieben werden.

Die in diesem Kapitel aufgeführten allgemeinen Sicherheitsanforderungen betreffen jeden, der die in diesem Handbuch benannten Verfahren durchführt.

Warnungen, Ermahnungen zur Vorsicht, und Beachtungshinweise

In diesen Verfahren werden Warnungen, Ermahnungen zur Vorsicht, und Beachtungshinweise verwendet, um den Benutzer auf besondere Bedingungen bezüglich der Sicherheit oder der korrekten Ausführung einer oder mehrerer Arbeitsschritte hinzuweisen. Sie befinden sich unmittelbar vor dem betreffenden Arbeitsschritt oder unmittelbar vor dem Verfahren selbst, falls sie das gesamte Verfahren betreffen.

Warnungen und Ermahnungen zur Vorsicht bestehen aus drei Teilen oder Sätzen. Zuerst wird die Gefahr benannt, zweitens wird die korrekte zu ergreifende Maßnahme benannt, und drittens wird die Konsequenz benannt, die durch das Nichtbefolgen der Maßnahme entsteht. Beachtungshinweise hingegen können auf jede der Vermittlung der benötigten Informationen dienlichen Weise erfolgen. Die unten aufgeführten Definitionen zeigen, wie Warnungen, Ermahnungen zur Vorsicht, und Beachtungshinweise verwendet werden.

WARNUNG — Wenn ein Verfahren, eine Technik, Einschränkung usw. nicht genau befolgt wird, ***könnte dies die Verletzung oder den Tod von Menschen verursachen***.

WARNUNG

Dieses Symbol bedeutet GEFAHR EINES ELEKTRISCHEN SCHLAGES bei einem Verfahrensschritt und wird immer dann verwendet, wenn der Tod oder die Verletzung von Menschen durch einen elektrischen Schlag verursacht werden könnten.

WARNUNG

Dieses Symbol bedeutet VERBRENNUNGSGEFAHR DURCH HOCHFREQUENZ bei einem Verfahrensschritt und wird immer dann verwendet, wenn der Tod oder die Verletzung von Menschen durch von Hochfrequenz hervorgerufene Verbrennungen verursacht werden könnten.

WARNUNG

Dieses Symbol bedeutet WARNUNG VOR LEITERSTURZGEFAHR und wird immer dann verwendet, wenn der Tod oder die Verletzung von Menschen durch unvorschriftsmäßiges Hantieren mit einer Leiter verursacht werden könnten.

WARNUNG

Dieses Symbol bedeutet eine ALLGEMEINE GEFAHRENWARNUNG bei einem Verfahrensschritt und wird immer dann verwendet, wenn der Tod oder die Verletzung von Menschen durch unvorschriftsmäßige Vorbereitung oder Durchführung verursacht werden könnte.

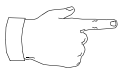
Ermahnung zur Vorsicht — Wenn ein Verfahren, eine Technik, Einschränkung usw. nicht genau befolgt wird, ***könnte dies Schaden am Gerät verursachen***.

Vorsicht

Dieses Symbol bedeutet ERMAHNUNG ZUR VORSICHT bei einem Verfahrensschritt. Eine ERMAHNUNG ZUR VORSICHT wird immer dann verwendet, wenn ein Geräteschaden als Folge eines nicht genau befolgten Verfahrens eintreten kann.

Hinweis — Ein Verfahren, eine Technik oder Einschränkung, besonderes Interesse usw. das Nachdruck oder Beachtung bei der Durchführung eines oder mehrerer Verfahrensschritte erfordert.

Hinweis



Dieses Symbol bedeutet einen HINWEIS bei einem Verfahrensschritt. Ein HINWEIS wird immer dann verwendet, wenn Nachdruck oder Beachtung bei der Durchführung eines oder mehrerer Verfahrensschritte nötig ist.

Allgemeine Warnungen und Ermahnungen zur Vorsicht

Hochspannungsgefahr

WARNUNG

Einige Modelle Solid State ODU besitzen externe Sicherungen, die neutrale Schmelzmasse verwenden. Die mit der Wartung oder Pflege von Geräten befassten Personen sollten bestens mit den Sicherheitsschutzmaßnahmen in Bezug auf ZWEIPOL/NEUTRAL SICHERUNGEN vertraut sein. Nichtbeachtung könnte ernsthafte Verletzungen oder Tod zur Folge haben.

WARNUNG

Der Leistungsverstärker des Solid State ODU ist nicht mit internen Sicherheits-Sperrschaltern ausgerüstet. Schalten Sie den Versorgungsstrom AUS und ziehen Sie das Stromkabel heraus bevor Sie die Abdeckungshülle des Verstärkers entfernen. Nichtbeachtung könnte ernsthafte Verletzungen oder Tod zur Folge haben.

WARNUNG

Der Leistungsverstärker verwendet Hochspannung, die bei Berührung tödlich sein kann. Wenn die Stromversorgungsabdeckung des Verstärkers entfernt wird, werden mehrere unter Hochspannung stehende Punkte freigelegt. Seien Sie extrem vorsichtig, wenn Sie den Verstärker ohne Abdeckung betreiben. Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

WARNUNG

Die AC Primärstrombuchse am Solid State ODU sollte nahe an einer Steckdose liegen und für das Wartungspersonal leicht zugänglich sein. Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

WARNUNG

Zur Vermeidung elektrischer Schläge sollte der Verstärker nur dann ohne Abdeckung betrieben werden, wenn das Wartungspersonal mit seiner Funktionsweise gründlich vertraut und im Umgang mit Hochspannung erfahren ist. Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

WARNUNG

Wenn Spannung in einer Hochspannungszuleitung gemessen werden soll:

- schalten Sie das Gerät AUS.
- benutzen Sie eine Kurzschlusssonde um sich zu vergewissern, dass die Kondensatoren entladen sind.
- vergewissern Sie sich, dass die Messsonden vorschriftsmäßig isoliert und auf 1 kv oder mehr ausgelegt sind.
- legen Sie die Sonden mit nur einer Hand an.
- vergewissern Sie sich, dass die Sonden keine anderen Kontakte berühren.

Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

Leitergefahren

WARNUNG

Wenn Sie eine Leiter benützen müssen, vergewissern Sie sich, dass:

- •sich auf der Oberfläche, auf der die Leiter aufgestellt werden soll, keine Gegenstände befinden, die eine Instabilität der Leiter bedingen könnten.
- •Sie ALLE an der Leiter angebrachten Etiketten gelesen und verstanden haben.
- •Sie die gesamte vorgeschriebene Sicherheitsausrüstung angelegt haben, wie Schutzhelm, Sicherheitsgeschirr usw.

Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

RF Strahlungsgefahr

WARNUNG

Der Leistungsverstärker kann eine hochwirksame Mikrowellenstrahlung erzeugen, die Körperschäden verursachen kann. Vergewissern Sie sich vor Inbetriebnahme, dass:

- der zur Durchführung der Wartung eingeteilte Techniker keinen Herzschrittmacher trägt.
- alle Mikrowellenverbindungen sicher befestigt sind.
- keine Mikrowellen austreten können.

Nichtbeachtung könnte zu ernsthaften Verletzungen oder Tod führen.

Vorsicht

Betreiben Sie den Verstärker niemals bei geöffnetem Hohlleiter. Die Hohlleiter und Festkörper-Verstärker sollten stets auf eine Endladung gefahren werden, die volle HF-Spannung ableiten kann. Nichtbeachtung könnte Beschädigung des Gerätes zur Folge haben.

Unpacking and Installation

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/02/2002	A.L. Crozier, Jr.
A	9869	Original Release	06/05/2002	A.L. Crozier, Jr.
B	10033	Update M&C Connector Pinouts; update Fault Indicators.	08/05/2002	A.L. Crozier, Jr.
C	10197	Update RF Inhibit Information	08/26/2002	A.L. Crozier, Jr.
D	10490	Update to reflect waveguide flange protection	12/10/2002	A.L. Crozier, Jr.,
E	12103	Add Analog Connector and Pinouts	04/13/2004	A.L. Crozier, Jr.
F	12217	Add Environmental paragraph	05/18/2004	A.L. Crozier, Jr.
G	12707	Added German Translations	12/03/2004	A.L. Crozier, Jr.
H	12990	Added Waveguide Switch Information and various other corrections and updates	04/28/2005	A. Auld
J	13557	Add 2nd Generation PS Information	11/21/2005	S. Lucvik
K	15097	Adding Optional Power Connector	12/20/2006	HB
L	16079	Update J2; Update Figure 3	04/30/2008	ALCjr

Table of Contents

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List of Tables

Unpacking and Installation

Note

This document is intended for outdoor SSPAs and other related products with Rabbit microporcessors.

This chapter contains AC Power information for two power supplies:

Generation 1 (Enable Switch) — Part Number 310-0415-002
Outline Drawing 304-0215-004

Generation 2 (Circuit Breaker) — Part Number 310-0415-004
Outline Drawing 304-0215-007

Unpacking and Inspection

Inspect the inside and outside of the shipping container for signs of damage. If any shipping damage is detected, call the shipping carrier and submit a damage report.

Unpacking

Compare the packing list to the contents of the container to be certain that all enclosed material has been received. Save all data sheets. They will be useful during any maintenance actions. Save the shipping container and packing material and use it if you need to reship the unit.

Inspection

Inspect all items for any damage received during shipment. If shipping damage is detected, submit a damage report to the shipping carrier. Failure to submit a report may invalidate any future claims.

Mechanical Installation

Some units have mounting brackets supplied to mount the amplifier. Refer to the appendix titled *Mechanical Drawings.*

When performing the procedures in this section refer to the Outline Drawings and Interconnect Drawings for your specific amplifier. These drawings are located in appendices titled *Mechanical Drawings* and *Interconnect Drawings* respectively.

Environmental Information

The Solid State ODU is designed for outdoor installation. The ODU enclosure meets IPX4 protection level.

Waveguide Connection

Vorsicht

Ziehen Sie die Hohlleiter-Befestigungsschrauben nicht zu fest an. Überdrehen kann das Gewinde in der Hohlleiterflansch ausleiern. Nichtbeachtung könnte zu Beschädigung des Gerätes führen.

Caution

Do not overtighten the waveguide mounting screws. Overtightening may strip the threads in the waveguide flange. Failure to comply could result in equipment damage.

The RF input waveguide (where applicable) is located on the front panel of the amplifier and RF output waveguide port is located on the rear panel of the amplifier. Ensure that the proper matching waveguide flange is used to connect the amplifier input and output to the RF load.

Refer to Figure 1 , Typical 4 Screw Mounting Flange Tightening Sequence or Figure 2 , Typical 8 Screw Mounting Flange Tightening Sequence, for the proper tightening sequence on the flange types installed on your amplifier.

Caution

When not connected to the external waveguide system or a terminated load, waveguide flanges should be covered with a protective cap or tape that does not leave glue residue when removed. Xicom recommends the use of Kapton® tape, 3M Brand, #92, Xicom P/N 602-0001-001. Remove tape or cap prior to final installation. Failure to comply could result in contamination to the internal waveguide system and equipment damage.

Vorsicht

Wenn Hohlleiterflansche nicht an das externe Hohlleitersystem oder eine terminierte Ladung angeschlossen sind, sollten sie mit einer Schutzkappe oder Klebeband abgedeckt werden das beim Entfernen keine Klebstoffreste hinterlässt. Xicom empfiehlt die Verwendung von Kapton® Band, 3M Brand, #92, Xicom P/N 602-0001-001. Band oder Kappe vor Endinstallation entfernen. Nichtbeachtung könnte Kontamination des internen Hohlleitersystems oder Beschädigung der Ausrüstung zur Folge haben.

Use the following procedure to install the waveguides on your amplifier.

1. Position the interconnecting waveguide flange with the amplifier waveguide flange. Make sure that the flanges can be mated without strain or torsion.
2. If the two flanges cannot be properly aligned or if the installation is subject to vibration, a flexible waveguide section should be utilized to eliminate potential strain on the waveguide connection.
3. Insert any necessary gaskets and windows between the two flanges.

Note

If the connecting waveguide is to be pressurized at greater than 5 PSI, a waveguide window must be installed at the output flange of the amplifier. Use an absorptive type gasket to preclude radiation leakage.

4. Start by hand tightening all waveguide mounting screws.
5. Tighten all mounting screws with the appropriate size Allen wrench.
6. Use a sequential tightening procedure. Proceed as follows:
   - Partially tighten one of the screws (#1).
   - Move the tool to the screw that is diagonally opposite to the screw tightened in step 1 (#2) and partially tighten that screw.
   - Move clockwise to the next screw to be tightened (#3) and partially tighten that screw.
   - Move to the screw diagonally opposite screw #3 and partially tighten that screw (#4).
   - If required, repeat this process for the remaining screws (#5-#6, #7-#8).
   - When you reach the first screw tightened in this step (#1) increase the torque on the screw and repeat the process until the screws have all been tightened to the correct torque.

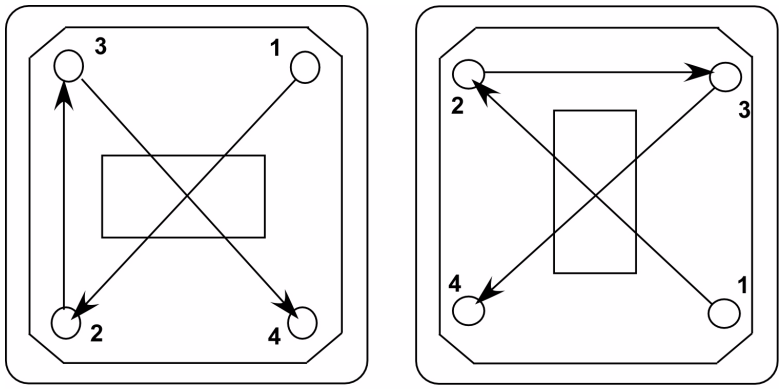


Figure 1, Typical 4 Screw Mounting Flange Tightening Sequence

Typical Torque Values	
10-32	30 inch-lb
6-32	10-12 inch-lb

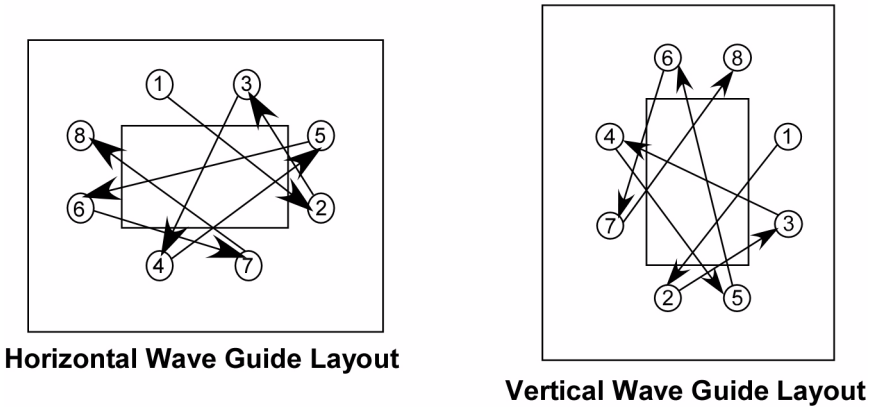


Figure 2, Typical 8 Screw Mounting Flange Tightening Sequence

Air Circulation

The power amplifier is cooled with a built-in fan. Heated exhaust air should not be recirculated into the power amplifier. A clearance of 6-8 inches is recommended to allow the heated exhaust air to clear the power amplifier air inlet.

If the unit is installed in a closed space or in a configuration that would tend to recirculate the exhaust air, provisions should be made to isolate the exhaust air from the intake air supply.

Power and Interface Interconnections

When performing the procedures in this section refer to the Wiring and Interconnect Drawings for your specific amplifier. These drawings are located in the appendix titled *Interconnect Drawings*.

Prime Power Connections

The AC Prime Power receptacle is located on the amplifier front panel. Nominal line voltage is 100 to 260 VAC (180 to 260 VAC on some high power units), 47-63 Hz, single phase. The amplifier will operate when the AC line voltage is anywhere in the specified range. There are two types of Power Connectors that are used on Low Power ODUs. Figure 3 shows the pin outs for both type of connectors. The Prime Power Connector Part Number is C016 20C003 200 12; the Mating Plug is C016 20D003 200 12.

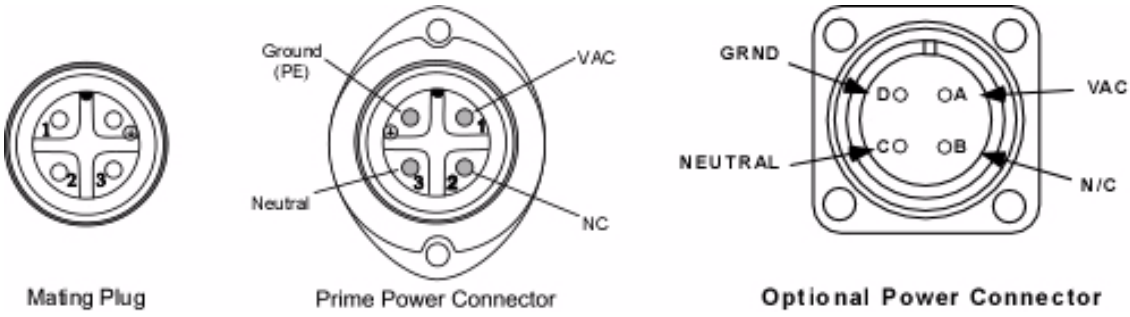


Figure 3, Connector J2 Pinout (Both Options)

Refer to the Outline Drawing in the appendix titled *Mechanical Drawings*.

Prime Power Enable Switch — Generation 1 Power Supply

The prime power to the amplifier can be either enabled or disabled depending on the position of the Prime Power Enable Switch. When the switch is closed it disables the bias voltage of the PFC which turns on the DC supply. When the switch is opened a soft start circuit is enabled which limits the turn on surge current into the supply. A low line protection circuit shuts the power supply down upon detection of a DC supply output under voltage fault.

Prime Power Circuit Breaker — Generation 2 Power Supply

The prime power to the amplifier can be either enabled or disabled depending on the position of the Prime Power Circuit Breaker. When the breaker is closed it disables the bias voltage of the PFC which turns on the DC supply. When the switch is opened a soft start circuit is enabled which limits the turn on surge current into the supply. A low line protection circuit shuts the power supply down upon detection of a DC supply output under voltage fault.

Monitor and Control Connector

To externally control the amplifier a M&C interface is provided. The connector is a 32-pin MIL style waterproof connector.

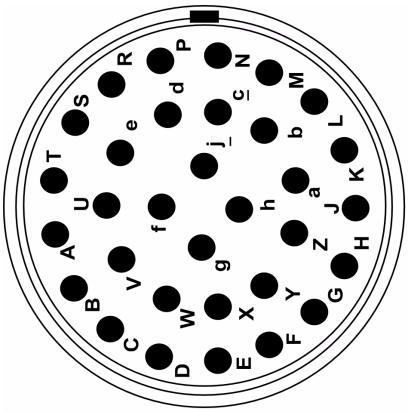
The Monitor and Control connector provides these interfaces for the use of the customer:

- COM1 — RS-232 Serial Port.
- COM2 — RS-422/ RS-485 Serial Port.
- Two sets of Form “C” Relay contacts for Summary Fault indication.
- RF Inhibit Control.
- 24 VDC @ 100 mA maximum.
- 15 VDC for monitoring purposes only.
- Hardware Address Select (digital SSAs only).

Monitor and Control Pinouts

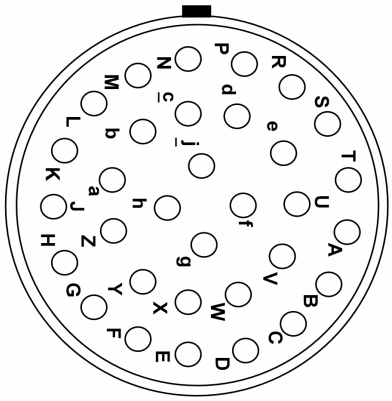
Figure 4 shows the pin layout; Table 1 lists the pinouts for the typical Digital Monitor and Control Connector on the Antenna Mount Power Amplifier.

Figure 5 shows the pin layout and Table 2 lists the pinouts for the typical Analog Monitor and Control Connector on the Antenna Mount Power Amplifier.



I/O Interface Connector Receptacle

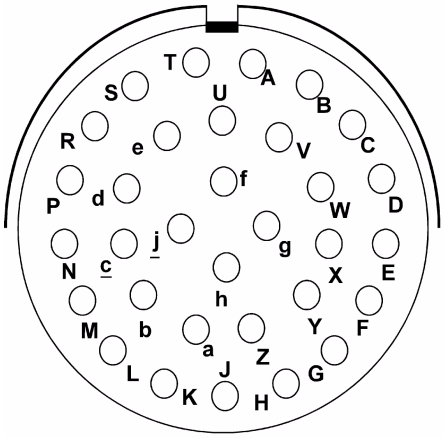
MS3114-E-18-32SW



I/O Mating Connector Plug

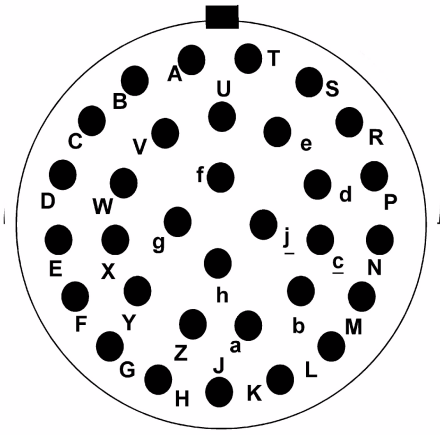
MS3116-F-18-32PW

Figure 4, Digital M&C Connector Pin Layout



I/O Interface Connector Receptacle

Bendix P/N: MS3114-E-18-32S



I/O Mating Connector Plug

Bendix P/N: MS3116-F-18-32P

Figure 5, Analog M&C Connector Pin Layout

Table 1, Digital Monitor and Control Connector J1 Pinouts

Pin	Signal	Description
A	Reserved	Reserved
B	RS-232	RX
C	RS-232	TX
D	Reserved	Reserved
E	RS-232	GND
F	Reserved	Reserved
G	Reserved	Reserved
H	Reserved	Reserved
J	Reserved	Reserved
K	System GND	System GND
L	RS-422/485	Transmit +
M	RS-422/485	Transmit -
N	RS-422/485	Receive +
P	RS-422/485	Receive -
R	RS-422/485	GND
S	Summary Fault A -- Normally Open Contact	S Closed to U when Fault
T	Summary Fault A -- Normally Closed Contact	T Opened to U when Fault
U	Summary Fault A	Summary Fault A Common
V	Summary Fault B -- Normally Open Contact	V Closed to X when Fault
W	Summary Fault B -- Normally Closed Contact	W Opened to X when Fault
X	Summary Fault B	X Summary Fault B Common
Y	RF Inhibit Opto isolator Low	RF Inhibit -- Connect Pin Y to either Pin Z or Pin a, and Pin g to Pin f to Inhibit RF
Z	System GND	System GND
a	System GND	System GND
b	+24 VDC Out	+24 VDC Current limit of 100 mA
c	+24 VDC Out	+24 VDC Current limit of 100 mA
d	A/B Amplifier	A/B Amplifier select
e	Re-program Computer	Re-program Computer command Low
f	+15 VDC Out	+15 VDC Monitor and Opto-isolator Bias Supply
g	RF Inhibit Opto isolator Hi	RF Inhibit -- Connect Pin g to Pin f, and Pin Y to either Pin Z or Pin a to Inhibit RF
h	Reset Computer	Connect Pin h to either Pin Z or Pin a to reset computer.
j	RF Output Analog	$V_o = 10^{(PdBm - 47.27)/19.05}$

Table 2, Analog Monitor and Control Connector Pinouts

Pin	Signal	Definition
A	Summary Fault A — Normally Open Contact	A closed to F when Fault
B	Transmit IND — Normally Open Contact	B closed to F when Transmit
C	Standby IND — Normally Open Contact	C closed to F when Standby
D	Reserved	Reserved
E	Power ON IND — Normally Open Contact	E closed to F when Power ON
F	Status Return	Status Common
G	Reserved	Reserved
H	Transmit Select ON	Opto Low = Transmit ON
J	Transmit Select OFF	Opto Low = Transmit OFF
K	Fault Reset	Opto Low = Reset
L	External Interlock 1	Normally Opto Low. Open (Hi) = Fault
M	External Interlock 2	Normally Opto Low. Open (Hi) = Fault
N	External Interlock 3	Normally Opto Low. Open (Hi) = Fault
P	External Vo;tage +15 VDC	+15 VDC Opto-isolator Supply
R	Reserved	Reserved
S	RFPower Monitor	RF Power Monitor
T	Ground	Ground
U	Reserved	Reserved
W	Reserved	Reserved
X	Reserved	Reserved
Y	Reserved	Reserved
Z	Reserved	Reserved
a	Reserved	Reserved
b	Reserved	Reserved
c	Reserved	Reserved
d	Reserved	Reserved
e	RS232 TXD	TXD
f	RS232 RXD	RXD
g	RS232 DTR	DTR
h	Reprogram Computer command	Reprogram Computer Opto Low
j	RS232 GND	Ground

Note

Refer to Table 1“, Digital Monitor and Control Connector J1 Pinouts,” on page 13 for the definition of the pins listed in the following paragraphs.

A/B AMP Select J1-d

Refer to Figure 6. The Amplifier A/B select is an Opto isolator input. When the input at J1-d is HI, amplifier address B is selected. Otherwise, amplifier address A is selected.

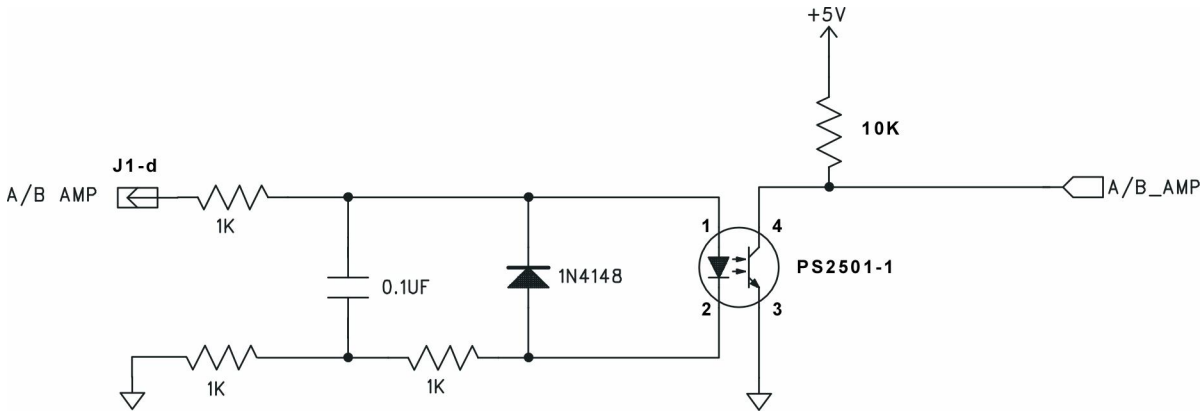


Figure 6, A/B Amplifier select

Re-program Computer J1-e

Connect this input low (to pin Z or a) to update firmware. To update firmware, please refer to Firmware Update procedure MNC-0500-014 for details.

Summary Fault Dry Contact J1-S to J1-X

Two sets of Form C relay contacts (Summary Fault A and Summary Fault B) are used to indicate that a fault has occurred.

The Summary Fault indicator signals change state any time an amplifier fault occurs. The user has the choice of a normally open or normally closed circuit.

Output Voltages

J1-b, c

A + 24 VDC voltage is supplied that can deliver up to 100 mA. This supply voltage is available on Pins b and c. The return for this voltage is either Pin a or Pin Z.

J1-f

A +15 VDC voltage is supplied that can deliver up to 10 mA. This supply voltage is available on Pin f. The return for this voltage is either Pin a or Pin Z.

RF Inhibit control

The HPA has the capability to Inhibit RF. If the unit has a SSA preamplifier, inhibit is accomplished by turning off the bias supply to the SSA driver.

RF Inhibit with Internal Source

Figure 7 shows RF Inhibit with Internal Source circuit using the HPA internal 15 VDC (Jumper J1-g to J1-f) and ground (Jumper J1-Y to either J1-Z or J1-a). RF will be inhibited when switch A is closed and Polarity Input is Hi.

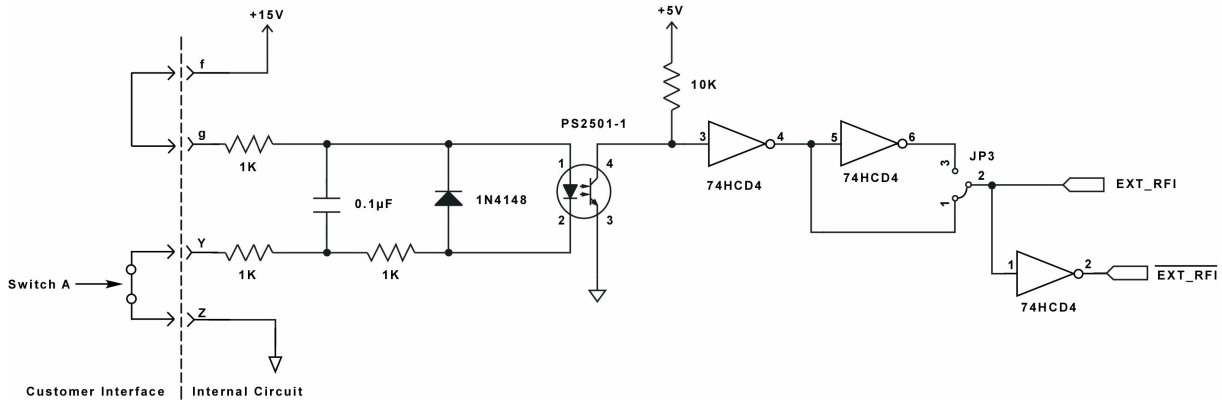


Figure 7, RF Inhibit with Internal Source

RF Inhibit with External Source

Caution

Do not mix internal and external references because there may a difference in ground potential between the external source and the HPA. Failure to comply could result in damage to the equipment.

Achtung

Wenn ein unterschied im Ground potential zwischen äusseren quelle und HPA vorhanden ist, die inneren und äusseren Referencen nucht mischen. Die Nichtbeachtung kann zu Schäden am Gerät Führen.

Refer to Figure 8. J1-g can be driven from an external voltage source of +5 to +15 VDC. In this case J1-Y should be connected to the ground reference of the external supply to prevent damage to the HPA. RF will be inhibited when Switch A is closed.

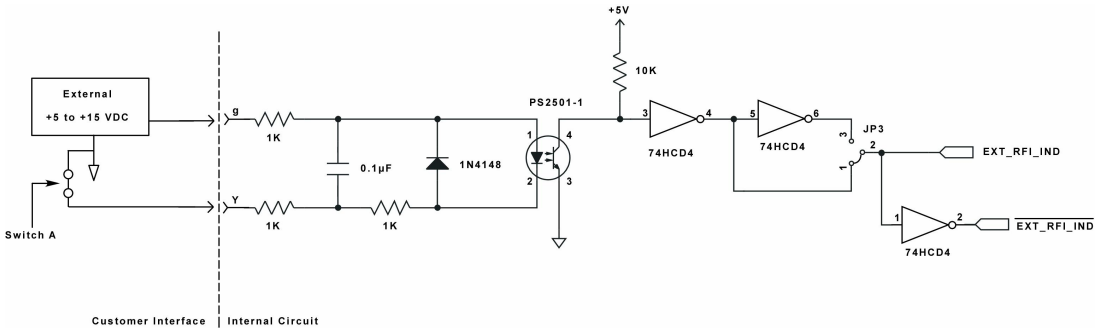


Figure 8, RF Inhibit with External Source

RF Inhibit with Switch A Opened

Refer to Figure 9. The RF Inhibit circuit also can be used with inverted logic. The figure illustrates a RF inhibit circuit using an external resistor. RF will be inhibited when switch A is opened.

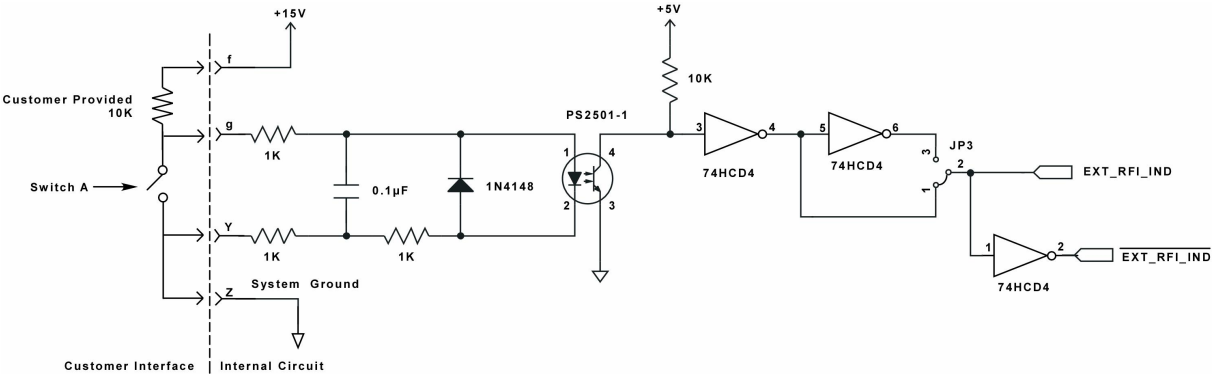


Figure 9, RF Inhibit with switch A opened

RF Output Analog output

The Digital Monitor and Control provides the analog output voltage correspondence to the RF output power. The conversion formula is:

$V_o = 10^{(PdBm - 47.27)/19.05}$

or $P_{dBm} = 47.27 + 19.05^{[\log10(Vo)]}$

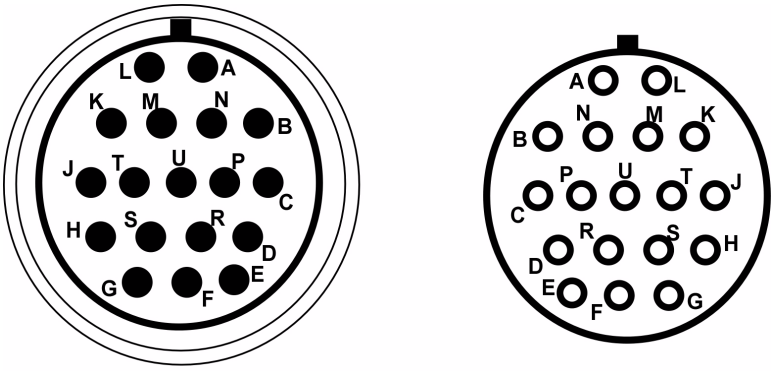
With P_{dBm} = RF Output power in dBm

Waveguide Switch connection (Digital SSPAs Only)

Table 3 Lists the Waveguide Switch Connector Pinouts. Figure 10 shows the pin and socket layout of the Waveguide Switch Interface Connector and the Waveguide Switch Mating Connector.

Table 3, J6 Waveguide Switch Connector Pinouts

PIN	Description
A	WG SW1 SEL A
B	WG SW1 SEL B
C	WG SW2 SEL A
D	WG SW2 SEL B
E	WG SW1 POS A IND
F	WG SW1 POS B IND
G	WG SW1 RF Inhibit
H	WG SW2 POS A IND
J	WG SW2 POS B IND
K	WG SW2 RF Inhibit
L	SUM Fault Out
M	SUM Fault In
N	GND
P	GND
R	GND
S	NC
T	NC
U	NC



Waveguide Switch Interface Connector

MS3114E-14-18S

Waveguide Switch Mating Connector

MS3116F-14-18P(SR)

Figure 10, Waveguide Connector Pin Layout

WG Switches Position select

Refer to Figure 11. The WG Switches Position can be selected via serial interface. When a WG switch position is selected, a +24 V pulse will be sent to the WG Switch to initiate the switch rotation.

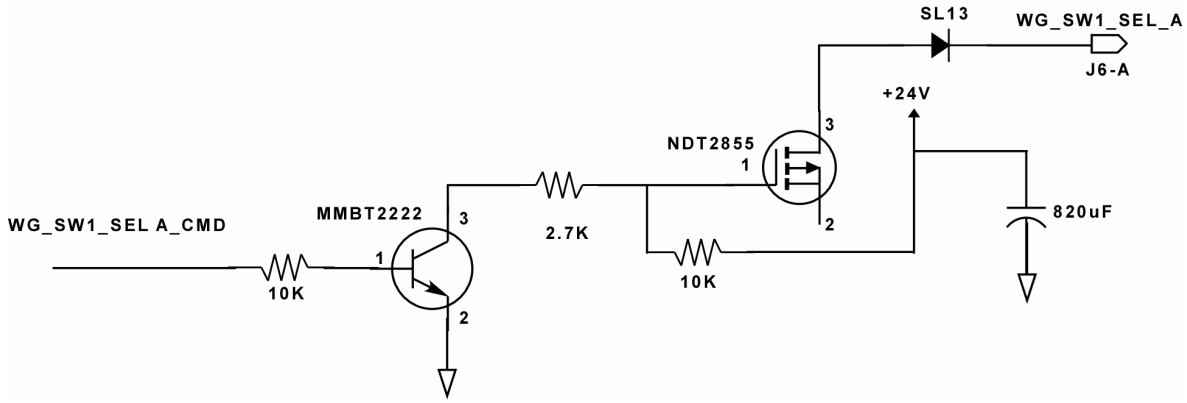


Figure 11, WG SW1 Position A Select Command

WG Switches Position Indicator

Refer to Figure 12. The WG Switch position input provides a pull up resistor of 100K to + 15V. Each WG Switch has two position indicators A and B. An input Low is required for each position.

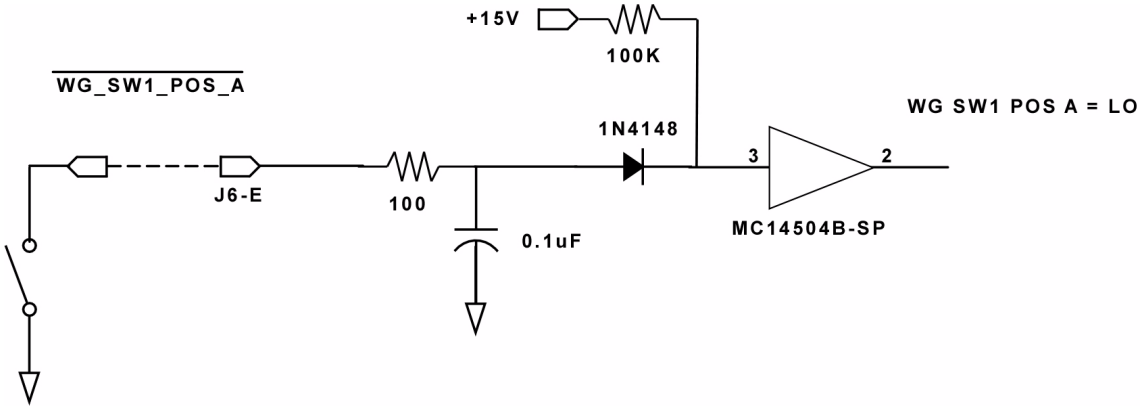


Figure 12, WG SW1 Position A Indicate Input

Sum Fault Input

Refer to Figure 13. The Sum Fault input comes from the other amplifier. The Sum Fault input provides a pull up resistor of 100K to + 15V for an open collector input at J6-M. A logic HI is present when the other amplifier faults or is turned off.

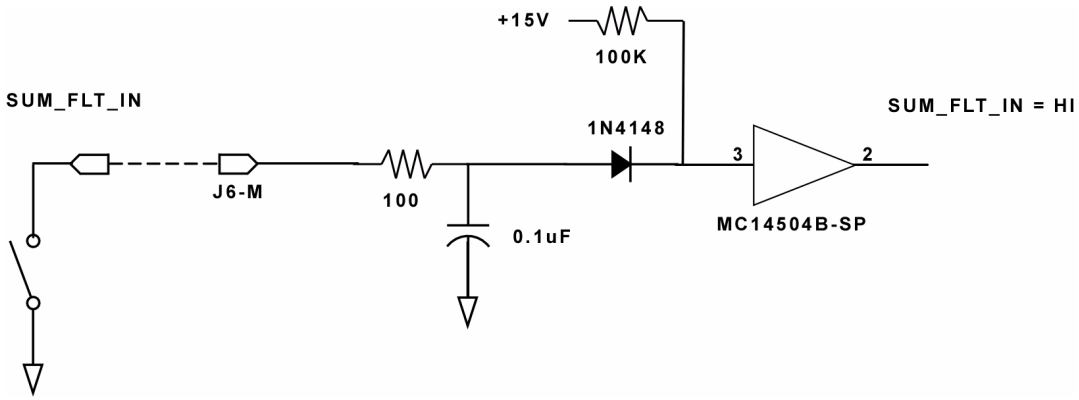


Figure 13, Sum Fault Input

Sum Fault Output

Refer to Figure 14. The Sum Fault output is an open collector output at J6-L. The output transistor will be off when this amplifier faults or is turned off.

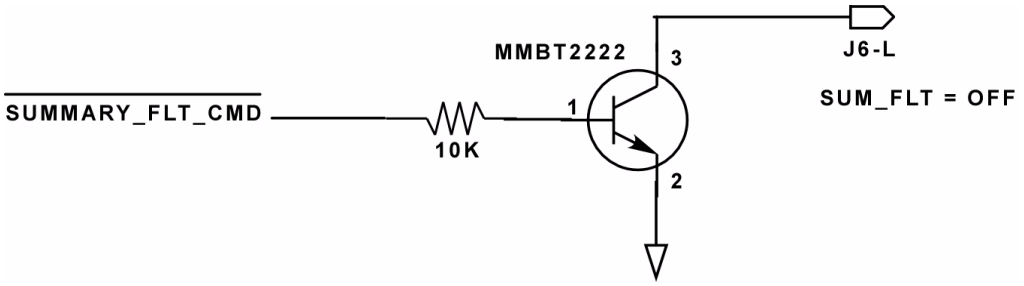


Figure 14, Sum Fault Output

Wave Guide Switch 1 and Wave Guide Switch 2 RF Inhibit

Refer to Figure 15. The Waveguide Switch RF Inhibit input provides a pull up resistor of 100K to + 15V. An input HI is required when a RF Inhibit command is received from Waveguide Switch 1 at J6-G or Waveguide Switch 2 at J6-K. For normal operation pins J6-G and J6-K must be grounded through a jumper to either J6-N or J6-P.

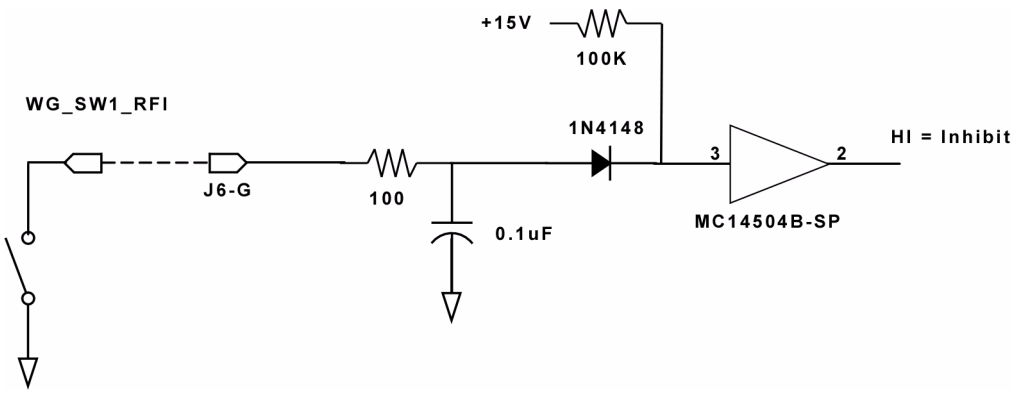


Figure 15, Waveguide SW1 RF Inhibit

Redundant Configuration Application

Refer to Figure 16. The SSPA has built-in Waveguide switch control and indicator functions. Two SSPAs can be configured in a 1:1 redundant system without an external system controller. In Redundant configuration one amplifier constantly monitors the operation of the other amplifier so that if the online amplifier becomes faulted, the backup amplifier will take its place. This automatic switching requires that the backup amplifier must be operational (not faulted) and in *automatic mode*. Please refer to the system manual for more details on redundant switching.

Note

The waveguide switch interface J6 provides the control and monitoring of two waveguide switches SW1 and SW2. Only SW1 can be used in a 1:1 redundant configuration. SW2 can be added as an offline switch. It cannot be configured as a 1:1 or 1:2 system with 3 HPA.

Note

The *Auto mode* can be selected via serial interface. Please refer to the Protocol and Operation chapters for more details.

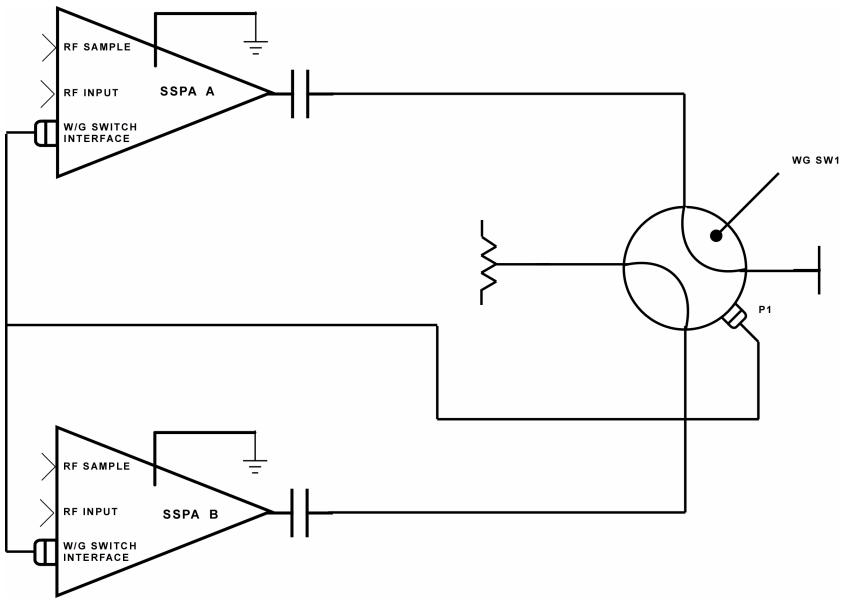


Figure 16, Switching System in 1:1 Configuration

Serial Interface Ports

Dual serial interface connectors (COM1 and COM2) are available for remote control operation. Both serial interface ports are always enabled. The amplifier will respond to commands from either interface. The last command received has precedence.

COM1 is an RS-232 only serial interface. No switch settings are required for COM1. Table 1“, Digital Monitor and Control Connector J1 Pinouts,” on page 13 lists the pinouts for COM1.

COM2 can be configured as an RS-485 2-wire serial interface or as an RS-485 4-wire serial interface. The pinouts for the COM2 interface are listed in Table 1 on page 13, and typical implementations are shown in Figure 17 and Figure 18.

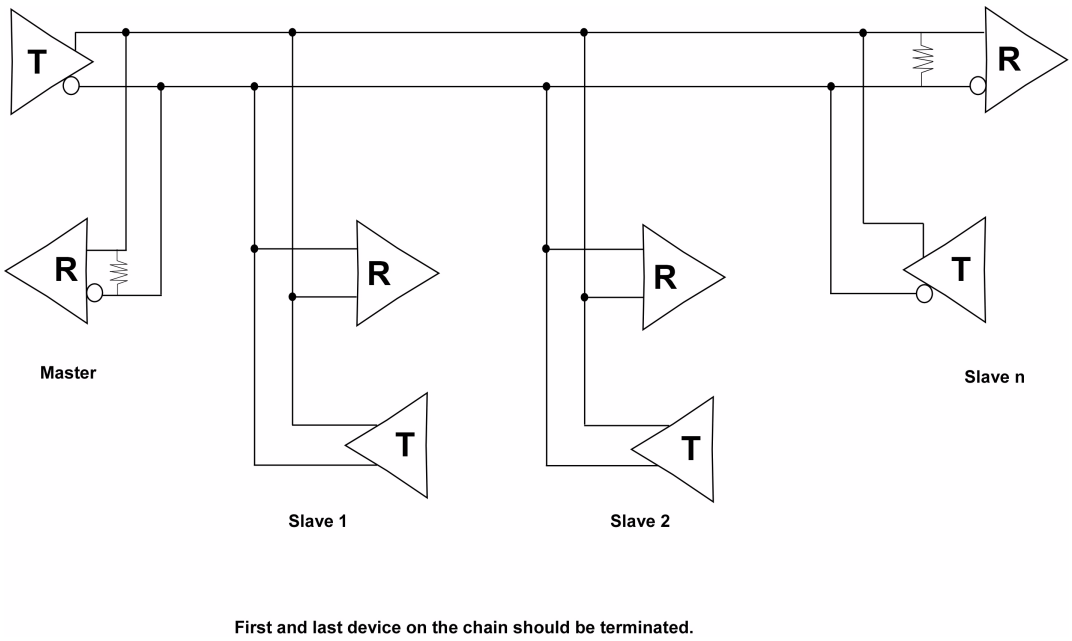


Figure 17, Typical RS-485 2-Wire Duplex Implementation

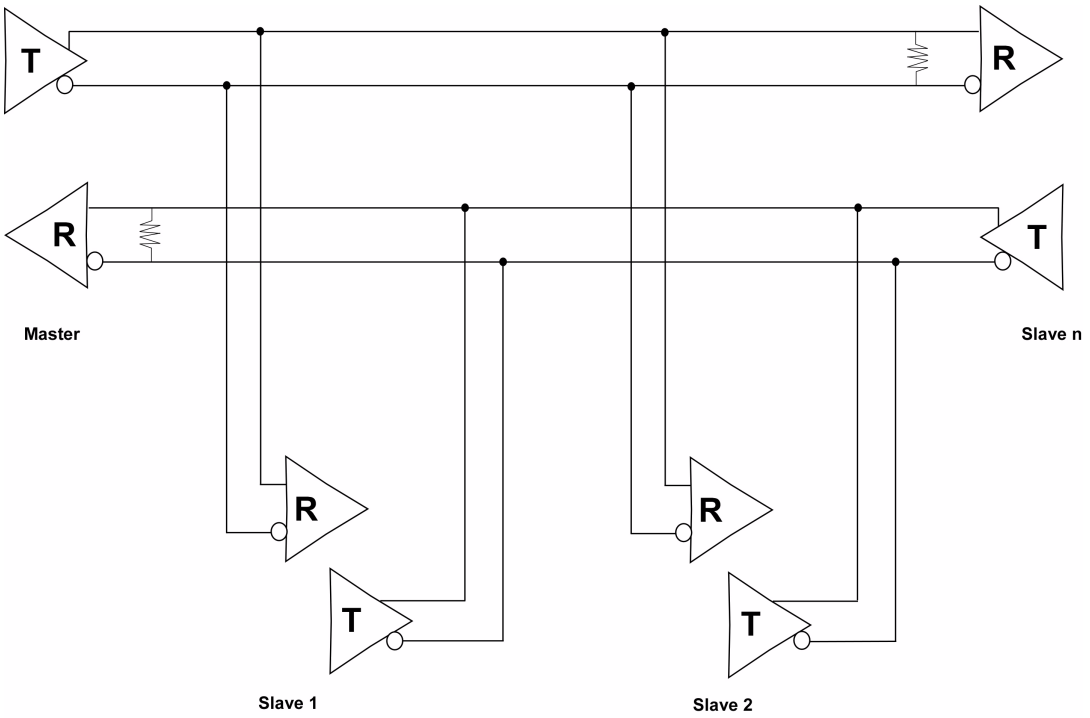


Figure 18, Typical RS-485 4-Wire Full Duplex Implementation

Reverse Power

The Reverse Power Fault is set to Active Low when the reflected power exceeds P_{rated} -7 dB, Prated -10 dB in some applications. Refer to the specification in Appendix A for detailed specifications of your apmplifier.

Grounding

WARNING

To prevent Electric Shock the amplifier should be securely connected to the grounding stud. Failure to comply could result in personnel injury or death.

WARNUNG

Zur Vermeidung elektrischer Schläge sollte der Verstärker fest mit dem Erdungsbolzen verbunden werden. Nichtbeachtung kann die Verletzung oder den Tod von Menschen verursachen.

Local and Remote Operation

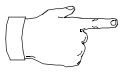
Xicom Technology ODUs have a built-in microprocessor for remote Monitor & Control using Xicom Standard Protocol. To operate from a remote position refer to the chapters titled *Operation* and *Amplifier communication and Protocol* for detailed information.

There is one switch on the front panel of the amplifier that allows you some local control of the unit. This switch is the Primary Power Switch and is used to turn AC input power ON or OFF.

There is also a LED indicator on the amplifier front panel. Depending on the state of the amplifier, this indicator shows:

- AMBER when the unit is in standby.
- GREEN when transmit is enable and there is no fault.
- RED when a fault occurs during standby.
- Flashing GREEN/AMBER when th unit is in transmit and RF is inhibited.
- Flashing GREEN/RED when a fault occurs during transmit.

Operating Procedure



Note

The power supply must be enabled and RF enabled for the amplifier to operate properly.

Use this procedure to operate the amplifier in LOCAL.

1. Ensure that all Waveguides are connected.
2. Connect the amplifier to the primary power source.
3. Turn the Primary Power Switch ON.

Operation

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/02/2002	A.L. Crozier, Jr.
A	9869	Original Release	06/05/2002	A.L. Crozier, Jr.
B	10033	Update to reflect amplifier improvement	08/05/2002	A.L. Crozier, Jr.
C	12707	Add German Translation	12/03/2004	A.L. Crozier, Jr.
D	13557	Add 2nd Generation PS Information	11/21/2005	S. Ludvik

Operation

Description

This chapter contains AC Power information for two power supplies:

Generation 1 (Enable Switch). Part Number 310-0415-002
Outline Drawing 304-0215-004

Generation 2 (Circuit Breaker). Part Number 310-0415-004
Outline Drawing 304-0215-007

An external control and monitor unit may be used to operate the SSPA ODU series amplifiers. Control and status signals are accessed via a 32 pin interface connector or an IrDA Interface.

Operating Modes

There are three amplifier operating modes:

- Standby
- Transmit ON
- Fault

Standby Mode

In this mode, the SSPA is ready for main voltage to be applied.

Transmit ON Mode

When transmit is enabled (applied to the SSPA) RF input signals are amplified.

Fault Mode

Summary Fault

This mode exists anytime a condition detrimental to the SSPA is detected by the power supply fault detection circuitry. Any of the following conditions trip the fault detection circuitry:

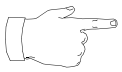
Power Supply Voltage Fault

The power supply voltage fault circuit will latch immediately when a fault in one of the three internal power supply voltages occurs. A voltage fault may be cleared by sending the Fault Reset command.

SSPA Overtemperature Fault

A SSPA over-temperature fault will clear itself once the temperature of the base plate is reduced to a safe operating level. Power supply voltage will automatically be enabled when the over-temperature fault clears.

Note



An over-temperature fault should be cause for immediate maintenance action as it is an indication of a fan failure or blocked air passage(s).

Reverse Power Fault

The reverse Power Fault is set to Active Low when the reflected power exceeds P_{rated} -7 dB.

Clearing Faults

Faults can be cleared by sending the Fault reset Command (‘B’)

If the fault condition occurs frequently, maintenance action is required.

Control and Status Signals

Control Signals

AC Power ON

Generation 1 Power Supply

Normal (M&C Interface)

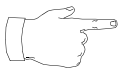
The SSPA is turned on by connecting the AC Cord to the prime AC power source. ON/OFF control of the AC input is at the AC power source. The control system turns ON as soon as prime AC power is applied. The main voltage is turned ON by sending the appropriate command through the system interface. All commands are identified in the chapter titled *SSPA Communications and Protocol*.

Manual

In manual operation the SSPA is turned ON by connecting the AC Cord to the prime AC power source. ON/OFF control of the AC input is at the prime AC power source. The system can be controlled through the following pins on the interface connector J1:

- Reset computer — connect Pin h to Pin f (+15 Vdc).
- Normal computer operation — connect Pin h to either Pin Z (GND)or Pin a (GND).

Note



In manual operation the system is configured to transmit ON when the prime AC power is on.

Generation 2 Power Supply

The SSPA is connected to the prime AC power source by an AC Power Cord. ON/OFF control of the AC input is at the AC power source.

The SSPA is turned ON by connecting the AC Cord to the prime AC power source. ON/OFF control of the AC input is at the Circuit Breaker located on the power supply. The system can be controlled through the following pins on the interface connector J1:

- Reset computer — connect Pin h to Pin f (+15 Vdc).

Initial Turn On

The Initial Turn On procedure has three parts:

- Prepower Check.
- Turn On.
- Turn Off.

This procedure should be followed to ensure proper operation of the amplifier and to avoid permanent damage to the amplifier.

Caution

Ensure that all of the following instructions are followed. Failure to comply could result in permanent damage to the amplifier.

Vorsicht

Stellen Sie sicher, dass alle folgenden Anweisungen befolgt werden.

Nichtbeachtung kann bleibende Schäden am Verstärker verursachen.

Prepower Check

1. The prime power voltage is within the specified limits of the amplifier. The correct power input connector pins must be used, dependent on voltage level and the prime power source. Refer to the appendix titled *Mechanical Drawings* for connector pin outs.
2. The amplifier is installed within an enclosure. The exhaust air from the amplifier should be ducted to the outside of the cabinet so that the warm air is not recirculated into the amplifier's air intake.
3. The RF output is terminated with a load capable of dissipating the power of your unit. This load should have a maximum VSWR of 1.5:1. The RF drive signal is within the frequency range of the amplifier's specification. Refer to the appendix titled *Specifications* for rated power gain.

Caution

Do not exceed the RF input power limit as defined in the product specification. Doing so will cause the SSPA to overheat. Failure to comply could result in permanent damage to the SSPA.

Vorsicht

Überschreiten Sie nicht die in der Produktspezifikation angegebene Begrenzung der HF-Eingangsspannung. Sie verursachen sonst eine Überhitzung der SSPA. Nichtbeachtung kann zu einer bleibenden Schädigung der SSPA führen.

Turn On

1 There are two ways to turn ON the SSPA:

Normal (M&C) Interface) — When operating the SSPA with the standard digital M&C Interface the system turns ON as soon as prime AC power is applied. The main voltage is turned ON by sending the appropriate command through the system interface. Refer to the chapter titled *SSPA Communication and Protocol* for command details.

Manual — In manual configuration the SSPA will turn ON the control system as soon as prime AC power is applied. The control system is held in the reset mode until the J1-Pin h is connected to either
J1-Pin Z or J1-Pin a. This allows the control system to operate normally.

Note

In manual operation the system is configured to transmit ON when the prime AC power is on.

2. Connect and turn ON a test RF signal source. Slowly increase the drive power to the amplifier. Monitor the RF output power through the SSPA's built-in sampler or through an external coupler.

Turn Off

There are two shut down modes.

Transmit OFF (M&C Interface)

When operating the SSPA with the standard digital M&C Interface the main system voltage is turned OFF by sending the appropriate command through the system interface. Refer to the chapter titled *SSPA Communication and Protocol* for command details.

System OFF (Manual)

Generation 1 Power Supply

The SSPA is switched off by disconnecting or manually turning OFF the prime AC power. If you turn the system OFF manually

it will turn ON and be in the same state as it was when you turned it off.

Generation 2 Power Supply

The SSPA is switched off by turning OFF the prime AC power using the circuit breaker . If you turn the system OFF it will turn ON and be in the same state as it was when you turned it off.

Solid State Power Amplifier Communication and Protocol

Record of Changes

ELECTRONIC APPPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/02/2002	A.L. Crozier, Jr.
A	9869	Original Release	06/05/2002	A.L. Crozier,
B	10523	Update to reflect change in specifications	12/06/2002	A.L. Crozier, Jr.
C	11379	Update to reflect Ethernet capability	08/14/2003	A.L. Crozier, Jr.
D	12070	Add Reject and ASCII Codes	04/08/2004	A.L. Crozier, Jr.
E	15784	Add Optional Parameter to allow setting power levels in dBm units	08/30/2007	ST

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List of Tables

Solid State Power Amplifier Communication and Protocol

Overview

Refer to Figure 1 for basic configuration.

Note

In this chapter, the term analog refers to devices without a serial interface. The term digital refers to devices with a serial interface (RS-232/RS-485).

Xicom amplifiers typically respond to a message in less than 20 milliseconds.

Communication

Digital SSPA (Solid State Power Amplifier)

Both rack-mounted and outdoor digital SSPAs have a built-in microprocessor for handling serial communications. With the exception of the Prime Power Switch, all operation of digital SSPAs can be completely controlled via the serial interface (RS-232/RS-485).

Compatibility

Two serial hardware interfaces (RS-232, RS-422/485) are available for the control link.

Amplifiers without the power monitor option will respond to queries for power readings, but the value returned should be ignored because output power is not being measured.

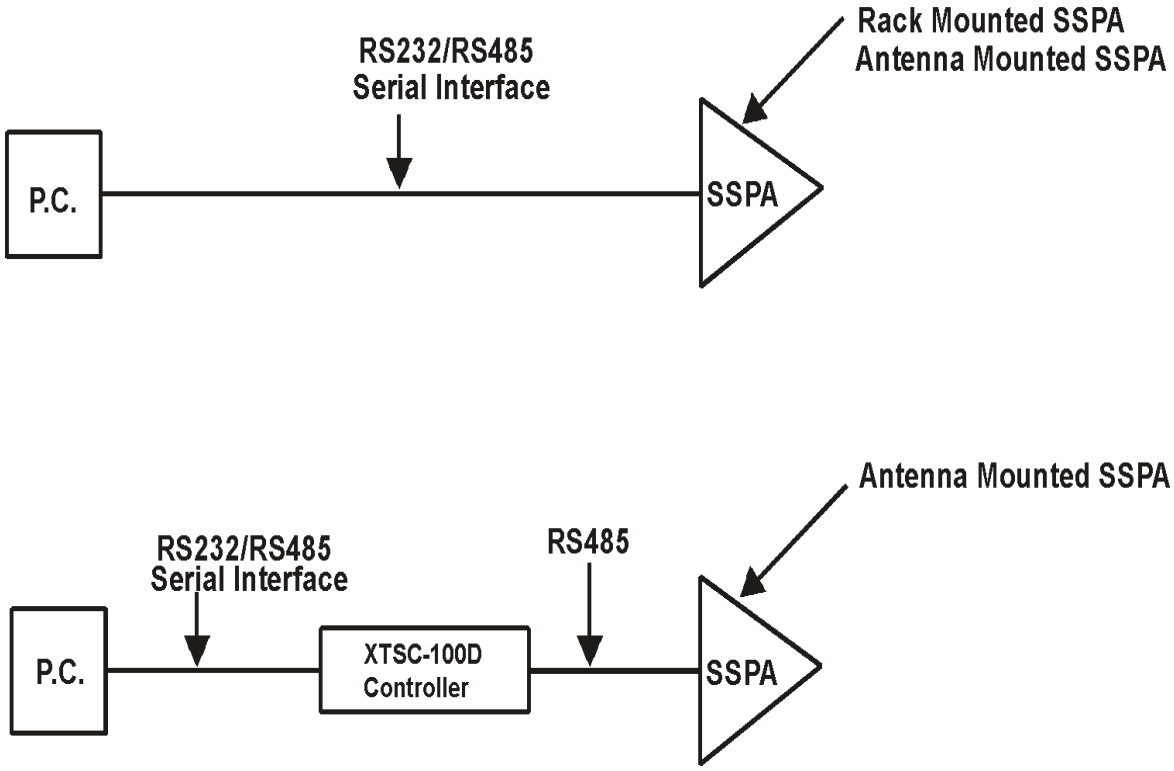

Figure 1, Basic Configuration

Protocol

Overview

Xicom digitally controlled devices monitor their serial and ethernet ports for incoming messages and respond to messages as soon as they are verified. Response time varies, typically less than 20 milliseconds. Although devices will respond to messages with invalid parameters, they ignore messages with invalid address bytes or check bytes.

Message Format

- Commands, Queries, and Responses are formatted according to Table 1 “, Standard Packet Format, ” on page 9 and Table 2 “, Packet Format (Redundant Controller — XTSC-100 Family),” on page 9
- Messages are delineated using start and stop characters, followed by a check byte.
- The address byte allows a master device to selectively communicate with individual devices that are sharing a RS-485 bus.
- Each message has a mandatory message byte, followed by a variable number of parameters. Some messages have no parameters, while others can have many. The variable length parameter field is also used to hold message responses.
- For Ethernet only. Each message must be terminated with a carriage return character (CR) or carriage return line feed character pair (CRLF.)

RS-485

Using RS-485, a master device can maintain status and control of multiple devices, which share send/receive lines. Slaves may transmit only in response to a command or query from the master. Each device is assigned a unique address between 'A' and 'Z' to differentiate it from other devices.

RS-485 device addresses are selected on rack SSPAs using the front panel interface. They are selected on digital outdoor SSPAs using Xicom's "wRemote" utility.

Note

If a device is not responding to your messages, check the RS-485 device address.

Printable vs. Non-Printable Protocols

Printable protocol facilitates teletype-style operations where users type in messages and view the responses. There are two drawbacks to this method:

1) Several responses contain bit flags (example: SSPA Summary Status Query). To force the resulting byte to be printable, bit 6 is conditionally set. However, there is no guarantee that the resulting byte will not be a start or stop character.
2) There is no provision for Xicom responses to directly indicate the success or failure of a given message. Rather, the length of the response can be checked to determine the presence or absence of a message-rejected code.

Printable protocol drawbacks are remedied by the non-printable protocol. Because start and stop bytes are non-printable, they cannot be confused with message parameters, which are always printable. Also, different start bytes are used to indicate whether a message was accepted or rejected. For nearly all implementations, the non-printable protocol should be used.

If you send a message using the printable protocol, devices will respond using the printable protocol. If you send a message using non-printable protocol, devices will respond using the non-printable protocol. There are no DIP switches to set, and there is no software to configure. Xicom devices always respond in kind:

- Printable and non-printable protocols differ only in the characters used for start, stop, and check bytes. Refer to Table 3 “, Start Byte, End Byte, & Check Byte, ” on page 9.
- The "printable" protocol uses printable start and stop characters; check bytes are generated using a method that produces printable ASCII characters.
- The "non-printable" protocol uses non-printable start and stop bytes; its check byte algorithm can yield non-printable characters. Refer to Table 4 “, Check Byte Calculation“ and examples on page 10.

Communication Parameters

Communications can be configured as follows:

Baud rates: 1200, 2400, 4800, 9600, 19,200, 38,400
Parity:None, Even, or Odd — Parity only available for 7 data bits
Data bits:7 or 8
Stop bits:1

Flow control options should be set to "none."

- SSPAs support 8/1 or 7/1, but not 8/2, etc.
- The default communication parameters are 9600 baud, N/8/1, unless otherwise requested.
- Parameters are selected using a remote interface.

Table 1, Standard Packet Format

Start Byte	Address Byte	Message Byte	Parameters as Required	End Byte	Check Byte

Table 2, Packet Format (Redundant Controller — XTSC-100 Family)

Start Byte	Address Byte	Device Selection Byte	Message Byte	Parameters as Required	End Byte	Check Byte	CRLF (Ethernet only)

Table 3, Start Byte, End Byte, & Check Byte

Protocol	Packet Type	Accept/ Reject	Start Byte	End Byte	Check Byte	Ethernet Terminator Byte
Printable	Message		(ASCII){	(ASCII)}		
	Response	Message Accepted or Rejected	{	}	“Base 95”	13 (CR)
	Message		STX	ETX		

Table 3, Start Byte, End Byte, & Check Byte

Non-Printable	Response	Message Accepted	ACK	ETX	"Exclusive OR"	13 (CR)
		Message Rejected	NAK	ETX		

Table 4, Check Byte Calculation

"Base 95"	1. Take [Sum (all message bytes)] – 32 = C 2. Then take [Modulus C ("Base 95")] + 32 = Result (Printable ASCII character in range of 32 to 126)
"Exclusive OR"	XOR (all message bytes) = Result (non-printable byte)

Example of "Base 95"

Message ("ID/Version" Query): {AO}

1 Take Sum of Message Bytes

'{' + 'A' + 'O' + '}'

123 + 65 + 48 + 125 = 361

2. Subtract 32

361 – 32 = 329

3. Modulus 95

329% 95 = 44

4. Add 32

44 + 32 = 76 (ASCII 'L')

Example of "Exclusive OR" Algorithm

Message ("ID/Version" Query): STX A 0 ETX (ASCII)

Progressively XORs the bytes to establish the check byte

Check byte = STX ^ A ^ 0 ^ ETX = ASCII character (may be non-printable)

thus:

STX	0000 0010	> XOR
A	0100 0001	
Result 1	0100 0011	> XOR
0	0011 0000	
Result 2	0111 0011	> XOR
ETX	0000 0011	
Check Byte	0111 0000 =	70h ⟶ "p"

Reject and ASCII Codes

Table 5 is a list of Reject Codes that are returned when an illegal or unsupported command is sent. Table 6 is a cross reference list of the ASCII Codes that are used in generating the commands and queries of the protocol.

Table 5, Command Reject Codes

ASCII Character	Reject Reason
a	Command byte not recognized
b	Illegal parameter or parameter out of range
c	System in local mode
d	Slow command being executed
e	Hardware or Software failure
f	High voltage is OFF
g	RF is inhibited
h	HPA Power is OFF
i	Invalid key or key sequence
j	Change in setting can only be made locally
k	A fault condition exists
l	System in Automatic Mode
m-z	Reserved

Table 6, ASCII Code Cross Reference

CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX
NUL	000	00	+	043	2B	V	086	56
SOH	001	01	,	044	2C	W	087	57
STX	002	02	-	045	2D	X	088	58
ETX	003	03	.	046	2E	Y	089	59
EOT	004	04	/	047	2F	Z	090	5A
ENQ	005	05	0	048	30	[	091	5B
ACK	006	06	1	049	31	\	092	5C
BEL	007	07	2	050	32	]	093	5D
BS	008	08	3	051	33	^	094	5E
HT	009	09	4	052	34		095	5F
LF	010	0A	5	053	35	‘	096	60
VT	011	0B	6	054	36	a	097	61
FF	012	0C	7	055	37	b	098	62
CR	013	0D	8	056	38	c	099	63
SO	014	0E	9	057	39	d	100	64
SI	015	0F	:	058	3A	e	101	65
DLE	016	10	;	059	3B	f	102	66
DC1	017	11	<	060	3C	g	103	67
DC2	018	12	=	061	3D	h	104	68
DC3	019	13	>	062	3E	i	105	69
DC4	020	14	?	063	3F	j	106	6A
NAK	021	15	@	064	40	k	107	6B
SYN	022	16	A	065	41	l	108	6C
ETB	023	17	B	066	42	m	109	6D
CAN	024	18	C	067	43	n	110	6E
EM	025	19	D	068	44	o	111	6F
SUB	026	1A	E	069	45	p	112	70

Table 6, ASCII Code Cross Reference

CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX
ESC	027	1B	F	070	46	q	113	71
FS	028	1C	G	071	47	r	114	72
GS	029	1D	H	072	48	s	115	73
RS	030	1E	I	073	49	t	116	74
US	031	1F	J	074	4A	u	117	75
SPACE	032	20	K	075	4B	v	118	76
!	033	21	L	076	4C	w	119	77
“	034	22	M	077	4D	x	120	78
#	035	23	N	078	4E	y	121	79
$	036	24	O	079	4F	z	122	7A
%	037	25	P	080	50	{	123	7B
&	038	26	Q	081	51	|	124	7C
‘	039	27	R	082	52	}	125	7D
(	040	28	S	083	53	~	126	7E
)	041	29	T	084	54	DEL	127	7F
*	042	2A	U	085	55			

Commands and Queries

Amplifier Queries

ID/Version
Command Byte: '0' **Response**: "MMMMMMMVRR" MMMMMMM is the amplifier model number. V is the firmware version number. RR is the firmware revision level. **Optional Parameter:** “0” Returns the following: **Response**: "MMMM-MMM/SSSSS/V.RR/YYYY-MM-DD" MMMM-MMM is the amplifier model number. SSSSS is the amplifier serial number. V is the firmware version number. RR is the firmware revision level. YYYY is the Firmware compile year. MM is the Firmware compile month. DD is the Firmware compile day.

Summary Status
Command Byte: '1' **Response**: "AB" formatted as follows: Byte 'A' Bit 7: Reserved (always zero) 6: Complement of Bit 5 5: Power Supply Enabled 4: VDD ON 3: Standby 2: Remote Mode 1: Constant Power On 0: RF Inhibited Byte 'B' Bit 7: Reserved (always zero) 6: Complement of Bit 5 5: Summary Fault 4: Reserved 3: Reserved 2: Alarm Exists 1: Reserved 0: Reserved **Notes**: Power Supply Enabled is only defined for amplifiers connected to a controller. If you query an amplifier through a controller, the controller generates the summary status response on behalf of the amplifier. Thus it can indicate Power Supply Enabled status. Amplifiers cannot respond to queries if power is off. Outdoor Units are always in Remote Mode unless they are configured with a Local Override switch.

Fault Status
Command Byte: '3' **Response**: "AB" formatted as follows: Byte 'A' Bit 7: Reserved (always zero). 6: Complement of bit 5. 5: Reserved 4: Upconverter Fault. 3: Over Temp Fault. 2: Reserved. 1: Fan Locked. 0: Low Line. Byte 'B' Bit 7: Reserved (always zero). 6: Complement of bit 5. 5: Power Supply Fault. 4: High Reflected Power. 3: External Interlock open. 2: Low Output Power. 1: High Output Power. 0: Reserved. **Notes**: Low Output Power, High Output Power and High Reflected Power are user-defined faults. A High Reflected Power fault can also occur when the VSWR detection circuit trips.

Fault History
Command Byte: '4' **Response**: A list of the last 100 faults. Each fault string has the following format: "AAAAAAAA YYMMDD HHMM!" The first eight bytes describe the fault, and the remaining bytes serve as a time-stamp. Each string is terminated by '!'; the last string in the sequence is followed by an additional '!'. **Compatibility**: Not available when querying amplifiers through controllers.

Current Screen
Command Byte: '5' Response: Returns the amplifier's current screen. The response is four 20 character strings, each terminated by '!' for a total of 84 characters. Refer to the chapter titled *Operation* for a definition of screens used.

Power in dBW
Command Byte: '6' **Response**: "XX.X" dBW. Returns the SSPA output power in dBW.

Power in Watts
Command Byte: '7' **Response**: "XXXX" Watts. Returns the SSPA output power in Watts.

Attenuator Counts
Command Byte: '8' **Response**: "XXXX" counts, ranging from 0 to 4095. This is the value written to the D-to-A converter which controls the attenuator.

Alarm Condition
Command Byte: '9' **Response**: One byte of alarm status, formatted as follows. Bit 7: Reserved (always zero). 6: Complement of bit 5. 5: High Output Power. 4: Low Output Power. 3: High Reflected Power (VSWR). 2: Reserved. 1: Reserved. 0: Reserved. **Notes**: Low Output Power, High Output Power and High Reflected Power are user-defined alarms. **Compatibility**: Not available when querying analog amplifiers via a controller.

Miscellaneous Setup
Command Byte: ‘P‘ **Query:** PEX<?> E = Ethernet X = mode or parameter you wish to query. D? = Interface Up/Down status. I? = IP Address N? = Netmask M? = MAC Address U? = Interface Up/Down status. **Examples:** Query: PED? Returns: PEDX where X = 1 if interface is Down (disabled) or 0 if interface is Up (enabled.) Query: PEU? Returns: PEUX where X = 0 if interface is Down (disabled) or 1 if interface is Up (enabled.) Query PEI? Returns: PEI192.168.1.10 where 192.168.1.10 is the IP Address of the Amplifier. Query PBCA? Query IF Attenuation. (only valid with programmable BUC) Returns: PCBAxx.x where xx.x is IF Attenuation in dB. Query PBCP? Query input power to BUC. (only valid with programmable BUC) Returns: PCBPxx.x where xx.x is input power in dBm. Query PBCT? Query temperature of BUC. (only valid with programmable BUC) Returns: PCBTxx.x where xx.x is temperature in degrees C.

Advanced Query

Command Byte: '?'

Description:

The Advanced Query feature, which is included in firmware versions 3.56 and higher, is intended to streamline the user's polling loop by allowing the user to construct custom query sequences. It is a complete polling solution returning virtually any measurement you might want.

Measurements are requested via a variable length parameter list. The length of the response will vary according to the measurements selected. Measurements are returned in the order specified by the user.

The syntax of an Advanced Query command is as follows:
<start character><address><'?'><parameter 1><parameter 2>…<parameter last><end character><check character>

EXAMPLE 1

Query: <STX>A?PQL<ETX><checksum>

Response: <ACK>A?|50.3|30.1|A|30.0|<ETX><Checksum>

- 50.3 — Power Out in dBm
- 30.1 — Reverse Power
- A — Low Power Alarm Enabled
- 30.0 — 30.0 dBm Low Power Alarm Threshold

Example 2

Query: <STX>A?13A<ETX><checksum>

Response: <ACK>A?|P$|A@|26.0|<ETX><Checksum>

- P$ — Summary Status Standby/Summary Fault
- A@ — Fault Status: Low Line Fault
- 26.0 — 26 dB of Attenuation

Parameter	Information Requested	Response Format

<table>
<tr>
<td>‘!’</td>
<td>Extended Summary Status</td>
<td>4 bytes
Byte A Summary Status Byte A
Byte B Summary Status Byte B
Byte C
Bit 7 — Reserved
Bit 6 — compliment of Bit 5
Bit 5 — Reserved
Bit 4 — Switch 2 Pos B
Bit 3 — Switch 2 Pos A
Bit 2 — automatic mode
Bit 1 — Waveguide Switch Position
‘0’ (“other” amplifier)
Bit 0 — Waveguide Switch Position
‘1’ (“this” amplifier)
Byte D
Bit 7 — Reserved (Always 0)
Bit 6 — Compliment of Bit 5.
Bit 5 — Reserved
Bit 4 — Reserved
Bit 3 — Reserved
Bit 2 — Mode Selected
Bit 1 — Mode Selected
Bit 0 — Mode Selected

<table>
<tr><th>Bit 2</th><th>Bit 1</th><th>Bit 0</th><th>Mode Selected</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>No Switch</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>1:1 Control</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>1+1 Control</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1:1 with switch control</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>1:2 Control</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>Future Use</td></tr>
</table>
</td>
</tr>
<tr>
<td>‘%’</td>
<td>Time & Date</td>
<td>YYYY/MM/DD, HH:MM</td>
</tr>
</table>

'#'	Extended Fault Status	4 Bytes Byte A Fault Status Byte A Byte B Fault Status Byte B Byte 'C' Bit 7: Reserved Bit 6: Compliment of bit 5 Bit 5: Reserved Bit 4:Reserved Bit 3: Reserved Bit 2: Reserved Bit 1: Reserved Bit 0: Reserved Byte D Bit7 — Reserved Bit6 — Compliment of Bit5 Bit5 — Reserved Bit4 — Reserved Bit3 — Reserved Bit2 — Reserved Bit1 — Reserved Bit0 — Reserved
'1'	Summary Status	XX
'3'	Fault Status	XX
'6'	Power	XX.X in dBW
'7'	Power	XXXX in Watts
'8'	Attenuator Setting	XXXX counts
'9'	Alarm Status	X
'A'	Attenuator	XX.X in dB
'H'	High Power Alarm/Fault Trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'h'	High Power Alarm/Fault Trip point and setting	A XXXX in Watts (generate alarm) F XXXX in Watts (generate fault) D XXXX in Watts (disabled)
'L'	Low Power Alarm/Fault Trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'l'	Low Power Alarm/Fault Trip point and setting	A XXXX in Watts (generate alarm) F XXXX in Watts (generate fault) D XXXX in Watts (disabled)
'M'	Supply Hours	XXXXXX hours

'N'	Transmit Hours	XXXXXX hours
'P'	Fwd Power	XX.X in dBm
'Q'	Reverse Power	XX.X in dBm
'R'	Reverse Power Alarm/ Fault trip point and setting	A XX.X in dBm (generate alarm) F XX.X in dBm (generate fault) D XX.X in dBm (disabled)
'r'	Reverse Power Alarm/ Fault Trip point and setting	XXXX in Watts
'T'	Base Plate Temp	XXXX in ^{o}Celsius (Right Justified and Padded with Spaces.)
Compatibility: The XTSC-100D supports the following parameter subset (when querying it for amplifier status): '1', '3', '8', 'M', 'N', 'P', 'Q', 'T'.		

Get Serial Configuration
Command Byte: 'X' **Parameters**: '?' returns the configuration of the communications port that the query was received on. "1?" returns information on COM1. "2?" returns information on COM2. “R?” returns RS-485 Configuration. **Response for ‘?’, ‘1?’, and ‘2?’**: "CBBBBBBPDS" C Communications port; 1=COM1, 2=COM2 (COM1 = RS-232 port, COM2 = RS-485 port.) BBBBBB Current baud rate. Example: 019200. P Parity, 'N', 'O', or 'E'. D Data bits, '8' or '7'. S Stop bits, '1' **Response for ‘R?’**: "ABC" A A is 4 or 2 Wire B B is T (Terminated) or U (Unterminated) C C is RS 485 address **Compatibility**: Not available when talking to an amplifier via a Digital Outdoor Controller. **Notes**: See also the *Set Serial Configuration* command.

Amplifier Commands

Time and Date

Command Byte: '%'
Function: Sets the Time and Date of unit's internal clock. If the Time and Date is set, a software reset is generated.
Parameter: %YYYY/MM/DD, HH:MM
Note: The Hour is in 24 hour format. Unit does not reply to this command.

Reset
Command Byte: '~' **Function**: Resets the unit. Note: Unit does not reply to this command.

VDD Voltage On
Command Byte: '@' **Function**: Turns power amplifier Power Supply voltage ON.

VDD Voltage Off
Command Byte: 'A' **Function**: Turns power amplifier Power Supply voltage OFF.

Fault Reset
Command Byte: 'B' **Function**: Resets any of the SSPA's resetable faults.

Step Attenuator
Command Byte: 'C' **Function**: Steps attenuator count up or down. The attenuator count is written to the D-to-A converter that controls the attenuation. When this command is executed, the change in attenuation is virtually instantaneous, permitting radical adjustments to output power. Note that drastic attenuator changes may affect the life of the SSPA. A recommended alternative is to use a *Go To Power* command ('D' or 'E'). **Parameter**: "+XXXX" steps. This is an integer preceded by '+' or '-'. This offset is applied to the current attenuator count which ranges from 0 to 4095. **Note:** If direct attenuation control is required, most users will prefer command Set Attenuator: (‘K’), which specifies attenuation in dB. **Compatibility**: Attenuator required.

Go To Power (dBW)
Command Byte: 'D' **Function**: The SSPA gradually seeks the specified power. **Parameter**: The desired power level in "XX.X" dBW. **Compatibility**: Attenuator required.

Go To Power (Watts)
Command Byte: 'E' **Function**: The SSPA gradually seeks the specified power. **Parameter**: The desired power level in "XXXX" Watts. **Compatibility**: Attenuator required. **Optional Parameter**: “M” Set power in dBm. Example: EMxx.x

Constant Power (dBW)
Command Byte: 'F' **Function**: The SSPA seeks the specified power level until Constant Power is terminated by *Goto Power* (Command Byte 'D' or 'E') or *Terminate Constant Power* (Command Byte 'H'). Also called "Auto Gain Stabilization," the Constant Power (dBW) command allows the user to operate an amplifier over extended periods of time while maintaining a set power level. Constant Power Mode is intended to compensate for gain drift (due to time or temperature). **Parameter**: The desired power level in "XX.X" dBW. **Compatibility**: Attenuator required.

Constant Power (Watts)
Command Byte: 'G' **Function**: The SSPA seeks the specified power level until Constant Power is terminated by *Goto Power* (Command Byte 'D' or 'E') or *Terminate Constant Power* (Command Byte 'H'). Also called "Auto Gain Stabilization," the Constant Power (Watts) command allows the user to operate an amplifier over extended periods of time while maintaining a set power level. Constant Power Mode is intended to compensate for gain drift (due to time or temperature). **Parameter**: The desired power level in "XXXX" Watts. **Compatibility**: Attenuator required. **Optional Parameter**: "M" Set power in dBm.

Terminate Constant Power
Command Byte: 'H' **Function**: If active, Constant Power Mode is terminated. **Compatibility**: Attenuator required.

RF Inhibit
Command Byte: 'I' **Function**: Inhibits RF drive to the SSPA. **Compatibility**: Attenuator required.

Clear RF Inhibit
Command Byte: 'J' **Function**: RF drive to the SSPA is enabled. **Compatibility**: Attenuator required.

Set Attenuator
Command Byte: 'K' **Parameter:** “XX.X” dB of attenuation OR “IX.X” to increase attenuation by X.X OR “DX.X” to decrease attenuation by X.X **Function**: Instantly sets the attenuator to the specified dB level. Use caution, as sudden large changes to output power can damage the SSPA. **Response:** Resulting attenuation in XX.X dB. If the user specified an attenuation value outside the attenuator’s range, the closest valid value will be used. **Note:** Use this to find max attenuation. For example, send {AK 99.9}. A typical response would be {AK 30.0}, indicating a 30 dB attenuation range. **Compatibility**: Attenuator required.

Low RF Trip
Command Byte: 'L' **Function**: Sets a Low RF trip point. If output power drops below the set point, an alarm or fault is generated. By default the trip point is not enabled until this trip point is set. **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, “D” to disable. XXXX is the desired trip point in Watts. **Optional Parameter**: “M” Set power in dBm. Example: LAMxx.x

High RF Trip
Command Byte: 'M' **Function**: Sets a High RF trip point. If output power exceeds the set point, an alarm or fault is generated provided. By default the trip point is not enabled until this trip point is set. **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, “D” to disable. XXXX is the desired trip point in Watts. **Optional Parameter**: “M” Set power in dBm. Example: MAMxx.x

Reflected RF Trip
Command Byte: 'O' **Function**: Sets a Reflected RF trip point. If reflected power exceeds the set point, an alarm or fault is generated, as specified by the user. (Note: A hardware Reflected RF Trip Point is pre-set at the factory. You cannot adjust the hardware trip point by changing the software trip point). By default, the trip point is not enabled until this trip point is set. **Parameter**: "AXXXX" to set an Alarm trip point, "FXXXX" to set a Fault trip point, “D” to disable. XXXX is the desired trip point in Watts. **Optional Parameter**: “M” Set power in dBm. Example: OAMxx.x

Miscellaneous Setup
Command Byte: 'P' **Function**: Miscellaneous Setup **Parameters:** “CX” to set Configuration Mode. X is the redundancy mode you wish to operate. 0 — is single thread no waveguide switch. 1 — is redundant system with one waveguide switch (1:1 configuration.) 2 — is power combined system with two waveguide switches (1+1 configuration.) 3 — is redundant system with a load switch on the output (1:1 w/load.) 4 — Reserved **Parameters:** IX to enable and disable Gain Temperature Compensation. X = 0 to disable; X = 1 to enable. **Parameter:** JXX to set ambient room temperature in degrees C. XX = 20 to 60 °C **Parameter:**EX X is the Ethernet mode or parameter you wish to set. D = Bring interface Down (disable.) U = Bring iinterface Up (enable.) PBCAxx.x Set IF Attenuation (only valid with programmable BUC) where xx.x is dB

Waveguide Switch Control
Command Byte: ‘U’ **Format:** ‘U3’ Activate override mode and switch in Amplifier Switch 2. ‘U2’ Activate override mode and switch in other Amplifier Switch 2. ‘U1’ Activate override mode and switch in Amplifier Switch 1. ‘U0’ Activate override mode and switch in other Amplifier Switch 1. ‘UM’ Activate overide mode. ‘UA’ Terminate overide mode, activating automatic mode. Notes: When sending a ‘U3‘, ‘U2’, ‘U1’ or ‘U0’ command, also send a ‘UM’ command to the other amplifier to prevent unwanted automatic-mode switches. **Compatibility:** For Redundant ODUs only

Set Serial Configuration
Command Byte: 'X' **Function**: Configures serial communications on the specified port and sets the unit address. Use this command carefully as it could cause you to lose communications with the amplifier. See the *Get Serial Configuration* query for a related command. To configure the serial port, use Parameter Format 1. To configure RS-485, use Parameter Format 2. **Parameter Format 1**: "CBBBBBBPDS" C Communications port; 1=COM1, 2=COM2 (COM1 = RS-232 port, COM2 = RS-485 port.) BBBBBB Desired baud rate: 038400, 019200, 009600, 004800, 002400, 001200 P Parity, 'N', 'O', or 'E'. D Data bits, '8' or '7'. S Stop bits, '1 **Parameter Format 2:** "RABC" **Response**: "ABC" A '4' or '2' Wire B 'T' (Terminated) or 'U' (Unterminated) C RS 485 address **Parameter: A** Sets the address of the amplifier. **Notes**: 1) The parameters listed represent all options currently available. 2) The leading zero on the baud rate is there to facilitate selection of higher baud rates in future software revisions. 3) Amplifiers currently support just two data/stop configurations: 8/1 and 7/1. Thus byte "S" is a placeholder. 4) Parity is not supported for 8 data bits. Parity will be disabled if 8 data bits are selected. **Compatibility:** Not available when talking to an amplifier via Digital Outdoor Controllers.

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Firmware Update Procedure, HPA

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	11/21/2002	A.L. Crozier, Jr.
A	12182	Original Release	05/04/2004	A.L. Crozier, Jr.
B	12760	Update to apply to both TWT and SSPA	01/03/2005	A.L. Crozier, Jr.

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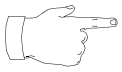
Firmware Update Procedure, HPA

Note



This document applies to HPAs with Rabbit Based Microprocessors.

Overview

This chapter provides the service technician with information and a procedure that will allow the equipment firmware to be updated. Contact Customer Service for assistance. Contact information is located in the chapter titled *Overview*.
The following files, listed by part description, are required to operate your equipment. The specific part numbers, 800-XXXX-XXX, 803-XXXX-XXX, 807-XXXX-XXX, and 808-XXXX-XXX are listed in the appendix titled *Firmware*.
The middle four digits (XXXX) of the 803 correspond to the middle four digits (XXXX) of the 808 part number.

- 800-XXXX-XXX

  Bill of material for the files required to operate your equipment.

  The last three digits (XXX) match the last three digits (XXX) of the 807-XXXX-XXX
- Part Number 803-XXXX-XXX consists of the set of support files listed below:

  coldload.bin

  pilot.bin

  flash.ini

  Rfu.exe
- Part Number 807-XXXX-XXX is the model configuration file. This is a text file that is loaded at the factory to configure the HPA to a predefined option.
- Part Number 808-XXXX-XXX is the firmware executable for your equipment.

Required Items

The following equipment is required to perform this procedure:

- PC (Personal Computer) — laptop or desktop with a serial port.
- A NULL modem cable.

Updating HPA Firmware

Use this procedure to update the HPA Firmware.

1 Connect the Com1 serial port to the RS-232 connector of the HPA control cable.

2. Set the programming switch on the control cable to the “program” position.
3. Place the firmware executable file and the coldloader.bin, pilot.bin, and flash.ini files in a common directory.
4. Start the Rfu.exe application.
5. Refer to Figure 1. Under the **Setup** menu item select **File Locations**.

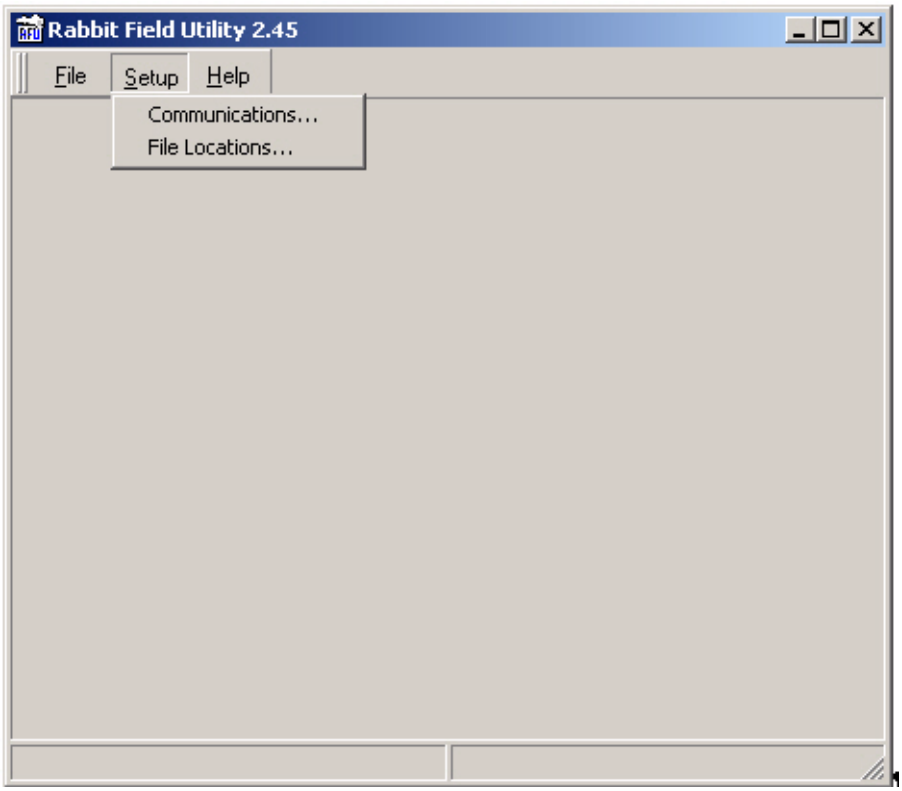


Figure 1, Select File Locations

6. Refer to Figure 2. Enter the complete path where the three loader files are stored; or click on the buttons with the three dots and browse to the directory where the files are located and select that file.

   Press **OK**.

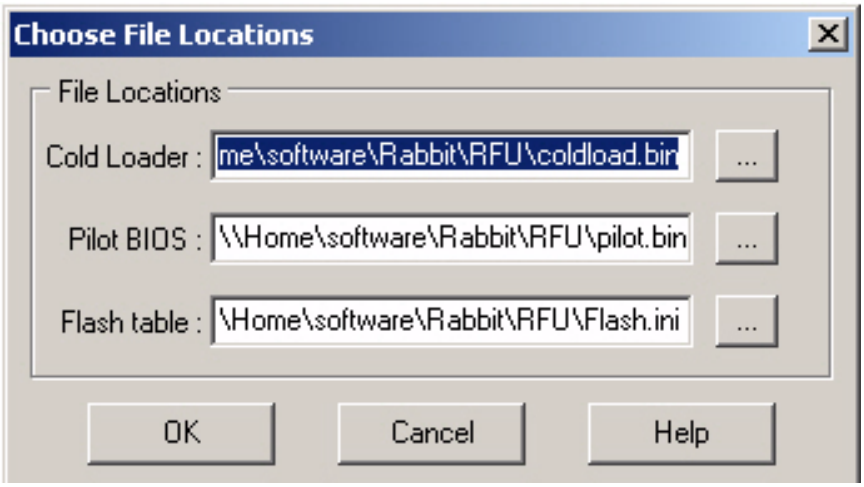
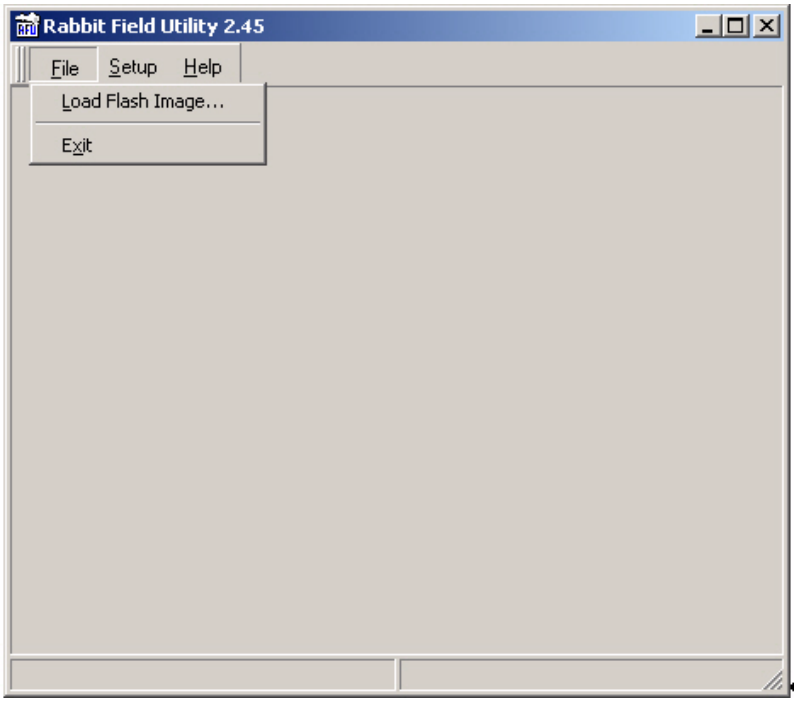


Figure 2, Locate the Files

7. Refer to Figure 3. Under the **File** menu item select **Load Flash Image**.



8. Refer to Figure 4. Click on the “three dots” button and browse to the directory where the firmware executable file is located and select that file. Press **OK**.

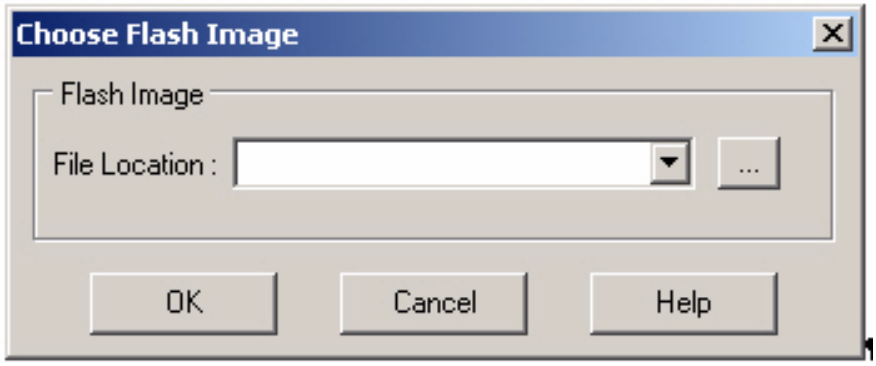


Figure 4, Locate the Flash Image File

9. The Rfu application will begin downloading the files.
10. Close the Rfu application and cycle the power on the unit.

Preventive Maintenance, ODU SSPA

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	03/11/2003	ALCjr
A	12302	Original Release	06/16/2004	ALCjr
B	10910	Update Chapter Title	03/31/2003	ALCjr
C	12707	Added German Translation	12/03/2004	ALCjr
D	15182	Add procedure to clean fins of ODU SSPA HPAs with internal or remote Power Supplies	01/02/2007	CM
E	15978	Add information about hinged bottom cover.	12/17/2007	SL

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Preventive Maintenance, ODU SSPA

Requirements

Monthly

Inspect the Air Inlet and Exhaust Ports. Ensure the ports are unobstructed. Remove any:

- Lint
- Leaves
- Straw

Quarterly

Inspect and clean:

- The electrical connections; make sure all connections are clean and tight.
- The Fin Assembly including main cooling fins and power supply fins.

Maintenance Procedures

Fin Assembly

Models with Removable Power Supplies

Perform the following procedure to remove, inspect, and clean the cooling Fin Assembly.

1. Turn the Power Amplifier OFF.
2. Disconnect the Prime Power.
3. Remove power supply leaving the main electrical conector in place. Refer to the appendix titled *SSPA Power Supply Removal Procedure*.
4. Using high pressure air blow the any accumulated dirt and debris out of the exposed amplifier and power supply fin assemblies.
5. Check the integrity of the electrical connections.

To replace the SSPA Power Supply refer to the appendix titled *SSPA Power Supply Removal Procedure*.

Models with Internal or Remote Power Supplies

Perform the following procedure to remove, inspect, and clean the cooling Fin Assembly.

1. Turn the Power Amplifier OFF.
2. Disconnect the Prime Power.
3. Locate the bottom enclosure covering the fin assembly and fan(s).
4. Using an appropriate screwdriver,do one of the following:
   - Remove and retain all flathead screws required to remove the bottom enclosure and uncover the fin assembly.
   - Loosen all captive flathead screws required to open the hinged bottom enclosure and uncover the fin assembly.
5. Remove or open bottom enclosure.
6. Using high pressure air blow any accumulated dirt and debris out of the exposed fin assembly.
7. Check the integrity of the electrical connections.

To replace the bottom enclosure reverse this procedure beginning with step 5.

Caution

Risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the manufacturer's instructions. Failure to comply could result in equipment damage.

Battery Disposal Instructions[1]

General Information

Replacement battery part number: 490-0008-001

Disposal of spent batteries should be performed by authorized, professional disposal company which has the knowledge in the requirements of the Federal, the State and the Local authorities regarding hazardous materials, transportation and waste disposal. It is recommended to contact the local EPA office.

Europe

The European Community (EC) has issued two directives: 91/157/EEC and 93/86/EEC. These directives are implemented differently by each member country. Therefore, in each country the manufacturers, importers and users are responsible for the proper disposal or recycling.

In accordance with these directives, the TL-5242/W battery contains no dangerous substances. The reaction products are inorganic and do not represent environmental hazards once the decomposition or neutralization process has terminated.

United States

Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (EPA) hazardous waste regulations as conveyed by the resources Conservation and Recovery Act (RCRA). The only metal of possible concern in the cell is the lithium metal that is not listed or characterized as a toxic hazardous waste. Significant amount of spent cells and batteries that are untreated and not fully discharged are considered as reactive hazardous waste.

1. The information in the following paragraphs was obtained from Tadrian Batteries, Ltd Tech Note LTN-2006-F April 2002

Hazardous waste of spent cells and batteries can be disposed after they are first neutralized through an approved secondary treatment prior to disposal (as required by U.S. Land Ban Restriction of the Hazardous and Solid Waste Amendments of 1984).

Achtung

Es besteht Explosionsgefahr, wenn die Batterie durch einen falschen Batterietyp ersetzt wird.

Entsorgen Sie gebrauchte Batterien entsprechend den Hinweisen des Herstellers. Nichtbeachtung kann zu Schäden am Gerät führen.

Anweisungen zur Entsorgung von Batterien[2]

Allgemeine Informationen

Teilnummer für Ersatzbatterien: 490-0008-001

Die Entsorgung verbrauchter Batterien muss durch einen autorisierten Entsorgungsbetrieb erfolgen, welcher mit den Bundes-, Landes- und örtlichen Vorschriften zum Transport und der Entsorgung von Gefahrstoffen vertraut ist. Wir empfehlen Ihnen, sich mit der örtlichen Umweltschutzbehörde in Verbindung zu setzen.

Europa

Die Europäische Union (EU) hat zwei Direktiven erlassen: 91/157/EEC und 93/86/EEC. Diese Direktiven werden von jedem Mitgliedsstaat unterschiedlich umgesetzt. Daher sind in jedem Land die Hersteller, Importeure und Nutzer für ordnungsgemäße Entsorgung oder Recycling verantwortlich.

In Übereinstimmung mit diesen Direktiven enthält die Batterie TL-5242/W keine Gefahrstoffe. Die Reaktionsprodukte sind anorganisch und stellen keine Gefahr für die Umwelt dar, sobald der Zersetzungs- oder Neutralisierungsprozess beendet ist.

2. **Die Informationen in den folgenden Abschnitten stammt von Tadrian Batteries, Ltd Tech Note LTN-2006-F April 2002**

Vereinigte Staaten

Lithiumbatterien sind weder speziell aufgeführt noch entsprechend dem Resources Conservation and Recovery Act (RCRA) von den Bestimmungen der Bundesumweltbehörde (EPA) zu Sondermüll ausgenommen. Das einzige möglicherweise in Betracht kommende Metall der Zelle ist das Lithium, das nicht auf der Liste geführt oder als giftiger Sondermüll eingestuft ist. Größere Mengen unbehandelter und nicht völlig entladener verbrauchter Zellen werden als Reaktiv-Sondermüll betrachtet.

Sondermüll bestehend aus verbrauchten Zellen und Batterien kann entsorgt werden, nachdem diese zuerst durch eine genehmigte, zusätzliche Behandlung (gemäß U.S. Land Ban Restriction of the Hazardous and Solid Waste Amendments von 1984) vor der Entsorgung neutralisiert werden.

Service and Repair

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	08/2001	A.L. Crozier, Jr.
2		Incorporate RMA Form and format change	08/2001	A.L. Crozier, Jr.
3		Format changes—Table of Contents, List of Figures, List of Tables	09/2001	A.L. Crozier, Jr.
A	9183	Original Release	10/12/2001	A.L. Crozier, Jr.
B	9359	Delete figure 1 and attach RMA Form PDF at end of chapter.	11/27/2001	A.L. Crozier, Jr.
C	9395	Remove RMA Form and replace with Figure 1.	01/07/2002	A.L. Crozier, Jr.
D	9997	Update to include controllers.	07/08/2002	A.L. Crozier, Jr.
E	11096	Update to reflect maintenance information	05/21/2003	A.L. Crozier, Jr.
F	11152	Update Figure 1 to reflect current form	03/08/2004	A.L. Crozier, Jr.

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Service and Repair

Introduction

Xicom Technology recommends that all equipment be returned to the Xicom factory or approved service centers for any calibration, tuning and repairs that require internal access to the equipment.

Special training, procedures, test equipment, and maintenance manuals are required to service this equipment. Do not attempt to service or repair Xicom Technology equipment unless you are a qualified technician and you have successfully completed the Xicom Technology equipment operation and repair program. Product maintenance manuals are provided to all personnel who complete the equipment operation and repair training program. The maintenance manuals include all the necessary documents to service and repair Xicom Technology equipment.

Return Authorization

Returned Material Authorization

Before returning the equipment obtain a RMA (Returned Material Authorization) Number. To obtain a RMA Number contact Xicom Technology at:

Telephone: **408-213-3000**
Facsimile: **408-213-3107**
email: **CustSupport@xicomtech.com**

Or you may use the online RMA request form located on the Xicom Technology Web Site:

www.xicomtech.com/support/support.htm

Figure 1 on page 5 is an example of the RMA Form.

When corresponding with Xicom Technology always refer to the equipment by the model number, part number and serial number.

Shipping Information

Return the equipment in the original packing. If the original packing is not available use wooden boxes or double layer corrugated boxes. Ensure there is adequate packing material between the equipment and the outside box. Seal the container with heavy packing tape or metal bands. Mark the container with the words *FRAGILE, DELICATE INSTRUMENT. HANDLE WITH CARE* on each side of the container.

Ship the container to the following address:

XICOM TECHNOLOGY
3550 Bassett Street
Santa Clara, CA 95054
RMA #_____

RMA REQUEST FORM

DATE: _____ WARRANTY: _____
RMA: _____ ORIG SHIP DATE: _____
COMPLETED BY: _____ ORIG SO : _____
WARRANTY EXPIRES: _____

CUSTOMER: _____

MODEL: _____ P/N: _____ S/N: _____
MODEL: _____ P/N: _____ S/N: _____

INCLUDED ACCESSORIES _____

Note: Please only return accessories as required to support repair testing

REASON FOR RETURN: _____

Has this unit been returned for repair before? Yes: ☐ No: ☐
USA: _____ UK: _____ Brazil: _____

SHIP TO ADDRESS: _____

BILL TO ADDRESS: _____

PREFERRED SHIPPING METHOD
Fed X ☐ _____ UPS ☐ _____
DHL ☐ _____ Other ☐ _____

PLEASE NOTE - Units returned during the Warranty period that are found to be problem free will be charged the minimum evaluation fee.
FOR ALL OUT OF WARRANTY UNITS: Xicom Technology will not proceed with the repair until we have a purchase order in place.

Price for this repair: _____ Includes all repair parts, labor, upgrades and full testing
Purchase order number: _____

***TWT and Linearizer Excluded - they will be quoted on a parts and labor basis.**
***The above price will not cover units that have been damaged beyond normal wear and tear- they will be quoted on a parts and labor basis - if repairable. Repair or Replacement at Xicom's Option.**
***Discontinued models will be quoted on a parts and labor basis - if repairable. Repair or Replacement at Xicom's Option.**
***Minimum Evaluation price will be charged for minor repairs, $1000. for amplifiers, $350. for controllers.**

Contact
Name: _____
Phone: _____
Fax: _____
e-mail: _____

Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054
Tel: 408-213-3000, Fax: 408-213-3107

Enclose a copy of this form with unit and ship to:
Xicom Technology
3550 Bassett Street
Santa Clara, CA 95054
Attn: RMA

Revision Date 3/8/2004

Figure 1, RMA Request Form Example

C-BAND SOLID STATE AMPLIFIER
XTS-200C, 5.85-6.425GHz,
w/BUC & INTERNAL 10MHZ REFERENCE
OUTDOOR SSPA

This document is best viewed using the Times New Roman font

17435	C	See ECO	05/18/2011	W. Wong
13061	B	Change Appendix A	05/09/2005	JT
12787	A	Change para 3.2.1 and 3.2.13	02/09/2005	SL
N/A	1	Create document.	1/11/2005	SL
ECO	**REV**	**DESCRIPTION**	**DATE**	**APPROVED**
COMTECH XICOM TECHNOLOGY		**XTS-200C, 5.85-6.425GHz W/BUC & INTERNAL 10MHZ REFERENCE**		
		Document No. 305-0281-202	**REV C**	**Page 1 of 8**

1.0 SCOPE

This specification defines performance requirements for a C- Band solid state power amplifier (SSPA) intended for operation as an outdoor unit (ODU) in a satellite mobile or ground station. The amplifier contains an L Band Block upconverter and an internal 10MHz reference.

2.0 APPLICABLE DOCUMENTS

3.0 PERFORMANCE SPECIFICATIONS

3.1 ELECTRICAL INTERFACE

3.1.1	RF Output	CPRG-137	
3.1.2	RF Input	Type N, female	
3.1.3	Sample Port	Type N, female	
3.1.4	Monitor & Control	32 pin	(PT07E-18-32SW-027)
3.1.5	Waveguide Switch Control	18 pin	(PT07E-14-18S-027)
3.1.5	Power (AC)	4 pin	(DDK, CE05-2A20-4PD-D)

3.2 ELECTRICAL SPECIFICATIONS

3.2.1	Frequency Range: (Output) (Input)	5.85 GHz to 6.425 GHz 950 MHz to 1525 MHz	
3.2.2.	Saturated Output Power:	53 dBm	(typical)
3.2.3	Rated Output Power : at 1dB gain compression	52 dBm	minimum
3.2.3.1	Reverse Power Protection	$P_{rated} - 6 \pm 0.5$ dB	
3.2.4	Maximum Input Power	10 dBm, no damage.	
3.2.5	Gain		
3.2.5.1	Gain Small Signal	65 dB minimum 75 dB maximum at maximum gain control	

3.2.5.2	Gain Flatness over 575MHz	2.5 dB peak to peak at any operating temperature 3 dB peak to peak at any operating temperature and gain setting
3.2.5.3	Gain Flatness over 40MHz	1.0 dB maximum at any operating temperature and gain setting
3.2.5.4	Gain Slope	± 0.04 dB/MHz maximum
3.2.5.5	Gain Adjustment	20 dB minimum
3.2.5.6	Gain Variation with Temperature	± 2 dB over -40 to +50 deg C
3.2.6	Noise Figure	8 dB maximum
3.2.7	Noise Power (In Band)	-80 dBW/4 kHz maximum
3.2.8	Noise Power (Receive Band) (3.7GHz to 4.2GHz)	-150 dBW/4 kHz maximum
3.2.9	Harmonics at rated power	-60 dBc maximum
3.2.10	AM/PM conversion	2.5 deg/dB maximum at 3 dB below rated output power
3.2.11	Third Order IMD Products	-24 dBc @ 3 dB back off from rated output power (Two tones separated by 5 MHz and equal power) -32 dBc @ 7 dB back off from rated output power (Two tones separated by 5 MHz and equal power)
3.2.12.	Output Return Loss	18 dB minimum
3.2.13	Input Return Loss	12 dB minimum
3.2.14	Group Delay: (over 80MHz)	
	Linear	± .03nsec/MHz
	Parabolic	± .003nsec/MHz^2
	Ripple	1ns peak to peak

3.2.15	Spurious Signals		
3.2.15.1	Residual AM (in band discrete)	-50 dBc -20(1.5+log(f)) dBc -85 dBc	30 Hz to 10 kHz 10 kHz to 500 kHz > 500 kHz
3.2.15.2	Residual FM (in band discrete)	-37 dBc -20(1.5+log(f)) +13 dBc -72 dBc Note: f (kHz)	30 Hz to 10 kHz 10 kHz to 500 kHz >500 kHz
3.2.15.3	Spurious Signals (out of band)	-65 dBc	
3.2.16	Sample Port Coupling (nominal)	-40 dB	
3.2.17	Power Requirements (Prime Power)	90-264 VAC 47-63Hz, single phase 1250 VA typical 1600 VA maximum 0.95 Power Factor	

3.3 MONITOR & CONTROL

The SSPA contains monitor and control functions consistent with standard serial control interface.
Specific control functions and operating conditions are defined in the operating and installation manual. A summary of the basic functions is summarized below:

3.3.1 Control

Serial Interfaces	RS232 and RS485
RF Inhibit	Hi disables RF Lo enables RF
Gain Adjustment	0 dB to 20 dB setting
Waveguide switch control	see operating and installation manual

3.3.2 Monitor

Summary Fault Condition	see operating and installation manual
Internal Protection	Sequencing /Fail safe/Excessive temperature

3.4 ENVIRONMENTAL:

3.4.1 Environmental Specifications (Non-Operating) :

3.4.1.1 Temperature -50 to +70 Deg C

3.4.1.2 Vibration:
When packed in original shipping containers or mounted to a rigid support structure, MIL-STD-810F, Method 514.5 Procedure I, two hours per axis using the following PDS curve.

Freq (Hz)	5	8	12	16	30	79	500
G^2/Hz	.29	1.36	.348	.78	.291	.000173	0.000002

3.4.1.3 Shock
When mounted to a rigid support structure, MIL-STD-810F Method 516.5 Procedure 1 at 15g. 11 ms duration. The equipment shall survive handling in accordance with MIL-STD-810F Method 516.5 Procedure VI.

3.4.2 Environmental Specifications (Operating):

3.4.2.1 Temperature: -40 to 50 deg C

3.4.2.2 Humidity Up to 100% condensing

3.4.2.3 Altitude 12,000 ft AMSL operating, derate 2 degC per 1000 ft

3.4.2.4 Cooling Forced air

3.5 MECHANICAL

3.5.1	Dimensions	Per outline drawing 304-0242-001
3.5.2	Air Intake	Rear, side & bottom surfaces
3.5.3	Air Exhaust	Front surface
3.5.4	Interface Cables	Monitor & Control Waveguide Switch Control (optional)
3.5.5	Weight	95 lb. maximum

3.6 GENERAL REQUIREMENTS

3.6.1	Quality Assurance	Quality standards will meet ISO 9000.

4.0 OPTION FEATURES

4.1 Waveguide Switch Control

5.0 TESTING REQUIREMENTS:

5.1 Acceptance Test Procedure (ATP) requirements

Output Power (P1dB)	3.2.3
Reverse Power Protection	3.2.3.1
Gain Small Signal	3.2.5.1
Gain Flatness	3.2.5.2 thru 3.2.5.4
Gain Control	3.2.5.5
Spurious Signals	3.2.15
Sample Port Coupling	3.2.16
Prime Power	3.2.17

5.2 First Article Test (FAT) procedure requirements

FAT testing is done per specified customer requirements. The FAT test shall include as a minimum the tests defined in Section 5.1 above. The amplifier contains an internal 10MHz reference.

Appendix A

ATP Test Performance Sheet
Serial Number _____

Test Conditions :
Unless otherwise specified, data will be taken at " Standard Conditions" aka STD defined as room (ambient) temperature (nominal 25deg C) , 120V AC , 60Hz line voltage and attenuation setting =0 dB.

Test Step 1: Test SSPA per the Final Test Setup Procedure WI-0070-01. Attach results to this TPS form
Test Step 2: Test the SSPA per the following:

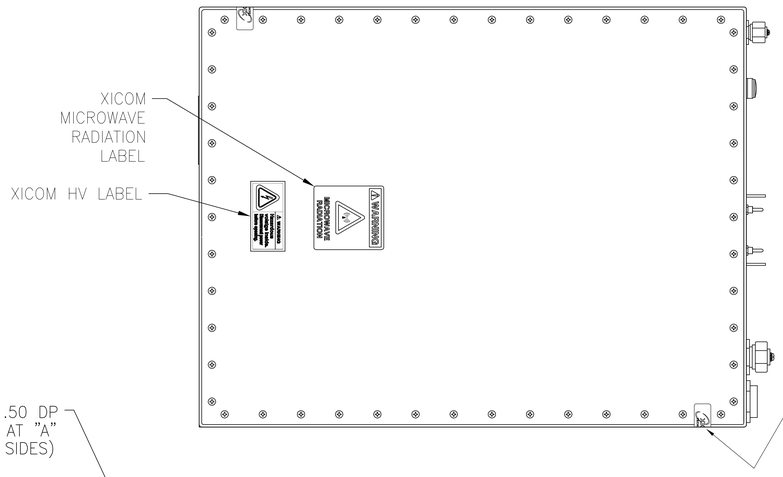
Spec Paragraph No	Test Description	Test Condition	Requirements Min	Requirements Max	Units	Measured Performance	Pass or Fail
3.2.1	Frequency Translation Frequency (Fout) Fout=4.9GHz+IF Fout= 5.85GHz 6.00GHz 6.1275GHz 6.425GHz Note 1): Output frequency(Fout)= Local Oscillator (LO)+Input Frequency(IF) Fin(MHz) LO(GHz) Fout(GHz) 950 4.9 5.85 1100 4.9 6.00 1237.5 4.9 6.1375 1525 4.9 6.425	STD Spectrum analyzer span=5kHz Test start 15min after turn on Record Fout with IF= 950 MHz 1100 MHz 1237.5 MHz 1525 MHz	 Fout-0.5 Fout-0.5 Fout-0.5 Fout-0.5	 Fout+0.5 Fout+0.5 Fout+0.5 Fout+0.5	 kHz kHz kHz kHz	 _____ _____ _____ _____	 ☐ Pass ☐ Fail
3.2.3	Output power P1 dB	STD Freq= 5.85, 6.1375, & 6.425 GHz Swept Input Power from -35 dBm to –12 dBm	52	N/A	dBm	See attached plots	☐ Pass ☐ Fail
3.2.3.1	Reverse Power Protection	STD Freq = 6.1375 GHz Operating into a short	P_{rated} – 6.5	P_{rated} – 5.5	dBm		☐ Pass ☐ Fail

Appendix A
(cont.)

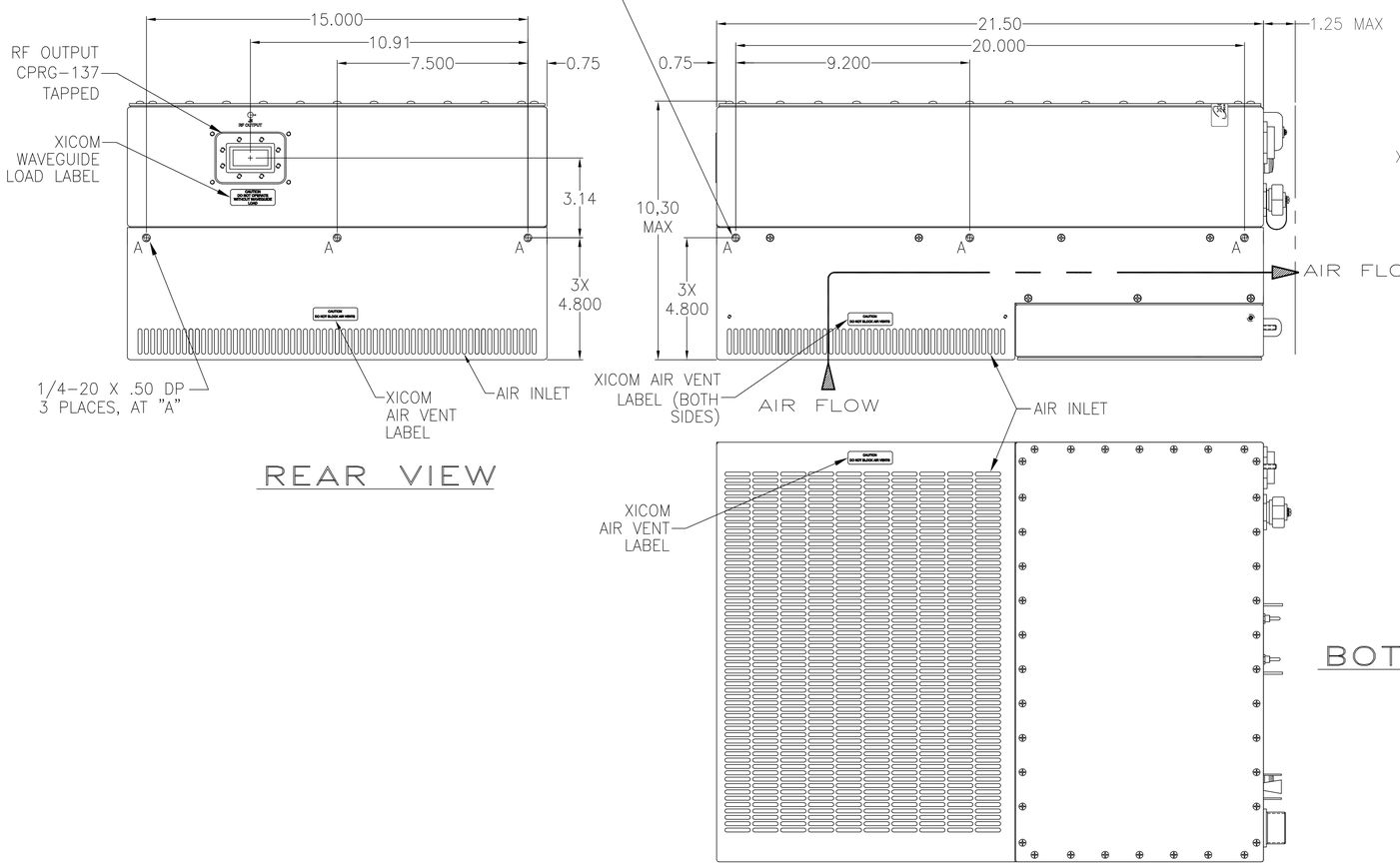
Spec Paragraph No	Test Description	Test Condition	Requirements Min	Requirements Max	Units	Measured Performance	Pass or Fail
3.2.5.1	Gain Small Signal Input Power P_{in} to provide $P_{out}=P_{rated}$-10 dB at midband Freq = 6.1375 GHz	STD Output freq swept from 5.85 to 6.425 GHz	65	75	dB	See attached plot	☐ Pass ☐ Fail
3.2.5.2	Gain Flatness over 575MHz	STD Output freq swept from 5.85 to 6.425 GHz	N/A	2.5	dB	See attached plot	☐ Pass ☐ Fail
3.2.5.3	Gain Flatness over 40 MHz	STD Output freq swept from 5.85 to 6.425 GHz	N/A	1.0	dB	See attached plot	☐ Pass ☐ Fail
3.2.5.4	Gain Slope	STD Output freq swept from 5.85 to 6.425 GHz	NA	± 0.04	dB/MHz	See attached plot	☐ Pass ☐ Fail
3.2.5.5	Gain Control Set Attn to 20 dB	STD Output freq swept from 5.85 to 6.425 GHz	20	N/A	dB		☐ Pass ☐ Fail
3.2.15	Spurious Signals (Inband discrete) maximum Adjust P_{in} for P_{rated}-3 dB	STD $P_{out}= P_{rated}$-3dB 30 Hz to 10 kHz 10 kHz to 500 kHz > 500 kHz	-37 -20(1.5+log(f)) -13 -72		dBc dBc dBc	See attached plot Span = 2 kHz Span = 20 kHz Span = 200kHz Span = 2 MHz Span = 20 MHz Span = 200 MHz	☐ Pass ☐ Fail
3.2.17	Prime Power Power Factor 5min after turn on	STD VAC= 90 , 60 Hz $P_{out}= P_{rated}$	NA	1600	VA		☐ Pass ☐ Fail
			0.95	N/A			☐ Pass ☐ Fail
		STD VAC= 264 , 60 Hz $P_{out}= P_{rated}$	NA	1600	VA		☐ Pass ☐ Fail
			0.95	N/A			☐ Pass ☐ Fail
3.2.16	Sample Port Coupling	STD Set drive level for 0 dBm at sample port. Record output power at flange for freq below :				Record Output Power (Coupling Factor)	
		Freq = 5.85 GHz	N/A	N/A	dB		
		Freq = 6.1375 GHz	N/A	N/A	dB		
		Freq = 6.425 GHz	N/A	N/A	dB		

Tested by : _____ Date:_____ Verified by : _____ Date: _____

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	4	SEE PREVIOUS REV	10/8/3	RG/LD
11634	A	SEE ECO	11/4/03	DG/JF
12225	B	SEE ECO	9/22/04	DG/JF
14406	C	SEE ECO	–	HL/SL
17430	D	SEE ECO	05/19/11	RC/WW

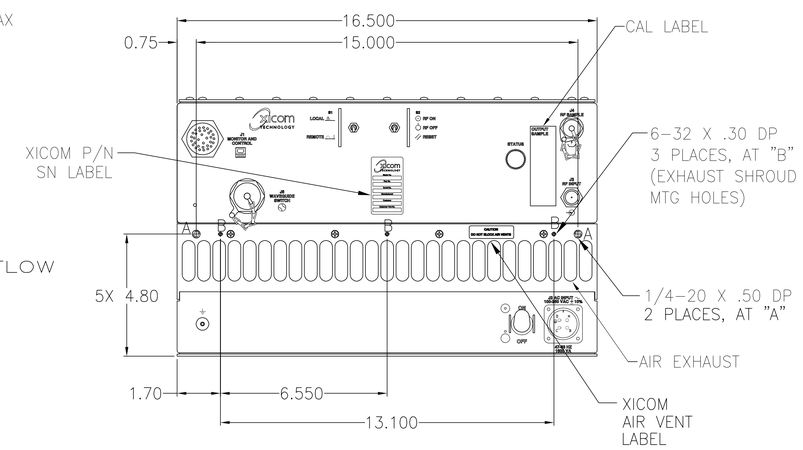


TOP VIEW



REAR VIEW

BOTTOM VIEW



FRONT VIEW

ELECTRONIC APPROVAL SEE PLM (OMNIFY)

NOTES: UNLESS OTHERWISE SPECIFIED

1 HOLES FOR UNIT MTG BRACKET AT "A". SEE SHEETS 3 & 4 FOR APPLICATION VIEW.

MATERIAL N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES PER ANSI Y14.5M FRAC DECIMALS ANGLES SURF. ✓ ± .XX ±.03 ±1° .XXX ±.015	CONTRACT NO.	XICOM TECHNOLOGY
FINISH N/A	DO NOT SCALE DRAWING	APPROVALS / DATE DRAWN D.GRANGER 8/21/03 CHECKED LD 9/03 ENGRG LDELL 9/03 MANFG QA	OUTLINE, XTS-150/200C SIZE E · CAGE CODE · DWG. NO. 304-0242-001 · REV. D CAD SCALE 1/1 · SHEET 1 OF 5

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

MONITOR AND CONTROL
PT07E-18-32SW-027
XICOM P/N 511-0058-032
MATING CONN:
PT06E-18-32PW-476
XICOM P/N 511-0059-032

DUST CAP

WAVEGUIDE SWITCH INTERFACE
PT07E-14-18S-027
XICOM P/N 511-0141-018
MATING CONN:
PT06E-14-18P-476
XICOM P/N 511-0142-018

GND STUD
10-32 X .50 LG

STATUS LED

ON/OFF SWITCH

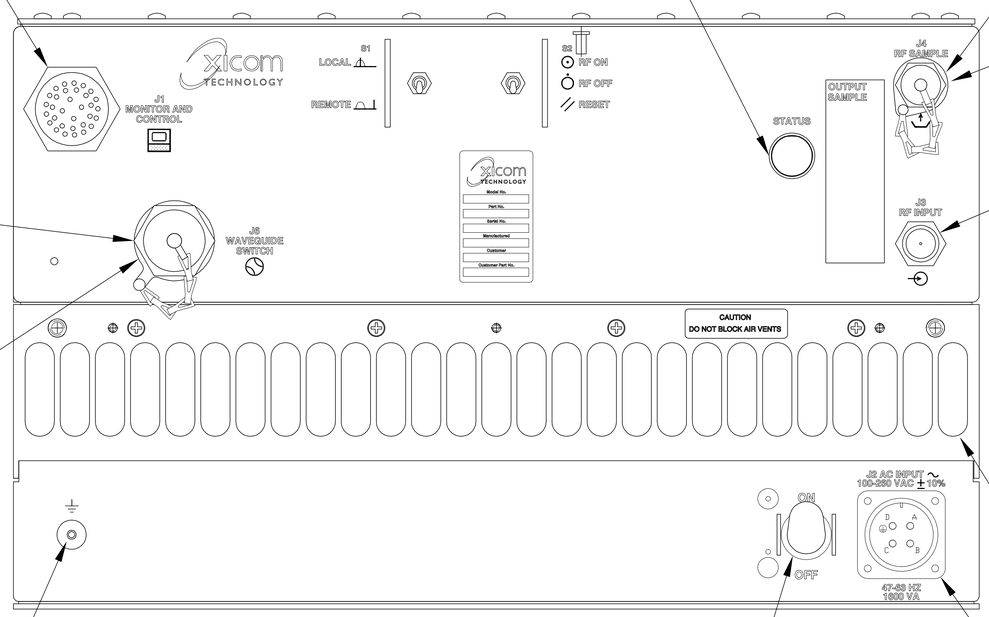
RF SAMPLE TYPE N (F)

DUST CAP

RF INPUT TYPE N (F)

AIR EXHAUST

POWER INPUT
100-260 VAC
47-63 HZ
P/N: DDK, CE05-2A20-4PD-D
XICOM P/N 511-0139-001
MATING CONN:
DDK CE05-6A20-4SD-D-BSS
XICOM P/N 511-0139-002
AND CE3057-12A-2-D
XICOM P/N 511-0139-003



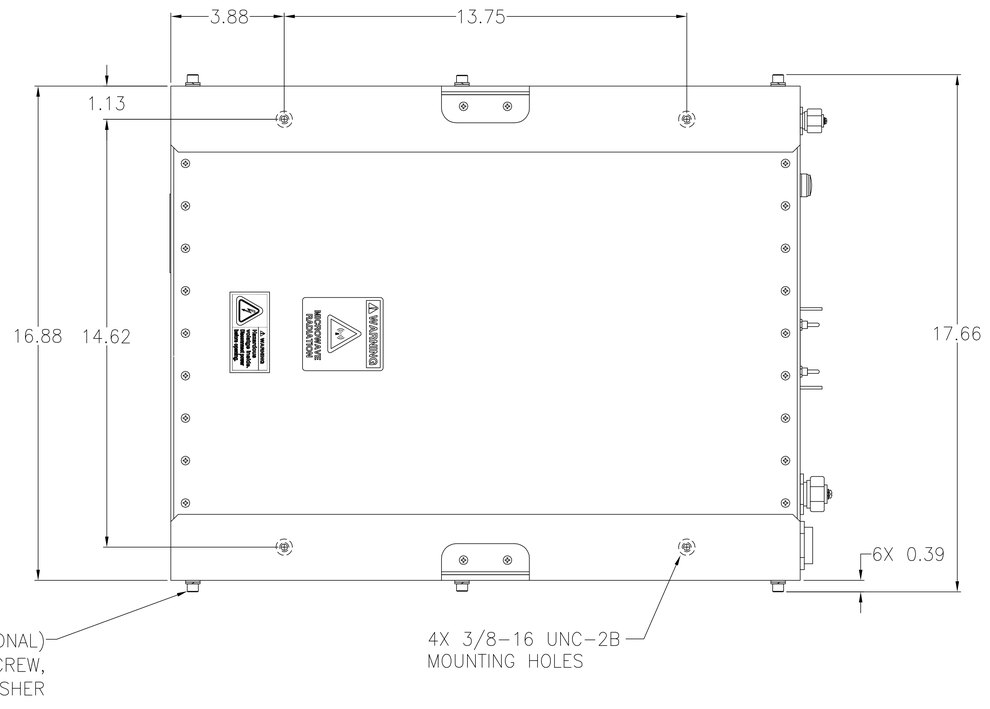
FRONT VIEW

XICOM TECHNOLOGY

OUTLINE,
XTS-150/200C

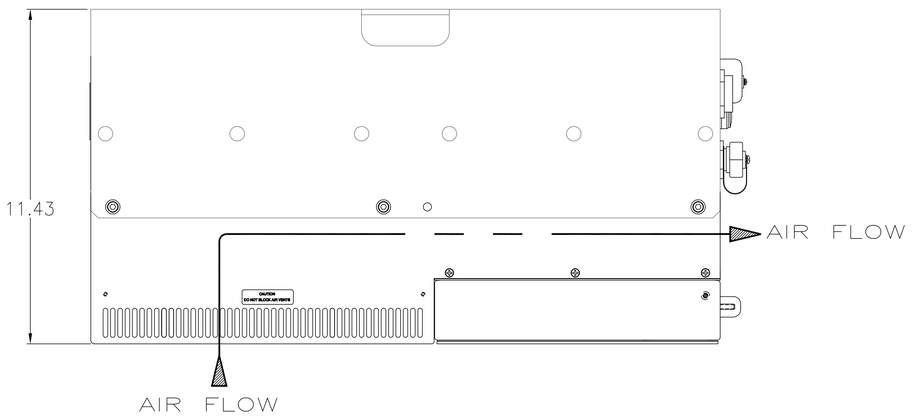
SIZE	CAGE CODE	DWG. NO.	REV.
E		304-0242-001	D
CAD SCALE 2/1		SHEET 2 OF 5	

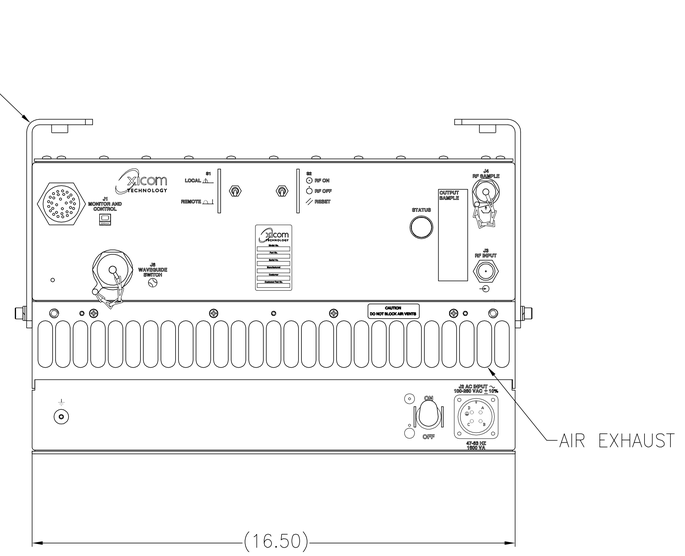
REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–



APPLICATION VIEW

TOP MOUNTING BRACKETS



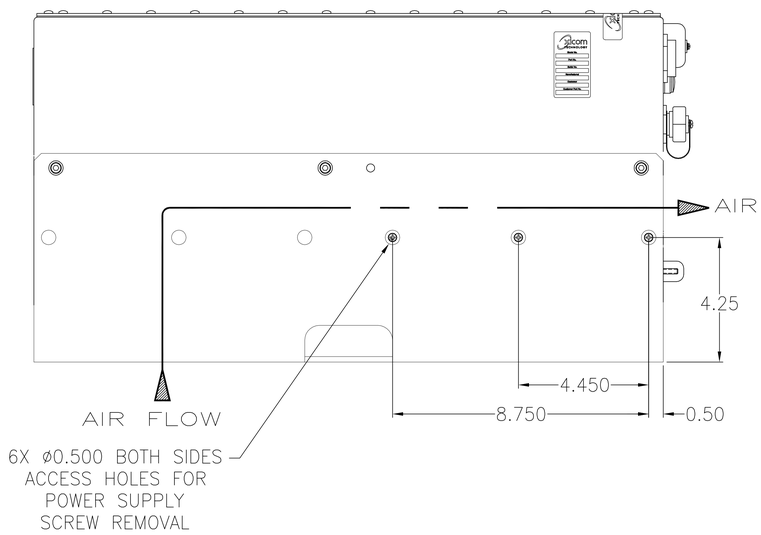


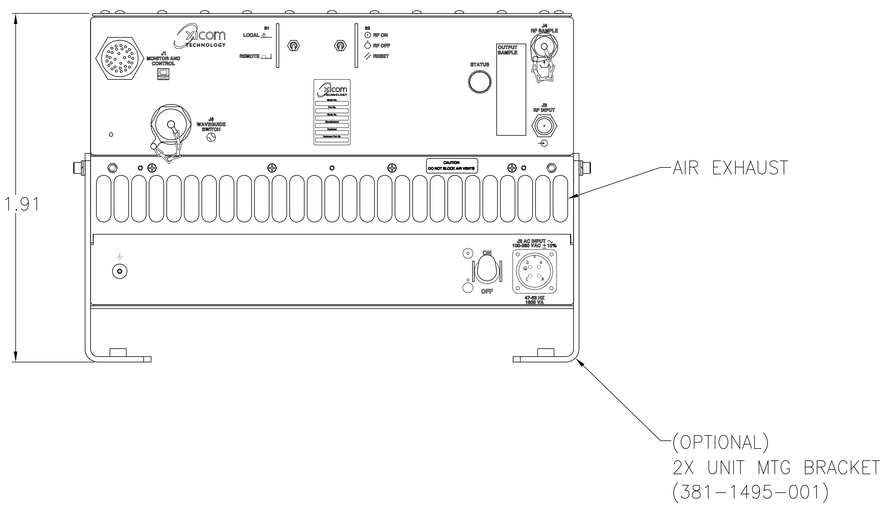
XICOM TECHNOLOGY

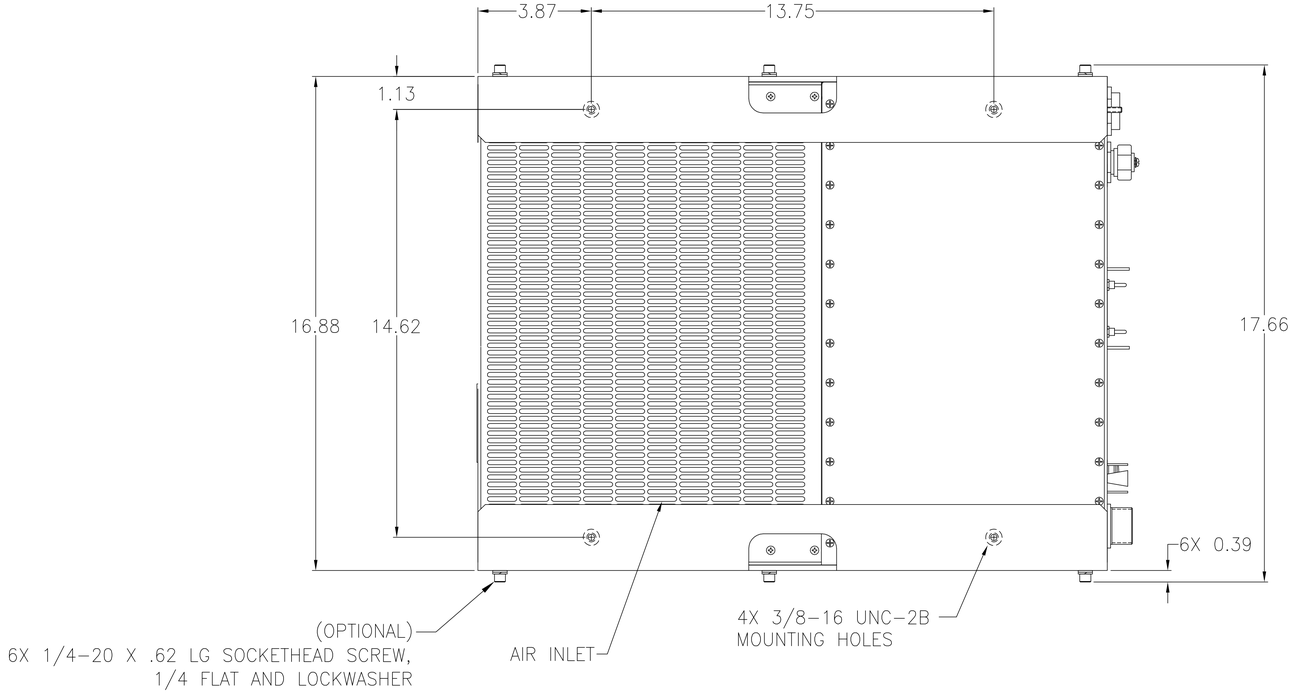
OUTLINE, XTS–150/200C

SIZE	CAGE CODE	DWG. NO.	REV.
E		304–0242–001	D
CAD SCALE 1/1		SHEET 3 OF 5	

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–







APPLICATION VIEW

BOTTOM MOUNTING BRACKETS

XICOM TECHNOLOGY

OUTLINE,
XTS–150/200C

SIZE	CAGE CODE	DWG. NO.	REV.
E		304–0242–001	D

CAD SCALE 1/1 | SHEET 4 OF 5

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

ETHERNET INTERFACE
AMPHENOL P/N ID-450-000
XICOM P/N 511-0154-001
MATING CONN:
AMPHENOL P/N ID-550-000
XICOM P/N 511-0155-001

DUST CAP

MONITOR AND CONTROL
PT07E-18-32SW-027
XICOM P/N 511-0058-032
MATING CONN:
PT06E-18-32PW-476
XICOM P/N 511-0059-032

STATUS LED

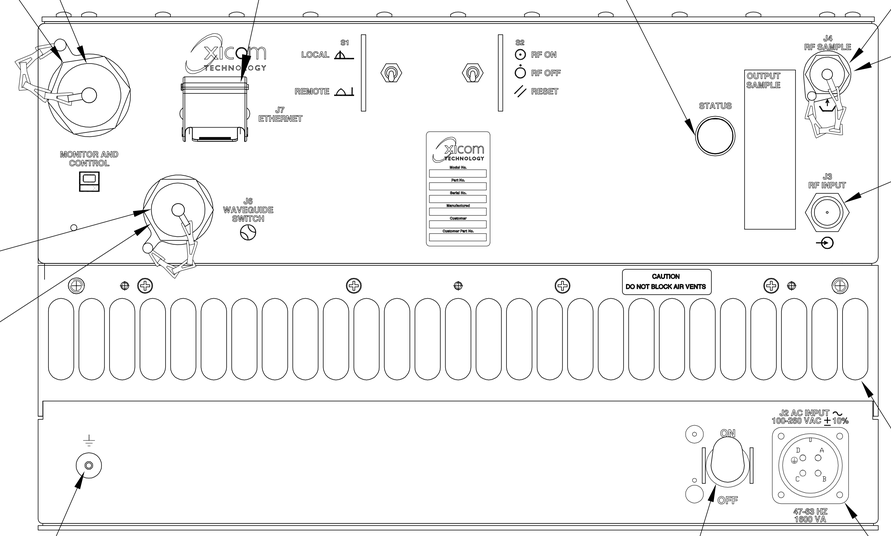
RF SAMPLE
TYPE N (F)

DUST CAP

RF INPUT
TYPE N (F)

DUST CAP

WAVEGUIDE SWITCH INTERFACE
PT07E-14-18S-027
XICOM P/N 511-0141-018
MATING CONN:
PT06E-14-18P-476
XICOM P/N 511-0142-018



AIR EXHAUST

GND STUD
10-32 X .50 LG

ON/OFF
SWITCH

POWER INPUT
100-260 VAC
47-63 HZ
P/N: DDK, CE05-2A20-4PD-D
XICOM P/N 511-0139-001
MATING CONN:
DDK CE05-6A20-4SD-D-BSS
XICOM P/N 511-0139-002
AND CE3057-12A-2-D
XICOM P/N 511-0139-003

FRONT VIEW

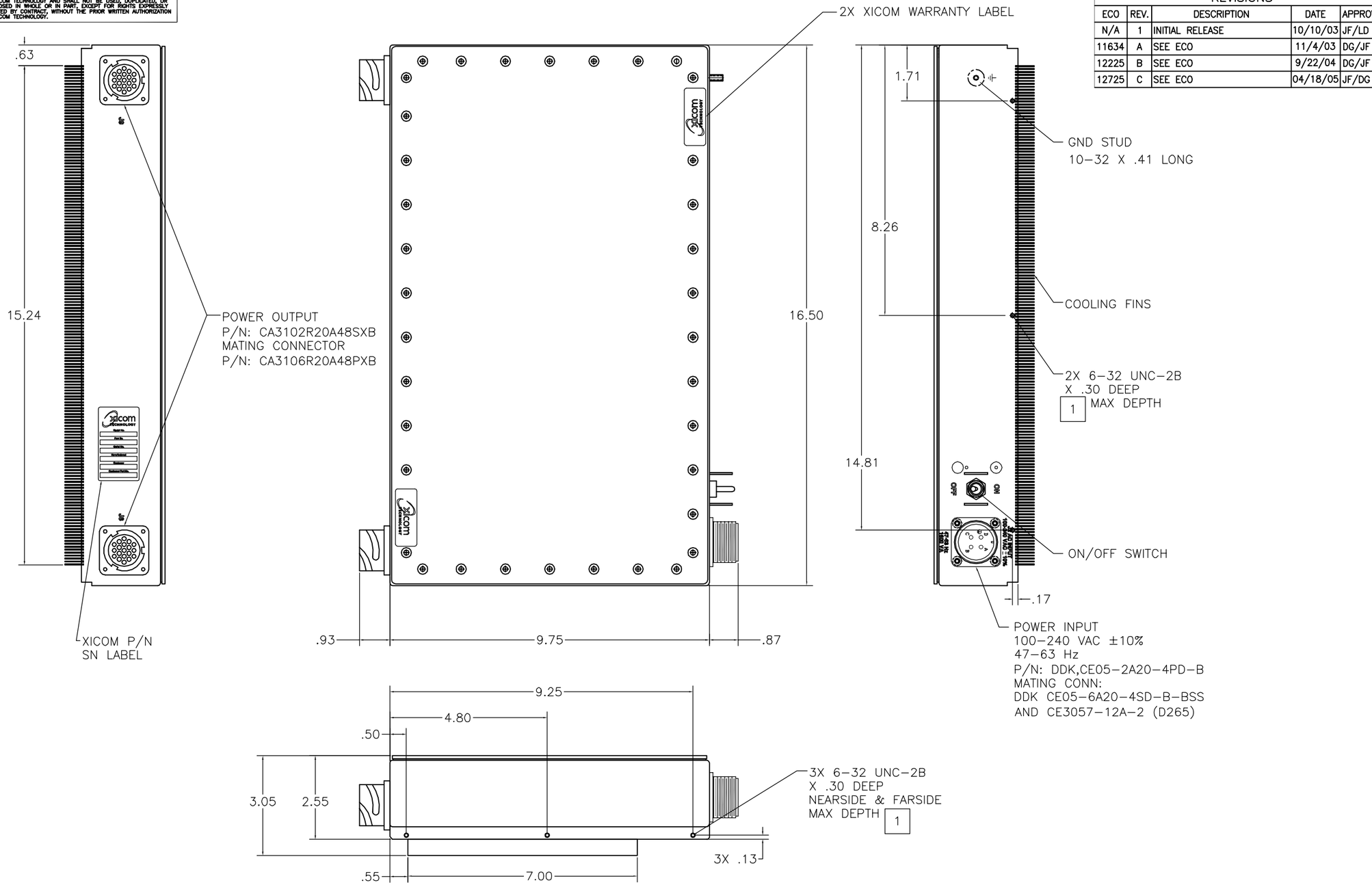
ETHERNET APPLICATION

XICOM TECHNOLOGY

OUTLINE,
XTS-150/200C

SIZE	CAGE CODE	DWG. NO.	REV.
E		304-0242-001	D
CAD SCALE 2/1		SHEET 5 OF 5	

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	1	INITIAL RELEASE	10/10/03	JF/LD
11634	A	SEE ECO	11/4/03	DG/JF
12225	B	SEE ECO	9/22/04	DG/JF
12725	C	SEE ECO	04/18/05	JF/DG



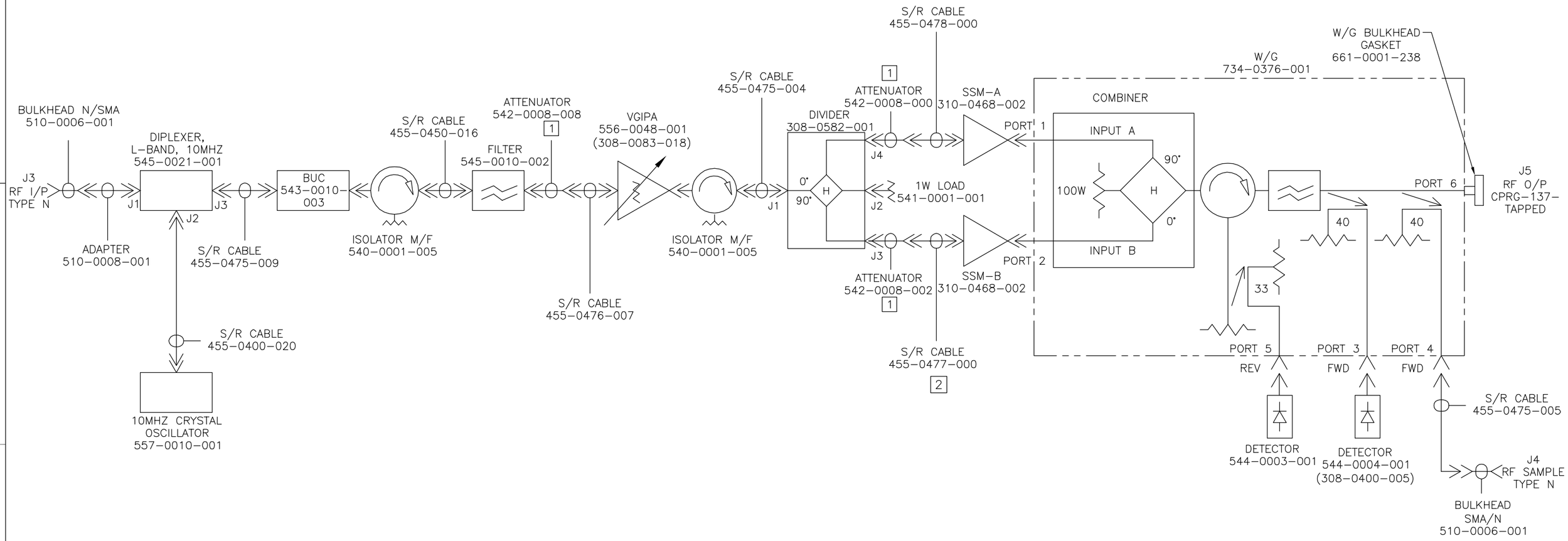
NOTES: UNLESS OTHERWISE SPECIFIED

1 MAX DEPTH REFERS TO HARDWARE DEPTH. ANY COMBINATION OF HARDWARE THAT EXCEEDS THIS DEPTH WILL RESULT IN DAMAGE TO COMPONENTS.

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES PER ANSI Y14.5M FRAC DECIMALS ANGLES SURF. ✓ ± .XX ±.03 ±1° .XXX ±.015	CONTRACT NO.		XICOM TECHNOLOGY
FINISH: N/A	DO NOT SCALE DRAWING	APPROVALS	DATE	OUTLINE, ODU SSPA POWER SUPPLY, HIGH POWER
		DRAWN J FRAHM	10/10/03	SIZE C · CAGE CODE · DWG. NO. 3041027G001 · REV. C
		CHECKED		CAD SCALE 1/1 · SHEET 1 OF 1
		ENGRG LD	10/10/03	
		MANFG		

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
N/A	1	INITIAL RELEASE	1/10/5	RG/SL
12787	A	SEE ECO	3/7/5	DG/SL
13162	B	SEE ECO	6/13/5	RG/DG
13640	C	SEE ECO	12/14/5	DG/SL

RF INTERCONNECT
305-0281-202
XTS-200C
W/BUC/10MHZ



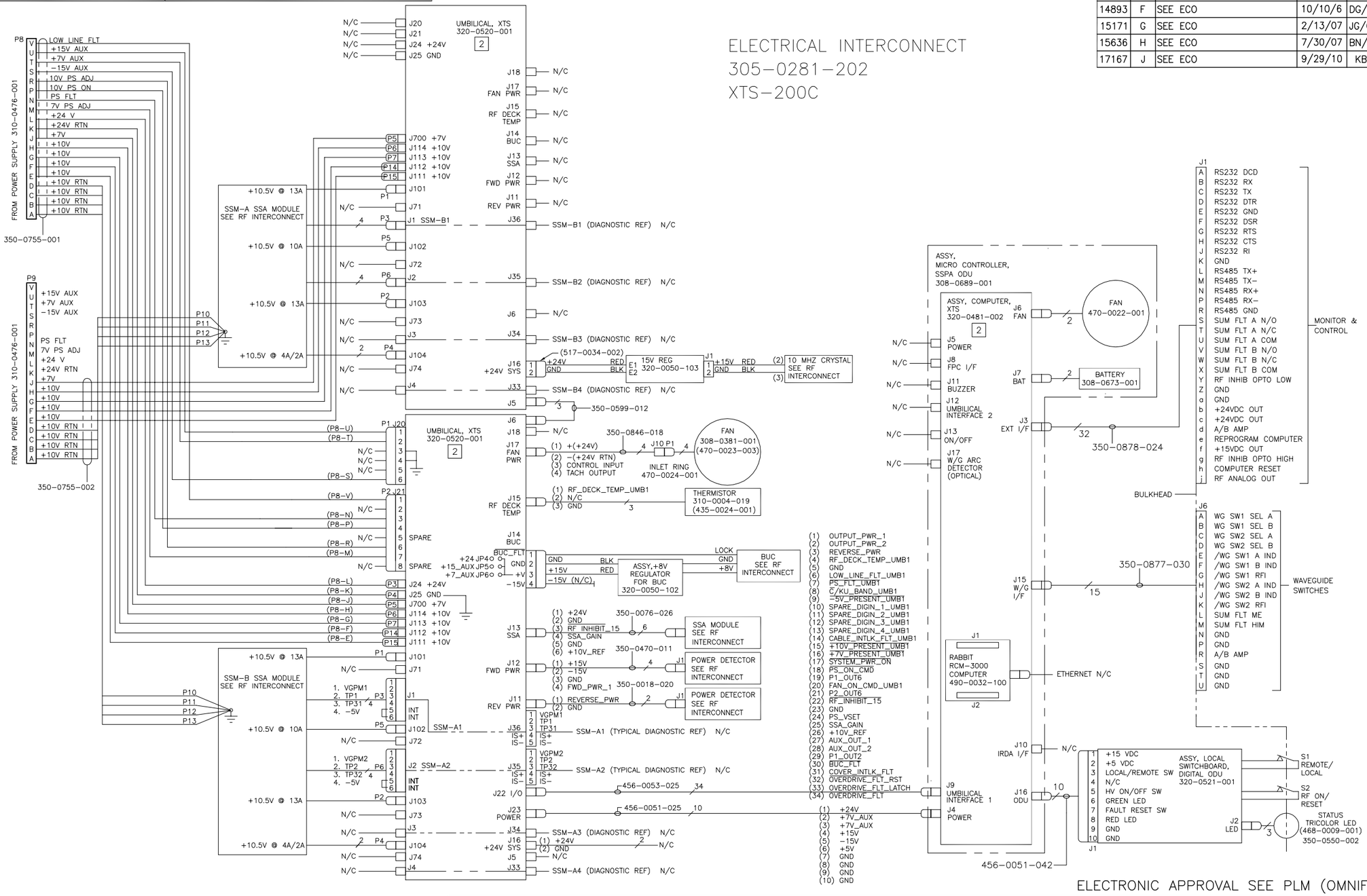
NOTES: UNLESS OTHERWISE SPECIFIED

1. ATTENUATORS SHALL BE SELECTED DURING RF TEST TO BALANCE GAIN OF HPA AND PREVENT VGIPA FROM OPERATING IN OVERDRIVEN CONDITION.
2. CABLE SHALL BE SELECTED DURING RF TEST.

MATERIAL: N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES PER ANSI Y14.5M. FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF. ✓ DO NOT SCALE DRAWING	CONTRACT NO.	XICOM TECHNOLOGY
FINISH: N/A		APPROVALS / DATE: DRAWN R.GILLANDERS 1/5/5; CHECKED D.GRANGER 1/10/5; ENGRG S.LUDVIK 1/10/5; MANFG L.SKAGGS 1/10/5	INTERCONNECT DIAGRAM, RF, 305-0281-202
			SIZE D; CAGE CODE; DWG NO. 307-0655-202; REV. C
			CAD SCALE N/A; SHEET 1 OF 1

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
14893	F	SEE ECO	10/10/6	DG/SL
15171	G	SEE ECO	2/13/07	JG/GH
15636	H	SEE ECO	7/30/07	BN/LS
17167	J	SEE ECO	9/29/10	KB/WW

ELECTRICAL INTERCONNECT
305-0281-202
XTS-200C



ELECTRONIC APPROVAL SEE PLM (OMNIFY)

NOTES: UNLESS OTHERWISE SPECIFIED

1. (X) INDICATES PIN NUMBERS ON CONNECTOR/CABLES.

[2] SEE SHEET 2 FOR JUMPER SETTINGS.

MATERIAL	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES PER ANSI Y14.5M	CONTRACT NO.	XICOM TECHNOLOGY
N/A	FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF.	APPROVALS / DRAWN R.GILLANDERS 1/5/5 / CHECKED D.GRANGER 1/10/5 / ENGRG S.LUDVIK 1/10/5 / MFG L.SKAGGS 10/10/5 / QA	INTERCONNECT DIAGRAM, ELECTRICAL, 305-0281-202
FINISH N/A	DO NOT SCALE DRAWING		SIZE E · CAGE CODE · DWG NO 305-0656-202 · REV J · CAD SCALE NONE · SHEET 1 OF 2

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–

2 TABLE 1: 320–0481–XXX BOARD JUMPER SETTINGS

JUMPER #	PINS	SETTING	FUNCTION
JMP1	1–2	OPEN	RF INHIBIT OPTO HIGH +15V PULL UP
JMP2	1–2	OPEN	SSPA (NO W/G ARC DETECTOR INSTALLED)
JMP3		OPEN	HV (VDD) STAYS ON WITH RF INHIBIT (IPA INSTALLED)
JMP4	1–2	SHORTED	SPARE ANALOG OUTPUT ENABLED (ODU STYLE UNIT)
JMP5	1–2	SHORTED	COMPUTER RESET ENABLE (ODU STYLE UNIT)
JMP6		OPEN	7V REGULATOR ENABLED (DEFAULT SETTING)

2 TABLE 2: 320–0520–001 BOARD JUMPER SETTINGS

JUMPER #	PINS	SETTING	FUNCTION
JP1	1–2	SHORTED	POWER SUPPLY VOLTAGE SELECT (10V FOR C–BAND UNITS)
JP2		OPEN	COMPUTER ADJUSTMENT OF 10V DISABLED (DEFAULT SETTING)
JP3*	1–2	SHORTED	MANUAL ADJUSTMENT OF 10V ENABLED (DEFAULT SETTING)
JP4		OPEN	+24V SUPPLIED TO BLOCK UPCONVERTER (NONE INSTALLED)
JP5	1–2	SHORTED	+15V SUPPLIED TO BLOCK UPCONVERTER
JP6		OPEN	+7V SUPPLIED TO BLOCK UPCONVERTER (NONE INSTALLED)
J9	1–2	SHORTED	COVER INTERLOCK DISABLED

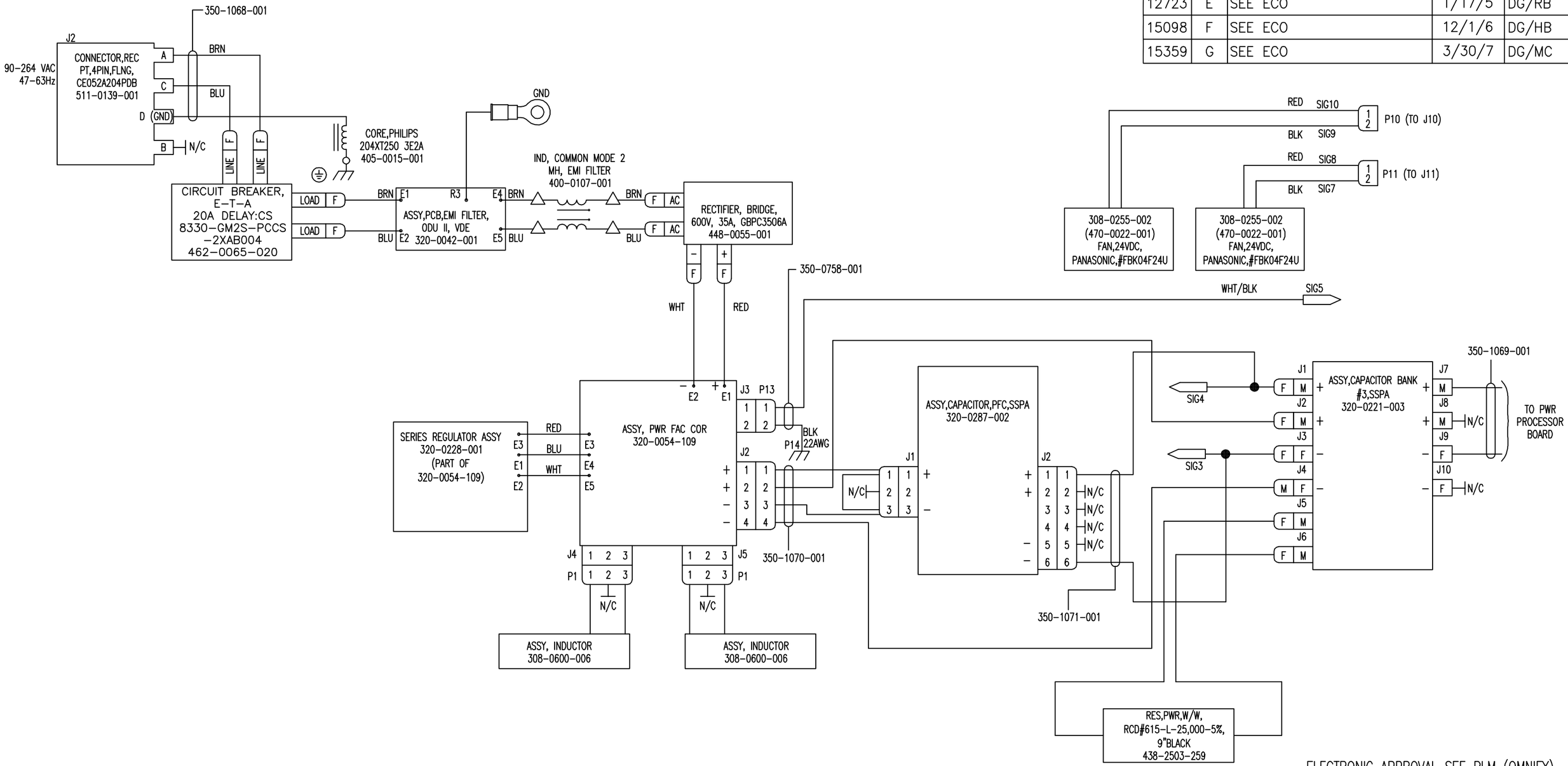
*JUMPER SHUNT NOT INSTALLED. BUSS WIRE SOLDERED IN PLACE.

XICOM TECHNOLOGY

INTERCONNECT DIAGRAM, ELECTRICAL, 305–0281–202

SIZE	CAGE CODE	DWG. NO.	REV.
E		307–0656–202	J
CAD SCALE NONE		SHEET 2 OF 2	

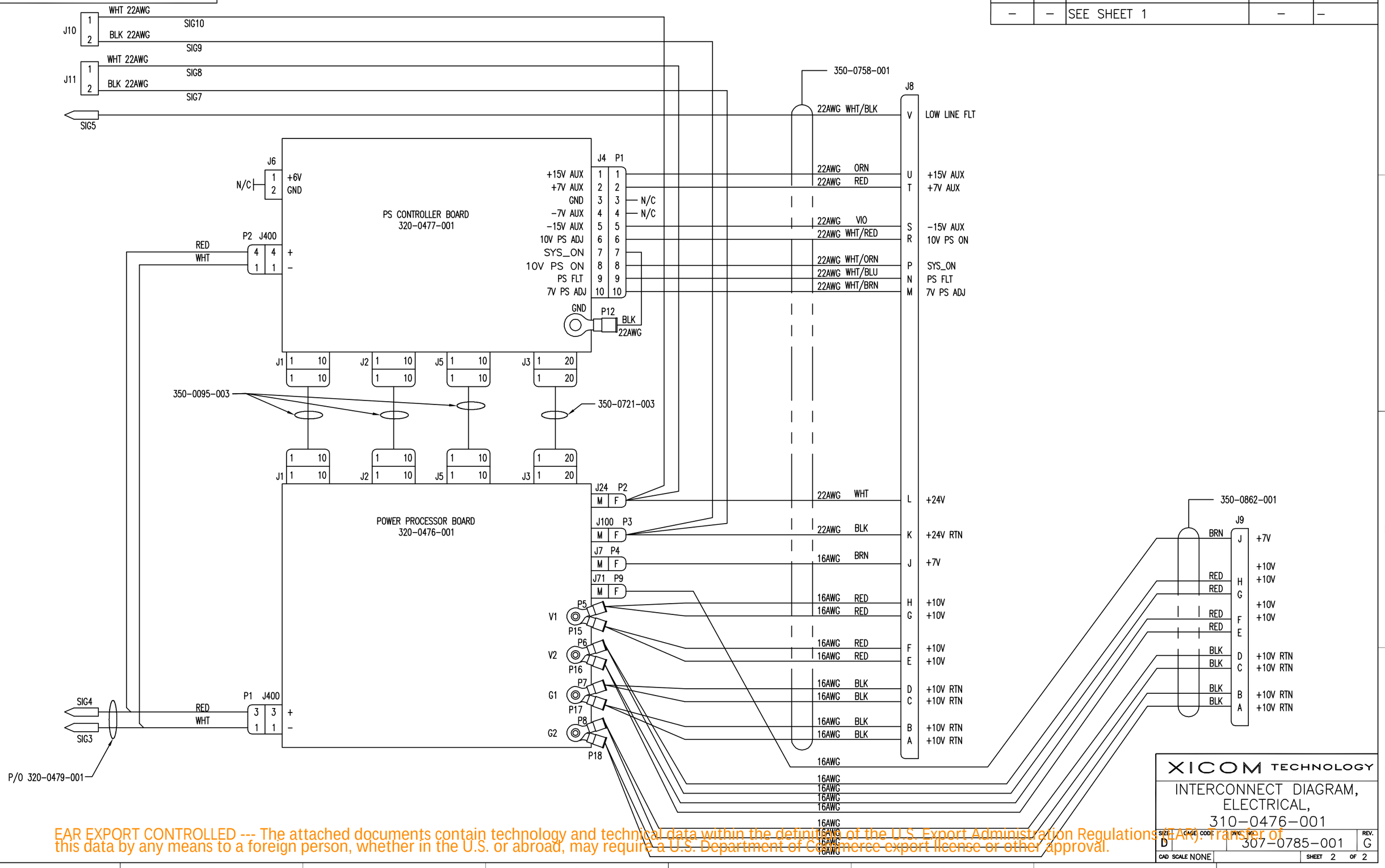
REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
12290	C	SEE ECO	9/24/04	DG/JF
12419	D	SEE ECO	10/8/04	DG/JF
12723	E	SEE ECO	1/17/5	DG/RB
15098	F	SEE ECO	12/1/6	DG/HB
15359	G	SEE ECO	3/30/7	DG/MC



ELECTRONIC APPROVAL SEE PLM (OMNIFY)

MATERIAL N/A	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES PER ANSI Y14.5M FRAC ± DECIMALS .XX ± .XXX ± ANGLES ± SURF.	CONTRACT NO.	XICOM TECHNOLOGY	
FINISH N/A	DO NOT SCALE DRAWING	APPROVALS / DRAWN T. KERR 06/20/03 / CHECKED / ENGRG R. STERNS 07/17/03 / MFG	INTERCONNECT DIAGRAM, ELECTRICAL, 310-0476-001	
			SIZE D · CAGE CODE · DWG NO. 307-0785-001 · REV. G	
			CAD SCALE NONE · SHEET 1 OF 2	

REVISIONS				
ECO	REV.	DESCRIPTION	DATE	APPROVED
–	–	SEE SHEET 1	–	–



XICOM TECHNOLOGY

INTERCONNECT DIAGRAM, ELECTRICAL, 310-0476-001

SIZE	CAGE CODE	DWG. NO.	REV.
D		307-0785-001	G

CAD SCALE NONE SHEET 2 OF 2

ODU SSPA Power Supply Removal

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	04/12/2004	A.L. Crozier, Jr.
2		Update to reflect new power supply	09/27/2004	A.L. Crozier, Jr.

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Paragraph Title — Page Number

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Paragraph	Title	Page Number

ODU SSPA Power Supply Removal

Overview

This is a step-by-step procedure showing how to remove and replace SSPA power supplies. The supply may be removed and replaced while the amplifier is in place or it may be done at a repair facility.

Required Tools and Materials

A #2 Phillips Head Screwdriver is the only tool required to remove and replace the power supply.

Note

The hardware that is removed from the amplifier when removing the power supply needs to be retained. It will be used when the new or repaired power supply is installed.

Removing Power Supply (Part Number 310-0476-001)

Use this procedure to remove the power supply (Part Number 310-0476-001).

1 Turn the amplifer power OFF. Remove the input power cable.

2. Refer to Figure 1. Turn the amplifier upside down.
3. Using a #2 Phillips Head Screwdriver, remove the six screws that secure the power supply to the amplifier.

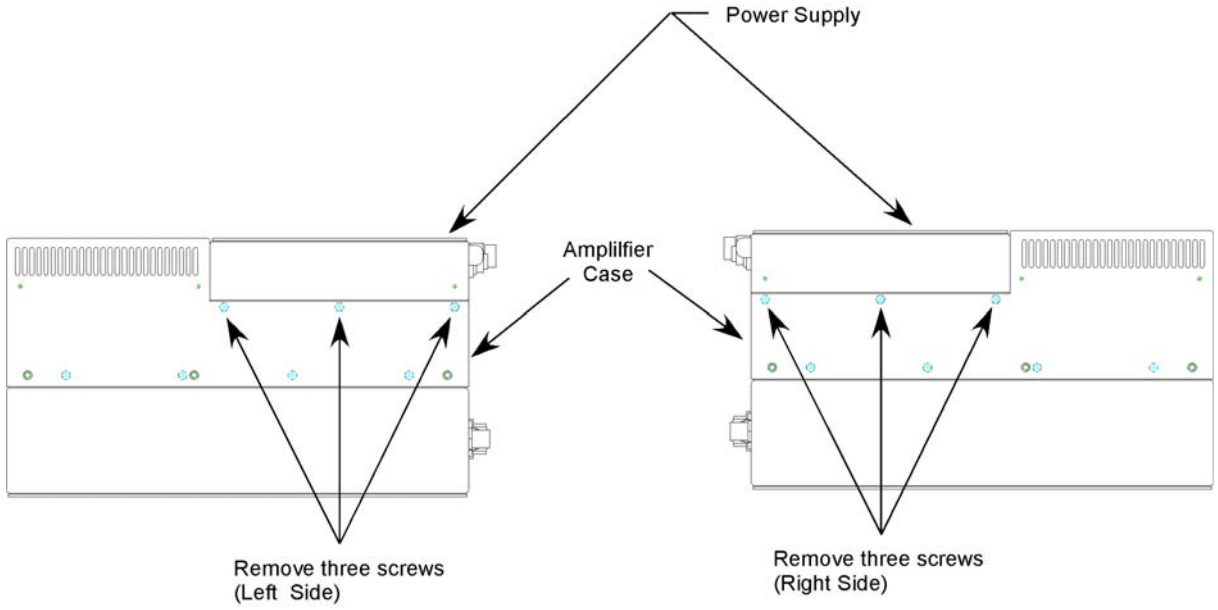


Figure 1, Location of Power Supply Screws

4. Refer to Figure 2. Carefully raise the front of the power supply to an angle of about 5 degrees. This will allow the power supply heatsink to clear the amplifier case.

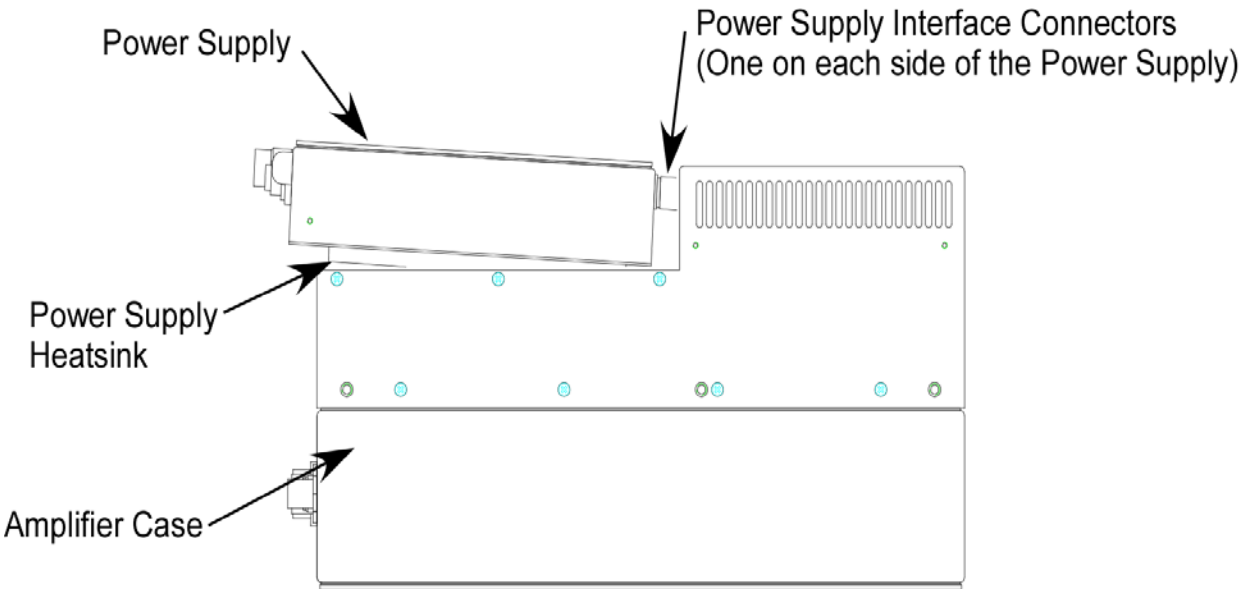


Figure 2, Power Supply Interface Connectors

Note

Each of the interface connectors on the amplifier are attached to cables that retract into the amplifier case. This makes connecting and disconnecting the power supply simple.

5. Pull the power supply away from the amplifier until you are able to easily reach the connectors.
6. Hold the power supply with one hand; unscrew the connectors at the rear.
7. Lift the power supply clear of the amplifier case and place it on a flat surface.

Replacing Power Supply (Part Number 310-0476-001)

Use this procedure to replace the power supply (Part Number 310-0476-001).

1 Refer to Figure 2 and Figure 3. Position the new power supply approximately one inch from the Power Supply Interface Connectors at an angle of approximately 5 degrees.

2. Connect the power supply to the interface connectors — one on each side of the amplifier and power supply:
   - Line up the connector key slots with the key on the power supply connectors.
   - Connect the power supply to the interface connectors.
   - Line up the red locking guide dots on the interface connector with the locking guide tracks on the power supply connector. Screw the interface connector on to the power supply connector..

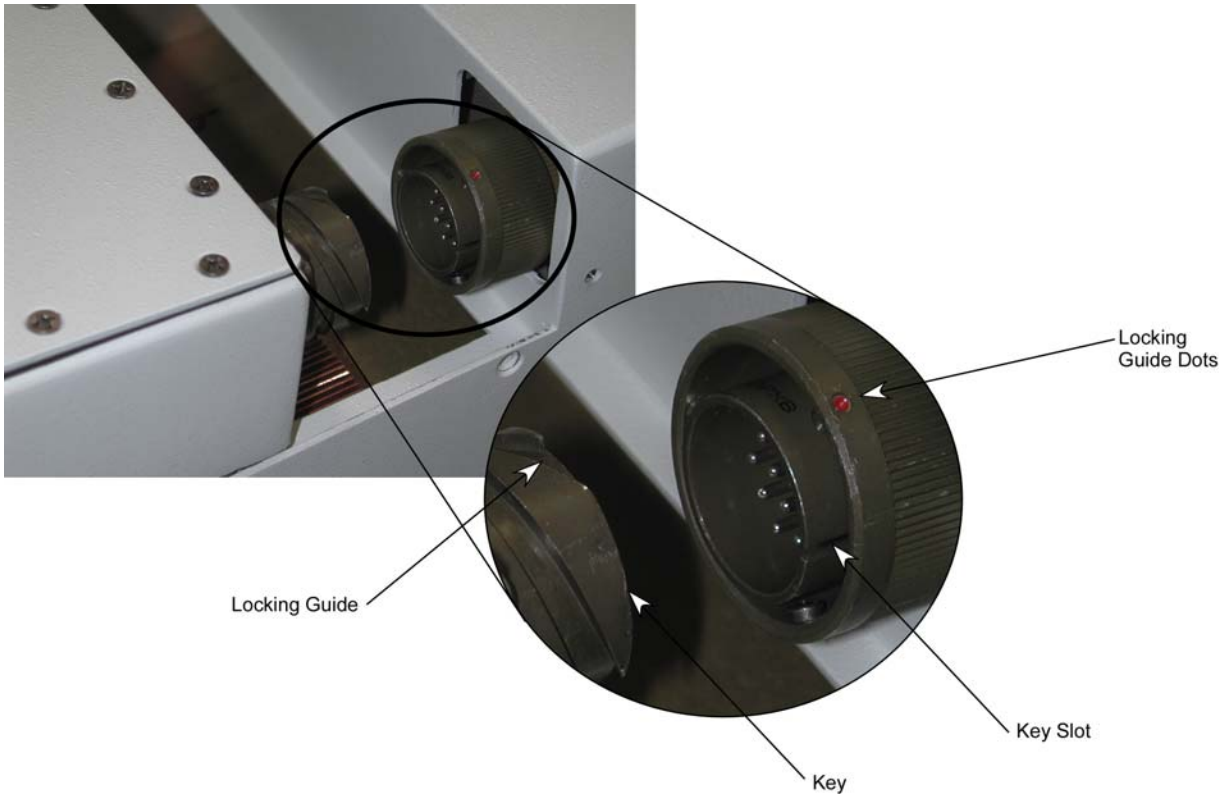


Figure 3, Power Supply Interface Connector Key and Slot Location
(One connector on each side of the Power Supply and Amplifier)

3. Carefully slide the power supply in until the heatsink fits into the amplifier case. Ensure the cables retract into the amplifier.
4. Lower the power supply into position.

5. Using a #2 Phillips Head Screwdriver, replace the six screws that secure the power supply to the amplifier.
6. Turn the amplifier right side up and connect the input power cable.
7. The amplifier is ready to be placed back in service.

Removing Power Supply (Part Number 310-0415-003)

Use this procedure to remove the SSPA power supply (Part Number 310-0415-003).

1 Turn the amplifer power OFF. Remove the input power cable.
2. Refer to Figure 4. Turn the amplifier upside down.
3. Using a #2 Phillips Head Screwdriver, remove the six screws that secure the power supply to the amplifier.

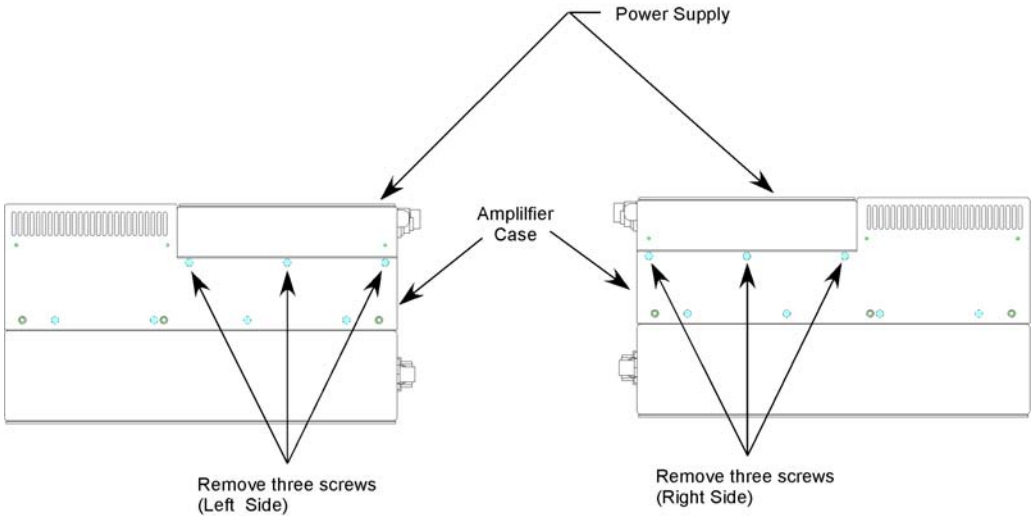


Figure 4, Location of Power Supply Screws

4. Refer to Figure 5. Carefully raise the front of the power supply to an angle of about 5 degrees. This will allow the power supply heatsink to clear the amplifier case.

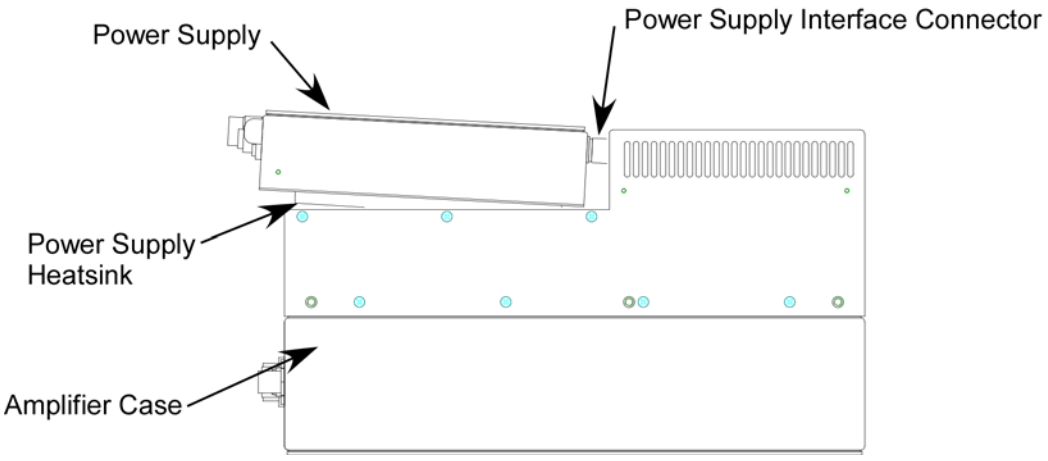


Figure 5, Power Supply Interface Connector

5. Hold power supply with one hand; unscrew the connector at the rear.
6. Lift the power supply clear of the amplifier case and place it on a flat surface.

Replacing Power Supply (Part Number 310-0415-003)

Use this procedure to replace the SSPA power supply (Part Number 310-0415-003.

1 Refer to Figure 5 and Figure 6. Position the new power supply approximately one inch from the Power Supply Interface Connector at an angle of approximately 5 degrees.

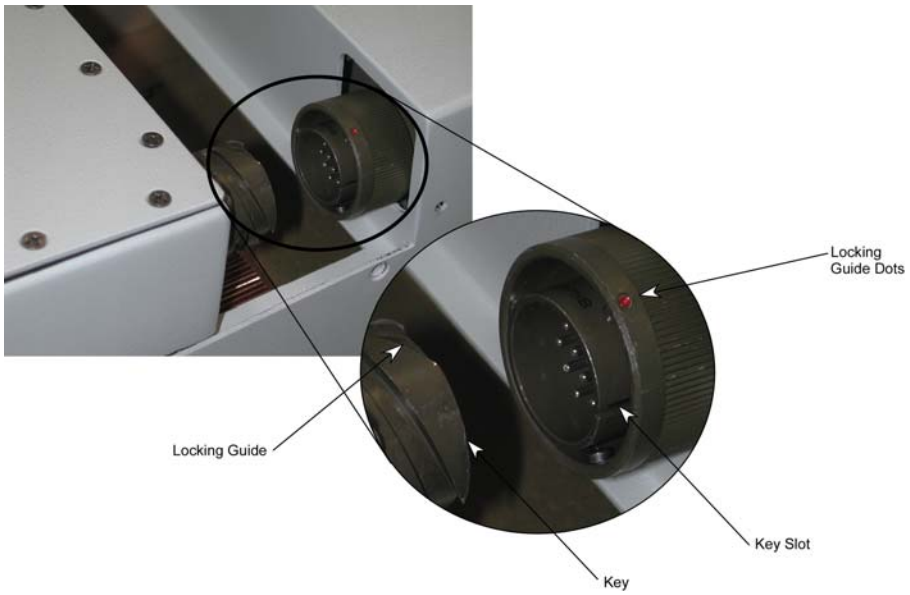


Figure 6, Power Supply Interface Connector

2. Connect the power supply to the interface connector:
   - Line up the connector key slot with the key on the power supply connector.
   - Connect the power supply to the interface connector.
   - Line up the red locking guide dots on the interface connector with the locking guide tracks on the power supply connector. Screw the interface connector on to the power supply connector.
3. Carefully slide the power supply in until the heatsink fits into the amplifier case.
4. Lower the power supply into position.
5. Using a #2 Phillips Head Screwdriver, replace the six screws that secure the power supply to the amplifier.
6. Turn the amplifier right side up and connect the input power cable.
7. The amplifier is ready to be placed back in service.

Operation Addendum, SSPA M&C Termination Cable

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	12/04/2002	A.L. Crozier, Jr.
A	12182	Original Release	05/04/2004	A.L. Crozier, Jr.
B	13238	Update Cable termination to reflect RF Inhibit Low	07/13/2005	S. Ludvik

Operation Addendum, SSPA M&C Termination Cable

Description

The SSPA is capable of operator interface through a controller or running continuously in the last mode programmed. This is accomplished using a specially configured termination cable (Xicom P/N 350-0716-002.)

The termination cable has been wired so that the SSPA will operate in an unattended or standalone state.

Using the Cable

Refer to the chapter titled *Operation*. Program the SSPA to perform the functions that you require. When you are satisfied that you have all the functions setup properly, disconnect the Controller M&C cable from the SSPA (J1) and replace it with the termination cable. The SSPA will now operate unattended.

Termination Cable Wiring

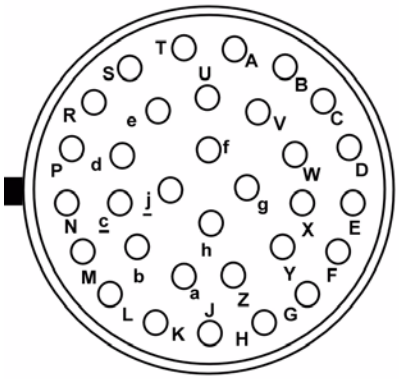
Pin letter and signal names are shown in the table below.

Pin	Signal Name
a	System Ground.
f	+15 VDC Monitor and Optical Isolator Bias Supply.
g	+5 to +15 VDC Input Supply to RF Inhibit Optical Isolator.
h	Reboot Computer (connect Pin h to either Pin Z or Pin a for normal operation.)
Y	RF Inhibit (connect Pin Y to either Pin Z or Pin a to inhibit RF.)
Z	System Ground.

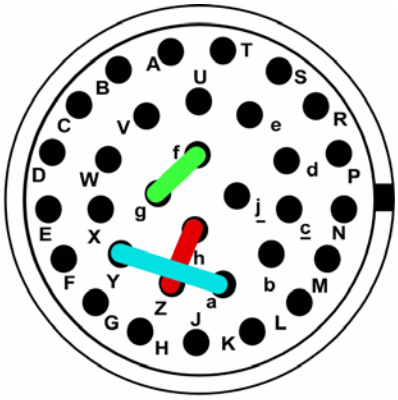
The termination cable is wired as follows:

- Pin h is jumpered to Pin Z.
- Pin f is jumpered to Pin g
- Pin Y is jumpered to Pin a.

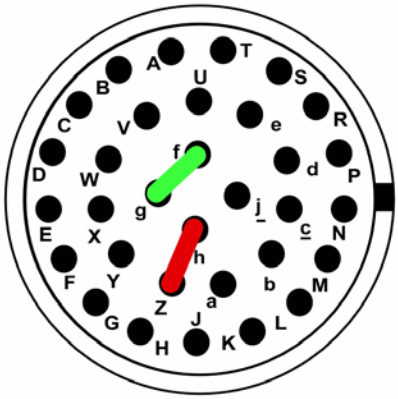
The figure on page 3 shows the jumpers connected. The two views illustrate the possible connector layout positions.



Termination Cable
Front View
MS3180-18C



Termination Cable
Rear View
MS3180-18C
RF Inhibit High



Termination Cable
Rear View
MS3180-18C
RF Inhibit Low

Operation Addendum, Block Upconverter

Record of Changes

ELECTRONIC APPROVAL. SEE PLM.

Revision	ECO	Description	Date	Initiated By
A	10125	Original Release	08/05/2002	A.L. Crozier, Jr.
B	10516	Add X and DBS Band Information	12/06/2002	A.L. Crozier, Jr.
C	12612	Add Note about 10 MHz Reference; add paragraph about oscillator drift	10/20/2004	A.L. Crozier, Jr.
D	16469	Update BUC Operation	11/17/2008	SL
E	16686	Remove reference to BUC output frequency plan	06/05/2009	LD
F	17332	See ECO	03/08/2011	G. Hurd
G	18442	See ECO	05/13/2013	J. Thompson

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Operation Addendum, Block Upconverter

Overview

The function of the BUC (Block Upconverter) is to convert the baseband input from a modem at an IF (intermediate frequency) to the system transmit frequency. The BUC accepts an intermediate frequency, mixes it with a highly stable LO (local oscillator) and passes it through a series of circuits that filter and amplify the signal to produce an output in the desired transmission band. The LO frequency is derived from the reference frequency that is provided by the baseband system. The regference frequency is typically 10 or 50 MHz and is critical the the overall system stability and phase noise. A typical phase noise requirement for a reference source is shown in Figure 1. The phase noise of the modem input signal at the IF frequency also affects the system performance and needs to be 5 to 10 dB below IESS (Intelsat earth Station Standards) phase noise profile for optimum performance.

See Figure 1 for a typical block diagram.

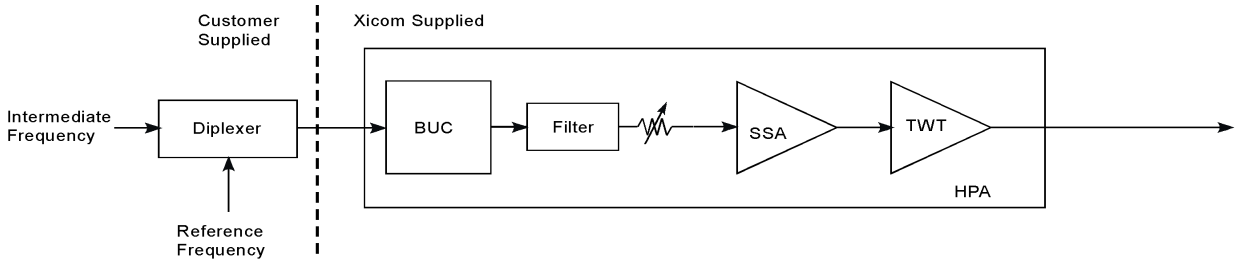


Figure 1, Typical Block Diagram of a High Power Amplifier with Block Upconverter.

Note

If the modem being used does not have the IF multiplexed with the reference, a dixplexer is available from Xicom (Part Number: 545-0021-001) to combine the two signals.

Note

Xicom offers SSPA/HPA Block Upconverter options with an internal 10 MHz reference. For these models, the Diplexer and 10 MHz crystal are mounted inside the SSPA/HPA enclosure. The only required input is at the Intermediate Frequency (IF).

Functional Description

The block diagram in Figure 3 provides a schematic for the BUC.

The input of the BUC provides diplexing to direct the reference frequency to the LO Synthesizer and IF frequency to the mixer. The synthesizer generates the LO frequency from the reference frequency and filters it to eliminate unwnated harmonics. The LO is amplified and passed on to the LO port of the mixer. The IF frequency is filtered to eliminate unwanted harmonics and amplified to the desired gain level of the BUC and passed to the IF port of the mixer. The mixer generates the mixing products from the combination of the IF and LO frequencies.

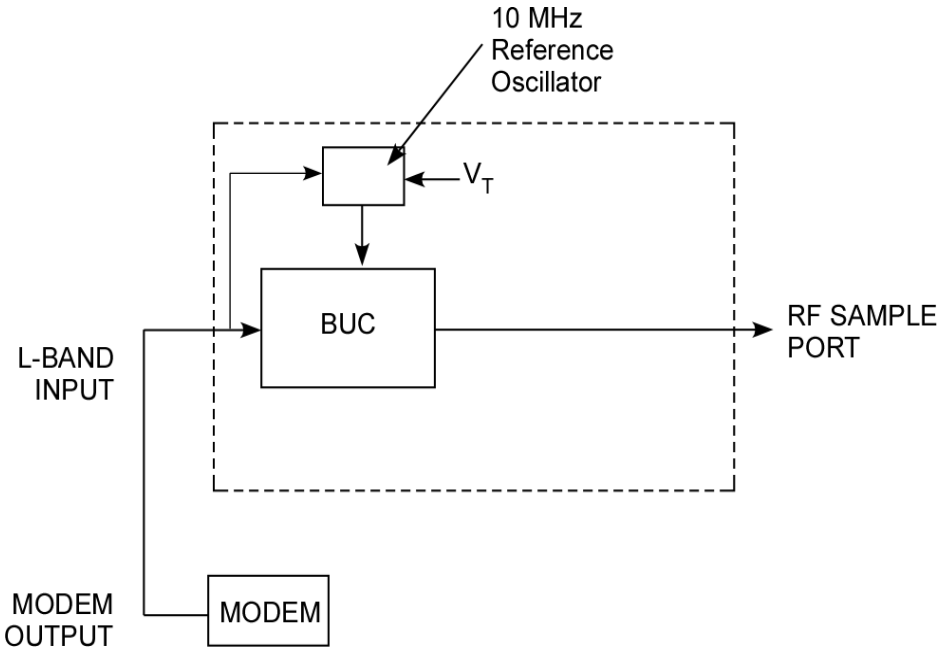


Figure 2, Reference Frequency Phase Noise Chart

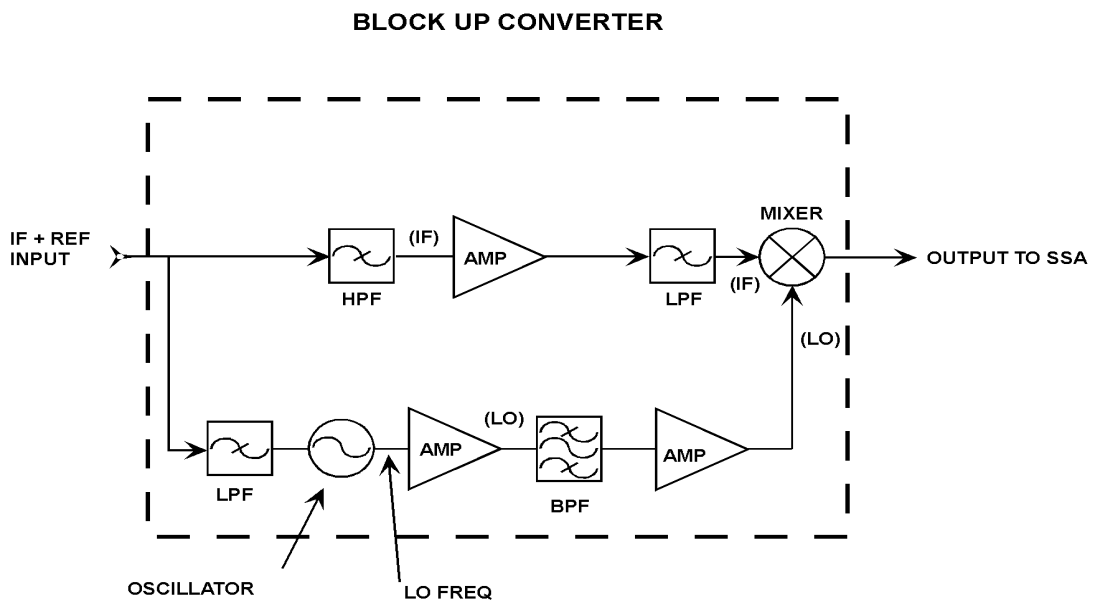


Figure 3, Detailed BUC Block Diagram

Setup and Turn On

In the normal operating condition the modem provides both L-Band and 10 MHz reference inputs. Other BUC configurations have a built-in (internal) 10 MHz references which operate as either standalone or phase locked to the 10 MHz input provided by the modem. These configureations are shown in Figure 4 and Figure 5.

Use this procedure to setup and operate the BUC.

1 Turn ON modem or signal source and set IF input power to -20 dBm ± 3 dB. Verify that the reference frequency is present and at 2 ± 5 dBm power level.

These power levels are specified at the input of the HPA and must be adjusted for any cable loss.

The phase noise of the reference frequency and signal source need to be verified using Figure 1. All spurious signals such as IF and reference frequency products must be below -60 dBc.

The output frequency accuracy depends on the accuracy of the reference and IF frequencies. The determining ratios for the frequency Bands are:

- Ku Band — (12.8 GHz / Reference Frequency) X Reference Offset = Output Offset.
- C Band — (4.90 GHz / Reference Frequency) X Reference Offset = Output Offset.
- X Band — (6.95 GHz/Reference Frequency) X Reference Offset = Output Offset.
- DBS Band — (16.35 GHZ/Reference Frequency) X Reference Offset = Output Offset.

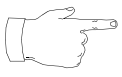
  Reference Offset is in MHz.

2. In the internal 10 MHz configuration there is a built-in 3 min delay (factory set) to allow the 10 MHz reference to stabilize. During this period the transmit indicator light will blink GREEN and increase blicking rate every 15 seconds until the warm-up is completed. At the end of the warm-up the transmit indicator light becomes solid GREEN.
3. To turn ON the HPA (High Power Amplifier) refer to the chapter titled *Operation*. The internal attenuator must be set to minimum value and gradually increased to achieve rated power.

The input power to the BUC should not exceed -17 dBm to minimize system spurious output. The maximum safe IF input power level is 10 dBm to avoid damage to the internal converter circuits.

4. Refer to the appendix titled *Protocol Addendum, Block Upconvert* for a description of the protocol and system interface to the BUC. The BUC, and optional internal reference, have an internal lock detect which senses the presence of the reference frequency and proper functioning of the internal PPL (Phase Lock Loop). The absence of either the reference frequency or a loss of lock in the PLL results in a system fault and the system internal fault detection circuit disables the HPA high voltage circuit. The behavior of the reference detection faults is configurable. See the “External Reference Detection” and lock behavior options sections

Note



The power levels and frequencies discussed in the paragraphs above are representative of typical BUC performance. The specific power levels and frequencies that the BUC in the HPA that this manual apply to are identified in the appendix titled *Product Specification*.

Reference Oscillator Drift Compensation

Over extended time periods, the 10MHz reference oscillator changes frequency due to temperature / aging and results in a shift in the output frequency that can exceed +/- 10kHz. Depending on the system budget, the converter must be re-adjusted to stay within its allocated transponder band and within the receiver acquisition range. Check the system specification to determine the allowable frequency drift range and periodically monitor the system output frequency through the RF sample port.

In the event that the frequency drifts outside the acceptable range, the unit must be either re-aligned by a Xicom certified maintenance center or alternatively the modem L Band output must be adjusted to correct the output frequency. Adjusting the L Band modem frequency is the simplest method and is recommended. The drift compensation scheme is summarized in Figure 4.

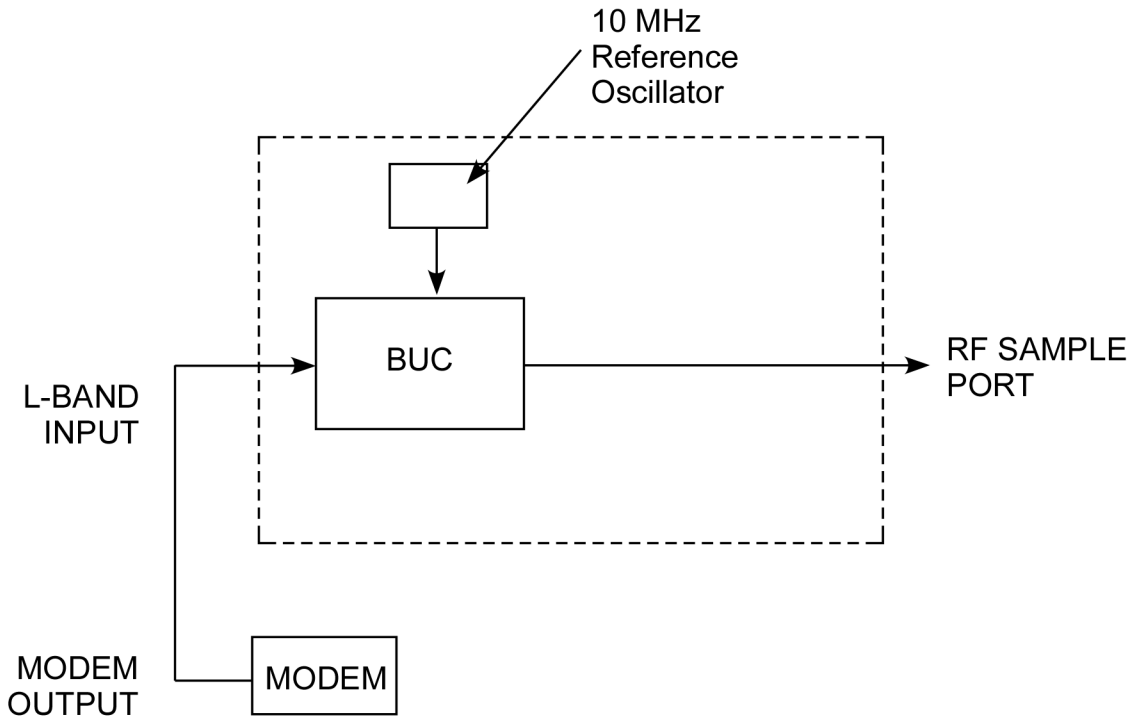


Figure 4, Drift Compensation Block Diagram

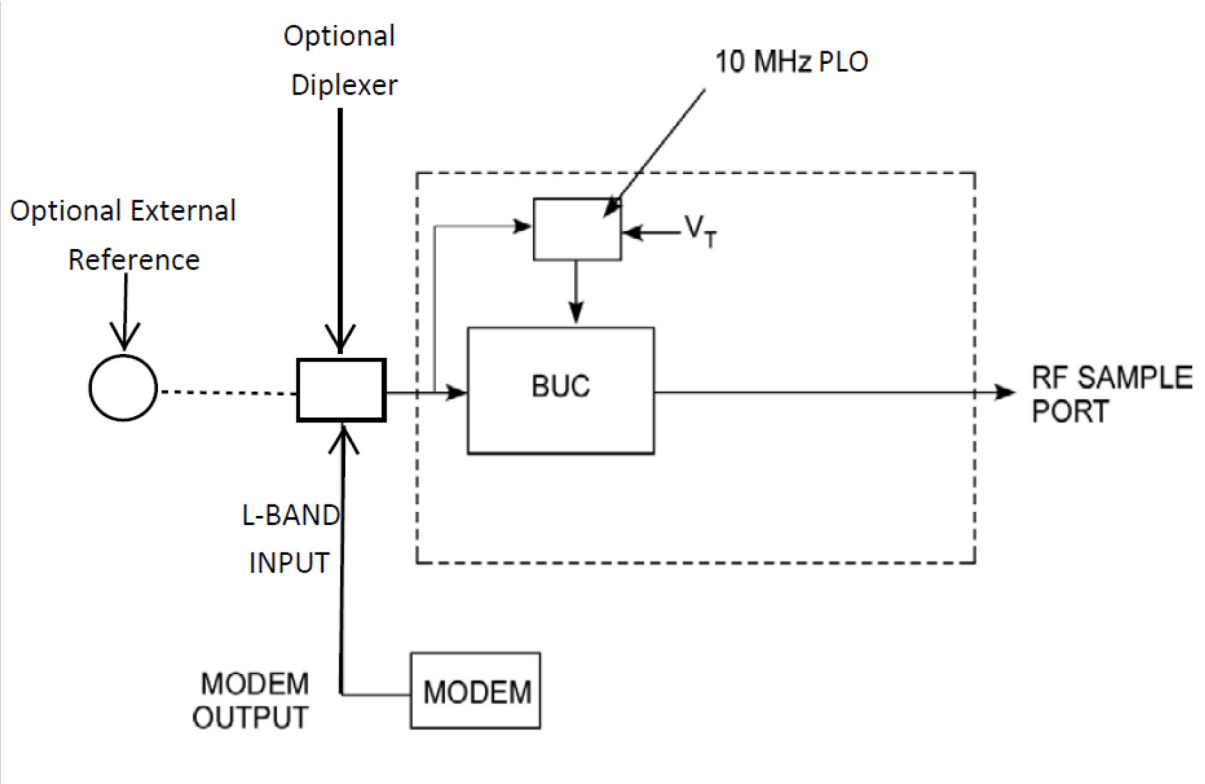


Figure 5, Internal Phase Locked Oscillator with External Input

External Reference Detection and Lock Fault Configuration:

There are three faults related to the external reference. The behavior of these faults is configurable via specific factory configuration serial commands. It is best to specify the desired behavior at the time of order, but the configuration may be adjusted in the field by factory trained personnel. Factory Default configurations are listed below in Table 1.

The three fault lines related to the external reference are:

Ext Ref Present - This feature is available only if the HPA includes an internal Phase Locked Oscillator (PLO), that is intended to improve the phase noise, and/or shift the frequency of an optional customer supplied reference (see Figure 5). This fault line senses the presence of the required reference frequency at approximately the proper power level. HPA function is disabled if the reference frequency is not detected when this feature is enabled. This feature can be disabled (turned off) if desired. If this feature is disabled, and the external reference is not supplied, the internal PLO will "free-run" and generate the necessary reference frequency for HPA operation. See the factory default setting below.

Ext Ref Lock - This feature is availalbe if the HPA includes an internal Phase Locked Oscillator (PLO), that is intended to improve the phase noise, and/or shift the frequency of a customer supplied reference (See Figure 5). This fault line indicates the proper function of the phase locked loop, (PLL), in either the PLO or the standalone reference. This feature can be disabled (turned off) if desired. If this feature is disabled, and the external reference is not supplied, the internal PLO will "free-run" and generate the necessary reference frequency. See the factory default setting below.

Upconverter fault Configuration (latching vs non-latching):

All HPAs that include block frequency upconverters will disable operation, and an upconverter fault will report, if the lock detect senses the absence of required reference frequency or a loss of lock in the PLL. The upconverter fault is configured by a default to be a latching fault, which requires a fault reset to clear, once the fault condition has been corrected.

Alternatively, the HPA may be configured to automatically clear an

upconverter fault when the fault condition is corrected, by enabling the Auto Clear Upconverter Fault feature.

Factory Default Settings:

The factory default settings of the upconverter and reference frequency are listed below in Table 1. These settings have been chosen to allow HPA functionality with the simplest setup.

Table 1, Factory Default Configuration

Fault/Feature Description	Default State	Fault/Event Log Abbreviation
Upconverter Fault	Enabled (On)	UC Fault
Auto-Clear Upconverter Fault	Enabled (On)	N/A
External Reference Present	Disabled (Off)	Ext Ref Pres
External Reference Lock	Disabled (Off)	Ext Ref Lock

Sub-Band Block Upconverter Operation;

An HPA can optionally be provided wih a block upconverter that has the ability to switch between multiple frequency sub-bands, within the upconverter's full operating bandwidth. In this scenario the local oscillator of the upconverter can be switched between designated LO frequencies, upon receiving a band switch command. The sub-band switch may be accomplished either by issuing a protocol command or by selecting the desired sub-band in HPA Control Utility. Refer to protocol chapter for proper band switch command formatting.

After switching to the desired sub-band, the upconverter and HPA can be operated at any desired frequency within the RF output range, (with corresponding IF input), of the selected sub-band, as designated in the HPA specification. When system operation requires operation in another RF output sub-band within the HPA's overall full bandwidth, a band switch command must be issued again. The HPA will operate within only one sub-band at a time.

Operation Addendum, HPA Control Utility

Record of Changes

Revision	ECO	Description	Date	Initiated By
1		Preliminary Release	01/10/2005	A.L. Crozier, Jr.
A	13824	Complete rewrite to incorporate changes and add redundant operation	03/27/2006	S. Trigero

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List of Figures

Operation Addendum, HPA Control Utility

Overview

The Xicom HPA Control Utility is a program that has been developed by Xicom Technology to provide a simple and flexible control interface that runs on PCs using the Microsoft Windows operating system.

Utility Setup for TWTA Operation

Use the following procedure to setup and operate HPA Control Utility for TWTA Operation.

1. Refer to Figure 1 on page 5 and Figure 2 on page 6. If this is the initial time running the program, select “Connect” in the lower center, or “File -> Connect” to scan the first 5 addresses used for amplifiers. All baud rates will be tested for these amplifiers. If you want to test ALL possible RS485 addresses, select “File -> Advanced Search” and all possible addresses and baud rates will be tested. This search will take much longer than the normal “Connect” search as all possible baud rate, parity, and data bit combinations are queried.

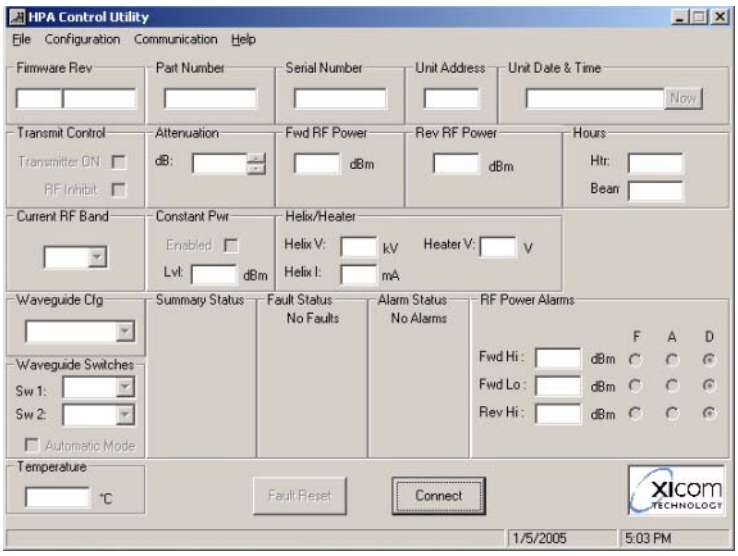


Figure 1, Primary User Interface - Disconnected

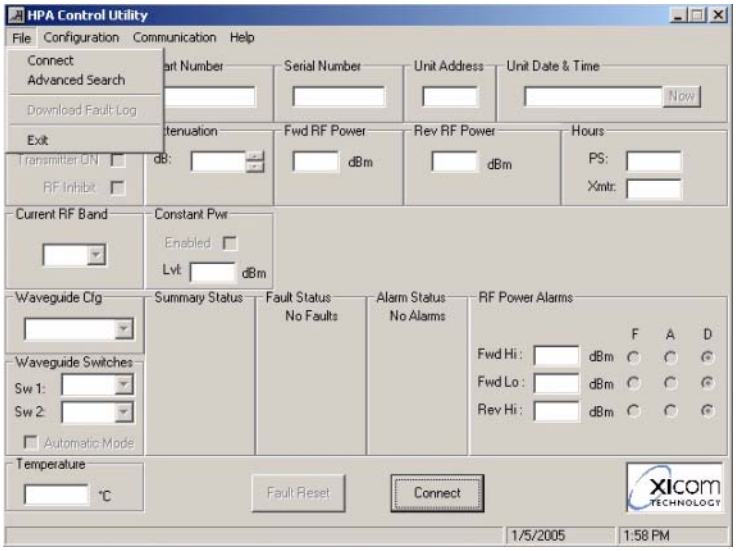


Figure 2, Primary User Interface – File Menu when disconnected

2. Refer to Figure 3 on page 7. Once communication has been established, the Firmware Revision, Part Number, Serial Number, RS485 Address, Unit Date & Time, Attenuation setting, Forward RF Power, Reverse RF power, Waveguide configuration, Waveguide switch positions (if applicable), heater and beam hours are reported. If High Voltage is on, the current Helix voltage and current are also displayed.

   It is possible to directly control RF Inhibit and Transmitter On/Off via the small checkboxes under the “Transmit Control” section. The desired attenuation level may be set by clicking in the box next to “dB” and typing the desired level. Alternatively, the up and down arrows to the right of the box may be adjusted.

   The Constant Power mode may be selected by clicking the small check box under the “Constant Pwr” section. If it is selected, the amplifier will change the attenuator setting to maintain the power level indicated in the “Lvl:” control box if the input drive to the amplifier changes.

   The “Summary Status” section indicates the current condition of the Amplifier, whether it is in Filament Time Delay, Standby, Transmitting, or if there is a Summary Fault Condition. It also indicates whether the amplifier is in local or remote control mode.

   If the amplifier is showing a summary fault, the condition causing the fault is indicated in the “Fault Status” window.

   The “RF Power Alarms” window contains settings for Forward Power Over, Forward Power Under, and Reverse Power Over conditions. Each of these conditions may be selected to fault, alarm, or be disregarded by the amplifier. Alarms do not affect

the operation of the amplifier, but when the limits are exceeded the current date, time and alarm condition are recorded in the fault log.

Lastly, the “Temperature” window indicates the current temperature of the TWTA.

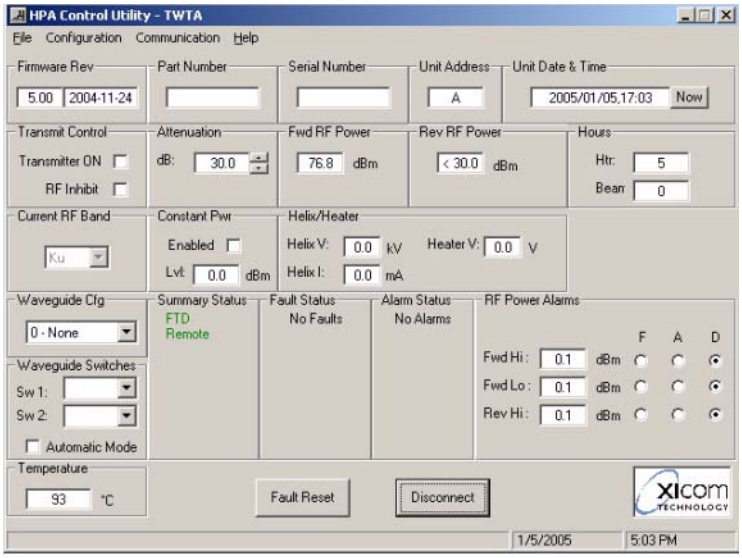


Figure 3, Primary User Interface - Connected

3. Refer to Figure 4 and Figure 5 on page 8. When the program is connected to an amplifier, the amplifier’s fault log may be viewed by Selecting :

   “File-> Download Fault Log”.

This will open a window containing the current fault log in the Windows Notebook program.

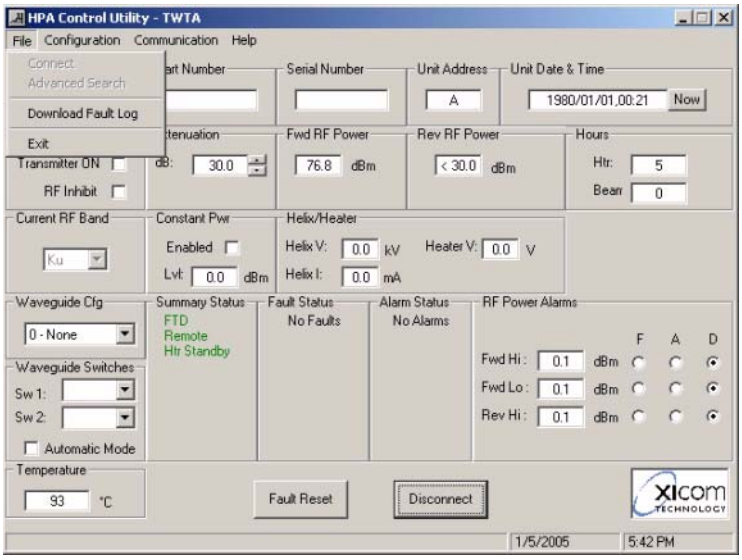


Figure 4, Primary User Interface – File Menu when connected

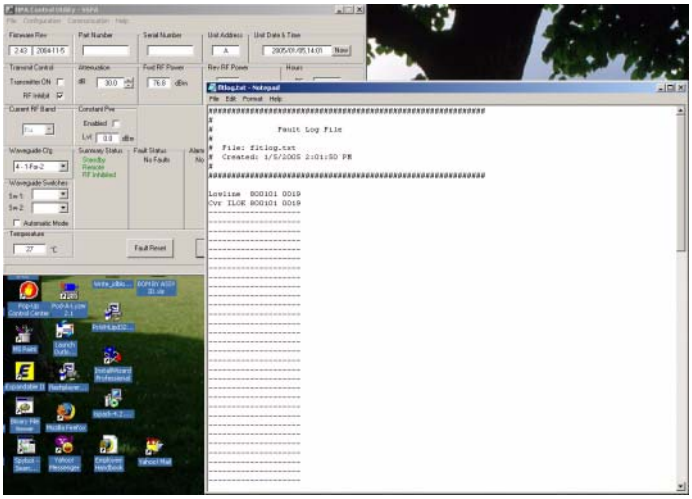


Figure 5, Display of Fault Log

4. Refer to Figure 6 on page 9. The Amplifier Configuration menu allows the configuration of the amplifier's COM ports, the startup configuration, the Maximum power level, Heater standby operation, Ethernet configuration, and the types of power units used for Forward Power, Reverse Power, and the RF Power Alarms.

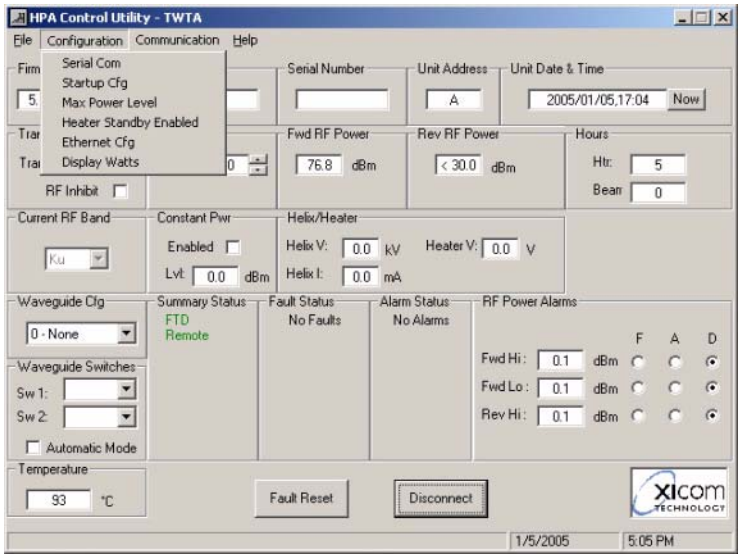


Figure 6, Configuration Menu

5. Selecting the “Serial Com” option presents a screen shown in Figure 7, which allows you to change the Baud Rate, Parity, number of data bits, and for RS485, 2 wire/4 wire mode and cable termination. The microprocessor used in the amplifier is only capable of operation with 1 stop bit.

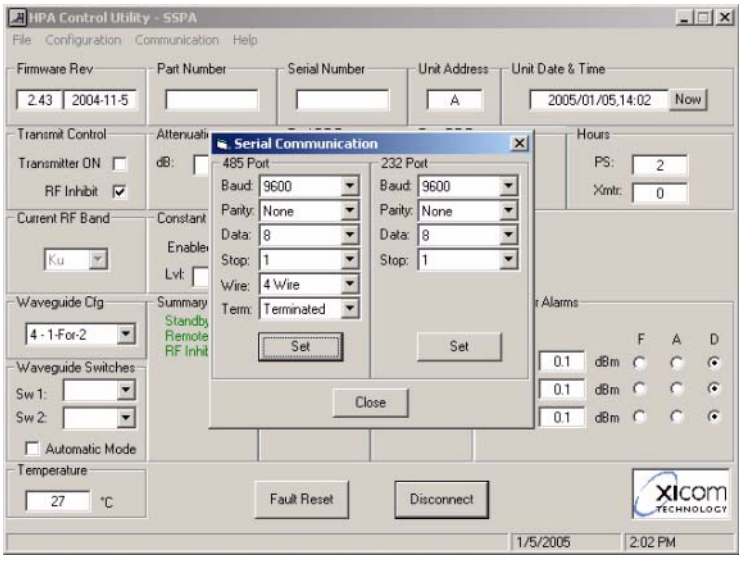


Figure 7, Serial Port communications parameters and RS485 operating mode

6. Refer to Figure 8 on page 10. If the “Configuration -> Startup Configuration” option is selected, you are presented with a dialog allowing the selection of Normal / Off / On.

Normal – the amplifier resumes operation in the last mode it was operating. If the amplifier was on the air and there was a power interruption, it will resume transmitting automatically. If the amplifier was off the air for an extended period of time it will complete filament time delay before going back on the air.

Off – The amplifier will resume operation by going into Standby mode. If the power interruption was for an extended period of time, the amplifier will complete filament time delay before going into Standby.

On – the amplifier will resume operation by going into Transmit mode. If the power transmission was for an extended period of time, the amplifier will complete filament time delay before going back on the air.

The amplifier does not manipulate the Waveguide switch based upon these settings; it merely controls the power up state of the amplifier.

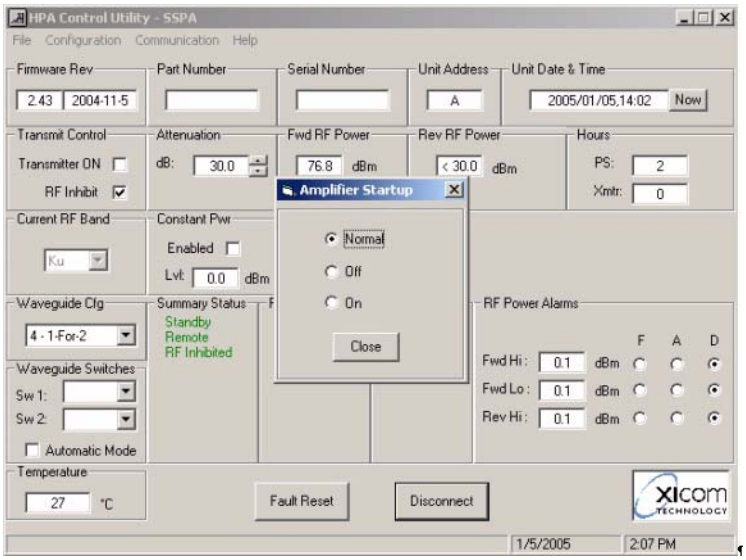


Figure 8, Amplifier Startup Configuration

7. Refer to Figure 9 on page 11. The “Configuration -> Max RF Power Level” sets the maximum power that may be produced by the amplifier. Once this output level is achieved, the amplifier will increase attenuation in the event that input drive is increased. This will continue until the input attenuator is at the maximum attenuation, after which the amplifier will fault with an overdrive condition.

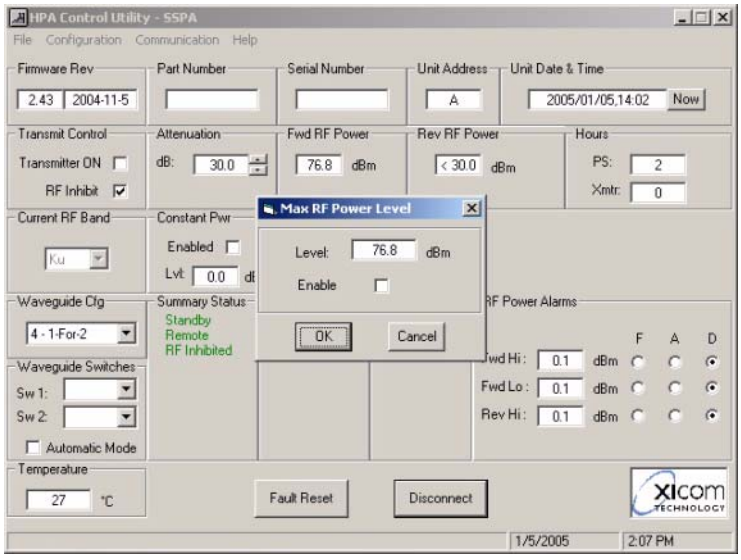


Figure 9, Maximum Power Level

8. Refer to Figure 10. When selected, the Heater Standby option will reduce the voltage applied to the TWT heater circuit when the amplifier is in standby mode, which will increase the life of the tube. If the amplifier is commanded into the transmit mode the voltage will automatically change to the correct operating voltage for the heater.

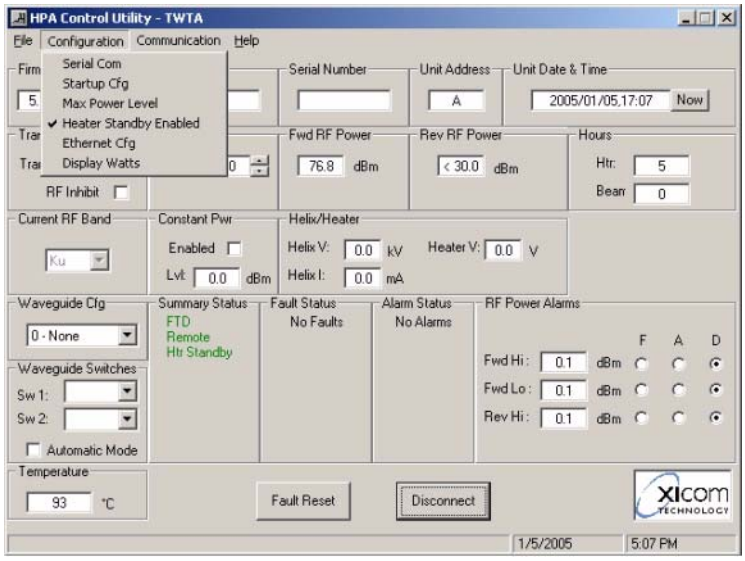


Figure 10, Heater Standby Control

9. Refer to Figure 11 on page 12. The “Configuration -> Ethernet Configuration” menu allows the selection of the network Host and Domain names, and allows configuration of the IP Address

and the net mask if “Static IP” is selected. If DHCP is selected, a server on your network assigns the IP address.

Note

Improper selection of IP addresses in Static IP mode may affect the proper operation of your Local Area Network; the use of DHCP mode is strongly advised.

10. The last option on the configuration menu is either “Display – Watts” or “Display – dBm” depending on the current units used for power. Selecting this option allows you to toggle power units for Forward Power, Reverse Power, and the Power Alarms.

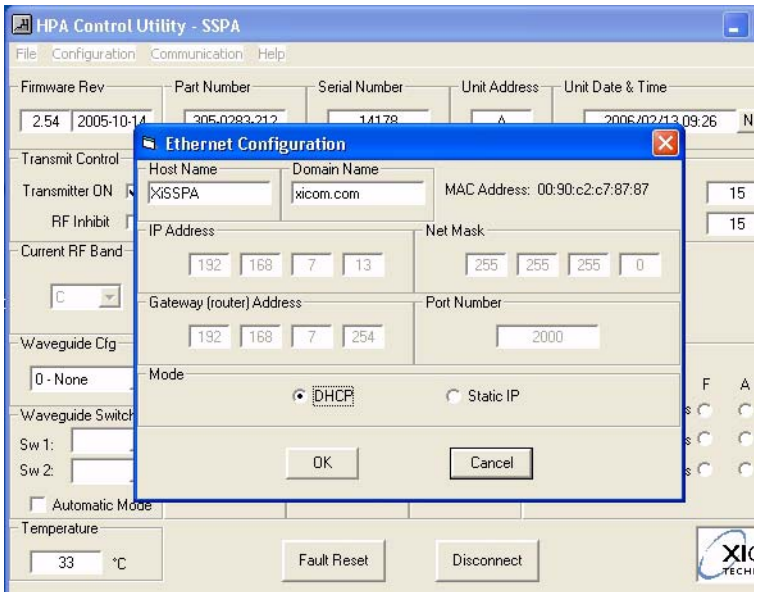


Figure 11, Ethernet Configuration

11. Refer to Figure 12 on page 13. The communications menu allows you to Use Ethernet for M&C operation. If this option is selected, all M&C operations are done solely over the Ethernet connection; RS232 and RS485 modes are not used.

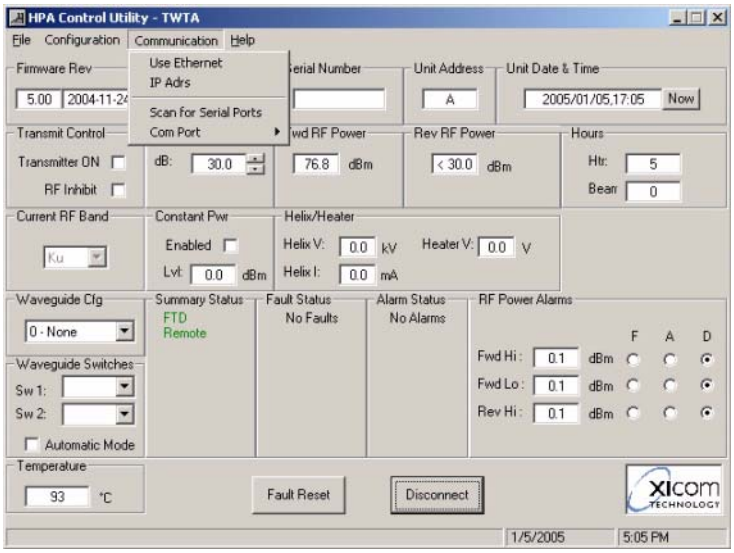


Figure 12, Communications Menu

12. Refer to Figure 13. The “IP Adrs” menu allows you to tell the HPA Control program the IP address of the amplifier that you wish to communicate with.

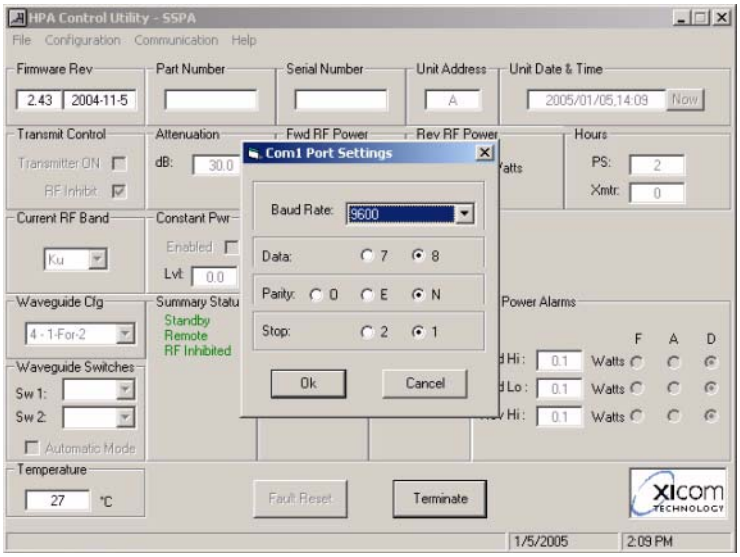


Figure 13, Set Ethernet IP Address

13. The “Scan for Serial Ports” option (Figure 12) allows you to scan the M&C PC for available RS232 communication ports.
14. Refer to Figure 14 on page 14. The “COM Port” option on the Communications menu allows you to set the Baud Rate, number of Data Bits, Parity and number of Stop bits used on the PC side of the connection.

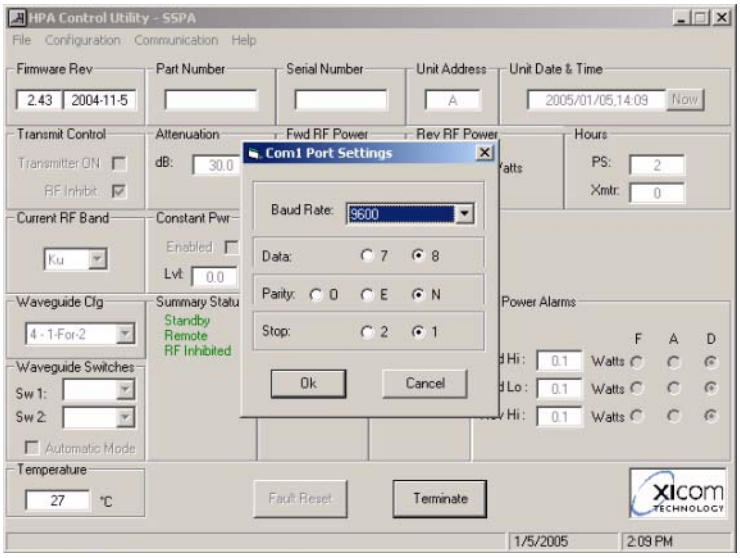


Figure 14, COM Port configuration

To operate the TWTA HPA in a redundant mode continue to the section titled Redundant Mode Operation.

If you are using the TWT HPA in stand-alone configuration it is ready for operation.

Utility Setup for SSPA Operation

Use the following procedure to setup and operate HPA Control Utility for SSPA Operation.

1. Refer to Figure 15 and Figure 16. If this is the initial time running the program, select “Connect” in the lower center, or “File -> Connect” to scan the first 5 addresses used for amplifiers. All baud rates will be tested for these amplifiers. If you want to test ALL possible RS485 addresses, select “File -> Advanced Search” and all possible addresses and baud rates will be tested. This search will take much longer than the normal “Connect” search as all possible baud rate, parity, and data bit combinations are queried.

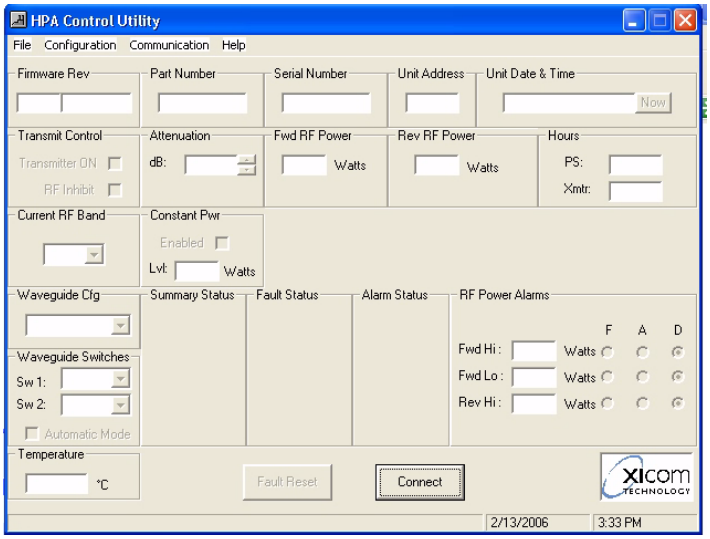


Figure 15, Primary User Interface - Disconnected

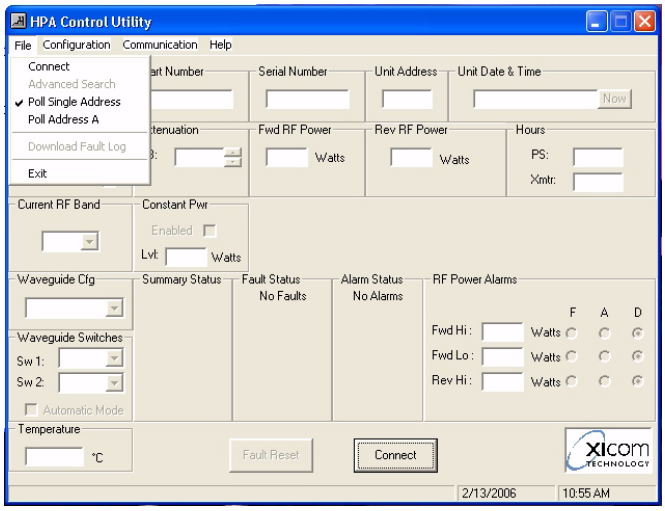


Figure 16, Primary User Interface – File Menu when disconnected

2. Refer to Figure 17. Once communication has been established, the Firmware Revision, Part Number, Serial Number, RS485 Address, Unit Date & Time, Attenuation setting, Forward RF Power, Reverse RF power, Waveguide configuration, Waveguide switch positions (if applicable), Power Supply and Transmit ON hours are reported.

   It is possible to directly control RF Inhibit and Transmitter On/Off via the small checkboxes under the “Transmit Control” section. The desired attenuation level may be set by clicking in the box next to “dB” and typing the desired level. Alternatively, the up and down arrows to the right of the box may be adjusted.

   The Constant Power mode may be selected by clicking the small check box under the “Constant Pwr” section. If it is selected, the amplifier will change the attenuator setting to maintain the power level indicated in the “Lvl:” control box if the input drive to the amplifier changes.

   The “Summary Status” section indicates the current condition of the Amplifier, whether it is in Standby, Transmitting, or if there is a Summary Fault Condition. It also indicates whether the amplifier is in local or remote control mode.

   If the amplifier is showing a summary fault, the condition causing the fault is indicated in the “Fault Status” window.

   The “RF Power Alarms” window contains settings for Forward Power Over, Forward Power Under, and Reverse Power Over conditions. Each of these conditions may be selected to fault, alarm, or be disregarded by the amplifier. Alarms do not affect the operation of the amplifier, but when the limits are exceeded

the current date, time and alarm condition are recorded in the fault log.

Lastly, the “Temperature” window indicates the current temperature of the amplifier.

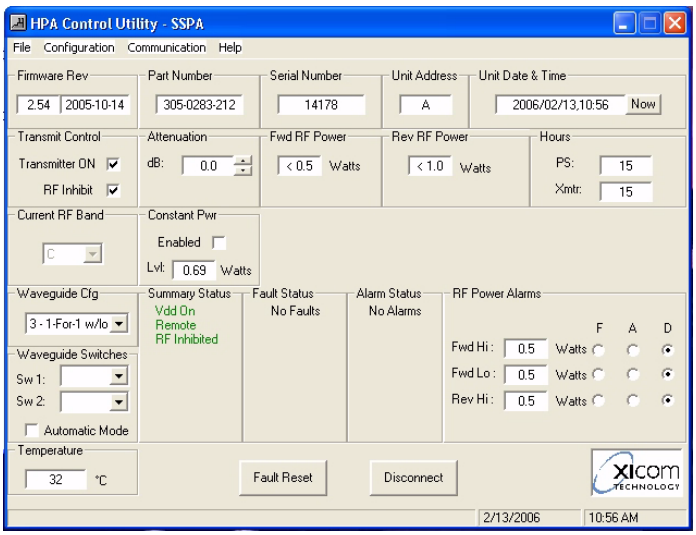


Figure 17, Primary User Interface - Connected

3. Refer to Figure 18 and Figure 19. When the program is connected to an amplifier, the amplifier’s fault log may be viewed by Selecting :

   “File-> Download Fault Log”.

This will open a window containing the current fault log in the Windows Notebook program.

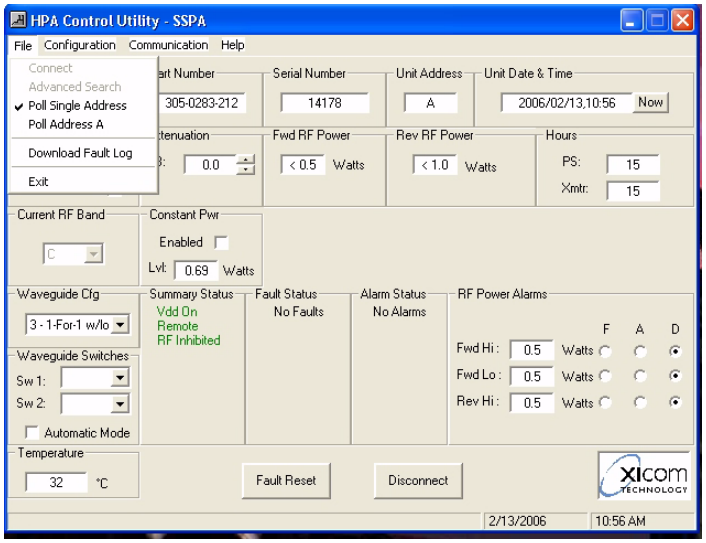


Figure 18, Primary User Interface – File Menu when connected

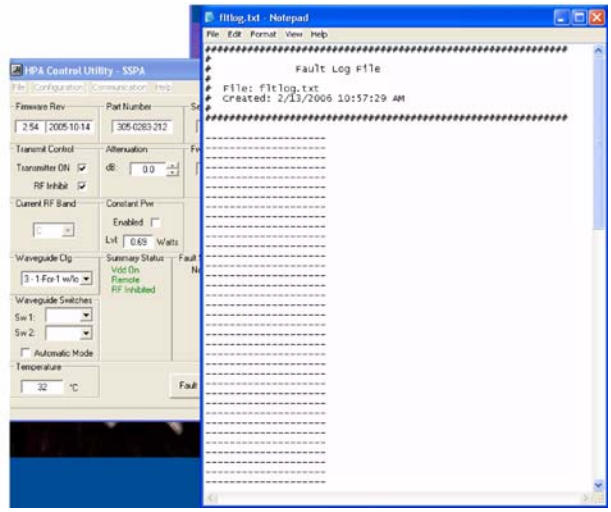


Figure 19, Display of Fault Log

4. Refer to Figure 20. The Amplifier Configuration menu allows the configuration of the amplifier's COM ports, the startup configuration, the Maximum power level, Ethernet configuration, and the types of power units used for Forward Power, Reverse Power, and the RF Power Alarms.

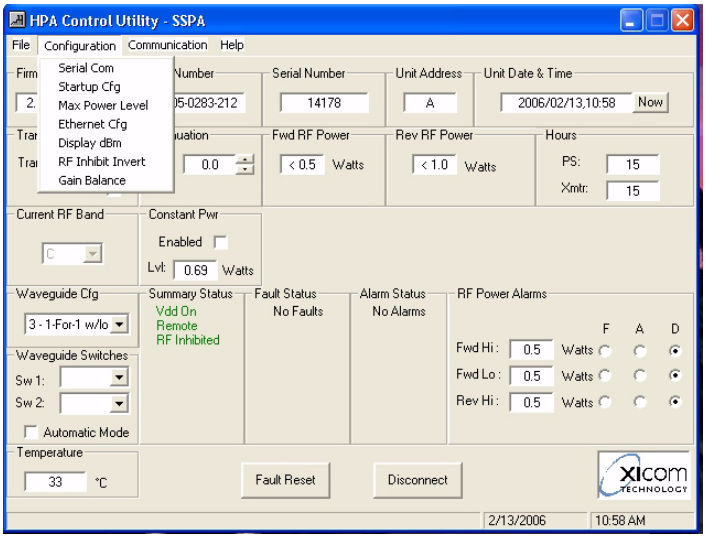


Figure 20, Configuration Menu

5. Selecting the “Serial Com” option presents a screen shown in Figure 21, which allows you to change the Baud Rate, Parity, number of data bits, and for RS485, 2 wire/4 wire mode and cable termination. The microprocessor used in the amplifier is only capable of operation with 1 stop bit.

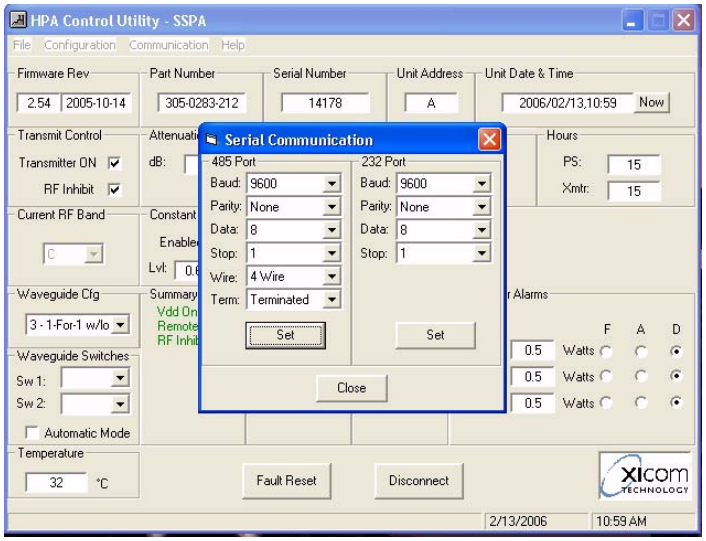


Figure 21, Serial Port communications parameters and RS485 operating mode

6. Refer to Figure 22. If the “Configuration -> Startup Configuration” option is selected, you are presented with a dialog allowing the selection of Normal / Off / On.

   Normal – the amplifier resumes operation in the last mode it was operating. If the amplifier was on the air and there was a power interruption, it will resume transmitting automatically.

   Off — The amplifier will resume operation by going into Standby mode.

   On — The amplifier will resume operation by going into Transmit mode.

   The amplifier does not manipulate the Waveguide switch based upon these settings; it merely controls the power up state of the amplifier.

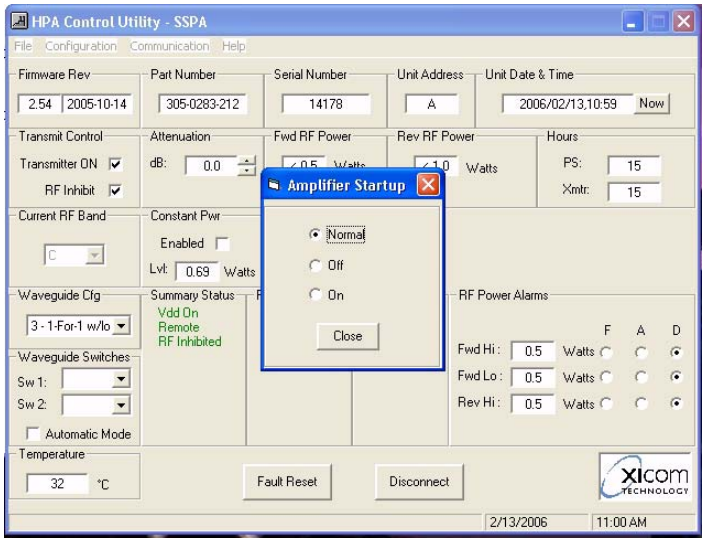


Figure 22, Amplifier Startup Configuration

7. Refer to Figure 23. The “Configuration -> Max RF Power Level” sets the maximum power that may be produced by the amplifier. Once this output level is achieved, the amplifier will increase attenuation in the event that input drive is increased. This will continue until the input attenuator is at the maximum attenuation, after which the amplifier will fault with an overdrive condition.

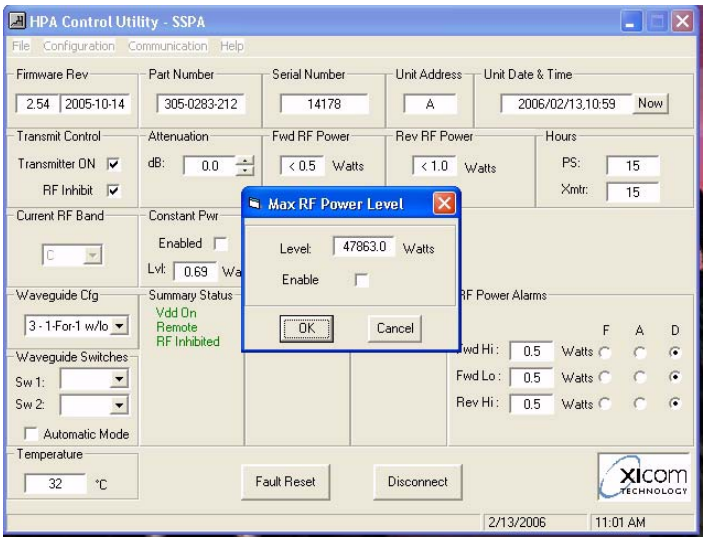


Figure 23, Maximum Power Level

8. Refer to Figure 24. The “Configuration -> Ethernet Configuration” menu allows the selection of the network Host and Domain names, and allows configuration of the IP Address and the net mask if “Static IP” is selected. If DHCP is selected, a server on your network assigns the IP address.

Note

Improper selection of IP addresses in Static IP mode may affect the proper operation of your Local Area Network; the use of DHCP mode is strongly advised.

The “MAC Address” item in the upper right corner of the Ethernet Configuration menu is a unique hardware address for IT use only.

9. The next option on the configuration menu is either “Display – Watts” or “Display – dBm” depending on the current units used for power. Selecting this option allows you to toggle power units for Forward Power, Reverse Power, and the Power Alarms. Toggle to select the display desired.
10. When selected, the RF Inhibit Invert menu item will cause the RF Inhibit Option to be inverted.

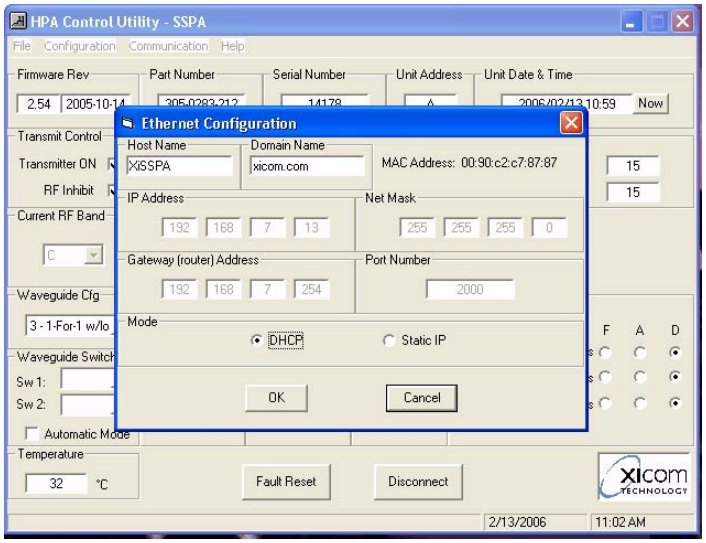


Figure 24, Ethernet Configuration

11. Refer to Figure 25. When two HPAs are configured for 1:1 Redundant operation, the Gain Balance Menu provides a means of adding attenuation to the amplifier that has the most gain of the two. When there is a failure of the online HPA, the output will be the same when the backup HPA is Switched online.

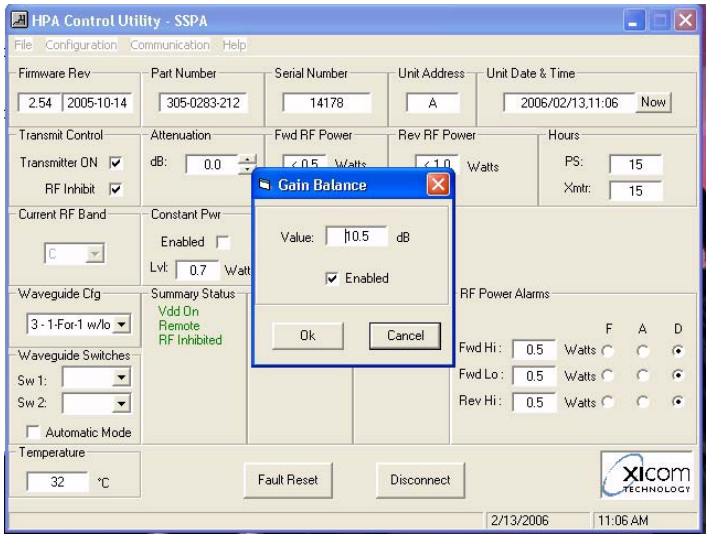


Figure 25, Gain Balance Menu

12. Refer to Figure 26. The communications menu allows you to Use Ethernet for M&C operation. If this option is selected, all M&C operations are done solely over the Ethernet connection; RS232 and RS485 modes are not used.

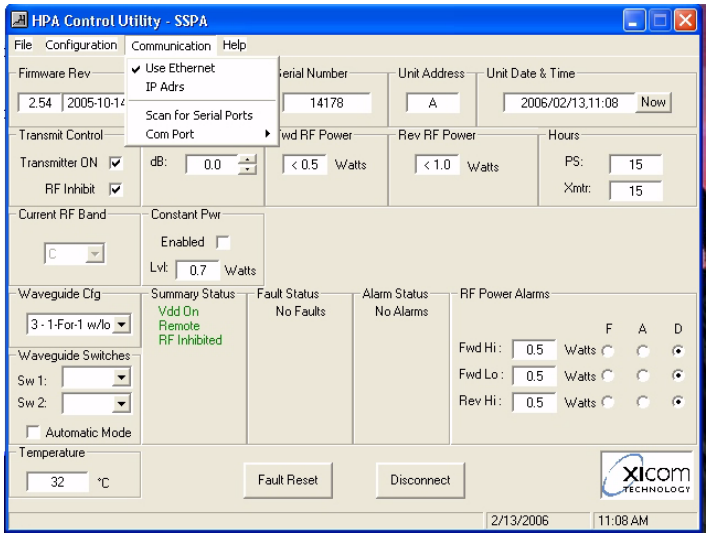


Figure 26, Communications Menu

13. Refer to Figure 27. The “IP Adrs” menu allows you to tell the HPA Control program the IP address of the amplifier that you wish to communicate with.

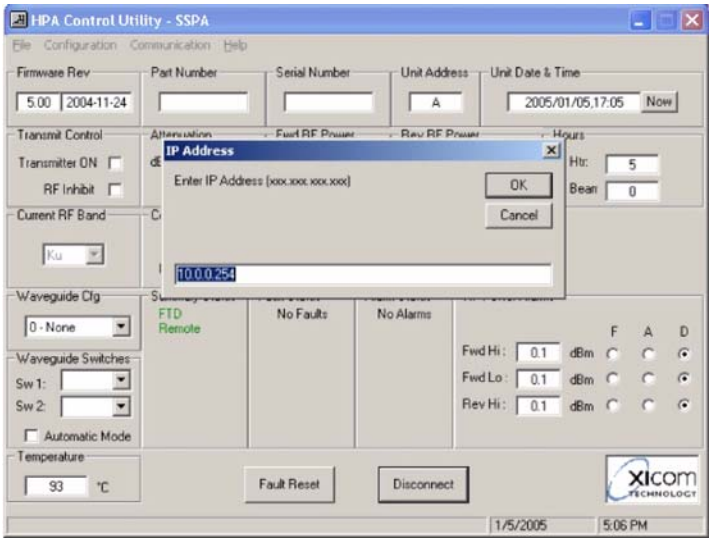


Figure 27, Set Ethernet IP Address

14. The “Scan for Serial Ports” option (Figure 26) allows you to scan the M&C PC for available RS232 communication ports.
15. Refer to Figure 28. The “COM Port” option on the Communications menu allows you to set the Baud Rate, number of Data Bits, Parity and number of Stop bits used on the PC side of the connection.

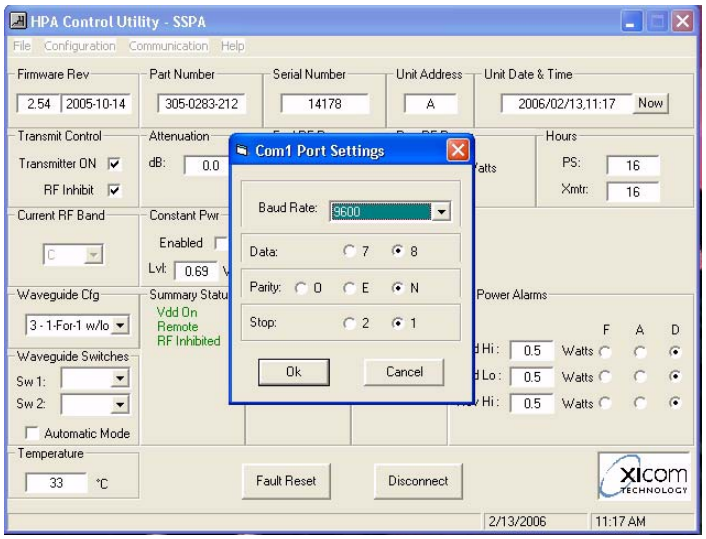


Figure 28, COM Port configuration

To operate the SSPA HPA in a redundant mode continue to the section titled Redundant Mode Operation.

If you are using the SSPA HPA in stand-alone configuration it is ready for operation.

Redundant ODU Configuration

Overview

ODU Amplifiers configured in a system for redundant operation are assembled and tested to function without an external controller unless one is ordered with the system.

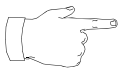
The two amplifiers are each equipped with internal microprocessors, and each unit contains the programming and hardware wiring that permits control of the RF waveguide switch in a 1:1 system.

Each of the steps must be performed for each amplifier in a redundant configuration. When configuring ODU amplifiers, you must use the HPA Control Utility to configure the amplifiers. When using Rack Mount amplifiers you may use either the HPA Control Utility or the amplifier front panel controls.

Basic System

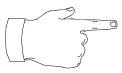
Refer to Figure 29. The amplifiers are connected to each other and the RF switch via a “Y” cable. This cable cross connects the “Amplifier Failed” output of one amplifier to the sensing input on the opposite amplifier. The cable also connects both amplifiers to the RF switch, so that either amplifier can operate the switch. The “Y” cable connectors are marked to connect to either the WG Switch or the “A” or “B” amplifier.

Note



Either amplifier can be installed in the “A” location without affecting function if internal address is “A”. However, the “Y” cable “A” connection must be made to the amplifier located in the “A” location of the RF plate as marked.

Note



The amplifier labeled “A” on the cable must be designated as “A” in the firmware; the “B” amplifier must be designated “B” in the firmware. If the firmware designation is changed the system will fail to function as a 1:1 system.

There is no external control of the systems except via serial port interface if no controller is installed.

The systems are shipped in the “default” configuration:

- Address “A” and “B” set on the appropriate amplifiers.
- AUTOMATIC Mode selected.

In case of failure by the on-line unit, the back-up will switch on-line by commanding the RF switch to go to the opposite position and put that amplifier on line instead.

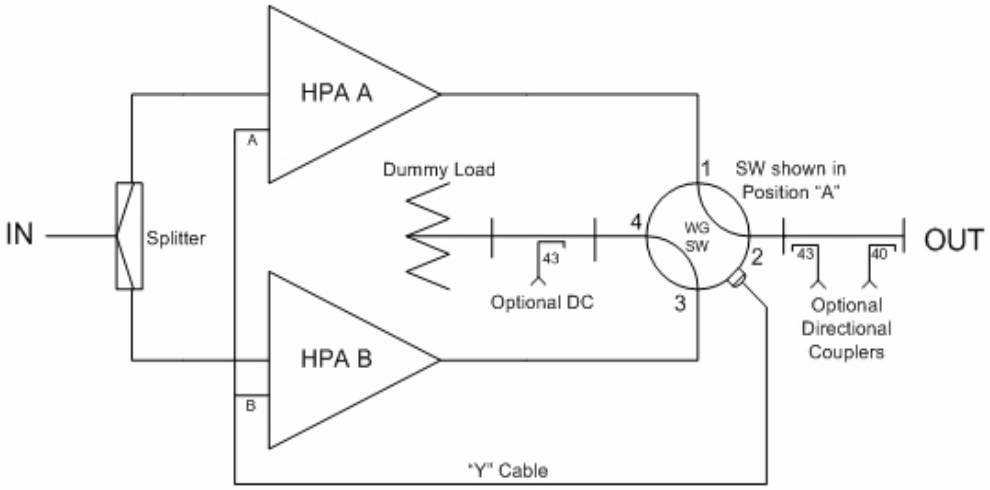


Figure 29, Basic System

ODU Configuration

Instructions for configuring two Outdoor Amplifiers (ODU) for One-For-One redundant operation without an external controller.

Note

Some of the following instructions may have been performed during the HPA Setup process. They are included here only to ensure that the HPAs are setup properly to be configured for redundant operation.

Required Equipment

The following equipment is required to configure the ODU system:

- Windows based computer with an open Serial Port (RS-232 or RS485)
- Xicom's HPA Control Utility for Windows. Xicom PN 809-0007-001. It is shipped on a CD with the amplifier manual.
- Appropriate serial cable:
  - — A null modem serial cable for RS-232 interface
  - — A straight-through serial cable with a 232-to-485 adapter for the RS-485 interface

Configuration

Refer to Figure 30. Perform these steps to configure the ODU system.

1. Connect the serial cable from the amplifier M&C connector to the PC's communication port.
2. Run the HPA Control utility on the PC and connect to the amplifier.

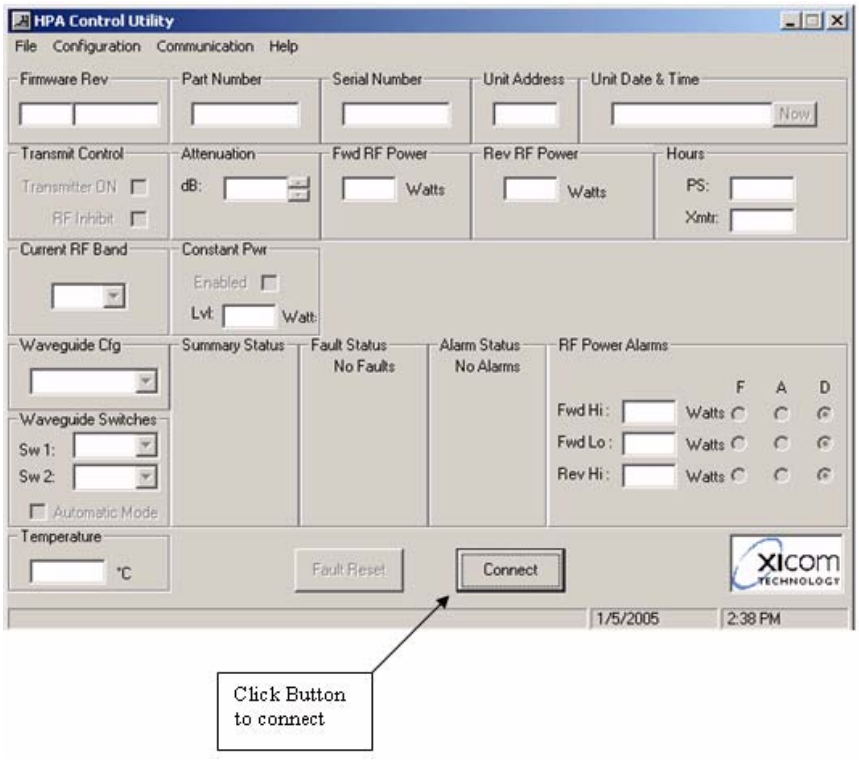


Figure 30, Connecting to Amplifier

3. If the address or connection speed is unknown, it may be desirable to run “Advanced Search” from the File Menu pulldown. (This may take several minutes as all possible addresses and data speeds are polled to find a configuration that works.)
4. Refer to Figure 31. Once connected, set the Unit Address. Each amplifier needs a unique address for RS-485 communication. (default is normally “A” unless set up as part of a system). If using RS232, it will talk to any unit it is directly connected to without an address.

   The Address choices are A, B,…through Z.

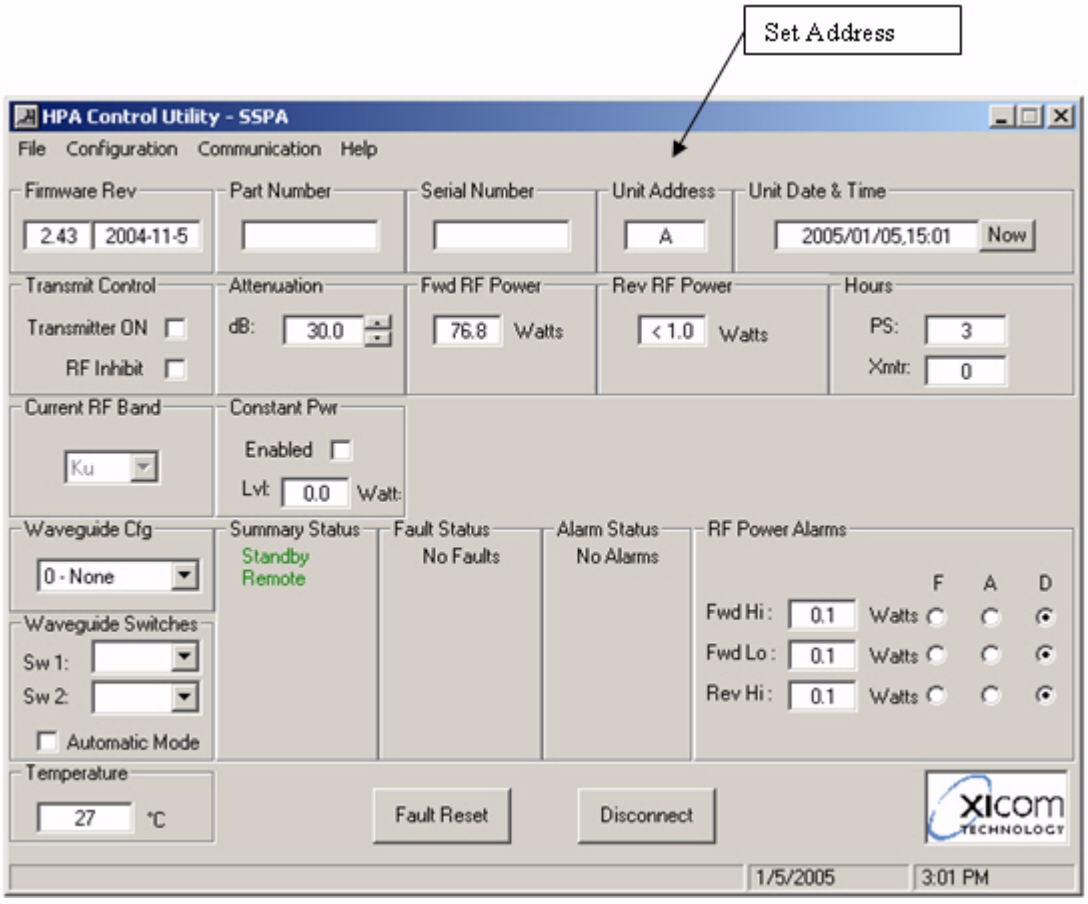


Figure 31, Select Address

5. Refer to Figure 32. Set the Waveguide Configuration by clicking on the down-arrow and select one of the four options from the drop-down menu. The "1-For-1" option is the most common.

   The choices are:

0 - None	for stand alone unit
1- 1 for 1	for simple 1:1 system
2 – 1 plus 1	for power combined system
3 – 1 for1 plus load	for 1:1 with "off line" switch

   The system is shipped set in the "1 for 1" mode.

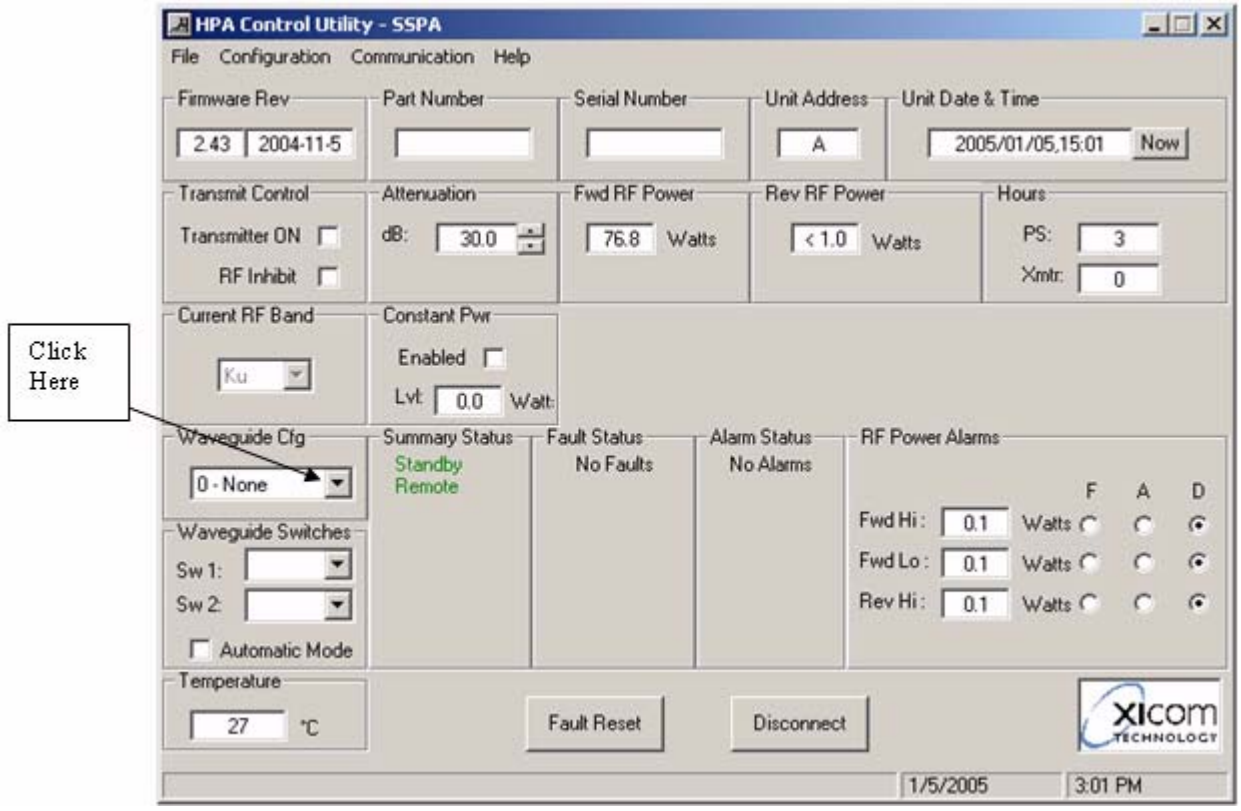


Figure 32, Select Waveguide Configuration

6. Refer to Figure 33 and Figure 34. Each amplifier can control two waveguide switches. When only one switch is used in a redundant configuration it is always Switch 1.Locate the **Waveguide Switches** area of the Waveguide CFG Box. Click on the down arrow of the switch you wish to control and select the desired switch position.

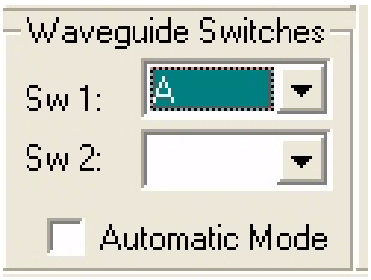


Figure 33, Set Waveguide Switch 1

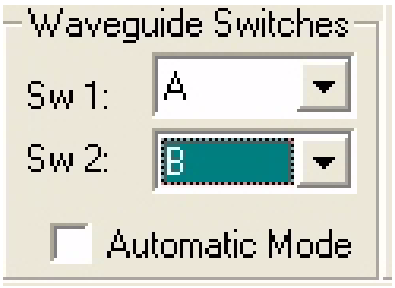


Figure 34, Set Waveguide Switch 2

Note

Switch positions “A” and “B” do not refer to an amplifier address. When a amplifier reports that a switch is set to position “A” it means that the switch is set to “me”, this amplifier. When the amplifier reports that a switch is set to position “B” it means that the amplifier is set to “him”, the other amplifier.

7. If using a second waveguide switch, set switch 2 as described in step 6.

8. Refer to Figure 35. Once the redundant mode is selected and the waveguide switch is set appropriately, to have a faulted amplifier automatically switched out and the standby amplifier switched in, Automatic Mode must be enabled. Enable Redundant Mode by clicking the “Automatic” mode checkbox as shown.

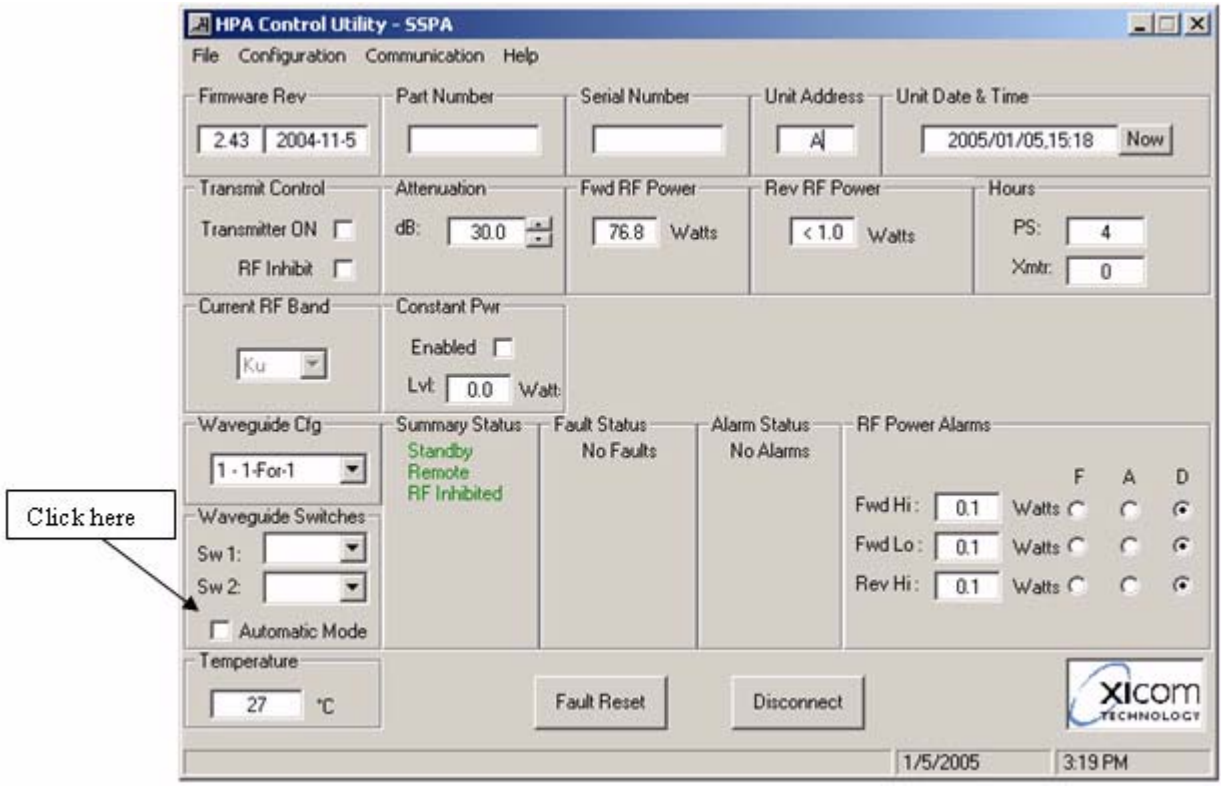


Figure 35, Select redundant Mode

9. Repeat steps 2 through 8 for the second amplifier, being sure to use a “B” Unit Address.

Rack Mount Amplifiers

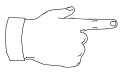
Refer to Figure 36 through Figure 38.

If you are setting up rack mount amplifiers, you may either perform the ODU Amplifier setup procedure, or you may use the schematic that appears on the front panel showing the waveguide configuration of the redundant system.

Looking at the front panel of an amplifier, the top amplifier is “this” amplifier, the one you are looking at. The bottom amplifier is the other amplifier. The top waveguide switch and the left-most waveguide switch, are switch 1. The bottom switch and right-most switch are switch 2.

Pressing the button to the right of each switch will cause the switch to change to its other position.

Note



When an amplifier is set for redundant mode operation the RS-232 port no longer functions as a control interface. Only the RS-485 port may be used as the control interface.

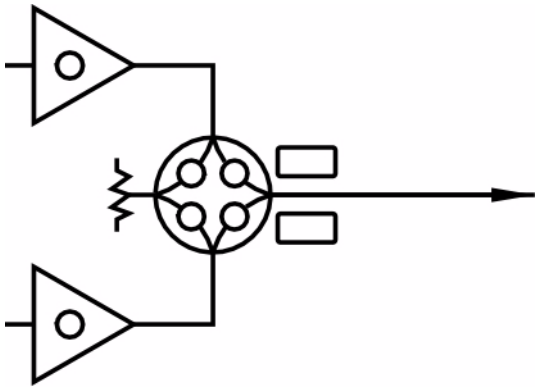


Figure 36, 1 - For - 1

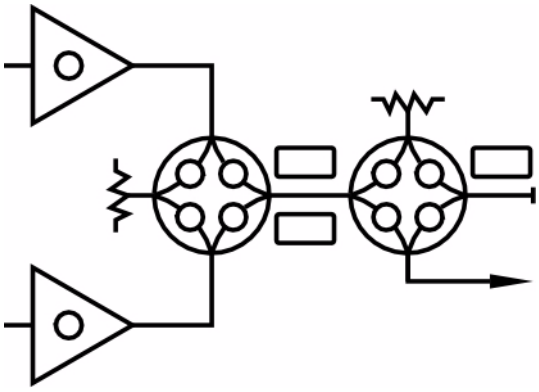


Figure 37, 1 - For - 1 with Load Switching

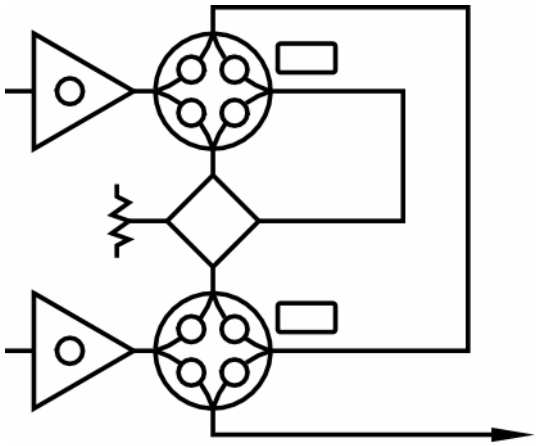


Figure 38, 1 - Plus - 1

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Engineering Approval: [signature] Date: 4/23/99
Purchasing Approval: [signature] Date: 4/26/99
Doc. Control Approval [signature] Date: 4-26-99

APPROVED PART SPECIFICATION

ESI Description 3-RING BINDER, 3", WHITE W/SLIP COVER SPIN

Manufacturer information:

Mfg. P/N: UNIVERSAL
Part Desc: ULNB-20992 WHITE 1 Inch Binder
Mfg. Name: ULNB-20962
Phone;
FAX:
Comments:

☐ No substitute parts permitted.
☒ Substitute Part (see attached).

ESI updates:**
☐ Planner/Buyer Code updated.
☐ Lead time updated.

Source information*:

	SOURCE 1	SOURCE 2
Vendor ID:	I376	2021
Vendor:	Tuffs	McWHorters
Phone:	(408)-727-0325	1-800-916-2850
FAX:	(408) 727-5862	1-408-291-0971

Document: Xicom Technology Purchased Parts Form. Rev 1. Created on 12/11/98 10:03 AM
File: S:Shared/Document Control/Purchase Parts Cover Sheets/APS Form
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* Source information on this form is to be accurate at the time the form is last updated; however the ESI database will take precedence.
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