KPA

Ku-Band Indoor Solid-State Power Amplifier Series
Installation and Operation Manual

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

Part Number MN/KPA.IOM Revision 1

Errata A

Comtech EF Data Documentation Update

KPA

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Installation and Operation Manual

Part Number MN/KPA.IOM
Revision 1

Subject: Add TPE and TPS Commands/Queries to Appendix C. REMOTE CONTROL Sect. C.6.1 Remote Commands and Queries (FW Version 2.X.X and Higher)

Original Manual Part Number/Rev: MN/KPA.IOM Rev 1

Errata Number/ PLM Document ID: ER-KPA-EA1

PLM CO Number: C-0027379

Comments: *The updated information will be incorporated into the next formal revision of the manual:*

Add TPE and TPS Commands/Queries to Append C. REMOTE CONTROL Sect. C.6.1 Remote Commands and Queries (FW Version 2.X.X and Higher), page C-16:

Time Protocol Enable	TPE=	1 byte	Command or Query. Used to enable or disable the Time Protocol, where: 0 = Time protocol disabled 1 = Time protocol enabled **Example:** TPE=1 (Time protocol enabled)	TPE?	TPE=x (see Description of Arguments)
Time Protocol Server	TPS=	15 bytes	Command or Query. Used to set the Time Server IP address for the Unit Tx Ethernet management port, in the format: xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx is the Time server IP address **Example:** TPS=192.168.001.005	TPS?	TPS= xx.xxx.xxx.xxx.yy (see Description of Arguments)

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Revision 1
October 29, 2010

Comtech EF Data, 2114 West 7th Street, Tempe, Arizona 85281 USA, 480.333.2200, FAX: 480.333.2161

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Table of Contents

Tables

Figures

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data family of Ku-Band Indoor Solid-State Power Amplifiers (ISSPAs) – the KPA-020IN, KPA-040, KPA-080, and KPA-100. This is a technical document intended for earth station engineers, technicians, and operators responsible for the operation and maintenance of the KPAs.

Revision 1 of this manual represents a complete rewrite in which all content has been updated in its entirety and re-ordered to conform to current Comtech EF Data Technical Publications standards and practices.

Disclaimer

Comtech EF Data has reviewed this manual thoroughly in order that it will be an easy-to-use guide to your equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described.

Further, Comtech EF Data reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

If you have any questions regarding your equipment or the information in this manual, please contact Comtech EF Data's Customer Support Department during normal business hours.

Reporting Comments or Suggestions Concerning this Manual

Comments and suggestions regarding the content and design of this manual are appreciated. To submit comments, please contact the Comtech EF Data Technical Publications department:

TechnicalPublications@comtechefdata.com

Military Standards

References to "MIL-STD-188" apply to the 114A series (i.e., MIL-STD-188-114A), which provides electrical and functional characteristics of the unbalanced and balanced voltage digital interface circuits applicable to both long haul and tactical communications. Specifically, these

references apply to the MIL-STD-188-114A electrical characteristics for a balanced voltage digital interface circuit, Type 1 generator, for the full range of data rates. For more information, refer to the Department of Defense (DOD) MIL-STD-188-114A, "*Electrical Characteristics of Digital Interface Circuits*."

Conventions and References

Metric Conversion

Metric conversion information is located on the inside back cover of this manual. This information is provided to assist the operator in cross-referencing non-Metric to Metric conversions.

Recommended Standard Designations

The Recommended Standard (RS) designation has been superseded by the new designation of the Electronic Industries Association (EIA). References to the old designation may be shown only when depicting actual text displayed on the screen of the unit (RS-232, RS-485, etc.). All other references in the manual will be shown with the EIA designation.

Trademarks

Windows is a trademark of the Microsoft Corporation. Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

The User should carefully review the information that follows.

Cautions and Warnings

IMPORTANT or NOTE indicates a statement that is associated with the task being performed or information critical for proper equipment function.

CAUTION indicates a hazardous situation that, if not avoided, may result in minor or moderate injury. CAUTION may also be used to indicate other unsafe practices or risks of property damage.

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

Electrical Safety and Compliance

This product contains a Lithium Battery. DANGER OF EXPLOSION EXISTS if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries in accordance with local and national regulations

This equipment has been designed to minimize exposure of personnel to hazards. The operators and technicians must:

- ***Know how to work around, with, and on high voltage and high RF power level equipment.***
- ***Exercise every precaution to ensure personnel safety.***
- ***Exercise extreme care when working near high voltages/high RF power level equipment.***
- ***Be familiar with the warnings presented in this manual.***
- ***Disconnect the power supply cord before servicing the ISSPA.***

Electromagnetic Compatibility (EMC) Compliance

Properly shielded cables for DATA I/O are required in order to meet the European Electromagnetic Compatibility (EMC) Directive (EN55022, EN50082-1). More specifically, these cables must be shielded from end-to-end, ensuring a continuous ground shield.

In accordance with European Directive 2004/108/EEC, the KPA family of products has been shown, by independent testing, to comply with the following standards:

Emissions: EN 55022 Class B – Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.

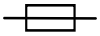
(Also tested to FCC Part 15 Class B.)

Immunity: EN 55024 – Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.

European Low Voltage Directive (LVD)

The following information is applicable for the European Low Voltage Directive (2006/95/EC):

Symbol	Description
<HAR>	Type of power cord required for use in the European Community.
	CAUTION: Double-pole/Neutral Fusing ACHTUNG: Zweipolige bzw. Neutralleiter-Sicherung

International Symbols			
Symbol	**Definition**	**Symbol**	**Definition**
	Alternating Current		Protective Earth
	Fuse		Chassis Ground

For additional symbols, refer to* Cautions and Warnings *listed earlier in this Preface.

Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

The warranty does not apply to any product or parts thereof where the serial number or the serial number of any of its parts has been altered, defaced, or removed.

The warranty does not cover damage or loss incurred in transportation of the product.

The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Customer Support

Refer to p. xii in this Preface for information regarding this product's Warranty Policy.

Contact the Comtech EF Data Customer Support Department for:

- Product support or training
- Reporting comments or suggestions concerning manuals
- Information on upgrading or returning a product

A Customer Support representative may be reached during normal business hours at:

Comtech EF Data
Attention: Customer Support Department
2114 West 7th Street
Tempe, Arizona 85281 USA

480.333.2200 (Main Comtech EF Data number)
480.333.4357 (Customer Support Desk)
480.333.2161 FAX

To return a Comtech EF Data product (in-warranty and out-of-warranty) for repair or replacement:

- **Contact** the Comtech EF Data Customer Support Department during normal business hours. Be prepared to supply the Customer Support representative with the model number, serial number, and a description of the problem.
- **Request** a Return Material Authorization (RMA) number from the Comtech EF Data Customer Support representative.
- **Pack** the product in its original shipping carton/packaging to ensure that the product is not damaged during shipping.
- **Ship** the product back to Comtech EF Data. (Shipping charges should be prepaid.)

Online Customer Support

An **RMA number** can be requested electronically by accessing Comtech EF Data's online **Support** page (**www.comtechefdata.com/support.asp**). From this page:

- **Click** the **Service** hyperlink, then read the **Return Material Authorization** section for detailed instructions on Comtech EF Data's return procedures.
- **Click [Send RMA Request]** on the **Support** page or the **RMA Request** hyperlink provided in the **Service | Return Material Authorization** section; fill out the *Billing Information*, *Return Information*, and *Unit to be Returned* sections completely, then click **[Send email]**

  – or –

- **Send an e-mail** providing this same detailed information to the Customer Support Department at **service@comtechefdata.com**.

Chapter 1. INTRODUCTION

1.1 Overview

The Comtech EF Data **K**u-Band Solid-State **P**ower **A**mplifier (KPA) family of products, shown in **Figure 1-1**, is a line of Indoor Solid-State Power Amplifiers (ISSPAs) designed for use in communication systems or satellite uplink data systems. The KPA operates over the RF input frequency range of 14.0 to 14.5 GHz and provides a cost effective and more reliable replacement for **T**raveling **W**ave **T**ube (TWT) amplifiers in Ku-Band terminals.

Due to its small form factor, it is also ideal for the construction of small "flyaway" terminals, medium size (equivalent to Intelsat F) earth stations, hub earth stations for small to medium size private networks, or point-to-point links.

Figure 1-1. Comtech EF Data KPA Family of Ku-Band Solid-State Amplifiers

1.2 Functional Description

Each KPA ISSPA is constructed with highly reliable **Ga**llium **Ar**s**e**nide **F**ield **E**ffect **T**ransistor**s** (GaAs FETs). With Third-Order Intermodulation products from 4 to 6 dB better than TWT ratings, the Comtech EF Data unit replaces TWTs with saturated power levels of up to twice the KPA's rated output. These KPAs also provide a **M**ean **T**ime **B**etween **F**ailure (MTBF) that is 4 to 5 times greater than the typical TWT MTBFs.

The KPA is designed to be rack-mounted in a standard 19-inch (48 cm) rack or cabinet by hard-mounting the unit to the rack's front mounting rails using the front panel mounting holes; optionally, rack slides may be installed onto the chassis that allow servicing of the unit without its removal from the rack. Handles at the front of the unit facilitate easy installation into and removal from the rack.

All user controls, indicators, and displays for local and remote operation – as well as the RF Input and Output sample test ports – are located on the front panel of the unit. User external interface connectors are located on the chassis rear panel.

Two internally mounted exhaust fans provide cooling – cool air is taken in through the front panel and exhausted out the rear panel.

An AC power connector and On/Off switch are located on the chassis rear panel. A six-foot AC power cord is supplied with the unit.

On the pages that follow, **Figure 1-2** and **Figure 1-3** depict the block diagrams for the available KPAs. Each KPA chassis consists of a power supply, fan assembly, front panel assembly, monitor/control processor (MCP), and a Comtech EF Data SSPA module. The KPA is designed using a Comtech EF Data low loss combining technique and an MCP based temperature *versus* gain compensation.

The front panel features:

- A Vacuum Fluorescent Display for user-friendly visual status update (Liquid Crystal Diode display for KPA-020IN and older KPA-040/-080/-100 units)
- The six-button cursor array is used to set or change operating parameters
- Six Light-Emitting Diodes (LEDs) provide quick reference to binary status points
- Input and output sample ports at –20 dBc and–40 dBc provide easy test point access

Each unit has the ability to function as a 1:1 or 1:2 redundancy controller in the backup mode. The optional redundancy configuration is implemented by attaching a ganged waveguide/coax transfer switch(es) to input and output connectors of the amplifiers with a combination coaxial cable and waveguide kit. When the backup KPA is commanded into the controller mode, it monitors the online KPAs for faults. A faulted online unit may be disconnected and replaced without affecting the online power amplifier. For detailed information about using the KPA in 1:1 or 1:2 redundancy, see **Appendix B. KPA REDUNDANT OPERATIONS**.

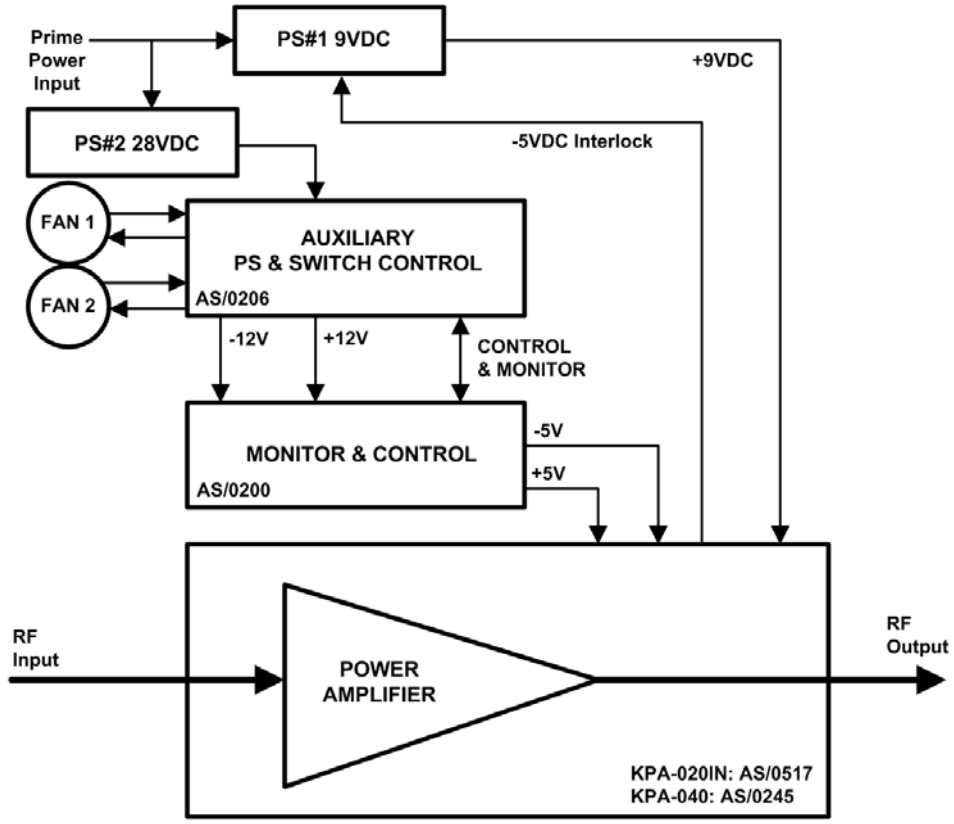


Figure 1-2. KPA-020IN/-040 Block Diagram

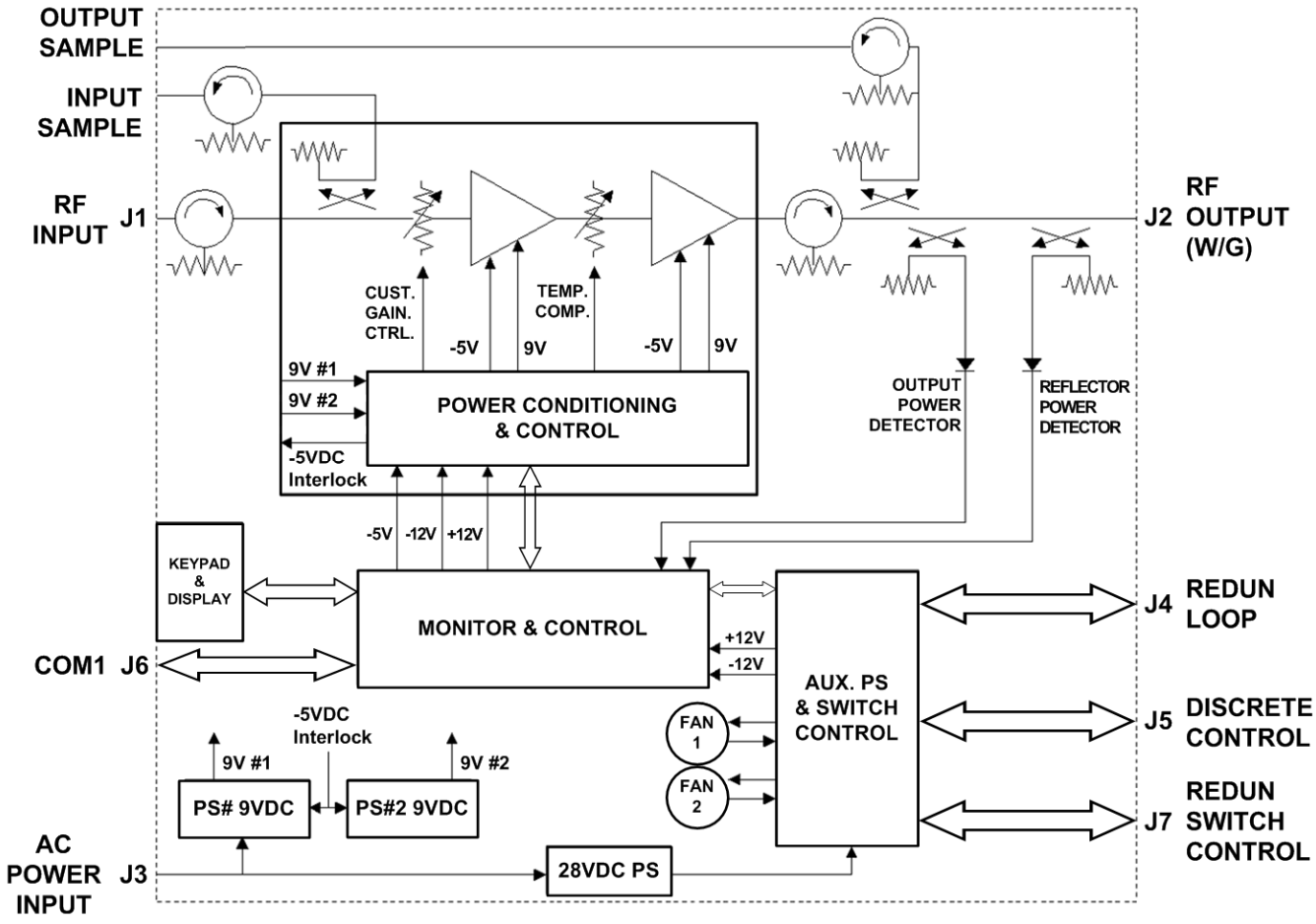


Figure 1-3. KPA-080/-100 Block Diagram

1.3 KPA Specifications

1.3.1 KPA-020IN Specifications

Parameters			Specifications
Input	Level		-10dBm Typical
	Impedance		50Ω
	Noise Figure		10 dB Typical, 15 dB max @ max gain
	VSWR		1.25: 1 maximum
	Connector		SMA Female
Output	Frequency		14.0 to 14.5 GHz
	Power		42.5 dBm minimum @ 1 dB Compression
	Mute		60 dB
	VSWR		1.25:1 maximum
	Connector		WR75G Waveguide
Gain	Linear		50 dB minimum, 53 dB Typical
	Adjust		20 dB in 0.25 dB steps
	Fill Band		± 0.75 dB
	Per 40 MHz		± -0.25 dB
	0 to +50°C (32 to 122°F)		± 0.75dB
Third Order Modulation	Intercept		+56.5 dBm minimum, 59.0 Typical
	Products		-25 dBc max, -30 dBc typical @ 3 dB total backoff from rated P1dB (two tones, Δf+MHz)
AM to PM Conversion	Output		2.0 degrees typical 3.0 max @ 42.5 dBm
Group Delay (per 40 MHz)	Linear		± 0.03 ns/MHz
	Parabolic		± 0.0025 ns/MHz^2
	Ripple		1.0 ns Peak-to-Peak
Front Panel	Display		24 x 2 LCD
	Data Entry		Cursor Control Keypad (6 keys)
	Output Sample		Type N female, 50Ω, –40 dBc
	Input Sample		Type N female, 50Ω, –20 dBc
Remote Control	COM Port		EIA-232 or EIA-485
	Protocol		ASCII
Alarms	Summary Fault		Form C
LEDs	Power On		Green
	Fault		Red
	Stored Fault		Red
	TX On		Yellow
	Online		Yellow
	Remote		Yellow
Mechanical	Envelope		3.5H x 19W x 24D inches (8.89H x 48.26W x 60.96D cm)
	Weight		TBD
Environmental	Temperature	Operating	0 to 50°C (32 to 122°F)
		Storage	–40 to 70°C (–40 to 158°F)
	Humidity	Operating	10 to 95% Noncondensing
		Storage	0 to 100% Noncondensing
	Altitude	Operating	15, 000 ft MSL
		Storage	50, 000 ft
	Shock		Normal Commercial Shipping and Handling
Power Requirements	VAC		90 to 135 or 180 to 270 VAC, 47 to 63 Hz 400W (Auto Select)

1.3.2 KPA-040 Specifications

Parameters			Specifications
Input	Level		10 dBm Typical
	Impedance		50Ω
	Noise Figure		10 dB typical, 15 dB maximum @ max gain
	VSWR		1.25:1 Maximum
	Connector		SMA Female
Output	Frequency		14.0 to 14.5 GHz
	Power		45.5 dBm min @ 1 dB Compression
	Mute		-60 dB
	Impedance		50 Ω
	VSWR		1.25:1 Maximum
	Connector		WR75G Waveguide
Gain	Linear		60.0 dB minimum, 63 dB typical
	Adjust		20 dB in 0.25 dB steps
	Fill Band		± 0.75 dB
	Per 40 MHz		± 0.25 dB
	0 to +50°C (32 to 122°F)		± 0.50 dB @ center frequency ± 1.00 dB full band
Third Order Modulation	Intercept		+53.5 dBm minimum, 56.0 dBm typical
	Products		-30 dBc typical @ –25 dBc maximum 3 dB total backoff (2 tones, Δf = 1 MHz)
AM to PM Conversion	Output		2.0 degrees typical, 3.0 maximum @ rated output
Group Delay (per 40 MHz)	Linear		± 0.03 ns/MHz
	Parabolic		± 0.03 ns/MHz^2
	Ripple		1.0 ns Peak-to-Peak
Front Panel	Display		24 x 2 LCD
	Data Entry		Cursor Control Keypad (6 keys)
	Output Sample		Type N, 50Ω, –40 dBc
	Input Sample		Type N, 50Ω, –20 dBc
Remote Control	COM Port		EIA-232 or EIA-485
	Protocol		ASCII
Alarms	Summary Fault		Form C
LEDs	Power On		Green
	Fault		Red
	Stored Fault		Red
	TX On		Yellow
	Online		Yellow
	Remote		Yellow
Mechanical	Envelope		7H x 19W x 24D inches (18H x 48.26W x 60.96D cm)
	Weight		TBD
Environmental	Temperature	Operating	0 to 50°C (32 to 122°F)
		Storage	–40 to 70°C (–40 to 158°F)
	Humidity	Operating	10 to 95% Noncondensing
		Storage	0 to 100% Noncondensing
	Altitude	Operating	15, 000 ft MSL
		Storage	50, 000 ft
	Shock		Normal Commercial Shipping and Handling
Power Requirements	VAC		90 to 135 VAC, or 180 to 270 VAC, 47 to 63 Hz, 600W (Auto-Select)

1.3.3 KPA-080 Specifications

Parameters			Specifications
Input	Impedance		50Ω
	Noise Figure		10 dB typical, 15 dB maximum @ max gain
	VSWR		1.25:1 Maximum
	Connector		SMA Female
Output	Frequency		14.0 to 14.5 GHz
	Power		48.5 dBm min @ 1 dB Compression
	Mute		60 dB
	Impedance		50 Ω
	VSWR		1.25:1 Maximum
	Connector		WR75G Waveguide
Gain	Linear		61 dB minimum, 64 dB typical
	Adjust		20 dB in 0.25 dB steps
	Fill Band		± 0.75 dB
	Per 40 MHz		± -0.25 dB
	0 to +50°C (32 to 122°F)		± 0.50 dB @ center frequency ± 1.00 dB full band
Third Order Modulation	Products		-30 dBc typical @ –25 dBc maximum @ 3 dB total backoff (2 tones, Δf = 1 MHz)
AM to PM Conversion	Output		2.0 degrees typical, 3.0 maximum @ rated output
Group Delay (per 40 MHz)	Linear		± 0.03 ns/MHz
	Parabolic		± 0.003 ns/MHz^2
	Ripple		1.0 ns Peak-to-Peak
Front Panel	Display		24 x 2 LCD
	Data Entry		Cursor Control Keypad (6 keys)
	Output Sample		Type N female, 50Ω, –40 dBc
	Input Sample		Type N female, 50Ω, –20 dBc
Remote Control	COM Port		EIA-232 or EIA-485
	Protocol		ASCII
Alarms	Summary Fault		Form C
LEDs	Power On		Green
	Fault		Red
	Stored Fault		Red
	TX On		Yellow
	Online		Yellow
	Remote		Yellow
Mechanical	Envelope		8.75H x 19W x 24D inches (22.22H x 48.26W x 60.96D cm)
	Weight		75 lbs (34 kg)
Environmental	Temperature	Operating	0 to 50°C (32 to 122°F)
		Storage	–40 to 70°C (–40 to 158°F)
	Humidity	Operating	10 to 95% Noncondensing
		Storage	0 to 100% Noncondensing
	Altitude	Operating	15, 000 ft MSL
		Storage	50, 000 ft
	Shock		Normal Commercial Shipping and Handling
Power Requirements	VAC		180 to 270 VAC, 47 to 63 Hz 1100W nominal

1.3.4 KPA-100 Specifications

Parameters			Specifications
Input	Level		-10 dBm Typical
	Impedance		50Ω
	Noise Figure		10 dB typical, 15 dB maximum @ max gain
	VSWR		1.25:1 Maximum
	Connector		SMA Female
Output	Frequency		14.0 to 14.5 GHz
	Power		49.5 dBm min @ 1 dB Compression
	Mute		-60 dB
	Impedance		50 Ω
	VSWR		1.25:1 Maximum
	Connector		WR75G Waveguide
Gain	Linear		65 dB minimum, 70 dB typical
	Adjust		20 dB in 0.25 dB steps
	Fill Band		± 0.75 dB
	Per 40 MHz		± 0.25 dB
	0 to +50°C (32 to 122°F)		± 0.50 dB @ center frequency ± 1.00 dB full band
Third Order Modulation	Products		-30 dBc typical @ –25 dBc maximum @ 3 dB total backoff (2 tones, Δf = 1 MHz)
AM to PM Conversion	Output		2.0 degrees typical, 3.0 maximum @ rated output
Group Delay (per 40 MHz)	Linear		± 0.03 ns/MHz
	Parabolic		± 0.003 ns/MHz^2
	Ripple		1.0 ns Peak-to-Peak
Front Panel	Display		24 x 2 LCD
	Data Entry		Cursor Control Keypad (6 keys)
	Output Sample		Type N female, 50Ω, –40 dBc
	Input Sample		Type N female, 50Ω, –20 dBc
Remote Control	COM Port		EIA-232 or EIA-485
	Protocol		ASCII
Alarms	Summary Fault		Form C
LEDs	Power On		Green
	Fault		Red
	Stored Fault		Red
	TX On		Yellow
	Online		Yellow
	Remote		Yellow
Mechanical	Envelope		8.75H x 19W x 24D inches (22.22H x 48.26W x 60.96D cm)
	Weight		75 lbs (34 kg)
Environmental	Temperature	Operating	0 to 50°C (32 to 122°F)
		Storage	–40 to 70°C (–40 to 158°F)
	Humidity	Operating	10 to 95% Noncondensing
		Storage	0 to 100% Noncondensing
	Altitude	Operating	15, 000 ft MSL
		Storage	50, 000 ft
	Shock		Normal Commercial Shipping and Handling
Power Requirements	VAC		180 to 270 VAC, 47 to 63 Hz 1100W nominal

1.3.5 Dimensional Envelopes

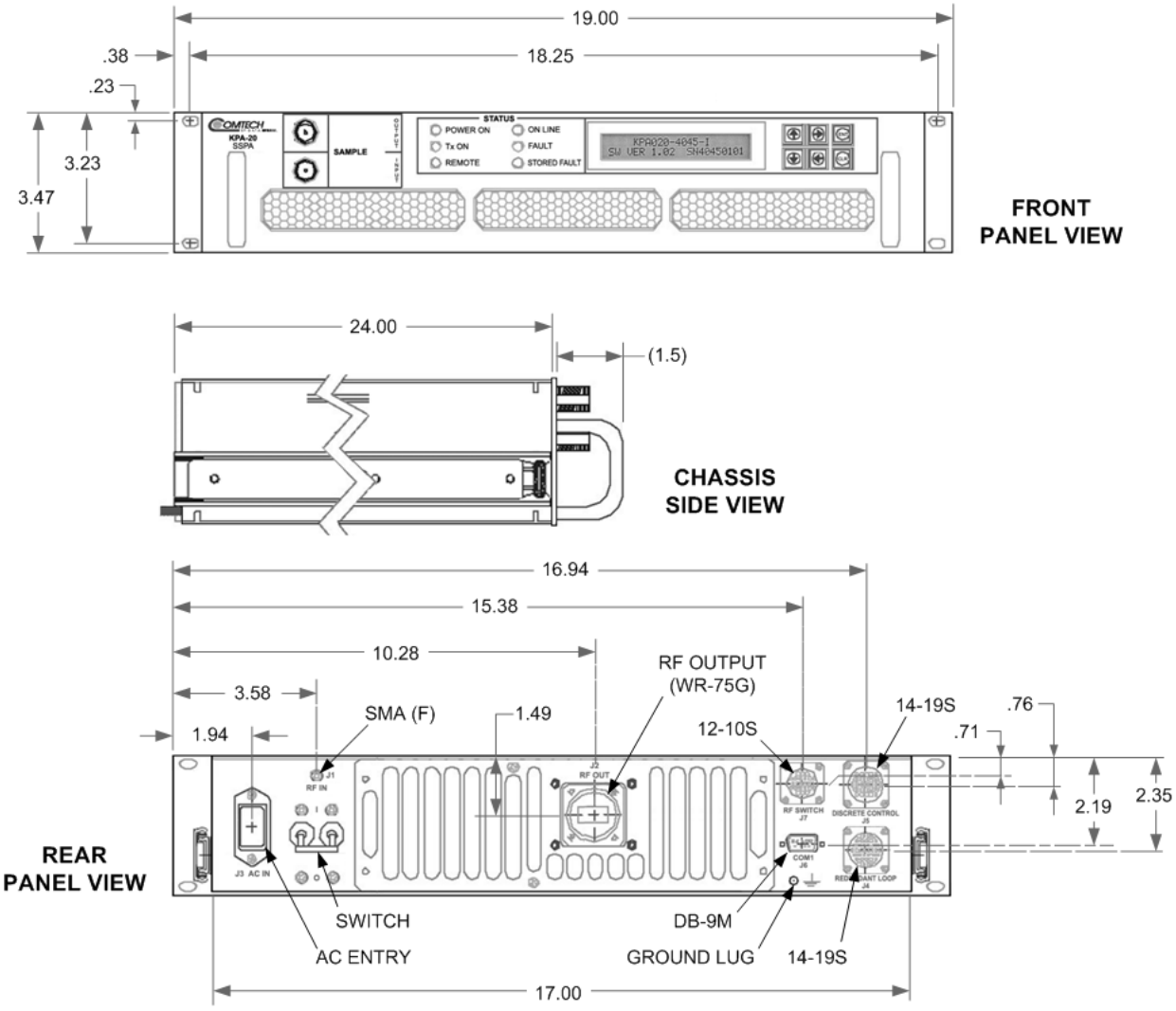


Figure 1-4. KPA-020IN Dimensional Envelope
(Shown with Optional Slide Railings Installed)

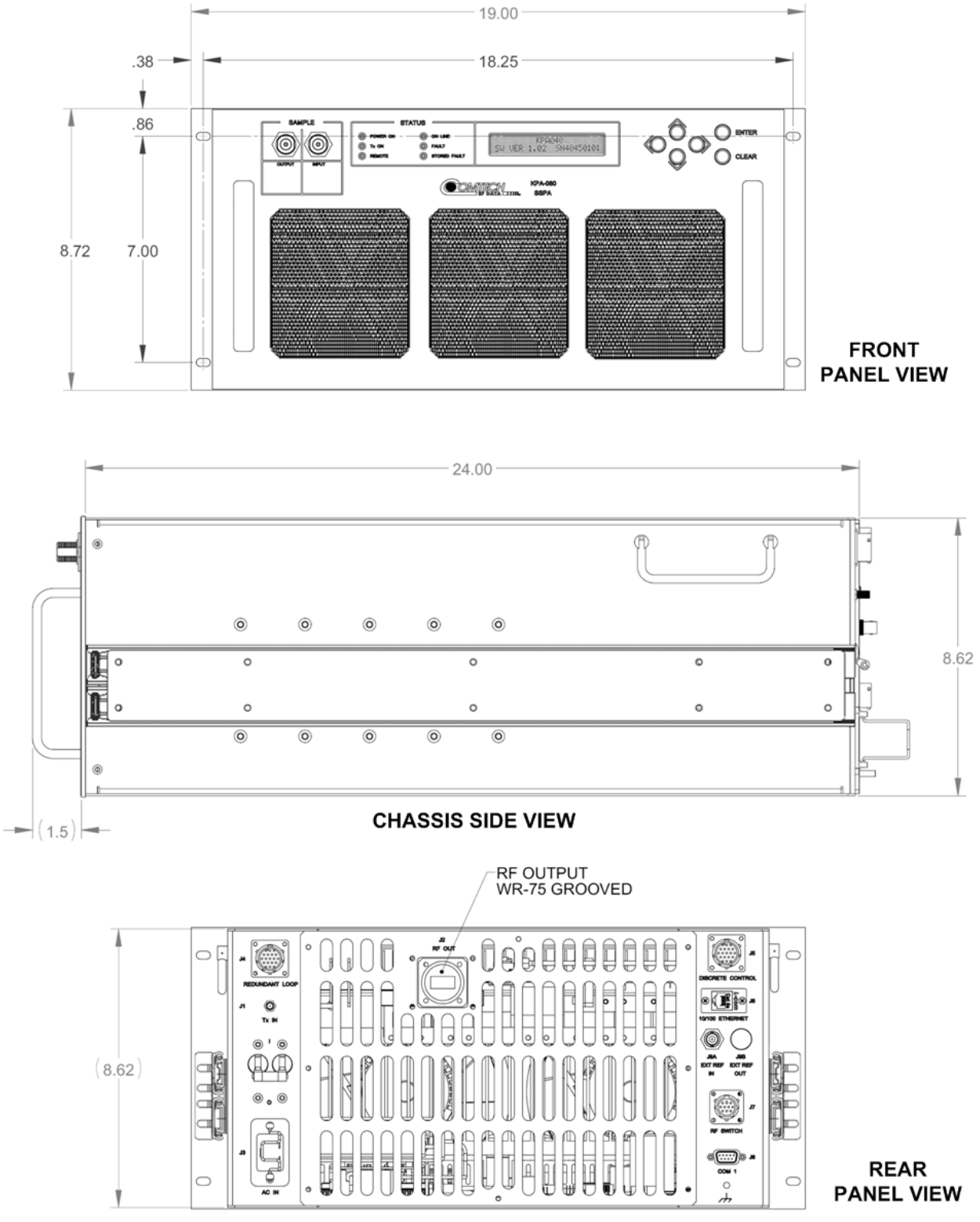


Figure 1-5. KPA-040/-080/-100 Dimensional Envelope (Shown with Optional Slide Railings Installed)

Chapter 2. INSTALLATION

2.1 Unpacking and Inspection

The KPA ISSPA and its Installation and Operation Manual are packaged and shipped in a pre-formed, reusable cardboard carton containing foam spacing for maximum shipping protection.

Do not use any cutting tool that will extend more than 1 inch into the container. This can cause damage to the unit.

Unpack and inspect the unit as follows:

Step	Procedure
1	Inspect shipping containers for damage.
2	If shipping containers are damaged, keep them until the contents of the shipment have been carefully inspected and checked for normal operation.
3	Remove the packing list from the outside of the shipping carton.
4	Open the carton and remove the contents.
5	Check the contents against the packing list to verify completeness of the shipment.
6	If physical damage is evident, contact the carrier and Comtech EF Data immediately and submit a damage report.
7	Test the unit for proper operation.
8	If the unit needs to be returned to Comtech EF Data, use the original shipping container.

Be sure to keep all shipping materials for the carrier's inspection.

2.2 Rack Mounting the KPA

The KPA is designed to be rack-mounted in a standard 19-inch (48 cm) rack or cabinet by hard-mounting the unit to the rack's front mounting rails using the front panel mounting holes/ Handles at the front of the units facilitate easy installation into and removal from the rack. Optionally, rack slides may be installed onto the chassis that allow servicing of the unit without its removal from the rack.

The KPA-020IN chassis is a 3RU unit requiring 4 inches (10 cm) of panel height space. The KPA-040/-080/-100 units are 5RU units requiring 8.75 inches (22 cm) of panel height space.

Two internally mounted exhaust fans provide cooling – cool air is taken in through the front panel and exhausted out the rear panel. **Locate the KPA so that the input and output airflow paths are not obstructed or restricted.** This will minimize the amplifier operating temperature.

It is important to ensure that there is adequate clearance for ventilation in the rack. In rack systems where there is high heat dissipation, provide forced-air cooling by installing top- or bottom-mounted fans or blowers.

2.2.1 Installation of the Optional Rack Slides

The following table identifies the rack slides options that may be purchased for use with the KPA unit (take note that the 5RU units require a heavy duty, dual rail rack slide).

KPA Unit	Rack Slide (CEFD P/N)	Description
KPA-020IN	FP/SL0007	22" Rack Slide Set (single rail)
	FP/SL0008	24" Rack Slide Set (single rail)
	FP/SL0006	26" Rack Slide Set (single rail)
KPA-040	FP/SL0004	24" Heavy Duty Rack Slide Set (dual rail)
KPA-080		
KPA-100		

Install the rack slides as follows:

Step	Procedure
1	Typical for either side of the KPA chassis, install the "chassis section" of the rack slide to the KPA chassis side, using the pan head machine screws provided with the rack slide installation kit.
2	Typical for either side of the rack cabinet: using the mounting hardware provided with the rack slide installation kit, install the "stationary section" of the rack slide, either to the interior wall of the cabinet (for single rail rack slides) or, for the heavy-duty rack slides, to the front and rear mounting rails of the cabinet as shown in **Figure 2-1**.
3	Install the KPA unit into position by mating the chassis-mounted rails into the cabinet-mounted stationary portion of the rack slide. Be sure that the ball retainer for either slide has first been positioned forward before installing the chassis section. The user may leave the unit free in place (to slide on the rails freely) or, alternately, bolt the unit into place via the slotted front panel mounting holes.

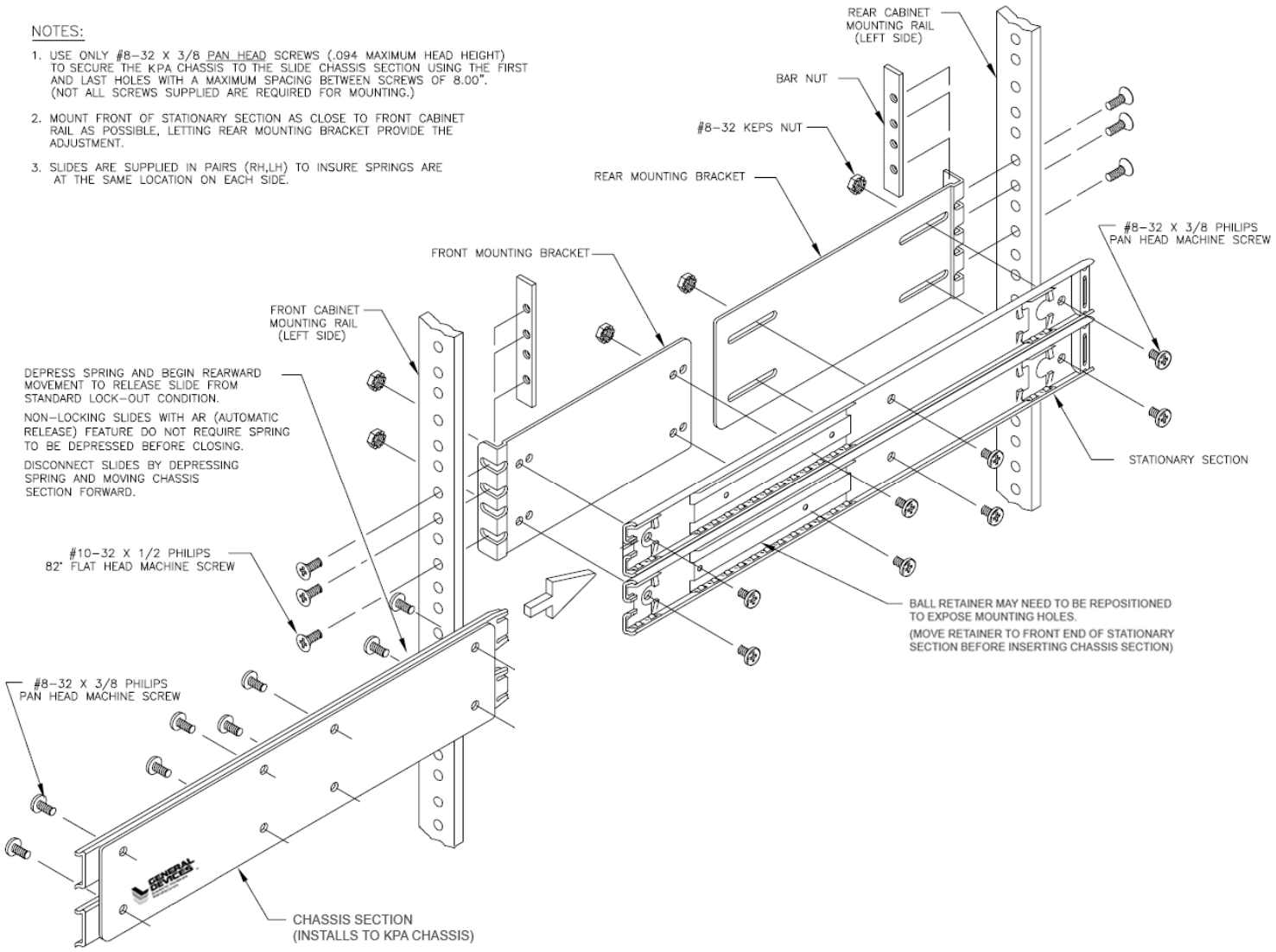


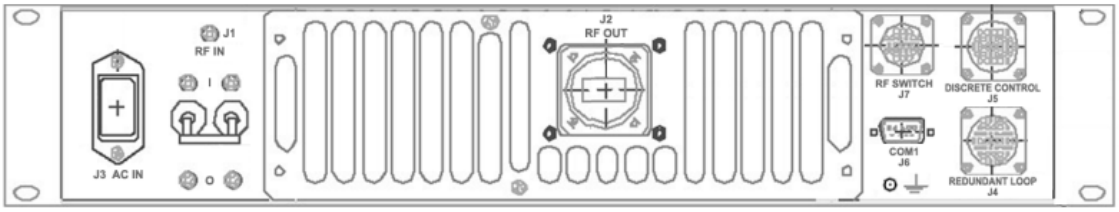
Figure 2-1. Installation of Optional Heavy-Duty Rack Slides (CEFD P/N FP/SL00004)

Notes:

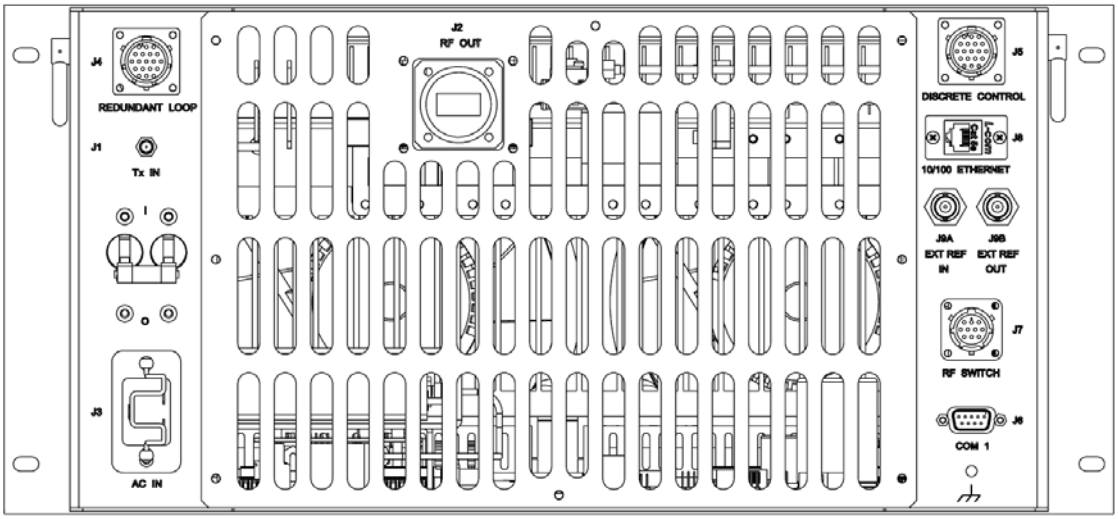
Chapter 3. CONNECTORS AND PINOUTS

3.1 Connector Overview

The KPA ISSPA rear panel connectors, shown in **Figure 3-1**, provide all necessary external connections between the unit and other equipment. **Table 3-1** on the next page summarizes the connectors provided on the rear panel interface (as well as the front panel sample ports), grouped according to service function.



KPA-020IN Unit



KPA-040/-080/-100 Units

Figure 3-1. KPA Rear Panel Views

Table 3-1. KPA Interface Connectors Summary

Connector Group	Ref Des	Name	Connector Type	Function
RF Sect. 3.2	J1	KPA-020IN: RF IN KPA-040: Tx IN KPA-080 KPA-100	Type 'SMA' Female	RF Input
	J2	RF OUT	WR75G Waveguide Flange	RF Output
Utility Sect. 3.3	N/A	SAMPLE | INPUT	Type 'N' Female	Front Panel –20 dBc and –40 dBc test sample ports
	N/A	SAMPLE | OUTPUT		
	J4**	REDUNDANT LOOP	19-pin Circular Conn	Unit-to-Unit Redundant Connection
	J5	DISCRETE CONTROL	19-pin Circular Conn	User ISSPA M&C
	J8*	10/100 ETHERNET	RJ-45 female	CAT5 10/100 BaseT Management and Data
	J9A*	EXT REF IN	BNC Female	External Reference Input
	J9B*	EXT REF OUT	BNC Female	External Reference Output
	J7**	RF SWITCH	10-pin Circular Conn	Waveguide Switch Interface
	J6	COM1	9-pin Type 'D' male	Serial Remote Comms Interface (EIA-232 or EIA-485)
Power/Ground Sect 3.5	J3	AC IN	See Sect. 3.5.1	Chassis prime power input
	N/A	(Ground)	#10-32 stud	Common chassis ground

Notes:

1. * KPA-040/-080/-100 units only (not provided on the KPA-020IN).
2. ** Used in redundant operations only. See **Appendix B. KPA REDUNDANT OPERATIONS** for further information about use of the KPA in 1:1 or 1:2 redundant systems.

3.2 RF Connections

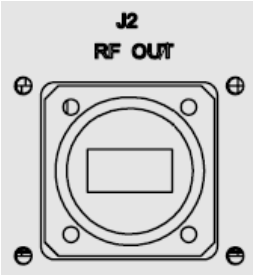
3.2.1 J1 RF IN / Tx IN Connectors

KPA-020IN Unit

KPA-040/-080/-100 Units

Connector Type	Description	Direction
SMA	RF Signal	In

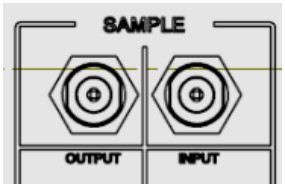
3.2.2 J2 RF OUT Connector



Connector Type	Description	Direction
WR75G Waveguide Flange	RF Signal	Out

3.3 Utility Connections

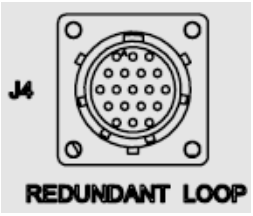
3.3.1 Sample Port Connectors (Front Panel)



The **SAMPLE INPUT / OUTPUT** ports are Type 'N' female connectors, providing easy user access –20 dBc and –40 dBc test points on the KPA front panel.

Name	Connector Type	Description	Direction
SAMPLE | OUTPUT	Type 'N' Female	–20 dBc / –40 dBc Sample Test Port	Input
SAMPLE | INPUT			Output

3.3.2 J4 REDUNDANT LOOP Connector



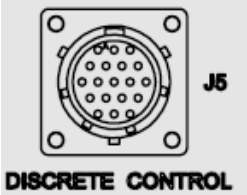
The J4 Redundant Loop connector is a 19-pin circular connector, type MS3112E14-19S. The pin-out specification is contained in **Table 3-2**. This connector is used only in redundant configurations – see **Appendix B. KPA REDUNDANT OPERATIONS** for further information about use of the KPA in 1:1 or 1:2 redundancy.

Mating connector: ITT KPT06J14-19P or MS3116J14-19P

Table 3-2. J4 Redundancy Loop Connector Pinout

Pin #	Description	Pin #	Description
A	Loop In 1	L	SumFlt 2 NO
B	ADDR 2	M	SumFlt 2 Common
C	Loop In 2	N	Local Loop Out
D	Loop Out 2	P	SumFlt 1 NO
E	ADDR Common	R	SumFlt 1 Common
F	ADDR 1	S	Local SumFlt Common
G	Loop Out 1	T	Local SumFlt NO
H	HSB +RX/TX	U	No Connect
J	HSB – RX/TX	V	No Connect
K	Local Loop In		

3.3.3 J5 DISCRETE CONTROL Connector



The J5 DISCRETE CONTROL connector is the primary input for monitoring and controlling the ISSPA. It is a 19-pin circular connector, type MS3112E14-19S. The pinout specification for Standalone or 1:1 Redundant Systems is provided in **Table 3-3**; for 1:2 Redundant Systems, refer to **Table 3-4**. See **Appendix B. KPA REDUNDANT OPERATIONS** for further information about use of the KPA in 1:1 or 1:2 redundant systems.

Mating connector: ITT: KPT06J14-19P or MS3116J14-19P.

Table 3-3. J5 DISCRETE CONTROL Connector Pinout (Standalone or 1:1 Redundant Systems)

Pin #	Signal Name	Description
A	Auto Select	Momentary short to pin F to force entire subsystem to Auto Mode.
B	BU-1 Command	Momentary short to pin F to force backup of KPA #1.
C	Priority 2 Sel	Not applicable for 1:1 system
D	BU-2 Command	Not applicable for 1:1 system
E	2 Online NO	Not applicable for 1:1 system
F	Remote Common	Control – Remote Common.
G	Online Common	Online Status Common.
H	BU Online NO	Open when Online, all other conditions tied to Pin G.
J	Manual Select	Momentary short to pin F to force entire subsystem to Manual Mode.
K	1 Online NO	Open when Online, all other conditions tied to Pin G.
L	2 Fault NO	Not applicable for 1:1 system
M	Priority 1 SEL	Momentary short to pin F to set KPA #1 as High priority.
N	Fault Common	Fault Status Common.
P	BU Fault NO	Open when faulted, else tied to Pin N.
R	BU Offline CMD	Momentary short to pin F to force backup KPA Offline.
S	1 Fault NO	Open when faulted, else tied to Pin N.

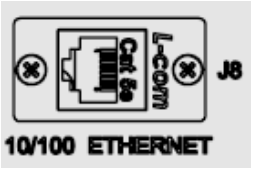
Table 3-4. J5 DISCRETE CONTROL Connector Pinout (1:2 Redundant Systems)

Pin #	Signal Name	Description
A	Auto Select	Momentary short to pin F to force entire subsystem to Auto Mode.
B	BU-1 Command	Momentary short to pin F to force backup of KPA #1.
C	Priority 2 Sel	Momentary short to pin F to set KPA #2 as HIGH priority.
D	BU-2 Command	Momentary short to pin F to force backup of KPA #2.
E	2 Online NO	Open when Online, all other conditions tied to pin G. see Note 1.
F	Remote Common	Control – Remote Common.
G	Online Common	Online Status Common.
H	BU Online NO	Tied to pin G when Redundancy functioning correctly, all other conditions OPEN. See Note 2.
J	Manual Select	Momentary short to pin F to force entire subsystem to Manual Mode.
K	1 Online NO	Open when Online, all other conditions tied to Pin G. see Note 1.
L	2 Fault NO	Open when faulted, else tied to Pin N.
M	Priority 1 SEL	Momentary short to pin F to set KPA #1 as HIGH priority.
N	Fault Common	Fault Status Common.
P	BU Fault NO	Open when faulted, else tied to Pin N.
R	BU Offline CMD	Momentary short to pin F to force backup KPA Offline.
S	1 Fault NO	Open when faulted, else tied to Pin N.

Notes:

1. Online status subject to state of Pin H.
2. When Open, can indicate loss of power or cabling problem. Online State of unit not determinable when open.

3.3.4 J8 10/100 ETHERNET Connector



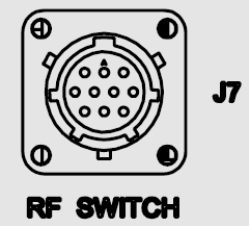
The J8 10/100 ETHERNET connector is not provided on the KPA-020IN unit. This RJ-45 connector provides the CAT5 10/100 BaseT interface for management and data exchange between the unit and the user.

3.3.5 J9A EXT REF IN / J9B EXT REF OUT Connectors

The J9A EXT REF IN and J9BN EXT REF OUT connectors are not provided on the KPA-020IN unit.

REF DES	Name	Connector Type	Description
J9A	EXT REF IN	BNC	External Reference Input
J9B	EXT REF OUT	BNC	External Reference Output

3.3.6 J7 RF SWITCH Connector



The **J7 RF SWITCH** connector is a 10-pin circular connector, type MS3112E12-10S. Used only in redundant configurations, it functions as the waveguide switch interface connector. The pinout specification is contained in **Table 3-5**. See **Appendix B. KPA REDUNDANT OPERATIONS** for further information about use of the KPA in 1:1 or 1:2 redundant systems.

Table 3-5. J7 RF SWITCH Connector Pinout

Pin	Description
A	Command BU-1
B	Command Common
C	Command 1 Online
D	IND 1 Online
E	IND Common
F	IND BU Online
G	Command BU-2
H	Command BU-2
J	IND 2 Online
K	No Connect

3.3.7 J6 COM 1 Connector

The **J6 COM 1** connector is a 9-pin Type 'D' female (DB-9F) connector that provides the EIA-232/EIA-485 Interface. The pinout specifications are provided in **Table 3-6**.

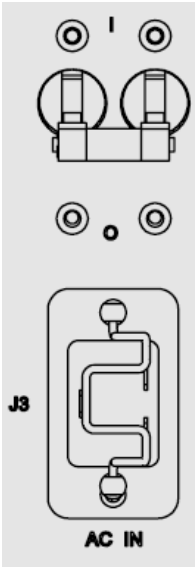
Mating Connector: 9-pin Type 'D' male connector (DB-9M).

Table 3-6. J6 COM 1 Connector Pinout (EIA-232/EIA-485 Interface)

Pin #	EIA-232	EIA-485 4-Wire	EIA-485 2-Wire
1	No Connect	Ground (GND)	Ground (GND)
2	Transmit Data (TD)	No Connect	No Connect
3	Receive Data (RD)	No Connect	No Connect
4	No Connect	+TX Signal	+RX/TX Signal Loop In
5	Ground (GND)	-TX Signal Compliment	-RX/TX Signal Complement Loop In
6	Unit Ready – always high (DSR)	No Connect	No Connect
7	Request to Send. Looped to CTS (RTS)	No Connect	No Connect
8	Clear to Send (CTS)	+RX Signal	+RX/TX Signal Loop Out
9	No Connect	-RX Signal Complement	-RX/TX Signal Complement Loop Out

3.4 Power / Ground Connections

3.4.1 Alternating Current Prime Power Switch and Connector



The On/Off prime power switch is located on the rear of the chassis adjacent to the prime power input connector. The circuit breaker is rated for 30 Amps.

A standard, detachable, non-locking, 3-prong power cord (IEC plug) supplies the Alternating Current (AC) power to the unit via the prime power input connector. Note that the specification for the power source is specific to the unit as follows:

- For KPA-020IN only – 90 to 135 VAC, 47 to 63 Hz
- For KPA-040 only – 90 to 270 VAC, 47 to 63 Hz
- For KPA-080/-100 only – 180 to 270 VAC, 47 to 63 Hz

3.4.2 Chassis Ground Connector

PROPER GROUNDING PROTECTION IS REQUIRED: The installation instructions require that the integrity of the protective earth must be ensured and that the equipment shall be connected to the protective earth connection at all times. Therefore, it is imperative during installation, configuration, and operation that the user ensures that the unit has been properly grounded using the ground stud provided on the rear panel of the unit.

A #10-32 stud is provided for connecting a common chassis ground among equipment.

Note: The AC power connector provides the safety ground.

Chapter 4. FLASH UPGRADING

4.1 Flash Upgrading via Internet

The KPA ISSPAs use 'Flash memory' technology internally, which makes upgrading the firmware very simple. For current KPA-040/-080/-100 production models, updates can now be sent via the Internet (**Figure 4-1**), via E-mail, or on CD.

This chapter outlines the complete upgrading process as follows:

- New firmware can be downloaded via the Internet to an external M&C PC.
- The upgrade can be performed without opening the KPA by simply connecting the unit to the serial port or Ethernet port of the M&C PC.
- The firmware update is transferred, via File Transfer Protocol (FTP), to the KPA.

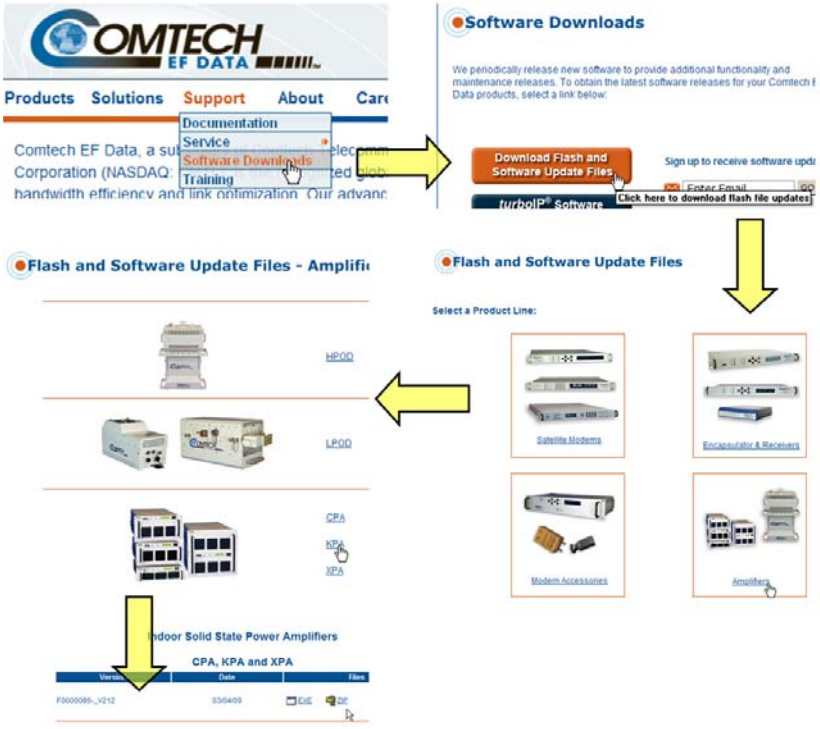


Figure 4-1. Flash Upgrade via Internet

4.2 Ethernet FTP Upload Procedure

Follow the steps provided in this section. Once the upload is complete, the KPA's top-level display screen will appear (for more information, see **Chapter 5. FRONT PANEL OPERATION**) as shown in **Step 10** of this procedure.

Note: This procedure is applicable to KPA-040/-080/-100 production units featuring the **J8 10/100 ETHERNET** connector on the rear panel. For the KPA-020IN, FTP Upload is accomplished via Telnet / HyperTerminal configured as Telnet Client using the KPA-020IN's **J6 COM1** serial port. See **Chapter 6. KPA ETHERNET MANAGEMENT** for further information.

Step	Procedure
1	**Identify the reflashable product, firmware number, and version for download:** The current base unit M&C version can be viewed at the top level display on the KPA front panel (press the **CLEAR** key several times to view). The firmware information can also be found within the **Utility: Firmware → Boot** menu tree. For more information, refer to **Chapter 5. KPA FRONT PANEL OPERATION**. Alternately, when using the Web Server Interface, the Bootrom, Bulk, App, and FPGA firmware loads may be viewed in the ***Firmware Information*** section of the ***Status | Status*** page. For more information, refer to **Chapter 6.5 Web Server (HTTP) Interface**.
2	**Create a temporary folder** (directory) on an external M&C PC: • ***For Windows Explorer:*** Select **File > New > Folder** to create a new folder, then rename it from "**New Folder**" to "**temp**" or another convenient, unused name. Assuming "**temp**" works, a "***c:\temp***" folder should now be created. **Note:** The drive letter **c:** is used in this example. Any valid writable drive letter can be used. • ***For Windows Command-line:*** Click **[Start]** on the Windows taskbar, then click the "**Run...**" icon (or, depending on Windows OS versions *prior* to Windows 95, click the "**MS-DOS Prompt**" icon from the Main Menu). Then, to open a Command-line window… o ***For Windows 95 or Windows 98*** – Type "**command**". o ***For any Windows OS versions later than Windows 98*** – Type "**cmd**" *or* "**command**". ***Alternately,*** from **[Start],** select ***All Programs > Accessories > Command Prompt***. At the Command-line prompt (c:\>), type "**mkdir temp**" or "**md temp**" (without quotes – **mkdir** and **md** stand for *make directory*). This is the same as creating a new folder from Windows Explorer. There should now be a "***c:\temp***" subdirectory created (where **c:** is the drive letter used in this example).
3	**Download the correct firmware file** to this temporary folder. As shown in **Figure 4-1**: a) Go online to: www.comtechefdata.com; b) From the **Home page** menu bar, click the ***Support*** tab; c) Click the ***Software Downloads*** drop-down *or* hyperlink from the ***Support*** page; d) Click the ***Download Flash and Software Update Files*** icon; e) Click the ***(Select a Product Line:) Amplifiers*** hyperlink provided on the ***Flash and Software Update Files*** page; f) Click the ***KPA*** product hyperlink; g) Select the appropriate firmware hyperlink.

3 (cont)	**About Firmware Numbers, File Versions, and Formats:** Comtech EF Data's Web site catalogues its flashable firmware upgrade files by product type (e.g., KPA, converter, etc.) and specific model/optional configuration. The hyperlinks appear as per the example to the right. For the KPA, the firmware download hyperlink appears as **F0000086X_V###**, where 'X' denotes the revision letter, and ### represents the firmware version. The current version firmware release is provided. If applicable, one version prior to the current release is also available. Be sure to identify and download the desired version. The downloadable files are stored in two formats: *.exe (self-extracting) and *.zip (compressed). Some firewalls will not allow the downloading of *.exe files. In this case, download the *.zip file instead. For additional help with "zipped" file types, refer to *PKZIP for Windows*, *WinZip*, or *ZipCentral* help files. *PKZIP for DOS* is not supported due to file naming conventions.
4	**Extract the files** into the temporary folder on the M&C PC. At least three files should be extracted: • **FW-0000086x.bin** (where 'x' denotes the bulk image revision letter); • **ReleaseNotes_ISSPA_v###.pdf** (where '###' denotes the firmware version);
5	**Confirm that the files have been extracted** to the specified temporary folder on the M&C PC. Using Command-line, type "**cd c:\temp**" to change to the temporary directory created in **Step 2**, then use the "**dir**" command to list the files extracted from the downloaded archive file.
6	**Connect the external M&C PC** from either the KPA's **J6 COM1** serial port (for the KPA-020IN only), ***or*** the **J8 10/100 Ethernet** port (for all other KPA models) via a hub or a switch or directly to the PC with a crossover cable.
7	**Send a "ping" command** to the KPA to verify the connection and communication. *First*, determine the IP address of the unit by using the front panel: **SELECT: Configuration → Remote → Ethernet →Address** *Then***, using Command-line to PING:** At the Command-line prompt, type "**ping *xxx.xxx.xxx.xxx***" (where '*xxx.xxx.xxx.xxx'* is the IP address of the KPA). The results should confirm whether or not the KPA is connected and communicating.
8	**Initiate an FTP session** with the KPA (this example uses Command-line): a) From the M&C PC, at the prompt type "**ftp xxx.xxx.xxx.xxx**" where 'xxx.xxx.xxx.xxx' is the IP address of the KPA. b) Verify the FTP transfer is *binary* by typing "**bin**". c) Type "**prompt**" then type "**hash**" to facilitate the file transfers.
9	**Transfer the files:** Type "**put FW-00000086x.bin bulk:**" (where 'x' denotes the revision letter) to begin the file transfer. **Note:** The destination "**bulk:**" must be all lower case. Allow a few seconds for the file to transfer.

10	**Verify the file transfer.**
	a) The M&C PC should report that the file transfer has occurred, and the display on the KPA will report:
	`Programming APP flash…`
	`Please wait…`
	b) The process sequences through several blocks – this will take several minutes. When it has finished, the KPA front panel will display:
	`KPA-080-4045-I`
	`Ver. X.X.X SNXXXXXXXXX`
	c) **Terminate the FTP session** by typing "**bye"** and closing the Command-line window.
	d) **Recycle the power** and wait for the unit to reboot.
	e) **Verify** that the new file loaded using the procedure in **Step 1**.

The Ethernet FTP Upload Procedure is now complete.

Chapter 5. FRONT PANEL OPERATION

5.1 Introduction

The user can fully control and monitor the operation of the KPA ISSPA from the front panel using the keypad and display. Nested menus are used, which display all available options and prompt the user to carry out a required action.

Figure 5-1 identifies the key operational features of the front panel – both the original (obsolete) and current panel layouts. The function of each feature is explained in greater detail in this chapter.

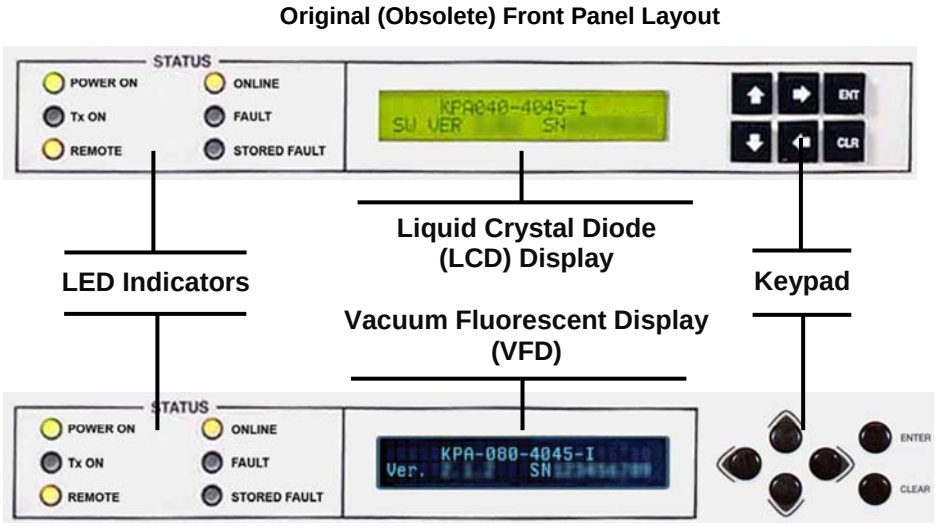


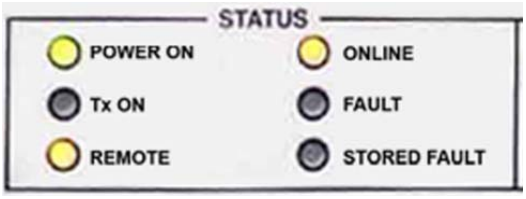
Figure 5-1. KPA-*XXX* Front Panel View

5.1.1 Startup Checklist

The user should always perform the following checklist before operating the KPA:

Step	Procedure
1	☐ Check to ensure that the installation is complete.
2	☐ Verify that the KPA is connected to the proper Prime Power Source, RF input, and RF output.
3	☐ Switch on the Prime Power Switch (located on the rear panel).
4	☐ Once the Prime Power Switch has been switched on, verify that the cooling fans are operating and that the six STATUS LED indicators appear as follows: • **POWER ON** – ON (yellow) • **Tx ON** – OFF • **REMOTE** – ON (yellow) • **ONLINE** – ON (yellow) • **FAULT** – OFF • **STORED FAULT** – OFF

5.1.2 LED Indicators



The operational behaviors of the six front panel LED indicators is as follows:

LED	Color	Condition *(When Lit)*
POWER ON	**Green**	Indicates that power is applied to the unit.
Tx ON	**Yellow**	Indicates that the transmit function of the unit is **on**. This LED indicator reflects the actual condition of the transmit function.
REMOTE	**Yellow**	Indicates that the unit is operating in remote control mode, where commands and data are transferred via an EIA-485 (EIA-232 is optional) serial communications link.
ONLINE	**Yellow**	Indicates that the unit is operating online to transmit data.
FAULT	**Red**	Indicates that a fault condition exists.
STORED FAULT	**Red**	Indicates that the fault has been logged and stored. The fault may or may not be active.

5.1.3 Keypad

As the manufacturing process of the KPA has evolved, there have been two keypad layouts as shown in **Figure 5-2**:

Layout 1: Protruding Square Button
(KPA-020IN only – obsolete all other units)

Layout 2: Protruding Round Button
(current production units)

Figure 5-2. KPA Front Panel Keypad

The function of the keypad is as follows:

ENTER (ENT)	This key is used to select a displayed function or to execute a modem configuration change. From the opening screen, pressing **ENTER** *once* takes the user to the **SELECT:** (Main) menu.
CLEAR (CLR)	This key is used to back out of a selection or to cancel a configuration change which has not been executed using **ENTER**. Pressing **CLEAR** generally returns the display to the *previous selection* or, if pressed *repeatedly*, to the opening screen. From the opening screen, pressing **CLEAR** *once* takes the user to the **SELECT:** (Main) menu.
◄ ► (Left, Right)	These keys are used primarily to move to the next menu screen section. At times, they may also be used to move the cursor position (e.g., when editing a parameter value or label character).
▲ ▼ (Up, Down)	These keys are used primarily used to move from one menu screen parameter selection to another. At times, they may also be used to edit configuration value digits (numbers) or label characters (e.g., letters).

IMPORTANT

The current production unit's keypad has an auto-repeat feature. If a key is held down for more than 1 second, the key action will repeat, automatically, at the rate of 15 keystrokes per second. This is particularly useful when editing numeric fields, with many digits, such as frequency or data rate.

5.1.4 Front Panel Display

As the manufacturing process of the KPA has evolved, there have been two display layouts as shown in **Figure 5-3**:

Layout 1: Liquid Crystal Diode (LCD)
(KPA-020IN only – obsolete all other units)

Layout 2: Vacuum Fluorescent Display (VFD)
(current production units)

Figure 5-3. KPA Front Panel Keypad

Display Type: Depending on the production version of the unit, the KPA features either a **L**iquid **C**rystal **D**isplay (LCD), featured on the KPA-020IN units and older KPA-040/-080/-100 units, while all current production versions of the KPA-040/-080/-100 units feature a **V**acuum **F**luorescent **D**isplay (VFD).

Both front panel displays are active displays showing two lines of 24 characters each. However, while the brightness of either display can be controlled by the user, compared to the original LCD the blue-lit display of the currently used VFD provides superior viewing characteristics and does not suffer problems of viewing angle or contrast.

Cursor Feature: On most menu screens, the user will observe a flashing solid block cursor, which blinks at a once-per-second rate. This indicates the currently selected item, digit, or field. Where this solid block cursor would obscure the item being edited (e.g., a numeric field) the cursor will automatically change to an underline cursor.

Screen Saver Feature: If the user were to display the same screen for weeks at a time, the display could become 'burnt' with this image. To prevent this, the unit has a 'screen saver' feature that will activate after 1 hour. The top line of for display saver features for display message '**Circuit ID:**' and a user-input text string; the bottom line reads '**`Press any key….`**'.

When for display saver activates, the message moves from right to left across for display, then wraps around. Pressing any key restores the previous screen.

5.2 Opening Screen

```
      KPA-XXX-4045-I
Ver. X.X.X   SNXXXXXXXXX
```

The opening screen displays whenever power is first applied to the unit; from any other nested menu, it is accessible by pressing **CLEAR** repeatedly. The specific product, currently loaded firmware, and the unit's unique serial number are identified on this display.

5.3 SELECT: (Main) Menu

```
SELECT: Config Monitor
Utility FrontPanel (◄ ► E)
```

Figure 5-4 illustrates the hierarchal structure of the front panel principle menu tree from the **SELECT:** menu on down. The amplifier commands are in a tree structured menu format designed for access and execution of all control functions, and to prevent the execution of an invalid entry by the operator.

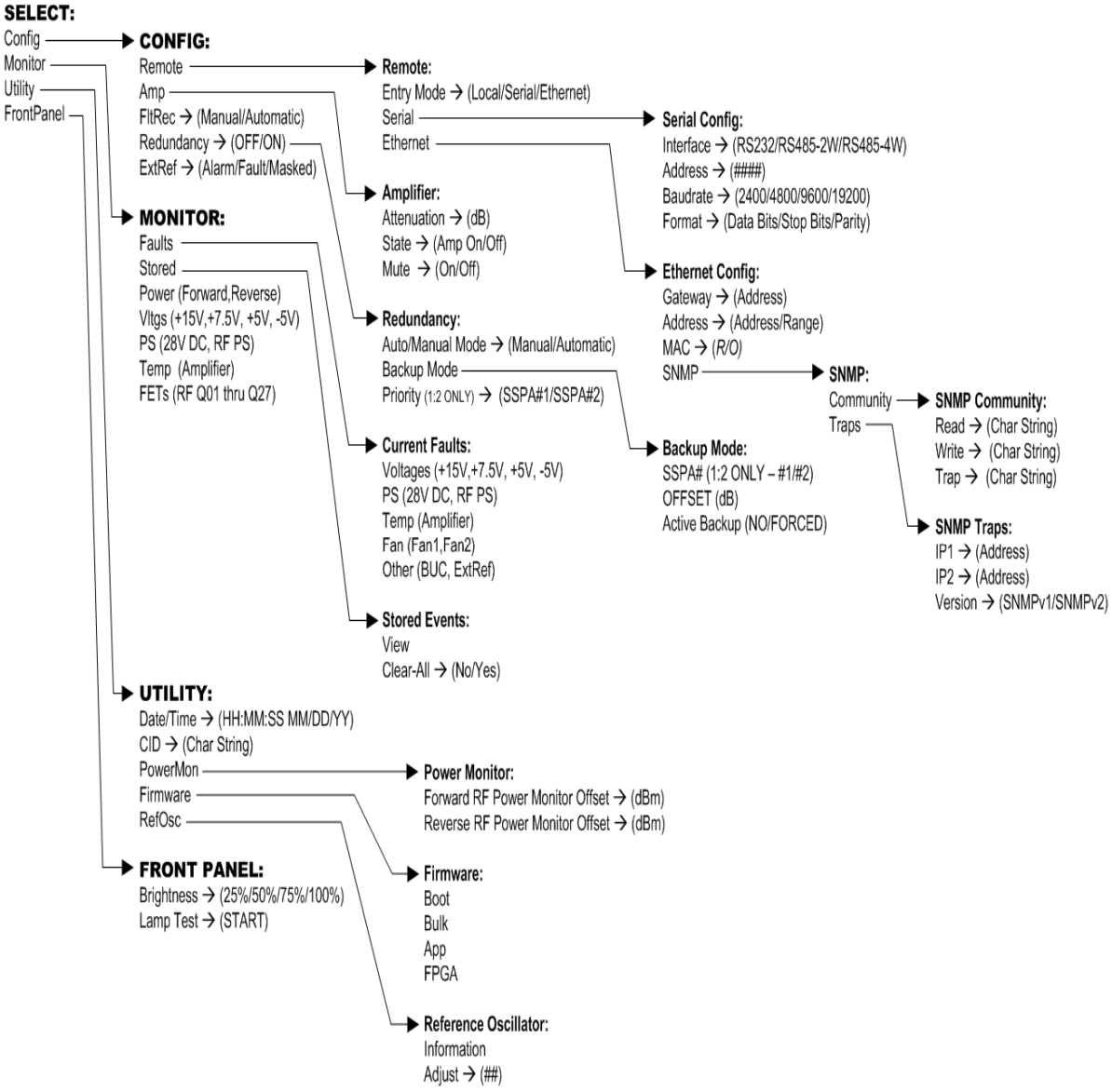


Figure 5-4. KPA Principle Menu Tree

The **SELECT:** menu screen is immediately accessible from the opening screen by pressing **ENTER** or **CLEAR** or, from any other nested menu, by repeatedly pressing **CLEAR** as needed, until it reappears.

Use the ◄ ► arrow keys to select from the choices shown, then press **ENTER**. The following table identifies each menu branch available from the **SELECT:** (Main) menu, its content section in this chapter, and the functional description of each branch:

Menu Branch	Sect	Description
Config	**5.3.1**	Used to fully configure the KPA.
Monitor	**5.3.2**	Provides read-only displays reflecting the operational and alarm status of the KPA's power supplies, internal temperature, RF output power level, and RF FETs; allows the user to read or clear stored fault logs.
Utility	**5.3.3**	Used to adjust operational parameters such as the system time and date, serial communications, LCD brightness and contrast, etc.
FrontPanel	**5.3.4**	Used to adjust front panel display brightness and run the LED (lamp) test.

5.3.1 SELECT: Config (Configuration)

```
CONFIG: Remote Amp
FltRec Redundancy ExtRef
```

Select **Remote**, **Amp**, **FltRec**, **Redundancy**, or **ExtRef** using the ◄ ► arrows keys, then press **ENTER** to continue.

5.3.1.1 CONFIG: Remote (Remote Control)

```
Remote: Entry Mode
Serial Ethernet   (◄ ► E)
```

Select **Entry Mode, Serial**, or **Ethernet** using the ◄ ► arrow keys, then press **ENTER**.

CONFIG: Remote → Entry Mode

```
Remote: Local  Serial
Ethernet          (◄ ► E)
```

Select **Local, Serial**, or **Ethernet** using the ◄ ► arrow keys, then press **ENTER**.

If **Local** is selected, then remote control will be disabled. Remote monitoring is still possible.

CONFIG: Remote → Serial

```
Serial Config: Interface
Address Baudrate Format
```

Note: In **Remote → Serial** mode, in addition to Serial M&C being enabled, Telnet connection is also allowed, which enables Telnet M&C for amplifiers configured for redundant operation.

Select **Interface, Address**, **Baudrate**, or **Format** using the ◄ ► arrow keys, then press **ENTER**.

If **Serial Config: Interface** is selected:

```
M&C Bus Interface: RS232
RS485-2W RS485-4W  (◄ ►)
```

Select **RS232** (only with the KPA-020IN), **RS485-2W** (2-wire), or **RS485-4W** (4-wire) by using the ◄ ► arrow keys, then press **ENTER**. Operation is automatically set to the selected M&C bus interface, and the user is then returned to **Remote: Serial** submenu.

If **Serial Config: Address** is selected:

```
Remote Address: 0001
                (◄ ► ▲ ▼ E)
```

The valid range of addresses is from 1 to 9997. Use the ◄ ► arrow keys to select the character to edit, then the ▲ ▼ arrow keys to edit the value of the digit, then press **ENTER**.

If **Serial Config: Baudrate** is selected:

```
Local M&C Bus Baud Rate:
19200 Baud          (▲ ▼ E)
```

To edit the baud rate of the remote control bus connected locally to the M&C computer, change the value using the ▲ ▼ arrow keys. Values of **2400**, **4800**, **9600**, **19200**, and **38400** baud are available. Press **ENTER** when done.

Note: The asynchronous character format is **FIXED** at 8 data bits, 1 stop bit, no parity (8-N-1).

If **Serial Config: Format** is selected:

```
Serial Port Data Format:
 8 Data, 1 Stop, Par None
```

Edit the serial port data format of the remote control bus connected locally to the M&C computer. The value is changed using the ▲ ▼ arrow keys. Note the following:

Data Bits	Select 7 or 8.
Stop Bits	Select 1 or 2.
Parity	Select Odd, Even, or None.

Press **ENTER** when done. The asynchronous character format default is **8** data bits, **1** stop bit, **and no** parity (8-N-1).

CONFIG: Remote → Ethernet (KPA-040/-080/-100 ONLY)

IMPORTANT

This command is not valid for KPA-020IN operation.

NOTE: In **Remote → Ethernet** mode, serial monitoring is allowed; however, serial control is not allowed except for use of the LRS (Local/Remote Status) commands/queries.

```
Ethernet Config: Gateway
Address MAC SNMP   (◄ ►)
```

Select the parameter to configure – **Gateway**, **Address**, **MAC**, or **SNMP** – using the ◄ ► arrow keys, then press **ENTER**.

If **Ethernet Config: Gateway** is selected:

```
Ethernet IP Gateway:
192.168.001.002  (◄ ► ▲ ▼)
```

Edit the IP Gateway Address for the Ethernet M&C port for this unit. Use the ◄ ► arrow keys to select the character to edit, then the ▲ ▼ arrow keys to edit the value of the digit. Press **ENTER** when done.

If **Ethernet Config: Address** is selected:

```
Ether IP Address/Range:
192.168.001.002/24(◄ ►,▲ ▼)
```

Edit the IP Address and Range for the Ethernet M&C port for this unit. Use the ◄ ► arrow keys to select the character to edit, then the ▲ ▼ arrow keys to edit the value of the digit. Press **ENTER** when done.

If **Ethernet Config: MAC** is selected:

```
M&C Port MAC Address:
00-06-B0-00-01-06 (ENTER)
```

This ***read-only*** menu shows the unit MAC address. Once the MAC address has been noted, exit this menu by pressing **ENTER** or **CLEAR.**

If **Ethernet Config: SNMP** is selected:

```
SNMP:
Community  Traps   (◄ ► E)
```

Use the ◄ ► arrow keys to select the parameter to configure: **Community** or **Traps**.

If **SNMP: Community** is selected:

```
SNMP Community:
Read  Write  Trap    (◄ ► E)
```

Use the ◄ ► arrow keys to select the community to edit: **Read**, **Write**, or **Trap**.

If **SNMP Community: Read** is selected:

```
Read Community: (◄ ► ▲ ▼ E)
public
```

The user may view or edit the SNMP Read Community string. To edit, first use the ◄ ► arrows keys to select the character to edit, then the ▲ ▼ arrows keys to edit that character. Press **ENTER** when done.

If **SNMP Community: Write** is selected:

```
Write Community:(◄ ► ▲ ▼ E)
private
```

The user may view or edit the SNMP Write Community string. To edit, first use the ◄ ►arrows keys to select the character to edit, then the ▲ ▼ arrows keys to edit that character. Press **ENTER** when done.

If **SNMP Community: Trap** is selected:

```
Trap Community:(◄ ► ▲ ▼ E)
comtech
```

The user may view or edit the SNMP Trap Community string. To edit, first use the ◄ ►arrows keys to select the character to edit, then the ▲ ▼ arrows keys to edit that character. Press **ENTER** when done.

Note: For the preceding menus, only the first 20 characters on the bottom line are available. All printable ASCII characters are available with the exception of the backslash (ASCII code 92) and ~ (ASCII code 126). When the user has composed the string and has pressed **ENTER,** all trailing spaces are removed from the Community string upon entry.

If **SNMP: Traps** is selected:

```
SNMP Trap IP Address:
IP1 IP2 Version
```

Use the ◄ ► arrow keys to select **IP1**, **IP2**, or **Version**, then press **ENTER**.

If **SNMP Trap IP Address: IP1** *or* **IP2** is selected:

```
Trap IP #1:
000.000.000.000(◄ ► ▲ ▼ E)
```

```
Trap IP #2:
000.000.000.000(◄ ► ▲ ▼ E)
```

The user may edit the Trap Destination's IP Addresses. To edit, first use the ◄ ► arrow keys to select the digit to edit, then the ▲ ▼ arrow keys to edit the value of that digit. Press **ENTER** when done.

Note: If both Trap IP Addresses are 000.000.000.000, it means Traps are ***disabled***.

If **SNMP Trap IP Address: Version** is selected:

```
Trap Version:
SNMPv1  SNMPv2      (◄ ► E)
```

Select the trap version – **SNMPv1** or **SNMPv2** – using the ▲ ▼ arrow keys, then press **ENTER**.

5.3.1.2 CONFIG: Amp

```
Amp: Attenuation  State
Mute              (◄ ► E)
```

Select **Attenuation**, **Amplifier**, or **Mute** using the ◄ ► arrows keys, then press **ENTER** to continue. Note the following:

Selection	Description
Attenuation (KPA-040/-080/-100 ONLY)	Input and displays the KPA attenuation setting which is selected between 0.00 dB to 20.00 dB in 0.25 dB steps. The default setting is 10.00 dB. *This command is not valid for KPA-020IN operation.*
Amplifier	Control supply voltage to RF FETS. The default mode is ON.
Mute	Provides KPA mute control. The default is OFF.

If Attenuation is selected:

This command is not valid for KPA-020IN operation.

```
Attenuation: 10.00 dB
```

Select the KPA attenuation setting using ▲ ▼ arrow keys to select a value between **0.00** dB to **20.00** dB (in **0.25** dB steps). The default setting is **10.00** dB. Press **ENTER** when done.

Note: This command is valid only in **Remote → Local** mode. If the user attempts to edit this setting while in **Remote → Serial** or **Remote → Ethernet** mode, the following message displays:

```
  THIS UNIT IS CURRENTLY
     IN REMOTE MODE!!
```

If State is selected:

```
Amplifier: OFF  ON
                  (◄ ► E)
```

Select the Amplifier State as **OFF** or **ON** using the ◄ ► arrow keys, then press **ENTER**.

Note: This command is valid only in **Remote → Local** mode. If the user attempts to edit this setting while in **Remote → Serial** or **Remote → Ethernet** mode, the following message displays:

```
  THIS UNIT IS CURRENTLY
     IN REMOTE MODE!!
```

If **Mute** is selected:

```
Amp Mute: OFF  ON
                  (◄ ► E)
```

Select the Amplifier Mute control as **OFF** or **ON** using the ◄ ► arrow keys, then press **ENTER**.

Note: This command is valid only in **Remote → Local** mode. If the user attempts to edit this setting while in **Remote → Serial** or **Remote → Ethernet** mode, the following message displays:

```
THIS UNIT IS CURRENTLY
   IN REMOTE MODE!!
```

5.3.1.3 CONFIG: FltRec (Fault Recovery) Menu Branches

```
Fault Recovery: Manual
Automatic          (◄ ► E)
```

Select Fault Recovery as **Manual** or **Automatic** using the ◄ ► arrows keys, then press **ENTER**.

5.3.1.4 CONFIG: Redundancy Menu Branches

Comtech EF Data's KPA family of SSPAs are designed to automatically sense and configure into Redundancy Mode when the redundant loop cable is connected between the two (i.e., 1:1) or three (i.e., 1:2) KPAs comprising the redundant subsystem.

The designation of each KPA in a redundant subsystem is determined automatically via the redundancy interface cable connected – polling on the dedicated redundancy bus will not begin until the redundancy loop cable is connected.

This display indicates the current operating mode – **Standalone** or **Redundancy**. When the KPA is operating in **Standalone** mode – that is, no additional KPAs are recognized as active – the display appears as follows:

```
Redundancy Mode: OFF
                        (E)
```

With the KPA in Standalone mode, the nested menus that follow will <u>not</u> be visible/selectable. Press **ENTER** or **CLEAR** to return to the previous menu.

Otherwise, when a valid redundancy configuration is detected, a ***read-only*** display will first appear:

If 1:1 Redundancy is recognized:

```
Redundancy Mode: ON
SSPA #BU 1:1          (E)
```

If 1:2 Redundancy is recognized:

```
Redundancy Mode: ON
SSPA #BU  1:2  Pri=1  (E)
```

Press **ENTER** to continue to configure 1:1 or 1:2 redundant operations, or press **CLEAR** to return to the previous menu.

If 1:1 Redundancy is recognized:

```
Config: Auto/Manual Mode
Backup Mode
```

If 1:2 Redundancy is recognized:

```
Config: Auto/Manual Mode
Backup Mode     Priority
```

For 1:1 configurations, select **Auto/Manual Mode** or **Backup Mode** using the ◄ ► arrow keys, then press **ENTER**.

For 1:2 configurations, select **Auto/Manual Mode**, **Backup Mode**, or **Priority** using the ◄ ► arrow keys, then press **ENTER**.

The operations that follow are typical for both 1:1 and 1:2 redundant operations unless otherwise indicated.

If **Auto/Manual Mode** is selected:

```
Operating Mode: Manual
Automatic          (◄ ► E)
```

Select **Manual** or **Automatic** using the ◄ ► arrows keys, then press **ENTER** to continue.

If **Backup Mode** is selected:

Note: This submenu is enabled only in **Remote → Local** mode, and with Redundancy **Auto/Manual Mode** set to **Manual**. If the user attempts to access this submenu either while in **Remote → Serial** or **Remote → Ethernet** mode, or with **Redundancy → Auto/Manual Mode** set as **Automatic**, this submenu is disabled and, in its place, the following message displays:

```
  NOT IN MANUAL MODE OR
  NOT ACTIVE
```

Otherwise:

```
SSPA #1 OFFSET: X.XX dB
Active Backup: NO
```

For 1:2 configurations only: On the top line, use the ▲ ▼ arrow keys to select the desired Backup KPA (i.e., SSPA #**1** or SSPA #**2**). *For 1:1 configurations, note that this number is always fixed as '**1**'.*

For 1:1 and 1:2 configurations:

On the top line, set the dB offset used for Gain Equalization for the selected Backup KPA. Use the ◄ ► arrow keys to select the numeral to edit, then using the ▲ ▼ arrow keys to edit the value of that digit (the valid range, in dB, is -7.00 to +7.00).

On the second line, use the ▲ ▼ arrow keys to set operation of the specified Backup KPA:

- The default setting is **NO (**i.e., the Backup KPA remains in *standby mode*).
- Select **FORCED** to toggle/activiate the selected Backup KPA, then press **ENTER** to take the primary unit *OFFLINE*, and take the selected Backup KPA *ONLINE*.

If **Priority** is selected (1:2 configurations only):

```
Priority SSPA: SSPA#1
SSPA#2
```

Use the ◄ ► arrows keys to select which Backup KPA in the configuration should serve as the priority unit in the 1:2 redundancy system – **SSPA#1** or **SSPA#2** – then press **ENTER**.

Note: In 1:1 configurations, this submenu is not accessible, as this number is always fixed as '**1**'.

5.3.1.5 CONFIG: ExtRef (External Reference)

This command is not valid for KPA-020IN operation.

```
ExtRef LD Alarm Mask:
Alarm Fault Masked (◄ ► E)
```

Select **Alarm**, **Fault**, or **Masked** using the ◄ ► arrow keys, then press **ENTER**. Note the following:

Selection	Description
Alarm	Causes an Alarm to be generated whenever the unit sees that: a) External Reference is selected, and b) There is no signal activity at the External Reference port. No action, other than event logging, will occur.
Fault	Causes a Transmit Traffic fault to be generated whenever the unit sees that: a) External Reference is selected, and b) There is no signal activity at the External Reference port.
Mask	No alarm or fault will be generated.

5.3.2 SELECT: Monitor

```
MONITOR: Faults Stored
Power Vltgs PS Temp FETs
```

The **Monitor** menus provide a collection of read-only status report screens, plus a management menu for the viewing and handling of stored faults.

Typical for all displays, the screen will indicate "**FT**" when a fault condition exists for a specific feature; otherwise, "**OK**" is indicated when no faults are detected.

From any menu, the user may press **ENTER** or **CLEAR** to return to the previous menu.

The display examples that follow are provided for reference only, and will vary depending on the active, operating configuration.

Select **Faults**, **Stored**, **Power**, **Vltgs**, **PS**, **Temp**, or **FETs** using the ◄ ► arrow keys, then press **ENTER**.

5.3.2.1 MONITOR: Faults

```
Current Faults: Voltages
PS Temp Fan Other(◄ ► E)
```

Select **Voltages**, **PS**, **Temp**, Fan, or **Other** using the ◄ ► arrow keys, then press **ENTER**.

If **Voltages** is selected:

```
+15V = OK +7.5V = OK
+5V  = OK  -5V  = OK (E)
```

If **PS** (Power Supply) is selected:

```
     28VDC PS = OK
 RF Power Supply = OK
```

Temp (Temperature) is selected:

```
        TEMP = OK
                        (E)
```

If **Fan** is selected:

```
FAN1  =  OK
FAN2  =  OK           (E)
```

If **Other** is selected:

```
BUC = OK
ExtRef = OK           (E)
```

5.3.2.2 MONITOR: Stored

```
Stored Events:  View
Clear-All       (◄ ► E)
```

Select **View** or **Clear-All** using the ◄ ► arrow keys, then press **ENTER**.

If **View** is selected:

```
Log05: 10/11/10 10:37:32
Info  -  Log CLEAR (▲ ▼)
```

The user may scroll backwards or forwards through the entries in the stored events log by using the ▲ ▼ arrow keys. Press **ENTER** or **CLEAR** to return to the previous menu. The stored events log can store up to 255 events.

The top line of the display indicates the log entry number, and the date and time of the entry.

IMPORTANT

Note that in accordance with European convention, the date is shown in* DAY-MONTH-YEAR *format.

The bottom line of the display shows the event that has been logged and stored.

If **Clear-All** is selected:

```
Clear All Stored Events:
No Yes           (◄ ► E)
```

Choose **No** or **Yes** using the ◄ ► arrow keys, then press **ENTER**. If **Yes** is selected, the stored events log is cleared, and the user is taken directly back to the previous menu.

5.3.2.3 MONITOR: Power

```
Forward Power: <19.0 dBm
Reverse Power: <12.0 dBm
```

5.3.2.4 MONITOR: Vltgs

```
+15V=14.6   +7.5V=7.9
+5V=5.0     -5V=-5.0 (E)
```

5.3.2.5 MONITOR: PS (Power Supply)

```
     28VDC PS = 27.2
 RF Power Supply = 9.1
```

5.3.2.6 MONITOR: Temp

```
  Amplifier Temp = 45 C
```

5.3.2.7 MONITOR: FETs

```
RF FET Q01  :  20mA
RF FET Q02  :  72mA (▲ ▼)
```

The user may scroll backwards or forwards through the displayed RF Power **F**ield **E**ffect **T**ransistor**s** (FETs) by using the ▲ ▼ arrow keys.

Note the following:

- **For KPA-040 only –** RF FET Q01 through Q14.
- **For KPA-020IN/-080/-100 –** RF FET Q01 through Q27.

5.3.3 SELECT: Utility

```
UTILITY:  Date/Time  CID
PowerMon Firmware RefOsc
```

Select **Date/Time**, **CID**, **PowerMon**, **Firmware**, or **RefOsc** using the ◄ ► arrow keys, then press **ENTER**.

5.3.3.1 UTILITY: Date/Time

```
Edit Real-Time Clock:
12:00:00 24/09/10(◄ ►▲▼E)
```

Edit the time and date settings of the real-time clock by selecting the digit to be edited using the ◄ ► arrow keys, then changing the value of the digit using the ▲ ▼ arrow keys. Press **ENTER** when done.

IMPORTANT

Note that in accordance with European convention, the date is shown in* DAY-MONTH-YEAR *format.

5.3.3.2 UTILITY: CID (Circuit ID)

```
Edit Circuit ID:(◄ ►,▲ ▼)
24 CHARACTER TST MESSAGE
```

Edit the Circuit ID string by using the ◄ ► and ▲ ▼ arrow keys. Only the bottom line is available (24 characters). Set the cursor position on the bottom line using the ◄ ► arrow keys, then edit the character using the ▲ ▼ keys. The following characters are available:

[Space] ( ) * + -, . / 0-9 and A-Z.

Once the Circuit ID string is composed, press **ENTER**.

5.3.3.3 UTILITY: PowerMon

```
Forward Power Mon Offset
Reverse Power Mon Offset
```

This function allows the user to calibrate (fine tune) the *RF Power Monitor* for a specific carrier frequency. The *RF Power Monitor* is factory-calibrated at the KPA center frequency. The user can adjust (offset) the display level using this function.

Select **Forward Power Mon Offset** or **Reverse Power Mon Offset** using the ◄ ► arrow keys, then, press **ENTER**.

If **Forward Power Mon Offset** is selected:

```
Forward RF Power Monitor
  Offset = +5.8 dBm
```

Set the cursor position on the bottom line using the ◄ ► arrow keys, then edit the numeric value using the ▲ ▼ keys. The range is within -6.0 to +6.0 dBm, in 0.1 dBm steps.

If **Reverse Power Mon Offset** is selected:

```
Reverse RF Power Monitor
  Offset = -5.8 dBm
```

Set the cursor position on the bottom line using the ◄ ► arrow keys, then edit the numeric value using the ▲ ▼ keys. The range is within -6.0 to +6.0 dBm, in 0.1 dBm steps.

5.3.3.4 UTILITY: Firmware

THESE MENUS ARE INTENDED FOR DIAGNOSTIC PURPOSES ONLY. DO NOT CHANGE AN IMAGE UNLESS OTHERWISE INSTRUCTED BY COMTECH EF DATA CUSTOMER SUPPORT.

```
Firmware Info: Boot Bulk
App FPGA
```

This series of submenus is used to view information about the KPA internal firmware. Select **Boot**, **Bulk**, **App**, or **FPGA** using the ◄ ► arrow keys, then press **ENTER**.

If **Boot** is selected:

```
Boot: FW-0000085
X.X.X    MM/DD/YY
```

If **Bulk** is selected:

```
Bulk: FW0000392
X.X.X    MM/DD/YY
```

If **App** is selected:

```
App: FW00000393
X.X.X    MM/DD/YY
```

If **FPGA** is selected:

```
Boot: FW-0000088
X.X.X    MM/DD/YY
```

5.3.3.5 UTILITY: RefOsc

Note: This display is used for debugging purposes only.

```
Reference Oscillator:
Information Adjust (◄ ► E)
```

Select **Information** or **Adjust** using the ◄ ► arrow keys, then press **ENTER**.

If **Information** is selected, the raw voltage of the voltage tuning monitor and the external reference status are displayed. **For example:**

```
Ref Osc: Vtune = 04.8
ExtRef: N/A
```

Press **ENT** or **CLR** to return to the previous menu.

If **Adjust** is selected:

```
Reference Frequency
   Adjust    87
```

The reference oscillator adjustment may be manipulated with this menu. Use the ◄ ► arrow keys to select the numeral to edit, then the ▲ ▼ arrow keys to edit the value of the selected

numeral, then press **ENT**. The default Reference Frequency tuning adjustment is 87, with allowable values from 0 to 255.

5.3.4 SELECT: Front Panel

```
Front Panel: Brightness
Lamp Test          (◄ ► E)
```

Select **Brightness** or **Lamp Test** using the ◄ ► arrow keys, then press **ENTER**.

5.3.4.1 Front Panel: Brightness

```
Display Brightness:
       100%
```

To edit the display brightness, use the ▲ ▼ arrow keys. The values of brightness that can be selected are **25%**, **50%**, **75%**, or **100%.** Press **ENTER** when the brightness is suitable.

5.3.4.2 Front Panel: Lamp Test

```
Lamp Test:
  START
```

The Lamp Test menu runs a performance diagnostic on the front panel LED Indicator array. This test does otherwise affect KPA operations while running. Press **ENTER** to begin the test – as the LEDs cycles through the Lamp Test, the following message displays:

```
Lamp Test:
 TESTING
```

Chapter 6. KPA ETHERNET MANAGEMENT

6.1 Overview

This chapter is not valid for KPA-020IN operation.

The sections that follow describe functionality of the KPA Ethernet Management Interfaces. Note that many of the operations featured in this chapter may also be executed via the KPA's front panel and via serial remote control. Refer to **Chapter 5. FRONT PANEL OPERATION**, and **Appendix C. REMOTE CONTROL** for supplemental descriptions of the configuration, monitor and control functionality that is afforded by the protocols featured in this chapter.

6.2 Ethernet Management Interface Protocols

The KPA's 10/100 BaseT Ethernet Management Interface supports three (3) different management protocols:

- SNMP with public and private MIB
- Telnet interface for remote product M&C
- Web Server (HTTP) Interface for complete product management

6.3 SNMP Interface

The *Simple Network Management Protocol* (SNMP) is an application-layer protocol designed to facilitate the exchange of management information between network devices. The KPA SNMP agent supports both **SNMPv1** and **SNMPv2c**.

For proper SNMP operation, the ISSPA MIB files must be used with the associated version of the KPA M&C. Please refer to the ISSPA Software Release Notes for information on the required FW/SW compatibility.

6.3.1 Management Information Base (MIB) Files

MIB files are used for SNMP remote management and consist of Object Identifiers (OID's). Each OID is a node that provides remote management of a particular function. A MIB file is a tree of nodes that is unique to a particular device. The following MIB files are associated with the KPA:

MIB File/Name	Description
FW-0000141-.mib Comtech EF Data Root MIB file	ComtechEFData MIB file gives the root tree for ALL Comtech EF Data SSPA products and consists of only the following OID: Name: comtechEFData Type: MODULE-IDENTITY OID: 1.3.6.1.4.1.6247 Full path: iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247) Module: ComtechEFData
FW-0000139-.mib ISSPA MIB	MIB file consists of all of the OID's for management of the KPA functions
FW-0000140-.mib ISSPA Traps MIB	Trap MIB file is provided for SNMPv1 traps common for the KPA.

These MIB files should be compiled in a MIB Browser or SNMP Network Monitoring System server.

6.3.2 SNMP Community Strings

The KPA uses community strings as a password scheme that provides authentication before gaining access to the KPA agent's MIBs.

In **SNMPv1** and **SNMPv2c**, the community string is sent unencrypted in the SNMP packets. Caution must be taken by the network administrator to ensure that SNMP packets travel only over a secure and private network if security is a concern. A packet sniffer can easily obtain the community string by viewing the SNMP traffic on the network.

The community string is entered into the MIB Browser or Network Node Management software and is used to authenticate users and determine access privileges to the SNMP agent.

The user defines three Community Strings for SNMP access:

- Read Community default = public
- Write Community default = private
- Trap Community default = comtech

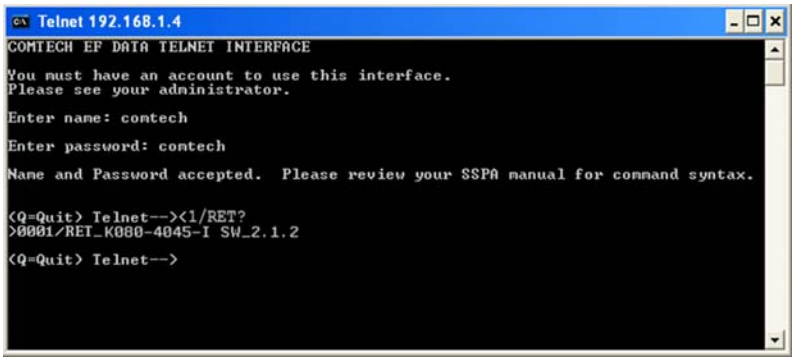
6.4 Telnet Interface

The KPA provides a Telnet interface for the purpose of Equipment M&C via the standard equipment Remote Control protocol.

The Telnet interface requires user login at the **Administrator** level and **Read/Write** level.

The screen capture to the right shows the login process:

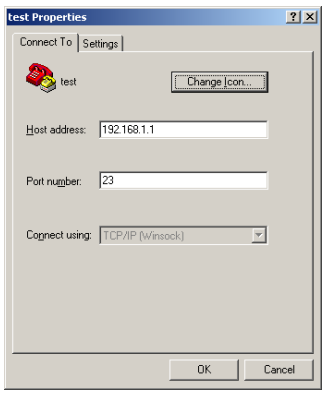
Once logged into the Telnet interface as Administrator, the user can access the standard remote control interface defined in **Appendix C. REMOTE CONTROL**, as shown in the example to the right:

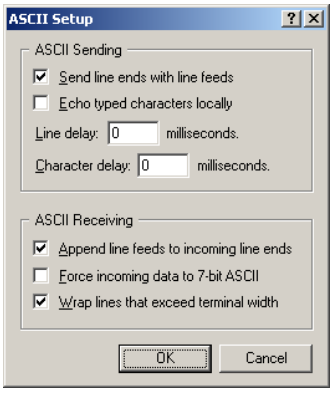


There is a disadvantage when using Windows Command-line as Telnet Client. Since Command-line cannot translate a '\r' to a '\r\n' for the messages coming from Telnet Server, the multi-line command response (for example, FRW? response) will be displayed as one line, with the latter lines overwriting the previous lines.

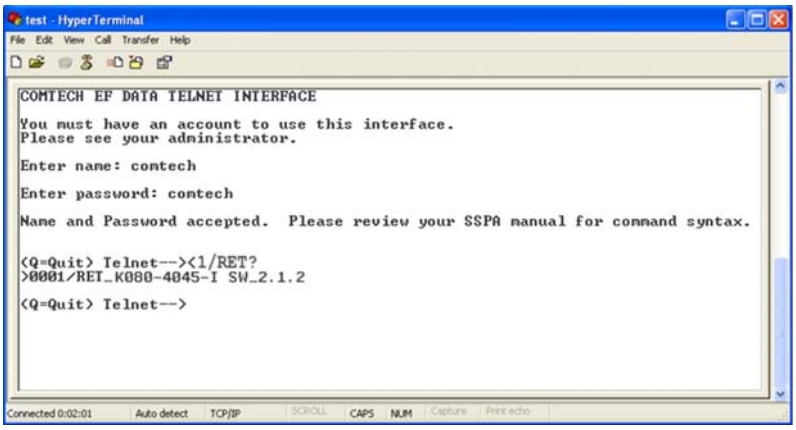
In order to view the full response messages, CEFD recommends using HyperTerminal configured as Telnet Client. To do so, configure HyperTerminal as follows:

1. Ensure that connection is made using **TCP/IP (Winsock)** instead of COM1 or COM2, as shown her to the left.
2. ASCII Setup (File → Properties → Settings → ASCII Setup): Check the "**Send line ends with line feeds**" option in the *ASCII Sending* section and the "**Append line feeds to incoming line ends**" option in the *ASCII Receiving* section, as shown to the far right.





Login and remote command execution via HyperTerminal configured as Telnet Client appears as shown:



6.5 Web Server (HTTP) Interface

6.5.1 Web Server page Introduction

The embedded Web Server application provides the user with an easy to use interface to configure and monitor all aspects of the KPA. These Web pages have been designed for optimal performance when using Microsoft's Internet Explorer Version 5.5 or higher (the examples shown use Internet Explorer Version 7.0).

The user can fully control and monitor base operations of the KPA from the Web Server Interface. By rolling the cursor over the navigation tabs located at the top of each page (right), the user can select from the available nested tabs.

6.5.2 Web Server Interface Access

To initiate a Web session with the KPA, from the PC type *http://www.xxx.yyy.zzzz* (where "*www.xxx.yyy.zzz*" represents the IP address of the unit) into the **Address** area of the Web browser:

Once the valid IP address is entered, Before any further access to the pages can granted, the User is prompted for a User Name and Password via the Login Window, similar to the example shown at right.

Default User name – **comtech**

Default Password – **comtech**

Type the User Name and Password, then click **[OK].**

Once the valid User name and Password are accepted, the user will see the KPA Web Server Interface "splash" page, similar to the example shown at right:

6.5.3 Web Server Menu Tree

The operations available through this interface are illustrated by this menu tree:

Home	Admin	Config	Status
Home	**Access**	**Amplifier**	**Events**
Support	**SNMP**	**Utility**	**Status**
		Redundancy	**FETs**

The KPA Web Server Interface provides access to four navigation tabs (shown in blue):

- **Home**
- **Admin**
- **Config (Configuration)**
- **Status**

Beyond this top-level row of navigation tabs, the diagram illustrates the available nested page hyperlinks (shown in grey) afford the user in-depth functionality.

Click any tab or select any hyperlink to continue.

6.5.4 Web Server page Descriptions

The sections and subsections that follow detail the Web pages accessible via hyperlink from the navigation tabs as shown in the menu tree diagram provided in **Sect. 6.5.3**:

Sect. 6.5.4.1 Home pages

Sect. 6.5.4.2 Admin pages

Sect. 6.5.4.3 Config pages

Sect. 6.5.4.4 Status pages

6.5.4.1 Home pages

Select the **Home** or **Support** hyperlink to continue.

6.5.4.1.1 Home (Splash) page

Figure 6-1. KPA Home (Splash) page

From any location within the Web Server Interface, the user can select the **Home** tab or '**Home | Home**' hyperlink to return back to this page. Note that the information on this page is unit-specific and changes according to the actual KPA unit in use. This figure shows, as the example, the Web Server Interface for a KPA-080 unit.

6.5.4.1.2 Home | Support page

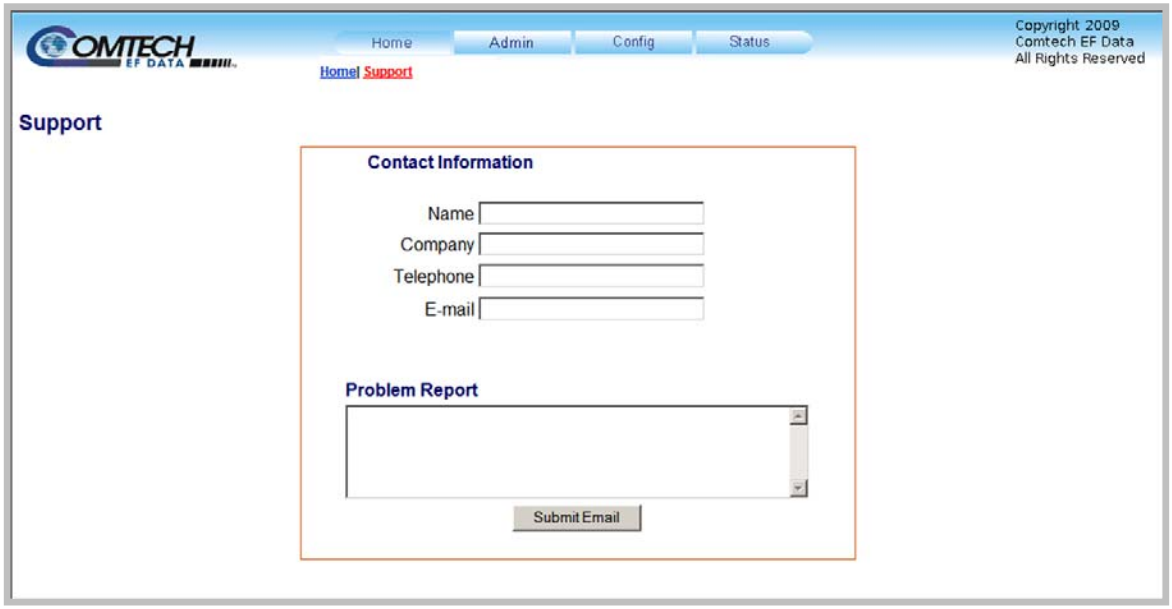


Figure 6-2. KPA Home | Support page

The '**Home | Support'** page (**Figure 6-2**) uses SMTP (Simple Mail Transport Protocol) to submit questions about or report problems with the KPA to Comtech EF Data Modem Support (cdmipsupport@comtechefdata.com).

The user should type in the pertinent contact information – **Name**, **Company**, **Telephone**, and **E-mail** address – in the **Contact Information** section, then use the **Problem Report** section to compose a message consisting of up to 256 characters maximum.

IMPORTANT

For this page to operate correctly, the modem's administrator is required to specify the SMTP server, domain name, and destination on the* Admin | Access *page (see Sect. 6.5.4.2.1).

Once the **Contact Information** is entered and a message composed in the **Problem Report** text window, click [**Submit E-mail]** to send the message.

6.5.4.2 Admin pages

The '**Admin'** pages provide the means to set up the access parameters required to facilitate communication with the KPA Web Server Interface.

IMPORTANT

The Admin pages are available only to users who have logged in using the Administrator Name and Password.

Select the **Access** or **SNMP** hyperlink to continue.

6.5.4.2.1 Admin | Access page

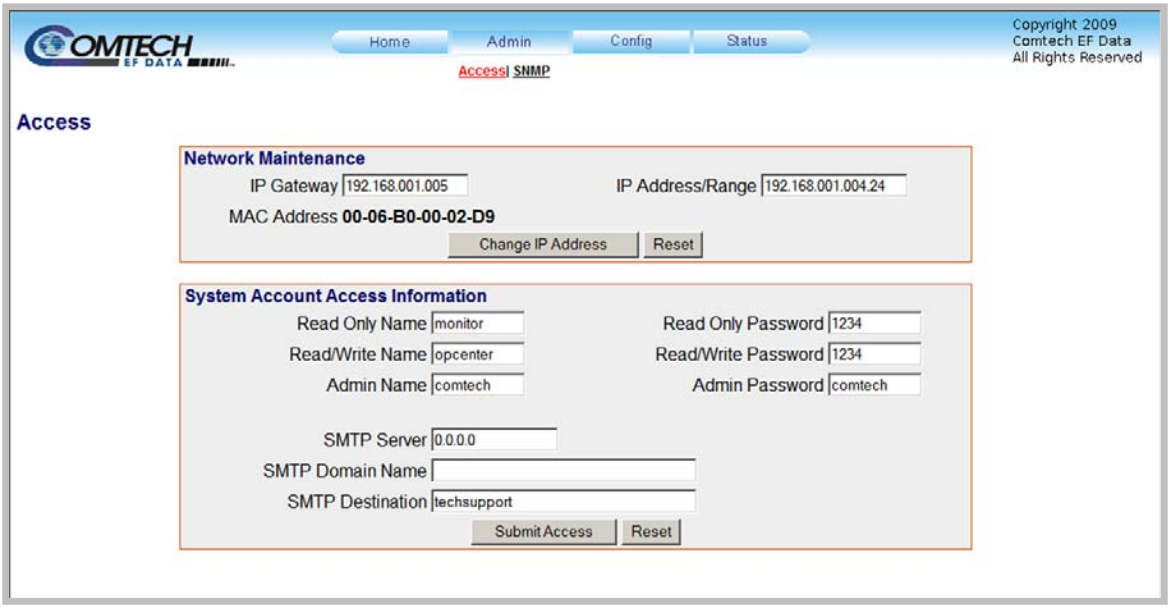


Figure 6-3. Admin | Access page

The '**Admin | Access**' page (**Figure 6-3)** provides the means to set up user names, passwords, the e-mail server, and the host IP addresses to facilitate communication with the KPA Web Server Interface.

Network Maintenance

- **IP Gateway:** Enter an IP Gateway Address for the Ethernet M&C port for this unit.
- **IP Address/Range:** Enter an IP address and a subnet mask to define a unique class of machines that are allowed access.
- **MAC Address:** This parameter is ***read-only*** and cannot be changed.

Once the desired changes have been made in this section, click **[Change IP Address]** to save these settings. Otherwise, click **[Reset]** to cancel any changes and restore the previously saved parameters.

System Account Access Information

- **Read/Write, Read Only and Admin Names and Passwords:**

  The factory defaults for these names/passwords are:

  - **Read Only** monitor/1234
  - **Read/Write** opcenter/1234
  - **Admin** comtech/comtech

  Note the following:

  - These **Name** fields can be any alphanumeric combination with a maximum length of 10 characters.
  - These **Password** fields can be any alphanumeric combination with a maximum length of 10 characters.

- **SMTP Server:** Specify the mail server IP address from where e-mail is to be sent.
- **SMTP Domain Name / Destination:** The Administrator can assign the SMTP Domain Name and Destination. This is required if the e-mail feature of the '**Home | Support**' page (**Sect. 6.5.3.2**) is to be used.
  - For **SMTP Domain Name**, specify the domain of the e-mail server (usually found to the right of the @ symbol in an e-mail address).
  - For **SMTP Domain Destination**, specify the e-mail recipient name (usually found to the left of the @ symbol in an e-mail address).

Once the desired configuration settings have been made on this page, click [**Submit Admin]** to save these changes.

6.5.4.2.2 Admin | SNMP page

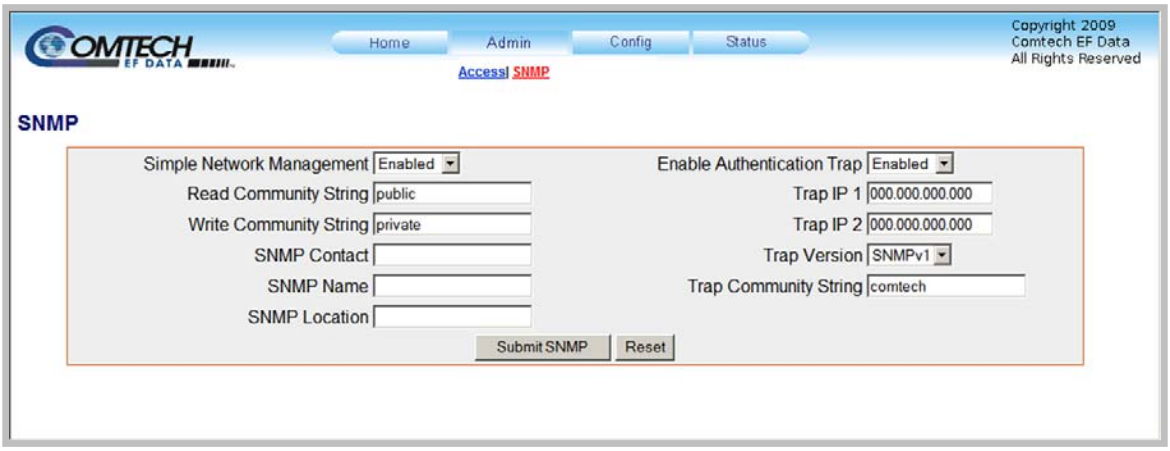


Figure 6-4. Admin | SNMP page

The '**Admin | SNMP**' page (**Figure 6-4**) sets and returns administration information for the KPA's Simple Network Management Protocol (SNMP) feature. For further details pertaining to the configuration parameters available on this page, refer to **Chapter 5. FRONT PANEL OPERATION** and **Sect. 6.3 SNMP INTERFACE**.

Note the following:

- **Simple Network Management:** Use the drop-down menu to select as **Enabled** or **Disabled**.
- **Read** and **Write Community String:** The factory defaults assigned for these parameters are, respectively, **public** and **private**. Otherwise, assign the desired parameters using any combination of characters and a length of 0 - 20 characters in these fields.
- **SNMP Contact / SNMP Name / SNMP Location:** Assign the pertinent administrator's information to each field using any combination of characters and a length of 0 - 20 characters in these fields.
- **Enable Authentication Trap:** Use the drop-down menu to select as **Enabled** or **Disabled**.
- **Trap IP 1 / Trap IP 2:** Up to two SNMP Trap IP addresses may be assigned.
- **Trap Version:** Use the drop-down menu to select the Trap Version **SNMPv1** or **SNMPv2**.
- **Trap Community String:** The factory default assigned for this parameter is **public**. The SNMP Trap Community String can be any combination of characters and a length of 0 - 20 characters.

Once the desired configuration settings have been made on this page, the user should then click [**Submit SNMP]** to save these changes. Otherwise, click **[Reset]** to cancel any changes and restore the previously saved parameters.

6.5.4.3 Config (Configuration) pages

The '**Config'** pages provide the means to set up the KPA's operational parameters for Standalone or Redundant operations.

Select the **Amplifier**, **Utility**, or **Redundancy** hyperlink to continue.

6.5.4.3.1 Config | Amplifier page

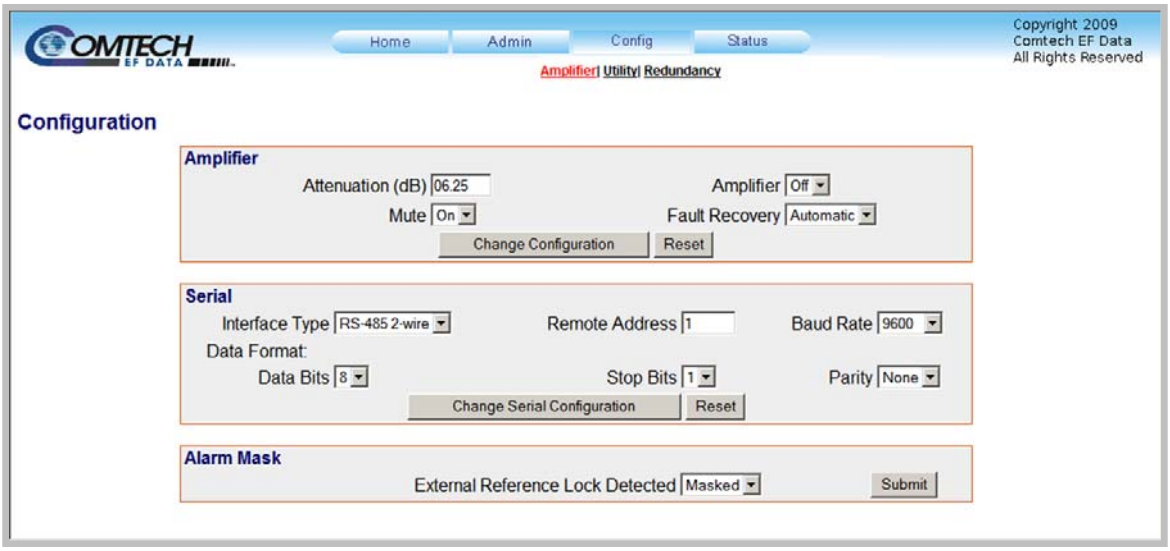


Figure 6-5. Config | Amplifier page

The '**Config | Amplifier**' page (**Figure 6-5**) sets and returns administration information for the KPA's Simple Network Management Protocol (SNMP) feature. For further details pertaining to the configuration parameters available on this page, refer to **Chapter 5. FRONT PANEL OPERATION** and **Sect. 6.3 SNMP INTERFACE**.

Amplifier

- **Attenuation:** Enter an attenuation value (in dB) between **0.00** and **20.00**.
- **Mute:** Use the drop-down menu to select Mute as **On** or **Off**.
- **Amplifier:** Use the drop-down menu to select Amplifier operation as **On** or **Off**.
- **Fault Recovery:** Use the drop-down menu to select Fault Recovery as **Automatic** or **Manual**.

Once the desired configuration settings have been made in this section, the user should then click [**Change Configuration]** to save these changes. Otherwise, click **[Reset]** to cancel any changes and restore the previously saved parameters.

Serial

- **Interface Type:** Use the drop-down menu to select the remote serial interface as **RS-232**, **RS-485 2-wire**, or **RS-485 4-wire**.
- **Remote Address:** Enter a remote address from **0** to **9999**.

- **Baud Rate:** Use the drop-down menu to select the baud rate as **2400**, **4800**, **9600**, **19200**, or **38400**.
- **Data Format – Data Bits:** Use the drop-down menu to select the Data Bits as **8** or **7**.
- **Data Format – Stop Bits:** Use the drop-down menu to select the Data Bits as **1** or **2**.
- **Data Format – Parity:** Use the drop-down menu to select Parity as **Odd**, **Even**, or **None**.

Once the desired configuration settings have been made in this section, the user should then click [**Change Serial Configuration]** to save these changes. Otherwise, click **[Reset]** to cancel any changes and restore the previously saved parameters.

Alarm Mask

Use the drop-down menu to define the **External Reference Lock Detected** alarm as **Masked** or **Active**, then click **[Submit]** to save this setting.

6.5.4.3.2 Config | Utility page

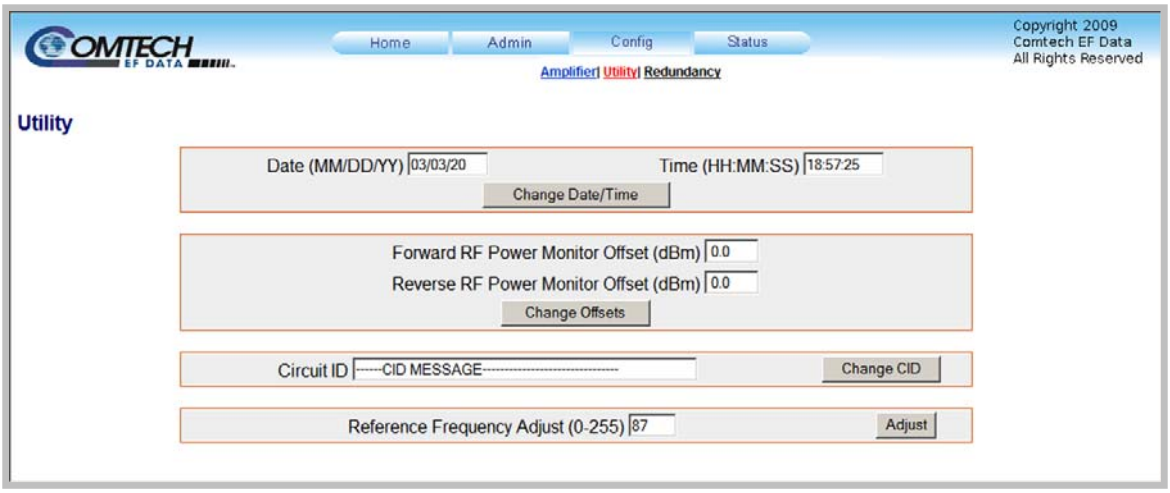


Figure 6-6. Config | Utility page

The '**Config | Utility**' page (**Figure 6-6**) is used to adjust or customize a variety of KPA operation features.

Note the following:

- **Date:** The user may enter a date using MM/DD/YY format

  (where MM = month [01 to 12], DD = day [01 to 31], and YY = year [00 to 99]).

- **Time:** The user may enter a time using HH:MM:SS format

  (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]).

  Once the desired date and time have been entered in this section, click **[Change Date/Time]** as needed to save these changes.

- **Forward RF Power Monitor Offset (dBm)** and **Reverse RF Power Monitor Offset (dBm):** For either, enter an offset value (in dBm) from **-6.0** to **+6.0**.

  Once the desired offsets have been entered in this section, click **[Change Offsets]** as needed to save these changes.

- **Circuit ID:** The user may enter a Circuit ID string of up to 24 characters.

  Once the desired string has been entered in this section, click **[Change CID]** as needed to save this change.

- **Reference Frequency Adjust:** The user may enter an adjustment value from **0** to **255**.

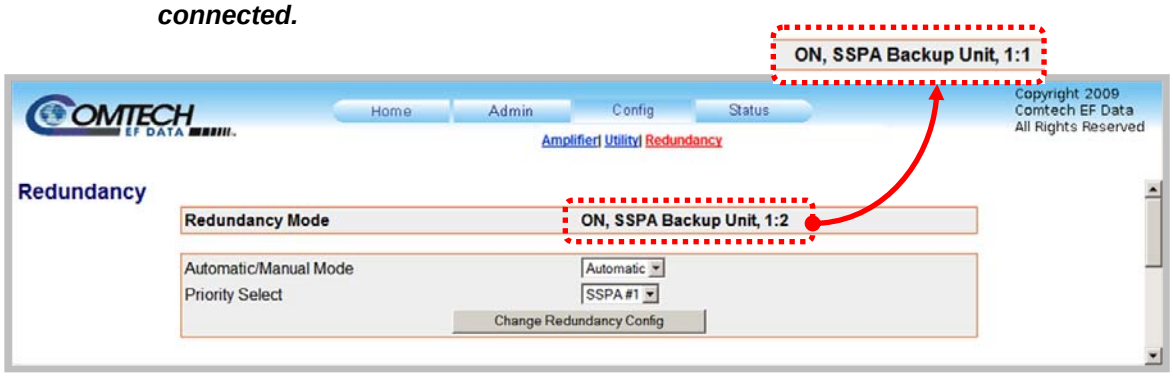
  Once the desired value has been entered in this section, click **[Adjust]** as needed to save this change.

6.5.4.3.3 Config | Redundancy page

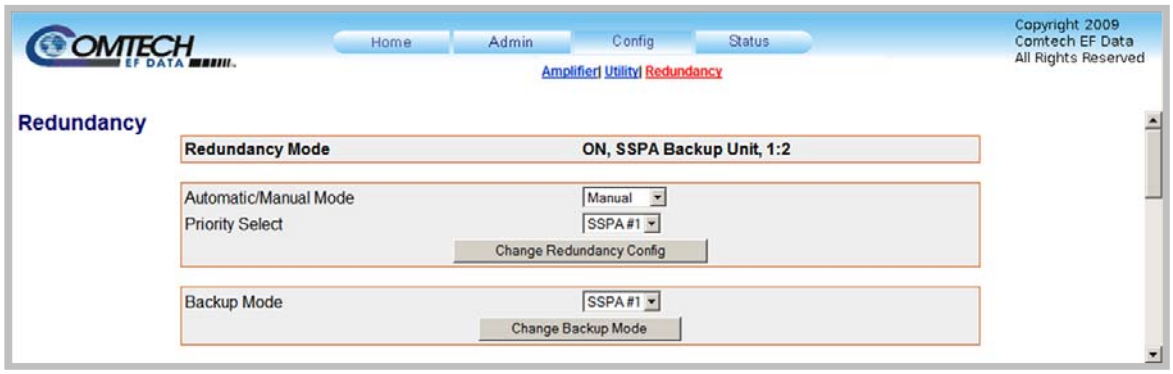
IMPORTANT

Comtech EF Data's KPA family of SSPAs are designed to automatically sense and configure into Redundancy Mode when the redundant loop cable is connected between the two (i.e., 1:1) or three (i.e., 1:2) KPAs comprising the redundant subsystem.

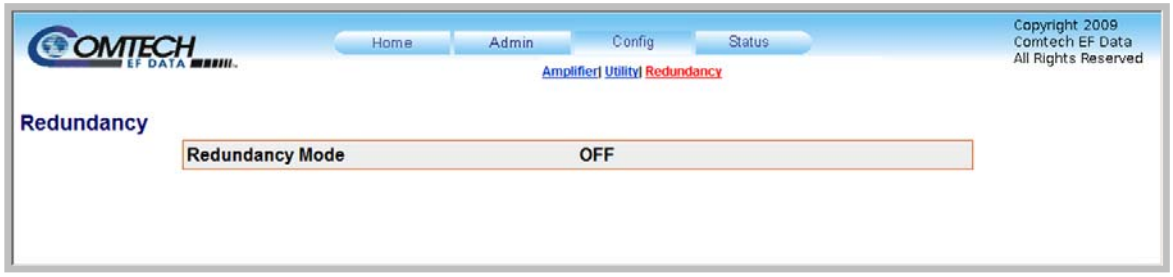
The designation of each KPA in a redundant subsystem is determined automatically via the redundancy interface cable connected – polling on the dedicated redundancy bus will not begin until the redundancy loop cable is connected.



Redundancy page in Automatic Mode



Redundancy page in Manual Mode



Redundancy page in Standalone Configuration (no redundant units recognized by system)

Figure 6-7. Config | Redundancy page

The '**Config | Redundancy**' page (**Figure 6-7**) is used to control the operational parameters for redundant operations. The active Redundancy Mode is identified on this page as **1:1**, **1:2**, or **OFF**, and the appearance of the page itself varies depending on its Operating Mode.

Redundancy Mode

This ***read-only*** section provides the following information:

- The active system operating status is identified as **ON** or **OFF** (when **OFF**, the configuration sections that follow on this page are not accessible).
- The active operating unit – i.e., the Primary KPA or Backup KPA – is identified.
- The active redundancy configuration – **1:1** or **1:2** – is identified.

Automatic/Manual Mode (1:1 or 1:2 Redundancy)

Use the provided drop-down menu to select the backup operation mode as **Automatic** or **Manual**.

Priority Select (1:2 Redundancy only)

Use the provided drop-down menu to select the desired Backup KPA as **SSPA#1 or SSPA#2**.

*Note that, for 1:1 configurations, the priority unit number is always fixed as **SSPA#1***.

Once the desired operational settings have been selected for the operating mode and backup priority (1:2 redundancy only), click **[Change Redundancy Config]** as needed to save these settings.

Backup Mode (1:1 or 1:2 Redundancy, Manual Mode only)

When Automatic Mode has been selected as the Operating Mode, this section of the Redundancy page is inaccessible.

Use the provided drop-down menu to force **SSPA#1** or, for 1:2 redundancy only, **SSPA#2** to replace the active operating KPA as the primary unit.

*Note that, for 1:1 configurations, the Backup KPA is always fixed as **SSPA#1***.

Once the desired Backup KPA has been selected, click **[Change Backup Mode]** to take the primary unit *OFFLINE*, and take the selected Backup KPA *ONLINE*.

6.5.4.4 Status pages

The '**Status'** pages provide the user with the means to monitor operations, review and manipulate the stored events, review configuration parameters, etc.

Select the **Events**, **Status**, or **FETs** hyperlink to continue.

6.5.4.4.1 Status | Events page

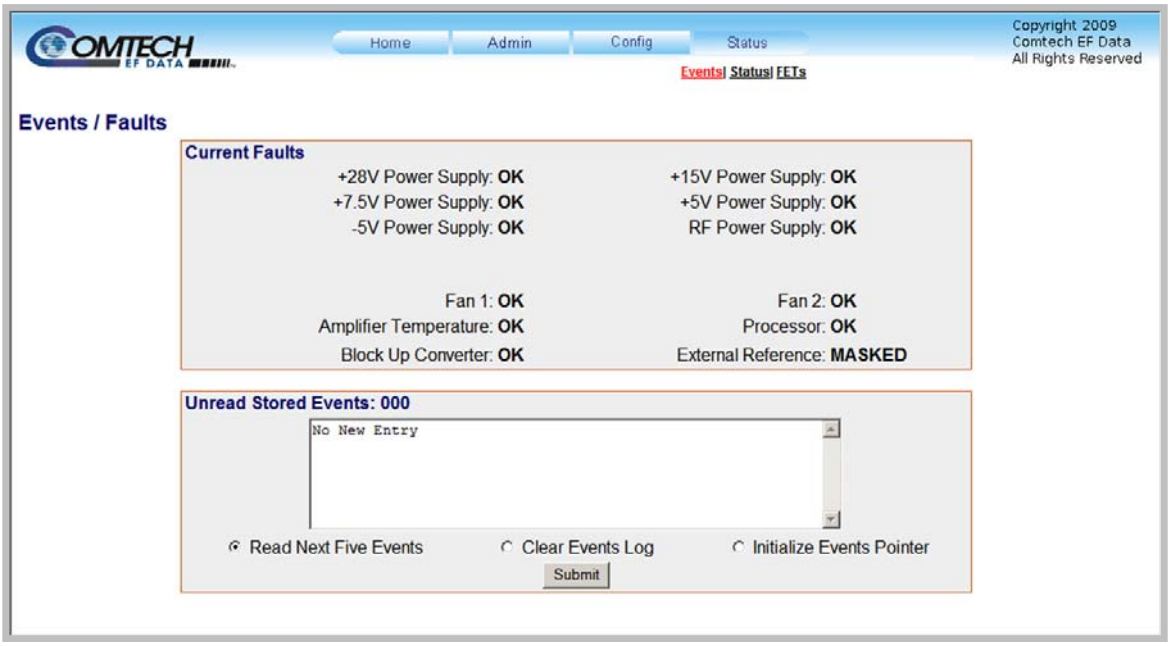


Figure 6-8. Status | Events page

The '**Status | Events**' page (**Figure 6-8**) provides the user with the means to monitor the current operating state (i.e., **OK** or *faulted*) of a variety of features, and provides a scrollable stored events window showing the logged system faults and events.

Current Faults

This ***read-only*** section provides the current operating state of the KPA. The information provided may vary based on the KPA's active/optional operating features.

Events Log Section

- **Unread Stored Events:** Displays the total number of *unread* stored events in the scrollable events window. As stored event groups are displayed, this number adjusts downward accordingly.
- **Read Next Five Events:** Click to buffer the next group of five stored events into the scrollable events window.
- **Clear Events Log:** Click to wipe clean the stored events log.
- **Initialize Events Pointer:** Click to reset the log's internal pointer.

Once the desired settings have been entered, click **[Submit]** as needed to execute update of this section.

6.5.4.4.2 Status | Status page

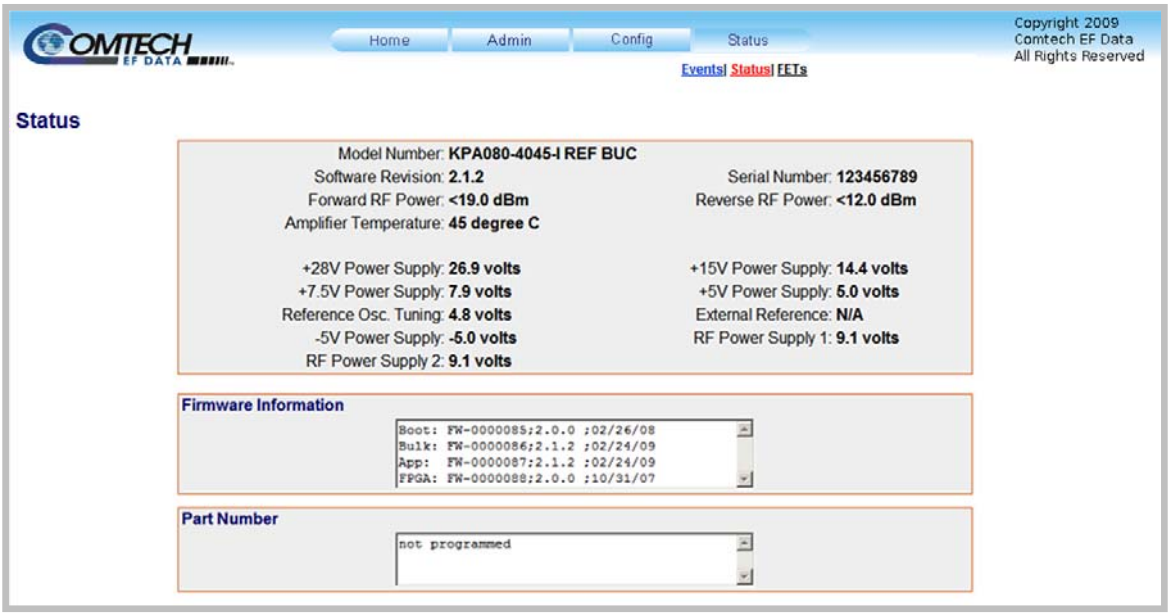


Figure 6-9. Status | Status page

The ***read-only*** '**Status | Status**' page (**Figure 6-9**) provides the user with the means to monitor the current operating status of a variety of features; provides identification parameters for the unit itself (e.g.., part number, model number, etc.); and identifies the currently running firmware (i.e., the software revision, and the individual firmware part numbers, versions, revision letters, and release dates).

6.5.4.4.3 Status | FETs page

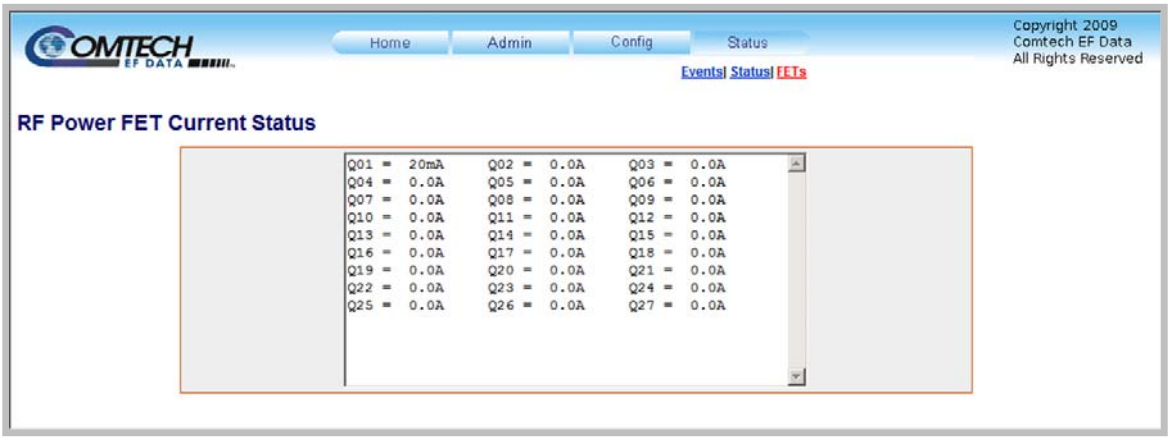


Figure 6-10. Status | FETs page

The ***read-only*** '**Status | FETs**' page (**Figure 6-10**) provides the user with the means to monitor the current operating status of the KPA's RF Power **F**ield **E**ffect **T**ransistor**s** (FETs).

Note the following:

- **For KPA-040 only –** RF FET Q01 through Q14.
- **For KPA-020IN/-080/-100 –** RF FET Q01 through Q27.

Appendix A. MAINTENANCE AND TROUBLESHOOTING

A.1 Introduction

Information about the KPA's operational features and overall functionality is provided throughout this manual as follows:

For information about:	Refer to:
KPA operation, including block diagrams, functional descriptions, summary of specifications, dimensional envelopes	Chapter 1. INTRODUCTION
Initial installation and setup of KPA in Standalone configurations	Chapter 2. INSTALLATION
KPA external user interfaces	Chapter 3. CONNECTORS and PINOUTS
Updating KPA operational firmware	Chapter 4. FLASH UPGRADING
M&C using the KPA Front Panel	Chapter 5. KPA FRONT PANEL OPERATION
M&C using the KPA Web Server Interface (not valid with KPA-020IN)	Chapter 6. KPA ETHERNET MANAGEMENT
Installation, setup, and operation of the KPA in 1:1 and 1:2 Redundant Operations	Appendix B. KPA REDUNDANT OPERATIONS
M&C using the Remote Control Interface	Appendix C. REMOTE CONTROL
Maintenance and Troubleshooting Tips	This appendix (Appendix A)

A.2 Maintenance Testing

Note the following:

- The **KPA-080** is a Ku-Band SSPA having an RF output level of +48.5 dBm at 1 dB compression.
- The **KPA-100** is a Ku-Band SSPA having an RF output level of +49.5 dBm at 1 dB compression.

A.2.1 Test Point Samples

The RF input and output can be monitored at the front panel's RF Sample Test Points (Type 'N' Input and Output connectors are provided). The sample RF input level is -20 dBc nominal, and the RF output level is -40 dBc nominal. Actual measured data for these sample ports is located on the front panel.

A.3 Troubleshooting

Operating problems can be identified by first observing the STATUS LED indicators on the KPA front panel. When a fault condition is indicated, the specific fault or faults can be further investigated by viewing the information provided via the front panel or, where applicable, the Web Server Interface:

- **From the front panel –** Review the pertinent **SELECT: MONITOR → Faults** submenus; further information can be obtained by viewing the stored events logs using the **SELECT: MONITOR → Stored → View** menu. **See Chapter 5. KPA FRONT PANEL OPERATION** for further information about KPA operations using the front panel.
- **From the Web Server Interface –** Select the '**Status | Events**' page. See **Sect. 6.5.4.4.1** in **Chapter 6. KPA ETHERNET MANAGEMENT** for further information**.**

The user should also check the status of the mute condition, either by using the front panel **SELECT: CONFIG → Amp → Mute** menu, or viewing the Web Server Interface's '**Config | Amplifier**' page (i.e., 'Mute = On' means that the amplifier will be muted).

A.3.1 Troubleshooting Guide

Issue	Possible Cause(s)	Solution(s)
Unit does not turn on (No front panel display, no front panel LEDs lit, no fans)	1. Check power cord connections. 2. Faulty wiring to 28V power supply. 3. 28V power supply fault.	1. Ensure power cord is connected. 2. With input power cord disconnected, check wiring and connections to 28V power supply. Reconnect power cord. 3. Check output of 28 VDC power supply. Remove and replace 28V power supply.
Fan(s) do not turn On.	Faulty wiring or bad connections.	At power-up, the fans are sequenced on. In normal operation, the second fan does not turn on until 3 seconds (approximately) after the first fan: 1. Check AS/0206 PCB to ensure connections at P4 and P5 are not loose. 2. Check cable connection at the fans. There should be 24 VDC (approximately) between the two pins at the fan. 3. Check cable wiring if faulty or return to factory for repair.
	Firmware not properly seated.	Fans are microprocessor controlled and monitored: 1. Ensure U11 and U12 on AS/0200 are properly seated. 2. Remove and replace AS/0200 PCB if damaged.
	Faulty 28V power supply.	Check the output voltage of the 28V power supply: 1. Either via the front panel SELECT: Monitor → PS menu, Web Server Interface 'Status | Status' page, or by using a voltmeter. 2. Ensure that 28V is present.
	Failed fan or faulty control circuitry.	Fan defective: 1. Replace fan. 2. Return to factory for repair re replacement.
Display not turning on, missing text, or incorrect backlighting.	1. Firmware not properly seated. 2. Faulty wiring or bad connections. 3. Failed display or display control card. 4. Circuitry on AS/0200 or AS/0206 PCB.	1. Ensure U11 and U12 on AS/0200 are properly seated. 2. Ensure good cable connections from M&C cards AS/0200 and AS/0206 to display card located behind front panel. Check cable wiring and if required return cables to factory. 3. Return to factory for repair. 4. Return to factory for repair.

Issue	Possible Cause(s)	Solution(s)
No RF output or ≤ output level.	1. Mute function activated. 2. Amplification = Off feature activated. 3. Large customer attenuation values selected. 4. Input power level not correct. 5. Faulty input connections from 9V supplies. 6. Fault KPA control cable or connection.	1. Check the configuration menu to determine if mute function has been activated. Mute = On Means that the unit is muted. Turn Mute feature to Off to allow RF amplification of the input signal. 2. The amplification = Off feature allows for lower current draw from the prime power source under standby conditions. To obtain RF output, ensure that this feature is set to amplification = On. 3. Check the Attenuation = XX setting in the configuration menu. Lower value to get more gain. 4. Use the input sample port on the front panel to determine that the input power level is as specified. Remove and replace the input cable. 5. Use the Monitor menu to check the internal level of the PS1 and PS2. The levels should be near 9V. If not correct, use a voltmeter to measure the voltage where the #8 wires enter the amplifier unit. With Unit Off, tighten connections if necessary. 6. Check the 25-pin ribbon cable connection at the amplifier module and at AS/0200 PCB. Tighten as necessary.
Failed KPA amplifier module.	This can usually be determined by using the Monitor menu to check the DC current levels being drawn by each transistor inside the amplifier module. Any transistor (QX) current that is 50% more or less than normal would probably indicate a failure.	Nominal Values: Q1 = 20mA Q2 = 100 mA Q3, Q4 = 1.0 A Q5, Q6, Q7 = 2.0 A Q8 to Q19 = 2.25 A Q20 to Q27 = 5.5 A There are no user serviceable parts inside the amplifier module. Return to factory for repair.
No remote control communication	1. Incorrect cable connections. 2. Improper communication settings between KPA and controlling terminal. 3. Entry mode of unit set to LOCAL.	1. Ensure cable is connected properly. 2. Check settings of KPA along with remote control terminal software. 3. Change entry mode setting in Configuration menu to Remote.

Issue	Possible Cause(s)	Solution(s)
Amplifier Temperature Fault	1. Operating temperature limits exceeded. 2. Air intake or air exhaust paths obstructed. 3. Fan failed. 4. Defective transistors in amplifier module.	1. Do not exceed 50°C (122°F) ambient input air temperature. 2. Remove obstructions to ensure adequate air flow and proper amplifier cooling. 3. Check fan operation. Remove and replace fan(s) as required. 4. Use Monitor menu to check transistor currents. Compare readings with the specified nominal values. Report excessive readings to the manufacturer for repair. *There are no user serviceable parts inside the KPA amplifier module.*
	Note: The KPA amplifier module contains an internal temperature monitor that will shut off the unit (i.e. turn off the 9V supplies) if the heat sink temperature becomes excessive. This prevents the overheating and destruction of the transistors. After cooling down below the trip point, the unit will automatically restart.	
9V power supply fault (PS1 and/or PS2)	1. Faulty wire or connection. 2. Excessive current draw from transistor inside amplifier module. 3. Faulty power supply.	1. Check cable and connections from PS1 and PS2 to amplifier module. On outside of module, measure voltage. Reading should be = 9.0 $\pm$ 0.5 VDC. 2. Use Monitor menus to check transistor currents. Record excessive values and return entire unit to manufacturer for repair. 3. Return failed power supply for repair. Replace with the new power supply.
Faulty/Improper Redundancy Switch Operation	1. Faulty wiring or connections. 2. Improper settings.	1. Ensure that the RF and control cables are connected. Poor RF performances would tend to indicate a faulty KPA cable/connector. a. Improper switch control would indicate a problem with the control cables. b. Ensure the ends of the cables labeled backup are connected to the backup unit. 2. Check redundancy setup in Configuration menu.

Notes:

Appendix B. KPA REDUNDANT OPERATIONS

B.1 Introduction

Comtech EF Data's KPA family of ISSPAs are designed to automatically sense and configure into Redundancy Mode when the redundant loop cable is connected. Polling on the dedicated redundancy bus will not begin until the redundancy loop cable is connected. Each KPA's designation in a redundant subsystem is determined automatically via the redundancy interface cable connected between the two (i.e., 1:1) or three (i.e., 1:2) KPAs in the redundant configuration.

All Comtech EF Data KPAs are designed to operate in both standalone and redundant configurations. Every KPA contains the circuitry and logic necessary to perform all the functions of a backup controller in both a 1:1 and 1:2 configuration. This includes the ability to monitor and control up to two RF waveguide switch assemblies. As note previously, the KPA has additionally been designed to automatically detect whether it is in a standalone or redundancy system. These features greatly simplify redundancy configurations from both the cost and operational complexity standpoint.

In a redundant configuration, the backup KPA in the redundancy subsystem automatically monitors the configuration and status for each of the primary (chained) KPAs. This information is communicated via the dedicated serial interface between the KPAs.

If a primary KPA fails, the backup detects this event and automatically reconfigures itself to the proper attenuation setting and positions the waveguide switch to provide minimal loss of traffic.

A result of this design is to greatly lessen the throughput requirements (i.e. polling rate) of earth station monitor and control systems. The backup KPA handles all of the time-critical tasks, allowing the earth station monitor and control system to focus on less intelligent subsystems.

B.2 Redundancy Operation

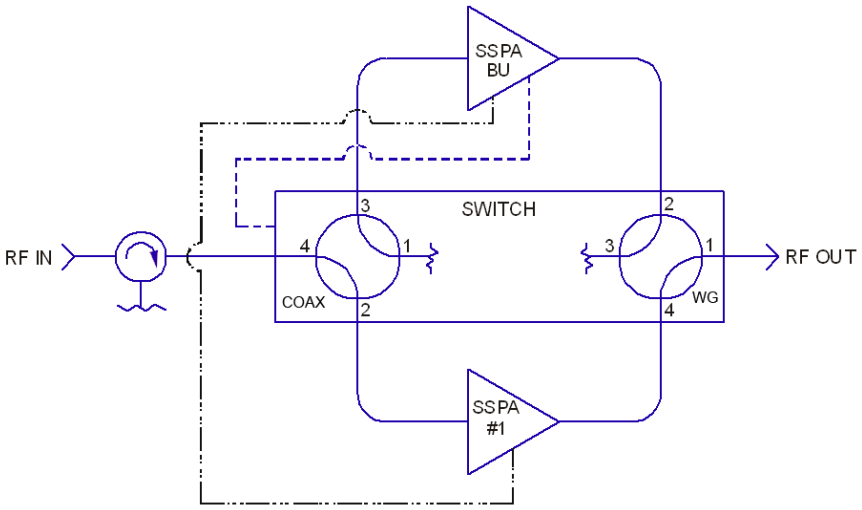


Figure B-1. 1:1 Redundancy Block Diagram

Figure B-1 shows the block diagram for a typical 1:1 redundant system. Whether 1:1 or 1:2 redundant operations are employed, note the following:

Normal Operation	Incoming RF signals are routed through the primary online SSPA (1:1), or SSPA (1:2) to the system output(s) by the combination waveguide/coax switch(es).
Controller Mode	With the backup SSPA in the controller mode, it monitors the Online Unit(s) for faults.
Fault	When a fault occurs in an Online Unit, the backup SSPA automatically configures itself with the settings of the faulted Online Unit. (These now active settings also incorporated any user defined offsets that may have been programmed into the Backup Unit.)
Waveguide	The position of the waveguide/coax switch also is automatically changes to route the signal through the Backup Unit, thereby minimizing the loss of traffic.

B.3 Redundancy Kit Installation

Comtech EF Data KPAs are easily configured for optional redundant operation by using an optional Redundancy Kits. These kits include all the necessary control, semi-rigid, and waveguide cabling, and the appropriate waveguide/coax switches and terminations. **Figure B-2** and **Figure B-4** show a typical 1:1 redundant system assembly; the associated parts lists are provided in **Table B-1**.

As shown, the primary and backup KPAs are typically installed adjacent to one another in a standard 19-inch wide (48 cm) equipment rack. Because of the configuration of the dual Waveguide Coax Switch, *the upper KPA always acts as the "Backup" unit*.

Note: Redundancy kits are available for 1:2 configurations, and provide all required cabling and switches. As 1:2 Redundancy Kits are typically designed to a customer's unique specifications,

they are not shown in this manual. Contact Comtech EF Data for 1:2 Redundancy Kits and their pertinent installation diagrams and assembly instructions.

Perform the installation as follows (refer also to **Figure B-2** and **Figure B-4**):

Step	Procedure
1	Assemble the waveguide load and bend to the proper port of the switch.
2	Attach the rigid lower waveguide arm, using the supplied screws. The switch should be installed with "Port 1" facing outward.
3	The upper Waveguide (flexible arm) along with the isolator bracket should be installed next.
4	Complete the installation by attaching the coaxial cables, coaxial load, and control cables.
5	Note that the installation of the control cables determines which unit will function as the backup KPA. Due to the nature of the dual WG-coax switch, this will always be the upper unit. Therefore, the end of the redundant loop cable (40, Figure 2-1) labeled "BU SSPA," should be connected to J4 of the upper (backup) unit.
6	The appropriate end of the control cable attaching to the Waveguide Switch (Item 50) should also be attached to the Backup Unit at the J7 RF SWITCH connector.

IMPORTANT

A gasket must be installed between each waveguide interface. If both waveguide surfaces are grooved, use a thick gasket. If only one surface is grooved, use a thin gasket.

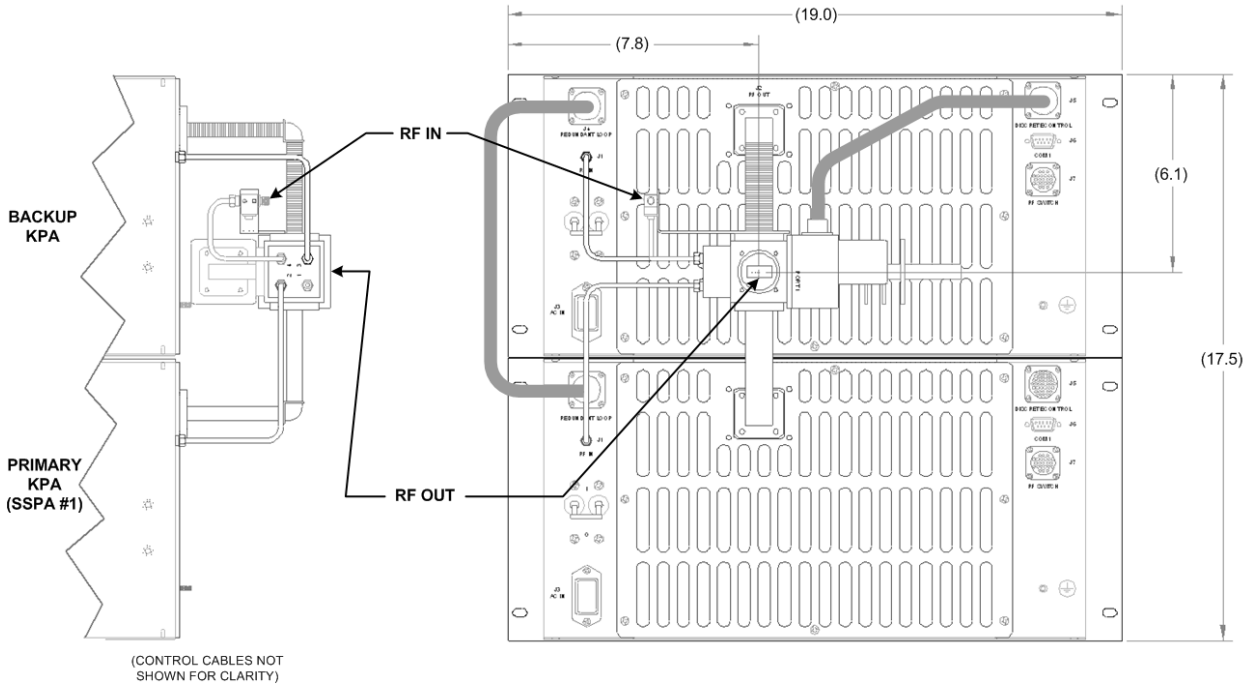
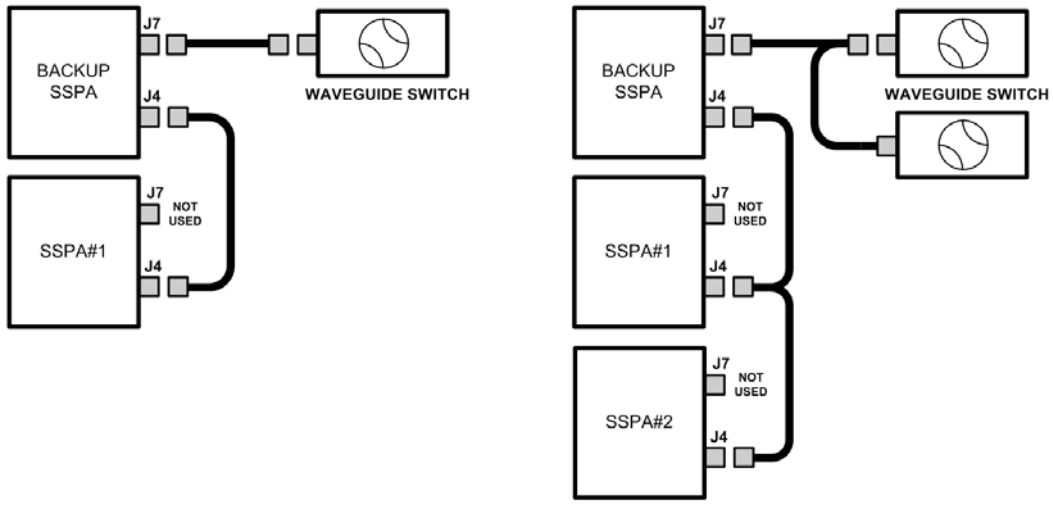


Figure B-2. 1:1 Redundancy Installation – Complete

B.3.1 Redundancy Kit Control Cabling

For either a 1:1 or a 1:2 redundant system, two control cable assemblies are required for setup as shown in **Figure B-3**. Other RF coaxial cables and waveguides are required as shown in **Figure B-4**.



1:1 System Control Cabling **1:2 System Control Cabling**

Figure B-3. KPA Redundancy System – Control Cabling Schematics

The redundant loop cable used for interconnection of the KPAs via their **J4 REDUNDANT LOOP** connectors, as shown in **Figure B-3** and **Figure B-4**, has the following characteristics:

- The cable assembly is not a "straight through" cable.
- The cable assembly is labeled "**BACKUP**" on one end, and "**KPA#1**" on the other end.
- The cable assembly is wired so that, when connected to two KPAs, one KPA will automatically configure itself as the Backup Controller and the other KPA will automatically configure itself as the 'Primary KPA'.
- The backup KPA communicates to the primary KPA via a serial interface that is also provided by this cable assembly. This interface is used by the Backup KPA to acquire configuration information from KPA #1. This interface additionally provides the link for virtual addressing as described in this manual in **Appendix C. REMOTE CONTROL**.
- Also included in this cable assembly are summary fault relay contacts that are used by the backup KPA as an input to its switching logic.

For 1:2 redundancy systems, note that the functionality described for the 1:1 cable assembly also applies to the 1:2 cable assembly; the only difference is that there is now a third connector, labeled "**KPA#2**", daisy-chained onto the cable assembly. When a third Comtech EF Data KPA is connected via this cable assembly, it will automatically configure itself as 'Primary KPA #2.'

A second cable assembly – a six-wire assembly – connects the Backup Unit's **J7 RF SWITCH** connector to the Waveguide Switch.

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Table B-1. KPA Redundancy Kits – Parts List

ITEM	CEFD PART NO.	QUANTITY (PER ASSY)		DESCRIPTION
		AS/0435	KPS-040	
10	CA/RF0075	1	–	Cable, Switch P3 to Backup (Upper) J1
	CA/RF0063	–	1	
20	CA/RF0076	1	–	Cable, Switch P2 to SSPA#1 (Lower) J1
	CA/RF0064	–	1	
30	CA/RF0065	1	1	Cable, Switch P4 to Isolator
40	CA/WR0006	1	1	Cable, Redundant Loop
50	CA/WR0007	1	1	Cable, Waveguide Switch to Backup (Upper) J7
60	CN/CX2001-6501-00	1	1	Connector – OSM, SMS, Plug Terminator
70	FP/BR0042	1	1	Bracket, Isolator Mounting
80	FP/WG0045	1	–	Waveguide, WR75, Backup (Upper) 90°
	FP/WG0022	–	1	
90	FP/WG0046	1	–	Waveguide, WR75, SSPA#1 (Lower) 90°
	FP/WG0023	–	1	
100	FP/WG0024	1	1	Waveguide, WR75, Elbow 90°
110	FP/WG0025	1	1	Waveguide, WR75, Termination 100W
120	GA/GSKTWR75FULL	7	7	Gasket, WR75, Full Thickness
130	03P1068	2	–	Screw, Philips Head, 0-80 x 3/16 LG
	HW/1.6MM	–	2	1.6mm Screw
140	HW/632X3/8SHCS-B	32	32	Screw, Socket Head Cap, 6-32 x 3/8 LG, Black
150	HW/6-SPLIT	32	32	Split Lock Washer, Stainless Steel, #0
160	RF/ISHF037306-001	1	–	RF – ISO, 13-16G, SMA – F/F
	RF/ISQC140145-1FF	–	1	
170	SW/WG-754AO	1	–	Switch, WR75, O-Ring, Dual WGSMA
	SW/WG-3SAG	–	1	
180	XX/P-SUPERO-LUBE	A/R	A/R	Parker Super O-Lube, 2 oz

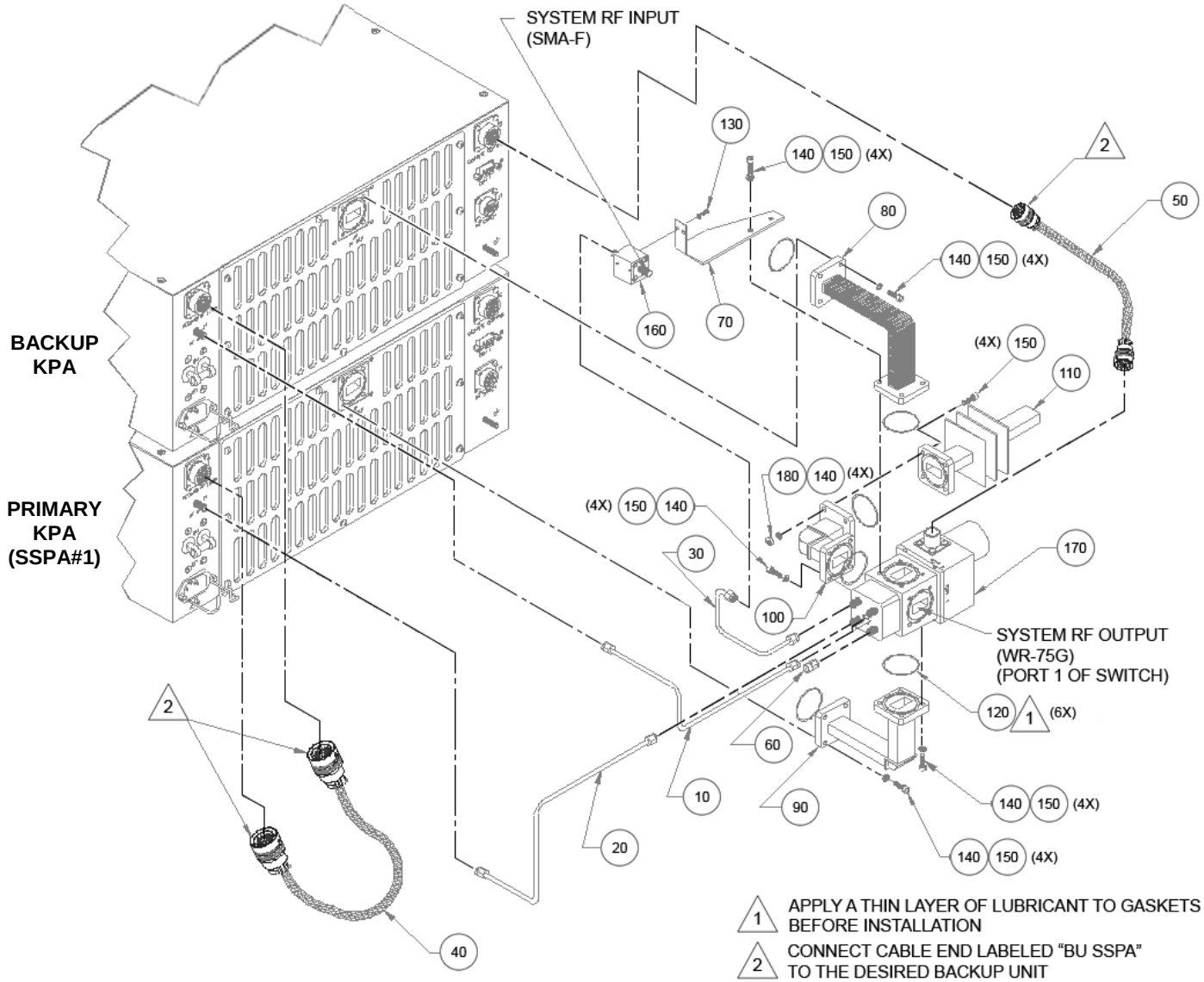

Figure B-4. 1:1 Redundancy Kit Assembly

B.4 Gain Equalization of Redundant Units

To equalize the gain between the Backup Unit and the Online Unit(s), Gain Offset adjustment is accomplished via the Backup Unit.

Before continuing, make sure that:

a) All external interface connections have been completed as outlined in Sect. B.3, and

b) The Online Unit is online and transmitting – this can be verified by observing the Online Unit's front panel LEDs, and through the pertinent configuration menus.

To determine the relative gain of the Backup Unit *versus* the Online unit(s):

Step	Procedure
1	Apply an RF signal to the RF redundancy input isolator. Monitor the output power level at the waveguide switch output. (Make sure not to apply too large of an input signal which will saturate the amplifiers. Also be sure to have a properly rated load to measure the output power.)
2	Adjust the input signal power level and attenuation of the Online Unit to arrive at the desired output power level.
3	Record the output level of the Online Unit in dBm.
4	Force the Backup Unit to be the active path as outlined in the **CONFIGURATION** Menu. Ensure the Offset Value at this point is 0.0 dBm. Record the output level in dBm of the Backup Unit.
5	If the output levels are equal, no more adjustment is necessary. Otherwise proceed as follows.

Section Notes:

B.4.1 Case Examples

Case 1. Backup ← Online unit(s)

1. Ensure the Online Unit attenuation is set to a value in dB greater than or equal (≥) to the difference in levels measured above.
2. With the Backup Unit forced to be the *active* unit, adjust the OFFSET value in the **CONFIG: Redundancy → SSPA#1** menu to approximately the difference measured previously. This will be a negative (-) number.
3. Toggle between the Online and Backup units as being the active path by forcing and un-forcing a backup through the Backup Unit's **CONFIG: Redundancy → SSPA#1** menu. Ensure the output levels measured are equal. If necessary, re-adjust the Offset Value until equal levels are measured. (Note that the Backup Unit's total attenuation level as now indicated in the **CONFIG: Amp → Attenuation** menu will be equal to the setting of the Online Unit less the OFFSET value.)

For Example:

Online Unit Output Level	47.00 dBm
Backup Unit Output Level	45.25 dBm
Backup Unit Offset Value	0.00 dBm
Online Attenuation Setting	3.00 dB (must be >1.75 dB)
AFTER TOGGLING AND ADJUSTING:	
Backup Offset Value	-1.75 dB
New Equalized Output Level	47.0 dBm
Backup Attenuation Setting	1.25 dB (3+(-1.75) = 1.25)

Section Notes:

Case 2. Backup → Online unit(s)

1. With the Backup Unit forced to be the active unit, adjust the Offset Value in the **CONFIG: Redundancy** menu to roughly the difference measured previously. This will be a positive (+) number.
2. Toggle between the online and Backup Units as being the active path by forcing and un-forcing a backup through the Backup Unit's **CONFIG: Redundancy → SSPA#1** menu. Make sure the output levels measured are equal. If necessary, re-adjust the Offset Value until equal levels are measured. (Note that the Backup Unit total attenuation level as now indicated in the **CONFIG: Amp → Attenuation** menu will be equal to the setting of the Online Unit plus the Offset Value.)

For Example:		
	Online Unit Output Level	47.00 dBm
	Backup Unit Output Level	48.75 dBm
	Backup Unit Offset Value	0.00 dBm
	Online Attenuation Setting	3.00 dB
	AFTER TOGGLING AND ADJUSTING:	
	Backup Offset Value	+1.75 dB
	New Equalized Output Level	47.00 dBm
	Backup Attenuation Setting	4.75 dB (3+(+1.75) = 4.75)

Section Notes:

Appendix C. REMOTE CONTROL

C.1 Overview

This appendix describes the protocol and message command set for remote monitor and control of the KPA ISSPA.

The electrical interface is either an EIA-485 multi-drop bus (for the control of many devices) or an EIA-232 connection (for the control of a single device), and data is transmitted in asynchronous serial form using ASCII characters. Control and status information is transmitted in packets of variable length, in accordance with the structure and protocol defined in later sections.

The default port is EIA-485 (2-wire); selection is made via the front panel **CONFIG: Remote → Serial → Interface** menu. See **Chapter 5. KPA FRONT PANEL OPERATION** for further information.

C.2 EIA-485

For applications where multiple devices are to be monitored and controlled, a full-duplex (or 4-wire plus ground) EIA-485 is preferred. Half-duplex (2-wire plus ground) EIA-485 is possible, but is not preferred. In full-duplex EIA-485 communication, there are two separate, isolated, independent, differential-mode twisted pairs, each handling serial data in different directions.

It is assumed that a 'Controller' device (a PC or dumb terminal) transmits data in a broadcast mode via one of the pairs. Many 'Target' devices are connected to this pair, and all simultaneously receive data from the Controller. The Controller is the only device with a line-driver connected to this pair – the Target devices have only line-receivers connected.

In the other direction, on the other pair each Target has a tri-state line driver connected, and the Controller has a line-receiver connected. All the line drivers are held in high-impedance mode until one (and only one) Target transmits back to the Controller. Each Target has a unique address, and each time the Controller transmits, the address of the intended recipient Target is included in a framed 'packet' of data.

All of the Targets receive the packet, but only one (the intended) will reply. The Target enables its output line driver and transmits its return data packet back to the Controller in the other direction, on the physically separate pair.

EIA-485 (full duplex) summary:

- Two differential pairs – one pair for Controller-to-Target, one pair for Target-to-Controller.
- Controller-to-Target pair has one line driver (Controller), and all Targets have line-receivers.
- Target-to-Controller pair has one line receiver (Controller), and all Targets have Tri-State drivers.

C.3 EIA-232

This is a much simpler configuration in which the Controller device is connected directly to the Target via a two-wire-plus-ground connection. Controller-to-Target data is carried, via EIA-232 electrical levels, on one conductor, and Target-to-Controller data is carried in the other direction on the other conductor.

C.4 Basic Protocol

Whether in EIA-232 or EIA-485 mode, all data is transmitted as asynchronous serial characters, suitable for transmission and reception by a UART. The asynchronous character format is 8-N-1 (8 data bits, no parity, one stop bit). Five (5) baud rates are supported: 2400 baud, 4800 baud, 9600 baud, 19200 baud, and 38400 baud.

All data is transmitted in framed packets. The Controller is assumed a PC or ASCII dumb terminal that is in charge of the process of monitor and control. The Controller is the only device that is permitted to initiate, at will, the transmission of data. Targets are only permitted to transmit when they have been specifically instructed to do so by the Controller.

All bytes within a packet are printable ASCII characters, less than ASCII code 127. In this context, the Carriage Return and Line Feed characters are considered printable.

All messages from Controller-to-Target require a response (with one exception). This will be either to return data that has been requested by the Controller, or to acknowledge reception of an instruction to change the configuration of the Target. The exception to this is when the Controller broadcasts a message (such as Set Time/Date) using Address 0, when the Target is set to EIA-485 mode.

C.5 Packet Structure

Controller-to-Target						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
< ASCII code 60 (1 character)	 (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	= or ? ASCII codes 61 or 63 (1 character)	 (n characters)	Carriage Return ASCII code 13 (1 character)

Example: <0412/MUT=1{CR}

Target-to-Controller						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
>ASCII code 62 (1 character)	 (4 characters)	/ ASCII code 47 (1 character)	 (3 characters)	=, ?, !, or * ASCII codes 61, 63, 33, or 42 (1 character)	 (From 0 to n characters)	Carriage Return, Line Feed ASCII codes 13,10 (2 characters) -OR- Carriage Return, Line Feed ASCII codes 13,10 (3 characters)

Example: >0412/MUT=1{CR}{LF}

If it is an error message or an old remote command, ‘]’ will show at the end.

Example: >1?ATT_INVALID PARAMETER'cr"lf']

C.5.1 Start of Packet

Controller-to-Target: This is the character ‘<’ (ASCII code 60).

Target-to-Controller: This is the character ‘>’ (ASCII code 62).

Because this is used to provide a reliable indication of the start of packet, these two characters may not appear anywhere else within the body of the message. The only exceptions are in command RMS and CMS where the response is “FWPWR=<19.0”.

C.5.2 Target Address

Up to 9,999 devices can be uniquely addressed. In both EIA-232 and EIA-485 applications, the permissible range of values is 1 to 9999. It is programmed into a target unit using the remote control port.

The controller sends a packet with the address of a target - the destination of the packet. When the target responds, the address used is the same address, to indicate to the controller the source of the packet. The controller does not have its own address.

C.5.3 Address Delimiter

This is the “forward slash” character '/ ' (ASCII code 47).

C.5.4 Instruction Code

This is a three-character alphabetic sequence that identifies the subject of the message. Wherever possible, the instruction codes have been chosen to have some significance. This aids in the readability of the message if seen in its raw ASCII form. Both upper and lower case alphabetic characters may be used (A-Z ASCII codes 65-90 and a-z ASCII codes 97-122).

C.5.5 Instruction Code Qualifier

This is a single character, which further qualifies the preceding instruction code. Code Qualifiers obey the following rules:

1. ***From Controller-to-Target***, the only permitted values are:

Symbol	Definition
= **(ASCII code 61)**	The **=** code is used as the **assignment** operator, and is used to indicate that the parameter defined by the preceding byte should be set to the value of the argument(s) that follow it. **Example:** In a message from Controller to Target, MUT=1 would mean ‘enable the mute function.’
? **(ASCII code 63)**	The **?** (ASCII code 63) is used as the **query** operator, and is used to indicate that the Target should return the current value of the parameter defined by the preceding byte. **Example:** In a message from Controller to Target, MUT? would mean ‘return the current state of the mute function.’

2. ***From Target-to-Controller***, the only permitted value is:

Symbol	Definition
= **(ASCII code 61)**	The = code is used in two ways: First, if the controller has sent a query code to a target (for example MUT?, meaning 'is mute enable or disable?'), the target would respond with MUT=x, where x represents the state in question: 1 being 'enable' and 0 being disable. Second, if the controller sends an instruction to set a parameter to a particular value, then, providing the value sent in the argument is valid, the target will acknowledge the message by replying with MUT= (with no message arguments).

3. The KPA will display the following error messages:

>DEV?COM_COMMAND UNRECOGNIZED'cr"lf']
>DEV?COM_INVALID PARAMETER'cr"lf']
>DEV?COM_DEVICE IN LOCAL MODE'cr"lf']
>DEV?COM_DEVICE IN AUTO MODE'cr"lf']
>DEV?COM_COMMAND NOT AVAILABLE'cr"lf']
>DEV?COM_DEVICE IS NOT IN SERIAL MODE'cr"lf']
>DEV?COM_DEVICE IS NOT IN ETHERNET MODE'cr"lf']

C.5.5.1 Backward Compatibility Code Qualifier

The current firmware version (FW Ver. 2.X.X and higher) supports both the current and old (FW Ver. 1.X.X) remote commands and queries, and is therefore backward compatible.

The KPA uses code qualifier '_' to identify the command as an old (i.e., FW Ver. 1.X.X) remote command. If it is, it will respond with the old format:

<001/MUT_OFF'cr'
>001/MUT_OFF'cr"lf']

SEE SECT. C.7 FOR THE LISTING OF OLD REMOTE COMMANDS.

C.5.6 Optional Message Arguments

Arguments are not required for all messages. Arguments are ASCII codes for the characters 0 to 9 (ASCII codes 48 to 57), period (ASCII code 46), and comma (ASCII code 44).

C.5.7 End of Packet

Controller-to-Target: This is the ‘Carriage Return’ character (ASCII code 13).

Target-to-Controller: This is the two-character sequence ‘Carriage Return’, ‘Line Feed’ (ASCII codes 13 and 10). Both indicate the valid termination of a packet.

For the error message or the old remote command, it is the three-character sequence ‘Carriage Return’, ‘Line Feed’, ‘]’ (ASCII codes 13, 10, and 93).

All indicate the valid termination of a packet.

C.6 Remote Control Using FW Version 2.X.X and Higher (CURRENT)

Where Column 'C' = Command; Column 'Q' = Query: Columns marked (X) indicate Command only, Query only, or Command/Query for Instruction Code.

Instr Code	C	Q	Page
AFR	X	X	C-8
AMP	X	X	C-8
ATT	X	X	C-8
CAE	X		C-8
CAS		X	C-8
CFS		X	C-9
CID	X	X	C-9
CMS		X	C-9
DAT	X	X	C-9
DAY	X	X	C-9
ESW	X	X	C-10
FBU	X	X	C-10
FRW		X	C-10
GAC	X	X	C-10
IEP	X		C-10
IPA	X	X	C-11
IPG	X	X	C-11
LCD	X	X	C-11
LRS	X	X	C-11
MAC		X	C-11
MSK	X	X	C-11
MUT	X	X	C-12
NUE		X	C-12

Instr Code	C	Q	Page
PNM		X	C-12
PRI	X	X	C-12
RAS		X	C-12
RBT	X		C-13
RCS		X	C-13
RED		X	C-13
REF	X	X	C-13
RET		X	C-13
RFS		X	C-14
RMS		X	C-14
RNE		X	C-15
SBR	X	X	C-15
SNO		X	C-15
SPA	X	X	C-16
TIM	X	X	C-16
TMP		X	C-16

C.6.1 Remote Commands and Queries (FW Version 2.X.X and Higher)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Auto Fault Recovery	AFR=	1 byte, value of 0, 1	Command or Query. The SSPA output will automatically be muted in the event of detected fault. If auto fault recovery is enabled, it will cause the output to go active (un-mute) if all faults are cleared. If disabled, the output will remain muted even if all faults are cleared.	AFR?	AFR=x (same format as command arguments)
RF Power Amplifier State	AMP=	1 byte, value of 0, 1	Command or Query. Turns ON or OFF the RF power amplifiers. 0 = Off 1 = On Example: AMP=1	AMP?	AMP=x (same format as command arguments)
Attenuation	ATT=	5 bytes, numerical	Command or Query. Valid attenuation level, in dB, at 0.25-dB step size as factory default. Example: ATT=12.25	ATT?	ATT=xx.xx (same format as command arguments)
Clear All Stored Events	CAE=	None	Command only. Instructs the KPA to clear all Stored Events This command takes no arguments. Example: <1/CAE='cr'	N/A	N/A
Concise Alarm Status	N/A	variable length, alpha numerical	Query only. Used to Query the Alarm status of the unit. Example: <0001/CAS? >0001/CAS=a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;'cr''lf' where: 0 = OK, 1 = Fault, 3 = Not Applicable, 4 = Alarm, 5 = Masked a = 28V Power Supply b = 15V Power Supply c = 7.5V Power Supply d = 5V Power Supply e = -5V Power Supply f = 9V or 10V RF Power Supply 1 g = 9V or 10V RF Power Supply 2 h = Heat-Sink Temperature 1 i = Heat-Sink Temperature 2 j = Isolator Load Temperature k = Shutdown l = Fan 1 m = Fan 2 n = BUC o = External Reference	CAS?	CAS=x….x (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Concise RF Power FET Current Status	N/A	variable length	Query only. Concise version of RFS. Example: CFS=xx.x;xx.x;xx.x;xx.x;…….;xx.x;	CFS?	CFS=x…..x (see description of RFS. Note that each argument is separated by a semicolon)
Circuit Identification	CID=	48 bytes, alphanumeric	Command or Query. Used to identify or name the unit or station. First line is limited to 24 characters. Second line is also limited to 24 characters. No carriage return between first line and second line. Example: CID='cr' --Earth Station 1— ---Converter #1----	CID?	CID=x…x (see Description of Arguments)
Concise Maintenance Status	N/A	variable length, alpha numerical	Query only. Query the Maintenance status of the unit in concise format. Response is semicolon delimited. Example: <0001/CMS? >0001/CMS=aa.a;bb.b;c.c;d.d;ee.e;ff.f;gg.g;hhh.h;iii.i;jjj.j;kkk.k;lll.l;mmm.m where, aa.a = 28V Power Supply bb.b = 15V Power Supply c.c = 7.5V Power Supply d.d = +5V Power Supply ee.e = -5V Power Supply ff.f = 9V or 10V RF Power Supply 1 gg.g = 9V or 10V RF Power Supply 2 hhh.h = Unit temperature 1 in deg. C iii.i = Unit temperature 2 in deg. C jjj.j = Isolator Load Temperature kkk.k = Forward RF output power, in dBm lll.l = Reverse RF output power, in dBm mmm.m = Ref. Osc. Tuning voltage If it is not applicable, it will display x.x	CMS?	CMS=x….x (see Description of Arguments)
Set RTC(Real-Time-Clock) Date US format	DAT=	6 bytes, numerical	Command or Query. A command in the form mmddyy, where; dd = day of the month, between 01 and 31, mm = month of the year, between 01 and 12 and yy = year, between 00 and 99 (2000 to 2099) Example (date = April 25, 2003): <0001/DAT=042503'cr' >0001/DAT='cr''lf'	DAT?	DAT=xxxxxx (same format as command arguments)
Set RTC(Real-Time-Clock) Date	DAY=	6 bytes, numerical	Command or Query. A command in the form ddmmyy, where; dd = day of the month, between 01 and 31, mm = month of the year, between 01 and 12 and yy = year, between 00 and 99 (2000 to 2099) Example (date = April 25, 2003): <0001/DAY=250403'cr' >0001/DAY='cr''lf'	DAY?	DAY=xxxxxx (same format as command arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Enable Redundancy Switch Mode	ESW=	1 byte, value of 0, 1, 2	Command or Query (backup unit only). Turns ON or OFF the redundancy state, where: 0 = Off (Manual Mode) 1 = 1:1 Redundancy (Auto Mode) 2 = 1:2 Redundancy (Auto Mode) Example: <1/ESW=1'cr' >0001/ESW='cr''lf'	ESW?	ESW=x
Force Back-Up State	FBU=	1 byte, value of 0, 1, 2	Command or Query (backup unit only). When ESW is off, force one of the online units to be a back-up for maintenance and test purposes, where: 0 – no force back-up 1 – force KPA 1 to go offline 2 – force KPA 2 to go offline	FBU?	FBU=x (see description)
Retrieve Firmware Number	N/A	variable length, alpha numerical	Query only. Gets the Firmware Number of the unit. Example: >0001/FRW= Boot: FW-0000085;2.0.0a;02/21/08 Bulk: FW-0000086;2.0.0a;02/21/08 FW-0000087;2.0.0a;02/21/08 FW-0000088;2.0.0a;02/21/08	FRW?	(see Description of Arguments)
Global Amplifier Configuration	GAC=	variable length, alpha numerical	Command or Query. Used to set up and query the global status of the amplifier. Example: GAC=aa.aabcdef'cr' where: aa.aa = Customer Attenuation (ATT) b = RF power amplifier state (AMP) c = mute state (MUT) d = online status (RED) e = redundancy mode (ESW) f = Auto Fault Recovery (AFR) NOTE: If it is not applicable, it will display x.	GAC?	GAC=x….x (see Description of Arguments)
Initialize Events Pointer	IEP=	None	Command only. Resets internal pointer to allow RNE? Queries to start at the beginning of the stored events log. Example: IEP=	N/A	N/A

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
IP Address	IPA=	18 bytes	Command or Query. Used to set the IP address and network prefix for the 10/100 BaseTx Ethernet management port, in the format xxx.xxx.xxx.xxx.yy, where: xxx.xxx.xxx.xxx is the IP address, and yy is the network prefix (8..30) Example: IPA=010.006.030.001.24	IPA?	IPA= xxx.xxx.xxx.xxx.yy
Gateway Address	IPG=	15 bytes	Command or Query. Used to set the Gateway IP address for the 10/100 Base Tx Ethernet management port, in the format xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx is the IP address Example: IPG = 010.006.030.001	IPG?	IPG = xxx.xxx.xxx.xxx
Front Panel LCD Brightness	LCD=	2 bytes 00 to 30	Command or Query. Front Panel LCD Brightness 00 to 09 : LCD Brightness 25% 10 to 19 : LCD Brightness 50% 20 to 29: LCD Brightness 75% 30: LCD Brightness 100% Example: LCD=30	LCD?	LCD=xx
Local/Remote State	LRS=	1 byte, value of 0, 1, 2	Command or Query. Set Remote Entry Mode. 0 = Local, 1=Serial, 2=Ethernet Example: LRS=1 NOTE: The customer will always have query access when using serial and telnet. Also, the LRS command is available in all modes as a means of acquiring control. The intent of this command is to limit changes from being made on multiple interfaces at the same time.	LRS?	LRS=x (see Description of Arguments)
Unit MAC Address	N/A	17 bytes	Query only. MAC address of the unit, reported in hexadecimal. Example: MAC=00-06-B0-00-D2-A7	MAC?	MAC=AA-BB-CC-DD-EE-FF
Unit Alarm Mask	MSK=	1 byte, Value of 0, 1, 2	Command or Query. Alarm mask conditions. If an alarm is masked, neither an alarm or a fault is set, and the user will not know of a problem. Form of a, where: 0 = Alarm, 1 = Fault, 2 = Masked a = External Reference Lock detect The default value is 2 There could be a variable delay in the time it takes for the internal reference to lock to an external reference, due warm-up characteristics and frequency differences between the references. Therefore, the default setting is "masked" for the reference lock detect. This setting may be changed if the customer so desires. The delay should be less than 1 s after 30 minutes of warm-up time.	MSK?	MSK=a (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Mute State	MUT=	1 byte, value of 0,1	Command or Query. Mute the unit, where: 0 = Disabled, 1 = Enabled Example: MUT=1	MUT?	MUT=x (same format as command arguments)
Number of Unread stored Events	N/A	3 bytes, numerical	Query only. Returns the number of Stored Events which remain unread, in the form xxx. Example reply: NUE=018	NUE?	NUE=xxx (see Description of Arguments)
Part Number	N/A	Various 1-96 bytes, alpha-numeric	Query only. Returns the Comtech EF Data part number of the unit. This part number is the unit's DOTCODE at the time it was manufactured. The DOTCODE may be up to 96 printable ASCII characters long. Example: <1/PNM?'cr' >0001/PNM=HPODC0.350WRSW00'cr''lf'	PNM?	PNM=x….x (see Description of Arguments for return string)
Priority Select	PRI=	1 byte, value of 1, 2	Command or Query (backup unit only). This command allows the user to assign priority when operating in a 1:2 redundant subsystem. This command provides arbitration in the event that both primary KPAs are faulted simultaneously. Example: PRI=1	PRI?	PRI=x (same format as command arguments)
Retrieve Alarm Status	N/A	variable length, alpha numerical	Query only. Used to Query the Alarm status of the unit. Example: <0001/RAS? >0001/RAS= +28=FT +15=OK +7.5=OK +5=OK -5=OK RF_PS1=OK RF_PS2=xx TEMP1=OK TEMP2=xx LTEMP=xx SHTD=OK FAN1=OK FAN2=OK BUCLD=OK XRFLD=OK TRMST=YS If it is not applicable, it will display xx. FT – fault AL – alarm MS – masked YS – yes	RAS?	RAS=x….x (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Reboot	RBT=	1 byte	Command only. Soft Reboot 1 = Reboot System Example: RBT=1	N/A	N/A
Retrieve Configuration Status	N/A	variable length, alpha numerical	Query only. Used to Query the configuration status of the unit. Example: RCS='cr' ATT=10.00 AMP=1 MUT=0 RED=1 ESW=0 AFR=1 XRF=N/A NOTES: 1. XRF = External reference status, where: N/A = no external reference 05M = 5 MHz 10M = 10 MHz XRF will always be N/A if the internal reference oscillator option is not installed. 2. If a parameter it is not applicable, it will display x. Example: ESW=x	RCS?	RCS=x….x (see Description of Arguments)
Online Status	N/A	1 byte, value of 0, 1	Query only. Online status (applies only to redundancy), where: 0 = Offline 1 = Online Example: <0001/RED?'cr' >0001/RED=1'cr''lf'	RED?	RED=x
Reference Oscillator Adjust	REF=	3 bytes, numerical	Command or Query. Ref Osc Adjust, between 000 and 255. Resolution 001. (Optional installation) Example: REF=087 Note: REF cannot be adjusted when the unit is locked to an external reference source.	REF?	REF=x (same format as command arguments)
Retrieve Equipment Type	N/A	variable length, alphanumerical	Query only. The unit returns a string indicated the Model Number and the value of internal software revision installed. Example: RET=KPA100-4045-I REF BUC VER: 1.03	RET?	RET=x….x (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
FET Current status	N/A	variable length	Query only. Used to display all the FET currents. Q01 and Q02 are in mA. All other FETs are in Amps. If it is not applicable, it will display xx.x. Example: RFS? Q01=xx.x'cr' Q02=xx.x'cr' Q03=xx.x'cr' Q04=xx.x'cr' … Q32=xx.x'cr' Q33=xx.x'cr' Q34=xx.x'cr''lf'	RFS?	RFS=x….x (see Description of Arguments)
Retrieve Maintenance Status	N/A	variable length, alpha numerical	Query only. Used to query the maintenance status of the unit. Example: <0001/RMS? >0001/RMS= V+28=+27.8 V+15=+15.0 V+7.5=+7.8 V+5=+5.0 V-5=-5.0 RF_PS1=09.9 RF_PS2=10.0 TEMP1=+09.0 TEMP2=-10.0 LTEMP=+10.0 FWPWR=029.0 RVPWR=<12.0 REFVT=+04.3 If it is not applicable, it will display xx.x – Example: TEMP2=xxx.x	RMS?	RMS=x….x (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Retrieve Next 5 unread stored Events	N/A	variable length	Query only. Unit returns the oldest 5 Stored Events which have not yet been read over the remote control. Reply format: {CR}Subbody{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Subbody, where Sub-body= ABCddmmyyhhmmss, A being the fault/clear indicator. F=Fault C=Clear I=Info B being the fault type where: 1=Unit 2=RF 3=Log C is Fault Code 0=+5V Power Supply 1=+7.5V Power Supply 2=+15V Power Supply 3=RF Power Supply 1 (KPA20 and KPA40) 4=RF Power Supply 2 (KPA20 and KPA40) 5=RF Power Supply 1 (KPA80, KPA100 and CPA) 6=RF Power Supply 2 (KPA80, KPA100 and CPA) 7=Fan #1 8=Fan #2 9=BUC LD A=External Reference B=Over Temperature C=Temp Shutdown D=+28V Power Supply E=-5V Power Supply If there are less than 5 events to be retrieved, the remaining positions are padded with zeros. If there are no new events, the response is >DEV?RNE_COMMAND NOT AVAILABLE'cr''lf'] RNE?	RNE?	RNE={CR}ABCddmmyyhhmmss{CR}ABCddmmyyhhmmss{CR}ABCddmmyyhhmmss{CR}ABCddmmyyhhmmss{CR}ABCddmmyyhhmmss (see Description of Arguments)
Remote Baud Rate	SBR=	4 bytes, alpha-numeric	Command or Query. Set remote baud rate as follows: 2400 = 2400 baud 4800 = 4800 baud 9600 = 9600 baud 19K2 = 19200 baud 38K4 = 38400 baud	SBR?	SBR=xxxx (same format as command arguments)
Serial Number	N/A	9 bytes, numerical 000000000 to 999999999	Query only. Used to Query the units 9 digit serial number. Slave returns its S/N, in the form xxxxxxxxx. Example: SNO=000000165	SNO?	SNO=xxxxxxxxx (see Description of Arguments)

Parameter Type	Command (Instr Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes, i.e., ASCII codes between 48 and 57)	Query (Instr Code and Qualifier)	Response to Query (Target to controller)
Remote Address	SPA=	4 byte, numerical	Command or Query. Set Physical Address-between 0001 to 9999. Resolution 0001 Example: SPA=0412	SPA?	SPA=xxxx (same format as command arguments)
Set RTC Time	TIM=	6 bytes, numerical	Command or Query. A command in the form hhmmss, indicating the time from midnight, where hh = hours, between 00 and 23; mm = minutes, between 00 and 59, and ss = seconds, between 00 and 59 Example: TIM=231259 would be 23 hours, 12 minutes and 59 seconds from midnight.	TIM?	TIM=xxxxxx (same format as command arguments)
Temperature	N/A	4 bytes	Query Only. Returns the temperatures of the heat sink in the form of a sign byte followed by 3 bytes for the temperature. Example: TMP=+26.0	TMP?	TMP=sxxx (see Description of Arguments)

C.7 Remote Control Using Firmware Version 1.X.X (OLD)

The following index table summarizes the OLD remote control commands – including commands supported by Virtual Addressing Mode as indicated with an 'X' in the VAM column – and their location (section and page number) in this appendix.

Old Command Type / Appendix Section	Command	Display	Page	VAM
Old Utility Commands C.7.1	Set Time	**<DEV/TIM_hh:mm:ss'cr'**	C-18	
	Set Date	**<DEV/DAT_mm/dd/yy'cr'**	C-18	
	Set Physical Address	**<DEV/SPA_xxx'cr'**	C-18	
	Set Baud Rate	**<DEV/SBR_xxxx'cr'**	C-18	
	Set Parity Rate	**<DEV/SPB_xxxx'cr'**	C-18	
	Set LCD Contrast	**<DEV/CON_xx'cr'**	C-18	
	Set LCD Brightness	**<DEV/LCD_xx'cr'**	C-18	
	Lamp Test (KPA-020IN)	**<DEV/LAM_xxx'cr'**	C-18	
	Retrieve Equipment type	**<DEV/RET_'cr'**	C-19	X
	Set Application ID Message	**<DEV/AID_xxx…xxx'cr'**	C-19	
	Set Local/Remote Mode (KPA-040)	**<DEV/LRS_x'cr'**	C-19	
Old Configuration Commands C.7.2	Set Amplifier On/OFF	**<DEV/AMP_xxx'cr'**	C-20	X
	Mute/Unmute	**<DEV/MUT_xxx'cr'**	C-20	X
	Set Attenuation	**<DEV/ATT_xx.xx'cr'**	C-20	X
	Select Auto Fault Recovery	**<MDEV/AFR_xxx'cr'**	C-20	X
Operating Mode Commands C.7.3	Select Auto/Manual Mode	**<DEV/SAM_y'cr'**	C-21	
	Forced Backup Mode	**<DEV/FBU_x_y'cr'**	C-21	
	Select Priority	**<DEV/PRI_x'cr'**	C-21	
Old Status Commands C.7.4	Retrieve Configuration Status	**<DEV/RCS_'cr'**	C-22	X
	Retrieve Maintenance	**<DEV/RMS_'cr'**	C-22	X
	Retrieve FET Status	**<DEV/RFS_'cr'**	C-22	X
	Retrieve Utility Status	**<DEV/RUS_'cr'**	C-24	X
	Retrieve Alarm Status	**<DEV/RAS_'cr'**	C-24	X
	Summary Alarm Status	**<DEV/SAS_'cr'**	C-25	X
	Terminal Status Change	**<DEV/TSC_'cr'**	C-25	X
	Packed Configuration Status	**<DEV/PACRCS_'cr'**	C-25	X
	Packed Maintenance Status	**<DEV/PACRMS_'cr'**	C-28	X
	Packed FET Status	**<DEV/PACRFS_'cr'**	C-28	X
	Packed Utility Status	**<DEV/PACRUS_'cr'**	C-28	X
	Packed Alarm Status	**<DEV/PACRAS_'cr'**	C-28	X
Old Stored Alarm Commands C.7.5	Retrieve Total Stored Alarms	**<DEV/TSA_'cr'**	C-28	
	Clear All Stored Alarms	**<DEV/CAA_YES'cr'**	C-28	
	List All Stored Alarms	**<DEV/LAA_'cr'**	C-28	

C.7.1 Old Utility Commands

Time	Set Time: Confirmation: Retrieve Time: Confirmation:	**<DEV/TIM_hh:mm:ss'cr'** **>DEV/TIM_hh:mm:ss 'cr''lf']** **<DEV/TIM_'cr'** **>DEV/TIM_hh:mm:ss 'cr''lf']**	Where: hh = Hour mm = Minutes ss = Seconds Note: 24-hour military is used.
Date	Set Date: Confirmation:	**<DEV/DAT_mm/dd/yy'cr'** **>DEV/DAT_mm/dd/yy/'cr''lf']**	Where: mm = Month dd = Day yy = Year
Physical Address	Set Physical Address : Confirmation: Retrieve Physical Address: Confirmation:	**<DEV/SPA_xxx'cr'** **>DEV/SPA_xxx'cr''lf']** **<DEV/SPA_'cr'** **>DEV/SPA_xxx'cr''lf']**	Where: xxx = 1 to 255 The default physical address is 1.
Baud Rate	Set Baud Rate: Confirmation: Retrieve Baud Rate: Confirmation:	**<DEV/SBR_xxxx'cr'** **>DEV/SBR_xxxx'cr''lf']** **<DEV/SBR_xxxx'cr'** **>DEV/SBR_xxxx'cr''lf']**	Where: xxxx = 300, 1200, 2400, 4800, or 9600 The default baud rate is 9600.
Parity Bit	Set Parity Bit: Confirmation: Retrieve Parity Bit: Confirmation:	**<DEV/SPB_xxxx'cr'** **>DEV/SPB_xxxx'cr''lf']** **DEV/SPB_'cr'** **DEV/SPB_xxxx'cr''lf']**	Where: xxxx = Odd or Even The default parity is Even.
LCD Contrast	Set Contrast: Confirmation: Retrieve Contrast: Confirmation:	**<DEV/CON_xx'cr'** **>DEV/CON_xx'cr''lf']** **<DEV/CON_'cr'** **>DEV/CON_xx'cr''lf']**	Where: xx = 0 to 30 The default is contrast 15.
LCD Brightness	Set Brightness: Confirmation: Retrieve Brightness: Confirmation:	**<DEV/LCD_xx'cr'** **>DEV/LCD_xx'cr''lf']** **<DEV/LCD_'cr'** **>DEV/LCD_xx'cr''lf']**	Where xx = 0 to 30 The default is contrast 15.
Lamp Test **KPA-020IN**	**Test Lamps:** **Confirmation:** **Lamp Test Status:** **Confirmation:**	**<DEV/LAM_xxx'cr'** **>DEV/LAM_xxx'cr''lf']** **<DEV/LAM_'cr'** **>DEV/LAM_xxx'cr''lf']**	**Where: xxx = On or Off**

Equipment Type	Retrieve Equipment Type: Confirmation:	**<DEV/RET_'cr'** **>DEV/RET_xxxxxxx yyyyy'cr''lf']**	Where: xxxxxxx = Model No. yyyyy = Software Version **Example:** >DEV/RET_K080-4045-I SW_1.02 Equipment Type is a command that retrieves the model number and software version of the equipment. The information cannot be changed by command.
Application Identification	Application ID: Confirmation: Retrieve ID: Confirmation:	**<DEV/AID_xxxxxxx…xxxxx'cr'** **>DEV/AID_'cr'xxxxxxxxxxxxxxxxxxxxxxx'cr'** **xxxxxxxxxxxxxxxxxxxxxxx'cr''lf']** **<DEV/AID_'cr'** **>DEV/AID_'cr'xxxxxxxxxxxxxxxxxxxxxxx'cr'** **xxxxxxxxxxxxxxxxxxxxxxx'cr''lf'**	Where: XXXXXXX …XXXXX = Message, maximum 48 characters The Application Identification (AID) command allows a free form message to be created. It is intended to identify the satellite transponder, beam, destination or other aspects of the application that may be significant to operations. The message length corresponds to capability of the LCD and is 48 characters in total. The second line begins at character 25; therefore, blanks must be used after line 1 information in order to space to line 2. A carriage return ends the command. Trailing blanks will be generated to fill the LCD field. The AID display will alternate with the Equipment type display by use of the clear function key on the front panel. The default is “AID MESSAGE.”
Local/Remote Entry Mode Status **KPA-040**	**Local/Remote Control:** **Confirmation:** **Retrieve Local/Remote Status:** **Confirmation:**	**<DEV/LRS_x'cr'** **>DEV/LRS_x'cr''lf']** **<DEV/LRS_'cr'** **>DEV/LRS_x'cr''lf']**	**Where: x= 0 for Local or 1 for Remote**

C.7.2 Old Configuration Commands

Amplifier On/OFF	Amplifier Control: Confirmation: Retrieve AMP Status: Confirmation:	**<DEV/AMP_xxx'cr'** **>DEV/AMP_xxx'cr''lf']** **<DEV/AMP_'cr'** **>DEV/AMP_xxx'cr''lf']**	Where: xxx = On or Off The default is On. The Comtech EF Data KPA provides the user direct control of the 9VDC supply voltage to the solid-state RF power FETs. This feature provides the ability to put the KPA into a low power consumption mode when the unit is offline.
Mute	Mute Output: Confirmation: Retrieve Mute Status: Confirmation:	**<DEV/MUT_xxx'cr'** **>DEV/MUT_xxx'cr''lf']** **<DEV/MUT_'cr'** **>DEV/MUT_xxx'cr''lf']**	Where: xxx = On or Off The default is On. The user is provider output mute control via the remote interface using this command.
Attenuator	Set Attenuator: Confirmation: Retrieve Attenuator: Confirmation:	**<DEV/ATT_yy.yy'cr'** **>DEV/ATT_yy.yy'cr''lf']** **<DEV/ATT_'cr'** **>DEV/ATT_yy.yy'cr''lf']**	Where: yy.yy = 0.0 to 20.0 dB in 0.25 steps. The default is 10 dB.
Auto Fault Recovery	Set Fault Recovery: Confirmation: Retrieve Status: Confirmation:	**<DEV/AFR_xxx'cr'** **>DEV/AFR_xxx'cr''lf']** **<DEV/AFR_xxx'cr'** **>DEV/AFR_xxx'cr''lf']**	Where xxx = On or Off The default is Off. The KPA output automatically muted in the event of a detected fault. Auto Fault Recovery, if enabled, will cause the output signal to go active (unmuted) if all faults clear. If disabled, the output will remain muted even after all faults clear until a MUT_OFF command is received.

C.7.3 Old Operating Mode Commands

Note: There are two modes of operation that may intersect – Redundancy Mode and Automatic Mode.

Redundancy Mode	Comtech EF Data's KPA family of KPAs is designed to automatically sense and configure into redundancy mode when the redundant loop cable is connected. Polling on the dedicated redundancy bus will not begin until the redundancy loop cable is connected. Each KPA's designation in a redundant subsystem is determined automatically via the redundancy interface cable connected between the two (1:1 subsystem) or three (1:2 subsystem) KPAs in the redundant subsystem.		
Automatic/Manual Mode	Select Automatic Mode: Confirmation: Automatic Status: Confirmation:	**<DEV/SAM_y'cr' xxx** **>DEV/SAM_y'cr''lf']** **<DEV/SAM_'cr'** **>DEV/SAM_y'cr''lf']**	Where: y = A for Auto M for Manual The default is Off. This command provides for automatic switching by the backup KPA if both units are in the Redundancy Mode. This command is only accepted by the backup KPA. If a primary KPA is set in Manual Mode and a fault occurs, the backup KPA will log the occurrence and not act upon further information from the KPA until put into Automatic Mode.
Backup Mode	Initiate a Backup: Confirmation: Retrieve Backup Status: Confirmation:	**<DEV/FBU_x_y'cr'** **>DEV/FBU_x_y'cr''lf']** **<DEV/FBU_'cr'** **>DEV/FBU_zzzzz'cr''lf']**	Where: x = 1 or 2 KPA number. Y = F to force a backup N = to remove a backup zzzzz = NONE, if no backup active. ACTIVE, if an automatic backup has occurred. FORCED, if a forced backup is active. This command allows the user to force a backup condition for maintenance and test purposes. This command must be sent to the KPA designated as the backup KPA to configure the Waveguide switch to a position such that the backup KPA is Online and the primary KPA is Offline.
Priority Select	Set Priority: Confirmation: Retrieve Priority Status: Confirmation:	**<DEV/PRI_x'cr'** **>DEV/PRI_x'cr''lf']** **<DEV/PRI_'cr'** **>DEV/PRI_x'cr''lf']**	Where x = 1 or 2 This command allows the user to assign priority when operating in a 1:2 redundant subsystem. This command provides arbitration in the event that both primary KPAs are faulted simultaneously.

C.7.4 Old Status Commands

Configuration Status	Configuration Status: Confirmation:	**<DEV/RCS_'cr'** **>DEV/RCS_'cr'** **ATT_yy.yy'cr'** **AMP_nnn'cr'** **TX_nnn'cr'** **ONL_nnn'cr'** **RED_xx_y'cr'** **AFR_nnn'cr'**	Where: Attenuator Amplifier – On/Off Transmit – On/Off Online – On/Off See Note. Auto Flt Recovery – On/Off **Notes:** 1. If Redundancy is Off, xx_y = Off, else if Redundancy is On the xx field indicates the KPA designation, either BU (Backup) 01 or 02. 2. If xx is 01 or 02 then the y field indicates the Auto/Manual status, either 'A' if Auto or 'M' if manual. 3. If xx field is BU, the y field indicates the priority KPA, either 1 if KPA #1 is high priority or 2 if KPA #2 is high priority. 4. For 1:1 systems priority is always #1.
Maintenance Status	Maintenance Status: Confirmation:	**<DEV/RMS_'cr'** **>DEV/RMS_'cr''lf']** **V+28_xx.x'cr'** **V+12xx.x'cr'** **V-12_xx.x'cr'** **V+5_x.x'cr'** **V–5_x.x'cr'** **V+9_1_xx.x'cr'** **V+9_2_xx.x'cr'** **TEMP_xx'cr'** **FPWR_xx.x'cr'** **RPWR_xx.x'cr''lf']**	Where: +28 VDC Supply +12 VDC Supply –12 VDC Supply +5 VDC Supply –5 VDC Supply 9 VDC Supply #1 9 VDC Supply #2 Temperature RF Forward Power (dBm) RF Reflected Power (dBm)
FET Status **KPA-020IN**	**FET Status:** **Confirmation:**	**<DEV/RFS_'cr'** **>DEV/RFS_'cr'** **FET1_xxx'cr'** **FET2_xxx'cr'** **FET3_xxx'cr'** **FET4_xxx'cr'** **FET5_xxx'cr'** **FET6_xxx'cr'** **FET7_xxx'cr'** **FET8_xxx'cr'** **FET9_xxx'cr''lf']**	**Where:** **FET1 current in mA** **FET2 current in mA** **FET3 current in amps** **FET4 current in amps** **FET5 current in amps** **FET6 current in amps** **FET7 current in amps** **FET8 current in amps** **FET9 current in amps**

FET Status **KPA-040**	**FET Status:** **Confirmation:**	**<DEV/RFS_'cr'** **>DEV/RFS_'cr'** **FET1_xxx'cr'** **FET2_x.x'cr'** **FET3_x.x'cr'** **FET4_x.x'cr'** **FET5_x.x'cr'** **FET6_xxx'cr'** **FET7_x.x'cr'** **FET8_x.x'cr'** **FET9_x.x'cr'** **FET10_x.x'cr'** **FET11_x.x'cr'** **FET12_x.x'cr'** **FET13_x.x'cr'** **FET14_x.x'cr''lf']**	**Where :** **FET1 current in mA** **FET2 current in amps** **FET3 current in amps** **FET4 current in amps** **FET5 current in amps** **FET6 current in mA** **FET7 current in amps** **FET8 current in amps** **FET9 current in amps** **FET10 current in amps** **FET11 current in amps** **FET12 current in amps** **FET13 current in amps** **FET14 current in amps**
FET Status **KPA-080** **KPA-100**	**FET Status:** **Confirmation:**	**<DEV/RFS_'cr'** **>DEV/RFS_'cr'** **FET1_xxx'cr'** **FET2_x.x'cr'** **FET3_x.x'cr'** **FET4_x.x'cr'** **FET5_x.x'cr'** **FET6_x.x'cr'** **FET7_x.x'cr'** **FET8_x.x'cr'** **FET9_x.x'cr'** **FET10_x.x'cr'** **FET11_x.x'cr'** **FET12_x.x'cr'** **FET13_x.x'cr'** **FET14_x.x'cr'** **FET15_x.x'cr'** **FET16_x.x'cr'** **FET17_x.x'cr'** **FET18_xxx'cr'** **FET19_x.x'cr'** **FET20_x.x'cr'** **FET21_x.x'cr'** **FET22_x.x'cr'** **FET23_x.x'cr'** **FET24_x.x'cr'** **FET25_x.x'cr'** **FET26_x.x'cr'** **FET27_x..x'cr''lf']**	**Where :** **FET1 current in mA** **FET2 current in mA** **FET3 current in amps** **FET4 current in amps** **FET5 current in amps** **FET6 current in amps** **FET7 current in amps** **FET8 current in amps** **FET9 current in amps** **FET10 current in amps** **FET11 current in amps** **FET12 current in amps** **FET13 current in amps** **FET14 current in amps** **FET15 current in amps** **FET16 current in amps** **FET17 current in amps** **FET18 current in amps** **FET19 current in amps** **FET20 current in amps** **FET21 current in amps** **FET22 current in amps** **FET23 current in amps** **FET24 current in amps** **FET25 current in amps** **FET26 current in amps** **FET27 current in amps**

Utility Status	Utility Status: Confirmation:	**<DEV/RUS_'cr'** **>DEV/RUS_'cr'** **COMM_aaaaaa'cr'** **ADD_xxx'cr'** **BR_nnnn'cr'** **PAR_nn'cr'** **CON_xx'cr'** **LCD_xx'cr''lf']**	Where: RS-232 or RS-485 Address (001 to 255) Baud Rate (300 to 9600) Parity (OD or EV) LCD Contrast (0 to 30) LCD Brightness (0 to 30)
Alarm Status **KPA-020IN**	**Alarm Status:** **Confirmation:**	**<DEV/RAS_'cr'** **>DEV/RAS_'cr'** **+28_xx'cr'** **+12_xx'cr'** **–12_xx'cr'** **+5_xx'cr'** **–5_xx'cr'** **+9_xx'cr'** **TEMP_xx'cr'** **FAN1_xx'cr'** **FAN2_xx'cr''lf']**	**Where:** **+28 VDC Fault** **+12 VDC Fault** **-12 VDC Fault** **+ 5 VDC Fault** **– 5 VDC Fault** **+ 9_xx'cr'** **TEMP_xx'cr'** **FAN1_xx'cr'** **FAN2_xx'cr'' lf']**
Alarm Status **KPA-040**	**Alarm Status:** **Confirmation:**	**<DEV/RAS_'cr'** **>DEV/RAS_'cr'** **+28_xx'cr'** **+12_xx'cr'** **–12_xx'cr'** **+5_xx'cr'** **–5_xx'cr'** **+9_xx'cr'** **TEMP_xx'cr'** **SHTD_xx'cr'** **FAN1_xx'cr'** **FAN2_xx'cr'** **PROC_xx'cr''lf']**	**Where: xx = OK or FT** **+28 VDC Fault** **+12 VDC Fault** **-12 VDC Fault** **+ 5 VDC Fault** **– 5 VDC Fault** **+9 VDC Fault** **TEMP_xx'cr'** **Over Temperature Shutdown** **FAN1 Fault** **FAN2 Fault** **Processor Fault** **Note: A temperature fault is indicated if the unit is ≤ -12°C or ≥ +80°C. This creates a summary fault and will cause the unit to mute itself and switchover to the back-up unit. However, the 9V supply to the FET transistors will remain on until the unit reaches the thermal shutdown temperature of ≥ 89°C. For protection reasons, the unit will shutdown the 9V supply to the power transistors at temperatures ≥ +89°C.**

Alarm Status **KPA-080** **KPA-100**	**Alarm Status:** **Confirmation:**	**<DEV/RAS_'cr'** **>DEV/RAS_'cr'** **+28_xx'cr'** **+12_xx'cr'** **–12_xx'cr'** **+5_xx'cr'** **–5_xx'cr'** **+9_1_xx'cr'** **+9_2_xx'cr'** **TEMP_xx'cr'** **SHTD_xx'cr'** **FAN1_xx'cr'** **FAN2_xx'cr''lf']**	**Where: xx = OK or FT** **+28 VDC Fault** **+12 VDC Fault** **-12 VDC Fault** **+ 5 VDC Fault** **– 5 VDC Fault** **+ 9_1_xx'cr'** **+ 9_2_xx'cr'** **TEMP_xx'cr'** **Over Temperature Shutdown** **FAN1_xx'cr'** **FAN2_xx'cr'' lf']** **Note: A temperature fault is indicated if the unit is ≤ -20°C or ≥ 85°C. This creates a summary fault and will cause the unit to mute itself and switchover to the back-up unit. However, the 9V supply to the FET transistors will remain on until the unit reaches the thermal shutdown temperature of ≥ 90°C. For protection reasons, the unit will shutdown the 9V supply to the power transistors at temperatures at ≥ 90°C.**
Summary Alarm Status	Summary Alarm: Confirmation:	**<DEV/SAS_'cr'** **>DEV/SAS_xx'cr''lf']**	Where: xx = Ok or FT Summary Alarm is set to Fault (FT), if any of items in Alarm Status are faulted.
Terminal Status Change	Configuration Status: Confirmation:	**<DEV/TSC_'cr'** **>DEV/TSC_nnn'cr''lf']**	Where: nnn = Yes or No The TSC_ command can be used to determine if the status of the terminal has changed since it was last polled. If any of the parameters listed in the RCS or RUS commands have changed as a result of user operations or if any new fault conditions occur the TSC_ command will return YES. The TSC_ command will then continue to return YES until any of the following commands are received: RCS_, RUS_, RAS_, PACRCS_, PACRUS_, or PACRAS_.
Packed Configuration Status	Configuration Status: Confirmation:	**<DEV/PACRCS_'cr'** **>DEV/PACRCS_aabcdeffgh'cr''lf']**	Where: aa = # of 0.25 dB steps in Hex above 0dB (0 to 120) b = 1 = Amplifier is On; 0 = Off c = 1 = TX On; 0 = Off d = 1 = unit ONLINE; 0 = OFFLINE e = 1 = Redundancy On; 0 = Redundancy Off ff = KPA No. = BU = 01 or 02 (e = 0, ff = 00) g = A = Auto Mode; M = Manual Mode h = 1 = Auto Recovery enabled; 0 if disabled

Packed Maintenance Status	Packed Maint Status: Confirmation:	**<DEV/PACRMS_'cr' >DEV/PACRMS_aabbccddeeffgghhhiiijjj'cr' 'lf']**	Where: aa = + 28 VDC supply, 100mV per count above 10.0V in Hex bb = + 12 VDC supply scaled 100 mV per count in Hex cc = - 12 VDC supply scaled 100mV per count in Hex dd = + 5 VDC supply scaled –100mV per count in Hex ee = - 5 VDC supply scaled –100mV per count in Hex ff = + 9 VDC supply #1 scaled 100 mV per count in Hex gg = + 9 VDC supply #2 scaled 100mV per count in Hex hhh = Signed temperature in degrees C (-10 to +95) iii = RF forward power, 0.1 dBm steps above 20.0 dBm in Hex jjj = RF reverse power, 0.1 dBm steps above 15.0 dBm in Hex
Packed FET Status **KPA-020IN**	**Packed FET Status: Confirmation:**	**<DEV/PACRFS_'cr' >DEV/PACRFS_aabbccddeeffgghhii'cr''lf']**	**Where:** **aa = FET1 current in Hex, formular:** **FET1 = (aa) mA** **bb = FET2 current in Hex, formular:** **FET2 = (aa) mA** **cc = FET3 current in Hex, scaled 100mV per count** **dd = FET4 current in Hex, scaled 100mV per count** **ee = FET5 current in Hex, scaled 100mV per count** **ff = FET6 current in Hex, scaled 100mV per count** **gg = FET7 current in Hex, scaled 100mV per count** **hh = FET8 current in Hex, scaled 100mV per count** **ii = FET9 current in Hex, scaled 100mV per count**
Packed FET Status **KPA-040**	**Packed FET Status: Confirmation:**	**<DEV/PACRFS_'cr' >DEV/PACRFS_aabbccddeeffgghhiijjkk llmmnn'cr''lf']**	**Where:** **aa = FET1 current in Hex, formular:** **FET1 = (aa * 3) mA** **bb = FET2 current in Hex, scaled 100mV per count** **cc = FET3 current in Hex, scaled 100mV per count** **dd = FET4 current in Hex, scaled 100mV per count** **ee = FET5 current in Hex, scaled 100mV per count** **ff = FET6 current in Hex, scaled 100mV per count** **gg = FET7 current in Hex, scaled 100mV per count** **hh = FET8 current in Hex, scaled 100mV per count** **ii = FET9 current in Hex, scaled 100mV per count** **jj = FET10 current in Hex, scaled 100mV per count** **kk = FET11 current in Hex, scaled 100mV per count** **ll = FET12 current in Hex, scaled 100mV per count** **mm = FET13 current in Hex, scaled 100mV per count** **nn = FET14 current in Hex, scaled 100mV per count**

Packed FET Status **KPA-080** **KPA-100**	**Packed FET Status:** **Confirmation:**	**<DEV/PACRFS_'cr'** **>DEV/PACRFS_aabbccddeeffgghhiijjkkllmm** **nnooppqqrrssttuuvvwwxxyyzzal'cr''lf']**	**Where:** **aa = FET1 current in Hex, formular:** **FET1 = (aa * 3) mA** **bb = FET2 current in Hex, formular:** **FET2 = (aa * 3) mA** **cc = FET3 current in Hex, scaled 100mV per count** **dd = FET4 current in Hex, scaled 100mV per count** **ee = FET5 current in Hex, scaled 100mV per count** **ff = FET6 current in Hex, scaled 100mV per count** **gg = FET7 current in Hex, scaled 100mV per count** **hh = FET8 current in Hex, scaled 100mV per count** **ii = FET9 current in Hex, scaled 100mV per count** **jj = FET10 current in Hex, scaled 100mV per count** **kk = FET11 current in Hex, scaled 100mV per count** **ll = FET12 current in Hex, scaled 100mV per count** **mm = FET13 current in Hex, scaled 100mV per count** **nn = FET14 current in Hex, scaled 100mV per count** **oo = FET15 current in Hex, scaled 100mV per count** **pp = FET16 current in Hex, scaled 100mV per count** **qq = FET17 current in Hex, scaled 100mV per count** **rr = FET18 current in Hex, scaled 100mV per count** **ss = FET19 current in Hex, scaled 100mV per count** **tt = FET20 current in Hex, scaled 100mV per count** **uu = FET21 current in Hex, scaled 100mV per count** **vv = FET22 current in Hex, scaled 100mV per count** **ww = FET23 current in Hex, scaled 100mV per count** **xx = FET24 current in Hex, scaled 100mV per count** **yy = FET25 current in Hex, scaled 100mV per count** **zz = FET26 current in Hex, scaled 100mV per count** **a1 = FET27 current in Hex, scaled 100mV per count**

Packed Utility Status	Packed Utility Status: Confirmation:	**<DEV/PACRUS_'cr'** **>DEV/PACRUS_abbcdeeff'cr''lf']**	Where: a = COM1 Mode; 0 =RS-232, 1 = RS-485-2; 2 = RS-485-4 bb = Address in Hex (01 to FF) c = 0 if Baud Rate = 9600 1 if Baud Rate = 4800 2 if Baud Rate = 2400 3 if Baud Rate = 1200 4 if Baud Rate = 300 d = 0 if Parity Even, 1 if Parity Odd ee = LCD Contrast (0 to 30) ff = LCD Brightness (0 to 30)
Packed Alarm Status	Packed Alarm Status: Confirmation:	**<DEV/PACRAS_'cr'** **>DEV/PACRAS_abcdefghijkl'cr''lf']**	Where: a = 1 if +28 Fault, else 0 b = 1 if +12 Fault, else 0 c = 1 if –12 Fault, else 0 d = 1 if + 5 Fault, else 0 e = 1 if – 5 Fault, else 0 f = 1 if + 9 PS#1 Fault, else 0 g = 1 if + 9 PS#2 Fault, else 0 h = 1 if TEMP Fault, else 0 I = 1 if SHTD Fault, else 0 j = 1 if FAN1 Fault, else 0 k = 1 if FAN2 Fault , else 0 l = 1 if PROC Fault, else 0

C.7.5 Old Stored Alarms

Up to 100 alarms are date/time stamped and stored in memory as they occur. The alarm entry also is updated with its date/time of clearance. The entry remains in memory until it is removed by command.

Total Stored Alarms	Retrieve Total Alarms: Confirmation:	**<DEV/TSA_'cr'** **>DEV /TSATOTAL :nnn'cr'** **LAST:hh:mm:ss mm/dd/yy'cr''lf']**	This command retrieves the total number of stored alarms and the time and date of the most recent alarm.
Clear All Stored Alarms	Clear Alarms: Confirmation:	**<DEV/CAA_YES'cr'** **>DEV/CAA_CLEARED'cr''lf']**	
List All Alarms	List All Alarms: Confirmation:	**<DEV/LAA_'cr'** **>DEV/LAA'cr'** **xxx yyyyyyyyyy hh:mm:ss mm /dd/yy'cr'** **xxx yyyyyyyyyy hh:mm:ss mm/dd/yy'cr'** **xxx yyyyyyyyyy hh:mm:ss mm /dd/yy'cr'** **xxx yyyyyyyyyy hh:mm:ss mm/dd/yy'cr'** **xxx yyyyyyyyyy hh:mm:ss mm /dd/yy'cr'** **xxx yyyyyyyyyy hh:mm:ss** **mm/dd/yy'cr''lf']**	Where : xxx = stored fault number yyyyyyyyyy = fault description hh:mm:ss = fault time mm/dd/yy = fault date

C.7.6 Error Processing

The following Error Response may be generated by any of the old commands instead of a confirmation.

General Error	Message:	**>DEV?COM CU COMMAND UNRECOGNIZED'cr''lf']** **>DEV?COM IP INVALID PARAMETER'cr''lf']** **>DEV?COM PE PARITY ERROR'cr''lf']**

C.7.7 Configuration Errors

The following Error Response may be generated by any of the old configuration commands.

Configuration Error	Message:	**>DEV?COM LO DEVICE IN LOCAL MODE'cr''lf']**

C.7.8 Time-Outs

A time-out should be assumed if there is no response in 1.0 seconds. The station monitor and control computer should try at least three times. Possible sources of time-outs are as follows:

- Incorrect Device Address
- Faulty Cable
- Faulty Connector
- I/O fault on remote interface
- I/O fault on M&C computer

Notes:

METRIC CONVERSIONS

Units of Length

Unit	Centimeter	Inch	Foot	Yard	Mile	Meter	Kilometer	Millimeter
1 centimeter	—	0.3937	0.03281	0.01094	6.214×10^{-6}	0.01	—	—
1 inch	2.540	—	0.08333	0.2778	1.578×10^{-5}	0.254	—	25.4
1 foot	30.480	12.0	—	0.3333	1.893×10^{-4}	0.3048	—	—
1 yard	91.44	36.0	3.0	—	5.679×10^{-4}	0.9144	—	—
1 meter	100.0	39.37	3.281	1.094	6.214×10^{-4}	—	—	—
1 mile	1.609×10^{5}	6.336×10^{4}	5.280×10^{3}	1.760×10^{3}	—	1.609×10^{3}	1.609	—
1 mm	—	0.03937	—	—	—	—	—	—
1 kilometer	—	—	—	—	0.621	—	—	—

Temperature Conversions

Temperature	° Fahrenheit	° Centigrade
Water freezes	32	0
Water boils	212	100
Absolute 0	-459.69	-273.16

Formulas
° C = (F - 32) * 0.555
° F = (C * 1.8) + 32

Units of Weight

Unit	Gram	Ounce Avoirdupois	Ounce Troy	Pound Avoirdupois	Pound Troy	Kilogram
1 gram	—	0.03527	0.03215	0.002205	0.002679	0.001
1 oz. avoir.	28.35	—	0.9115	0.0625	0.07595	0.02835
1 oz. troy	31.10	1.097	—	0.06857	0.08333	0.03110
1 lb. avoir.	453.6	16.0	14.58	—	1.215	0.4536
1 lb. Troy	373.2	13.17	12.0	0.8229	—	0.3732
1 kilogram	1.0×10^{3}	35.27	32.15	2.205	2.679	—

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