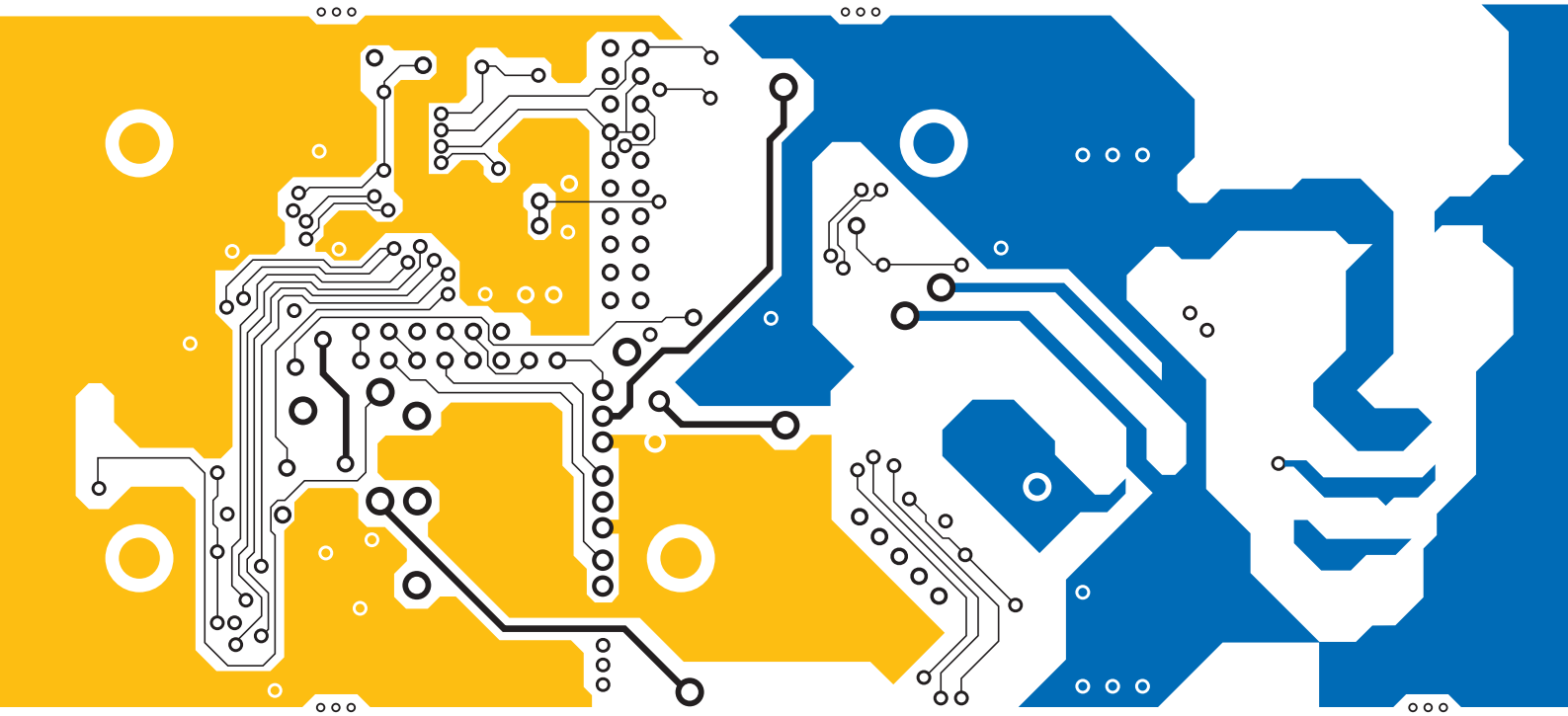
CODAN

C-Band and Ku-Band Hub-mount SSPAs

5760/5712H and 5940

SATELLITE COMMUNICATIONS



REFERENCE MANUAL

Codan part number 15-44011-EN Issue 2, March 2003

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1 About this manual

This reference manual is for installation technicians and operators of the C-Band 5760/5712H and Ku-Band 5940 SSPAs.

This manual contains the following sections:

Chapter 1 About this manual—lists all terms, abbreviations and units used in this manual

Chapter 2 Electromagnetic compatibility and safety notices—describes how to ensure CE compliance of the SSPAs is maintained

Chapter 3 Overview—contains a general description of the SSPAs and their controls

Chapter 4 Specifications—contains the specifications for the SSPAs

Chapter 5 How the SSPAs work—provides a brief technical description of how the SSPAs work

Chapter 6 Installation and setup—describes how to install the SSPAs and the safety precautions that must be taken

Chapter 7 Operating the SSPA—describes how to operate the SSPAs

Chapter 8 Operating the SSPA remotely—describes how to operate the SSPAs remotely

Chapter 9 Maintenance and fault finding—describes how to maintain the SSPAs, and the possible causes of alarms and faults

Chapter 10 Drawings—contains the drawings referred to in the manual

Appendix A Summary of parameters controlled by the SSPA Manager software—contains a summary of the parameters that are monitored and controlled by the SSPA Manager software

Appendix B SSPA Manager screens—contains the screens from the SSPA Manager software that show full functionality

An index can be found at the end of this manual.

Standards and icons

The following standards and icons are used in this manual:

This typeface	Means...
BOLD/Bold	a button, key, switch, connector or displayed text
Bold times	text that is typed in as a command, or the name of a key on a computer's keyboard
Italics	a cross-reference or text requiring emphasis

This icon	Means...
❑	a step to follow
WARNING	your actions may cause harm to yourself or the equipment
CAUTION	proceed with caution as your actions may lead to loss of data, privacy or signal quality
NOTE	the text provided next to this icon may be of interest to you

Definitions

Acronyms and abbreviations

This term	Means...
AC	alternating current
AM/PM	amplitude modulation to phase modulation
ASCII	American standard code for information interchange
AUX	auxiliary
Comms	communications
Comp/COMP	compensation
CTS	clear to send
CW	continuous wave, carrier wave
DC	direct current
EEPROM	electronically erasable programmable read only memory
EMC	electromagnetic compatibility
FET	field effect transistor
GaAs	Gallium Arsenide
GCP	gain compression point
Gnd	ground
IF	intermediate frequency
LCL	local (mode)
LLO	local lockout (mode)
Maint	maintenance
MAX	maximum
N/C	not connected
NC	normally closed
NO	normally open
OPBO	output back off
PA	power amplifier
PFC	power factor correcting

This term	Means...
PIN	P-type intrinsic N-type
P–P	peak to peak
R&TTE	radio and telecommunications terminal equipment
REM	remote (mode)
RF	radio frequency
RLO	remote lockout (mode)
RMA	return materials authorisation
RTS	ready to send
Rx	receive
SSPA	solid state power amplifier
Tx	transmit
UART	universal asynchronous receiver/transmitter

Glossary

This term	Means...
Firmware	Software that is embedded within the SSPA.

Units

Measurement	Unit	Abbreviation
Attenuation	decibel	dB
Current	ampere	A
Data rate	bits per second	bps
Distance	metre	m
Frequency	hertz	Hz
Impedance	ohm	Ω
Mass	gram	g
Noise temperature	kelvin	K
Power	decibels relative to a carrier	dBc
Power	decibels relative to 1 mW	dBm
Power	watt	W
Temperature	degrees Celsius	°C
Time	hour	hr
Time	second	s
Voltage	volt	V

Unit multipliers

Unit	Name	Multiplier
n	nano	10^{-9}
µ	micro	10^{-6}
m	milli	10^{-3}
d	deci	10^{-1}
k	kilo	10^{3}
M	mega	10^{6}
G	giga	10^{9}

About this issue

This is the second issue of the C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual covering the CE compliance regulations introduced in April 2001.

Associated documents

The associated documents are:

- High Power SSPA Redundancy Switching Equipment Reference Manual (Codan part number 15-44015-EN)
- C-Band Transceiver 5700 series Reference Manual (Codan part number 15-44001-EN)
- Ku-Band Transceiver 5900 series Reference Manual (Codan part number 15-44005-EN)

2 Electromagnetic compatibility and safety notices

This section describes how to ensure the C-Band 5760/5712H and Ku-Band 5940 SSPAs comply with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC.

The C-Band 5760/5712H and Ku-Band 5940 SSPAs have been tested and comply with the following standards:

- ETSI EN 301 428 V1.2.1 (2001–02) 'Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal (VSAT); Transmit-only, transmit/receive or receive-only satellite earth stations operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE directive' (5940 only)
- ETSI EN 301 443 V1.2.1 (2001–02) 'Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal (VSAT); Transmit-only, transmit/receive or receive-only satellite earth stations operating in the 4 GHz and 6 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE directive' (5760/5712H only)
- ETSI EN 301 489-1 V1.2.1 (2000–08) 'Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements'
- ETSI EN 301 489-12 V1.1.1 (2000–12) 'Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges between 4 GHz and 30 GHz in the Fixed Satellite Service (FSS)'
- EN 60950 ('Safety of Information Technology Equipment, including electrical business machines', 2000)

Compliance with these standards is sufficient to fulfil the requirements of the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC, which encompasses the following directives:

- European EMC Directive, 89/336/EEC
- European Low Voltage Directive, 73/23/EEC with no lower voltage limit

Equipment supplied by Codan that satisfies these requirements is identified by the CE 0682 ⊙ markings on the model label of the product.

NOTE Some countries may restrict the use of satellite communications equipment on certain frequency bands or require such equipment to be licensed. It is the user's responsibility to check the specific requirements with the appropriate communications authorities.

Complying with the European Radio and Telecommunications Terminal Equipment Directive

Electromagnetic compatibility

To ensure compliance with the EMC Directive is maintained, you must ensure the covers for the equipment are correctly fitted.

CAUTION If it is necessary to remove the covers at any stage, they must be refitted correctly before using the equipment.

Electrical safety

To ensure compliance with the European Low Voltage Directive is maintained, you must install the C-Band 5760/5712H and Ku-Band 5940 SSPAs in accordance with the following safety precautions. These precautions must be checked before applying power to the SSPA.

WARNING An earth connection must be included in the mains wiring to the SSPA (see page 9, *Earth symbols*).

WARNING As the SSPA is intended for permanent connection to the mains supply, a readily accessible switch or circuit breaker must be incorporated in the mains wiring to enable easy isolation of the unit.

WARNING The isolating switch must disconnect both poles simultaneously. However, if you can positively identify the neutral conductor, you may have a single-pole isolating device in the live conductor.

Radiation safety

WARNING Do not look into the unterminated output of the SSPA or point it towards anyone.

WARNING Always fit the correct termination to the SSPA or fit the blanking plate.

Spurious emissions

The waveguide filter (Codan part number 14-0465) must be fitted to the output of the 5760 and 5712H SSPAs to ensure compliance with the spurious emission requirements of the European R&TTE Directive.

Earth symbols

Earth connection points have been provided on the SSPA. To comply with the European Low Voltage Directive, the symbols shown in Table 1 are used to identify the earths on the equipment.

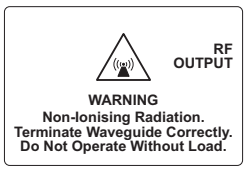
Table 1: Earth symbols

Symbol	Meaning
	Chassis earth
	Protective earth

Warning label

The symbol shown in Table 2 is used to identify potential hazards on the equipment.

Table 2: Warning label

Symbol	Meaning
	Non-ionising radiation may be emitted

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3 Overview

This section describes the features of the C-Band 5760/5712H and Ku-Band 5940 SSPA modules.

The SSPAs provide high performance together with compact size, rugged construction and optimum thermal characteristics. Innovative RF power combining technology, the latest GaAs FET devices and surface-mount technology are used. Remote operation of all control and status functions is possible via a serial interface.

The SSPAs feature an output isolator for operation into any load. The RF output power and FET flange temperature are continuously monitored. Alarm thresholds can be set for low or high power and the gain of each SSPA is adjustable over a 20 dB range. Gain variation versus temperature is automatically compensated in firmware.

Modular construction is used throughout. The comprehensive monitoring functions facilitate rapid field troubleshooting. No regular maintenance is required on the unit.

The SSPAs are designed to be mounted outdoors on the antenna pedestal.

This description should be read in conjunction with the drawings on page 79, *Drawings*. Drawing 0969D22 provides a complete visual description of the C-Band SSPAs. Drawing 0969D23 provides a complete visual description of the Ku-Band SSPA. The drawings also show connector designations. The unit has two external fans for cooling the RF modules of the SSPA and the power supplies.

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4 Specifications

This section contains the following topics:

Electrical

Frequency band

5760/5712H	5.850 to 6.425 GHz
5940	14.0 to 14.5 GHz

Output power @ 25°C

5760	+47.8 dBm typical at saturation +47.0 dBm minimum at 1 dB GCP
5712H	+50.8 dBm typical at saturation +50.0 dBm minimum at 1 dB GCP
5940	+46.5 dBm minimum at saturation +46.0 dBm minimum at 1 dB GCP

Third order intermodulation products (two carriers each at 6 dB below 1 dB GCP)

5760	–26.0 dBc maximum
5712H	–26.0 dBc maximum
5940	–25.0 dBc maximum

Gain

Gain at 0 dB gain setting	
5760/5712H	65 dB minimum
5940	60 dB minimum
Gain variation over band	±1 dB maximum
Gain variation over any 40 MHz band	±0.3 dB maximum
Gain stability over –40 to +55°C	±1.5 dB maximum
Gain adjustment	0 to –20 dB in 0.2 dB steps

Maximum input power (at maximum gain)

5760	–15.0 dBm
5712H	–12.0 dBm
5940	–12.0 dBm

Output noise power

5760/5712H	–90 dBm/Hz maximum
5940	–82 dBm/Hz maximum

AM/PM conversion (at 1 dB OPBO from 1 dB GCP)	2°/dB maximum

Harmonics (at rated output power)

5760/5712H	–50 dBc maximum
5940	–50 dBc maximum

Group delay (over 40 MHz)

Linear	0.03 ns/MHz
Parabolic	0.003 ns/MHz^2
Ripple	1 ns P–P

VSWR

Input	1.3:1 minimum
Output	1.25:1 minimum

Protection	Input and output isolators Overtemperature shutdown

General

Monitor and control

Monitor and control	RF power meter RF monitor @ –41 dBc nominal FET flange temperature ON/OFF control
Summary alarm	Overtemperature FET failure Low/High RF power
Alarm logic levels	Dry contacts
Serial interface	RS232 RS422/RS485
Data rate	9600 bps
Data format	8 bits, no parity, 1 stop bit

Power supply

5760	115 V AC, 7.1 A (60 Hz) or 230 V AC, 3.6 A (50 Hz)
5712H	115 V AC, 11.3 A (60 Hz) or 230 V AC, 5.6 A (50 Hz)
5940	115 V AC, 8.0 A (60 Hz) or 230 V AC, 4.0 A (50 Hz)

DC outputs

Main	–48 V DC	] 75 W maximum, 1.5 A (total)
Auxiliary	–48 V DC	

Connectors

RF input	N-type female 50 Ω
RF output	
5760/5712H	CPR137-G waveguide flange (M5 × 8 mm deep, 8 places)
5940	PBR120 grooved waveguide flange (WR75) (M4 × 8 mm deep, 4 places)
RF monitor	N-type female 50 Ω
AC input	Amphenol T3110 000
Control	MS3114E14-19P
Serial	MS3114E14-19S
–48 V DC main output	MS3114E8-2S
–48 V DC auxiliary output	MS3114E8-2S

Environmental

Operating environment

Operating temperature	–40 to +50°C
Relative humidity	100%
Cooling	Fan forced
Maximum operating altitude	3000 m above sea level

Physical

Mechanical

Size	277 mm W × 354 mm D × 491 mm H
Weight	27 kg
Sealing	To IP66

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The input signal is amplified by a variable gain driver module. The driver module uses PIN diode attenuation for gain control and temperature compensation driven by the SSPA microcontroller. The driver module FET current is monitored and, if any FET fails and the total current falls outside acceptable limits, an alarm is indicated.

The amplified signal feeds the final power module. The power module consists of a cascade of single-ended stages. The 5760 SSPA has two parallel power stages. The 5712H and 5940 SSPAs have four parallel power stages. The outputs of these power stages are combined as required, then routed to the output via a waveguide isolator and monitor.

The current drawn by each of the power FETs is continuously monitored and if the current to any device falls outside acceptable limits, an alarm is indicated.

If the input voltage to the power module exceeds a preset limit, or the FET flange temperature increases above about 105°C (C-Band) or 85°C (Ku-Band), an alarm is indicated.

A monitor/detector unit is provided at the output for monitoring the RF output level. The detector output feeds the microcontroller to allow the RF output level to be read via the serial interface. The RF monitor output feeds a connector to allow the SSPA output to be monitored on a spectrum analyser or power meter.

The RF power monitor operates as an average power monitor, i.e. the voltage indication is the same for both CW and modulated signals.

The SSPA power supply incorporates:

- a PFC AC–DC converter
- a DC–DC converter providing the main PA supply
- magnetic amplifiers providing auxiliary DC supplies

The PFC front end converts the AC mains to a nominal 400 V DC bus.

The DC–DC converter converts the 400 V DC bus to the low voltage, high current supply required for the power amplifier.

The auxiliary DC supplies for the microcontroller system, analog support circuitry, cooling fans and the 48 V supply are derived from the main DC–DC converter via the magnetic amplifiers.

The power supply temperature is also monitored, and when the temperature is too high, an alarm is indicated.

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6 Installation and setup

This section contains the following topics:

Unpacking the SSPA

Ensure that the packing boxes containing the equipment are upright, as indicated by the printing on the boxes. Open each box and examine the contents for signs of damage. If damage is detected, contact Codan immediately to obtain an RMA before returning the equipment. Failure to do so may result in any warranty being void.

The SSPA is shipped with a mounting kit.

Remove the SSPA and its mounting kit from the packaging.

Check that the mounting kit provided has:

- four Unistrut bars
- four threaded rods
- miscellaneous screws, nuts and washers

A blanking plate is attached to the output waveguide flange of the SSPA. This blanking plate should be removed before installing the SSPA in your system. If the SSPA needs to be shipped for any reason, the blanking plate must be re-attached to the SSPA.

Installing the SSPA

Mounting the SSPA

The SSPA is designed to be mounted on the antenna post. A suggested mounting arrangement for the C-Band and Ku-Band SSPAs using the mounting kit supplied is shown in drawing 0969D46.

The SSPA power supply can operate with any AC input voltage in the range 104 to 274 V AC.

WARNING Voltages outside of these limits may cause damage to the SSPA.

Connecting the SSPA

NOTE For details on the power supply connections see page 28, *Power supply connections*.

To connect the SSPA:

- ❑ Connect the AC power lead (Codan part number 04-0969A-12) to the AC mains supply.

  WARNING You must check that the AC supply has a proper ground connection before connecting the unit to the mains supply.

  WARNING Observe AC supply precautions (see page 8, *Electrical safety*).

  WARNING The positive terminal of the –48 V supply is grounded. Any equipment using the supply should either be fully floating or operate with the same polarity. Failure to observe this precaution may result in damage to the –48 V supply.

- ❑ Ensure the isolating switch for the AC supply is switched off.
- ❑ Connect the AC power lead to the plug on the bottom of the SSPA.
- ❑ Connect the RF coaxial cable from the **Tx RF O/P** connector on the converter to the **RF Input** connector on the SSPA.
- ❑ Using appropriate waveguide sections, connect the SSPA RF output to the antenna transmit port.

  WARNING Use appropriate waveguide gaskets to ensure all waveguide joints are sealed (see below, *Gasket kits*).

  NOTE Ensure that the **RF MONITOR** port is terminated with the supplied 50 Ω termination when it is not in use.

- ❑ Tape all connectors with self-amalgamating tape.
- ❑ Check that all fans are unobstructed and operating correctly.

Gasket kits

NOTE With C-Band equipment, a half gasket is used when mating a grooved flange with a flat flange. A full gasket is used when mating two grooved surfaces.

NOTE With Ku-Band equipment, a thin gasket is used when mating a shallow groove (0.050") with a flat flange. A thick gasket is used when mating a deep groove (0.080") with a flat flange.

All Codan Ku-Band SSPAs have shallow groove flanges.

Table 3 lists the gasket kits available from Codan for C-Band and Ku-Band equipment.

Table 3: Gaskets kits for C-Band and Ku-Band equipment

Codan part number	Name	Contents of kit
C-Band equipment		
15-40095	Flange kit	WR137 half gasket, 25 mm screws and nuts
15-40096	Flange kit	WR137 full gasket, 25 mm screws and nuts
15-40097	Flange kit	WR137 half gasket, 16 mm screws, no nuts
15-40098	Flange kit	WR137 full gasket, 16 mm screws, no nuts
15-40123	Flange kit	WR137 full gasket, 12 mm screws, no nuts
Ku-Band equipment		
15-40173	Thin gasket kit	Thin gasket, 10, 12 and 16 mm M4 screws and nuts
15-40172	Thick gasket kit	Thick gasket, 10, 12 and 16 mm M4 screws and nuts
15-40174	Universal gasket kit	Thin and thick gaskets with a variety of screws and nuts

Grounding recommendations

WARNING Precautions *must* be taken to ensure the installation is adequately protected against voltage potential differences that may occur between the outdoor and indoor equipment.

These potential differences may occur:

- if there is a fault in the AC mains reticulation system
- when high power electrical machinery located nearby is switched on or off
- if a lightning strike occurs in the area

It is highly recommended that the antenna metal structures and the cases of the outdoor equipment be connected together and grounded with earth stakes, or in the case of rooftop sites, be connected to the lightning grid and earth system of the building. The earth screws on the SSPA modules are provided specifically to provide this protection.

In the case of lightning strikes, huge ground currents occur for several hundred metres around a strike area, causing large voltage potentials between separate earth points. For this reason, some lightning engineers recommend the use of large copper earth straps (or braid) to connect the indoor and outdoor equipment earth systems.

WARNING For critical installations in lightning-prone areas, it is strongly advised that you seek expert advice on lightning protection.

CAUTION The SSPA must be earthed via its chassis earth to ensure CE compliance.

Welding precautions

When arc welding on or near the antenna structure, take the following precautions to minimise the danger of large welding currents flowing through the communications cables:

- ❑ Disconnect all cables from the indoor equipment, including power, control and IF cables.
- ❑ Disconnect all cables between the SSPA and any other equipment.

Safety precautions

Before switching the SSPA on, these safety precautions *must* be taken.

Moisture protection

WARNING The SSPA case is not designed to be opened in the field. Any moisture inside the cabinet may damage the SSPA.

WARNING Ensure all connectors have either their protective caps fitted or are taped with self-amalgamating tape.

Radiation warning

The SSPA is capable of both high gain and high power. If it has not been terminated correctly, the SSPA could emit high levels of non-ionising radiation from its waveguide output when activated due to oscillation caused by feedback.

WARNING Do not look into the unterminated output or point it towards anyone.

WARNING Ensure the output waveguide port of the SSPA is either connected to the antenna feed or terminated with a high power load before operating the SSPA.

WARNING When the SSPA is in Standby mode it is *not* muted and can still generate RF output power. You must mute the SSPA if you want to prevent transmission.

Power supply

Regardless of the AC supply connected, the power supply unit in the SSPA produces an internal DC voltage of about 400 V DC.

WARNING The DC voltage inside the SSPA can be lethal. Do not operate the SSPA with the covers removed.

Power supply connections

SSPA AC mains supply

Table 4 lists the pin connections and provides a description of input functions available on the **AC INPUT** connector.

Table 4: AC input connector pinouts (Amphenol T 3110 000)

Pin	Description
1	Neutral
2	Not connected
3	Active
	Protective earth

–48 V DC output connectors

There are two **–48 V DC OUTPUTS** connectors on the SSPA.

Table 5 lists the pin connections and provides a description of output functions available on the **–48 V DC OUTPUTS** connectors.

Table 5: –48 V DC outputs connectors pinouts (MS3114E8-2S)

Pin	Description
A	0 V
B	–48 V DC

Interface connections

The status and parameters of the SSPA can be controlled by a serial interface. Alarms and other SSPA functions are controlled by a control interface. The interface connections are provided via the **CONTROL** and **SERIAL** connectors on the SSPA.

Control interface

The Control interface may be set to either generic mode or to specifically drive the Codan 5700/5900 converter. This setting is accessed using the SSPA Manager software.

The interface connections to a 5700 or 5900 Converter are shown in Figure 1. The converter is powered by the –48 V DC output from the SSPA.

Figure 1: Connection diagram for C-Band or Ku-Band transceiver

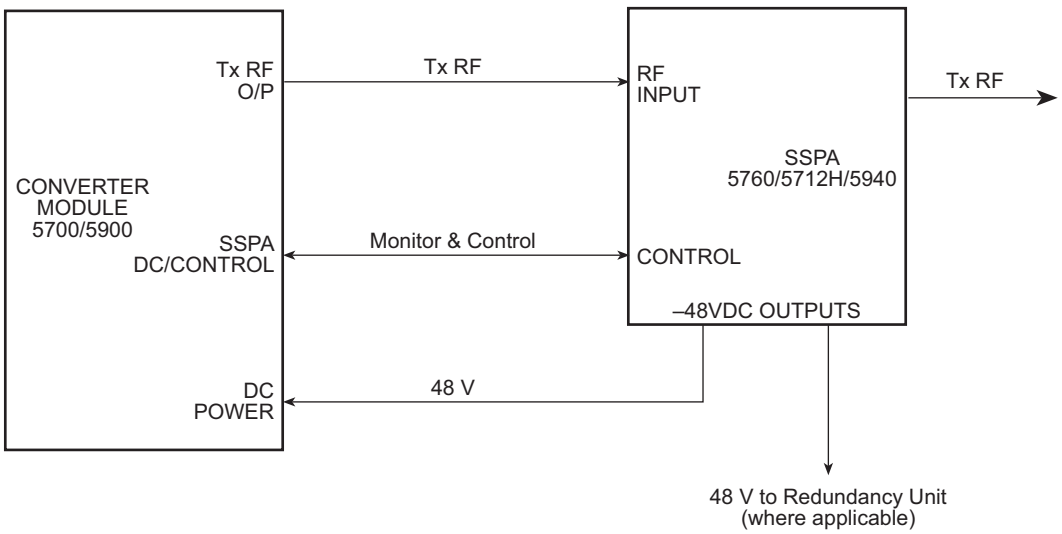

Table 6 lists the pin connections for the control interface and provides a description of input/output functions available on the **CONTROL** connector. All relay contacts are fail safe, i.e. the relay is de-energised in alarm state. The descriptions shown are only applicable when the SSPA control interface is set to generic mode.

Table 6: Control connector pinouts (MS3114E14-19P)

Pin	Type	Name	Description
A	Output	Sw Drive	+11 V supply output, which may be used to drive internal opto couplers.
B	Output	Urgent (NO)	Normally open contact of the Urgent Alarm relay, i.e. open when an urgent alarm condition is present.
C	Output	Maint (Overtemp)	Normally open contact of the Maintenance relay, i.e. open when the SSPA is indicating an overtemperature condition.
D		GND	Signal ground.
E	Output	Alarm	Normally open contact of the Summary Alarm relay, i.e. open when an alarm condition is present.
F	Output	Sw Out (NO)	Normally open contact of the Switchover Out relay, i.e. open when the SSPA is in the standby state.
G	N/C		
H	N/C		
J	N/C		
K	Input	Clr In	A low on the Clear Alarms input clears any latched alarms that are no longer active. The minimum low time is 10 ms.
L	Input	Control Com	An external +11 V input that is common to pins P, N, V and K. Connected internally to Pin A.
M	In/Out	Contact Com	Common contact for pins B, C and E. This pin is connected to ground.
N	Input	PA Act	Ignored in generic mode.
P	Input	Sw In	Used to control switchover in redundancy SSPA systems. SSPA goes to standby if pulled low (> 20 ms).

Table 6: Control connector pinouts (MS3114E14-19P) (cont.)

Pin	Type	Name	Description
R	In/Out	Sw Out (Com)	Common contact of the Switchover Out relay. This pin is connected to ground.
S	In/Out	Sw Out (NC)	Normally closed contact of the Switchover Out relay, i.e. closed when the SSPA is in the standby state.
T	N/C		
U	Input	Mute	A low will cause the internal mute facility to activate, muting the RF output of the SSPA. A high will restore the RF output. This input overrides the unmute command from the serial interface.
V	Input	Aux In	Auxiliary Alarm input for use with external equipment. A connection to ground (default) will cause an alarm condition. This can also be active high depending upon the setting in the SSPA Manager.

The control interface input levels and relay outputs are defined in Table 7 and Table 8.

Table 7: Control interface levels

Control signal	Level
Sw In Mute In Aux In Clr In	Contact closure to Contact Common 10 mA typical
PA Act	Contact Closure to Contact Com < 1 mA

Table 8: Relay output definitions

Relay output definition	**Level**
Type	Dry contact, isolated
Maximum current	100 mA
Maximum voltage (to ground)	50 V
Operate time	3 ms maximum

Serial interface

The C-Band 5760/5712H and Ku-Band 5940 SSPAs can be set up via their serial interface using a PC running the SSPA Manager software. See page 60, *Remote communications protocol* for details of how to communicate with the SSPA remotely via the serial interface.

Table 9 lists the pin connections for the serial interface and provides a description of the input/output functions available on the **SERIAL** connector.

Table 9: Serial connector pinouts (MS3114E14-19S)

Pin	Type	Name	Description
A	N/C		
B	N/C		
C	N/C		
D	Ground	GND	Signal ground.
E	–	Termination 1	A link across these pins terminates the RS422/485 bus.
F	–	Termination 2	
G	Output	RS232 RTS	RTS for RS232.
H	Output	RS232 TxD	Transmit data for RS232.
J	Input	RS232 RxD	Receive data for RS232.
K	N/C		
L	N/C		
M	N/C		
N	N/C		
P	Input	RS422/485 RxD+	Receive data+ for RS422/485.
R	Input	RS422/485 RxD–	Receive data– for RS422/485.
S	Output	RS422/485 TxD+	Transmit data+ for RS422/485.
T	Input	RS232 CTS	CTS for RS232.
U	N/C		
V	Output	RS422/485 TxD–	Transmit data– for RS422/485.

Installing the SSPA Manager software

System requirements

Software requirements

You must have Microsoft Windows 95 (or later) operating system installed on your PC.

Hardware requirements

To use SSPA Manager, the following PC hardware is required:

- 1 RS232 serial communication port for connecting to an SSPA
- CD ROM drive to load software
- approximately 5 MB hard disk space

Installing the software

To install the software:

- ❑ Insert the Codan SSPA Manager CD into the CD drive of your PC.
- ❑ If the CD does not autostart, use Windows Explorer to navigate to the CD drive of your PC, then double click on the setup.exe file.
- ❑ Follow the prompts in the installation wizard to complete the installation.

Connecting a PC to the SSPA

To connect a PC to the SSPA:

- ❑ Connect the serial cable (Codan part number 08-05301-002) from the 9-way D-type female connector on the PC to the **SERIAL** connector on the SSPA.

Details of the wiring of this cable are shown in drawing 08-05301. If connection to a 25-way D-type serial port is required, use a standard 25-way female to 9-way male adaptor.

The connection may be permanent as part of the installation, or temporary, just for the purpose of setting the operating parameters of the SSPA.

Setting up the SSPA

To set up the SSPA in the system:

- ❑ Switch on the AC supply to the SSPA.
- ❑ Start the SSPA Manager software.

Setting SSPA parameters

To set the parameters:

- ❑ In the SSPA Manager window, set up the following parameters:

Parameter	Setting
User Mute Setting	RF Mute
Operating State	Standby
Gain Adjust	–20 dB

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu, then select the Standard tab.
- ❑ Set the type of converter to Codan or Generic to suit your system.
- ❑ Click Close.
- ❑ Feed an RF signal into the SSPA at –30 dBm and connect a suitably rated power meter to the SSPA output of the **RF MONITOR** port.
- ❑ In the SSPA Manager window, set the SSPA to Online and RF On, then adjust the RF gain using the Gain Adjust field to set the required output power level.

WARNING Significant damage to and possible failure of the SSPA may result from driving the SSPA beyond the rated output power.

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7 Operating the SSPA

This section contains the following topics:

Switching on the SSPA

To switch on the SSPA:

- ❑ Switch on the AC supply to the SSPA.

NOTE The SSPA has non-volatile memory, so previous configurations and settings are maintained while the power is switched off. Default settings are present in non-volatile memory when the SSPA is shipped from Codan.

CAUTION Do not switch the unit off during the update period as this may corrupt the non-volatile memory.

If for any reason the non-volatile memory is corrupted during operation, the SSPA reverts to the factory default settings. A summary of the factory default settings is given in Table 10.

Table 10: Factory default settings for the SSPA

Setting	**Factory default**
Alarm style	Latched
Amplifier shutdown mode	On
Audible alarm	On
Auxiliary alarm sense	Active low
Comms parameters	8 bits, no parity, 1 stop bit
Control interface mode	Generic
Data rate	9600 bps
EEPROM storage	On
Gain Adjust	0.0 dB
Maximum RF threshold	Disabled
Minimum RF threshold	Disabled

Table 10: Factory default settings for the SSPA (cont.)

Setting	Factory default
PIN diode table	Single PIN diode (0, 0), (1, 11), (2, 17), (3, 21), (4, 25), (5, 29), (6, 33), (7, 37), (8, 40), (9, 44), (10, 48), (11, 51), (12, 55), (13, 59), (14, 63), (15, 67), (16, 71), (17, 75), (18, 79), (19, 84), (20, 89), (21, 94), (22, 100), (23, 105), (24, 111), (25, 117), (26, 123), (27, 130), (28, 138), (29, 145), (30, 153), (31, 161), (32, 169), (33, 178), (34, 187), (35, 197), (36, 208), (37, 219), (38, 232), (39, 244), (40, 255) Dual PIN diode (0, 0), (1, 15), (2, 32), (3, 40), (4, 48), (5, 59), (6, 64), (7, 74), (8, 81), (9, 89), (10, 100), (11, 107), (12, 122), (13, 133), (14, 146), (15, 166), (16, 179), (17, 204), (18, 230), (19, 242), (20, 255), (21, 15), (22, 32), (23, 40), (24, 48), (25, 59), (26, 64), (27, 74), (28, 81), (29, 89), (30, 100), (31, 107), (32, 122), (33, 133), (34, 146), (35, 166), (36, 179), (37, 204), (38, 230), (39, 242), (40, 255)
RF level calibration table	Linear curve (0.5 dB/1 V step) with rated power output at 10 V; 20 dB below rated power output at 0 V
RF level temperature compensation	(6°C, Disabled), (50°C, Disabled), (88°C, Disabled)
RF mute	Off
State	Standby
Temp compensation calibration table	All 0°C and disabled
Temperature compensation	Off
Thermal fan control	Off
Unit address	0

Switching off the SSPA

To switch off the SSPA:

- ❑ Switch off the AC supply to the SSPA.

Operating the SSPA using the SSPA Manager software

The SSPA can be controlled using a PC and the Codan SSPA Manager software. This software provides monitor and control facilities for the parameters listed in Table 17 on page 81. It provides an alarm when values exceed the set operating range of the SSPA.

All control functions of the SSPA described in the following sections assume that:

- the SSPA is on
- a connection exists between the SSPA and the PC
- the SSPA Manager software is running

The following sections describe the full functionality of the SSPA Manager software. Some aspects of the software may not be available with your particular SSPA, depending on its hardware configuration or type.

Changes to settings that are made in the following ways are applied immediately:

- selecting from the drop list
- using the scroll buttons
- using the ↑ and ↓ keys on the keyboard when the field has focus

Changes to settings that are made by entering text into a field are applied by pressing **Enter**. Changes to text fields are discarded by closing the window, changing the focus to another tab within the open window, or by pressing **Esc**.

The SSPA Manager software may be operated without a mouse.

A summary of the SSPA Manager screens showing full functionality is included on page 85, *SSPA Manager screens*.

Setting up communications

Setting up parameters for a PC

To set the serial communications parameters for a PC:

- ❑ In the SSPA Manager window, select Software Options from the Options menu.
- ❑ Select the Communications tab.
- ❑ In the Port frame, select the Com port on the PC that is connected to the SSPA.
- ❑ Select the serial communication option.

Option	Description
RS232	Normal setting
RS422/485	Used when the PC is fitted with an RS422/485 serial interface card and cable or external adaptor

NOTE The RS232 and RS422/485 interfaces are on separate pins on the **SERIAL** connector.

- ❑ Set up the following communication parameters:

Parameter	Setting
Data rate	9600 bps
Data bits	8
Parity	None
Stop bits	1

- ❑ If you have selected the RS232 serial communication option, set the flow control setting to None.

Option	Description
None	No feedback is provided by the SSPA on the state of its input buffers

- ❑ If you have selected the RS422/485 serial communication option, set the half duplex control that you want to use.

Option	Description
None/Auto	Used when the attached interface card or external adaptor has its own duplex control, or if a full duplex connection is in place
RTS	Used when the attached interface card or external adaptor requires a half duplex control signal for data transmission to the PC

- ❑ Click OK.

Connecting to an SSPA

To connect to an SSPA:

- ❑ In the SSPA Manager window, Communications Connection frame, set the address of the SSPA attached to the PC.

  If you do not know the address of the SSPA to which you are connected, set the address to 0.

  CAUTION The broadcast address 0 cannot be used with an RS485 bus if there is more than one device on the bus.

- ❑ Click Connect.

Using the basic settings

Selecting the operating state

The SSPA has three operating states:

- online
- standby
- maintenance (see page 55, *Selecting Maintenance mode*)

The usual operating state is on line.

NOTE If certain faults are detected during operation, the SSPA switches to standby.

Selecting Online mode

To switch the SSPA to Online mode:

❑ In the SSPA Manager window, select the Online option in the Operating State frame.

You will not be able to switch the SSPA to Online mode if it has an urgent fault present (see Table 13 on page 72). If an urgent fault has occurred:

- the Standby option in the Operating State frame will be selected
- the field in the Alarms frame will be flashing red

Selecting Standby mode

WARNING Standby mode does not automatically place the SSPA into an RF mute state. The SSPA will only be automatically muted if it has switched to Standby mode due to the failure of a module.

To switch the SSPA to Standby mode:

❑ In the SSPA Manager window, select the Standby option in the Operating State frame.

Setting the RF gain

To set the RF gain:

- ❑ In the SSPA Manager window, RF Output frame, set the gain that you want to use in the Gain Adjust field.

  The RF gain can be set in increments of 0.2 dB.

  As the RF gain is adjusted, the output power will change. This is indicated by a change in the RF level as shown in the RF Level field.

Setting the mute status

To set the mute status:

- ❑ In the SSPA Manager window, User Setting frame, select the mute status that you want to use.

Option	Description
RF On	SSPA is unmuted and able to transmit if not externally muted
RF Mute	SSPA is muted with no RF output

The mute state of the SSPA is shown in the SSPA Mute State frame.

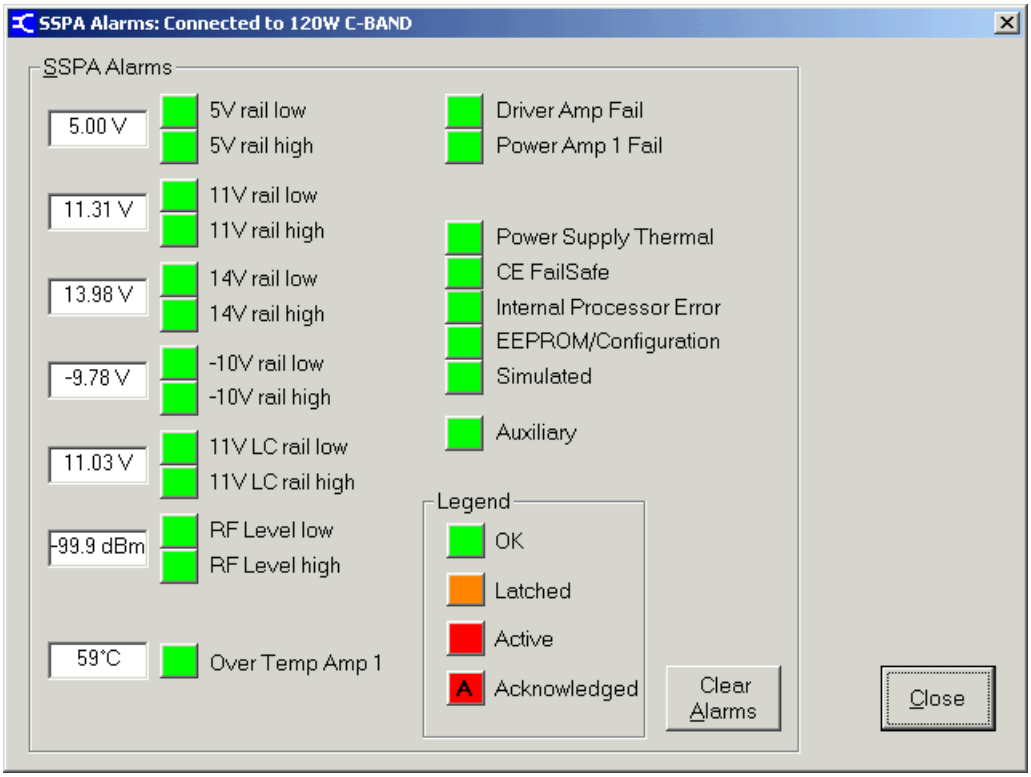
State	Description
RF On	SSPA is unmuted
RF Mute (User)	SSPA is muted by the user
RF Mute (Direct I/O)	SSPA is muted by a contact closure input signal in the **CONTROL** connector
RF Mute (Amp Module Fail)	SSPA is muted due to a driver module or power amplifier module fault

Viewing the basic status

Viewing alarms

To view alarms:

- ❑ In the SSPA Manager window, click View in the Alarms frame.



The value of the parameter is indicated in the corresponding field.

The status of the parameter is indicated by the colour of the corresponding button. Active alarms are shown in red. The Legend frame shows the possible colours of the buttons and their meaning.

- ❑ Click Close.

Viewing the RF level

To view the output RF level:

- ❑ In the SSPA Manager window, view the output RF level in the RF Output frame, RF Level field.

Viewing the mute status

To view the mute status:

- ❑ In the SSPA Manager window, view the mute state in the SSPA Mute State frame.

Viewing the temperature of a PA module

To view the temperature:

- ❑ In the SSPA Manager window, view the temperature in the Temperatures frame.

Viewing voltages

To view voltages:

- ❑ In the SSPA Manager window, click View in the Alarms frame.

  The value of the voltage is indicated in the corresponding field.
- ❑ Click Close.

Setting the alarm notification

To set the alarm notification status:

- ❑ In the SSPA Manager window, select Software Options from the Options menu.
- ❑ Select the General tab.
- ❑ In the Audible Alarm Notification frame, select the status that you want to use.

Option	Description
On	Your PC will beep at 1 second intervals when an alarm occurs
Off	Your PC will not beep when an alarm occurs

- ❑ Click OK.

Acknowledging alarms

To acknowledge alarms:

- ❑ In the SSPA Manager window, click View in the Alarms frame.
- ❑ Click on the button that is alarming.

  An ‘A’ will appear on the button indicating that it has been acknowledged.
- ❑ Click Close.

NOTE If all current active and latched alarms are acknowledged, the audible notification of the alarm and flashing of text in the Alarms field will cease.

Clearing latched alarms

To clear latched alarms:

- ❑ In the SSPA Manager window, click View in the Alarms frame.
- ❑ Click Clear Alarms.

  All alarms that are no longer active are cleared.
- ❑ Click Close.

Setting up Standard features

Setting the type of converter

The monitor and control interface determines how the SSPA will communicate with the converter.

To set the type of converter to which the SSPA is connected:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Standard tab.
- ❑ In the Converter Connection frame, select the type of converter that is connected to the SSPA.

Option	Description
Codan	SSPA is connected to a Codan 5700 or 5900 converter
Generic	SSPA is used with a non-Codan converter

- ❑ Click Close.

Setting the maximum and minimum power alarm thresholds

To set the maximum and minimum power alarm thresholds:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Standard tab.
- ❑ In the RF Level Thresholds frame, set the maximum and minimum thresholds that you want to use.

  The RF Level Thresholds can be set in 0.5 dB steps.

Option	Description
Minimum	Sets the minimum threshold below which a non-urgent alarm will occur 5760: 28.5 ≤ xx.x ≤ 52.0 in 0.5 dB steps 5712H: 31.5 ≤ xx.x ≤ 55.0 in 0.5 dB steps 5940: 25.5 ≤ xx.x ≤ 49.0 in 0.5 dB steps
Maximum	Sets the maximum threshold above which a non-urgent alarm will occur 5760: 28.0 ≤ xx.x ≤ 51.5 in 0.5 dB steps 5712H: 31.0 ≤ xx.x ≤ 54.5 in 0.5 dB steps 5940: 25.0 ≤ xx.x ≤ 48.5 in 0.5 dB steps

NOTE The threshold is disabled by setting it to D.

- ❑ Click Close.

Setting the address

To set the address:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Standard tab.
- ❑ In the SSPA Address frame, set the address that you want to use for the connected SSPA.

  The address must be an integer in the range 0–31.
- ❑ Click Close.

  The address of the SSPA is automatically updated in the Connection Address field in the SSPA Manager window.

Setting up Advanced features

Setting the amplifier shutdown mode

To set the amplifier shutdown mode:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Advanced tab.
- ❑ Click Unlock to gain access to the parameters on the Advanced tab.
- ❑ In the Amplifier Shutdown frame, select the mode that you want to use.

Option	Description
On	Faults detected in either the driver or the power modules are logged and both modules are shut down automatically
Off	Faults detected in either the driver or the power modules are logged but both modules continue to operate, possibly in a degraded state

- ❑ Click Close.

Setting the method of temperature compensation

CAUTION Although this temperature compensation method can be changed at any time, the user should not alter it without prior consultation with Codan.

To set the method of temperature compensation:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Advanced tab.
- ❑ Click Unlock to gain access to the parameters on the Advanced tab.
- ❑ In the Temperature Compensation frame, select the type of compensation that you want to use.

Option	Description
On	Gain is automatically compensated over temperature (normal setting)
Off	Compensation is fixed at the middle of the range (factory/special testing only)
Max	Compensation is fixed to give the SSPA maximum gain (factory/special testing only)
Min	Compensation is fixed to give the SSPA minimum gain (factory/special testing only)

- ❑ Click Close.

Setting the alarm style

To set the alarm style:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Advanced tab.
- ❑ Click Unlock to gain access to the parameters on the Advanced tab.
- ❑ In the SSPA Alarm Style frame, select the style that you want to use.

Option	Description
Latching	Alarm is latched until it is cleared via the Clear Alarms button (recommended style)
Fleeting	Alarm is logged as it occurs but is cleared as soon as the cause of the alarm is resolved

- ❑ Click Close.

Setting the auxiliary alarm sense

To set the auxiliary alarm sense:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Advanced tab.
- ❑ Click Unlock to gain access to the parameters on the Advanced tab.
- ❑ In the Auxiliary Alarm Sense frame, select the status that you want to use.

Option	Description
High	An alarm is generated if a high input signal occurs on the Auxiliary Alarm input pin of the **CONTROL** connector
Low	An alarm is generated if a low input signal occurs on the Auxiliary Alarm input pin of the **CONTROL** connector

- ❑ Click Close.

Setting up Factory features

Setting the RF level table

CAUTION Although the RF level table can be changed at any time, the user should not alter it without prior consultation with Codan.

To set the RF level table:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the RF Level Table frame, select the entry in the table that you want by using the scroll keys on the Scroll Table field.

  The level and corresponding sensor level values will appear in their respective fields.
- ❑ Edit the entries as required.
- ❑ Click Close.

Setting the PIN diode table

CAUTION Although the PIN diode table data can be changed at any time, the user should not alter it without prior consultation with Codan.

To set the PIN diode table data:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the PIN Diode Table frame, select the entry in the table that you want by using the scroll keys on the Scroll Table field.

  The attenuation level and corresponding DAC values will appear in their respective fields.

  NOTE You will need to select an appropriate entry from the PIN diode table if you intend to place the SSPA in Maintenance mode. The selected PIN diode point data is applied to the PIN diode attenuator while the SSPA is in Maintenance mode.

- ❑ Edit the entries as required.
- ❑ Click Close.

Selecting Maintenance mode

To place the SSPA into Maintenance mode:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the Mode frame, select Maint.
- ❑ Click Close.

  The operating state of the SSPA is shown in the SSPA Manager window, Operating State frame as Maintenance.

Setting the temperature compensation points

CAUTION Although this temperature compensation data can be changed at any time, the user should not alter it without prior consultation with Codan.

To set the temperature compensation points:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the System Temperature Comp Points frame, select the entry in the table that you want by using the scroll keys on the Scroll Table field.

  The compensation and corresponding temperature values will appear in their respective fields.
- ❑ Edit the entries as required.
- ❑ Click Close.

Setting the RF level temperature compensation points

CAUTION Although this RF level temperature compensation data can be changed at any time, the user should not alter it without prior consultation with Codan.

To set the RF level temperature compensation points:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the RF Level Temperature Comp Points frame, select the entry in the table that you want by using the scroll keys on the Scroll Table field.

  The compensation and corresponding temperature values will appear in their respective fields.
- ❑ Edit the entries as required.
- ❑ Click Close.

Setting the thermal fan control mode

To set the thermal fan control mode:

- ❑ In the SSPA Manager window, select SSPA Settings from the Options menu.
- ❑ Select the Factory tab.
- ❑ Click Unlock to gain access to the parameters on the Factory tab.
- ❑ In the Thermal Fan Control frame, select the mode that you want to use.

Option	Description
On	Disables fan operation until the SSPA has warmed up to approximately 30°C
Off	Enables fan operation at all times

- ❑ Click Close.

Recording the setup of your SSPA

To record the setup of your SSPA:

- ❑ In the SSPA Manager window, select Save Snapshot (SSPA) from the File menu.
- ❑ Enter appropriate descriptive information in the File Description field.

  SSPA Manager uses the first 20 characters of this text as the filename.
- ❑ Click OK.

8 Operating the SSPA remotely

This section contains the following topics:

Remote communications protocol

The communications protocol enables remote devices to control the SSPA, and also to determine its status. Typically, a remote device issues a command, the SSPA performs any actions necessary, then sends a reply. The reply will indicate the new status or operating condition. Checksum is used to validate commands and responses.

The protocol uses only the printable ASCII characters SPACE (0x20) to ~ (0x7E), where 0xYY represents the hexadecimal value YY.

Protocol format

Both transmit and receive messages fit the following format:

[Lead-in][Address][Message][Checksum][Terminator]

The characters used for the various message elements are given in Table 11.

Table 11: Characters used in message elements

Message element	Character
[Lead-in]	A control character with ASCII value 0x10 to 0x1F or the '{' character. Packets generated by the SSPA always use '{'.
[Address]	Single alphabetic character representing the address of the unit. The character is (0x40 + ADDR), where ADDR is in the range 0x00 to 0x1F (0 to 31). For example, 'A' for address 1, 'B' for 2..., up to '_' for address 31. Address 0 (or '@') is reserved as a global address so all units will respond to and act on messages containing this address.
[Message]	Up to 16 characters in the range 'SPACE' (0x20) to 'z' (0x7A).
[Checksum]	Calculated from the address and message bytes of the transmission. The value of the single character checksum can be calculated as: ((SUM AND 63) XOR (SUM DIV 64)) + 32 where: SUM is the modulo 256 sum of the address and message bytes AND is the bitwise AND operator XOR is the bitwise exclusive OR operator DIV is the integer divide operator Character values are ASCII. This is equivalent to saying that the checksum is the 8-bit sum of the ASCII values of the address and message characters, with the two most significant bits of the result shifted down and exclusive ORed with the two least significant bits of the result. The value 32 (SPACE) is added to make the result printable.
[Terminator]	This character completes the transmission. Any control character (0x01 to 0x0F) or the '}' character may be used as a terminator. Packets generated by the SSPA always use '}'.

Command and reply message format

A range of commands can be sent to the SSPA using the message format. A list of all these commands is given in Table 12 on the following pages.

If any of the characters in the command are lower case (0x60 through 0x7A), then the reply message will be suppressed. This function is useful when global addressing is used. Apart from this and the checksum calculations, the case of the message characters is ignored.

The absence of a reply packet from the SSPA indicates that the command was not valid.

Except where specified, numeric values in commands do not require a '+' for positive numbers, and leading or trailing zeros are not required to expand numbers to the field sizes indicated.

The '+' is omitted on positive numbers in command responses from the SSPA. Where values normally have a decimal component (such as gain), the response from the SSPA will have a trailing zero after the decimal point (for example, G=–1.0).

Table 12: Remote operation commands for an SSPA

Command	Transmit	Reply	Remarks
Display alarms	A?	A=abc...z	Upper-case letters are used for active alarms, lower-case for cleared but latched alarms. A letter is not returned when the corresponding alarm is not active or latched. If no alarms are active or latched, no characters follow the '='. Possible responses are: **A**/**a** = 5 V rail low **B**/**b** = 5 V rail high **C**/**c** = 11 V (C-Band)/9.3 V (Ku-Band) rail low **D**/**d** = 11 V (C-Band)/9.3 V (Ku-Band) rail high **E**/**e** = EEPROM corrupt or config changed (system still operational with default settings) **F**/**f** = 14 V rail low **G**/**g** = 14 V rail high **H**/**h** = Power supply thermal warning **I**/**i** = Internal processor error **J**/**j** = –10 V rail low **K**/**k** = –10 V rail high **L**/**l** = RF level below P_{min} threshold **M**/**m** = RF level above P_{max} threshold **O**/**o** = Driver amp fail **P**/**p** = Power Amp Module fail **R**/**r** = 11 V LC rail low **S**/**s** = 11 V LC rail high **T**/**t** = Overtemperature module **X**/**x** = Auxiliary alarm **Y**/**y** = Failsafe alarm **Z**/**z** = Simulated alarm
Test all (Self test)	ZA	A=abc...z	Responds with alarm state.
Simulate urgent alarm	ZZ	A=abc...z	Responds with alarm state.
Set amplifier shutdown mode	CS=E CS=D	CS=SHUTDOWN ON CS=SHUTDOWN OFF	Enables Amplifier Shutdown mode. Disables Amplifier Shutdown mode.

Table 12: Remote operation commands for an SSPA (cont.)

Command	Transmit	Reply	Remarks
Display amplifier shutdown mode	CS?	CS=SHUTDOWN ON CS=SHUTDOWN OFF	Responds with current Amplifier Shutdown mode.
Display number of PIN diodes	CP?	CP=*n* PIN DIODES	Responds with number of PIN diodes, *n*, where n = 1 or 2.
Display unit type	CT?	CT=60W C-BAND CT=120W C-BAND CT=40W Ku-BAND	Describes type of SSPA.
Display firmware version	CV?	CV=0518A-01V6.0	Shows version number of firmware for the SSPA (example only shown).
Set auxiliary alarm active state	CX=L CX=H	CX=ACTIVE LOW CX=ACTIVE HIGH	Sets auxiliary alarm active state to low. Sets auxiliary alarm active state to high.
Display auxiliary alarm active state	CX?	CX=ACTIVE LOW CX=ACTIVE HIGH	Describes active state of auxiliary alarm input.
Set alarm style	CA=L CA=F	CA=LATCHED CA=FLEETING	Sets alarm style to latched. Sets alarm style to fleeting.
Display alarm style	CA?	CA=LATCHED CA=FLEETING	Describes alarm style.
Display hardware platform	CH?	CH=0969A	Responds with hardware platform of connected SSPA (example only shown).
Set thermal fan control mode	CF=E	CF=FAN CTRL ON	Sets the thermal fan control to on, which disables the fan operation until the SSPA has warmed up to approximately 30°C.
	CF=D	CF=FAN CTRL OFF	Sets the thermal fan control to off, which enables the fan operation at all times.
Display thermal fan control mode	CF?	CF=FAN CTRL ON CF=FAN CTRL OFF	Describes state of thermal fan control.

Table 12: Remote operation commands for an SSPA (cont.)

Command	Transmit	Reply	Remarks
Display status	S?	S=ACD...Z	Letters correspond to full status, e.g. **S=OCATR** = on line, temperature compensated gain, audible alarm, RF mute off, EEPROM storage on. Possible responses are: **A** = audible alarm **B** = mute is off but alarm has shut down amplifier **C** = temperature compensated gain **D** = mute is currently on via direct interface **F** = EEPROM storage off **H** = maximum compensated gain **L** = minimum compensated gain **M** = maintenance mode **O** = on line mode **Q** = quiet mode **R** = EEPROM storage on **S** = standby mode **T** = RF mute off **U** = uncompensated gain **X** = RF mute on **Y** = unit is in LLO mode **Z** = unit is in RLO mode NOTE The audible alarm and quiet mode responses are provided for software compatibility with other hardware versions of the equipment. These responses have no effect in the 5760/5712H and 5940 SSPAs.
Online Standby Maintenance	S=O S=S S=M	S=ACD...Z S=ACD...Z S=ACD...Z	Sets the operating mode (Online, Standby or Maintenance) and responds with complete status as shown for Display status command.

Table 12: Remote operation commands for an SSPA (cont.)

Command	Transmit	Reply	Remarks
Temperature compensated gain	S=C	S=ACD...Z	Sets mode of temperature compensated gain (On, Off, Max or Min) and responds with complete status as shown for Display status command.
Uncompensated gain	S=U	S=ACD...Z	
Maximum compensated gain	S=H	S=ACD...Z	
Minimum compensated gain	S=L	S=ACD...Z	
Audible alarm	S=A	S=ACD...Z	Sets the alarm mode (Audible or Quiet) and responds with complete status as shown for Display status command. NOTE These commands and responses are provided for software compatibility with other hardware versions of the equipment. These commands and responses have no effect in the 5760/5712H and 5940 SSPAs.
Quiet mode	S=Q	S=ACD...Z	
RF mute off	S=T	S=ACD...Z	Sets the RF mute (Off or On) and responds with complete status as shown for Display status command.
RF mute on	S=X	S=ACD...Z	
EEPROM storage on	S=R	S=ACD...Z	Sets the mode of EEPROM storage (On or Off) and responds with complete status as shown for Display status command.
EEPROM storage off	S=F	S=ACD...Z	
Remote	REM	S=ACD...Z	Switches unit to Remote, Local or Local Lockout mode and responds with complete status as shown for Display status command.
Local	LCL	S=ACD...Z	
Local lockout	LLO	S=ACD...Z	
Set unit address	U=x	U=x	x = address in encoded format as follows: @ = 0, A = 1, B = 2, C = 3,...Z = 26, [= 27, \ = 28,] = 29, ^ = 30, _ = 31. The address will not be changed if the specified address is invalid.

Table 12: Remote operation commands for an SSPA (cont.)

Command	Transmit	Reply	Remarks
Display unit address	U?	U=x	x = address in encoded format as shown above.
Set gain	G=–xx.x	G=–xx.x	Sets gain in dB. Allowed range is: 0.0 ≤ xx.x ≤ 20.0 in 0.2 dB steps. If the specified gain is not a 0.2 multiple, the gain is set to the next lower 0.2 value. The gain will not be changed if the specified gain is out of range.
Display gain setting	G?	G=–xx.x	Responds with gain in dB.
Set P_{min} RF threshold	T1=xx.x	T1=xx.x T1=D	Sets P_{min} threshold in dBm. Allowed range is: 5760: 28.5 ≤ xx.x ≤ 52.0 in 0.5 dB steps 5712H: 31.5 ≤ xx.x ≤ 55.0 in 0.5 dB steps 5940: 25.5 ≤ xx.x ≤ 49.0 in 0.5 dB steps If the specified threshold is not a 0.5 multiple, it is rounded to the nearest 0.5 value. If xx.x < 28.5/31.5/25.5 respectively, the threshold is set to the minimum value. If xx.x > 52.0/55.0/49.0 respectively, the threshold is set to the maximum value.
Disable P_{min} RF threshold	T1=D	T1=D	Responds with D if facility is disabled.
Display P_{min} RF threshold	T1?	T1=xx.x T1=D	Responds with P_{min} threshold in dBm. Responds with D if facility is disabled.
Set P_{max} RF threshold	T2=xx.x	T2=xx.x T2=D	Sets P_{max} threshold in dBm. Allowed range is: 5760: 28.0 ≤ xx.x ≤ 51.5 in 0.5 dB steps 5712H: 31.0 ≤ xx.x ≤ 54.5 in 0.5 dB steps 5940: 25.0 ≤ xx.x ≤ 48.5 in 0.5 dB steps If the specified threshold is not a 0.5 multiple, it is rounded to the nearest 0.5 value. If xx.x > 51.5/54.5/48.5 respectively, the threshold is set to the maximum value. If xx.x < 28.0/31.0/25.0 respectively, the threshold is set to the minimum value.

Table 12: Remote operation commands for an SSPA (cont.)

Command	Transmit	Reply	Remarks
Disable P_{max} RF threshold	T2=D	T2=D	Responds with D if facility is disabled.
Display P_{max} RF threshold	T2?	T2=xx.x T2=D	Responds with P_{max} threshold in dBm. Responds with D if facility is disabled.
Set interface mode	TX=0 TX=1	TX=0 TX=1	Sets interface mode to generic.
Display interface mode	TX?	TX=0 TX=1	Responds with the interface mode.
Display 5 V rail voltage	V5?	V5=x.xx	Responds with reading in volts.
Display 11 V rail voltage	V11?	V11=xx.x	Responds with reading in volts. NOTE This command represents both the 11 V rail in C-Band and 9.3 V rail in Ku-Band.
Display 11 V LC rail voltage	V11LC?	V11LC=xx.x	Responds with reading in volts.
Display 14 V rail voltage	V14?	V14=xx.x	Responds with reading in volts.
Display –10 V rail voltage	V–10?	V–10=–xx.x	Responds with reading in volts.
Display RF level	VR?	VR=xx.x	Responds with reading in dBm. If RF level is: 5760: < 28.0 dB 5712H: < 31.0 dB 5940: < 25.0 dB the response will be –99.9.
Display temperature Module 1	VT?	VT=±xxx	Responds with reading in °C.
Display RF level (volts)	VER?	VER=x.xx	Responds with reading in volts.
Display temperature Module 1 (volts)	VET?	VET=x.xx	Responds with reading in volts.

Programming notes

The following code fragments are provided for the benefit of system programmers to illustrate how to implement the communications protocol in a high level language.

```
/*
**   comms_chk .. convert sum into checksum
*/
static byte comms_chk(byte ch)
{
     return(((ch&0x3f)^((ch&0xc0)>>6)) + 0x20);/* calc checksum */
     }
/*
**   comms_send .. transmit formatted string over UART
*/
     static void comms_send(char *str)
{
            byte   chk;
            uart_putc('{');               /* send lead-in */
            chk = status.address+'@';     /* calculate address */
            uart_putc(chk);               /* send address */
            while (*str)
            {
                   chk += *str;           /* calculate checksum */
                   uart_putc(*str);       /* send character */
                   str++;                 /* next character */
            }
            uart_putc(comms_chk(chk));    /* send checksum */
            uart_putc('}');               /* send termination */
```

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9 Maintenance and fault finding

This section contains the following topics:

Faults

Three types of faults may occur:

- internal—urgent
- internal—non-urgent
- external

External faults are fixed as urgent and non-latching, i.e. auxiliary alarm.

Internal faults (both urgent and non-urgent) may be set to either:

- latched (fault condition remains even if the cause of the fault ceases)
- fleeting (fault condition ceases when the cause of the fault ceases)

To select the style of the alarm using the SSPA Manager software see page 53, *Setting the alarm style*.

NOTE The setting selected (i.e. latched or fleeting) applies to both urgent and non-urgent alarms.

Urgent faults

An urgent fault switches the SSPA to the standby state and activates the Urgent and Summary Alarms (see Table 6 on page 30). Table 13 lists the conditions that cause urgent faults. For details on how the alarms are triggered see page 19, *How the SSPAs work*.

Table 13: Urgent fault conditions

Condition
Configuration changed
EEPROM corrupt
Failsafe error (factory purposes only)
Failure of the driver module
Failure of the power module
FET flange temperature is above 110°C (C-Band) or 90°C (Ku-Band) (see page 73, *Overtemperature shutdown*)
Internal processor error
Simulated alarm
Voltage rail out of limits

If urgent faults are detected, the affected modules may be shut down.

Amplifier shutdown

Amplifier Shutdown mode determines how the driver and power module alarms operate.

When Amplifier Shutdown mode is enabled, faults detected in either the driver or the power modules will be logged and both modules will shut down automatically.

When Amplifier Shutdown mode is disabled, faults detected in either the driver or the power modules will be logged, but the modules will not shut down. The SSPA will continue to operate but not at its full capacity. The extent to which the performance of the SSPA is reduced will depend on the actual fault.

Amplifier Shutdown mode is enabled or disabled using the SSPA Manager software (see page 51, *Setting the amplifier shutdown mode*).

Overtemperature shutdown

When the SSPA is operated within the specified ambient temperature range, the measured FET flange temperature should stay below the threshold temperature of 105°C (C-Band) or 85°C (Ku-Band). A warning message is issued if the temperature reaches this threshold. The Maintenance and Summary alarms are also activated.

CAUTION Continuous operation under these conditions may affect the reliability of the SSPA.

Typically this type of temperature problem is caused by fan failure or air flow restrictions and blockages. If the temperature reaches the shutdown threshold temperature of 110°C (C-Band) or 90°C (Ku-Band), the RF module will shut down and an urgent alarm will be generated.

Non-urgent faults

A non-urgent fault leaves the SSPA state unchanged and activates the Summary Alarm (see Table 6 on page 30). Table 14 lists the conditions that cause non-urgent faults. For details on how the alarms are triggered see page 19, *How the SSPAs work*.

Table 14: Non-urgent fault conditions

Condition
FET flange temperature is above 105°C (C-Band) or 85°C (Ku-Band) (see page 73, *Overtemperature shutdown*)
Power supply thermal warning
RF power level is outside preset thresholds

External faults

An external fault switches the SSPA to the standby state and activates the Urgent Alarm. Table 15 lists the only condition that causes an external fault. For details on how the alarm is triggered see page 19, *How the SSPAs work*.

NOTE External alarms are fleeting.

Table 15: External fault condition

Condition
Auxiliary alarm input

Fault finding

The SSPA has been designed so that no routine maintenance or adjustments are required.

The SSPA *is not* field serviceable. If the SSPA is faulty, contact Codan immediately to obtain an RMA before returning the equipment. Failure to do so may result in any warranty being void.

CAUTION The warranty on your SSPA will be void if the warranty seals are broken.

Auxiliary alarm

The Auxiliary Alarm input is commonly used to detect an alarm generated by external equipment.

NOTE The Auxiliary alarm is fleeting.

When an alarm is received:

- the SSPA is switched to the standby state
- the equipment that drives the Auxiliary alarm input may have faults

If technical assistance is required...

If technical assistance is required for any reason, please contact the Customer Service Engineering staff. For the most rapid response, please call the Codan office that is currently in office hours (see Table 16).

Outside of normal office hours, Codan has Customer Service Engineers on call to provide emergency technical assistance. They will either answer your call immediately or return your call as soon as possible. The contact phone numbers for after hours emergency technical assistance are also listed in Table 16.

Table 16: Customer service contact numbers

Region	Office hours contact number	After hours contact number	Email address
Asia/Pacific	+61 8 8305 0311	+61 8 8305 0427	asiatech.support@codan.com.au
Europe, Middle East and Africa	+44 1252 717 272	+44 1252 741 300	uktech.support@codan.com.au
The Americas	+1 703 361 2721	+1 703 366 3690	ustech.support@codan.com.au

If you are connected to a voice mail system when you call, please follow the instructions carefully, i.e. leave a brief, clear description of your problem and your name and contact phone number including the country code.

The Customer Service Engineer may request a snapshot of the setup of your SSPA to assist with fault finding. For information on how to take a snapshot see page 58, *Recording the setup of your SSPA*.

Cooling fans

NOTE

If the Thermal Fan Control mode is set to On, the fans will not switch on until the FET flange temperature reaches 30°C. For information on the Thermal Fan Control mode see page 57, *Setting the thermal fan control mode*.

The SSPA has two 14 V DC fans to cool the heatsinks. These are the only components within the SSPA that are subject to wear.

The DC power is supplied to the fans through DC feed-through capacitors. The fans blow air into the heatsink.

The fans should be replaced if the bearings become noisy. If overtemperature warnings occur (see page 73, *Overtemperature shutdown*), the fans should be checked for correct operation and the air passages should be checked for obstructions or restrictions. If a fan needs to be replaced, a spare fan may be ordered from Codan (power supply fan: Codan part number 32-F-10; power amplifier fan: Codan part number 32-F-30).

Replacing a fan

To replace a fan:

- ❑ Switch off the AC supply to the SSPA.
- ❑ Unscrew the screws retaining the fan cowling on the heatsink of the failed fan.
- ❑ Desolder the two wires supplying power to the fan.
- ❑ Unscrew the four M4 cap screws used to mount the fan.
- ❑ Remove the fan.
- ❑ Mount the replacement fan using the four M4 cap screws.
- ❑ Resolder the fan supply wires to the DC feed-through capacitors, noting correct polarity.
- ❑ Refit the cowling to the heatsink.
- ❑ Switch on the AC supply to the SSPA.
- ❑ Check that the fan is working and that the air is blowing into the heatsink and not away from it.

Storage and shipment

The SSPA should be stored in a clean and dry environment.

If an SSPA needs to be shipped, the blanking plate should be re-attached to the output waveguide flange of the SSPA. All connectors should have their protective caps in place. The SSPA should be wrapped in plastic, and placed in a durable shipping container or crate.

CAUTION If the mounting kit is to be shipped with the SSPA, ensure that it is separated from the SSPA to prevent the SSPA from being scratched.

Sufficient shock absorbing material should be used to cushion the unit and prevent movement inside the container. The container should be sealed and marked ‘FRAGILE’.

10 Drawings

Drawing No.	Description
0969D22	Interface Control Drawing (C-Band)
0969D23	Interface Control Drawing (Ku-Band)
0969D46	Mounting details of hub-mount SSPA 5760, 5712H and 5940
08-05301	Cable, Serial

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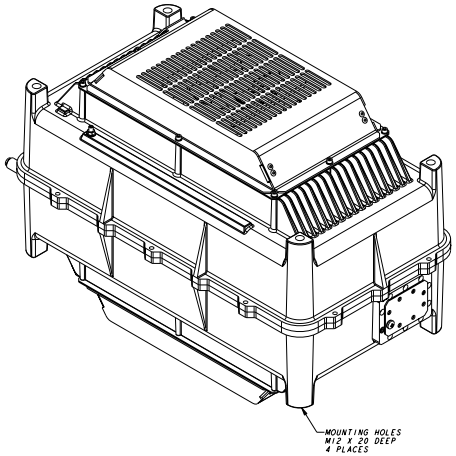

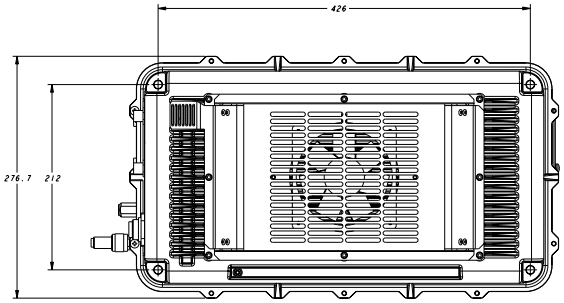

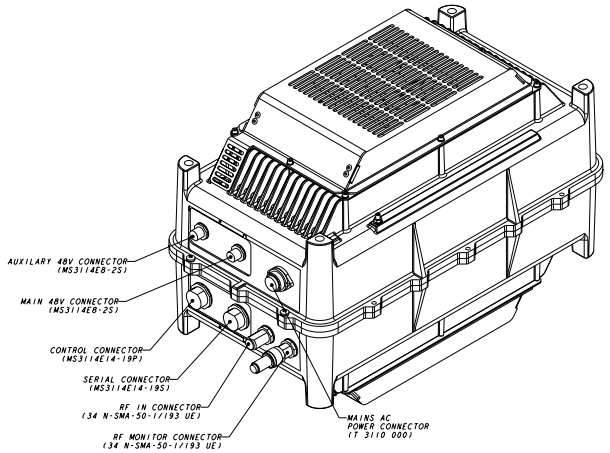

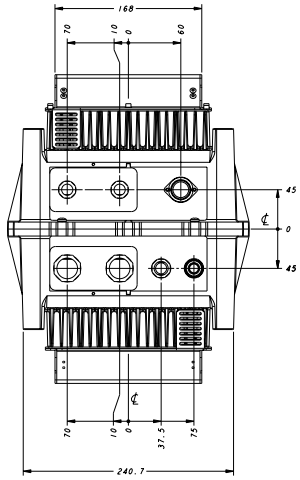

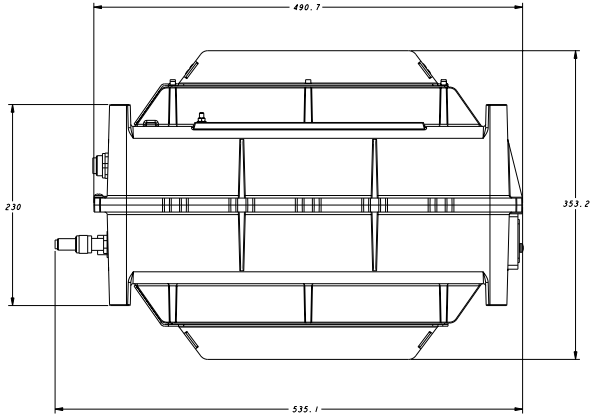

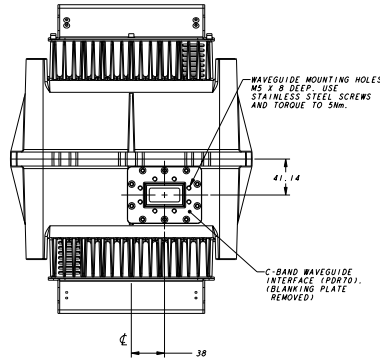

REVISION	DESCRIPTION	APPROVED	DATE
D	DESCRIPTIONS ALTERED C9 AND F12, C1 ADDED E3 PCO 00609	PRM	09-01-02
C	ADD TORQUE SPECIFICATION DETAILS TO W/G OUTPUT	AH	01-11-01
B	UPDATE TO REFLECT CURRENT STATUS	AH	17-10-01

CODAN

THIRD ANGLE PROJECTION
DIMENSIONS IN MILLIMETRES
FINISH
MATERIAL N/A
TOLERANCE ±0.5 U.O.S.

DRN RH
DATE 11-07-01
CHK AH
APP PRM
SCALE 2:5
SIZE A1

TITLE INTERFACE CONTROL DRAWING (C-BAND)
P/N 5712H & 5760
HUB MOUNT SSPA
DO NOT SCALE, IF IN DOUBT - ASK
FILE 0969D22D DRG No. 0969D22
REV D

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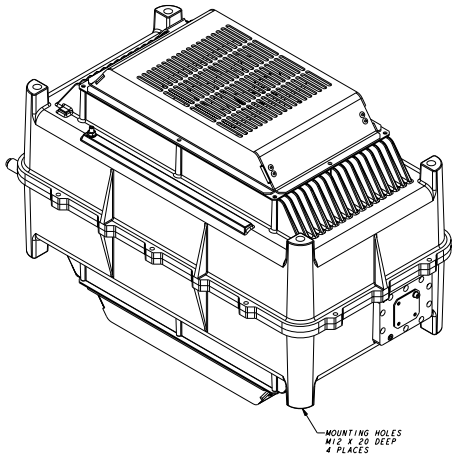

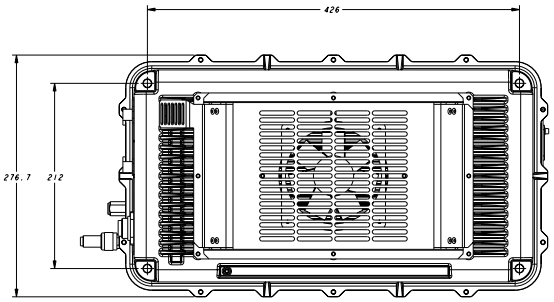

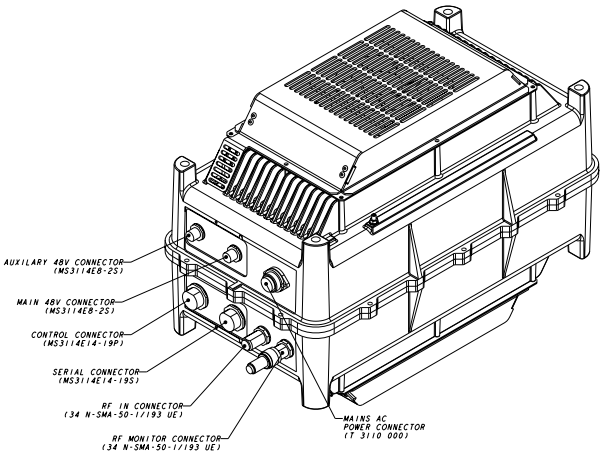

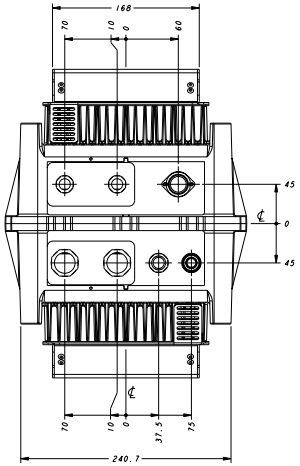

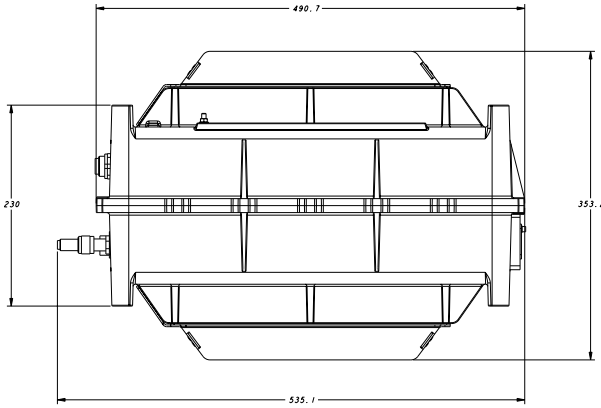

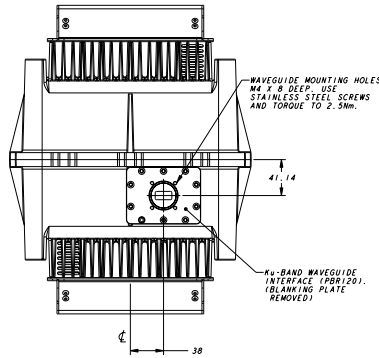

REVISION	DESCRIPTION	APPROVED	DATE
B	DESCRIPTIONS ALTERED C9 AND F12, CL ADDED E3 PCO 00609	PRM	09-01-02

CODAN

THIRD ANGLE PROJECTION
DIMENSIONS IN MILLIMETRES
FINISH
MATERIAL N/A
TOLERANCE ±0.5 U.O.S.

DRN	RH
DATE	01-11-01
CHK	AH
APP	PRM
SCALE	2:5
SIZE	A1

TITLE: INTERFACE CONTROL DRAWING (Ku-BAND)
P/N 5940
HUB MOUNT SSPA
DO NOT SCALE, IF IN DOUBT - ASK
FILE 0969D23B
DRG No. 0969D23
REV B

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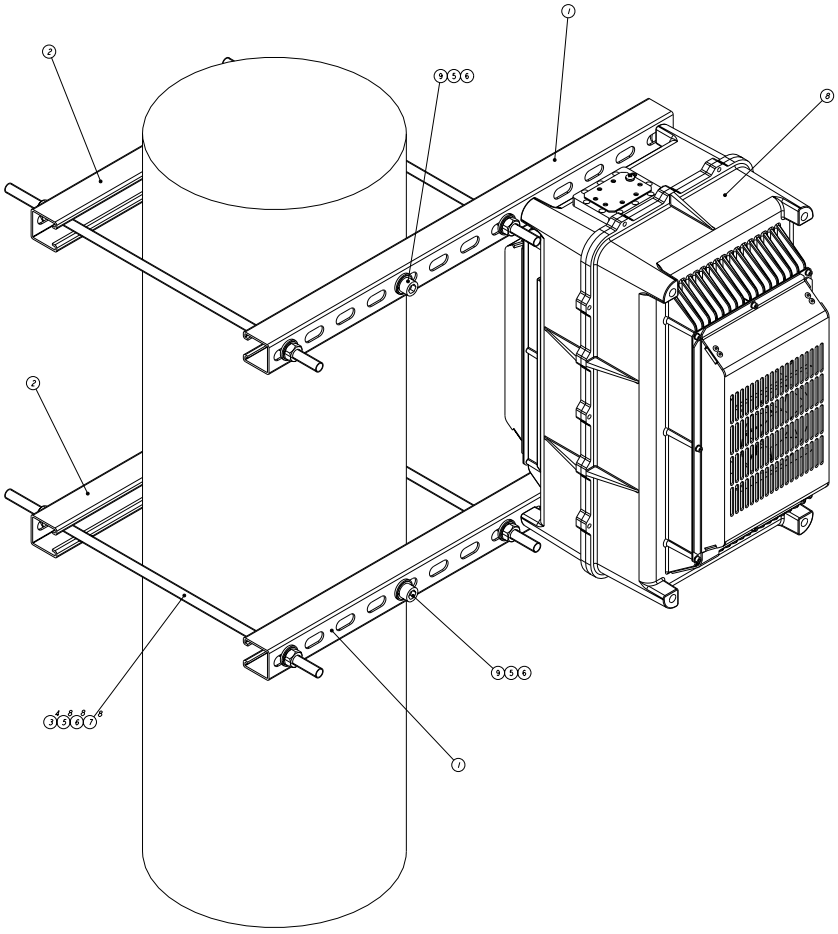
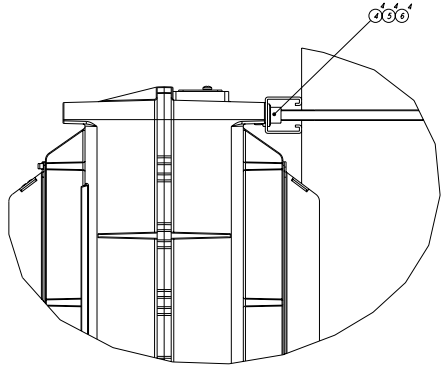




SUGGESTED ASSEMBLY PROCEDURE:

1. *ATTACH THE UPPER UNISTRUT PIECES (ITEMS 1 & 2) WITH THREADED RODS, WASHERS & NUTS (ITEM 3, 5, 6 & 7).*
2. *USING A SUITABLE NUT DRIVER FOR METRIC M12, TIGHTEN TO A TORQUE OF 90Nm.*
3. *ASSEMBLE THE LOWER UNISTRUTS AS PER THE UPPER UNISTRUTS. PLACE AT A DISTANCE OF 426mm BELOW THE UPPER STRUT. DO NOT TORQUE UP THE THREAD AT THIS STAGE.*
4. *ATTACH THE HUB SSPA (ITEM 8) TO THE UPPER UNISTRUT USING M12 SCREWS & WASHERS (ITEM 4, 5 & 6). USING A SUITABLE SOCKET DRIVER FOR METRIC M12, TORQUE TO 90Nm.*
5. *ADJUST THE LOWER UNITSTRUTS SO THAT THE HUB SITS IN A VERTICAL PLANE WITH NO TENSIONING OF THE UNISTRUTS.*
6. *ATTACH THE HUB TO THE LOWER UNITSTUT AND TIGHTEN THE UNISTRUT THREADED ROD TO THE APPROPRIATE TORQUE.*
7. *DRILL AND TAP HOLE IN POLE 426mm APART TO TAKE M12 SCREW OR BOLT. SCREW SHOULD GO THROUGH UNISTRUT SLOT. THIS MAY BE DONE FIRST IF MORE CONVENIENT.*

   AN ALTERNATIVE WOULD BE TO WELD A SUITABLY SIZED STEEL BRACKET UNDER EACH OF THE UNISTRUTS SUCH THAT THE UNISTRUT MAY NOT MOVE DOWN OR ROTATE FORWARD.

   THESE SUGGESTED METHODS OF FIXING ARE DEPENDANT ON THE POLE TYPE/CONSTRUCTION. OTHER METHODS MAY HAVE TO BE EMPLOYED.

ITEM	CODAN P/N	DESCRIPTION	DRAWING	QTY
9	24-A12M60-05	SCREW, M12 X 60, SOCKET HD, DIN 912	-	2
8	01-0969B/C/D	HUB MOUNT SSPA	0969D42/16/41	1
7	25-12M-02	NUT, M12 SELF-LOCKING	-	8
6	26-12M-02	WASHER, M12 FLAT S/S	-	10
5	26-12M-01	WASHER, M12 SPRING S/S	-	10
4	24-A12M25-05	SCREW, M12 X 25 SOCKET HD, DIN 912	-	4
3	24-R12M500-01	M12 X 1.75 X 500 THREADED ROD	0893D84	4
2	22-0893A-28	P1000T UNITSTRUT (SHORT)	0893D83	2
1	22-0893A-27	P1000T UNISTRUT (LONG)	0893D82	2

REVISION	DESCRIPTION	APPROVED	DATE

CODAN

THIRD ANGLE PROJECTION
DIMENSIONS IN MILLIMETRES
FINISH
MATERIAL AS NOTED
TOLERANCE ±N/A

DRN RH
DATE 29-10-01
CHK AH
APP PRM
SCALE 2:5
SIZE A1

TITLE
MOUNTING DETAILS OF HUB MOUNT SSPA 5760, 5712H & 5940

P/N 01-0969B, 01-0969C & 01-0969D

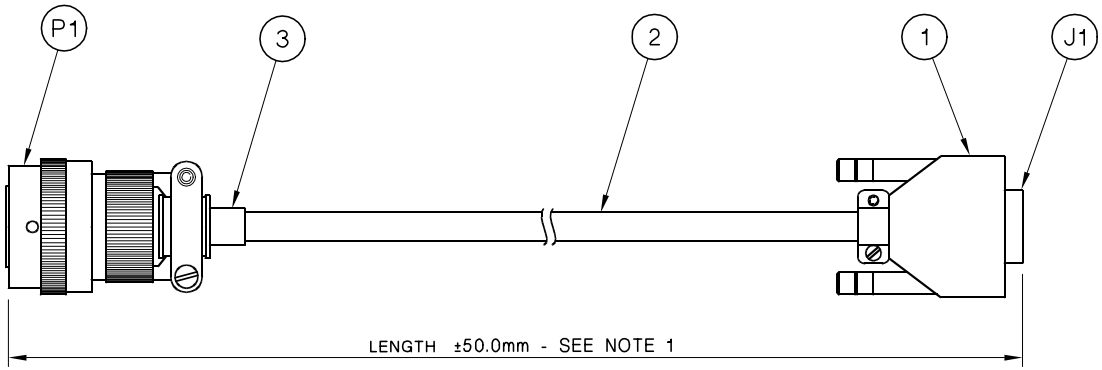
HUB MOUNT SSPA

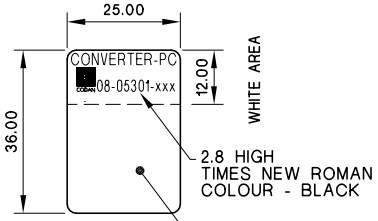
DO NOT SCALE, IF IN DOUBT - ASK

FILE 0969D46A
DRG No. 0969D46

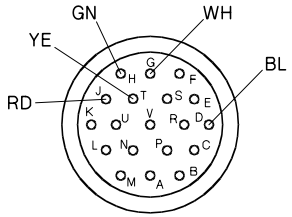
REV

DO NOT SCALE



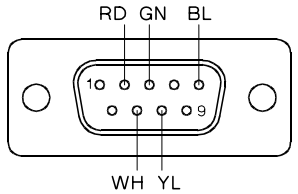


ITEM 4
LABEL DETAILS



P1 REAR VIEW
SCALE 2:1

COLOUR	FROM	TO
RED	P1/J	J1/2
GREEN	H	3
BLUE	D	5
WHITE	G	7
YELLOW	T	8
BLACK	N/C	N/C



J1 REAR VIEW
SCALE 2:1

NOTES:
1. LENGTH IS DEFINED BY SUFFIX OF P/No IN METRES, eg 08-05301-005 IS 5.0m LONG.
2. FOR RS232 COMMUNICATIONS ONLY. PIN CONNECTIONS DO NOT COMPLY WITH RS485 (DE-9S) COMMUNICATIONS STANDARDS.

ITEM	DESCRIPTION	MANUFACTURER	MANUFACTURERS PART No	CODAN PART No	QTY
1	COVER, 9WAY SCREW-LOCK	CEEP INC	CT09	60-00099-091	1
2	CABLE, 6 CORE 16/0.20	A. F. BAMBACK	90153R	67-60604-801	A/R
3	SLEEVE, HELSYN 5x1.0WALLx19	HELLERMANN	H50x19 Bk	71-95010-190	1
4	LABEL	THT-9	JABAC	-	1
P1	PLUG, 19WAY MIL	ITT-CANNON	MS3116F-14-19P	60-00191-090	1
J1	SOCKET, 9WAY 'D'	ITT-CANNON	DE-9S-K83	60-00093-090	1

ISSUE B
P1 UPDATED & ITEM 3 REDUCED FROM 2-OFF TO 1-OFF.
C/R 25031
15-05-97 DJM

ISSUE 2
NOTE 2 ADDED.
C/R 26290
27-09-99 SJH

ISSUE 3
NOTE 2 REF TO USE OF CABLE WITH JIG No 75-80582 DELETED, PARTS LIST ADDED.
C/R 26361
21-12-99 GZ

ISSUE 4:
LABEL (ITEM 4) ADDED
C/R 26603
HKJ 22-6-00

FILE No.
08\05301__4.DWG

CODAN

MATERIAL

FINISH

SCALE 1:1

DRN	DB	DATE 16-8-96
CHKD	DJM	20-8-96
APPD	VS	15-10-98

TOLERANCES UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.25
1 PLACE DEC. ±0.5
0 PLACE DEC. ±1
ANGULAR ±2

TITLE
CABLE, SERIAL
CONVERTER - PC(DE-9S)

A3

DRAWING/DOC NO.
08-05301

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Appendix A Summary of parameters controlled by the SSPA Manager software

Table 17 lists the parameters of the SSPA that are monitored and controlled by the SSPA Manager software.

Table 17: SSPA parameters

Parameter	Monitored	Control
Alarms	5 V rail low/high 11 V rail low/high (C-Band) 9.3 V rail low/high (Ku-Band) 14 V rail low/high –10 V rail low/high –11 V LC rail low/high RF Level low/high Over Temp Amp 1 Driver Amp fail Power Amp 1 fail Power supply thermal Internal processor error EEPROM/configuration CE fail safe Simulated Auxiliary	View Acknowledgment Clear Alarms
Amplifier Shutdown		On Off
Audible Alarm Notification		On Off
Auxiliary Alarm Sense		High Low
Communications Connection		Connection Address

Table 17: SSPA parameters (cont.)

Parameter	Monitored	Control
Communications Mode	RLO	REM LLO
Converter Connection		Codan Generic
Data Rate		Data Rate
Data Format		Data Bits Parity Stop Bits
User Setting (Mute)		RF On RF Mute
Operating State		Online Standby Maintenance (factory settings)
PIN Diode Table		Attenuation Level DAC Value Scroll Table
RF Level Table		Level Sensor Level Scroll Table
RF Level Temperature Comp Points		Compensation Temperature Scroll Table
RF Level Thresholds		Minimum Maximum
RF Output	RF Level (output power)	
RS232 Flow Control		None RTS/CTS
RS485 Half Duplex Control		None/Auto RTS

Table 17: SSPA parameters (cont.)

Parameter	**Monitored**	**Control**
Port		Port RS232 RS422/485
SSPA Address		Address
SSPA Alarm Style		Latching Fleeting
SSPA Gain		Gain Adjust
SSPA Mute State	RF On RF Mute (User) RF Mute (Direct I/O) RF Mute (Amp Module Fail)	
System Temperature Comp Points		Compensation Temperature Scroll Table
Temperature Compensation		On Off Min Max
Temperatures	PA Module 1	
Thermal Fan Control		On Off

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Figure 2: Codan SSPA Manager window

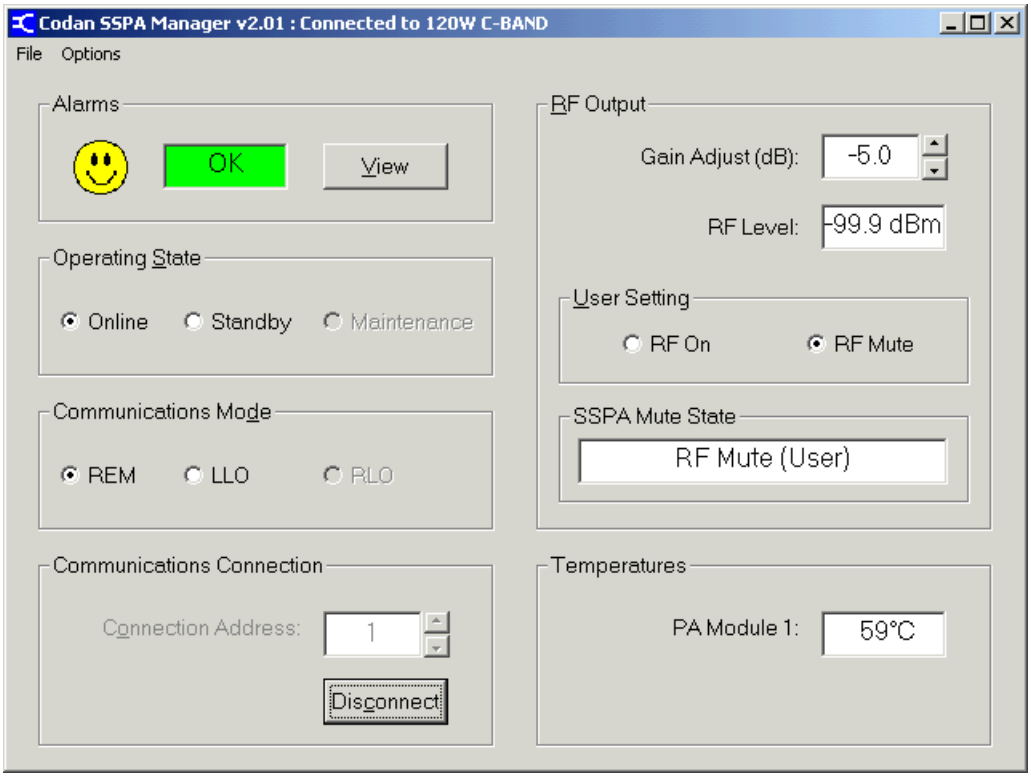


Figure 3: Save Snapshot window

Figure 4: SSPA Settings window—Standard tab

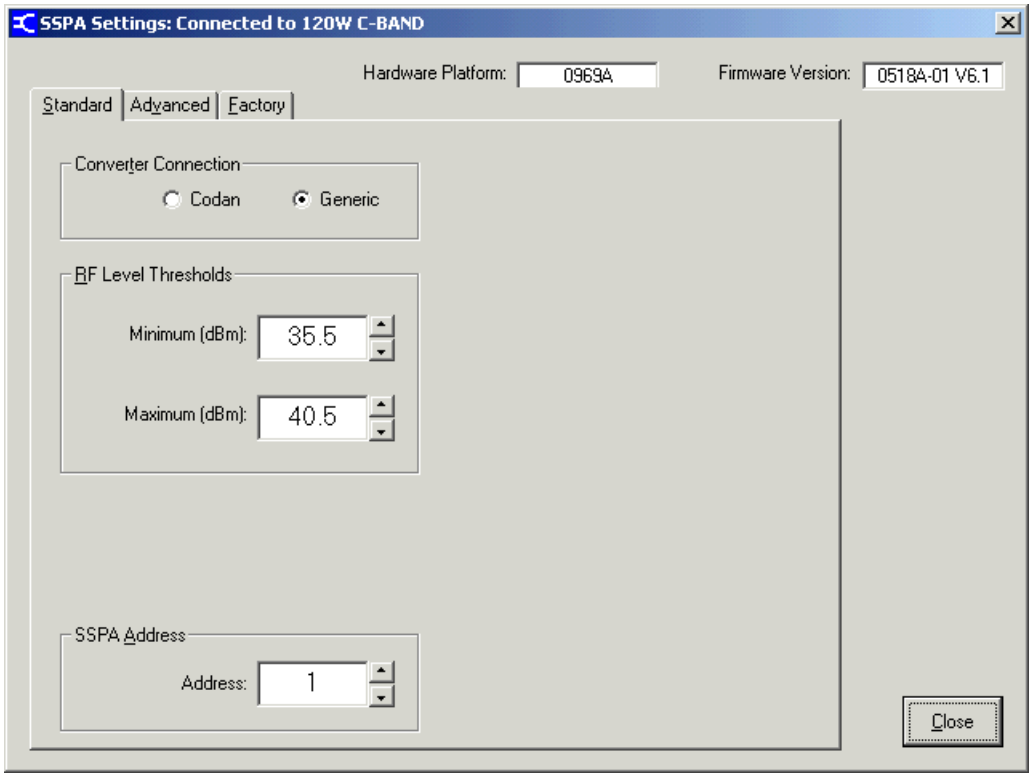


Figure 5: SSPA Settings window—Advanced tab

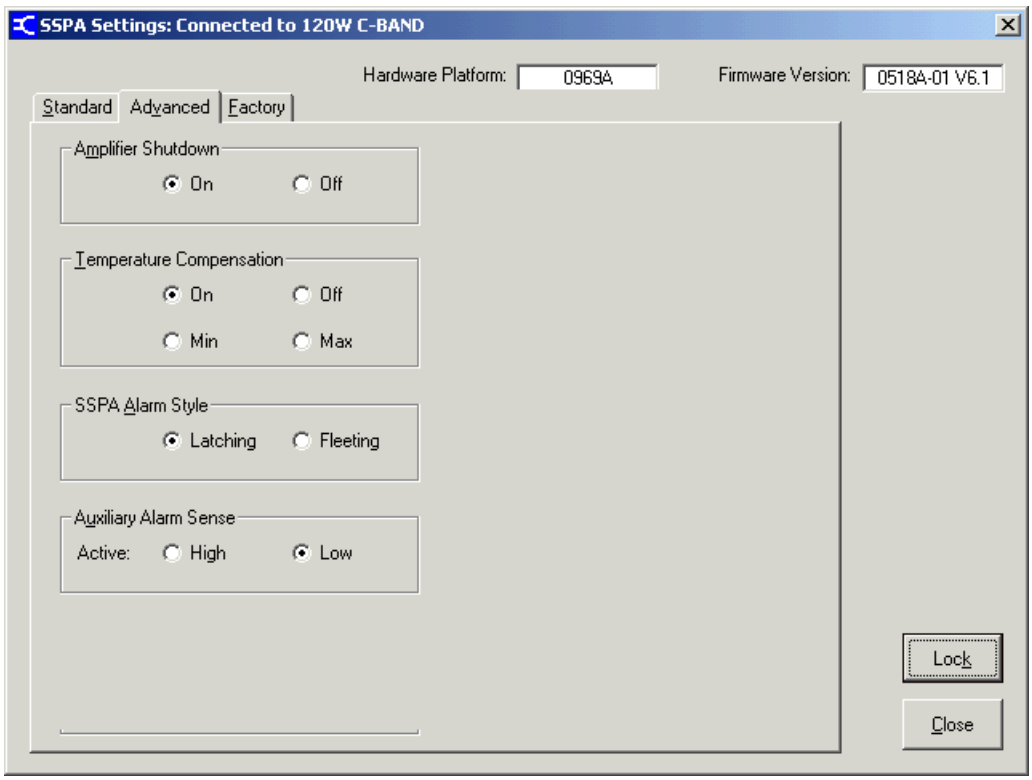


Figure 6: SSPA Settings window—Factory tab

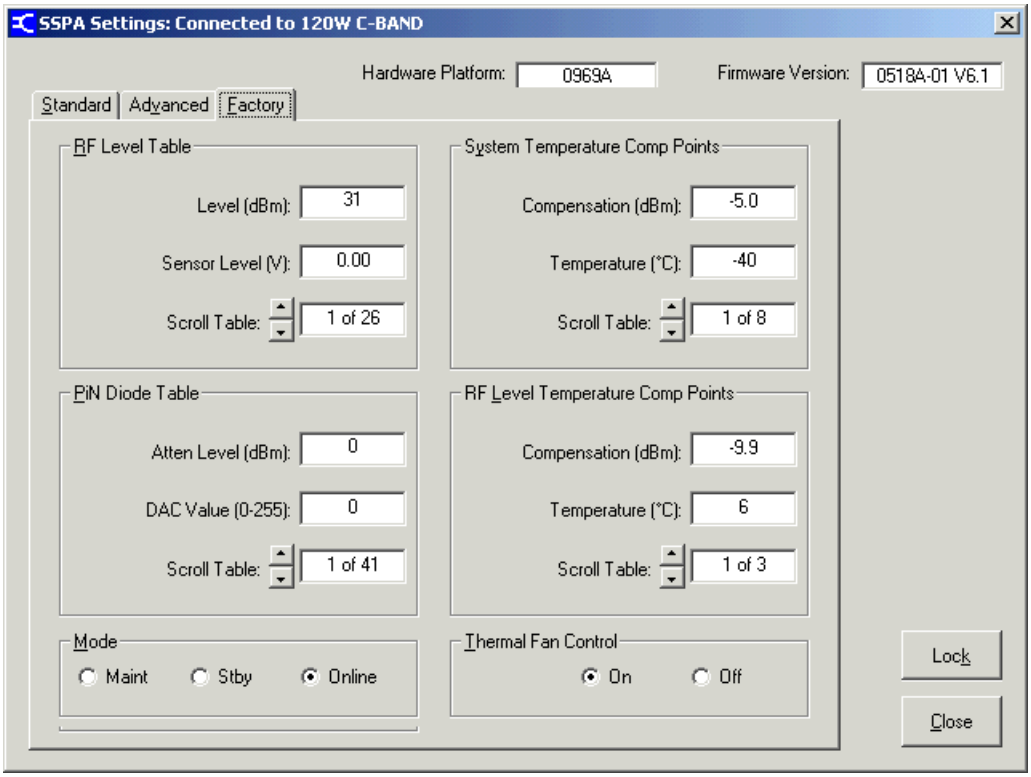


Figure 7: Software Options window—Communications tab

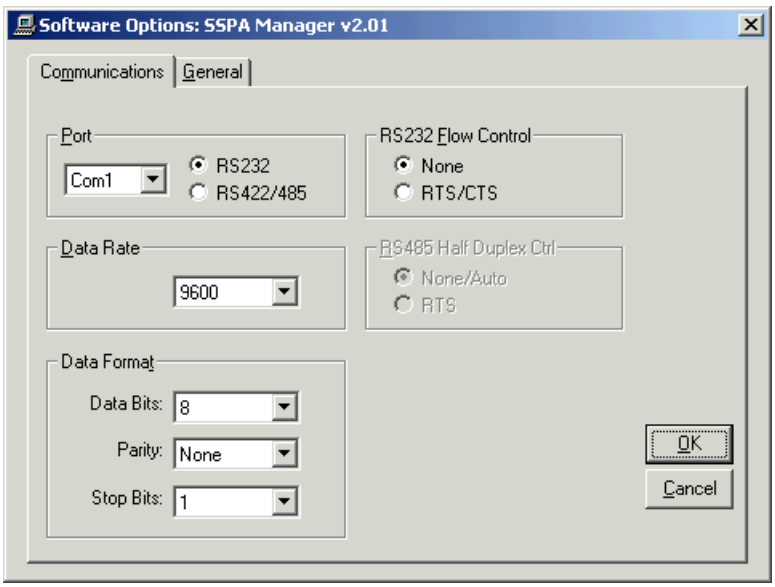


Figure 8: Software Options window—General tab

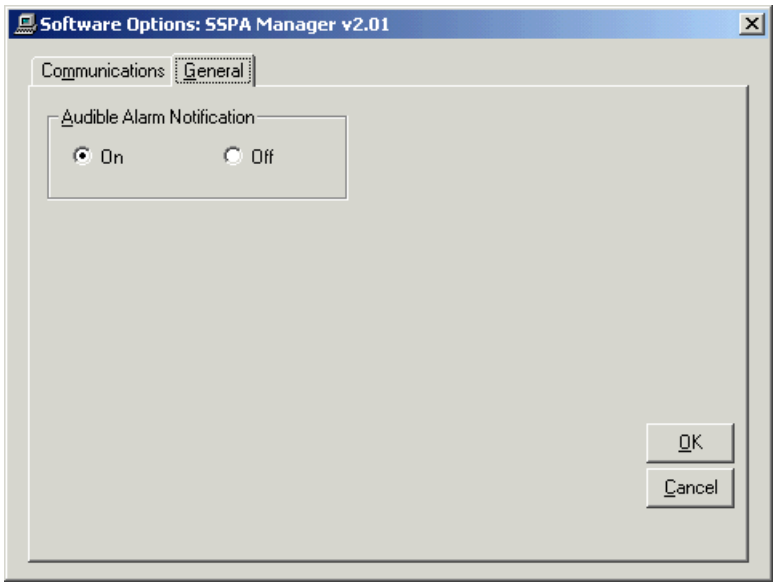
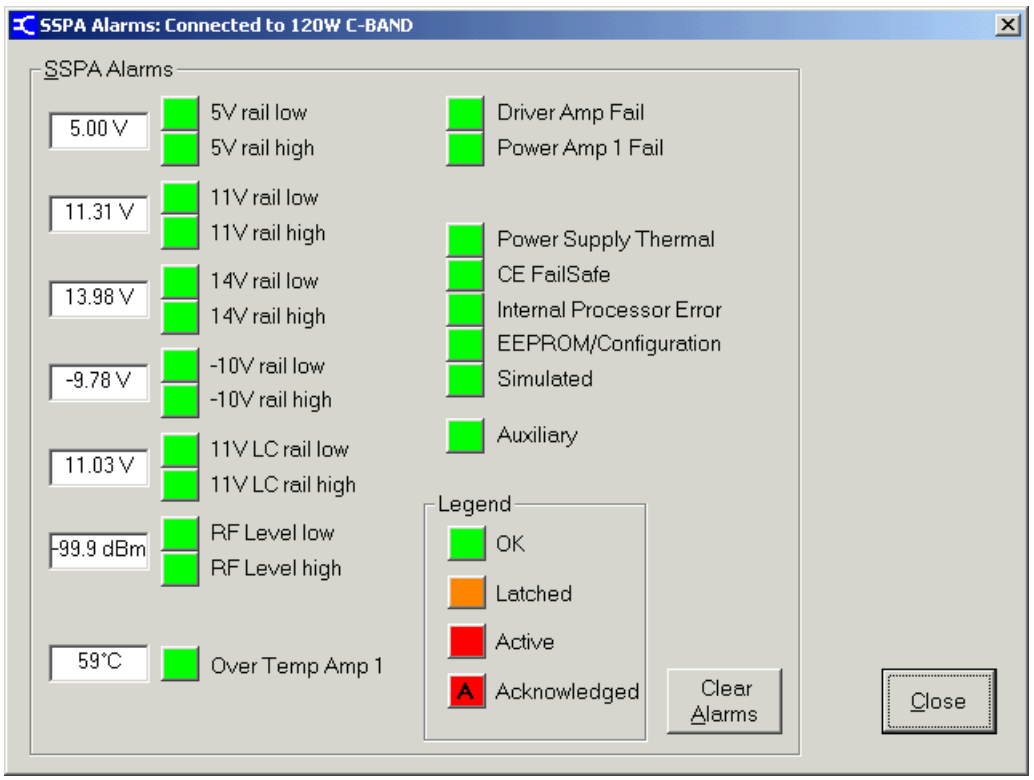


Figure 9: SSPA Alarms window



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