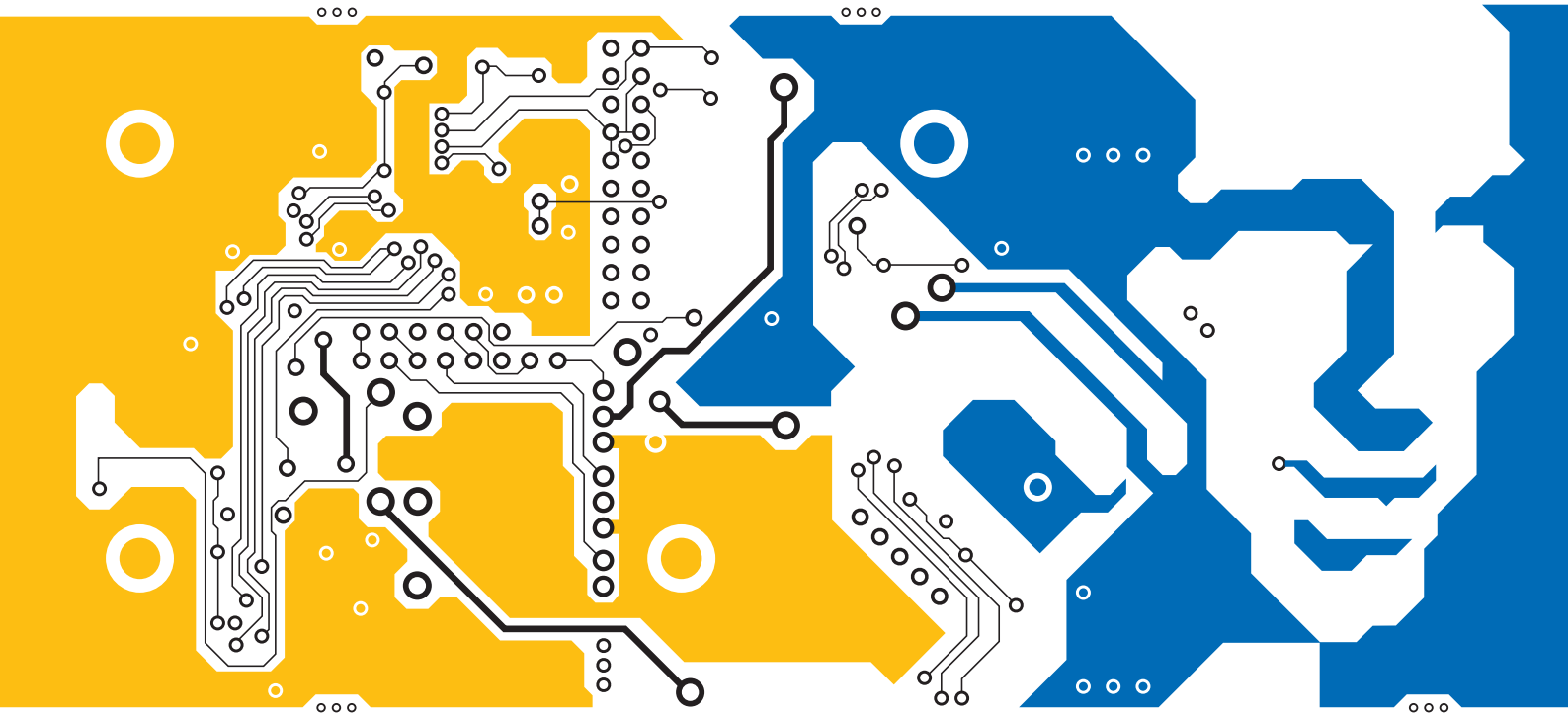
CODAN

C-Band Transceiver

5700 series

SATELLITE COMMUNICATIONS



REFERENCE MANUAL

Codan part number 15-44001-EN Issue 2, March 2002

The Certification Body of the Russian Federation State Committee of Communications and Information Technology confirms that the C-Band Transceiver 5700 series conforms to the technical specifications of Russian Interconnected Communication System.

ССЭ
СЕРТИФИКАТ

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1 About this manual

This reference manual is for installation technicians and operators of the C-Band Transceiver 5700 series.

This manual has ten chapters and one appendix:

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

Chapter 2 C-Band transceiver compliance—describes how to ensure CE compliance of the C-Band transceiver is maintained

Chapter 3 Overview—general description of the transceiver

Chapter 4 Specifications—specifications for all the transceiver modules

Chapter 5 How the transceiver works—brief technical description of the transceiver

Chapter 6 Installation—how to unpack and install the transceiver

Chapter 7 Setting up the transceiver—how to set up the transceiver ready for operation

Chapter 8 Operating the transceiver—operating procedures and serial interface commands

Chapter 9 Maintenance and fault finding

Chapter 10 Drawings

Appendix A Summary of commands—summary of the commands described in Chapter 8, *Operating the transceiver*

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

Standards and icons

The following standards and icons are used in this manual:

This typeface	Means...
BOLD	a button, switch, LED, connector or displayed text
Bold	a command that you enter or keyboard key that you press
`Courier`	a segment of text that is taken directly from a computer screen
Italics	a cross-reference or text requiring emphasis
UPPER CASE	a switch position

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

Definitions

Acronyms and abbreviations

This term	Means...
AC	alternating current
AGC	automatic gain control
ASCII	American standard code for information interchange
AWG	American wire gauge
BW	bandwidth
CTS	clear to send
CW	continuous wave, carrier wave
DC	direct current
DCE	data communication equipment
DIP	dual inline package
EMC	electromagnetic compatibility
FET	field effect transistor
FM	frequency modulation
GaAs	Gallium Arsenide
GCP	gain compression point
GND	ground
G/T	gain/temperature
H	hexadecimal
H/W	hardware
HEMT	high electron mobility transistor
HPA	high power amplifier
IF	intermediate frequency
ICNIRP	International Commission on Non-Ionizing Radiation Protection
LED	light emitting diode
LNA	low noise amplifier

This term	Means...
LO	local oscillator
LSB	least significant bit
MS	military specification
MSB	most significant bit
NC	normally closed
NO	normally open
OMT	ortho-mode transducer
OPBO	output back off
PC	personal computer
PLL	phase locked loop
PSU	power supply unit
QPSK	quadrature phase shift keying
RD	receive data
RF	radio frequency
RTS	request to send
R&TTE	radio and telecommunications terminal equipment
Rx	receive
SHF	super high frequency
SSB	single sideband
SSPA	solid state power amplifier
TD	transmit data
TRF	transmit reject filter
TWTA	travelling wave tube amplifier
Tx	transmit
VSWR	voltage standing wave ratio

Glossary

This term	Means...
Carrier	RF signal used to carry information.
C-band	Band of frequencies nominally covering the frequencies generally in the range 4 GHz to 6 GHz.
Demodulator	Device used to extract digital information from a modulated RF carrier.
High power transceiver	Transceiver system that uses an SSPA rated at 60 W and above.
Low power transceiver	Transceiver system that uses an SSPA rated at 40 W and below.
Modem	Device used to convert digital information to a modulated RF carrier and to extract digital information from a modulated RF carrier.
Packet protocol	Serial communication method using a structured addressable packet of ASCII characters.
Transceiver	Equipment comprising the converter, solid state power amplifier and low noise amplifier, connecting cables and mounting brackets.
Transponder	The equipment on a satellite that receives signals, translates their frequency, and re-transmits these signals.

Units

Measurement	Unit	Abbreviation
Antenna gain	decibels relative to an isotropic radiator	dBi
Attenuation	decibel	dB
Current	ampere	A
Data rate	bits per second	bps
Depth	millimetre	D
Frequency	hertz	Hz
Height	millimetre	H
Impedance	ohm	Ω
Length	metre	m
Noise temperature	kelvin	K
Pressure	pascal	Pa
Power	decibels relative to a carrier	dBc
Power	decibels relative to 1 mW	dBm
Power	watt	W
Temperature	degrees Celsius	°C
Voltage	volt	V
Weight	gram	g
Width	millimetre	W

Unit multipliers

Unit	Name	Multiplier
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 Transceiver 5700 series Reference Manual covering the CE compliance regulations introduced in April 2001.

This issue has been updated to include all the details required to operate your transceiver with the 5760/5712H Solid State Power Amplifier.

Associated documents

This manual is one of a series of publications related to the C-Band Transceiver 5700 series. Other associated publications are:

- C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual (Codan part number 15-44011-EN)
- Hand-Held Controller 5560 User Guide (Codan part number 15-44009-EN)
- Remote Controller 5570 User Guide (Codan part number 15-44010-EN)
- C-Band Transceiver 5700 series Redundancy Switching Equipment Reference Manual (Codan part number 15-44003-EN)

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2 C-Band transceiver compliance

This chapter describes how to ensure the C-Band Transceiver 5700 series complies with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC. Only those transceivers fitted with the transmit frequency Band 2 option have been tested and certified for compliance with this Directive.

Electromagnetic compatibility and safety notices

The C-Band Transceiver 5700 series has been tested and complies with the following standards.

- 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’
- 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.

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:

- ❑ Use standard shielded cables supplied from Codan for all connections (see Table 6-1 on page 6-20 for the appropriate cables).

  It is not necessary to use shielded cables from the DC supply to the converter.

- ❑ Ensure the covers for the equipment are correctly fitted.

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 Transceiver 5700 series in accordance with the following safety precautions. These precautions must be checked before applying AC power to the transceiver.

- A protective earth connection must be included in the mains wiring to the transceiver (see page 2-6, *Earth symbols*).
- As the transceiver 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.
- 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.

- If the unit is connected to the mains supply via a non-detachable power supply cable, the socket-outlet must be installed near the equipment and must be easily accessible.
- When terminating the mains supply cable to the 5582B terminal block, ensure the protective earth wire (green/yellow) is at least 10 mm longer than the live and neutral wires.
- Where the transceiver uses a 5582B PSU, the PSU must be set to the required AC mains voltage and the correct fuses must be fitted (see page 6-9, *Power supply unit*).
- The protective cover must be secured above the AC input terminal block.

- ❑ Use the standard DC supply cable shown to connect the DC power to the converter:

PSU/SSPA	Cable (Codan part number)
5582B	08-05634-xxx
5760/5712H	08-05961-xxx

These cables have conductors with red insulation for the +ve supply connections, and conductors with black insulation for the –ve supply connections.

Radiation safety

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

Always fit the correct termination to the SSPA (N-type connection or waveguide) or fit the blanking plate (waveguide only).

Earth station antennas radiate electromagnetic fields that may be harmful to humans. Ensure that you maintain the minimum safe distance for the elevation angle of the antenna in your earth station (see Table 2-1).

R&TTE Directive 1999/5/EC article 3.1(a) specifies essential requirements for protection of the health and safety of the user and any other person in the vicinity of an earth station antenna. ICNIRP guidelines have been used to determine how close a person may approach the front of the antenna without exceeding the ICNIRP general public reference level for electromagnetic fields.

Table 2-1 specifies the minimum safe distance versus elevation angle for a 1.8 m diameter antenna fitted with a 40 W transceiver system.

A suitable fence or other barrier must be provided to prevent casual occupancy of the area in front of the antenna within the safe distance given in Table 2-1. As the antenna size is increased or the transceiver output power rating is reduced, the required safe distance becomes smaller.

Table 2-1: Safe distance for 1.8 m diameter antenna with 40 W transceiver

Antenna elevation angle (degrees)	Safe distance (m)
7.5	26.5
15	12.5
30	6.0
45	3.6
60	2.4
75	1.7

Table 2-2: Safe distance for 1.8 m diameter antenna with 120 W transceiver

Antenna elevation angle (degrees)	Safe distance (m)
7.5	27.5
15	13.0
30	6.0
45	4.0
60	3.0
75	2.0

In the limit case, a 7.2 m diameter antenna with a 60 W transceiver system does not require a fence or barrier.

Protection of radio spectrum

It is the responsibility of the user to ensure any modem used in conjunction with the transceiver complies with EN 301 443 so that CE compliance with respect to radiated spurious signals is maintained. If necessary, consult Codan for more information.

For CE compliance, the transceiver must be set up so that it does not enter the transmit on state upon power up.

To set up the transceiver for CE compliant operation you must:

- ❑ Enter the **SPU1** command.
- ❑ Set the **SSPA** switch on the converter to REMOTE.
- ❑ Ensure the remote opto-isolated Req SSPA Activate input is either in the off state or left disconnected.
- ❑ Enter the **SPA1** command to activate the SSPA.

Earth symbols

Earth connection points have been provided on the transceiver. To comply with the European Low Voltage Directive, the symbols shown in Table 2-3 are used to identify the protective earth and earth on the equipment.

Table 2-3: Earth symbols

Symbols	Meaning
	Protective earth
	Earth

Warning labels

The symbols shown in Table 2-4 are used to identify potential hazards on the equipment.

Table 2-4: Warning labels

Symbols	Meaning
	The surface may be hot to touch
	Non-ionising radiation may be emitted
WARNING TERMINATION FOR OUTPUT CIRCULATOR CONTAINS BERYLLIUM	If you intend to process or recycle this product, refer to the current Material Safety Data Sheet

3 Overview

This chapter provides an overview of the C-Band Transceiver 5700 series. It includes:

- an introduction to the C-Band transceiver (3-2)
- transceiver control and monitoring (3-3)
- features of the converter control panel (3-4)
- converter options (3-7)
- solid state power amplifier options (3-9)
- transceiver configurations (3-10)
- a brief description of the outdoor modules of the transceiver (3-14)
- accessories (3-17)

Introduction to the C-Band Transceiver 5700 series

The Codan C-Band Transceiver 5700 series is a high performance transceiver for use in a satellite earth station. It is ideally suited to single or multicarrier rural and remote area telephony and data communications.

The transceiver is designed for direct mounting on a wide range of earth station antennas.

The transceiver is based on field-proven, high-reliability microwave modules. It complies with major international standards for C-Band equipment.

The C-Band Transceiver 5700 series range of equipment comprises:

- Converter module 5700
- 5 W Solid State Power Amplifier 5705
- 10 W Solid State Power Amplifier 5710
- 20 W Solid State Power Amplifier 5720
- 30 W Solid State Power Amplifier 5730
- 40 W Solid State Power Amplifier 5740
- 60 W Solid State Power Amplifier 5760
- 120 W Solid State Power Amplifier 5712H
- Power Supply Unit 5582B
- low noise amplifier
- transmit reject filter
- Hand-Held Controller 5560
- Remote Controller 5570

The LNA and TRF are not designed or manufactured by Codan, however, they are available from Codan.

The operation of the Hand-Held Controller 5560 and the Remote Controller 5570 is not covered within this manual.

Transceiver control and monitoring

The operating parameters of the transceiver are controlled via the converter. To view or change the operating parameters of the transceiver, the converter must be connected to a Hand-Held Controller 5560, a Remote Controller 5570 or a terminal.

A hand-held or remote controller provide the simplest and most convenient way to set the parameters of the transceiver. For details of how to use a hand-held or remote controller, see the *Hand-Held Controller 5560 User Guide* or the *Remote Controller 5570 User Guide*.

For users who do not have a hand-held or remote controller, they can create a temporary interface connection to the transceiver via the serial port of a personal computer (see page 7-14, *Serial interface control during setup*).

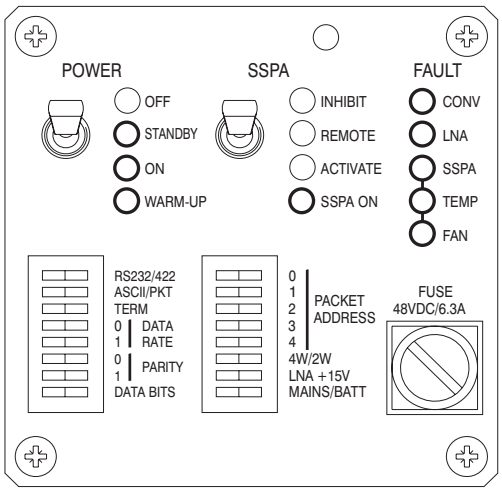
Control panel of the converter

The control panel of the converter provides all the major operational status indicators and controls for the converter, the LNA and the SSPA.

The control panel of the converter consists of:

- three power status indicators and one switch position marker
- one SSPA status indicator and three switch position markers
- five fault indicators
- two sets of DIP option switches

Figure 3-1: Control panel of the converter



Power status indicators and switch position marker

There are three power status indicators on the control panel of the converter:

- **STANDBY**
- **ON**
- **WARM-UP**

There is one power switch position marker (OFF) on the control panel of the converter.

SSPA status indicator and switch position markers

There is one SSPA status indicator (**SSPA ON**) on the control panel of the converter.

There are three SSPA switch position markers on the control panel of the converter:

- INHIBIT
- REMOTE
- ACTIVATE

Fault indicators

There are five red fault indicators on the control panel of the converter:

- **CONV**
- **LNA**
- **SSPA**
- **TEMP**
- **FAN**

These LEDs will illuminate to indicate faults in the converter, LNA and SSPA, including SSPA Temperature, and/or SSPA Fan fault.

The converter may be used with a range of SSPAs and LNAs, some of which may not require fault reporting via the converter module. The unused fault indicators can be disabled.

DIP option switches

There are two sets of eight DIP option switches on the control panel of the converter. These switches enable you to select:

- the serial interface that will operate the parameters of your transceiver
- mains or battery operation
- LNA +15 V operation

For information on how to set the converter option switches, see page 7-2, *Setting the converter option switches*.

Converter options

The model label on the converter indicates the frequency band, bandwidth and synthesiser options used by the converter. For example, **2/W/D** indicates that the converter operates on extended C-Band (Band 2), provides wide bandwidth and has a dual synthesiser.

Frequency band options

The converter may be supplied for operation on one of three different frequency bands.

Band option 2 on the converter must be specified for use with 5760 and 5712H SSPAs.

Table 3-1: Frequency band options for the converter

Band option	Description	Transmit frequency (MHz)	Receive frequency (MHz)
2	C-Band, Extended	5850 to 6425	3625 to 4200
3	Insat	6725 to 7025	4500 to 4800
4	Palapa C & Intelsat VIII-A	6425 to 6725[a]	3400 to 3700[b]

a. For converters with software versions earlier than 1.62, the maximum transmit frequency is 6700 MHz.
b. For converters with software versions earlier than 1.62, the maximum receive frequency is 3675 MHz.

The software version can be identified using the serial interface, hand-held controller or remote controller.

The frequency band used by the converter is indicated by the first number on the model label of the converter.

Bandwidth options

The converter may be supplied with one of two IF bandwidths.

Narrow	40 MHz (indicated by an **N** in the second position on the model label of the converter)
Wide	80 MHz (indicated by a **W** in the second position on the model label of the converter)

If the converter is a narrow bandwidth model, you can select IF operation at either 70 MHz or 140 MHz.

If the converter is a wide bandwidth model, IF operation is at 140 MHz only.

Synthesiser options

The converter may be supplied to operate with one of two synthesiser options.

Dual	available for Band 2 and 4 (indicated by a **D** in the third position on the model label of the converter)
Single	available for Band 2 and 3 (indicated by an **S** in the third position on the model label of the converter)

Operation with a single synthesiser provides a fixed transmit to receive frequency offset of 2225 MHz.

Solid state power amplifier options

The model label on the 5705/5710/5720/5730/5740 SSPA indicates the frequency band, output and monitor port options for the SSPA. For example, **2/N/M** indicates that the SSPA operates on extended C-Band (Band 2), has a standard N-type output connector and is fitted with a monitor port.

Frequency band options

The frequency of operation can be in one of two frequency bands.

Table 3-2: Frequency band options for the 5705/5710/5720/5730/5740 SSPAs

Band option	Description	Transmit frequency (MHz)
2	C-Band, Extended	5850 to 6425
3&4	Insat, Palapa C & Intelsat VIII-A	6425 to 7025

The frequency band covered by the SSPA is indicated by the band number on the model label of the SSPA.

The 5760 and 5712H SSPAs can only operate on Band 2 (5850 to 6425 MHz).

Output options

The SSPA output connector options are:

N-type — indicated by an **N** in the second position on the model label of the SSPA (5705/5710/5720/5730/5740 only)

Waveguide — indicated by a **W** in the second position on the model label of the SSPA

The 5760 and 5712H SSPAs only have waveguide output.

Monitor port option

The 5710 and 5720 SSPAs may be supplied with an optional monitor port, indicated by an **M** in the third position on the model label of the SSPA.

5760 and 5712H SSPAs have a monitor port as standard.

Transceiver configurations

Transceivers using a 5705/5710/5720/5730/5740 SSPA can be powered in two ways:

- the DC supply configuration, or
- the AC supply configuration with a Power Supply Unit 5582B

Transceivers using a 5760 or 5712H SSPA are powered via the AC supply connected to the SSPA. The SSPA supplies 48 V DC to the converter.

DC supply configuration (5705/5710/5720/5730/5740 SSPAs)

The DC supply configuration provides a complete transceiver system. It does not require any indoor equipment (see Figure 3-2). Power is provided from a 48 V DC source.

AC supply configuration (5705/5710/5720/5730/5740 SSPAs)

The AC supply configuration is supplied with a Power Supply Unit 5582B, which enables the transceiver to be powered from AC mains (see Figure 3-3).

The PSU may be mounted outdoors to:

- reduce the requirement for long DC power cables
- minimise the DC power cable voltage drop
- remove the need for indoor equipment associated with the transceiver

AC supply configuration (5760/5712H SSPAs)

The 5760/5712H SSPAs can only be powered from AC mains. The power supply for the converter in a high power configuration comes from the high power SSPAs (see Figure 3-4).

Figure 3-2: DC supply configuration

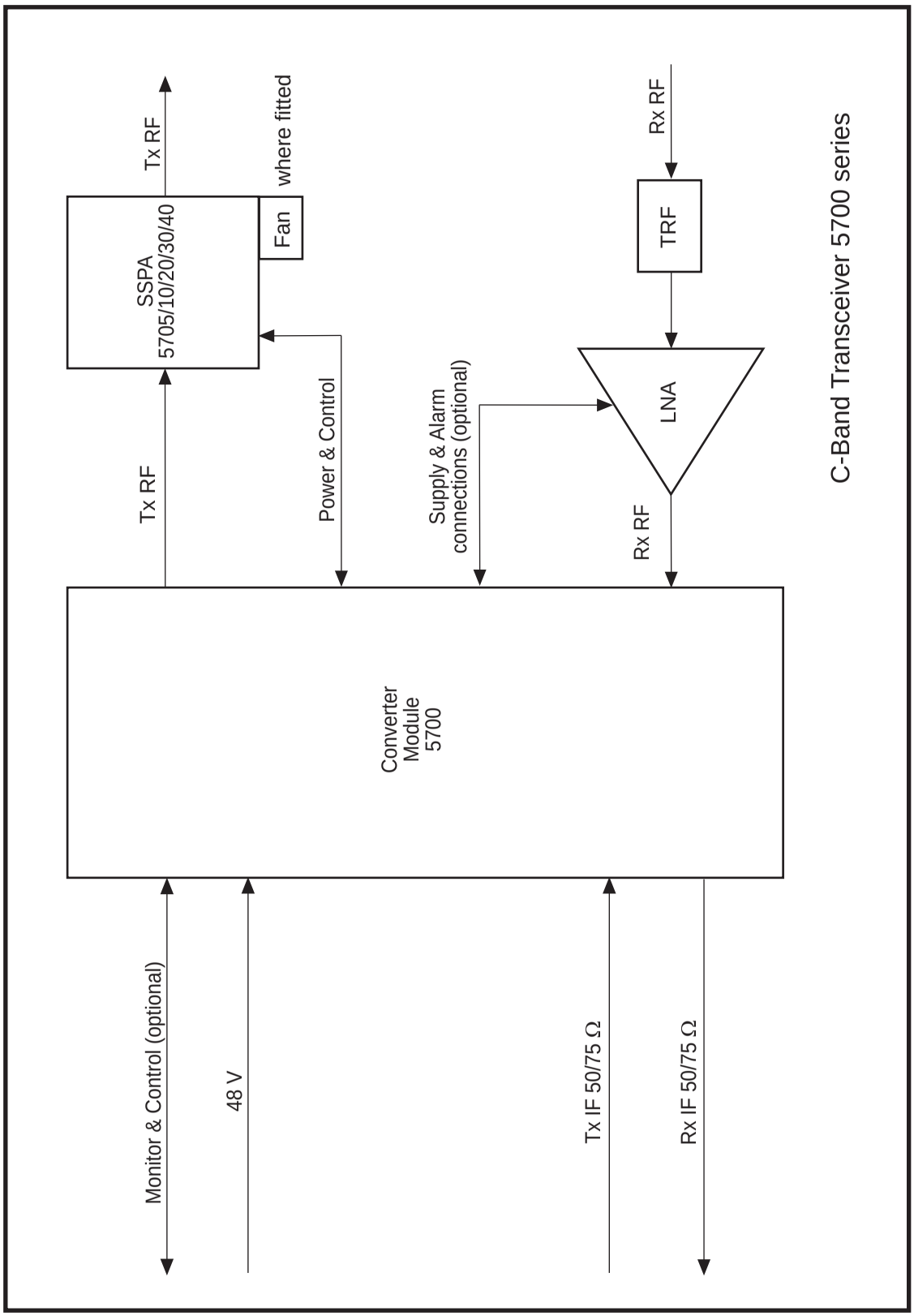


Figure 3-3: AC supply configuration

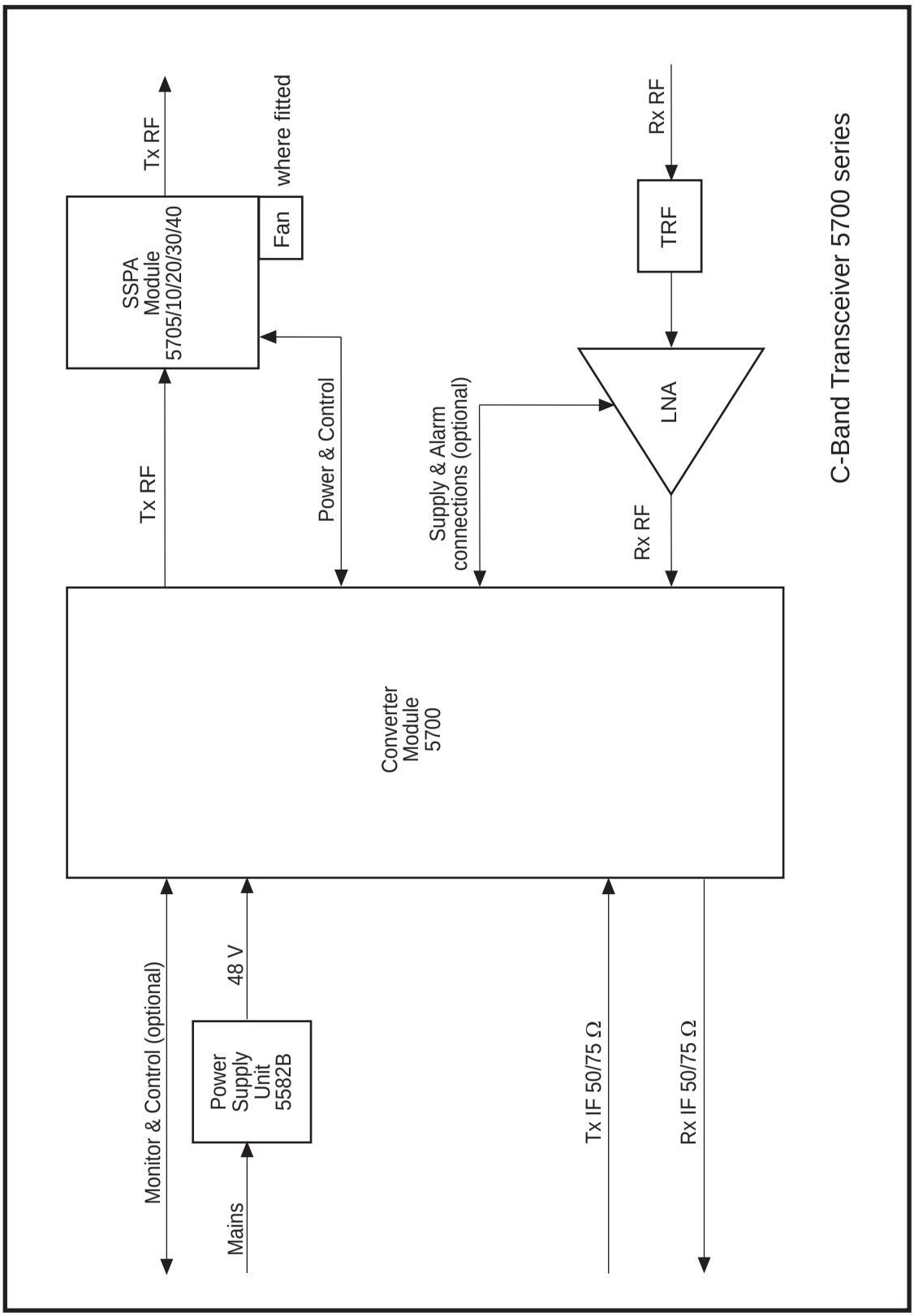
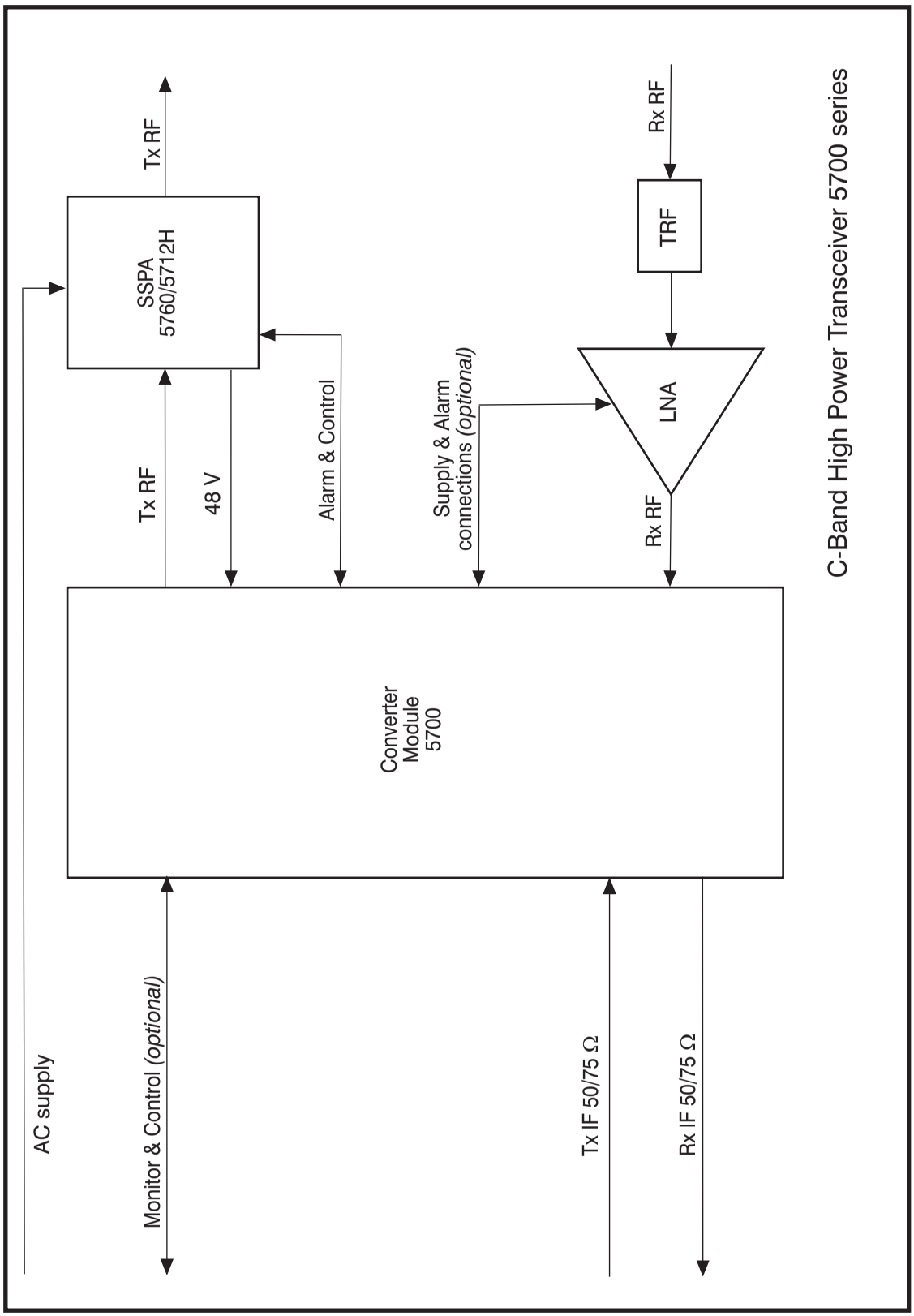


Figure 3-4: High power transceiver configuration



Outdoor modules

The transceiver comprises up to five outdoor-mounting modules:

- synthesised Converter Module 5700
- Solid State Power Amplifier 5705/5710/5720/5730/5740/5760/5712H
- low noise amplifier
- transmit reject filter
- Power Supply Unit 5582B (optional, not required with 5760/5712H)

The outdoor modules of the transceiver can be mounted on the antenna or feed support structure. Although a protected position is preferable, the modules are designed to withstand exposure to outdoor weather conditions.

The modules are supplied with brackets and hardware to enable universal mounting.

Diagrams of significant panels and connectors for this equipment are provided in Chapter 10, *Drawings*.

Converter module

The converter performs the frequency conversion in the transceiver. It is a single, integrated outdoor-mounted module (see drawing 03-00959 in Chapter 10, *Drawings*).

The converter uses dual conversion and synthesised frequency control in 1 MHz increments. It is protected against transmitting on out-of-band frequencies.

All oscillators are phase locked to the internal reference frequency. The status of all phase locked loops is monitored at all times. If any loop becomes unlocked, the converter indicates a fault.

The converter also has the capability to provide automatic gain versus temperature compensation for the SSPA. This feature is not utilised when used with the 5760 or 5712H SSPAs as they are internally compensated.

A specific feature of the up/down converter is its low spurious output specification. This feature makes the system ideally suited to multicarrier applications.

5705/5710/5720/5730/5740 SSPAs

The Codan C-Band transceiver is available with a 5 W, 10 W, 20 W, 30 W or 40 W low power SSPA.

The SSPA is designed to be mounted on the feed support close to the antenna feed to minimise transmission losses.

Each of these SSPAs has a single power output stage that provides high DC power efficiency while maintaining excellent multicarrier intermodulation performance.

The combination of low power consumption and high speed activation from an external control line makes the transceiver ideal for solar-powered systems.

5760/5712H SSPAs

The Codan C-Band transceiver is available with either a 60 W or 120 W high power SSPA. These SSPA modules 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 SSPA modules feature an output isolator for operation into any load. Alarm thresholds can be set for low or high power and the gain of the SSPA is adjustable over a 20 dB range. Gain variation versus temperature is automatically compensated in firmware.

The SSPA is designed to be mounted on the antenna support structure close to the antenna feed to minimise transmission losses.

Low noise amplifier

The LNA is mounted directly on the antenna feed Rx port. In addition to the standard LNA, an optional higher performance LNA is available. Other LNAs may also be used.

Any LNAs used with this transceiver must receive their power via either the RF output connector of the LNA or a separate power and alarm connector.

Transmit reject filter

The TRF is mounted directly on the antenna feed Rx port. It can be used when the antenna feed does not provide adequate attenuation of the transmit signals at the antenna feed Rx port.

Power supply unit

The PSU provides DC power to the transceiver from a 50/60 Hz, 115/230 V AC source. The PSU contains a simple transformer/rectifier supply.

The robust design of the module enables the transceiver to operate reliably when the AC mains supply is fluctuating (see drawing 03-00993 in Chapter 10, *Drawings*).

Accessories

There are two accessories available for the C-Band Transceiver 5700 series:

- the Hand-Held Controller 5560
- the Remote Controller 5570

The Hand-Held Controller 5560 is a fully-portable controller that is used to display and change selected operating parameters of the transceiver.

The Remote Controller 5570 is a rack-mounted controller that is used to display the operating status and change all operating parameters of the transceiver. This controller has an in-built security function to protect the parameters of the transceiver from being changed unintentionally or by unauthorised people.

Both controllers connect to the transceiver via the **MONITOR/CONTROL** connector on the converter.

The operation of these controllers is covered in their respective user guides.

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4 Specifications

This chapter lists the specifications of the C-Band Transceiver 5700 series. It includes:

- transmit section (4-2)
- receive section (4-6)
- low noise amplifier (4-8)
- transmit reject filter (4-9)
- general (4-10)
- environmental (4-14)
- physical (4-15)

Transmit section

IF input

Frequency range	
narrow BW option	70±20 MHz/140±20 MHz selectable
wide BW option	140±40 MHz
Impedance	50/75 Ω selectable
Connector	N-type female
Return loss	18 dB minimum @ 50 Ω

Gain specification

Gain (0 dB converter attenuation setting)

5705	71 dB nominal
5710/5720/5730/5740	74 dB nominal
5760/5712H	64 dB nominal (–10 dB SSPA gain setting)
Attenuator range	
Converter with D prefix serial number	0 to 25 dB nominal
Converter with A, B, or C prefix serial number	0 to 30 dB nominal
Attenuator step size	1 dB nominal
Gain flatness	
narrow BW option	±1.0 dB maximum, 40 MHz
wide BW option	±2.0 dB maximum, 80 MHz
Gain stability	
5710/5720/5730/5740	±1.5 dB maximum, –40°C to +55°C
5760/5712H	±2.0 dB maximum, –40°C to +55°C

RF output

Frequency range	
Band 2 (Extended)	5.850 to 6.425 GHz
Band 3 (Insat)	6.725 to 7.025 GHz
Band 4 (Palapa C & Intelsat VIII-A)	6.425 to 6.725 GHz (software version 1.62 or later) 6.425 to 6.700 GHz (software version earlier than 1.62)

5705 5 W SSPA

Output power (1 dB GCP)	+37.0 dBm minimum
Connector	N-type female, or CPR137-G (Band 2 only)
VSWR	1.5:1 maximum
Carrier to intermodulation ratio	–29 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5710 10 W SSPA

Output power (1 dB GCP)	+40.0 dBm minimum
Connector	N-type female, or CPR137-G (Band 2 only)
VSWR	1.5:1 maximum
Carrier to intermodulation ratio	–29 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5720 20 W SSPA

Output power (1 dB GCP)	+43.0 dBm minimum
Connector	N-type female, or CPR137-G (Band 2 only)
VSWR	1.5:1 maximum
Carrier to intermodulation ratio	–27 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5730 30 W SSPA

Output power (1 dB GCP)	+44.8 dBm minimum
Connector	N-type female, or CPR137-G (Band 2 only)
VSWR	1.5:1 maximum
Carrier to intermodulation ratio	–27 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5740 40 W SSPA

Output power (1 dB GCP)	+45.7 dBm minimum, 46.0 dBm typical
Connector	N-type female, or CPR137-G (Band 2 only)
VSWR	1.5:1 maximum
Carrier to intermodulation ratio	–25 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5760 60 W SSPA

Output power @ 25°C	+47.8 dBm (60 W) typical at saturation +47.0 dBm minimum at 1 dB GCP
Connector	CPR137-G
VSWR	1.25:1 maximum
Carrier to intermodulation ratio	–26 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

5712H 120 W SSPA

Output power @ 25°C	+50.8 dBm (120 W) typical at saturation +50.0 dBm minimum at 1 dB GCP
Connector	CPR137-G
VSWR	1.25:1 maximum
Carrier to intermodulation ratio	–26 dBc, two carriers each at 6 dB OPBO from 1 dB GCP

Spurious outputs (including harmonics)	Meets ETSI EN 301 443 when used with an antenna compliant with ETSI ETS 301 332 and having a gain of 53 dBi

Phase noise (SSB)

100 Hz	–60 dBc/Hz maximum, –75 dBc/Hz typical
1 kHz	–70 dBc/Hz maximum, –80 dBc/Hz typical
10 kHz	–80 dBc/Hz maximum, –85 dBc/Hz typical
100 kHz	–90 dBc/Hz maximum, –95 dBc/Hz typical

Synthesiser step size 1 MHz

Frequency stability

–40°C to + 55°C	$\pm 2 \times 10^{-8}$
Aging	$\pm 1 \times 10^{-7}$/year

Cable compensation[a]

Range	
narrow BW option	0 to +1.2 dB nominal, 16 steps
wide BW option	0 to +2.5 dB nominal, 16 steps

a. Cable compensation facility is not provided in converters with D prefix serial numbers.

Receive section (excluding LNA)

RF input

Frequency range	
Band 2 (Extended)	3.625 to 4.200 GHz
Band 3 (Insat)	4.500 to 4.800 GHz
Band 4 (Palapa C & Intelsat VIII-A)	3.400 to 3.700 GHz (software version 1.62 or later) 3.400 to 3.675 GHZ (software version earlier than 1.62)
Impedance	50 Ω
Connector	N-type female
VSWR	1.4:1 maximum
Noise figure	18 dB typical
DC output (switch selectable)	+15 V @ 75 to 250 mA

IF output

Frequency range	
narrow BW option	70±20 MHz/140±20 MHz selectable
wide BW option	140±40 MHz
Impedance	50/75 Ω selectable
3rd order intercept	+15 dBm minimum
Connector	N-type female
Return loss	18 dB minimum @ 50 Ω

Gain specification

Gain	45 dB nominal
Attenuator range	0 to 30 dB nominal
Attenuator step size	1 dB nominal
Gain flatness	
narrow BW option	±1.0 dB maximum, 40 MHz
wide BW option	±2.0 dB maximum, 80 MHz
Gain stability	+5.0/–4.0 dB maximum, –40°C to +55°C

Image rejection	50 dB minimum
Spurious output	–65 dBm maximum
Phase noise (SSB)	
100 Hz	–60 dBc/Hz maximum, –75 dBc/Hz typical
1 kHz	–70 dBc/Hz maximum, –80 dBc/Hz typical
10 kHz	–80 dBc/Hz maximum, –85 dBc/Hz typical
100 kHz	–90 dBc/Hz maximum, –95 dBc/Hz typical
Synthesiser step size	1 MHz
Frequency stability	
–40°C to +55°C	$\pm 2 \times 10^{-8}$
Aging	$\pm 1 \times 10^{-7}$/year

Low noise amplifier

These specifications are indicative. Low noise amplifiers to cover other frequency bands are also available.

Input

Frequency range	3.625 to 4.200 GHz
Interface	CPR229-G

Noise temperature	40 K typical at 25°C (other noise temperatures available)

Gain specification

Gain	50 dB minimum
Gain flatness	±1.5 dB maximum full band

Output

1 dB GCP	+5 dBm minimum
Impedance	50 Ω
Connector	N-type female
VSWR	2.0:1 maximum

Transmit reject filter

These specifications are indicative. Transmit reject filters to cover other frequency bands are also available.

Pass band	3.625 to 4.200 GHz
Insertion loss	0.05 dB maximum
Reject band	5.850 to 6.425 GHz
Rejection	55 dB minimum

General

Input voltage

5705/5710/5720/5730/5740	42 to 72 V DC (floating input) standard, or 115/230 V AC, ±15% with optional PSU 5582B
5760/5712H	104 to 274 V AC, 47 to 63 Hz

Power consumption

DC	5705	95 W maximum SSPA On
	5710	160 W maximum SSPA On
	5720	200 W maximum SSPA On
	5730	220 W maximum SSPA On
	5740	280 W maximum SSPA On 40 W maximum SSPA Off
AC	5705	150 VA maximum SSPA On
	5710	240 VA maximum SSPA On
	5720	310 VA maximum SSPA On
	5730	340 VA maximum SSPA On
	5740	370 VA maximum SSPA On
	5760	440 VA typical SSPA On
	5712H	760 VA typical SSPA On (all @ nominal AC voltage)

LNA DC/Alarm facilities

DC output	+15 V @ 75 to 400 mA
Alarm input	Current monitoring as specified above, and contact closure; open circuit is fault condition

Monitor and control facilities

Indicators	**STANDBY** **ON** **WARM-UP** **SSPA ON** **CONV FAULT** **LNA FAULT** **SSPA FAULT** **TEMP FAULT** **FAN FAULT**
Controls	Power control: OFF/STANDBY/ON SSPA control: INHIBIT/REMOTE/ACTIVATE Serial interface settings LNA supply via **Rx RF I/P** connector MAINS/BATT supply select

Remote monitor and control facilities

Serial interface standards	RS232 RS422 (RS485)
Protocol standards	ASCII Packet (RS485); various standards available
Packet protocol address range	0 to 127

Remote monitor and control facilities (cont.)

Remote monitoring functions (serial interface)	Standby
	On
	Warm-up
	SSPA on
	Converter fault
	LNA fault
	SSPA fault
	Temperature fault
	Fan fault
	Converter temperature
	SSPA temperature
	SSPA inhibit control
	SSPA activate control
	Transmit frequency
	Receive frequency
	Transmit attenuation
	Receive attenuation
	Power up mode
	Cable compensation
	Reference oscillator override
	SSPA alarm enable
	LNA alarm enable
	Fan alarm enable
	Temperature compensation select
	Packet address (ASCII mode only)
	Packet address range (ASCII mode only)
	Packet protocol select
	SSPA control mode select
	Converter lock
	Status change poll
	IF impedance
	IF frequency

Remote monitor and control facilities (cont.)

Remote control functions (serial interface)	Power control: standby/on SSPA inhibit control SSPA activate control Transmit frequency Receive frequency Transmit attenuation Receive attenuation Power up mode Cable compensation Reference oscillator override SSPA alarm enable LNA alarm enable Fan alarm enable Temperature compensation select Address range select (ASCII mode only) Packet protocol select SSPA control mode select Reset Reset change bits IF impedance IF frequency
Remote monitoring functions (contact closure)	Standby Warm-up SSPA on Converter fault LNA fault SSPA fault Temperature fault Fan fault
Remote control functions (contact closure)	Power control: standby/on SSPA inhibit control SSPA activate control

Environmental

Converter module and SSPA module

Temperature	–40°C to +55°C
Relative humidity	100%
Cooling	
5700	Convection
5705	Convection
5710/5720/5730/5740	Forced air
5760/5712H	Forced air
Weatherproofing	
5700	Sealed to 34 kPa
5705/5710/5720/5730/5740	Sealed to 34 kPa
5760/5712H	Sealed to IP66

Power supply unit

Temperature	–40°C to +55°C
Relative humidity	100%
Cooling	Convection
Weatherproofing	Sealed to IP65

Physical

All dimensions are measured over the connectors.

Size

Converter module	110 mm W × 410 mm D × 240 mm H
SSPA module	
N-type output option	
5705	120 mm W × 370 mm D × 185 mm H
5710/5720/5730/5740	165 mm W × 415 mm D × 215 mm H
Waveguide output option	
5705	120 mm W × 380 mm D × 185 mm H
5710/5720/5730/5740	165 mm W × 420 mm D × 215 mm H
5760/5712H	277 mm W × 354 mm D × 491 mm H
Power supply unit 5582B	200 mm W × 160 mm D × 370 mm H

Weight

Converter module	8 kg
SSPA module,	
5705	4.5 kg
5710/5720/5730/5740	9 kg
5760/5712H	27 kg
Power supply unit 5582B	10 kg

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5 How the transceiver works

This chapter provides a brief technical description of the main operating components of the transceiver. It includes the:

- converter module (5-2)
- solid state power amplifier (5-4)
- low noise amplifier (5-4)
- transmit reject filter (5-5)
- power supply unit (5-5)

Converter module

The Converter Module 5700 provides the IF/RF frequency conversion functions required in a C-Band satellite earth station. It consists of an up converter and a down converter.

Up converter

The up converter converts the Tx IF input signals up to the appropriate Tx RF output via dual conversion. The actual IF frequency, IF bandwidth and RF frequency are dependent on:

- the options fitted to the converter
- the IF selected (narrow bandwidth option only)
- the Tx frequency selected

The up converter provides a step attenuator and a gain control prior to the first frequency conversion with the Tx LO. The gain control compensates for gain variations due to temperature changes in both the up converter and the SSPA.

The first conversion output signal is filtered by a high-Q interdigital filter, amplified, then applied to the second conversion stage together with the Tx synthesiser output. The resultant signal is filtered and amplified to provide the final Tx RF output signal.

Down converter

The down converter converts the Rx RF input signals from the LNA down to the appropriate Rx IF output via dual conversion. The actual RF frequency, IF bandwidth and IF frequency are dependent on:

- the options fitted to the converter
- the IF selected (narrow bandwidth option only)
- the Rx (dual synthesiser) or Tx (single synthesiser) frequency selected

The Rx RF input signal is band-pass filtered and applied to the first conversion stage together with the Rx synthesiser signal. The resultant signal is amplified and filtered again, then applied to the second conversion stage together with the Rx LO. The second conversion output is then further amplified and passed through the Rx step attenuator control to provide the final Rx IF output.

Synthesisers

The synthesisers contain two phase locked loops to produce the required SHF LO outputs. The resolution of the frequency control is 1 MHz.

For a single synthesiser converter, the output of the synthesiser is actively split to produce the required Tx and Rx SHF LOs. In this situation, only the transmit frequency is programmed. The receive frequency is the transmit frequency with an offset of 2225 MHz.

All oscillators and synthesisers are phase locked to the internal reference frequency.

Control and fault detection

A microprocessor in the converter provides the control logic and fault detection for the converter, LNA and SSPA.

The status of all phase locked loops in the converter is monitored and a converter fault is indicated if any loop becomes unlocked. During an up converter fault period, the converter inhibits transmission by shutting down power to the final transmit stages.

The converter monitors the supply current of the LNA to detect LNA failure and incorporates overcurrent shutdown circuit protection.

A separate **LNA DC/ALARM** connector is provided on the converter. It uses a contact closure from the LNA and current monitoring to detect failure of the LNA.

Solid state power amplifier

The SSPA modules use GaAs FETs, and in the high power SSPAs, RF power combining technology to amplify signals in the specified frequency range.

The SSPAs incorporate either a CPR137-G waveguide output or a N-type connector output (5705/5710/5720/5730/5740 only) and an integral heatsink.

A cooling fan and shroud are fitted on all SSPAs except the 5705 SSPA. The fan operates whenever the SSPA is activated.

In the high power SSPAs, the C-Band input signal is amplified by a variable gain driver module, which then feeds the final power module. The final power module amplifies the signal and divides the signal into two or four parts by a divider. In the 5760 SSPA, the two outputs are amplified by two parallel power stages. In the 5712H SSPA, the four outputs are amplified by four power stages. The outputs of these power stages are combined in a waveguide power combiner.

The SSPAs are internally protected from damage in conditions of:

- overcurrent
- high temperature
- output short circuit
- output open circuit

Low noise amplifier

The LNA uses HEMT FETs to amplify signals in the specified receive frequency range. The input is via a CPR229-G waveguide flange and connects directly to the feed to maintain a low noise input.

Two types of LNA are recommended for operation with the C-Band Transceiver 5700 series—a standard LNA and an optional LNA. The choice is dependent on the system requirements of the earth station.

The standard LNA has a noise temperature of 40 K and receives its DC supply via the Rx RF cable.

The optional LNA has a noise temperature of 45 K or 35 K (depending on the version). This LNA receives its DC supply via a separate DC/Alarm connector.

The LNA can be powered via the **Rx RF I/P** connector of the converter and the Rx RF coaxial cable.

Transmit reject filter

The TRF is a low-pass, waveguide filter. It has a low insertion loss in the specified receive pass band and high attenuation in the specified transmit reject band.

The increased isolation between the receive and transmit ports provided by the TRF ensures that the transmit signals will not enter and overload the LNA or down converter.

Depending upon the isolation provided by the OMT, a TRF may not be necessary on some antennas.

Power supply unit

The Power Supply Unit 5582B is a robust, wide-range power supply. It is specifically designed to provide the nominal 48 V DC supply required by the C-Band transceiver. The supply source is 50/60 Hz, 115/230 V AC mains.

The PSU is unregulated and behaves like a simple transformer/rectifier supply. The DC voltage output to the transceiver will be somewhere between 37 V (at very low mains) and 72 V (at high mains).

The positive output of the PSU is earthed for protection. An auxiliary 48 V DC output is provided for powering a redundancy system.

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6 Installation

This chapter explains how to unpack and install the C-Band Transceiver 5700 series. It includes:

- unpacking the equipment (6-2)
- safety precautions (6-3)
- installing the outdoor equipment (6-5)
- grounding recommendations (6-11)
- welding precautions (6-12)
- serial interface (6-13)
- monitor and control interface (6-16)
- low noise amplifier interface (6-19)
- cables (6-20)

Unpacking the equipment

Ensure that the packing boxes are upright, as indicated by the printing on the boxes. Open each packing case and examine the contents for signs of damage. If you notice any damage, contact Codan immediately. Failure to contact Codan before returning the unit may result in any warranty being void.

If all units are in a satisfactory condition, follow the safety precautions and installation procedures in this chapter.

Safety precautions

Before switching the transceiver on, the following safety precautions must be taken.

Radiation warning

The higher power SSPAs are capable of both high gain and high power. The output should be connected to the antenna feed, a suitably rated load or the supplied blanking plate. Ensure that the output is always correctly terminated to prevent possible oscillations due to feedback. When activated, the SSPA could emit high levels of non-ionising radiation from its output if it has not been terminated.

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

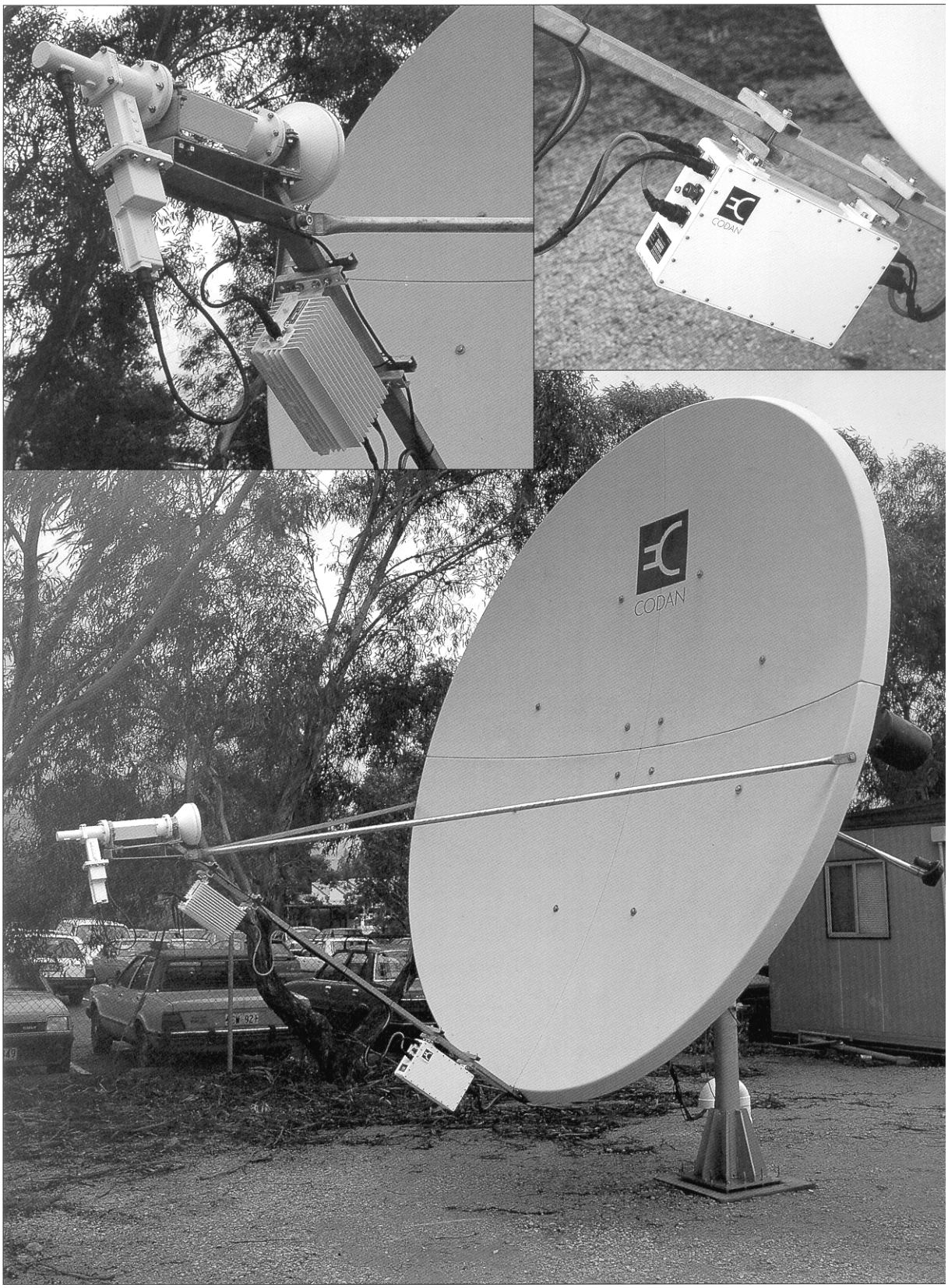
High voltage warning

Regardless of the AC mains voltage used, the power supply unit in the 5760/5712H SSPA produces a DC output voltage in excess of 300 V DC.

The DC output voltage can be lethal.

Do not operate the SSPA with the covers removed.

Figure 6-1: Typical transceiver installation



Installing the outdoor equipment

Ensure you follow all sealing precautions listed in this chapter. If the modules or cable connections are not sealed correctly, the equipment may be damaged or the performance of the satellite station may deteriorate over time.

Converter module

The converter can be mounted on a flat surface adjacent to the SSPA, on the antenna or SSPA support structures, or on the antenna feed support boom. Although a protected position is preferable, the module is designed to withstand exposure to outdoor weather conditions. However, you should avoid areas where water runoff is likely to be channelled into concentrated streams across any connectors.

The converter is supplied with brackets for mounting on a flat surface. The locations of the four M8 clearance mounting holes for mounting on a flat surface are shown in drawing 03-00958 in Chapter 10, *Drawings*.

Where a flat surface is not available, use the appropriate kit to mount the converter. Fitting instructions for mounting the converter onto circular or rectangular structures are shown in drawing 15-42000-001 sheet 1 in Chapter 10, *Drawings*.

If the 5760/5712H SSPA has been mounted using the SSPA mounting kit provided, the converter can be mounted on the same mounting frame using the converter bracket plate supplied. Fitting instructions for mounting the converter on the SSPA mounting frame are shown in drawing 15-40196-001 in Chapter 10, *Drawings*.

Mount the converter so that you have easy access to and a clear view of the control panel. Also, ensure that the position of the converter allows interconnecting cables to be run neatly.

For cable interconnection information, see Table 6-1 on page 6-20.

The DC power input is floating. Therefore, either polarity output may be earthed when connecting the converter to a battery or regulated supply.

The converter has a removable transparent front cover that is sealed with a gasket. There is a second seal between the control panel and the internal sections of the converter.

To minimise the chance for moisture to enter the module, the front cover should be taken off the equipment only when absolutely necessary. Great care should be taken not to allow rain to enter the control panel area.

Ensure that you use the protective covers supplied with the converter to weatherproof any unused connectors.

You need to set up the converter after you have installed it (see page 7-2, *Setting the converter option switches*).

5705/5710/5720/5730/5740 SSPAs

Mount the SSPA on the antenna feed support boom with the Tx output as close as possible to the feed. Ensure that the fan shroud (if fitted) is in the lower-most position and that the open end of the shroud is facing downwards. You can reverse the shroud by unscrewing the six M5 socket cap screws (three each side) a few turns.

Although a protected position is preferable, the module is designed to withstand exposure to outdoor weather conditions. However, you should avoid areas where water runoff is likely to be channelled into concentrated streams across any connectors.

The SSPA is supplied with brackets for mounting on a flat surface. The locations of the four M8 clearance mounting holes for the 5 W SSPA, 10/20 W SSPAs and 30/40 W SSPAs are shown in drawings 03-01099, 03-01098 and 03-01097 respectively in Chapter 10, *Drawings*.

Where a flat surface is not available, use the appropriate boom-mounting kit for mounting the SSPA onto circular or rectangular structures. Fitting instructions are shown in drawing 15-42000-001 sheet 1 or 15-42000-001 sheet 2 in Chapter 10, *Drawings*.

SSPAs with a waveguide output can be connected to the antenna feed transmit flange with a length of flexible WR137 waveguide and waveguide bends as required. Ensure all waveguide joints are correctly gasketed. If you are joining two waveguide flanges that are both grooved (CPRG type), use a full-thickness gasket. Only use half-thickness gaskets if one surface is flat, such as with antenna feed flanges.

If the SSPA has an N-type connector output, use a length of low-loss coaxial cable to connect it to the antenna feed transmit connector.

You do not need to set up or adjust the SSPA after you have installed it.

5760/5712H SSPAs

The SSPA may be damaged if it is driven beyond the level required to produce 1 dB gain compression (see page 8-9, *Transceiver output level (5760/5712H SSPAs only)*).

Ensure the transmit input level, the converter transmit attenuation and SSPA gain setting are correct before applying transmit IF input signal.

Mount the SSPA on the antenna support structure with the Tx waveguide output orientated towards the feed.

Ensure the air flow for the cooling fans is not obstructed.

Although a protected position is preferable, the module is designed to withstand exposure to outdoor weather conditions. However, you should avoid areas where water runoff is likely to be channelled into concentrated streams across any connectors.

The SSPA is supplied with brackets for mounting purposes. The locations of the four M12 clearance mounting holes are shown in drawing 0969D22 in Chapter 10, *Drawings*.

For mounting onto circular or rectangular structures, an appropriate mounting kit for the SSPA is supplied. Fitting instructions are shown in drawing 15-40196-001 in Chapter 10, *Drawings*.

The waveguide output of the SSPA can be connected to the antenna feed transmit flange with flexible WR137 waveguide, straight WR137 waveguide and waveguide bends as required. Ensure all waveguide joints are correctly gasketed. If you are joining two waveguide flanges that are both grooved (CPRG type), use a full-thickness gasket. Only use half-thickness gaskets if one surface is flat, such as with antenna feed flanges.

For cable interconnection information, see Table 6-1 on page 6-20.

You need to set up the SSPA after you have installed it (see page 7-10, *Setting the interface configuration on the 5760/5712H SSPA*).

Before applying power to the SSPA, ensure the installation complies with the safety precautions listed on page 2-3, *Complying with the European Radio and Telecommunications Terminal Equipment Directive*.

Low noise amplifier and transmit reject filter

To maintain a good station G/T performance, the LNA should be mounted directly on the feed receive port.

If a TRF is required, you can bolt the LNA and TRF together before connecting them directly to the feed receive port.

Ensure all waveguide joints are correctly gasketed. If you are joining two waveguide flanges that are both grooved (CPRG type), use a full-thickness gasket. Only use half-thickness gaskets if one surface is flat, such as with antenna feed flanges.

DC power through the **Rx RF I/P** connector of the down converter allows the LNA to be connected by a single coaxial cable.

Optional LNAs with separate RF output and DC power/alarm connectors can be powered via the converter by connecting the LNA supply/alarm directly to the **LNA DC/ ALARM** connector on the converter.

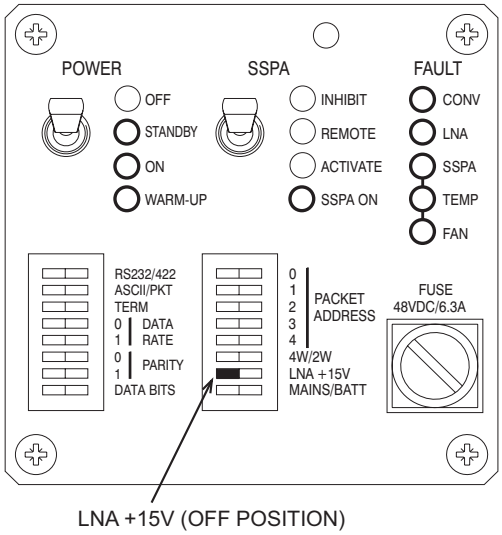
Damage may be caused to optional LNAs with separate RF output and DC power/alarm connectors if DC voltage is present when the LNA is connected to the **Rx RF I/P** connector of the converter.

If you are connecting an LNA with separate RF output and DC power/alarm connectors, check that the appropriate configuration DIP switch on the converter is set to the OFF position prior to connecting the RF output of the LNA to the RF input of the converter.

To set the LNA +15 V DIP switch:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Ensure that the **LNA +15V** switch is OFF (see Figure 6-2).

Figure 6-2: LNA +15V switch position



Note: The shaded area represents the depressed part of the switch.

❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

For cable interconnection information, see Table 6-1 on page 6-20.

Ensure that you use the protective covers supplied with the converter to weatherproof any unused connectors.

Power supply unit

You may mount the PSU on the antenna support. Although a protected position is preferable, the module is designed to withstand exposure to outdoor weather conditions. However, you should avoid areas where water runoff is likely to be channelled into concentrated streams across any connectors.

The PSU should be positioned with the cable glands at the bottom.

There are two mounting flanges on the top and bottom of the PSU, with six mounting holes in each flange. The location of the mounting holes is shown in drawing 03-00994 in Chapter 10, *Drawings*. You can use these holes to secure the PSU to an appropriate flat surface.

Where a flat surface is not available, use the appropriate pole-mounting kit for mounting the PSU onto circular structures. Fitting instructions are shown in drawing 15-40128-001 in Chapter 10, *Drawings*.

Before applying power to the PSU, ensure the installation complies with the safety precautions listed on page 2-3, *Complying with the European Radio and Telecommunications Terminal Equipment Directive*.

The PSU may be damaged if an incorrect voltage is selected or an incorrect fuse is used.

Selecting the operating voltage and checking the fuse

To select the correct operating voltage and check the fuse:

- ❑ Locate the **Voltage Selector** switch on the internal panel of the PSU.
- ❑ Using a small flat-bladed screwdriver, position the **Voltage Selector** switch for the required AC mains voltage.
- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn counter-clockwise. Remove the cap.
- ❑ Ensure the correct AC line fuse is fitted:

Power supply	Fuse
115 V	5 A/250 V Delay
230 V	2.5 A/250 V Delay

- ❑ Re-insert the fuse and cap into the fuse holder.
- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn clockwise. Ensure the cap is locked into position.

For cable interconnection information, see Table 6-1 on page 6-20.

The connection details of the 48 V DC power cable to the PSU or other DC source can be found in drawing 08-05634 in Chapter 10, *Drawings*.

The positive output of the nominal 48 V DC supply from the PSU is connected to the chassis of the PSU and hence the mains supply input earth. Do not connect the negative output to earth or connect the supply output to equipment in which the negative supply is earthed.

Grounding recommendations

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 protective earth screws on the transceiver modules are provided specifically to provide this protection. This practice will also reduce the likelihood of the mains supply or RF interfering with the serial interface signals.

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.

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

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 PSU, converter, SSPA and LNA.

Serial interface

The serial interface can be configured for either RS232 or RS422/RS485 interface standard. The protocol can be configured for either ASCII or packet mode. The most common mode of interface operation is with RS232 interface and ASCII protocol selected. All four operating modes are summarised as follows:

Interface/Protocol	Application
RS232/ASCII	Normal RS232 interface for use with a dedicated control computer or a ‘dumb’ terminal (short distances)
RS422/ASCII	RS422 interface for use with a dedicated control computer or a ‘dumb’ terminal (long distances)
RS232/Packet	Allows the RS485 bus to be extended via an RS232 link such as a standard data modem
RS422/Packet	RS485 interface for use in a multidrop bus computer control environment

When RS422/Packet is selected, four packet protocol options are available:

- CODAN (see page 8-16, *Packet protocol*)
- Mode 1
- Mode 2
- Mode 3

If you want to use a packet protocol other than CODAN, contact your Codan representative for more information on the specifications of the alternative protocols.

The appropriate packet protocol can only be selected when in the ASCII protocol.

When RS422/Packet is selected, there is an option of either 2-wire or 4-wire interface available.

Set the mode of operation of the serial interface using the appropriate configuration DIP option switch on the control panel of the converter. The options that can be set include the data rate, parity, number of bits per byte and the packet address. The packet protocol and packet address range are not set using the DIP option switches.

RS232 interface

The RS232 interface is specified as a DCE connection. The RS232 interface is a general purpose interface for local point to point communications. Descriptions of the interface connections are as follows:

- RD (receive data)—receive data from the transceiver to the controlling source.
- TD (transmit data)—transmit data to the transceiver from the controlling source.
- CTS (clear to send)—set to the inactive state immediately upon power-on. It is not set to the active state until the transceiver is able to accept serial data (that is, it is held inactive during the power-on reset period and until the transceiver has performed all its initialisation functions). When it is ready to accept serial data, the transceiver uses this output to control the data flow from the controlling source.
- RTS (request to send)—the transceiver transmits serial data either after receiving a request for information, at a periodic time for temperature logging, or following a change in status of the transceiver. In all cases, the amount of data is minimal and the need to control data transmission from the transceiver is not required. Although this signal is received, no action is taken by the converter.
- GND (ground)—reference ground connected to the chassis and 0 V.

RS422 interface

The RS422 interface uses a pair of signal lines operating in a differential mode. This provides much greater distance and noise immunity than the RS232 interface. No external data flow control signals are used with the RS422 interface.

The RS422 interface is also suitable for multidrop bus applications, where multiple transceivers or modems are connected to the one controlling source, such as a computer. In this situation, each RS422 driver on the bus must only switch on when a transmission from that device is required.

Although no external data flow control signals are used with the RS422 interface, each bus device internally controls the transmit status of its RS422 driver.

When ASCII protocol is selected in the converter, the RS422 driver is permanently enabled.

When packet protocol is selected, the RS422 driver is enabled only during the transmission periods. This method of operation also allows the driver and receiver lines to be connected together, thus requiring only two wires to interconnect the bus devices and the controlling source. However, 4-wire operation is preferred as it places less restriction on the operation of the controlling source.

Descriptions of the interface connections are as follows:

- Rx+ (receive data +)—receive data at the transceiver from the controlling source.
- Tx+ (transmit data +)—transmit data from the transceiver to the controlling source.
- Rx– (receive data –)—complement of the receive data at the transceiver from the controlling source.
- Tx– (transmit data –)—complement of the transmit data from the transceiver to the controlling source.
- GND (ground)—reference ground connected to the chassis and 0 V.

When operating in a 2-wire mode, the Tx+ and Rx+ signals are connected together and the Tx– and Rx– signals are connected together.

The general requirement for wiring the RS422 interface is a low impedance (120 Ω) transmission line (twisted pair) from the controlling source to the bus device that is farthest from the controlling source.

Connections can be made to the other bus devices along the length of the transmission line. Under these conditions, only the controlling source and the far end device should be terminated. All other bus devices should be unterminated. Use the **TERM** option switch on the control panel of the converter to terminate the RS422 lines as required.

Monitor and control interface

The **MONITOR/CONTROL** connector interface of the converter provides relay contacts to indicate the faults and operational status of the transceiver. The following contacts share a common contact connection.

SSPA Fault	Closed when there is an undervoltage or overcurrent condition in the SSPA, or if the SSPA is disconnected
Temp Fault	Closed when the SSPA temperature is in excess of: 75°C nominal for 5705/5710/5720/5730/5740 SSPAs, 90°C nominal for 5760 SSPA, 105°C nominal for 5712H SSPA, or if the SSPA is disconnected
Warm-up	Closed during the warm-up period
	Switches on and off if the reference oscillator override option is selected
SSPA Activated	Closed when the SSPA is not activated
Fan Fault	Closed when a fan fault has been detected (not used with 5705 and 5760/5712H SSPAs)
Conv Fault	Closed when a converter fault has been detected
Standby	Closed when in standby mode
LNA Fault	Closed when an LNA fault has been detected

Opto-isolated control inputs and DC supply connections are provided. DC supply connections should only be used when isolated contact closures are available.

The opto-isolated control inputs are:

System On	Used to switch the transceiver from standby to on
Req SSPA Activate	Turns the SSPA on
SSPA Inhibit	Unconditionally prevents radiating a carrier by preventing the SSPA from being switched on

The serial interface connections depend on which operating mode of the serial interface has been selected. This is determined by three option switches:

- **RS232/422** switch
- **ASCII/PKT** switch
- **4W/2W** switch

Details of the appropriate connections are as follows:

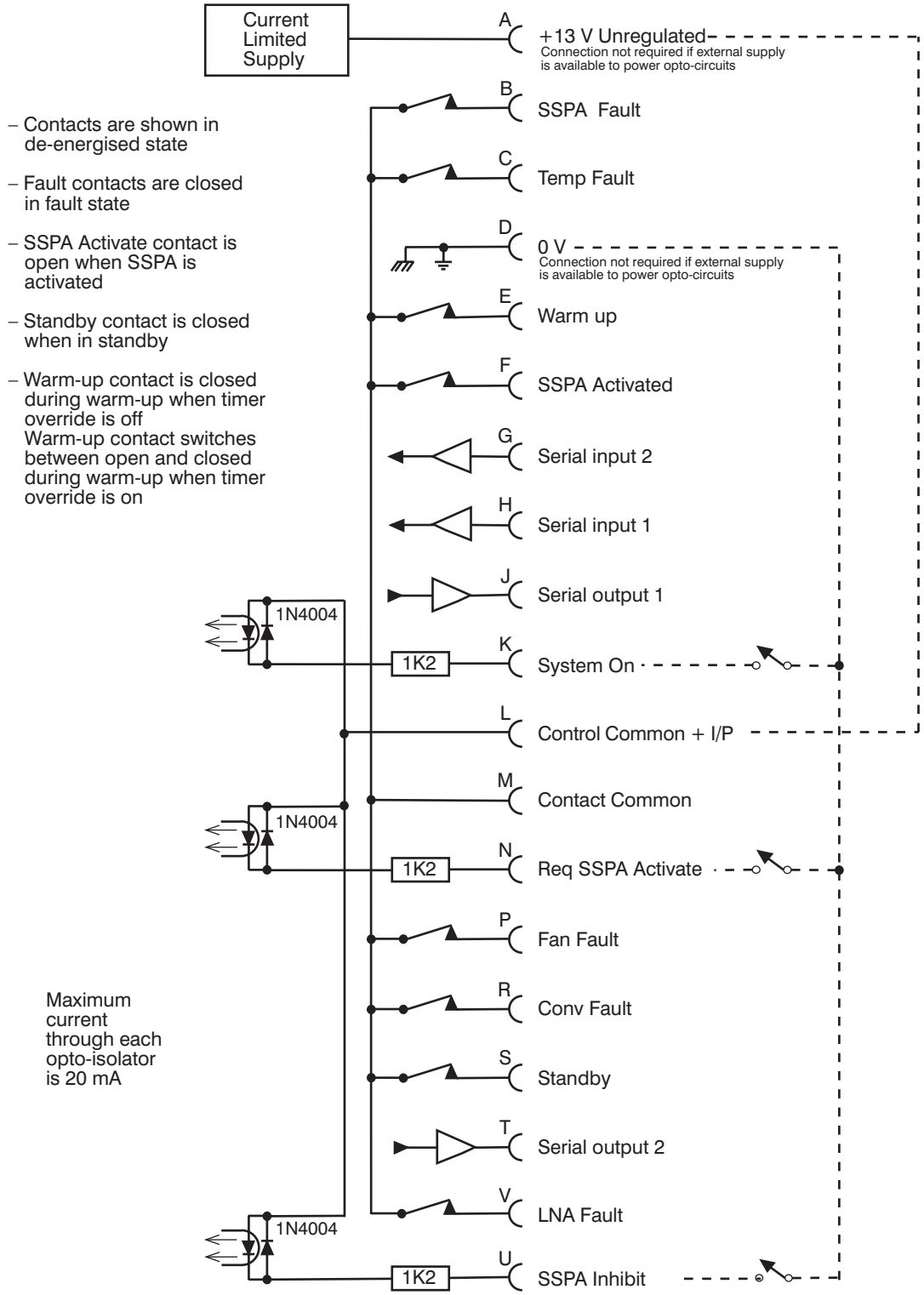
Description	RS232	RS422/ASCII or RS422/Packet/4W	RS422/Packet/2W
Serial output 1	RD	Tx+	Tx+ and Rx+
Serial input 1	TD	Rx+	No connection required
Serial input 2	RTS	Rx–	No connection required
Serial output 2	CTS	Tx–	Tx– and Rx–

The **MONITOR/CONTROL** connector interface of the converter is shown in Figure 6-3.

The **MONITOR/CONTROL** connector is a MIL-C-26482 14-19S socket.

For information on the serial interface signals, see page 6-13, *Serial interface*.

Figure 6-3: Monitor/Control connector interface of the converter



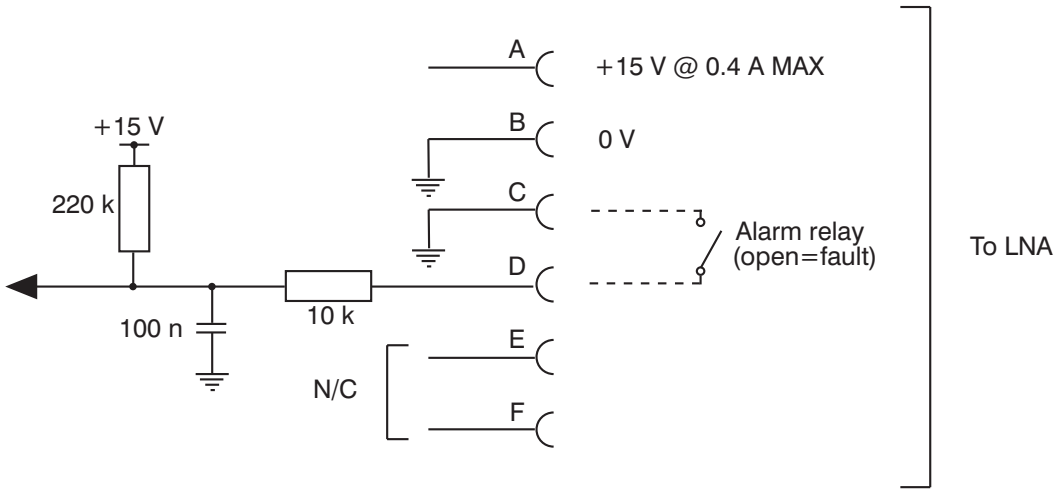
Low noise amplifier interface

The standard LNA supplied with the transceiver is powered via its RF output connector. The +15 V DC power is fed from the **Rx RF I/P** connector of the converter. This connector is capable of supplying up to 250 mA.

To allow LNAs with separate RF and DC power connectors to be connected to the converter, there is a dedicated **LNA DC/ALARM** connector on the converter. This connector is capable of supplying up to 400 mA.

Details of the **LNA DC/ALARM** connector interface are shown in Figure 6-4.

Figure 6-4: LNA DC/ALARM connector interface of the converter



If you want to use an LNA with the transceiver, and it cannot be powered via its RF output connector, contact your Codan representative for the appropriate cable requirements.

If the LNA does not provide the necessary alarm contacts, the alarm contact pins C and D should be wired together. In this situation, the current monitoring provides the alarm input.

The **LNA DC/ALARM** connector of the converter is a MIL-C-26482 10-6S socket.

Cables

You *must* use standard shielded Codan cables to make the interconnections as shown in Table 6-1 on page 6-20. These cables conform with the EMC Directive (see Chapter 2, *C-Band transceiver compliance*).

The 48 V DC power cable is the only cable that does not require shielding (see page 6-22, *48 V DC power cable (5582B to 5700)* or page 6-22, *48 V DC power cable (5760, 5712H to 5700)*).

The last three digits of each part number (shown as xxx in Table 6-1) represent a code for the cable length. This will vary with different cables and systems.

In installations where the cables are not supplied by Codan, the cable requirements in the *Cable fabrication* section below should be noted.

For details of the installation requirements, see page 6-23, *Cable installation*.

Table 6-1: Interconnection of standard cables

Cable		**From**		**To**	
Part No.	**Type**	**Equipment**	**Connector**	**Equipment**	**Connector**
Systems using 5705/5710/5720/5730/5740 SSPAs					
–	AC Mains to Flying leads	AC Mains	As required	5582B	AC input Terminal Block
08-05634-xxx	Flying leads to MS3106F18-11S	DC supply	As required	5700	**DC POWER**
08-05634-xxx	Flying leads to MS3106F18-11S	5582B	Transceiver 48 V Terminal Block	5700	**DC POWER**
08-05887-xxx	MS3116F12-10P to MS3116F12-10S	5700	**SSPA DC/ CONTROL**	5705/5710/ 5720/5730/ 5740	**DC/ CONTROL**
–	N(P) to N(P) coaxial cable	5705/5710/ 5720/5730/ 5740	RF Output	Antenna feed	Tx Port

Table 6-1: Interconnection of standard cables (cont.)

Cable		**From**		**To**	
Part No.	**Type**	**Equipment**	**Connector**	**Equipment**	**Connector**
Systems using 5760/5712H SSPAs					
04-0969A-12	AC Mains to Amphenol T 3109 001	AC Mains	As required	5760/12H	**AC INPUT**
08-05961-xxx	MS3106F18-11P to MS3106F18-11S	5760/15712H	**–48 V DC OUTPUTS**	5700	**DC POWER**
08-05857-xxx	MS3116F12-10P to MS3116F14-19S	5700	**SSPA/DC CONTROL**	5760/5712H	**CONTROL**
Common cables					
Various[a]	MS3116F10-6P to MS3116F8-4S	5700	**LNA DC/ ALARM**	LNA	Power
08-05366-xxx	N(P) to N(P) coaxial cable	5700	**Tx RF O/P**	5705/5710/ 5720/5730/ 5740/5760/ 5712H	**RF INPUT**
08-05366-xxx	N(P) to N(P) coaxial cable	5700	**Rx RF I/P**	LNA	Output
–	WR137 Flex W/G	5705/5710/ 5720/5730/ 5740/5760/ 5712H	**RF OUTPUT**	Antenna feed	Tx Flange
–	N(P) to N(P) coaxial cable	5700	**Tx IF I/P**	User IF equipment	Tx IF Output
–	N(P) to N(P) coaxial cable	5700	**Rx IF O/P**	User IF equipment	Rx IF Input

a. For further information, see page 6-19, *Low noise amplifier interface*.

Cable fabrication

For connector requirements, see the ‘Cable type’ column in Table 6-1 on page 6-20.

To conform with the EMC Directive (see Chapter 2, *C-Band transceiver compliance*), all cables must be assembled as shown in drawings 08-05301, 08-05634, 08-05961, 08-05887 and 08-05857 in Chapter 10, *Drawings*.

48 V DC power cable (5582B to 5700)

The 48 V DC power cable should be wired as shown in drawing 08-05634 in Chapter 10, *Drawings*. The total cable loop resistance must not exceed 0.35 Ω.

Ensure that you use the wire colours specified in drawing 08-05634 to comply with the EMC Directive (see Chapter 2, *C-Band transceiver compliance*).

The minimum input voltage required by the transceiver is 37 V DC. You must ensure the voltage at the **DC POWER** connector of the converter does not fall below this voltage. Ensure you take into account the DC power cable resistance and battery/power supply regulation at full load.

For example, to manufacture a 50 m (164 ft) cable use 4-core cable with each wire 50/0.25 (2.5 mm^2, approximately 13 AWG). Connect the wires in parallel to produce two conductors, each with a total cross-sectional area of 5 mm^2.

48 V DC power cable (5760, 5712H to 5700)

The 48 V DC power cable should be wired as shown in drawing 08-05961 in Chapter 10, *Drawings*.

Ensure that you use the wire colours specified in drawing 08-05961 to comply with the EMC Directive (see Chapter 2, *C-Band transceiver compliance*).

The wire size should be suitable for the required connectors.

IF cables

The transmit input IF and receive output IF impedances of the converter can be set to either 50 Ω or 75 Ω. However the converter is only fitted with 50 Ω N-type sockets.

The 75 Ω N-type connector has a centre pin of smaller diameter than that of the 50 Ω N-type connector. Due to this, the 75 Ω N-type plugs cannot be connected to the 50 Ω N-type sockets on the converter. If you want to use 75 Ω IF cables, you must fit 50 Ω N-type plugs to the converter ends of the IF cables.

When purchasing a 50 Ω N-type plug to use with a 75 Ω cable, ensure the size of the cable entry point at the rear of the plug is sufficient to fit the thicker 75 Ω coaxial cable.

The use of 50 Ω connectors in a 75 Ω system operating at IFs of 70 MHz or 140 MHz does *not* affect performance.

Cable installation

General guidelines

Use the most direct route possible for the cable runs. Secure the cable runs with cable ties or other suitable clamps.

You may install the indoor/outdoor interconnecting cables underground (for example, in 75 mm PVC pipe), or supported by an overhead catenary wire. Since the transmit and receive IF coaxial cables are identical, mark the cables at each end before you install them. Also, ensure that there is enough slack left to make antenna adjustments without straining the cables.

AC input connection (AC supply to 5582B or 5760/5712H)

Connect the AC mains to the 5582B using flexible 3-core cable. The cable should be secured and sealed with the sealing gland supplied. This gland is suitable for cables with an outer diameter between 5 mm and 10 mm.

The 5760/5712H SSPA should be connected to the AC mains using the cable supplied.

Before connecting the AC mains, ensure you take the precautions listed on page 2-3, *Complying with the European Radio and Telecommunications Terminal Equipment Directive*.

The mains cable (including any fixed building wiring) should be of sufficient gauge to ensure that the mains voltage at the mains input of the PSU does not fall by more than 1% when the transceiver is switched on and the SSPA is activated (i.e. 1.2 V @ 120 V AC input or 2.4 V @ 240 V AC input).

Connector sealing

All cable connection points require special care during installation, particularly the N-type connections. The slightest amount of water in a microwave coaxial connection will almost completely attenuate the signal.

There are three main areas where N-type connectors leak:

- around the connector junction, where the plug is screwed onto the socket
- the plug itself, between the turning and fixed parts of the plug
- the cable connection to the back of the plug

The connector junction must be well taped with a self-amalgamating tape, such as 3M type 23 Scotch self-amalgamating tape. The tape must cover the connector junction so that no water can creep into the thread between the plug and socket.

To prevent water entering the plug, cover between the turning and fixed parts of the plug with self-amalgamating tape.

It is not sufficient to rely on heatshrink tubing over the connector body to seal the cable connection to the back of the plug. Even the best heatshrink glues do not adhere reliably to the outer sheath of the cable or to the shiny metal connector body. It is essential to tape this area with self-amalgamating tape to prevent water getting into the back of the N-type plug.

The N-type connections should be carefully taped from the plug/socket junction right to the cable itself.

All other connectors must also be taped. Although many control and power connections are made with MS connectors, it is still recommended that these junctions are fully taped in the same way as the N-type connections outlined above. Tape from the fixed equipment socket (or plug body), right over the cable connector, to the cable sheath.

When using self-amalgamating tape, do not stretch it too much, especially over the protruding parts of MS connectors. If the tape is over-stretched, it tends to break away after a few weeks or months.

7 Setting up the transceiver

This chapter explains how to set up the C-Band Transceiver 5700 series ready for operation. It includes:

- setting the converter option switches (7-2)
- setting the remote configuration switches on the SSPA (7-10)
- switching on the transceiver (7-11)
- serial interface control during setup (7-14)
- setting converter parameters (7-19)
- mandatory transceiver settings (7-28)
- aligning the antenna (7-30)
- setting the transmit attenuation (7-31)
- setting the receive attenuation (7-33)

Setting the converter option switches

Two sets of DIP option switches (2 × 8) are located on the control panel of the converter. These switches enable you to select:

- mains or battery operation
- LNA +15 V operation
- serial interface parameters

Table 7-1: Option switches

Left option switch group

Switch	Option
1	RS232/RS422 interface select
2	ASCII/Packet protocol select
3	RS422 interface termination
4 & 5	Data rate select
6 & 7	Parity select
8	Number of data bits select

Right option switch group

Switch	Option
1–5	Packet protocol address select
6	4-wire/2-wire mode select (RS485 only)
7	LNA +15 V ON/OFF
8	Mains/Battery select

To gain access to the option switches, use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.

When you are replacing the transparent cover after changing the options, ensure the gasket is in place and that the screws are *not* overtightened.

Selecting mains or battery operation

The Mains/Battery option enables you to select the turn-on voltage of the transceiver. Selecting the correct turn-on voltage provides clean switch-on and switch-off characteristics during unreliable voltage supply conditions.

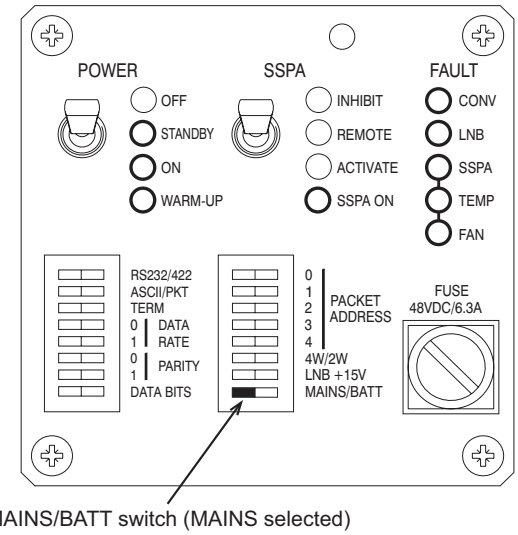
The location of the **MAINS/BATT** switch is shown in Figure 7-1.

The turn-on voltage required by the transceiver depends on which supply source is used. If you are using an unregulated supply source, such as the PSU 5582B, a high turn-on voltage (52 V) is required. In this situation, set the **MAINS/BATT** switch to MAINS.

If you are using the supply from a 5760/5712H SSPA, a 48 V DC battery system or a regulated 48 V DC supply, a low turn-on voltage (42 V) is required. In this situation, set the **MAINS/BATT** switch to BATT.

The turn-off voltage is 37 V in both cases.

Figure 7-1: Mains/Battery switch



Note: The shaded area represents the depressed part of the switch.

Selecting the voltage at the RF connector

The LNA +15 V option enables you to switch on or off the +15 V DC supply to the **Rx RF I/P** connector.

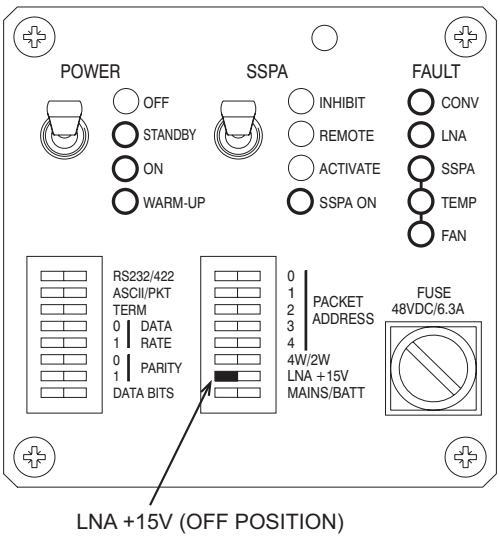
If you are using the standard LNA, or an LNA that is powered via its RF output connector, set the **LNA +15V** switch to ON.

If you are using an LNA that has a separate RF output and DC Power/Alarm connector, or you wish to connect test equipment, set the **LNA +15V** switch to OFF.

For switch positions, see Figure 7-2.

Ensure that the **LNA +15V** switch is set to OFF if the LNA or any test equipment connected is not designed to be powered via its RF output connector. If the switch is ON, the equipment may be damaged.

Figure 7-2: LNA +15V switch position



Note: The shaded area represents the depressed part of the switch.

Setting serial interface parameters

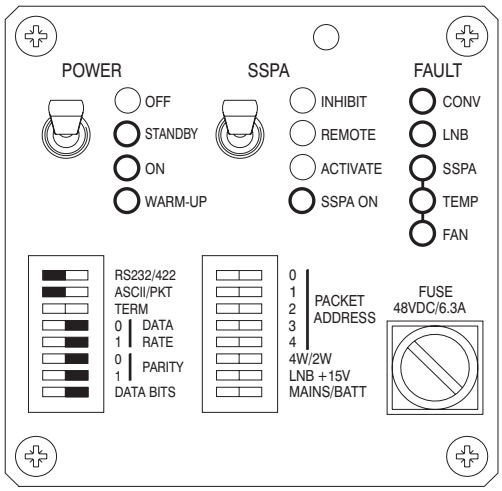
The serial interface DIP option switches enable you to select the serial interface operating parameters of the transceiver.

The recommended and most common mode of interface operation is:

- RS232 interface
- ASCII protocol
- 9600 bits per second
- 8 data bits
- no parity

Figure 7-3 shows the switch positions for the mode of serial interface operation listed above.

Figure 7-3: Recommended serial interface option switch settings



Note: The shaded area represents the depressed part of the switch.

Before setting the serial interface parameters, check that they are within the specific requirements or capabilities of the equipment used in your installation.

If your installation requires different settings to those listed above, see the serial interface parameter options in Tables 7-2, 7-3 and 7-4.

Selecting the operating mode

Two DIP option switches enable you to select the serial interface operating mode. The parameter options are shown in Table 7-2.

Table 7-2: Position of DIP option switches for serial interface operating mode

Switch position	**RS232/422**
OFF	RS232
ON	RS422
Switch position	**ASCII/PKT**
OFF	ASCII
ON	PACKET

Setting general serial interface parameters

The general parameter DIP option switches enable you to select the general serial interface operating parameters. They are applicable to all serial interface operating modes and should be set to match the corresponding settings of the terminal to be connected. The parameter options are shown in Table 7-3.

Table 7-3: Position of DIP option switches for general serial interface parameters

Switch positions		
Switch 0	**Switch 1**	**Data rate (bit/sec)**
OFF ON OFF ON	OFF OFF ON ON	1200 2400 4800 9600
Switch position		**Data bits**
OFF ON		7 data bits[a] 8 data bits
Switch positions		
Switch 0	**Switch 1**	**Parity**
OFF ON OFF ON	OFF OFF ON ON	Do not use[b] Odd Even None[a]

a. When 7 data bits with no parity is selected, the transmission format changes from the normal one stop bit to two stop bits.

b. At switch-on, this switch setting will cause the stored parameter settings to be erased and reset to the default settings.

If your converter is fitted with software prior to version 2.00 and switches 0 and 1 are set to OFF, apart from the parameter settings being reset to the factory default settings, the following information is deleted:

- the custom converter temperature compensation table
- the custom SSPA temperature compensation tables

The deletion of the custom temperature compensation tables will cause the 5700 Converter to default to the standard converter compensation table and the standard 5705 temperature compensation table. You must set the SSPA temperature compensation table to the standard table corresponding to your SSPA to avoid significant changes in the overall transceiver gain versus temperature compensation characteristic.

Selecting RS422 interface parameters

The RS422 DIP option switches enable you to select the serial interface operating parameters applicable to the RS422 interface only. They should be set based on the type of installation. The selection of 2-wire or 4-wire operation is possible only if packet operation (RS485) is selected. The parameter options are shown in Table 7-4.

Table 7-4: Position of DIP option switches for serial interface RS422

Switch position	**4W/2W**
OFF	4-wire RS485 operation
ON	2-wire RS485 operation
Switch position	**TERM**
OFF	Not terminated
ON	Terminated

Setting the packet address

The packet address DIP option switches enable you to select a serial interface packet address. The address is applicable only when the packet protocol mode is selected. It is determined by network requirements.

The address switches provide an address selection capability of up to 31. You use these switches in conjunction with the set address range command to expand the address selection capability to 127.

The address should not be set to 0 as this is reserved for the controller's address.

The significance of each address switch and the minimum and maximum address switch settings are shown in Table 7-5.

Table 7-5: Position of DIP option switches for serial interface packet address

Switch positions					**Packet address**
Switch 0	**Switch 1**	**Switch 2**	**Switch 3**	**Switch 4**	
OFF	OFF	OFF	OFF	OFF	0
ON	OFF	OFF	OFF	OFF	1
OFF	ON	OFF	OFF	OFF	2
OFF	ON	ON	OFF	OFF	4
OFF	OFF	OFF	ON	OFF	8
OFF	OFF	OFF	OFF	ON	16
ON	ON	ON	ON	ON	31

Setting the interface configuration on the 5760/5712H SSPA

The monitor and control interface in the 5760/5712H SSPA must be set to specifically drive the Converter 5700. For information on how to change the setup of the SSPA using the SSPA Manager software, see *Chapter 7, Operating the solid state power amplifier* in the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*. The converter connection must be set to Codan.

Switching on the transceiver

Before you can complete setting up the transceiver, the transceiver must be switched on. The steps involved in switching on the transceiver depend on the configuration of your installation and the power source used.

These procedures are used when operating the transceiver with a Codan SSPA. Follow the appropriate configuration section below when you want to switch on the transceiver and verify correct basic operation.

The 5760/5712H SSPA may be damaged if it is driven beyond the level required to produce 1 dB gain compression (see page 8-9, *Transceiver output level (5760/5712H SSPAs only)*).

Ensure the transmit input level, the converter transmit attenuation and SSPA gain setting are correct before applying transmit IF input signal.

DC supply configuration (5705/5710/5720/5730/5740 only)

To switch on the transceiver configured with a DC supply and verify correct basic operation:

- ❑ Ensure power is connected to the converter.
- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Set the **SSPA** switch on the converter to INHIBIT.
- ❑ Set the **POWER** switch on the converter to STANDBY.
- ❑ Check on the converter that:
  - the **STANDBY** LED is on
  - the **WARM-UP** LED is on (if the reference oscillator override has been selected, the **WARM-UP** LED will flash until the warm-up period has elapsed)
  - all the **FAULT** LEDs are on momentarily indicating that all **FAULT** LEDs are operational
- ❑ Set the **POWER** switch on the converter to ON and check that:
  - the **ON** LED is on
  - the **STANDBY** LED is off
  - the **CONV FAULT** and **LNA FAULT** LEDs are off (on momentarily when power is turned on)

  See Chapter 9, *Maintenance and fault finding*, if either the **CONV FAULT** or the **LNA FAULT** LED remain on.
- ❑ Set the **SSPA** switch on the converter to ACTIVATE.

- ❑ Check that the **SSPA ON** LED on the converter is on.

  If the **SSPA ON** LED is not on, see Chapter 9, *Maintenance and fault finding*.

- ❑ Check that all **FAULT** LEDs are off.

  If any **FAULT** LEDs are on, see Chapter 9, *Maintenance and fault finding*.

- ❑ If you are using a remote control to activate the system, switch the **POWER** switch on the converter to STANDBY.

- ❑ If you are using a remote control to activate the SSPA, switch the **SSPA** switch on the converter to REMOTE.

- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

AC supply configuration with 5582B or 5760/5712H

To switch on the transceiver and verify correct basic operation:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Set the **SSPA** switch on the converter to INHIBIT.
- ❑ Switch the AC power on via the isolation switch.
- ❑ If you are using a 5582B, open the door of the PSU and check that the green **48 V On** LED is on, indicating that the power supply is activated.
- ❑ Set the **POWER** switch on the converter to STANDBY.
- ❑ Check on the converter that:
  - the **STANDBY** LED is on
  - the **WARM-UP** LED is on (if the reference oscillator override has been selected, the **WARM-UP** LED will flash until the warm-up period has elapsed)
  - all the **FAULT** LEDs are on momentarily indicating that all **FAULT** LEDs are operational
- ❑ Set the **POWER** switch on the converter to ON and check that:
  - the **ON** LED is on
  - the **STANDBY** LED is off
  - the **CONV FAULT** and **LNA FAULT** LEDs are off (on momentarily when power is turned on)

  See Chapter 9, *Maintenance and fault finding*, if either the **CONV FAULT** or the **LNA FAULT** LED remain on.
- ❑ Set the **SSPA** switch on the converter to ACTIVATE.

- ❑ Check that the **SSPA ON** LED on the converter is on.

  If the **SSPA ON** LED is not on, see Chapter 9, *Maintenance and fault finding*.

- ❑ Check that all **FAULT** LEDs are off.

  If any **FAULT** LEDs are on, see Chapter 9, *Maintenance and fault finding*.

- ❑ If you are using a remote control to activate the system, switch the **POWER** switch on the converter to STANDBY.

- ❑ If you are using a remote control to activate the SSPA, switch the **SSPA** switch on the converter to REMOTE.

- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

Serial interface control during setup

To set the remaining operating parameters of the transceiver, the transceiver must be connected to one of the following:

- a Hand-Held Controller 5560
- a Remote Controller 5570
- a terminal (such as a dedicated terminal, a personal computer, a laptop or an organiser emulating a terminal)

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

The hand-held or the remote controller provide the simplest and most convenient way to set the parameters of the transceiver. For details of how to use the hand-held or remote controller, see the user guides for these items of equipment.

For users who do not have one of the controllers mentioned above, the following section describes the temporary connection of a personal computer running Microsoft Windows 95/98®. This system is readily available and includes a terminal emulation program called HyperTerminal©. Other operating systems also provide terminal emulation programs. Use the following sections as a guide to the parameters that must be set up for the operation of these other systems.

Temporary interface connection

A serial interface cable is available to connect the transceiver to the serial port of a personal computer. Connect the appropriate cable (Codan part number 08-05301-002) between the **MONITOR/CONTROL** connector of the converter and a PC. This cable provides a 9-way D-type female connector for connection to the PC. Details of the wiring of this cable are shown in drawing 08-05301 in Chapter 10, *Drawings*. If connection to a 25-way D-type serial port is required, use a standard 25-way female to 9-way male adaptor.

HyperTerminal

Setting up HyperTerminal

The terminal emulation program supplied with Microsoft Windows 95/98® is HyperTerminal©. Use this procedure to configure HyperTerminal to match the interface settings of the transceiver. For additional help, consult the Windows 95/98® on-line help.

To set up the HyperTerminal:

- ❑ From the Windows 95/98® Start icon, select Programs, then Accessories.
- ❑ Click on HyperTerminal to open the HyperTerminal folder.
- ❑ Double click on the HyperTrm (or Hypertrm.exe) icon.

  The Hyperterminal starts and the Connection Description window is displayed. This window enables you to name and select an icon from which you can start the terminal emulation program for the transceiver.
- ❑ In the Name field, enter a name for the icon, e.g. 5700 Terminal.
- ❑ In the Icon field, scroll to the icon you want and select it by clicking on it.
- ❑ Click OK.

  The Phone Number window is displayed.
- ❑ In the Connect using field, click on the drop list arrow and select the communications port on your computer to which the transceiver will be connected. Do one of the following:
  - If COM1 is *not* being used by another device, select COM1.
  - If COM1 is being used, select another COM port (e.g. COM2).
- ❑ Click OK.

  The selected COM port Properties window is displayed depending on the communications port you selected.
- ❑ To select the port settings, click on the drop list arrow for each setting and select the following:

Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

- ❑ Click OK to close the COM port Properties window.

  The 5700 Terminal-Hyperterminal window is displayed.
- ❑ From the File menu, select Properties.

  The Properties window is displayed.
- ❑ Select the Settings tab.
- ❑ In the Emulation field, click on the drop list arrow and select VT100.
- ❑ Click on the ASCII Setup... button.

  The ASCII Setup window is displayed.
- ❑ Ensure the Echo typed characters locally check box is *not* ticked.
- ❑ Click OK.
- ❑ Click OK on the Properties window.

  The computer is now configured to emulate a terminal capable of communicating with the transceiver.

Saving the emulation configuration

To save the configuration you created in the previous steps:

- ❑ From the File menu, select Save.

Retrieving the emulation configuration

To retrieve the saved emulation configuration:

- ❑ From the Windows 95/98® Start icon, select Programs, then Accessories.
- ❑ Click on HyperTerminal to open the HyperTerminal folder.
- ❑ Within the HyperTerminal folder, double click on the 5700 Terminal icon to open the 5700 Terminal application.

Starting the HyperTerminal emulation for the 5700 transceiver

To start the HyperTerminal emulation for the 5700 transceiver:

- ❑ From the Windows 95/98® Start button, select Programs, then Accessories, then HyperTerminal.

  The HyperTerminal window is displayed.

- ❑ Double click the icon created for the 5700 transceiver terminal emulation (e.g. 5700 Terminal).

  The HyperTerminal main window is displayed.

Changing the communications settings used by the HyperTerminal

To change the communications settings used by the HyperTerminal to coincide with the settings on the Converter 5700:

- ❑ From the File menu, select Properties.

  The Properties window is displayed.

- ❑ Click on the Configure... button.

  The COM port Properties window is displayed depending on the communications port you selected when you set up the emulation.

- ❑ Click on the drop list arrows of the port settings you want to change and select the new settings accordingly.

- ❑ Click OK.

- ❑ Click OK on the Properties window.

To force the HyperTerminal to recognise these new settings:

- ❑ From the Call menu, select Disconnect.

- ❑ From the Call menu, select Connect.

Exiting HyperTerminal

To exit the HyperTerminal program:

- ❑ From the File menu, select Exit.

  A message is displayed asking if you want to disconnect now.

- ❑ Click Yes.

Checking the connection between the terminal and transceiver

To verify that the terminal is communicating with the converter:

- ❑ Check that the **POWER** switch on the converter is set to STANDBY.
- ❑ Press **Enter** on the terminal keyboard.

  The prompt symbol (>) should be displayed on the terminal screen indicating that communication has been established.
- ❑ Enter **VPS** to view all the parameter settings of the transceiver.

  If VPS is not visible on the terminal screen after you have entered it, enter **SEC1** to enable the transceiver to echo command entries back to the terminal.

You can now complete setting up the transceiver.

Setting converter parameters

This section contains procedures on how to set the operating parameters via the serial interface.

Some configuration and operating parameters are set via the converter serial interface and are stored by the converter. For high power systems, some parameters are entered via the SSPA serial interface and are stored by the SSPA. For details on how to set up parameters on the SSPA, see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual.*

Certain configuration and operational settings in the 5700 Converter and the 5760/5712H SSPA must be set up specifically for operation in the C-Band high power transceiver system.

Power up mode

For CE compliance, the transceiver must be set up so that the SSPA does not activate upon power up.

To set the power up mode:

- Enter **SPU0** to allow the SSPA to resume operation in the last state before power off.
- Enter **SPU1** to select the CE compliant mode of operation.

  This ensures that any prior **SPA1** commands do not automatically re-activate the SSPA after power up.

Frequency

The frequency of operation must be set in accordance with the system requirements.

If a dual synthesiser option is fitted in the converter, then the transmit and receive frequencies may be set independently. If a single synthesiser option is fitted, then only the transmit frequency is required to be set as the receive frequency will have the standard 2225 MHz offset.

Dual synthesiser operation is indicated by a **D** in the third position on the model label of the converter. Single synthesiser operation is indicated by an **S**.

To set the transmit or receive frequency:

- ❑ Enter **STFnnnn** (where nnnn is the frequency required) to set the transmit frequency, or **SRFnnnn** to set the receive frequency. The frequency can be set in 1 MHz increments.

  The range of frequencies available depends on the band option of the converter, as shown in Table 7-6. The 5760 and 5712H SSPAs are only compatible with the Band 2 option of the converter.

Table 7-6: Available frequency ranges

Band option	Tx low (MHz)	Tx high (MHz)	Rx low (MHz)	Rx high (MHz)
2	5850	6425	3625	4200
3	6725	7025	4500	4800
4	6425	6725[a]	3400	3700[b]

a. For converters with software versions earlier than 1.62, the maximum transmit frequency is 6700 MHz.
b. For converters with software versions earlier than 1.62, the maximum receive frequency is 3675 MHz.

SSPA control mode

The SSPA control mode selects the method that the converter uses to monitor and control the SSPA.

In converters with software version 1.40 or earlier, Basic corresponds to non-Codan.

To set the SSPA control mode:

- ❑ Use Table 7-7 to determine the appropriate command settings for your application.

Table 7-7: SSPA control mode commands

Application	Command
Using a 5705/5710/5720/5730/5740 SSPA, select Extended mode	SPM0
Using a 5760/5712H or non-Codan SSPA[a], select Basic mode	SPM1

a. You must set the SSPA temperature compensation appropriately (see page 7-22, *SSPA temperature compensation type*).

If the converter in your installation is in a stand-alone situation, such as where the HPA system is independent and not monitored via the converter, it does not matter how the SSPA control mode is set.

Fault enables

The converter may be used with SSPAs or LNAs that do or do not require fault reporting via the converter. When faults are enabled, the converter will indicate faults via the **FAULT** LEDs on the control panel of the converter. Any unwanted fault indications may be disabled in the converter.

To set the fault enables:

- ❑ Use Table 7-8 to determine the appropriate command settings for your application.

Table 7-8: Fault enable commands

Application	Command
Using an SSPA with a fan	SFE1
Using an SSPA without a fan (5705) or an SSPA that does not support fault detection (5760/5712H)	SFE0
Using an LNA that requires fault reporting	SLE1
Using an LNA in which either the alarm system is maintained separately, or the LNA does not have a set of compatible alarm contacts	SLE0
Using a Codan SSPA that requires fault reporting via the converter	SPE1
Using a non-Codan SSPA without monitor and control via the converter	SPE0

Converter temperature compensation type

The converter temperature compensation type option enables you to select the gain versus temperature compensation characteristic of the converter.

To set the converter temperature compensation type:

- ❑ If you are using the standard converter compensation characteristic, enter **SCT0**.

  If the 5700 Converter is provided with a custom temperature compensation characteristic, enter **SCT1**.

  Use the view table data (**VTD**) command to determine if there is custom data available (see page 8-28, *View table data*).

SSPA temperature compensation type

The SSPA temperature compensation type option enables you to select the gain versus temperature compensation characteristic of the SSPA.

The 5760 and 5712H are internally temperature compensated. For operation with the 5760 and 5712H, the SSPA temperature compensation provided by the converter must be set to off.

To set the SSPA temperature compensation type:

- ❑ Use Table 7-9 to determine the appropriate command settings for your application.

Table 7-9: Standard SSPA type

Application	**Command**
Using a 5705 SSPA	SPT4
Using a 5710 SSPA	SPT5
Using a 5720/5730/5740 SSPA	SPT6
Using a 5760/5712H SSPA or an SSPA that does not require temperature compensation[a]	SPT0
Using an SSPA with a custom SSPA temperature compensation characteristic[b]	SPT1, SPT2 or SPT3

a. If you are using an SSPA not manufactured by Codan that does require temperature compensation, contact your Codan representative.

b. Use the view table data (**VTD**) command to determine if there is custom data available (see page 8-28, *View table data*).

Cable compensation

For converters with a D prefix serial number fitted with software version 3.00 or later, a cable compensation facility is not provided.

The cable compensation facility enables you to correct the frequency response roll-off of the transmit IF cable. The transmit frequency response is important because variations in the transmit level will affect the quality of the received signal at the receiving earth station. Any receive response variations of the IF are not as important because they will be compensated for by the demodulator AGC system of the receiving equipment.

The cable compensation facility provides 16 boost increments, from flat (0 dB boost) to 1.2 dB boost for the 70 MHz IF, or 2.5 dB boost for the 140 MHz IF.

To set the cable compensation:

- ❑ Enter **SCCn** or **nn** (where n = 0 to 15).

  To determine the most suitable cable compensation setting based on the type and length of the transmit IF cable, use Table 7-10 for 70 MHz IF operation, or Table 7-11 for 140 MHz IF operation.

  The settings listed in Tables 7-10 and 7-11 typically provide compensation to within ±0.2 dB over the IF range.

  If a more accurate compensation is required, use a signal generator and power meter to measure the total system frequency response from IF to RF at the SSPA output. Adjust the cable compensation to achieve a minimum output variation across the frequency band being used. This compensates not only for the IF cable, but also for both the up converter and the SSPA on the transponder being used.

Table 7-10: Cable compensation settings (70 MHz IF)

Cable length		RG58	RG8	FSJ1-50A Heliax	Belden 9913	RG6	RG11	Belden 9116
Metres	**Feet**	**50 Ω**	**50 Ω**	**50 Ω**	**50 Ω**	**75 Ω**	**75 Ω**	**75 Ω**
0–5	0–16	1	0	0	0	0	0	0
6–10	17–33	3	1	1	1	1	1	1
11–15	34–49	5	2	2	1	2	2	3
16–20	50–66	7	3	3	2	3	3	4
21–25	67–82	9	4	3	2	5	4	5
26–30	83–98	12	5	4	3	6	5	6
31–35	99–115	14	6	5	3	6	6	7
36–40	116–131	15	7	6	3	7	7	8
41–45	132–148	–	7	6	4	8	7	9
46–50	149–164	–	8	7	4	9	8	10
51–55	165–180	–	9	8	5	11	9	11
56–60	181–197	–	10	9	5	12	10	12
61–65	198–213	–	11	9	6	12	11	13
66–70	214–230	–	12	10	6	13	12	14
71–75	231–246	–	12	11	7	14	12	15
76–80	247–262	–	13	12	8	15	13	–
81–85	263–279	–	14	12	8	–	14	–
86–90	280–295	–	15	13	9	–	15	–
91–95	296–312	–	–	14	9	–	–	–
96–100	313–328	–	–	15	10	–	–	–

Table 7-11: Cable compensation settings (140 MHz IF)

Cable length		RG58	RG8	FSJ1-50A Heliax	Belden 9913	RG6	RG11	Belden 9116
Metres	**Feet**	**50 Ω**	**50 Ω**	**50 Ω**	**50 Ω**	**75 Ω**	**75 Ω**	**75 Ω**
0–5	0–16	1	0	0	0	0	0	0
6–10	14–33	2	1	1	1	1	1	1
11–15	34–49	4	2	1	1	2	2	2
16–20	50–66	5	2	2	1	2	2	3
21–25	67–82	7	3	2	2	3	3	4
26–30	83–98	8	3	3	2	4	3	5
31–35	99–115	10	4	3	3	5	4	5
36–40	116–131	11	5	4	3	5	5	6
41–45	132–148	13	5	4	4	6	5	7
46–50	149–164	14	6	5	4	7	6	8
51–55	165–180	15	6	6	4	7	6	9
56–60	181–197	–	7	6	5	8	7	10
61–65	198–213	–	8	7	5	9	8	11
66–70	214–230	–	8	7	6	10	8	11
71–75	231–246	–	9	8	6	10	9	12
76–80	247–262	–	10	8	7	11	10	13
81–85	263–279	–	10	9	7	12	10	14
86–90	280–295	–	11	9	7	12	11	15
91–95	296–312	–	11	10	8	13	11	15
96–100	313–328	–	12	10	8	14	12	–

Intermediate frequency

The ability to change the IF depends on whether the converter in your installation is fitted with the wide or narrow bandwidth option. Wide bandwidth operation is indicated by a **W** in the second position on the model label of the converter. Narrow bandwidth operation is indicated by an **N**.

If the converter is fitted with the wide bandwidth option (80 MHz), the IF is preset to 140 MHz.

If the converter is fitted with the narrow bandwidth option (40 MHz), you will be able to select IF operation at either 70±20 MHz or 140±20 MHz.

To select the 70 MHz range:

- ❑ Enter **SIF0**.

To select the 140 MHz range:

- ❑ Enter **SIF1**.

IF impedance

You can select either of two IF impedances, 50 Ω or 75 Ω.

To select 50 Ω IF impedance:

- ❑ Enter **SIM0**.

To select 75 Ω IF impedance:

- ❑ Enter **SIM1**.

Reference oscillator override

When the transceiver is switched from OFF to STANDBY or ON, the internal reference oscillator has to warm up. This may take only 30 seconds or as long as 15 minutes, depending on the ambient temperature and how long the transceiver has been switched off.

If the reference oscillator override is disabled, transmission from the converter during the warm-up period is prevented. If the reference oscillator override is enabled, transmission from the converter can occur during the warm-up period.

If you choose to transmit during the warm-up period the accuracy of the frequency of the transmitted signal cannot be guaranteed.

To disable the reference oscillator override (this is the recommended setting):

- Enter **SRO0**.

To enable the reference oscillator override:

- Enter **SRO1**.

Mandatory transceiver settings for high power applications

Certain configuration and operational settings in the 5700 Converter and the 5760/5712H SSPA must be set up specifically for operation in the C-Band high power transceiver system.

Converter settings

The mandatory settings for the 5700 Converter when used in a high power transceiver system are given in Table 7-12.

Table 7-12: Mandatory converter settings

Parameter	Setting	Refer to...
MAINS/BATT DIP switch	BATT	page 7-3
SSPA temperature compensation type	SPT0	pages 7-22, 8-33
SSPA control mode	SPM1	pages 7-20, 8-33
Fault enable—fan	SFE0	pages 7-21, 8-38
Fault enable—SSPA	SPE1	pages 7-21, 8-37

SSPA settings

The mandatory settings for the 5760/5712H SSPA when used in a high power transceiver system are given in Table 7-13. For details on how to change these settings using the SSPA Manager software, see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*.

Table 7-13: Mandatory SSPA settings

Parameter	Setting
Temperature compensation	On
Converter connection	Codan
RF gain	–10 dB—this setting can be changed if required to optimise system performance

Recommended SSPA settings

The recommended settings for the 5760/5712H SSPA when used in a high power transceiver system are given in Table 7-14. For details on how to change these settings using the SSPA Manager software, see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*.

Table 7-14: Recommended SSPA settings

Parameter	**Setting**
Maximum power alarm threshold	Disabled—the SSPA will indicate an internal alarm if the RF power exceeds the limit set, however this alarm will not be indicated as an SSPA alarm on the converter.
Minimum power alarm threshold	Disabled—the SSPA will indicate an internal alarm if the RF power falls below the limit set, however this alarm will not be indicated as an SSPA alarm on the converter.
SSPA Alarm Style	Latched—if a fault occurs it will be stored until viewed and reset by the operator. If alarms are set to Fleeting, it is possible that alarms may occur and then clear automatically without the operator seeing the cause of the alarm.
Auxiliary Alarm Sense	This setting can be left in either state because it is not used when the SSPA is operating with the Converter 5700.
RF mute	This setting can be left in either state. However, if the SSPA has been muted via the converter (e.g. if the **SSPA** switch is set to INHIBIT), it will *not* be possible to select the RF On state.

Aligning the antenna

If an antenna tracking system is available, use this to align the antenna on the peak of the signal received. Take care that you do not select side lobe peaks.

If an antenna tracking system is not available, connect a spectrum analyser to the **Rx IF O/P** connector and manually adjust the antenna to receive the maximum signal level. Alternatively, use a received signal strength meter within the demodulator and manually adjust the antenna to receive the maximum signal level.

Setting the transmit attenuation

The transmit attenuation value sets the attenuation of the up converter and hence can be used to set the output level of the SSPA. See the RF Level Diagram, drawings 03-00960 and 03-01014 in Chapter 10, *Drawings* as a guide when setting the level.

It is good practice to monitor the SSPA output power when changing the transmit attenuation. If you are switching the SSPA on for the first time or reconnecting a modem of unknown output level, set the transmit attenuation of the converter to maximum (30 dB) and then reduce attenuation while monitoring the output level of the SSPA.

The SSPA may be damaged it is driven beyond the level required to produce 1 dB gain compression (see page 8-9, *Transceiver output level (5760/5712H SSPAs only)*).

Ensure the transmit input level, the converter transmit attenuation and SSPA gain setting are correct before applying a transmit IF input signal.

You must deactivate the SSPA before disconnecting the SSPA output from the antenna or power meter.

To adjust the transmit attenuation:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Note the position of the **SSPA** switch on the control panel of the converter module because you will have to reset it to this position after the adjustment.
- ❑ Switch the **SSPA** switch on the converter to INHIBIT.
- ❑ Disconnect the SSPA output from the antenna.
- ❑ Connect the SSPA output to an appropriately rated load and a power meter.

  Alternatively, the power meter may be connected to the monitor port (if fitted).
- ❑ Set the modem (or other IF signal source) to transmit a carrier at a frequency near the centre of the IF band (70 MHz or 140 MHz).
- ❑ Use a power meter or spectrum analyser to check that the IF level is correct.
- ❑ Switch the **SSPA** switch on the converter to ACTIVATE so that the **SSPA ON** LED is on.

  Ensure the SSPA is not inhibited elsewhere.

- ❑ Enter **STAn** or **nn** (where n is between 0 and 30 dB) to adjust the transmit attenuation until the RF level is within ±1 dB of the required level (reducing attenuation increases the RF level).

The monitor port (if fitted) provides an output at a nominal 30 dB or 40 dB below the SSPA output for the 5710/5720 or 5760/5712H SSPAs respectively.

- ❑ Switch the **SSPA** switch on the converter to INHIBIT and set the modem (or other IF signal source) to the transmit off state.
- ❑ Disconnect all test equipment and reconnect the SSPA output to the antenna.
- ❑ Switch the **SSPA** switch on the converter to its normal operating state.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

Setting the receive attenuation

The receive attenuation sets the received carrier level presented to the demodulators. Because of the wide input range capability of typical demodulators, absolute gain setting accuracy is not as important as that required for the transmit path. See the RF Level Diagram, drawings 03-00960 and 03-01014 in Chapter 10, *Drawings*, as a guide when setting the level.

To adjust the receive attenuation:

- ❑ Connect a spectrum analyser to the **Rx IF O/P** connector of the converter.
- ❑ Select a carrier at a level suitable for reception at the earth station.

  If no such carrier is available, arrange for a carrier to be transmitted either from another earth station, or by looping back via the satellite from your earth station.
- ❑ Enter **SRAn** or **nn** (where n is between 0 and 30 dB) to adjust the receive attenuation until the IF level is within ±2 dB of the required level (reducing attenuation increases the receive IF output level).
- ❑ Turn off the loop back carrier (if used) and disconnect all test equipment.

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8 Operating the transceiver

This chapter contains information on operating the transceiver and SSPA, serial interface protocol formats and associated commands. It includes information on:

- how to switch on the transceiver (8-2)
- how to select the operating mode (8-6)
- how the LED indicators operate (8-7)
- how the LNA operates (8-8)
- transceiver output level (8-9)
- how to activate and inhibit the solid state power amplifier (8-10)
- how the fan operates (8-13)
- serial interface monitor and control (8-14)
- protocol formats (8-15)
- operating commands (8-21)

For specific details on operating the 5760/5712H SSPA, see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual.*

Switching on the transceiver

The steps involved in switching on the transceiver depend on the configuration of your installation and the power source used.

To switch the transceiver on, follow the appropriate section below for your configuration.

DC supply configuration (5705/5710/5720/5730/5740 SSPAs)

To switch on the transceiver configured with a DC supply and verify correct operation:

- ❑ Ensure power is connected to the converter.
- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Set the **SSPA** switch on the converter to INHIBIT.
- ❑ Set the **POWER** switch on the converter to STANDBY.
- ❑ Check on the converter that:
  - the **STANDBY** LED is on
  - the **WARM-UP** LED is on (if the reference oscillator override has been selected, the **WARM-UP** LED will flash until the warm-up period has elapsed)
  - all the **FAULT** LEDs are on momentarily indicating that all **FAULT** LEDs are operational
- ❑ Set the **POWER** switch on the converter to ON and check that:
  - the **ON** LED is on
  - the **STANDBY** LED is off
  - the **CONV FAULT** and **LNA FAULT** LEDs are off (on momentarily when power is turned on)

  See Chapter 9, *Maintenance and fault finding*, if either the **CONV FAULT** or the **LNA FAULT** LED remain on.
- ❑ Set the **SSPA** switch on the converter to ACTIVATE.
- ❑ Check that the **SSPA ON** LED is on.

  If the **SSPA ON** LED is not on, see Chapter 9, *Maintenance and fault finding*.
- ❑ Check that all **FAULT** LEDs are off.

  If any **FAULT** LEDs are on, see Chapter 9, *Maintenance and fault finding*.
- ❑ If you are using a remote control to activate the system, switch the **POWER** switch on the converter to STANDBY.

- ❑ If you are using a remote control to activate the SSPA, switch the **SSPA** switch on the converter to REMOTE.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

AC supply configuration with 5582B or 5760/5712H

The SSPA may be damaged if it is driven beyond the level required to produce 1 dB gain compression (see page 8-9, *Transceiver output level (5760/5712H SSPAs only)*).

Ensure the transmit input level, the converter transmit attenuation and SSPA gain setting are correct before applying transmit IF input signal.

To switch on the transceiver and verify correct operation:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Set the **SSPA** switch on the converter to INHIBIT.
- ❑ Switch the AC power on via the isolation switch.
- ❑ If you are using a 5582B, open the door of the PSU and check that the green **48 V On** LED is on, indicating that the power supply is activated.
- ❑ Set the **POWER** switch on the converter to STANDBY.
- ❑ Check on the converter that:
  - the **STANDBY** LED is on
  - the **WARM-UP** LED is on (if the reference oscillator override has been selected, the **WARM-UP** LED will flash until the warm-up period has elapsed)
  - all the **FAULT** LEDs are on momentarily indicating that all **FAULT** LEDs are operational
- ❑ Set the **POWER** switch on the converter to ON and check that:
  - the **ON** LED is on
  - the **STANDBY** LED is off
  - the **CONV FAULT** and **LNA FAULT** LEDs are off (on momentarily when power is turned on)

  See Chapter 9, *Maintenance and fault finding*, if either the **CONV FAULT** or the **LNA FAULT** LED remain on.
- ❑ Set the **SSPA** switch on the converter to ACTIVATE.

- ❑ Check on the converter that the **SSPA ON** LED is on.

  If the **SSPA ON** LED is not on, see Chapter 9, *Maintenance and fault finding*.

- ❑ Check that all **FAULT** LEDs are off.

  If any **FAULT** LEDs are on, see Chapter 9, *Maintenance and fault finding*.

- ❑ If you are using a remote control to activate the system, switch the **POWER** switch on the converter to STANDBY.

- ❑ If you are using a remote control to activate the SSPA, switch the **SSPA** switch on the converter to REMOTE.

- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

Power control

Standby mode

To switch the transceiver to standby mode locally:

- ❑ Switch the AC power on via the isolation switch.
- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Switch the **POWER** switch on the converter to STANDBY.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To switch the transceiver to standby mode via a remote control facility:

- ❑ Ensure that the:
  - remote serial interface system on command is *not* set to on (see page 8-29, *Control commands*), and
  - remote opto-isolated System On input is not activated (see page 6-16, *Monitor and control interface*)

  The setting of the **POWER** switch and the System On input may be checked by using the **VCS** command.

Operating mode

To switch the transceiver to operating mode locally:

- ❑ Switch the AC power on via the isolation switch.
- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Switch the **POWER** switch on the converter to ON.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To switch the transceiver to operating mode via a remote control facility:

- ❑ Leave the **POWER** switch on the converter in STANDBY and either:
  - set the remote serial interface system on command to on (see page 8-29, *Control commands*), or
  - activate the remote opto-isolated System On input (see page 6-16, *Monitor and control interface*)

Warm-up operation

When the transceiver is switched from OFF to STANDBY or ON, the internal reference oscillator has to warm up. This may take only 30 seconds or as long as 15 minutes, depending on the ambient temperature and how long the transceiver has been switched off.

If the reference oscillator override is disabled, the **WARM-UP** LED on the control panel of the converter will be on during the warm-up period regardless of whether the transceiver mode is STANDBY or ON. During this time, transmission from the converter is prevented. The **WARM-UP** LED goes off when the oscillator reaches its correct operating temperature. Transmission can then occur if the transceiver is in operating mode.

If the reference oscillator override is enabled, transmission from the converter can occur during the warm-up period. In this situation, the **WARM-UP** LED on the control panel of the converter flashes during the warm-up period regardless of whether the transceiver mode is STANDBY or ON.

If you choose to transmit during the warm-up period the accuracy of the frequency of the transmitted signal cannot be guaranteed.

LED indicators

The LED indicators listed in Table 8-1 are located on the control panel of the converter.

When you switch the transceiver from OFF to STANDBY, no faults will be indicated. When you switch the transceiver to operating mode (ON), the **CONV FAULT**, **LNA FAULT** and **TEMP FAULT** LEDs will indicate the status of the converter, LNA and SSPA temperature respectively. When you switch the **SSPA** switch on the converter to ACTIVATE, the **SSPA FAULT** LED will indicated the status of the SSPA.

The **SSPA FAULT** LED continues to indicate a fault until it is reset.

When you switch the transceiver from ON to STANDBY, the **FAULT** LEDs will continue to indicate faults that were present prior to switching to STANDBY.

Table 8-1: LED indications

LED	**Colour**	**Indicates...**
POWER		
STANDBY	Yellow	Transceiver is in standby mode
ON	Green	Transceiver is in operating mode
WARM-UP	Yellow	Transceiver is in warm-up mode (flashes if the warm-up period is overridden)
SSPA		
SSPA ON	Yellow	SSPA is on[a]
FAULT		
CONV	Red	Converter has a fault condition
LNA	Red	LNA has a fault condition
SSPA	Red	SSPA has a fault condition
TEMP	Red	SSPA has exceeded the following temperature limit: 75°C nominal for 5705/5710/5720/5730/5740 SSPAs, 90°C nominal for 5760 SSPA, 105°C nominal for 5712H SSPA
FAN	Red	SSPA cooling fan has failed to operate (not used in the high power transceiver)

a. Contact your Codan representative for exact details of this LED if the SSPA control mode is set to basic (command **SPM1**).

Low noise amplifier operation

The LNA is operational whenever the converter is in operating mode.

DC supply for the LNA is via one of two connectors:

- **Rx RF I/P** connector
- **LNA DC/ALARM** connector

The connector used for your installation depends on the supply interface of the LNA. For further information, see Chapter 6, *Installation*.

If your LNA is powered via the **Rx RF I/P** connector, a +15 V DC supply is available to the LNA whenever the **LNA +15V** option switch is set to ON and the transceiver is on.

If your LNA is powered via the **LNA DC/ALARM** connector, a +15 V DC supply is available to the LNA whenever the transceiver is on.

The current drawn by the LNA is monitored for fault indication and overcurrent protection.

If the current drawn by the LNA exceeds the specified maximum, the supply will automatically switch off, and an LNA fault will be indicated.

To reset the LNA supply overcurrent protection and the resulting fault condition locally:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ If the **POWER** switch on the converter is set to ON, switch the **POWER** switch on the converter to STANDBY then back to ON.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To reset the LNA supply overcurrent protection and the resulting fault condition via a remote control facility:

- ❑ Either:
  - set the remote serial interface system on command from on to standby, then back to on (see page 8-29, *Control commands*), or
  - set the remote opto-isolated System On input from on to standby, then back to on (see page 6-16, *Monitor and control interface*)

For further information on faults, see Chapter 9, *Maintenance and fault finding*.

Transceiver output level (5760/5712H SSPAs only)

The output level of the transceiver is dependent on the input level to the transceiver, the transmit attenuation setting of the converter and the gain setting of the SSPA. The SSPA is supplied with the RF gain adjust set to –10.0 dB. It is recommended that this setting is maintained, and transceiver gain adjustments made by using the converter transmit attenuation control.

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

Peak power levels of a modulated RF input, such as QPSK, will drive the SSPA of the transceiver into saturation when the total output power of the modulated signal approaches the 1 dB compression point. This excessive drive level will initially cause a reduction in the life of the active amplifying devices and eventually result in a total failure of these devices.

To avoid causing damage to the SSPA, a modulated input to the SSPA must never exceed the level required to drive the average output higher than 2 dB below the stated 1 dB compression point. For QPSK modulated input signals, it is recommended that a total OPBO of at least 2 dB be applied. Thus, for a single QPSK carrier, the OPBO required is 2 dB, for two QPSK carriers the OPBO would be 5 dB per carrier, and so on for larger numbers of carriers.

For single QPSK or multiple carrier applications, higher OPBO will be needed to meet intermodulation distortion emission requirements.

For CW and FM signals, the amplifier may be safely operated continuously at the 1 dB compression point.

Activating/inhibiting the solid state power amplifier

To activate the SSPA locally:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Switch the **SSPA** switch on the converter to ACTIVATE.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To activate the SSPA via a remote control facility:

- ❑ Either:
  - use the SSPA activation command via the remote serial interface (see page 8-29, *Control commands*), or
  - set the remote opto-isolated Req SSPA Activate input to on (see page 6-16, *Monitor and control interface*)

  There should be no inhibit control, command or input set to on.

For CE compliance, the SSPA must be activated via the remote serial interface. The **SSPA** switch on the converter must be set to REMOTE and the remote opto-isolated Req SSPA Activate input must be off.

When operating in CE compliant mode (i.e. **SPU1**), an **SPA1** command must be sent to the converter to re-activate the SSPA after power on.

When the SSPA is activated, the **SSPA ON** LED on the converter should be on.

To inhibit the SSPA locally:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Switch the **SSPA** switch on the converter to INHIBIT.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To inhibit the SSPA via a remote control facility:

- ❑ Either:
  - use the SSPA inhibit command via the remote serial interface (see page 8-29, *Control commands*), or
  - set the remote opto-isolated SSPA Inhibit input to on (see page 6-16, *Monitor and control interface*)

The SSPA will be inhibited from activation by either an SSPA fault or a temperature fault.

An SSPA temperature fault condition resets itself and the SSPA module is re-activated automatically when the SSPA has cooled down.

A fan fault does not prevent the SSPA from being switched on.

The SSPA must be activated for the transceiver to determine if the SSPA is operating correctly. If an SSPA fault exists after you activate the SSPA, the fault indication will remain until the SSPA fault has been reset.

To reset an SSPA fault condition locally:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.
- ❑ Either:
  - switch the **SSPA** switch on the converter to INHIBIT then back to REMOTE or ON, or
  - switch the **POWER** switch on the converter to STANDBY then back to ON
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To reset an SSPA fault condition via a remote control facility:

- ❑ Do one of the following:
  - set the SSPA inhibit command to on, and then off (see page 8-29, *Control commands*), or
  - set the remote opto-isolated SSPA Inhibit input to on, and then to off (see page 6-16, *Monitor and control interface*), or
  - set the remote serial interface system on command from on to standby, and then to on (see page 8-29, *Control commands*), or
  - set the remote opto-isolated System On input from on to standby, then back to on (see page 6-16, *Monitor and control interface*)

If you disconnect the SSPA from the converter, the SSPA and temperature fault conditions are indicated at the converter.

For information on fault conditions in the 5760/5712H SSPA, their causes and how to reset the alarms, see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*.

Fan operation (5710/5720/5730/5740 SSPAs only)

The fan operates whenever the SSPA is activated. If the SSPA is not activated, the transceiver is unable to determine if the fan has failed.

A fan fault is indicated when the SSPA is activated and the fan is not operating. When a fan fault has been detected, the **FAN FAULT** LED remains on irrespective of whether or not the SSPA module is activated.

The supply voltage to the fan is still present when a fan fault is indicated and the SSPA is activated.

To reset a fan fault condition locally:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.

  Either:

  - switch the **SSPA** switch on the converter to INHIBIT then back to REMOTE or ON, or
  - switch the **POWER** switch on the converter to STANDBY then back to ON

- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

To reset a fan fault condition via a remote control facility:

- ❑ Do one of the following:
  - set the SSPA inhibit command to on, and then off (see page 8-29, *Control commands*), or
  - set the remote opto-isolated SSPA Inhibit input to on, and then to off (see page 6-16, *Monitor and control interface*), or
  - set the remote serial interface system on command from on to standby, and then to on (see page 8-29, *Control commands*), or
  - set the remote opto-isolated System On input from on to standby, then back to on (see page 6-16, *Monitor and control interface*)

Serial interface monitor and control

To view or change the operating parameters of the transceiver, the transceiver must be connected to one of the following:

- a Hand-Held Controller 5560
- a Remote Controller 5570
- a terminal (such as a dedicated terminal, personal computer, laptop or organiser emulating a terminal)

The remote controller and terminal options provide extensive monitoring capabilities.

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

The Hand-Held Controller 5560 or the Remote Controller 5570 provide the simplest and most convenient way to set the parameters of the transceiver. For details of how to use the Hand-Held Controller 5560 or the Remote Controller 5570, see the user guides for these items of equipment.

For users who do not have one of the controllers mentioned above, see page 8-15, *ASCII protocol* and page 8-21, *Operating commands*. These sections provide the relevant operating details for a PC or terminal.

To establish communications between the PC and the transceiver, follow the steps on page 7-14, *Serial interface control during setup*.

For more advanced remote control applications, see page 8-16, *Packet protocol*.

The transceiver is monitored and controlled using 3-letter operating commands, followed by data if required. These commands are described on page 8-21, *Operating commands*.

The commands described are used exactly as shown when using ASCII protocol. When using packet protocol, the commands are embedded within the packet structure. Note that not all commands are available with packet protocol. For more information on packet protocol, see page 8-16, *Packet protocol*.

Protocol formats

ASCII protocol

The ASCII protocol allows control and monitoring of the transceiver from a simple ASCII terminal (or a PC emulating a terminal).

When using ASCII protocol, the transceiver sends a prompt when first powered up and then after each command has been processed.

The prompt consists of four components:

(CR) (LF) > (SP), where

CR = carriage return

LF = line feed character

SP = space character

To send a command:

- ❑ Type the 3-letter command, and if using the set parameter commands, the command data (see page 8-21, *Operating commands*).

  Use the backspace key to delete characters if required.

- ❑ Press **Enter** or **Return**.

The transceiver ensures that a carriage return character is always followed by a line feed character, whether sent by the terminal or not. This procedure prevents overwriting previous data on the terminal display.

If an invalid command or data item is received by the transceiver, an error response is sent and is immediately followed by a prompt sequence.

Error responses

After the transceiver has received a command, it makes the following checks before the command is performed.

- The transceiver checks that the 3-letter command received corresponds to a defined command. If the command is not valid, the error message ‘`***No such command!`’ is displayed.
- The transceiver checks any extra data associated with the command for validity. If the data is not valid, the error message ‘`***Invalid command data!`’ is displayed.
- For some commands, the transceiver checks to ensure the operation is allowed. Some commands are not allowed because of the way the transceiver has been set up. When an error of this type is detected, the error message ‘`***Command not allowed!`’ is displayed.

Packet protocol

This section provides details of the Codan packet protocol. For information on other packet protocol modes, contact your Codan representative.

The packet protocol allows up to 126 devices to be addressed. The transceiver only responds to commands containing its own address or a global address of 127. The address 0 is reserved for the bus controller.

All data transfers on the bus are in the form of predefined packets. Each packet consists of:

- a start character
- a byte count
- an address byte
- a control byte
- command bytes
- data bytes (if applicable)
- a checksum byte
- an end character

Packets must be received by the transceiver in the order listed above. Packets that do not comply with this structure are ignored.

Packets sent from the bus controller to slave devices, such as the transceiver, may request an acknowledgment from the addressed device. The acknowledgment provides the controller with an indication that the command and data (if required) were accepted by the slave device.

The protocol allows for 7-bit or 8-bit characters, with or without parity.

All packets may have a maximum total length of 127 characters/bytes. Packets longer than this length are ignored.

Packet structure

Start character

The start character must be the ASCII STX (Hex 02) character.

Byte count

The byte count character is a binary representation of the total number of characters in the packet. The minimum value is 6 (i.e. no command or data characters) and the maximum value is 127.

Address byte

For controller to slave communications, the address character will be a binary representation of the destination device address as follows:

Bit No.	Function
0	LSB — Device address
1	
2	
3	
4	
5	
6	MSB — Device address
7	Only sent if 8 data bits are selected. It is used to calculate the complete address.

For slave to controller communications, a device address of zero is used.

Control byte

For controller to slave communications, the control byte will have bits 1 to 6 set to 0 (and bit 7 if 8 data bits are selected). Bit 0 will only be set to 1 if the controller requires an acknowledgment from the slave.

For the slave to controller communications, bits 0 to 5 are set to 0 (and bit 7 if 8 data bits are selected) and bit 6 is set to 1.

Command bytes

The command bytes consist of a 3-letter command mnemonic unique to the command being sent.

Data bytes

The data bytes depend on the command being sent. Not all commands require data characters.

Checksum

The checksum is used for error detection within a packet. It is calculated as the modulo 128 sum of packet bytes (before the addition of parity if selected) from the address byte to the last data byte inclusive. Packets failing the checksum tests are ignored.

End character

The end character is the ASCII ETX (Hex 03) character.

Synchronisation

The start (STX) and end (ETX) characters are used for message synchronisation and help the converter re-acquire lost synchronisation.

The message protocol is structured such that the STX and ETX characters (Hex 02 and 03 respectively) can never appear in any other part of the message apart from in the address and checksum bytes.

If the STX character is received for any byte other than the address or checksum, the converter terminates reception and interpretation of the current message and assumes that a new message has begun. Similarly, if an ETX character is received for any byte other than the address or checksum, the converter terminates reception and interpretation of the current message and begins looking for the STX character again.

If a converter is *not* synchronised, several situations arise:

- The converter may receive a checksum of 02 Hex, which it interprets as a start character. It will then immediately receive 03 Hex, which it interprets as the byte count. Since the byte count cannot be less than 6, the converter aborts receiving the message and begins looking for the start character (STX, 02) again.
- If the converter interprets an address of 02 Hex as a start character, it will interpret the next byte (the control byte) as the byte count. It will then attempt to interpret the following characters as the remainder of the message. It is unlikely that a valid message will be seen because:
    - the address byte may not match the converter address
    - the actual message ETX character will terminate the message before the correct byte count is reached
    - the byte count will be reached before the ETX character is received
    - even if the byte count and ETX correspond, the checksum probably will not
    - the command and data bytes will probably not represent a valid command
- If the converter interprets either an address or checksum of 03 Hex as an end character, it will cease receiving the message and begin looking for the next start (STX) character. This will correspond to the start of the next valid message and the converter will then be correctly synchronised.

Multiple ETX bytes can be sent by the controller to force an unsynchronised converter to synchronise. The converter then begins looking for the STX start character.

If the converter does not receive either the STX or ETX bytes, it discards the message and does not respond.

Commands not available with packet protocol

The following commands cannot be used when using packet protocol:

- Help commands
- View commands
- Logging commands
- the set echo command
- the set packet address range command
- the set packet protocol command
- the output packet address command
- the output packet address range command

If you attempt to use any of the commands listed above with a packet protocol, you will receive an error message saying that the command is not allowed.

The echo and all log status settings are set to off when the packet protocol is selected.

Acknowledgment messages

If a valid command is received that requires only an acknowledgment message to be returned, an empty packet (i.e. no command or data bytes) is returned.

If an acknowledgment is requested with the reset command (**RST**), an empty packet is returned to the controller before the command is executed.

Error responses listed in Table 8-2 are sent only if a command error occurred in the last packet, and if an acknowledgment was requested in that packet (as indicated by the appropriate bit in the control byte).

Table 8-2: Error responses

Error	**Means**
ER1	No such command
ER2	Invalid command data
ER3	Command not allowed

Operating commands

This section describes the format of commands and the response they produce. Descriptions given are based on using the ASCII protocol.

Commands consist of a 3-letter mnemonic, and command data in some cases. When required, command data may be either a single control parameter (0 or 1) or numerical data.

Generally, the first letter of the command determines the type of command (i.e. S = Set, H = Help, V = View, O = Output) and the last two letters uniquely define the command.

The transceiver is insensitive to the case of command text.

The information shown on the example screens is indicative only, and in some cases may depend upon the software version of the converter.

A summary of the commands covered in this chapter can be found in the appendix at the end of this manual.

Help commands

Help commands are not available if you are using packet protocol.

General help

The help commands provide on-screen information for all commands available with ASCII protocol.

To display all the help commands:

- ❑ Enter **HLP**. No data is required.

```
General Help (this Display)   > HLP
Control Commands              > HCC
Set Log Commands              > HLC
Set Fault enable Commands     > HFC
Set Parameter Commands        > HPC
View Commands                 > HVC
Output Commands               > HOC
>
```

Help for control commands

To display the commands and the command data for the major control functions of the transceiver:

- ❑ Enter **HCC**. No data is required.

```
System On               > SSOn n ==>  0 - Standby   1 - On
SSPA Activate           > SPAn n ==>  0 - Off       1 - On
SSPA Inhibit            > SPIn n ==>  0 - Off       1 - On
Reset Change Bits       > RCB[a]
Reset                   > RST
>
```

a. The **RCB** command is only available in software versions 1.30 or later.

Help for logging commands

To display the commands and the command data for the logging control of the transceiver:

- ❑ Enter **HLC**. No data is required.

```
Set Fault Logging          > SFLn n ==> 0 - Disabled ; 1 - Enabled
Set Status Logging         > SSLn n ==> 0 - Disabled ; 1 - Enabled
Set Lock status Logging    > SLLn n ==> 0 - Disabled ; 1 - Enabled
Set Temperature Logging    > STLn n ==> 0 - Disabled ; 1 - Enabled
>
```

Help for fault enable commands

To display the commands and the command data for the fault control of the transceiver:

- ❑ Enter **HFC**. No data is required.

```
Set LNA  Fault Enable     > SLEn n ==> 0 - Disabled ; 1 - Enabled
Set SSPA Fault Enable     > SPEn n ==> 0 - Disabled ; 1 - Enabled
Set Fan  Fault Enable     > SFEn n ==> 0 - Disabled ; 1 - Enabled
>
```

Help for set parameter commands

To display the commands and the command data for the parameter settings of the transceiver:

- ❑ Enter **HPC**. No data is required.

```
Set echo               > SECn n ==> 0 - Off     ; 1 - On
Set Ref Override       > SROn n ==> 0 - Off     ; 1 - On
Set Impedance          > SIMn n ==> 0 - 50      ; 1 - 75
Set IF Frequency       > SIFn n ==> 0 - 70      ; 1 - 140
Set Conv Comp Type     > SCTn n ==> 0 - Standard; 1 - Custom
Set SSPA Comp Type     > SPTn n ==> 0 - Off
                                    1-3 - Custom 1-3
                                    4 - 5705    -  5W
                                    5 - 5710    - 10W
                                    6 - 5720-40 - 20W-40W
Set SSPA Mode          > SPMn n ==> 0 - Extended   ; 1 - Basic
Set Tx Frequency       > STFnnnn  5850 <=nnnn<= 6425[a]
Set Rx Frequency       > SRFnnnn  3625 <=nnnn<= 4200[a]
Set Tx Attenuation     > STAnn    0 <=nn<= 30
Set Rx Attenuation     > SRAnn    0 <=nn<= 30
Set Cable Compensation > SCCnn    0 <=nn<= 15
Set Address Range      > SARn n ==> 0 -  0 to 31
                                    1 - 32 to 63
                                    2 - 64 to 95
                                    3 - 96 to 127
Set Packet Protocol[b]   > SPPn n ==> 0 - Codan
                                    1-3 - Mode 1-3
Set Power Up[c]          > SPUn n ==> 0 - Last State ; 1 - Transmit off
>
```

a. The frequency limits displayed depend on the frequency band option of the converter.
b. The **SPP** command is only shown in software versions 1.30 or later.
c. The **SPU** command is only shown in software versions 3.00 or later.

Help for view commands

To display the commands for viewing the various parameter settings and status information of the transceiver:

- ❑ Enter **HVC**. No data is required.

```
View Fault Status         > VFS
View Parameter Settings   > VPS
View Control Status       > VCS
View System Status        > VSS
View Lock Status          > VLS
View Identify information > VID
View Table Data           > VTD
View System Temperature   > VST
>
```

Help for output parameter commands

To display the commands for outputting individual parameter settings and status information of the transceiver:

- ❑ Enter **HOC**. No data is required.

```
Output System On         > OSO  Output Identification     > OID
Output SSPA Activate     > OPA  Output Echo               > OEC
Output SSPA Inhibit      > OPI  Output Ref. Override      > ORO
Output Conv Comp Type    > OCT  Output Temperature Conv   > OTC
Output SSPA Comp Type    > OPT  Output Temperature SSPA   > OTP
Output LNA  Fault Enable > OLE  Output Fault   Status     > OFS
Output Fan  Fault Enable > OFE  Output Control Status     > OCS
Output SSPA Fault Enable > OPE  Output System  Status     > OSS
Output SSPA Mode         > OPM  Output Lock    Status     > OLS
Output Transmit Frequency> OTF  Output Transmit Attenuator> OTA
Output Receive Frequency > ORF  Output Receive  Attenuator> ORA
Output Cable Compensation> OCC  Output Fault       Logging> OFL
Output Impedance         > OIM  Output Status      Logging> OSL
Output IF Frequency      > OIF  Output Lock Status Logging> OLL
Output Address           > OAD  Output Temperature Logging> OTL
Output Address Range     > OAR[a] Output Packet Protocol    > OPP[a]
Output Identity Data     > OTD[b] Output Configuration Data > ODP[b]
Output Status Poll       > OSP[a] Output Device Type        > ODT[a]
Output Frequency Data    > OFD[b] Output Conv Serial no.    > OCN[b]
Output Power Up          > OPU[c]
>
```

a. The **OAR**, **OSP**, **OPP** and **ODT** commands are only shown in software versions 1.30 or later.
b. The **OTD**, **OFD**, **ODP**, **OCN** commands are only shown in software versions 2.00 or later.
c. The **OPU** command is only shown in software versions 3.00 or later.

View commands

View commands are not available if you are using packet protocol.

The view commands provide comprehensive information for:

- fault status
- operational status
- control status
- parameter settings
- temperature
- temperature compensation data

View fault status

To display the fault status of the transceiver:

❑ Enter **VFS**. No data is required.

```
--------Fault Status--------
Converter   :  OK
LNA         :  OK[a]
SSPA        :  OK[a]
Temperature :  OK[a]
Fan         :  OK[a]
----------------------------
>
```

a. Disabled faults will not be visible. If SSPA fault detection is disabled, then SSPA, fan and temperature faults are not displayed, SSPA activation is not possible and compensation for the SSPA is set to zero.

View parameter settings

The parameter settings are set via the serial interface of the converter. The actual transceiver state is dependent on the parameter settings, the control switch positions on the converter and the states of the contact closure inputs. Use the **VSS** command if you want to view the current transceiver state (see page 8-27, *View system status*).

To display the parameter settings of the transceiver:

- ❑ Enter **VPS**. No data is required.

```
---------------------Parameter Settings---------------------
System Command : Stand-By     Tx Freq    : 6125   Atten :  0
SSPA Activate  : Off          Rx Freq    : 3900   Atten :  0
SSPA Inhibit   : Off          Cable Comp : 0
Echo           : On           Impedance  : 50
Ref. Override  : Off          IF Freq    : 70
SSPA Mode      : Extended     Faults     : LNA  - Enable
SSPA Comp Type : 5710                     FAN  - Enable
Conv Comp Type : Standard                 SSPA - Enable
Packet Protocol: Codan        Packet addr: 1  (01H)
Power Up       : Last State[a]
------------------------------------------------------------
        For actual transceiver status use VSS command
------------------------------------------------------------
>
```

a. The power up parameter is only shown in software versions 3.00 or later.

View control status

To display the control switch positions and contact closure input states of the transceiver:

- ❑ Enter **VCS**. No data is required.

```
-------Control Status-------
Power Switch      : On
SSPA Switch       : Remote
H/W System On     : Off
H/W SSPA Activate : Off
H/W SSPA Inhibit  : Off
---------------------------
>
```

View system status

To display the system status of the transceiver:

- ❑ Enter **VSS**. No data is required.

```
----------------------System Status-----------------------
System     : On               SSPA : Off        Tx IF  : On
Summary SSPA Activate : Off   Enabled Logging : Faults - Off
Summary SSPA Inhibit  : Off                   Status - Off
Reference Osc.        : Warm                  Lock   - Off
                                              Temp.  - Off
-----------------------------------------------------------
>
```

View lock status

To display the lock status of the phase locked oscillators within the converter:

- ❑ Enter **VLS**. No data is required.

```
--------Lock Status---------
Rx LO            :   Locked
Tx LO            :   Locked
Rx Synthesiser 1 :   Locked[a]
Rx Synthesiser 2 :   Locked[a]
Tx Synthesiser 1 :   Locked[a]
Tx Synthesiser 2 :   Locked[a]
----------------------------
>
```

a. When the converter is fitted with a single synthesiser, only one set of synthesiser lock status information is displayed.

View identification information

To display the identification information of the converter:

- ❑ Enter **VID**. No data is required.

```
----------CODAN (C) - 5700 C-Band Converter Module----------
Software Part Number : 91-00069          Version :  1.62
Date of revision :  30th April 1999
Options : Band 2 / Narrow   Bandwidth / Dual     Synthesiser
-----------------------------------------------------------
>
```

View table data

To display the table data for temperature compensation within the converter:

- ❑ Enter **VTD**. No data is required.

```
SSPA Temp Comp Table          Conv Temp Comp Table
--------------------          --------------------
0    Off                      0   Standard
1    No Data                  1   No Data
2    No Data
3    No Data
4    5705
5    5710
6    5720-40
>
```

View system temperature

To display the temperature of the converter and the SSPA:

- ❑ Enter **VST**. No data is required.

```
SSPA Temperature[a] : 24  C   Converter Temperature : 22  C
>
```

a. SSPA temperature is not shown if the SSPA temperature compensation type is set to off (i.e. **SPT0**) or if the SSPA fault enable is set to disabled (i.e. **SPE0**).

When the high power transceiver is set up correctly, the SSPA temperature compensation type is set to off (i.e. **SPT0**) and the **VST** command will only display the converter temperature.

Control commands

The control commands control the major functions of the transceiver. They are used when control via the serial interface is required.

Set system on/off

The set system on/off command switches the transceiver on or off (to standby). For the command to be effective, the corresponding hardware input line must be in standby mode and the **POWER** switch on the control panel of the converter must be set to STANDBY.

To switch the system on or off:

- ❑ Enter **SSOn**, where

  n = 0 for off (standby), or
  1 for on

If the installation does not require this control, it is recommended that the parameter is set to standby mode to provide full control via the hardware line and switch.

SSPA activate on/off

The SSPA activate on/off command controls the state of the SSPA depending on other associated inputs and controls. For the command to be effective:

- the corresponding hardware input line must be in the off mode
- the **SSPA** switch on the control panel of the converter must be set to REMOTE
- all inhibit inputs and controls must be off

To switch the SSPA activate control on or off:

- ❑ Enter **SPAn**, where

  n = 0 for off (not activated), or
  1 for on (activated)

If the installation does not require this control, it is recommended that the parameter is set to off to provide control via the hardware line and switch.

SSPA inhibit on/off

The SSPA inhibit on/off command can override the activate inputs and controls, thus inhibiting transmission from the SSPA. The control is effective irrespective of the setting of all other associated hardware input lines and the position of the **SSPA** switch on the control panel of the converter.

To switch the SSPA inhibit on or off:

- ❑ Enter **SPIn**, where

  n = 0 for off (not inhibited), or
  1 for on (inhibited)

If the installation does not require this control, it is recommended that the parameter is set to off to provide control via the associated hardware lines and switches.

Reset change bits

This command is only available with converter software versions 1.30 or later.

The reset change bits command is used after the output status poll command to reset all three change bits to the ‘no change’ state (i.e. 0).

To reset the change bits:

- ❑ Enter **RCB**. No data is required.

Reset

The reset command resets the controlling functions of the microprocessor within the converter. It has the same effect as switching the converter off then on again.

To reset the converter:

- ❑ Enter **RST**. No data is required.

Set parameter commands

The set parameter commands are used to set the operating parameters of the transceiver.

Set power up

For CE compliance, the transceiver must be set up so that it does not enter the transmit on state (SSPA on) upon power up. The set power up command controls the SSPA state upon power up by exerting control over the operation of the **SPA** command.

To set the power up mode:

- Enter **SPUn**, where

  n = 0 to allow the SSPA to return to the state prior to power off, or
  1 to prevent a previous **SPA1** command from switching the SSPA on when the transceiver is powered on

Set echo

The set echo command is not available if you are using packet protocol.

The set echo command sets whether or not data from the terminal is echoed by the converter back to the terminal.

To switch the echo on or off:

- Enter **SECn**, where

  n = 0 for off (no echo), or
  1 for on (echo)

Set reference oscillator override

The set reference oscillator override command sets whether transmission from the converter during the reference oscillator warm-up period is inhibited (no override) or is allowed (override).

To switch the reference oscillator override on or off:

- Enter **SROn**, where

  n = 0 for off (no override), or
  1 for on (override)

Set impedance

The set impedance command sets the IF impedance of the converter.

To set the IF impedance of the converter:

- ❑ Enter **SIMn**, where

  n = 0 for 50 Ω IF impedance, or
  1 for 75 Ω IF impedance

Set intermediate frequency

The set intermediate frequency command sets the IF of the converter. This command is valid only when the converter is fitted with the narrow bandwidth option. Converters fitted with the wide bandwidth option can only operate at 140 MHz IF.

To set the IF of the converter:

- ❑ Enter **SIFn**, where

  n = 0 for 70 MHz IF, or
  1 for 140 MHz IF

Set converter temperature compensation type

The set converter temperature compensation type command selects the gain versus temperature compensation data for the converter. The normal setting is standard, however if custom temperature compensation data is loaded, select custom. You cannot select custom if there is no data loaded.

To set the converter temperature compensation type:

- ❑ Enter **SCTn**, where

  n = 0 for standard temperature compensation, or
  1 for custom temperature compensation

Set SSPA temperature compensation type

The set SSPA temperature compensation type command selects the gain versus temperature compensation data for the SSPA. The normal setting is 5705, 5710 or 5720/5730/5740. If custom temperature compensation data for your SSPA is loaded, select custom SSPA temperature compensation data. You cannot select custom if there is no data loaded.

To set up the high power transceiver system correctly, the SSPA temperature compensation type *must* be set to off.

To set the SSPA temperature compensation type:

- ❑ Enter **SPTn**, where

  n = 0 for off, 5760/5712H, or
  1 for custom 1, or
  2 for custom 2, or
  3 for custom 3, or
  4 for 5705, or
  5 for 5710, or
  6 for 5720/5730/5740

Set SSPA control mode

The set SSPA control mode command selects the SSPA control mode provided by the converter. Extended mode is used for 5705, 5710, 5720, 5730 and 5740 Codan SSPAs.

Basic mode is used for Codan high power SSPAs (see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*) and all vendor HPAs (SSPA or TWTA). This mode provides modified operating logic to interface with other HPAs. Consult your Codan representative if you have special requirements.

To set the SSPA control mode:

- ❑ Enter **SPMn**, where

  n = 0 for extended mode, or
  1 for basic mode

Table 8-3: SSPA control mode settings

SSPA	SSPA control mode	Setting
5705/5710/5720/5730/5740	Extended	0
5760/5712H	Basic	1
Non-Codan SSPA	Basic	1

Set transmit frequency

The set transmit frequency command sets the transmit frequency of the converter. The allowable ranges of frequency are dependent on the frequency band option of the converter, as shown in Table 8-4.

To set the transmit frequency:

- ❑ Enter **STFnnnn**, where nnnn is the transmit frequency in MHz.

Table 8-4: Transmit frequency ranges

Converter band option	Low limit inclusive (MHz)	High limit inclusive (MHz)
2	5850	6425
3	6725	7025
4	6425	6725[a]

a. For converters with software versions earlier than 1.62, the limit is 6700 MHz. The software version can be identified using the serial interface, hand-held or remote controller.

Set receive frequency

The set receive frequency command sets the receive frequency of the converter. The allowable ranges of frequency are dependent on the frequency band option of the converter, as shown in Table 8-5.

This command is not available when a single synthesiser option is fitted.

To set the receive frequency:

- ❑ Enter **SRFnnnn**, where nnnn is the receive frequency in MHz.

Table 8-5: Receive frequency ranges

Converter band option	Low limit inclusive (MHz)	High limit inclusive (MHz)
2	3625	4200
3	4500	4800
4	3400	3700[a]

a. For converters with software versions earlier than 1.62, the limit is 3675 MHz. The software version can be identified using the serial interface, hand-held or remote controller.

Set transmit attenuation

The set transmit attenuation command sets the transmit attenuation of the converter. The range is 0 to 30 dB in 1 dB steps.

No leading zero is required when entering a single-digit figure.

To set the transmit attenuation:

- ❑ Enter **STAn**, where $0 \leq n \leq 30$.

Set receive attenuation

The set receive attenuation command sets the receive attenuation of the converter. The range is 0 to 30 dB in 1 dB steps.

No leading zero is required when entering a single-digit figure.

To set the receive attenuation:

- ❑ Enter **SRAn**, where $0 \leq n \leq 30$.

Set cable compensation

For converters with a D prefix serial number fitted with software version 3.00 or later, a cable compensation facility is not provided and the **SCC** command has no effect.

The set cable compensation command sets the cable compensation of the converter. Setting 0 corresponds to no compensation; 15 corresponds to maximum compensation.

For information on cable compensation and the required setting, see Table 7-10 on page 7-24 for 70 MHz IF, or Table 7-11 on page 7-25 for 140 MHz IF.

No leading zero is required when entering a single-digit figure.

To set the cable compensation:

- ❑ Enter **SCCn**, where $0 \leq n \leq 15$.

Set packet address range

The set packet address range command is not available if you are using packet protocol.

The set packet address range command sets the address range for the packet address of the converter. The remainder of the address is set via the address switches on the control panel of the converter. The complete address may be calculated by adding 0, 32, 64 or 96 as appropriate to the address value set on the control panel switches.

To set the packet address range:

- ❑ Enter **SARn**, where

  n = 0 for 0 to 31 address range, or
  1 for 32 to 63 address range, or
  2 for 64 to 95 address range, or
  3 for 96 to 127 address range

Set packet protocol

This command is only available with converter software versions 1.30 or later.

The set packet protocol command is not available if you are using packet protocol.

The set packet protocol command sets the packet protocol to be used. To use the selected protocol the **ASCII/PKT** DIP switch on the control panel of the converter must be set to PKT.

To set the packet protocol:

- ❑ Enter **SPPn**, where

  n = 0 for Codan mode, or
  1 for packet protocol mode 1, or
  2 for packet protocol mode 2, or
  3 for packet protocol mode 3

Fault enable commands

The fault enable commands are used to enable or disable fault indications associated with modules other than the converter.

Set LNA fault enable

The set LNA fault enable command sets whether or not the LNA fault is monitored. The normal setting is enabled.

Select the disable setting if you are using an LNA with incompatible alarm outputs or when a separate LNA system is installed.

To set the LNA fault enable:

- ❑ Enter **SLEn**, where

  n = 0 for disabled, or
  1 for enabled

Set SSPA fault enable

The set SSPA fault enable command sets whether or not the SSPA and associated faults are monitored. The normal setting is enabled if you are using a Codan SSPA.

Select the disable setting if:

- you are using a basic SSPA with incompatible alarm outputs
- your installation uses an SSPA in which the alarms are not monitored by the converter

If you select the disable setting, this command automatically disables the monitoring of fan faults and sets the SSPA temperature compensation type to off.

If you disable the SSPA fault monitoring, the following functions are also disabled:

- SSPA fault monitoring
- temperature fault monitoring
- fan fault monitoring
- SSPA activation
- gain versus temperature compensation associated with the SSPA
- SSPA temperature monitoring

To set the SSPA fault enable:

- ❑ Enter **SPEn**, where

  n = 0 for disabled, or
  1 for enabled

Set fan fault enable

The fan fault enable command sets whether or not the fan fault is monitored. The setting should be disabled for SSPAs without a fan (such as the 5705) or SSPAs where the fan is not monitored by the converter (such as the 5760/5712H), and enabled for SSPAs with a compatible fan.

To set the fan fault enable:

- ❑ Enter **SFEn**, where

  n = 0 for disabled, or
  1 for enabled

Logging commands

Logging commands are not available if you are using packet protocol.

The logging commands control the four logging functions provided by the converter:

- fault status changes
- operational status changes
- temperatures of the converter and SSPA
- lock status changes

When fault logging is enabled, any enabled fault status changes will be displayed as they occur. Due to the significance of fault indications, the displayed fault information will be preceded by ‘##’.

When status logging is enabled, any control input or operational status changes will be displayed as they occur.

When temperature logging is enabled, the temperature of the SSPA and the converter will be displayed every five minutes. If the SSPA fault enable has been disabled, then only the converter temperature will be displayed.

When lock logging is enabled, any converter PLL lock status changes will be displayed as they occur.

Set fault logging

The set fault logging command sets whether or not the fault logging is enabled.

To set the fault logging:

- ❑ Enter **SFLn**, where

  n = 0 for disabled, or
  1 for enabled

Set status logging

The set status logging command sets whether or not the status logging is enabled.

To set the status logging:

- ❑ Enter **SSLn**, where

  n = 0 for disabled, or
  1 for enabled

Set lock status logging

The set lock status logging command sets whether or not the lock status logging is enabled.

To set the lock status logging:

- ❑ Enter **SLLn**, where

  n = 0 for disabled, or
  1 for enabled

Set temperature logging

The set temperature logging command sets whether or not the temperature logging is enabled.

To set the temperature logging:

❑ Enter **STLn**, where

n = 0 for disabled, or
1 for enabled

Output parameter commands

The output commands are used to display the following information about the transceiver:

- fault status
- operational status
- control status
- parameter settings
- temperature information

Output system on

To display the system on parameter setting:

❑ Enter **OSO**. No data is required.

The setting is displayed as either:

- 0 if the system on parameter is set to standby, or
- 1 if the system on parameter is set to on

Output SSPA activate

To display the SSPA activate parameter setting:

❑ Enter **OPA**. No data is required.

The setting is displayed as either:

- 0 if the SSPA activate parameter is set to off, or
- 1 if the SSPA activate parameter is set to on

Output SSPA inhibit

To display the SSPA inhibit parameter setting:

❑ Enter **OPI**. No data is required.

The setting is displayed as either:

- 0 if the SSPA inhibit parameter is set to off, or
- 1 if the SSPA inhibit parameter is set to on

Output converter temperature compensation type

To display the converter temperature compensation type setting:

❑ Enter **OCT**. No data is required.

The setting is displayed as either:

- 0 if the converter temperature compensation type is set to standard, or
- 1 if the converter temperature compensation type is set to custom

Output SSPA temperature compensation type

To display the SSPA temperature compensation type setting:

❑ Enter **OPT**. No data is required.

The setting is displayed as:

- 0 if the SSPA temperature compensation type is set to off, or
- 1 if the SSPA temperature compensation type is set to custom 1, or
- 2 if the SSPA temperature compensation type is set to custom 2, or
- 3 if the SSPA temperature compensation type is set to custom 3, or
- 4 if the SSPA temperature compensation type is set to 5705, or
- 5 if the SSPA temperature compensation type is set to 5710, or
- 6 if the SSPA temperature compensation type is set to 5720/5730/5740

For high power transceiver systems that are set up correctly, the output will be 0 indicating that the SSPA temperature compensation type is set to off.

Output LNA fault enable

To display the LNA fault enable parameter setting:

❑ Enter **OLE**. No data is required.

The setting is displayed as either:

- 0 if the LNA fault enable parameter is set to disabled, or
- 1 if the LNA fault enable parameter is set to enabled

Output fan fault enable

To display the fan fault enable parameter setting:

❑ Enter **OFE**. No data is required.

The setting is displayed as either:

- 0 if the fan fault enable parameter is set to disabled, or
- 1 if the fan fault enable parameter is set to enabled

For high power transceiver systems that are set up correctly, the output will be 0 indicating that the fan fault enable parameter is set to disabled.

Output SSPA fault enable

To display the SSPA fault enable parameter setting:

❑ Enter **OPE**. No data is required.

The setting is displayed as either:

- 0 if the SSPA fault enable parameter is set to disabled, or
- 1 if the SSPA fault enable parameter is set to enabled

For high power transceiver systems that are set up correctly, the output will be 1 indicating that the SSPA fault enable parameter is set to enabled.

Output SSPA control mode

To display the SSPA control mode setting:

❑ Enter **OPM**. No data is required.

The setting is displayed as either:

- 0 if SSPA control mode is set to extended, or
- 1 if SSPA control mode is set to basic

For high power transceiver systems that are set up correctly, the output will be 1 indicating that SSPA control mode is set to Basic.

Output transmit frequency

To display the transmit frequency of the converter:

❑ Enter **OTF**. No data is required.

The transmit frequency of the converter is displayed in MHz with four numeric characters.

Output receive frequency

To display the receive frequency of the converter:

❑ Enter **ORF**. No data is required.

The receive frequency of the converter is displayed in MHz with four numeric characters.

Output cable compensation

For converters with a D prefix serial number fitted with software version 3.00 or later, a cable compensation facility is not provided and the **OCC** command always returns a value of 0.

To display the cable compensation of the converter:

❑ Enter **OCC**. No data is required.

The cable compensation is displayed as one or two numeric characters.

Output impedance

To display the IF impedance setting of the converter:

❑ Enter **OIM**. No data is required.

The setting is displayed as either:

- 0 if the IF impedance is set to 50 Ω, or
- 1 if the IF impedance is set to 75 Ω

Output IF

To display the IF setting of the converter:

❑ Enter **OIF**. No data is required.

The setting is displayed as either:

- 0 if the IF is set to 70 MHz, or
- 1 if the IF is set to 140 MHz

Output packet address

The output packet address command is not available if you are using packet protocol.

To display the packet address setting:

❑ Enter **OAD**. No data is required.

The address is displayed as up to three numeric characters representing the converter's packet address setting. The address is determined by the set packet address range command and the packet address DIP switches on the control panel of the converter.

Output packet address range

This command is only available with converter software versions 1.30 or later.

The output packet address range command is not available if you are using packet protocol.

To display the packet address range setting:

- ❑ Enter **OAR**. No data is required.

  The setting is displayed as:

  - 0 if the packet address range is 0 to 31, or
  - 1 if the packet address range is 32 to 63, or
  - 2 if the packet address range is 64 to 95, or
  - 3 if the packet address range is 96 to 127

Output power up

This command is only available with converter software versions 3.00 or later.

To display the power up mode setting:

- ❑ Enter **OPU**. No data is required.

  The setting is displayed as either:

  - 0 if the power up mode is set to last state, or
  - 1 if the power up mode is set to transmit off

Output all identity data

This command is only available for converter software versions 2.00 or later.

To display all the identity data for the transceiver on one line:

- Enter **OTD**. No data is required.

  All the identity data of the transceiver is displayed on one line across the screen. The output converter identity data (**OID**) is displayed first, followed by the output converter serial number (**OCN**). Each parameter is separated by a '|' character (ASCII code 124 decimal, 7C hex). The parameters displayed have the same format and values as specified for the individual commands. The multiline outputs of the **OID** command are displayed on one line as separate parameters (i.e. each line of data is separated by a '|').

  Example:

```
5700|91-00161|2.03  |15th Nov 2000
|Narrow|Single|C0231
```

Output status poll

This command is only available with converter software versions 1.30 or later.

To display whether or not a change has occurred in the fault, control or system status of the transceiver:

- Enter **OSP**. No data is required.

  The status poll is displayed as one numeric character indicating whether or not a change has occurred in the fault, control or system status of the transceiver. This is based on the sum of the following values:

Fault	0 = No change	1 = Change
Control	0 = No change	2 = Change
System	0 = No change	4 = Change

  For example, an output of 0 indicates that no change has occurred; an output of 6 indicates that a change has occurred in the control status and the system status.

The functions associated with Fault are:

- Converter fault
- LNA fault
- SSPA fault
- Temp fault
- Fan fault[1]

The functions associated with Control are:

- Power switch
- SSPA Activate switch
- SSPA Inhibit switch
- H/W System On
- H/W SSPA Activate
- H/W SSPA Inhibit

The functions associated with System are:

- System On
- Summary SSPA Activate
- Summary SSPA Inhibit
- SSPA On
- Tx IF
- Reference Oven

Use the associated **OFS**, **OCS** or **OSS** output commands for more information on the status of the transceiver.

To reset the status poll output to the ‘no change’ state:

❑ Enter **RCB** (reset change bits command). No data is required.

1. If the high power transceiver is set up correctly, fan faults are *not* reported and will not set the Fault bit.

Output converter serial number

This command is only available for converter software versions 2.00 or later.

To display the serial number of the converter:

- ❑ Enter **OCN**. No data is required.

```
C0231
>
```

Output identification information

To display the identification information for the transceiver:

- ❑ Enter **OID**. No data is required.

  The following information will be displayed separated by line feeds:

  - header (e.g. ‘5700’)
  - firmware part number
  - firmware revision number
  - date of revision
  - filter option
  - synthesiser option

```
5700
91-00161
2.03
15th Nov 2000
Narrow
Single
>
```

Output echo

To display the echo parameter setting:

- ❑ Enter **OEC**. No data is required.

  The setting is displayed as either:

  - 0 if the echo parameter is set to off, or
  - 1 if the echo parameter is set to on

Output reference oscillator override

To display the reference oscillator override parameter setting:

❑ Enter **ORO**. No data is required.

The setting is displayed as either:

- 0 if the reference oscillator override parameter is set to off (inhibit transmission), or
- 1 if the reference oscillator override parameter is set to on (enable transmission)

Output temperature converter

To display the temperature of the converter:

❑ Enter **OTC**. No data is required.

The temperature is displayed in degrees Celsius.

Output temperature SSPA

This command is only available if the SSPA temperature compensation is not set to off (see page 7-22, *SSPA temperature compensation type*).

If the high power transceiver system is set up correctly, this command is *not* available as the SSPA temperature compensation must be set to off (see page 7-22, *SSPA temperature compensation type*). To set up the transceiver correctly, see Chapter 7, *Setting up the transceiver*.

To view the temperature of a 5760/5712H SSPA, use the SSPA Manager software to navigate to the appropriate SSPA menu (see the *C-Band and Ku-Band Hub-mount SSPAs 5760/5712H and 5940 Reference Manual*).

To display the temperature of a 5705/5710/5720/5730/5740 SSPA:

❑ Enter **OTP**. No data is required.

The temperature is displayed in degrees Celsius.

Output fault status

To display the overall fault status of the transceiver:

- ❑ Enter **OFS**. No data is required.

  The fault status is displayed as one or two numeric characters representing the overall fault status of the transceiver based on the sum of the following values:

Conv Fault	0 = OK	1 = Fault
LNA Fault	0 = OK	2 = Fault
SSPA Fault	0 = OK	4 = Fault
Temp Fault	0 = OK	8 = Fault
Fan Fault[a]	0 = OK	16 = Fault

a. If the high power transceiver is set up correctly, a fan fault will not be displayed when using this command.

  For example, an output of 0 indicates that there are no faults; an output of 3 indicates there is an LNA fault and a converter fault.

Output control status

To display the control status of the transceiver:

- ❑ Enter **OCS**. No data is required.

  The control status is displayed as one or two numeric characters representing the control status of the transceiver based on the sum of the following values:

Power switch	0 = Standby	1 = On
SSPA switch Activate	0 = Not activated	2 = Activated
SSPA switch Inhibit	0 = Not inhibited	4 = Inhibited
H/W System On	0 = Standby	8 = On
H/W SSPA Activate	0 = Not activated	16 = Activated
H/W SSPA Inhibit	0 = Not inhibited	32 = Inhibited

  For example, an output of 2 indicates that the **SSPA** switch is set to ACTIVATE; an output of 10 indicates that the **SSPA** switch is set to ACTIVATE and the H/W system input is on.

Output system status

To display the system status of the transceiver:

- ❑ Enter **OSS**. No data is required.

  The system status is displayed as one or two numeric characters representing the system status of the transceiver based on the sum of the following values:

System On	0 = Standby	1 = On
Summary SSPA Activate	0 = Not activated	2 = Activated
Summary SSPA Inhibit	0 = Not inhibited	4 = Inhibited
SSPA On	0 = Off	8 = On
Tx IF	0 = Off	16 = On
Reference oven	0 = Warming up	32 = Warm

  For example, an output of 59 indicates that the transceiver is on, SSPA is requested on, the SSPA is on, the Tx IF is on and the reference oscillator is warm.

Output lock status

To display the lock status of the PLLs in the converter (dual synthesiser):

- ❑ Enter **OLS**. No data is required.

  The lock status is displayed as one or two numeric characters representing the lock status of the PLLs in the converter based on the sum of the following values:

Tx Local Oscillator	0 = Locked	1 = Unlocked
Rx Local Oscillator	0 = Locked	2 = Unlocked
Tx Synthesiser 1	0 = Locked	4 = Unlocked
Tx Synthesiser 2	0 = Locked	8 = Unlocked
Rx Synthesiser 1	0 = Locked	16 = Unlocked
Rx Synthesiser 2	0 = Locked	32 = Unlocked

  For example, an output of 0 indicates that all PLLs are locked; an output of 2 indicates that the Rx LO is unlocked.

When the converter is fitted with a single synthesiser, the values for the Tx synthesisers are always 0 and the values for the Rx synthesisers are used to represent the single synthesiser 1 and 2 lock status.

Output transmit attenuation

To display the transmit attenuation of the converter:

❑ Enter **OTA**. No data is required.

The transmit attenuation of the converter is displayed in dB with one or two numeric characters.

Output receive attenuation

To display the receive attenuation of the converter:

❑ Enter **ORA**. No data is required.

The receive attenuation of the converter is displayed in dB with one or two numeric characters.

Output fault logging

To display the fault logging parameter setting:

❑ Enter **OFL**. No data is required.

The setting is displayed as either:

- 0 if the fault logging parameter is set to disabled, or
- 1 if the fault logging parameter is set to enabled

Output status logging

To display the status logging parameter setting:

❑ Enter **OSL**. No data is required.

The setting is displayed as either:

- 0 if the status logging parameter is set to disabled, or
- 1 if the status logging parameter is set to enabled

Output lock status logging

To display the lock status logging parameter setting:

❑ Enter **OLL**. No data is required.

The setting is displayed as either:

- 0 if the lock status logging parameter is set to disabled, or
- 1 if the lock status logging parameter is set to enabled

Output temperature logging

To display the temperature logging parameter setting:

- ❑ Enter **OTL**. No data is required.

  The setting is displayed as either:

  - 0 if the temperature logging parameter is set to disabled, or
  - 1 if the temperature logging parameter is set to enabled

Output packet protocol

This command is only available with converter software versions 1.30 or later.

To display the packet protocol mode setting:

- ❑ Enter **OPP**. No data is required.

  The setting is displayed as:

  - 0 if the packet protocol mode is set to Codan, or
  - 1 if the packet protocol mode is set to mode 1, or
  - 2 if the packet protocol mode is set to mode 2, or
  - 3 if the packet protocol mode is set to mode 3

Output configuration data

This command is only available for converter software versions 2.00 or later.

To display all the configuration data of the transceiver on one line:

- Enter **ODP**. No data is required.

  The configuration data of the transceiver is displayed on one line across the screen. Each parameter value is separated by a '|' character (ASCII code 124 decimal, 7C hex). The parameters displayed have the same format and values as specified for the individual output commands. The data is displayed in the following order:

  Output packet address (**OAD**)
  Output packet address range (**OAR**)
  Output cable compensation (**OCC**)
  Output converter temperature compensation type (**OCT**)
  Output echo command (**OEC**)
  Output fan fault enable (**OFE**)
  Output IF frequency (**OIF**)
  Output impedance (**OIM**)
  Output LNA fault enable (**OLE**)
  Output SSPA activate (**OPA**)
  Output SSPA fault enable (**OPE**)
  Output SSPA inhibit (**OPI**)
  Output SSPA control mode (**OPM**)
  Output packet protocol (**OPP**)
  Output SSPA temperature compensation type (**OPT**)
  Output receive attenuation (**ORA**)
  Output receive frequency (**ORF**)
  Output reference override (**ORO**)
  Output system on (**OSO**)
  Output transmit attenuation (**OTA**)
  Output transmit frequency (**OTF**)
  Output power up (**OPU**)[1]

  Example:

```
4|0|15|1|0|0|1|0|1|1|1|1|0|0|6|25|4200|1|1|25|6425|0|
```

1. The **OPU** command is only shown in software versions 3.00 or later.

Output device type

This command is only available with converter software versions 1.30 or later.

To display the converter type number and firmware version:

- Enter **ODT**. No data is required.

  The 4-digit converter type number is followed by the 3-digit firmware version number to two decimal places, e.g. 203 = 2.03.

```
5700203
>
```

Output compensation data

This command is only available with converter software versions 1.30 or later.

To display the names of the temperature compensation tables available for the converter and SSPA:

- Enter **OCD**. No data is required.

  The following information is displayed separated by line feeds.

  Converter compensation table names:

  - converter default compensation table name
  - custom converter compensation table name (‘No Data’ if data not loaded)

SSPA compensation table names:

- ‘Off’
- custom 1 SSPA compensation table name (‘No Data’ if data not loaded)
- custom 2 SSPA compensation table name (‘No Data’ if data not loaded)
- custom 3 SSPA compensation table name (‘No Data’ if data not loaded)
- ‘5705’
- ‘5710’
- ‘5720–5740’
- ‘No Data’ (reserved for future use)

```
Standard
5700DFLT
Off
No Data
No Data
No Data
5705
5710
5720-40
No Data
>
```

Output frequency data

This command is only available with converter software versions 1.30 or later.

To display the transmit and receive frequency ranges of the converter and the synthesiser step size:

- Enter **OFD**. No data is required.

  The following information is displayed separated by line feeds:

  - the maximum transmit frequency (MHz)
  - the minimum transmit frequency (MHz)
  - the maximum receive frequency (MHz)
  - the minimum receive frequency (MHz)
  - synthesiser step size (MHz)

```
6425
5850
4200
3675
1
>
```

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9 Maintenance and fault finding

This chapter describes the maintenance and fault finding requirements for the C-Band Transceiver 5700 series. It includes:

- safety precautions (9-2)
- how to maintain the solid state power amplifier fans (9-3)
- how to check the reference oscillator frequency (9-4)
- how to replace fuses (9-7)
- how to find faults in the transceiver (9-9)
- how to test the operation of the transceiver (9-27)

Precautions

DC supply

The 48 V DC input supply circuits of the transceiver are completely floating. Consequently, the power supply has separate 0 V input and 0 V output lines.

When servicing, take care not to short the 0 V input and 0 V output lines together, particularly when connecting test equipment.

Connections to power supplies

Many of the intermodule connectors carry DC supplies.

As a general rule, exposed connector pins do not carry DC supply voltages.

Care should be taken at all times to avoid short circuiting connector pins.

Non user-serviceable modules

Repair of the Up/Down Converter module 5700, 5705/5710/5720/5730/5740/5760/ 5712H SSPAs and the LNA requires specialised test equipment and tools.

If you find that any of these modules are faulty, return the module to Codan for repair.

Do not attempt to repair any module as you may cause further faults and void the manufacturer’s warranty.

Maintaining the solid state power amplifier fans

The SSPAs have one or two DC fans to cool the heatsinks. The fans blow air into the heatsink.

The fans should be replaced if they have failed, which is usually indicated by overtemperature warnings or if the bearings become noisy. If a fan needs to be replaced, it can be ordered from Codan.

Check the air passages on the SSPA fan and heatsink regularly for obstructions. This is necessary to ensure that the fan is able to supply adequate cooling to the SSPA.

If necessary, you can remove the fan shroud to clear the air passages or to replace a faulty fan.

A faulty fan may be replaced with the SSPA off or activated. If the SSPA is activated, the fan wires should be unsoldered from the feed-through terminals using a DC isolated soldering iron.

Ensure you do *not* short the feed-through terminals.

If the transceiver attempts to turn the fan on whilst it is disconnected, a fan fault will be indicated, but the transceiver will continue to operate. To reset this fault, see page 8-13, *Fan operation (5710/5720/5730/5740 SSPAs only)*.

Checking the reference oscillator frequency

Check the reference oscillator frequency every 1 to 2 years.

Because of the high frequency accuracy required, the frequency measurement equipment used for adjusting the reference oscillator of the transceiver must have an accuracy and resolution of 1×10^{-8} (e.g. 60 Hz in 6 GHz) or better.

Two techniques may be used to check the reference oscillator frequency indirectly:

- remote measurement
- local measurement

Remote measurement

Remote measurement is the preferred method for checking the reference oscillator frequency.

To check the frequency, transmit a test carrier from your satellite station and have its frequency checked at a major earth station equipped with the appropriate equipment (e.g. a spectrum analyser locked to a high stability frequency reference).

If you use this method, you must know the actual offset frequency of the satellite (it may be measured by the major earth station). You must also be sure that the modulator or signal generator generating the Tx IF input is accurate to within 10 Hz.

To provide voice communications between your station and the major earth station, an orderwire circuit or other communication channel is required.

Local measurement

If you want to use a local measurement method, measure the RF frequency of a test carrier at the **Tx RF O/P** of the converter with either:

- a high stability and high sensitivity frequency counter, or
- a spectrum analyser locked to a high stability reference

You must be sure that the modulator or signal generator generating the Tx IF input is accurate to within 10 Hz.

Adjusting the reference oscillator frequency

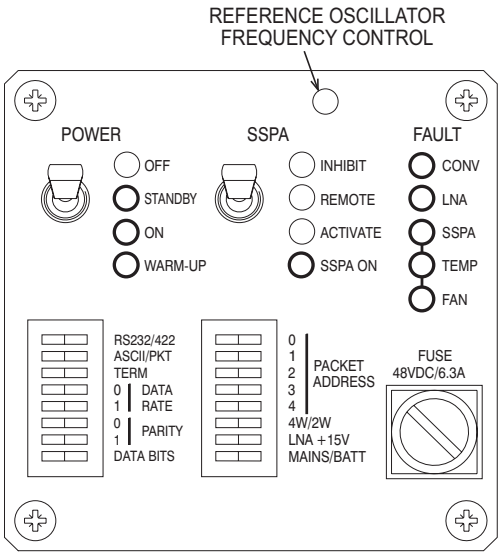
To obtain maximum frequency accuracy, adjust the reference oscillator only when it has been operating continuously for more than 24 hours.

To adjust the reference oscillator frequency:

- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.

  The adjustment screw is located at the top of the control panel as shown in Figure 9-1.

Figure 9-1: Reference oscillator adjustment



- ❑ If you are using the local measurement method, connect the frequency counter or the spectrum analyser to the **Tx RF O/P** connector.
- ❑ Measure the carrier frequency.
- ❑ Use a small flat-bladed screwdriver to adjust the frequency control a small amount.

  One turn changes the frequency by approximately 600 Hz at 6 GHz.

  Due to the use of different reference oscillators, the direction the reference oscillator frequency control must be rotated to increase or decrease the oscillator frequency may vary between converters.

- ❑ Re-measure the frequency and repeat the previous steps until the RF carrier is within ±30 Hz of the required frequency.

- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

Replacing fuses

Converter fuse

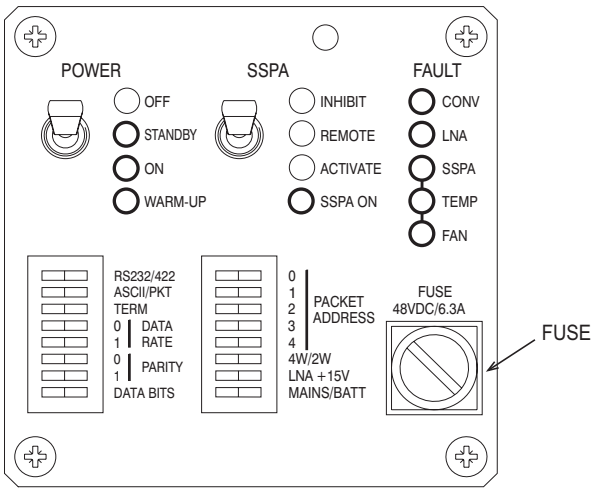
The converter has one M20 × 5 mm, 6.3 A fast blow fuse in the 48 V DC line. A shunt diode ensures that if reverse polarity is applied to the converter, the fuse will blow.

To replace the fuse:

- ❑ Switch off the 48 V DC supply.
- ❑ Use a 2.5 mm Allen key to remove the transparent cover on the control panel of the converter.

  The location of the fuse is shown in Figure 9-2.

Figure 9-2: Location of the fuse on the converter



- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn counter-clockwise. Remove the cap and fuse from the fuse holder.
- ❑ Replace the fuse with one of an equivalent rating as specified.
- ❑ Re-insert the fuse and cap into the fuse holder.
- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn clockwise. Ensure the cap is locked into position.
- ❑ Replace the transparent cover on the control panel of the converter.

When you are replacing the transparent cover, ensure the gasket is in place and that the screws are *not* overtightened.

Power supply unit fuse

The 5582B PSU has one M20 × 5 mm delay fuse in the AC mains line. The fuse fitted depends on your mains supply (see Table 9-1).

Table 9-1: Power supply fuses

Mains supply	Type
115 V AC	5 A/250 V Delay
230 V AC	2.5 A/250 V Delay

You may damage the PSU if an incorrect voltage selection is made or an incorrect fuse is used (see page 6-10, *Selecting the operating voltage and checking the fuse*).

To replace the fuse:

- ❑ Open the door of the PSU.
- ❑ Turn the AC supply off via the isolation switch.
- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn counter-clockwise. Remove the cap and fuse from the fuse holder.
- ❑ Replace the fuse with one of an equivalent rating as specified (see Table 9-1).
- ❑ Re-insert the fuse and cap into the fuse holder.
- ❑ Using a flat-bladed screwdriver, depress and rotate the cap of the fuse holder 1/8th of a turn clockwise. Ensure the cap is locked into position.
- ❑ Turn the AC supply on via the isolation switch.
- ❑ Close the door of the PSU.

Fault finding

The fault finding information provided in this section is designed to locate faulty modules and cables, and to determine if correct operating procedures have been followed. The fault finding process involves following fault finding diagnostic flow charts, which include simple test procedures.

If technical assistance is required...

If the fault finding procedures do not locate the faulty module or cable, or if further technical assistance is required for any other 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 9-2).

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 9-2.

Table 9-2: 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
UK, Europe and Middle East	+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.

Using the fault finding flow charts

To begin the fault finding process use Figure 9-3: Main fault diagnosis chart, to ascertain which module should be tested. Then follow the appropriate flow chart, Figures 9-4 to 9-13b, to determine the correct test procedures to follow. The tests indicated in the flow charts can be found at the end of this chapter on page 9-27. When an '*' appears in a flow chart, it indicates that you are to refer to either the relevant test or the relevant text in this chapter.

The flow charts assume that the remote control inputs are not used. To avoid confusion due to multiple control inputs, it is recommended that you do not have any equipment connected to the **MONITOR/CONTROL** connector of the converter.

You should be able to locate simple faults with minimal test equipment. The most effective technique when dealing with complex faults is to substitute modules.

During fault finding or performance testing, disconnect the Tx IF signal and/or terminate the SSPA output into a suitable rated dummy load. This will ensure that unwanted signals are not transmitted.

Cable wiring diagrams are included in Chapter 10, *Drawings* to allow you to check the integrity of interconnecting cables. Internal fault signalling is fail-safe (a fault is indicated if a unit is disconnected).

Power supply fault

If you have a power system fault and your system is a DC supply configuration, see Figure 9-4: DC power supply system fault diagnosis chart.

If your system is an AC supply configuration with a Codan power supply, see Figure 9-5: AC power supply (5582B) system fault diagnosis chart.

If your system uses a 5760/5712H SSPA, see Figure 9-6: 5760/5712H SSPA supply system fault diagnosis chart.

Low noise amplifier fault

If you have an LNA fault and your LNA is powered via the **Rx RF I/P** connector and coaxial cable, see Figure 9-12a and Figure 9-12b: LNA fault diagnosis chart A.

If your LNA is powered via the **LNA DC/ALARM** connector, see Figure 9-13a and Figure 9-13b: LNA fault diagnosis chart B.

Solid state power amplifier fault

When checking for faults causing no SSPA output power, note that the following events inhibit transmission:

- the warm-up period has not yet expired (when the reference oscillator override is not selected)
- the **SSPA** switch on the control panel of the converter is set to INHIBIT
- an external inhibit input is present
- the set SSPA inhibit parameter is set to on
- an SSPA fault has been detected
- an SSPA temperature fault has been detected
- a converter fault has been detected in the transmit path

If a low power SSPA fault is indicated, see Figure 9-7: 5705/5710/5720/5730/5740 SSPA fault diagnosis chart.

If a high power SSPA fault is indicated, see Figure 9-8: 5760/5712H SSPA fault diagnosis chart.

If a low power SSPA temperature fault is indicated, see Figure 9-10a and Figure 9-10b: 5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart.

If a high power SSPA temperature fault is indicated, see Figure 9-11: 5760/5712H SSPA temperature fault diagnosis chart.

Figure 9-3: Main fault diagnosis chart

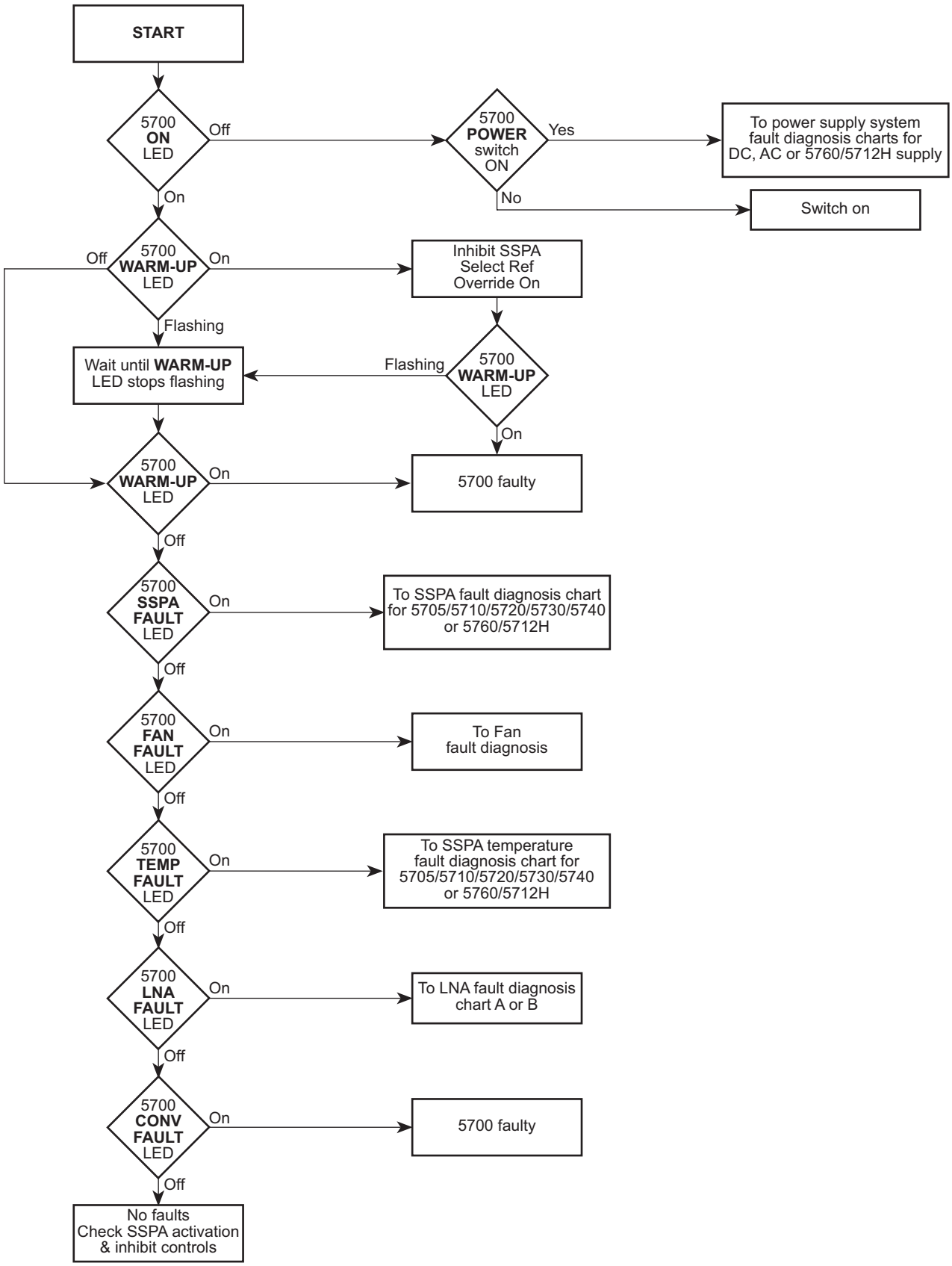


Figure 9-4: DC power supply system fault diagnosis chart

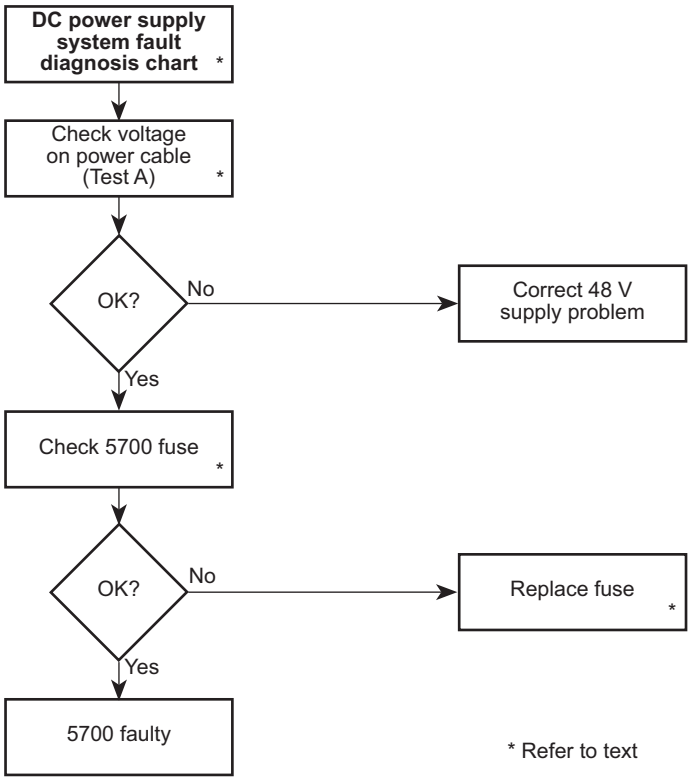


Figure 9-5: AC power supply (5582B) system fault diagnosis chart

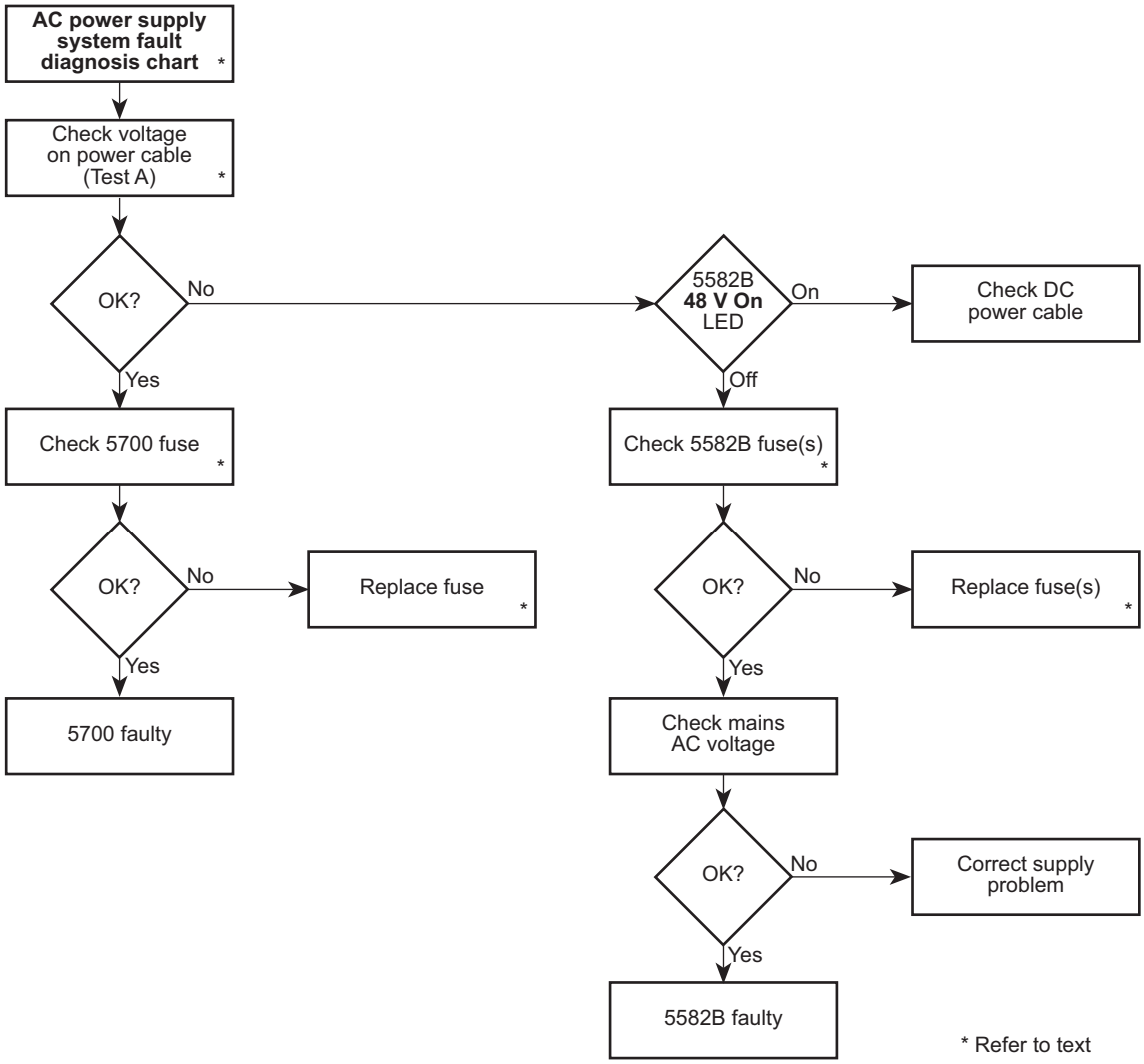


Figure 9-6: 5760/5712H SSPA supply system fault diagnosis chart

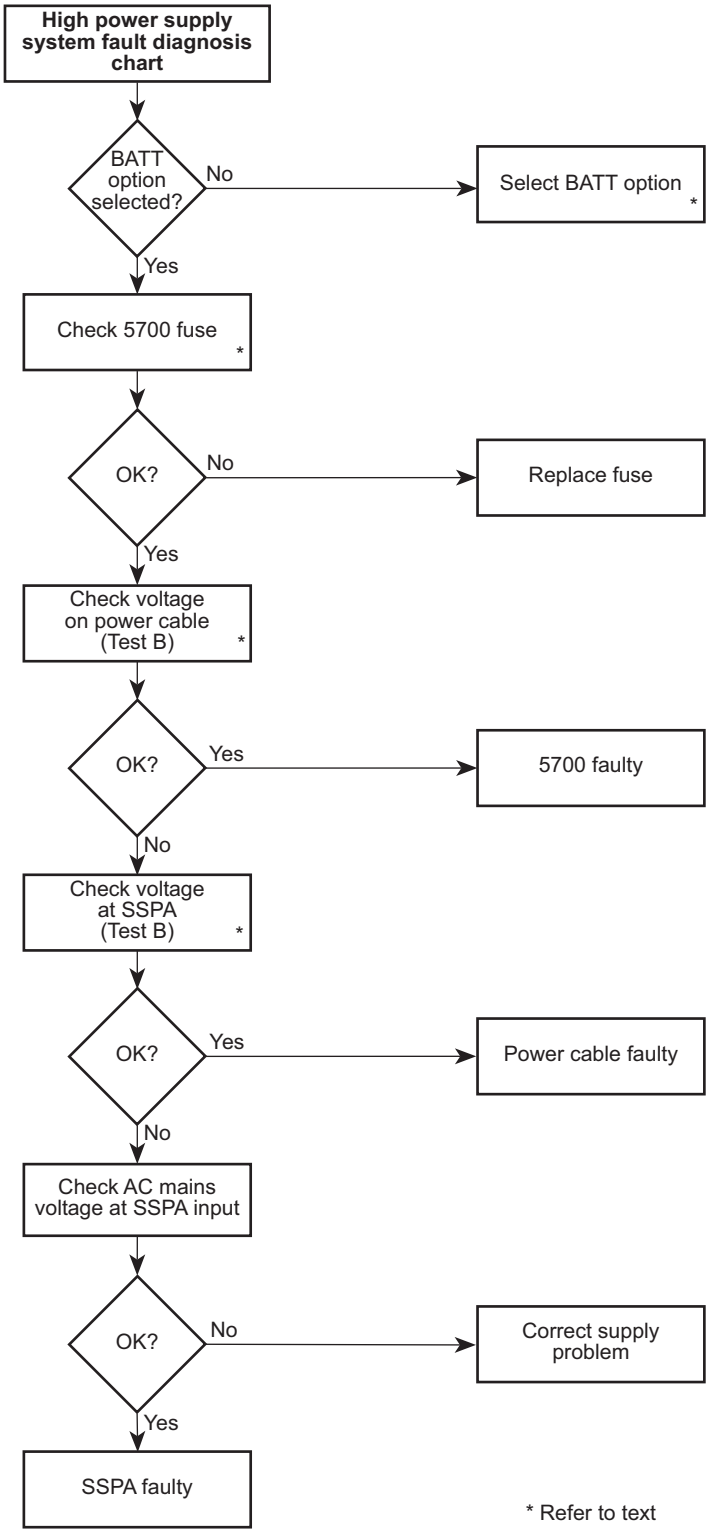


Figure 9-7: 5705/5710/5720/5730/5740 SSPA fault diagnosis chart

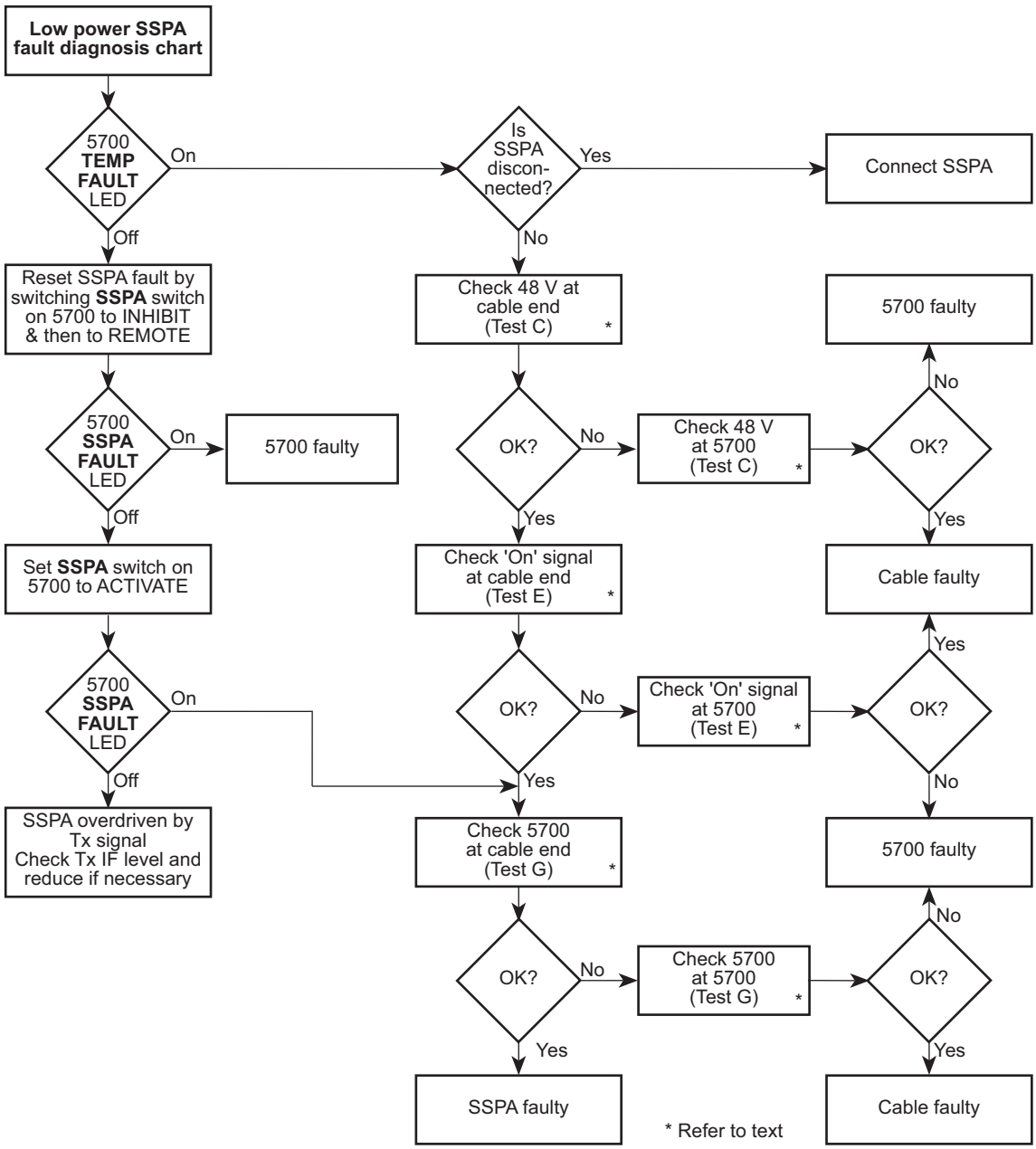


Figure 9-8: 5760/5712H SSPA fault diagnosis chart

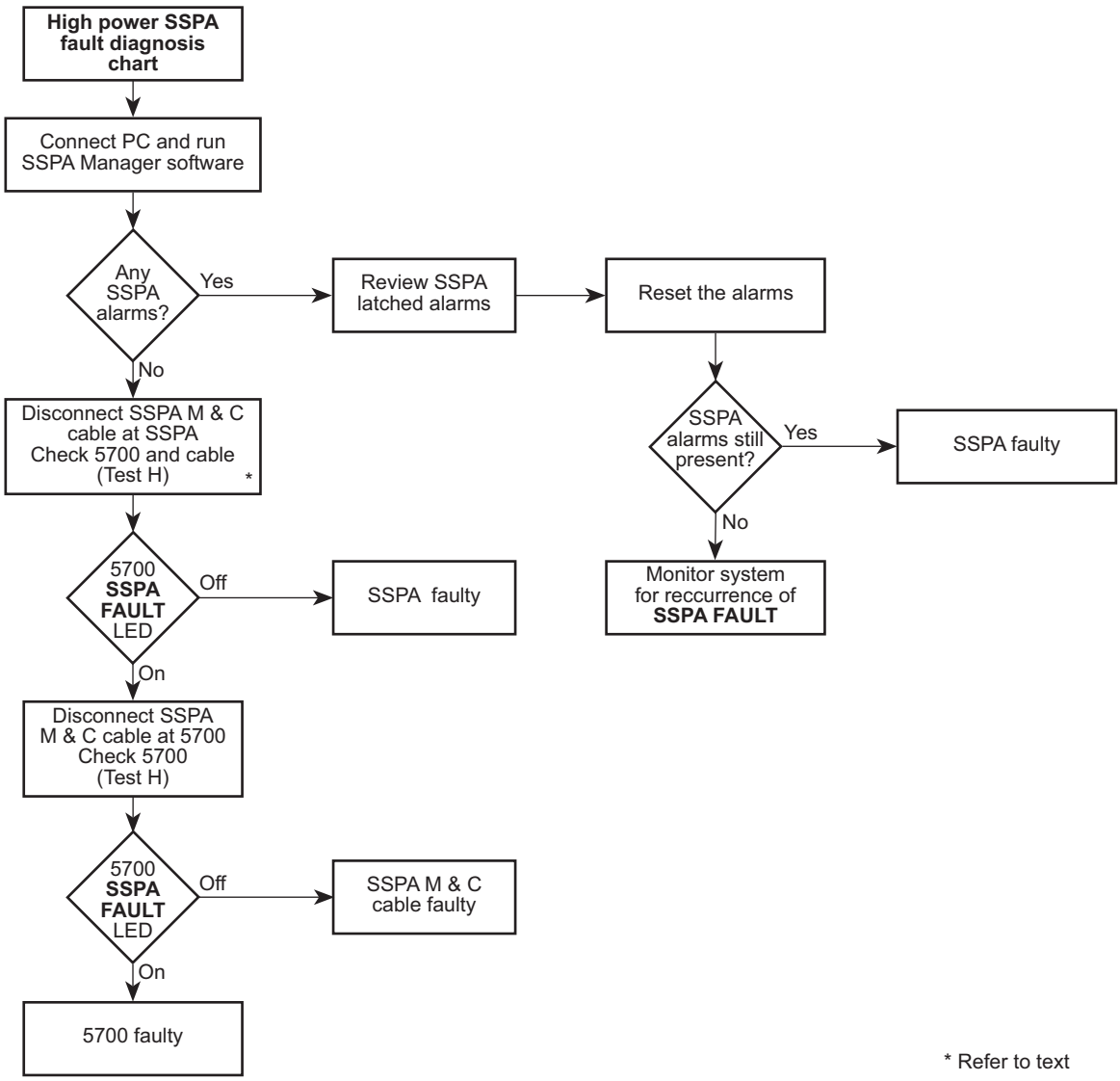


Figure 9-9a: Fan fault diagnosis chart

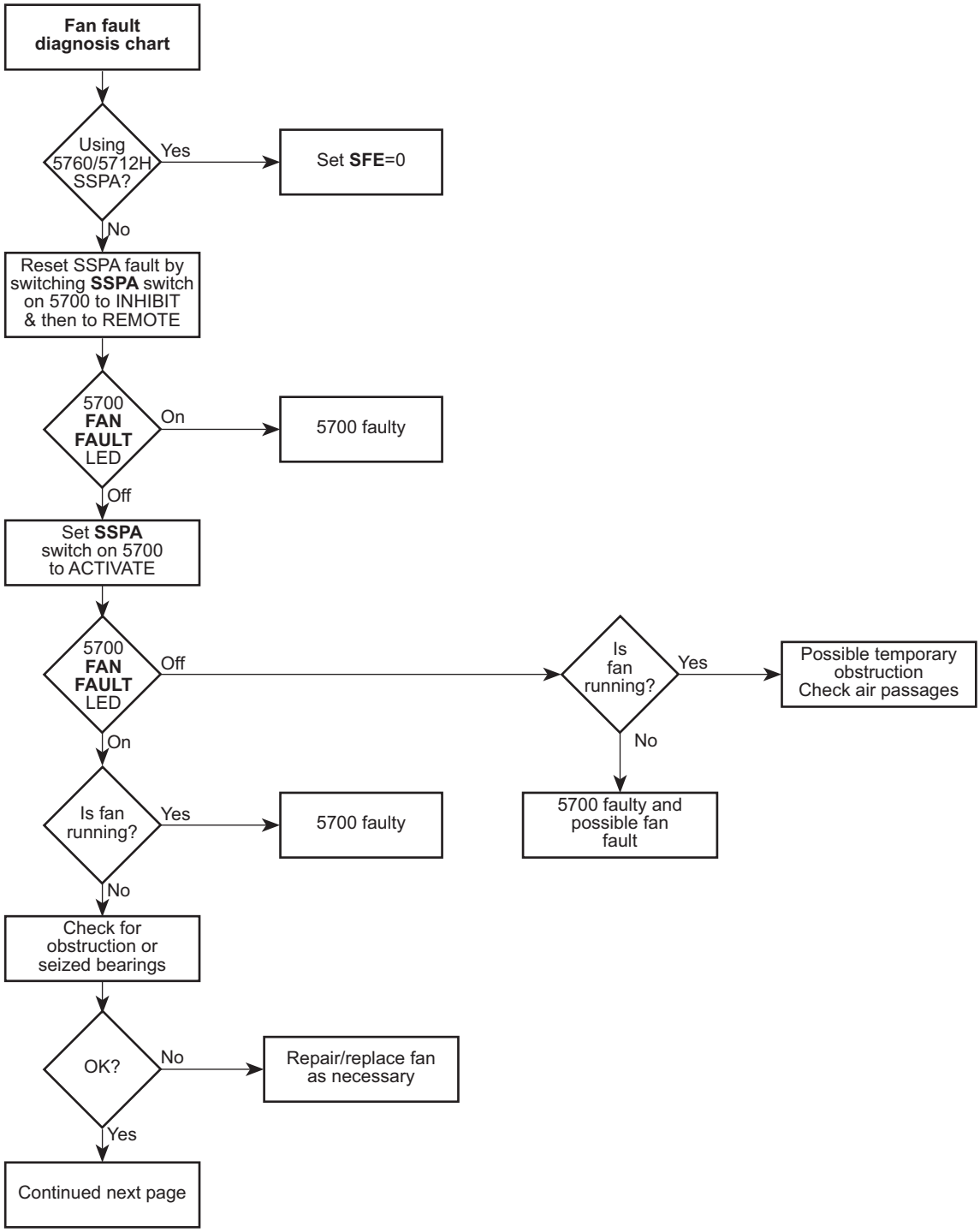


Figure 9-9b: Fan fault diagnosis chart continued

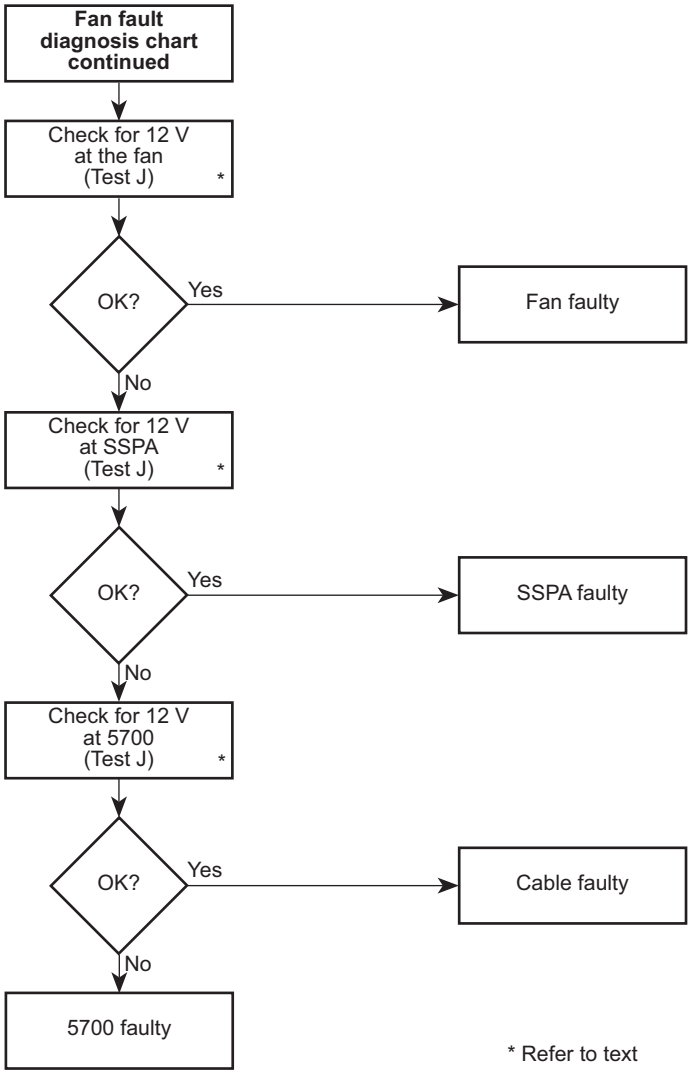


Figure 9-10a: 5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart

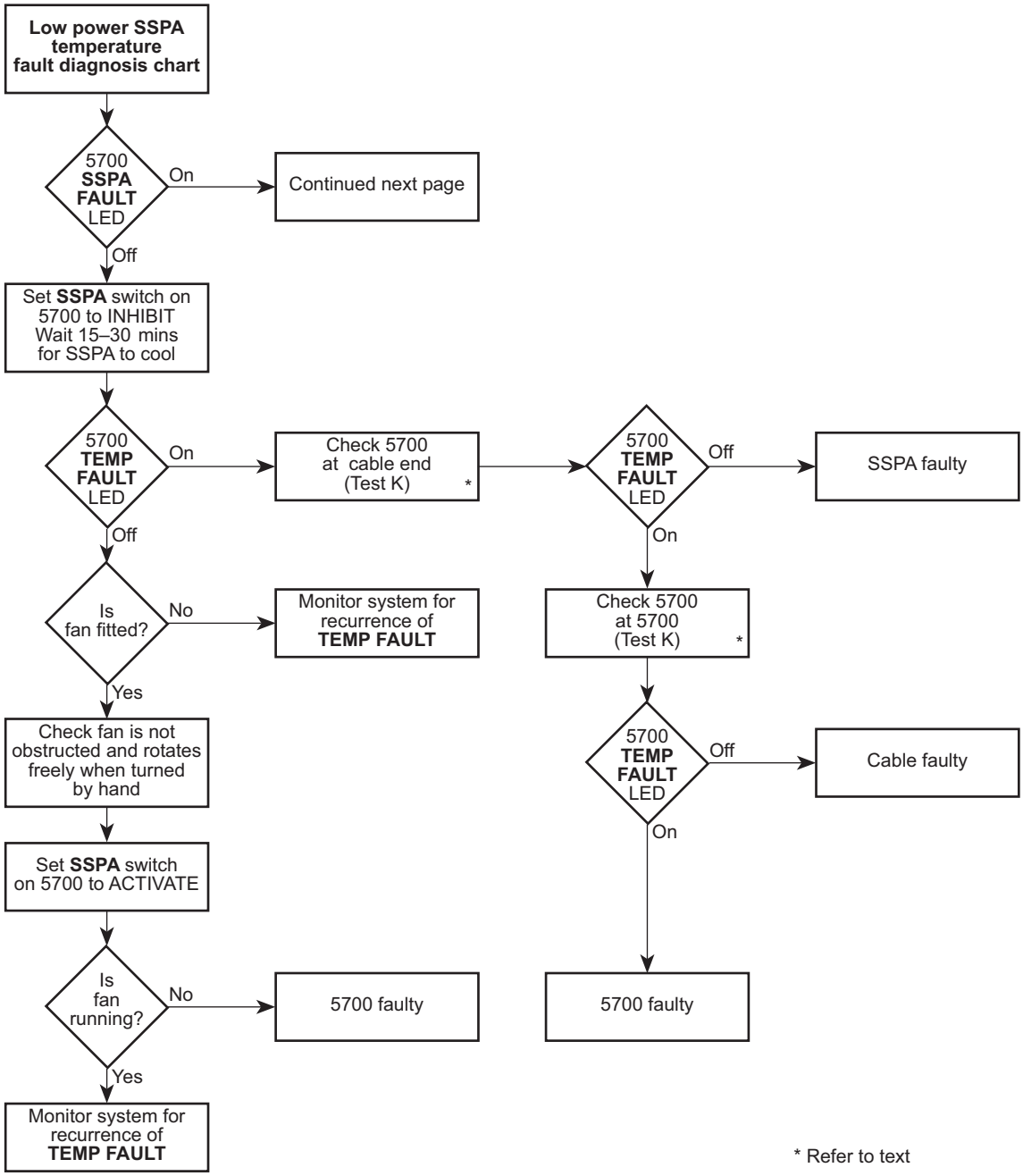


Figure 9-10b: 5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart continued

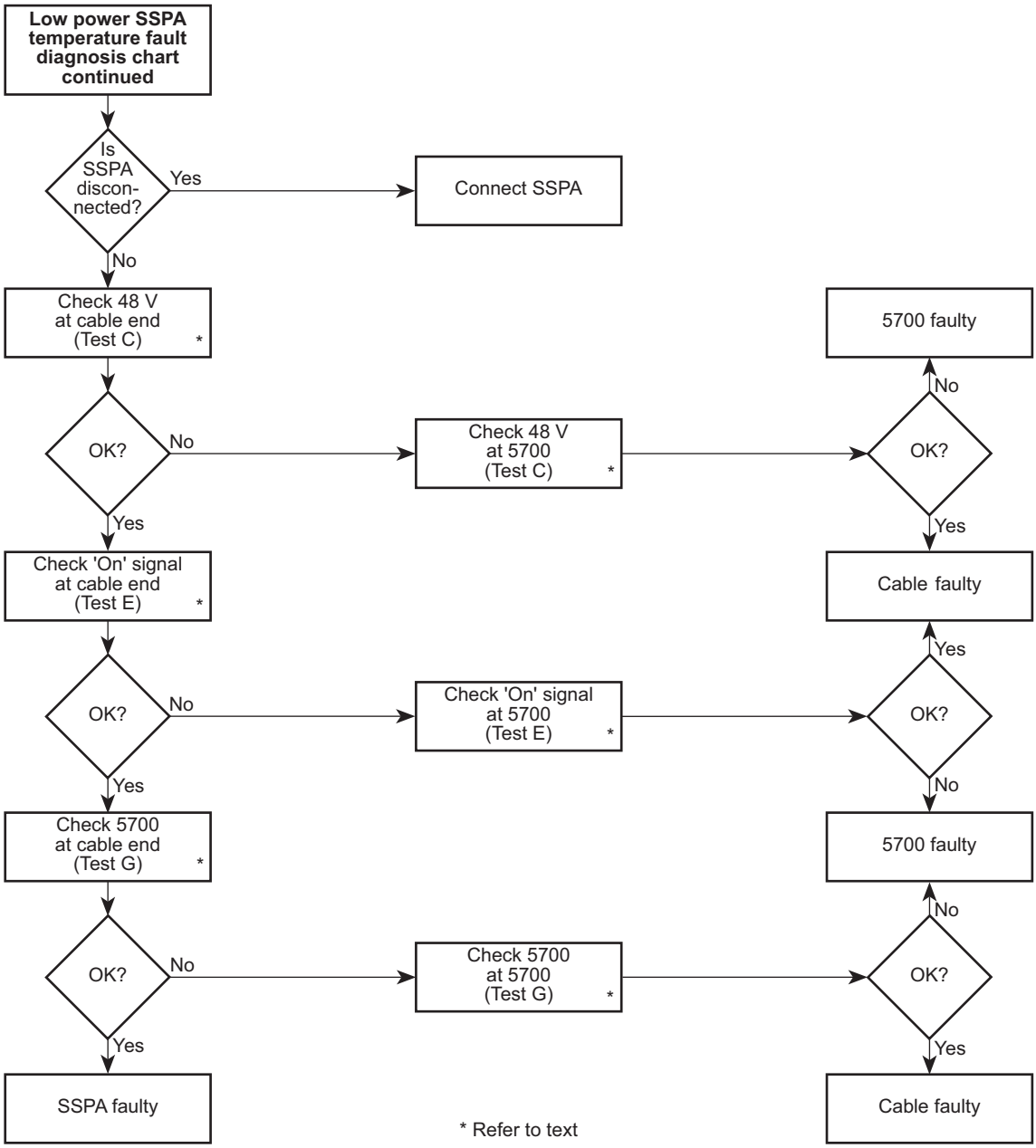


Figure 9-11: 5760/5712H SSPA temperature fault diagnosis chart

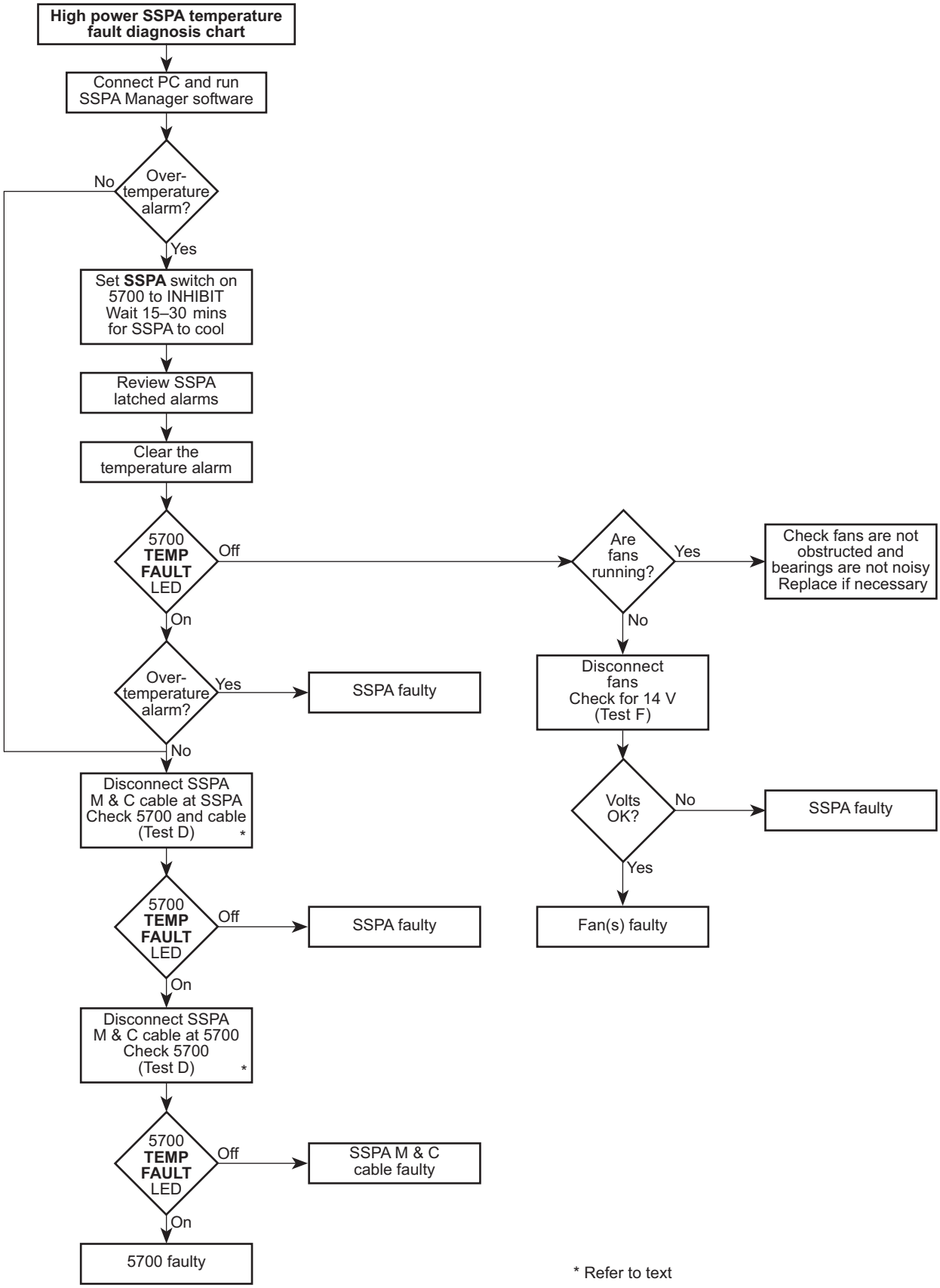


Figure 9-12a: LNA fault diagnosis chart A

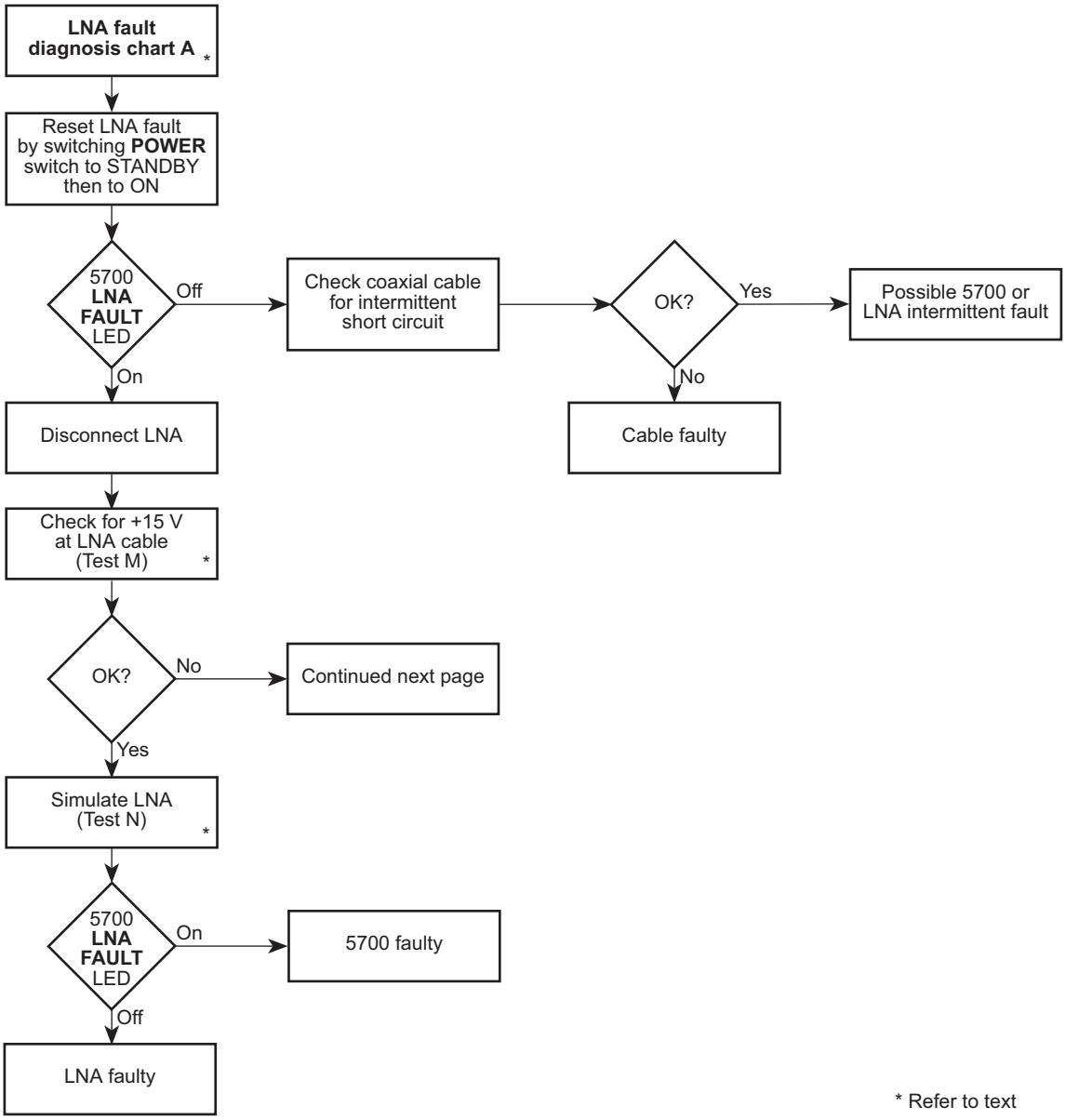


Figure 9-12b: LNA fault diagnosis chart A continued

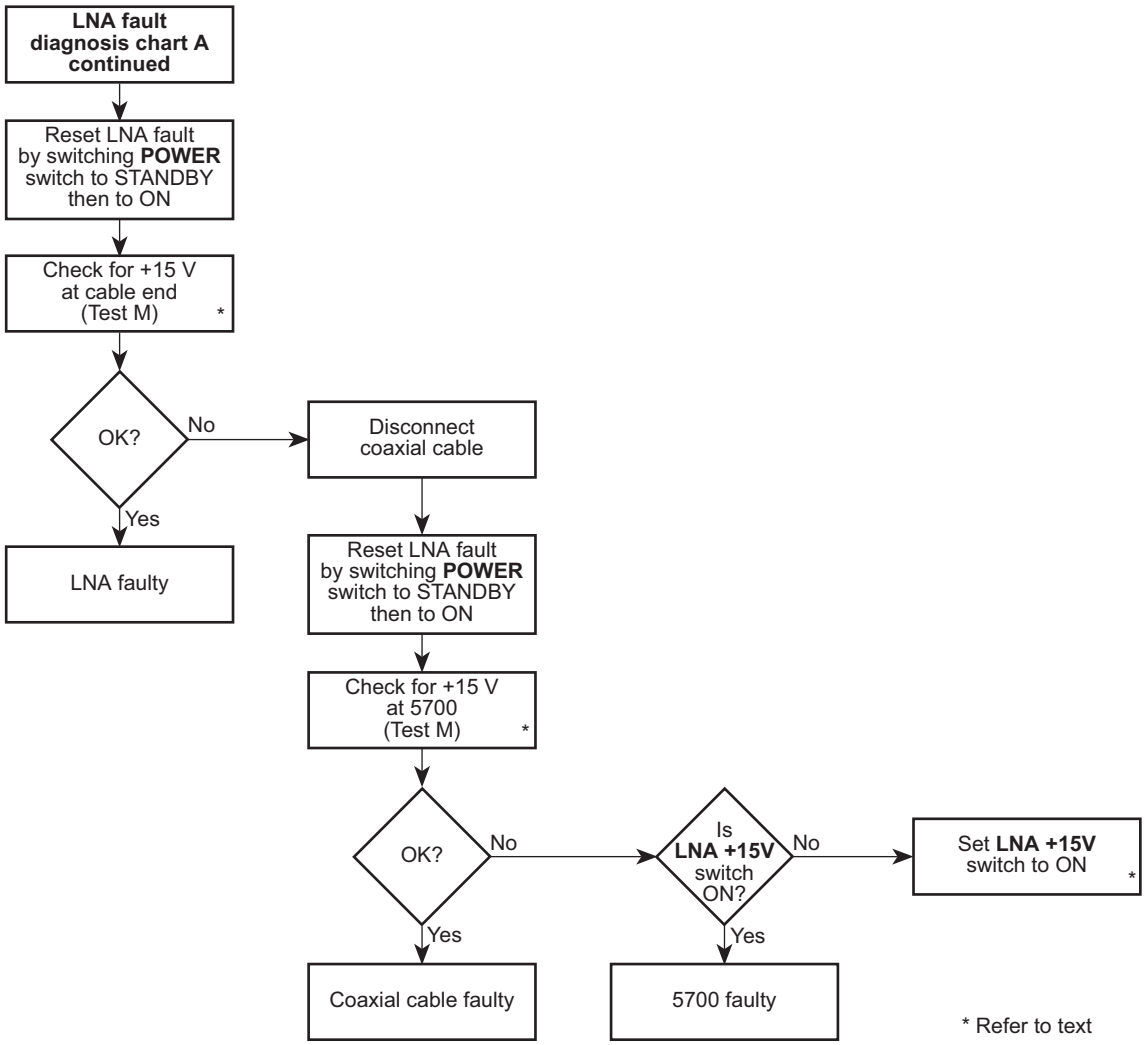


Figure 9-13a: LNA fault diagnosis chart B

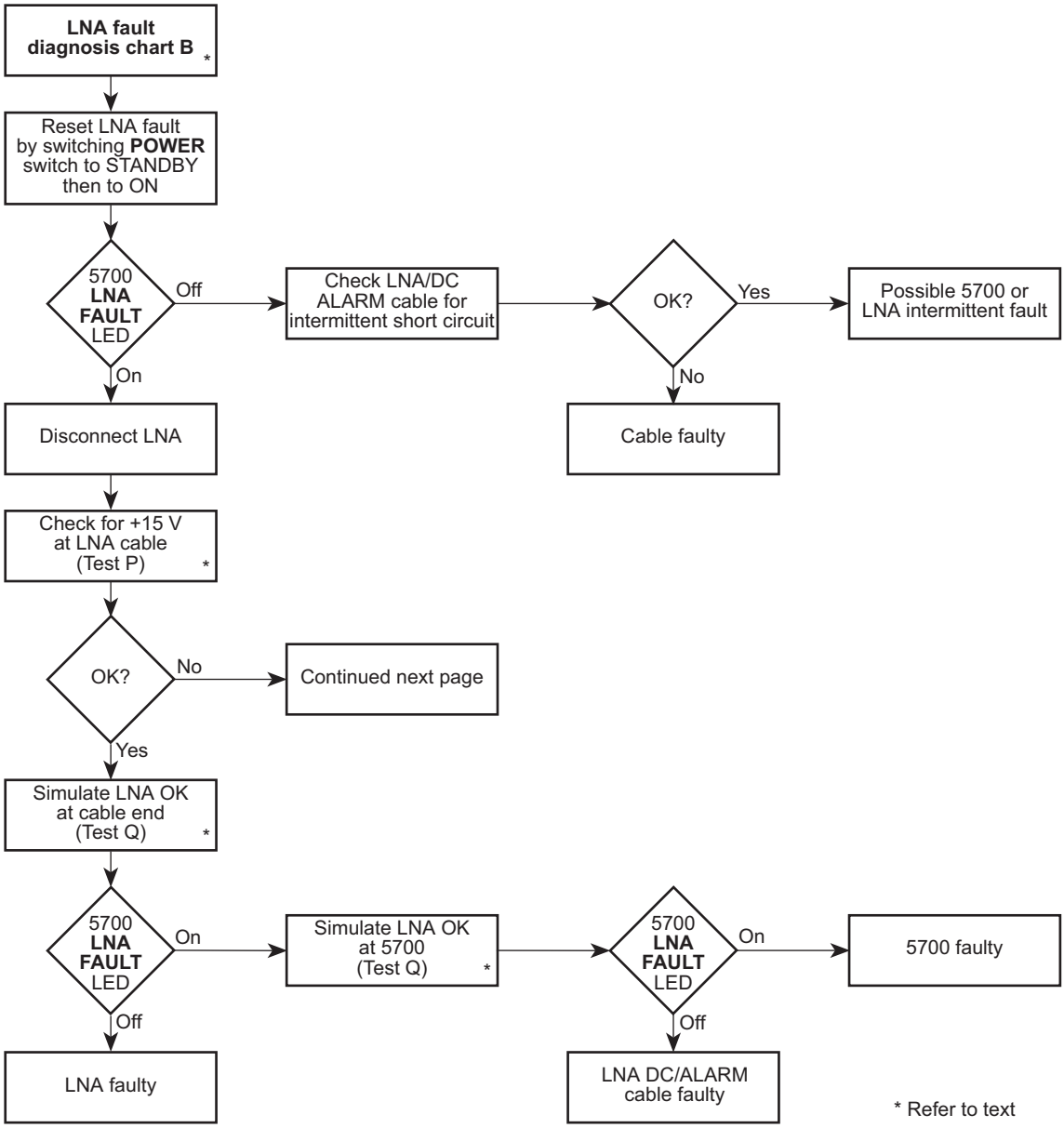
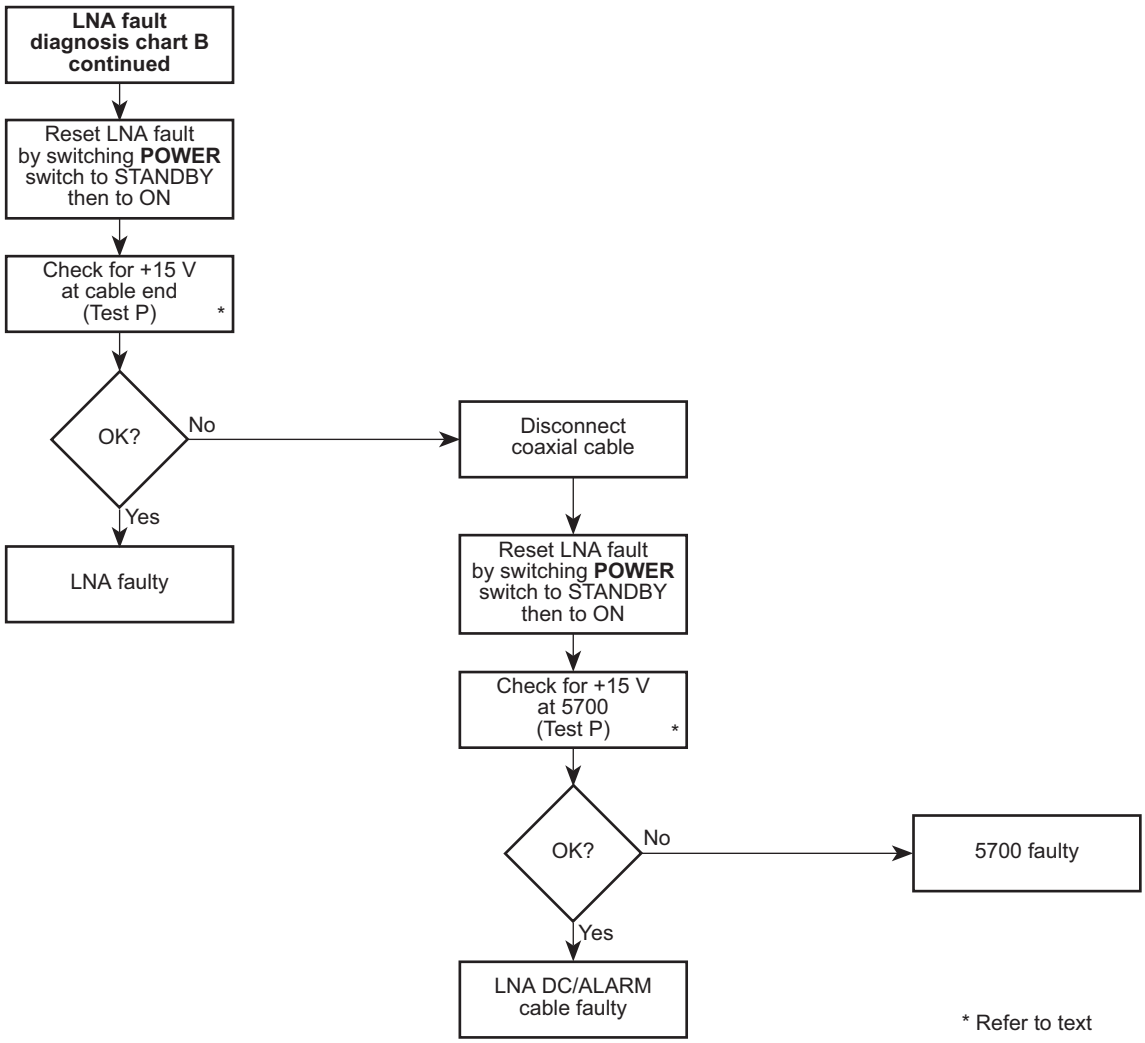


Figure 9-13b: LNA fault diagnosis chart B continued



Test procedures

The following tests are to be used in conjunction with the fault finding flow charts.

Table 9-3: Test A

Procedure	Comment
Measure the DC voltage at the **DC POWER** connector end of the 48 V supply cable. Connect positive to pins A and B, negative to pins C and D.	For correct operation, the DC voltage must be within the range 52 to 72 V DC with the **MAINS/BATT** option switched to MAINS, or within the range 42 to 72 V DC with the **MAINS/BATT** option switched to BATT.

Table 9-4: Test B

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at either: • the converter end of the SSPA to converter power cable, or • the **–48 V DC OUTPUTS** connector of the SSPA Connect positive to pin A or B, negative to pin C or D.	For correct operation, the DC voltage must be within the range 46 to 50 V DC.

Table 9-5: Test C

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at either: • the SSPA end of the converter to SSPA cable, or • the **SSPA DC/CONTROL** connector of the 5700 Connect positive to pin H and negative to pin J.	The DC voltage must be within the range 38 to 72 V DC.

Table 9-6: Test D

Procedure	Comment
As applicable in the fault diagnosis chart, either: • connect pins C and D together at the SSPA end of the converter to SSPA M & C cable, or • connect pins A and G together at the **SSPA DC/CONTROL** connector of the 5700	When the transceiver is on, the **TEMP FAULT** LED should be off.

Table 9-7: Test E

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at either: • the SSPA end of the converter to SSPA cable, or • the **SSPA DC/CONTROL** connector of the 5700 Connect positive to pin K and negative to pin J.	The DC voltage should be less than 50 mV when the transceiver is on or in STANDBY mode. The voltage is approximately 4.7 V DC when the transceiver is off.

Table 9-8: Test F

Procedure	Comment
Remove the fan shroud and measure the DC voltage at the fan feed-through connections.	The DC voltage should be 14.0±0.2 V DC.

Table 9-9: Test G

Procedure	Comment
As applicable in the fault diagnosis chart, connect pins A, D and G together at either: • the SSPA end of the converter to SSPA cable, or • the **SSPA DC/CONTROL** connector of the 5700	When the transceiver is on, the **SSPA FAULT** and **TEMP FAULT** LEDs should be off. When the SSPA is set to ON, the **SSPA FAULT** and **TEMP FAULT** LEDs should remain off.

Table 9-10: Test H

Procedure	Comment
As applicable in the fault diagnosis chart, either: • connect pins B and D together at the SSPA end of the converter to SSPA M & C cable, or • connect pins A and D together at the **SSPA DC/CONTROL** connector of the 5700	When the transceiver is on, the **SSPA FAULT** LED should be off.

Table 9-11: Test J

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at one of the following: • the fan feed-through connections on the SSPA, positive and negative as marked, or • the SSPA end of the converter to SSPA cable, positive on pin B and negative on pin A, or • the **SSPA DC/CONTROL** connector of the 5700, positive to pin B and negative to pin A	The DC voltage should be 12±0.2 V DC, when the SSPA is set to ACTIVATE.

Table 9-12: Test K

Procedure	Comment
As applicable in the fault diagnosis chart, connect pins A and G together at either: • the SSPA end of the converter to SSPA cable, or • the **SSPA DC/CONTROL** connector of the 5700	When the transceiver is on, the **TEMP FAULT** LED should be off.

Table 9-13: Test L

Procedure	Comment
Connect to the LNA coaxial cable either: • an LNA known to be working, or • a 270 Ω, 2 W resistor between the centre pin and coaxial cable ground	When the transceiver is on, the **LNA FAULT** LED should be off.

Table 9-14: Test M

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at either: • the LNA end of the converter to LNA coaxial cable, or • the **Rx RF I/P** connector of the 5700 Connect positive to the centre pin and negative to ground (to the screen).	The DC voltage should be 15.0±0.2 V DC.

Table 9-15: Test N

Procedure	Comment
Connect to the LNA coaxial cable either: • an LNA known to be working, or • a 270 Ω, 2 W resistor between the centre pin and coaxial cable ground	When the transceiver is on, the **LNA FAULT** LED should be off.

Table 9-16: Test P

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at either: • the LNA end of the converter to LNA DC/ALARM cable, or • the **LNA DC/ALARM** connector of the 5700 Connect positive to pin A and negative to pin B.	The DC voltage should be 15.0±0.2 V DC.

Table 9-17: Test Q

Procedure	Comment
As applicable in the fault diagnosis chart, connect pins C and D together and connect a 270 Ω, 2 W resistor between pins A and B, at either: • the LNA end of the converter to LNA DC/ALARM cable, or • the **LNA DC/ALARM** connector of the 5700	When the transceiver is on, the **LNA FAULT** LED should be off.

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10 Drawings

Drawing	Description
03-00958	Mounting Details, Converter Module
03-00959	Converter Module, 5700
03-00960	RF/IF Level Diagram (Low power transceiver system)
03-00993	Power Supply Unit, 5580/1/2
03-00994	Mounting Details, Power Supply Unit
03-01014	RF/IF Level Diagram (High power transceiver system)
03-01097	Mounting Details, SSPA 30/40 Watt
03-01098	Mounting Details, SSPA 10/20 Watt
03-01099	Mounting Details, SSPA 5 Watt
08-05301	Cable, Serial to PC (DE-9S)
08-05634	Cable, Power
08-05857	Cable, High Power SSPA to Converter
08-05887	Cable, Converter to SSPA
08-05961	Cable, DC power, SSPA to Converter (CE)
0969D22	Interface Control Drawing (C-Band)
15-40128-001	Fitting Instructions, Supply and Redundancy Controller
15-40196-001	Fitting instructions, Converter/High Power SSPA
15-42000-001 sheet 1 15-42000-001 sheet 2	Fitting Instructions, Boom Mounting

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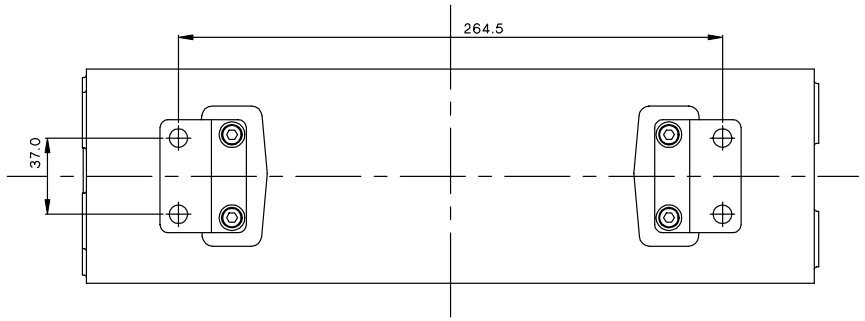
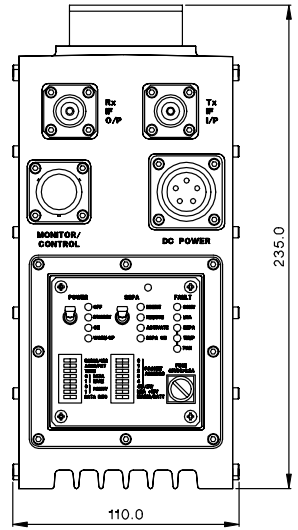
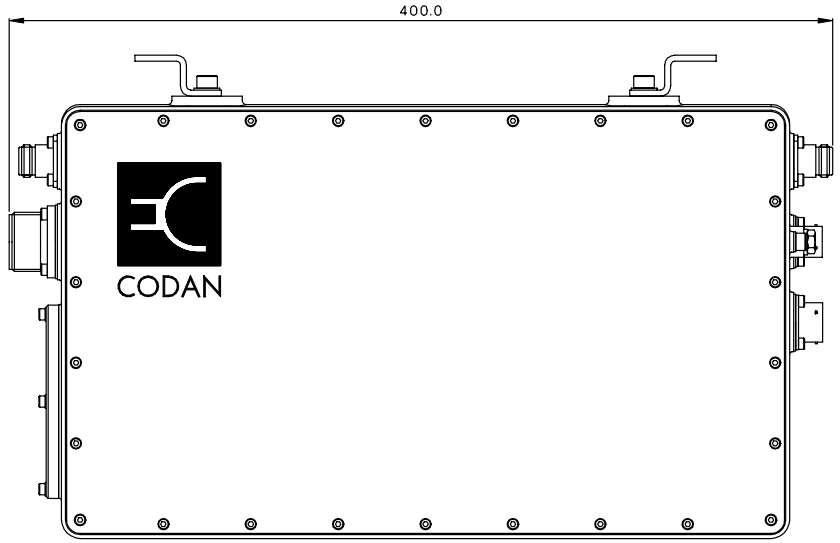
DO NOT SCALE







FILE No.
15\40142__1.DWG

DIMENSIONS IN mm

CODAN		SCALE	NTS
MATERIAL	DRN	DB	DATE 11-7-96
	CHKD	DJM	12-7-96
FINISH	APPD	GHZ	12-7-96

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

TITLE
CONVERTER
MOUNTING DETAILS

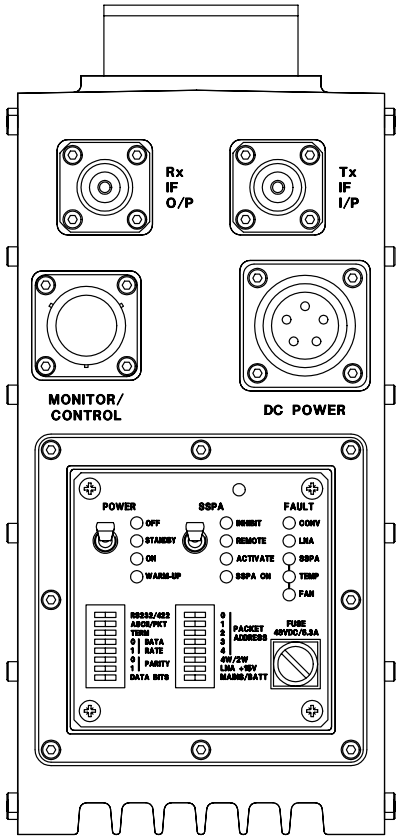
A2

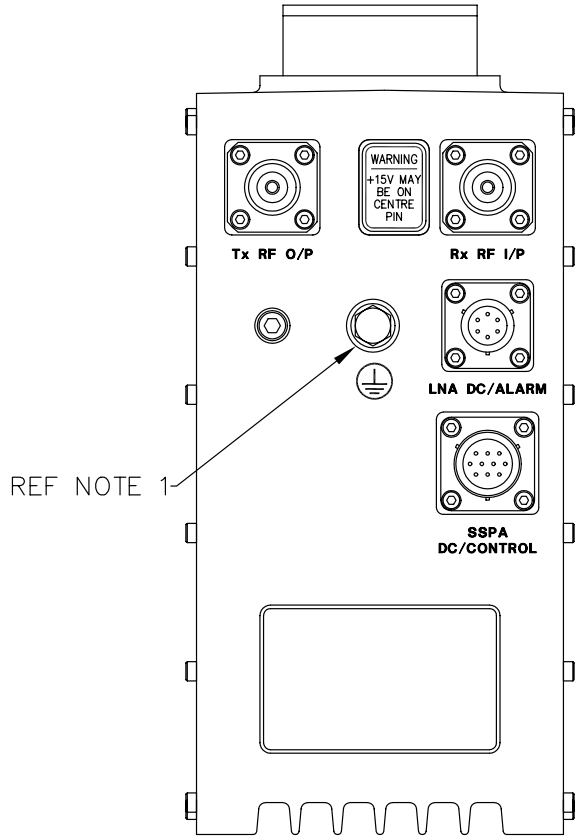
DRAWING/DOC NO.
03-00958

ISS 1

SHT. 1
OF 1

DO NOT SCALE





REF NOTE 1

ISSUE 2
SERIAL NUMBER
DETAIL REMOVED.
C/R 27023
18-07-01 GHZ

ISSUE 3
EARTH SYMBOL
CHANGED
C/R 27075
PMK 13-09-01

FILE No.
15\40142XAC.DWG

NOTE:
1. PROTECTIVE EARTH MUST BE CONNECTED TO GROUND

DIMENSIONS IN mm

CODAN

MATERIAL

FINISH

SCALE NTS

DRN	DB	DATE 11-7-96
CHKD	DJM	12-7-96
APPD	GHZ	12-7-96

TOLERANCES
UNLESS OTHERWISE STATED

2 PLACES DEC.	±0.25
1 PLACE DEC.	±0.5
0 PLACE DEC.	±1
ANGULAR	±2°

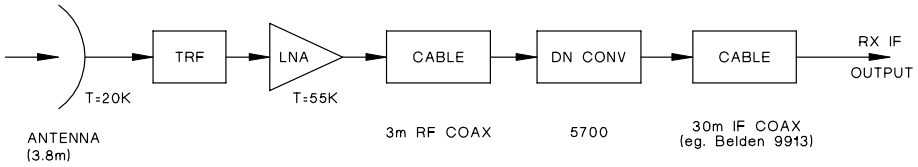
TITLE
CONVERTER
MODULE

A3

DRAWING/DOC NO.
03-00959

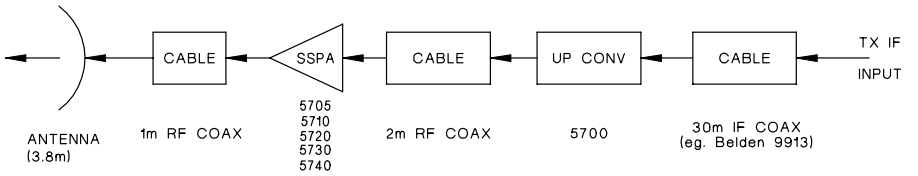
ISS X Z 3

SHT. 1 OF 1



GAIN (dB)	+42.0	-0.05	+50.0	-1.4	+45.0 (+45 to +15)	-1.3 (@ 70 MHz)
CONV ATTEN. (dB)					0 (0 to 30)	
NOMINAL LEVEL (dBm)	-159.25	-117.25	-117.3	-67.3	-68.7	-23.7	-25.0

Rx Levels shown result in an IF output C/No of approx 65dB-Hz due to the LNA & antenna only (ie excluding uplink & downlink)



GAIN (dB)	+46.0	-0.6	5705 +61.0 5710/20/30/40 +64.0	-1.2	0.0 (+10 to -20)	-1.3 (@ 70MHz)
CONV ATTEN. (dB)					10 (0 to 30)	
NOMINAL LEVEL (dBm)	+85.4	+39.4	+40.0	-24.0	-22.8	-22.8	-21.5
NOMINAL LEVEL (dBW)	+55.4	+9.4	+10.0				

Tx levels shown are for single 10W carrier output from 5710 10w SSPA
Multi-carrier operation will require lower levels

5700 SERIES C-BAND TRANSCEIVER RF/IF LEVEL DIAGRAM

ISSUE 2
"RF COAX" WAS "HELIAX". "IF COAX" ADDED TO "30m BELDEN 9913".
5730/40 SSPAs ADDED TO GAIN (dB) TABLE.
C/R 26533
12-4-2000 GZ

FILE No.
03\00960__2.DWG

CODAN

MATERIAL

FINISH

SCALE 1:1

DRN	ILT	DATE 6-8-96
CHKD	DJM	8-8-96
APPD	DJM	8-8-96

TOLERANCES UNLESS OTHERWISE STATED

2 PLACES DEC.	±0.25
1 PLACE DEC.	±0.5
0 PLACE DEC.	±1
ANGULAR	±2°

TITLE
RF/IF LEVEL DIAGRAM

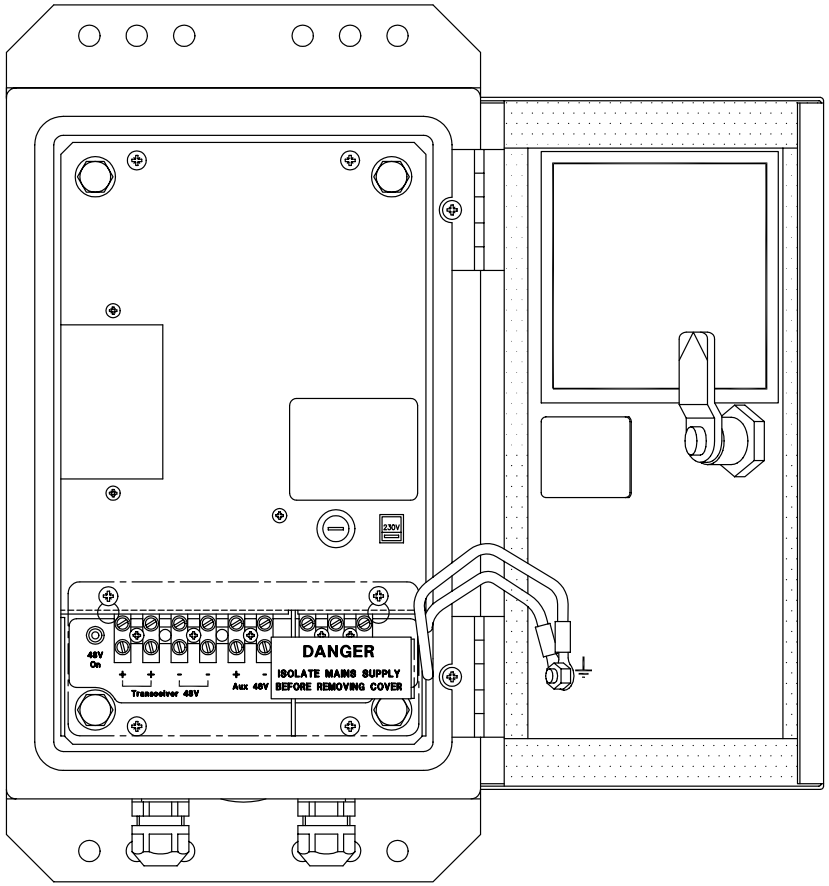
A3

DRAWING/DOC NO.
03-00960

ISS 2

SHT. 1 OF 1

DO NOT SCALE



ISSUE CHANGE
ISSUE 2: SECOND EARTH WIRE ADDED. LABEL ON DOOR WAS SMALLER. C/R 25746 MYL 1–12–98
ISSUE 3 LABEL DETAIL REMOVED. TITLE BLOCK WAS 5580/5581 C/R 26542 02–08–01 GHZ
ISSUE 4 EARTH SYMBOL CHANGED C/R 27075 PMK 13–09–01

FILE No.
03\00993__4.DWG

DIMENSIONS IN mm

CODAN

MATERIAL

FINISH

SCALE 1:2

		DATE
DRN	SMC	24–10–97
CHKD	DB	28–10–97
APPD	DJM	13–2–98

TOLERANCES
UNLESS OTHERWISE STATED

2 PLACES DEC.	±0.25
1 PLACE DEC.	±0.5
0 PLACE DEC.	±1
ANGULAR	±2°

TITLE
POWER SUPPLY UNIT

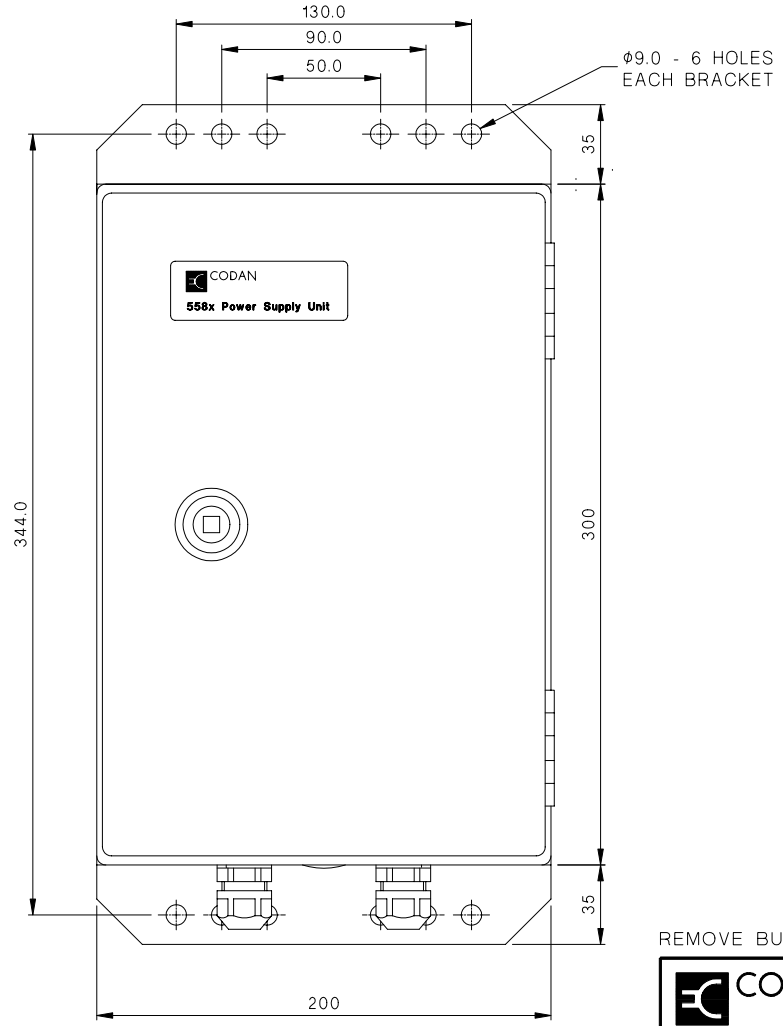
A3

DRAWING/DOC NO.
03–00993

ISS 1 2 3 4

SHT. 1 OF 1

DO NOT SCALE



REMOVE BURRS & SHARP EDGES

DIMENSIONS IN mm

ISSUE 2
TITLE BLOCK WAS
5580/5581..
C/R 26542
02-08-01 GHZ

FILE No.
03/00994__2.DWG

CODAN

MATERIAL

FINISH

		SCALE 1:2
DRN	SMC	DATE 23-10-97
CHKD	DB	28-10-97
APPD	DJM	13-2-98

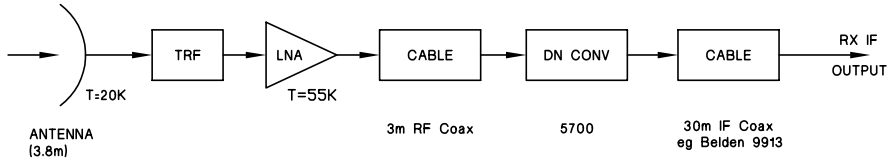
TOLERANCES
UNLESS OTHERWISE STATED

2 PLACES DEC.	±0.25
1 PLACE DEC.	±0.5
0 PLACE DEC.	±1
ANGULAR	±2°

TITLE
POWER SUPPLY UNIT
MOUNTING DETAILS

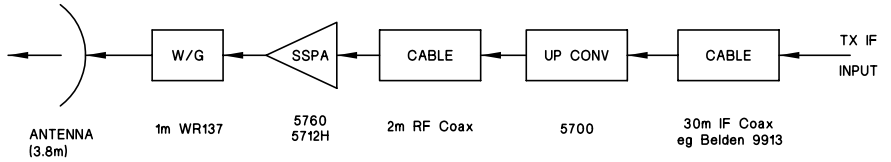
DRAWING/DOC NO.
A3 03-00994

ISS										SHT. 1
1	2									OF 1



GAIN (dB)	+42.0	-0.05	+50.0	-1.4	+45.0 (+45 to +15)	-1.3 (@ 70 MHz)
CONV ATTEN. (dB)					0 (0 to 30)	
NOMINAL LEVEL (dBm)	-159.25	-117.25	-117.3	-67.3	-68.7	-23.7	-25.0

Rx Levels shown result in an IF output C/No of approx 55dB-Hz due to the LNA & antenna only (ie excluding uplink & downlink)



GAIN (dB)	+46.0	-0.1	+55.0 (+65 to +45)	-1.2	+10 (+10 to -20)	-1.3 (@ 70MHz)
SSPA/CONV SETTING (dB)			-10.0 (0 to -20)		0 (0 to 30)	
NOMINAL LEVEL (dBm)	+91.7	+45.7	+45.8	-9.2	-8.0	-18.0	-16.7
NOMINAL LEVEL (dBW)	+61.9	+15.7	+15.8				

Tx levels shown are for a single carrier at 2db OPBO from 60W from 5760 60W SSPA.

5700 SERIES HIGH POWER C-BAND TRANSCEIVER RF/IF LEVEL DIAGRAM

ISSUE 2:
VARIOUS TEXT CHANGES
C/R 26684
GHZ 28-8-00

ISSUE 3:
SOME CHANGES TO Tx GAIN & LEVEL FIGURES.
C/R 26807
GHZ 17/11/00

FILE No.
03\01014__3.DWG

CODAN

MATERIAL

FINISH

SCALE 1:1

DRN	ILT	DATE 10-11-98
CHKD	DJM	10-11-98
APPD	DJM	10-11-98

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

TITLE
RF/IF LEVEL DIAGRAM

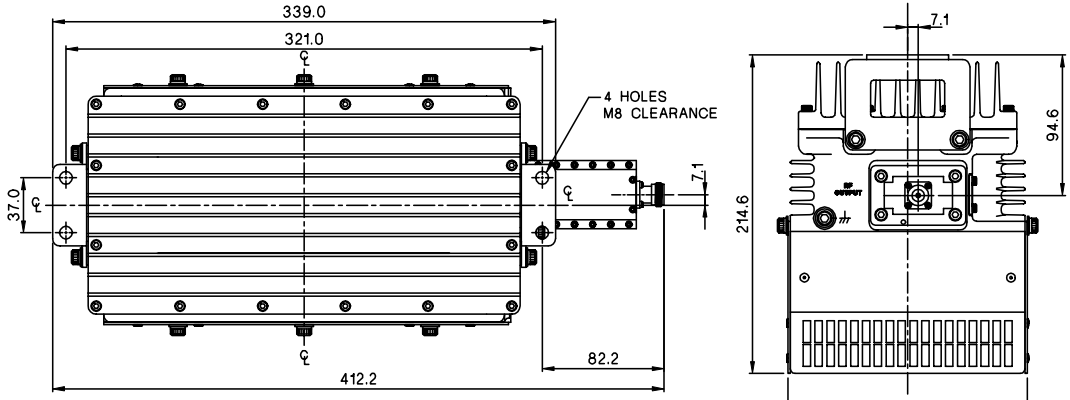
A3

DRAWING/DOC NO.
03-01014

ISS 1 2 3

SHT. 1
OF 1

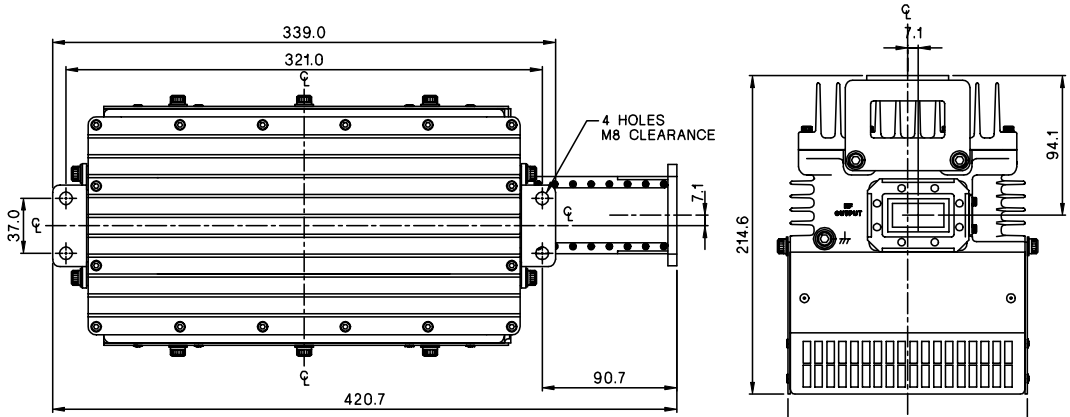
DO NOT SCALE



TOP VIEW

END VIEW
(ROTATED TO VERTICAL)

30/40 WATT SSPA WITH N-TYPE OUTPUT



TOP VIEW

END VIEW
(ROTATED TO VERTICAL)

30/40 WATT SSPA WITH WAVEGUIDE OUTPUT

DIMENSIONS IN mm

FILE No.
03\01097__1.DWG

CODAN

MATERIAL

FINISH

SCALE NTS

DRN	GS	DATE 29-08-2001
CHKD	PMK	29-08-2001
APPD	GHZ	05-09-2001

TOLERANCES UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.10
1 PLACE DEC. ±0.5
0 PLACE DEC. ±1

TITLE
SSPA 30/40 WATT
MOUNTING DETAILS (CE)

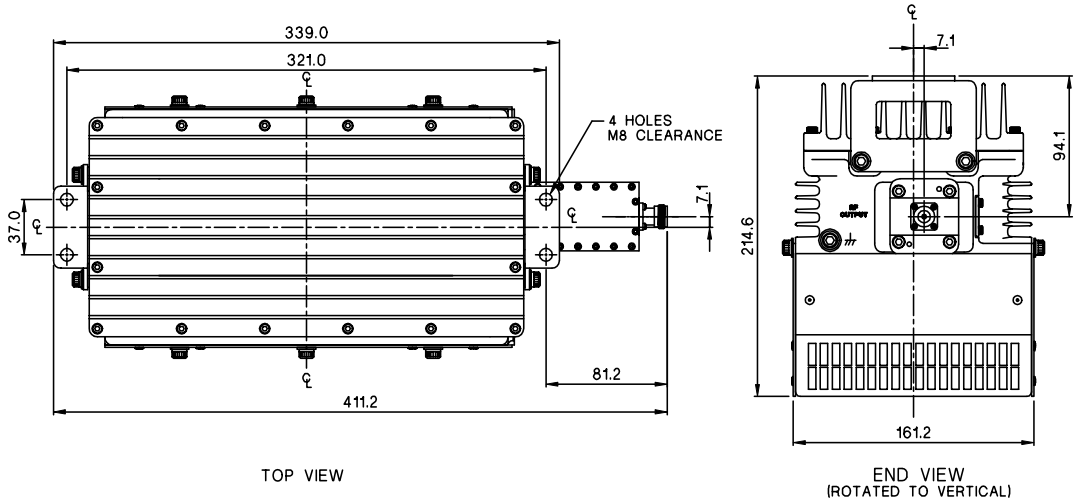
A2

DRAWING/DOC NO.
03-01097

ISS 1

SHT. 1 OF 1

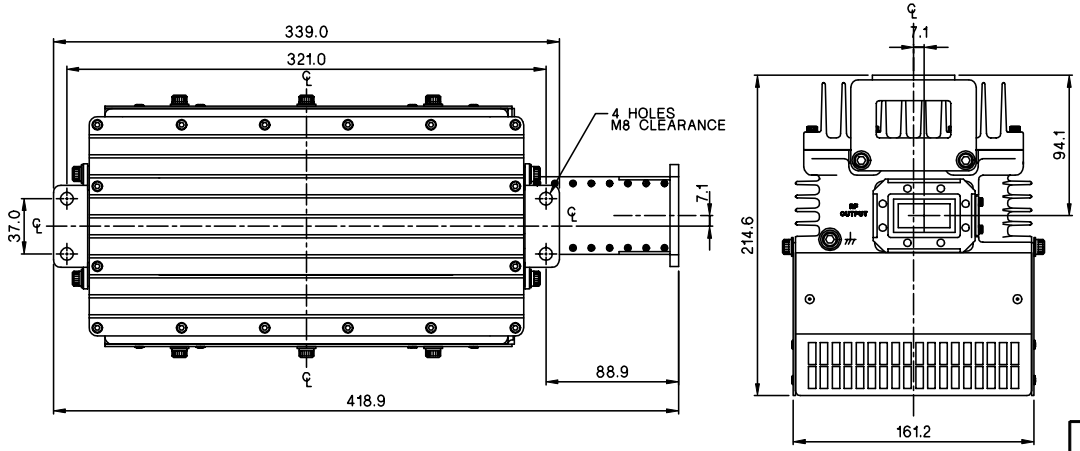
DO NOT SCALE



TOP VIEW

END VIEW
(ROTATED TO VERTICAL)

10/20 WATT SSPA WITH N-TYPE OUTPUT



TOP VIEW

END VIEW
(ROTATED TO VERTICAL)

10/20 WATT SSPA WITH WAVEGUIDE OUTPUT

DIMENSIONS IN mm

FILE No.
03\01098_1.DWG

CODAN

MATERIAL

FINISH

			SCALE NTS
DRN	GS	DATE 29-08-2001	
CHKD	PMK	29-08-2001	
APPD	GHZ	05-09-2001	

TOLERANCES
UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.10
1 PLACE DEC. ±0.5
0 PLACE DEC. ±1

TITLE
SSPA 10/20 WATT
MOUNTING DETAILS (CE)

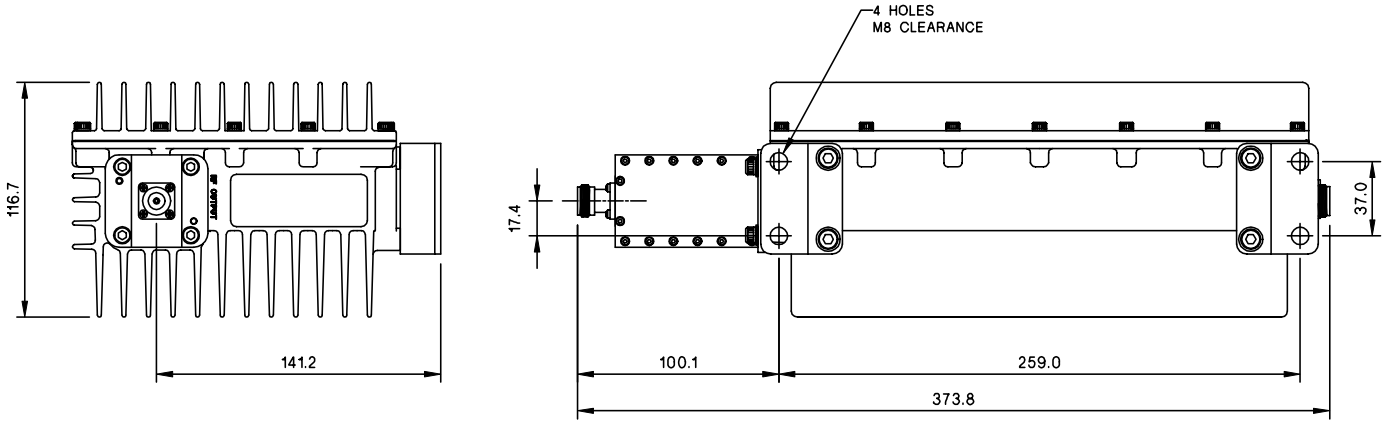
A2

DRAWING/DOC NO.
03-01098

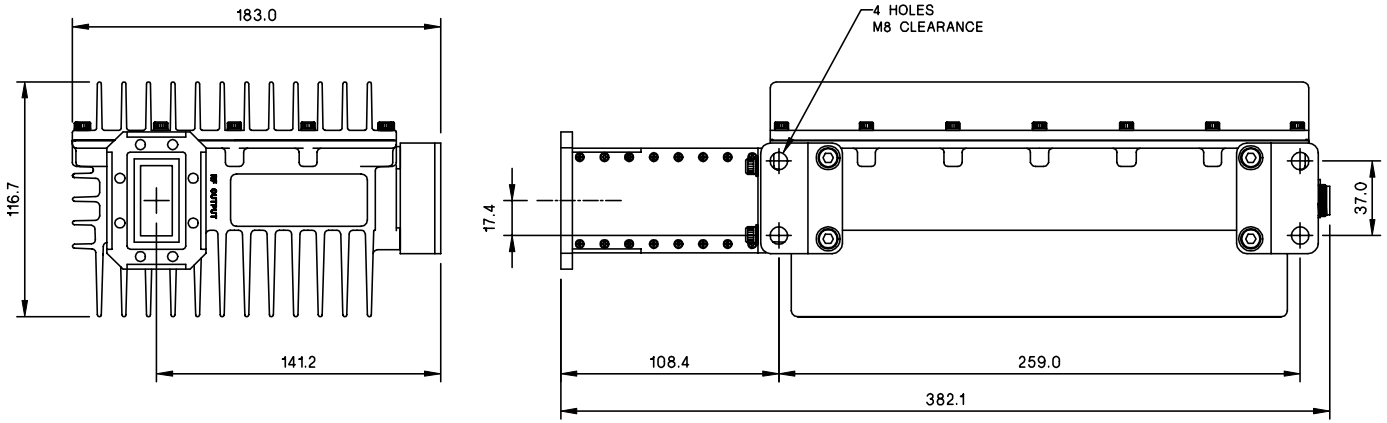
ISS 1

SHT. 1 OF 1

DO NOT SCALE



5 WATT SSPA WITH N-TYPE OUTPUT



5 WATT SSPA WITH WAVEGUIDE OUTPUT

DIMENSIONS IN mm

FILE No.
03\01099__1.DWG

CODAN

MATERIAL

FINISH

SCALE NTS

DRN	GS	DATE 28-08-2001
CHKD	PMK	29-08-2001
APPD	GHZ	05-09-2001

TOLERANCES
UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.10
1 PLACE DEC. ±0.5
0 PLACE DEC. ±1

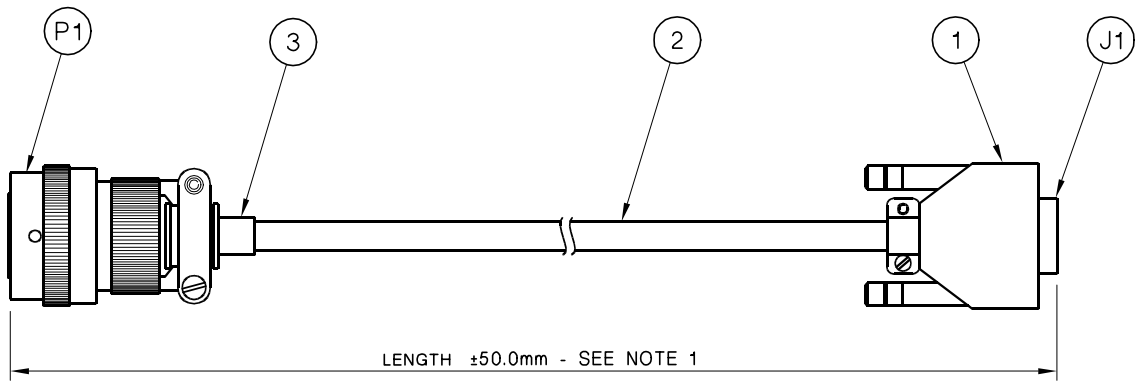
TITLE
SSPA 5 WATT
MOUNTING DETAILS (CE)

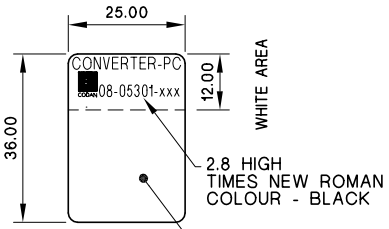
DRAWING/DOC NO.
A2 03-01099

ISS 1

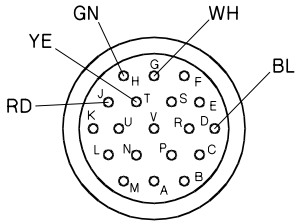
SHT. 1 OF 1

DO NOT SCALE



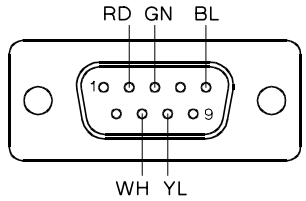


ITEM 4
LABEL DETAILS



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)

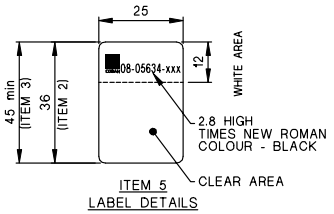
A3

DRAWING/DOC NO.
08-05301

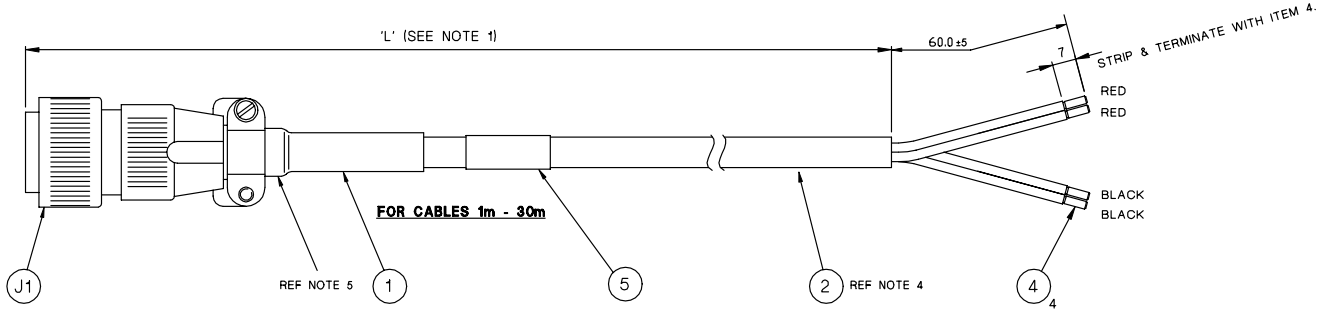
ISS 4

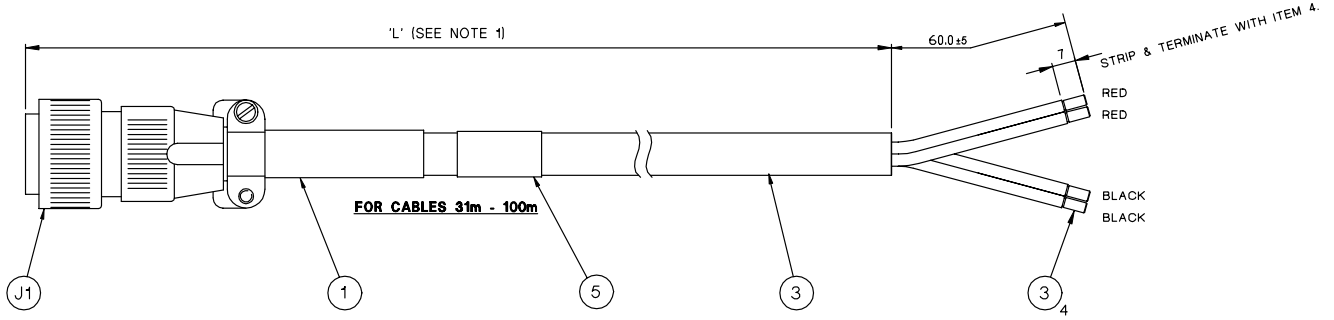
SHT. 1 OF 1

DO NOT SCALE



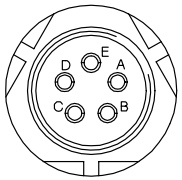
ITEM 5
LABEL DETAILS





TYPICAL ALL CABLES

WIRE	TO
RD	J1/A
RD	/B
BK	/C
BK	/D
N/C	/E



J1 REAR VIEW

VARIANT TABLE		
VARIANT	LENGTH	TOLERANCE
-005	5m	±100mm

NOTES

1. FOR CABLE LENGTH "L" 1m - 30m USE ITEM 2 (ALSO REF NOTE 4).
   FOR CABLE LENGTH "L" 31m - 100m USE ITEM 3.
2. ASSEMBLY No 08-05634-XXX
3. INJECT A SMALL AMOUNT OF SILICON SEALANT INTO THE UNUSED 'E' HOLE IN THE RUBBER GLAND.
4. ALSO INJECT A SMALL AMOUNT OF SILICON SEALANT AROUND THE SOLDERED JOINTS BEFORE CLOSING THE CONNECTOR, TO ENSURE MOISTURE CANNOT CONTACT JOINTS. (THIS IS ONLY NECESSARY WHEN USING ITEM 2)
5. USE SELF-POLYMERISING TAPE &/OR SLEEVES TO INCREASE CABLE DIAMETER, SO CABLE IS FIRMLY SECURED BY J1 CABLE CLAMP.

	ITEM	DESCRIPTION	CODAN P/No	MANUFACTURER	MANUFACTURERS PART No	QTY
REF NOTE 1 & 4	2✳	CABLE, 4 CORE GREY 30/0.25	——	TYCAB	HMC4CK25A	A/R
REF NOTE 1	3✳	CABLE, 4 CORE GREY 56/0.30	——	TYCAB	FMC4EF30A	A/R
	4	BOOT-LACE TERMINAL	——	AMP	0-0926933-1	4
	5	LABEL	——	JABAC	THT-9	1
	J1	SOCKET, 5WAY	60-00054-091	ITT-CANNON	MS3106E-18-11S	1

✳ USE APPROPRIATE CABLE FOR REQUIRED CABLE LENGTH.

DIMENSIONS IN mm

ISSUE B
STRIPPED WIRE TOLERANCES CHANGED.
C/R 25902
VS 21-01-99

ISSUE 2
ITEM 4 ADDED,
NOTES CHANGED
C/R 26254
14-09-99 GSP

ISSUE 3
ITEM 5 & VARIANT TABLE ADDED.
NOTES 1 & 4 UPDATED.
"L" TOLERANCES MOVED TO VARIANT TABLE.
27-6-2000 HJK

FILE No.
08\05634__3.DWG

CODAN

MATERIAL

FINISH

SCALE 1:1

DRN	DB	DATE 10-11-98
CHKD	DJM	25-11-98
APPD	VS	21-01-99

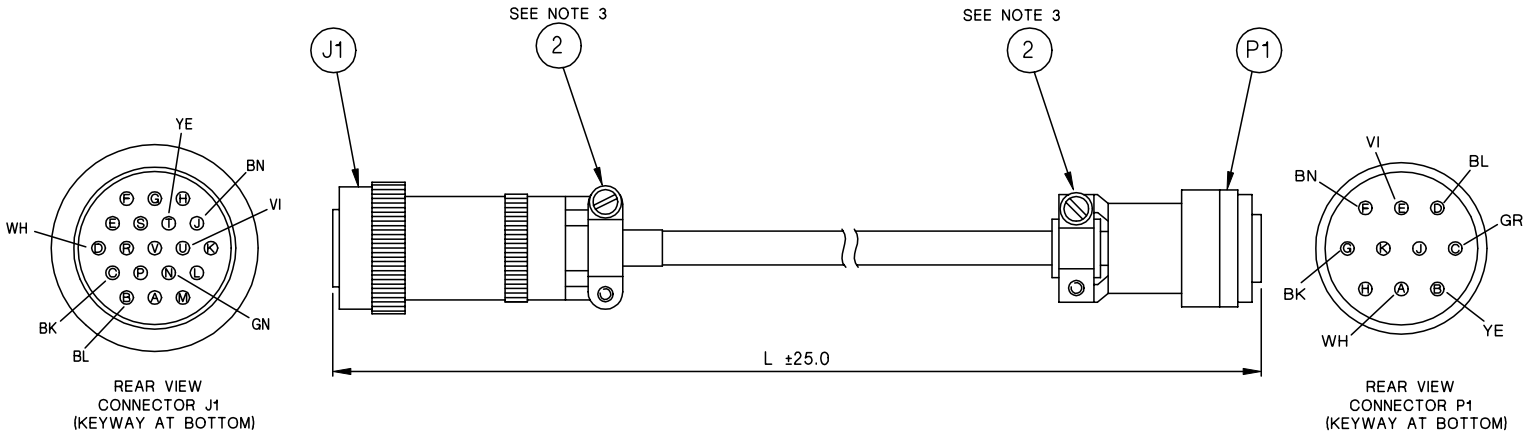
TOLERANCES UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.25
1 PLACE DEC. ±0.5
0 PLACE DEC. ±1

TITLE
CABLE, POWER

DRAWING/DOC NO.
A2 08-05634

ISS B Y Z 3 SHT. 1 OF 1

DO NOT SCALE



REAR VIEW
CONNECTOR J1
(KEYWAY AT BOTTOM)

REAR VIEW
CONNECTOR P1
(KEYWAY AT BOTTOM)

WIRE	FROM	TO
WH	J1/D	P1/A
YE	/T	/B
GN	/N	/C
BL	/B	/D
VI	/U	/E
BN	/J	/F
BK	/C	/G
SEE NOTE 4 RD	-	-
SCREEN	SHELL	SHELL

NOTES:

1. LENGTH 'L' IS VARIANT EXTENSION IN 0.1m
   ie 'L'=XX.Xm
   eg 08-05857-030 IS 3.0m LONG.
2. ASSEMBLY No 08-05857-XXX
3. THE SCREEN WIRE (BRAID) SHOULD BE SOLDERED TO SOLDER LUGS ON BOTH ENDS OF THE CABLE. THE SOLDER LUGS ARE TO BE PLACED BETWEEN THE RUBBER GROMMET AND THE CABLE CLAMP OF THE CONNECTOR AND ATTACHED TO THE CONNECTOR SHELL WITH A SCREW.
4. RED WIRE NOT USED, CUT SHORT AT BOTH ENDS.
5. INJECT SOME SILASTIC (ITEM 3) UNDER THE CABLE OUTER SHEATH AT BOTH ENDS TO SEAL THE CABLE.

FILE No.
08\05857__1.DWG

ITEM	DESCRIPTION	QTY	MANUF. PRT No.	MANUF.	CODAN P/No
J1	SOCKET, 19 WAY MIL SOLDER POT	1	MS3116J-14-19S	ITT-CANNON	60-00194-000
P1	PLUG, 10 WAY MIL SOLDER POT	1	MS3116F12-10P	ITT-CANNON	60-00101-581
1	CABLE, 8 CORE 7/0.20 SCR. GREY	SEE NOTE 1	HCE308P GREY	HARTLAND	67-00807-000
2	LUG, SOLDER 3.5mm	2	G410 Code 330	CLIFORD W	61-30200-025
3	ADHESIVE/SEALANT, CLEAR RTV	A/R	5140	LOCTITE	71-30001

DIMENSIONS IN mm

CODAN

MATERIAL

FINISH

SCALE 1:1

		DATE
DRN	SMC	04-09-2000
CHKD	GHZ	07-09-2000
APPD	GHZ	17-09-2001

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

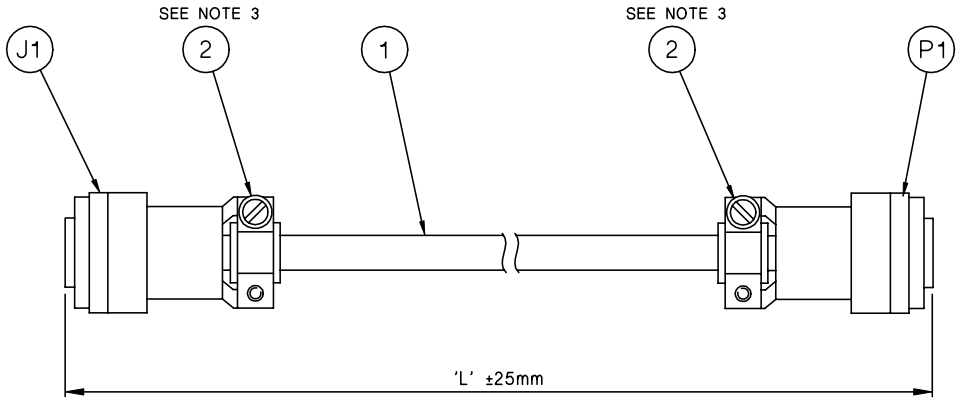
TITLE
CABLE, HP SSPA
TO CONVERTER

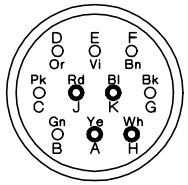
DRAWING/DOC NO.
A3 08-05857

ISS 1

SHT. 1
OF 1

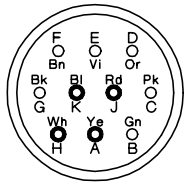
DO NOT SCALE





REAR VIEW
CONNECTOR J1
SCALE 2:1
(KEYWAY AT BOTTOM)

WIRE TYPE HC6002 - **BOLD OUTLINE**



REAR VIEW
CONNECTOR P1
SCALE 2:1
(KEYWAY AT BOTTOM)

WIRE TYPE HC6002 - **BOLD OUTLINE**

WIRE	FROM	TO	SIGNAL FORMAT	
			5700	5900
(YE)	J1/A	P1/A	0V	OV
GN	/B	/B	FAN +	SSPA DATA _
PK	/C	/C	SSPA ACT	SSPA ACT
OR	/D	/D	SSPA FAULT	INPUT 1
VI	/E	/E	TEMP SENSOR	SSPA INH
BN	/F	/F	TEMP SENSOR	SSPA DATA +
BK	/G	/G	TEMP FAULT	INPUT 2
(WH)	/H	/H	FUSED PWR +	FUSED PWR +
(RD)	/J	/J	PWR -	PWR -
(BL)	/K	/K	SW	SW
BRAID	SHELL	SHELL	0V	OV

NOTES

1. LENGTH 'L' IS VARIANT EXTENSION IN 0.1m
   ie 'L'=XX.Xm
   eg 08-05618-020 IS 2.0m LONG.
2. ASSEMBLY No 08-05618-XXX
3. THE SCREEN WIRE (BRAID) SHOULD BE SOLDERED TO SOLDER LUGS ON BOTH ENDS OF THE CABLE. THE SOLDER LUGS ARE TO BE PLACED BETWEEN THE RUBBER GROMMET AND THE CABLE CLAMP OF THE CONNECTOR AND ATTACHED TO THE CONNECTOR SHELL WITH A SCREW.
4. INJECT SOME SILASTIC (ITEM 3) UNDER THE CABLE OUTER SHEATH AT BOTH ENDS TO SEAL THE CABLE.

PART No. 08-05887-XXX (REFER NOTE 1)

ITEM	DESCRIPTION	QTY	MANUF. PRT No.	MANUF.
J1	SOCKET, 10 WAY MIL SOLDER POT	1	MS3116F12-10S	ITT-CANNON
P1	PLUG, 10 WAY MIL SOLDER POT	1	MS3116F12-10P	ITT-CANNON
1	CABLE, 6 CORE 16/0.2 &4 CORES HC6002 SCR. GREY	SEE NOTE 1	HCY 685 GREY	HARTLAND
2	LUG, SOLDER 3.5mm	2	G410 Code 330	CLIFORD W
3	ADHESIVE/SEALANT, CLEAR RTV	A/R	5140	LOCTITE

DIMENSIONS IN mm

CODAN

MATERIAL

FINISH

SCALE 1:1

		DATE
DRN	GS	30-05-2001
CHKD	PMK	06-06-2001
APPD	GHZ	17-09-2001

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

TITLE
CABLE, CONV TO SSPA CONNECTOR

A3

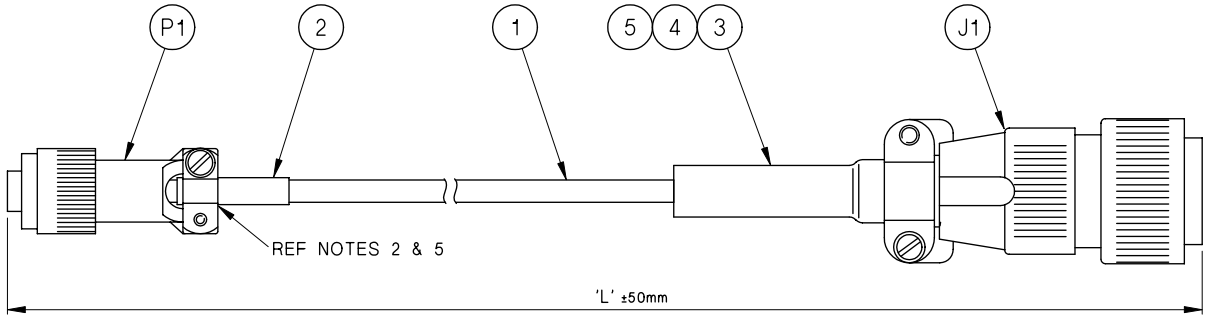
DRAWING/DOC NO.
08-05887

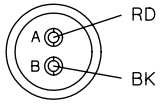
ISS 1

SHT. 1 OF 1

FILE No.
08\05887__1.DWG

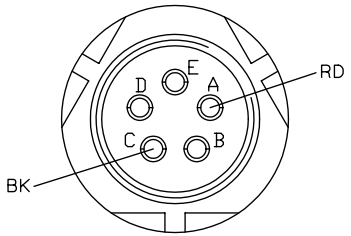
DO NOT SCALE





P1 - REAR VIEW
SCALE 2:1

WIRE	FROM	TO
RD	P1/A	J1/A
BK	/B	/C



J1 - REAR VIEW
SCALE 2:1

ITEM	DESCRIPTION	MANUFACTURER	MANUFACTURERS PART No	QTY
1	CABLE, 2 CORE (16/0.20)	HARTLAND	HC2032	A/R
2	TUBING, HEATSHRINK	3M	FP-301, 1/4"	25mm
3	BUSHING, TELESCOPING	ITT-CANNON	MS3420-4	1
4	BUSHING, TELESCOPING	ITT-CANNON	MS3420-6	1
5	BUSHING, TELESCOPING	ITT-CANNON	MS3420-8	1
J1	SOCKET, 5WAY	ITT-CANNON	MS3106E-18-11S	1
P1	PLUG, 2WAY	ITT-CANNON	MS3116F8-2P	1

NOTES

1. LENGTH 'L' IS VARIANT EXTENSION IN METRES
   ie 'L'= XXXm
   eg 08-05961-003 IS 3m LONG
2. DISCARD GROMMET SUPPLIED WITH CONNECTOR P1.
3. INJECT A SMALL AMOUNT OF SILICON SEALANT AROUND THE SOLDERED JOINTS BEFORE CLOSING THE CONNECTORS TO ENSURE MOISTURE CANNOT CONTACT JOINTS.
4. CAN USE AMP BOOT-LACE TERMINAL (0-0926933-1) IN LIEU OF 'TWIST & TIN'.
5. MAY USE SELF-POLYMERISING TAPE IN LIEU OF TUBING TO INCREASE CABLE DIAMETER SO THAT THE CABLE IS FIRMLY SECURED BY J1 & P1 CABLE CLAMPS.

DIMENSIONS IN mm

FILE No.
08\05961__A.DWG

CODAN

MATERIAL

FINISH

SCALE 1:1

DRN	DB	DATE 23-11-01
CHKD	GZ	28-11-01
APPD		

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

TITLE
CABLE, DC POWER
SSPA - CONVERTER (CE)

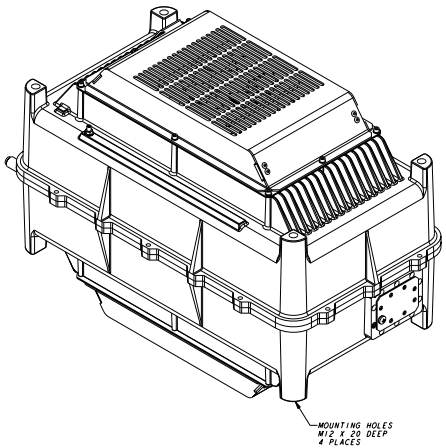
A3

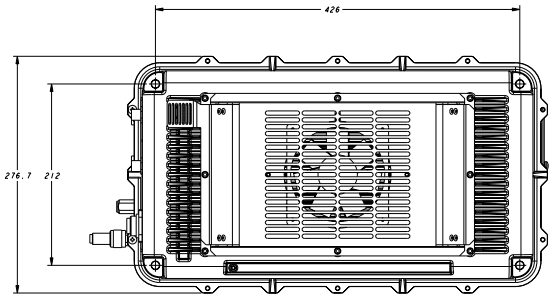
DRAWING/DOC NO.
08-05961

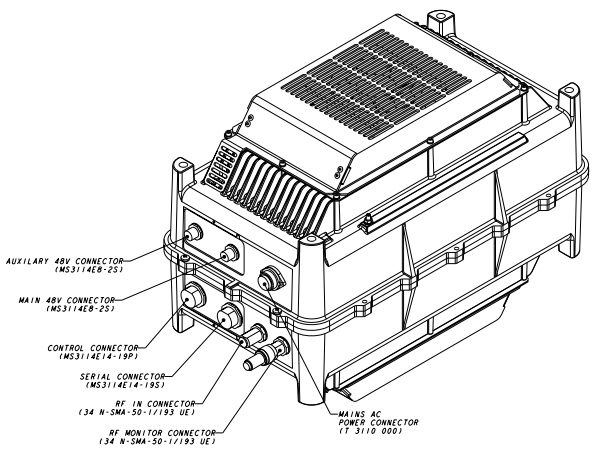
ISS A

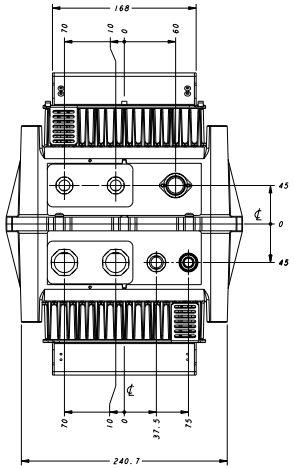
SHT. 1 OF 1

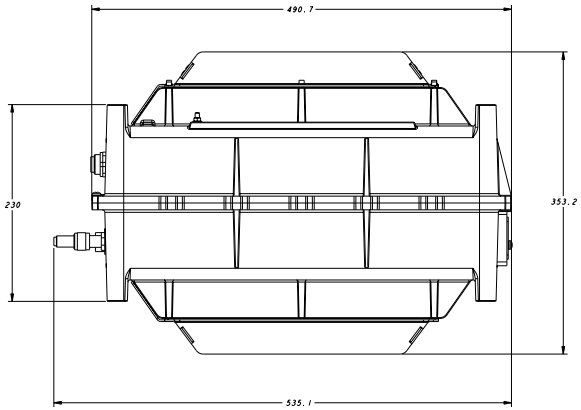
THIS DRAWING WAS PRODUCED USING PRO ENGINEER
REVISIONS WILL ALSO BE MADE WITH PRO ENGINEER

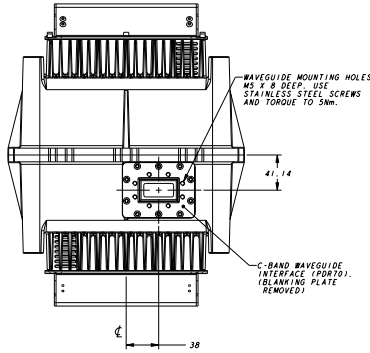












REVISION	DESCRIPTION	APPROVED	DATE
D	DESCRIPTIONS ALTERED C9 AND F12, C1 ADDED E3 PCO 00609	PRM	09-01-02
C	ADD TORQUE SPECIFICATION DETAILS TO W/G OUTPUT	AH	01-11-01
B	UPDATE TO REFLECT CURRENT STATUS	AH	17-10-01

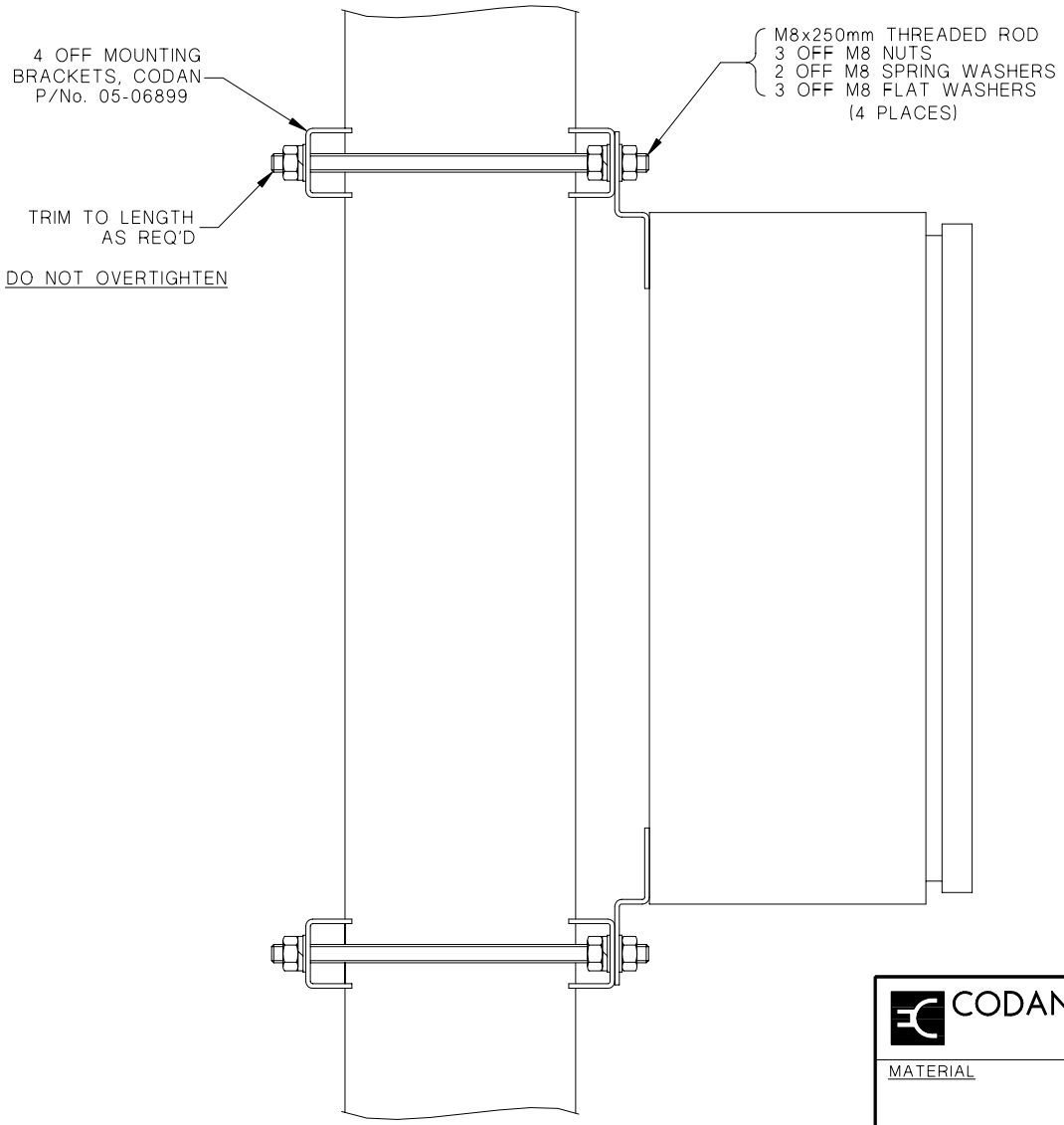
CODAN

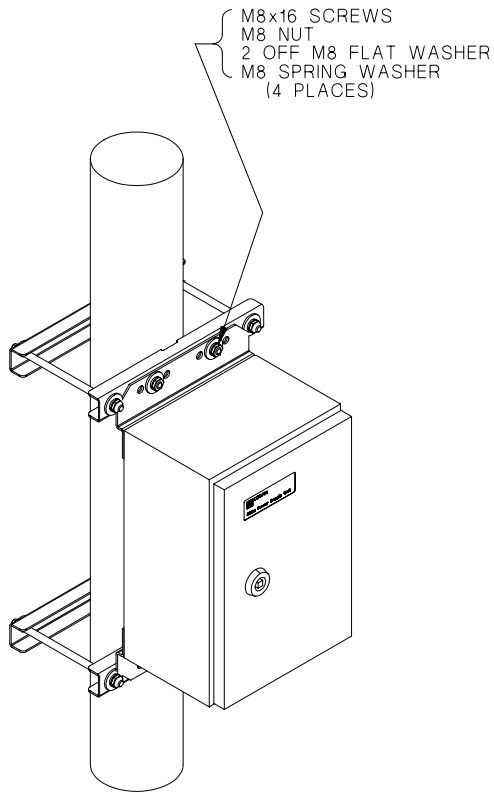
THIRD ANGLE PROJECTION
DIMENSIONS IN MILLIMETRES
FINISH
MATERIAL N/A
TOLERANCE ±0.5 U.O.S.

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
RUR MOUNT SSPA
DO NOT SCALE. IF IN DOUBT - ASK
FILE 0969D220 DRG No. 0969D22
REV D
SHEET 1 OF 1

DO NOT SCALE





POWER SUPPLY SHOWN
(SCALE 1:5)

DIMENSIONS IN mm

ISSUE 2:
BALLOONS DELETED
PART DESCR ADDED
C/R 24686
DB 08-08-96

ISSUE 3:
TITLE WAS"SUPPLY MODULE/ ETC."
5580/5581 POWER SUPPLY
ISO VIEW ADDED.
C/R 25153
28-10-97 DB

ISSUE 4
TITLES MADE GENERIC
C/R 26542
02-08-01 GHZ

FILE No.
15\40128__4.DWG

CODAN

MATERIAL

FINISH

		SCALE 1:2 1:5
DRN	DB	DATE 28-06-95
CHKD	DBr	29-06-95
APPD	CM	01-11-95

TOLERANCES UNLESS OTHERWISE STATED

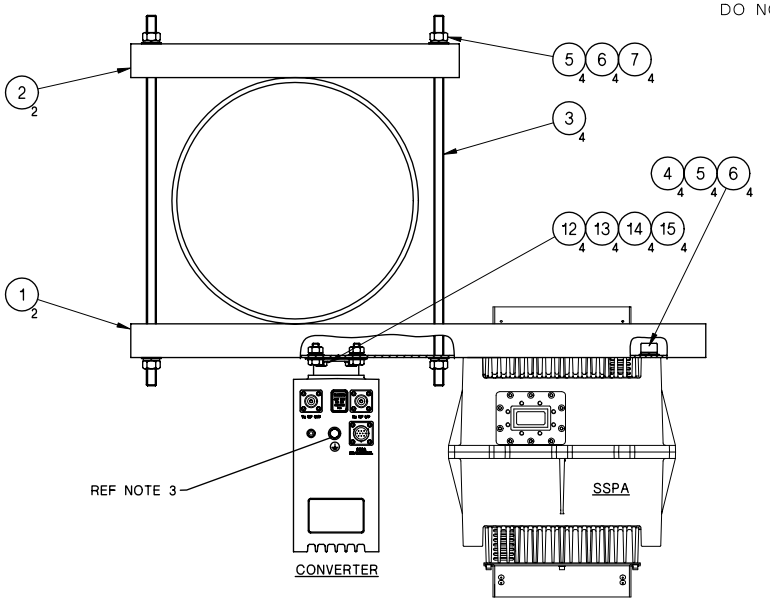
2 PLACES DEC.	±0.25
1 PLACE DEC.	±0.5
0 PLACE DEC.	±1
ANGULAR	±2°

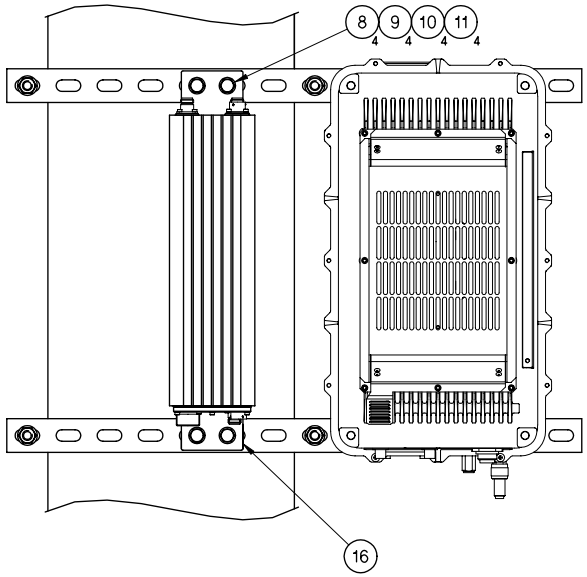
TITLE
POWER SUPPLY/ REDUNDANCY CONTROLLER FITTING INSTRUCTIONS

A3 DRAWING/DOC NO. 15-40128-001

ISS											SHT. 1
1	2	3	4								OF 1

DO NOT SCALE





SUGGESTED FITTING INSTRUCTIONS

1. ATTACH UPPER SLOTTED CHANNELS (ITEMS 1&2) TO POLE WITH M12 THREADED ROD (ITEM 3), M12 NUTS, FLAT WASHERS & SPRING WASHERS (ITEMS 5-7).
2. ATTACH SSPA TO 700mm SLOTTED CHANNEL (ITEM 1) AS SHOWN WITH M12 SCREWS, FLAT WASHERS & SPRING WASHERS (ITEMS 4-6).
3. ATTACH LOWER SLOTTED CHANNELS (ITEMS 1&2) TO POLE WITH M12 THREADED ROD (ITEM 3), M12 NUTS, FLAT WASHERS & SPRING WASHERS (ITEMS 5-7). DO NOT OVERTIGHTEN.
4. SLIDE LOWER SLOTTED CHANNEL UNTIL LOWER MOUNTING HOLES ON SSPA ALIGN WITH SLOTTED CHANNEL & FIT SSPA WITH M12 SCREWS, FLAT WASHERS & SPRING WASHERS (ITEMS 4-6).
5. ATTACH WIDE-SPACING BRACKET (ITEM 16) NEXT TO SSPA WITH M10 SCREWS, NUTS, FLAT WASHERS & SPRING WASHERS (ITEMS 8-11).
6. ATTACH CONVERTER TO WIDE-SPACING BRKT (ITEM 16) WITH M8 SCREWS, NUTS, FLAT WASHERS & SPRING WASHERS (ITEMS 12-15).
7. TIGHTEN ALL THREADED RODS & SCREWS.

ITEM	DESCRIPTION	QTY
1	SLOTTED CHANNEL, 700mm	2
2	SLOTTED CHANNEL, 400mm	2
3	M12x500mm THREADED ROD	4
4	M12x25 SKT CAP SCREW	4
5	M12 SPRING WASHER	12
6	M12 FLAT WASHER	12
7	M12 HEX NUT, SELF LOCKING	8
8	M10x40 HEX SCREW	4
9	M10 SPRING WASHER	4
10	M10 FLAT WASHER	8
11	M10 HEX NUT	4
12	M8x20 HEX SCREW	4
13	M8 SPRING WASHER	4
14	M8 FLAT WASHER	8
15	M8 HEX NUT	4
16	WIDE-SPACING BRACKET	1

NOTES:

1. ADDITIONAL ITEMS OF MOUNTING HARDWARE TO THOSE LISTED ABOVE MAY BE SUPPLIED THOUGH NOT NECESSARILY USED IN ASSEMBLY.
2. C-BAND SSPA AND CONVERTER SHOWN. KU-BAND VERSIONS ARE MECHANICALLY IDENTICAL.
3. PROTECTIVE EARTH MUST BE CONNECTED TO GROUND

DIMENSIONS IN mm

FILE No. 15\40196__A.DWG

CODAN

MATERIAL

FINISH

SCALE 1:4

DRN DB DATE 20-11-01

CHKD GZ 27-11-01

APPD

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

TITLE
KIT, CONVERTER MTG, HP SSPA's (CE)

DRAWING/DOC NO.
A2 15-40196-001

ISS A

SHT. 1 OF 1

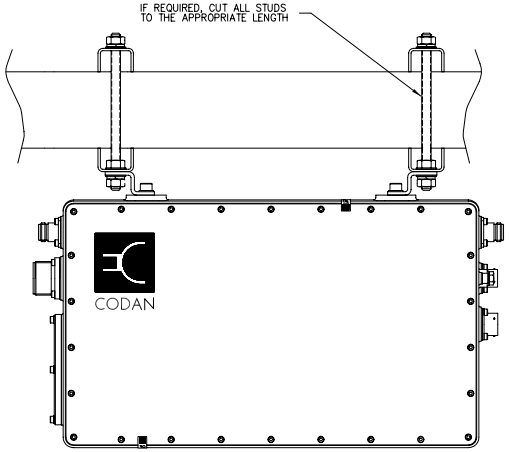
DO NOT SCALE

ISSUE 2
NOTE 2 ADDED,
WAS 3 SHTS.
C/R 25666
08-10-98 DJM

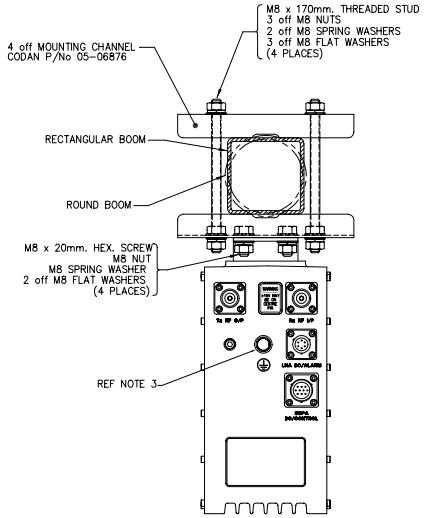
ISSUE 3
SERIAL NUMBER DETAIL
REMOVED.
C/R 27023
18-07-01 GHZ

ISSUE 4
EARTH SYMBOL
CHANGED. NOTE 3
ADDED.
C/R 27075
PMK 13-09-01

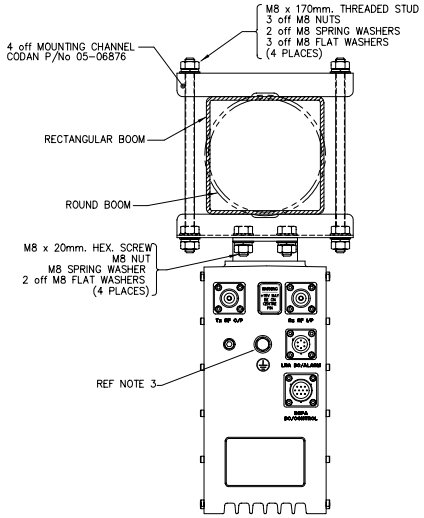
MOUNTING FOR BOOMS UP TO 65mm WIDE/DIA.



NUTS & WASHERS ON BOTTOM OF
THREADED STUDS NOT SHOWN IN THIS VIEW.



MOUNTING FOR BOOMS UP TO 100mm WIDE/DIA.



NOTES:

1. BOOM MOUNTING KIT PART No. 15-42000-000.
2. CONVERTER SHOWN IS C-BAND MODEL 5700.
3. PROTECTIVE EARTH MUST BE CONNECTED TO GROUND

REMOVE BURRS & SHARP EDGES

DIMENSIONS IN mm

FILE No.
15\42000__4

CODAN		SCALE 1:2	© CODAN PTY LTD, A.C.N. 007 590 605: 1997
MATERIAL	DRN SMC	DATE 27-02-97	TITLE CONVERTER FITTING INSTRUCTIONS BOOM MOUNTING ACCESSORIES
	CHKD P.F.	30-04-97	
	APPD DJM	13-2-98	DRAWING/DOC NO.
FINISH	TOLERANCES UNLESS OTHERWISE STATED		A1 15-42000-001
	2 PLACES DEC. ±0.25 1 PLACE DEC. ±0.5 0 PLACE DEC. ±1 ANGULAR ±2°		ISS 4 SHT. 1 OF 2

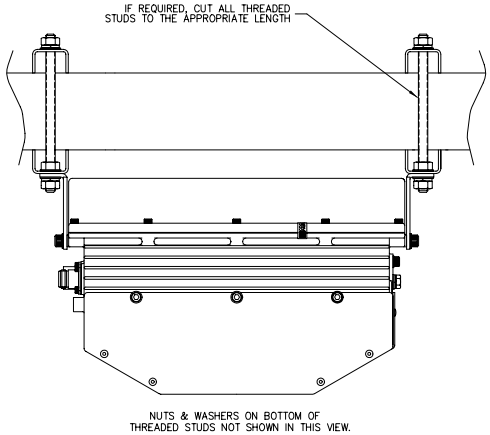
DO NOT SCALE

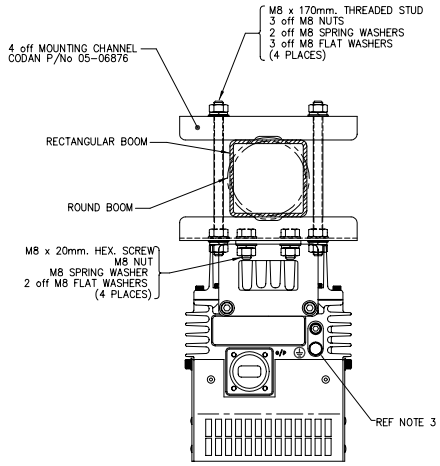
ISSUE 2
DETAIL UPDATED, WAS 3 SHTS.
C/R 25666
08-10-98 DJM

ISSUE 3
SERIAL NUMBER DETAIL REMOVED.
C/R 27023
16-07-01 GHZ

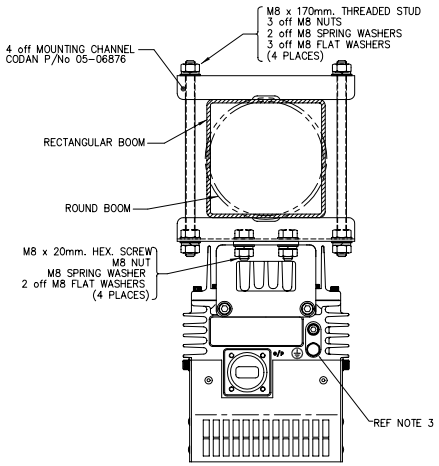
ISSUE 4
EARTH SYMBOL CHANGED. NOTE 3 ADDED.
C/R 27075
PMK 13-09-01

MOUNTING FOR BOOMS UP TO 65mm WIDE/DIA.





MOUNTING FOR BOOMS UP TO 100mm WIDE/DIA.



NOTES:
1. BOOM MOUNTING KIT PART No. 15-42000-000.
2. SSPA SHOWN IS Ku-BAND MODEL 5908.
3. PROTECTIVE EARTH MUST BE CONNECTED TO GROUND

REMOVE BURRS & SHARP EDGES

DIMENSIONS IN mm

FILE No.
15\42000__4.DWG

CODAN

MATERIAL

FINISH

SCALE 1:2

DRN	SMC	27-02-97
CHKD	P.F.	30-04-97
APPD	DJM	13-2-98

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

TITLE
SSPA
FITTING INSTRUCTIONS
BOOM MOUNTING ACCESSORIES

DRAWING/DOC NO.
A1 15-42000-001

ISS 4

SHT. 2 OF 2

Appendix A—Summary of commands

This appendix provides a summary of commands used to view and change the operating parameters and status of the C-Band Transceiver 5700 series. It includes:

- help commands (A-2)
- view commands (A-3)
- control commands (A-4)
- set parameter commands (A-5)
- fault enable commands (A-7)
- logging commands (A-8)
- output commands (A-9)

Help commands

Help commands are not available if you are using packet protocol.

The help commands provide on-screen information for all commands available with ASCII protocol.

Table A-1: Help commands

Command	Data required	Displays...
HCC	None	Details of control commands
HFC	None	Details of fault enable commands
HLC	None	Details of logging commands
HLP	None	Details of help commands
HOC	None	Details of output commands
HPC	None	Details of set parameter commands
HVC	None	Details of view commands

View commands

View commands are not available if you are using packet protocol.

The view commands provide comprehensive information on the system.

Table A-2: View commands

Command	Data required	Displays...
VCS	None	Current status of the switches and control input lines of the transceiver
VFS	None	Current fault status of the transceiver
VID	None	Converter software revision and fitted options
VLS	None	Current PLL lock status of the converter
VPS	None	Current settings of the operating parameters
VSS	None	Current operational status of the transceiver
VST	None	Current temperature of the converter and SSPA
VTD	None	Available compensation data installed in the converter

Control commands

The control commands control the major functions of the transceiver. They are used when control via the serial interface is required.

Table A-3: Control commands

Command	Data required	Description
RCB	None	Resets the status poll change bits to no change (i.e. 0)
RST	None	Resets the microprocessor in the converter
SPA	0 = off 1 = on	Controls the activation of the SSPA
SPI	0 = off 1 = on	Overrides activation of the SSPA
SSO	0 = standby 1 = on	Controls the standby/on state of the transceiver

Set parameter commands

The set parameter commands are used to set the operating parameters of the transceiver.

Table A-4: Set parameter commands

Command	Data required	Description
SAR	0 = 0 to 31 1 = 32 to 63 2 = 64 to 95 3 = 96 to 127	Sets the packet address range of the converter Command not available if using packet protocol
SCC	n where $0 \leq n \leq 15$	Sets the cable compensation of the transmit path Command not available to converters with D prefix serial numbers
SCT	0 = standard 1 = custom	Sets the converter compensation characteristic used in the converter
SEC	0 = off 1 = on	Controls the echo from the converter Command not available if using packet protocol
SIF	0 = 70 1 = 140	Sets the IF of the converter
SIM	0 = 50 1 = 75	Sets the IF impedance of the converter
SPM	0 = extended 1 = basic	Sets the SSPA control mode used in the converter
SPP	0 = Codan 1 = mode 1 2 = mode 2 3 = mode 3	Sets the packet protocol mode Command not available if using packet protocol

Table A-4: Set parameter commands (cont.)

Command	Data required	Description
SPT	0 = off 1 = custom 1 2 = custom 2 3 = custom 3 4 = 5705 5 = 5710 6 = 5720/30/40	Sets the SSPA compensation characteristic used in the converter
SPU	0 = last state 1 = transmit off	Sets the SSPA state on power up
SRA	n or nn where 0 ≤ n ≤ 25	Sets the receive attenuation of the converter (dB)
SRF	nnnn	Sets the receive frequency of the converter (MHz)
SRO	0 = off 1 = on	Sets whether or not transmission from the converter is inhibited during the warm-up period (transmission is inhibited if set to off)
STA	n or nn where 0 ≤ n ≤ 25	Sets the transmit attenuation of the converter (dB)
STF	nnnn	Sets the transmit frequency of the converter (MHz)

Fault enable commands

The fault enable commands are used to control fault monitoring of modules other than the converter.

Table A-5: Fault enable commands

Command	Data required	Description
SFE	0 = disabled 1 = enabled	Sets the fan fault reporting status of the converter
SLE	0 = disabled 1 = enabled	Sets the LNA fault reporting status of the converter
SPE	0 = disabled 1 = enabled	Sets the SSPA fault reporting status of the converter

Logging commands

Logging commands are not available if you are using packet protocol.

The logging commands control the logging functions provided by the converter.

Table A-6: Logging commands

Command	Data required	Description
SFL	0 = off 1 = on	Enables or disables fault logging; if enabled, faults will be logged as they occur
SLL	0 = off 1 = on	Enables or disables lock status logging; if enabled, the lock status changes will be logged as they occur
SSL	0 = off 1 = on	Enables or disables status logging; if enabled, status changes will be logged as they occur
STL	0 = off 1 = on	Enables or disables temperature logging for the SSPA and converter; if enabled, the temperatures will be logged every 5 minutes

Output parameter commands

The output commands are used to display information about the transceiver.

Table A-7: Output parameter commands

Command	Output	Displays...
OAD	0–127	Packet address setting Command not available if using packet protocol
OAR	0 = 0 to 31 1 = 32 to 63 2 = 64 to 95 3 = 96 to 127	Packet address range setting Command not available if using packet protocol
OCC	Cable compensation setting displayed as one or two numeric characters	Cable compensation setting Command not available to converters with D prefix serial numbers
OCD	Converter default compensation table name Custom converter compensation table name off Custom 1 SSPA compensation table name Custom 2 SSPA compensation table name Custom 3 SSPA compensation table name 5705 5710 5720–40 No Data	Names of temperature compensation tables available for the converter and SSPA

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OCN	5-character serial number	Serial number of the converter
OCS	Power switch: 0 = standby 1 = on SSPA switch: 0 = not activated 2 = activated SSPA switch: 0 = not inhibited 4 = inhibited H/W system on: 0 = standby 8 = on H/W SSPA activate: 0 = not activated 16 = activated H/W SSPA inhibit: 0 = not inhibited 32 = inhibited	Current control status of transceiver as one or two numeric characters, which is the sum of the values in the Output column
OCT	0 = standard 1 = custom	Converter temperature compensation type
ODP	See page 8-54, *Output configuration data*	All the transceiver configuration data
ODT	4-digit type number followed by 3-digit firmware version to two decimal places	Converter type and firmware version
OEC	0 = off 1 = on	Echo setting

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OFD	Max transmit frequency Min transmit frequency Max receive frequency Min receive frequency Synthesiser step size	Transmit and receive frequency of the converter and the synthesiser step size
OFE	0 = disabled 1 = enabled	Fan fault detection setting
OFL	0 = disabled 1 = enabled	Fault logging setting
OFS	Converter fault: 0 = OK 1 = fault LNA fault: 0 = OK 2 = fault SSPA fault: 0 = OK 4 = fault Temp fault: 0 = OK 8 = fault Fan fault: 0 = OK 16 = fault	Current fault status of transceiver as one or two numeric characters, which is the sum of the values in the Output column

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OID	Type number Firmware part number Firmware version number Firmware release date Converter bandwidth Synthesiser option	Identification information of the converter
OIF	0 = 70 MHz 1 = 140 MHz	IF frequency setting of the converter
OIM	0 = 50 Ω 1 = 75 Ω	IF impedance setting of the converter
OLE	0 = disabled 1 = enabled	LNA fault detection setting
OLL	0 = disabled 1 = enabled	Lock status logging setting
OLS	Tx local oscillator: 0 = locked 1 = unlocked Rx local oscillator: 0 = locked 2 = unlocked Tx synthesiser 1: 0 = locked 4 = unlocked Tx synthesiser 2: 0 = locked 8 = unlocked Rx synthesiser 1: 0 = locked 16 = unlocked Rx synthesiser 2: 0 = locked 32 = unlocked	Current PLL lock status of converter as one or two numeric characters, which is the sum of the values in the Output column

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OPA	0 = off 1 = on	SSPA activate setting
OPE	0 = disabled 1 = enabled	SSPA fault detection setting
OPI	0 = off 1 = on	SSPA inhibit setting
OPM	0 = extended 1 = basic	SSPA control mode
OPP	0 = Codan 1 = packet protocol mode 1 2 = packet protocol mode 2 3 = packet protocol mode 3	Packet protocol mode
OPT	0 = off 1 = custom 1 2 = custom 2 3 = custom 3 4 = 5705 5 = 5710 6 = 5720/30/40	SSPA compensation type
OPU	0 = last state 1 = transmit off	SSPA state on power up
ORA	Receive attenuation displayed in dB	Receive attenuation setting
ORF	Receive frequency in MHz	Receive frequency
ORO	0 = off 1 = on	Reference oscillator override setting

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OSL	0 = disabled 1 = enabled	Status logging setting
OSO	0 = standby 1 = on	System on setting
OSP	Fault: 0 = no change 1 = change Control: 0 = no change 2 = change System: 0 = no change 4 = change	Changes that have occurred in the fault, control or system status of the transceiver as one or two numeric characters, which is the sum of the values in the Output column
OSS	System on: 0 = standby 1 = on SSPA activate: 0 = not activated 2 = activated SSPA inhibit: 0 = not inhibited 4 = inhibited SSPA on: 0 = off 8 = on Tx IF: 0 = off 16 = on Reference oven: 0 = warming up 32 = warm	Current system status of transceiver as one or two numeric characters, which is the sum of the values in the Output column
OTA	Transmit attenuation displayed in dB	Transmit attenuation setting
OTC	Temperature in degrees Celsius	Current converter temperature

Table A-7: Output parameter commands (cont.)

Command	Output	Displays...
OTD	See page 8-46, *Output all identity data*	All the transceiver identity data
OTF	Transmit frequency in MHz	Transmit frequency
OTL	0 = disabled 1 = enabled	Temperature logging setting
OTP	Temperature in degrees Celsius	Current SSPA temperature Command not allowed if SSPA temperature compensation is set to off, i.e. **SPT0**.

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