No part of this manual may be reproduced, transcribed, translated into any language or transmitted in any form whatsoever without the prior written consent of Codan Limited.

© Copyright 2001 Codan Limited

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

Windows® is a registered trademark of Microsoft Corporation

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
№ ОС/1-CC-249
# Table of contents

## 1 About this manual
- Standards and icons ........................................... 1-2
- Definitions ......................................................... 1-3
  - Acronyms and abbreviations .............................. 1-3
  - Glossary ......................................................... 1-5
  - Units ......................................................... 1-6
  - Unit multipliers ............................................... 1-6
- About this issue .................................................. 1-7
- Associated documents ........................................ 1-7

## 2 C-Band transceiver compliance
- Electromagnetic compatibility and safety notices ........ 2-2
  - Complying with the European Radio and Telecommunications Terminal Equipment Directive .................. 2-3

## 3 Overview
- Introduction to the C-Band Transceiver 5700 series ....... 3-2
- Transceiver control and monitoring ......................... 3-3
- Control panel of the converter ................................ 3-4
- Converter options ............................................. 3-7
  - Frequency band options .................................. 3-7
  - Bandwidth options ....................................... 3-8
  - Synthesiser options ...................................... 3-8
- Solid state power amplifier options ......................... 3-9
  - Frequency band options .................................. 3-9
  - Output options ........................................... 3-9
  - Monitor port option ...................................... 3-9
- Transceiver configurations .................................. 3-10
- Outdoor modules ............................................... 3-14
  - Converter module ......................................... 3-14
  - 5705/5710/5720/5730/5740 SSPAs ......................... 3-15
  - 5760/5712H SSPAs ........................................ 3-15
  - Low noise amplifier ...................................... 3-15
  - Transmit reject filter .................................... 3-15
  - Power supply unit ........................................ 3-16
- Accessories ..................................................... 3-17
# Table of contents

## 4 Specifications
- Transmit section ................................................................. 4-2
- Receive section (excluding LNA) ........................................ 4-6
- Low noise amplifier ............................................................ 4-8
- Transmit reject filter .......................................................... 4-9
- General ................................................................................. 4-10
- Environmental ...................................................................... 4-14
- Physical ................................................................................. 4-15

## 5 How the transceiver works
- Converter module ................................................................. 5-2
  - Up converter ....................................................................... 5-2
  - Down converter .................................................................. 5-2
  - Synthesisers ....................................................................... 5-3
    - Control and fault detection ................................................ 5-3
- Solid state power amplifier ..................................................... 5-4
- Transmit reject filter ............................................................. 5-5

## 6 Installation
- Unpacking the equipment ....................................................... 6-2
- Safety precautions ............................................................... 6-3
  - Radiation warning .............................................................. 6-3
  - High voltage warning .......................................................... 6-3
- Installing the outdoor equipment ............................................. 6-5
  - Converter module .............................................................. 6-5
  - 5705/5710/5720/5730/5740 SSPAs ..................................... 6-6
  - 5760/5712H SSPAs ............................................................... 6-7
  - Low noise amplifier and transmit reject filter ....................... 6-8
  - Power supply unit .............................................................. 6-9
- Grounding recommendations .................................................. 6-11
- Welding precautions ............................................................. 6-12
- Serial interface ...................................................................... 6-13
  - RS232 interface ................................................................. 6-14
  - RS422 interface ................................................................. 6-14
- Monitor and control interface ................................................ 6-16
- Low noise amplifier interface ............................................... 6-19
- Cables .................................................................................. 6-20
  - Cable fabrication ............................................................... 6-22
  - Cable installation .............................................................. 6-23
7 Setting up the transceiver

Setting the converter option switches ............................................................... 7-2
Selecting mains or battery operation ............................................................... 7-3
Selecting the voltage at the RF connector ....................................................... 7-4
Setting serial interface parameters ................................................................. 7-5
Setting the interface configuration on the 5760/5712H SSPA .......................... 7-10
Switching on the transceiver ............................................................................. 7-11
DC supply configuration (5705/5710/5720/5730/5740 only) .......................... 7-11
AC supply configuration with 5582B or 5760/5712H ...................................... 7-12
Serial interface control during setup ................................................................. 7-14
Temporary interface connection ..................................................................... 7-14
HyperTerminal ................................................................................................. 7-15
Checking the connection between the terminal and transceiver ..................... 7-18
Setting converter parameters ......................................................................... 7-19
Power up mode ................................................................................................. 7-19
Frequency .......................................................................................................... 7-19
SSPA control mode .......................................................................................... 7-20
Fault enables ..................................................................................................... 7-21
Converter temperature compensation type ..................................................... 7-21
SSPA temperature compensation type ............................................................. 7-22
Cable compensation ......................................................................................... 7-23
Intermediate frequency .................................................................................... 7-26
IF impedance ...................................................................................................... 7-26
Reference oscillator override ........................................................................... 7-26
Mandatory transceiver settings for high power applications ............................ 7-28
Converter settings ............................................................................................ 7-28
SSPA settings ..................................................................................................... 7-28
Aligning the antenna ........................................................................................ 7-30
Setting the transmit attenuation ...................................................................... 7-31
Setting the receive attenuation ........................................................................ 7-33

8 Operating the transceiver

Switching on the transceiver ............................................................................ 8-2
DC supply configuration (5705/5710/5720/5730/5740 SSPAs) ......................... 8-2
AC supply configuration with 5582B or 5760/5712H ....................................... 8-3
Power control .................................................................................................... 8-5
Standby mode .................................................................................................... 8-5
Operating mode ............................................................................................... 8-6
Warm-up operation ........................................................................................... 8-6
LED indicators .......................................................... 8-7
Low noise amplifier operation ........................................ 8-8
Transceiver output level (5760/5712H SSPAs only) .............. 8-9
Activating/inhibiting the solid state power amplifier .......... 8-10
Fan operation (5710/5720/5730/5740 SSPAs only) ............. 8-13
Serial interface monitor and control ............................... 8-14
Protocol formats ........................................................ 8-15
  ASCII protocol ....................................................... 8-15
  Packet protocol ...................................................... 8-16
Operating commands .................................................. 8-21
  Help commands ...................................................... 8-21
  View commands ...................................................... 8-25
  Control commands .................................................. 8-29
  Set parameter commands ......................................... 8-31
  Fault enable commands .......................................... 8-37
  Logging commands ................................................ 8-38
  Output parameter commands ..................................... 8-40

9 Maintenance and fault finding

Precautions ................................................................ 9-2
  DC supply .............................................................. 9-2
  Connections to power supplies .................................. 9-2
  Non user-serviceable modules ................................... 9-2
Maintaining the solid state power amplifier fans ............. 9-3
Checking the reference oscillator frequency .................... 9-4
  Remote measurement .............................................. 9-4
  Local measurement ............................................... 9-4
  Adjusting the reference oscillator frequency ................. 9-5
Replacing fuses ......................................................... 9-7
  Converter fuse ........................................................ 9-7
  Power supply unit fuse ............................................ 9-8
Fault finding ............................................................ 9-9
  If technical assistance is required............................. 9-9
  Using the fault finding flow charts .............................. 9-10
Test procedures ....................................................... 9-27

10 Drawings
Appendix A—Summary of commands

- 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 parameter commands .............................................. A-9

Index
This page has been left blank intentionally.
## List of figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Control panel of the converter</td>
<td>3-4</td>
</tr>
<tr>
<td>3-2</td>
<td>DC supply configuration</td>
<td>3-11</td>
</tr>
<tr>
<td>3-3</td>
<td>AC supply configuration</td>
<td>3-12</td>
</tr>
<tr>
<td>3-4</td>
<td>High power transceiver configuration</td>
<td>3-13</td>
</tr>
<tr>
<td>6-1</td>
<td>Typical transceiver installation</td>
<td>6-4</td>
</tr>
<tr>
<td>6-2</td>
<td>LNA +15V switch position</td>
<td>6-9</td>
</tr>
<tr>
<td>6-3</td>
<td>Monitor/Control connector interface of the converter</td>
<td>6-18</td>
</tr>
<tr>
<td>6-4</td>
<td>LNA DC/ALARM connector interface of the converter</td>
<td>6-19</td>
</tr>
<tr>
<td>7-1</td>
<td>Mains/Battery switch</td>
<td>7-3</td>
</tr>
<tr>
<td>7-2</td>
<td>LNA +15V switch position</td>
<td>7-4</td>
</tr>
<tr>
<td>7-3</td>
<td>Recommended serial interface option switch settings</td>
<td>7-5</td>
</tr>
<tr>
<td>9-1</td>
<td>Reference oscillator adjustment</td>
<td>9-5</td>
</tr>
<tr>
<td>9-2</td>
<td>Location of the fuse on the converter</td>
<td>9-7</td>
</tr>
<tr>
<td>9-3</td>
<td>Main fault diagnosis chart</td>
<td>9-12</td>
</tr>
<tr>
<td>9-4</td>
<td>DC power supply system fault diagnosis chart</td>
<td>9-13</td>
</tr>
<tr>
<td>9-5</td>
<td>AC power supply (5582B) system fault diagnosis chart</td>
<td>9-14</td>
</tr>
<tr>
<td>9-6</td>
<td>5760/5712H SSPA supply system fault diagnosis chart</td>
<td>9-15</td>
</tr>
<tr>
<td>9-7</td>
<td>5705/5710/5720/5730/5740 SSPA fault diagnosis chart</td>
<td>9-16</td>
</tr>
<tr>
<td>9-8</td>
<td>5760/5712H SSPA fault diagnosis chart</td>
<td>9-17</td>
</tr>
<tr>
<td>9-9a</td>
<td>Fan fault diagnosis chart</td>
<td>9-18</td>
</tr>
<tr>
<td>9-9b</td>
<td>Fan fault diagnosis chart continued</td>
<td>9-19</td>
</tr>
<tr>
<td>9-10a</td>
<td>5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart</td>
<td>9-20</td>
</tr>
<tr>
<td>9-10b</td>
<td>5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart continued</td>
<td>9-21</td>
</tr>
<tr>
<td>9-11</td>
<td>5760/5712H SSPA temperature fault diagnosis chart</td>
<td>9-22</td>
</tr>
<tr>
<td>9-12a</td>
<td>LNA fault diagnosis chart A</td>
<td>9-23</td>
</tr>
<tr>
<td>9-12b</td>
<td>LNA fault diagnosis chart A continued</td>
<td>9-24</td>
</tr>
<tr>
<td>9-13a</td>
<td>LNA fault diagnosis chart B</td>
<td>9-25</td>
</tr>
<tr>
<td>9-13b</td>
<td>LNA fault diagnosis chart B continued</td>
<td>9-26</td>
</tr>
</tbody>
</table>
This page has been left blank intentionally.
## List of tables

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Safe distance for 1.8 m diameter antenna with 40 W transceiver</td>
<td>2-5</td>
</tr>
<tr>
<td>2-2</td>
<td>Safe distance for 1.8 m diameter antenna with 120 W transceiver</td>
<td>2-5</td>
</tr>
<tr>
<td>2-3</td>
<td>Earth symbols</td>
<td>2-6</td>
</tr>
<tr>
<td>2-4</td>
<td>Warning labels</td>
<td>2-6</td>
</tr>
<tr>
<td>3-1</td>
<td>Frequency band options for the converter</td>
<td>3-7</td>
</tr>
<tr>
<td>3-2</td>
<td>Frequency band options for the 5705/5710/5720/5730/5740 SSPAs</td>
<td>3-9</td>
</tr>
<tr>
<td>6-1</td>
<td>Interconnection of standard cables</td>
<td>6-20</td>
</tr>
<tr>
<td>7-1</td>
<td>Option switches</td>
<td>7-2</td>
</tr>
<tr>
<td>7-2</td>
<td>Position of DIP option switches for serial interface operating mode</td>
<td>7-6</td>
</tr>
<tr>
<td>7-3</td>
<td>Position of DIP option switches for general serial interface parameters</td>
<td>7-7</td>
</tr>
<tr>
<td>7-4</td>
<td>Position of DIP option switches for serial interface RS422</td>
<td>7-8</td>
</tr>
<tr>
<td>7-5</td>
<td>Position of DIP option switches for serial interface packet address</td>
<td>7-9</td>
</tr>
<tr>
<td>7-6</td>
<td>Available frequency ranges</td>
<td>7-20</td>
</tr>
<tr>
<td>7-7</td>
<td>SSPA control mode commands</td>
<td>7-20</td>
</tr>
<tr>
<td>7-8</td>
<td>Fault enable commands</td>
<td>7-21</td>
</tr>
<tr>
<td>7-9</td>
<td>Standard SSPA type</td>
<td>7-22</td>
</tr>
<tr>
<td>7-10</td>
<td>Cable compensation settings (70 MHz IF)</td>
<td>7-24</td>
</tr>
<tr>
<td>7-11</td>
<td>Cable compensation settings (140 MHz IF)</td>
<td>7-25</td>
</tr>
<tr>
<td>7-12</td>
<td>Mandatory converter settings</td>
<td>7-28</td>
</tr>
<tr>
<td>7-13</td>
<td>Mandatory SSPA settings</td>
<td>7-28</td>
</tr>
<tr>
<td>7-14</td>
<td>Recommended SSPA settings</td>
<td>7-29</td>
</tr>
<tr>
<td>8-1</td>
<td>LED indications</td>
<td>8-7</td>
</tr>
<tr>
<td>8-2</td>
<td>Error responses</td>
<td>8-20</td>
</tr>
<tr>
<td>8-3</td>
<td>SSPA control mode settings</td>
<td>8-33</td>
</tr>
<tr>
<td>8-4</td>
<td>Transmit frequency ranges</td>
<td>8-34</td>
</tr>
<tr>
<td>8-5</td>
<td>Receive frequency ranges</td>
<td>8-34</td>
</tr>
<tr>
<td>9-1</td>
<td>Power supply fuses</td>
<td>9-8</td>
</tr>
<tr>
<td>9-2</td>
<td>Customer service contact numbers</td>
<td>9-9</td>
</tr>
<tr>
<td>9-3</td>
<td>Test A</td>
<td>9-27</td>
</tr>
<tr>
<td>9-4</td>
<td>Test B</td>
<td>9-27</td>
</tr>
<tr>
<td>9-5</td>
<td>Test C</td>
<td>9-27</td>
</tr>
<tr>
<td>9-6</td>
<td>Test D</td>
<td>9-28</td>
</tr>
<tr>
<td>9-7</td>
<td>Test E</td>
<td>9-28</td>
</tr>
<tr>
<td>9-8</td>
<td>Test F</td>
<td>9-28</td>
</tr>
<tr>
<td>9-9</td>
<td>Test G</td>
<td>9-29</td>
</tr>
<tr>
<td>9-10</td>
<td>Test H</td>
<td>9-29</td>
</tr>
</tbody>
</table>
List of tables

Table 9-11: Test J ................................................................. 9-29
Table 9-12: Test K ................................................................. 9-30
Table 9-13: Test L ................................................................. 9-30
Table 9-14: Test M ................................................................. 9-30
Table 9-15: Test N ................................................................. 9-30
Table 9-16: Test P ................................................................. 9-31
Table 9-17: Test Q ................................................................. 9-31
Table A-1: Help commands .................................................. A-2
Table A-2: View commands .................................................. A-3
Table A-3: Control commands .............................................. A-4
Table A-4: Set parameter commands .................................... A-5
Table A-5: Fault enable commands ....................................... A-7
Table A-6: Logging commands .............................................. A-8
Table A-7: Output parameter commands ............................... A-9
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:

<table>
<thead>
<tr>
<th>This typeface</th>
<th>Means...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BOLD</strong></td>
<td>a button, switch, LED, connector or displayed text</td>
</tr>
<tr>
<td><strong>Bold</strong></td>
<td>a command that you enter or keyboard key that you press</td>
</tr>
<tr>
<td><strong>Courier</strong></td>
<td>a segment of text that is taken directly from a computer screen</td>
</tr>
<tr>
<td><strong>Italics</strong></td>
<td>a cross-reference or text requiring emphasis</td>
</tr>
<tr>
<td><strong>UPPER CASE</strong></td>
<td>a switch position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>This icon</th>
<th>Means...</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://example.com/warning-icon.png" alt="warning" /></td>
<td>a warning—your actions may cause harm to yourself or the equipment</td>
</tr>
<tr>
<td><img src="https://example.com/caution-icon.png" alt="caution" /></td>
<td>a caution—proceed with caution as your actions may lead to loss of data, privacy or signal quality</td>
</tr>
<tr>
<td><img src="https://example.com/note-icon.png" alt="note" /></td>
<td>a note—the text provided next to this icon may be of interest to you</td>
</tr>
<tr>
<td><img src="https://example.com/step-icon.png" alt="step" /></td>
<td>a step to follow</td>
</tr>
</tbody>
</table>
### Definitions

#### Acronyms and abbreviations

<table>
<thead>
<tr>
<th>This term</th>
<th>Means...</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>alternating current</td>
</tr>
<tr>
<td>AGC</td>
<td>automatic gain control</td>
</tr>
<tr>
<td>ASCII</td>
<td>American standard code for information interchange</td>
</tr>
<tr>
<td>AWG</td>
<td>American wire gauge</td>
</tr>
<tr>
<td>BW</td>
<td>bandwidth</td>
</tr>
<tr>
<td>CTS</td>
<td>clear to send</td>
</tr>
<tr>
<td>CW</td>
<td>continuous wave, carrier wave</td>
</tr>
<tr>
<td>DC</td>
<td>direct current</td>
</tr>
<tr>
<td>DCE</td>
<td>data communication equipment</td>
</tr>
<tr>
<td>DIP</td>
<td>dual inline package</td>
</tr>
<tr>
<td>EMC</td>
<td>electromagnetic compatibility</td>
</tr>
<tr>
<td>FET</td>
<td>field effect transistor</td>
</tr>
<tr>
<td>FM</td>
<td>frequency modulation</td>
</tr>
<tr>
<td>GaAs</td>
<td>Gallium Arsenide</td>
</tr>
<tr>
<td>GCP</td>
<td>gain compression point</td>
</tr>
<tr>
<td>GND</td>
<td>ground</td>
</tr>
<tr>
<td>G/T</td>
<td>gain/temperature</td>
</tr>
<tr>
<td>H</td>
<td>hexadecimal</td>
</tr>
<tr>
<td>H/W</td>
<td>hardware</td>
</tr>
<tr>
<td>HEMT</td>
<td>high electron mobility transistor</td>
</tr>
<tr>
<td>HPA</td>
<td>high power amplifier</td>
</tr>
<tr>
<td>IF</td>
<td>intermediate frequency</td>
</tr>
<tr>
<td>ICNIRP</td>
<td>International Commission on Non-Ionizing Radiation Protection</td>
</tr>
<tr>
<td>LED</td>
<td>light emitting diode</td>
</tr>
<tr>
<td>LNA</td>
<td>low noise amplifier</td>
</tr>
<tr>
<td>This term</td>
<td>Means...</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>LO</td>
<td>local oscillator</td>
</tr>
<tr>
<td>LSB</td>
<td>least significant bit</td>
</tr>
<tr>
<td>MS</td>
<td>military specification</td>
</tr>
<tr>
<td>MSB</td>
<td>most significant bit</td>
</tr>
<tr>
<td>NC</td>
<td>normally closed</td>
</tr>
<tr>
<td>NO</td>
<td>normally open</td>
</tr>
<tr>
<td>OMT</td>
<td>ortho-mode transducer</td>
</tr>
<tr>
<td>OPBO</td>
<td>output back off</td>
</tr>
<tr>
<td>PC</td>
<td>personal computer</td>
</tr>
<tr>
<td>PLL</td>
<td>phase locked loop</td>
</tr>
<tr>
<td>PSU</td>
<td>power supply unit</td>
</tr>
<tr>
<td>QPSK</td>
<td>quadrature phase shift keying</td>
</tr>
<tr>
<td>RD</td>
<td>receive data</td>
</tr>
<tr>
<td>RF</td>
<td>radio frequency</td>
</tr>
<tr>
<td>RTS</td>
<td>request to send</td>
</tr>
<tr>
<td>R&amp;TTE</td>
<td>radio and telecommunications terminal equipment</td>
</tr>
<tr>
<td>Rx</td>
<td>receive</td>
</tr>
<tr>
<td>SHF</td>
<td>super high frequency</td>
</tr>
<tr>
<td>SSB</td>
<td>single sideband</td>
</tr>
<tr>
<td>SSPA</td>
<td>solid state power amplifier</td>
</tr>
<tr>
<td>TD</td>
<td>transmit data</td>
</tr>
<tr>
<td>TRF</td>
<td>transmit reject filter</td>
</tr>
<tr>
<td>TWTA</td>
<td>travelling wave tube amplifier</td>
</tr>
<tr>
<td>Tx</td>
<td>transmit</td>
</tr>
<tr>
<td>VSWR</td>
<td>voltage standing wave ratio</td>
</tr>
</tbody>
</table>
## Glossary

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

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

### Unit multipliers

<table>
<thead>
<tr>
<th>Unit</th>
<th>Name</th>
<th>Multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>milli</td>
<td>$10^{-3}$</td>
</tr>
<tr>
<td>d</td>
<td>deci</td>
<td>$10^{-1}$</td>
</tr>
<tr>
<td>k</td>
<td>kilo</td>
<td>$10^3$</td>
</tr>
<tr>
<td>M</td>
<td>mega</td>
<td>$10^6$</td>
</tr>
<tr>
<td>G</td>
<td>giga</td>
<td>$10^9$</td>
</tr>
</tbody>
</table>
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)
This page has been left blank intentionally.
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); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements’


- 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 <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:

<table>
<thead>
<tr>
<th>PSU/SSPA</th>
<th>Cable (Codan part number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5582B</td>
<td>08-05634-xxx</td>
</tr>
<tr>
<td>5760/5712H</td>
<td>08-05961-xxx</td>
</tr>
</tbody>
</table>

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.
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.

<table>
<thead>
<tr>
<th>Antenna elevation angle (degrees)</th>
<th>Safe distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>26.5</td>
</tr>
<tr>
<td>15</td>
<td>12.5</td>
</tr>
<tr>
<td>30</td>
<td>6.0</td>
</tr>
<tr>
<td>45</td>
<td>3.6</td>
</tr>
<tr>
<td>60</td>
<td>2.4</td>
</tr>
<tr>
<td>75</td>
<td>1.7</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Antenna elevation angle (degrees)</th>
<th>Safe distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>27.5</td>
</tr>
<tr>
<td>15</td>
<td>13.0</td>
</tr>
<tr>
<td>30</td>
<td>6.0</td>
</tr>
<tr>
<td>45</td>
<td>4.0</td>
</tr>
<tr>
<td>60</td>
<td>3.0</td>
</tr>
<tr>
<td>75</td>
<td>2.0</td>
</tr>
</tbody>
</table>

In the limit case, a 7.2 m diameter antenna with a 60 W transceiver system does not require a fence or barrier.
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>
<thead>
<tr>
<th>Symbols</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Protective earth symbol]</td>
<td>Protective earth</td>
</tr>
<tr>
<td>![Earth symbol]</td>
<td>Earth</td>
</tr>
</tbody>
</table>

**Warning labels**

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

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![The surface may be hot to touch symbol]</td>
<td>The surface may be hot to touch</td>
</tr>
<tr>
<td>![Non-ionising radiation may be emitted symbol]</td>
<td>Non-ionising radiation may be emitted</td>
</tr>
<tr>
<td>![If you intend to process or recycle this product, refer to the current Material Safety Data Sheet symbol]</td>
<td>If you intend to process or recycle this product, refer to the current Material Safety Data Sheet</td>
</tr>
</tbody>
</table>

**Table 2-3: Earth symbols**

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Protective earth symbol]</td>
<td>Protective earth</td>
</tr>
<tr>
<td>![Earth symbol]</td>
<td>Earth</td>
</tr>
</tbody>
</table>

**Table 2-4: Warning labels**

<table>
<thead>
<tr>
<th>Symbols</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>![The surface may be hot to touch symbol]</td>
<td>The surface may be hot to touch</td>
</tr>
<tr>
<td>![Non-ionising radiation may be emitted symbol]</td>
<td>Non-ionising radiation may be emitted</td>
</tr>
<tr>
<td>![If you intend to process or recycle this product, refer to the current Material Safety Data Sheet symbol]</td>
<td>If you intend to process or recycle this product, refer to the current Material Safety Data Sheet</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Band option</th>
<th>Description</th>
<th>Transmit frequency (MHz)</th>
<th>Receive frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>C-Band, Extended</td>
<td>5850 to 6425</td>
<td>3625 to 4200</td>
</tr>
<tr>
<td>3</td>
<td>Insat</td>
<td>6725 to 7025</td>
<td>4500 to 4800</td>
</tr>
<tr>
<td>4</td>
<td>Palapa C &amp; Intelsat VIII-A</td>
<td>6425 to 6725(^a)</td>
<td>3400 to 3700(^b)</td>
</tr>
</tbody>
</table>

\(^a\) 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.
Overview

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

<table>
<thead>
<tr>
<th>Band option</th>
<th>Description</th>
<th>Transmit frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>C-Band, Extended</td>
<td>5850 to 6425</td>
</tr>
<tr>
<td>3&amp;4</td>
<td>Insat, Palapa C &amp; Intelsat VIII-A</td>
<td>6425 to 7025</td>
</tr>
</tbody>
</table>

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
AC supply configuration

- Monitor & Control (optional)
- Power Supply Unit 5582B
- Mains
- 48 V
- Tx IF 50/75 Ω
- Rx IF 50/75 Ω
- Power & Control
- SSPA Module 5705/10/20/30/40
- Tx RF
- Fan where fitted
- Tx RF
- Rx RF
- LNA
- TRF
- Rx RF
- C-Band Transceiver 5700 series
- Converter Module 5700
- Supply & Alarm connections (optional)
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.
Overview

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.
This page has been left blank intentionally.
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)
**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
Specifications

**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)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Minimum dBc/Hz</th>
<th>Maximum dBc/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Hz</td>
<td>-60</td>
<td>-75</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-70</td>
<td>-80</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-80</td>
<td>-85</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-90</td>
<td>-95</td>
</tr>
</tbody>
</table>

### Synthesiser step size

<table>
<thead>
<tr>
<th></th>
<th>1 MHz</th>
</tr>
</thead>
</table>

### Frequency stability

- **Temperature range:**
  - -40°C to +55°C: ±2 × 10^{-8}
  - Aging: ±1 × 10^{-7}/year

### Cable compensation\(^a\)

<table>
<thead>
<tr>
<th>Range</th>
<th>Range Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>narrow BW option</td>
<td>0 to +1.2 dB nominal, 16 steps</td>
</tr>
<tr>
<td>wide BW option</td>
<td>0 to +2.5 dB nominal, 16 steps</td>
</tr>
</tbody>
</table>

\(^a\) Cable compensation facility is not provided in converters with D prefix serial numbers.
Specifications

Receive section (excluding LNA)

**RF input**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>RF input range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band 2 (Extended)</td>
<td>3.625 to 4.200 GHz</td>
</tr>
<tr>
<td>Band 3 (Insat)</td>
<td>4.500 to 4.800 GHz</td>
</tr>
<tr>
<td>Band 4 (Palapa C &amp; Intelsat VIII-A)</td>
<td>3.400 to 3.700 GHz (software version 1.62 or later)</td>
</tr>
<tr>
<td></td>
<td>3.400 to 3.675 GHz (software version earlier than 1.62)</td>
</tr>
</tbody>
</table>

- 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**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>IF output range</th>
</tr>
</thead>
<tbody>
<tr>
<td>narrow BW option</td>
<td>70±20 MHz/140±20 MHz selectable</td>
</tr>
<tr>
<td>wide BW option</td>
<td>140±40 MHz</td>
</tr>
</tbody>
</table>

- Impedance: 50/75 Ω selectable
- 3\textsuperscript{rd} 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
<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Image rejection</strong></td>
<td>50 dB minimum</td>
</tr>
<tr>
<td><strong>Spurious output</strong></td>
<td>–65 dBm maximum</td>
</tr>
<tr>
<td><strong>Phase noise (SSB)</strong></td>
<td></td>
</tr>
<tr>
<td>100 Hz</td>
<td>–60 dBc/Hz maximum, –75 dBc/Hz typical</td>
</tr>
<tr>
<td>1 kHz</td>
<td>–70 dBc/Hz maximum, –80 dBc/Hz typical</td>
</tr>
<tr>
<td>10 kHz</td>
<td>–80 dBc/Hz maximum, –85 dBc/Hz typical</td>
</tr>
<tr>
<td>100 kHz</td>
<td>–90 dBc/Hz maximum, –95 dBc/Hz typical</td>
</tr>
<tr>
<td><strong>Synthesiser step size</strong></td>
<td>1 MHz</td>
</tr>
<tr>
<td><strong>Frequency stability</strong></td>
<td></td>
</tr>
<tr>
<td>–40°C to +55°C</td>
<td>±2 × 10⁻⁸</td>
</tr>
<tr>
<td>Aging</td>
<td>±1 × 10⁻⁷/year</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pass band</strong></td>
<td>3.625 to 4.200 GHz</td>
</tr>
<tr>
<td><strong>Insertion loss</strong></td>
<td>0.05 dB maximum</td>
</tr>
<tr>
<td><strong>Reject band</strong></td>
<td>5.850 to 6.425 GHz</td>
</tr>
<tr>
<td><strong>Rejection</strong></td>
<td>55 dB minimum</td>
</tr>
</tbody>
</table>
Specifications

General

**Input voltage**

<table>
<thead>
<tr>
<th>Model</th>
<th>DC Input Voltage</th>
<th>AC Input Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>5705/5710/5720/5730/5740</td>
<td>42 to 72 V DC (floating input) standard, or 115/230 V AC, ±15% with optional PSU 5582B</td>
<td>104 to 274 V AC, 47 to 63 Hz</td>
</tr>
<tr>
<td>5760/5712H</td>
<td>115/230 V AC, ±15% with optional PSU 5582B</td>
<td>115/230 V AC, ±15% with optional PSU 5582B</td>
</tr>
</tbody>
</table>

**Power consumption**

<table>
<thead>
<tr>
<th>DC Model</th>
<th>DC Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>5705</td>
<td>95 W maximum SSPA On</td>
</tr>
<tr>
<td>5710</td>
<td>160 W maximum SSPA On</td>
</tr>
<tr>
<td>5720</td>
<td>200 W maximum SSPA On</td>
</tr>
<tr>
<td>5730</td>
<td>220 W maximum SSPA On</td>
</tr>
<tr>
<td>5740</td>
<td>280 W maximum SSPA On</td>
</tr>
<tr>
<td></td>
<td>40 W maximum SSPA Off</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AC Model</th>
<th>AC Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>5705</td>
<td>150 VA maximum SSPA On</td>
</tr>
<tr>
<td>5710</td>
<td>240 VA maximum SSPA On</td>
</tr>
<tr>
<td>5720</td>
<td>310 VA maximum SSPA On</td>
</tr>
<tr>
<td>5730</td>
<td>340 VA maximum SSPA On</td>
</tr>
<tr>
<td>5740</td>
<td>370 VA maximum SSPA On</td>
</tr>
<tr>
<td>5760</td>
<td>440 VA typical SSPA On</td>
</tr>
<tr>
<td>5712H</td>
<td>760 VA typical SSPA On</td>
</tr>
</tbody>
</table>

(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 monitoring functions

<table>
<thead>
<tr>
<th>(serial interface)</th>
<th>Standby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote monitor and control facilities (cont.)</td>
<td></td>
</tr>
<tr>
<td>Standby</td>
<td>On</td>
</tr>
<tr>
<td>Warm-up</td>
<td></td>
</tr>
<tr>
<td>SSPA on</td>
<td></td>
</tr>
<tr>
<td>Converter fault</td>
<td></td>
</tr>
<tr>
<td>LNA fault</td>
<td></td>
</tr>
<tr>
<td>SSPA fault</td>
<td></td>
</tr>
<tr>
<td>Temperature fault</td>
<td></td>
</tr>
<tr>
<td>Fan fault</td>
<td></td>
</tr>
<tr>
<td>Converter temperature</td>
<td></td>
</tr>
<tr>
<td>SSPA temperature</td>
<td></td>
</tr>
<tr>
<td>SSPA inhibit control</td>
<td></td>
</tr>
<tr>
<td>SSPA activate control</td>
<td></td>
</tr>
<tr>
<td>Transmit frequency</td>
<td></td>
</tr>
<tr>
<td>Receive frequency</td>
<td></td>
</tr>
<tr>
<td>Transmit attenuation</td>
<td></td>
</tr>
<tr>
<td>Receive attenuation</td>
<td></td>
</tr>
<tr>
<td>Power up mode</td>
<td></td>
</tr>
<tr>
<td>Cable compensation</td>
<td></td>
</tr>
<tr>
<td>Reference oscillator override</td>
<td></td>
</tr>
<tr>
<td>SSPA alarm enable</td>
<td></td>
</tr>
<tr>
<td>LNA alarm enable</td>
<td></td>
</tr>
<tr>
<td>Fan alarm enable</td>
<td></td>
</tr>
<tr>
<td>Temperature compensation select</td>
<td></td>
</tr>
<tr>
<td>Packet address (ASCII mode only)</td>
<td></td>
</tr>
<tr>
<td>Packet address range (ASCII mode only)</td>
<td></td>
</tr>
<tr>
<td>Packet protocol select</td>
<td></td>
</tr>
<tr>
<td>SSPA control mode select</td>
<td></td>
</tr>
<tr>
<td>Converter lock</td>
<td></td>
</tr>
<tr>
<td>Status change poll</td>
<td></td>
</tr>
<tr>
<td>IF impedance</td>
<td></td>
</tr>
<tr>
<td>IF frequency</td>
<td></td>
</tr>
</tbody>
</table>
**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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>–40°C to +55°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>100%</td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
</tr>
<tr>
<td>5700</td>
<td>Convection</td>
</tr>
<tr>
<td>5705</td>
<td>Convection</td>
</tr>
<tr>
<td>5710/5720/5730/5740</td>
<td>Forced air</td>
</tr>
<tr>
<td>5760/5712H</td>
<td>Forced air</td>
</tr>
<tr>
<td>Weatherproofing</td>
<td></td>
</tr>
<tr>
<td>5700</td>
<td>Sealed to 34 kPa</td>
</tr>
<tr>
<td>5705/5710/5720/5730/5740</td>
<td>Sealed to 34 kPa</td>
</tr>
<tr>
<td>5760/5712H</td>
<td>Sealed to IP66</td>
</tr>
</tbody>
</table>

### Power supply unit

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>–40°C to +55°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>100%</td>
</tr>
<tr>
<td>Cooling</td>
<td>Convection</td>
</tr>
<tr>
<td>Weatherproofing</td>
<td>Sealed to IP65</td>
</tr>
</tbody>
</table>
**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
This page has been left blank intentionally.
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.
How the transceiver works

**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.
How the transceiver works

This page has been left blank intentionally.
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

![LNA +15V switch position](image)

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 channeled 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*. 
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:

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Fuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 V</td>
<td>5 A/250 V Delay</td>
</tr>
<tr>
<td>230 V</td>
<td>2.5 A/250 V Delay</td>
</tr>
</tbody>
</table>

- 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.

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.
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:

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

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.
- **SSPA Activated**: Switches on and off if the reference oscillator override option is selected.
- **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:

<table>
<thead>
<tr>
<th>Description</th>
<th>RS232</th>
<th>RS422/ASCII or RS422/Packet/4W</th>
<th>RS422/Packet/2W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial output 1</td>
<td>RD</td>
<td>Tx+</td>
<td>Tx+ and Rx+</td>
</tr>
<tr>
<td>Serial input 1</td>
<td>TD</td>
<td>Rx+</td>
<td>No connection required</td>
</tr>
<tr>
<td>Serial input 2</td>
<td>RTS</td>
<td>Rx–</td>
<td>No connection required</td>
</tr>
<tr>
<td>Serial output 2</td>
<td>CTS</td>
<td>Tx–</td>
<td>Tx– and Rx–</td>
</tr>
</tbody>
</table>

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

- Contacts are shown in de-energised state
- Fault contacts are closed in fault state
- SSPA Activate contact is open when SSPA is activated
- Standby contact is closed when in standby
- Warm-up contact is closed during warm-up when timer override is off
  Warm-up contact switches between open and closed during warm-up when timer override is on

Maximum current through each opto-isolator is 20 mA
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

<table>
<thead>
<tr>
<th>Cable</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equipment</td>
<td>Connector</td>
</tr>
<tr>
<td><strong>Systems using 5705/5710/5720/5730/5740 SSPAs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>–</td>
<td>AC Mains to Flying leads</td>
<td>AC Mains</td>
</tr>
<tr>
<td>08-05634-xxx</td>
<td>Flying leads to MS3106F18-11S</td>
<td>DC supply</td>
</tr>
<tr>
<td>08-05634-xxx</td>
<td>Flying leads to MS3106F18-11S</td>
<td>5582B</td>
</tr>
<tr>
<td>08-05887-xxx</td>
<td>MS3116F12-10P to MS3116F12-10S</td>
<td>5700</td>
</tr>
<tr>
<td>–</td>
<td>N(P) to N(P) coaxial cable</td>
<td>5705/5710/ 5720/5730/ 5740</td>
</tr>
</tbody>
</table>
Table 6-1: Interconnection of standard cables (cont.)

<table>
<thead>
<tr>
<th>Cable</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part No.</strong></td>
<td><strong>Type</strong></td>
<td><strong>Equipment</strong></td>
</tr>
<tr>
<td><strong>Systems using 5760/5712H SSPAs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04-0969A-12</td>
<td>AC Mains to Amphenol T 3109 001</td>
<td>AC Mains</td>
</tr>
<tr>
<td>08-05961-xxx</td>
<td>MS3106F18-11P to MS3106F18-11S</td>
<td>5760/15712H</td>
</tr>
<tr>
<td>08-05857-xxx</td>
<td>MS3116F12-10P to MS3116F14-19S</td>
<td>5700</td>
</tr>
<tr>
<td><strong>Common cables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various</td>
<td>MS3116F10-6P to MS3116F8-4S</td>
<td>5700</td>
</tr>
<tr>
<td>08-05366-xxx</td>
<td>N(P) to N(P) coaxial cable</td>
<td>5700</td>
</tr>
<tr>
<td>08-05366-xxx</td>
<td>N(P) to N(P) coaxial cable</td>
<td>5700</td>
</tr>
<tr>
<td>–</td>
<td>WR137 Flex W/G</td>
<td>5705/5710/5720/5730/5740/5760/5712H</td>
</tr>
<tr>
<td>–</td>
<td>N(P) to N(P) coaxial cable</td>
<td>5700</td>
</tr>
<tr>
<td>–</td>
<td>N(P) to N(P) coaxial cable</td>
<td>5700</td>
</tr>
</tbody>
</table>

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 mm², approximately 13 AWG). Connect the wires in parallel to produce two conductors, each with a total cross-sectional area of 5 mm².

### 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.
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

<table>
<thead>
<tr>
<th>Left option switch group</th>
<th>Switch</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>RS232/RS422 interface select</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>ASCII/Packet protocol select</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>RS422 interface termination</td>
</tr>
<tr>
<td>4 &amp; 5</td>
<td></td>
<td>Data rate select</td>
</tr>
<tr>
<td>6 &amp; 7</td>
<td></td>
<td>Parity select</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Number of data bits select</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Right option switch group</th>
<th>Switch</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–5</td>
<td></td>
<td>Packet protocol address select</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>4-wire/2-wire mode select (RS485 only)</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>LNA +15 V ON/OFF</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Mains/Battery select</td>
</tr>
</tbody>
</table>

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 up the transceiver

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

<table>
<thead>
<tr>
<th>Switch position</th>
<th>RS232/422</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>RS232</td>
</tr>
<tr>
<td>ON</td>
<td>RS422</td>
</tr>
<tr>
<td>Switch position</td>
<td>ASCII/PKT</td>
</tr>
<tr>
<td>OFF</td>
<td>ASCII</td>
</tr>
<tr>
<td>ON</td>
<td>PACKET</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Switch positions</th>
<th>Switch positions</th>
<th>Data rate (bit/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch 0</td>
<td>Switch 1</td>
<td></td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
<td>1200</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td>2400</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
<td>4800</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
<td>9600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch positions</th>
<th>Data bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch position</td>
<td></td>
</tr>
</tbody>
</table>
| OFF | 7 data bits
| ON | 8 data bits

<table>
<thead>
<tr>
<th>Switch positions</th>
<th>Switch positions</th>
<th>Parity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch 0</td>
<td>Switch 1</td>
<td></td>
</tr>
</tbody>
</table>
| OFF | OFF | Do not use
| ON | OFF | Odd
| OFF | ON | Even
| ON | ON | None

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

<table>
<thead>
<tr>
<th>Switch position</th>
<th>4W/2W</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>4-wire RS485 operation</td>
</tr>
<tr>
<td>ON</td>
<td>2-wire RS485 operation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switch position</th>
<th>TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>Not terminated</td>
</tr>
<tr>
<td>ON</td>
<td>Terminated</td>
</tr>
</tbody>
</table>
Setting up the transceiver

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

<table>
<thead>
<tr>
<th>Switch positions</th>
<th>Packet address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch 0</td>
<td>Switch 1</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>ON</td>
<td>ON</td>
</tr>
</tbody>
</table>
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.
Setting up the transceiver

- 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:

1. From the Windows 95/98® Start icon, select Programs, then Accessories.
2. Click on HyperTerminal to open the HyperTerminal folder.
3. 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.
4. In the Name field, enter a name for the icon, e.g. 5700 Terminal.
5. In the Icon field, scroll to the icon you want and select it by clicking on it.
6. Click OK.
   The Phone Number window is displayed.
7. 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).
8. Click OK.
   The selected COM port Properties window is displayed depending on the communications port you selected.
9. 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
Setting up the transceiver

☐ 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

<table>
<thead>
<tr>
<th>Band option</th>
<th>Tx low (MHz)</th>
<th>Tx high (MHz)</th>
<th>Rx low (MHz)</th>
<th>Rx high (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5850</td>
<td>6425</td>
<td>3625</td>
<td>4200</td>
</tr>
<tr>
<td>3</td>
<td>6725</td>
<td>7025</td>
<td>4500</td>
<td>4800</td>
</tr>
<tr>
<td>4</td>
<td>6425</td>
<td>6725(^a)</td>
<td>3400</td>
<td>3700(^b)</td>
</tr>
</tbody>
</table>

\(^a\) 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

<table>
<thead>
<tr>
<th>Application</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a 5705/5710/5720/5730/5740 SSPA, select Extended mode</td>
<td>SPM0</td>
</tr>
<tr>
<td>Using a 5760/5712H or non-Codan SSPA(^a), select Basic mode</td>
<td>SPM1</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Application</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a 5705 SSPA</td>
<td>SPT4</td>
</tr>
<tr>
<td>Using a 5710 SSPA</td>
<td>SPT5</td>
</tr>
<tr>
<td>Using a 5720/5730/5740 SSPA</td>
<td>SPT6</td>
</tr>
<tr>
<td>Using a 5760/5712H SSPA or an SSPA that does not require temperature compensation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SPT0</td>
</tr>
<tr>
<td>Using an SSPA with a custom SSPA temperature compensation characteristic&lt;sup&gt;b&lt;/sup&gt;</td>
<td>SPT1, SPT2 or SPT3</td>
</tr>
</tbody>
</table>

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

<sup>b</sup> 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)

<table>
<thead>
<tr>
<th>Cable length</th>
<th>RG58</th>
<th>RG8</th>
<th>FSJ1-50A Heliax</th>
<th>Belden 9913</th>
<th>RG6</th>
<th>RG11</th>
<th>Belden 9116</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metres/Feet</td>
<td>50 Ω</td>
<td>50 Ω</td>
<td>50 Ω</td>
<td>75 Ω</td>
<td>75 Ω</td>
<td>75 Ω</td>
<td>75 Ω</td>
</tr>
<tr>
<td>0–5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6–10</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>11–15</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>16–20</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21–25</td>
<td>9</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26–30</td>
<td>12</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>31–35</td>
<td>14</td>
<td>6</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>36–40</td>
<td>15</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>41–45</td>
<td>–</td>
<td>7</td>
<td>6</td>
<td>4</td>
<td>8</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>46–50</td>
<td>–</td>
<td>8</td>
<td>7</td>
<td>4</td>
<td>9</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>51–55</td>
<td>–</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>11</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>56–60</td>
<td>–</td>
<td>10</td>
<td>9</td>
<td>5</td>
<td>12</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>61–65</td>
<td>–</td>
<td>11</td>
<td>9</td>
<td>6</td>
<td>12</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>66–70</td>
<td>–</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>13</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>71–75</td>
<td>–</td>
<td>12</td>
<td>11</td>
<td>7</td>
<td>14</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>76–80</td>
<td>–</td>
<td>13</td>
<td>12</td>
<td>8</td>
<td>15</td>
<td>13</td>
<td>–</td>
</tr>
<tr>
<td>81–85</td>
<td>–</td>
<td>14</td>
<td>12</td>
<td>8</td>
<td>–</td>
<td>14</td>
<td>–</td>
</tr>
<tr>
<td>86–90</td>
<td>–</td>
<td>15</td>
<td>13</td>
<td>9</td>
<td>–</td>
<td>15</td>
<td>–</td>
</tr>
<tr>
<td>91–95</td>
<td>–</td>
<td>–</td>
<td>14</td>
<td>9</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>96–100</td>
<td>–</td>
<td>–</td>
<td>15</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>
Table 7-11:  Cable compensation settings (140 MHz IF)

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

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

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature compensation</td>
<td>On</td>
</tr>
<tr>
<td>Converter connection</td>
<td>Codan</td>
</tr>
<tr>
<td>RF gain</td>
<td>−10 dB—this setting can be changed if required to optimise system performance</td>
</tr>
</tbody>
</table>
**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**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum power alarm</td>
<td>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.</td>
</tr>
<tr>
<td>Minimum power alarm</td>
<td>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.</td>
</tr>
<tr>
<td>SSPA Alarm Style</td>
<td>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.</td>
</tr>
<tr>
<td>Auxiliary Alarm Sense</td>
<td>This setting can be left in either state because it is not used when the SSPA is operating with the Converter 5700.</td>
</tr>
<tr>
<td>RF mute</td>
<td>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.</td>
</tr>
</tbody>
</table>
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 \textbf{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 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 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.
- 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 SRA0 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.
This page has been left blank intentionally.
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 the transceiver

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 indicate 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

<table>
<thead>
<tr>
<th>LED</th>
<th>Colour</th>
<th>Indicates...</th>
</tr>
</thead>
<tbody>
<tr>
<td>POWER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STANDBY</td>
<td>Yellow</td>
<td>Transceiver is in standby mode</td>
</tr>
<tr>
<td>ON</td>
<td>Green</td>
<td>Transceiver is in operating mode</td>
</tr>
<tr>
<td>WARM-UP</td>
<td>Yellow</td>
<td>Transceiver is in warm-up mode (flashes if the warm-up period is overridden)</td>
</tr>
<tr>
<td>SSPA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSPA ON</td>
<td>Yellow</td>
<td>SSPA is on(^a)</td>
</tr>
<tr>
<td>FAULT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONV</td>
<td>Red</td>
<td>Converter has a fault condition</td>
</tr>
<tr>
<td>LNA</td>
<td>Red</td>
<td>LNA has a fault condition</td>
</tr>
<tr>
<td>SSPA</td>
<td>Red</td>
<td>SSPA has a fault condition</td>
</tr>
<tr>
<td>TEMP</td>
<td>Red</td>
<td>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</td>
</tr>
<tr>
<td>FAN</td>
<td>Red</td>
<td>SSPA cooling fan has failed to operate (not used in the high power transceiver)</td>
</tr>
</tbody>
</table>

\(^a\) 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.

   ![Hand Icon] 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-isolatedReq 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:

<table>
<thead>
<tr>
<th>Bit No.</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>LSB</td>
</tr>
<tr>
<td>1</td>
<td>Device address</td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>MSB</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Only sent if 8 data bits are selected. It is used to calculate the complete address.</td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Error</th>
<th>Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>ER1</td>
<td>No such command</td>
</tr>
<tr>
<td>ER2</td>
<td>Invalid command data</td>
</tr>
<tr>
<td>ER3</td>
<td>Command not allowed</td>
</tr>
</tbody>
</table>
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
>

C-Band Transceiver 5700 series Reference Manual 8-21
Operating the transceiver

**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.

<table>
<thead>
<tr>
<th>Command</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>System On</td>
<td>SSo n</td>
</tr>
<tr>
<td>SSPA Activate</td>
<td>SPAn n</td>
</tr>
<tr>
<td>SSPA Inhibit</td>
<td>SPI n</td>
</tr>
<tr>
<td>Reset Change Bits</td>
<td>RCB</td>
</tr>
<tr>
<td>Reset</td>
<td>RST</td>
</tr>
</tbody>
</table>

> 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.

<table>
<thead>
<tr>
<th>Command</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set Fault Logging</td>
<td>SFLn n</td>
</tr>
<tr>
<td>Set Status Logging</td>
<td>SSLn n</td>
</tr>
<tr>
<td>Set Lock status Logging</td>
<td>SLLn n</td>
</tr>
<tr>
<td>Set Temperature Logging</td>
<td>STL n</td>
</tr>
</tbody>
</table>

**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.

<table>
<thead>
<tr>
<th>Command</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set LNA Fault Enable</td>
<td>SLE n</td>
</tr>
<tr>
<td>Set SSPA Fault Enable</td>
<td>SPE n</td>
</tr>
<tr>
<td>Set Fan Fault Enable</td>
<td>SFEn  n</td>
</tr>
</tbody>
</table>

>
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< 6425a
Set Rx Frequency       > SRFnnnn 3625 <=nnnn< 4200a
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 Protocolb   > SPPn n ==> 0 - Codan
                      1-3 - Mode 1-3
Set Power Upc          > 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 SSPA Activate       > OPA
  Output SSPA Inhibit        > OPI
  Output Conv Comp Type      > OCT
  Output SSPA Comp Type      > OPT
  Output LNA Fault Enable    > OLE
  Output Fan Fault Enable    > OFE
  Output SSPA Fault Enable   > OPE
  Output SSPA Mode           > OPM
  Output Transmit Frequency  > OTF
  Output Receive Frequency   > ORF
  Output Cable Compensation  > OCC
  Output Impedance           > OIM
  Output IF Frequency        > OIF
  Output Address             > OAD
  Output Address Range       > OAR^a
  Output Identity Data       > OT^b
  Output Status Poll         > OSP^a
  Output Frequency Data      > OF^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.
Operating the transceiver

**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
-------------
```

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.

<table>
<thead>
<tr>
<th>SSPA Temp Comp Table</th>
<th>Conv Temp Comp Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  Off</td>
<td>0  Standard</td>
</tr>
<tr>
<td>1  No Data</td>
<td>1  No Data</td>
</tr>
<tr>
<td>2  No Data</td>
<td></td>
</tr>
<tr>
<td>3  No Data</td>
<td></td>
</tr>
<tr>
<td>4  5705</td>
<td></td>
</tr>
<tr>
<td>5  5710</td>
<td></td>
</tr>
<tr>
<td>6  5720–40</td>
<td></td>
</tr>
</tbody>
</table>

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
  
  \[
  n = \begin{cases} 
  0 & \text{for off (standby), or} \\
  1 & \text{for on} 
  \end{cases}
  \]

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
  
  \[
  n = \begin{cases} 
  0 & \text{for off (not activated), or} \\
  1 & \text{for on (activated)} 
  \end{cases}
  \]

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

\[ n = 0 \text{ to allow the SSPA to return to the state prior to power off, or} \]

\[ 1 \text{ to prevent a previous SPA1 command from switching the SSPA on when the transceiver is powered on} \]

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

\[ n = 0 \text{ for off (no echo), or} \]

\[ 1 \text{ for on (echo)} \]

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

\[ n = 0 \text{ for off (no override), or} \]

\[ 1 \text{ for on (override)} \]
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

\[ n = 0 \text{ for off, 5760/5712H, or} \]
\[ 1 \text{ for custom 1, or} \]
\[ 2 \text{ for custom 2, or} \]
\[ 3 \text{ for custom 3, or} \]
\[ 4 \text{ for 5705, or} \]
\[ 5 \text{ for 5710, or} \]
\[ 6 \text{ for 5720/5730/5740} \]

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

\[ n = 0 \text{ for extended mode, or} \]
\[ 1 \text{ for basic mode} \]

Table 8-3: SSPA control mode settings

<table>
<thead>
<tr>
<th>SSPA</th>
<th>SSPA control mode</th>
<th>Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>5705/5710/5720/5730/5740</td>
<td>Extended</td>
<td>0</td>
</tr>
<tr>
<td>5760/5712H</td>
<td>Basic</td>
<td>1</td>
</tr>
<tr>
<td>Non-Codan SSPA</td>
<td>Basic</td>
<td>1</td>
</tr>
</tbody>
</table>
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 \texttt{STFnnnn}, where \texttt{nnnn} is the transmit frequency in MHz.

Table 8-4: Transmit frequency ranges

<table>
<thead>
<tr>
<th>Converter band option</th>
<th>Low limit inclusive (MHz)</th>
<th>High limit inclusive (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>5850</td>
<td>6425</td>
</tr>
<tr>
<td>3</td>
<td>6725</td>
<td>7025</td>
</tr>
<tr>
<td>4</td>
<td>6425</td>
<td>6725a</td>
</tr>
</tbody>
</table>

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 \texttt{SRFnnnn}, where \texttt{nnnn} is the receive frequency in MHz.

Table 8-5: Receive frequency ranges

<table>
<thead>
<tr>
<th>Converter band option</th>
<th>Low limit inclusive (MHz)</th>
<th>High limit inclusive (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3625</td>
<td>4200</td>
</tr>
<tr>
<td>3</td>
<td>4500</td>
<td>4800</td>
</tr>
<tr>
<td>4</td>
<td>3400</td>
<td>3700a</td>
</tr>
</tbody>
</table>

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 $0 \leq n \leq 15$. 
Operating the transceiver

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

\[ n = \begin{align*} 
0 & \text{ for 0 to 31 address range, or} \\
1 & \text{ for 32 to 63 address range, or} \\
2 & \text{ for 64 to 95 address range, or} \\
3 & \text{ for 96 to 127 address range} 
\end{align*} \]

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

\[ n = \begin{align*} 
0 & \text{ for Codan mode, or} \\
1 & \text{ for packet protocol mode 1, or} \\
2 & \text{ for packet protocol mode 2, or} \\
3 & \text{ for packet protocol mode 3} 
\end{align*} \]
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 $SLE{n}$, where

\[ n = \begin{cases} 0 \text{ for disabled,} \\ 1 \text{ for enabled} \end{cases} \]

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 \texttt{SPEn}, where
  
  \begin{align*}
  n &= 0 \text{ for disabled, or} \\
  n &= 1 \text{ for enabled}
  \end{align*}

**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 \texttt{SFEn}, where
  
  \begin{align*}
  n &= 0 \text{ for disabled, or} \\
  n &= 1 \text{ for enabled}
  \end{align*}

**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
  
  \[ n = \begin{cases} 
  0 & \text{for disabled, or} \\
  1 & \text{for enabled} 
  \end{cases} \]

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
  
  \[ n = \begin{cases} 
  0 & \text{for disabled, or} \\
  1 & \text{for enabled} 
  \end{cases} \]

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
  
  \[ n = \begin{cases} 
  0 & \text{for disabled, or} \\
  1 & \text{for enabled} 
  \end{cases} \]
Operating the transceiver

Set temperature logging

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

To set the temperature logging:

- Enter \texttt{STLn}, where
  
  \[ n = \begin{cases} 
  0 & \text{for disabled}, \\
  1 & \text{for enabled} 
  \end{cases} \]

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 \texttt{OSO}. No data is required.
  
  The setting is displayed as either:
  
  \[ \begin{cases} 
  0 & \text{if the system on parameter is set to standby}, \\
  1 & \text{if the system on parameter is set to on} 
  \end{cases} \]

Output SSPA activate

To display the SSPA activate parameter setting:

- Enter \texttt{OPA}. No data is required.
  
  The setting is displayed as either:
  
  \[ \begin{cases} 
  0 & \text{if the SSPA activate parameter is set to off}, \\
  1 & \text{if the SSPA activate parameter is set to on} 
  \end{cases} \]
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.
Operating the transceiver

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
Operating the transceiver

**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

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.

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
Operating the transceiver

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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>System On</td>
<td>0 = Standby</td>
</tr>
<tr>
<td>Summary SSPA Activate</td>
<td>0 = Not activated</td>
</tr>
<tr>
<td>Summary SSPA Inhibit</td>
<td>0 = Not inhibited</td>
</tr>
<tr>
<td>SSPA On</td>
<td>0 = Off</td>
</tr>
<tr>
<td>Tx IF</td>
<td>0 = Off</td>
</tr>
<tr>
<td>Reference oven</td>
<td>0 = Warming up</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tx Local Oscillator</td>
<td>0 = Locked</td>
</tr>
<tr>
<td>Rx Local Oscillator</td>
<td>0 = Locked</td>
</tr>
<tr>
<td>Tx Synthesiser 1</td>
<td>0 = Locked</td>
</tr>
<tr>
<td>Tx Synthesiser 2</td>
<td>0 = Locked</td>
</tr>
<tr>
<td>Rx Synthesiser 1</td>
<td>0 = Locked</td>
</tr>
<tr>
<td>Rx Synthesiser 2</td>
<td>0 = Locked</td>
</tr>
</tbody>
</table>

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.
Operating the transceiver

**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)

Example:

4|0|15|1|0|0|1|0|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.
Operating the transceiver

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)

<table>
<thead>
<tr>
<th>Standard</th>
<th>5700DFLT</th>
<th>Off</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Data</td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td>No Data</td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td>5705</td>
<td>5710</td>
</tr>
<tr>
<td></td>
<td>5720–40</td>
<td>No Data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;</td>
</tr>
</tbody>
</table>
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
>
This page has been left blank intentionally.
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

Repairs 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 $1 \times 10^{-8}$ (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

<table>
<thead>
<tr>
<th>Mains supply</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 V AC</td>
<td>5 A/250 V Delay</td>
</tr>
<tr>
<td>230 V AC</td>
<td>2.5 A/250 V Delay</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Region</th>
<th>Office hours contact number</th>
<th>After hours contact number</th>
<th>Email address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia/Pacific</td>
<td>+61 8 8305 0311</td>
<td>+61 8 8305 0427</td>
<td><a href="mailto:asiatech.support@codan.com.au">asiatech.support@codan.com.au</a></td>
</tr>
<tr>
<td>UK, Europe and Middle East</td>
<td>+44 1252 717 272</td>
<td>+44 1252 741 300</td>
<td><a href="mailto:uktech.support@codan.com.au">uktech.support@codan.com.au</a></td>
</tr>
<tr>
<td>The Americas</td>
<td>+1 703 361 2721</td>
<td>+1 703 366 3690</td>
<td><a href="mailto:ustech.support@codan.com.au">ustech.support@codan.com.au</a></td>
</tr>
</tbody>
</table>

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

START

5700 ON LED

5700 WARM-UP LED

5700 SSPA FAULT LED

5700 TEMP FAULT LED

5700 LNA FAULT LED

5700 CONV FAULT LED

5700 POWER switch

Inhibit SSPA
Select Ref Override On

5700 WARM-UP LED

5700 fault

5700 fault

5700 fault

To power supply system fault diagnosis charts for DC, AC or 5760/5712H supply

Switch on

To SSPA fault diagnosis chart for 5705/5710/5720/5730/5740 or 5760/5712H

To Fan fault diagnosis

To SSPA temperature fault diagnosis chart for 5705/5710/5720/5730/5740 or 5760/5712H

To LNA fault diagnosis chart A or B

No faults
Check SSPA activation & inhibit controls
Figure 9-4: DC power supply system fault diagnosis chart

DC power supply system fault diagnosis chart

Check voltage on power cable (Test A)

OK? No

Correct 48 V supply problem

Yes

Check 5700 fuse

OK? No

Replace fuse

Yes

5700 faulty

* Refer to text
Figure 9-5: AC power supply (5582B) system fault diagnosis chart

AC power supply system fault diagnosis chart

Check voltage on power cable (Test A)

OK? No Yes

Check 5700 fuse

OK? No Yes

Replace fuse

5700 faulty

SS82B 48 V On LED

On Off

Check DC power cable

Check 5582B fuse(s)

OK? No Yes

Replace fuse(s)

Correct supply problem

* Refer to text
Figure 9-6: 5760/5712H SSPA supply system fault diagnosis chart

High power supply system fault diagnosis chart

BATT option selected?

Yes → Select BATT option *

No → Check 5700 fuse *

OK?

Yes → Replace fuse

No → Check voltage on power cable (Test B) *

OK?

Yes → 5700 faulty

No → Check voltage at SSPA (Test B) *

OK?

Yes → Power cable faulty

No → Check AC mains voltage at SSPA input

OK?

Yes → Correct supply problem

No → SSPA faulty

* Refer to text
Figure 9-7: 5705/5710/5720/5730/5740 SSPA fault diagnosis chart

Low power SSPA fault diagnosis chart

5700 TEMP FAULT LED

On

Is SSPA disconnected?

Yes

Connect SSPA

No

5700 SSPA FAULT LED

On

5700 faulty

OK?

No

Check 48 V at 5700 (Test C) *

OK?

Yes

5700 faulty

Check 'On' signal at cable end (Test E) *

OK?

Yes

SSPA faulty

Check 5700 at cable end (Test G) *

No

No

SSPA faulty

* Refer to text

Cable faulty

No

5700 faulty

OK?

Yes

Cable faulty

Reset SSPA fault by switching SSPA switch on 5700 to INHIBIT & then to REMOTE

Set SSPA switch on 5700 to ACTIVATE

Off

SSPA overloaded by Tx signal
Check Tx IF level and reduce if necessary

On

Off
Figure 9-8: 5760/5712H SSPA fault diagnosis chart

[Diagram of fault diagnosis chart]

* Refer to text
Figure 9-9a: Fan fault diagnosis chart

1. **Fan fault diagnosis chart**
   - **Using 5760/5712+ SSPA?**
     - Yes: Set SFE=0
     - No: Reset SSPA fault by switching SSPA switch on 5700 to INHIBIT & then to REMOTE
   - **5700 FAN FAULT LED**
     - On: 5700 faulty
     - Off: Set SSPA switch on 5700 to ACTIVATE
   - **5700 FAN FAULT LED**
     - Off: Is fan running? (Yes: 5700 faulty, No: Check for obstruction or seized bearings)
     - On: Is fan running? (Yes: 5700 faulty, No: 5700 faulty and possible fan fault)
   - Check for obstruction or seized bearings
   - **OK?**
     - No: Repair/replace fan as necessary
     - Yes: Continued next page
Figure 9-9b: Fan fault diagnosis chart continued

- Check for 12 V at the fan (Test J) → OK?
  - Yes → Fan faulty
  - No → Check for 12 V at SSPA (Test J) → OK?
    - Yes → SSPA faulty
    - No → Check for 12 V at 5700 (Test J) → OK?
      - Yes → Cable faulty
      - No → 5700 faulty

* Refer to text
Figure 9-10a: 5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart

Low power SSPA temperature fault diagnosis chart

5700 SSPA FAULT LED
On
Continued next page

Off
Set SSPA switch on 5700 to INHIBIT Wait 15–30 mins for SSPA to cool

5700 TEMP FAULT LED
On
Check 5700 at cable end (Test K) *

Off
SSPA faulty

Off

Is fan fitted?
No
Monitor system for recurrence of TEMP FAULT

Yes
Check fan is not obstructed and rotates freely when turned by hand

Set SSPA switch on 5700 to ACTIVATE

5700 TEMP FAULT LED
On

Off
Cable faulty

On
5700 faulty

Off

Is fan running?
No
5700 faulty

Yes
Monitor system for recurrence of TEMP FAULT

* Refer to text
Figure 9-10b: 5705/5710/5720/5730/5740 SSPA temperature fault diagnosis chart continued

```
Low power SSPA temperature fault diagnosis chart continued

Is SSPA disconnected? Yes

Connect SSPA

No

Check 48 V at cable end (Test C) *

OK? No

Check 'On' signal at cable end (Test E) *

OK? Yes

Check 'On' signal at 5700 (Test E) *

OK? Yes

5700 faulty

No

Check 48 V at 5700 (Test C) *

OK? No

Check 'On' signal at 5700 (Test E) *

OK? Yes

Cable faulty

No

Check 5700 at cable end (Test G) *

OK? Yes

SSPA faulty

No

Check 5700 at 5700 (Test G) *

OK? Yes

Cable faulty

* Refer to text
```
Figure 9-11: 5760/5712H SSPA temperature fault diagnosis chart

High power SSPA temperature fault diagnosis chart

Connect PC and run SSPA Manager software

No Over-temperature alarm?

Yes Set SSPA switch on 5700 to INHIBIT Wait 15–30 mins for SSPA to cool

Review SSPA latched alarms

Clear the temperature alarm

5700 TEMP FAULT LED

Off

Are fans running?

Yes

Check fans are not obstructed and bearings are not noisy Replace if necessary

No

Disconnect fans Check for 14 V (Test F)

Volts OK?

No

SSPA faulty

SSPA faulty

Yes

Fan(s) faulty

5700 TEMP FAULT LED

On

SSPA faulty

SSPA M & C cable faulty

5700 faulty

Disconnect SSPA M & C cable at SSPA Check 5700 and cable (Test D)

* Refer to text

5700 TEMP FAULT LED

On

SSPA faulty

5700 TEMP FAULT LED

Off

SSPA faulty
Figure 9-12a: LNA fault diagnosis chart A

- Reset LNA fault by switching POWER switch to STANDBY then to ON
- Check coaxial cable for intermittent short circuit
- Cable faulty
- Possible 5700 or LNA intermittent fault

* Refer to text
Figure 9-12b: LNA fault diagnosis chart A continued

1. **LNA fault diagnosis chart A continued**
   - Reset LNA fault by switching **POWER** switch to **STANDBY** then to **ON**
   - Check for +15 V at cable end (Test M) *

   **OK?**

   - No: Disconnect coaxial cable
   - Yes: LNA faulty
     - Reset LNA fault by switching **POWER** switch to **STANDBY** then to **ON**
     - Check for +15 V at 5700 (Test M) *

     **OK?**
     - No: LNA +15V switch ON?
       - No: Set LNA +15V switch to ON *
       - Yes: 5700 faulty
     - Yes: Coaxial cable faulty

* Refer to text
Figure 9-13a: LNA fault diagnosis chart B

- **LNA fault diagnosis chart B**

  1. **Reset LNA fault by switching POWER switch to STANDBY then to ON**
  2. **Check LNA/DC ALARM cable for intermittent short circuit**
     - **OK?**
       - **Yes**: Possible 5700 or LNA intermittent fault
       - **No**: LNA DC/ALARM cable faulty
  3. **Disconnect LNA**
  4. **Check for +15 V at LNA cable (Test P)**
     - **OK?**
       - **No**: Continued next page
       - **Yes**: Simulate LNA OK at cable end (Test Q)
  5. **Simulate LNA OK at 5700 (Test Q)**
     - **On**: 5700 faulty
     - **Off**: LNA faulty

* Refer to text
Figure 9-13b: LNA fault diagnosis chart B continued

LNA fault diagnosis chart B continued

Reset LNA fault by switching POWER switch to STANDBY then to ON

Check for +15 V at cable end (Test P) *

OK? No

Yes

LNA faulty

Disconnect coaxial cable

Reset LNA fault by switching POWER switch to STANDBY then to ON

Check for +15 V at 5700 (Test P) *

OK? No

Yes

LNA DC/ALARM cable faulty

5700 faulty

* Refer to text
Test procedures

The following tests are to be used in conjunction with the fault finding flow charts.

Table 9-3: Test A

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure the DC voltage at the <strong>DC POWER</strong> connector end of the 48 V supply cable. Connect positive to pins A and B, negative to pins C and D.</td>
<td>For correct operation, the DC voltage must be within the range 52 to 72 V DC with the <strong>MAINS/BATT</strong> option switched to MAINS, or within the range 42 to 72 V DC with the <strong>MAINS/BATT</strong> option switched to BATT.</td>
</tr>
</tbody>
</table>

Table 9-4: Test B

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>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 <strong>–48 V DC OUTPUTS</strong> connector of the SSPA Connect positive to pin A or B, negative to pin C or D.</td>
<td>For correct operation, the DC voltage must be within the range 46 to 50 V DC.</td>
</tr>
</tbody>
</table>

Table 9-5: Test C

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, measure the DC voltage at either: • the SSPA end of the converter to SSPA cable, or • the <strong>SSPA DC/CONTROL</strong> connector of the 5700 Connect positive to pin H and negative to pin J.</td>
<td>The DC voltage must be within the range 38 to 72 V DC.</td>
</tr>
</tbody>
</table>
### Table 9-6: Test D

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, either:</td>
<td>When the transceiver is on, the TEMP FAULT LED should be off.</td>
</tr>
<tr>
<td>• connect pins C and D together at the SSPA end of the converter to SSPA M &amp; C cable, or</td>
<td></td>
</tr>
<tr>
<td>• connect pins A and G together at the SSPA DC/CONTROL connector of the 5700</td>
<td></td>
</tr>
</tbody>
</table>

### Table 9-7: Test E

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, measure the DC voltage at either:</td>
<td>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.</td>
</tr>
<tr>
<td>• the SSPA end of the converter to SSPA cable, or</td>
<td></td>
</tr>
<tr>
<td>• the SSPA DC/CONTROL connector of the 5700</td>
<td></td>
</tr>
<tr>
<td>Connect positive to pin K and negative to pin J.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 9-8: Test F

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove the fan shroud and measure the DC voltage at the fan feed-through connections.</td>
<td>The DC voltage should be 14.0±0.2 V DC.</td>
</tr>
</tbody>
</table>
Table 9-9:  Test G

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, connect pins A, D and G together at either:</td>
<td>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.</td>
</tr>
<tr>
<td>• the SSPA end of the converter to SSPA cable, or</td>
<td></td>
</tr>
<tr>
<td>• the SSPA DC/CONTROL connector of the 5700</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-10:  Test H

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, either:</td>
<td>When the transceiver is on, the SSPA FAULT LED should be off.</td>
</tr>
<tr>
<td>• connect pins B and D together at the SSPA end of the converter to SSPA M &amp; C cable, or</td>
<td></td>
</tr>
<tr>
<td>• connect pins A and D together at the SSPA DC/CONTROL connector of the 5700</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-11:  Test J

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, measure the DC voltage at one of the following:</td>
<td>The DC voltage should be 12±0.2 V DC, when the SSPA is set to ACTIVATE.</td>
</tr>
<tr>
<td>• the fan feed-through connections on the SSPA, positive and negative as marked, or</td>
<td></td>
</tr>
<tr>
<td>• the SSPA end of the converter to SSPA cable, positive on pin B and negative on pin A, or</td>
<td></td>
</tr>
<tr>
<td>• the SSPA DC/CONTROL connector of the 5700, positive to pin B and negative to pin A</td>
<td></td>
</tr>
</tbody>
</table>
Table 9-12: Test K

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, connect pins A and G together at either:</td>
<td>When the transceiver is on, the TEMP FAULT LED should be off.</td>
</tr>
<tr>
<td>• the SSPA end of the converter to SSPA cable, or</td>
<td></td>
</tr>
<tr>
<td>• the <strong>SSPA DC/CONTROL</strong> connector of the 5700</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-13: Test L

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect to the LNA coaxial cable either:</td>
<td>When the transceiver is on, the LNA FAULT LED should be off.</td>
</tr>
<tr>
<td>• an LNA known to be working, or</td>
<td></td>
</tr>
<tr>
<td>• a 270 Ω, 2 W resistor between the centre pin and coaxial cable ground</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-14: Test M

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, measure the DC voltage at either:</td>
<td>The DC voltage should be 15.0±0.2 V DC.</td>
</tr>
<tr>
<td>• the LNA end of the converter to LNA coaxial cable, or</td>
<td></td>
</tr>
<tr>
<td>• the <strong>Rx RF I/P</strong> connector of the 5700</td>
<td></td>
</tr>
<tr>
<td>Connect positive to the centre pin and negative to ground (to the screen).</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-15: Test N

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connect to the LNA coaxial cable either:</td>
<td>When the transceiver is on, the LNA FAULT LED should be off.</td>
</tr>
<tr>
<td>• an LNA known to be working, or</td>
<td></td>
</tr>
<tr>
<td>• a 270 Ω, 2 W resistor between the centre pin and coaxial cable ground</td>
<td></td>
</tr>
</tbody>
</table>
Table 9-16: Test P

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>As applicable in the fault diagnosis chart, measure the DC voltage at either:</td>
<td>The DC voltage should be 15.0±0.2 V DC.</td>
</tr>
<tr>
<td>• the LNA end of the converter to LNA DC/ALARM cable, or</td>
<td></td>
</tr>
<tr>
<td>• the <strong>LNA DC/ALARM</strong> connector of the 5700</td>
<td></td>
</tr>
<tr>
<td>Connect positive to pin A and negative to pin B.</td>
<td></td>
</tr>
</tbody>
</table>

Table 9-17: Test Q

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>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:</td>
<td>When the transceiver is on, the <strong>LNA FAULT</strong> LED should be off.</td>
</tr>
<tr>
<td>• the LNA end of the converter to LNA DC/ALARM cable, or</td>
<td></td>
</tr>
<tr>
<td>• the <strong>LNA DC/ALARM</strong> connector of the 5700</td>
<td></td>
</tr>
</tbody>
</table>
Maintenance and fault finding

This page has been left blank intentionally.
## 10 Drawings

<table>
<thead>
<tr>
<th>Drawing</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03-00958</td>
<td>Mounting Details, Converter Module</td>
</tr>
<tr>
<td>03-00959</td>
<td>Converter Module, 5700</td>
</tr>
<tr>
<td>03-00960</td>
<td>RF/IF Level Diagram (Low power transceiver system)</td>
</tr>
<tr>
<td>03-00993</td>
<td>Power Supply Unit, 5580/1/2</td>
</tr>
<tr>
<td>03-00994</td>
<td>Mounting Details, Power Supply Unit</td>
</tr>
<tr>
<td>03-01014</td>
<td>RF/IF Level Diagram (High power transceiver system)</td>
</tr>
<tr>
<td>03-01097</td>
<td>Mounting Details, SSPA 30/40 Watt</td>
</tr>
<tr>
<td>03-01098</td>
<td>Mounting Details, SSPA 10/20 Watt</td>
</tr>
<tr>
<td>03-01099</td>
<td>Mounting Details, SSPA 5 Watt</td>
</tr>
<tr>
<td>08-05301</td>
<td>Cable, Serial to PC (DE-9S)</td>
</tr>
<tr>
<td>08-05634</td>
<td>Cable, Power</td>
</tr>
<tr>
<td>08-05857</td>
<td>Cable, High Power SSPA to Converter</td>
</tr>
<tr>
<td>08-05887</td>
<td>Cable, Converter to SSPA</td>
</tr>
<tr>
<td>08-05961</td>
<td>Cable, DC power, SSPA to Converter (CE)</td>
</tr>
<tr>
<td>0969D22</td>
<td>Interface Control Drawing (C-Band)</td>
</tr>
<tr>
<td>15-40128-001</td>
<td>Fitting Instructions, Supply and Redundancy Controller</td>
</tr>
<tr>
<td>15-40196-001</td>
<td>Fitting instructions, Converter/High Power SSPA</td>
</tr>
<tr>
<td>15-42000-001 sheet 1</td>
<td>Fitting Instructions, Boom Mounting</td>
</tr>
<tr>
<td>15-42000-001 sheet 2</td>
<td></td>
</tr>
</tbody>
</table>
This page has been left blank intentionally.
NOTE:
1. PROTECTIVE EARTH MUST BE CONNECTED TO GROUND
5700 SERIES C-BAND TRANSCEIVER RF/IF LEVEL DIAGRAM

Rx Levels shown result in an IF output S/N of approx. 25dB due to the LNA & antenna only (excluding skip & downlinks)

Tx levels shown are for single 10W carrier output from 5110 to 6 SSPA
Multi-carrier operation will require lower levels
DO NOT SCALE

DIMENSIONS IN mm

REMOVE BURRS & SHARP EDGES

CODAN
55Vc Power Supply Unit

ISSUE 2
TITLE BLOCK WAS
5982/5581,
C/R 26542
02-08-01 GHZ

FILE No.
03-00994_2D.png

POWER SUPPLY UNIT
MOUNTING DETAILS

SCALE
1:2

DATE
03-10-97

DRAWING/DOC No.
A3 03-00994

TOLERANCES
UNLESS OTHERWISE STATED

FINISH

2 PLACES DEC. +0.25
1 PLACE DEC. +0.8
0 PLACE DEC. +1
ANGULAR +2°

SB 1 2
5700 SERIES HIGH POWER C-BAND TRANSCEIVER RF/IF LEVEL DIAGRAM

Rx Levels shown result in an IF output C/Nc of approx 55dB/Hz due to the LNA & antenna only (excluding uplink & downlink)

Tx levels shown are for a single carrier at 20dB CRBO from 60W from 5780 80W SSPA.
30/40 WATT SSPA WITH N-TYPE OUTPUT

30/40 WATT SSPA WITH WAVEGUIDE OUTPUT
5 WATT SSPA WITH N-TYPE OUTPUT

5 WATT SSPA WITH WAVEGUIDE OUTPUT
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 (IEC-952) COMMUNICATIONS STANDARDS.
DO NOT SCALE

SEE NOTE 3

SEE NOTE 3

 SEE NOTE 4

SEE NOTE 4

WIRE FROM TO

WH J1/O P1/A
YE /T /B
GN /N /C
BL /B /D
VI /U /E
SN /J /F
BK /C /G
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 GRAMMET 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.

ITEM DESCRIPTION QTY MANUF. PRT No. MANUF. CODAN P/No
J1 SOCKET, 19 WAY MIL SOLDER POT 1 MS3166J-14-195 ITT-CANNON 60-00194-000
P1 PLUG, 10 WAY MIL SOLDER POT 1 MS42619-12-10P ITT-CANNON 60-00101-561
1 CABLE, 8 CORE 7/050 SCR. GREY SEE NOTE 1 MCE308P 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 71-32001

DIMENSIONS IN mm

CABINET, HP SSPA TO CONVERTER

MATERIAL
CHKO GHZ 07-09-2000
APPO GHZ 17-09-2001

FINISH

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

FILE No. 89/95857-1.0WG

B/N 1
ISS 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

J1 A P1 A 0V 0V
G /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
BN /H /H FUSED PWR + FUSED PWR -
EI /J /J PWR - PWR +
EI /K /K SW SW
BRAID SHELL SHELL 0V 0V

NOTES
1. LENGTH 'L' IS VARIANT EXTENSION IN 0.1m
   e.g. 'L.1xx.Xxxm' eg. 08-05887-020 IS 2.0m LONG.
2. ASSEMBLY No. 08-05887-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 3/1 UNDER THE CABLE OUTER SHEATH AT BOTH ENDS TO SEAL THE CABLE.

PART No. 08-05887-XXX [REFER NOTE 1]

**FILE NO.**
08-05887_A2DGW

**CODAN**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>MANUF. PRT No.</th>
<th>MANUF.</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>SOCKET, 10 WAY MIL SOLDER POT</td>
<td>1</td>
<td>MS3116F12-10S</td>
<td>ITT-CANNON</td>
</tr>
<tr>
<td>P1</td>
<td>PLUG, 10 WAY MIL SOLDER POT</td>
<td>1</td>
<td>MS3116F12-10P</td>
<td>ITT-CANNON</td>
</tr>
<tr>
<td>1</td>
<td>CABLE, 6 CORE 16/0.2 &amp; 4 CORES HC6002 SCR. GREY</td>
<td>SEF</td>
<td>HC6 685 GREY</td>
<td>HARTLAND</td>
</tr>
<tr>
<td>2</td>
<td>LUG, SOLDER 3.5mm</td>
<td>2</td>
<td>G410 Code 330</td>
<td>CLIFORD W</td>
</tr>
<tr>
<td>3</td>
<td>ADHESIVE/SEALANT, CLEAR RTV</td>
<td>A/R</td>
<td>5140</td>
<td>LOCTITE</td>
</tr>
</tbody>
</table>

DIMENSIONS IN mm

CABLE, CONV TO SSPA CONNECTOR

**SCALE**
1:1

**DATE**
20-06-2001

**DRN**
GS

**MATERIAL**
CHKD. PMK

**APPD**
GHZ

**FINISH**
2 PLACES DEC. x0.25
1 PLACE DEC. x0.0
0 PLACE DEC. x1

**SHT. 1 OF 1**
DO NOT SCALE

P1 - REAR VIEW
SCALE 2:1

J1 - REAR VIEW
SCALE 2:1

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>MANUFACTURER</th>
<th>MANUFACTURERS PART No</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CABLE, 2 CORE [16/0.20]</td>
<td>HARTLAND</td>
<td>HG2032</td>
<td>A/R</td>
</tr>
<tr>
<td>2</td>
<td>TUBING, HEATSHRINK</td>
<td>3M</td>
<td>FP-301, 1/4&quot;</td>
<td>25mm</td>
</tr>
<tr>
<td>3</td>
<td>BUSHING, TELESCOPING</td>
<td>ITT-CANNON</td>
<td>MS3420-4</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>BUSHING, TELESCOPING</td>
<td>ITT-CANNON</td>
<td>MS3420-6</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>BUSHING, TELESCOPING</td>
<td>ITT-CANNON</td>
<td>MS3420-8</td>
<td>1</td>
</tr>
<tr>
<td>J1</td>
<td>SOCKET, 5WAY</td>
<td>ITT-CANNON</td>
<td>MS3108E-18-11S</td>
<td>1</td>
</tr>
<tr>
<td>P1</td>
<td>PLUG, 2WAY</td>
<td>ITT-CANNON</td>
<td>MS3196F8-2P</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTES

1. LENGTH 'L' IS VARIABLE EXTENSION IN METRES
   ie L = XXXm
   ep 06-00961-003 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. 06-00961-ADW

CABLE, DC POWER
SSPA - CONVERTER [ICE]

MATERIAL

FINISH

TOLERANCES

UNLESS OTHERWISE STATED

DIMENSIONS IN mm

DRAWING/DOC NO. 06-00961

CODE: AD

DATE 23-11-01

DRAWN Codi

CHECKED GZ

APPROVED A3

SPEC A

0.5

0

T. 1

1
4 OFF MOUNTING BRACKETS, CODAN P/N 05-08999

TRIM TO LENGTH AS REQ'D

DO NOT OVERTIGHTEN

DO NOT SCALE

M8 x 250mm THREADS ROD
3 OFF M8 NUTS
2 OFF M8 SPRING WASHERS
3 OFF M8 FLAT WASHERS
(4 PLACES)

M8 x 16 SCREWS
M8 NUT
2 OFF M8 FLAT WASHER
M8 SPRING WASHER
(4 PLACES)

POWER SUPPLY SHOWN
(Scale 1:1)

ISSUE 2
BALLOONS DELETED
PART DESCRA ADDED
C/R 26544
DB 08-08-96

ISSUE 3
TITLE WAS 'SUPPLY MODULE/ETC'
C/R 5580/5581 POWER SUPPLY
QD VIEW ADDED
C/R 25653
28-10-97 D3

ISSUE 4
TITLE MADE GENERIC
C/R 26544
05-08-91 RHZ

© CODAN PTY LTD ACN 007 590 505 1995

TITLE
POWER SUPPLY/REDUNDANCY CONTROLLER FITTING INSTRUCTIONS
DRAWING/DOC NO.
A3.15-40128-001

MATERIAL

FINISH

TO,ERANCES UNLESS OTHERWISE STATED
2 PLACES DEC. +0.25
1 PLACE DEC. +0.5
0 PLACE DEC. +1
ANGULAR +2°

DIMENSIONS IN mm

FILE No.
15-40128-001.DWG
SUGGESTED FITTING INSTRUCTIONS

1. ATTACH UPPER SLOTTED CHANNEL ITEMS 14-23 TO POLE WITH M2 HEXaken THREADED ROD ITEM 21, M2 NUTS, FLAT WASHERS & SPRING WASHERS ITEMS 5-11.
2. ATTACH SSPA TO 100mm SLOTTED CHANNEL ITEM 6 AS SHOWN WITH M2 SCREWS, FLAT WASHERS & SPRING WASHERS ITEMS 4-6.
3. ATTACH LOWER SLOTTED CHANNEL ITEMS 18-19 TO POLE WITH M2 THREADED ROD ITEM 21, M2 NUTS, FLAT WASHERS & SPRING WASHERS ITEMS 5-11. DO NOT OVERTIGHTEN.
4. SLIDE LOWER SLOTTED CHANNEL UNTIL LOWER MOUNTING HOLES ON SSPA ALIGN WITH SLOTTED CHANNEL & FIT SSPA WITH M8 SCREWS, FLAT WASHERS & SPRING WASHERS ITEMS 4-6.
5. ATTACH WIDE-SPACING BRACKET ITEM 161 NEXT TO SSPA WITH M8 SCREWS, NUTS, FLAT WASHERS & SPRING WASHERS ITEMS 8-11.
6. ATTACH CONVERTER TO WIDE-SPACING BRKT ITEM 161 WITH M8 SCREWS, NUTS, FLAT WASHERS & SPRING WASHERS ITEMS 8-11.
7. TIGHTEN ALL THREADED RODS & SCREWS.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SLOTTED CHANNEL, 700mm</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>SLOTTED CHANNEL, 400mm</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>M2x50mm THREADED ROD</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>M2x25 SKT CAP SCREW</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>M2 SPRING WASHER</td>
<td>12</td>
</tr>
<tr>
<td>6</td>
<td>M2 FLAT WASHER</td>
<td>12</td>
</tr>
<tr>
<td>7</td>
<td>M2 HEX NUT, SELF LOCKING</td>
<td>8</td>
</tr>
<tr>
<td>8</td>
<td>M10x40 HEX SCREW</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>M10 SPRING WASHER</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>M10 FLAT WASHER</td>
<td>8</td>
</tr>
<tr>
<td>11</td>
<td>M10 HEX NUT</td>
<td>4</td>
</tr>
<tr>
<td>12</td>
<td>M8x20 HEX SCREW</td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>M8 SPRING WASHER</td>
<td>4</td>
</tr>
<tr>
<td>14</td>
<td>M8 FLAT WASHER</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>M8 HEX NUT</td>
<td>4</td>
</tr>
<tr>
<td>16</td>
<td>WIDE-SPACING BRACKET</td>
<td>1</td>
</tr>
</tbody>
</table>

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.
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

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCC</td>
<td>None</td>
<td>Details of control commands</td>
</tr>
<tr>
<td>HFC</td>
<td>None</td>
<td>Details of fault enable commands</td>
</tr>
<tr>
<td>HLC</td>
<td>None</td>
<td>Details of logging commands</td>
</tr>
<tr>
<td>HLP</td>
<td>None</td>
<td>Details of help commands</td>
</tr>
<tr>
<td>HOC</td>
<td>None</td>
<td>Details of output commands</td>
</tr>
<tr>
<td>HPC</td>
<td>None</td>
<td>Details of set parameter commands</td>
</tr>
<tr>
<td>HVC</td>
<td>None</td>
<td>Details of view commands</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>VCS</td>
<td>None</td>
<td>Current status of the switches and control input lines of the transceiver</td>
</tr>
<tr>
<td>VFS</td>
<td>None</td>
<td>Current fault status of the transceiver</td>
</tr>
<tr>
<td>VID</td>
<td>None</td>
<td>Converter software revision and fitted options</td>
</tr>
<tr>
<td>VLS</td>
<td>None</td>
<td>Current PLL lock status of the converter</td>
</tr>
<tr>
<td>VPS</td>
<td>None</td>
<td>Current settings of the operating parameters</td>
</tr>
<tr>
<td>VSS</td>
<td>None</td>
<td>Current operational status of the transceiver</td>
</tr>
<tr>
<td>VST</td>
<td>None</td>
<td>Current temperature of the converter and SSPA</td>
</tr>
<tr>
<td>VTD</td>
<td>None</td>
<td>Available compensation data installed in the converter</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCB</td>
<td>None</td>
<td>Resets the status poll change bits to no change (i.e. 0)</td>
</tr>
<tr>
<td>RST</td>
<td>None</td>
<td>Resets the microprocessor in the converter</td>
</tr>
<tr>
<td>SPA</td>
<td>0 = off, 1 = on</td>
<td>Controls the activation of the SSPA</td>
</tr>
<tr>
<td>SPI</td>
<td>0 = off, 1 = on</td>
<td>Overrides activation of the SSPA</td>
</tr>
<tr>
<td>SSO</td>
<td>0 = standby, 1 = on</td>
<td>Controls the standby/on state of the transceiver</td>
</tr>
</tbody>
</table>
Set parameter commands

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

Table A-4: Set parameter commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAR</td>
<td>0 = 0 to 31, 1 = 32 to 63, 2 = 64 to 95, 3 = 96 to 127</td>
<td>Sets the packet address range of the converter Command not available if using packet protocol</td>
</tr>
<tr>
<td>SCC</td>
<td>n where 0 ≤ n ≤ 15</td>
<td>Sets the cable compensation of the transmit path Command not available to converters with D prefix serial numbers</td>
</tr>
<tr>
<td>SCT</td>
<td>0 = standard, 1 = custom</td>
<td>Sets the converter compensation characteristic used in the converter</td>
</tr>
<tr>
<td>SEC</td>
<td>0 = off, 1 = on</td>
<td>Controls the echo from the converter Command not available if using packet protocol</td>
</tr>
<tr>
<td>SIF</td>
<td>0 = 70, 1 = 140</td>
<td>Sets the IF of the converter</td>
</tr>
<tr>
<td>SIM</td>
<td>0 = 50, 1 = 75</td>
<td>Sets the IF impedance of the converter</td>
</tr>
<tr>
<td>SPM</td>
<td>0 = extended, 1 = basic</td>
<td>Sets the SSPA control mode used in the converter</td>
</tr>
<tr>
<td>SPP</td>
<td>0 = Codan, 1 = mode 1, 2 = mode 2, 3 = mode 3</td>
<td>Sets the packet protocol mode Command not available if using packet protocol</td>
</tr>
</tbody>
</table>
### Table A-4: Set parameter commands (cont.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPT</td>
<td>0 = off</td>
<td>Sets the SSPA compensation characteristic used in the converter</td>
</tr>
<tr>
<td></td>
<td>1 = custom 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = custom 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = custom 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = 5705</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 = 5710</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 = 5720/30/40</td>
<td></td>
</tr>
<tr>
<td>SPU</td>
<td>0 = last state</td>
<td>Sets the SSPA state on power up</td>
</tr>
<tr>
<td></td>
<td>1 = transmit off</td>
<td></td>
</tr>
<tr>
<td>SRA</td>
<td>n or nn where 0 ≤ n ≤ 25</td>
<td>Sets the receive attenuation of the converter (dB)</td>
</tr>
<tr>
<td>SRF</td>
<td>nnnn</td>
<td>Sets the receive frequency of the converter (MHz)</td>
</tr>
<tr>
<td>SRO</td>
<td>0 = off</td>
<td>Sets whether or not transmission from the converter is inhibited during the warm-up period (transmission is inhibited if set to off)</td>
</tr>
<tr>
<td></td>
<td>1 = on</td>
<td></td>
</tr>
<tr>
<td>STA</td>
<td>n or nn where 0 ≤ n ≤ 25</td>
<td>Sets the transmit attenuation of the converter (dB)</td>
</tr>
<tr>
<td>STF</td>
<td>nnnn</td>
<td>Sets the transmit frequency of the converter (MHz)</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFE</td>
<td>0 = disabled</td>
<td>Sets the fan fault reporting status of the converter</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
<tr>
<td>SLE</td>
<td>0 = disabled</td>
<td>Sets the LNA fault reporting status of the converter</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
<tr>
<td>SPE</td>
<td>0 = disabled</td>
<td>Sets the SSPA fault reporting status of the converter</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
</tbody>
</table>
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**

<table>
<thead>
<tr>
<th>Command</th>
<th>Data required</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SFL</td>
<td>0 = off&lt;br&gt;1 = on</td>
<td>Enables or disables fault logging; if enabled, faults will be logged as they occur</td>
</tr>
<tr>
<td>SLL</td>
<td>0 = off&lt;br&gt;1 = on</td>
<td>Enables or disables lock status logging; if enabled, the lock status changes will be logged as they occur</td>
</tr>
<tr>
<td>SSL</td>
<td>0 = off&lt;br&gt;1 = on</td>
<td>Enables or disables status logging; if enabled, status changes will be logged as they occur</td>
</tr>
<tr>
<td>STL</td>
<td>0 = off&lt;br&gt;1 = on</td>
<td>Enables or disables temperature logging for the SSPA and converter; if enabled, the temperatures will be logged every 5 minutes</td>
</tr>
</tbody>
</table>
## Output parameter commands

The output commands are used to display information about the transceiver.

### Table A-7: Output parameter commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>OAD</td>
<td>0–127</td>
<td>Packet address setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command not available if using packet protocol</td>
</tr>
<tr>
<td>OAR</td>
<td>0 = 0 to 31</td>
<td>Packet address range setting</td>
</tr>
<tr>
<td></td>
<td>1 = 32 to 63</td>
<td>Command not available if using packet protocol</td>
</tr>
<tr>
<td></td>
<td>2 = 64 to 95</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = 96 to 127</td>
<td></td>
</tr>
<tr>
<td>OCC</td>
<td>Cable compensation setting displayed as one or two numeric characters</td>
<td>Cable compensation setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command not available to converters with D prefix serial numbers</td>
</tr>
<tr>
<td>OCD</td>
<td>Converter default compensation table name</td>
<td>Names of temperature compensation tables available for the converter and SSPA</td>
</tr>
<tr>
<td></td>
<td>Custom converter compensation table name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Custom 1 SSPA compensation table name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Custom 2 SSPA compensation table name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Custom 3 SSPA compensation table name</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5705</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5710</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5720–40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Data</td>
<td></td>
</tr>
</tbody>
</table>
Table A-7: Output parameter commands (cont.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCN</td>
<td>5-character serial number</td>
<td>Serial number of the converter</td>
</tr>
</tbody>
</table>
| 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 SSP A activate: 0 = not activated 16 = activated  
          H/W SSP A 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 |
<p>| 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 |</p>
<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFD</td>
<td>Max transmit frequency&lt;br&gt;Min transmit frequency&lt;br&gt;Max receive frequency&lt;br&gt;Min receive frequency&lt;br&gt;Synthesiser step size</td>
<td>Transmit and receive frequency of the converter and the synthesiser step size</td>
</tr>
<tr>
<td>OFE</td>
<td>0 = disabled&lt;br&gt;1 = enabled</td>
<td>Fan fault detection setting</td>
</tr>
<tr>
<td>OFL</td>
<td>0 = disabled&lt;br&gt;1 = enabled</td>
<td>Fault logging setting</td>
</tr>
<tr>
<td>OFS</td>
<td>Converter fault:&lt;br&gt;0 = OK&lt;br&gt;1 = fault&lt;br&gt;LNA fault:&lt;br&gt;0 = OK&lt;br&gt;2 = fault&lt;br&gt;SSPA fault:&lt;br&gt;0 = OK&lt;br&gt;4 = fault&lt;br&gt;Temp fault:&lt;br&gt;0 = OK&lt;br&gt;8 = fault&lt;br&gt;Fan fault:&lt;br&gt;0 = OK&lt;br&gt;16 = fault</td>
<td>Current fault status of transceiver as one or two numeric characters, which is the sum of the values in the Output column</td>
</tr>
</tbody>
</table>
Table A-7: Output parameter commands (cont.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>OID</td>
<td>Type number</td>
<td>Identification information of the converter</td>
</tr>
<tr>
<td></td>
<td>Firmware part number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Firmware version number</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Firmware release date</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Converter bandwidth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Synthesiser option</td>
<td></td>
</tr>
<tr>
<td>OIF</td>
<td>0 = 70 MHz</td>
<td>IF frequency setting of the converter</td>
</tr>
<tr>
<td></td>
<td>1 = 140 MHz</td>
<td></td>
</tr>
<tr>
<td>OIM</td>
<td>0 = 50 Ω</td>
<td>IF impedance setting of the converter</td>
</tr>
<tr>
<td></td>
<td>1 = 75 Ω</td>
<td></td>
</tr>
<tr>
<td>OLE</td>
<td>0 = disabled</td>
<td>LNA fault detection setting</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
<tr>
<td>OLL</td>
<td>0 = disabled</td>
<td>Lock status logging setting</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
<tr>
<td>OLS</td>
<td>Tx local oscillator:</td>
<td>Current PLL lock status of converter as one or two numeric characters, which</td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td>is the sum of the values in the Output column</td>
</tr>
<tr>
<td></td>
<td>1 = unlocked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rx local oscillator:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = unlocked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tx synthesiser 1:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = unlocked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tx synthesiser 2:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 = unlocked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rx synthesiser 1:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16 = unlocked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rx synthesiser 2:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 = locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td>32 = unlocked</td>
<td></td>
</tr>
</tbody>
</table>
Table A-7: Output parameter commands (cont.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
</table>
| 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.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays…</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSL</td>
<td>0 = disabled 1 = enabled</td>
<td>Status logging setting</td>
</tr>
<tr>
<td>OSO</td>
<td>0 = standby 1 = on</td>
<td>System on setting</td>
</tr>
</tbody>
</table>
| 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.)

<table>
<thead>
<tr>
<th>Command</th>
<th>Output</th>
<th>Displays...</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTD</td>
<td>See page 8-46, <em>Output all identity data</em></td>
<td>All the transceiver identity data</td>
</tr>
<tr>
<td>OTF</td>
<td>Transmit frequency in MHz</td>
<td>Transmit frequency</td>
</tr>
<tr>
<td>OTL</td>
<td>0 = disabled</td>
<td>Temperature logging setting</td>
</tr>
<tr>
<td></td>
<td>1 = enabled</td>
<td></td>
</tr>
<tr>
<td>OTP</td>
<td>Temperature in degrees Celsius</td>
<td>Current SSPA temperature</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command not allowed if SSPA temperature compensation is set to off, i.e. <strong>SPT0</strong>.</td>
</tr>
</tbody>
</table>

*command*
This page has been left blank intentionally.
Index

A

AC
  input connection 6-23
AC power supply
  configuration 3-10, 7-12, 8-3
accessories
  Hand-Held Controller 5560 3-17
  Remote Controller 5570 3-17
acknowledgment messages 8-20
address 8-17
address byte 8-19
antenna alignment 7-30

B

bandwidth
  IF 3-8, 7-26
  narrow 7-26
  options 3-8, 7-26
  wide 7-26
battery operation
  mandatory settings 7-28
  selecting 7-3
byte count 8-17, 8-19

C

cable 6-20
  compensation
    140 MHz IF 7-25
    70 MHz IF 7-24
    for converter 7-23
fabrication 6-22
installation 6-23
power 6-22
serial interface 7-14
C-Band transceiver
  accessories 3-17
checksum 8-18, 8-19
command bytes 8-17
compliance
  electromagnetic compatibility 2-2
  safety notices 2-2
  with the European Radio and Telecommunications
  Terminal Equipment Directive 2-3
  electrical safety 2-3
  electromagnetic compatibility 2-3
  protection of radio spectrum 2-5

D

data bytes 8-18, 8-19
DC power supply 9-2
  configuration 3-10, 7-11, 8-2
  maintenance precautions 9-2
demodulators 7-33
DIP switches
  converter 3-6
down converter 5-2

radiation safety 2-4
configuration of the transceiver 3-10
connectors
  sealing 6-24
control byte 8-17
control commands 8-29, A-4
  reset change bits command 8-30
  reset command 8-30
  set system on/off command 8-29
  SSPA activate on/off command 8-29
  SSPA inhibit on/off command 8-30
control panel
  of the converter 3-4
converter 3-14, 5-2
  bandwidth options 3-8
  cable compensation 7-23
  control panel 3-4
  DIP switches 3-6
  fault detection 5-3
  fault indicators 3-5
  frequency 7-19
  frequency band options 3-7
  IF 7-26
  IF impedance 7-26
  installation 6-5
  mandatory settings 7-28
  options 3-7
  power status indicators 3-5
  power switch position markers 3-5
  reference oscillator position override 7-26
  synthesiser options 3-8
  temperature compensation type 7-22
Index

E
end character 8-18
equipment
  unpacking 6-2
error responses 8-16
European Radio and Telecommunications Terminal
equipment Directive
  compliance 2-3
  earth symbols 2-6
  electrical safety 2-3
  electromagnetic compatibility 2-3
  protection of radio spectrum 2-5
  radiation safety 2-4

F
fan operation 8-13
fault
detection
  in the converter 5-3
  in the LNA 5-3
  in the SSPA 5-3
finding 9-9
LNA 9-10
power supply unit 9-10
SSPA 9-11
fault enable commands 8-37, A-7
  mandatory settings
    set fan fault enable command 7-28
    set SSPA fault enable command 7-28
  set fan fault enable command 8-38
  set LNA fault enable command 8-37
  set SSPA fault enable command 8-37
fault indicators
  converter 3-5
frequency
  band options
    for the converter 3-7
    for the SSPA 3-9
fuse
  converter 9-7
  power supply unit 9-8
  replacing 9-7

G
grounding recommendations 6-11

H
Hand-Held Controller 5560 3-17, 7-14, 8-14
help commands 8-21, A-2
general help command 8-21
help for control commands 8-22
help for fault enable commands 8-22
help for logging commands 8-22
help for output parameter commands 8-24
help for set parameter commands 8-23
help for view commands 8-24
high voltage warning 6-3
HyperTerminal 7-15
  exiting 7-17
  setting up 7-15

I
IF
  bandwidths 3-8
  for converter 7-26
  input 4-2
IF impedance 8-44
  for converter 7-26
indicators
  fault 3-5
  power status 3-5
  SSPA status 3-5
input voltage 4-10
installation
  of the cables 6-23
  of the converter 6-5
  of the LNA 6-8
  of the outdoor equipment 6-5
  of the SSPA 6-7
  of the TRF 6-8
interface
  LNA 6-19
  monitor and control 6-16
  temporary connection to a PC 7-14

L
LED indicators 8-7
LNA 3-15, 5-4
  DC/Alarm facilities 4-10
  fault 9-10
  installation 6-8
  interface 6-19
  noise temperature 4-8
  operation 8-8
lock status
  of the phase locked loops 8-51
logging commands 8-38, A-8
  set fault logging command 8-39
  set lock status logging command 8-39
C-Band Transceiver 5700 series Reference Manual

Index

set status logging command 8-39
set temperature logging command 8-40

M
mains operation
selecting 7-3
markers
power status 3-5
SSPA status indicator 3-5
monitor and control
interface 6-16
specifications 4-11
mounting modules 3-14

N
narrow bandwidth 7-26
noise temperature 4-8

O
operating commands 8-21
control commands 8-29, A-4
fault enable commands 8-37, A-7
help commands 8-21, A-2
logging commands 8-38, A-8
output parameter commands 8-40, A-9
set parameter commands 8-31, A-5
summary A-1
view commands 8-25, A-3
operating mode
setting 8-6
option switches
setting 7-2
options
bandwidth 3-8
monitor port 3-9
of the converter 3-7
of the SSPA 3-9
synthesiser 3-8
opto-isolated control inputs 6-16
outdoor
equipment
installation 6-5
mounting modules 3-14
output level 8-9
output parameter commands 8-40, A-9
output all identity data command 8-46
output cable compensation command 8-43
output compensation data command 8-55
output configuration data command 8-54
output control status command 8-50
output converter serial number command 8-48
output converter temperature compensation type command 8-41
output device type command 8-55
output echo command 8-48
output fan fault enable command 8-42
output fault logging command 8-52
output fault status command 8-50
output frequency data command 8-57
output identification command 8-48
output IF command 8-44
output impedance command 8-44
output LNA fault enable command 8-42
output lock status command 8-51
output lock status logging command 8-52
output packet address command 8-44
output packet address range command 8-45
output packet protocol command 8-53
output power up command 8-45
output receive attenuation command 8-52
output receive frequency command 8-43
output reference oscillator override command 8-49
output SSPA activate command 8-40
output SSPA control mode command 8-43
output SSPA fault enable command 8-42
output SSPA inhibit command 8-41
output SSPA temperature compensation type command 8-41
output status logging command 8-52
output status poll command 8-46
output system on command 8-40
output system status command 8-51
output temperature converter command 8-49
output temperature logging command 8-53
output temperature SSPA command 8-49
output transmit attenuation command 8-52
output transmit frequency command 8-43

P
packet address
setting 7-9
packet protocol 8-53
acknowledgment messages 8-20
packet structure 8-17
address 8-17
byte count 8-17
checksum 8-18
command bytes 8-17
control byte 8-17
data bytes 8-18
end character 8-18
Index

start character 8-17  
synchronisation 8-18  

power  
cable 6-22  
control 8-5  

power supply unit 3-16, 5-5  
fault 9-10  

power up mode 7-19  

precautions  
connections to power supplies 9-2  
converter 9-2  
DC supply 9-2  
LNA 9-2  
SSPA 9-2  

protocol formats 8-15  
ASCII 8-15  
packet protocol 8-16

R  
radiation warning 6-3  
receive  
attenuation 7-33  
setting 7-33, 8-35  
frequency  
setting 8-34  
specifications  
synthesiser step size 4-7  

received carrier level 7-33  

reference oscillator  
frequency  
adjusting 9-5  
checking 9-4  
local measurement 9-4  
remote measurement 9-4  
override 7-26  

warm-up operation 8-6  
relay contacts 6-16  
Remote Controller 5570 3-17, 7-14, 8-14  
RF connector  
voltage 7-4  

RS232 interface 6-14  
RS422 interface 6-14  
selecting parameters 7-8

S  
safe distance  
1.8 m diameter antenna/40 W transceiver 2-4  
7.2 m diameter antenna/60 W transceiver 2-5  
safety  
grounding 6-11  
SSPA 6-3  
radiation 6-3  
voltage 6-3  
welding precautions 6-12  
serial interface 6-13, 8-14  
and terminal emulation 7-14  
cable 7-14  
control 7-14, 8-14  
monitor 8-14  
operating mode 7-6  
RS232 6-13, 6-14  
RS422 6-13, 6-14  
RS485 6-13  
setting parameters 7-5, 7-7  

serial interface commands  
control commands 8-29, A-4  
reset change bits command 8-30  
reset command 8-30  
set system on/off command 8-29  
SSPA activate on/off command 8-29  
SSPA inhibit on/off command 8-30  
fault enable commands 8-37, A-7  
set fan fault enable command 8-38  
set LNA fault enable command 8-37  
set SSPA fault enable command 8-37  
help commands 8-21, A-2  
general help command 8-21  
help for control commands 8-22  
help for fault enable commands 8-22  
help for logging commands 8-22  
help for output parameter commands 8-24  
help for set parameter commands 8-23  
help for view commands 8-24  
logging commands 8-38, A-8  
set fault logging command 8-39  
set lock status logging command 8-39  
set status logging command 8-39  
set temperature logging command 8-40  
output parameter commands 8-40, A-9  
output all identity data command 8-46  
output cable compensation command 8-43  
output compensation data command 8-55  
output configuration data command 8-54  
output control status command 8-50  
output converter serial number command 8-48  
output converter temperature compensation type command 8-41  
output device type command 8-55  
output echo command 8-48  
output fan fault enable command 8-42
output fault logging command 8-52
output fault status command 8-50
output frequency data command 8-57
output identification command 8-48
output IF command 8-44
output impedance command 8-44
output LNA fault enable command 8-42
output lock status command 8-51
output lock status logging command 8-52
output packet address command 8-44
output packet address range command 8-45
output packet protocol command 8-53
output power up command 8-45
output receive attenuation command 8-52
output receive frequency command 8-43
output reference oscillator override command 8-49
output SSPA activate command 8-40
output SSPA control mode command 8-43
output SSPA fault enable command 8-42
output SSPA inhibit command 8-41
output SSPA temperature compensation type command 8-41
output status logging command 8-52
output status poll command 8-46
output system on command 8-40
output system status command 8-51
output temperature converter command 8-49
output temperature logging command 8-53
output temperature SSPA command 8-49
output transmit attenuation command 8-52
output transmit frequency command 8-43
set parameter commands 8-31, A-5
set cable compensation command 8-35
set converter temperature compensation type command 8-32
set echo command 8-31
set IF command 8-32
set impedance command 8-32
set packet address range command 8-36
set packet protocol command 8-36
set power up command 8-31
set receive attenuation command 8-35
set receive frequency command 8-34
set SSPA control mode command 8-33
set SSPA temperature compensation type command 8-33
set transmit attenuation command 8-35
set transmit frequency command 8-34
specifications 4-1
environmental 4-14
general 4-10
LNA 4-8
physical 4-15
receive 4-6
transmit 4-2
TRF 4-9
SSPA
activation control 8-10
control mode 7-20
for converter 7-20
description 3-15
fan maintenance 9-3
fault 9-11
frequency band options 3-9
installation 6-7
mandatory settings 7-28
operation 5-4
options 3-9
recommended settings 7-29
remote configuration switches
setting 7-10
switch position markers 3-5
temperature compensation type 7-22
standby mode
setting 8-5
start character 8-17
Index

status indicators
  converter 3-4
  switch options 7-7
synchronisation 8-18
synthesiser 5-3
  options 3-8
  step size
    receive 4-7

T

temperature compensation type
  for converter 7-22
  for SSPA 7-22
terminal emulation 7-14, 7-15, 7-17
test procedures 9-27
transceiver
  configuration 3-10
  controlling 3-3
  mandatory settings 7-28
  monitoring 3-3
  mounting modules 3-14
  operation 8-1
  setting parameters 7-19
  setting up 7-1
  switching on 7-11, 8-2
transmit
  attenuation 7-31
    setting 7-31, 8-35
  frequency
    setting 8-34
  specifications
    IF input 4-2
TRF 3-15, 5-5
  insertion loss 4-9
  installation 6-8
  pass band 4-9
  reject band 4-9
  rejection 4-9

U

up converter 5-2

V

view commands 8-25, A-3
  view control status command 8-26
  view fault status command 8-25
  view identification information command 8-27
  view lock status command 8-27
  view parameter settings command 8-26

view system status command 8-27
view system temperature command 8-28
view table data command 8-28
voltage
  safety precautions 6-3

W

warm-up operation 8-6
welding precautions 6-12
wide bandwidth 7-26