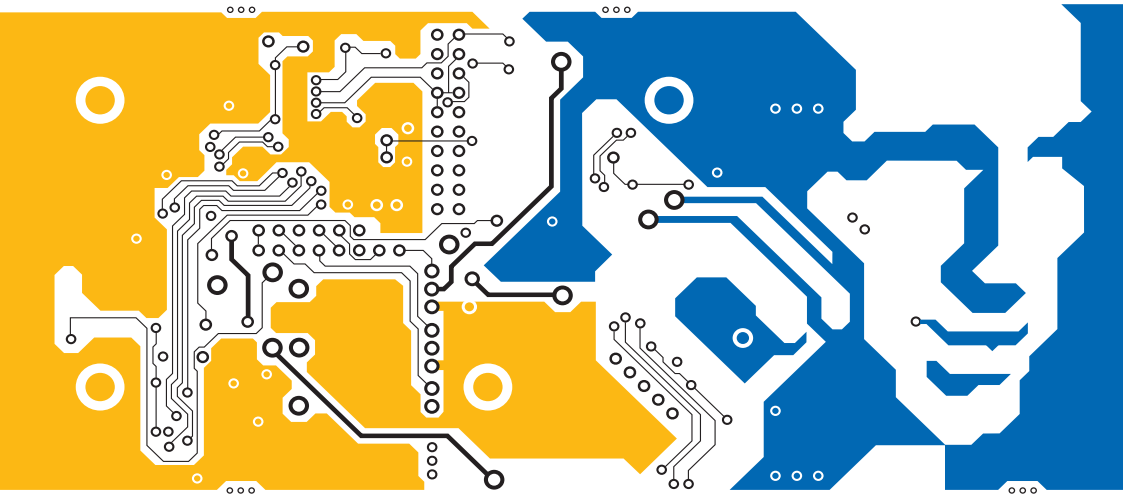
CODAN

L-Band IF Transceiver

6700/6900 series

SATELLITE COMMUNICATIONS



USER GUIDE

Codan part number 15-44017-EN Issue 6, January 2005

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Introduction

This user guide is for installation technicians and operators of the L-Band IF Transceiver 6700/6900 series.

This guide contains the following sections:

Section 1 BUC compliance—compliance information and safety notices

Section 2 Overview—general description of the transceiver

Section 3 Installation—installation instructions specific to the L-Band IF transceiver

Section 4 Setting up and operating the transceiver—setup and operating procedures, and serial interface commands

Section 5 Maintenance and fault finding—description of how to maintain and fault find an L-Band IF transceiver

Section 6 Specifications—specifications for all the transceiver modules and their connectors

Section 7 Drawings—drawings referred to in this guide

Appendix A Example outputs for the View commands—summary of the commands described on page 43, *Setting up and operating the transceiver*

Appendix B Definitions—explains the terms and abbreviations used in this guide

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1 BUC compliance

This section contains the following topics:

Introduction

The L-Band IF Transceiver 6700/6900 series is manufactured in a number of variants. CE-compliant versions are marked with the CE 0682 !, CE 0682 or CE symbols.

This section describes how to ensure the L-Band IF Transceiver 6700/6900 series complies with the European Electromagnetic Compatibility Directive 89/336/EEC and the European Low Voltage Directive 73/23/EEC as called up in the European Radio and Telecommunications Terminal Equipment Directive 1999/5/EC.

The CE Declarations of Conformity for the range of products are listed on page 108, *Associated documents*. These documents can be made available on request to Codan or a Codan-authorised supplier.

European Radio and Telecommunications Terminal Equipment Directive

CE-compliant versions of the L-Band IF Transceiver 6700/6900 series have been tested and comply with the following standards (articles of the R&TTE Directive):

- Article 3.1a: EN 60950
- Article 3.1b: ETSI EN 301 489-1
- Article 3.1b: ETSI EN 301 489-12
- Article 3.2: ETSI EN 301 428
- Article 3.2: ETSI EN 301 443

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

Product marking and labelling

Any equipment supplied by Codan that satisfies these requirements is identified by the CE 0682 !, CE 0682 or CE markings on the model label of the product.

CAUTION

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.

Declaration of Conformity

The CE Declarations of Conformity and Expert Letters of Opinion for each specific product are listed on page 108, *Associated documents*. These documents can be made available upon request to Codan or a Codan-authorised supplier.

Protection of the radio spectrum

It is the responsibility of the user to ensure any modem used in conjunction with the L-Band IF Transceiver 6700/6900 series complies with EN 301 428 or EN 301 443 so that CE compliance with respect to radiated spurious signals is maintained. If necessary, contact Codan for more information.

To set up the BUC for CE-compliant operation you must:

- ❑ Enter the **STD0** command.

  This sets the default transmit state on powerup to Off.
- ❑ Enter the **STO1** command to activate the transceiver.

Health requirements (human exposure to electromagnetic fields)

The L-Band IF Transceiver 6700/6900 series has been assessed against the health requirements in article 3.1a of the R&TTE Directive (1999/5/EC) complying with VDE0848, ICNIRP and FCC health requirements.

Electromagnetic compatibility and safety notices

Radiation safety

WARNING

A radiation hazard exists if the BUC is operated with its RF output unterminated. Do *not* operate the BUC without a load or termination attached to the RF output.

Electromagnetic compatibility

To ensure compliance with the EMC Directive is maintained, you must:

- ❑ Use standard shielded cables supplied from Codan (where applicable).
- ❑ Ensure the covers for the equipment are fitted correctly.

CAUTION

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

Electrical safety

To ensure compliance with the European Low Voltage Directive is maintained, you must install the L-Band IF Transceiver 6700/6900 series in accordance with the following safety precautions. These precautions must be checked before applying power to the transceiver.

WARNING

For LBUCs, a protective earth connection must be connected to the protective earth terminal on the LBUC (see page 9, *Earth symbols*).

For MBUCs:

- A protective earth connection must be included in the mains wiring to the MBUC (see page 9, *Earth symbols*).

WARNING

- As the MBUC 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.

Earth symbols

Earth connection points are provided on the L-Band IF Transceiver 6700/6900 series. The symbols shown in Table 1 are used to identify the earths on the equipment.

Table 1: Earth symbols

Symbol	Meaning
	Chassis earth
	Protective earth

Warning labels

The labels shown in Table 2 are used to identify potential hazards on the equipment.

Table 2: Warning labels

Label	Meaning
	Non-ionising radiation may be emitted
WARNING TERMINATION FOR OUTPUT ISOLATOR CONTAINS BERYLLIUM	If you intend to process or recycle this product refer to the current Material Safety Data Sheet

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2 Overview

This section contains the following topics:

Introduction

The Codan L-Band IF Transceiver 6700/6900 series is a high performance transceiver for use in a satellite earth station.

The L-Band IF Transceiver 6700/6900 series comprises:

- LBUC or MBUC (see Table 3 and Table 4 on page 13)
- LNB
- TRF

The transceiver is designed to be mounted on a wide range of earth station antennas. The LNB and TRF are designed to be direct-mounted (that is, mounted on the antenna feed support structure). The LBUC may be direct or boom-mounted. The MBUC must be boom-mounted.

The BUC converts transmit L-Band IF signals from the modem to the required RF band. The LNB converts received RF signals to IF signals in the L-Band frequency range to drive the modem receive IF input.

The modem supplies the BUC and the LNB with 10 MHz reference signals, and the LNB and LBUC with the required DC power. The MBUC is AC mains powered.

NOTE If your modem cannot supply 10 MHz reference signals to the LNB and BUC, and DC power to the LNB and LBUC, contact your Codan representative for information on the L-Band IF Interface Unit 6550.

The TRF is a waveguide filter that ensures transmit signals do not enter and overload the LNB.

C-Band BUCs are supplied with a waveguide or N-type output. Ku-Band BUCs are supplied with a waveguide output only.

Table 3: C-Band BUCs

C-Band BUC	**Model number**
2 W C-Band LBUC	6702
5 W C-Band LBUC	6705
10 W C-Band LBUC	6710CE
10 W C-Band LBUC	6710SE
20 W C-Band MBUC	6720
25 W C-Band MBUC	6725
40 W C-Band MBUC	6740

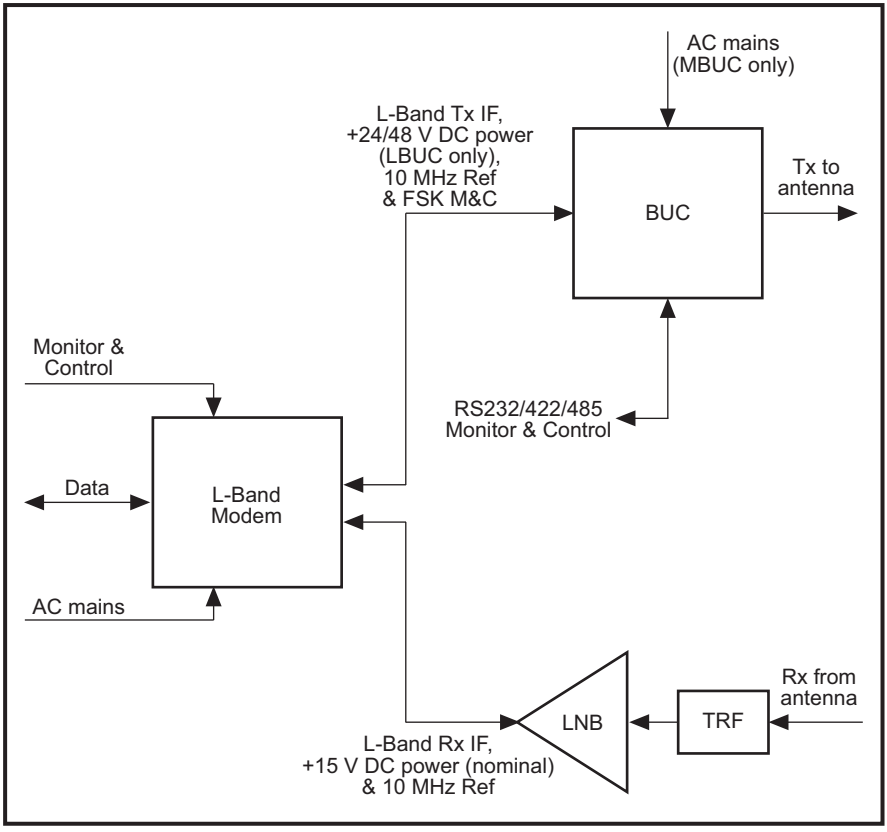
Table 4: Ku-Band BUCs

Ku-Band BUC	**Model number**
1 W Ku-Band LBUC	6901
2 W Ku-Band LBUC	6902
4 W Ku-Band LBUC	6904
8 W Ku-Band LBUC	6908CE
8 W Ku-Band LBUC	6908SE
16 W Ku-Band MBUC	6916

Transceiver configuration

Figure 1 shows the configuration of the L-Band IF transceiver.

Figure 1: L-Band IF transceiver



BUC

Transmit frequency bands

Table 5: Transmit frequency bands for C-Band and Ku-Band BUCs

BUC	Model number	Transmit frequency band (MHz)
C-Band	6702, 6705, 6710CE, 6725, 6740	5 850 to 6 725
	6710SE, 6720	5 850 to 6 425
Ku-Band	6901, 6902, 6904, 6908CE	13 750 to 14 500
	6908SE, 6916	14 000 to 14 500

Frequency conversion plans

All BUCs are frequency inverting, that is, the higher the RF frequency required, the lower the modem IF frequency must be.

To calculate the modem IF frequency ($f_{IF)}$ for a given RF frequency, subtract the RF frequency ($f_{RF)}$ from the local oscillator frequency ($f_{LO)}$.

$$f_{IF} = f_{LO} - f_{RF}$$

Example 1:

The local oscillator frequency of your C-Band LBUC is set to 7300 MHz (see Table 6 on page 17). If you need an RF frequency of 5975 MHz, then you must set the modem IF frequency to:

$$f_{IF} = 7300 - 5975$$
$$= 1325 \text{ MHz}$$

Example 2:

The local oscillator frequency of your Ku-Band MBUC is 15450 MHz (see Table 7 on page 20). If you need an RF frequency of 14500 MHz, then you must set the modem IF frequency to:

$$f_{IF} = 15450 - 14500$$
$$= 950 \text{ MHz}$$

C-Band

Figure 2 to Figure 5 show the frequency conversion plan for each local oscillator frequency of the C-Band BUCs.

Table 6: Frequency ranges for C-Band BUCs

LO frequency (MHz) f_{LO}	**L-Band modem tuning range (MHz)** f_{IF}	**Frequency output (MHz)** f_{RF}	**See...**
7300	950–1450	5850–6350	Figure 2
7375	950–1525	5850–6425	Figure 3
7600	950–1750	5850–6650 (Intelsat VIII-A)	Figure 4
7675	950–1750	5925–6725 (Palapa C)	Figure 5

NOTE The local oscillator frequencies of 7600 and 7675 MHz, and associated frequency ranges, are not available for the 6710SE.

Figure 2: C-Band frequency conversion plan at a local oscillator frequency of 7300 MHz

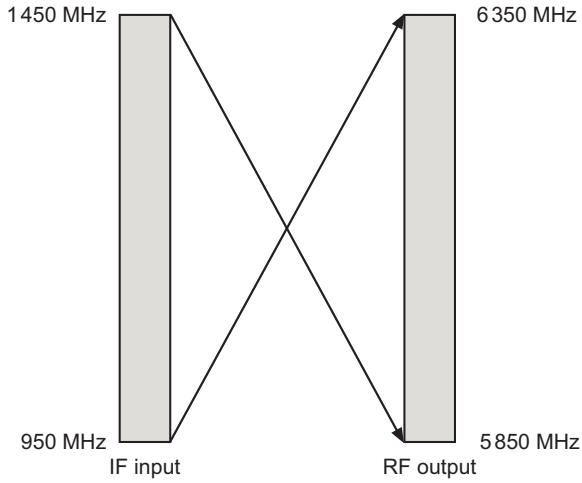


Figure 3: C-Band frequency conversion plan at a local oscillator frequency of 7375 MHz

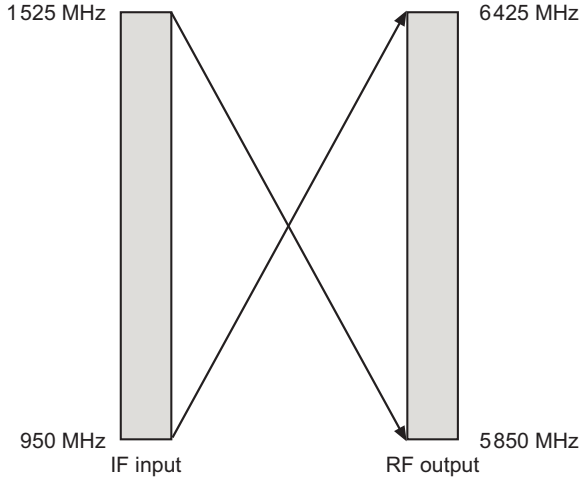


Figure 4: C-Band frequency conversion plan at a local oscillator frequency of 7600 MHz

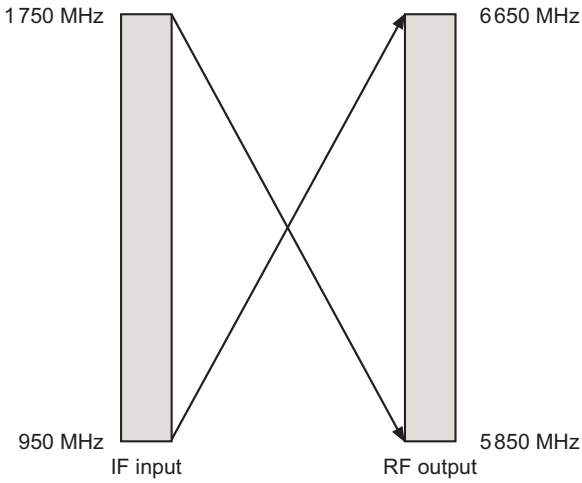
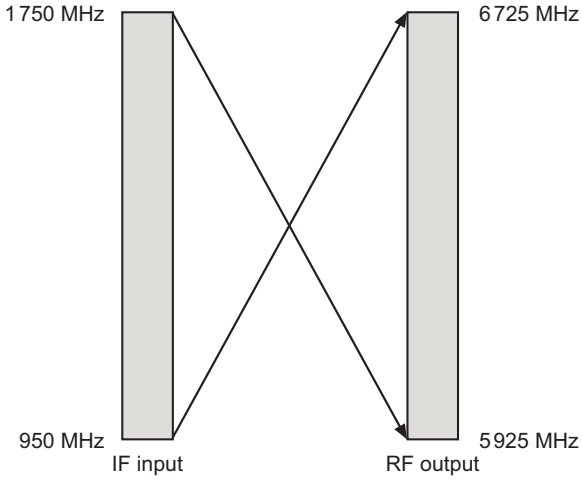


Figure 5: C-Band frequency conversion plan at a local oscillator frequency of 7675 MHz



Ku-Band

Figure 6 and Figure 7 show the frequency conversion plans for the single local oscillator frequency 15450 MHz of the Ku-Band LBUC and MBUC respectively.

Table 7: Frequency ranges for Ku-Band BUCs (6901, 6902, 6904, 6908CE)

LO frequency (MHz) f_{LO}	L-Band modem tuning range (MHz) f_{IF}	Frequency output (MHz) f_{RF}	See...
15450	950–1450	14000–14500	Figure 7
15450	950–1700	13750–14500	Figure 6

Table 8: Frequency ranges for Ku-Band BUCs (6908SE and 6916)

LO frequency (MHz) f_{LO}	L-Band modem tuning range (MHz) f_{IF}	Frequency output (MHz) f_{RF}	See...
15450	950–1450	14000–14500	Figure 7

Figure 6: Ku-Band frequency conversion plan for BUCs that cover frequency band 13750 to 14500 MHz

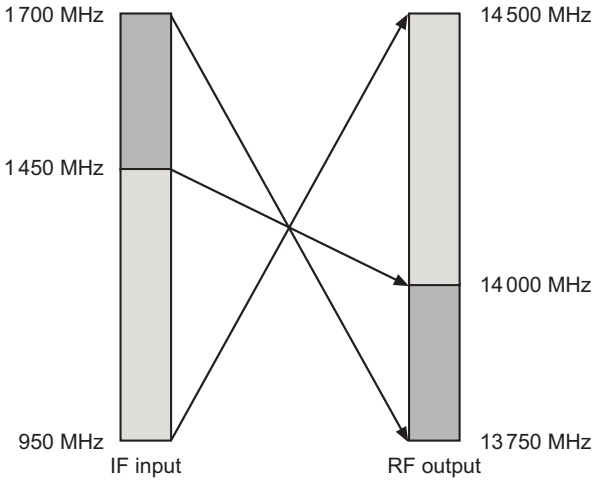
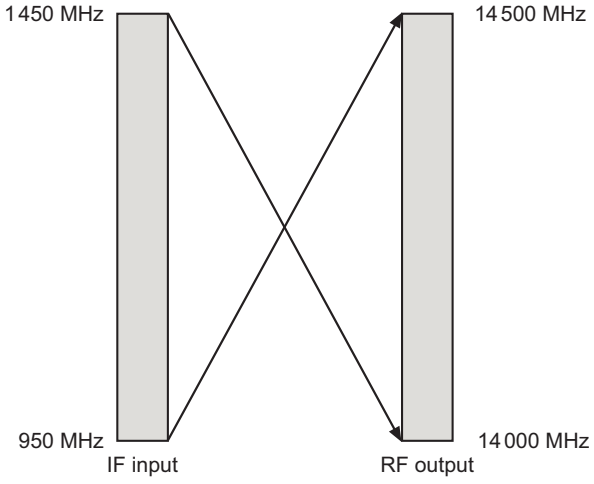


Figure 7: Ku-Band frequency conversion plan for BUCs that cover frequency band 14000 to 14500 MHz



Power supply options

The LBUC is powered by 48 V DC. Lower power LBUCs can be supplied to operate on 24 V DC. The MBUC has a universal AC mains input (94–275 V AC).

Table 9: Power supply options for BUCs

Model	Power supply option
6702, 6705, 6901, 6902, 6904	24 V and 48 V
6710CE, 6710SE, 6908CE, 6908SE	48 V
6720, 6725, 6740, 6916	AC mains

NOTE

Although the MBUC is AC powered, it draws current from the DC power input on the IF input cable for remote alarm indication purposes only. If an Interface Unit 6550 detects that the current drawn by the MBUC from the IF input cable drops below a certain threshold, it will report an MBUC fault state.

LNB

The frequency band that is down converted by the LNB is indicated on the model label of the LNB.

C-Band LNB

The C-Band LNB is supplied for operation on the frequency band 3400 to 4200 MHz. It has a local oscillator frequency of 5150 MHz.

NOTE The C-Band LNB is frequency inverting.

Ku-Band LNB

The Ku-Band LNB may be supplied for operation in one of three frequency band options listed in Table 10.

Table 10: Frequency band options for the Ku-Band LNB

Band option	Receive frequency (MHz)	LO frequency (MHz)	L-Band output frequency (MHz)
1	10950–11700	10000	950–1700
2	11700–12200	10750	950–1450
3	12250–12750	11300	950–1450

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3 Installation

This section contains the following topics:

Installing the L-Band IF transceiver

CAUTION

Water is the most common cause of poor performance in VSAT installations. Ensure that all cables and waveguide junctions are properly sealed (see the *Satellite Communication Equipment Installation Handbook*).

WARNING

A radiation hazard exists if the BUC is operated with its RF output unterminated (see page 7, *Radiation safety*).

TRF and LNB

The TRF and LNB are normally direct-mounted on the antenna feed structure.

The LNB obtains the required +15 to +24 V DC power and 10 MHz reference signal from a compatible L-Band modem. The modem is connected to the receive output connector of the LNB.

LBUC

LBUCs are supplied with either N-type or waveguide outputs. A boom-mounting kit is supplied with N-type output LBUCs, which enables the LBUC to be mounted on either a round or rectangular boom with diameters between 20 and 100 mm (Codan part number 15-42003-000, see drawing 15-42003-001). The kit is optional with waveguide output LBUCs. Contact your antenna manufacturer if you have specific installation requirements.

MBUC

MBUCs must be boom-mounted due to their size and weight. The boom-mounting kit is provided as standard with MBUCs. The mounting kit enables the MBUC to be mounted on either a round or rectangular boom with diameters between 20 and 100 mm (Codan part number 15-42019-000, see drawing 15-42019-001). Contact your antenna manufacturer if you have specific installation requirements.

Cables

Use an IF coaxial cable to connect the modem to the BUC (see page 32, *Cable recommendations*). It is recommended that you use the same type of cable to connect the modem to the LNB.

If you are using the RS232/422 serial interface, use an M/C cable to connect the BUC to a PC (see page 40, *Monitor and control interface*).

AC mains connection (MBUC only)

The MBUC power supply operates with any AC input voltage in the range 94–275 V AC.

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

To connect the MBUC to the AC mains:

- ❑ Connect the AC power lead (Codan part number 08-06201-001) to the AC mains supply.

WARNING Before applying power to the MBUC, ensure that the installation complies with the safety precautions listed on page 7, *Electromagnetic compatibility and safety notices*.

- ❑ Ensure the isolating switch for the AC supply is switched off.
- ❑ Connect the AC power lead to the **AC INPUT** connector on the MBUC.

If you need to make your own AC mains cable, or reterminate the cable supplied, Table 11 lists the pin connections and describes the input functions available on the **AC INPUT** connector on the MBUC.

Table 11: Pinouts of the AC INPUT connector (Amphenol T 3110 000)

Pin	Description
1	Neutral
2	Not connected
3	Active
	Protective earth

Serial interfaces

The following serial interfaces are provided:

- RS232 and RS422/485 available on the **M/C** connector on the BUC
- FSK available on the **IF INPUT** connector on the BUC

RS232 interface

The RS232 serial interface supports both the ASCII and the Codan packet protocols simultaneously. Responses to commands are returned in the same protocol format as they are sent. The RS232 serial interface operates with the following parameters:

data rate	9600 bps
word length	8 bits
parity	none
stop bit	1

The fixed data rate and protocol simplifies the connection during installation and commissioning, and enables a PC running a terminal emulation program to be used to configure the BUC. For information on protocols, contact your Codan representative and quote the Codan part number listed on page 109, *Associated specifications*.

The BUC is able to detect the connection of an RS232 interface. When an RS232 interface is used, the BUC inhibits the use of the Set and Reset commands on the RS422/485 and FSK interfaces. View and Output commands can still be used on these interfaces. This functionality is provided for safety reasons.

NOTE If you disabled transmission, don't forget to re-enable it before you remove the RS232 connection.

For example, a technician working on a BUC at the antenna can make an RS232 connection and disable transmissions. Transmissions cannot be re-enabled at another source, but the other interfaces can still monitor the BUC parameters. When the RS232 connection is removed and transmission is restored using the RS232 interface, normal monitor and control operation is restored.

RS422/485 interface

The RS422/485 interface can be operated in either 2-wire or 4-wire mode. The RS422/485 interface enables monitor and control of the BUC over long distances using other protocols that are not available for use with the RS232 interface.

FSK interface

The FSK interface enables monitor and control of the BUC over long distances using other protocols that are not available for use with the RS232 interface. The FSK interface does not require an extra monitor and control serial cable, but does require a modem with FSK monitor and control capability. If an appropriate modem is not available you can use the L-Band IF Interface Unit 6550 to convert the RS232 or RS422/485 signals to FSK signals. For more information see the *L-Band IF Interface Unit 6550 User Guide*.

Connecting the serial interface

To set the operating parameters of the BUC, the BUC must be connected to a terminal (for example, a Hand-held Controller 6560, a Remote Controller 6570, a PC, or an organiser emulating a terminal). If you are using an Interface Unit 6550, the terminal may be connected to the RS232 connector on the rear of the unit instead (see the *L-Band IF Interface Unit 6550 User Guide*).

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

Permanent interface connection

A permanent interface connection can be provided via the monitor and control interface of the BUC (see Figure 12 on page 41). The RS232 serial interface may only be used for distances less than 15 m. The RS422/485 serial interface may be used for distances up to approximately 1000 m.

The Remote Controller 6570 is designed as a permanent interface connection and is supplied with a standard 50 m cable.

Temporary interface connection

A serial interface cable is available to connect the BUC to the RS232 serial port of a PC or an organiser emulating a terminal, or you may connect a Hand-held Controller 6560.

If using a PC, connect the cable (Codan part number 08-05972-001) between the **M/C** connector of the BUC and the serial port of the PC. This cable provides a 14-way female MS-style connector to 9-way D-type female connector for connection to the PC. If connection to a 25-way D-type serial port is required, use a standard 25-way female to 9-way male adaptor.

Cable recommendations

Table 12 lists the recommended specifications for IF coaxial cables used in your system. These specifications place restrictions on the maximum length of the transmit IF cable. The limiting factor will most likely be the 20 dB maximum cable loss. Cables that have 20 dB cable loss at L-Band frequencies usually have DC loop resistances much less than those shown below.

Table 12: Recommendations for IF coaxial cables

Characteristic	**Recommendation**
Cable loss at operating frequency	20 dB maximum
DC loop resistance	2 Ω maximum (+48 V LBUC) 1 Ω maximum (+24 V LBUC)
Screening	100 dB minimum
Nominal impedance	50 Ω
Connectors	BUC end: • N-type male connector Indoor end: • connector to suit the modem used, or • if using the Interface Unit 6550, an N-type male connector to suit the unit

Cable loss specification

The recommended maximum cable loss is derived from the maximum output power normally provided by modems and the maximum gain of the BUC.

DC loop resistance specification

The maximum DC loop resistance is determined by the DC power drain drawn by an LBUC and its minimum operating input voltage. MBUCs are not powered via the cable, so the DC loop resistance of the IF cable is not a consideration for MBUC installations.

CAUTION To ensure correct operation, the DC loop resistance figure must not be exceeded.

Cable screening specification

Cable screening is derived from regulatory requirements related to the radiation of spurious signals from the antenna. Screening is more critical if the BUC is co-located with other radio transmitting equipment, for example, mobile-phone towers.

Cable lengths

Table 13 shows the maximum lengths of different types of cables to ensure the 20 dB loss recommendation is not exceeded. The cable lengths are shown in metres and feet.

Table 13: Cable lengths resulting in a 20 dB loss

Frequency (MHz)	RG223 (m (ft))	Belden 9914 (m (ft))	Belden 9913F (m (ft))	Times Microwave LMR-400 (m (ft))
950	43 (141)	104 (341)	125 (410)	150 (492)
1450	34 (111)	81 (266)	99 (325)	120 (394)
1700	31 (102)	74 (243)	91 (299)	111 (364)
1750	31 (102)	73 (240)	89 (292)	109 (358)

IF levels

The figures and tables in this section show the single carrier IF levels required to achieve rated P1dB output power from the BUC using various types and lengths of IF cables. Your actual IF levels may be different from those shown if you are operating with multiple carriers and you require output back off to control intermodulation product levels.

Examples are provided for short cables (with a 3 dB loss) and long cables (with a 20 dB loss).

The figures in this section are provided as examples only. You should determine the loss of your selected cable from its length and your operating frequency (see Table 13 on page 33). You can then set the modem IF output level and the BUC attenuator to achieve the required output power.

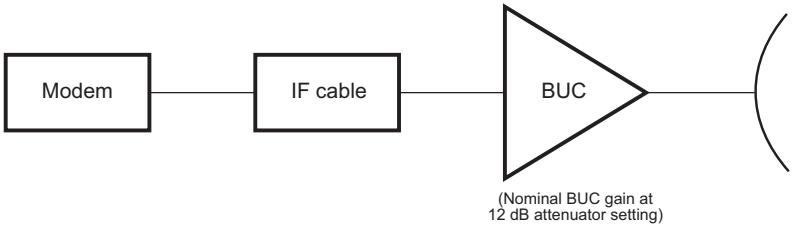
As a general principle, you should set the BUC attenuator at the highest possible attenuation setting given the available modem IF output power and the cable loss. This reduces the susceptibility of the system to external interference.

Using short IF cables

Figure 8 on page 35 (C-Band) and Figure 9 on page 36 (Ku-Band) show the IF levels required when using short IF cables such as the following:

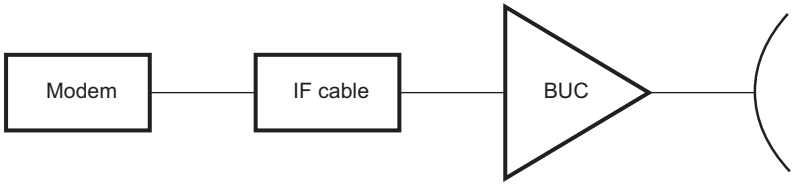
- 5 m RG223
- 12 m 9914
- 15 m 9913F
- 18 m LMR-400

Figure 8: C-Band IF levels required for short cables



6702	Gain		–3 dB		64–12=52 dB	
	Input/output level	–16 dBm		–19 dBm		+33 dBm
6705	Gain		–3 dB		68–12=56 dB	
	Input/output level	–16 dBm		–19 dBm		+37 dBm
6710CE	Gain		–3 dB		71–12=59 dB	
	Input/output level	–16 dBm		–19 dBm		+40 dBm
6710SE	Gain		–3 dB		71–12=59 dB	
	Input/output level	–16 dBm		–19 dBm		+40 dBm
6720	Gain		–3 dB		75–12=63 dB	
	Input/output level	–16 dBm		–19 dBm		+44 dBm
6725	Gain		–3 dB		75–12=63 dB	
	Input/output level	–16 dBm		–19 dBm		+44 dBm
6740	Gain		–3 dB		77–12=65 dB	
	Input/output level	–16 dBm		–19 dBm		+46 dBm

Figure 9: Ku-Band IF levels required for short cables



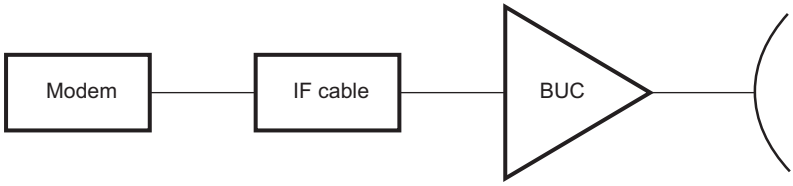
6901	Gain		–3 dB		61–12=49 dB	
	Input/output level	–16 dBm		–19 dBm		+30 dBm
6902	Gain		–3 dB		64–12=52 dB	
	Input/output level	–16 dBm		–19 dBm		+33 dBm
6904	Gain		–3 dB		67–12=55 dB	
	Input/output level	–16 dBm		–19 dBm		+36 dBm
6908CE	Gain		–3 dB		70–12=58 dB	
	Input/output level	–16 dBm		–19 dBm		+39 dBm
6908SE	Gain		–3 dB		70–12=58 dB	
	Input/output level	–16 dBm		–19 dBm		+39 dBm
6916	Gain		–3 dB		73–12=61 dB	
	Input/output level	–16 dBm		–19 dBm		+42 dBm

Using long IF cables

Figure 10 on page 38 (C-Band) and Figure 11 on page 39 (Ku-Band) show the IF levels required when using long IF cables such as the following:

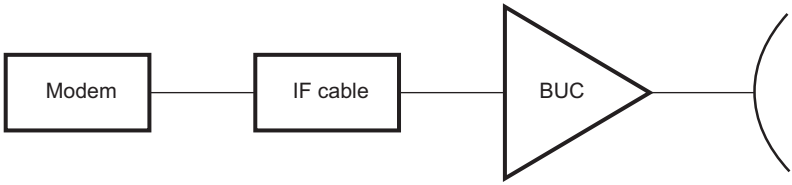
- 34 m RG223
- 80 m 9914
- 100 m 9913F
- 120 m LMR-400

Figure 10: C-Band IF levels required for long cables



6702	Gain		–20 dB		64–4=60 dB	
	Input/output level	–7 dBm		–27 dBm		+33 dBm
6705	Gain		–20 dB		68–4=64 dB	
	Input/output level	–7 dBm		–27 dBm		+37 dBm
6710CE	Gain		–20 dB		71–4=67 dB	
	Input/output level	–7 dBm		–27 dBm		+40 dBm
6710SE	Gain		–20 dB		71–4=67 dB	
	Input/output level	–7 dBm		–27 dBm		+40 dBm
6720	Gain		–20 dB		75–4=71 dB	
	Input/output level	–7 dBm		–27 dBm		+44 dBm
6725	Gain		–20 dB		75–4=71 dB	
	Input/output level	–7 dBm		–27 dBm		+44 dBm
6740	Gain		–20 dB		77–4=73 dB	
	Input/output level	–7 dBm		–27 dBm		+46 dBm

Figure 11: Ku-Band IF levels required for long cables

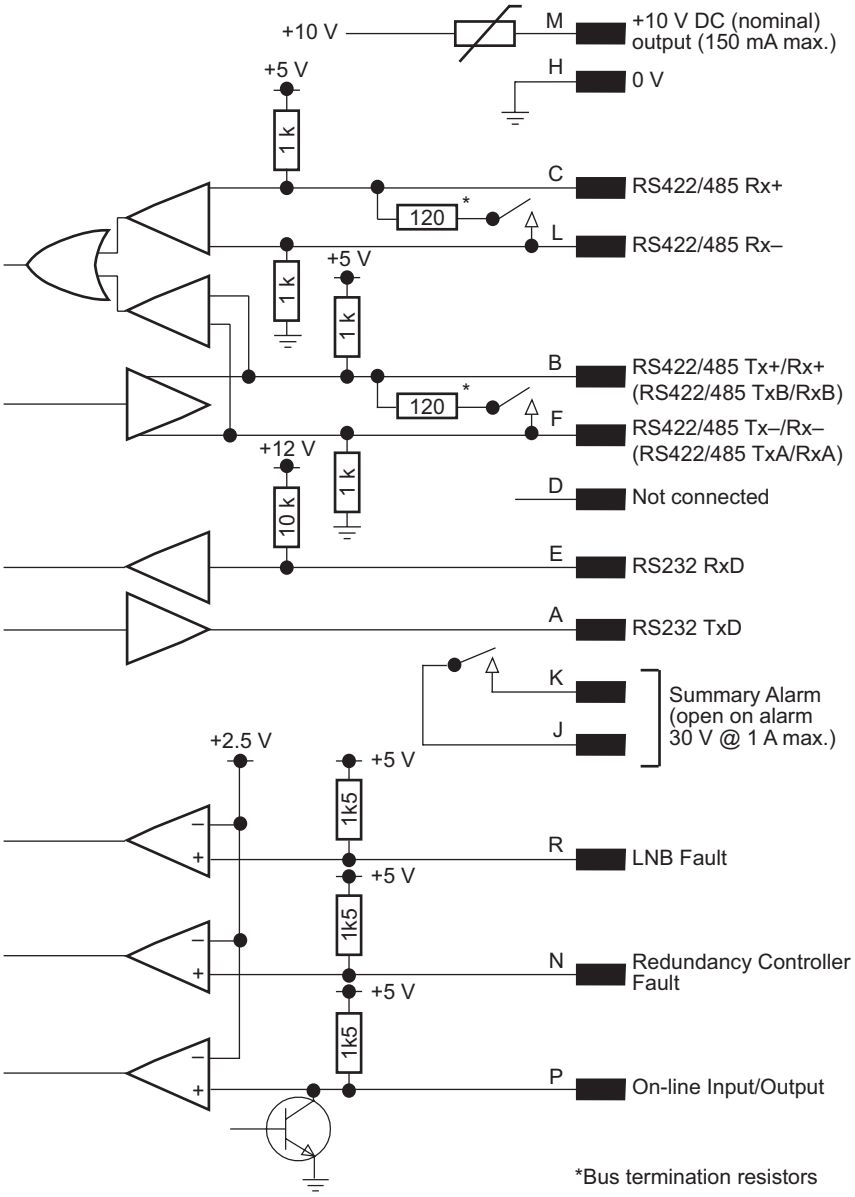


6901	Gain		–20 dB		61–4=57 dB	
	Input/output level	–7 dBm		–27 dBm		+30 dBm
6902	Gain		–20 dB		64–4=60 dB	
	Input/output level	–7 dBm		–27 dBm		+33 dBm
6904	Gain		–20 dB		67–4=63 dB	
	Input/output level	–7 dBm		–27 dBm		+36 dBm
6908CE	Gain		–20 dB		70–4=66 dB	
	Input/output level	–7 dBm		–27 dBm		+39 dBm
6908SE	Gain		–20 dB		70–4=66 dB	
	Input/output level	–7 dBm		–27 dBm		+39 dBm
6916	Gain		–20 dB		73–4=69 dB	
	Input/output level	–7 dBm		–27 dBm		+42 dBm

Monitor and control interface

The monitor and control interface of the BUC provides a relay contact to indicate the fault status of the transceiver. See Figure 12 for the pin assignments of the **M/C** connector. A MIL-C-26482 12-14P connector (for example, MS3116F12-14P) is required to mate with the **M/C** connector.

Figure 12: Monitor and control interface of the BUC



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4 Setting up and operating the transceiver

This section contains the following topics:

Switching on the BUC

CAUTION Ensure that the modem provides the correct DC voltages to power the particular BUC and LNB models being used.

To switch on the transceiver:

- ❑ Switch on the modem, and if you have installed an MBUC, switch on the AC mains power to the MBUC.
- ❑ If you need to set up the BUC, switch off the carrier at the modem.

  Connect the BUC to a PC (see page 31, *Connecting the serial interface*), then set up the BUC using the Set commands in Table 16 on page 49.

  Switch on the carrier at the modem.

LED indicators

There are three LED indicators on the BUC. These LEDs indicate the state of the BUC (see Table 14).

Table 14: LED indicators on the BUC and their states

LED	State	Indicates...
PWR	Green	Power is supplied to the BUC.
Tx	Yellow	The BUC PA is on.
FLT	Off	No faults or latched faults are present.
	Constant red	One or more of the following hardware faults have been detected in the BUC: • overtemperature fault (> 90°C) • PA fault • LO fault • fan fault • output power threshold • hardware/firmware incompatibility For information on fault finding see page 61, *Maintenance and fault finding*.
	Flashing red (2 flashes every second)	One or more of the following faults have been detected in the system: • an external fault in the LNB • an external fault in the redundancy controller • a non-volatile memory fault in the BUC
	Flashing red (1 flash every 2 seconds)	The fault information from a latched fault has been stored, however the fault is no longer present (firmware V1.10 or earlier).

NOTE Use the **VFS** command to view the status of the faults.

Serial interface monitor and control

To view or change the operating parameters of the BUC, the BUC must be connected to a terminal (for example, a Hand-held Controller 6560, a Remote Controller 6570, a PC, or an organiser emulating a terminal).

To establish communications between the PC and the BUC see page 31, *Connecting the serial interface*.

For more advanced remote control applications, contact your Codan representative.

The BUC is monitored and controlled using 3-letter operating commands followed, in some cases, by data. These commands are described in Table 15 to Table 19.

NOTE

The commands listed in Table 15 to Table 19 are used with common installations. If you have other requirements for your installation, contact your Codan representative for the facilities and commands available.

Serial interface commands

This section describes the serial interface commands you can use to set parameters and display information about the BUC. The descriptions given are based on using ASCII protocol.

The commands consist of a 3-letter mnemonic and, in some cases, command data.

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

The BUC is insensitive to the case of the command text.

NOTE

For example output of a command set see page 97, *Example outputs for the View commands*.

Table 15: Help commands

Command	Description	Enter...	Data required
Help	This command displays a list of the Help commands.	HLP	None
Help for Set commands	This command displays a list of the Set commands and the possible settings. NOTE Some settings are dependent on the model of the BUC or another setting.	HSC	None
Help for Output commands	This command displays a list of the Output commands.	HOC	None
Help for View commands	This command displays a list of the View commands.	HVC	None
Help for Reset commands	This command displays a list of the Reset commands.	HRC	None

Table 16: Set commands

Command	Description	Enter...	Data required
Set transmit on	This command switches transmit on or off by controlling the PA of the BUC. To switch on the PA, all three serial interfaces (RS232, RS422/485 and FSK) must be set to **STO1**. **STO1** is the default setting for all of the serial interfaces. A built-in safety feature only allows transmit to be switched on via the interface that was used to switch it off originally. **STO1** cannot be used to switch on transmit if an internal fault has occurred in the BUC. NOTE For CE-compliant operation you must set the transmit default state to Off (**STD0**). When **STD0** is used (see page 53, *Set transmit default*), you must use **STO1** after powerup to switch transmit on.	STOn	n = 0 to switch transmit off n = 1 to switch transmit on

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set compensation frequency	This command sets either the IF or RF compensation frequency of the carrier in MHz. The BUC determines from the value entered whether you have set the IF or RF compensation frequency, and calculates the corresponding RF or IF compensation frequency. The IF or RF compensation frequency range is dependent on the model of the BUC and the LO setting. The BUC uses the specified RF frequency for the internal temperature compensation and other calibration functions. It does not affect the carrier frequency. If the carrier frequency is unknown, set the IF or RF compensation frequency to zero. If multiple carriers are being transmitted and the frequency is limited to a narrow band (for example, over one transponder), set the IF or RF compensation frequency to the nominal centre frequency of the operating band.	SCFn	For 6702, 6705, 6710CE, and 6710SE (where applicable) LBUCs, and 6720, 6725, and 6740 MBUCs: LO = 7300 MHz IF: 950 ≤ n ≤ 1450 RF: 5850 ≤ n ≤ 6350 LO = 7375 MHz IF: 950 ≤ n ≤ 1525 RF: 5850 ≤ n ≤ 6425 LO = 7600 MHz IF: 950 ≤ n ≤ 1750 RF: 5850 ≤ n ≤ 6650 LO = 7675 MHz IF: 950 ≤ n ≤ 1750 RF: 5925 ≤ n ≤ 6725 For 6901, 6902, 6904, and 6908CE LBUCs: LO = 15450 MHz IF: 950 ≤ n ≤ 1700 RF: 13750 ≤ n ≤ 14500 For 6908SE LBUC and 6916 MBUC: LO = 15450 MHz IF: 950 ≤ n ≤ 1450 RF: 14000 ≤ n ≤ 14500 Use n = 0 for broadband operation (this forces broadband calibration data to be used)

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set transmit attenuator	This command sets the transmit attenuator of the BUC in dB. To minimise the possible effects of interference it is preferable to have a high transmit attenuation and a high IF level from the modem, rather than low transmit attenuation and a low IF level from the modem. Therefore, the BUC attenuator should be set as high as possible, consistent with the required BUC output power, transmit IF cable loss and maximum IF output level capability of the modem.	STAn	n = 0, 4, 8 or 12 dB
Set transmit power alarm threshold	This command sets the transmit power alarm threshold in dBm. The allowable threshold range depends upon the model of the BUC. Use the **VLD** command to display the upper and lower limits of the allowable range for your BUC (see page 58, *View limit data*). If the transmit power falls below the set threshold, a transmit power alarm is generated.	SATn	n = value within the allowable threshold range for your BUC n = 0 to disable the transmit power alarm

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set burst mode power threshold	This command sets the burst mode power threshold in dBm. NOTE: When you set a new burst mode power threshold, the current, minimum and maximum burst power readings are reset to zero (see page 57, *Output burst powers*). This command enables you to set the threshold level above which transmitted TDMA bursts or similar signals are recorded. The allowable threshold range depends upon the model of the BUC. Use the **VLD** command to display the upper and lower limits of the allowable range for your BUC (see page 58, *View limit data*).	SBTn	n = value within the allowable threshold range for your BUC n = 0 to disable burst detection

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set local oscillator	This command sets the local oscillator frequency in MHz. NOTE Before you change the LO setting you should switch off transmission using the **STO0** command. NOTE It is not necessary to use the **SLOn** command with 6901, 6902, 6904 or 6916 BUCs as they only have one local oscillator frequency.	SLOn	For 6702, 6705, 6710CE, 6725 and 6740 BUCs: n = 7300, 7375, 7600 or 7675 MHz For 6710SE and 6720 BUCs: n = 7300 or 7375 MHz
Set transmit default	This command sets the default transmit state at powerup. NOTE For CE-compliant operation you must set the transmit default state to Off (**STD0**). When **STD0** is used you must use **STO1** after powerup to switch transmit on (see page 49, *Set transmit on*).	STDn	n = 0 to keep transmit off (that is, PA off) at powerup n = 1 to return to previous transmit state prior to powerdown

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set redundant mode	This command sets the BUC to operate in a redundancy system. NOTE: For a system without redundancy you must always set the redundant mode to zero.	SRMn	n = 0 for a system without redundancy n = 1 for a warm standby system n = 2 for a hot standby system
Set on line	This command sets the on-line or off-line state of the BUC in a warm standby or hot standby redundant system, that is, **SRM1** or **SRM2** has been set. NOTE: If a BUC is forced off line when the alternative BUC in the redundancy system is faulty, the redundancy system will automatically switch the non-faulty BUC back on line.	SOLn	n = 0 to force the selected BUC off line n = 1 to force the selected BUC on line

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set serial interface	This command sets the data format of the RS422/485 and FSK serial interfaces. The data format for these interfaces cannot be set independently. This command can only be used on the RS232 port.	SSIr,w, p,s,t	r = baud rate (1200, 2400, 4800, 9600, 19200) w = word length in bits (7 or 8) p = parity N/n (none), E/e (even), O/o (odd) s = number of stop bits (1 or 2) t = RS422/485 bus terminated or unterminated (T/t, U/u)
Set packet protocol	This command sets the packet protocol to be used on the RS422/485 and FSK serial interfaces. The packet protocols for these interfaces cannot be set independently. This command can only be used on the RS232 port.	SPPn	n = 0 for ASCII protocol n = 1 for Codan protocol n = 2 for SAbus protocol n = 3 for Comstream protocol n = 4 for NDSatcom protocol

Table 16: Set commands (cont.)

Command	Description	Enter...	Data required
Set packet address	This command sets the packet address. The packet address range depends on the packet protocol selected (see page 55, *Set packet protocol*). For information on protocols, contact your Codan representative and quote the Codan part number listed on page 109, *Associated specifications*.	SADn	$1 \leq n \leq 126$ for Codan protocol $49 \leq n \leq 111$ for SAbus protocol $1 \leq n \leq 31$ for Comstream protocol $1 \leq n \leq 15$ for NDSatcom protocol
Set echo	This command switches the echoing of characters on or off in ASCII protocol mode on the RS232 interface only. Echo is always off on the FSK and RS422/485 interfaces.	SECn	n = 0 to disable echoing n = 1 to enable echoing

Table 17: Output commands

Command	Description	Enter...	Data required
Output power output	This command displays the RF power output of the BUC in dBm. If the output power is less than the lower limit, 0.0 dBm is displayed. If the output power is greater than the upper limit, 99.9 dBm is displayed.	OPO	None
Output burst powers	This command displays the current, minimum and maximum burst output powers of the BUC in dBm. If the burst power is less than the lower limit, 0.0 dBm is displayed. If the burst power is greater than the upper limit, 99.9 dBm is displayed.	OBP	None

Table 18: View commands

Command	Description	Enter...	Data required
View system status	This command displays the status and parameter settings of the BUC.	VSS	None
View operational data	This command displays the operational data of the BUC.	VOD	None
View fault status	This command displays the fault status of the BUC. In a redundancy system it also displays the fault status of the LNB and the redundancy controller. It displays both current faults and latched faults (that is, faults that have previously occurred but may have cleared).	VFS	None
View identity and configuration data	This command displays the identification and configuration data of the BUC.	VID	None
View limit data	This command displays the frequency and power ranges for the BUC.	VLD	None
View protocol data	This command displays the serial interface protocol information.	VPD	None
View build standard data	This command displays the build standard information of the BUC.	VBS	None

Table 19: Reset commands

Command	Description	Enter...	Data required
Reset	This command resets the BUC settings to the settings at powerup (that is, it has the same effect as switching the power off then on again). The maximum and minimum readings for the burst mode power are cleared, the LO synthesiser is reloaded and, if the transmit default state is set to off, the PA of the BUC is switched off.	RST	None
Reset latched faults	This command clears all latched faults except those that are still current.	RLF	None
Reset to default values	This command resets the parameters that are changed via the Set commands to their factory default settings. NOTE: If you have a C-Band BUC, you should switch off the carrier at the modem before using this command. This will prevent transmission on an undesired frequency. When you have reset the LO frequency, switch transmission on. The default settings are: transmit — on (for RS232, RS422/485 and FSK) RF compensation frequency — 0 MHz	RDV	None

Table 19: Reset commands (cont.)

Command	Description		Enter...	Data required
Reset to default values (cont.)	IF compensation frequency	0 MHz		
	transmit attenuator	12 dB		
	output power threshold	0 dBm (off)		
	burst mode power threshold	0 dBm (off)		
	LO frequency	C-Band: 7375 MHz Ku-Band: 15450 MHz		
	transmit default	PA returns to transmit state prior to powerdown		
	redundant mode	non-redundant mode		
	serial interface	9600 baud 8 bits no parity 1 stop bit unterminated RS422/485 bus		
	packet protocol	NDSatcom protocol		
	packet address	1 for Codan 49 for SAbus 1 for Comstream 1 for NDSatcom		
	echo	on		

5 Maintenance and fault finding

This section contains the following topics:

Precautions

Connections to power supplies

In general, exposed connector pins do not carry DC supply voltages.

WARNING Care should be taken at all times to avoid short circuiting connector pins.

Servicing requirements

If you find that any module is faulty, contact your Codan representative or Codan customer service staff. Before returning goods to Codan you must obtain an RMA to authorise the return of your goods.

WARNING Do not attempt to repair the module as you may cause further faults and void the manufacturer's warranty.

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. Faults are indicated by the LEDs on the BUC (see Table 14 on page 45).

If a fault is indicated on the BUC it is recommended that you check the cables and the cable connections. For information on troubleshooting the installation see the *Satellite Communication Equipment Installation Handbook*.

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 20 on page 63).

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 listed in Table 20.

Table 20: Customer service contact numbers and email addresses

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

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

Using the fault diagnosis charts

The tests indicated in the diagnosis charts are at the end of this section. When an '*' appears in a diagnosis chart it indicates that you are to refer to the relevant test.

You should be able to locate simple faults with minimal test equipment. A terminal or a computer emulating a terminal is required for checking the BUC. The most effective technique when dealing with complex faults, or if a terminal is not available, is to substitute modules.

CAUTION

During fault finding or performance testing, disconnect the Tx IF signal and/or terminate the BUC output into a suitably-rated dummy load. This will ensure that unwanted signals are not transmitted.

You can commence fault finding using the:

- Main BUC fault diagnosis chart
- LNB fault diagnosis chart

NOTE

The following flow charts assume the BUC is in non-redundant mode. If the BUC is set to either of the two redundancy modes and is *not* installed in a redundancy system, LNB and redundancy controller faults are permanently indicated and cannot be cleared.

Figure 13: Main BUC fault diagnosis chart

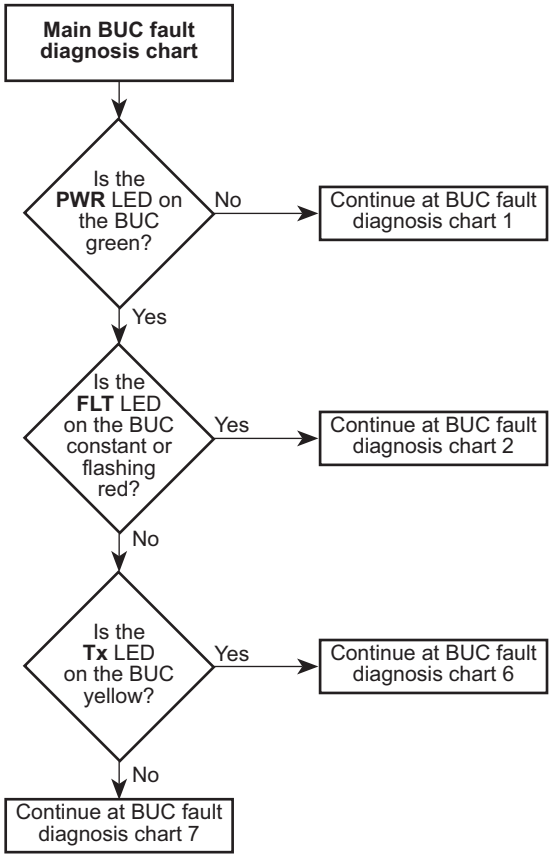


Figure 14: BUC fault diagnosis chart 1

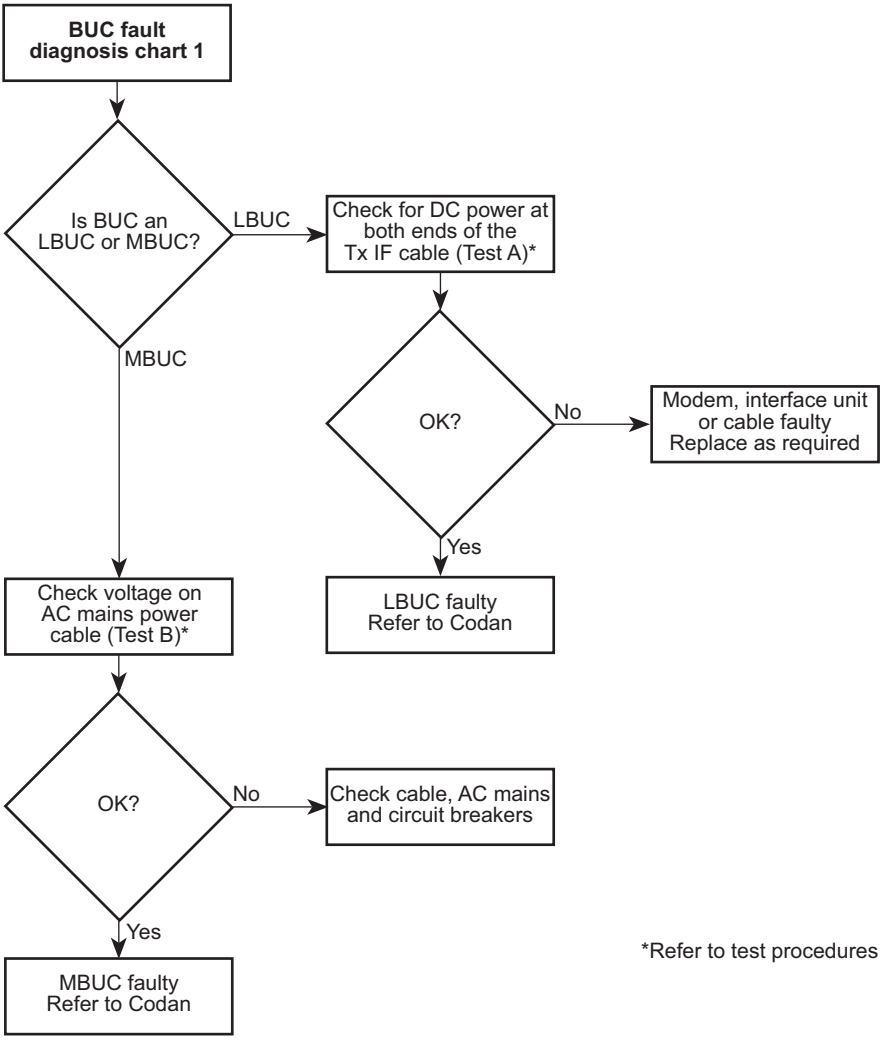


Figure 15: BUC fault diagnosis chart 2

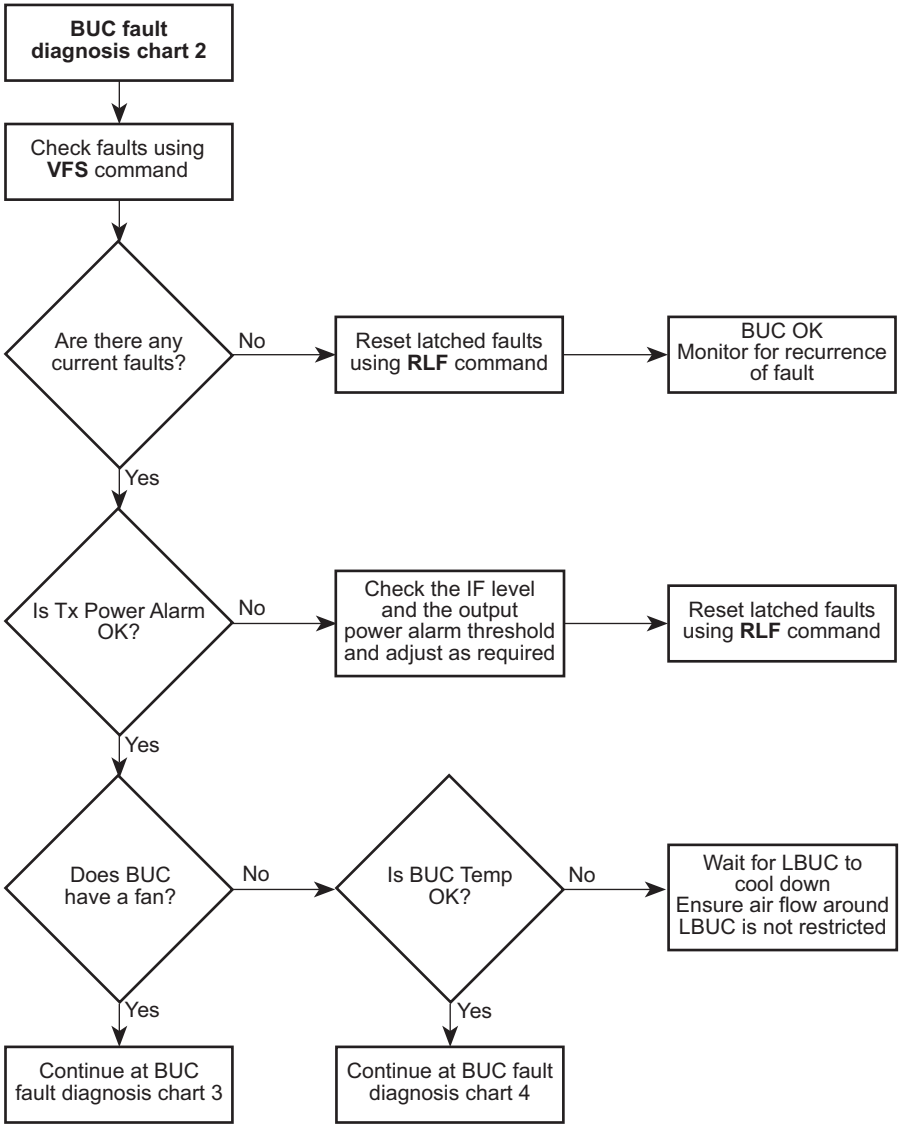


Figure 16: BUC fault diagnosis chart 3

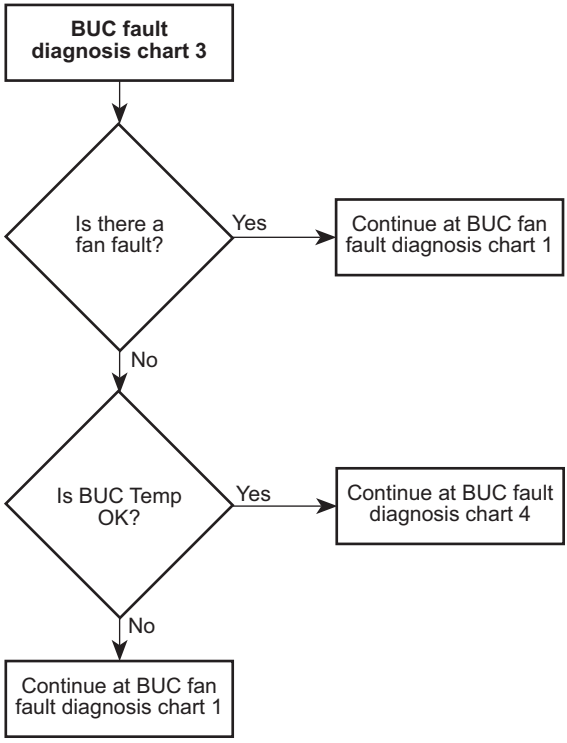


Figure 17: BUC fault diagnosis chart 4

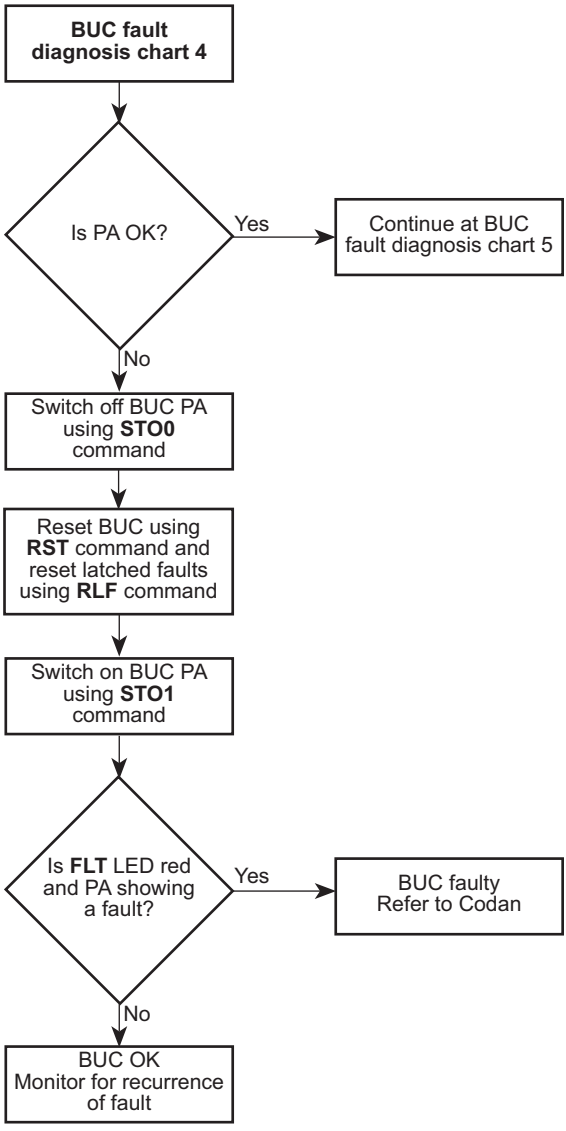


Figure 18: BUC fault diagnosis chart 5

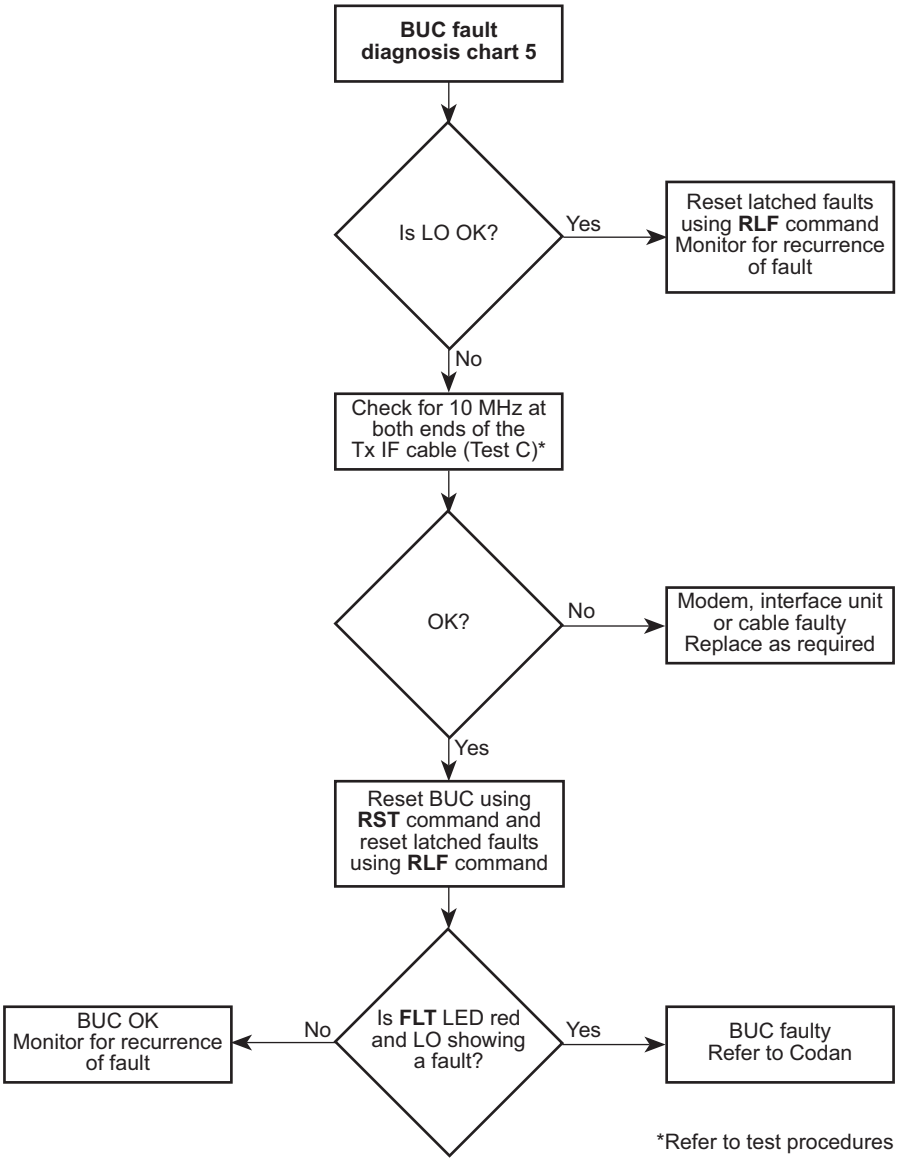


Figure 19: BUC fault diagnosis chart 6

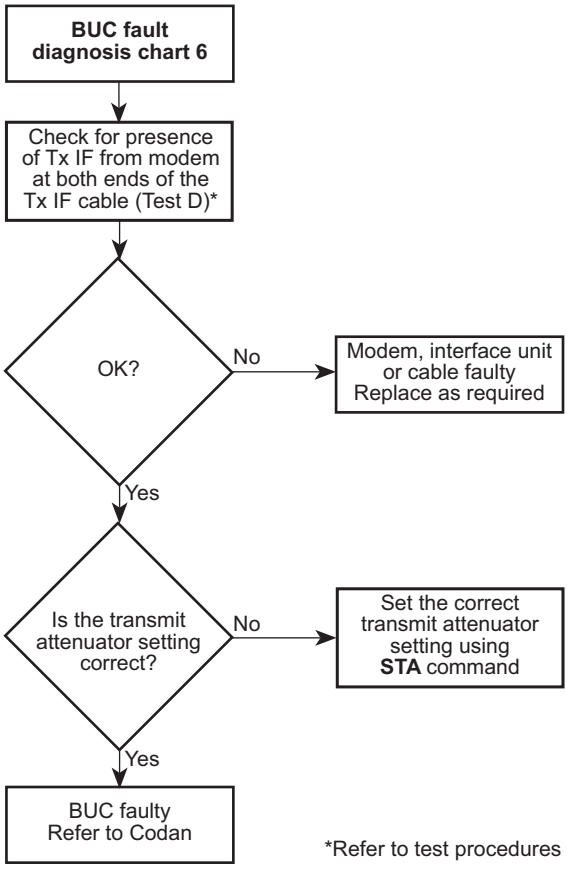


Figure 20: BUC fault diagnosis chart 7

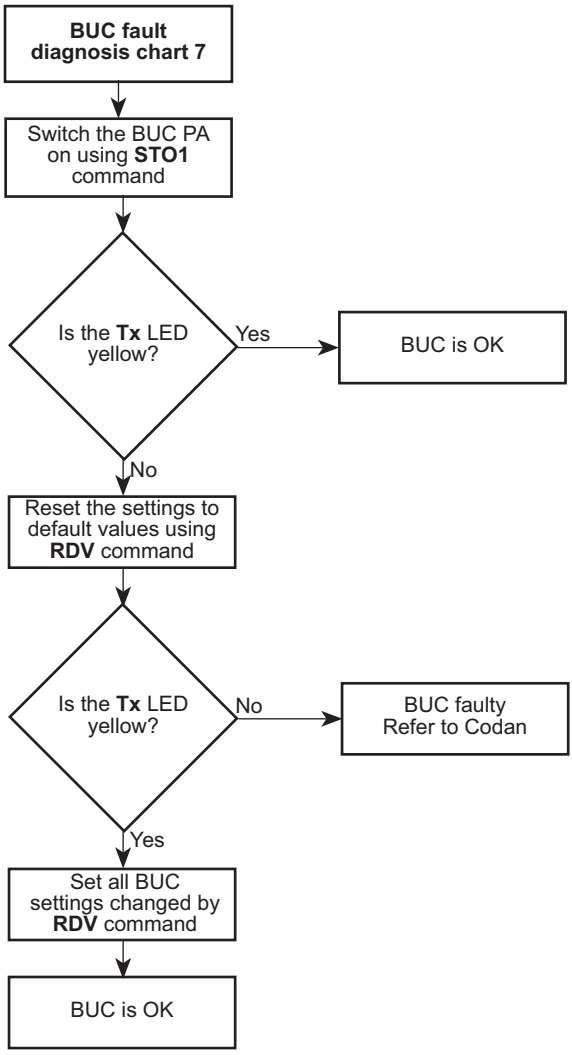


Figure 21: BUC fan fault diagnosis chart 1

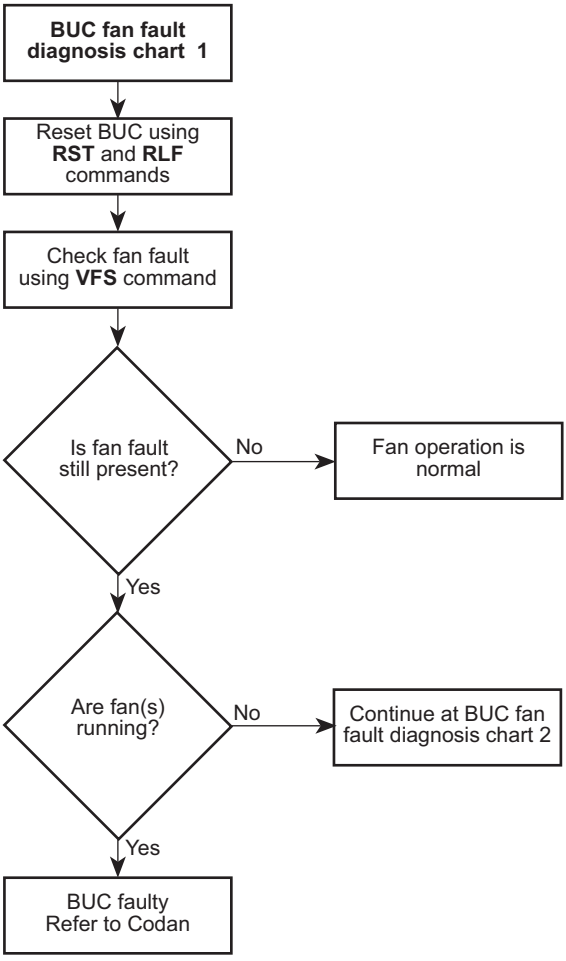


Figure 22: BUC fan fault diagnosis chart 2

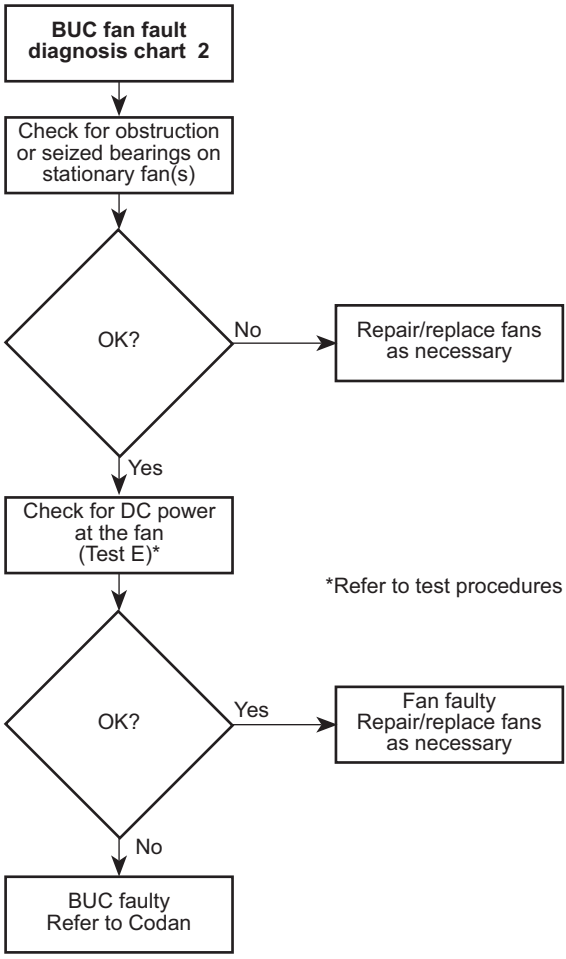
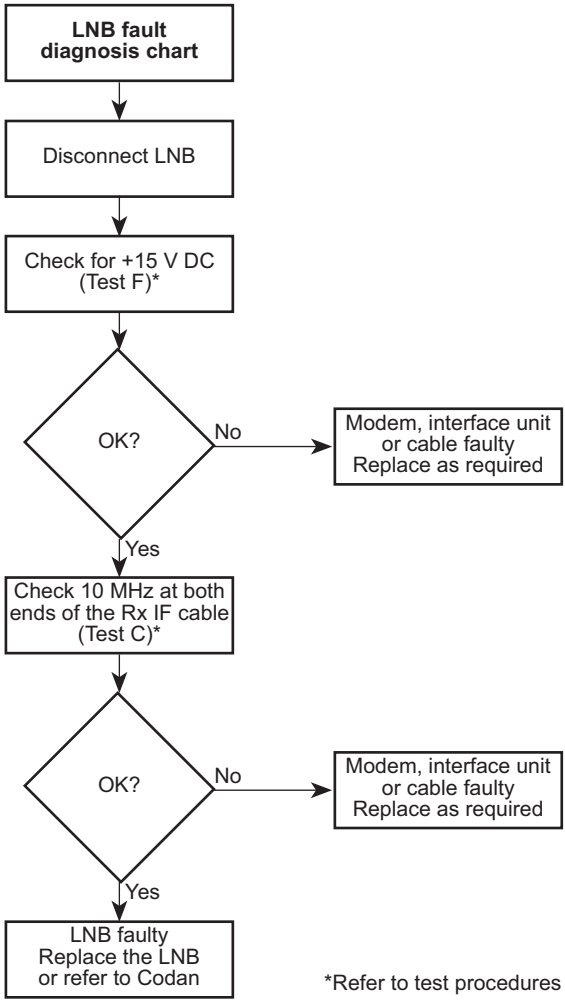


Figure 23: LNB fault diagnosis chart



Test procedures

Use the following tests in conjunction with the fault finding diagnostic charts.

Table 21: Test A

Procedure	Comment
Measure the DC voltage at both ends of the Tx IF cable. Connect positive to the centre pin and negative to ground (to the screen).	For +24 V LBUCs the DC voltage should be +19 to +35 V DC. For +48 V LBUCs the DC voltage should be +42 to +60 V DC.

Table 22: Test B

Procedure	Comment
As applicable in the fault diagnosis chart, measure the AC mains voltage on the connector that plugs into the MBUC. For pinouts of the **AC INPUT** connector see Table 11 on page 28.	The measured AC mains voltage must be between 94 and 275 V AC. WARNING Care needs to be taken when performing this measurement as a severe electric shock and personal injury may result.

Table 23: Test C

Procedure	Comment
Measure 10 MHz at both ends of the Tx or Rx IF cable as required.	The 10 MHz signal level should be –5 to +5 dBm. WARNING A DC block may be required to protect the test equipment from the DC voltage on the IF cable.

Table 24: Test D

Procedure	Comment
Measure IF level at both ends of the Tx IF cable. NOTE It is recommended that a spectrum analyser is used to measure the IF level. A power meter may be used but the reading will be misleading unless the 10 MHz signal can be filtered out.	The IF signal level should be consistent with the IF level plan for the transceiver. WARNING A DC block may be required to protect the test equipment from the +24/48 V DC on the Tx IF cable.

Table 25: Test E

Procedure	Comment
As applicable in the fault diagnosis chart, measure the DC voltage at the fan feed-through connections on the BUC, positive and negative as marked.	The DC voltage should be 9 to 10.2 V DC, when power is supplied to the LBUC. The DC voltage should be 12 ±1 V DC, when power is supplied to the MBUC.

Table 26: Test F

Procedure	Comment
Measure the DC voltage at both ends of the Rx IF cable.	The DC voltage should be +15 to +24 V DC.

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6 Specifications

This section contains the following topics:

BUC

IF input

Frequency range

6702, 6705, 6710CE, 6725, 6740	950 to 1750 MHz
6710SE, 6720	950 to 1525 MHz
6901, 6902, 6904, 6908CE	950 to 1700 MHz
6908SE, 6916	950 to 1450 MHz
Connector	N-type female

Gain specification

Gain

6702	64 dB nominal
6705	68 dB nominal
6710CE, 6710SE	71 dB nominal
6720, 6725	75 dB nominal
6740	77 dB nominal
6901	61 dB nominal
6902	64 dB nominal
6904	67 dB nominal
6908CE, 6908SE	70 dB nominal
6916	73 dB nominal

Gain specification (cont.)

Gain flatness	
40 MHz	±0.75 dB maximum
Full band	±1.5 dB maximum
Gain stability (over –40 to +55°C when compensation frequency set)	±1.25 dB maximum

RF output

Frequency range	
6702, 6705, 6710CE, 6725, 6740	5850 to 6725 MHz
6710SE, 6720	5850 to 6425 MHz
6901, 6902, 6904, 6908CE	13750 to 14500 MHz
6908SE, 6916	14000 to 14500
Connector	
6702, 6705, 6710CE, 6710SE, 6725, 6740	CPR137G flange with 5.0 mm through holes or N-type female (optional)
6901, 6902, 6904, 6908CE, 6908SE, 6916	WR75, PBR120 flange with 4.2 mm through holes

RF output (cont.)

Power at 1 dB GCP

6702	+33.0 dBm minimum
6705	+37.0 dBm minimum
6710CE	+40.0 dBm minimum
6710SE	+40.0 dBm typical
6720	+43.0 dBm minimum
6725	+44.0 dBm typical
6740	+46.0 dBm minimum
6901	+30.0 dBm minimum
6902	+33.0 dBm minimum
6904	+36.0 dBm minimum
6908CE	+39.0 dBm minimum
6908SE	+39.0 dBm typical
6916	+42.0 dBm typical

RF output (cont.)

Carrier to intermodulation ratio

6702, 6705	–29 dBc, two carriers, each at 6 dB OPBO from 1 dB GCP
6710CE, 6710SE	–26 dBc, two carriers, each at 6 dB OPBO from 1 dB GCP
6720, 6725, 6740	–25 dBc, two carriers, each at 6 dB OPBO from 1 dB GCP
6901, 6902, 6904	–26 dBc, two carriers, each at 6 dB OPBO from 1 dB GCP
6908CE, 6908SE, 6916	–25 dBc, two carriers, each at 6 dB OPBO from 1 dB GCP

Output power meter

Range	P1dB down to P1dB – 15 dB
Absolute accuracy when compensation frequency set	±1.0 dB maximum
Relative accuracy when compensation frequency set	±0.5 dB maximum

Spurious output

6702, 6705, 6710CE, 6710SE	–50 dBc maximum at 3 dB OPBO
6720, 6725, 6740	–60 dBc maximum at 3 dB OPBO
6901, 6902, 6904, 6908CE, 6908SE	–50 dBc maximum at 3 dB OPBO
6916	–60 dBc maximum at 3 dB OPBO

Phase noise (SSB) when fed with the frequency reference that has the specifications shown below

100 Hz	–63 dBc/Hz
1 kHz	–73 dBc/Hz
10 kHz	–83 dBc/Hz
100 kHz	–93 dBc/Hz

Frequency reference

Frequency	10 MHz
Phase noise	
100 Hz	–135 dBc/Hz
1 kHz	–145 dBc/Hz
10 kHz	–155 dBc/Hz
100 kHz	–155 dBc/Hz
Level	–12 to +5 dBm
Connector	Via transmit IF input

Frequency conversion	Spectrum inverting

Power supply

Voltage	
24 V LBUC (6702, 6705, 6901, 6902, 6904 only)	+19 to +35 V DC
48 V LBUC	+42 to +60 V DC
MBUC	+94 to +275 V AC
Connector	
LBUC	Via transmit IF input, +ve on centre conductor
MBUC	Amphenol T 3110 000

Power supply (cont.)

Consumption

6702	60 W maximum
6705	80 W maximum
6710CE, 6710SE	105 W maximum
6720, 6725	240 W maximum
6740	375 W maximum
6901	40 W maximum
6902	50 W maximum
6904	80 W maximum
6908CE, 6908SE	115 W maximum
6916	300 W maximum

Monitor and control interface (FSK)

Data format	User-selectable format and protocol
Data transmitter	
Frequency	650 kHz ±1%
Deviation	±60 kHz ±1%
Sense	+60 kHz = mark –60 kHz = space
Output level	–3 dBm nominal
Start tone time	10 ms minimum
Data receiver	
Nominal frequency	650 kHz
Locking range	±30 kHz
Input sensitivity	–15 dBm minimum

Monitor and control interface (digital)

Data format	
RS232	9600 bps, 8 bits, no parity, 1 stop bit, ASCII protocol
RS485	User-selectable format and protocol
Connector	MIL-C-26482 12-14S socket

MBUC fault monitor

Connector	Transmit IF input
Polarity	+ve on centre conductor
No fault state	> 23 mA at 48 V DC
Fault state	< 20 mA at 48 V DC

LNB

Input

Frequency range	
C-Band	3400 to 4200 MHz
Ku-Band	
Band 1	10950 to 11700 MHz
Band 2	11700 to 12200 MHz
Band 3	12250 to 12750 MHz

Noise temperature

C-Band	45 K at 20°C maximum
Ku-Band	75 K at 20°C maximum

Gain specification

Gain	60 dB typical

Local oscillator frequency

C-Band	5150 MHz
Ku-Band	
Band 1	10000 MHz
Band 2	10750 MHz
Band 3	11300 MHz

Output

Frequency range	
C-Band	950 to 1750 MHz
Ku-Band	950 to 1450/1700 MHz
Connector	F-type female

Phase noise (SSB) when fed with the frequency reference that has the specifications shown below

100 Hz	–63 dBc/Hz
1 kHz	–73 dBc/Hz
10 kHz	–83 dBc/Hz
100 kHz	–93 dBc/Hz

Frequency reference

Frequency	10 MHz
Phase noise	
100 Hz	–135 dBc/Hz
1 kHz	–145 dBc/Hz
10 kHz	–155 dBc/Hz
100 kHz	–155 dBc/Hz
Level	–10 to 0 dBm
Connector	Via IF output connector

DC power

Voltage	+15 to +24 V DC
Current	500 mA maximum
Connector	Via IF output connector

Environmental

Operating temperature range

BUC and LNB	–40 to +55°C

Relative humidity

BUC and LNB	100%

Weatherproofing

BUC	Sealed to 34 kPa
LNB	Weatherproof

Physical

Size

6702, 6705, 6901, 6902, 6904	182 mm W × 285 mm D × 104 mm H
6710CE, 6710SE, 6908CE, 6908SE	182 mm W × 285 mm D × 140 mm H
6720, 6725, 6740, 6916	182 mm W × 443 mm D × 204 mm H
LNB	
C-Band	100 mm W × 190 mm D × 90 mm H
Ku-Band	65 mm W × 130 mm D × 40 mm H

Weight

LBUC (6702, 6705, 6901, 6902, 6904)	6 kg maximum
LBUC (6710CE, 6710SE, 6908CE, 6908SE)	6.5 kg maximum
MBUC (6725, 6740, 6916)	12 kg maximum
LNB	0.5 kg maximum

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7 Drawings

Table 27: List of drawings

Drawing No.	Description
15-42003-001	LBUC Fitting Instructions Boom Mounting
01-01176	Interface Control Drawing LBUC, 2 W/5 W, C-Band
01-01192	Interface Control Drawing LBUC, 1, 2 & 4 W, Ku-Band
15-42019-001	MBUC Fitting Instructions Boom Mounting
01-01301	Interface Control Drawing C-Band MBUCs 6720, 6725, 6740
01-01302	Interface Control Drawing Ku-Band MBUC 6916

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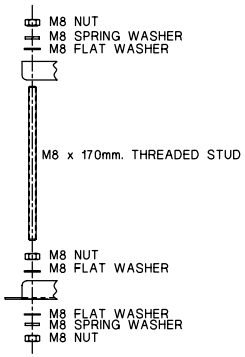
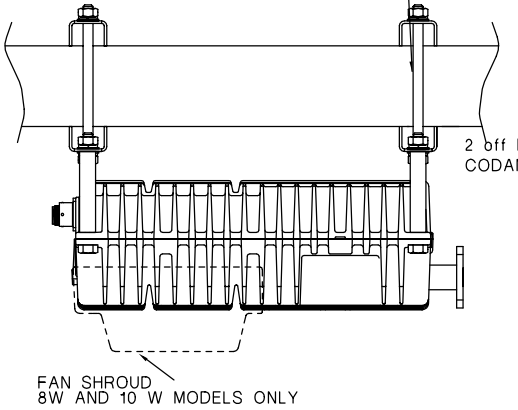
DO NOT SCALE

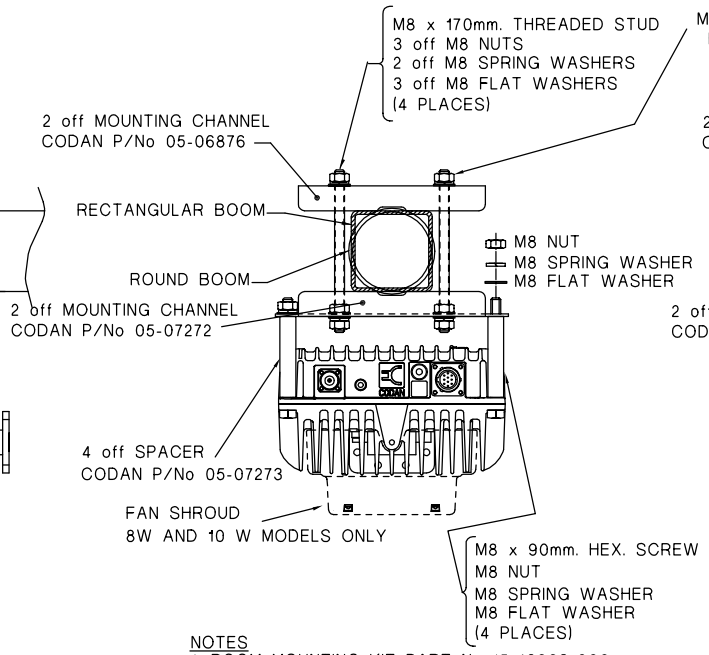
ISSUE B
REMOVED FLAT WASHER
ADDED EXPLODED DETAIL
C/R 27421

ISSUE 1
ADDED FAN SHROUD
C/R 28361

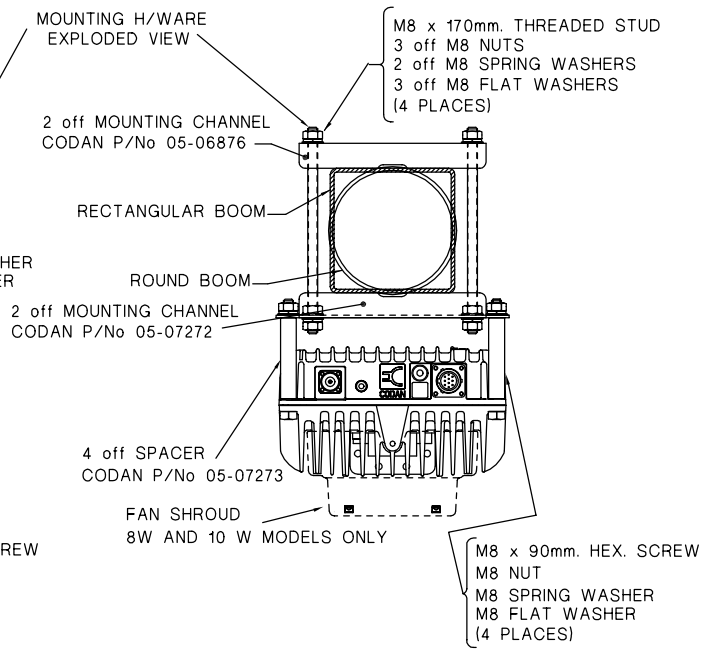


MOUNTING FOR BOOMS UP TO 65mm WIDE/DIA.





MOUNTING FOR BOOMS UP TO 100mm WIDE/DIA.



NOTES
1. BOOM MOUNTING KIT PART No 15-42003-000.
2. UNIT SHOWN IS C-BAND LBUC.

DIMENSIONS IN mm

FILE No. 15\42003__B.DWG

CODAN

MATERIAL

FINISH

SCALE	1:2	
DRN	D B	DATE 15-1-02
CHKD	GZ	28-3-02
APPD	PMC	11-01-05

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

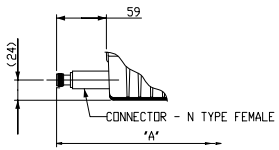
TITLE
LBUC
FITTING INSTRUCTIONS
BOOM MOUNTING

DRAWING/DOC NO.
A1 15-42003-001

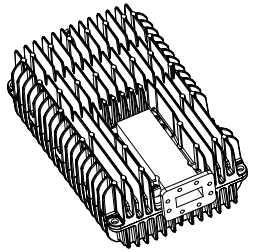
ISS 1

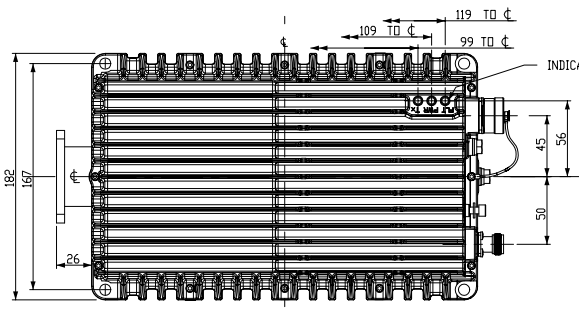
SHT. 1 OF 1

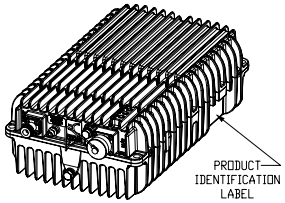
DO NOT SCALE

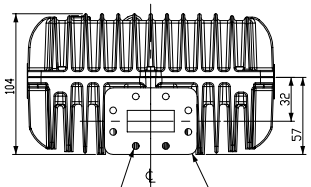


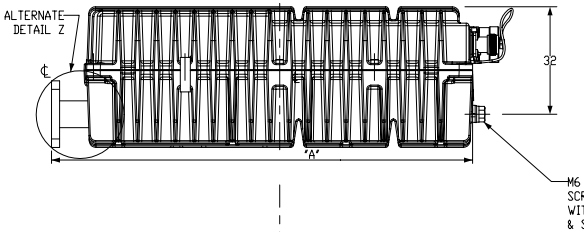
DETAIL 'Z'
PARTIAL VIEW
DEPICTS ALTERNATIVE PART SPECIFICATION
REFER PRODUCT ID TABLE

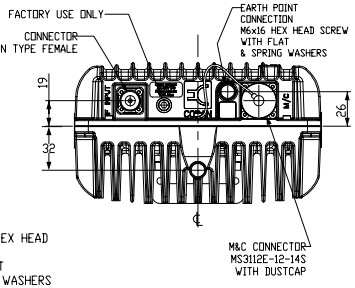


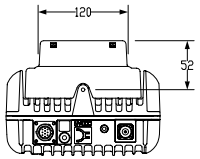


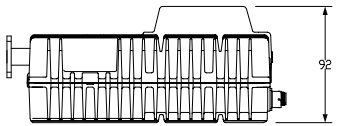




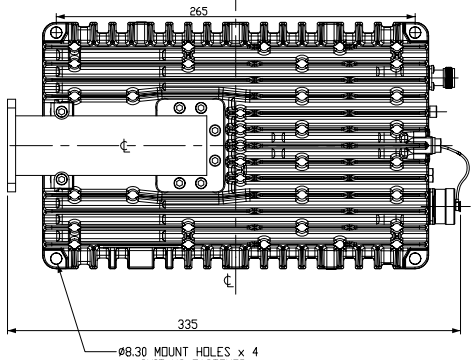








DETAIL OF 10W VERSION ONLY
SCALE 1:2



PRODUCT I.D. TABLE	
OUTPUT TYPE	DIMENSION A
W/G	311
N	344

ISSUE B:

DIM 'A' IN PRODUCT ID TABLE:
311 WAS 315,
344 WAS 339
C/R 27515
TJM 26-03-2003

ISSUE C:
EARTH POINT SCREW WAS M5x10
C/R 27533
TJM 23-04-2003

ISSUE 1:
10W VERSION ADDED
TITLE WAS 2W/5W
FORMAT WAS A3
C/R 28054
C/R 28361
TJM 11-01-05

DIMENSIONS IN mm

CODAN

MATERIAL
N/A

FINISH

SCALE 0.250

DRN	DAB	DATE 15-07-02
CHKD	RL	04-09-02
APPD	PMC	11-01-05

TOLERANCES
UNLESS OTHERWISE STATED
2 PLACES DEC. ±0.1
1 PLACE DEC. ±0.2
0 PLACE DEC. ±0.5

TITLE
INTERFACE CONTROL DRAWING
LBUC, 5W/10W, C-BAND

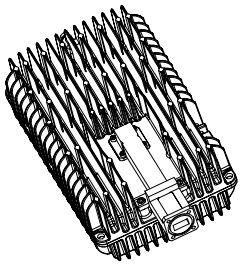
A2

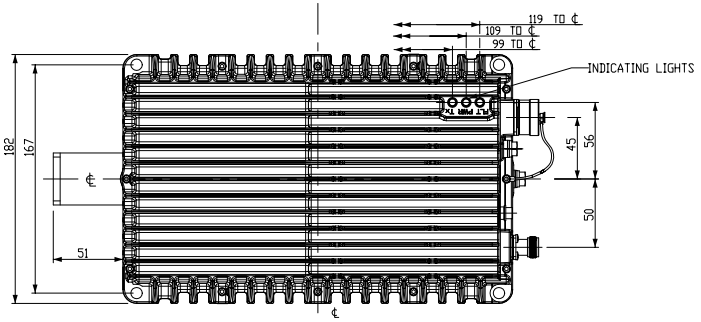
DRAWING/DOC NO.
01-01176

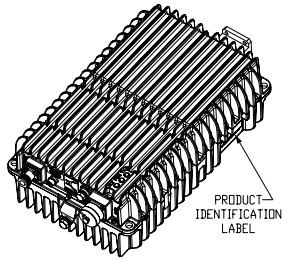
ISS 1

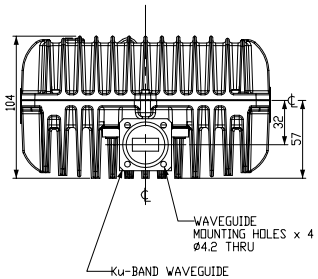
SHT. 1 OF 1

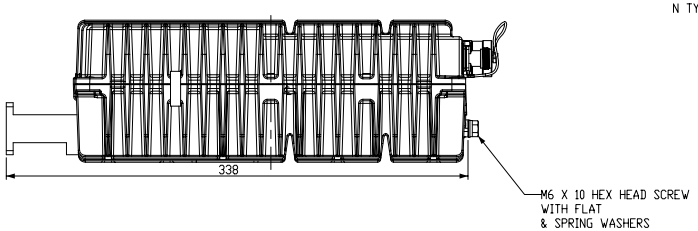
DO NOT SCALE

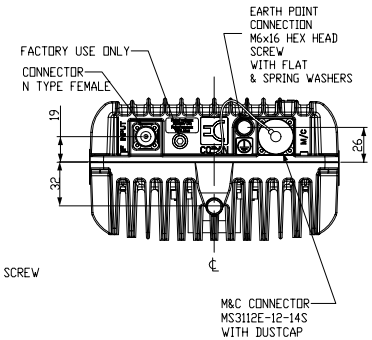


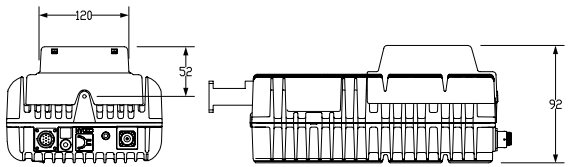




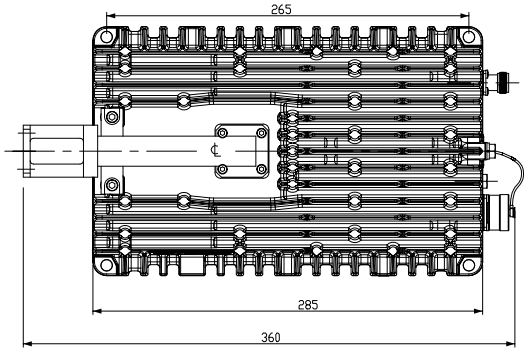








8W VERSION ONLY
SCALE 2:1



ø8.30 MOUNT HOLES x 4
SUIT M8 FASTENER
ALT.5/16"

ISSUE B:
EARTH POINT SCREW
WAS M5x10,
DIM 338 WAS 336
C/R 27534
TJM 23-04-2003

ISSUE 1:
8W VERSION ADDED
TITLE WAS
1,2 & 4W
FORMAT WAS
A3
C/R 28054
C/R 28361
TJM 11-01-05

DIMENSIONS IN mm

CODAN		SCALE 1.000	©CODAN LIMITED, A.C.N. 007 590 605: 2003
MATERIAL N/A	DRN	DAB	DATE 26-08-02
	CHKD	RL	04-09-02
FINISH	APPD	PMC	11-01-05
TOLERANCES UNLESS OTHERWISE STATED: 2 PLACES DEC. ±0.1; 1 PLACE DEC. ±0.2; 0 PLACE DEC. ±0.5			

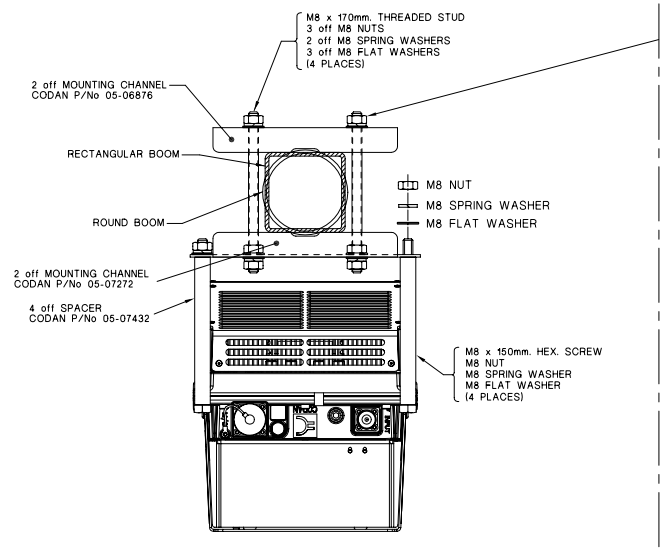
TITLE
INTERFACE CONTROL DRAWING
LBUC, 4W & 8W, Ku-BAND

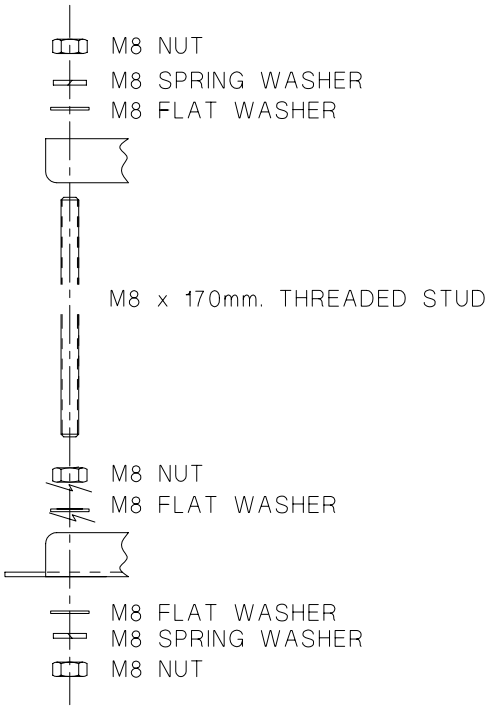
A2 | DRAWING/DOC NO. 01-01192

ISS 1 | SHT. 1 OF 1

DO NOT SCALE

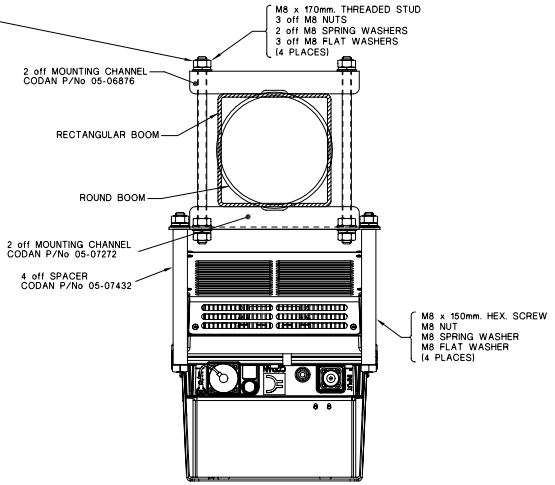
MOUNTING FOR BOOMS UP TO 65mm WIDE/DIA.

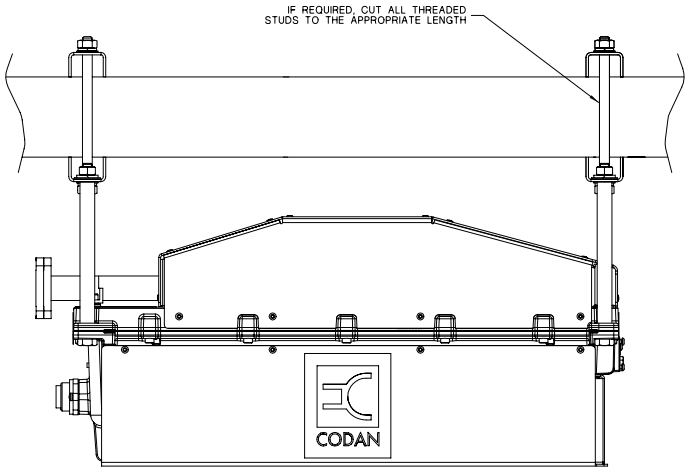




MOUNTING H/WARE
EXPLODED VIEW

MOUNTING FOR BOOMS UP TO 100mm WIDE/DIA.





NOTES
1. BOOM MOUNTING KIT PART No 15-42019-000.
2. UNIT SHOWN IS C-BAND MBUC.

DIMENSIONS IN mm

CHANGE REQUEST

ISSUE B
Update pictorially, and invert MBUC return "upside down".
C/R 28088
RL 29-07-04

ISSUE 1
CODAN LABEL WAS INVERTED
NOW UPRIGHT
C/R 28054
PMC 11-01-05

REMOVE BURRS & SHARP EDGES

FILE No. 15\42019__B.DWG

CODAN

MATERIAL		SCALE	1:2
	DRN	DOW	DATE 31-03-04
	CHKD	RL	01-04-04
	APPD	PMC	11-01-05
FINISH	TOLERANCES UNLESS OTHERWISE STATED		
	2 PLACES DEC.		±0.25
	1 PLACE DEC.		±0.5
	0 PLACE DEC.		±1

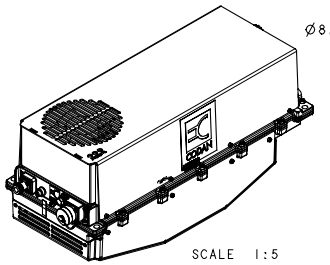
TITLE: MBUC
FITTING INSTRUCTIONS
BOOM MOUNTING

DRAWING/DOC NO.
A1 15-42019-001

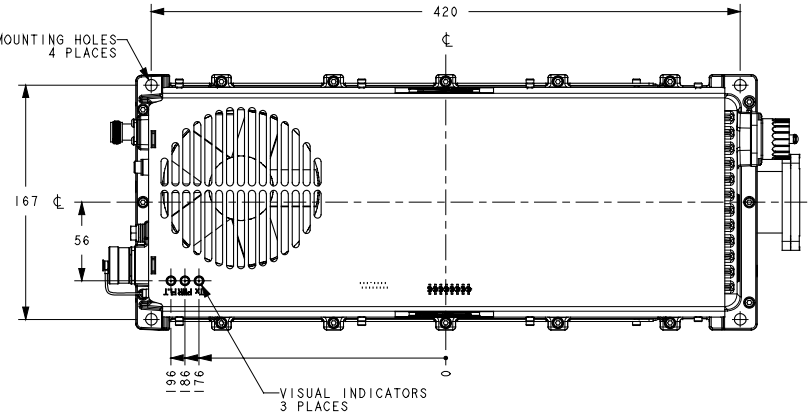
ISS 1

SHT. 1 OF 1

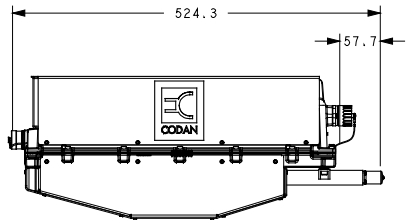
DO NOT SCALE



SCALE 1:5



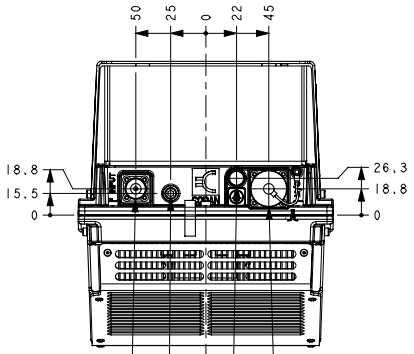
SPECIFIC DIMENSIONS FOR
N-TYPE OUTPUT VARIANT
SCALE 1:5



CONNECTOR
N TYPE FEMALE

ISSUE B:
DRAWING UPDATED
& FORMAT CHANGED
C/R 27809
PMC 09-01-04

ISSUE C:
TITLE BLOCK &
DRAWING UPDATED
C/R 28019
RL 31-05-04

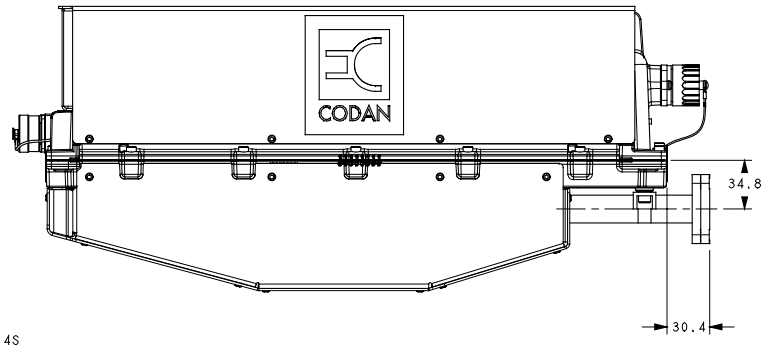


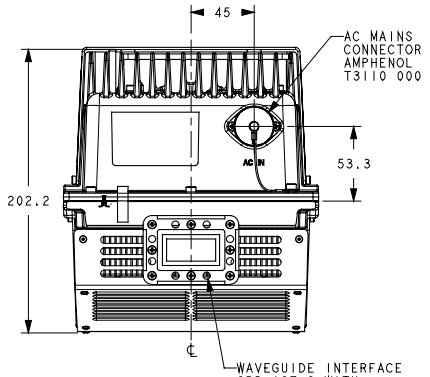
RF CONNECTOR
N TYPE FEMALE

M&C CONNECTOR
MILSPEC MS3112E-12-14S
WITH DUSTCAP

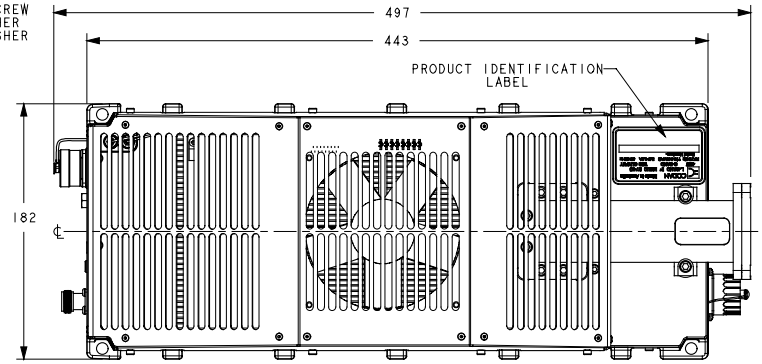
PRESSURE TESTING
M5x10 SOCKET HEAD
(FACTORY USE ONLY)

EARTHING POINT
M6x12 SS HEX HEAD SCREW
WITH M6 SS FLAT WASHER
AND M6 SS SPRING WASHER





WAVEGUIDE INTERFACE
CPR 137 G WITH
Ø5 THROUGH HOLES



DIMENSIONS IN mm

MATERIAL	DRN	KF	SCALE 2:5
	CHKD	GHZ	DATE 04-06-03
	APPD	PMC	04-06-03 / 13-01-05
FINISH	TOLERANCES UNLESS OTHERWISE SPECIFIED: LINEAR ± 0.2; ANGULAR ± 0.5°; FLATNESS ± 0.2; ROUGHNESS 1.6 µmRa		

CODAN

TITLE: INTERFACE CONTROL DRAWING
C-BAND MBUCs 6720, 6725, 6740

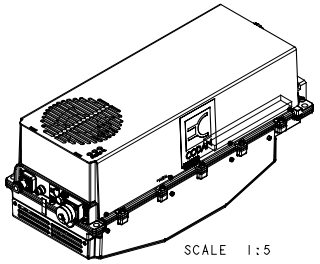
A2

ISS 1 | DRAWING/DOC NO. 01-01301 | SHT.1 OF 1

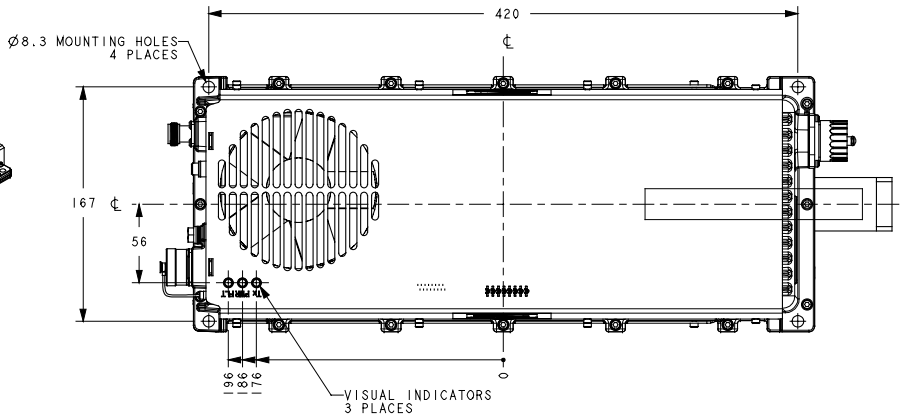
DO NOT SCALE

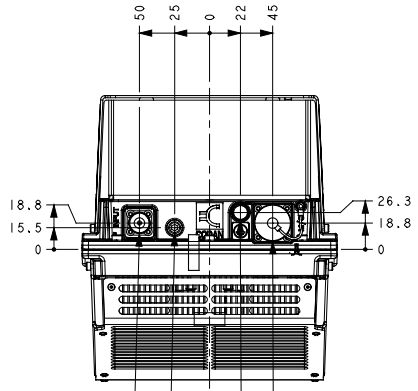
ISSUE B:
DRAWING UPDATED
& FORMAT CHANGED
C/R 27810
PMC 09-01-04

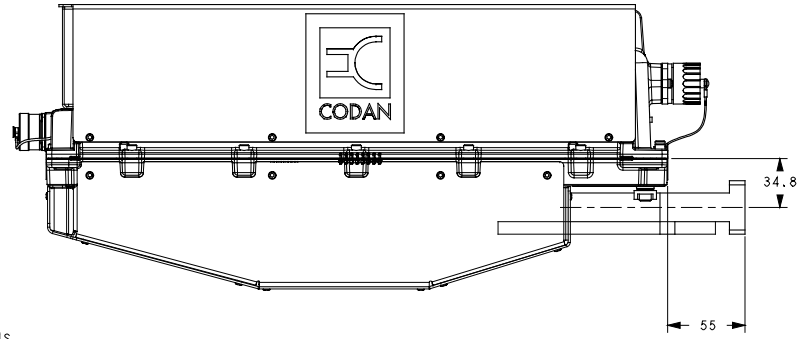
ISSUE C:
TITLE BLOCK &
DRAWING UPDATED
C/R 28019
RL 31-05-04

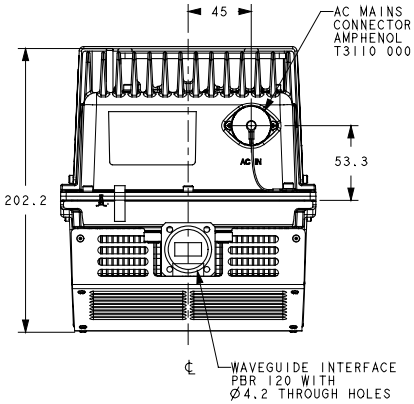


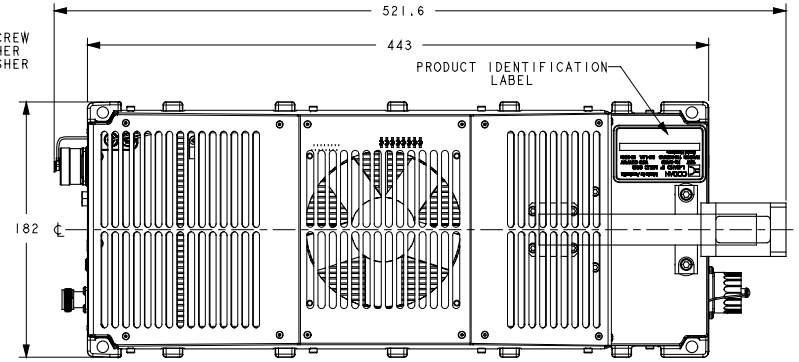
SCALE 1:5











DIMENSIONS IN mm

MATERIAL		SCALE	2:5
	DRN	KF	DATE 08-04-03
	CHKD	GHZ	08-04-03
FINISH	APPD	PMC	13-01-05

TOLERANCES
UNLESS OTHERWISE SPECIFIED
LINEAR ± 0.2
ANGULAR ± 0.5°
FLATNESS ± 0.2
ROUGHNESS 1.6 µmRa

CODAN

A2

TITLE
INTERFACE CONTROL DRAWING
Ku-BAND MBUC 6916

ISS	DRAWING/DOC NO.	SHT.
1	01-01302	OF 1

Appendix A—Example outputs for the View commands

NOTE

These outputs show example data only. The data displayed can vary between transceiver systems and firmware versions.

View system status

The figures in brackets are the parameter values enabled for the Set commands that were used to achieve the settings displayed.

NOTE

In a system without redundancy:

- the BUC is always On Line; this setting cannot be changed
- the Redundant Mode must always be set to non-redundant (0)

```
----------------------System Status------------------------------
PA State            Off           Transmit Atten       4
Transmit On (RS232) On  (1)       Tx Alarm Thresh      0.0
Transmit On (RS485) Off (0)       Burst Pwr Thresh     19.0
Transmit On (FSK)   On  (1)       Serial I/face        9600,8,N,1,T
Transmit Default    Off (0)       Packet Protocol      Codan (1)
Compensation Freq   0             Packet Address       126
IF Comp Freq        0             Red'cy -Mode         Non (0)
LO Freq             7375                 -On/Off Line  On (1)
-----------------------------------------------------------------
```

View operational data

```
--------------------Operational Data----------------------
Output Power        0.0           Burst Power          0.0
Min Burst Power     0.0           Max Burst Power      99.9
Temperature(C)      31
----------------------------------------------------------
```

View fault status

```
-------------Fault Status-------------
                 Current       Latched
PA                  OK            OK
Fan                 OK            OK
Tx Power Alarm      OK            OK
BUC Temp            OK            OK
LO                  OK            OK
Internal            OK            OK
LNB                 -             -
Red'cy Controller   -             -
---------------------------------------
```

NOTE If there is no fan in the BUC, the Current and Latched status for the fan will show a dash.

View identity and configuration data

```
-------------------------Identity Data----------------------------
Model No            6702/48       Serial No            3232676a0005
Firmware P/No       90-20621-001  Firmware Version     1.06
------------------------------------------------------------------
```

View limit data

The data displayed depends on the model of the BUC and the current LO setting.

```
----------------------Limit Data--------------------------
Min Tx IF Freq      950           Max Tx IF Freq       1525
Min Tx RF Freq      5850          Max Tx RF Freq       6425
LO1 Freq            7300          LO2 Freq             7600
LO3 Freq            7375          LO4 Freq             7675
Min Power Meter     19.0          Max Power Meter      36.0
----------------------------------------------------------
```

View protocol data

```
-----------------------Protocol Data--------------------
Protocol 0          ASCII
Protocol 1          Codan         Address Range 1..126
Protocol 2          SAbus         Address Range 49..111
Protocol 3          Comstream     Address Range 1..31
Protocol 4          NDSatcom      Address Range 1..15
--------------------------------------------------------
```

View build standard data

```
-----------Build Standard -------------
                  H/W Std      S/W Std
M&C PCB             1             1
RF  PCB             1             1
LO  PCB             1             1
Pwr PCB             1             -
---------------------------------------
```

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Appendix B—Definitions

This section contains the following topics:

Standards and icons

The following standards and icons are used in this guide:

This typeface	Means...
BOLD/Bold	a light emitting diode, or connector
Bold Times	a command that you enter or keyboard key that you press
`Courier`	a segment of text that is taken directly from a computer screen
Italics	a cross-reference or text requiring emphasis

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

Acronyms and abbreviations

This term	Means...
AC	alternating current
ASCII	American standard code for information interchange
BUC	block up converter
DC	direct current
EMC	electromagnetic compatibility
FLT	fault
FSK	frequency shift keying
GCP	gain compression point
H/W	hardware
IF	intermediate frequency
LBUC	low power block up converter
LED	light emitting diode
LNB	low noise block down converter
LO	local oscillator
M/C	monitor and control
MBUC	medium power block up converter
MS	military standard
O/P	output
OPBO	output back off
PA	power amplifier
PC	personal computer

This term	Means...
PWR	power
RF	radio frequency
RMA	return materials authorisation
R&TTE	radio and telecommunications terminal equipment
Rx	receive
TDMA	time division multiple access
TRF	transmit reject filter
Tx	transmit
VSAT	very small aperture terminal

Units

Measurement	Unit	Abbreviation
Absolute temperature	kelvin	K
Attenuation	decibel	dB
Current	ampere	A
Data rate	bits per second	bps
Frequency	hertz	Hz
Impedance	ohm	Ω
Length	metre	m
Power	decibels relative to a carrier	dBc
Power	decibels relative to 1 mW	dBm
Power	watt	W
Pressure	pascal	Pa
Temperature	degrees Celsius	°C
Voltage	volt	V
Weight	gram	g

Unit multipliers

NOTE

Units are expressed in accordance with ISO 1000:1992 ‘SI units and recommendations for the use of their multiples and of certain other units’.

Unit	Name	Multiplier
m	milli	0.001
d	deci	0.1
k	kilo	1000
M	mega	1000000
G	giga	1000000000

About this issue

This is the sixth issue of the L-Band IF Transceiver 6700/6900 series User Guide. Information on the 8 W and 10 W LBUCs and 20 W MBUC is included.

Associated documents

The other publications associated with the L-Band IF Transceiver 6700/6900 series are:

- Satellite Communication Equipment Installation Handbook (Codan part number 15-44016-EN)
- L-Band IF Interface Unit 6550 User Guide (Codan part number 15-44020-EN)
- Hand-held and Remote Controller 6560/6570 User Guide (Codan part number 15-44021-EN)
- Declaration of Conformity for the 6702 2 W L-Band IF Transceiver (Codan part number 19-40099)
- Declaration of Conformity for the 6705 5 W L-Band IF Transceiver (Codan part number 19-40098)
- Declaration of Conformity for the 6710CE 10 W L-Band IF Transceiver (Codan part number 19-40186)
- Declaration of Conformity for the 6720 20 W L-Band IF Transceiver (Codan part number 19-40193)
- Declaration of Conformity for the 6725 25 W L-Band IF Transceiver (Codan part number 19-40154)
- Declaration of Conformity for the 6740 40 W L-Band IF Transceiver (Codan part number 19-40155)
- Declaration of Conformity for the 6901 1 W L-Band IF Transceiver (Codan part number 19-40100)
- Declaration of Conformity for the 6902 2 W L-Band IF Transceiver (Codan part number 19-40097)
- Declaration of Conformity for the 6904 4 W L-Band IF Transceiver (Codan part number 19-40096)
- Declaration of Conformity for the 6908CE 8 W L-Band IF Transceiver (Codan part number 19-40187)
- Declaration of Conformity for the 6916 16 W L-Band IF Transceiver (Codan part number 19-40156)

Associated specifications

The following specifications associated with the L-Band IF Transceiver 6700/6900 series are available from Codan by request:

- 6700/6900 series L-Band IF Transceiver user serial commands and responses (Codan part number 01-01019)
- ASCII Protocol (Codan part number 01-01030)
- Codan Packet Protocol (Codan part number 01-01020)
- Scientific Atlanta SAbus Packet Protocol (Codan part number 01-01038)
- Comstream Packet Protocol (Codan part number 01-01076)
- NDSatcom Packet Protocol (Codan part number 01-01021)

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