BECKER
AVIONIC SYSTEMS

Remote - Controlled VHF Transceiver

CM 4201 - (1)

Installation and Operation

Manual DV 64550.03
Issue 1 June 1999

BECKER FLUGFUNKWERK GmbH ● Baden Airpark ● B 108
D-77836 Rheinmünster ● Telephone +49 (0) 7229 / 305-0
E-Mail info@becker-avionics.de or support@becker-avionics.de

FIRST ISSUE AND CHANGES

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Section 1 GENERAL INFORMATION

1.1 Introduction

The following manual describes the core module CM 4201 - (1).

The manuals DV 64550.03 “Installation and Operation” and DV 64550.04 “Maintenance and Repair” contain the following section:

Section		DV 64550.03	DV 64550.04
1	General Information	X	X
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1.2 Purpose of equipment

The core module enables voice communication on 760 channels in the 118.000 MHz to 136.975 MHz range with a channel spacing of 25 kHz. The core module is designed with sufficient mechanical strength to enable it to be fitted in an aircraft without any limitations. There is no restriction within the verified environmental classes on fitting in the avionics compartment.

1.3 General description

The remote control VHF transceiver is controlled from a master unit via a RS 232 interface. The equipment connector for connecting the aircraft cabling and the antennae socket are mounted on the back of the unit.

The core module is fitted with a single superheterodyne receiver. A squelch (muting) circuit suppresses transmitters or disturbances below a certain field strength. The switching threshold can be set. The squelch function can also be switched off.

The transmitter is designed to be wideband over the 118.000 MHz to 136.975 MHz range. The transmitter output power is ≥ 5 Watt. The sidetone is automatically switched to the headphone output (AFHI/AFLO) during transmission.

The oscillator frequency of the receiver and the the transmitting frequency of the transmitter are generated by a VCO (voltage controlled oscillator). This is monitored by a digital frequency evaluation circuit. This digital frequency processing operates in conjunction with a microprocessor.

The microphone inputs are designed for both dynamic and standard microphones. The inputs are connected to a dynamic volume compressor which keeps the modulation depth constant over a wide input voltage range.

The core module also contains a memory device for storing 99 different frequencies which remain stored even with the unit switched off without an auxiliary battery.

Aircraft internal communication is possible in the IC (intercom) mode. Activation is by means of an external IC button (or switch) which is to be connected to the equipment connector.

The AF auxiliary input enables AF signal switching of auxiliary units in the aircraft. The switched AF signals can, however, only be monitored in the reception mode.

The scan function can be switched on in the service mode and called up in mode 2. The active frequency is shown in the top line of the display and the bottom line shows the associated storage channel with the preset CS. In the scanning mode the stored frequencies in the storage channels are scanned in succession at 200 ms intervals. When an adequate reception signal is receive, the core module remains on this frequency until a adequate reception signal is present. Then scan starts again. In the service mode, the hold time between the end of an evaluatable signal and the continuation of the scanning of the next channels can be set to between 0 and 60 seconds.

1.3.1 Options

The frequency setting can be inhibited from the master. The remote controlled VHF transceiver then operates only on the frequencies stored in the storage channels.

The storage of frequencies in the storage channels can also be blocked from the master. Stored frequencies can be deleted.

In the temperature display mode, a temperature in °C or °F can be measured by means of the temperature sensor which can be connected externally. The selection of °C or °F is determined by the control from the master.

1.4 Technical data

1.4.1 General data

Nominal supply voltage	13.75 V.d.c.
Supply voltage range	12.4 V to 15.1 V
Emergency operation (10.0 V)	intelligible communication
Power consumption at 13.75 V	
“Standby” reception mode	≤ 70 mA
Reception mode	≤ 500 mA
Transmission mode	≤ 2.5 A
Frequency range	118.000 MHz to 136.975 MHz
Number of channels	760
Channel spacing	25 kHz
Storage temperature range	-55° C to +85° C
Operating temperature range as per EUROCAE/RTCA ED-14C/DO-160C	-20° C to +55° C (short-time +70° C)
Operating altitude as per EUROCAE/RTCA ED-14C/DO-160C	50000 ft
Vibration as per EUROCAE/RTCA ED-14C/DO-160C	Cat. NM
Humidity as per EUROCAE/RTCA ED-14C/DO-160C	Cat. A/+50°C: 95%, 48 h
Dimensions	
Front panel	61 mm x 61 mm
Depth of unit without cable connector	192 mm
Weight	0.67 kg
Fuse	5 A

1.4.2 Receiver data

Type of receiver	Single conversion superhetrodyne receiver
Sensitivity	≤ 5 µV EMF for 6 dB = SINAD (mod. 1000 Hz/30%)
IF bandwidth	≥ ± 8 kHz at 6 dB attenuation
Selectivity	≥ 40 dB at ± 17 kHz ≥ 60 dB at ± 25 kHz
Squelch	Can be adjusted and switched off
AGC characteristic for 5 µV to 100 mV EMF	≤ 6 dB
Distortion m = 85%	≤15%
Audio frequency response relative to 1000 Hz	≤ 6 dB 350 Hz to 2500 Hz ≥18 dB at 4000 Hz
Intermediate frequency	21.4 MHz
Rated output	
speaker output	at 13.75 V nominal operating voltage ≥3 W into 4 Ω at 10.0 V operating voltage (emergency mode) ≥ 1.5 W into 4 Ω
headset output	at 13.75 V nominal operating voltage ≥ 100 mW into 600 Ω at 10.0 V operating voltage (emergency mode) ≥30 mW into 600 Ω
Audio auxiliary input adjustable (regardless of volume)	1 V to 8 V at 600 Ω ± 10%

1.4.3 Transmitter data

Transmitter power output into 50 Ω	≥ 5 W
at 10.0 V operating voltage (emergency mode)	≥ 2 W
Frequency tolerance	≤ 15 ppm
Duty cycle	1:4 (1 minute transmit, 4 minutes receive)
Type of modulation	A3E amplitude modulation
Modulation factor	≥ 70% to ≤ 99% (dynamic compressor)

Distortion at 70% modulation	≤ 15%
Modulation bandwidth	350 Hz to 2500 Hz
Frequency response	-6 dB (relative to 1 kHz/0 dB)
Input voltage (m = 70%)	
Dynamic microphone	≤ 2 mV balanced 150 Ω (dynamic compressor)
Standard microphone	≤ 100 mV 100 Ω (dynamic compressor)
Unwanted frequency	≤ 3 kHz
Sidetone	true, adjustable
Automatic shutdown of transmitter circuit of transmit button	after 2 mins of continuous transmission, the transmitter shuts down. Re-activated by releasing the transmit button and re-pressing

1.4.4 Additional functions

Digital voltmeter (Supply voltage display)	7 V to 15 V d.c. ± 0.1 V
Digital thermometer with external sensor (option)	-20°C to + 55°C

1.4.5 Software

The frequency processing, frequency storage and frequency display of the CM 4201 - (1) are controlled by microprocessors. The software was classified as Category “ESSENTIAL” Level 2 in accordance with EUROCAE/RTCA Document ED12A/DO-178A.

1.5 Approval

1.5.1 Regulations

JTSO - 2C37d, ED-23A, Equipment Class 4

JTSO - 2C38d, ED-23A, Equipment Class C

EUROCAE/RTCA ED-14C/DO-160C

EUROCAE/RTCA ED-12A/DO-178A

FTZ 17T R2010

1.6 Environmental Qualification Form

The following performance standards under environmental test conditions have been established in accordance with the procedures set forth in EUROCAE/RTCA Document No. ED-14C/DO-160C.

Environmental condition	ED - 14C DO - 160C	Category	Performance
Temperature	4.0	D1	
Low operating temperature	4.5.1		- 20° C
Low ground survival (storage temperatur)			- 55° C
High short-time operating temperature	4.5.2		70° C
High operating temperature	4.5.3		+ 55° C
High ground survival (storage) temperature			+ 85° C
Min. operating pressure (equivalent altitude)	4.6.1		50000 ft.
Temperature variation	5.0	B	
Humidity	6.0	A	48 hrs at up to 50° C and 95% relative humidity
Shock :	7.0		
Operational shocks	7.2		11 ms at 6 G for all three dimensional axes
Crash safety shocks	7.3		11 ms at 15 G for all three dimensional axes
Vibration	8.0	MN	
Magnetic effect	15.0	Z	Deflection of 1° of compass at a distance of ≥30 cm
Power input variation	16.0	B	Includes 10-volt emergency power supply
Resistance to voltage spikes on equipment power leads	17.0	A	
Audio-frequency conducted susceptibility	18.0	B	
Susceptibility to induced magnetic and electric fields	19.0	A	
Radio-frequency interference susceptibility	20.0	T	
Spurious RF emissions	21.0	A	

1.7 Accessories

Unit connection

Cable socket	Article No. 0725.021.277
Connector housing	Article No. 0775.479-277
Antenna plug	Article No. 0725.706-277
Temperature sensor 1K043	Article No. 0878.170-278
Mounting bracket	Article No. 0884.324-288
Manual Installation and Operation	Article No. 0886.629-071
Manual Maintenance and Repair	Article No. 0886.637-071

1.8 Scope of delivery

CM 4201-( ) Core module	Article No. 0882.690-910

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Section 2 INSTALLATION

2.1 General

The installation of the remote controlled VHF transceiver depends on the type of aircraft and its equipment. Therefore, only general information can be given in this Section.

2.1.1 Testing before installation

2.1.2 General

Before installing the remote controlled VHF transceiver in an aircraft, inspect the unit for signs of transport damage.

2.1.3 Visual examination

Before commissioning, visually examine the unit paying particular attention to the following defects :

1. Dirt, dents, scratches, corrosion or broken attaching parts, damaged paintwork on housing, parts of the housing and panel.
2. Dirt or scratches on the identification plate, front panel or inscriptions.
3. Dirt, bent or broken pins, displaced inserts of plugs and sockets.

2.1.4 Mechanical installation

2.1.5 Mechanical installation of remote controlled VHF transceiver

The remote controlled VHF transceiver is designed for installation in the avionics compartment, the mounting plate being secured by three screws. The necessary dimensions are given in Fig. 2-1. Attachment is by means of four screws, which are included in the delivery.

2.1.6 Mechanical installation of a temperature sensor

The remote controlled VHF transceiver enables temperatures in the -20° C to +55° C range with the aid of the fitted measuring device and the connection of an external temperature sensor. The location of the mounting of the temperature sensor depends on the particular purpose and local conditions. The cabling is shown in Fig. 2-2. A twisted, screened cable should be used.

2.2 Installation wiring

2.2.1 General

The installation wiring is shown in Fig. 2-2.

CAUTION

- Use only cable which is fit for use in aircraft (self extinguishing). AWG 20 for power supply and AWG 22 for other cables.
- Fit rubber sleeves over the solder joints on the equipment connector.
- Protect the power supply with a 5 A fuse or circuit breaker.
- Carefully check the wiring before switching on the unit and check particularly that (+) and (-) have not been reversed.

NOTES

- The core module is protected internally by a 5 A fuse.
- No RF cables should be included in the cable harnesses of the system and the routing of connecting cables alongside cables which carry audio power or pulses should also be avoided.

2.2.2 Microphone connection

The remote controlled VHF transceiver enables a maximum of two dynamic microphones and two standard microphones (d.c. supply) to be connected at the same time. A input transformer with an impedance of 150 Ohm is fitted at the input of the dynamic microphone.

2.2.3 Speaker connection

A 4 to 8 Ohm speaker can be connected to audio output P1- 1AF-asym.

2.2.4 Headphone connection

Up to two headphones with an impedance of 600 Ohm can be connected to the audio output P1 - 2.3 AF-HI/LO.

2.2.5 Intercom mode “IC connection”.

The intercom mode is designed for aircraft with a high noise level and assumes operation using headsets. Additional wiring on the equipment connector with an IC switch is necessary (refer to Fig. 2-2).

The normal RX/TX mode takes place with the IC switch in the OFF position. When the IC switch is set to ON, RX/TX mode can be carried on as before but intercommunication is also possible between two crew members. The IC is switched off during transmission and when squelch is opened.

2.2.6 “Auxiliary” audio input

The AF-AUX (P1/4) auxiliary audio input enables the switching of audio signals from other equipment in the aircraft. The switched-in audio signals can, however, only be monitored in the reception mode. The facility to switch two units together will be used particularly in those aircraft which are fitted with an Transceiver and an NAV receiver. An audio input voltage of 1 to 8 V, 600 Ohm is necessary for modulation of the audio audio amplifier (can be adjusted in the “Service” mode).

2.3 Pin connection P 1

Pin	Description	Connection
1	AF-ASYM.	AF-Output asymmetricaly
2	AFHI	AF-Output Symmetricaly HI
3	AFLO	AF-Output Symmetricaly HI
4	AFAUX	AF-Output Auxiliary
5	MIKE DYN. HI	Dynamic Mike connection HI
6	MIKE DYN. LO	Dynamic Mike connection LO
7	IC	Connection IC-Key
8	TEMS 1	Temperatursensor
9	RXD	RS 232 Data-Interface
10	N.C.	Not connected
11	+ VS	Plus power supply voltage
12	+ VS	Plus power supply voltage
13	GND	Minus power supply voltage
14	AFGND/ MIC.STD.GND	Standard Mike connection GND or AF-Output asy.
15	AFCU	AF-Output remote control unit
16	VAGC/AFWB	Output AGC-Voltage or AF-wide-band Output
17	PTT	Connection PTT-Key
18	MIKE STD	Standard Mike connection HI
19	CPIN	Code pin
20	TEMS2 (SQI)	Temperatursensor
21	GND DATA	Ground RS 232 Data-Interface
22	TXD	RS 232 Data-Interface
23	POWER CONTR. LINE	Control line to switch ON/OFF the equipment
24	+ VS switched	Power supply voltage switched
25	GND	Minus Power supply voltage

2.4 RS 232 instructions

2.4.1 General

If a transmitted data is not recognised, 00h (e = echo) is echoed and the unit waits for data new. If a permissible value is over- or undershot, the complement (se = special echo) is echoed and the data transmission is aborted, i.e. the unit waits for a new instruction.

2.4.2 Remote controlled VHF transceiver CM 4201

The level converter is active when the unit is switched on. As the level converter requires a certain time to achieve the necessary level, the first answer byte is usually incorrectly transmitted. The following procedure is recommended :

Repeat the Test RS 232 (B5h) instruction until 10h is received as an echo.

Set intercom level

Instruction sequence : c, e, b1, se
c = 83h
e = echo
se = echo with result of field test
b1 = 0...31h data

B1 serves as offset for a table from which two values for a volume setting which corresponds to a correct audio level are taken. The high value is entered in the loop register of IC7/P0 and the low value in IC13/P1.

Set AF external level

Instruction sequence : c, e, b1, se
c = 84h
e = echo
se = echo with result of field test
b1 = 0..40h data

B1 is entered in the loop register of IC7/P1.

Set sidetone level

Instruction sequence : c, e, b1, se
c = 85h
e = echo
se = echo with result of field test
b1 = 0..40h data

B1 is entered in the loop register of IC7/P3.

Set microphone sensitivity

Instruction sequence : c, e, b1, se
c = 99h
e = echo
se = echo with result of field test
b1 = 0..40h data

B1 is entered in the loop register of IC7/P2.

Set volume

Instruction sequence : c, e, b1, se
c = 86h
e = echo
se = echo with result of field test
b1 = 0..31h data

B1 is used as offset for a table from which two values for a volume setting which corresponds to a correct audio level are taken. The high value is entered in the loop register of IC7/P0 and the low value in IC13/P1.

Read IF external level

Instruction sequence : c, e, s, b1
c = 87h
e = echo
s = start byte
b1 = 0..40h data

B1 is read directly from IC7/P1/R1.

Read sidetone level

Instruction sequence : c, e, s, b1
c = 88h
e = echo
s = start byte
b1 = 0..40h data

B1 is read directly from IC7/P3/R1.

Read intercom level

Instruction sequence : c, e, s, b1
c = 89h
e = echo
s = start byte
b1 = 0...40h data

B1 is read directly from IC13/P2/R1.

Read microphone sensitivity

Instruction sequence : c, e, s, b1
c = 98h
e = echo
s = start byte
b1 = 0...40h data

B1 is read directly from IC7/P2/R1.

Read volume from PIC

Instruction sequence : c, e, s, b1
c = 90h
e = echo
s = start byte
b1 = 0...49 data (table offset)

Permanently store intercom level

Instruction sequence : c, e
c = 8Ah
e = echo

The last determined value is entered in IC13/P2/R1.

Permanently store sidetone level

Instruction sequence : c, e
c = 8Bh
e = echo

The last determined value is entered in IC7/P3/R1.

Permanently store IF external level

Instruction sequence : c, e
c = 8Ch
e = echo

The last determined value is entered in IC7/P1/R1.

Permanently store microphone sensitivity

Instruction sequence : c, e
c = 9Ah
e = echo

The last determined value is entered in IC7/P2/R1.

Copy values of firm ware in user fields

Instruction sequence : c, e
c = 8Dh
e = echo

The contents of all register 2 of IC7/13 are copied into the particular loop register and register.

2.4.2.1 Various PIC instructions

Switch on squelch

Instruction sequence : c, e
c = 95h
e = echo

By means of this instruction the squelch can be selectively switched on.

Switch off squelch

Instruction sequence : c, e
c = 96h
e = echo

By means of this instruction the squelch can be selectively switched off.

Switch off transmitter

Instruction sequence : c, e
c = 93h
e = echo

This instruction corresponds to release of the PTT button.

Switch on internal speaker relay

Instruction sequence : c, e
c = 9Bh
e = echo

The internal speaker relay can be switched on using this instruction.

Switch off internal speaker relay

Instruction sequence : c, e
c = 9Ch
e = echo

The internal speaker relay can be switched off using this instruction.

Read status word from PIC

Instruction sequence : c, e, s, b1
c = 8Eh
e = echo
s = start byte
b1 = data

Status word :
bit 0=1 = unknown instruction
bit 1=1 = mod value too large
bit 2=1 = watchdog reset in PIC
bit 3=1 = no lock detect
bit 4=1 = no acknowledge IC
bit 5=1 = (self test fail)
bit 6=1 = IC data value too large
bit 7 always high

2.4.2.2 Header instructions

Set squelch threshold

Instruction sequence : c, e, b1, se
c = A0h
e = echo
se = echo with result of field test
b1 = 30...230 in increments of 5

Directly entered in comparison register and permanently stored in the EEPROM. The indicated value in mode SF1 is calculated from 230 - b1.

Set active frequency

Instruction sequence : c, e, b1, e, b2, se
c = A1h
e = echo
se = echo with result of field test
b1 = high byte
b2 = low byte

The value is entered in the memory for the active frequency. If the unit is not in the channel mode the indication is updated and the synthesizer set to the new frequency. The data is transmitted in hex and is calculated from the transmission frequency in Hz divided by 12500 Hz.

Set standby frequency

Instruction sequence : c, e, b1, e, b2, se
c = Ach
e = echo
se = echo with result of field test
b1 = high byte
b2 = low byte

Value is stored in the memory for the standby frequency. If the unit is in mode 1 the display is updated. The data is transferred in hex and it calculated from the transmission in Hz divided by 12500 Hz.

Read squelch threshold

Instruction sequence : c, e, s, b1
c = A2h
e = echo
s = start byte
b1 = 30...230 in increments of 5

Value is read directly from the comparison register. The indicated value in mode SF1 is calculated from 230-b1.

Reset

Instruction sequence : c, e
c = A3h
e = echo

This instruction is used to generate a cold boot. This gives the PIC an actual hardware reset.

Set fixed frequency channel

Instruction sequence : c, e, b1, se, b2, e, b3, se
c = A4h
e = echo
se = echo with result of field test
b1 = 1...99 channel
b2 = high byte frequency
b3 = low byte frequency

The transmitted frequency is permanently stored in the given memory location (channel). The frequency data is transferred in hex and calculated by subtracting the lower band limit from the transmission frequency in Hz and dividing the result by 12500 Hz. If bit 6 of b3 is set, transmission on this frequency is not possible.

Read fixed frequency channel

Instruction sequence : c, e, b1, se, s, b2, e, b3
c = A5h
e = echo
s = start byte
se = echo with result of field test
b1 = 1...99 channel
b2 = high byte frequency
b3 = low byte frequency

The transmitted frequency is read directly from the given memory location (channel). The frequency data is transmitted in hex and calculated by multiplying the transmitting frequency in Hz (equals transmitted value) by 12500 Hz.

Delete fixed frequency channel

Instruction sequence : c, e, b1, se
c = Aeh
e = echo
se = echo with result of field test
b1 = 1...99 channel

The frequency of the given memory location (channel) is deleted.

Set channel scan waiting time

Instruction sequence : c, e, b1, e, b2, e
c = Afh
e = echo
b1 = high byte time in 1/100s
b2 = low byte time in 1/100s

This value determines the time which the unit waits after the squelch threshold is undershot until it changes the channel.

Set start channel for scan mode

Instruction sequence : c, e, b1, se
c = B1h
e = echo
se = echo with result of field test
b1 = 1...98 channel

The start channel must always be smaller than the stop channel.

Set stop channel for scan mode

Instruction sequence : c, e, b1, se
c = B2h
e = echo
se = echo with result of field test
b1 = 2...99 channel

The stop channel must always be larger than the start channel.

Set usable fixed frequency channels

Instruction sequence : c, e, b1, se
c = Aah
e = echo
se = echo with result of field test
b1 = 1...99

The value is permanently stored and defines the upper channel limit.

Read mode

Instruction sequence : c, e, s, b1
c = Bch
e = echo
s = start byte
b1 = mode

The current mode is transmitted.

Increment mode

Instruction sequence : c, e
c = ABh
e = echo

This instruction corresponds to briefly pressing the MDE key.

Set mode 1

Instruction sequence : c, e
c = ADh
e = echo

This instruction corresponds sustained pressing of the MDE key.

Read remote status

Instruction sequence : c, e, s, b1, e, b2
c = BDh
e = echo
s = start byte
b1 = status byte 1
b2 = status byte 2

Status byte 1 :
bit 0=1 = checksum error
bit 1=1 = no lock detect
bit 2=1 = EEPROM error
bit 3=1 = no PIC present

Status byte 2 :
bit 0=1 = mode changed
bit 1=1 = Tx active
bit 2=1 = Ubatt normal
bit 3=1 = squelch on
bit 4=1 = rotary switch executed
bit 5=1 = XCHG key in mode 1 pressed
bit 6=1 = scan hold

Read usable fixed frequency channels

Instruction sequence : c, e, s, b1
c = C5h
e = echo
s = start byte
b1 = mode

Read channel scan waiting time

Instruction sequence : c, e, s, b1, e, b2
c = C6h
e = echo
s = start byte
b1 = high byte time in 1/100s
b2 = low byte time in 1/100s

This value determines the time which the unit waits after the squelch threshold level until it changes the channel.

Read start channel for scan mode

Instruction sequence : c, e, s, b1
c = C7h
e = echo
s = start byte
b1 = 1...98 channel

Read stop channel for scan mode

Instruction sequence : c, e, s, b1
c = C8h
e = echo
s = start byte
b1 = 2...99 channel

Read temperature

Instruction sequence : c, e, s, b1, e, b2
c = BEh
e = echo
s = start byte
b1 = temperature
b2 = status

Status :
bit 0=1 = C
bit 1=1 = minus

Read operating voltage

Instruction sequence : c, e, s, b1
c = BFh
e = echo
s = start byte
b1 = voltage

Store code number

Instruction sequence : c, e, b1 e, b2, e
c = B0h
= echo
b1 = high byte code number
b2 = low byte code number

The code number is in hex in the 0...9999 numerical range.

Test RS 232

Instruction sequence : c, b1
c = B5h
b1 = status

If everything is OK, status = 10h, otherwise :
bit 1 = framing error
bit 2 = noise flag
bit 3 = overrun error

Switch off RS 232 driver

Instruction sequence : c, e
c = B6h
e = echo

This instruction switches off the level converter to reduce the power.

Read active frequency

Instruction sequence : c, e, s, b1, e, b2
c = C2h
e = echo
s = start byte
b1 = high byte active frequency
b2 = low byte active frequency

Read standby frequency

Instruction sequence : c, e, s, b1, e, b2
c = C2h
e = echo
s = start byte
b1 = high byte standby frequency
b2 = low byte standby frequency

Read channel number

Instruction sequence : c, e, s, b1
c = C0h
e = echo
s = start byte
b1 = channel number

Read channel frequency

Instruction sequence : c, e, s, b1, e, b2
c = C1h
e = echo
s = start byte
b1 = high byte channel frequency
b2 = low byte channel frequency

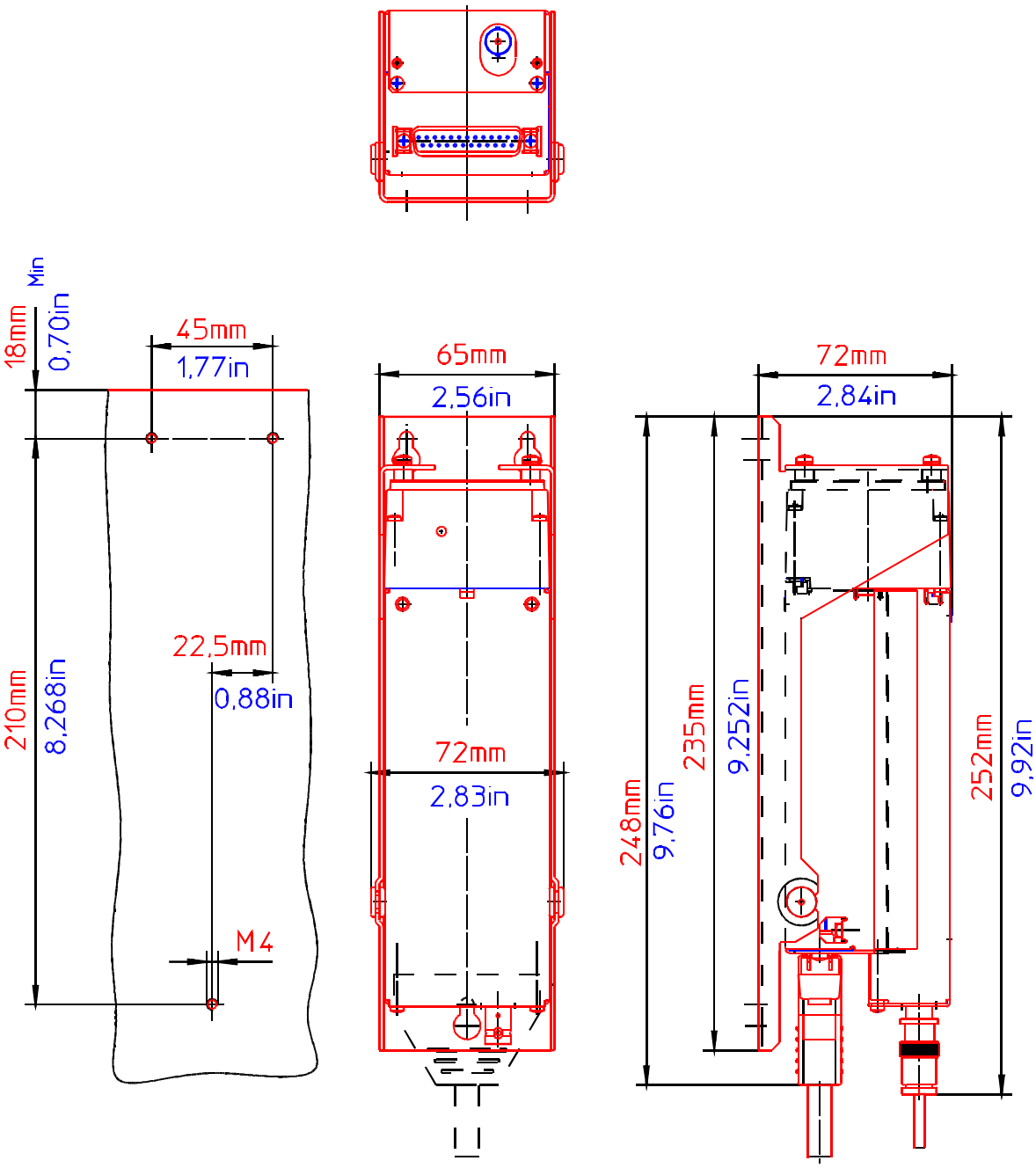

Fig. 2-1 Installation dimensions

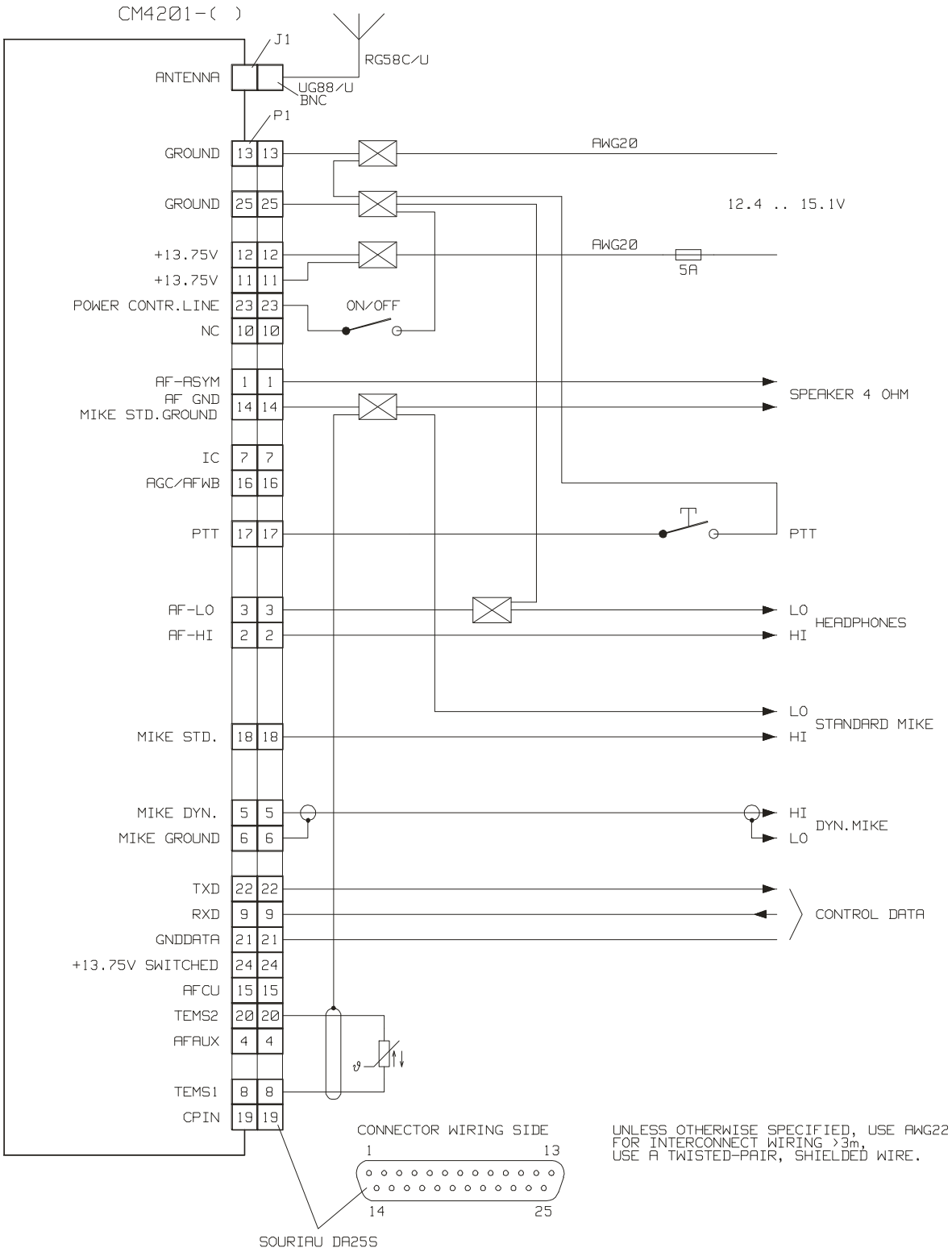

Fig. 2-2 Interwiring diagram

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Section III OPERATION

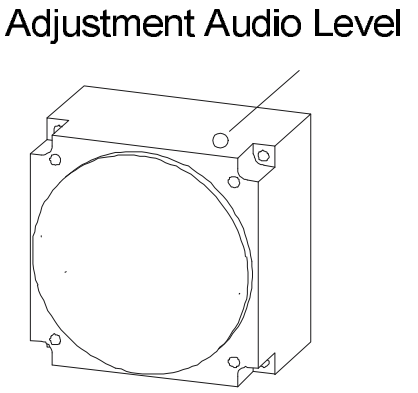

Fig. 3-1 Remote controlled VHF- transceiver CM 4201 - (1)

3.1 Operating instructions

3.1.1 Preparation

Switch on the aircraft power supply (check that the circuit breaker for the remote controlled VHF-transceiver system is set).

WARNING!

Do not switch on the remote controlled VHF-transceiver system if engines or motors are being started up or shut down.

Set the correct audio level with screwdriver (see Fig. 3-1) whilst the ground station is answering.

Blank

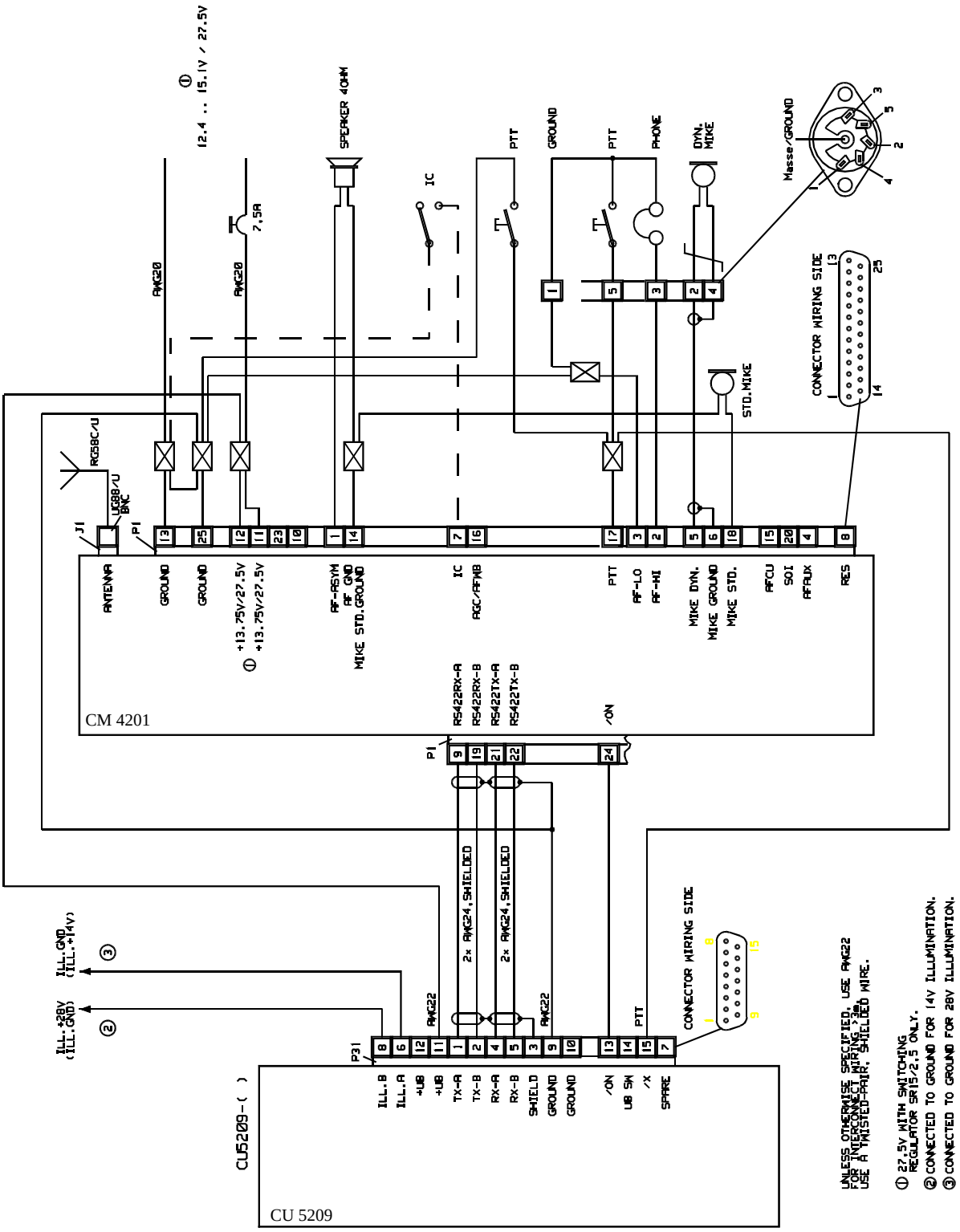

Fig. 2-3 Interwiring of the VHF- Transceiver CM 4201 and adapter P/N XXXX-XXX.XXX with control unit CU 5209 - ( )