



VHF-Transceiver

AR6201-(XXX)

Installation and Operation

Manual DV 14300.03
Issue 1 May 2010

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FIRST ISSUE AND CHANGES

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Section I GENERAL DESCRIPTION

1.1 Introduction

This manual describes the VHF transceiver AR6201-(XXX). The manuals DV 14300.03 (“Installation and Operation”) and DV 14300.04 (“Maintenance and Repair”) contain the following sections.

Section		DV 14300.03	DV 14300.04
1	General Information	X	X
2	Installation	X	X
3	Operation	X	X
4	Theory of operation	N/A	X
5	Maintenance and Repair	N/A	X
6	Illustrated Parts List	N/A	X
7	Modification and Changes	N/A	X
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1.2 Purpose of equipment

The VHF transceiver enables voice communication in the very high frequency band between 118.000 MHz to 136.990 MHz (radio communication part of airband) with a channel spacing of 25 kHz in **25 kHz** mode and with **8.333 kHz** channel spacing in **25+8.33 kHz** mixed mode.

1.3 General description

The VHF transceiver is designed without any verified environmental class restrictions. It can be fitted in the instrument panel of all aircraft types.

The VHF transceiver can be fully remote controlled via a RS422 interface and the industry established Commercial Serial Data Bus protocol.

Configuration of the system is possible by means of a dedicated service interface implemented as a RS422 interface line with a proprietary serial data communication protocol.

The VHF transceiver is a compact and lightweight single block unit. The dimensions correspond to the standard instrument diameter of 58 mm (2 1/4 inch). Mounting is by means of four screws (rear panel mounting). All controls and indicators are located on the front panel. The equipment connectors and the antenna socket are located at the rear of the unit.

After switch on, the unit performs a self test (PBIT). After the PBIT the transceiver shows "WAIT" and the corresponding software versions of the control head and chassis module. If the PBIT detects a fatal error, the transceiver terminates operation and will be locked.

The transmitter is designed for the 118.000 MHz to 137.000 MHz frequency range. The sidetone is available on the headphone output during transmission. The sidetone level can be set in the service menu.

The frequency indication is by means of a liquid crystal display (LCD). The required operating frequency is set with the frequency selector switch. The pushbutton selects the digits.

Memory channels

The VHF transceiver also contains a memory device for storing 99 different frequencies which remain stored even with the unit switched off without an auxiliary battery. Last 9 frequencies are stored automatically.

Mike inputs

The VHF transceiver has an input for dynamic microphone (DYN_MIKE) and an input for standard microphone (STD_MIKE). Each input is able to operate with single microphone or with 2 microphones of the same type connected in parallel.

AF auxiliary input

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

Audio outputs

The Headphone rated output power is $\geq 300 \text{ mW @ } 150 \text{ Ohm}$.

The transceiver includes a speaker output (SPK). The rated output power from the Speaker Output is min. $4 \text{ W @ } 4 \text{ Ohm}$

The transceiver has an asymmetrical LINE output (**LINE_OUT**). When the transceiver is operating in RX mode the line output supplies the sum of intercom audio, receiver audio and auxiliary audio. When the transceiver is operating in TX mode, then the LINE output supplies the natural sidetone.

Intercom mode

Aircraft internal communication is possible in the intercom mode (IC). The intercom mode is activated by a long press of the SQL/IC button.

Squelch Operation

There are two kinds of squelch methods implemented. The carrier squelch (C_Squelch) and noise squelch (N_Squelch). The carrier squelch is based on received signal strength; the noise squelch is based on noise level detected in demodulated received signal.

Scan sub mode

The scan sub-mode is activated by a long press of the EXCHANGE/SCAN key in all selection modes.

Illumination

The VHF transceiver include a dimming input that controls illumination of LCD and push buttons. The dimming entry is either 14V AC/DC or 28V DC.

The illumination can be dimmed from off to full illumination. The display has minimum illumination to ensure that the indicators are always visible.

The characteristic of the dimming and illumination curve can be adapted to other units in the instrument panel in the service mode. The unit setup enables selection value of display contrast in range of 0 ... 100 %.

Monitoring stage for the power supply voltage

The VHF transceiver also contains a monitoring stage for the power supply voltage which is activated when the VHF transceiver is switched on. If the supply voltage drops below 10.5 V (**Low Battery Threshold**), the display indicates the message "LOW BATT".

Emergency operation

In emergency operation the following performance reduction is possible i.e. when the supply voltage dropped down to 9 V.

- For TX Mode: RF Rated power is $\geq 2\text{ W}$ @ 50 Ohm, modulation depth is $\geq 50\%$,
- For RX Mode: $(S+N)/N \geq 6\text{ dB}$ for RF level -93 dBm, m = 30% 1 kHz sine

1.4 Variants survey

Type designation Part-No.:	Nominal supply voltage	Transmitter output	Panel lighting	Panel colour
VHF Transceiver single block Green AR6201-(000) Article Nr.: 0610.321-910	13.75 V	$\geq 6\text{ W}$	13.75 V / 27.5 V	black
VHF Transceiver single block- Blue-White AR6201-(002) Article Nr.: 0614.203-910	13.75 V	$\geq 6\text{ W}$	13.75 V / 27.5 V	black

1.5 Technical data

1.5.1 Power supply data

Nominal supply voltage	13.75 V DC
Supply voltage range	9.0 V ... 32.2V DC
Emergency operation	9.0 V DC ... 10.25 V DC
Power consumption	
Power off state	≤ 0.1 mA
Reception mode	≤ 140 mA
Transmission mode	≤ 2 A TX mode m ≥ 70 % ≤ 1.8 A @ 12 VDC; TX Carrier unmodulated ≤ 4 A @ 14 VDC; Antenna VSWR = 3:1
DC-Fuse internal	5 A (resettable)
Dimming control	13.75 V DC or 27.5 V DC

1.6 General data

Frequency range	118.000 MHz to 136.975 MHz for 25 kHz
Frequency range	118.000 MHz to 136.990 MHz for 8.333 kHz
Channel spacing	25 kHz or 8.333 kHz
Number of channels	760 (25 kHz) / 2278 (8.333 kHz)
Storage temperature range	-55 °C to +85 °C
Operating temperature range as per EUROCAE/RTCA ED-14E/DO-160E	-20 °C to + 55 °C short-time + 70 °C
Operating altitude as per EUROCAE/RTCA ED-14E/DO-160E	35,000 ft
Vibration as per EUROCAE/RTCA ED-14E/DO-160E	Cat. S+U

1.6.1 Dimensions weight

Front panel	61.2 mm x 61.2 mm
Depth of unit without cable connector	208.3 mm
Mounting (backpanel)	standard 58 mm diameter (2 1/4 inch)
Material of Case, surface treatment	ALMg, blank coated black matt paint
Weight	≤ 800 g

1.6.2 Receiver data

Sensitivity	-93 dBm for a (S+N)/N ratio of 6 dB (mod. 1000 Hz/30%)
Effective bandwidth	≥ ± 3 kHz at the 6 dB points ≤ ± 7.37 kHz at the 60 dB points
Squelch	Can be adjusted to any trigger level or switched off
AGC characteristic for -93 dBm to 0 dBm	≤ 6 dB mod. 30% 1000 Hz
Distortion m = 85%	≤ 15%
Audio frequency response relative to 1000 Hz	≤ 6 dB 350 Hz to 2500 Hz ≥ 35 dB at 4000 Hz
Rated output for speaker operation	≥ 4 W into 4 Ω
Rated output power for headphone operation	≥ 300 mW into 150 Ω ≥ 100 mW into 600 Ω
Audio auxiliary input adjustable (regardless of volume setting)	1 V to 8 V at 600 Ω ± 10%

1.6.3 Transmitter data

Transmitter output	≥ 6 W into 50 Ω
Frequency tolerance	≤ 5 ppm
Duty cycle	1:4 (Min)
Type of modulation	A3E (amplitude modulation)
Modulation capability	≥ 70%
Distortion at 70% modulation	≤ 15%
Modulation bandwidth ≤ 6 dB	350 Hz to 2500 Hz
Dynamic microphone	1 ... 20 mV balanced (200 Ω) (dynamic compressor)
Standard microphone	10 mV ≥ 1 V (150 Ω) (dynamic compressor)

FM deviation with modulation $m = 70\% f = 25 \text{ kHz} / 8.33 \text{ kHz}$	$\leq 3 \text{ kHz}$
Sidetone	adjustable
Automatic shutdown on transmit mode	after 30 seconds ... 120 seconds of continuous transmission, the transmitter shuts down

1.6.4 Software EUROCAE ED-12B/RTCA DO-178B Level D

The frequency processing, frequency storage and frequency indication are controlled by microprocessors. The software is classified as Category "MINOR" Level D in accordance with EUROCAE/RTCA Document ED12B/DO-178B.

1.7 Approval

ETSO	pending
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1.8 Environmental Qualification

The following performance standards under environmental test conditions have been established in accordance with the procedures set forth in EUROCAE/RTCA Document ED-14E/DO-160E.

Condition	Section	Cat.	Description
Temperature and Altitude	4.0	C4	
Ground Survival Low Temperature	4.5.1		-55 deg C
Short-Time Operating Low Temperature			-20 deg C
Operating Low Temperature			-20 deg C
High Ground Survival Temperature	4.5.2		+85 deg C
High Short-Time Operating Temp.	4.5.3		+70 deg C
Operating High Temp.	4.5.4		+55 deg C
In-flight Loss of Cooling	4.5.5	X	No forced cooling required
Altitude	4.6.1	C4	35,000 ft
Decompression	4.6.2		
Overpressure	4.6.3		
Temperature Variation	5.0	B	5°C per minute
Humidity	6.0	A	Standard
Shock and Crash Safety	7.0	B	Fixed-wing and Helicopter, standard
Vibration	8.0	S U	Curve M for Fixed-wing Aircraft Curve G for Helicopters
Explosion proofness	9.0	X	N/A
Water proofness	10.0	X	N/A
Fluids Susceptibility	11.0	X	N/A
Sand and Dust	12.0	X	N/A
Fungus Resistance	13.0	X	N/A
Salt Spray	14.0	X	N/A
Magnetic Effect	15.0	Z	Less than 0.3m
Power Input	16.0	B	DC installations with battery of significant capacity
Voltage Spike	17.0	A	High degree of protection against voltage spikes

Condition	Section	Cat.	Description
Audio Freq. Conducted Susceptibility	18.0	B	DC installations with battery of significant capacity
Induced Signal Susceptibility	19.0	AC	Primary power DC or AC, 400Hz
Radio Frequency Susceptibility	20.0	WS	Interim High Intensity Radiated Fields
Emission of Radio Frequency Energy	21.0	B	Equipment where interference should be controlled to a tolerable level
Lightning Induced Transients Susceptibility	22.0	A1E3X	Pin test waveform A, level 1 Cable bundle test waveform E, level 3
Lightning Direct Effects	23.0	X	N/A
Icing	24.0	X	N/A
Electrostatic Discharge	25.0	A	Equipment operated in an aerospace environment
Fire, Flammability	26.0	X	N/A

1.9 Accessories

Connector Kit CK4201-S (soldering version) Article-No.: 0879.304-954

consisting of

25-pol. cable connector, soldering F Article no. 0725.021-277

Connector housing Article no. 0775.479-277

Antenna plug Article no. 0725.706-277

Label "COMM" Article no. 0711.111-258

Connector Kit CK4201-C (crimp version) Article-No.: 0514.901-954

consisting of

25-pol. cable connector, crimp F Article no. 0472.921-277

Connector housing Article no. 0775.479-277

Antenna plug Article no. 0725.706-277

Label "COMM" Article no. 0711.111-258

Connector Kit CK6200-S (soldering version) Article-No.: 0617.903-954

consisting of

25-pol. cable connector, soldering F Article no. 0725.021-277

25-pol. cable connector, soldering M Article no. 0726.331.277

2 X Connector housing Article no. 0775.479-277

Antenna plug Article no. 0725.706-277

Label "COMM" Article no. 0711.111-258



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Connector Kit CK6200-C (crimp version)

Article-No.: 0617.891-954

consisting of

25-pol. cable connector, crimp F

Article no. 0472.921-277

25-pol. cable connector, crimp M

Article no. 0891.551-277

2 X Connector housing

Article no. 0775.479-277

Antenna plug

Article no. 0725.706-277

Label "COMM"

Article no. 0711.111-258

Documentation

Operating instructions

Article no. 0618.764-071

Manual Installation and Operation

Article no. 0617.857-071

Manual Maintenance and Repair

Article no. 0617.865-071

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Section 2 INSTALLATION

2.1 General

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

Notice:

Changes or modifications made to this equipment not expressly approved by Becker Flugfunkwerk may void the authorization to operate this equipment.

2.2 Testing before installation

General

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

Visual examination

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

- (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, LCD or inscriptions.
- (3) Dirt, bent or broken pins, displaced inserts of plugs and sockets.
- (4) Dirt and mechanical damage to push buttons and operating knobs.

2.3 Mechanical installation

2.3.1 Mechanical installation of VHF transceiver.

The VHF transceiver is designed for installation in the instrument panel of an aircraft. It is constructed for mounting behind the panel. The circular cutout and the mounting holes are to be drilled in accordance with the instrument size. The mounting point shall be at least 30 cm away from the aircraft magnetic compass, to avoid any interference to the magnetic compass by the transceiver. The necessary dimensions are given in Fig. 2-3. Attachment is by means of four screws, which are included in the delivery.

2.4 Installation wiring

2.4.1 General

The installation wiring diagrams are shown in Fig. 2-5 to 2-7.

Note :

- (1) Use only cable which is fit for aircraft use (self extinguishing). AWG 20 for power supply and AWG 22 for other cables.
- (2) Fit sleeves over the solder joints on the equipment connector.
- (3) Protect the power supply with a 7.5 A fuse or circuit breaker.

Note :

The VHF transceiver is protected internally by a 5 A resettable fuse.

- (4) Type-specific cable harnesses are also available for the aircraft wiring (details from the manufacturer).
- (5) No HF cables should be included in the cable harnesses of the system. The routing of connecting cables alongside cables which carry audio power or pulses should also be avoided.
- (6) Carefully check the wiring before switching on the unit and check particularly that (+) and (-) have not been reversed.

2.4.2 Microphone connection

Standard (carbon) microphone

For standard (carbon) microphone operation mode the transceiver has an asymmetric input with an input resistance of 150 Ohm and a nominal sensitivity of 250 mV. This can be changed in the service mode from 10 mV to 1 V. The power supply for standard microphone is dc supply voltage (open circuit) 10.5 V, feed resistance 470 Ohm.

MIKE EXT (HI)	Pin 18	Microphone Input
MIKE EXT (LO)	Pin 8	Microphone Input

Dynamic microphone

For dynamic microphone operation mode, the transceiver has a balanced input with an impedance of 200 Ohm input resistance and a nominal sensitivity of 2 mV. This can be changed in the service mode from 1 to 20 mV.

MIKE EXT (HI)	Pin 5	Microphone Input
MIKE EXT (LO)	Pin 6	Microphone Input

The VHF transceiver enables a maximum of two dynamic microphones or two standard microphones (d.c. supply) to be connected at the same time. For connection between the transceiver and any microphone input longer than 1.5 m, ground loop shall be avoided.

2.4.3 Speaker connection

A 4 Ohm speaker can be connected to audio output connector P1 pin 1 and pin 14.

Speaker	Pin 1	Speaker AF signal
GND	Pin 14	Signal ground

CAUTION :

The magnetic field of a speaker influences the magnetic compass. When choosing the mounting point, a distance of not effecting the mag. Compass must be determined. After speaker installation a compass swing must be performed.

2.4.4 Headphone connection

Up to two headphones with an impedance of 600 Ohm can be connected to the audio output connector P1 pin 2 and pin 3.

Phone	Pin 2	Headphones AF signal
GND	Pin 3	Signal ground

2.4.5 Intercom mode "IC connection".

The intercom mode is designed for aircraft with a high noise level and assumes operation using headsets. When the intercom mode is set to ON, R/T communication can be carried on but intercommunication is also possible between two crew members. The IC is switched off during transmission.

IC Volume can be adjusted by a "Long press" of "IC/SQL" key and then turning the rotary encoder, possible in all modes, including scan mode but except during TX mode.

The VOX setting is activated by a "Short press" of "IC/SQL" key or by pressing the "rotary encoder" during IC Volume settings.

2.4.6 Panel lighting

The VHF transceiver is fitted with panel lighting. It is to be connected to the aircraft external power supply via the aircraft wiring.

For 0...14 V dimming voltage range connect ILL_HI (pin 23) to dimming voltage bus and ILL_LO (pin 10) to system ground (P_SUPP_GND) (refer to the following illustration).

CAUTION :

The lighting is not switched off when the unit is switched off (ON/OFF switch)

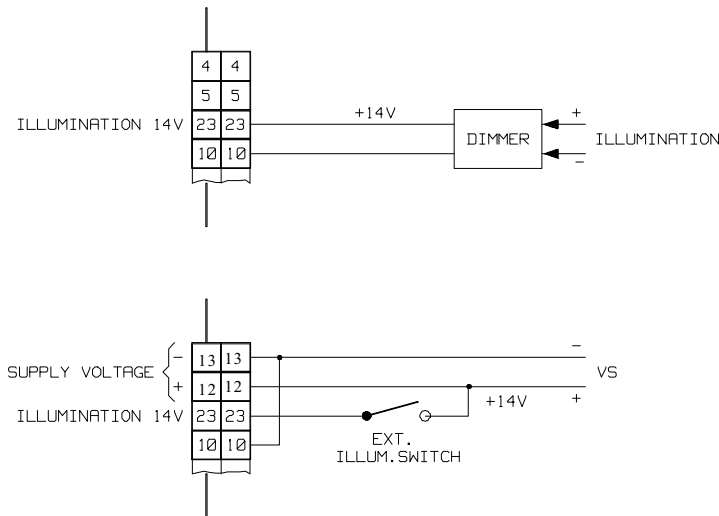


Fig. 2-1 Interwiring panel lighting

For 0...28 V dimming voltage range connect ILL_LO (pin 10) to dimming voltage bus and ILL_HI (pin 23) to system ground (P_SUPP_GND).

2.4.7 “Auxiliary” audio input

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

AF AUX	Pin 4	Auxiliary audio input
GND	Pin 21	Auxiliary audio ground

2.4.8 LINE output

The transceiver has an asymmetric AF broadband Output (AC coupled). The RX AF-signal from the transceiver is present at this output. The output level = $1 V_{RMS} \pm 0.2 V$ 1k Ohm.

2.4.9 Location of internal automatic fuse (resetable)

The internal automatic fuse is reactivated by means of a matching plastic tool (self made).



Fig. 2-2 Location of internal automatic fuse (resetable)

2.5 Dimensions VHF transceiver

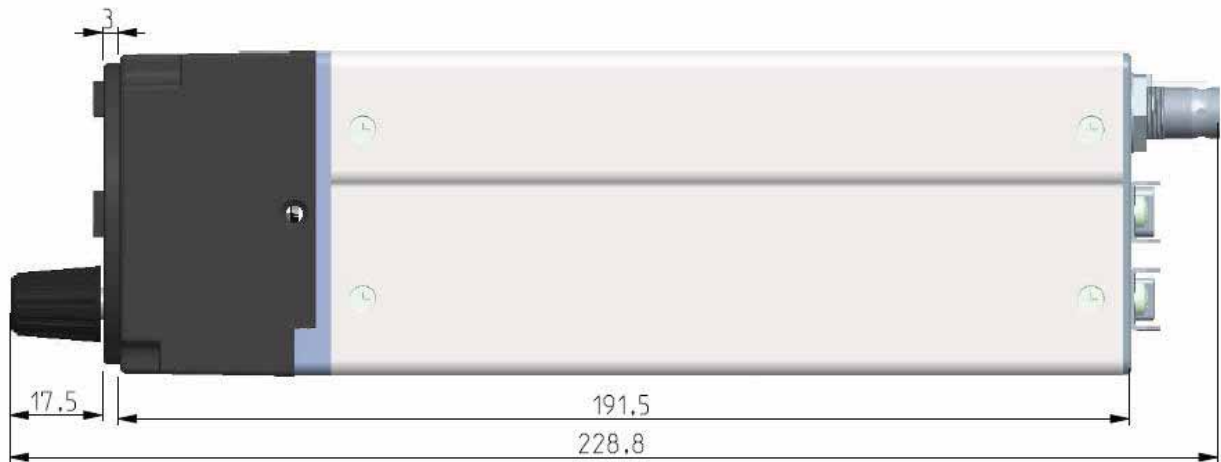


Fig. 2-3 Mounting dimensions VHF transceiver

2.5.1 Drilling jig for back-panel mounting

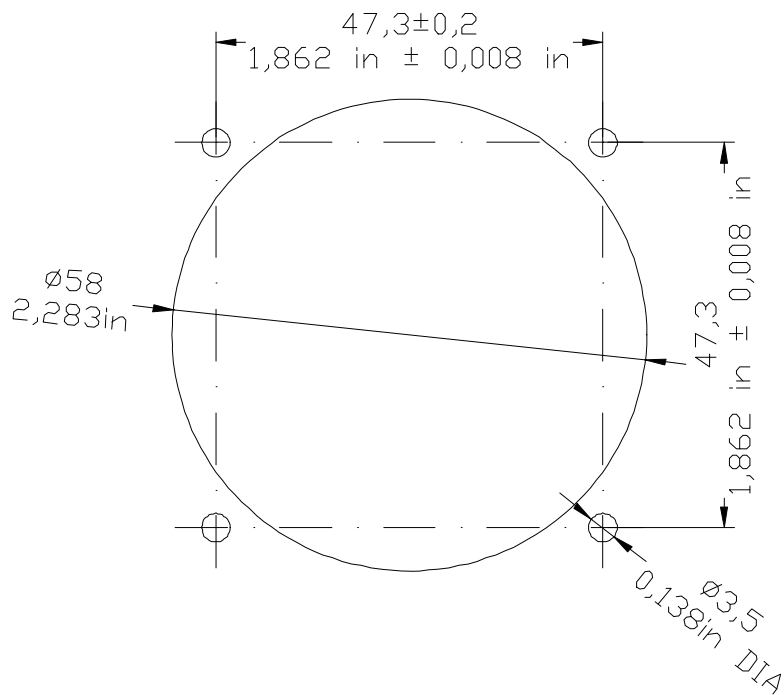


Fig. 2-4 Drilling jig for back-panel mounting

2.6 Electrical Interface Overview

- power supply
- antenna
- headphone(s)
- microphone(s)
- PTT key.

Depending on the transceiver configuration and the aircraft installation.

- external exchange key
- microphone type switch
- squelch monitor
- speaker
- external power on switch
- power supply monitor output
- auxiliary audio source
- Intercom key
- control panel brightness control.

2.7 P1 Connector (System Interfaces)

The P1 connector is a D-SUB male connector with 25 pins and slide-in fastener.

Pin No.	Pin Name	Direction	Function
1	SPK_HI	OUT	Speaker output signal
2	HDPH_A	OUT	Symmetrical Output for Headphone(s)
3	HDPH_B	OUT	Symmetrical Output for Headphone(s)
4	AF_AUX_IN_HI	IN	Auxiliary audio input
5	MIKE_DYN_HI	IN	Symmetrical input for dynamic microphone(s)
6	MIKE_DYN_LO	IN	Symmetrical input for dynamic microphone(s)
7	IC	IN	Intercom key input; ACTIVE state - closed contact to GND
8	MIKE_STD_LO	-	Std. Mic. Low (return)
9	NC		not connected
10	ILL_LO	IN	Illumination low input
11	P_SUPP	IN	Power supply Hot (positive)
12	P_SUPP	IN	Power supply Hot (positive)
13	P_SUPP_GND	-	Power supply Ground (return)
14	SPK_LO	-	Speaker ground (return)
15	LINE_OUT	OUT	Auxiliary audio output
16	AGC_OUT	OUT	Receiver AGC output
17	/PTT	IN	Press To Talk key input ACTIVE state - closed contact to GND
18	MIKE_STD_HI	IN	Std. Mic. High
19	CPIN	IN	Coding PIN
20	NC	-	not connected
21	AF_AUX_IN_LO	-	Auxiliary audio input ground
22	NC	-	-
23	ILL_HI	IN	Illumination high
24	/PWR_EVAL	-	Power on Monitor output
25	P_SUPP_GND	-	Power supply Ground (return)

2.8 J1 Connector (Serial Interfaces and Discrete I/Os)

The J1 connector is a D_SUB female connector with 25 pins and slide-in fastener.

Pin No.	AR6201 Pin Name	Direction	Function
1	CPIN	-	Coding PIN
2	TX2+	IN	Interface 2 OUT+
3	RX2+	IN	Interface 2 IN+
4	/SQL_EVAL	out	sqlch monitor output ACTIVE state - closed contact to GND
5	/CSDB_EXT	IN	Extended CSDB protocol enabling ACTIVE state - closed contact to GND
6	SHIELD_1	-	Interface 1 SHIELD
7	TX1+	OUT	Interface 1 OUT+
8	RX1+	IN	Interface 1 IN+
9	TX2-	OUT	Interface 2 OUT-
10	RX2-	IN	Interface 2 IN-
11	SHIELD_2	-	Interface 2 SHIELD
12	/EXT_SO	IN	External "Exchange" key ACTIVE state - closed contact to GND
13	/SRV_EN	IN	Service enable pin ACTIVE state - closed contact to GND
14	TX1-	OUT	Interface 1 OUT-
15	RX1-	IN	Interface 1 IN-
16	NC		not connected
17	NC		not connected
18	NC		not connected
19	NC		not connected
20	(/GPI)	IN	General Purpose Input pin (unused, for future purposes) ACTIVE state - closed contact to GND
21	D_GND	-	Discrete lines ground
22	D_GND	-	Discrete lines ground
23	D_GND	-	Discrete lines ground
24	/MIKE_SW	IN	Microphone type selector input ACTIVE state - closed contact to GND
25	/ON	IN	External Power ON input ACTIVE state - closed contact to GND

2.9 Antenna connector

Bayonet Nut Connector (BNC 50 Ohm).

2.10 Transceiver grounding

The transceiver includes a grounding bolt (M4 threaded bolt).

2.11 Service mode

The service mode is meant to enable the ground technicians to set the equipment configuration and must not be used in flight. The service mode is activated when the **MDE** key is pressed while the transceiver is switched ON.

"SETUP" is indicated on the screen, press any key enter the service mode.


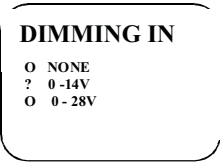
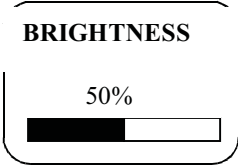
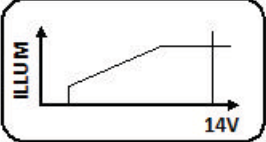


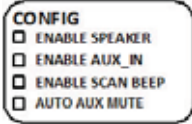


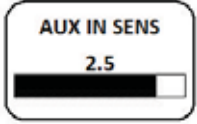

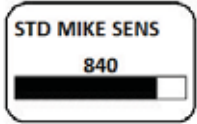
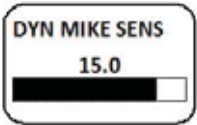
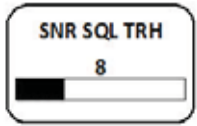
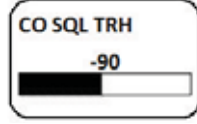
Setup indication

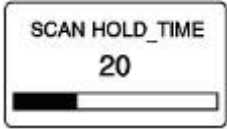
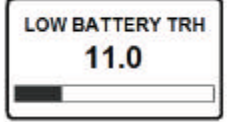
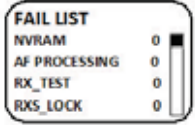
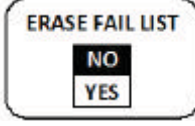
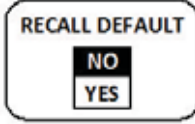
Set the 4-digit numerical code password "**6435**" using "rotary encoder" and push button of the "rotary encoder" and confirm by pushing the "STO" button.



Password Dialog

Push "rotary encoder"	Turn "rotary encoder"	Operating	View and Conditions
AR6201 INFO	CH-SW (Control Head CH) CM-SW (chassis module CM) SN (Serial Number)	View only	
Dimming input	None 0 - 14 V DC 0 - 28 V DC	Push STO key will activate the selected option	
BRIGHTNESS	0%...50%...100%	Adjustment is stored automatically without pushing STO key	Displayed only if Dimming input is set to "NONE" 
ILLUM CURVE	Characteristic points: A - Minimum Illumination B – Maximum Illumination) Y - Minimum Dimming Voltage Z - Maximum Dimming Voltage	Adjustment is stored automatically without pushing STO key	 Displayed only if Dimming input different than "NONE" 14V or 28V is displayed depending on selection
ENABLE STORE	Enable Store	Pushing STO key activates the selected option	
ERASE_MEM (Erase memory channels for selected channel spacing only)	NO YES	Pushing STO key activates the selected option	
CONFIG	Enable Speaker Enable AF_AUX_IN Enable SCAN BEEP Automatic AUX mute	Pushing STO key is toggle ON/OFF the selected variable	

Push "rotary encoder"	Turn "rotary encoder"	Operating	View and Conditions
AF_AUX_IN SENSITIVITY	1.0..8.0V, step 0.1V	Adjustment is stored automatically without pushing STO key	 <p>Displayed only if AF_AUX_IN Enabled</p>
MIKE TYPE	HARDWARE SELECTION INVERTED HARDWARE SELECTION STD MIKE DYN MIKE MIXED	Adjustment is stored automatically without pushing STO key	
STD MIKE SENSITIVITY	10..1000 mV, in 10 mV steps	Adjustment is stored automatically without pushing STO key	 <p>Displayed if MIXED or STD_MIKE Type is chosen by software or Mike Type is set to hardware selection and STD_MIKE is selected on external pin</p>
DYN MIKE SENSITIVITY	1.0..20.0 mV in 0.2 mV step	Adjustment is stored automatically without pushing STO key	 <p>Displayed if MIXED or DYN_MIKE Type is chosen by software or Mike Type is set to hardware selection and DYN Mike is selected on external pin</p>
SNR SQUELCH THRESHOLD	6 ... 12 dB	Adjustment is stored automatically without pushing STO key	
CO SQUELCH THRESHOLD	-95 ... -85 dBm	Adjustment is stored automatically without pushing STO key	

Push "rotary encoder"	Turn "rotary encoder"	Operating	View and Conditions
SCAN HOLD TIME	1..60 s	Adjustment is stored automatically without pushing STO key	
LOW BATTERY THRESHOLD	10.0 ... 33.0 V, step 0.1 V	Adjustment is stored automatically without pushing STO key	
SIDETONE ATT	0...12dB	Adjustment is stored automatically without pushing STO key	
AR ERROR LATCH	PBIT and CBIT Failure List according /BIT/	View only	
ERASE FAIL LIST (LATCHES)	NO YES	Pushing STO key activates the selected option	
RECALL DEFAULT (FACTORY)	NO YES	Pushing STO key activates the selected option	

To return from service mode the device must be turned OFF and ON again.

2.12 Interwiring diagram of the VHF transceiver

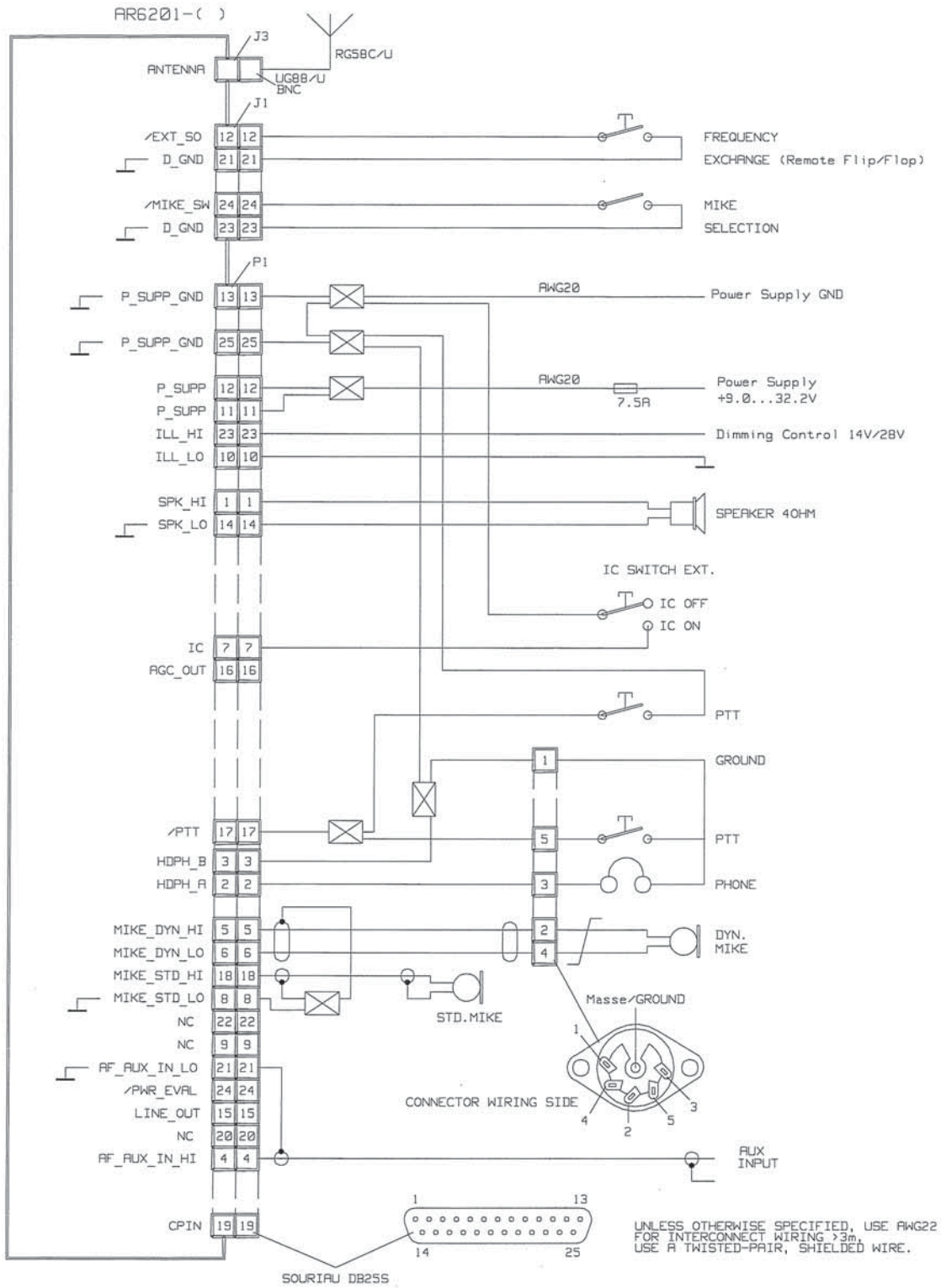


Fig. 2-5 Interwiring of the VHF transceiver

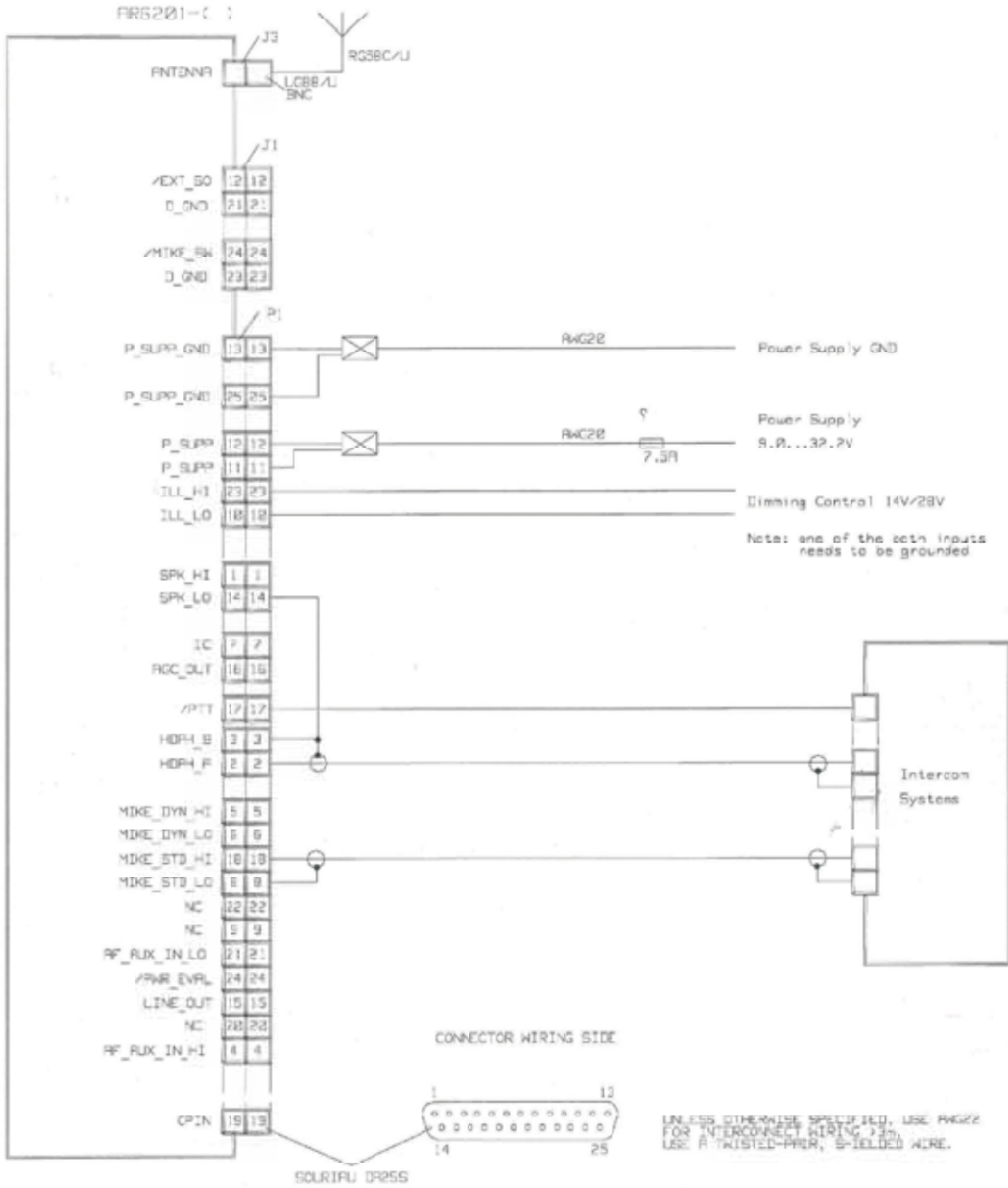


Fig. 2-6 Interwiring diagram VHF transceiver with intercom systems

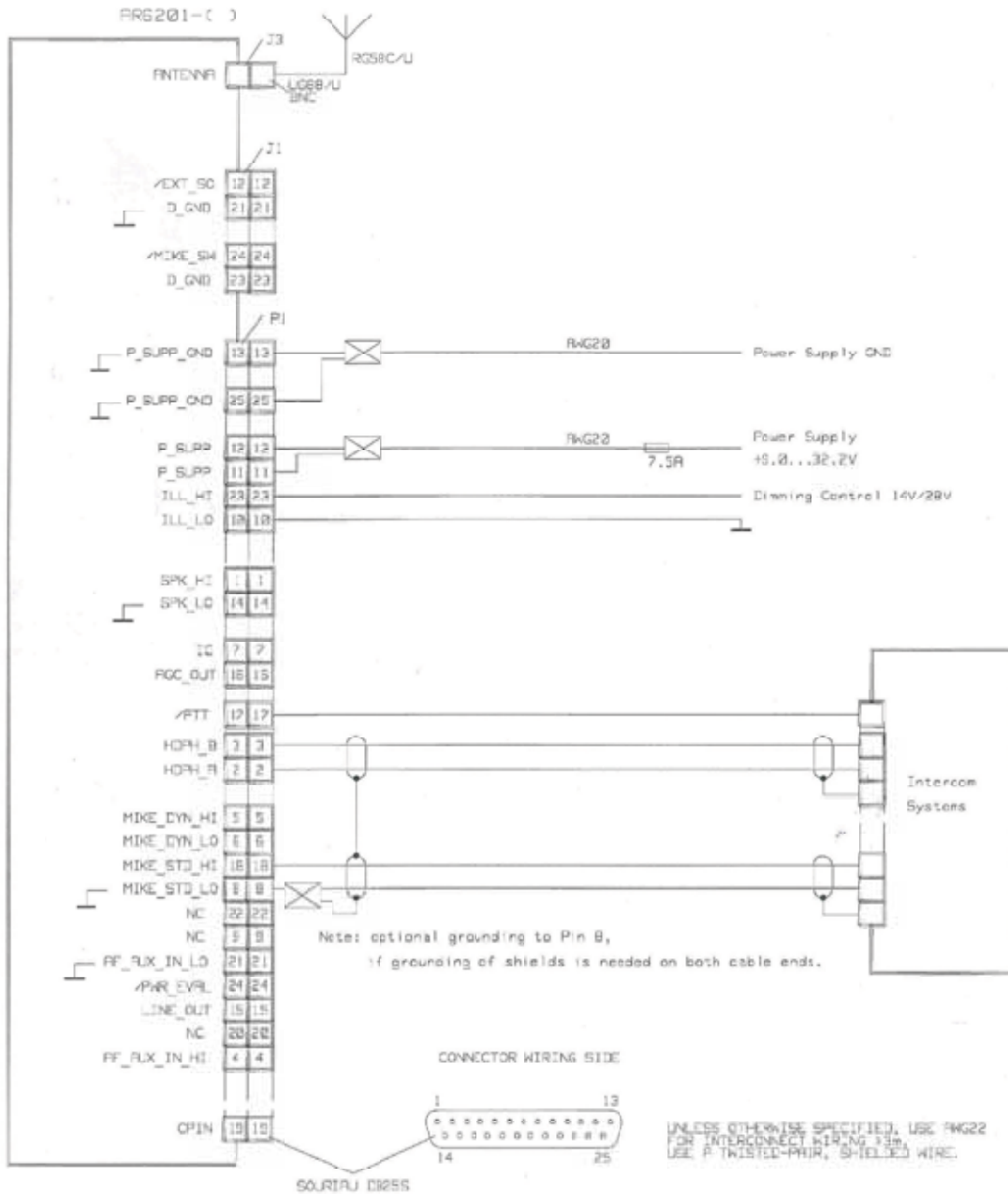


Fig. 2-7 Interwiring diagram VHF transceiver with intercom systems

2.13 Testing after installation

2.13.1 Ground test with engine shut down.

After installation of the unit, measure the antenna tuning between the base of the antenna and the antenna connecting cable using a VHF reflection-coefficient meter (voltage standing wave meter).

The VSWR (voltage standing wave ratio) over the complete frequency range of the unit shall be within 3:1. If this matching value is exceeded it indicates a mismatch, caused for example by an incorrect or unsatisfactory counterpoise, a cable with an impedance which deviates significantly from 50 Ohm or an incorrectly tuned antenna, or faults on the BNC connectors of the antenna cable.

2.13.2 Ground test with engine running.

With the engine running at cruising speed check that the aircraft power supply is within the permissible tolerances at approximately 14 V.

When performing a communication test, ensure that the distance from the ground station is as great as possible, at least 100 m. With the engine at cruising speed, the cabin noise of the aircraft should be only slightly transmitted and communication should be clear and distinct. Hold the microphone close to the lips while speaking.

Activate the intercom function and carry out a speech test with the engine running at cruising speed. If necessary, adjust the IC volume (refer to the service mode).

Switch on the squelch and check the squelch function. The threshold of the squelch can be set in the service mode .

The sidetone volume can be adapted to pilots convenience. If necessary, adjust the sidetone volume (refer to the service mode). When using the loudspeaker, the sidetone should be adjusted to zero, so that no acoustic feedback occurs.



AR6201

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Section III OPERATION



3.1 Controls and indicators







Fig. 3-1 controls and indicators


Meaning of symbols on controls and indicators

	Symbol	Description	Type	Description
1		Squelch/IC key	Push button	<p>"Short press" during <i>normal operation</i> toggles squelch ON/OFF state.</p> <p>"Short press" during Intercom settings toggles between IC Volume settings and VOX settings.</p> <p>"Short press" during <i>Setup</i> moves menu in backward direction.</p> <p>"Long press" during <i>normal operation</i> activates <i>IC volume setting</i>.</p> <p>"Long press" during <i>VOX setting</i> deactivates <i>VOX setting</i> and returns to previous selection mode</p>

	Symbol	Description	Type	Description
2		Mode key	Push button	<p>“Short press” during <i>normal operation</i> changes selection modes.</p> <p>“Long press” during <i>normal operation</i> activated the setting for the brightness and squelch threshold .</p> <p>When Key pressed during the transceiver is switch ON, the service mode is activated.</p> <p>“Long press” together with “STO” key during <i>normal operation</i> toggles 8.33+25 kHz and 25 kHz channel spacing.</p> <p>“Short press” during Intercom settings returns to previous selection mode.</p> <p>Short press” during Scan Sub-mode leaves Scan Sub-mode to Standard mode.</p>
3		Store key	Push button	<p>”Short press” during <i>normal operation</i> activates storage procedure.</p> <p>“Long press” together with MDE key during <i>normal operation</i> toggles 8.33+25 kHz and 25 kHz channel spacing.</p>

	Symbol	Description	Type	Description
4		Exchange/SCAN key	Push button	<p>"Short press" during "Standard mode" and Scan Sub mode exchanges preset frequency and active frequency.</p> <p>"Short press" during Setup moves menu in forward direction.</p> <p>"Long press" in Standard mode, Direct mode and Channel mode activates Scan Sub-mode.</p> <p>"Short press" during Scan Sub-mode exchanges preset frequency and active frequency without leaving the Scan Sub-Mode.</p> <p>"Long press" during Scan Sub-mode leaves Scan Sub-mode without exchanging preset and active frequency.</p>
5		ON/OFF power switch with volume potentiometer	Volume potentiometer combined with power switch	Switches power ON/OFF and adjusts volume level.
6a		Rotary encoder	Optical encoder (with integrated push button)	16 steps per turn rotary encoder, used to change settings.
6b		Push button of the rotary encoder	Push button (of the optical encoder)	<p>Push button to move between digits for settings, acceptance of selections; generally treated as an enter key.</p> <p>"Short press" during Scan Sub-mode activates setting of preset frequency (see frequency selection function for details)".</p> <p>Short press" during IC volume settings activates VOX settings.</p>
7		LCD display	Dot matrix	Liquid crystal display

3.1.1 Rear of unit

- | | | | |
|---|---|---------------------|---|
| 1 | ANT | BNC | 50 Ohm antenna connector. |
| 2 |  | Grounding bolt | |
| 3 | P1 | 25-pin D sub-male | Equipment connector for connecting the installation wiring. |
| 4 | J1 | 25-pin D sub-female | Equipment connector for connecting the installation wiring. |

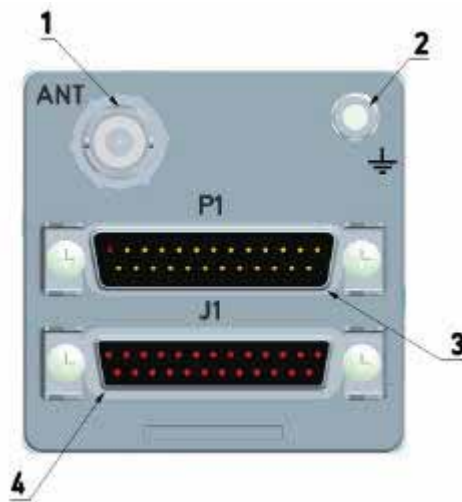


Fig. 3-2 Rear side

3.1.2 Operating instructions

3.1.3 General button functionality description

When any push button is pressed, and the operation performed by this control is not allowed at this time, then for a short period of time whole content of the display is inverted.

Long press is detected when the user presses and holds the key for at least 3 seconds, otherwise Short press is assumed.

3.1.4 Start-up

CAUTION

Do not switch ON the VHF transceiver when engines are being started or shut down.

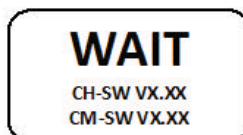
Note:

Excessive pulses on the DC Bus of the aircraft may cause a damage on electrical circuits of any installed instrument

- a. Switch ON the VHF transceiver using the ON/OFF power switch.

During PBIT, display is first switched to black for 1 second together with setting Illumination to 100% and then switched to white for 1 second (display test) together with setting Illumination to 0% and slowly (1 ... 5 seconds) increasing Illumination to the last saved value.

- b. After PBIT the display indicates the message "WAIT" the software version of "Control Head" (CH) and the software version of "Chassis Module" (CM) are indicated.



- c. If the PBIT has detected error(s), the display indicates "FAILURE" (for details see chapter 3.9.6)

3.1.5 Mode selection

There are three selection modes:

Standard mode

Direct tune mode

Channel mode

3.2 Mode selection function

When the **MDE** key is shortly pressed, the selection mode changes from Standard mode to Direct tune mode or Channel mode.

3.2.1 Mode transition rules

When changed from Standard mode to Direct tune mode the active frequency stays the same.

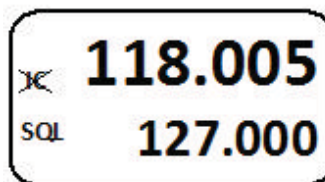
When changed from Direct tune mode to Channel mode the active frequency stays the same. If the active frequency has no assigned channel number this is indicated in the display as "**CH —**"

When switching from Channel mode to Standard mode the active frequency stays the same and the preset frequency stays the same as before leaving Standard mode.

3.2.2 Standard mode

Both preset and active frequencies are indicated on Display. The active frequency is indicated in the top line. The preset frequency is indicated in the bottom line. The preset frequency is settable by using the "**Rotary encoder**" (see frequency selection function).

Short press the "**Exchange/SCAN**" key to exchange active and preset frequency. Exchange is disabled while the transceiver is in transmit mode.



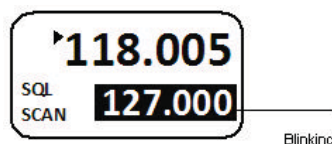
3.2.3 Scan Sub-mode

The Scan Sub-mode can be activated by a long press of **Exchange/SCAN** key in all selection modes

Note: Leaving Scan Sub-mode means going back to the Standard mode

A short press off the **MDE** key changes back from Scan Sub-mode to Standard mode. Both preset and active frequencies are indicated on display. The active frequency is indicated in the top line. The preset frequency is indicated in the bottom line.

The SCAN sign in the display indicates scanning mode is active.



If signal is detected on the active frequency and also signal is detected on the preset frequency (carrier detected), the preset frequency is inverted.

A arrow sign near active frequency indicates that active frequency audio is provided to the audio outputs.

If a signal is detected on preset frequency, while nothing on the active frequency is received, an arrow sign near preset frequency indicates that preset frequency audio is provided to the audio outputs.



Short press of the **Exchange/SCAN** key exchanges preset frequency and active frequency without leaving scan sub-mode. Exchange is disable while the transceiver is in transmitt mode.

Long press of the **Exchange/SCAN** key leaves scan sub-mode (without exchanging preset and active frequency to Standard mode).

Short press of the encoder push button activates setting of preset frequency (see frequency selection function for details).

3.3 Frequency selection function

Note:

Left side figure for Standard mode, right side figure for Direct tune mode



Frequency MHz selection

If selected channel spacing is 25+8.33 kHz (mixed mode), the frequency is displayed in 6 digits, three for MHz and three for kHz. If selected spacing is 25 kHz, frequency is displayed in 5 digits, three for MHz and two for kHz.

Direct editing of the active frequency while transmitter is in transmit mode is disabled.

Frequency selection

By a short press of the **Rotary encoder Push button** the MHz digits are inverted. By turning **Rotary encoder** the MHz frequency is incremented/decremented in 1 MHz steps depending on the turning direction.

Note:

A timeout of 5 seconds is implemented to abort selection mode if no user action occurs.

By short press of the **Rotary encoder Push button** again, the 100 kHz kHz spacing is selected. The 100 kHz digits are inverted, by turning **Rotary encoder** kHz-frequency is incremented/decremented depending on the turning direction in 100 kHz steps.

Note:

A timeout of 5 seconds is implemented to abort selection mode if no user action occurs.

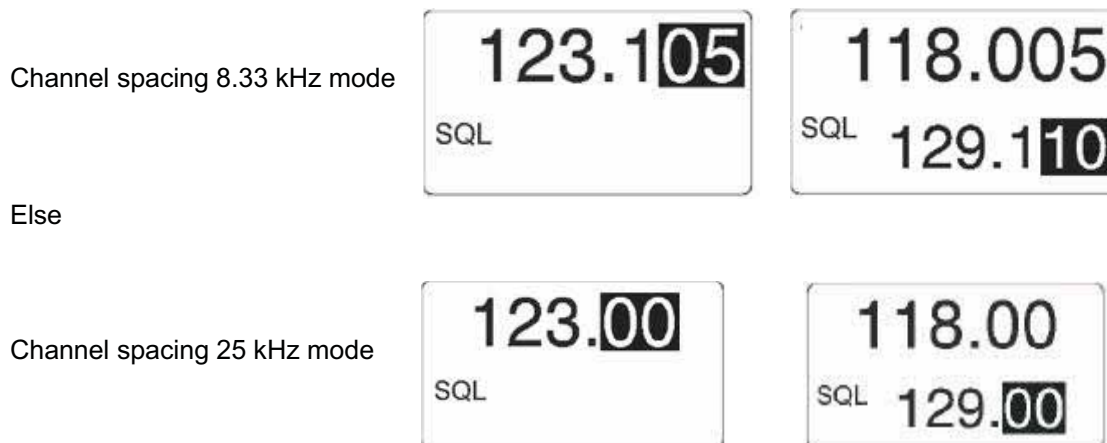


Frequency hundreds digit selection

By a short press of the **Rotary encoder Push button** again the tens / 25 kHz (depending channel spacing 8.33 or 25 kHz mode) digits are inverted and by turning **Rotary encoder** the indication is incremented/decremented depending on the turning direction.

Note:

A timeout of 5 seconds is implemented to abort selection mode if no user action occurs.



Frequency kHz selection

By short press of the **Rotary encoder Push button** again, the frequency selection is cancelled.

3.3.1 Direct tune mode

The active frequency is indicated in the top line.

The active frequency is set directly using the **Rotary encoder** if the transceiver is not in transmit mode.

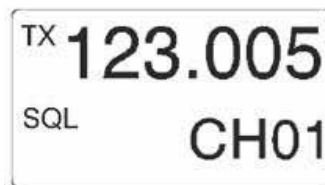


By frequency change in Direct tune mode, the changes become active immediately

On the bottom line the battery sign is indicated with power voltage value.

3.3.2 Channel mode

Select the channel mode by short press of the **MDE** key. In the top line of the display the stored frequency is indicated. In the bottom line of the display, the channel number is indicated.



By a short press of the **Rotary encoder Push button** the channel number is inverted.

Select the required channel number by turning the **Rotary encoder** (incremented / decremented depending on the turning direction).

Only selection of channels with assigned frequency in the selected channel spacing is possible.

Note:

A timeout of 5 seconds is implemented to abort selection mode if no user action occurs.

Exit from channel selection is achieved by short pressing the **Rotary encoder Push button**.



Channel digits selection

3.4 Storage function

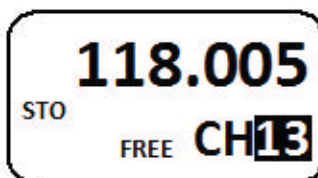
It is possible to activate storage function in all selection modes.

During storage procedure:

- "STO" text is displayed on the left side of the display.
- The transceiver is ready to transmit and receive on the frequency as active in previous mode, without any restriction.

Storage function is activated as follows:

Short press of the **STO** key. On the top line active frequency is indicated.



Channel number selection.

On the bottom line channel number is indicated; if channel is free, sign "FREE" is displayed, otherwise "USED" is displayed as follows:



"FREE" and "USED" channel indication.

The channel digits are inverted. By turning the **Rotary encoder** the channel number is incremented / decremented depending on the turning direction in range 10 ... 99.

Short press of **STO** key. The transceiver stores the frequency into the selected channel and goes back to the previous mode.

If no action occurs during 7 seconds the transceiver goes back to the previous mode without storing the frequency.

3.4.1 Automatic storage function

The transceiver contains a standard mode automatic storage function. The last active frequency is stored in memory channel 1(CH01). The active frequency previously located in memory channels 1, 2 ... 8 is shifted to memory channels 2, 3 ... 9. Frequency channel previously located in memory channel 9 is lost.

Select channel 1 to 9

Select the channel mode by short press of the **MDE** key. In the top line of the display is the stored frequency indicated. In the lower line of the display, the channel number 10 is indicated.

By a short press the **Rotary encoder Push button** the channel number is inverted.

Select required channel number by turning the **Rotary encoder** counter clock wise.

Note:

A timeout of 5 seconds is implemented to abort selection mode if no user action occurs.

Exit from channel selection is achieved by short pressing the **Rotary encoder Push button**.

3.5 Intercom settings

Intercom menus give easy access to settings, for example:

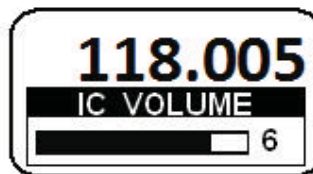
- Intercom volume
- VOX settings (Enable/Disable VOX, VOX threshold)

3.5.1 Intercom volume / VOX settings

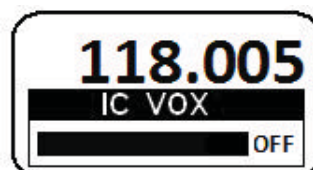
The Intercom menu is activated by long press of **IC/SQL** key in all selection modes and SCAN-Sub mode.

The active frequency is indicated in the top line of the display. On the bottom line is indicated "IC Volume" with bar graph and value.

Select required value by turning the **Rotary encoder** (incremented / decremented depending on the turning direction).



By a short press of the **Rotary encoder Push button** the VOX setting is activated. Select required value by turning the **Rotary encoder** (incremented / decremented depending on the turning direction).

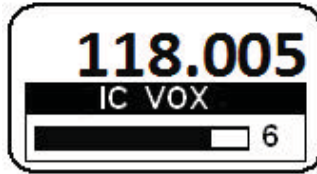


When VOX is switched OFF the display shows

When VOX is switched ON the display indicates bar according to current VOX threshold value.

Note:

When VOX is ON (0..10) bar is not filled.



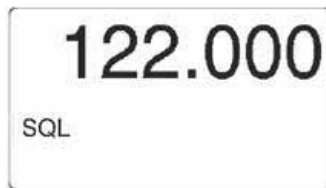
The change values is automatically stored 2 second after the last change took place.

3.6 Squelch function

Squelch function is activated as follows:

Short press of the **SQL/IC** key.

Squelch is toggled between ON and OFF state.



Squelch status ON



Squelch status OFF

3.7 Channel spacing switchover 25 kHz to 8.33 kHz

The switchover between 25 kHz channel spacing and 8.33 kHz channel spacing is only possible in Standard mode and Direct tune mode. The channel spacing is changed by pressing **STO** and **MDE** keys simultaneously for at least 3 seconds.

8.33 kHz channel spacing



25 kHz channel spacing



3.8 Special setting of brightness and squelch threshold

Special settings selection can be activated by long press of **MDE** key in all selection modes.

The active frequency is indicated in the top line of the display. Indicated brightness value in the bottom line of the display.

Short pressing of **Rotary encoder push button**. Setting the value with **Rotary encoder** and stored the value by pressing of the **STO** key.

Change to squelch threshold setting by Short pressing of **Rotary encoder push button**. Set the value with **Rotary encoder** and store the value by pressing of the **STO** key.

Push "rotary encoder"	Turn "rotary encoder"	Push "sto" key	View and Conditions
BRIGHTNESS	0%..50%..100%	Store immediately	Displayed only if Dimming input is set to "NONE"
SQUELCH THRESHOLD	6 ... 12 dB	Store immediately	

Ending of the settings by long press of **MDE** button.

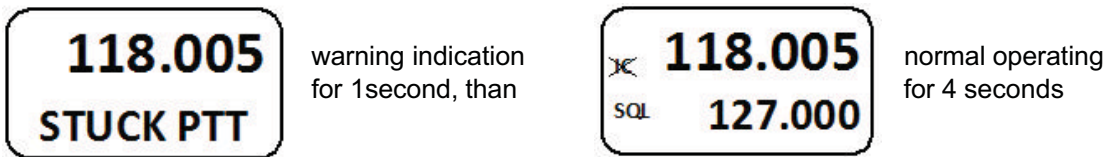
3.9 Built-In Test

3.9.1 CBIT test results indication

The device is able to indicate Continuous BIT result during operation. Negative results are indicated on the display (Failure or warning message is displayed).

3.9.2 CBIT Stuck_PTT warning

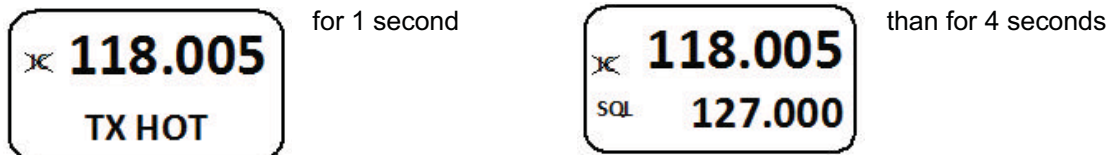
If the CBIT has detected stuck PTT warning, the display indicate it as follows:



CBIT "Stuck PTT" warning indication

3.9.3 CBIT TX_HOT warning presentation mode

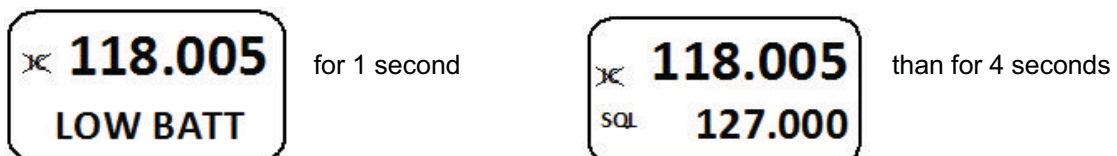
If the CBIT has detected TX HOT warning, the display indicates as follows:



CBIT "TX HOT" warning indication

3.9.4 CBIT LOW BATTERY warning presentation mode

If the CBIT has detected LOW BATTERY warning, the display indicates as follows:



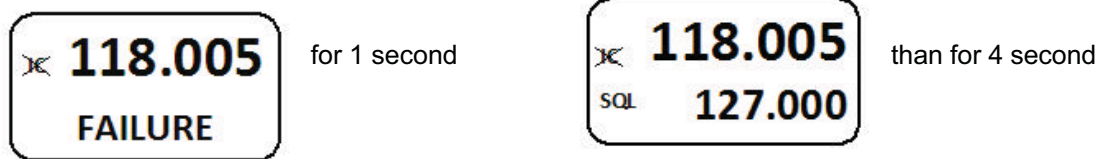
CBIT "LOW BATT" warning indication.

3.9.5 CBIT TX_HOT, Stuck_PTT and LOW BATTERY warnings

If the CBIT has detected TX HOT, Stuck PTT and LOW BATTERY warnings in any combinations, the display indicates in sequence: 1st warning (1 second), normal operation (4 seconds), 2nd warning (1 second), normal operation (4 seconds) and 3rd warning (1 second), normal operation (4 seconds).

3.9.6 CBIT failure

If the CBIT has detected Failure, the display indicates as follows:



If the CBIT has detected failure together with TX HOT and / or Stuck PTT warnings, only failure is indicated.

3.10 Safety instructions

The following instructions must be followed for safe operation of the VHF transceiver:

- Switch OFF the unit before starting or shutting down engines.
- A speech test is to be performed before startup and it should be noted that if the speech test is carried out close to the ground station the results may be positive even if the antenna cable is broken or short-circuited. At a distance of 5 to 10 km no connection will be made.
- Use a loud voice for speech communication and hold the microphone close to the lips. Otherwise cabin noise can be intrusive and make understanding difficult.
- Use only microphones or headsets which are suitable for use in aircraft. In aircraft made of wood or synthetic materials or in gliders or helicopters, incoming radiation on the equipment antenna can affect the integrated amplifier of the microphone (feedback). This is noticeable in the ground station by whistling and/or heavy distortion. The described disturbances can occur in different ways on the different transmission channels.