VHF-Transceiver

AR6201-(X0X)

Software Versions:

SCI1050S305 Version 3.05

SCI1051S305 Version 1.49

and upwards

Installation

Operation

Manual DV 14300.03

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Becker Flugfunkwerk GmbH • Baden Airpark • 77836 Rheinmünster • Germany

Telephone +49 (0) 7229 / 305-0 • Fax +49 (0) 7229 / 305-217

http://www.becker-avionics.com • e-mail: info@becker-avionics.de

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List of Abbreviations

AF	Audio Frequency
ATT	Attenuation
CBIT	Continuous Built In Test
CFG	Configuration
EASA	European Aviation Safety Agency
EMI	Electro Magnetic Interference
ETSO	European Transmission System Operators
GPS	Global Positioning System
HMI	Human Machinery Interface
HIRF	High Intensity Radiated Fields
IC	Intercom
I&O	Installation & Operation
LCD	Liquid Crystal Display
M&R	Maintenance & Repair
PBIT	Power-On Built In Test
PTT	Push TO Talk
PWR	Power
RX	Receive
SQL	Squelch
SPKR	Speaker (Loudspeaker)
SRC	Source
TSO	Transmission System Operator
TX	Transmit
VOX	Voice Operated IC Threshold
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio

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Section 1. GENERAL DESCRIPTION

1.1 Introduction

This manual describes the VHF transceiver AR6201-(XOX). The manuals DV 14300.03 **I&O** ("Installation and Operation") and DV 14300.04 **M&R** ("Maintenance and Repair") contain the following sections.

Section		DV 14300.03 I&O	DV 14300.04 M&R
1	General	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
8	Circuit Diagrams	N/A	X

1.2 Purpose of Equipment

The AR6201-(XOX) VHF transceiver enables voice communication in the very high frequency band between 118.000 MHz and 136.9916 MHz with a selectable channel spacing of 25 kHz or 8.33 kHz.
The AR6201-(10X) VHF transceiver enables voice communication in the very high frequency band between 118.000 MHz and 136.9750 MHz with a selectable channel spacing of 25 kHz only.

1.3 General Notes

The word "frequency", also used in this document in the sense of "channel name", as defined in EUROCAE, ED-23B: chapter 1.3.2.
The word "memory channel" or "channel" used in this document means a memory place identified by a channel number. On that memory place, a frequency may be stored for later use.

1.4 Short Description

The AR6201-(XOX) is a single block transceiver ideal to be fitted in all type of general aviation aircraft and helicopters.
The VHF transceiver is a compact and lightweight single block unit. The dimensions correspond to the standard instrument diameter of 58 mm (2 ¼ inch). Mounting is by means of four screws (back panel installation).

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. On the right-hand side is a Circuit Breaker located.

Frequency Indication

By means of a liquid crystal display (LCD) the frequency indication is provided. The required operating frequency is set with the rotary knob. The relation between the real operating frequency and the displayed frequency is according to standards (ED-23B, chapter 1.3.2). For an overview, refer to the table below.

Operating Frequency (MHz)	Channel Spacing (kHz)	Displayed Frequency in 8.33+25 kHz Mixed Mode	Displayed Frequency in 25 kHz Mode
118.0000	25	118.000	118.00
118.0000	8.33	118.005	N/A
118.0083	8.33	118.010	N/A
118.0166	8.33	118.015	N/A
118.0250	25	118.025	118.02
etc.	etc.	etc.	etc.
136.9750	25	136.975	136.97
136.9750	8.33	136.980	N/A
136.9833	8.33	136.985	N/A
136.9916	8.33	136.990	N/A

Audio Outputs

The transceiver includes two audio outputs: headphone and speaker. The headphone rated output power is 300 mW into 150 Ohm. The rated output power from the speaker output is 4 W into 4 Ohm.

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 to connect an external audio source (NAV, music-player …) to the transceiver. The external audio is audible only when the transceiver is in Receive Mode.

Sidetone

The Sidetone is available on the headphone output during transmission. The Sidetone Volume depends simultaneous on the Intercom Volume setting.

Squelch Operation

A Squelch (muting) circuit suppresses received signals if the signal quality is poor. There are two kinds of Squelch methods implemented, Carrier Squelch and Noise Squelch. The carrier squelch rests upon the signal strength of the received signal; the noise squelch rests upon the detected noise level and is adjustable in the pilot's setup menu.

Memory Channels

The VHF transceiver also contains a channel memory function for automatically/manually channel memory storage of up to 99+9 frequencies. The last 9 used (active) frequencies are always stored automatically. The manual storage of up to 99 different frequencies is in addition possible. It is also possible to assign for each stored frequency a user defined text label.

Intercom Operation

Aircraft internal communication via connected headsets is provided by the built in intercom circuit. The Intercom operation may be automatically via VOX (adjustable) or externally via the intercom switch triggered. The Setting of VOX-threshold and Intercom Volume is accessible for the pilot by the Intercom Menu.

Scan Function

In "Scan Function" a dual watch functionality is provided. In case of a signal is received on both (active/preset) frequencies simultaneously the signal of the active frequency will become audible with priority at any time.

Illumination

The illumination of the LCD and the push buttons can be controlled either directly from the front panel via the pilot's menu or externally via the dimming input lines. In case of external dimming is selected the illumination curve (brightness to voltage relation) can be adjusted in the Installation Setup.

LOW BATT Indication

The VHF transceiver also contains a monitoring stage for the power supply voltage. If the supply voltage drops below the adjustable threshold, the display indicates the message "LOW BATT".

Emergency Operation

The VHF transceiver is able to operate in emergency operation (9.0 V) with some reduced performance.

Built In Tests

After power-up, the unit performs a power-up built in test (PBIT). During PBIT the transceiver displays "WAIT" and the corresponding

software versions of the control head and chassis module. The continuous built in test (CBIT) verifies the correct function of the unit permanently during normal operation. If a problem is detected an error message will be displayed.

Installation Setup

Configuration of the installation parameters like mike sensitivity, mike type selection, speaker ON/OFF and further parameters is possible via the Installation Setup.

Service Mode

The Service Mode is a special configuration mode of the AR6201 via a RS422 interface with a proprietary serial data communication protocol.

1.5 Variants Survey

Part Number	Article Number	Panel Color	Display Color	25 kHz Mode	8.33+25 kHz Mixed Mode
AR6201-(000)	0610.321-910	black	green	Yes	Yes
AR6201-(002)	0614.203-910	black	blue - white	Yes	Yes
AR6201-(100)	0621.218-910	black	green	Yes	Not available
AR6201-(102)	0621.226-910	black	blue - white	Yes	Not available

1.6 Technical Data

1.6.1 Power Supply Data

Nominal supply voltage range	11.0 … 30.3 VDC
Abnormal supply voltage range	10.25 … 32.2 VDC
Emergency operation	9.0 VDC (reduced performance, ref.chapter1.6.6)
Power consumption:	
Power "OFF" state	≈ 1.5 mA @ 12 VDC
	< 10 mA @ 28 VDC
Receive Mode	≤ 140 mA @ 14 VDC, panel backlight "OFF"
	< 90 mA @ 28 VDC, panel backlight "OFF"
	(< 85 mA typ.)
Transmit Mode	≤ 2 A @ 14 VDC; 70% modulation, VSWR=1:1
	≤ 4 A @ 14 VDC; 70% modulation, VSWR=3:1
	≤ 1 A @ 28 VDC; 70% modulation, VSWR=1:1
	≤ 1 A @ 28 VDC; 70% modulation, VSWR=3:1
Circuit Breaker (internal)	5 A (resettable)
Dimming control	14 VDC or 28 VDC

1.6.2 General Data

Frequency range	118.000 MHz to 136.975 MHz (25 kHz Mode)
Frequency range	118.000 MHz to 136.9916 MHz (8.33 + 25 kHz Mixed Mode)
Channel spacing	25 kHz or 8.33 kHz
Number of channels	760 (25 kHz Mode)
	2280 + 760 (8.33 + 25kHz Mode)
Storage temperature range	-55°C to +85°C
Operating temperature range	-20°C to +55°C / short-time +70°C
Operating altitude	35.000 ft

1.6.3 Dimensions & Weight

Front panel	61.2 mm x 61.2 mm
Depth of unit	211.4 mm (front plate to the end of Antenna connector)
Mounting-hole (instrument panel)	standard 58 mm diameter ($2^{1/4}$ inch)
Material of Case	ALMg
Surface treatment	control-head coated with black paint (matt)
Weight	850g

1.6.4 Receiver Data

Sensitivity	≤ -93 dBm for a (S+N)/N ratio of 6 dB
Effective bandwidth	≥ ± 2.78 kHz at the 6 dB points
	≥ ± 7.37 kHz at the 60 dB points

1.6.5 Transmitter Data

Output power	≥ 6 W into 50 Ω @ 12 VDC (with and without modulation)
Frequency tolerance	≤ 5 ppm
Duty cycle	1 minute (TX):4 minutes (RX)
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 compressor starting point adjustable, balance input, 140 Ohm, input range up to 20 dB above compressor starting point.
Standard microphone (with compressor)	25 … 1000 mV compressor starting point, unbalanced input, 110 Ω, input range up to 20 dB above compressor starting point.
FM deviation with modulation	≤ 3 kHz
Sidetone	adjustable
Automatic shutdown of TX mode	after 120 seconds of permanent TX (stuck PTT)

1.6.6 Emergency Operation

TX output power	≥ 2 W into 50 Ω (with modulation) @ 9 VDC
TX modulation depth	≥ 50% @ 9 VDC
RX sensitivity	≤ -93 dBm for a (S+N)/N ratio of 6 dB @ 9VDC
Panel & Display backlight	switched "OFF"
Speaker output	switched "OFF"
Headphone output	operating

CAUTION: For power-supply voltages below 10 V the speaker output of the transceiver will automatically be switched "OFF", without notification for the pilot!
Depending on settings in Installation Setup "LOW BATT" may be indicated if supply voltage drops below a predefined threshold. If the threshold adjusted within the range 10.3 … 10.5V is reached the "LOW BATTERY" warning indicates the user, that he should connect his headset because the speaker may be switched "OFF" soon).

1.6.7 Software

The software is as Level D in accordance with EUROCAE/RTCA document ED12B/DO-178B classified.

1.6.8 Complex Hardware

Complex hardware is not used.

1.6.9 Regulatory Compliance

Part Number	Article Number	EASA Approval	TSO Approval	FCC Approval
AR6201-(000)	0610.321-910	EASA.210.1249 ETSO-2C37e Class: D, E ETSO-2C38e Class: 4, 6	TSO-C169a Class: D, E, 4, 6	B54AR6201
AR6201-(002)	0614.203-910			
AR6201-(100)	0621.218-910	EASA.210.1249 ETSO-2C37e Class: D ETSO-2C38e Class: 4	TSO-C169a Class: D, 4	B54AR6201
AR6201-(102)	0621.226-910			

Note: Unauthorized changes or modifications to the AR6201-(XOX) may void the compliance to the required regulatory agencies and authorization for continued equipment usage.

1.7 Environmental Qualification

Under environmental test condition in accordance with the procedures set forth in EUROCAE/RTCA Document ED-14E/DO-160E the following performance has been demonstrated.

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

Condition	Section	Cat.	Description
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	Condensing water
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
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	SW	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

1.8 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
Coding pin	Article no. 0782.211-277

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
Coding pin	Article no. 0782.211-277

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
Coding pin	Article no. 0782.211-277

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
Coding pin	Article no. 0782.211-277

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

Section 2. INSTALLATION

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

2.1 Limitations

The installation of the AR6201-(XOX), designed as a single block unit for use in cockpit environment of general aviation aircrafts including helicopters, can be performed under consideration of the following limitations:

- Installations have to be in accordance with appropriate EASA or FAA approved guidelines.
- The AR6201-(XOX) must be connected to a VHF antenna in order to satisfy FAA TSO-C169a.
- The conditions and tests for ETSO/TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of an aircraft, must determine that the aircraft installation conditions are within the ETSO/TSO standards.

Note: Changes or modifications made to this equipment not expressly approved in written form by Becker Flugfunkwerk may void the authorization to operate this equipment.

2.2 Unpacking the Equipment and Preparation for Installation

General

Visually inspect the package for signs of transport damage. Carefully unpack all items and check for completeness.

Additional Required Equipment

The AR6201-(XOX) is intended for use with standard aviation accessories. The following equipment is required for installation:

- VHF COMM Antenna with coaxial 50 Ω impedance cable and BNC connector
- Microphone
- Headphone and/or speaker

2.3 Mechanical Installation

The AR6201-(XOX) is designed to be mounted in the aircraft instrument panel within easy view and reach of pilot/operator. The AR6201-(XOX) is designed for back-panel mounting by means of four screws, which are already attached to the AR6201 front. The circular cut out and the mounting holes have to be prepared in accordance with Figure 2-3. The location of the AR6201-(XOX) shall be at least 30 cm away from the aircraft magnetic compass, to avoid any interference to the magnetic compass by the transceiver. For typical installations, there is no need for a forced cooling of the AR6201-(XOX). Leave clearance of minimum 5 mm between the AR6201-(XOX) and other avionics to allow air circulation. Figure 2-1, Figure 2-2 and Figure 2-3 show the unit dimensions.

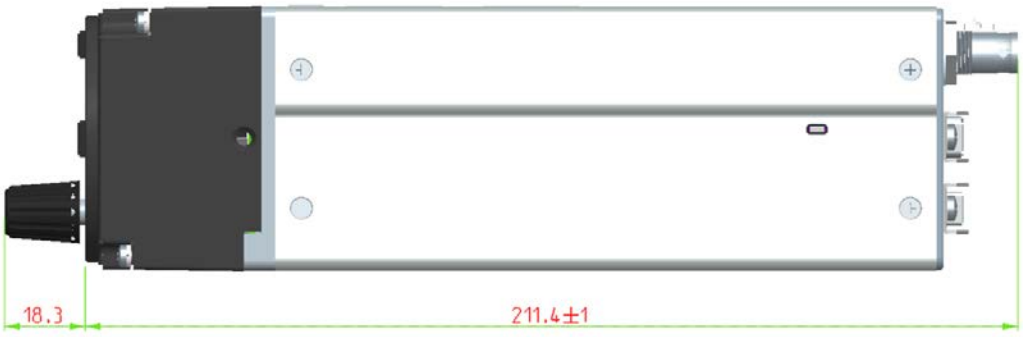


Figure 2-1 VHF transceiver side view

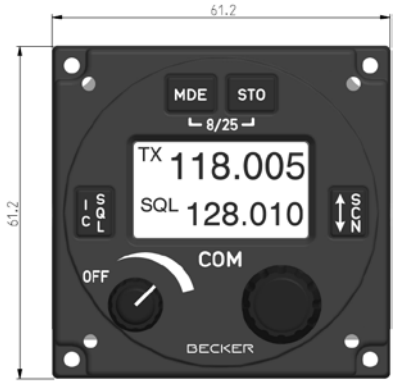


Figure 2-2 Mounting dimensions VHF transceiver

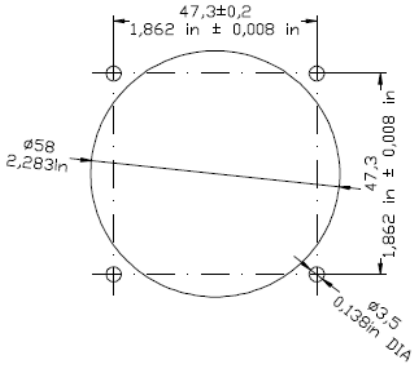


Figure 2-3 Drilling jig for back-panel mounting

2.4 Electrical Interface

2.4.1 Connectors and Pin Assignment

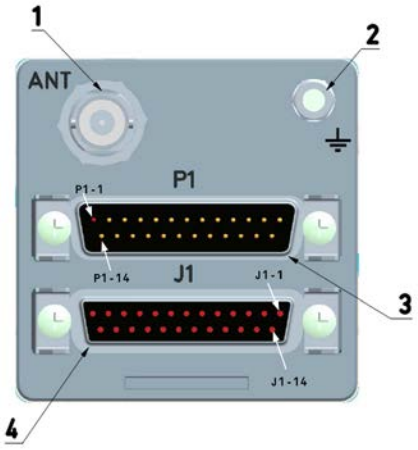


Figure 2-4 Connectors on rear plate

Antenna Connector (Position 1)

The antenna connector (Figure 2-4, Position 1) is a BNC type.

Grounding Bolt (Position 2)

The transceiver has a M4 threaded grounding bolt (Figure 2-4, Position 2) allowing a low impedance grounding of the unit. Low impedance grounding is essential to avoid damage or malfunction in case of indirect lightning, EMI and HIRF effects.

P1 Connector (System Interfaces)

The P1 connector (Figure 2-4, Position 3) is a D-SUB male type with 25 pins and slide-in fastener.

Pin No.	Pin Name	Direction	Function
P1-1	SPK_HI	OUT	Speaker output signal (HI)
P1-2	HDPH_A	OUT	Balanced output for headphone(s)
P1-3	HDPH_B	OUT	Balanced output for headphone(s)
P1-4	AF_AUX_IN_HI	IN	Auxiliary audio input (HI)
P1-5	MIKE_DYN_HI	IN	Balanced input for dynamic microphone(s)
P1-6	MIKE_DYN_LO	IN	Balanced input for dynamic microphone(s)
P1-7	IC	IN	Intercom key input; LO active - closed contact to GND
P1-8	MIKE_STD_LO	-	Standard Microphone LO (ground/return)
P1-9	NC		not connected
P1-10	ILL_LO	IN	Illumination LO input
P1-11	P_SUPP	IN	Power supply (+)
P1-12	P_SUPP	IN	Power supply (+)
P1-13	P_SUPP_GND	-	Power supply (return)
P1-14	SPK_LO	-	Speaker ground (return)
P1-15	LINE_OUT	OUT	High impedance audio output
P1-16	AGC_OUT	OUT	Receiver AGC output
P1-17	/PTT	IN	Press To Talk key input LO active - closed contact to GND
P1-18	MIKE_STD_HI	IN	Standard Microphone (HI)
P1-19	CPIN	-	Pin removed to allow mechanical coding of the harness connector.
P1-20	NC	-	not connected
P1-21	AF_AUX_IN_LO	-	Auxiliary audio input LO (ground/return)
P1-22	NC	-	-

Pin No.	Pin Name	Direction	Function
P1-23	ILL_HI	IN	Illumination (HI)
P1-24	/PWR_EVAL	-	Power on monitor output
P1-25	P_SUPP_GND	-	Power supply (return)

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
J1-1	CPIN	-	Reserved Coding PIN
J1-2	TX2+	IN	Interface 2 OUT+
J1-3	RX2+	IN	Interface 2 IN+
J1-4	/SQL_EVAL	OUT	Squelch monitor output LO active - closed contact to GND
J1-5	/CSDB_EXT	IN	Extended CSDB protocol enabling LO active - closed contact to GND
J1-6	SHIELD_1	-	Interface 1 SHIELD
J1-7	TX1+	OUT	Interface 1 OUT+
J1-8	RX1+	IN	Interface 1 IN+
J1-9	TX2-	OUT	Interface 2 OUT-
J1-10	RX2-	IN	Interface 2 IN-
J1-11	SHIELD_2	-	Interface 2 SHIELD
J1-12	/EXT_SO	IN	External "Exchange" key Falling edge activates frequency exchange
J1-13	/SRV_EN	IN	Service enable pin LO active - closed contact to GND
J1-14	TX1-	OUT	Interface 1 OUT-
J1-15	RX1-	IN	Interface 1 IN-
J1-16	NC		not connected
J1-17	NC		not connected
J1-18	NC		not connected
J1-19	NC		not connected
J1-20	(/GPI)	IN	General Purpose Input pin (unused, for future purposes) LO active - closed contact to GND
J1-21	D_GND	-	Discrete lines ground
J1-22	D_GND	-	Discrete lines ground
J1-23	D_GND	-	Discrete lines ground

Pin No.	AR6201 Pin Name	Direction	Function
J1-24	/MIKE_SW	IN	Audio configuration selector input
J1-25	/ON	IN	External Power ON input LO active - closed contact to GND

2.4.2 Inputs / Outputs Detailed Description

Microphone Connection – Carbon Microphone Standard

Pin No.	AR6201 Pin Name	Direction	Function
P1-8	MIKE_STD_LO	-	Standard Microphone LO (ground/return)
P1-18	MIKE_STD_HI	AF IN / DC OUT	Standard Microphone (HI)

For interfacing with standard microphone the transceiver has an unbalanced input with an input impedance of 110 Ohm and a nominal sensitivity of 110 mV. This sensitivity level can be adjusted in the Installation Setup from 9 mV to 1500 mV. The power supply delivered from pin 18 for supply of the connected microphone(s) is > 8 V DC (8.3 V nominal) open circuit.

Note: Sensitivity range 25 mV to 1000 mV was qualified under environmental conditions

For all popular aviation microphones the power supply is capable to supply two microphones in parallel.

Care should be taken to combine only microphones of the same type / impedance.

It is highly recommended to mount the jacks isolated from aircraft frame in order to avoid ground loops.

Microphone Connection - Dynamic Microphone

Pin No.	AR6201 Pin Name	Direction	Function
P1-5	MIKE_DYN_HI	IN	Balanced input for dynamic microphone(s)
P1-6	MIKE_DYN_LO	IN	Balanced input for dynamic microphone(s)

For interfacing with dynamic microphone the transceiver has a balanced input with an impedance of 140 Ohm and a nominal sensitivity of 3.5 mV. This sensitivity level is adjustable in the Installation Setup from 0.5 mV to 25 mV.

Note: The sensitivity range of 1 mV to 20 mV was qualified under environmental conditions.

Two dynamic microphones in parallel may be connected (identical technical characteristics of the microphones are preferable).
It is highly recommended to install the microphone jacks isolated from aircraft ground in order to avoid ground loops.

Speaker Connection

Pin No.	AR6201 Pin Name	Direction	Function
P1-1	SPK_HI	OUT	Speaker output (HI)
P1-14	SPK_LO	-	Speaker LO (ground/return)

The speaker output provides nominal 4 Watts into 4 Ohm.

CAUTION: The magnetic field of a speaker may influence the magnetic compass.
When choosing the installation place, a distance where the magnetic compass is not affected must be determined. After the speaker is installed accuracy of the compass operation must be verified.

Headphone Connection

Pin No.	AR6201 Pin Name	Direction	Function
P1-2	HDPH_A	OUT	Balanced Output for headphone(s)
P1-3	HDPH_B	OUT	Balanced Output for headphone(s)

The headphone output is a balanced and transformer coupled output providing nominal 300 mW into 150 Ohm.
Up to two headphones with an impedance of 300 Ohm (or higher) may be connected in parallel.
Because the headphone output is balanced and in most installation the use of a single shielded wire for headphone is very popular, P1-3 can be grounded (connection to pin P1-13/P1-25). In that case, the balanced output becomes unbalanced.
It is highly recommended to install the headphone jacks isolated from aircraft ground in order to avoid ground loops.

Panel Illumination

Pin No.	AR6201 Pin Name	Direction	Function
P1-10	ILL_LO	IN	Illumination (LO)
P1-23	ILL_HI	IN	Illumination (HI)

The VHF transceiver provides illumination for push-button and LCD display. In the Installation Setup it can be configured if this illumination is controlled via the front panel or externally via pins P1-10/P1-23.
Connect ILL_LO (pin P1-10) to aircraft ground. Connect ILL_HI (pin P1-23) to dimming bus.

"Auxiliary" Audio Input

Pin No.	AR6201 Pin Name	Direction	Function
P1-4	AF_AUX_IN_HI	IN	Auxiliary audio (HI)
P1-21	AF_AUX_IN_LO	-	Auxiliary audio LO (ground/return)

The AF auxiliary input enables to connect an external audio source (NAV, music-player …) to the transceiver. The external audio is audible only when transceiver is in Receive Mode. The sensitivity can be adjusted in the Installation Setup from 50 mV to 8 V. The input impedance of this input is 600 Ohm.

/PTT (Press To Talk)

Pin No.	AR6201 Pin Name	Direction	Function
P1-17	/PTT	IN	Press To Talk key input LO active - closed contact to GND

If pin 17 is connected to ground the transceiver changes to transmission Mode.
This input has an internal pull up and is LO active with max. 1 mA.

IC (External Intercom Key)

Pin No.	AR6201 Pin Name	Direction	Function
P1-7	IC	IN	Intercom key input; LO active - closed contact to GND

The transceiver provides with pin 7 connected to ground intercom operation. This input has an internal pull up and is LO active at max.1 mA. For installations where automatic intercom operation is activated via VOX connection of this pin 7 is not necessary.
This discrete input activates intercom:

- when VOX does not work satisfactorily because of too high ambient noise in the cockpit,
- or speaker is "enabled" in current audio in/out configuration (Installation Setup).

/PWR_EVAL

Pin No.	AR6201 Pin Name	Direction	Function
P1-24	/PWR_EVAL	-	Power on monitor output: AR6201 "OFF" - open circuit AR6201 on - closed circuit to GND (max. 100 mA)

Refer Figure 2-5 for further guidance.

Note: In order to avoid damage of this output a protection diode in parallel to the external relay shall connected.

/MIKE_SW (external Mike Switch)

Pin No.	AR6201 Pin Name	Direction	Function
J1-24	/MIKE_SW	IN	Toggles between: IN/OUT CFG 1 - open circuit IN/OUT CFG 2 - closed circuit to GND (configurable in Installation Setup)

The external Mike switch provides selection between the two available audio in/out configurations.

2.5 Installation Wiring

Connection to the following equipments is required as minimum for the AR6201-(XOX):

- Power Supply
- Antenna
- Microphone (direct or via external audio panel)
- Headphone or speaker (direct or via external audio panel)
- Push-To-Talk (PTT) switch

Note:

- Use only cables which are qualified for aircraft use (self-extinguishing).
- AWG 20 for power supply and,
- AWG 22/24 for other cables.
- Fit shrink sleeves over the solder joints on the equipment connector. Crimp connectors are also available from Becker.
- Protect the power supply with a 7.5 A fuse or Circuit Breaker. The VHF transceiver is protected internally by a 5 A resettable fuse.
- Type-specific cable harnesses are also available for the aircraft wiring (contact BECKER for detailed information).
- No RF antenna cables should be included in the cable harnesses of the system. Avoid routing of the cable loom along with other wiring, which carry audio power or pulses.
- Check the wiring carefully before power up the unit and check particularly that power supply lines are not been reversed.

Typical installation wiring diagrams for different aircraft type show the following Figure 2-5 to Figure 2-11.

2.5.1 Typical Wiring for Single Seater Glider

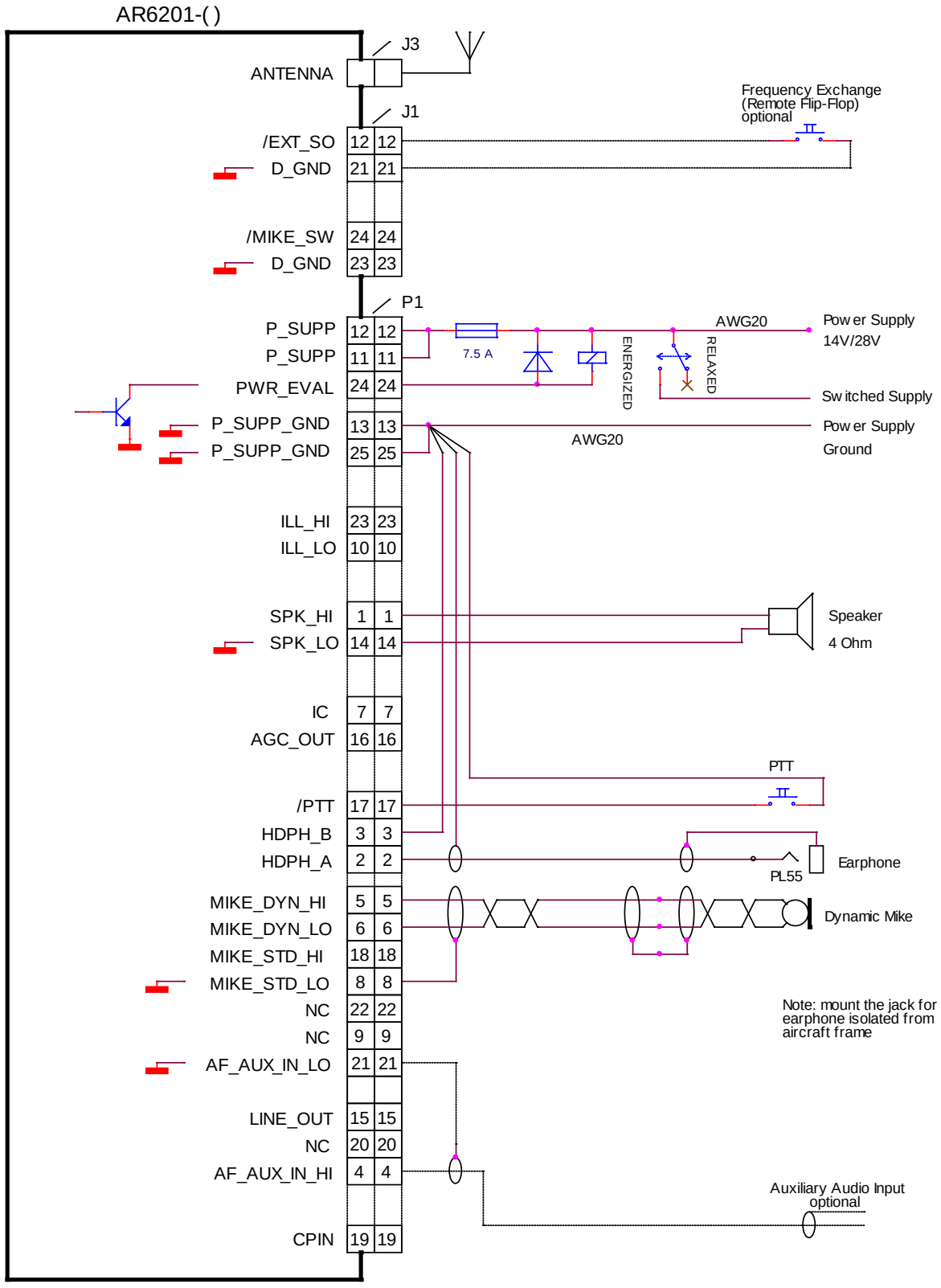


Figure 2-5 Typical Wiring for Single Seater Glider

2.5.2 Typical Wiring for Single Seater Glider (5-pol DIN Jack)

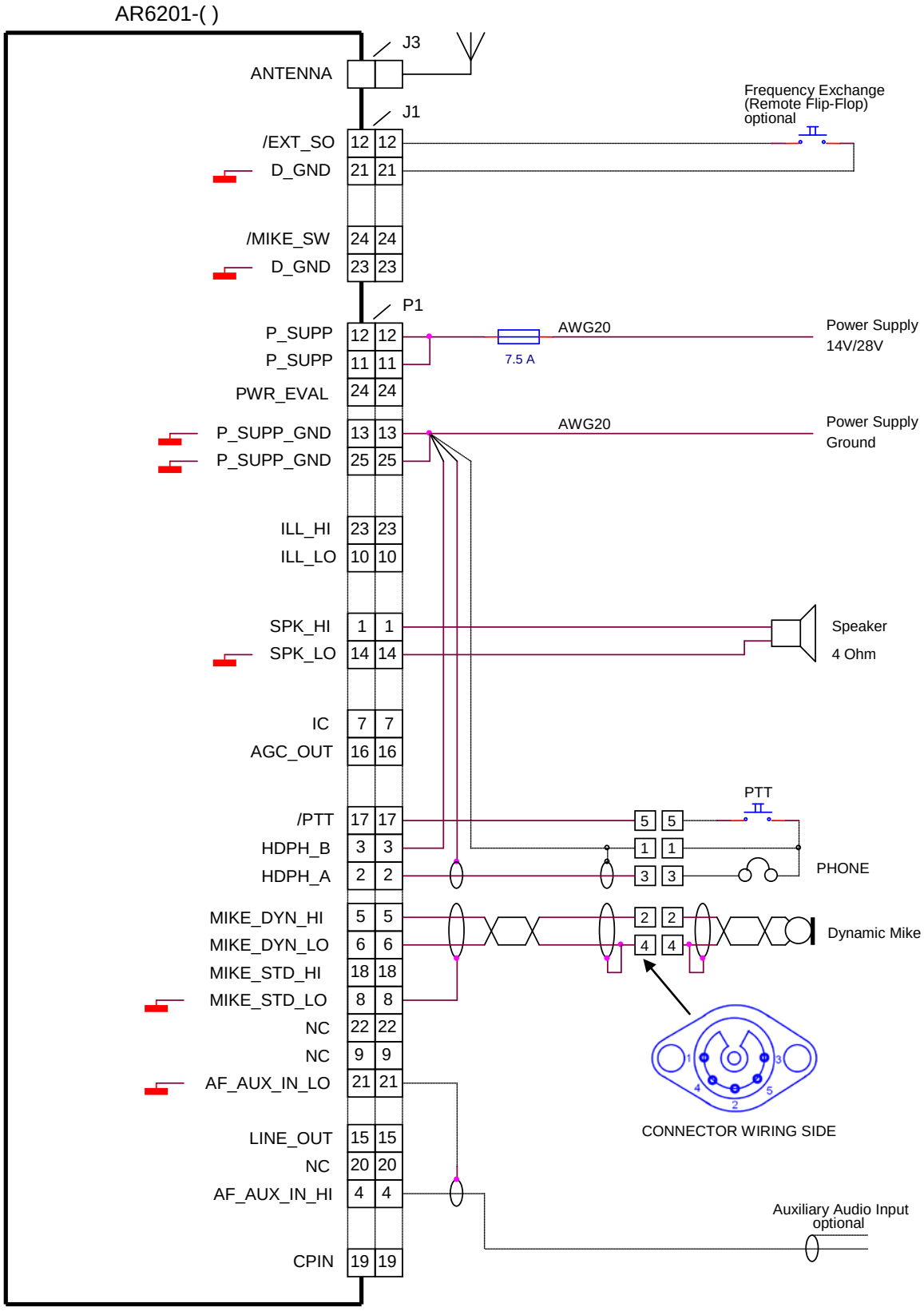


Figure 2-6 Typical Wiring for Single Seater Gliders (5-pol DIN Jack)

2.5.3 Typical Wiring for Twin Seater Motor Glider

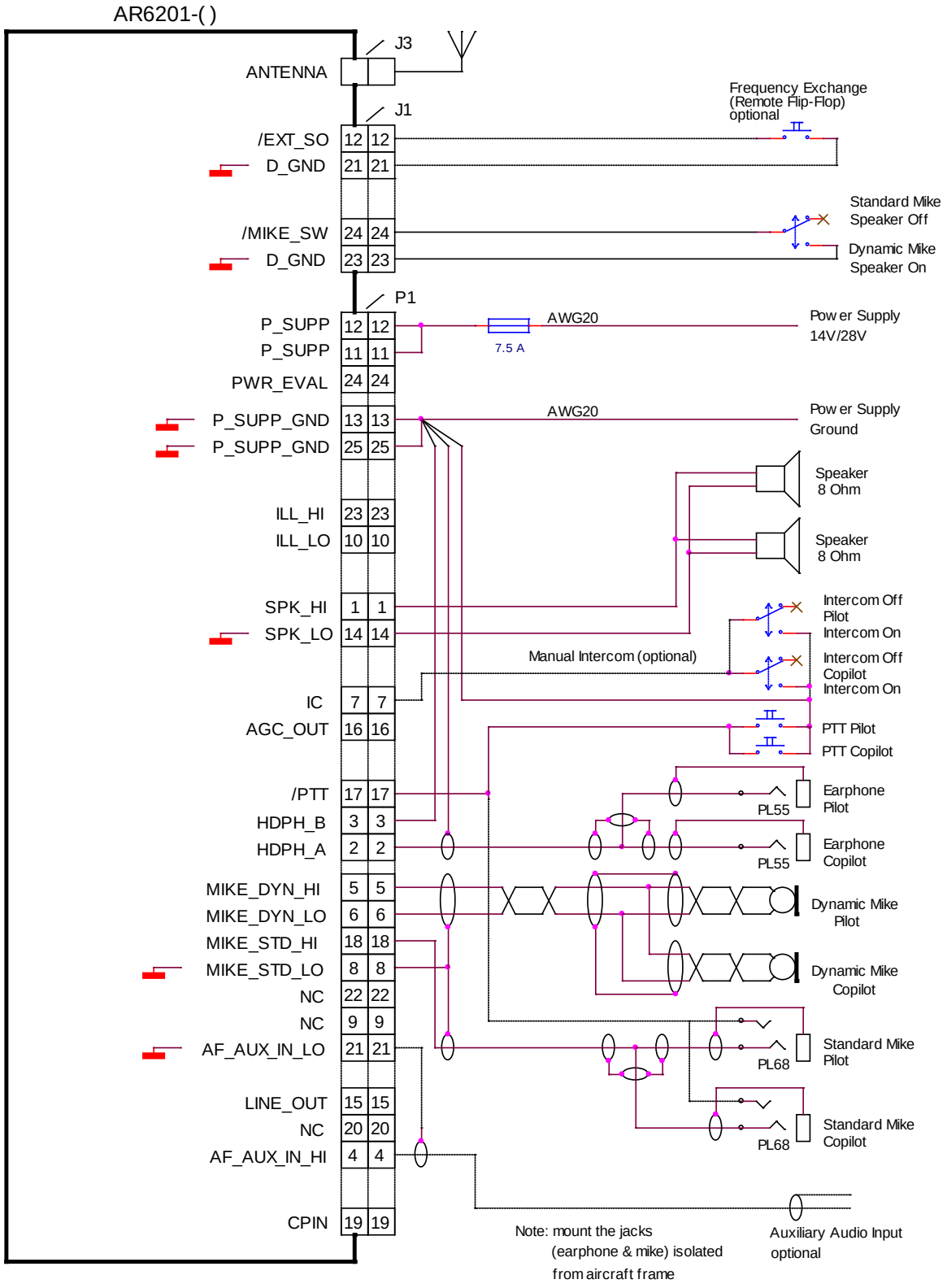


Figure 2-7 Typical Wiring for Twin Seater Motor Glider

2.5.4 Typical Wiring for Standard Headsets in use

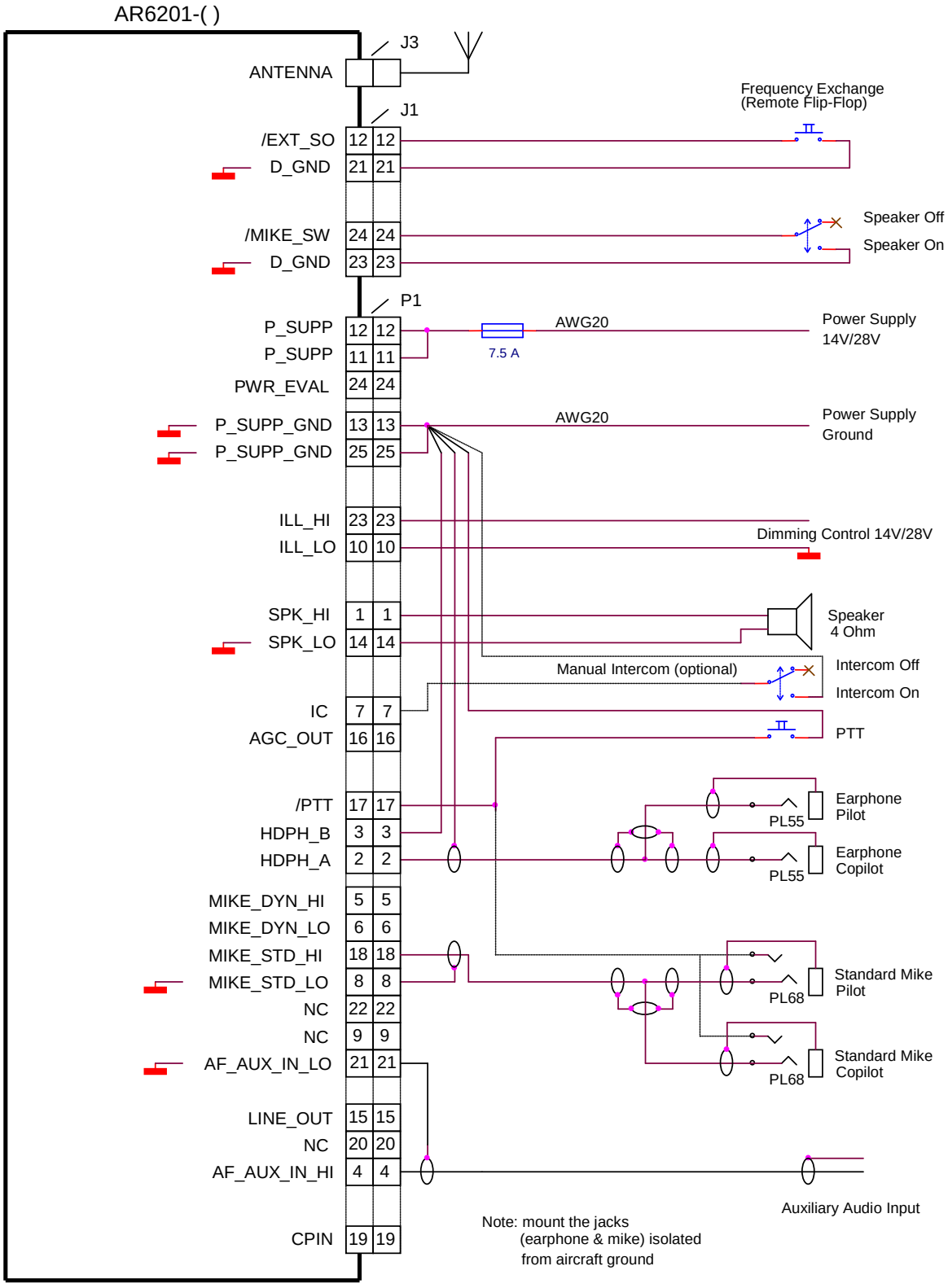


Figure 2-8 Typical Wiring for Standard Headsets in use

2.5.5 Typical Wiring for Aircrafts with Intercom System (unbalanced)

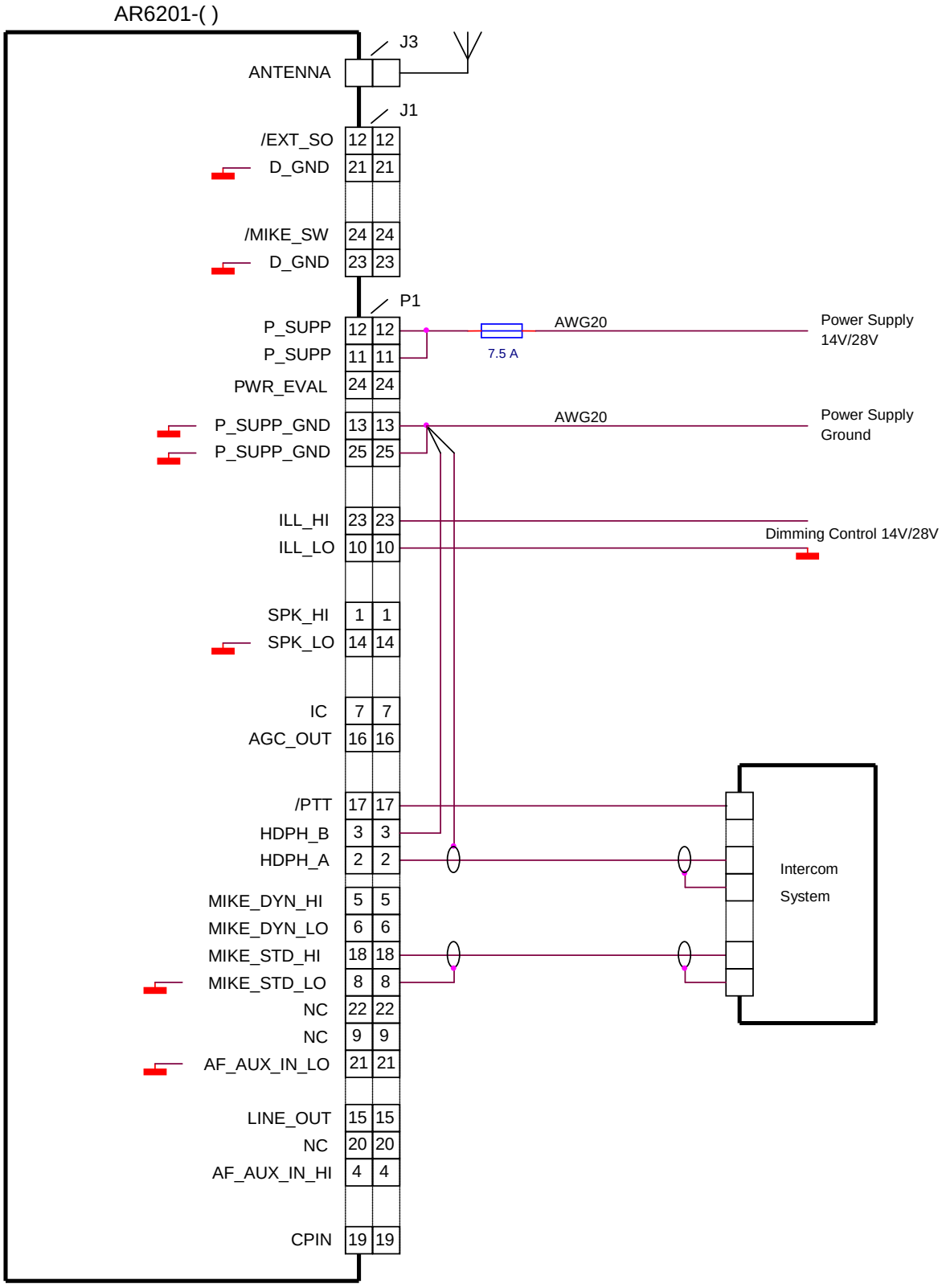


Figure 2-9 Typical Wiring for Aircrafts with Intercom System (unbalanced)

2.5.6 Typical Wiring for Aircrafts with Intercom System (balanced)

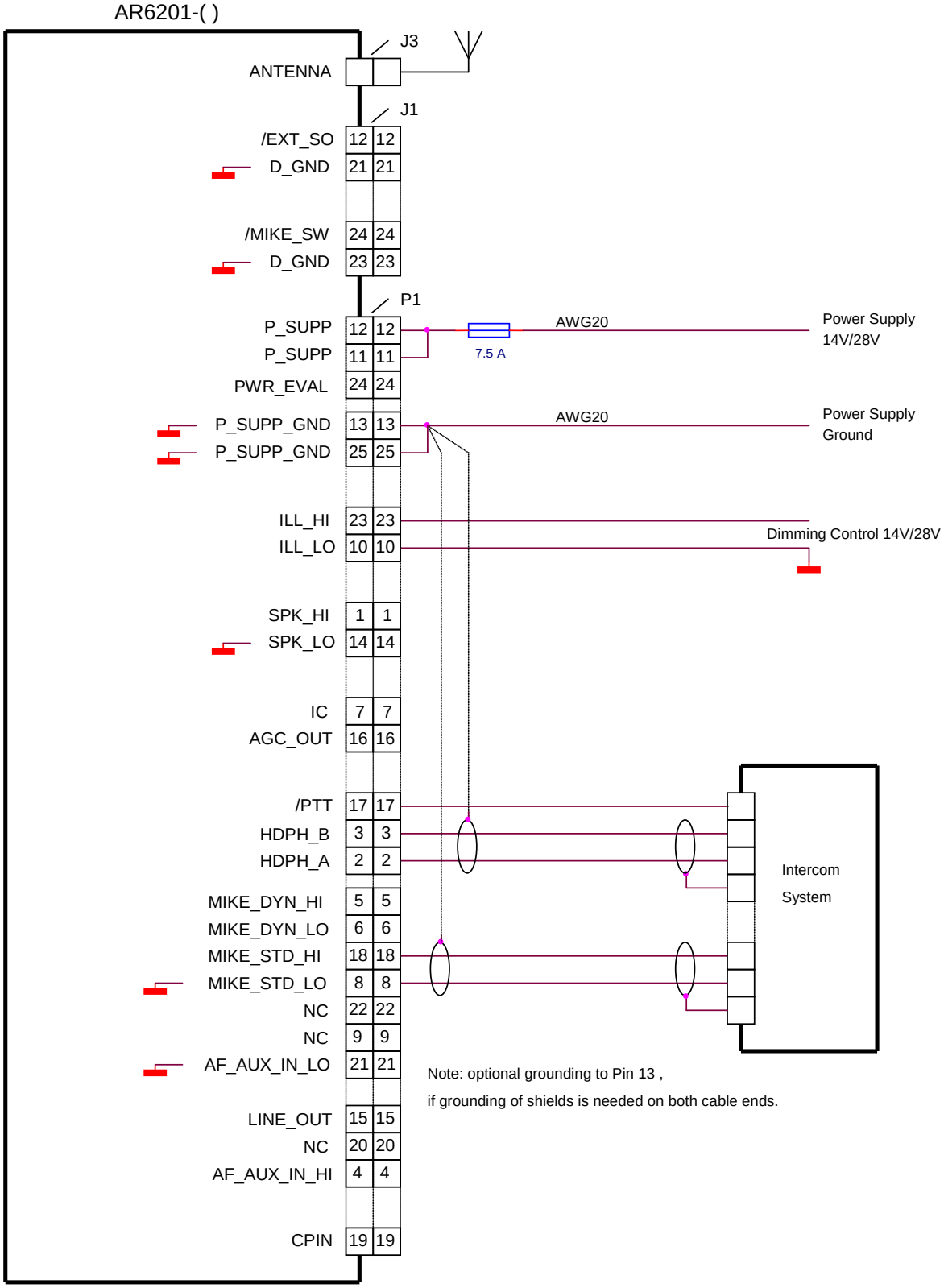


Figure 2-10 Typical Wiring for Aircrafts with Intercom System (balanced)

2.5.7 Typical Wiring for Twin Seater Aircrafts, Tandem (additional Radio Control Unit)

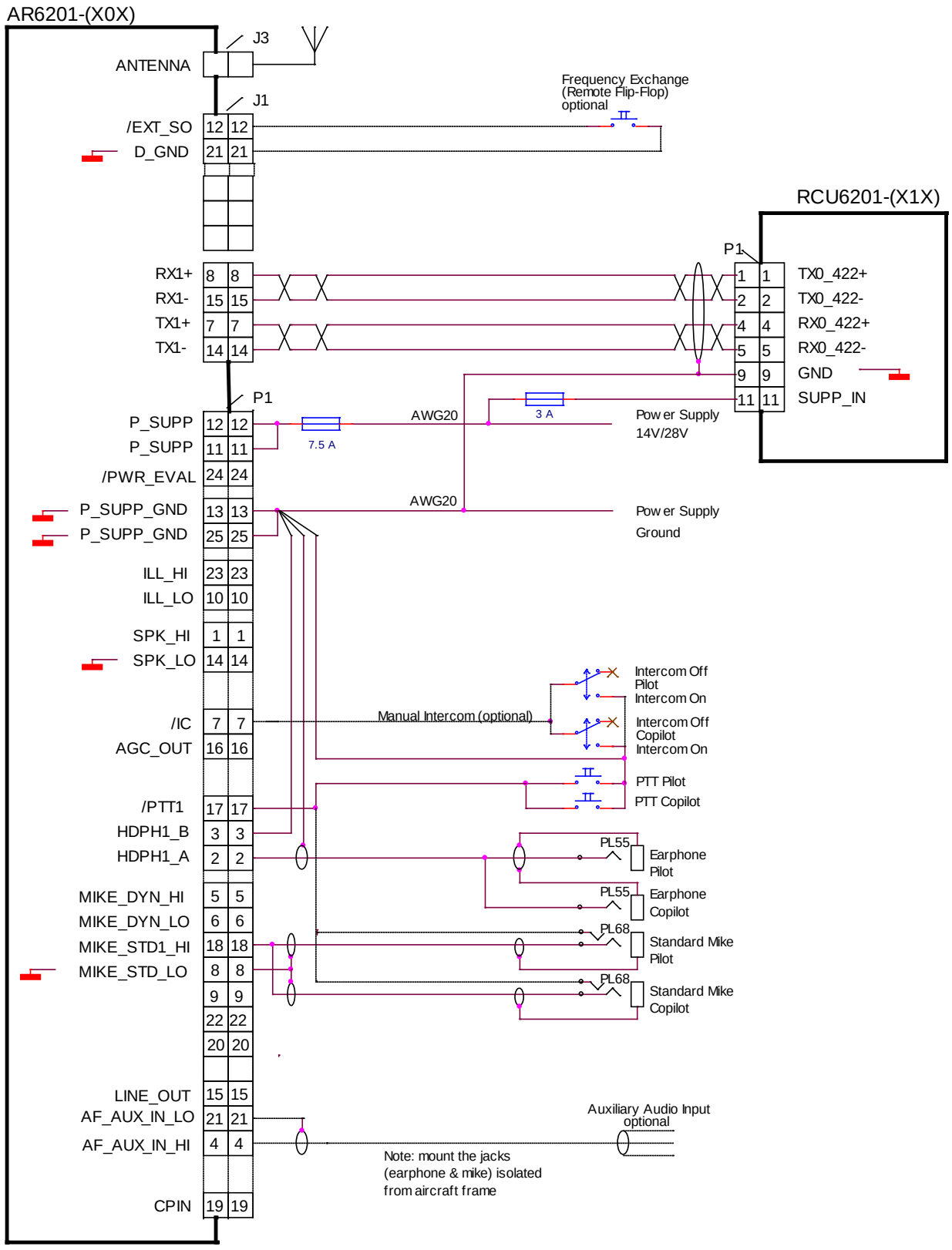


Figure 2-11 Typical Wiring for Twin Seater Aircrafts, Tandem

2.6 Antenna Installation

The AR6201-(XOX) requires a standard 50 Ohm vertically polarized VHF antenna. Follow the antenna manufacturer's installation instructions. In addition consider the following recommendations:

- The COM antenna shall be on an electrical conductive surface or, on a ground plane with sufficient area of approximately 60 x 60 cm installed. *(VSWR ≤ 3:1)*
- The COM antenna should be as much as possible separated from GPS antennas installed (not less than 50 cm)
- The COM antenna should be as far as possible separated from ELT antenna installed.
  Some ELTs have exhibited re-radiation problems generating harmonics that may interference with other receivers. This can happen when the AR6201 is transmitting on certain frequencies such as 121.5 MHz or 121.175 MHz, which may cause the ELT output circuit to auto-oscillate.

2.7 Location of internal Circuit Breaker

The internal Circuit Breaker is resettable by means of a matching nonconductive tool (may be self-made).

Figure 2-12 Location of the internal Circuit Breaker.

2.8 Installation Setup

2.8.1 Entering Installation Setup

The Installation Setup enables the avionics technician to set up the equipment configuration (In-flight changes are not recommended).
The Installation Setup is accessible by holding down the "MDE" key during power up.
The following screen appears:

Fig. 1 Password Dialog

Enter the password "6435" by means of the "ROTARY ENCODER" and push the "ROTARY ENCODER" to select the next digits.
Confirm by a short push on "STO" key.

First page of Installation Setup appear:

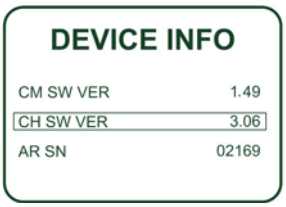


Fig. 2 Example of an info page for AR6201-(XOX)

2.8.2 Page Up / Page Down in the Installation Setup

The Installation Setup consists of several pages.

By pushing on "↕/SCN" key or,

By pushing on "ROTARY ENCODER" the next page is displayed

By pushing on "IC/SQL" key the previous page is displayed.

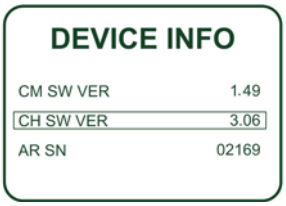
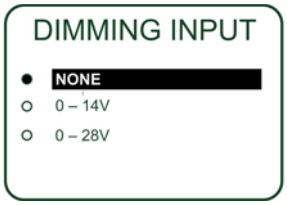
2.8.3 Storage of Setup Data

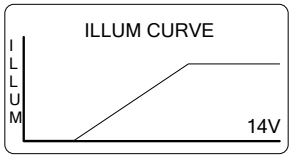
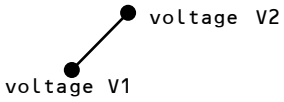
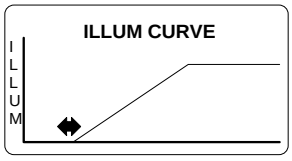
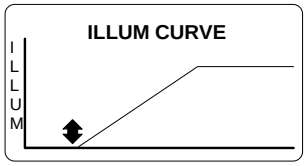
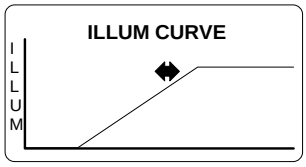
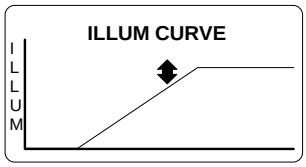
The settings of a parameter are stored immediately after changing the parameter.
Before leaving any setup page, no special action is required to do and terminating the setup is always possible (refer to article 2.8.4 also).

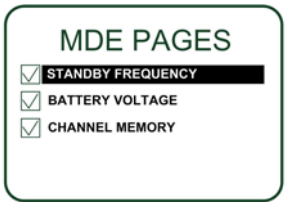
2.8.4 Terminate Installation Setup

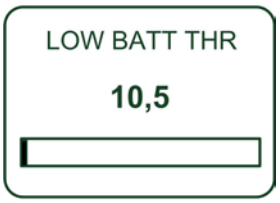
Just by switching "OFF" the AR6201-(XOX) the "Installation Setup" can be terminated.
All changes made up to this time will be stored automatically.

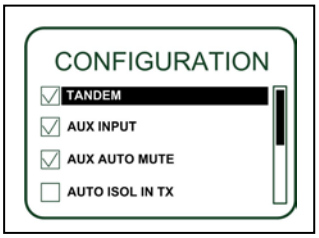
2.8.5 Installation Setup Pages - Data Description

Display Contents	Description
	After initiating the "Installation Setup" the first page will be displayed. This page shows information about the SW version and the serial number of the transceiver.
 Select your option by turning the "ROTARY ENCODER" and press "STO" push-button to finalize the selection.	One of the three following options may be selected to dim the display and push-button background lighting: NONE: The illumination for LCD and push-buttons is controlled via the "ROTARY ENCODER" of the AR6201-(XOX). The Pilot can change the brightness in the Pilots Menu (refer to chapter 3.13.2). Dimming via the "ROTARY ENCODER" is no longer available after selecting one of both options below. 0-14V: The background lighting for LCD and push-buttons is controlled (via pin P1-10/P1-23) by the dimming bus of the aircraft. The dimming curve will be adjustable within the range from 0 … 14 V DC 0-28V: The background lighting for LCD and push-buttons is controlled (via pin P1-10/P1-23) by the dimming bus of the aircraft. The dimming curve will be adjustable within the range from 0 … 28 V DC
 **Note:** This page is displayed only if dimming bus is set to "NONE", otherwise the pages of "ILLUM CURVE" adjustment will be accessible.	The brightness of the LCD and push-button illumination is adjustable between 0% and 100%. Note: The same adjustment is also possible in the pilot´s setup menu. Pilots can change the parameter at any time. Select your brightness by turning "ROTARY ENCODER".

Display Contents	Description
	Provision for adjustment of the illumination curve *(relation between dimming bus voltage and brightness of the LCD and push-button illumination)* on the following four points. Use the "ROTARY ENCODER" for adjustments and a push on "STO" button toggles between the 4 adjustment points. 
	(1) This adjustment defines where the brightness increase will start. *(between 0 volt and V1 the brightness is zero, the lowest trigger point for V1 can be adjusted to ≈1.5 Volts for a 14 volt dimming bus and to ≈ 4 Volts for a 28 Volt dimming bus).*
	(2) With this adjustment is defined the value of brightness increase when the trigger point of V1 is reached.
	(3) With this adjustment is defined the rate of brightness increase starting at the trigger point of V1 until V2 is reached.
	(4) This adjustment is setting the point of the max possible brightness related to a certain value of the dimming voltage from where the brightness is no more increasing even when the dimming voltage can go up further.
Note: This page is displayed only if the DIMMING Input is either selected for "14V or 28V" dim-bus voltage. *(see Installation Setup page "DIMMING Input")*	

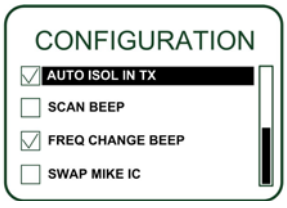
Display Contents	Description
	Two options can be selected independent from each other on this page. By means of the "ROTARY ENCODER" the requested option can be highlighted and enabled/ disabled by a push on "STO" button. CHANNEL STORE: Enabling this option provide the user the possibility to store frequencies. Dedication of the stored frequency to any of the 99 available channels is possible. *(for details refer to chapter 3.9)*. The User has access to previously stored "User Channels" even if the "CHANNEL STORE" option is disabled. STORE LAST CHANNEL If this option is enabled, the device automatically stores the last used VHF frequency in "Last Channel" database and user has a read access to this database *(for details refer to chapter 3.9.2).* If this option is deselected there is no access to and storage in the "LAST CHANNEL" database possible.
 **Note:** There is no possibility to deselect all options from the "MDE PAGES", therefore at least one page will remain active. Deselecting "BATTERY VOLTAGE" the "Direct Tune Mode" page is no more available in the normal operation of the AR6201-(XOX).	There are three Frequency Selection Modes providing different user interfaces for convenient selection of the operating frequency. *(for details refer to chapter 3.5):* - STANDBY FREQUENCY enables/disables "Standard Mode" - BATTERY VOLTAGE enables/disables "Direct Tune Mode". - CHANNEL MEMORY enables/disables "Channel Mode". By means of the "ROTARY ENCODER" the requested option can be highlighted and enabled/ disabled by a push on "STO" button. Storing a frequency in a specific channel will be possible even if only "BATTERY VOLTAGE" or "STANDBY FREQUENCY" remain selected.

Display Contents	Description
	If the supply voltage drops below the adjustable threshold (10 … 33 V DC) the display indicates the message "LOW BATT". The factory setting for this threshold is 10.5 V. The Low Battery threshold adjustment shall be set, depending on the battery type in use, by the installer. The value can be adjusted by turning the "ROTARY ENCODER".



The CONFIGURATION page consists of 6 (max.7) selectable options. ***(refer to the Note under "AUX AUTO Mute" in the column on the right side)*** Use the "ROTARY ENCODER" to scroll up and down.

continued from previous page:



Options 5 to 7 are visible.

Seven options are selectable on this page.

TANDEM

If "TANDEM" is selected a second controller RCU6201 can be connected to AR6201-(XOX).

AUX INPUT

If "AUX INPUT" is selected the auxiliary audio signal applied to pins P1-4 / pin P1-21 is audible on headphone / speaker.

Note: If the auxiliary audio input is not used it is recommended to deselect "AUX INPUT".

AUX AUTO MUTE

If "AUX AUTO MUTE" is selected the auxiliary audio input will be muted also if the receiver detects (based on squelch evaluation) a signal, otherwise the user has disabled the squelch.
Deselecting "AUX AUTO MUTE" the auxiliary audio input signal and the receiver signal will intermix continuously.

Note: Only if "AUX INPUT" is enabled "AUTO AUX MUTE" will be displayed.

AUTO ISOL IN TX:

If "AUTO ISOL IN TX" is selected a separation between the pilots and passenger intercom circuits is provided while one of the pilots transmits.

SCAN BEEP:

If "SCAN BEEP" is selected the transceiver generates *(only in Scan Function)* a short beep tone to notify a signal presence on the "PRESET FREQUENCY" when this become audible. If the switch over from the "ACTIVE FREQUENCY" to the "PRESET FREQUENCY" **during signal reception on the "ACTIVE FREQUENCY"** is not possible, the beep tone become generated and the audio stay on the "ACTIVE FREQUENCY".
Additionally the "PRESET FREQUENCY" appears inverted in a sequence of approximately one second.

FREQ CHANGE BEEP:

If "FREQ CHANGE BEEP" is selected the transceiver generates a short "BEEP" on each change of the "ACTIVE FREQUENCY".

SWAP MIKE IC

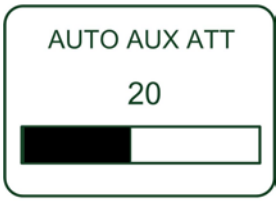
If "SWAP MIKE IC" is selected the /IC input function as /MIKE_SW input and /MIKE_SW input operates as /IC input.

Select your option by turning "ROTARY ENCODER" and pressing "STO" push-button.

Note:
This page is displayed only if "ENABLE_AUX_IN" is selected.

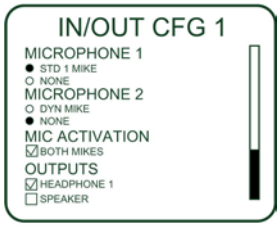
The sensitivity adjustment of the Auxiliary Audio Input (Pin P1-4 / Pin P1-21), in the range 50mV to 8000mV, can be set by turning the "ROTARY ENCODER".

The VU meter shows the current signal level of the Aux Audio Input and keep on displaying the highest detected signal value about 3 seconds.



When intercommunication is initiated (regardless of the intercom activation: "VOX", or "/IC" discrete input) the signal from auxiliary audio input will be attenuated. The attenuation is adjustable between 0 to 40dB.

After intercommunication is finished the auxiliary audio will revert to its previous level.



Note:

Only if "SWAP MIKE IC" in **Disabled**. Otherwise IN/OUT CFG 1 in displayed in "IC" input **inactive** (open)

This "IN/OUT CFG 1" menu provides configuration of the audio in- and outputs by means of the "ROTARY ENCODER" to change the selection and the "STO" button to select the desired function.

Note: *The first **two** sub-menus allow selection of only one choice. All following sub-menus allow selection or de-selection of all available options.*
See also the Note in the left column.

Configuration of "MICROPHONE 1"

STD1 MIKE

If "STD 1 MIKE" is selected the Standard Microphone input connected to (Pins P1-18/ P1-8) will be active.

NONE

If "NONE" is selected this Mike input will be inactive.

Configuration of "MICROPHONE 2"

DYN MIKE

IF "DYN MIKE" is selected the Dynamic Microphone input connected to (Pins P1-6/ P1-5) will be active.

NONE

If "NONE" is selected this Mike input will be inactive.

	Configuration of "MIC ACTIVATION" BOTH MIKES If "BOTH MIKES" is selected the - input "/PTT" activates **TX modulation** from "MICROPHONE 1" and "MICROPHONE 2", - input "/IC" activates **intercom** from "MICROPHONE 1" and "MICROPHONE 2". If "BOTH MIKES" is deselected the - input "/PTT" (Pin P1-17) activates **TX modulation** from "MICROPHONE 1" only, - input "/IC" (Pin P1-7) activates **intercom** from "MICROPHONE 1" only. **Configuration of "OUTPUTS"** Note: This sub-menu allows to select both choices. HEADPHONE 1 If "HEADPHONE 1" is selected audio will be available on headphone output (Pins P1-2/P1-3) If "HEADPHONE 1" is disabled no audio is available on headphone output (Pins P1-2/P1-3) SPEAKER Selecting "SPEAKER" make audio available on speaker output (Pins P1-1/P1-14). De-selection "SPEAKER" make audio unavailable on speaker output (Pins P1-1/P1-14) and the internal speaker amplifier circuit shut "OFF", which results in lower power consumption of the AR6201.
 Note: Only if "SWAP MIKE IC" in **Disabled**. Otherwise IN/OUT CFG 1 in displayed in "IC" input **inactive** (open)When "MIKE_SW" input is in use both configurations, "IN/OUT CFG1" and "IN/OUT CFG2", shall be configured	This "IN/OUT CFG 2" menu consists of identical sub-menus as described above under "IN/OUT CFG 1". ! See also the Note in the left column.

This page is only displayed if :

- Standard Mike 1 input is selected in "IN/OUT CFG1" and "MIKE_SW" input pin status is inactive
- or "Standard Mike 1" input is selected in "IN/OUT" CFG 2 and "MIKE_SW" input pin status is active

The sensitivity of Standard Microphone 1, "STD 1 MIKE SENS", input is adjustable within a range of 9 mV to 1500 mV by turning the "ROTARY ENCODER".

The factory setting is 110 mV.

The VU meter display the current signal level on the audio input and keep on showing the highest signal value for 3 seconds.

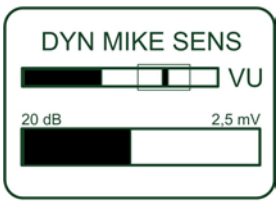
While you are speaking with a normal voice level to the microphone, for most of the time, a convenient sensitivity is achieving and the bargraph remain within the predefined area.

Note:
The microphone sensitivity shall be adjusted to achieve a correct modulation by keeping the cockpit noise suppression as high as possible.

If the sensitivity is adjusted to a smaller value (e.g. 10 mV) the cockpit noises may become louder than for a higher adjustment (e.g. 100 mV).

Otherwise, adjusting the sensitivity to a very high value (e.g. 1000 mV), the cockpit noise is very much reduced, but the modulation of the transmitter might be not sufficient.

The installer shall perform a communication check after modification of this parameter. Recommended is to perform this check with and without a running engine.



Note:

This page is only displayed if :

- Dynamic input is selected in "IN/OUT" CFG1 and "MIKE_SW" input pin status is inactive (open).
- or Dynamic Mike input is selected in "IN/OUT" CFG 2 and "MIKE_SW" input pin status is active (closed)

The sensitivity of the Dynamic Mike, "DYN MIKE SENS", input is adjustable within a range of 0,5 mV to 25 mV by turning the "ROTARY ENCODER".

The factory setting is 3.5 mV.

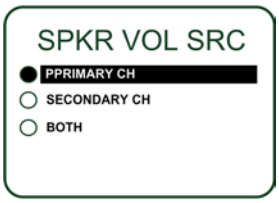
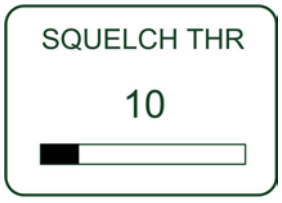
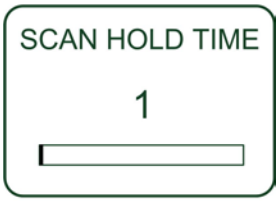
While you are speaking with a normal voice level to the microphone, for most of the time, a convenient sensitivity is achieving and the bargraph remain within the predefined area.

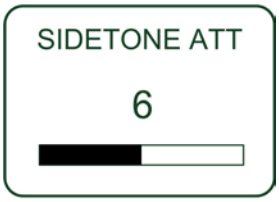
Note:
The microphone sensitivity shall be adjusted to achieve a correct modulation by keeping the cockpit noise suppression as high as possible.

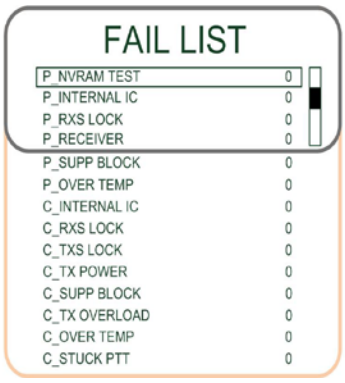
If the sensitivity is adjusted to a smaller value (e.g. 1 mV) the cockpit noises may become louder than for a higher adjustment (e.g. 25 mV).

Otherwise, adjusting the sensitivity to a very high value (e.g. 25 mV), the cockpit noise is very much reduced, but the modulation of the transmitter might be not sufficient.

The installer shall perform a communication check after modification of this parameter. Recommended is to perform this check with and without a running engine.

	One of the three following options may be selected for speaker volume source, "SPKR VOL SRC", by pushing the "STO" button: PRIMARY CH If "PRIMARY CH" is selected the speaker volume will be adjustable by AR6201-(XOX). SECONDARY CH If "SECONDARY CH" is selected the speaker volume will be adjustable by RCU6201. BOTH If "BOTH" is selected the speaker volume will be adjustable by the arithmetic average value from AR6201-(XOX) and RCU6201. *Note: The "SPKR VOLUME SOURCE" shall be set to "PRIMARY CH" if the optional second controller RCU6201 is not available.*
	The Noise Squelch threshold "SQUELCH THR" is adjustable within a range between figures 6 to 26 by turning the "ROTARY ENCODER". Minimum Adjustment of 6 means: Also weak RF signals can trigger the Squelch threshold and the voice signal might be low combined with a noisy background. Maximum adjustment of 26 means: Only strong RF signals with can trigger the Squelch threshold. The voice signal will be audible very clear and without, or very low noise in the background. Weaker RF signals might not be able to trigger the Squelch threshold and therefore do not become audible for the pilots. *Note: Adjustment of the "SQUELCH THR" is also provided in the "PILOTS MEUNU", therefore this parameter can be re-adjusted easily by pilot at any time. (refer to "PILOTS MENUE" 3.13.2).*
	The "SCAN HOLD_TIME" is adjustable within the range of 1 to 60 seconds by turning the "ROTARY ENCODER". Factory setting is 1 second and it is recommended to leave the factory setting at 1 second for normal airborne operation

	The Sidetone attenuation "SIDETONE ATT" is adjustable within the range 0 … 12 dB by turning the "ROTARY ENCODER". This attenuation is relating to the intercom volume. 0 = Sidetone as loud as intercom signal. 12 = Sidetone signal 12dB more silent than intercom. Note: *If the intercom volume (refer chapter 3.13.1) is set to a very low value, also the Sidetone is quite silent, even if adjusted to 0 (zero) attenuation on this page.* *The "SIDETONE ATT" parameter is an additional attenuation of the Sidetone signal in Transmit Mode.*
	The AR6201-(XOX) provides two databases to store up to 99 frequencies within the VHF-COM band, identified by channel numbers (CH01 to CH99). *(refer to chapter 3.9 for further details).* Both, the "User Channels Database" and "Last Channels Database" are erasable selecting "YES" by means of the "ROTARY ENCODER" and pressing "STO" push-button to confirm this selection.
	The AR6201-(XOX) provides a third database, "FRQUENCY LABELS DATABASE", containing 99 text labels of max 10 characters each. A text label can be, to any of the channels (CH01 to CH99), assigned. The Labels are stored manually (for details see chapter 3.9). This "LABELS DATABASE" is erasable selecting "YES" by means of the "ROTARY ENCODER" and pressing the "STO" push-button to confirm this selection.

 *Note: This drawing shows all monitored failures types.* *Within the display frame of the AR6201 only 4 failure types can be shown.* *By means of the "ROTARY ENCODER" all further failure types become in view.*	This page displays information about all failures occurred during operation of the AR6201(XOX) and have been automatically stored in the memory. This page may be very helpful for trouble shooting and failure isolation. "0" means no failure was detected and stored. "1" means that a failure was detected once or several times and stored. This page is for information purpose only.
	Selecting "YES" by means of the "ROTARY ENCODER" and pressing the "STO" push-button all stored failures *(see previous page)* erase concurrently. Only the factory or a maintenance shop shall delete the "FAILURE LIST" after a repair is completed.
	The factory default settings are the settings of the AR6201-(XOX) when it left the factory after production. Restoring the factory default settings provided by selecting "YES" by means of the "ROTARY ENCODER" and a short push on the "STO" push-button. Note: **Restoring the factory default settings will overwrite all previous and customized installation settings !**

2.9 Typical Settings in the INSTALLATION SETUP

2.9.1 Single Seater Glider

Typical Installation Wiring	**Figure 2-5, Figure 2-6**
Sub-Menu	**Function: / *Selection***
"SPKR VOLUME SOURCE":	..... *PRIMARY CH*
"IN/OUT CFG1":	"MICROPHONE 1": *NONE* "MICROPHONE 2": *DYN_MIKE* "BOTH MIKES": .. *Enabled* "HEADPHONE 1": . *Enabled* "SPEAKER": ..... *Enabled*
"IN/OUT FG2":	N/A
Remarks	Permanent speaker sign  is visible on LCD screen. VOX operation suppressed.

2.9.2 Twin Seater Motor Glider

Typical Installation Wiring	Figure 2-7
Sub-Menu	**Function: / *Selection***
"SPKR VOLUME SOURCE":	.....*BOTH*
"CONFIGURATION"	"SWAP MIKE IC": *Disabled*
"IN/OUT CFG 1":	"MICROPHONE 1": *STD_* "MICROPHONE 2": *NONE* "BOTH MIKES": ...*Enabled* "HEADPHONE 1": .*Enabled* "SPEAKER": .....*Disabled*
"IN/OUT CFG 2":	"MICROPHONE 1": *NONE* "MICROPHONE 2": *DYN_MIKE* "BOTH MIKES": ..*Enabled* "HEADPHONE 1": .*Enabled* "SPEAKER": .....*Enabled*
Remarks	The external switch (connected to pin J1-24 /MIKE_SW) has the following functions: Open: Standard Microphone is selected. Speaker is disabled. Intercom via VOX is possible. Closed: Dynamic Microphone is selected. Speaker is enabled. No Intercom via VOX is possible. Permanent speaker sign is visible on LCD screen.

2.9.3 GA aircraft using Standard Microphones

Typical Installation Wiring	Figure 2-8
Sub-Menu	**Function: / *Selection***
"SPEAKER VOLUME SOURCE":	..... *BOTH*
"CONFIGURATION"	"SWAP MIKE IC": *Disabled*
"IN/OUT CFG 1":	"MICROPHONE 1": *STD1_MIKE* "MICROPHONE 2": *NONE* "BOTH MIKES": .. *Enabled* "HEADPHONE 1": . *Enabled* "SPEAKER": ..... *Disabled*
"IN/OUT CFG 2":	"MICROPHONE 1": *STD1_MIKE* "MICROPHONE 2": *NONE* "BOTH MIKES": .. *Enabled* "HEADPHONE 1": . *Enabled* "SPEAKER": ..... *Enabled*
Remarks	The external switch (connected to pin J1-24 /MIKE_SW) has the following functions: Open: Speaker is disabled, Intercom via VOX is possible. Closed: Speaker is enabled No Intercom via VOX is possible Permanent speaker sign is visible on LCD screen. The Standard Microphone Input is selected regardless of the position of the external switch.

2.9.4 Aircraft with Intercom System

Typical Installation Wiring	Figure 2-9, Figure 2-10
Sub-Menu	**Function: / *Selection***
"SPKR VOLUME SOURCE":	..... *BOTH*
"CONFIGURATION"	SWAP MIKE IC: .. *Disabled*
"IN/OUT CFG 1":	MICROPHONE 1: .. *STD1_MIKE* MICROPHONE 2: .. *NONE* BOTH MIKES: .... *Enabled* HEADPHONE 1: ... *Enabled* SPEAKER: ..... *Disabled*
"IN/OUT CFG 2":	MICROPHONE 1: .. *STD1_MIKE* MICROPHONE 2: .. *NONE* BOTH MIKES: .... *Enabled* HEADPHONE 1: .... *Enabled* SPEAKER: ..... *Disabled*
Remarks	The same configuration applies for balanced and unbalanced wiring.

2.9.5 Tandem Seater Aircraft

Typical Installation Wiring	Figure 2-11
Sub-Menu	**Function: / *Selection***
"SPKR VOLUME SOURCE":	..... *BOTH*
"CONFIGURATION"	"TANDEM": ..... *Enabled* "SWAP MIKE IC": *Disabled*
"IN/OUT CFG 1":	"MICROPHONE 1": *STD1_MIKE* "MICROPHONE 2": *NONE* "BOTH MIKES": .. *Enabled* "HEADPHONE 1": . *Enabled* "SPEAKER": ..... *Disabled*
"IN/OUT CFG 2":	"MICROPHONE 1": *STD1_MIKE* "MICROPHONE 2": *NONE* "BOTH MIKES": .. *Enabled* "HEADPHONE 1": . *Enabled* "SPEAKER": ..... *Disabled*
Remarks	Regulation of Volume, Intercom Volume and VOX threshold is possible only for AR6201-(OXO).

2.10 Retrofitting an AR4201 with an AR6201-(XOX)

In most cases, a retrofit of the AR4201 with an AR6201-(XOX) does not cause any problem.
However, in some cases differences may occur because not all pins are fully compatible.

!!! To connect the AR6201-(XOX) to an AR4201 wiring does not cause any defect, neither to the AR6201-(XOX) nor to the aircraft installation.

2.10.1 Pin Compatibility

Pin No.	AR4201 Pin Name	AR4201 Function	AR6201-(XOX) Pin Name	AR6201-(XOX) Function	Fully compatible
P1-1	AF-ASYM	Speaker output, unbalanced	SPK_HI	Speaker output, unbalanced	Yes
P1-2	AF-HI	Headphone output, balanced	HDPH_A	Headphone output, balanced	Yes
P1-3	AF-LO	Headphone output, balanced	HDPH_B	Headphone output, balanced	Yes
P1-4	AFAUX	Auxiliary audio input, unbalanced	AF_AUX_IN_HI	Auxiliary audio input, unbalanced	Yes
P1-5	MIKE DYN	Dynamic microphone input, high side, (unbalanced)	MIKE_DYN_HI	Dynamic microphone input, (balanced)	Yes
P1-6	MIKE GROUND	Ground for dynamic microphone,	MIKE_DYN_LO	Dynamic microphone input, (balanced)	**No**
P1-7	IC	Intercom input	/IC	Intercom input	Yes
P1-8	TEMS1	Input for temperature sensor	MIKE_STD_LO	Ground	**No**
P1-9	RXD	RS232 RXD	NC	Not connected	**No**
P1-10	-ILLUMINATION	Illumination, low side	ILL_LO	Illumination, low side	Yes
P1-11	+13.75V	Positive power supply	P_SUPP	Positive power supply	Yes

Pin No.	AR4201 Pin Name	AR4201 Function	AR6201-(XOX) Pin Name	AR6201-(XOX) Function	Fully compatible
P1-12	+13.75V	Positive power supply	P_SUPP	Positive power supply	Yes
P1-13	GROUND	Power supply return / Ground	P_SUPP_GND	Power supply return / Ground	Yes
P1-14	AF GND MIKE STD GND	Ground	SPK_LO	Ground	Yes
P1-15	AFCU	Normally not used in airborne installation	LINE_OUT	Normally not used in airborne installation	**No**
P1-16	AGC/AFWB	Normally not used in airborne installation	AGC_OUT	Normally not used in airborne installation	**No**
P1-17	PTT	Push To Talk	/PTT	Push To Talk	Yes
P1-18	MIKE STD.	Standard microphone input, high side, unbalanced	MIKE_STD_HI	Standard microphone input, high side, unbalanced	Yes
P1-19	CPIN	coding pin (removed pin)	CPIN	coding pin (removed pin)	Yes
P1-20	TEMS2	Ground for Temperature sensor	NC	Not connected	**No**
P1-21	GNDDATA	Ground	AF_AUX_IN_LO	Ground	Yes
P1-22	TXD	RS232 TXD	NC	Not connected	**No**
P1-23	+ILLUMINATION	Illumination, high side	ILL_HI	Illumination, high side	Yes
P1-24	+13.75V SWITCHED	Power on monitor Switched positive power supply.	/PWR_EVAL	Power on monitor, open collector output, GND if "ON".	**No**
P1-25	GROUND	Power supply return / Ground	P_SUPP_GND	Power supply return / Ground	Yes

2.10.2 Dynamic Microphone Input

Retrofitting an AR4201 with the AR6201-(XOX) in a typical glider installation with a dynamic microphone is shown below:

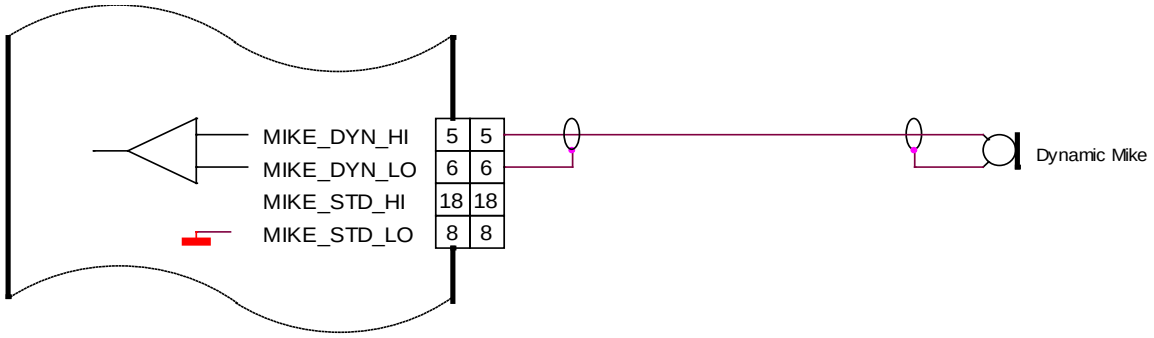


Figure 2-13 AR6201 with already existing interwiring for AR4201

Connect the cable shielding to pin P1-6, which is the low side input for dynamic microphone. Because in AR6201-(XOX) this input is balanced, the cable shield is not any more connected to ground (like it was case with the AR4201). In most cases, it is not a problem. Carrying out the following modification is recommended if interference with microphone signal occurred:
Connect Pin P1-6 with Pin P1-8 (the cable shield is grounded). See Figure 2-14.

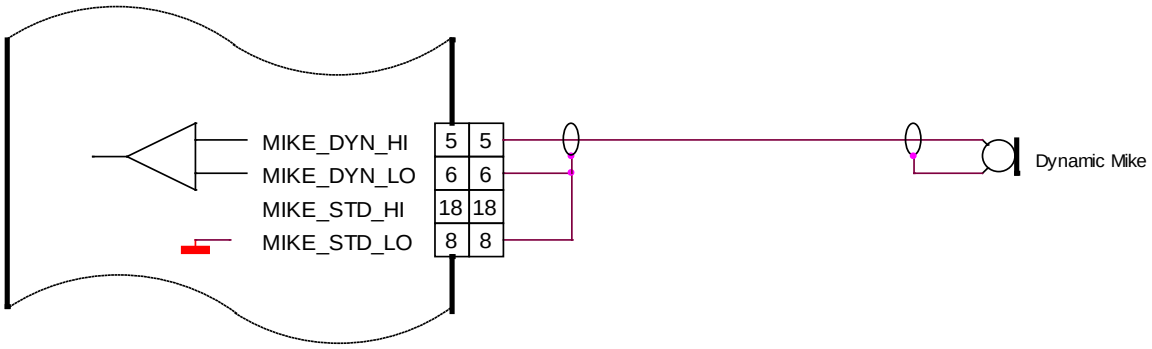


Figure 2-14 Modified Dynamic Microphone interwiring for AR6201

2.10.3 Temperature Sensor

The AR6201-(XOX) has no temperature sensor input, but a temperature sensor connected between pin P1-8 and pin P1-20 (from previous installation) has no impact to the operation of the transceiver.

2.10.4 RS-232 Interface

The AR6201-(XOX) has no RS-232 interface for remote control, but a RS-232 signal connected to pin P1-9 or pin P1-22 (from previous installation) has no impact to the operation of the transceiver.

2.10.5 AFCU/AGC/AFWB

Normally not used in aircraft installations are Pin P1-15 and Pin P1-16. Different functions of these pins will not cause any trouble when retrofitting an AR4201.

2.10.6 /PWR_EVAL

The AR6201-(XOX) provides on pin P1-24 a low signal when the unit is switched on and a high impedance signal, when switched "OFF".
This function is different to the AR4201, which provides supply voltage out when switched "ON" and no supply voltage when switched "OFF".
If it is intended to switch "ON" and switch "OFF" a slaved equipment together with the AR6201-(XOX) connect a relay on pin P1-24 as shown in Figure 2-5.

2.11 Post Installation Tests

Note: It is assumed that the "Installation Setup" (refer Chapter 2.8) has been done before the Post Installation Tests will be carried out.

Once the AR6201-(XOX) is installed, complete a test procedure to verify proper system operation. Ensure compliance with authority required procedures. Refer to the Installation Order of the Minor Change document or use an own approved test protocol for VHF-COM units. The following chapter below provide guidance for such tests.
Refer to section 3 of this manual for detailed operating instructions.

2.11.1 Mechanical Installation and Wiring Check

Verify all cables are stored securely and shields connected properly to signal ground. Check the movement of aircraft controls to verify there is no interference. Verify all screws are tight well which keep the AR6201-(XOX) in the installation cut out and the connectors on the rear side of the unit are secured.

2.11.2 Power Supply

Check the power supply lines for correct polarity. Check that the aircraft power supply is within the specified limits, with and without a running engine (refer chapter 1.6.1).

2.11.3 Receiver / Transmitter Operation

Power up the AR6201-(XOX) and tune it to a local station for a communication test. Verify that the receiver output produces a clear and readable audio and ask the local station for proper readability of the AR6201´s transmit signal. Repeat this communication test with an airborne station in an radius between ≈ 20-40 NM.

2.11.4 Antenna Check

Check the VSWR (voltage standing wave ratio) over the complete frequency band (e.g. by using a VHF Reflection-Coefficient Meter).
The VSWR ratio should be less than 2:1 and is not acceptable when exceeding 3:1.
Refer chapter 2.12 for further guidance.

2.11.5 Interference Check

Check the AR6201-(XOX) while engine is running and all other avionics/ electrical systems on the aircraft are powered, to verify that no significant interference exists. Check also that the AR6201-(XOX) does not cause significant interference with other systems.
The installers standard test procedure may be used for the interference check and the below table can be taken as a reference.
Depending on the individual avionic systems installed in the aircraft, it might be necessary to extend the following checklist accordingly.

Aircraft Systems	Test Result System 1	Test Result System 2	Remarks
Audio/Intercom System			
VHF COM 1 / COM 2			
VHF NAV 1/2 (VOR/LOC) all channels			
UHF NAV 1/2 (GS) all channels			
ADF			
Marker Beacon			
GPS 1/2 (see table below)			
VHF / NAV 2 all channels			
Marker Beacon			
Motor(s)			
Engine Instruments			
Stormscope			
Transponder			
Air Data Computer			
Autopilot and Servos			
Magnetic Compass			

Power the GPS and make sure that not less than 5 satellites are tracked. Check the interference between the VHF-COM and the GPS receiver is in the activated NAV mode. Select the following channels/frequencies on the AR6201-(XOX) and on each frequency stay in TX and RX mode for at least 30 seconds. Verify that GPS integrity Flag is always out of view.

Channel	Frequency (MHz)	Test Result (√)
121.140	121.1416	
121.150	121.1500	
121.155	121.1500	
121.160	121.1583	
121.165	121.1666	
121.175	121.1750	
121.180	121.1750	
121.185	121.1833	
121.190	121.1916	
121.200	121.2000	
121.205	121.2000	
121.210	121.2083	
130.250	130.2583	
131.240	131.2416	
131.250	131.2500	
131.255	131.2500	
131.260	131.2583	
131.265	131.2666	
131.275	131.2750	
131.280	131.2750	
131.285	131.2833	
131.290	131.2916	
131.300	131.3000	
131.305	131.3000	
131.310	131.3083	

For the remaining avionic equipment repeat all interference checks during a flight and include all equipment not checked out on ground before.
A communication performance check in the low, mid and high frequency band of the AR6201-(XOX) should be included. Verify the receiver output produces a clear and understandable audio output. Verify the transmitter by contacting another station and getting a report of reliable communications. Ensure the range check to a far station does not take place closer than appx.100 m from your own position.

Check the intercom function just by talking into the microphone, while the engine is running at cruising rpm. You should hear yourself and/or your co-pilot loud and clear.
Switch "ON" the squelch and check that the normal radio noise, without a present carrier signal, is constant suppressed. The threshold of the squelch can be set in the Pilots Menu.

2.11.6 Flight Test Check

It is highly recommended to perform flight test as final installation verification. The performance of the AR6201-(XOX) may be verified by contacting a ground station at a range of at least 50 nm while maintaining an appropriate altitude and over all normal flight attitudes. Check the performance in the low, mid and high band frequencies.

2.12 Trouble Shooting

Problem	Possible Reason	Proposed Solution
Intercom function is not working.	VOX not activated, or the threshold adjustment is set too high.	Adjust the VOX trigger level to a lower value. A value of "-15" is suitable in most cases. *Refer to chapter 3.13.1.*
You cannot hear yourself by talking into the microphone. Continued from previous page	Intercom volume turned "OFF", or adjusted to a very low signal level.	Adjust the intercom volume to a higher value. A value "37" result in an intercom signal level well readable. *Refer to chapter 3.13.1.*
	Probably the microphone input sensitivity level adjustment is insufficient and adjusted to a too high value.	Adjust the sensitivity of the microphone input to a lower value. For standard mike a setting of 50 … 120 mV is typically sufficient for most of the avionic headsets. *Refer to chapter 2.8.5.*
The VOX threshold can-not be adjusted at all. VOX is always "OFF".	VOX function might be deselected because the speaker is "ON".	Switch speaker "OFF". *Refer to chapter 2.8.5.*
A high cabin noise is too high during intercom / transmission operation.	The sensitivity of the microphone input is too sensitive.	Adjust the microphone sensitivity to a higher value and this makes the cabin noise relatively decreased. Recheck transmission operation and/or Intercom function.

Problem	Possible Reason	Proposed Solution
Speaker output is not working.	Speaker is switched "OFF"	Switch speaker "ON". *Refer chapter 2.8.5.(Page: CONFIG and MIKE TYPE) and the explanation about /MIKE_SW in chapter 2.4.2.*
The noise suppression function of the squelch is not working. Receiver noise is always present.	Some avionic (especially non ETSO/TSO approved avionic) is producing quite high electromagnetic interference, possibly received by AR6201-(XOX).	Reduce the interference emitted by the avionic around by improving shielding, distance or grounding. Try to suppress the interference by adjusting the squelch to a higher value. *Refer to chapter 3.13.2.* Note, that a higher value causes a reduced sensitivity.
The display shows a warning or failure message (LOW BATT, STUCK PTT, TX HOT, FAILURE)	*Refer to chapter 3.14.*	*Refer to chapter 3.14.*
The Antenna VSWR exceeds 3:1.	Possibly caused by an defective or insufficient counterpoise for the antenna.	Check for sufficient size of the counterpoise and make sure there is no mechanical defect on the antenna.
	The impedance of the antenna cable deviates significantly from 50 Ohm.	Make sure the used antenna cable has 50 Ω impedance and the cable is not pinched or kinked on its way from the radio to the antenna.
	Possibly caused by an fault on the BNC connectors of the antenna cable.	Check for proper crimp/solder work on the BNC connectors and rectify as far as necessary.

2.13 Continued Airworthiness

The AR6201-(XOX) maintenance is defined as "on condition" only. No scheduled or regular maintenance of this product is required.

To verify the frequency accuracy of the AR6201-(XOX) it is recommended to perform a respective calibration test after 7 years.

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Section 3. OPERATION

3.1 Safety Instructions

For safe operation of the AR6201-XOX takes the following instruction into account.

Turn the unit "OFF" before starting or shutting down the engine.

Speak loud and clear to the microphone while keeping it always close to the lips. This ensures a crystal-clear readability of the transmitted signal at the receiving station.

It is highly recommended to use the same type microphones or headsets, which are suitable for use in aircrafts.

At power supply voltages below 10 V the speaker output of the transceiver is automatically switched "OFF", speaker sign will no longer be presented on LCD display if activated before, the pilot must use headphones to continue listening watch.
A "LOW BATTERY" message will appear all 3 seconds in the lower part of the display if "LOW BATT THR" is to a suitable level adjusted within the supply voltage range.

3.2 Controls and Indicators

Figure 3-1 Controls and Indicators

Note: The following graphics of the AR6201-(XOX) display content are shown in the 8.33 kHz channel spacing for all possible operation modes.

Dedicated pictures are not explicit provided for the 25 kHz modes because the basic display content is very similar and they differ only in the number of digits for the frequency indication. (Refer to chapter 3.4).

3.2.1 Controls

		Description	Main Function
1		IC/SQL (Intercom/Squelch)	A "Short press" during normal operation toggles the RX -SQL ON/OFF. A "Long press" during normal operation activates Intercom Menu.
2		MDE (Mode)	A "Short press" during normal operation changes to display page Frequency Selection Mode. "Long press" during normal operation activates the Pilots Menu.
3		STO (Store)	A "Short press" during normal operation activates storage procedure.
4		↕/SCN (Exchange/SCAN)	A "Short press" during Standard Mode or Scan Function exchanges Preset Frequency and Active Frequency. "Long press" activates Scan Function.
5		Volume Knob	Turning the transceiver ON/OFF and provide adjustment of the audio volume level.
6		„ROTARY ENCODER"	Turning the "ROTARY ENCODER" changes the setting of several parameters (frequency, IC-volume, VOX …). A push on the "ROTARY ENCODER" moves the cursor to the next digit.
7		Display	

When the user presses and holds down a key for at least 2 seconds, the AR6201-(XOX) detects a "Long press" otherwise a "Short press" is assumed.

The whole content of the AR6201-(XOX) display is inverted for a short time, if any action is done by the user, e.g. pressing a key, and the operation is not allowed at this time.

Beside the main functions, described in the table above, the controls have additional functions. Description for these functions follow in the chapters below.

3.2.2 Symbols shown on the Display

Symbol	Meaning
IC	Intercom operation is active (triggered by VOX or external IC key).
	Intercom operation via VOX is disabled.
 	Speaker enabled in Installation Setup and not muted. During Transmission and Intercom, the Speaker automatically is muted.
TX	The transceiver is in Transmission Mode
SQL	The squelch function is active. Receiver noise only suppressed.
SCAN	Transceiver operates in Scan Function.
▶	In "Scan" function, an arrow is visible. The arrow points to the active or standby frequency from which the audio is deriving (see chapters 3.5.4 and 3.7)
STO	The transceiver performs a storage operation
LOW BATT	
128.225	Inverted figures or letters on display ready to edit

3.3 Start-Up

CAUTION: Do not turn "ON" the VHF transceiver when engines are being started or shut down.

Note: Excessive pulses on the DC bus of the aircraft may cause damage on electrical circuits of any installed instrument.

a. Turn "ON" the VHF transceiver by turning the volume knob clockwise.

b. During 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 an error, the display indicates "FAILURE" (for details see chapter 3.14)

d. If no error has been detected the transceiver starts in the Frequency Selection Mode last time used before switching "OFF" the unit.

3.4 Receive and Transmission Operation

The VHF transmitter provides operation in two modes:

- Receive Mode
- Transmission Mode

3.4.1 Receive Mode

If /PTT input is inactive and PTT key is not pressed, the transceiver stays in Receive Mode.

In Receive Mode the headphone output, if enabled, can provide a mixed signal consisting of:
- received signal from antenna,
- intercom signal from intercom circuit (if intercom is active),
- signal from auxiliary input (if enabled).

In Receive Mode the speaker output, if enabled, can provide a mixed signal consisting of:
- received signal from antenna on operating frequency,
- signal from auxiliary input (if enabled).

The signal from the auxiliary input can be automatically muted under specific conditions.
Refer to chapter 3.10 for details.

3.4.2 Transmission Operation

If /PTT input is active (PTT key is pressed) the transceiver switches into Transmission Mode. Microphone(s) signals can modulate the transmitter.

The "TX" symbol in the left upper corner of the display indicates the AR6201-(XOX) is in Transmission Mode.

In Transmission Mode, the most user actions (changing Frequency Selection Mode, Channel Spacing Mode etc.), normally allowed in Receive Mode, are blocked. As an exception, in Standard Mode the "Preset" Frequency may still be changeable, even during transmission.

No intercom operation is possible in Transmission Mode.

The Sidetone (demodulated audio of the transmitted signal) is available on the headphone output. The Transmit Mode automatically deactivates the Speaker.

Note: Transmission Mode is automatically terminated (return to Receive Mode) after 120 seconds of continuous transmitting even if PTT is still pressed. In this case "STUCK PTT" is indicated (refer chapter 3.14). For initiation of a new transmission, /PTT line needs first to become inactive.

3.5 Frequency Selection Modes

The following Frequency Selection Modes can be available on AR6201-(XOX):

- **Standard Mode** (only this mode provides the **Scan Function**)
- **Direct Tune Mode**
- **Channel Mode**

The three modes (Standard Mode, Direct Tune Mode and Channel Mode) provide different user pages on the display for convenient selection of the operating frequency.

A consecutive short press on "MDE" key provide toggling between the three pages, which appear in the flowing order: **Standard Mode** *and* **Direct Tune Mode** *and* **Channel Mode** *and back to* **Standard Mode**…etc.

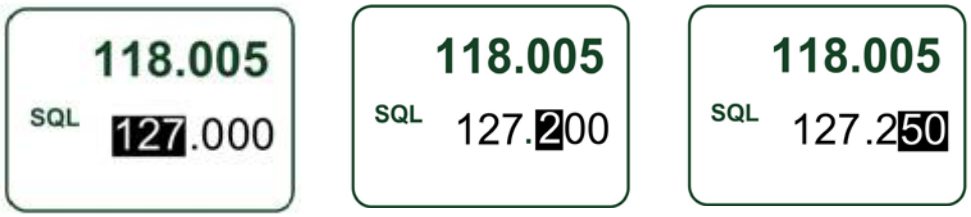
The Scan Function is a sub-mode of the Standard Mode, providing monitoring of two frequencies (Active Frequency and Preset Frequency) at the same time.
A 2 seconds press on "↕/SCN" key activates/deactivates the Scan Function.

Out of the three pages from the Frequency Selection Modes any page can be enabled or disabled in the Installation Setup but at least one page must remain selected (see chapter 2.8.5, screen MDE PAGES in Installation Setup).

3.5.1 Standard Mode

Push on "MDE" key until the Standard Mode page appears.
In Standard Mode page, the display indicates the Active Frequency in the top line and Preset Frequency in the bottom line.

Direct editing of the Active Frequency is not available like in the Direct Tune Mode. On this page, only editing of the Preset Frequency is possible. By the first push on the "ROTARY ENCODER", the MHz digits are inverted and turning the "ROTARY ENCODER" clock- or counter clockwise change the frequency. Two further pushes on the "ROTARY ENCODER", the first inverts the 100 kHz and the second selects the 25 / 8.33 kHz digits, enable for modification of the frequency.



A short press of the "↕/SCN" key exchanges the Active and Preset Frequency. While the transceiver is in Transmission Mode, the Exchange between the frequencies is disabled.
Pressing the "STO" key activates storing of the Active Frequency into the next vacant memory place in the User Channels Database. (see chapter 3.9.1 for more details)

3.5.2 Direct Tune Mode

Push on "MDE" key until the Direct Tune Mode page appears.

If BATTERY VOLTAGE is deselected in the Installation Setup, this mode is ***not*** accessible! Only "Standard" or "Channel" mode are accessible.

The Active Frequency, indicated in the top line, in Direct Tune Mode is editable by means of the "ROTARY ENCODER" as described in chapter 3.5.1.
The battery voltage, indicated in the bottom line shows the current value of the supply voltage.

Direct editing of the Active Frequency is available in the Direct Tune Mode. By the first push on the "ROTARY ENCODER", the MHz digits are inverted and turning the "ROTARY ENCODER" clock- or counter clockwise change the frequency. Two further pushes on the "ROTARY ENCODER", the first inverts the 100 kHz and the second selects the 25 / 8.33 kHz digits. The changes become active immediately.

Changing the Active Frequency is possible only when the transceiver is not transmitting.
Pressing STO key activates storing of Active Frequency in User Channels Database (see chapter 3.9.1)

3.5.3 Channel Mode

Push on "MDE" key until the Channel Mode page appears.
The Channel Mode provides selection of stored VHF frequency by means of channel number (CH01 to CH99 or LAST1 to LAST9). The channel number appears in the bottom line of the display, either CH01 to CH99 or LAST1 to LAST9. The top line shows the corresponding VHF frequency assigned to the specific channel number. The bottom line contains a text label assigned to the displayed VHF frequency. Any label already stored to a VHF frequency will automatically assign to any new channel number when the same frequency is stored.
The Channel Mode shows data from User Channels Database, or Last Channels Database and Labels Database on the display. (For a detailed database description, refer to chapter 3.9.)

The both pictures below show identification of the database in use by means of prefix "CH" or "LAST" in front of the channel number.

Channel Mode Last Channel Mode

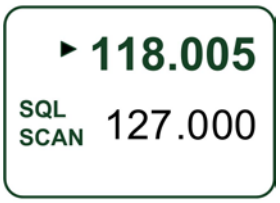
Toggling between the three Modes the Active Frequency always stays the same.
After selecting Channel Mode, the channel number is indicated, e.g."CH03", if the frequency has already an assigned channel number in User Channels Database, otherwise the indication will be "CH--".
In order to select a new channel number from **USER** Channels Database make a short press or one clockwise turn on the "ROTARY ENCODER". The Channel Number is now inverted and the desired Channel is selectable turning either clockwise or counter clockwise the "ROTARY ENCODER". Each step the receiver tunes immediately to the displayed VHF frequency. The Mode

of channel number selection can be left manually by consecutive short press of the "ROTARY ENCODER", or leaves the Mode automatically after 5 s timeout.
In order to select the new channel number from **LAST** Channels Database make a counter clockwise turn on the "ROTARY ENCODER". The Channel Number is now inverted and the desired last used frequency, which is related to one of the last nine channels, is selectable turning either clockwise or counter clockwise the "ROTARY ENCODER". The mode of channel number selection can be left manually by a consecutive short press of the "ROTARY ENCODER", or leaves the Mode automatically after 5 s timeout.
When leaving the LAST Channels Database and the last shown frequency is not stored in one of the **USER** cannels Database, "CH--" will appear on the display.
Accessing the "Last Channels Database" will be possible if "STORE LAST CHANNEL" selected on MEMORY OPTIONS page in the Installation Setup, otherwise the recently stored VHF frequencies are not available.

Note: If the device operates in the 25 kHz Mode a selection of an earlier stored 8.33 kHz channel is not possible. For Selection of 8.33 kHz channels, the device has to operate in the 8.33/25 kHz Mixed Mode.

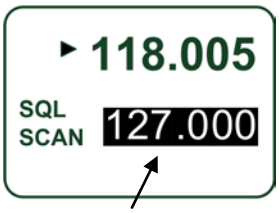
3.5.4 Scan Function

In all Frequency Selection Modes, a long press of "↕/SCN" key activates the Scan Function and change to STANDARD MODE if activated from CHANNEL or DIRECT TUNE Mode.
A short push on the "MDE" key, or a long press on "SCN" key terminates Scan Function. After leaving Scan Function, the device will remain in Standard Mode.
Simultaneously indicated on the display appears the Active Frequency on the top line and the Preset Frequency on the bottom line. The SCAN sign in the display indicates that Scan Function is active.



SCAN Mode

While Active Frequency and Preset Frequency detected a signal simultaneously, the Preset Frequency inverts and blinks. The Active Frequency has priority. The arrow sign "▶" in front of the Active Frequency indicates audio from Active Frequency is audible. A sample display shows the picture below.



Blinking

An audio notification "Beep" tone, if selected in the Installation Setup, additionally to the blinking Preset Frequency notifies the presence of an RX signal on the Preset Frequency.
If Preset Frequency detects an RX signal while on the Active Frequency no signal is present, the transceiver automatically switches over to the Preset Frequency. The arrow sign now appear in front of the Preset Frequency and the signal is audible. A sample display shows the picture below.

Reception on Preset Frequency in Scan mode

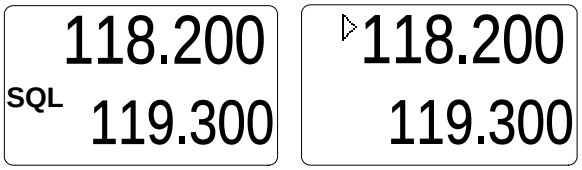
Disabling Squelch in Scan Function provides audio of the Active Frequency to the audio output all the time, regardless of the presence of RF signal on Active Frequency or Preset Frequency).

A short push on "↕/SCN" key exchange, without leaving the Scan Function, the Preset- with Active Frequency. While the transceiver is in Transmission Mode this function is disabled.
A short push on the "ROTARY ENCODER" activates editing the Preset Frequency (for details refer to 3.5.1 Standard Mode).

Note: Transmission always executes on the Active Frequency, even if the monitored frequency is currently audible.

3.6 Squelch

Independent of the selected operation menu, squelch can be toggled between "ON" and "OFF" by a short push on "SQL/IC" key.



Squelch "ON" Squelch "OFF"

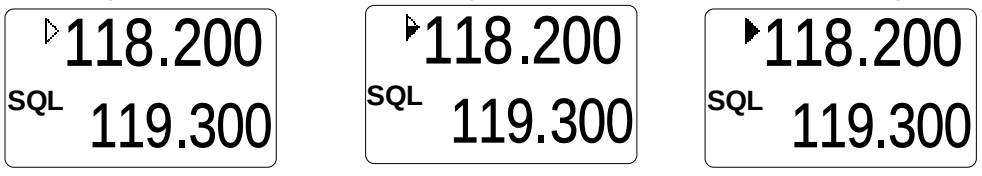
If the squelch function is active ("ON") the Receivers noise is muted. In the Pilots Menu, the Squelch threshold is adjustable to a convenient trigger level.
If the Squelch is "OFF" the arrow sign "▶" in front of the Active Frequency stays visible all the time.

3.7 RX Field strength indication

The RX field strength, represented inside the triangle "▶" appearing in front of the currently receiving frequency, fills the triangle not, half or fully, depending on the strength of the signal. The field strength symbol is available in all three Frequency Selection Modes.

- **poor signal,** signal just passing squelch level (triangle empty)
- **good signal,** signal include a minor level of noise (triangle half filled)
- **strong signal,** very clear signal (triangle filled completely)

poor good strong



3.8 Channel Spacing Mode

The transceiver provide two frequency channel spacing operation modes, selectable by means of pressing "STO" and "MDE" keys simultaneously for at least 2 seconds.

8.33 kHz channel spacing (left) / 25 kHz channel spacing (right)

Toggling of frequency channel spacing Mode is only available for AR6201-(0XX) variants. The AR6201-(1XX) variants cannot be toggled. The AR6201-(1XX) variants are operating in 25 kHz Mode only.

In 25 kHz Mode 5 frequency digits are shown. Only operating frequencies with a channel spacing of 25 kHz are selectable. If 8.33 kHz channels are not in use this mode provides the advantage of faster tuning since skipping all 8.33 kHz frequencies.

In the "8.33 and 25 kHz Mixed Mode" the displayed frequency consist of 6 digits. The transceiver tunes to all possible frequencies within the aviation VHF frequency band. The channel spacing and operating frequency is derived automatically from the selected and displayed frequency (refer chapter 1.4).

3.9 Storage Function

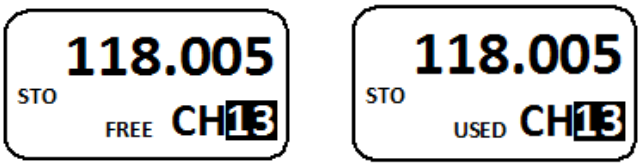
The VHF transceiver provides three databases:

1. User Channels Database
2. Last Channels Database
3. Labels Database

The **"User Channels Database"** provides 99 channels identified as CH01 to CH99 and to each channel, the user can assign any frequency within the VHF-COM range from 118.000 MHz to 136.9916 MHz by simply pressing the "STO" button. All 99 channels are editable, when selected, after the "STO" button is pressed.
The "User Channels Database" can be edited manually or uploaded/edited by using a PC-application connected to an interface port on connector J1 of the AR6201.
The transceiver automatically stores nine last used frequencies into the "Last Channels Database", identified and easy to recall as LAST1 to LAST9.
The **"Labels Database"** allows attaching a text label to each of the 99 stored VHF frequencies. To a particular VHF frequency, only one label is assignable and the label length is limited to 10 characters. The **"Labels Database"** can be edited or uploaded/edited by using a PC-application connected to an interface port on connector J1 of the AR6201.

3.9.1 Modification of User Channels Database and Labels Database

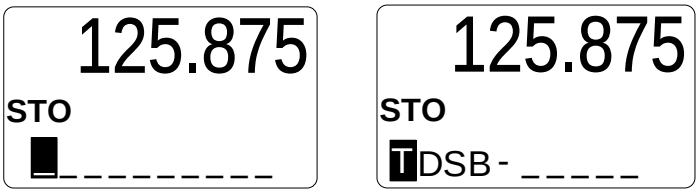
The User Channels Database and Labels Database can be modified (new entry added or existing entry edited) only, if CHANNEL STORE option is selected in the MEMORY OPTIONS page in Installation Setup (see chapter 2.8.5).
Pushing on "STO" key activates Database modification in Standard Mode, Direct Tune Mode, or Channel Mode.
During this procedure, the display looks similar to the Channel Mode with the difference "STO" appear on the left side of the display. In the display top line the Active Frequency appears and the bottom line shows the already assigned or next vacant channel number. The channel number can be selected by means of the "ROTARY ENCODER". The label "FREE" appear in front of "CHXX" if the selected channel number is vacant, but if the selected channel number contains an already stored frequency "USED" appears.



"FREE" and "USED" channel indication.

By entering the storage procedure, the transceiver proposes the first free channel for storing the Active Frequency. Beside the proposed channel, also every other channel within the range 1 to 99 is selectable by turning the rotary knob. For every selected channel, "USED" or "FREE" appears respectively.

Pushing on the "STO" key once again assigns the Active Frequency to the selected channel number, regardless of the channel is "FREE" or "USED". Afterwards the transceiver automatically activates storing of alphanumeric label assigned to the Active Frequency.
If the frequency has no label attached, ten underscore signs become visible, otherwise directly indicating the current label.
Cursor appears on the first position (see figures below).



By turning the "ROTARY ENCODER characters can be selected ". Selection works in both directions (example: from "blank → A → B → C" by turning clockwise and from "C → B → A → blank" by turning counter clockwise).
Each push on the "ROTARY ENCODER" shifts the cursor to the next position.
A short push on "STO" key stores the label and a long press on "STO" key clears currently edited label.

After storing labels, the transceiver returns back to the previous Frequency Selection Mode (Standard Mode / Direct Tune Mode / Scan Function).
If no action occurs in label editing mode, the transceiver returns after 7 seconds to the previous Frequency Selection Mode without storing the frequency and label information.
Recalling labels associated to the stored frequencies is possible in Channel Mode (see chapter 3.5.3).

3.9.2 Automatic Storage Function

Transceiver automatically updates Last Channels Database only if STORE LAST CHANNEL option selected in MEMORY OPTIONS page in the Installation Setup (see chapter 2.8.5). The Transceiver provides possibility to store 9 recently selected VHF frequencies.

The Last Channels Database of the transceiver updates automatically only when operated in Standard Mode, Direct Tune Mode or Scan Function.
When a new Active Frequency stay selected for at least 10 seconds, the VHF frequencies stored in LAST1, LAST2 … LAST8 shift to LAST2, LAST3 … LAST9 and the current Active Frequency is stored as LAST1.
In Channel Mode the automatically stored frequencies "LAST" can be recalled (see chapter 3.5.3).

3.10 Auxiliary Audio Input

The transceiver has an auxiliary audio input. In the Installation Setup, enabling or disabling the auxiliary audio is provided (see chapter 2.8.5, page "CONFIGURATION").
Is the input enabled, the audio signal applied to this input is transferred to the audio output(s) while the transceiver is in Receive Mode.
Is the input disabled, the adjacent input signal will be ignored.

AUX AUTO MUTE function depends on the AUX INPUT is selected on CONFIGURATION page in the Installation Setup (refer to chapter 2.8.5).
AUX AUTO MUTE function will mute the audio signal from the auxiliary audio input automatically, as long as the AR6201-(XOX) detects (based on squelch evaluation) a RX from the signal or user deactivates the squelch manually.

If this function is disabled the signal from the auxiliary audio input is permanently audible on the audio output, independently of the received signal or the squelch status.

Automatic aux attenuation functionality is coupled with the auxiliary audio input (Installation Setup, screen AUTO AUX ATT in chapter 2.8.5). The level of the auxiliary input signal attenuates if intercom is activated by VOX or by /IC discrete input. The auxiliary input signal reverts to its previous value after intercom deactivation. The attenuation value can be adjusted within the range from 0 to 40dB.

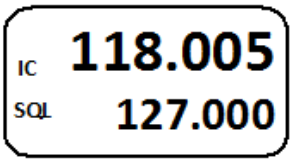
The auxiliary audio input signal is, if enabled and not muted, mixed with the received signal from antenna and the intercom signal (if squelch triggered and intercom activated).

3.11 Intercom Operation

The transceiver has an internal built in intercom. With activated intercom the signals from the microphones are mixed and amplified to become audible on headphone output. This enables internal communication via headsets between both pilots.

Intercom operation in Receive Mode is also possible:
- Automatically via VOX (threshold adjustable in the Intercom Menu),
- Externally via intercom switch (pin P1-7).

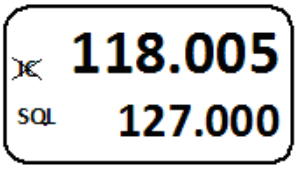
If intercom operation is activated the "IC" sign is displayed.



Intercom operation is not possible in Transmission Mode.

Intercom activation via VOX is not possible if:
- Speaker is enabled (see chapter 0),
- VOX is disabled by the user (refer Intercom Menu, chapter 3.13.1).

In both cases, the display shows the ~~IC~~ sign to indicate that activation via VOX is not possible.



Activation of Intercom operation provided by an external intercom switch independent of VOX or speaker status (enabled/disabled). The external intercom switch has priority. During intercom operation the Speaker output is disabled

3.12 VOX & speaker operation

The AR6201-(XOX) disables VOX if enabling speaker in active Audio Configuration.

With active speaker, enabled in Audio Configuration, VOX is always "OFF" and intercom via VOX is not possible. This prevent from oscillation of VOX due to acoustical feedback.

Speaker output is switched "OFF" even if speaker is enabled in current Audio Configuration in one of the following cases:
- Transceiver is in Transmission Mode,
- Intercom is activated by external intercom switch (/IC input),
- Power supply is below 10 Volt.

3.13 Menus

During normal operation in one of the Frequency Selection Modes the following menus can be activated:
- Intercom Menu for adjustment of intercom volume and VOX threshold,
- Pilots Menu for adjustment of panel brightness and squelch threshold.

3.13.1 Intercom Menu

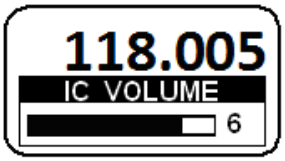
A long press on "IC/SQL" key activates the Intercom Menu.
Another long press on MDE key terminates Intercom Menu, or leaves the menu automatically after 5 s timeout.

The Intercom Menu consists of two pages:
- Intercom Volume (first page),
- Intercom VOX (second page).

A short press on "IC/SQL" key provides toggling between the pages.

- **Intercom Volume Menu**

The Active Frequency stays indicated in the top line of the display, while "IC VOLUME" label appears in the bottom lines. Below the label "IC VOLUME" a bar graph with numerical value is displayed.



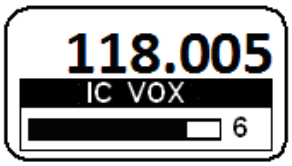
By means of the "ROTARY ENCODER" the intercom volume can be changed from 0 to 46, 0 means minimum intercom volume, 46 means maximum intercom volume. Intercom volume setting affects the Intercom audio signal and Sidetone signal routed to the headphone.

Note: In installation with the second controller (see Figure 2-11), adjustment of Intercom Volume by means of the RT6201 has no effects. IC VOLUME can be regulated only by means of AR6201-(XOX).

A short press on the "IC/SQL" key activates the Intercom VOX page.

- **Intercom VOX Menu**

The Active Frequency stays indicated in the top line of the display. On the next two lines the label "IC VOX" and a bar graph with numerical value are indicated.



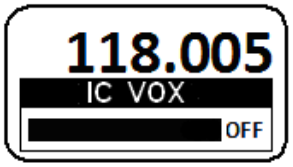
By means of the "ROTARY ENCODER", Intercom VOX threshold can be set. Setting -30 means VOX is most sensitive and even a very low microphone signal already triggers the VOX threshold for Intercom operation, +10 means that VOX is less sensitive and only high microphone signals trigger the VOX threshold for Intercom operation.

Note: At a setting for VOX threshold of -15 a convenient behaviour of the VOX should be achieved in most aircrafts. This requires that mike sensitivity had been correct adjusted (Installation Setup). If the mike sensitivity is incorrect adjusted, VOX may work not satisfying.

Note: In installation with the second controller (see Figure 2-11), AR6201-(XOX) adjusts VOX threshold for Microphone 1 only, RCU6201 adjusts VOX threshold for Microphone 2 only (see description of /MIKE_SW pin in chapter 2.4.2).

An adjustment of the VOX threshold level is not possible if VOX forced to be "OFF" (due to Enabled speaker in current Audio Configuration).

By changing the VOX threshold level to above +10, VOX can be switched "OFF". In this case, "OFF" replaces the numerical value indication (see figure below):



If VOX switched "OFF", activation of intercom operation by the external intercom switch (/IC discrete input) is possible at any time.

3.13.2 Pilots Menu

Make a two seconds press on the "MDE" key to enter the Pilots Menu. The Pilots Menu can be left by a two seconds press again on the "MDE" key, or left automatically after a few seconds, or after a short push on the "ROTARY ENCODER" when SQUELCH setting page is visible.

The Pilots Menu consists of two pages:

- BRIGHTNESS (first page)
- SQUELCH (second page)

Toggling between the pages is provided by a short press on the "MDE" key, or by a short press on the "ROTARY ENCODER".

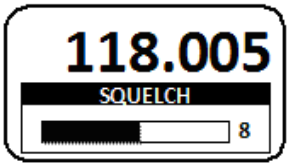
BRIGHTNESS

The Active Frequency stays indicated in the top line of the display. Underneath the Active Frequency, the "BRIGHTNESS" label appears in combination with a bar graph including a figure for the selected value.

The panel brightness for display illumination and pushbuttons can be changed from 0 to 100 by turning the "ROTARY ENCODER". Adjustment 0 means illumination is turns "OFF" completely and 100 means the illumination is at maximum.

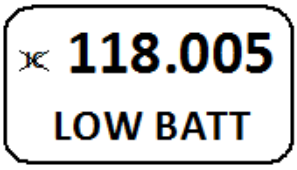
Note: This page is not available if in Installation Setup the dimming input is set to 14 V or 28 V. Dimming control by the aircrafts dimming circuit is at this selection performed.

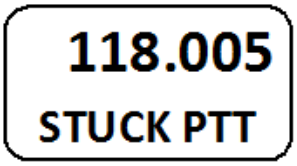
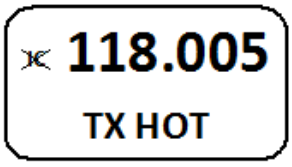
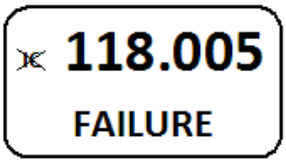
Another press on the "MDE" key change to SQUELCH and by means of the "ROTARY ENCODER", the setting can be changed. The Active Frequency stays indicated in the top line of the display and on the bottom line "SQUELCH" label appears together with a bar graph and a figure showing the current value.



The squelch threshold can be changed from 6 to 26 by means of the "ROTARY ENCODER".
Adjustment 6 makes very week and noisy signals audible. Squelch opens at about -105 dBm.
Adjustment 26 makes only quite strong signals with low noise content audible. Squelch opens at about -87 dBm.

3.14 Warning and Failure Indications

Display Contents	Description
 Reappear every 5 seconds.	"LOW BATT" appears after the supply voltage of the transceiver dropped below the threshold defined in the Installation Setup. Transceiver still operates. Depending on the aircrafts supply voltage the transceiver may have a reduced performance. Below 10 volts the speaker output is switched "OFF"! Possible reasons for indication: - Problems with battery capacity (gliders), - Power interrupts, - General problem of power supply, - Wrong (too high) adjusted threshold in Installation Setup (refer to LOW BATTERY TRH page in chapter 2.8.5).

Display Contents	Description
 Reappear every 5 seconds.	"STUCK PTT" indication appears after 120 seconds of continues transmitting. The transceiver return to Receive Mode even if the /PTT line is still active (GND). For initiating a new transmission, the /PTT line needs first to become inactive (open). Possible reasons for indication: - Transmitting more than 120 seconds. - PTT-key stuck. - /PTT line permanently grounded (short circuit in installation).
 Reappear every 5 seconds.	"TX HOT" indicates the internal device temperature exceeds + 90°C. The AR6201-(XOX) still operates, but the transmitter has reduced RF output power. Possible reasons for "TX HOT" indication: - Too hot environmental temperature, excessive long transmissions times in insufficient airflow conditions.
 Reappear every 5 seconds.	The transceiver has detected an internal failure during normal operation. Depending on failure reason, the device may still operates with a degraded performance or not operate at all. Possible reasons for indication: - Out of specified environmental conditions - HW or SW failure inside the transceiver. Contact maintenance shop for assistance.
	The transceiver has detected an internal failure during start up. Depending on failure reason, the device may still operates with degraded performance or not operate at all. Possible reasons for indication: - Out of specified environmental conditions - HW or SW failure inside the transceiver. Contact maintenance shop for assistance.