

# **BECKER**

AVIONIC SYSTEMS

**Control Unit**

**CU 5209 - ( )**

## **Installation and Operation**

Manual                      DV 60507.03  
Issue 1                      August 1997

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LIST OF EFFECTIVE PAGES

Page No.:	Date :	Page No.:	Date :
Title	08/97		
1 -I - 1-II	08/97		
1-1 - 1-6	08/97		
2-I - 2-II	08/97		
2-1 - 2-6	08/97		
3-I - 3-II	08/97		
3-1 - 3-12	08/97		

## TABLE OF CONTENTS

---

<b>Section</b>	<b>I</b>	<b>General Information</b>	<b>Page</b>
1.1		Introduction	1-1
1.2		Purpose	1-1
1.3		General description	1-2
1.3.1		Mechanical description	1-2
1.3.2		Electrical description	1-2
1.4		Technical data	1-3
1.5		Software	1-3
1.6		Overview of variants	1-4
1.7		Specification	1-4
1.8		Environmental influences	1-5
1.9		Scope of delivery	1-6
1.10		Accessories (not included in scope of delivery)	1-6

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## Section I General Information

### 1.1 Introduction

The CU 5209 - ( ) control unit is described in the "Installation and Operation" DV 60507.03 and "Maintenance and Repair" DV 60507.04 manuals.

The manuals DV 60507.03 "Installation and Operation" and DV 60507.04 "Maintenance and Repair" contain the following sections:

	Section	DV 60507.03	DV 60507.04
1	General Information	X	X
2	Installation	X	X
3	Operation	X	X
4	Theory of Operation		X
5	Maintenance and Repair		X
6	Illustrated Parts List		X
7	Modification and Changes		X
8	Circuit Diagrams		X

### 1.2 Purpose

The CU 5209-( ) control unit is used to operate and control the RT 3209 - ( ) VHF-transceiver. Both enable voice communication on 760 channels in the 118.000 MHz to 136.975 MHz range with a channel spacing of 25 kHz.

The mechanical construction of the control unit is such that it can be installed without limitation in aircraft. There is no restriction with regard to installation in the instrument panel or installation by rigid attachment to the fuselage in any aircraft, including rotary wing aircraft, in the verified environmental categories.

### 1.3 General description

#### 1.3.1 Mechanical description

The control unit is designed for installation in the instrument panel of aircraft. The dimensions correspond to the ARINC standard for standard instruments of 60 mm (2 1/4") diameter. Installation is by means of four bolts (back panel mounting).

All the controls and indicators are located on the front panel. The equipment connectors are fitted on the back.

The control unit consists of the following circuit boards:

- Display Board,
- Switch Board,
- Processor Board,
- Power Supply Board.

Mechanically the control unit consists of a front section and rear section. The front section contains the Display Board and the Switch Board and these boards are connected to each other by a connector and held in place within the unit by four bolts. The Processor Board, which is also secured to the front section by two bolts, is mounted on the switch board. The Power Supply Board is inserted into the rear section and secured from outside (back of rear section) by three bolts. After all the boards are assembled, the front and rear sections are joined and secured to each other by four bolts inserted from the front section.

#### 1.3.2 Electrical description

After power on, an initialization phase takes place between the control unit and transceiver. During this period, data transmission takes place from the remote transceiver to the control unit. This is necessary because the data backup takes place in the remote transceiver. On completion of this phase, the mode which was set before power off is automatically displayed on the control unit.

The frequencies are indicated by means of an LC display. The required active working frequency can be set in the top line of the LC display by means of the MHz and kHz frequency selector switches. The MHz rotary switch engages at steps of 1 MHz, the kHz rotary switch at 25 kHz steps. In the frequency preselection mode, a faster frequency change between the set active frequency and the preset frequency is achieved by pressing the (**<->**) **exchange** key.

A storage device enables 20 different frequencies to be stored, which are also retained when the unit is switched off.

Data transmission between the control unit and transceiver takes place through a bi-directional, serial RS 422 interface.

**1.4 Technical data**

Power supply	+ 13.75 V to + 27.5 V d.c.
Emergency power supply	+ 10 V d.c.
Power consumption (without panel lighting)	≤ 0.06 A at 13.75 V ≤ 0.06 A at 27.5 V
Panel lighting	≤ 0.160 A at 13.75 V ≤ 0.080 A at 27.5 V
Operating temperature	- 20° C . . . + 55° C
Storage temperature	- 55° C . . . + 85° C
Operating ceiling	50.000 ft
Interface	RS 422
Vibration resistance in accordance with EUROCAE/RTCA ED-14C/DO-160C	Cat. NM
Humidity resistance in accordance with EUROCAE/RTCA ED-14C/DO-160C	Cat. A / + 50° C; 95%, 48 h
Environmental performance class	DO-160C
Dimensions	61.3 x 61.3 x 62 mm H x W x D
Weight	0.26 kg

**1.5 Software**

All data such as the set frequencies, stored frequencies, selected mode etc. are stored in the transceiver. If the control elements are altered, a data transmission immediately takes place to the remote transceiver. The frequency display is controlled by a microcontroller. The software was classed as level C in accordance with the EUROCAE/RTCA Document ED12B/DO-178B.

**1.6 Overview of variants**

Table 1-1 shows the variants of the CU 5209 - ( ) control unit. There is no external difference between the different variants, i.e. dimensions, installation depth etc. are the same for all the series.

Article-No.	Type designation	Illumintion voltage	Background lighting		Panel surface	
			red-orange	blue-white	Powder coated	Painted
		14 V / 28 V				
0506.842-911	CU 5209 - (1) - 101	X	X			X

**1.7 Specification**

LBA-No.: 10.911/99JTSO

BAPT A133570J

Specifications

EUROCAE ED-23A JTSO - 2c37d

EUROCAE ED-23A JTSO - 2c38d

Software EUROCAE/RTCA Dokument  
ED-12B/DO-178B Level C

FTZ 17 TR 2010

Environmental categories D1-BA(MN)XXXXXXZBABATAXXX



**1.8 Environmental influences**

The following resistances to environmental influences were verified in accordance with EUROCAE/RTCA ED-14C/DO-160C.

Environmental influence	ED-14C DO-160C	Environmental class	Influence variable
Temperature and altitude	4.0	D1	
Low operating temperature	4.5.1		- 20° C
Low storage temperature			- 55° C
High short-duration temperature	4.5.2		+ 70° C
High operating temperature	4.5.3		+ 55° C
High storage temperature			+ 85° C
Negative pressure (altitude)	4.6.1		50.000 ft.
Temperature change	5.0	B	
Humidity	6.0	A	48 hrs at 50° C and ≥ 95% humidity
Impact under:	7.0		
Operating conditions	7.2		6 G/11 ms for the 3 axes
Crash landing conditions	7.3		Impact: 15 G/11 ms for the 3 axes
Vibration	8.0	MN	
Magnetic influence	15.0	Z	Deflection of a compass by 1° at a distance of ≥ 30 cm
Altered power supply	16.0	B	The functioning of the equipment on 10 V emergency power was verified
Voltage impulse on power supply	17.0	A	
Low frequency disturbing voltages	18.0	B	
Induced magnetic and electrical fields	19.0	A	
High frequency disturbing voltages and disturbing fields	20.0	T	
Unwanted radiation	21.0	A	

**1.9 Scope of delivery**

Control unit	Article-No.: 0506.842-910
4 Phillips head screw	Article-No.: 0868.590-203
or	
4 countersunk screw	Article-No.: 0889.350-204
Operating instructions	Article-No.: 0512.389-071

**1.10 Accessories (not included in scope of delivery)**

Equipment cable socket 15-pole (crimped version)	Article-No.: 0774.030-277
Equipment cable socket 15-pole (soldered version)	Article-No.: 0344.801-277
Housing with push-in locking	Article-No.: 0774.049-277
Manuals	
Installation and Operation DV 60507.03	Article-No.: 0511.528-071
Maintenance and Repair DV 60507.04	Article-No.: 0511.536-071

## TABLE OF CONTENTS

---

<b>Section</b>	<b>II</b>	<b>Installation</b>	<b>Page</b>
2.1	General		2-1
2.2	Inspection before installation		2-1
2.3	Mechanical installation		2-1
2.4	Aircraft wiring		2-1
2.4.1	General		2-1
2.4.2	Panel and display lighting		2-2
2.4.3	Connector contact assignment for 15-pole P 31 connector		2-2
2.5	List of Abbreviations		2-3
Fig. 2-1	Installation dimensions for the control unit CU 5209 - ( )		2-6

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## **Section II Installation**

### **2.1 General**

The installation of the control unit depends on the type of aircraft and its equipment and therefore only general information can be given in this section.

### **2.2 Inspection before installation**

Before installing the control unit in an aircraft, carry out a visual inspection for any transport damage, paying particular attention to the following.

1. Dirt, dents, scratches, corrosion, broken attaching parts on the housing and housing parts.
2. Dirt and scratches on the identification plate, front panel, LC display and marking.
3. Dirt, bent or broken pins, cracked connector inserts.
4. Dirt and mechanical damage to switches, keys and knobs.
5. Missing screws and bolts.

### **2.3 Mechanical installation**

The control unit is designed for installation in the instrument panel of an aircraft. It is constructed for rear panel mounting. The circular cutout and the attaching holes are to be drilled to suit a small instrument size. The necessary dimensional details are given in Fig. 2-1. The unit is attached using four bolts which are included in the scope of delivery. The aircraft wiring diagram is in Manual DV 60607.04 of the RT 3209 - ( ) transceiver.

### **2.4 Aircraft wiring**

#### **2.4.1 General**

The following points are to be observed for the wiring.

- a.) Only cable fit for aviation (self-extinguishing) may be used. AWG 20 for power supply and AWG 22 for other cables.
- b.) The interface lines TX-A/TX-B and RX-A/RX-B are each to be laid as 2-core twisted and screened (AWG 24) cables.
- c.) Rubber sleeves are to be fitted over the soldering points on the equipment connector.

- d.) A 5 A fuse or circuit breaker should be fitted in the power supply.
- e.) No HF cable should be included in the cable harnesses. Laying connecting cables together with cables which carry audio power or impulses is also to be avoided.
- f.) Check the wiring carefully before switching on the unit, particularly that (+UB) and (GND) have not been mixed up.

### 2.4.2 Panel and display lighting

The control unit is fitted with panel and display lighting. It can also be connected via a dimmer system.

Connection panel and display lighting	13,75 V Power supply	27,5 V Power supply
P 31 - Pin 6 ILL.A	+ 13,75 V	Ground
P 31 - Pin 8 ILL.B	Ground	+ 27,5 V

#### NOTE

The panel and display lighting is not switched off when the unit is switched off (ON/OFF switch).

### 2.4.3 Connector contact assignment for 15-pole P 31 connector

Pin	Connection	Description
1	TX-A	RS 422 interface
2	TX-B	RS 422 interface
3	Shield	Screen of RS 422 interface ground
4	RX-A	RS 422 interface
5	RX-B	RS 422 interface
6	ILL.A	Panel and display lighting A
7	Spare	Not wired
8	ILL.B	Panel and display lighting B
9	GND	Ground
10	GND	Ground
11	+UB	+ UB operating voltage
12	+UB	+ UB operating voltage
13	/ON	ON/OFF function
14	UBSW	Switched operating voltage
15	/X	Input special function low active

## 2.5 List of Abbreviations

The following abbreviations are used in this manual:

### Abbreviations

Fig.	Figure
AC	Alternating current
AM	Amplituden modulation
ARINC	Aeronautical radio incorporation
ARINC 429 Line	ARINC 429 serial bus
ARINC 410 Line	ARINC 410 parallel bus
ATR	Avionics transport rack
Bite	Built in test equipment (Self test)
COM	Communication (Transceiver)
CU	Control Unit
dB	Dezibel
dBm	Dezibel refer to 1mW
DC	Direct current
EMK (EMF)	Electromotive force
EMV	Electrical magnetic interference
EEPROM	Electrical erasable programable read only memory
EXT	External
FTZ	Fernmelde-Technisches Zentralamt
ft	Feet
ICAO	Internationale civil aviation organization
ILL.A	Illumination.A
ILL.B	Illumination.B

I/O ports	Input/Output ports
GND	Ground
Kbit/s	Data transfer rate
LBA	Lufffahrt-Bundesamt
LCD	Liquid crystal display
LOC	Localizer
MAX	Maximum
MTBF	Mean time between failure
N.C.	Not connected
NF-Signal	Audio signal
NOVRAM	Non volatile random acces memory
NVG	Night vision goggle
OUT	Output
/ON	ON/OFF function
PTT	Push-To-Talk
PRG	Program mode
PWR	Power
RAM	Random acces memory
RD	Read
RX-A	RS 422 interface
RX-B	RS 422 interface
/SCK	Seriell clock display
SDA	Seriell data I2c-bus
SCL	Seriell clock I2c-bus
SPARE	Spare
SQL	Squelch



TR	Transceiver
TX-A	RS 422 interface
TX-B	RS 422 interface
UBSW	Operating voltage switched
V5	Internal operating voltage + 5 V
VOL	Volume
VHF	Very high frequency
/X	Input special function, low activ
ZF	Intermediate frequency

BACK-PANEL MOUNTING

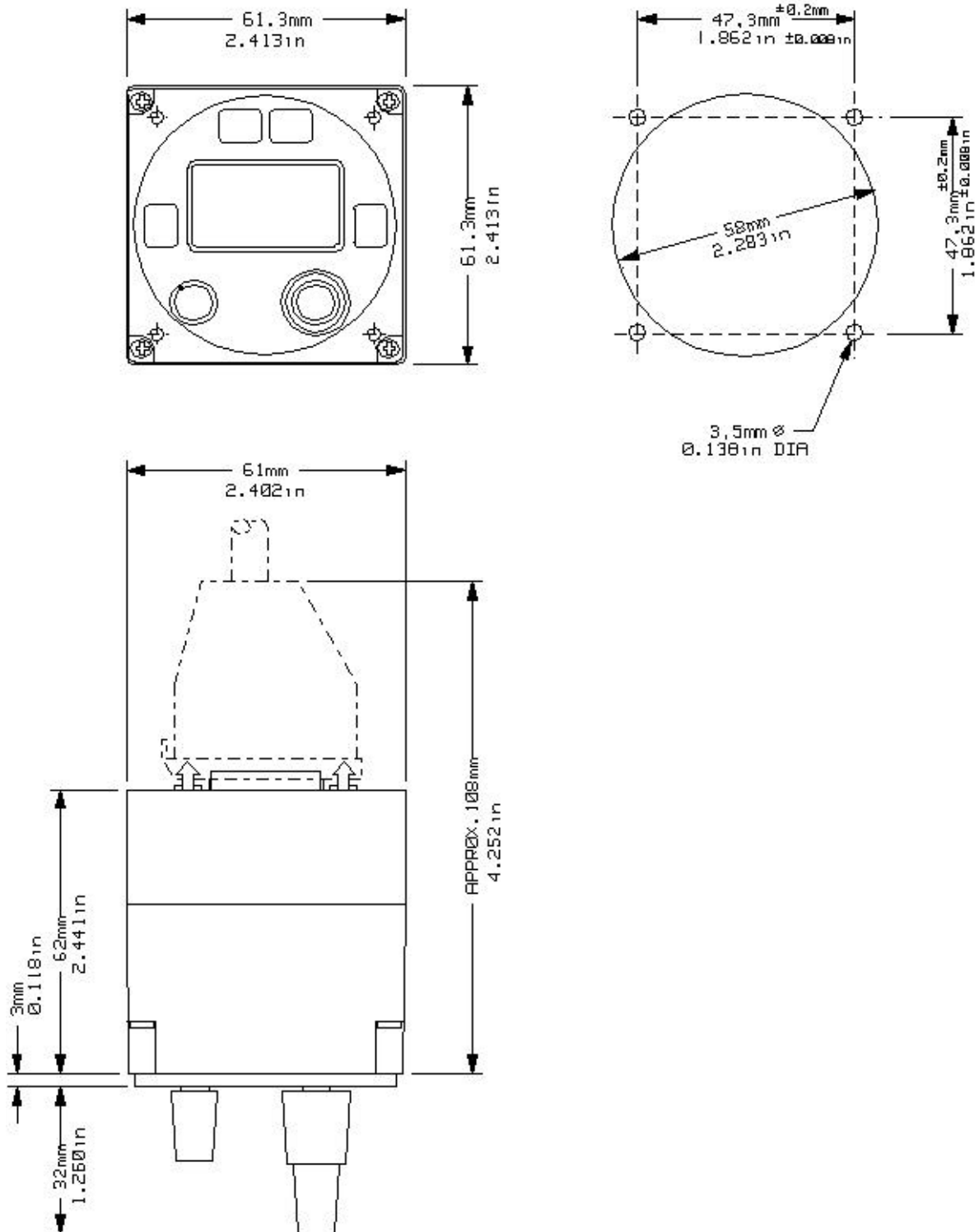


Fig. 2-1 Installation dimensions for the control unit CU 5209 - ( )

## TABLE OF CONTENTS

---

<b>Section</b>	<b>III</b>	<b>Operation</b>	<b>Page</b>
3.1		Controls and indicators	3-1
3.2		Operating instructions	3-3
3.2.1		Preparation	3-3
3.2.2		Switching on the control unit	3-3
3.2.3		Transmit/receive mode	3-3
3.2.4		Operation of intercom mode	3-4
3.2.5		Audio auxiliary input	3-4
3.2.6		Jamming of transmit button	3-5
3.3		Operation of the various modes	3-5
3.3.1		Frequency setting mode	3-6
3.3.2		Frequency preselection mode	3-6
3.3.3		Channel setting mode	3-7
3.3.4		Storage procedure	3-7
3.4		Service mode (equipment configurations)	3-8
3.4.1		Calling up the service mode	3-8
3.5		Deletion of all stored frequencies in the storage channels	3-12
3.6		Safety instructions	3-12
Fig. 3-1		Control unit CU 5209 - ( )	3-1

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**Section III Operation**

**3.1 Controls and indicators**

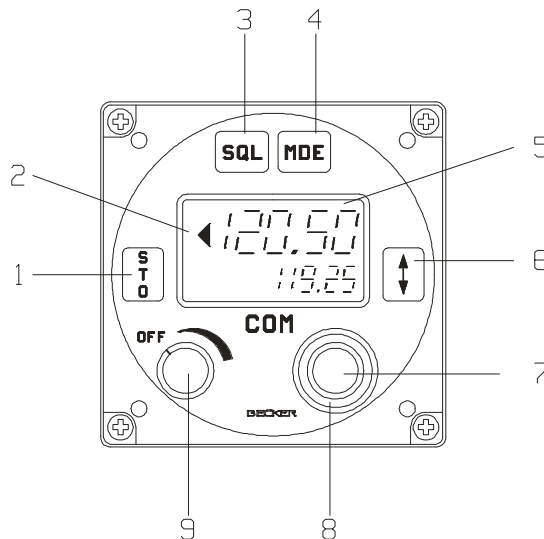









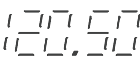
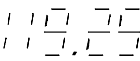

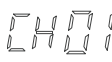



Fig. 3-1 Control unit CU 5209 - ( )

**Meaning of symbols on controls and indicators**

	Symbol	Description	Function
1		Store key	Storing the set frequency and other settings in the service mode.
3		Squelch key	Switching the squelch on or off. When SQL key pressed in the bottom line indicates "ON" or "OFF" for one second.
4		Function key	Selection of mode and selecting the parameter in the service mode.
6		Exchange key	Frequency preselection: Exchange of preset frequency and active frequency.
7		Frequency selector (inner rotary switch)	Switches the indicated frequency in 25 kHz steps or the storage channel by 1 step each case upwards or downwards, without carry over.

8		Frequency selector (outer rotary)	Switching the indicated switch frequency in 1 MHz (outer rotary switch) steps or the storage channel upwards or downwards in steps of 10.  The 3rd digit after the decimal point is not displayed, e.g 125.52 = 125.525 MHz.
9		ON/OFF switch combined with volume control	ON/OFF switch of VHF-transceiver and control unit and volume control.

**LCD (liquid crystal display) elements**

	Symbol	Description	Function
5		(top line)	Indication of active transmission/reception frequency (active frequency).
5		(bottom line)	Indication of preset transmission/reception frequency (preset frequency).
2		(top line)	Transmission indication (transmission button is pressed.)
5		(bottom line)	CH indication steady : indicates the storage channel.
5		(bottom line)	CH indication flashes : If the initiated storage operation is not completed by pressing the store key. "ch" = free channel "CH" = occupied channel (can be overwritten)
5		(bottom line)	Indication "ON"
5		(bottom line)	Indication "OFF"

**Rear of unit**

15-pin D sub-male

Equipment connector for connecting the installation wiring

## 3.2 Operating instructions

### 3.2.1 Preparation

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

#### **WARNING!**

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

### 3.2.2 Switching on the control unit

- a. Rotate the volume control clockwise and switch on the VHF-transceiver system.

#### **NOTE**

System initialization takes place, i.e. data is transmitted between the control unit and transceiver for the first 5 to 10 seconds after power on. The display flashes during this period. After completion of the initialization, the mode which was set before power off appears.

In all modes, disturbances of the VHF-transceiver system are displayed in the form of fault messages.

- E2 synthesizer failed, lock detect error
- E5 interface fault

A comprehensive description of the various modes follows the general operating instructions.

### 3.2.3 Transmit/receive mode

- a. Set the frequency of the local ground station. Rotate the **VOL** control to the centre position.

#### **NOTE**

If the error message E2 appears in the bottom indication during operation, the synthesizer is not latching and further R/T operation is no longer possible. The VHF-transceiver must be checked in a service station.

- b. Operate the transmit button and call the ground station. Hold the microphone close to the lips for optimum speech transmission.

#### **NOTE**

The arrow in the top line indicates transmit mode. During transmission a protective circuit prevents a frequency change or frequency channel change even if the frequency selector switch is rotated. The keying functions on the control panel are also inhibited.

Where there is acoustic feedback during transmission the sidetone volume on the VHF-transceiver must be turned down (refer to Service Mode for adjustment).

- c. Set the correct reception volume using the **VOL** control whilst the ground station is answering.
- d. Switch on the squelch (press **SQL** key again). Weak reception signals and reception noises are suppressed. The switch-on threshold of the squelch can be set in the service mode.

**NOTE**

When changing the mode or the frequencies (PRESET-ACTIVE frequency) the change is automatically stored 2 seconds after the last change took place. Due to this delay changes which were made immediately before switching off the transceiver will not be memorized. Exception: Memory actions are stored by pressing the **STO** key.

**3.2.4 Operation of intercom mode**

- a. Switch on the IC switch (external).
- b. Operate the intercommunication (IC).
- c. If necessary, the IC volume can be adjusted to the noise level of the aircraft (for adjustment refer to service mode).

**3.2.5 Audio auxiliary input**

A second and third radio unit (navigation receiver) can be monitored simultaneously via the audio auxiliary input. During transmission the auxiliary input is switched off from the audio amplifier. If necessary, the input sensitivity can be matched to the noise level of the aircraft (for setting refer to service mode).



### 3.2.6 Jamming of transmit button

The VHF- transceiver system is fitted with a protective circuit to avoid unwanted transmitting if the a transmit button is jammed or a short circuit is on the PTT key line. For continuous transmissions exceeding three minutes the protective circuit automatically switches from transmission to reception. This avoids the switched channel being blocked.

It is possible to activate the transmitter again immediately by re-pressing the transmit button. In the event of a fault, this is only possible after the short circuit has been cleared or the transmit button released.

#### CAUTION

In order to be able to continue transmitting even with the transmit button jammed, the VHF-transceiver must be switched off and then back on again. After that the VHF- transceiver then continues to operate in the transmit mode for a further three minutes.

### 3.3 Operation of the various modes

The VHF- transceiver system contains various functions which are performed under three modes. The individual modes are selected by pressing the **MDE** key on the control unit.

#### Frequency setting mode

Display of the active frequency in the top line. The bottom line is switched off. The active frequency can be directly changed using the frequency selector switches.

#### Frequency preselection mode

Display of the active and preset frequency. The preset frequency can be set using the frequency selector switches. Pressing the **exchange** key changes over from the active to the preset frequency.

#### Channel setting mode

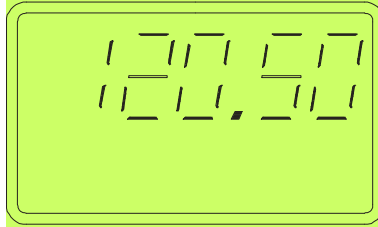
Display of the stored frequencies in the storage channels. The channels can be selected using the frequency selector switches.

#### NOTE

All setting or frequency changes are automatically stored after two seconds. This means that changes which are made immediately before switching off are not stored. This does not include deliberate storage operations performed using the **STO** key.

### 3.3.1 Frequency setting mode

Select the mode using the **MDE** key. The active frequency is shown in the top line. The bottom line is switched off.



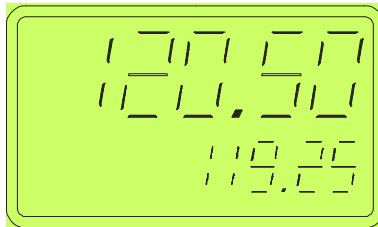
The active frequency can be changed using the **MHz** and **kHz** frequency selector switches. The set frequency is held even when the unit is switched off.

#### Change of mode

To change the mode, press the **MDE** key.

### 3.3.2 Frequency preselection mode

Select the mode using the **MDE** key. The last indicated active and preset frequency are shown in the top and bottom lines respectively.



The preset frequency (bottom line) is set using the **MHz** and **kHz** frequency selector switches. Pressing the **<-> exchange** key changes over between the active and preset frequency.

#### NOTE

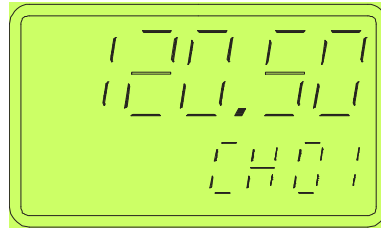
The VHF-transceiver system is always ready to receive and transmit on the frequency shown in the top line.

#### Change of mode

To change the mode, press the **MDE** key.

### 3.3.3 Channel setting mode

Select the channel setting mode using the **MDE** key. The last indicated storage channel appears in the bottom line and the stored frequency is shown in the top line. The transceiver is ready to receive and transmit on this frequency.



Select the require channel using the **kHz** frequency selector switch (single steps) or **MHz** frequency selector switch (steps of ten).

#### NOTE

Only channels with frequencies assigned can be selected.

#### Change of mode

To change the function, press the **MDE** key.

### 3.3.4 Storage procedure

A storage procedure can be performed at any time and is activated by pressing the **STO** key.

- a. Press the **STO** key. The active frequency remains indicated in the top line. The transceiver system is ready to receive and transmit on this frequency. The active frequency is shown flashing in the bottom line and, in the frequency preselection mode, the preset frequency. Set the required frequency using the **kHz** frequency selector switch and the **MHz** frequency selector switch.
- b. Press the **STO** key. The next free channel is shown flashing "ch". The channel in which the frequency is to be entered is selected using the **MHz** and **kHz** frequency selector switches. Channels which are already occupied are indicated by "CH" and can be overwritten.
- c. Press the **STO** key. The frequency is stored in the selected channel and the storage procedure ended.

#### NOTE

If no input (action) takes place for more than 7 seconds during the storage procedure, the operation is automatically broken off. A storage operation can be broken off at any time by pressing the **MDE** key.

### 3.4 Service mode (equipment configurations)

The service mode is intended to enable the ground technicians to set the equipment configuration and must not be used in flight.

The following settings can be changed or set:

Indication	Explain	Range
Sql	Setting the switch-on threshold of the squelch	0 . . . 200 (steps of 5)
IC	Setting the IC volume	0 . . . 63
AU	Setting the audio auxiliary volume	0 . . . 63
SIdE	Setting the sidetone volume	0 . . . 63
SEnS	Dynamic mike input sensitivity	0 . . . 63
FrCH	Inhibiting the frequency setting (channel selection only (ON/OFF))	OFF / On
ChSt	Inhibiting the frequency storage (ON/OFF)	OFF / On
dEL	Erasure of stored frequencies	2 . . . 99
COdE	Entering a password to interlock the equipment configuration	0000 . . . 9999

#### 3.4.1 Calling up the service mode

Press and hold the **MDE** key whilst the unit is being switched on and wait until the version number is displayed. As long as the **MDE** key is held pressed, the following is shown in the top line.

On the left, two positions of the software version number of the transceiver.  
Right two positions of the software version number of the control unit.

Release the **MDE** key. Sql appears in the top line and OFF or ON in the bottom line.

#### NOTE

In the service mode, the transceiver operates on the frequency last set as the active frequency, regardless of the settings on the control knob.

The parameters in the service mode are selected in steps by pressing the **MDE** key.

### Setting the squelch threshold

If function "Sql" is called up, the following displays appear :

top line	Sql
bottom line	0 to 200 sensitivity (HI < -> LO)

Set the squelch threshold using the **kHz** frequency selector switch (steps of 5) or **MHz** frequency selector switch (steps of 50). The set value is stored by pressing the **STO** key.

### Setting the IC level

Call up the "IC" function using the **MDE** key. The following displays appear :

top line	IC
bottom line	00 to 63 (LO level HI)

Set the IC level using the **kHz** frequency selector switch (steps of 1) or **MHz** frequency selector switch (steps of 10). Every change can be checked by means of the headset. The set value is stored by pressing the **STO** key.

### Setting the audio auxiliary level

Call up the "AU" function using the **MDE** key. The following displays appear :

top line	AU
bottom line	00 to 63 (LO level HI)

Set the audio auxiliary level using the **kHz** frequency selector switch (steps of 1) or **MHz** frequency selector switch (steps of 10). Every change can be checked by means of the headset. The set value is stored by pressing the **STO** key.

### Setting the sidetone level

Call up the "Slde" function using the **MDE** key. The following displays appear :

top line	Slde
bottom line	00 to 63 (LO level HI)

Set the sidetone level using the **kHz** frequency selector switch (steps of 1) or **MHz** frequency selector switch (steps of 10). Every change can be checked by means of the headset. The set value is stored by pressing the **STO** key.

### Setting the dynamic mike input sensitivity

Call up function "SEnS" using the **MDE** key. The following displays appear :

top line	SEnS
bottom line	00 bis 63 (LO sensitivity HI)

Press the transmit button. The dynamic mike input sensitivity can be changed using the **kHz** frequency selector switch (steps of 1) or **MHz** frequency selector switch (steps of 10). Every change can be checked by means of the headset. The set value is stored by pressing the **STO** key.

### Release the frequency setting (channel selection only)

Call up function "FrCh" using the **MDE** key. The following displays appear :

top line	FrCh
bottom line	ON or OFF

Select the required function using the **kHz** frequency selector switch and store the function by pressing the **STO** key.

- OFF = Frequency setting not possible. The VHF-transceiver can only work on the frequencies stored in the individual channels.
- ON = Frequency setting possible (standard setting).

### Release the frequency storage

Call up function "ChSt" using the **MDE** key. The following displays appear :

top line	ChSt
bottom line	ON or OFF

Select the required function using the **kHz** frequency selector switch and store the selection by pressing the **STO** key.

- OFF = The storage of frequencies in the individual channels is not possible. The VHF-transceiver can only work on the set frequency.
- ON = Storage of frequencies in the individual channels is possible (standard setting)

### Erase stored frequencies

Call up function "dEL" using the **MDE** key. The following displays appear :

top line	dEL
bottom line	CH channel number

Select the channel to be erased using the **kHz** frequency selector switch (steps of 1) or **MHz** frequency selector switch (steps of 10). The stored frequency is erased by pressing the **STO** key. The channel No. 1 cannot be erased.

### Entry of password to interlock the equipment configuration

Call up the "COdE" function using the **MDE** key. The following displays appear :

top line	COdE
bottom line	0000

Select a digit using the **MHz** frequency selector switch (select digit is flashes). Select a number between 0 and 9 with kHz frequency selector switch. Select the next digit with **MHz** frequency selector switch and select a number between 0 and 9 and so on. After set 4 digit, store the numerical code by pressing the **STO** key.

#### NOTE

As soon as a password is given a 0000 appears in the bottom line when the service mode is called up. The numerical code must then be input using the **MHz-** and **kHz** frequency selector switch and press the **STO** key. If the VHF-transceiver detects a false numerical code, it automatically switches to the last mode. If the password is to be erased or changed, this is done by calling up the service mode using the old password. The COdE function is then chosen and either a 0 is entered everywhere or the changed numerical code is entered.

Normal transmitting and receiving can be extended without using the password.

The password is stored in the control unit. If the password gets lost only the control unit needs to be send back to the manufacturer.

### Ending of the service mode

The control unit must be switched off to end the service mode.

### 3.5 Deletion of all stored frequencies in the storage channels

Press and hold the **STO** and **MDE** keys whilst switching on the unit. All the stored frequencies in the storage channels are deleted, with the exception of channel 01.

### 3.6 Safety instructions

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

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