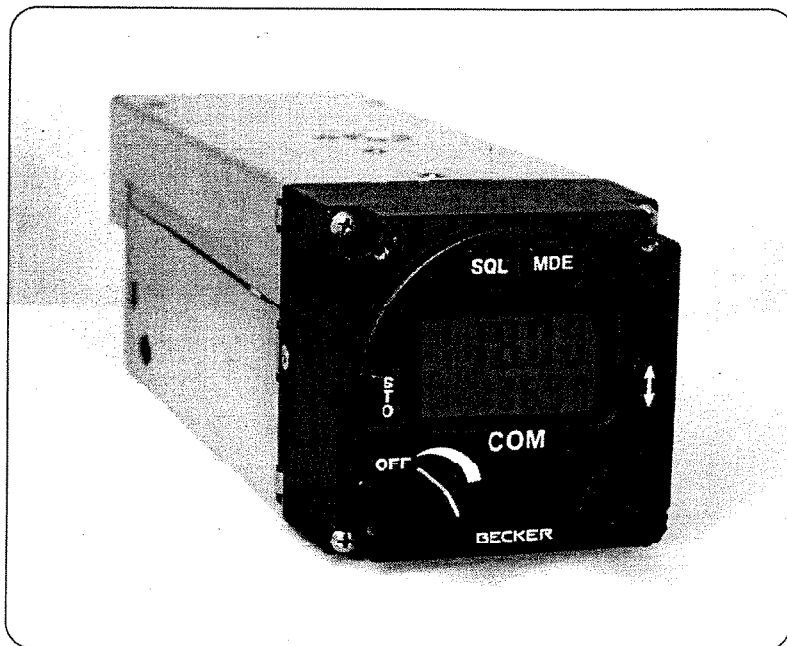


## **OPERATING INSTRUCTIONS**



**BECKER AR 4201**

**VHF-Transceiver**  
upwards serial - No.: 1000

**BECKER**  
AVIONIC SYSTEMS

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Ausgabe / Issue 01/96

Bestell-Nr. / Part No. 894.001-071

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## ***Operating Instructions***

### **IMPORTANT**

Carefully read these operating instructions right through before attempting to operate the VHF transceiver.

Keep these operating instructions carefully. They contain important safety and operating instructions for the VHF transceiver.

### **INTRODUCTION**

Thank you for purchasing the BECKER VHF transceiver. The VHF transceiver can be installed in the instrument panel and is easy to operate. The technology used is to the state of the art.

To fully utilise the capabilities of your VHF transceiver, please carefully read these operating instructions right through before you start operating the set.

If you have any questions regarding the operation of the VHF transceiver, please get in touch with your nearest Becker Dealer or with the Becker Customer Service.

## **BECKER AR 4201**

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The CAUTION, WARNING and NOTE highlights have the following meanings:

|                |  |
|----------------|--|
| <b>WARNING</b> | Failure to comply, or incorrect compliance, with these instructions or procedures can lead to injuries or fatal accidents. |
| <b>CAUTION</b> | Failure to comply, or incorrect compliance, with these instructions or procedures can lead to damage to equipment.         |
| <b>NOTE</b>    | Feature to which attention should be drawn.  |

**CAUTION**

- Never connect the VHF transceiver to alternating current voltage or to voltage sources exceeding 15 V.d.c.
- Never connect the VHF transceiver with reversed polarity to a voltage source.
- The installation or use of the VHF transceiver in ambient temperatures below -20°C or above +55°C is to be avoided.
- Switch off the unit when starting or shutting down engines.

**SAFETY INFORMATION**

- 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. Therefore, when transmitting ensure that the triangle in the top line on the left next to the active frequency display disappears when the transmission button is released.

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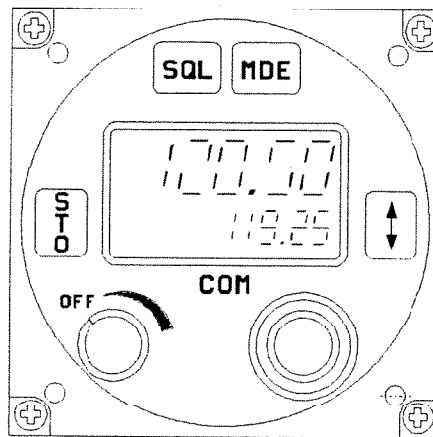
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## **GENERAL INFORMATION**

The VHF transceiver enables voice communication on 760 channels in the 118.000 MHz to 136.975 MHz range with a channel spacing of 25 kHz. The VHF transceiver is designed with sufficient mechanical strength to enable it to be fitted in an aircraft without any limitations. There is no restriction within the verified environmental classes on fitting in the instrument panel, or fixed mounting in the fuselage, of all types of aircraft including rotary wing machines.

## CONTROLS AND INDICATORS







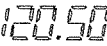

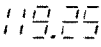
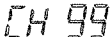
### Meaning of symbols on controls and indicators

|   |              |   |
|---|--------------|---|
|  | Function key | Selection of mode   |
|  | Exchange key | Mode 1:<br>Exchange of preset<br>frequency and active frequency.<br><br>Mode 3:<br>Switching between temperature and<br>operating voltage indication. |
|  | Store key    | Storage of set frequency or in Mode 2<br>a change between the channel<br>selection mode and scan mode.  |

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## Operating Instructions

|   |   |  |
|---|---|--|
|    | Squelch key                                     | Switching the squelch on or off.<br>When the key is pressed, the bottom line indicated ON or OFF.  |
|    | Frequency selector switch (outer rotary switch) | Switching the indicated frequency in 1 MHz steps or the storage channel upwards or downwards in steps of 10.                             |
|    | Frequency selector switch (inner rotary switch) | Switches the indicated frequency in 25 kHz steps or the storage channel by 1 step in each case upwards or downwards, without carry over. |
|  | ON/OFF switch, combined with volume control     | Adjustment of volume   |
|  | (top line)                                      | Indication of active transmission/reception frequency (active frequency).  |
|  | (top line)                                      | Transmission indication (transmission button is pressed).  |
|  | (bottom line)                                   | Indication of preset transmission/reception frequency (preset frequency).  |
|  | (bottom line)                                   | CH indication steady: indicates the storage channel.   |

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(bottom line)

CH indication flashes:  
if the initiated storage  
operation is not completed by  
pressing the store key.

F

(bottom line)

Indication that the selected  
storage channel is not occupied.

24.0C

(bottom line)

Indication of temperature  
Celsius  
or  
Fahrenheit

72.0F

V 11.7

(bottom line)

Indication of supply voltage



Indicating segment flashes.  
Supply voltage  $\leq 10.5$  V.

LS 99

(bottom line)

Indication of scan function

ON

(bottom line)

Indication ON

OFF

(bottom line)

Indication OFF

## OPERATING INSTRUCTIONS

### Switching on the unit

**CAUTION**

Do not switch on the VHF transceiver when engines are being started or shutdown.

Switch on the VHF transceiver using the **ON/OFF** switch (rotate volume control clockwise).

Both LCDs must show the numbers 188.88 flashing (unit test approximately 2 seconds). If the test is positive, the VHF transceiver automatically switches to the mode which was selected before switch-off. If the test is negative, the LCD flashes for approximately 5 seconds. A fault report can be called up by pressing the store key. After approximately 5 seconds the VHF transceiver automatically switches to the mode which was selected before switch-off.

The following fault signals are possible:

|    |  |
|----|--|
| E1 | Processor defective                    |
| E2 | Synthesizer failed                     |
| E3 | Fault in EE-PROM                       |
| E4 | Controller (PIC) audio board defective |

The various modes are comprehensively described in the Annex to the General Operating Instructions.

**Transmit/receive mode**

Set the frequency of the local ground station in the preset display and press the exchange key. Rotate the **VOL** control to the centre position. Operate the transmit button and call the ground station. Hold the microphone close to the lips for optimum speech transmission.

**NOTES**

The arrow in the top line of the display 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.

If the error message E2 appears in the top line during operation, the synthesizer is not latching and further transmit / receive operation is no longer possible. The VHF transceiver must be checked in the next service station.

Set the correct reception volume using the **VOL** control whilst the ground station is answering.

Switch on the squelch (muting) (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 as storage by pressing the **STO** key.

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## ***Operating Instructions***

### **❑ Operation of aircraft intercommunication**

Switch on the **IC** switch (external) and operate the aircraft intercommunication (**IC**). **IC** volume can be adjusted in service mode.

### **❑ Jamming of transmit button**

The AR 4201-( ) is fitted with a protective circuit to protect against jamming of the transmit button or a short circuit on the key supply line. For continuous transmissions exceeding two 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.

### **NOTE**

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 two minutes.

**□ Flashing of the LCD**

If the power supply for the VHF transceiver drops below 10.5 V, the display begins to flash. This flashing indicates, when operating on batteries for example, that the batteries require recharging. In practice the display begins to flash in the transmit mode because this is when the power consumption is greatest. If the power supply again increases above 10.5 V, the flashing ceases.

Because the discharge curves of the batteries are very dependant on the type of battery, e.g. lead or nickel/cadmium accumulators, and the ambient temperature also influences the discharge curves, it is not possible to state precisely how long the VHF transceiver continues to be fully functional after the LCD begins to flash.

When transmitting, the batteries can be completely discharged after a few transmission cycles but during reception functioning is still guaranteed in most cases for approximately 1 to 2 hours after the flashing begins. At 10 V supply voltage the unit still continues to function at reduced transmission power.



❑ **Operation of the various modes**

The VHF transceiver performs various functions which are covered by individual operating modes.

The mode is selected by briefly pressing the **MDE** key. If it is pressed for a long time (more than 1 second) this selects mode 1.

**Modes:**

- 1 Standard mode (display of active and preset frequency), setting the preset frequency and storing frequencies in the storage channels.
- 2 Display of the storage frequencies in the storage channels or calling up the scan function.
- 3 Display of active frequency, power supply voltage and temperature (option).
- 4 Service mode, for setting the equipment configuration.

**NOTE**

When changing the mode or the frequencies (Preset/Active frequency) the change is automatically stored 2 second 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 as storage by pressing the **STO** key.

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### Mode 1 (standard mode)

The last displayed active and preset frequencies appear in the LCD display.



The preset frequency (bottom line) is set using the **MHz** and **kHz** frequency selector switches.

When the **exchange** key is pressed, a change from the active to the preset frequency occurs. A further operation of the key cancels the frequency change.

### **Storage operation**

Pressing the **STO** key.

The active frequency remains displayed in the top line. The VHF transceiver is ready to transmit and receive on this frequency.

The preset frequency appears flashing in the bottom line. The required frequency can be set using the **kHz** frequency selector (steps of 1) or the **MHz** frequency selector (steps of 10).

Pressing the **STO** key.

The next free channel is shown flashing "ch" and the letter F (free channel) appears in the bottom line before CH. A no memory channel is free, the highest assign memory channel is selected automatically.

Press the **STO** key.

The selected frequency is stored in the free channel and the storage process is ended.

or

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## Operating Instructions

Select the channel to be overwritten using the **MHz/kHz** frequency selector and press the **STO** key. This means that this channel will be overwritten with the new frequency and the storage process ended.

### Note

If no input takes place within approximately seven seconds, the VHF transceiver switches to the previously set mode.

### Leaving the mode

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

### Mode 2 (display of fixed frequencies in the various channels)

Channel selection mode

#### NOTE

If in mode 2 the scan function is switched on in the service mode, no storage operation can be activated in this mode.

Select mode 2 using the **MDE** key. The last indicated storage channel appears in the bottom line of the LCD and the stored frequency is shown in the top line. The VHF transceiver is ready to transmit and receive on this frequency.



The required channel can be selected using the kHz frequency selector (steps of 1) or the MHz frequency selector (steps of 10). Free channel (no frequency stored) will be skipped when selected.

Exit from mode 2 is achieved either by pressing the **MDE** key.

**☐ Scan function**

If the scan function is activated in the equipment configuration, pressing the **STO** key changes from the channel selection mode to the scan function. In the scan function, the frequency appears in the top line of the display and the associated channel with the preset CS is shown in the bottom line.

In the scan function, either all the occupied storage channels or a required range of storage channels can be scanned. The scanning range is specified in the service mode. The various storage channels are scanned in short intervals. If the microprocessor finds a carrier in one of the channels, it holds a short on this channel and checks whether an evaluatable signal is present. If no evaluatable signal is present, it switches to the next channel and then reverts to the short intervals (milliseconds range).

In the event of an evaluatable reception signal being received the VHF transceiver remains on the storage channel until an evaluatable reception signal is no longer present. After a hold time 0 to 60 seconds (can be set in the service mode) the scanning of the storage channels at short intervals begins again. The set squelch level is the criterium for an evaluatable reception signal, regardless of whether the squelch is activated or not.

The VHF transceiver is equipped with channel priority. This function can be switched ON or OFF in service mode SF 18.

**NOTE**

If an adequate signal is required on the priority channel with option channel priority switched ON, the VHF transceiver automatically leaves the SCAN mode and is ready for transmission and receive on this channel. For return to the SCAN mode, again press the **STO** key.

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## Operating Instructions

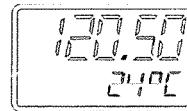
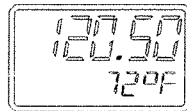
The scan function is terminated by pressing the **STO** key. The VHF transceiver then begins to operate again in the channel selection mode the CS in the bottom line goes out and CH appears. Exit from mode 2 is accomplished in the same way as described in the channel selection mode.

**Mode 3 Indication of operating voltage or temperature (option)**

When the **exchange** key is pressed, a change from the supply voltage and temperature indication occurs.

### NOTE

If no temperature sensor is connected, this mode is skipped when the **exchange** key is pressed.



The operating voltage and temperature is continuously measured. Indication takes place in mode 3. The mode is selected by briefly pressing the **MDF** key once or several times (depending on the previous state). The active frequency on which the VHF transceiver is ready for operation appears in the top line and the bottom line shows the measured voltage/temperature. The display in °C or °F can be set in the service mode.

The active frequency can be changed using both frequency selector switches. A storage operation is activated using the **STO** key. This procedure is described in Mode 1.

## **BECKER AR 4201**

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To exit mode 3 it is necessary to press either the **MDE** key.

### **☐ Service mode (equipment configurations)**

The service mode is meant 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:

|      |   |
|------|---|
| SqL  | Setting the switch-on threshold of the squelch                    |
| Slde | Setting the sidetone volume                                       |
| AU   | Setting the audio auxiliary volume                                |
| IC   | Setting the IC volume   |
| SF5  | Calibrating the temperature sensor                                |
| SF6  | Setting the addressable storage locations                         |
| SF7  | Setting the temperature display in °C or °F                       |
| SF8  | Switching on the scan function                                    |
| SF9  | Setting the hold time after completion of a call in the scan mode |
| SF10 | Release the frequency setting (channel selection only)            |
| SF11 | Release the frequency storage                                     |
| SF12 | Erasure of stored frequencies                                     |
| SF13 | Setting the "channel start" of the scanning range                 |
| SF14 | Setting the "channel end" of the scanning range                   |
| COdE | Entering a password to interlock the equipment configuration.     |
| SF16 | Dynamic mike input sensitivity                                    |
| SF17 | Inhibiting the transmit mode for one or more memory channel       |
| SF18 | Channel priority ON/OFF switch (option)                           |
| SFqL | No function   |
| SF20 | Speaker muting switch ON/OFF                                      |
| --   | Indication the software version and change status.                |

**NOTE**

The equipment configuration SQL, SIdE, AU, IC and SF16 settings given in the service mode are set by the factory as basic settings using standard values. If reversion to the standard values is required, the portable VHF Transceiver must be switched off and switched on again by simultaneously pressing the **STO** and **MDE** keys. This does not overwrite the password.

If no temperature sensor is connected, the mode SF5 and SF 7 is skipped when the **MDE** key is pressed.

If the SF8 scan function is not activated, than the function SF9, SF13 and SF14 will not be displayed.

The settings SF 17 and SF 18 are optionen. When the optionen are not activated, the mode SF17 and SF 18 is skipped when the mode key is pressed.

**The Operating Instructions do not include instructions on the setting of the equipment configuration because this procedure is meant to be carried out only by specialist ground personnel.**

## BECKER AR 4201

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### TECHNICAL DATA

|                               |                                      |
|-------------------------------|--------------------------------------|
| Supply voltage range:         | 12.4 . . . 15.1 V DC                 |
| Normal power supply voltage : | 13.75 V DC                           |
| Power consumption at 13.75 V: |                                      |
| - "Standby" reception mode    | typ. 70mA                            |
| - Reception mode              | typ. 500mA                           |
| - Transmission mode           | typ. 2,5 A                           |
| Temperature range:            | - 20° C . . . + 55° C                |
| Dimensions:                   | 60.6 x 60.6 x 192 mm                 |
| Weigth:                       | 0.67 kg                              |
| Frequency range:              | 118,000 ...136,975 MHz               |
| Number of channels :          | 760 (25 kHz channel spacing)         |
| Sensitivity                   | $\leq 5\mu\text{V}$ for 6dB S+ N / N |
| Storage channels :            | 99                                   |
| Rated output power            |                                      |
| - for speaker operation       | typ 3W at 4 $\Omega$                 |
| - for headphone               | typ 100mW at 600 $\Omega$            |
| Transmitter output            | $\geq 5\text{W}$                     |
| Type of modulation            | A3E                                  |
| Modulation depth              | $\geq 70\%$ - $\leq 99\%$            |
| Frequency deviation           | $\leq 15\text{ppm}$                  |
| Distortion m=85%/1000Hz       | $\leq 15\%$                          |
| Digital voltmeter (option)    |                                      |
| Operation voltage indication  | 7V - 15V DC $\pm 0,1\text{V}$        |
| Digital thermometer           | - 20°C - + 55°C                      |



## **OPERATING INSTRUCTIONS**

### **NOTES**

- If an equipment fault the unit may be sent to a Becker Dealer or the Becker customer service together with a description of the fault. The completed fault description shortens the repair times and hence lowers the resultant costs.
- These operating instructions do not replace the equipment manuals listed below.

#### **Equipment manuals**

to be purchased from the manufacturer or Becker Dealer

Installation and Operation DV 64502.03, Becker order No.:894.036-071

Maintenance and Repair DV 64502.04, Becker order No.:894.044-071

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*Subject to technical changes*