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COMM 2000

**VHF
Communications-
Equipment**

Installation and Operation

Handbook No. DV 240.03

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COMM 2000

GENERAL INFORMATION

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1.1 Introduction

The following Handbooks describe the VHF-communication transceivers of the COMM 2000-System.

The Handbook DV 240.03 „ Installation and Operation “ contains the following sections :

- I General Information
- II Installation
- III Operating Instructions
- VIII Circuit Diagrams

The Handbook DV 240.04 „ Maintenance and Repair “ contains the following sections :

- I General Information
- II Installation
- III Operating Instructions
- IV Theory of Operation
- V Maintenance and Repair
- VI Illustrated Parts List
- VII Modification and Changes
- VIII Circuit Diagrams

1.2 Purpose of equipment

The COMM 2000-system comprises a series of airborne VHF-communication transceivers, covering the aeronautical radio frequency range from 118,000 MHz to 135,975 MHz in 50 kHz or 25 kHz increments.

The COMM 2000-system provides 7 variants which are designed so that all the operational requirements encountered in VFR and IFR flying can be met with the selection of the appropriate transceiver. Variants identified with the suffix /25 are designed for the selection of 720 channels in 25 kHz steps.

System Variant	Exploitation	Transmitter Power	Operating Temperature Range
AR 2011, AR 2011/25	IFR, Category I all aircraft	> 10 watts under all environmental conditions	− 46° C . . . + 55° C
AR 2010, AR 2010/25	IFR, Category II A/C up to FL 200	6 . . . 10 watts	− 40° C . . . + 55° C
AR 2009, AR 2009/25	IFR, Category II A/C up to FL 200	6 . . . 10 watts	− 15° C . . . + 55° C
AR 2008/25	VFR, Category III A/C up to 5.7 tons	2 . . . 3 watts	− 15° C . . . + 55° C

1.3 General description

1.3.1 VHF transceivers

The transceivers are designed as a single block units for instrument panel or console mounting in the aircraft. The dimensions are in keeping with the ARINC standard for control units. It is held in place by four DZUS fasteners. All controls and indicating devices are located on the front panel. The rear panel of the unit locates the connectors for connecting the aircraft wiring and the antenna socket.

The electronics are sub-divided into a number of modules. Receiver, frequency synthesizer and audio module can be easily removed and located vertical to the baseplate to facilitate servicing the VHF transceiver.

The receiver is a single superhet. Squelch can be switched in and out of circuit by the squelch button. The squelch adjustment is located on the lefthand side panel for access from without. The sidetone and interphone volume controls are located on the righthand side panel.

The transmitter is a wideband transmitter for the frequency range 118.00 MHz to 135.97 MHz.

The frequency synthesizer used in common by the transmitter and receiver has digital circuitry for generating the frequency.

The COMM 2000-system is designed for operation with a power input voltage of 14 V DC. A remotely installed voltage regulator is required for 28 V electrical systems (e.g. VR 14/4 or VR 2011).

The system options include battery and emergency power unit EPU 400 intended to provide power in aircraft without electrical systems and continued operation in the event of an aircraft power failure.

1.3.2 Voltage regulator VR 14/4

Voltage regulator VR 14/4 is a stand-alone single-block unit serving to connect all COMM 2000-system transceivers to 28 V aircraft systems by regulating the 28 V aircraft voltage down to the 14 V operating voltage.

The voltage regulator is secured by means of the mounting plate provided. Point of installation in the aircraft must be selected in keeping with local conditions.

1.3.3 Voltage regulator VR 2011

Voltage regulator VR 2011 is the successor to voltage regulator VR 14/4. It is described separately in Manual DV 28601.02.

1.3.4 Battery box BK 5

The battery box BK 5 contains 2 maintenance-free rechargeable batteries in series. Pressing the voltage check pushbutton produces an indication of the battery voltage under load. Should the pointer of the voltmeter swing into the red sector, this indicates that the batteries need recharging.

Locate BK 5 where easily accessible so that the unit can be easily removed for recharging the batteries.

1.3.5 Emergency power unit EPU 400

Emergency power unit EPU 400 serves as an emergency power supply for part of the radio and navigation equipment when the aircraft voltage is down. The ON time of the emergency power unit exceeds the internationally established minimum time of 30 minutes by a multiple thereof.

The EPU 400 is available in two versions :

EPU 400 version B for 14 V aircraft voltage

EPU 400 version A for 28 V aircraft voltage

Both versions have two 6 V/6 Ah batteries in series which are continuously charged by the aircraft voltage under normal operating conditions. The separate EMERG/NORM switch in the aircraft wiring must be switched from NORM to EMERG in an emergency, i.e. aircraft voltage down. To check the charging condition of the battery, press the test button beneath the meter.

1.4 Specifications

Unless otherwise stated specifications are applicable to all the COMM 2000-system variants.

1.4.1 General data

Operating voltage	14 V DC \pm 10% — 20% degradation of performance is tolerable (RTCA DO - 156) 28 V DC with voltage regulator VR 14/4
Current consumption	at 14 V
— Receive „stand by “	AR 2008/25 typ. 370 mA AR 2008/25 eff. serial No. 2000 typ. 170 mA AR 2009, AR 2009/25 typ. 370 mA AR 2009, AR 2009/25 eff. serial No. 4000 typ. 235 mA AR 2010, AR 2010/25 typ. 370 mA AR 2011, AR 2011/25 typ. 370 mA
— Transmit	AR 2008/25 typ. 1,5 A AR 2009, AR 2009/25 typ. 3,5 A AR 2010, AR 2010/25 typ. 3,5 A AR 2011, AR 2011/25 typ. 4,5 A
Current consumption (with VR 14/4)	at 28 V
— Receive „stand by “	AR 2008/25 typ. 385 mA AR 2008/25 eff. serial No. 2000 typ. 185 mA AR 2009, AR 2009/25 typ. 385 mA AR 2009, AR 2009/25 eff. serial No. 4000 typ. 235 mA AR 2010, AR 2010/25 typ. 385 mA AR 2011, AR 2011/25 typ. 385 mA
— Transmit	AR 2008/25 typ. 1,5 A AR 2009, AR 2009/25 typ. 3,5 A AR 2010, AR 2010/25 typ. 3,5 A AR 2011, AR 2011/25 typ. 4,5 A
Fuse	
— AR 2008/25	at 14 V = 3 A
— AR 2009, AR 2009/25, AR 2010, AR 2010/25	at 14 V = 7,5 A, at 28 V = 7,5 A
— AR 2011, AR 2011/25	at 14 V = 10 A, at 28 V = 10 A
Operating temperature range	
— AR 2008/25, AR 2009, AR 2009/25	— 15° C ... + 55° C, shorttime temperature + 60° C
— AR 2010, AR 2010/25	— 40° C ... + 55° C, shorttime temperature + 71° C
— AR 2011, AR 2011/25	— 46° C ... + 55° C, shorttime temperature + 71° C
Altitude max.	45,000 ft

Vibration

Receiver

Constant deviation of 0.02" from 5 to 2000 Hz at max. 3 g acceleration, constant deviation of 0.1" from 5 to 55 Hz at max. acceleration of 1 g from 55 to 2000 Hz according Environmental Categories I and N RTCA DO - 138

Transmitter

Constant deviation of 0.01" from 5 to 55 Hz, from 55 to 500 Hz at max. acceleration of 1.5 g; constant deviation of 0.1" from 5 to 17 Hz; from 17 to 55 Hz at max. acceleration of 1.5 g; from 55 to 2000 Hz max. acceleration of 1 g according Environmental Categories M and N Eurocae ED-14 (RTCA DO - 160)

Panel dimensions

146 x 47,5 mm (ARINC norm Size)

Mounting depth

195 mm

Weight

13 N \approx 1,3 kp

1.4.2 Receiver specifications

Receiver type

single conversion superheterodyne

Frequency range

118.000 MHz . . . 135.975 MHz

Number of channels

- AR 2009, AR 2010, AR 2011 360
- AR 2008/25, AR 2009/25, AR 2010/25, AR 2011/25 720

Channel separation

- AR 2009, AR 2010, AR 2011 50 kHz
- AR 2008/25, AR 2009/25, AR 2010/25, AR 2011/25 25 kHz

Sensitivity

better than $5\mu V$ EMF for $6 dB \frac{S+N}{N}$
(modulated 30% at 1000 Hz)

Bandwidth

- AR 2009, AR 2010, AR 2011 $\geq 14 kHz$ 6 dB down
- AR 2008/25, AR 2009/25, AR 2010/25, AR 2011/25 $\geq 9 kHz$ 6 dB down

Selectivity eff.

- AR 2009, AR 2010, AR 2011 $\geq 60 dB$ at $\pm 50 kHz$
- AR 2008/25, AR 2009/25 $\geq 40 dB$ at $\pm 17 kHz$
- AR 2010/25, AR 2011/25 $\geq 60 dB$ at $\pm 25 kHz$

Squelch

- AR 2008/25, AR 2009, AR 2009/25 fixed in unit, defeatable with squelch button
- AR 2010, AR 2010/25, AR 2011, AR 2011/25 Automatic squelch. Carrier to noise with manual disable and carrier squelch override

AGC characteristic	less than 6 dB from 5 μ V to 100 mV EMF
Spurious responses	≥ 60 dB
Undesired radiation	$\leq 4 \times 10^{-10}$ watt
Distortion	$\leq 10\%$ with 85% modulation
Frequency response audio channel relative to 1000 Hz/0 dB	≤ 6 dB 350 Hz . . . 2500 Hz ≥ 18 dB at 5000 Hz (variant 25 kHz only)
Rated audio output	
— AR 2008/25, AR 2009, AR 2009/25	4 W into 4 Ω or ≥ 70 mW into 300 Ω
— AR 2010, AR 2010/25, AR 2011, AR 2011/25	4 W into 4 Ω or ≥ 150 mW into 300 Ω

1.4.3 Transmitter specifications

Frequency range	118.000 MHz . . . 135.975 MHz
Transmitter output	
— AR 2008/25	≥ 2 W
— AR 2009, AR 2009/25	≥ 6 W
— AR 2010, AR 2010/25	≥ 6 W
— AR 2011, AR 2011/25	≥ 10 W
Frequency deviation	$\leq 0.003\% = 30 \times 10^{-6}$ Hz
Mode of modulation	amplitude modulation A3
Modulation depth	85%, dynamic compression range 20 dB
Modulation fidelity	≤ 6 dB from 350 Hz . . . 2500 Hz
Distortion	$\leq 10\%$ with 85% modulation $\leq 15\%$ with 85% modulation (variant AR 2008/25 only)
Undesired radiation	less than $2,5 \times 10^{-5}$ watts, less than 2×10^{-7} watts in the band 108 MHz . . . 117.95 MHz
Carrier noise level	more than 35 dB down
Input voltage for m = 85%	approx. 200 . . . 250 mV (standard aircraft mike) or approx. 5 . . . 10 mV (dynamic mike)

1.4.4 Electrical data Voltage regulator VR 14/4

Power input voltage	typ. 27,5 V + 10%/– 20%
Power output voltage	typ. 13,75 V
Peak load current	typ. 5 A
Dimensions	90 x 110 x 150 mm
Weight	9 N \approx 0,9 kp

1.4.5 Electrical data Battery box BK 5

Number of batteries	2
Battery type	lead-acid battery
Battery voltage	12 V
Capacity	approx. 9,5 Ah
Rated operating time on duty cycle of 1 : 5 (frequent usage)	
20° C . . . 30° C	11 hours
– 15° C	7,5 hours
+ 55° C	10,5 hours
Rated operating time on a duty cycle of 1 : 10 (normal usage)	12,5 hours

1.4.6 Electrical data Emergency power unit EPU 400

Operating voltage	
– Version A	28 V
– Version B	14 V
Charging current	
– Version A	430 mA
– Version B	400 mA
Output voltage	
– Version A and B	12 V
Battery capacity	6 Ah
Max. discharge current	
– Version A and B	5 A
Weight	25 N \approx 2,5 kp
Dimensions	70 x 245 x 170 mm

1.5 Design specifications

FTZ	LB 203/73
LBA	10.911/48
TSO Compliance	C 37b, C 38b
STNA Compliance	
AGR	SPEC. 3/1
RTCA	DO - 156
RTCA	DO - 157
Environmental categories	
— AR 2008/25, AR 2009, AR 2009/25	DA $\frac{J}{N}$ AAAXXXXXX
— AR 2010, AR 2010/25	CA $\frac{J}{N}$ AAAXXXXXX
— AR 2011, AR 2011/25	BA $\frac{J}{N}$ AAAXXXXXX

1.6 Accessories

1.6.1 Transceiver COMM 2000-system

Cable connector plug	Order No. 248.436-277
Antenna connector plug UG 88/U	Order No. 726.706-277

1.6.2 Voltage regulator VR 14/4

Voltage regulator	Order No. 759.554-918
3-pin cable connector plug	Order No. 724.890-277
Mounting plate	Order No. 735.396-283

1.6.3 Battery box BK 5

Battery box (not included batteries)	Order No. 262.633-910
5-pin cable connector	Order No. 726.214-277
Mounting plate	Order No. 203.017-262
Batteries 6 V for BK 5 (2 ea necessary)	Order No. 202.363 391

1.6.4 Emergency power unit EPU 400

Emergency power unit	
— Version A	Order No. 262.595-910
— Version B	Order No. 262.587-910
Cable connector for both variants	Order No. 248.363-277

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INSTALLATION

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2.1 General

Installation of the VHF-communication transceivers depends on the type of aircraft and equipment involved, the instructions given in this section thus being only generally applicable.

2.1.1 Pre-installation check

Prior to fitting the new system in the aircraft, the equipments must be checked according to the following procedure to establish whether they have been damaged in transit.

2.1.2 Visual inspection

Prior to commissioning the equipment, carry out a visual inspection to establish any of the following deficiencies.

1. Soilage, dents scratches, corrosion, brocken fasteners, damaged paintwork on enclosures and parts thereof.
2. Soilage and scratches on the nameplate, front panel and markings.
3. Soilage, bends or broken off pins, cracked plug and socket inserts.
4. Soilage and mechanical damage to rotary switches, toggle switches and potentiometer controls.

2.2 Mechanical installation

2.2.1 Mechanical installation of the VHF-communication transceivers

The VHF-communication transceivers are designed for instrument panel or control panel mounting in the aircraft and are secured by four DZUS fasteners. Fitting the fastener strips is shown in Fig. 2-6. Fig. 2-4 shows all the dimensions required for installation.

If a cutout having a width of 161 - 163 mm is already provided in the instrument panel (American aircraft types) a space of approx. 8 mm must be bridged over on both sides. This is done by backing the receiver with 8 x 20 mm aluminium sheet. Smaller tolerances can, however, be compensated for by 1 mm gauge aluminium sheet.

If a cutout is not provided in the instrument panel, this can be machined out according to the dimensions given in Fig. 2-4. In this case, you are recommended to use the straight fastener strips.

2.2.2 Mechanical installation of the Voltage regulator VR 14/4

The voltage regulator must be fitted in a suitable location in the aircraft, this usually being the avionics compartment. The dimensions necessary for installation can be seen from Fig. 2-7.

2.2.3 Mechanical installation of the Emergency power unit EPU 400 (Version A and B)

The emergency power unit EPU 400 must be fitted in a suitable location in the aircraft, this usually being the avionics compartment. The dimensions necessary for installation can be seen from Fig. 2-8.

2.2.4 Mechanical installation of the Battery box BK 5

Locate the battery box where it is easily accessible to facilitate removal of the batteries for recharging. The baseplate is secured by six screws (dimension see Fig. 2-9). The battery box is secured to the baseplate by two wing bolts to permit quick removal from the aircraft when required.

2.3 Installation wiring

2.3.1 General

Fig. 2-10 - Fig. 2-12 illustrates the installation wirings of the COMM 2000-system. AWG 16 wire must be used for wiring pins 2, 3, 4 and 5 of P 6001.

CAUTION

Never tie any aircraft wiring into the connecting lines. In addition, the connecting cable must not be put down together with lines carrying pulsed information (IFC's, DME, XPR, SLAVED GYRO) the same applying to autopilot supply and control lines.

If intercom is desired pin 2 and 13 of P 6001 must be bridged out, this function is performed by the IC switch. The voltage required for equipment front panel illumination is fed from outside. This voltage can be made variable by means of a Dimmer potentiometer.

2.3.2 Microphone connection

Series AR 2010, AR 2010/25, AR 2011 and AR 2011/25 transceivers are designed for operation with a standard carbon mike. Series AR 2008/25, AR 2009 and AR 2009/25 transceivers are designed for operation with a standard carbon mike and a dynamic microphone. Transceivers AR 2009, AR 2009/25 are adjusted in the works for operation with a standard carbon mike, unless stated otherwise. Transceiver AR 2008/25 is set in the works for operating with a dynamic microphone. Converting the microphone connection from standard carbon to dynamic is made by resoldering the jumpers on the audio pcb (see Section 2.3.8). Max. two microphones can be connected (for pilot and co-pilot) to the microphone input of all COMM 2000-system units.

When used in plastic and wood aircraft, feedback trouble may result when using headsets on transceivers designed for operation with a standard carbon mike due to the amplifier in the headset absorbing and demodulating transmit energy (due to the lack of metallic screening as compared to metal aircraft). It is thus recommended to use hand-held microphones which are well screened, or dynamic headsets (without an integrated preamplifier).

2.3.3 Auxiliary audio input

The low impedance auxiliary audio inputs (Aux audio I + II) (pin 1 and 8 of J 6001) accomodate the headphones output of one or two additional receivers. These allow the monitoring of navigation equipment via the COMM 2000 audio amplifier. Both aux audio inputs are correctly terminated, no additional resistors are required when the audio output of additional equipment is connected.

The auxiliary audio inputs approx. 1 V for rated power output.

2.3.4 Intercom mode

Intercom facilities are available in the COMM 2000-system without the use of additional units, provided an (IC) switch is fitted in the installation wiring.

The IC-switch bridges pin 2 and 13 of the equipment plug P 6001 and switches the cockpit loudspeaker off as illustrated in Fig. 2-9 and 2-10. The speaker must be disabled to avoid accoustical feedback.

The intercom volume can be adjusted by means of trimmer potentiometer R 4091 which is accessible through a hole in the transceiver righthand side. Refer to Fig. 2-4, Postinstallation adjustments.

2.3.5 Sidetone

Sidetone is obtained in the transceiver by demodulation of the transmitted signal. The sidetone is fed to pin 14 of P 6001 for as long as the PTT button is depressed.

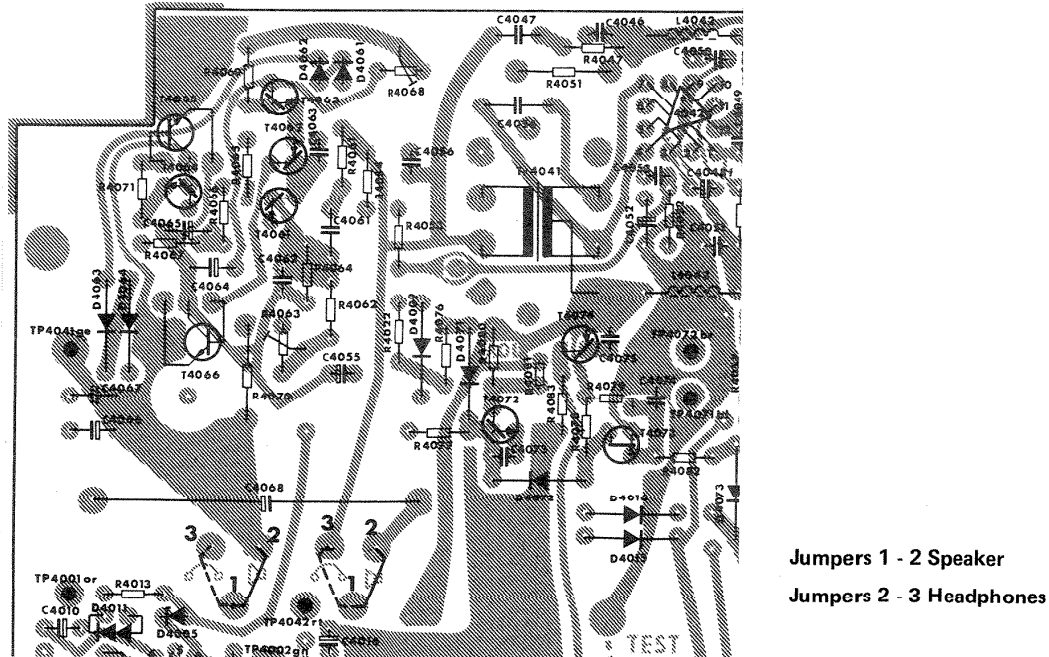
The sidetone volume can be adjusted with trimmer potentiometer R 4112 which is accessible through a hole in the transceiver righthand side. Refer to Fig. 2-4, Postinstallation adjustments.

When using COMM 2000-system transceivers in ground radio stations, portable stations or in gliders, the sidetone should be adjusted to minimum volume (fully counter-clockwise) to prevent audio feedback.

2.3.6 Audio output

The audio output of the transceivers AR 2010, AR 2010/25, AR 2011 and AR 2011/25 is factory adjusted for a 4 Ω -speaker. One or two pairs of headphones may be connected in parallel.

The audio output can be adjusted for headphones only when two jumpers are repaced as depicted below.



The jumpers are in the left center section of the audio module. They become accessible when the transceiver bottom cover is removed. Disabling of the speaker amplifier reduces the current consumption.

The audio output of series AR 2008/25, AR 2009 and AR 2009/25 transceivers requires no changeover since the audio output is a function of the terminating impedance (headphones or speaker) and must not drop below 4Ω .

2.3.7 Converting microphone input from dynamic to standard carbon mike

Transceiver AR 2008/25 to works No. 1039 (or audio modules No. 2149)

Series AR 2008/25 transceivers have a microphone amplifier as standard which permits connecting a dynamic microphone (5 mV - 10 mV into 200Ω) or a standard carbon mike (150 mV - 200 mV into 100Ω). AR 2008/25 transceiver is adjusted in the works for operating with a dynamic mike, unless agreed to otherwise.

Transceivers AR 2009, AR2009/25 up to works No. 3999 (or audio modules No. 2149)

Series AR 2009, AR 2009/25 transceivers up to works No. 3999 or audio modules No. 2149 are only fitted out with a microphone amplifier when explicitly requested by the customer to permit optional connection of a dynamic or standard carbon mike. When converting the microphone connector from standard mike to dynamic mike or vice versa, proceed as follows :

Microphone connection for dynamic microphones :

Close jumpers 2, change resistance of R 4126 from 150Ω to $4k7$

Microphone connection for standard carbon mike for dynamic mike with amplifier

Close jumpers 1, change resistance of R 4126 from $4k7$ to 150Ω

The jumpers are accessible after removing this bottom cover from the case.

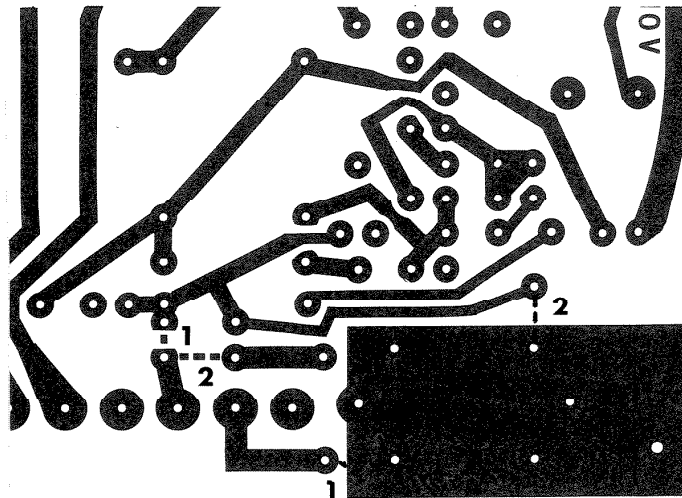
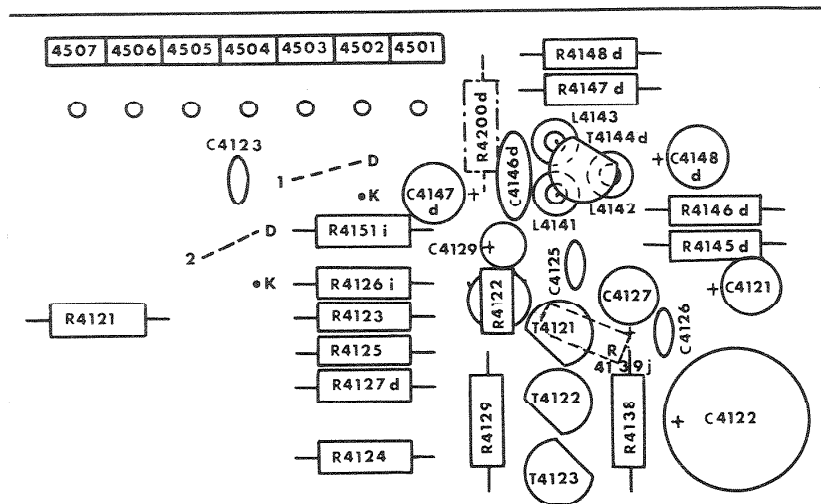


Fig. 2-2 Location of jumpers for dynamic microphone or standard carbon mike operation



Transceiver AR 2008/25 as of works No. 1040 (or audio modules No. 2150)

Transceiver AR 2009, AR 2009/25 as of works No. 4000 (or audio modules No. 2150)

Transceivers AR 2008/25, AR 2009 and AR 2009/25 have a microphone amplifier as standard permitting connection of either a dynamic microphone (5 mV - 10 mV into 200Ω) or a standard carbon mike (150 mV - 200 mV into 100Ω).

Transceiver AR 2008/25 is adjusted in the works for a dynamic microphone, unless stated otherwise, whereas AR 2009 and AR 2009/25 transceivers are set for a standard carbon mike.

By unsoldering the two jumpers on the audio pcb, the microphone input can be converted from dynamic mike to standard carbon mike, and vice versa.

Standard carbon mike

Solder jumpers to K (K = standard carbon mike)

Dynamic microphone

Solder jumpers to D (D = dynamic mike)

Any other setting will only be made in the works when expressly requested.

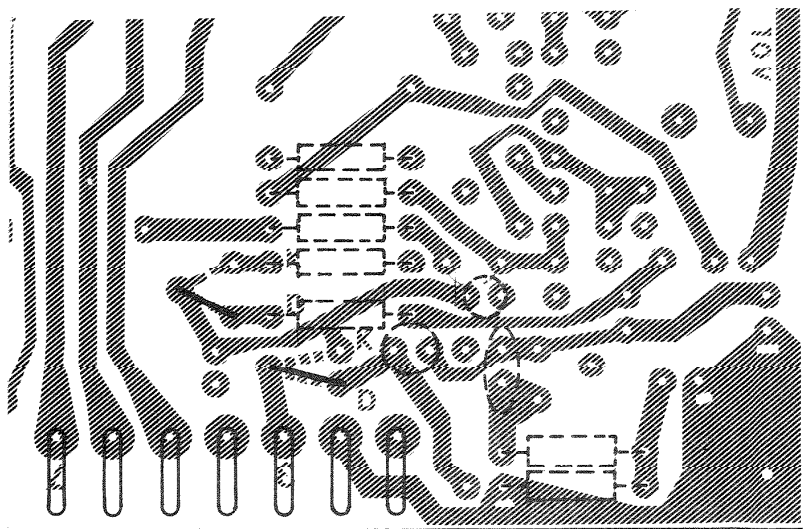


Fig. 2-3 Location of jumpers for dynamic microphone or standard carbon mike operation

2.4 Postinstallation check

2.4.1 Ground check

The VSWR of the antenna system should be tested with a voltage-standing wave meter as soon as installation has been completed. The VSWR should be 1 : 4 better over the entire frequency range. An increased VSWR indicates a mismatch which can be produced by inadequate counterpoise.

After antenna check has been completed carry out operational check (voice communication) with a ground station.

2.4.2 Ground check with engine running

With the engine running at cruising R.P.M. make sure that the voltage of the electrical system is within the permissible tolerance of 14 V or 28 V. An operational check (voice communication) shall be carried out with a distant groundstation. With the microphone held close to the lips, the aircraft transmission should be clear and with little background noise.

Check and adjust intercom and sidetone for convenient and interference free level.

Position squelch ON and check squelch function. The squelch threshold can be set from without using the squelch control.

CAUTION

In speaker operation, no audio feedback should occur due to the sidetone. If necessary, turn down the sidetone by means of the SIDETONE control (see Fig. 2-4).

Switch on interphone with interphone switch (IC) and test for speech at engine cruising speed. If necessary, correct volume by means of interphone control (see Fig. 2-4).

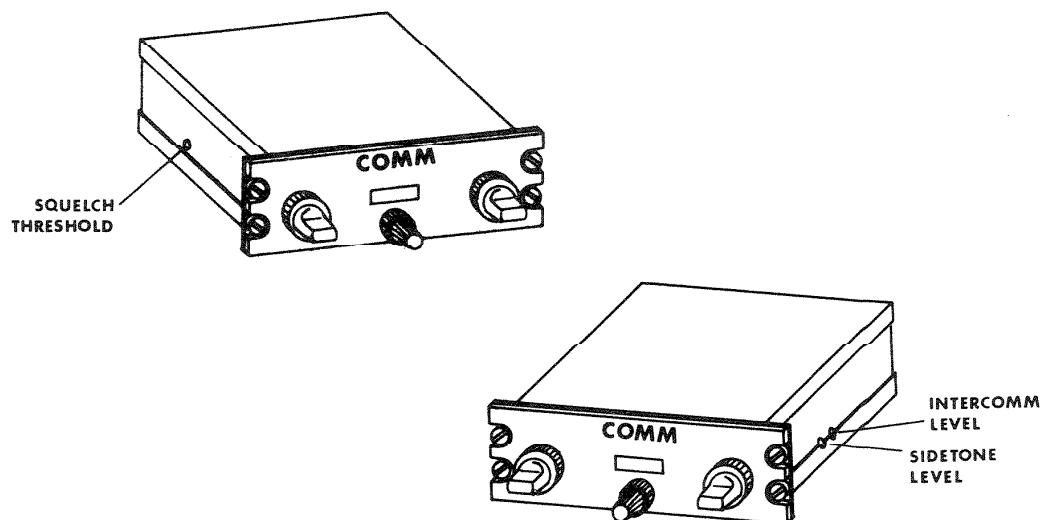
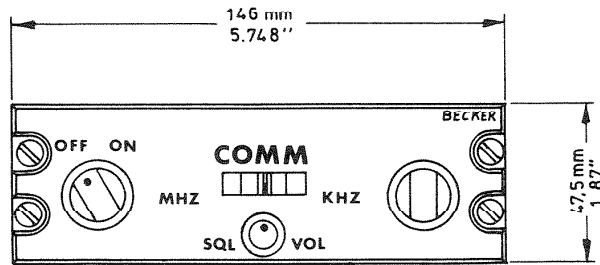


Fig. 2-4 Postinstallation adjustments

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1) nur bei AR2011/25
IN AR2011/25 ONLY

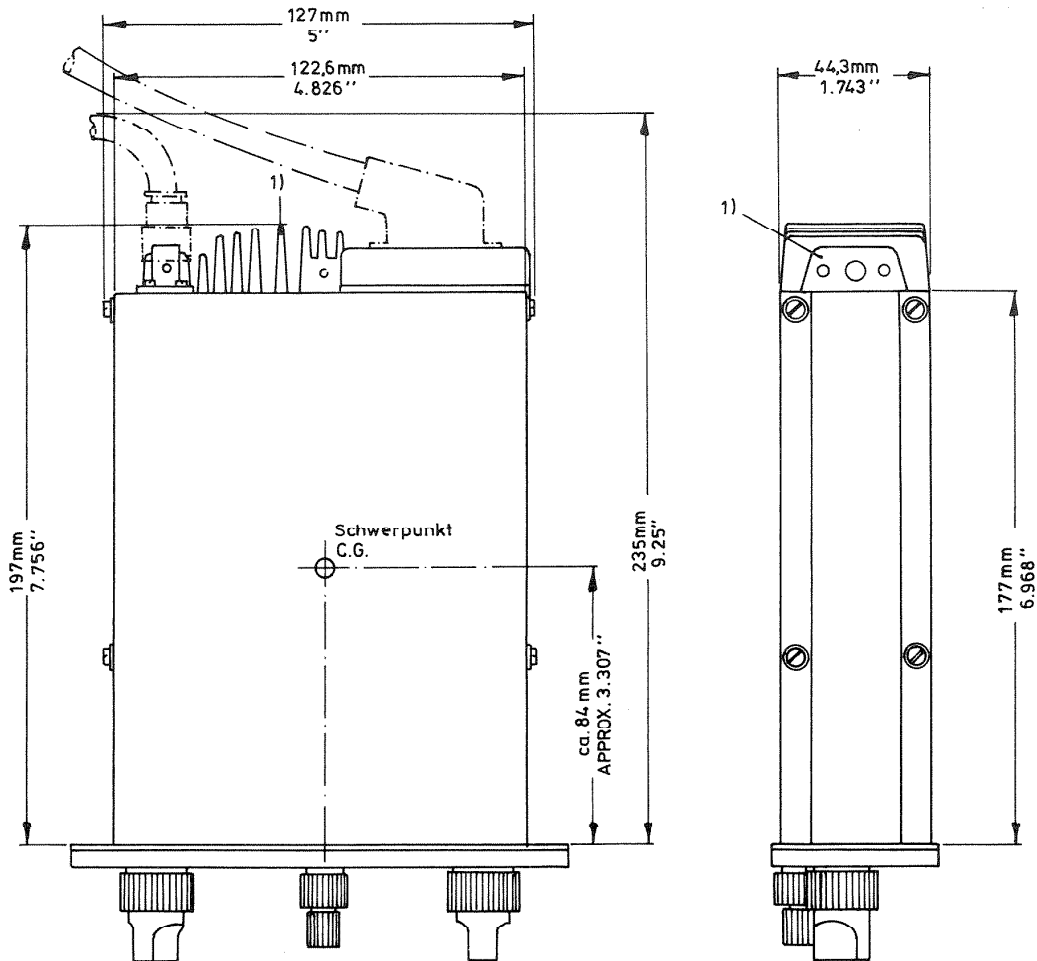
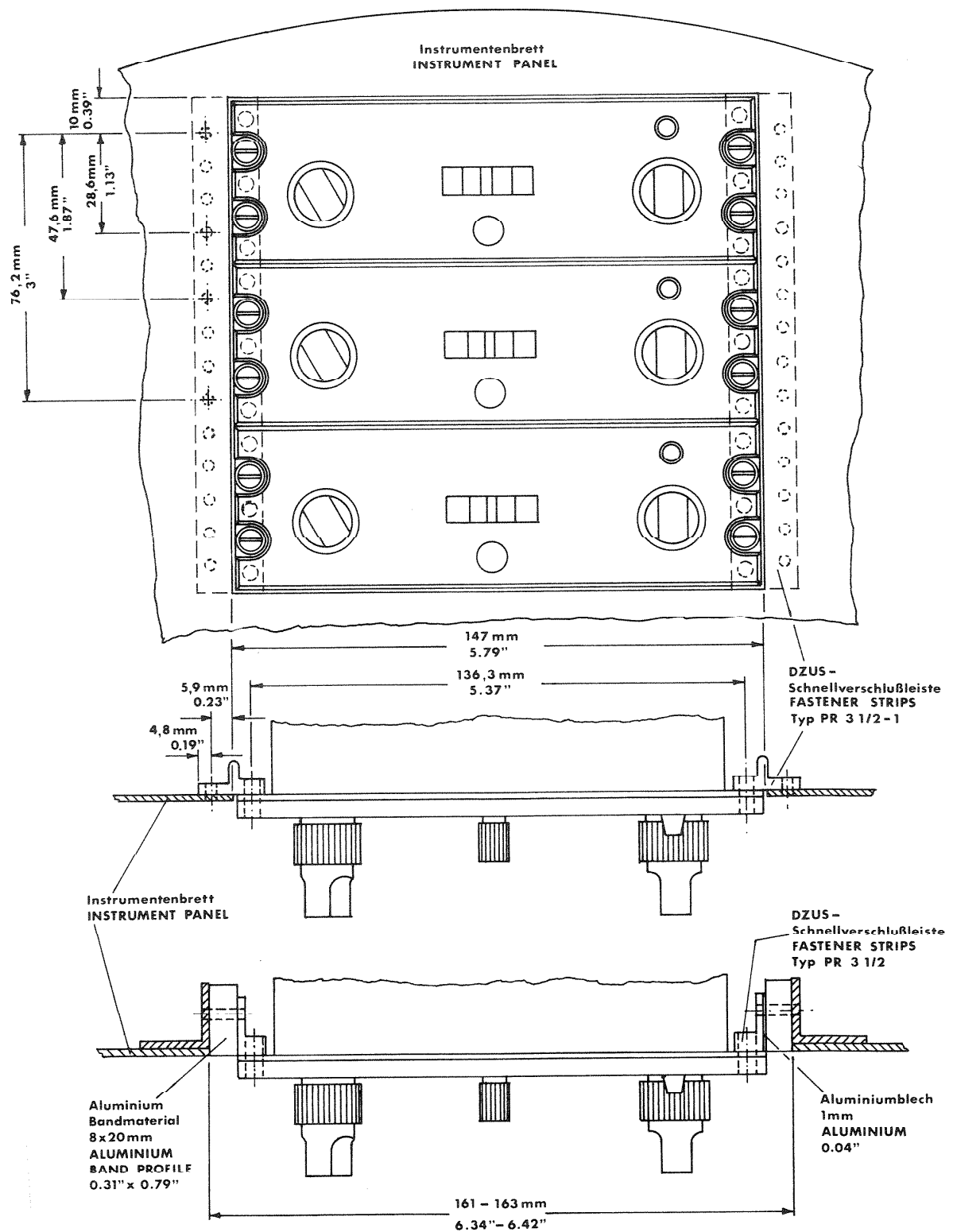


Fig. 2-5 Mounting dimensions COMM 2000



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Fig. 2-6 Installation of fastener strips

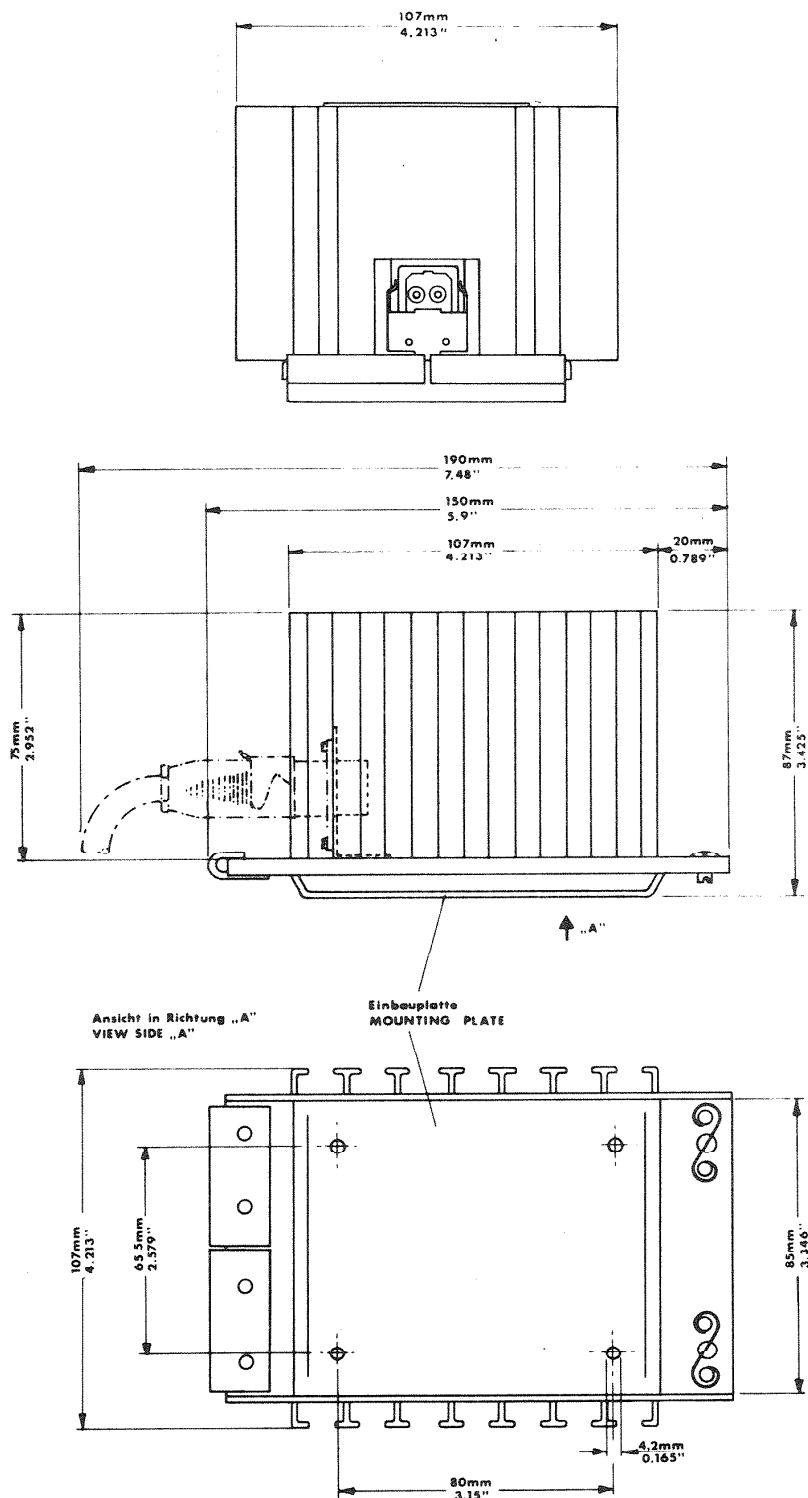


Fig. 2-7 Mounting dimensions VR 14/4

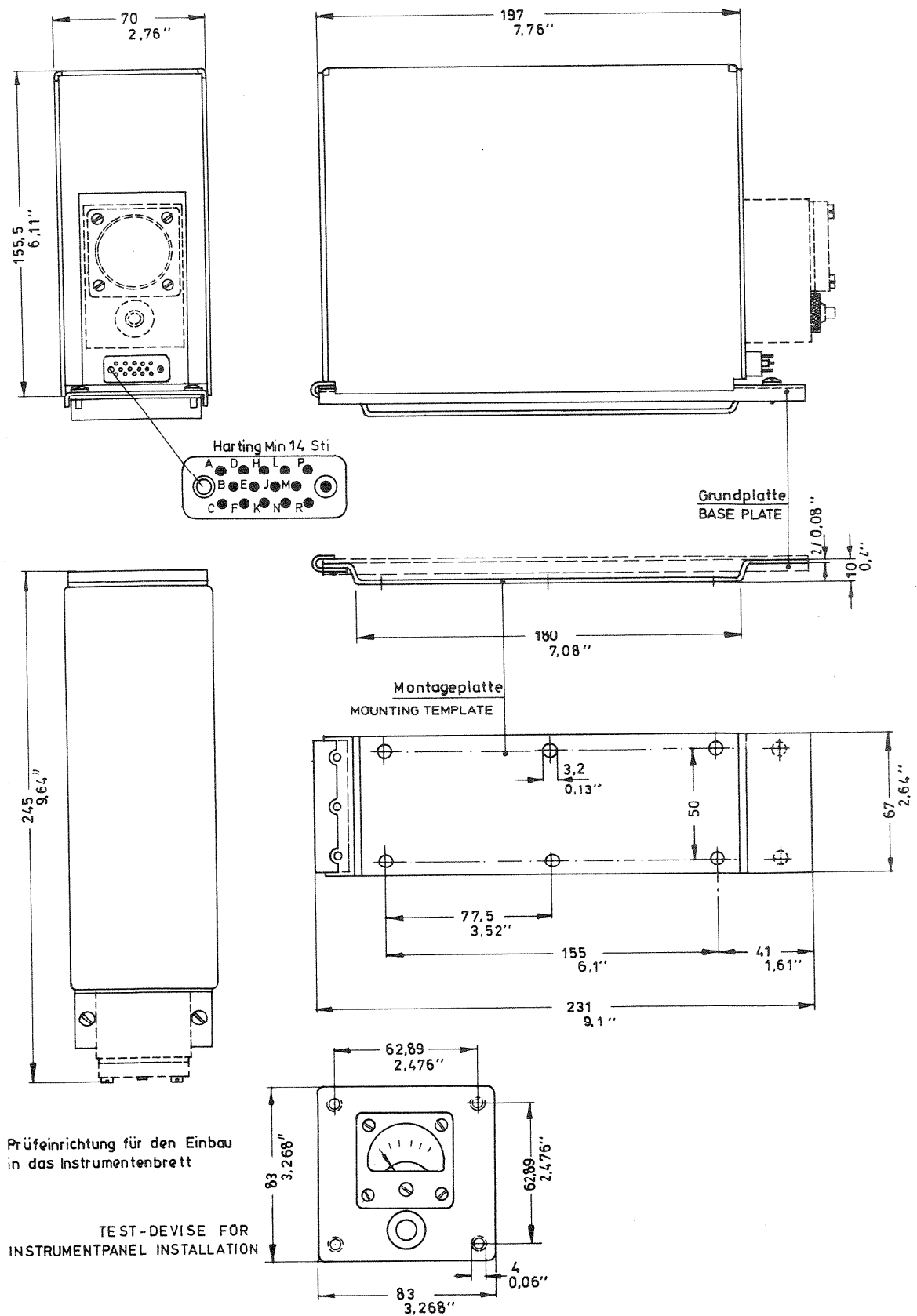


Fig. 2-8 Mounting dimensions EPU 400

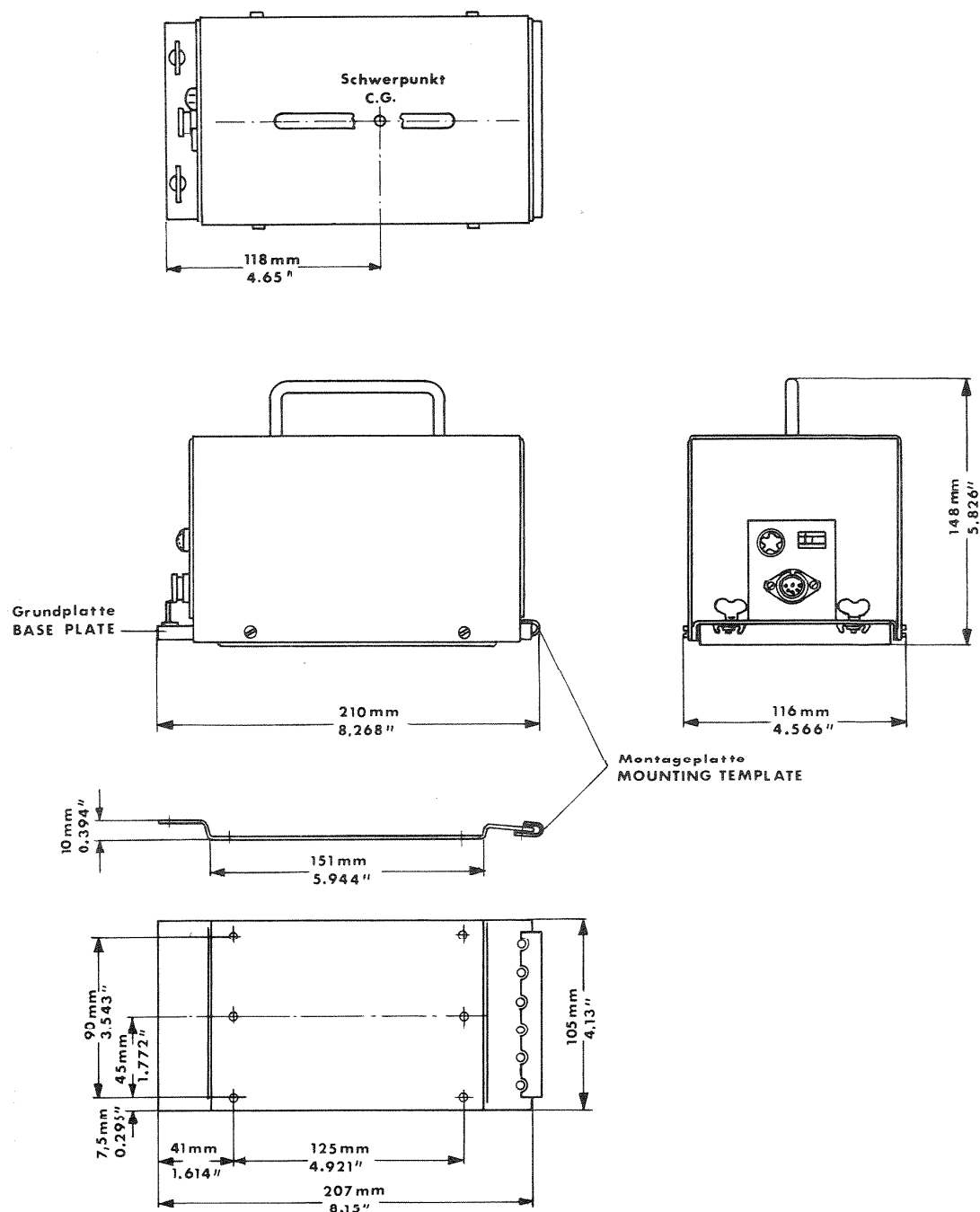
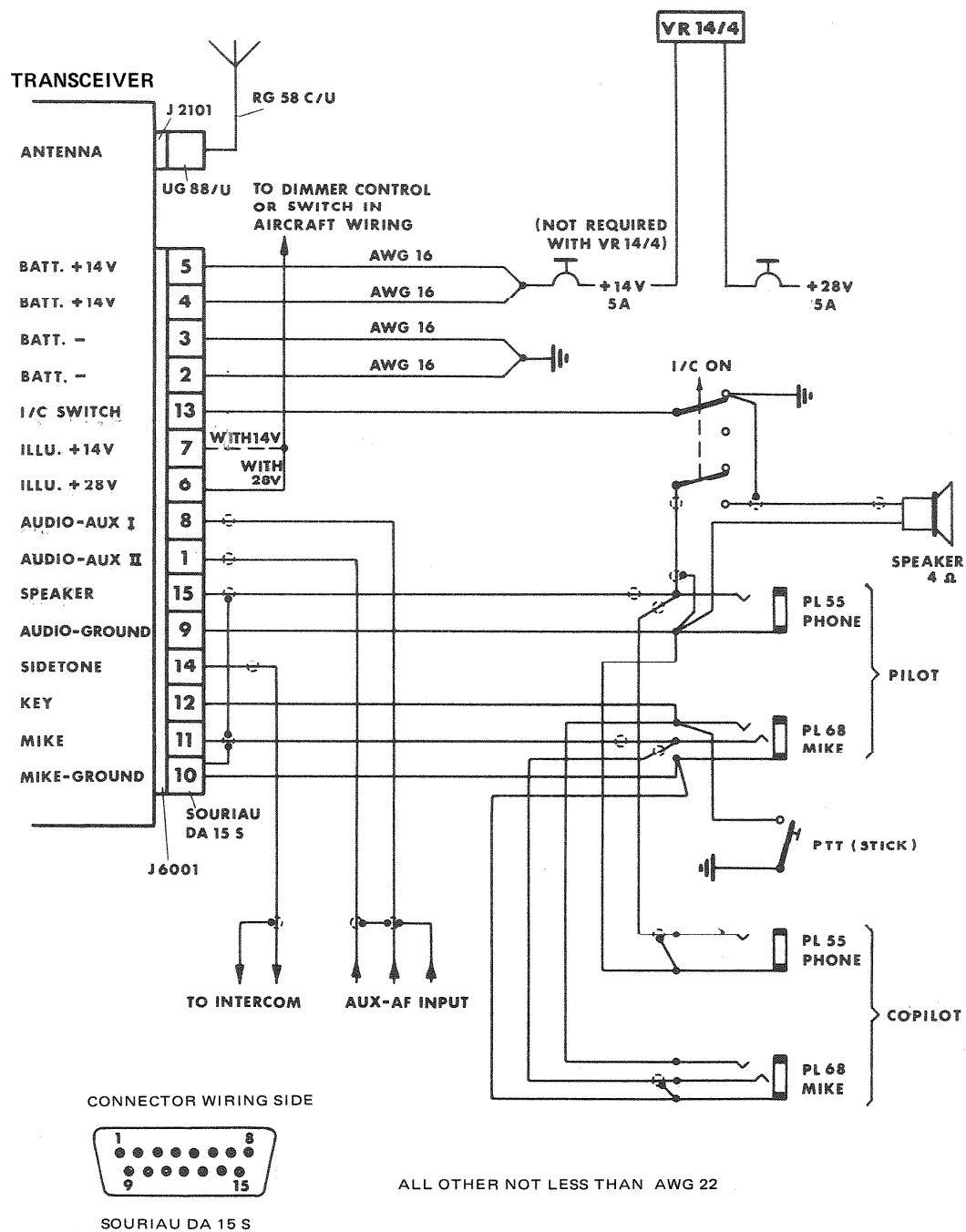


Fig. 2-9 Mounting dimensions BK 5



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Fig. 2-10 Installation wiring diagram until serial No. 710
AR 2009, AR 2009/25, AR 2010, AR 2010/25, AR 2011, AR 2011/25

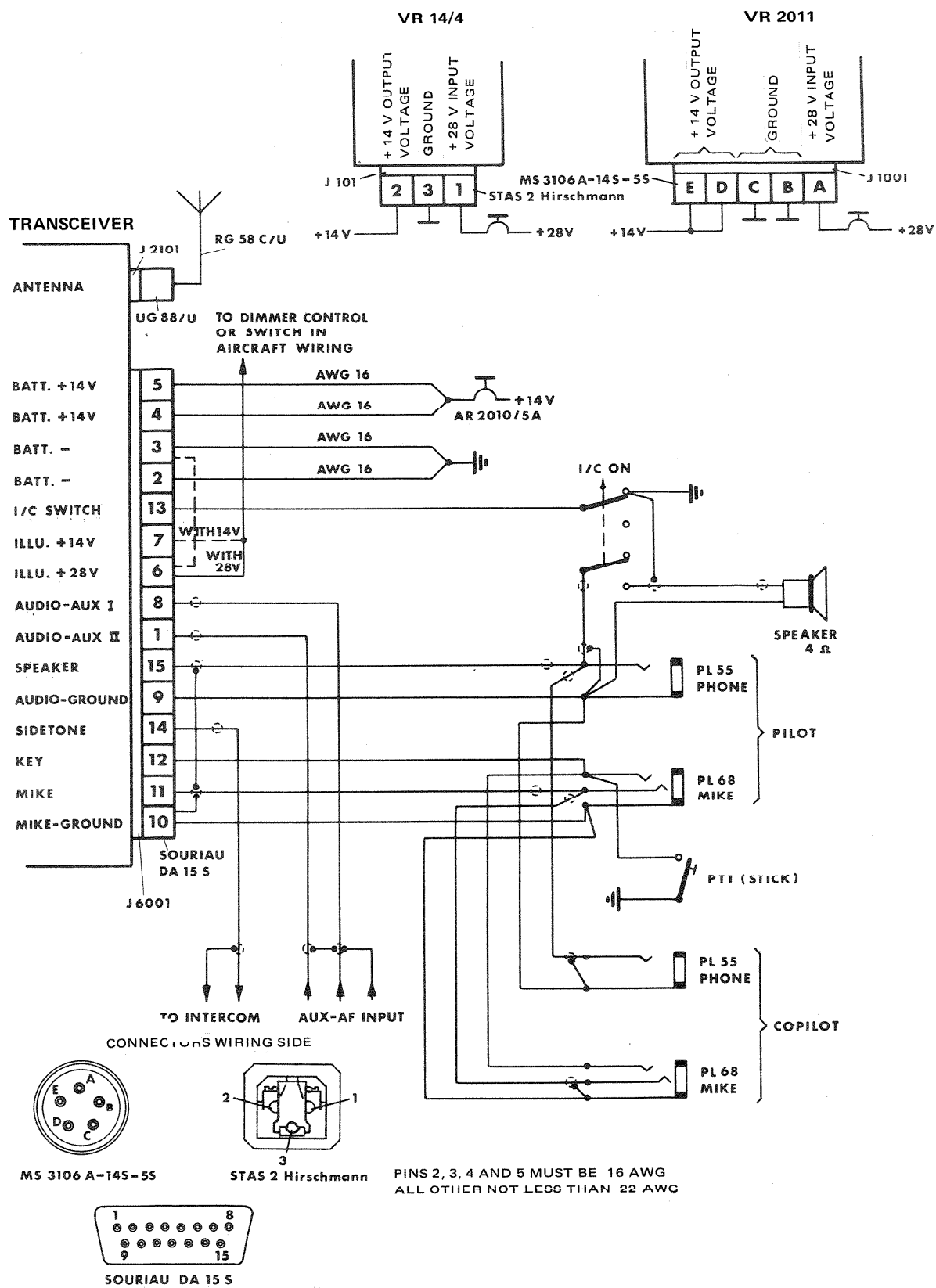
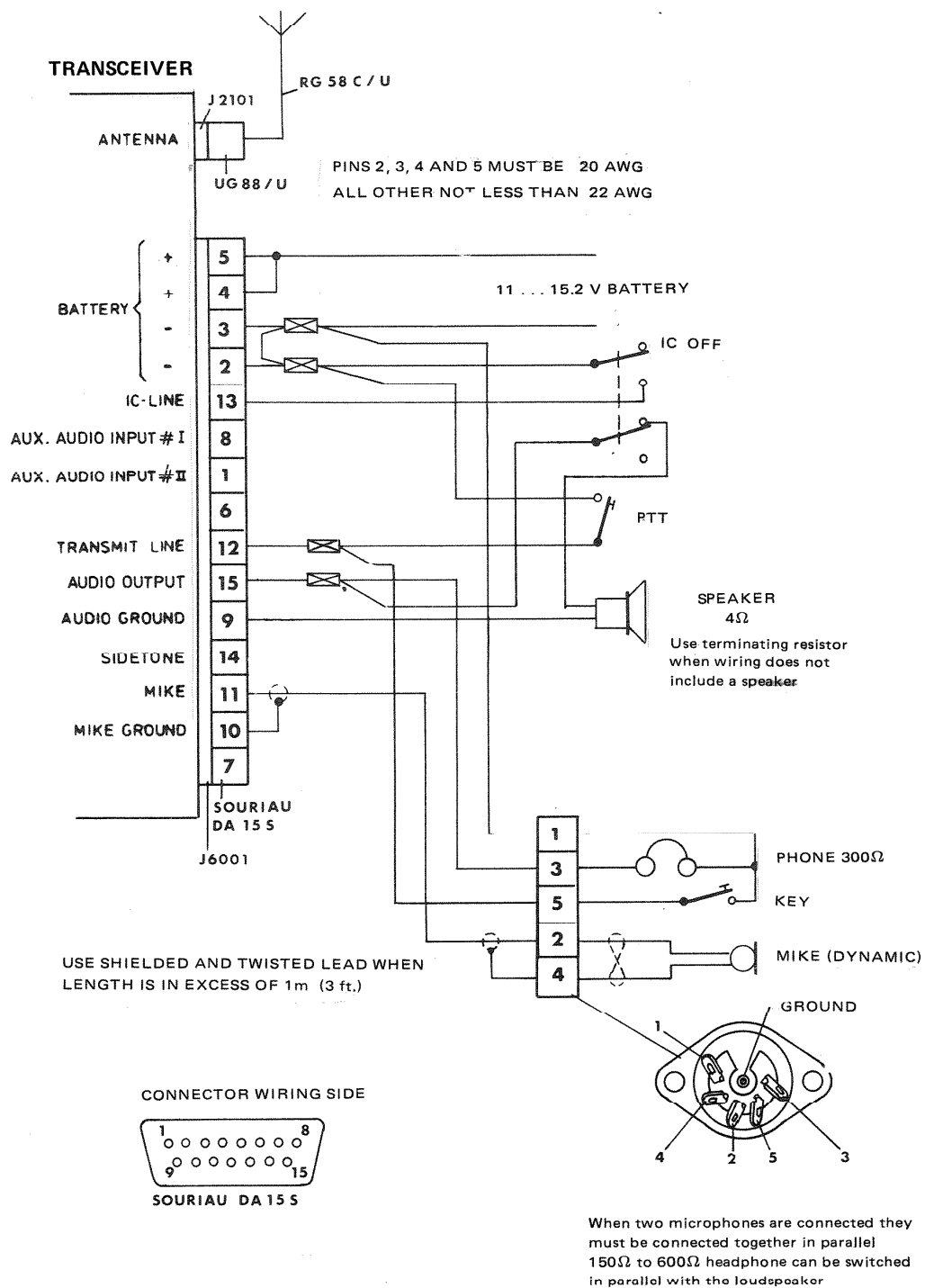


Fig. 2-11 Installation wiring diagram upwards serial No. 711
AR 2009, AR 2009/25, AR 2010, AR 2010/25, AR 2011, AR 2011/25



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Fig. 2-12 Installation wiring diagram AR 2008/25

COMM 2000

OPERATING INSTRUCTIONS

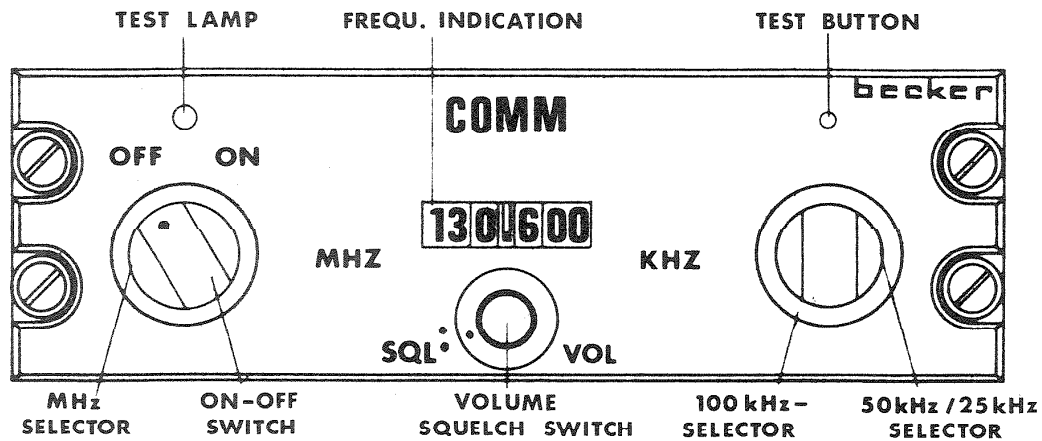
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3.1 Operating controls

Note that test lamp and button are provided in the AR 2010, AR 2010/25, AR 2011 and AR 2011/25 variants only. Squelch switch is provided in AR 2010, AR 2010/25, AR 2011 and AR 2011/25 variants from serial number 1050 and up.

Series AR 2008/25, AR 2009 and AR 2009/25 have a squelch switch as standard.



3.2 Operating information

Control/Element	Description	Function
ON/OFF	2-position rotary switch	Rotates clockwise to switch equipment on.
MHz-Frequency selector	18-position rotary switch	Switches the frequency in 1 MHz steps.
100 kHz-Frequency selector	10-position rotary switch	Switches the frequency in 100 kHz steps.
50/25 kHz-Frequency selector	2/4-position rotary switch	Switches the frequency in 50 kHz or 25 kHz steps.

Control/Element	Description	Function
VOL	Potentiometer	Volume Control
TEST	Press button	For equipment functional check. Receive mode : when the test-button is depressed the test lamp should light up and low noise should be heard if the receiver is working properly. Transmit mode : the test function is now activated by the PTT key. The test lamp should always light up in transmit mode.
SQL	2-position rotary switch	Rotates clockwise to disable squelch.

3.3 Operating procedures

CAUTION

Do not switch on the VHF transceiver until the engine has been started and switch off before the engine is shut down to avoid the instrument being damaged by possible surge currents.

3.3.1 Radio communication

1. Switch equipment on.
2. Select desired frequency.
3. Depress the test button (AR 2010, AR 2010/25, AR 2011 and AR 2011/25), if provided the test lamp illuminates and low noise is perceptible if the receiver is working properly.
4. Key the transmitter, the test lamp illuminates and voice communication can be carried out with the ground station, with microphone held close to lips.
5. During reception of ground station transmission, adjust the volume control for suitable audio level.
6. Disable squelch when reception is weak. The receiver is now operated with maximum sensitivity, but background noise is always perceptible.

3.3.2 Interoommunication

1. Switch IC-switch on.
2. Intercommunication and simultaneous monitoring of incoming signals is possible.
3. Depressing the PTT button keys the transmitter and allows voice communication. It is not necessary to alter IC-switch setting.
4. Releasing the PTT button automatically reverts the COMM 2000 to IC mode. The intercom audio level is preadjusted and not affected by the setting of the COMM 2000 volume control.

3.3.3 Auxiliary audio input

Two additional receivers can be monitored via the aux audio input and audio amplifier of the COMM 2000. The individual volume controls should be so adjusted that the audio signals are clearly distinguishable. The setting of the COMM 2000 volume control does not affect the audio level of the auxiliary input.

3.4 Battery treatment

3.4.1 General

The battery box BK 5 contains two 9.5 A secondary lead-acid batteries in series. Pressing the voltage check button produces an indication of battery voltage under load. If the pointer of the voltmeter is in the red sector, this is a sign that the batteries need recharging.

The batteries are maintenance-free, rechargeable batteries which must be stored at mean ambient temperatures of + 20° C to – 40° C. Should the batteries be discharged to less than the safe discharge voltage of approx. 10 V, they must be recharged instantly. Should the batteries be held stored or in readiness for a long time, they must be recharged not later than 6 months.

3.4.2 Instructions for recharging the maintenance-free batteries

Only recharge the batteries with a voltage and current regulated battery charger, e.g., battery charger LG 7 or LG 8. To recharge the batteries which are in series a charging voltage of approx. 13.8 V and a charging current of I_{\max} 0.8 A is necessary at an ambient temperature of 20°. Failing to maintain the minimum safe charging voltage will shorten the life of the batteries.

