BECKER
AVIONICS
INTERNATIONAL

Audio Control Unit

ACU6100-1-(xxx)
ACU6100-2-(xxx)
ACU6100-1-(xxxx)
ACU6100-2-(xxxx)

Installation and Operation

Manual	DV 64440.03
Issue 8	February 2015

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ACU6100

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Section 1 GENERAL INFORMATION

1.1 Introduction

The BECKER Audio Control Unit ACU6100 is described in the "Installation and Operation" DV 64440.03 and "Maintenance and Repair" DV 64440.04 manuals.

The manuals contain the following sections:

	Section	DV 64440.03	DV 64440.04
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
9	List of the used Abbreviations		X

1.2 Application

The Audio Control Unit is part of the Digital Voice Communication System DVCS 6100 and provided for installation in an aircraft. It serves for the control of REU6100 Remote Electronic Unit. Maximum six Audio Control Units can be connected to the Remote Electronic Unit at the same time.

1.3 General description

1.3.1 Mechanical description

The Audio Control Unit is designed for installation in the operator console of an aircraft. The dimensions correspond to the ARINC 601 standard for control units. Installation is by means of four DZUS fasteners.

The Audio Control Unit consists of the following electrical assemblies respectively circuit boards:

- Illumination board
- Rotary board
- 2 x Volume board
- Processor board
- Connector board

1.3.2 Electrical description

1.3.2.1 General Functions

The Audio Control Unit has the following functions:

- Driving of up to 8 transceivers or 7 transceivers plus one public address (PA) amplifier.
- Indication of transmission via status lights.
- Monitoring of up to 8 transceivers with a capability of individual volume control.
- Monitoring of up to 8 receivers with a capability of individual volume control.
- Monitoring of up to 6 fixed inputs.
- Monitoring of up to 10 internally generated signal tones. 8 tones can be activated by discrete control lines from external (aural alert tones).
- Main volume control.
- Aircraft intercommunication in either VOX or PTT-controlled mode.
- 2 intercom circuits to separate cockpit and cabin communication.
- Optical call indication for intercom request plus acoustical call alert for combining or separating the different intercom circuits assigned to the individual control unit.
- Slaved Mode: In case total loss of pilots or co-pilots ACU, the control is switched in parallel, by means of setting the selector switch to SLAVED, to the other pilots ACU.
- Emergency Mode: In the event of a total power failure, the headsets of pilot and copilot are automatically by-passed direct to COM 1/ FIX 1 and COM 2/ FIX 2.
- P-BIT, I-BIT, C-BIT functionality with optical indication of test status/result.

The functional inscriptions of key caps, rotary switch, and increment sensor are finished in white translucent characters. Illumination available in white, warm white and NVIS green B compatible (MIL-STD3009, RTCA DO-275).

Every Audio Control Unit has a microcontroller to process switch and button activations as well as indication signals. Control data are transferred via a dual redundant can bus interface. SLAVE position (toggle switch) and Back-up toggle switch are not be routed through the interface but must be hard-wired in order to allow Back-up operation, even if the unit had failed.

Audio Control Units are factory configurable to different operation profiles, e.g. disabling certain transceiver or receiver accessibility in the cabin / passenger area. Audio Control Units may also be equipped with front panels imprinted to customer requests.

Rotary board:

The following are mounted on the rotary board

- 1 rotary switch, 10 positions, to preselect the active transceiver as well as Public Address or Intercom mode. Also to select dual or multi transmission mode if provided (option).
- 1 lockable switch.
- 1 PTT button (toggle switch).

Processor board:

The following are mounted on the processor board

- Dual potentiometer to set the individual main volume control (outer rotary knob) and to set the individual IC volume control (inner rotary knob).
- VOX potentiometer to switch on/off VOX functionality and set the individual VOX-threshold level.

Volume board (top)

The following are mounted on the volume board (top):

   8 monitoring buttons to switch on /off transceiver monitoring combined with 8 potentiometers for individual channel volume control.

Volume board (bottom)

The following are mounted on the volume board (bottom):

8 monitoring buttons to switch on /off receiver monitoring combined with 8 potentiometers for individual channel volume control.

Illumination board

The following are mounted on the illumination board

- VOICE button with LED to switch on and off the ident filter (green LED: filter on, ident frequency 1020 Hz suppressed)
- TEST button with yellow LED to initiate the IBIT. By pressing the test button an internal self test procedure is started. After the test the following results are shown:

Result "GO"   Test LED goes off

Result "NOGO"   Test LED flashes

- SPKR button with LED to switch on and off the speaker (green LED: speaker on)
- ISOL /CALL with LED to control the intercom functions between cockpit and cabin

Connector board

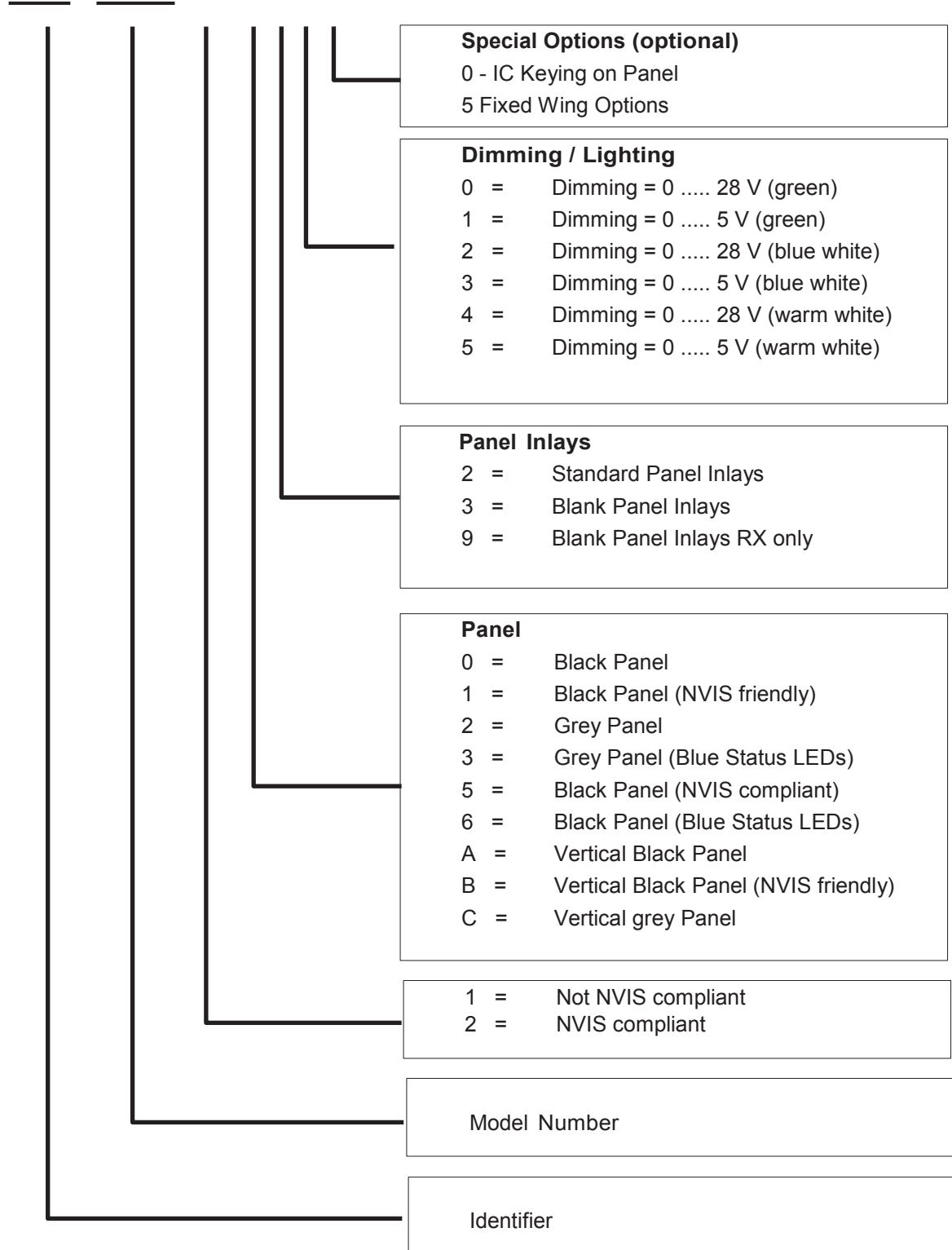The two unit connectors are located on the connector board.

1.4 Identification of article

1.4.1 Types of Audio Control Unit

Audio Control Unit   Part Number ACU6100-X-(XXXX)

ACU6100-X-(XXXX)

Special Options (optional)
0 - IC Keying on Panel
5 Fixed Wing Options

Dimming / Lighting
0 = Dimming = 0 ..... 28 V (green)
1 = Dimming = 0 ..... 5 V (green)
2 = Dimming = 0 ..... 28 V (blue white)
3 = Dimming = 0 ..... 5 V (blue white)
4 = Dimming = 0 ..... 28 V (warm white)
5 = Dimming = 0 ..... 5 V (warm white)

Panel Inlays
2 = Standard Panel Inlays
3 = Blank Panel Inlays
9 = Blank Panel Inlays RX only

Panel
0 = Black Panel
1 = Black Panel (NVIS friendly)
2 = Grey Panel
3 = Grey Panel (Blue Status LEDs)
5 = Black Panel (NVIS compliant)
6 = Black Panel (Blue Status LEDs)
A = Vertical Black Panel
B = Vertical Black Panel (NVIS friendly)
C = Vertical grey Panel

1 = Not NVIS compliant
2 = NVIS compliant

Model Number

Identifier

1.5 Technical data

1.5.1 Power supply

Supply voltage (Bus) I	27.5 V DC nominal 18.0 V DC emergency
Supply voltage (Bus) II	27.5 V DC nominal 18.0 V DC emergency
Power consumption	≤ 150 mA inclusive Illumination

Dimming input:

Dim control input 1	max. 27.5 V DC (panel illumination)
Dim control input 2	max. 27.5 V DC (LED brightness)

1.5.2 Control data transfer ACU-REU

Interface	Dual CAN Bus (redundant)
Protocol	BFW specific

1.5.3 Control inputs (Discrete)

PTT	low active ≤ 0.3V
Hot Mike In	low active ≤ 0.3V

1.5.4 Mechanical data

Width	145.8 mm
Height	75.8 mm
Depth	91.5 mm
Standard	ARINC 601
Weight	≤ 800 g
Mounting	D-ZUS

1.5.5   Unit connectors

Unit connector P1   10-pin
Control bus- connector P2   19-pin
- locking device   bayonet

1.6   Software

All data for ACU 6100 are stored in the microcontroller. If the control elements are altered, a data transmission immediately takes place to the Remote Electronic Unit. The software is classified as level C in accordance with EUROCAE / RTCA document ED12B / DO-178B.

1.7 Approvals

ETSO	ETSO-C50c
	EASA.21O.443
FAA	TSO-C139

1.8 Environmental qualification (EUROCAE/RTCA ED-14E/DO-160E)

Characteristic ED-14E/DO-160E	Section	Category	Condition
Temperature / Altitude	4.0	D1	
Low Ground Survival Temperature	4.5.1	D1	-55° C
Low Operating Temperature	4.5.1	D1	-40 °C
High Ground Survival Temperature	4.5.2	D1	+85 °C
High Short-Time Operating Temperature	4.5.2	D1	+70 °C
High Operating Temperature	4.5.3	D1	+70 °C
In-Flight Loss of Cooling	4.5.4	X	no auxiliary cooling required
Altitude	4.6.1	D1	50,000 ft.
Temperature Variation	5.0	B	5 °C per minute
Humidity	6.0	B	48 h at 65 °C at 95% RH
Shock	7.2	B	6g in all directions
Crash Safety	7.3	B	20g shock; 20g acceleration
Vibration	8.0	S	M
		U	G
Explosion Proofness	9.0	X	
Water Proofness	10.0	X	
Fluids Susceptibilities	11.0	X	
Sand and Dust	12.0	X	
Fungus Resistance	13.0	X	
Salt Spray	14.0	X	
Magnetic Effect	15.0	Z	less than 0.3 m
Power Input (DC)	16.0	B	

Characteristic ED-14E/DO-160E	Section	Category	Condition
Audio Frequency Conducted Susceptibility	18.0	B	
Induced Signal Susceptibility	19.0	AC	
Radio Frequency Susceptibility	20.0	WR	
Emission of RF	21.0	M	
Lightning Induced Transient Susceptibility	22.0	A3E3X	
Lightning Direct Effects	23.0	X	
Icing	24.0	X	
Electrostatic Discharge (ESD)	25.0	A	
Fire Flammability	26.0	X	

1.9   Scope of delivery

ACU6100-1-(0320) Audio Control Unit	Article-No.: 0608.092-921
ACU6100-1-(034) Audio Control Unit	Article-No.: 0614.750-921
ACU6100-1-(035) Audio Control Unit	Article-No.: 0615.821-921
ACU6100-1-(0350) Audio Control Unit	Article-No.: 0619.329-921
ACU6100-1-(232) Audio Control Unit	Article-No.: 0597.678-921
ACU6100-1-(2330) Audio Control Unit	Article-No.: 0618.500-921
ACU6100-1-(293) Audio Control Unit	Article-No.: 0617.725-921
ACU6100-2-(120) Audio Control Unit	Article-No.: 0585.319-921
ACU6100-2-(130) Audio Control Unit	Article-No.: 0588.921-921
ACU6100-2-(1300) Audio Control Unit	Article-No.: 0619.310-921
ACU6100-2-(2300) Audio Control Unit	Article-No.: 0608.106-921
ACU6100-2-(2310) Audio Control Unit	Article-No.: 0623.083-921
ACU6100-2-(5200) Audio Control Unit	Article-No.: 0608.114-921
ACU6100-2-(5300) Audio Control Unit	Article-No.: 0608.122-921
ACU6100-2-(1310) Audio Control Unit	Article-No.: 0629.571-921
ACU6100-2-(1305) Audio Control Unit	Article-No.: 0627.631-921
ACU6100-2-(5310) Audio Control Unit	Article-No.: 0629.677-921
ACU6100-1-(2305) Audio Control Unit	Article-No.: 0627.658-921
ACU6100-2-(B300) Audio Control Unit	Article-No.: 0629.723-921
ACU6100-2-(B305) Audio Control Unit	Article-No.: 0625.681-921
ACU6100-1-(C305) Audio Control Unit	Article-No.: 0627.641-921
ACU6100-1-(2325) Audio Control Unit	Article-No.: 0629.588-921
ACU6100-1-(A330) Audio Control Unit	Article-No.: 0639.176-921
ACU6100-1-(A350) Audio Control Unit	Article-No.: 0639.494-921

1.10 Accessories (not contained in the scope of delivery)

Connector Kit CK5102-C   Article-No.: 0586.889-954

consisting of

    10-pol. cable connector, crimp   Article-No.: 0858.188-277
    19-pol. cable connector, crimp   Article-No.: 0794.279-277

 alternatively:

Connector Kit CK5104-C (Manufacturer Commital)   Article-No.: 0614.971-954

consisting of

    10-pol. cable connector, crimp   Article-No.: 0614.998-277
    19-pol. cable connector, crimp   Article-No.: 0615.005-277

Manuals:

Installation and Operation DV 64440.03   Article-No.: 0589.845.071

Maintenance and Repair DV 64440.04   Article-No.: 0589.853.071

Installation and Operation Configuration   Article-No.: 0608.939.071
Software CSW6100-2 DV 64492.01

Operating instructions   Article No.: 0590.363-071

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Section 2 INSTALLATION

2.1 General

The installation of the Audio 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 Audio Control Unit in an aircraft, carry out a visual inspection for any transport damage, paying particular attention to the following:

- Dirt, dents, scratches, corrosion, broken attaching parts on the housing and housing parts.

- Dirt and scratches on the identification plate, front panel and marking.

- Dirt, bent or broken pins, cracked connector inserts.

- Dirt and mechanical damage on the rotary switches, push-buttons and knobs.

- Missing screws.

2.3 Mechanical installation

The Audio Control Unit is designed for installation in the operator console of an aircraft. The necessary dimensional details are given in Fig. 2-1. The unit is fixed using four DZUS fasteners.

2.3.1 Continued Airworthiness

Maintenance of the Audio Control Unit is "on condition" only. Periodic maintenance of this product is not required.

2.4   Aircraft wiring

2.4.1   General

The Audio Control Unit connections can be seen in Fig. 2-4 to Fig. 2-7. 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 24 for other cables.

b. The interface lines are each to be laid as 2-core twisted and screened (AWG 24) cables.

c. Every single cable harness of a unit connector must get a separate screening.

d. Rubber sleeves are to be fitted over the soldering points on the unit connector.

e. No HF cable should be included in the cable harnesses. Laying connecting cables together with cables which carry AF power or impulses is also being avoided.

f. Check the wiring carefully before switching on the units, particularly that (UB+) and (GND) have not been mixed up.
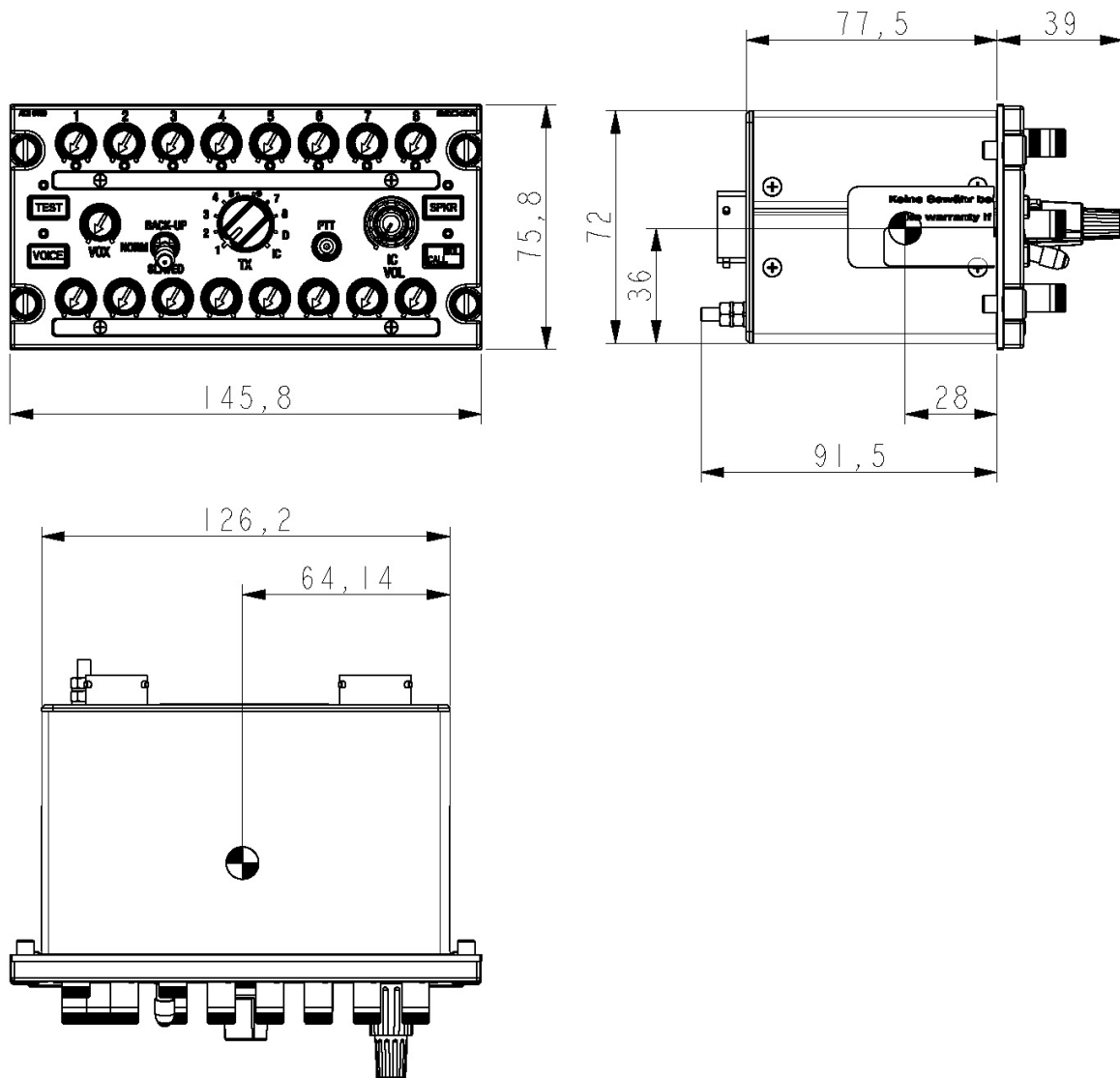
Fig. 2-1 Installation dimensions Audio Control Unit (measures in mm)

2.5 Gravo Plate Installation

The engraved label strips EL6100 which identify the function of TX and RX controls are prepared for customer individual configuration and therefore must be purchased separate from the ACU6100 unit. On delivery, the ACU6100 comes with installed blank label strips covered by a transparent plastic strip. Before installation of an ACU6100 unit the blank label strip must be replaced by the customized engraved label strip which is delivered separate from the ACU.

Procedure

Remove the left and right screw from each label strip and replace the blank by the engraved label strip. Reinstall and tighten carefully the crews on both label strips.
Note: Do not exceed a torque of 0.18 Nm.

Each variant of the label strip EL6100 receives an individual part number for identification in this format (0XXX.XXX-XXX). For information of available pre-defined label strips, or providing a definition template to create a new label strip, please contact Becker Avionics.

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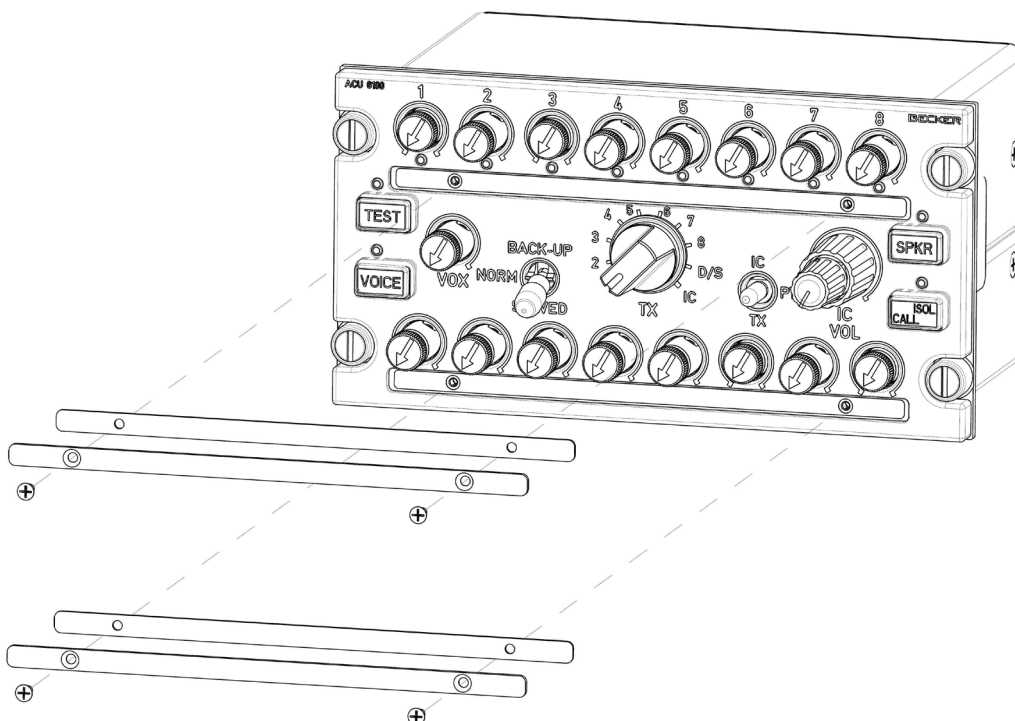

Fig. 2-2   Installation Gravo Plate

2.6 Laser Plate Installation

The laser plate strips LP6100 which identify the function of TX and RX controls are prepared for customer individual configuration and therefore must be purchased separate from the ACU6100 unit. On de- livery, the ACU6100 comes with installed blank label strips. Before installation of an ACU6100 unit the blank label strip must be replaced by the customized laser plate strip which is delivered separate from the ACU.

Procedure

Remove the left and right screw from each label strip and replace the blank by the printed laser plate strip. Reinstall and tighten carefully the crews on both label strips.
Note: Do not exceed a torque of 0.18 Nm.

Each variant of the label strip LP6100 receives an individual part number for identification in this format (0XXX.XXX-XXX). For information of available pre-defined label strips, or providing a definition tem-plate to create a new label strip, please contact Becker Avionics.

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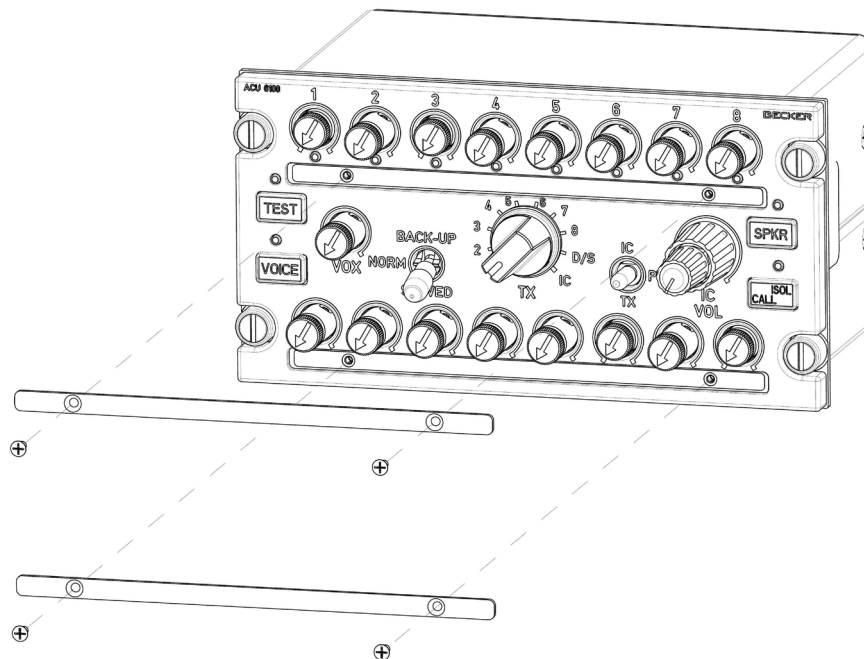
Fig. 2-3   Installation Laser Plate
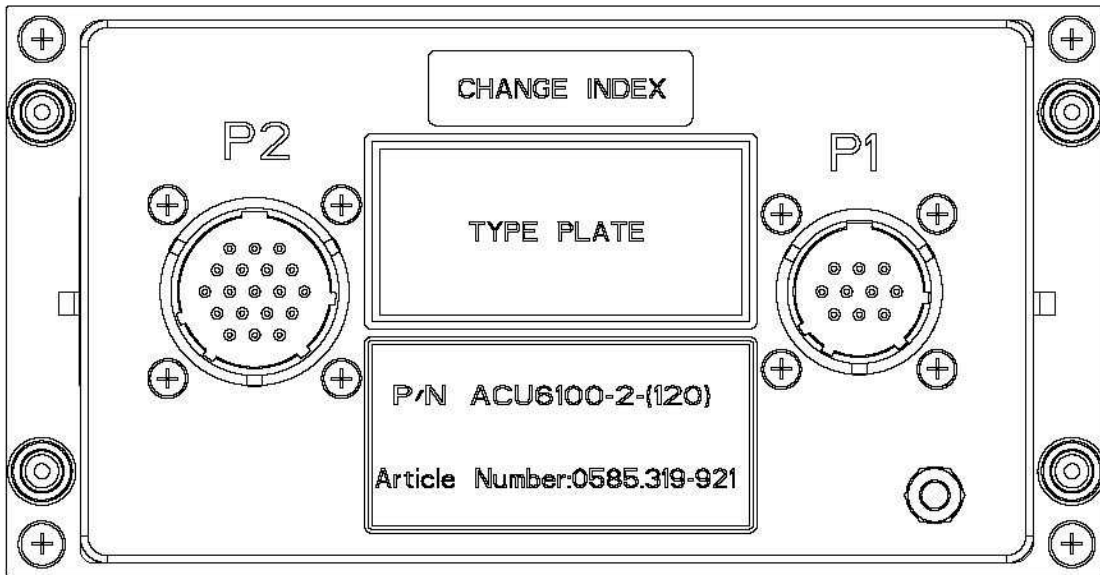
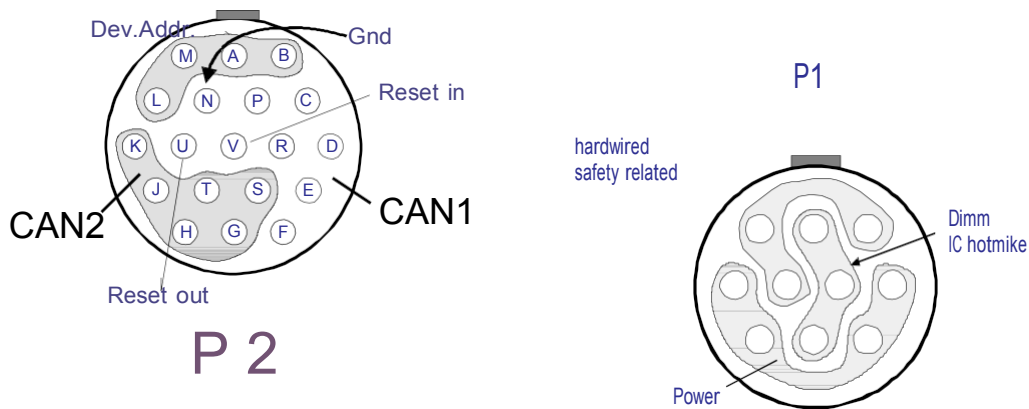Fig. 2-4 Physical locations of Audio Control Unit connectors

Fig. 2-5 Logical pin assignment Audio Control Unit

2.7 Panel illumination

The Audio Control Unit is fitted with panel lighting. It can also be connected via a dimmer system.

Panel illumination connection	Remark
Plug P 1 - Pin E	Dim Control in 1 (panel illumination)
Plug P 1 - Pin A	Dim Control in 2 (brightness of LEDs)

2.8 Connector pin assignments

Table 1 P1   10-pol. bayonet

Pin	Connection	Remark
C	DC1	+ 27.5 V
D	GND1	
G	DC2	+ 27.5 V
F	GND2	
H	PTT in/out	
B	Back-up	
K	Slaved / Mask-Mike	ACU6100-X-(XXXX) / ACU6100-X-(XXX5)
J	Hot mike in	
E	Dim Control in 1	panel illumination
A	Dim Control in 2	brightness of LED's

Table 2 P2   19-pol. bayonet

Pin	Connection	Remark
L	Device Address Bit 0	
M	Device Address Bit 1	
A	Device Address Bit 2	
B	Device Address Bit 3	
U	Reset out	
V	Reset in	
N	GND	
C	CAN1 in (HI)	

Pin	Connection	Remark
D	CAN1 in (LO)	
P	CAN1 in (shield)	
E	CAN1 out (HI)	
F	CAN1 out (LO)	
R	CAN1 out (shield)	
G	CAN2 in (HI)	
H	CAN2 in (LO)	
S	CAN2 in (shield)	
J	CAN2 out (HI)	
K	CAN2 out (LO)	
T	CAN2 out (shield	
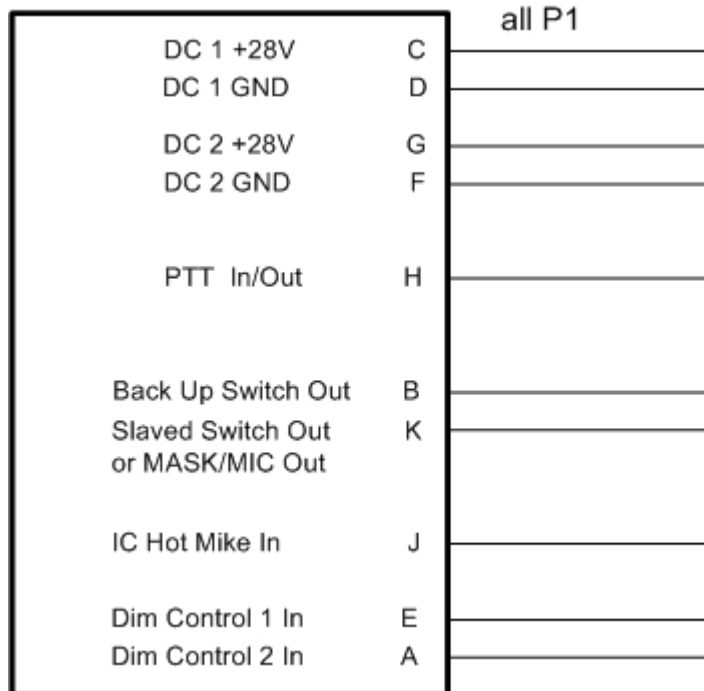
Fig. 2-6 Audio Control Unit power connections

```
                                              all P2
 ┌─────────────────────────────────────┐
 │   Device Address Bit0    L  ──────────────────
 │   Device Address Bit1    M  ──────────────────
 │   Device Address Bit2    A  ──────────────────
 │   Device Address Bit3    B  ──────────────────
 │   Address Ground         N  ──────────────────
 │
 │   Reset out              U  ──────────────────
 │   Reset in               V  ──────────────────
 │
 │   CAN1 in (Hi)           C  ──────────────────
 │   CAN1 in (Lo)           D  ──────────────────
 │   CAN1 in (shield)       P  ──────────────────
 │
 │   CAN1 out (Hi)          E  ──────────────────
 │   CAN1 out (Lo)          F  ──────────────────
 │   CAN1 out (shield)      R  ──────────────────
 │
 │   CAN2 in (Hi)           G  ──────────────────
 │   CAN2 in (Lo)           H  ──────────────────
 │   CAN2 in (shield)       S  ──────────────────
 │
 │   CAN2 out (Hi)          J  ──────────────────
 │   CAN2 out (Lo)          K  ──────────────────
 │   CAN2 out (shield)      T  ──────────────────
 └─────────────────────────────────────┘
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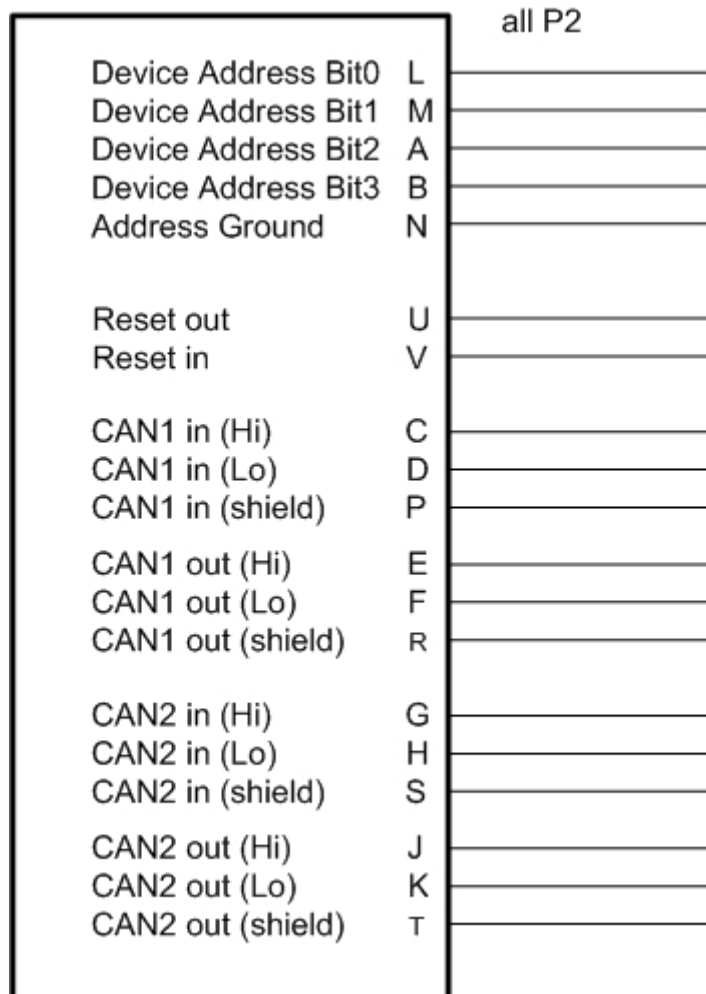
Fig. 2-7 Audio Control Unit connections

Note

The complete interwiring diagram for the Audio Control Unit and Remote Electronic Unit is shows in the Manual "Installation an Operation" DV 64460.03.

2.9 Configuration software

The configuration of the DVCS 6100 can be changed by using a Personal Computer or Laptop and Configuration Set CSW6100-X.
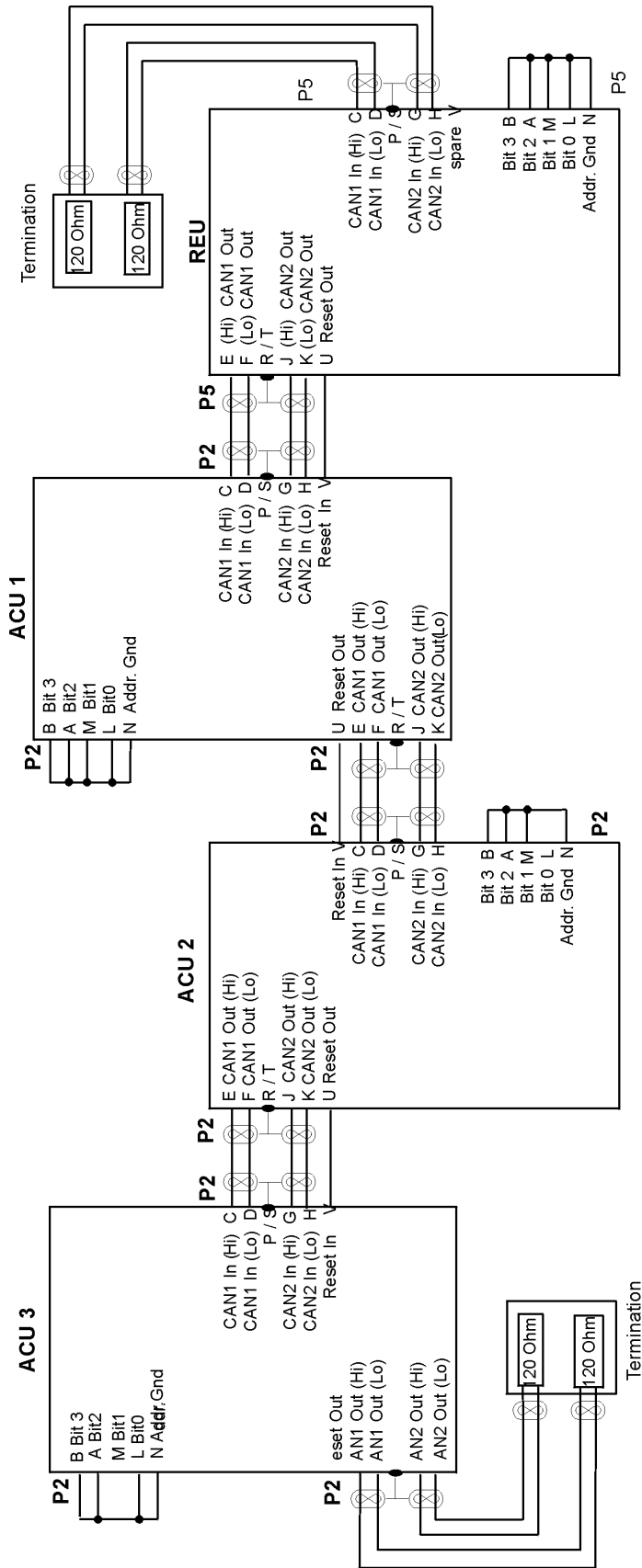
Fig. 2-7 Audio Control Unit connections

Note

The ends of each bus must be terminated with 120 Ohm. It can be in the harness or on a separate junction block.

For correct operation with one ACU removed, a dummy mating connector will have to be connected in its place.

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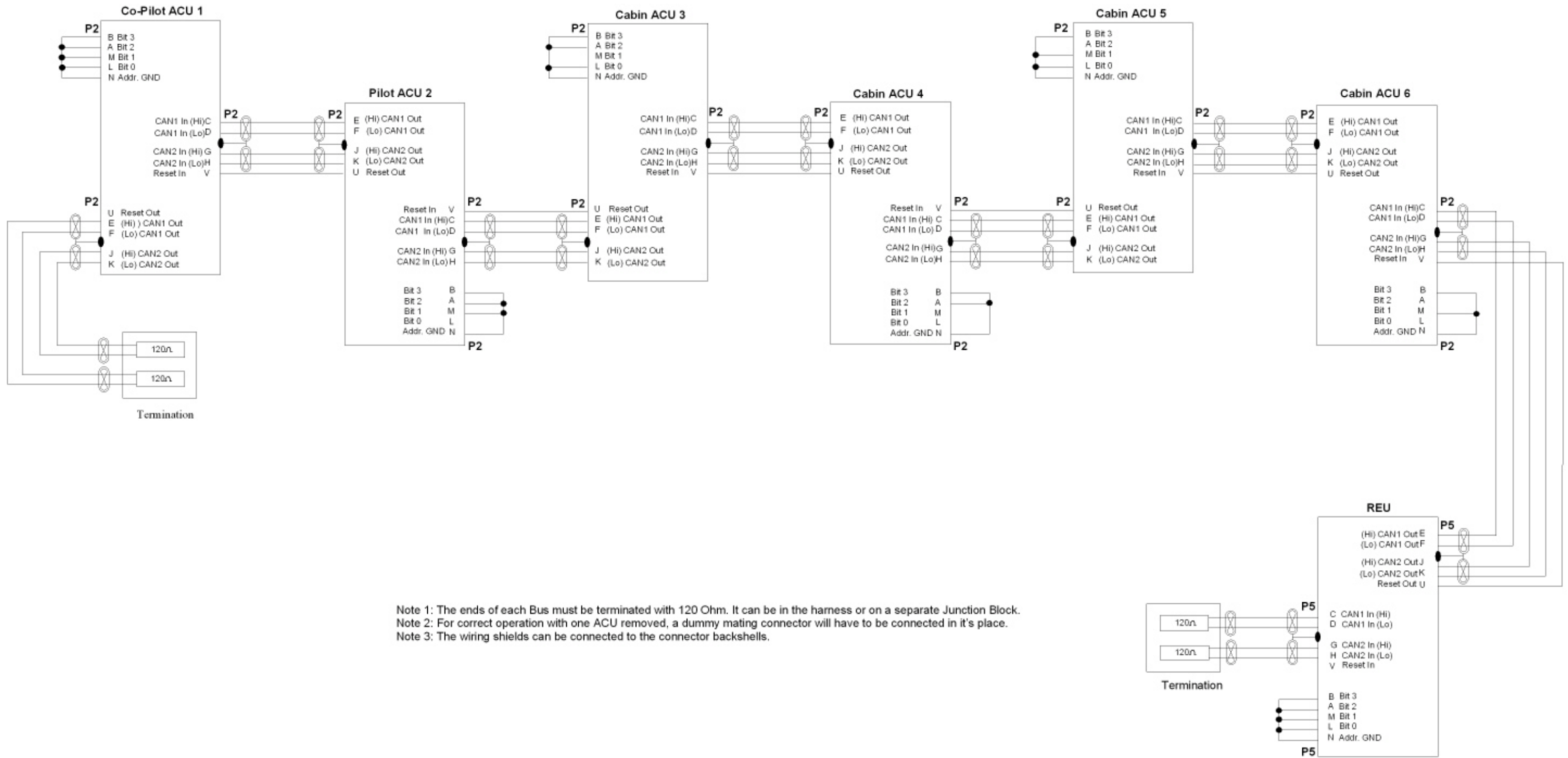
Fig. 2-7 Audio Control Unit bus connections

Note 1: The ends of each Bus must be terminated with 120 Ohm. It can be in the harness or on a separate Junction Block.
Note 2: For correct operation with one ACU removed, a dummy mating connector will have to be connected in it's place.
Note 3: The wiring shields can be connected to the connector backshells.

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Section 3 OPERATION
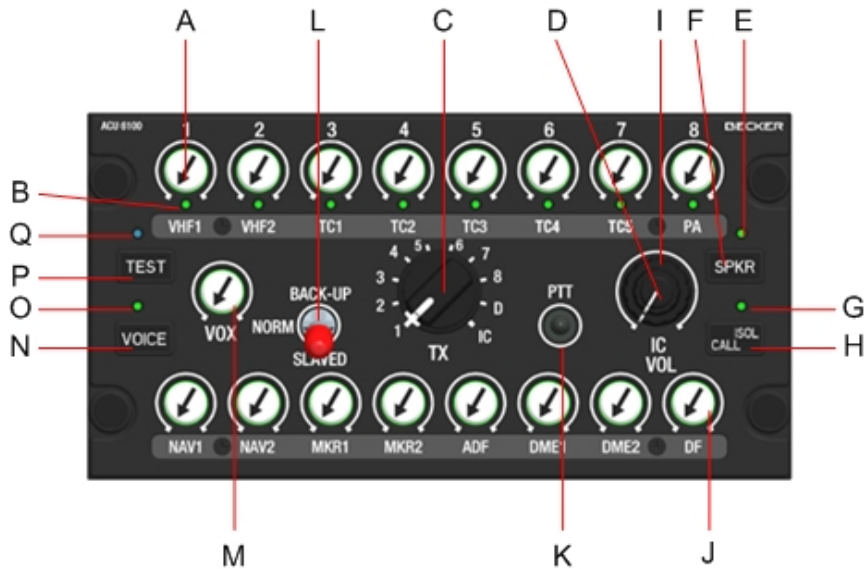
3.1 Operating controls

Figure 3-1 Front panel of the Audio Control Unit with generic button-inscription

3.2 Description and function of the operating controls and indicators

Item	Control / Indicator	Description	Function
A	TX1 to TX8 controls	8 potentiometer with push-push switches	On/Off switch for every TX channels and individual volume adjust for audio monitoring
B	TX indicators 1 to 8	8 LED (green)	Indication of individual TX channel status LED on = channel is preselected for transmission LED blinking = transmission is active LED blinking = Selective "CALL" is active fast
C	Transmitter selector switch	Rotary switch with 10 lock positions	Position 1 to 8 preselection of TX channel for transmission Position D selection of 2 predefined TX channels for dual transmission mode Position D selection of multi transmit mode, if configured Position IC Intercom PTT mode
D	IC volume control	Potentiometer	Volume adjustment for intercom

Item	Control / Indicator	Description	Function
E	"SPKR" indicator	LED (green)	LED on = Speaker is on LED off = Speaker is off
F	"SPKR" button	Push-button	On/Off switch for audio monitoring via the speaker
G	"ISOL/ CALL" indicator	LED (green)	LED on = cockpit and cabin intercom circuits are isolated LED off = cockpit and cabin intercom circuits are connected LED blinking = intercom request "CALL" is active
H	"ISOL/ CALL" button	Push-button	Cockpit connect or truncate the cockpit and cabin intercom circuits Cabin initiates an intercom request "CALL" if the intercom circuits are truncate
I	Volume control	Potentiometer,	Main volume control
J	RX1 to RX8 controls	8 potentiometer with push-push switches	On/Off switch for every RX channels and individual volume adjust for audio monitoring
K	PTT switch **optional** PTT/IC switch **or** MASK/MIC switch	Momentary switch with 2 key positions Toggle switch with two locking positions	Switch pressed = selected transmitter is keyed Switch released = selected channels are monitored Option IC-Switch = Activation IC operation External relay control for MASK / MIC switch over
L	BACK-UP switch	Toggle switch with 3 locking positions **or** Toggle switch with 2 locking positions	Position BACK-UP = emergency operation Position NORM = normal operation Position SLAVED = slave operation Position EMER = emergency operation Position NORM = normal operation Position
M	VOX level adjustment VOX ON/OFF switch	Potentiometer with push-push switch	VOX sensitivity selection ON/OFF switch for VOX activation
N	"VOICE" button	Push-button	On/Off switch for VOICE filter (for configured -RX channels)
O	"VOICE" indicator	LED (green)	LED on = voice filter is active LED off = voice filter is not active
P **or**	"TEST" button "MKR / MUTE" button	Push-button	Activation of IBIT (test function) Activation of Maker mute function
Q	"TEST" indicator	LED (yellow)	LED on = internal self test is running LED blinking = the internal selftest detected an failure

3.3   Operating instructions

3.3.1   Preparations (power-up test)

1. Switch on the unit by using the audio selector master switch (circuit breaker).

2. When the Audio Control Unit is powered, the device starts an internal self test procedure. All the microprocessors and memories are tested as well as data transfer between Audio Control Units and Remote Electronic Unit.

    While test is running, the LED above "TEST" push button illuminates. The test needs about 4 seconds.
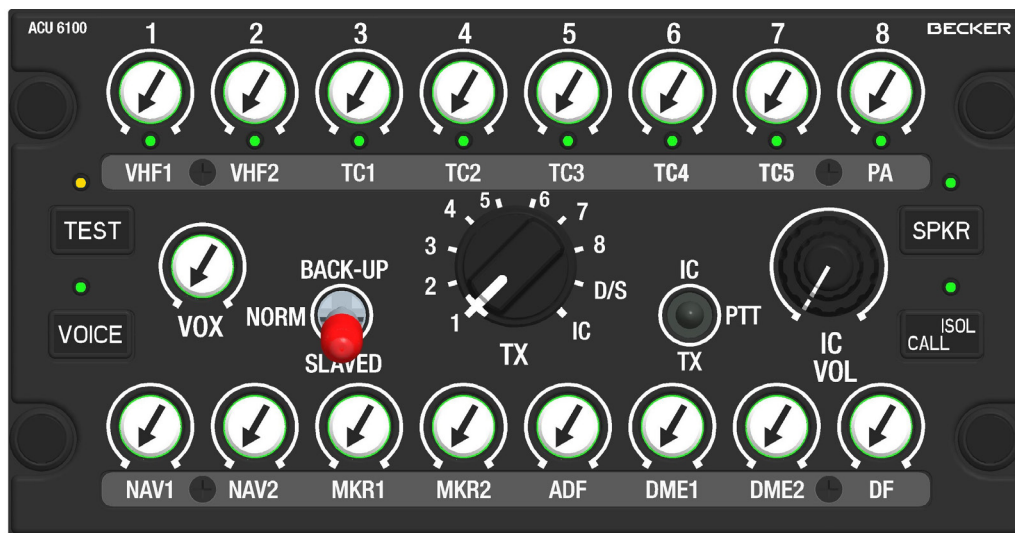

Figure 3-2 Power-up test

After test, following results are shown:

- No failure detected   yellow LED is off; the system is in normal mode

- Failure detected   yellow LED is blinking

If the internal test routine detected a failure (yellow LED is blinking), the operator has 2 possibilities:

- By pressing the "TEST" button, failure can be acknowledged. In case of a permanent problem inside the system, it will be detected by continous self test routine and indicated again.

- Switching into slaved or emergency mode by using the "BACK-UP" switch.

3.4 Transceiver operation
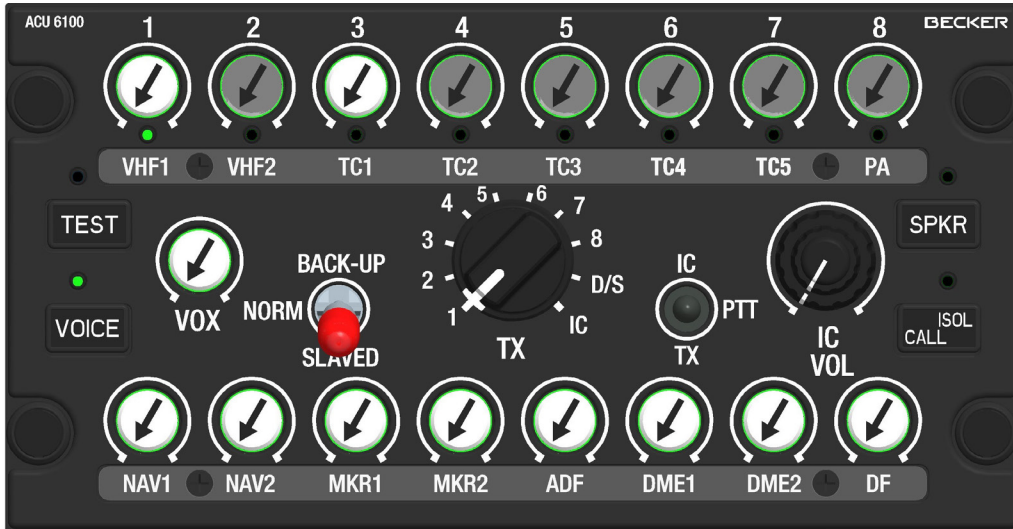
3.4.1 Transceiver monitoring

Figure 3-3 Transceiver monitoring

For transceiver monitoring, a TX-channel is activated by push release of the respective knob.

- Knob released   monitoring ON

- Knob pressed   monitoring OFF

Several transceivers may be selected for monitoring at the same time.

3.4.2 Individual transceiver channel volume adjustment

The individual volume for the monitored channels can be selected by turning the respective knob.

3.4.3 Monitored TX-channel visualization

The activated TX-channel (released) knobs are illuminated.
By looking at the panel from an angle that's unequal to the rectangular top view, it's easy to detect the activated and deactivated channels.

An arrow on top of each knob helps the user to pick the selected volume of the several channels quickly.

3.4.4 Main volume adjustment

Main volume can be adjusted at any time by turning just the VOL control. This action adjusts the sum volume of all activated TX- and RX-channels and the fixed inputs 4 to 6.

3.5 Selection of transmission mode

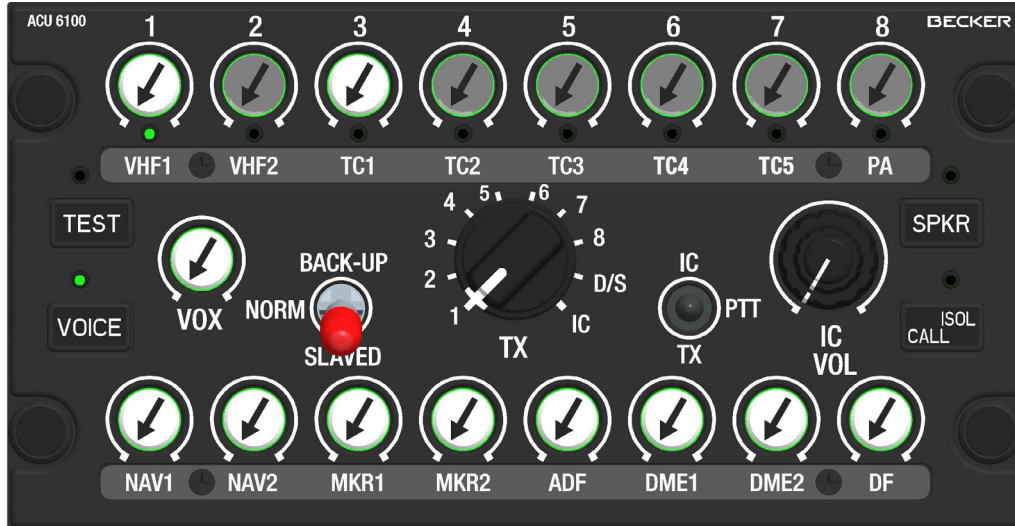### 3.5.1 Selecting a radio for transmission

Figure 3-4 Selecting a radio for transmission

For transmission with an individual radio, the transceiver is pre-selected by means of the TX-selector rotary switch in the centre of the Audio Control Unit. In the given example TX-channel 1 is pre-selected for transmission. The green LED illuminates (TX channel 1).

3.5.2 Selection of dual or multi transmission mode

Positions 9 of the TX-selector rotary switch labelled with "D" is for dual or multi transmission mode. By system configuration at installation time, 2 out of the 8 TX-channels can be defined for usage in dual transmission mode.

3.5.3 Selection of intercom PTT

The last position (by turning clock wise) of the TX-selector rotary switch selects the "Intercom by PTT" mode.

3.5.4 Forced monitoring

The reception signal of the radio which is pre-selected for transmission is monitored, even if it was not active for monitoring before (forced monitoring).

Using the respective knob, the monitoring volume can be adjusted.

Forced monitoring can be deactivated during installation setup by configuration.

With activated "Forced Monitoring", in the following example, TX-channel 1 would be audible thus it is not manually activated (knob not released).

Figure 3-5 Forced monitoring
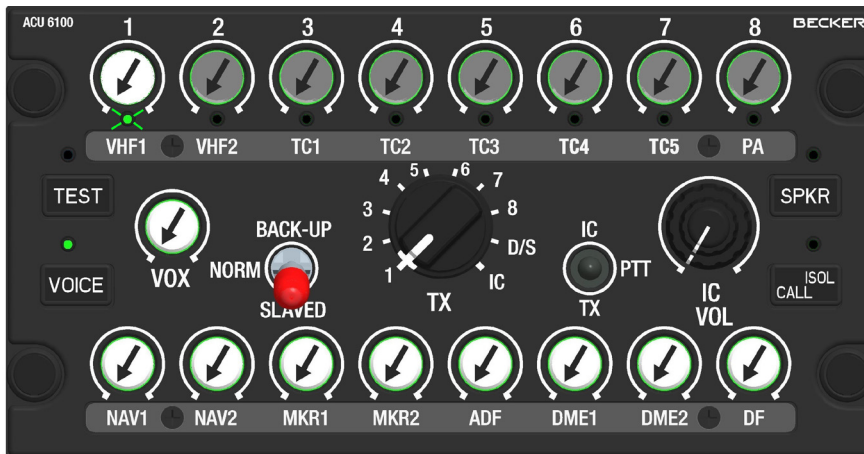
3.5.5 Transmission mode

Figure 3-6 Transmission mode

By pressing a PTT switch (on panel or external), the following actions will result:

- The selected transmitter will be keyed.

- The green LED below the associated channel volume knob is blinking.

Note:

During transmission, all received signals possibly selected, are muted as well as signals originating from aircraft intercommunication.

The muting can be deactivated during installation setup by configuration.

Only those warning tones which have been programmed as essential during installation setup, are still audible when transmitting.

If loudspeakers are provided and if the one related to the individual control unit had been switched on prior to transmitting, it will be muted to avoid acoustic feedback to the microphone.

By speaking into the microphone while in transmission mode, the following actions will result:

- The activated transmitter is modulated.

- A sidetone is audible with a volume that is in accordance with the preselection in the installation setup. The individual volume for the monitored channels can be selected by turning the respective knob.

- The TX indications (blinking LED) assigned to an individual transmitter is active on all ACUs when keyed by any operator.

- Any other transmitter could be modulated by different operators simultaneously.

By releasing the PTT switch (on panel or external), the following actions will result:

- The transceiver turns back to receive mode.

- The green LED lights up (stops flashing).

- All previously selected signals, intercom, and warning tones are resumed.

- If the loudspeaker was activated before pressing PTT, it is switched on again.
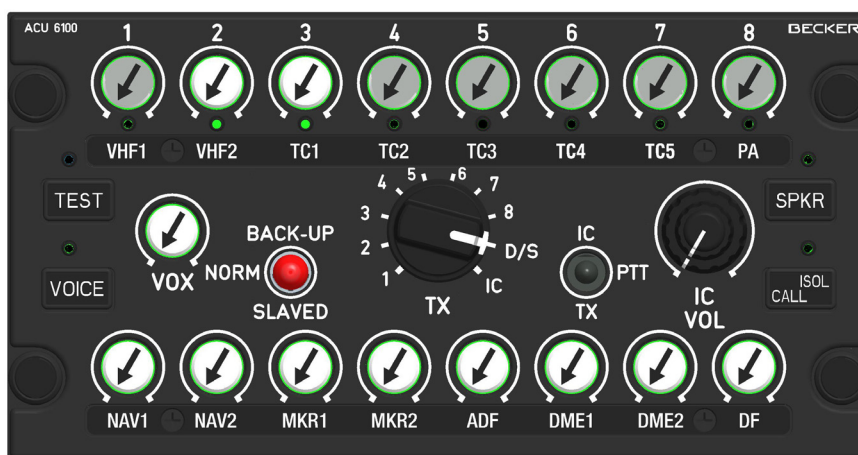
3.5.6   Dual transmission

Figure 3-7 Dual transmission mode

If the TX-selector rotary switch is turned to position "D", the operator activates 2 transceiver simultaneously for dual transmission. The green LED`s (transceiver monitoring) from the selected transceivers illuminate. The selection of the two transceivers for dual transmission is configured during installation setup of the control unit.

By pressing a PTT switch (on panel or external), the transmission is indicated by the corresponding green LED`s blinking as long as the PTT switch is held.

By configuration the system is able to be configured for Dual TX or Multi TX operation. The dual transmission mode can be blocked by system configuration.
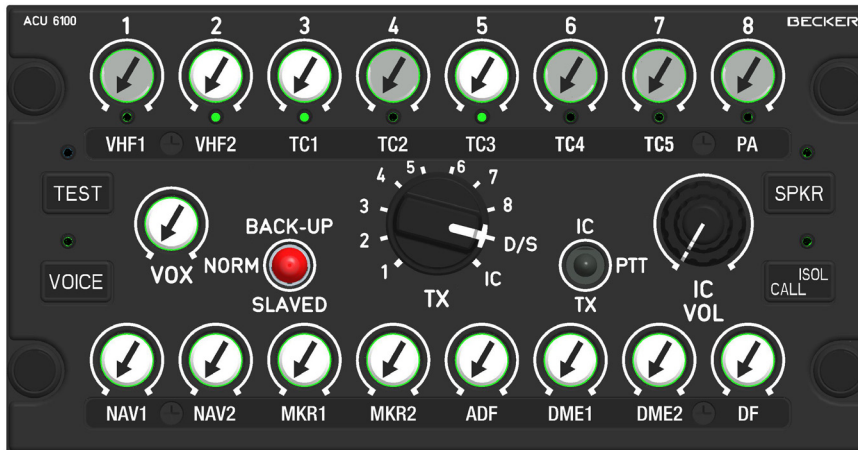
3.5.7 Multi transmission mode

Figure 3-8 Multi transmission mode

If the TX-selector rotary switch is turned to position "D", the operator activates (TX-knob released) several transceivers simultaneously for transmission. The green LED`s (transceiver monitoring) from the selected transceivers illuminate. The selection of the function for simulcast is configured during installation setup of the control unit.

By pressing a PTT switch (on panel or external), the transmission is indicated by the corresponding green LED`s blinking as long as the PTT switch is held.

By configuration the system is able to be configured for Dual TX or Multi TX operation. The simulcast transmission mode can be blocked by system configuration.

3.6 Receiver operation

3.6.1 Receiver monitoring

For receiver monitoring, a RX-channel is activated by push release of the respective knob:

- Knob released   monitoring ON
- Knob pressed   monitoring OFF

Figure 3-9 Receiver operation

Several receivers may be selected for monitoring at the same time.

In the given example, RX-channel 1, 2 and 6 are selected for monitoring. RX-channel 5 is not audible, even though the volume knob is not in the far left (ccw) position.

3.6.2 Individual receiver channel volume adjustment

The individual volume for the monitored channels can be selected by turning the respective knobs.

3.6.3 Monitored RX-channel visualization

The activated RX-channel (released) knobs are illuminated.

By looking at the panel from an angle that's unequal to the rectangular top view, it's easy to detect the activated and deactivated channels.

An arrow on top of each knob helps the user to pick the selected volume of the several channels quickly.

3.6.4 Main volume adjustment

Main volume can be adjusted at any time by turning the VOL control. This action adjusts the sum volume of all activated TX- and RX-channels.

3.6.5 Voice filter activation

The system has the possibility to activate a 1020Hz notch filter for all the RX-channels. This is to suppress identification codes in the incoming audio signals from navigation receivers (e.g. for listening to weather information).

In the configuration of the system, the system integrator can define the RX-channels that will have this filter.

Figure 3-10 Voice filter activation

Whilst operating, the filter can be activated and deactivated by pressing the "VOICE" push button. The status of voice filter activation is visible by a green LED in top of that push button:

- "VOICE" LED on   voice filter is active

- "VOICE" LED off   voice filter is not active

3.6.6   Loudspeaker operation

Note:

The DVCS6100 system provides two speaker channels which are assigned in the standard version to ACU1 and ACU2.

Pressing the "SPKR" button briefly, switches on the loudspeaker that is related to this control unit. All selected TX/RX channel signals and warnings are reproduced through the loudspeaker. The green LED above the button indicates the speaker mode.

Pressing the key once again, the speaker is switched off and the LED goes off.
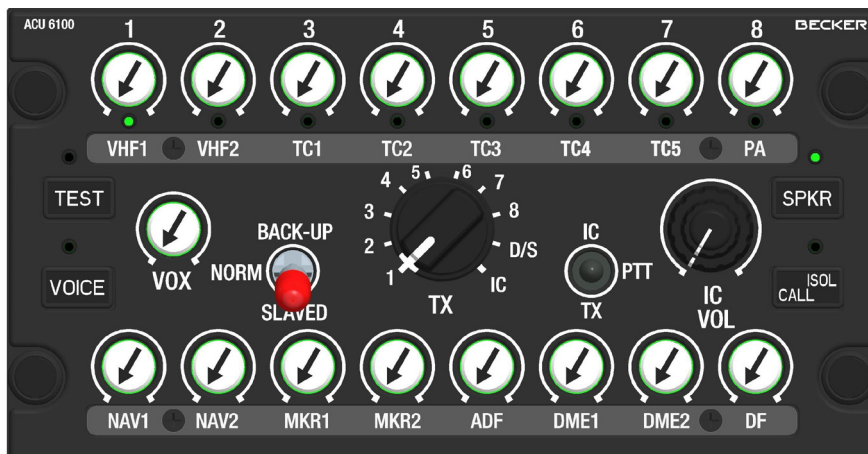

Figure 3-11 Loudspeaker operation

When speaker mode is active with an individual Audio Control Unit, voice controlled intercommunication (VOX) is disabled.

Intercom is still possible by activating the external IC-PTT button or by pressing the TX-PTT button while the TX-selector rotary switch is in position "IC". In both cases, the loudspeaker is muted to avoid feedback.

3.7 Intercommunication

3.7.1 Virtual Intercom Circuits

There are four Intercom Circuits provided by the DVCS6100 System.

1. Cockpit Crew
2. Cabin Crew
3. Third Circuit (controlled by a external switch, refer to the REU6100 manual)
4. IC-Ring Line (connected to the cabin, Cockpit or 3rd intercom circuit; configurable by the CSW - Software).

Two of the intercom circuits (Cockpit and Cabin) can be direct controlled by the Control Unit.

The Intercom between cockpit and cabin can be truncated by pressing the "ISOL/CALL" push button. When the intercom mode between cockpit and cabin is interrupted, the green LED above the "ISOL/CALL" button is active.

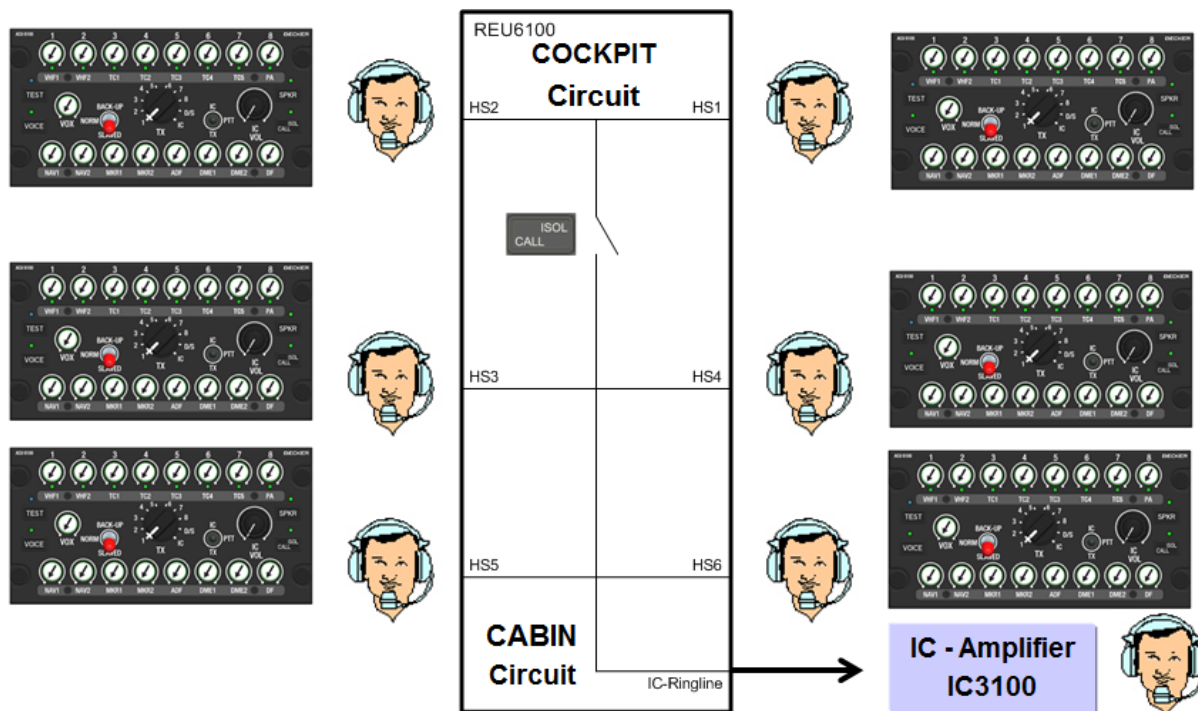## Intercom extension for passengers:

Figure 3-12 Virtual Intercom Circuits

By using an additional intercom amplifier (e.g. Becker IC3100) passengers can be connected with the intercom system. These passengers are representing a fourth intercom circuit which is connected with the cabin intercom circuit of the DVCS6100 system. It can be truncated by an external switch which is not shown in the above diagram.

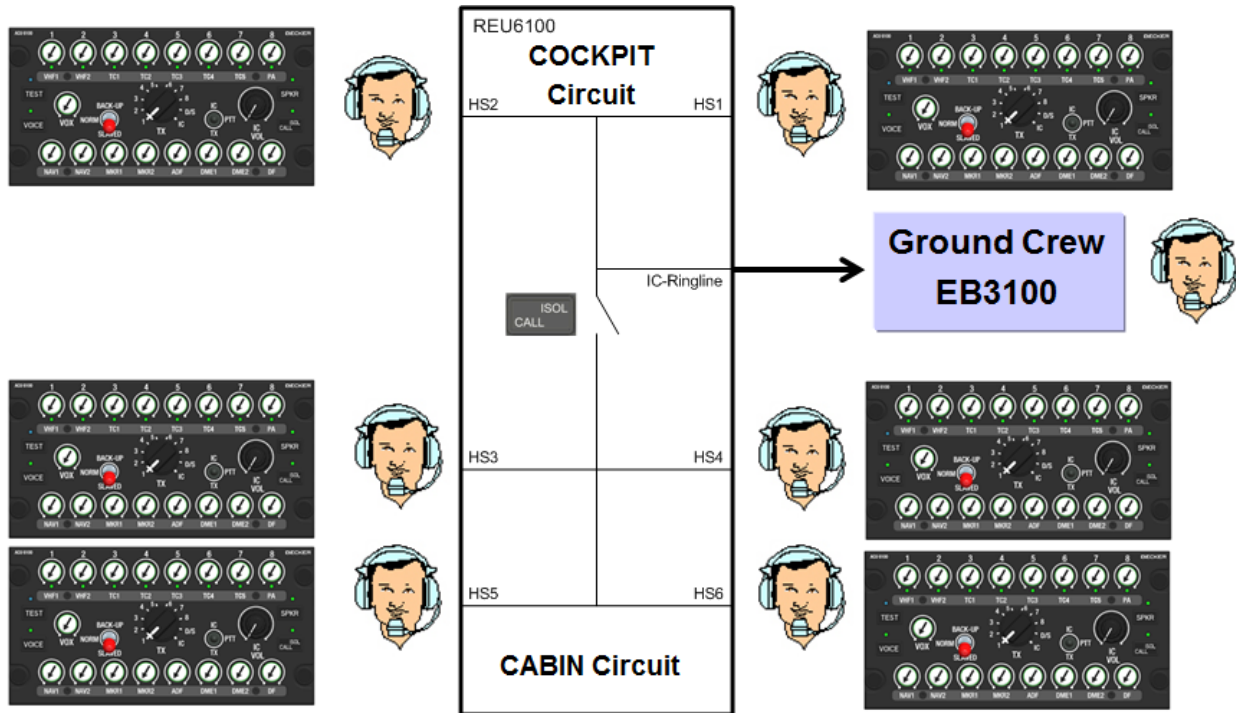## Intercom extension for Ground Crew:

Figure 3-13 Intercom extension for Ground Crew

By using an additional ground crew box (e.g. Becker EB3100) ground crew can be connected with the intercom system. That ground crew is representing a fourth intercom circuit which is connected with the cockpit intercom circuit of the DVCS6100 system.

3.7.2   Cockpit "ISOL/CALL" Functionality

In the cockpit, the "ISOL/CALL" button is used to toggle the connection/disconnection between the cockpit and the cabin intercom circuits.

A LED above this button indicates the actual status of the connection:

- LED on ➔ cockpit and cabin intercom circuits are isolated

- LED off ➔ cockpit and cabin intercom circuits are connected

3.7.3   Cabin "ISOL/CALL" Functionality

The "ISOL/CALL" button on the cabin ACUs gives the cabin passengers the possibility to call for a connection. The cockpit crew can react to this call by ending the isolation mode.

The LED above the "ISOL/CALL" button shows the call status in the following way:

- LED off   Cockpit and cabin intercom circuits are connected

- LED blinking   The "CALL" button was pressed and the system is in call mode. By pressing the "ISOL/CALL" key at his Audio Control Unit the pilot or copilot can reestablish the connection between the passengers. While the LED indications are blinking, a CALL tone is audible in the cockpit.The "CALL" tone can be enabled/disabled by configuration.

- LED on   The intercom system is in isolation mode

If the system is in call mode (blinking LED), there are two possibilities:

   - the cockpit crew leave the isolation mode and connect the
     intercom circuits (LED off).

   - the cabin crew presses the "CALL" button once again and
     the system stays in isolation mode (LED on).

If the intercom circuits are connected (no isolation mode), the "ISOL/CALL" button on the cabin ACUs have no function.

Note:
For some special mission profiles also the cabin crew must be able to isolate the cabin crew from the Cockpit crew circuit. Cabin operator can only disconnect the two intercom circuits. This feature can be enabled in the configuration setup.

3.8   Intercom activation

Intercommunication between the different users can be activated in three ways:

- Voice controlled

- PTT controlled

- IC Switch on the control panel (optional) or External Switch controlled

3.8.1 Voice Controlled Intercom

In positions "1" to "8" and "D" of the TX selector rotary switch, Voice Controlled Intercom (VOX) is established without the need for any further action (assuming no transmitter is keyed).

Voice Controlled Intercom can be activated or deactivated by switching functionality of the VOX knob.

- VOX knob released   Voice Controlled Intercom ON

- VOX knob impressed   Voice Controlled Intercom OFF

The switch function of the VOX knob can be activated or deactivated by the Configuration Software.

3.8.2 VOX level adjustment

The VOX level of the microphones associated with each ACU can be adjusted independently for each ACU by turning the VOX potentiometer knob. The VOX potentiometer knob can be impressed in the same way as the channel volume knobs.

Figure 3-14 VOX level adjustment

3.8.3 PTT controlled intercom

Setting the TX selector to position IC, enables intercom by using the PTT button. In this case, the mike signal is forwarded to the intercom amplifier when the PTT switch is pressed only.

3.8.4 External switch controlled intercom

Each ACU supports an external momentary or 2-state switch for activation of a "Hot Mike Mode". If this switch is activated, the mike line is "open" and the signal is forwarded directly to the intercom amplifier.

3.8.5 IC volume adjustment

Figure 3-15 IC volume adjustment

For individual intercom volume adjustment, the ACU provides a dedicated potentiometer on the front panel. The intercom volume is independent from the main volume.

The transmission mode always has a higher priority than the intercommunication mode. If an operator activates the transmission mode for any transceiver, the ACU stops its "VOX" or "HOT MIKE" mode and carries out transmission mode. Other ACUs are not affected and their operators may continue intercommunication.

3.8.6 Winchman intercom

By pressing the special external push button the winchman function is activated.

With this, the winchman is able to increase the VOX level and the main volume for his headset. The external push buttons (connected via discrete input lines) are mounted separately from the corresponding ACU in the winchman working area (near the cabin door).
By configuration, it is possible to assign the winchman functionality to any ACU or headset without ACU.

The following sub paragraphs describe the winchman external buttons functionality in detail.

3.8.6.1 Winchman VOX level functionality

If the VOX level push button is pressed for a short time (0.3s to ≤ 3s), the VOX level is increased step by step, until the maximum value is reached. If the VOX level push-button is pressed for a time ≥3s, the VOX level will be reset to the value selected on the corresponding ACU panel. The VOX level can be reseted too, when the wichmann function is switched off and the volume control or VOX control on the ACU is changed.

3.8.6.2 Winchman volume level functionality

If the winchman volume push button is pressed a short time (0.3s to ≤ 2s), the volume level is increased by one step, until the maximum value is reached. If the winchman volume push button is pressed for a time ≥ 3s, the volume level will be reseted to the value selected on the corresponding ACU panel. The VOX level can be reseted also, when the main volume control or VOX control on the related ACU is changed.

3.8.7 Emergency CALL function

The Audio Control Unit provides an "Emergency CALL" (E-CALL) via a dedicated discrete input. If this discrete input is activated, the "E-CALL" tone is audible for cockpit ACU operators. The "E-CALL" tone is different from the intercom request CALL- tone.

The "E-CALL" functionality can be deactivated via system configuration.

3.9 Selective CALL function

A "Selective CALL" functionality is provided by the Audio Control Unit in a configurable way.
The system detects selective call status via a discrete input line.

The behaviour of the Audio Control Unit Selective CALL functionality can be selected by configuration of the system.

3.9.1 Allocation of "Selective CALL"

The "Selective CALL" function can be allocated to one of the 8 TX-channels white system integration setup.

3.9.2 Selective CALL indication

As long as the "Selective CALL" discrete input is activated, the LED below the associated TX-channel will blink with double frequency. The operator can react to this indication by activating the corresponding channel for monitoring (if not yet done) or starting communication.

3.9.3 Selective CALL forced monitoring

If forced monitoring for "Selective CALL" is activated in the configuration of the system, the associated TX-channel is automatically monitored as long as the selective CALL is active.

If this channel is being already monitored, there is no additional action.

3.10 Built in test

3.10.1 Power-up built in test (P-BIT)

Every time the system is powered, an internal self test procedure is started.

While the test is running, the LED above the "TEST" push button is active. The test lasts up to 4 seconds. After the test, the following results are shown:

- No failure detected   yellow LED gets off; the system is in normal mode

- Failure detected   yellow LED starts blinking

If the internal test routine detected a failure (yellow LED is blinking), the operator has 2 possibilities:

- By pressing the "TEST" button, the failure can be acknowledged. In case at a permanent problem inside the system, it will be detected by the continuous self test routine and indicated again.

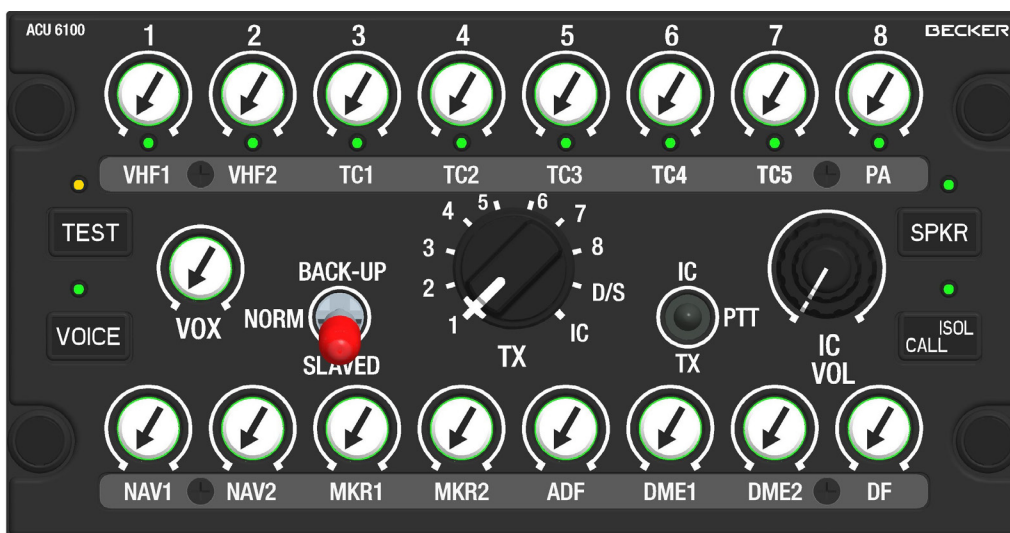- Switching into the slaved or emergency mode by using the "BACK-UP" switch

Figure 3-16 Power-up built in test

3.10.2 Continuous built in test (C-BIT)

During normal operation of the system, a permanent background test routine is continuously running. If an error is detected, the "TEST" LED starts to flash. If it is not a fatal error, the operator can acknowledge the failure by pressing the test button.

In case of notable degradation in unit or system performance, the operator can turn to emergency operation, either in "SLAVED" or "BACK-UP" mode.

3.10.3 Initiated built in test (I-BIT)

An initiated built in test can be activated on each ACU at any time by pressing the "TEST" button (except during transmission mode).

3.11 Emergency operation

3.11.1 Slave operation

Copilot´s ACU   Pilot´s ACU

Figure 3-17 Slave operation

When switching the emergency toggle switch to position "SLAVED" on ACU 1 or ACU 2, the matching headset is disconnected from its audio processing circuits in the Remote Electronic Unit and its mike and phone capsules are directly paralleled to the headset of the remaining ACU.

No further action is possible on the slaved Audio Control Unit.

"SLAVED" mode is a first step of security in the case where one of the control panels appears to be defective or not working.

3.11.2 Back-Up operation

The Audio Control Unit provides a back-up mode. This mode can be activated either by a dedicated switch on the cockpit ACU panels or in an automatic way by the system itself.

3.11.3 Back-Up switch activated

The pilot or copilot has the possibility to activate the back-up mode by switching a special toggle switch (after unlocking by pulling its lever) in position "BACK UP".

In this mode, the microphone and headphone amplifier is powered via an external emergency supply provided by the aircraft.

The following signal routings and functionalities are active in back-up mode:

- Headphone 1 - TX 1 & FIX 1

- Headphone 2 - TX 2 & FIX 2

- Intercom volume level is fixed to 50%
  CVR ½ level is fixed to 50%

- No actions on the ACUs are supported

3.11.4 Automatic activation

When the two main power supply busses fail or if a fatal defect occurs within the unit's internal supply, the security logic falls back to Back-Up operation even if the "BACK-UP" switch had not been activated. The signal routings and functionalities are as described in chapter 3.11.3

3.12 Special Version Audio Control Unit ACU6100-X-(XXX0) Intercom /PTT Switch on ACU

This ACU variant ACU6100-X-(XXX0) supports a 2-state up/down IC/TX PTT- tip switch. The upper position "IC" is for activation of a "Hot Mike Mode" that means the mike line is "open" and the signal is forwarded directly to the intercom. The lower position "TX" is used to key the transmitter in transmitt mode. The mikeselector label "D" has changed into "D/S" because of the new feature Simulcast (= Multi Transmission). This functionality is described in chapter 3.5.7.
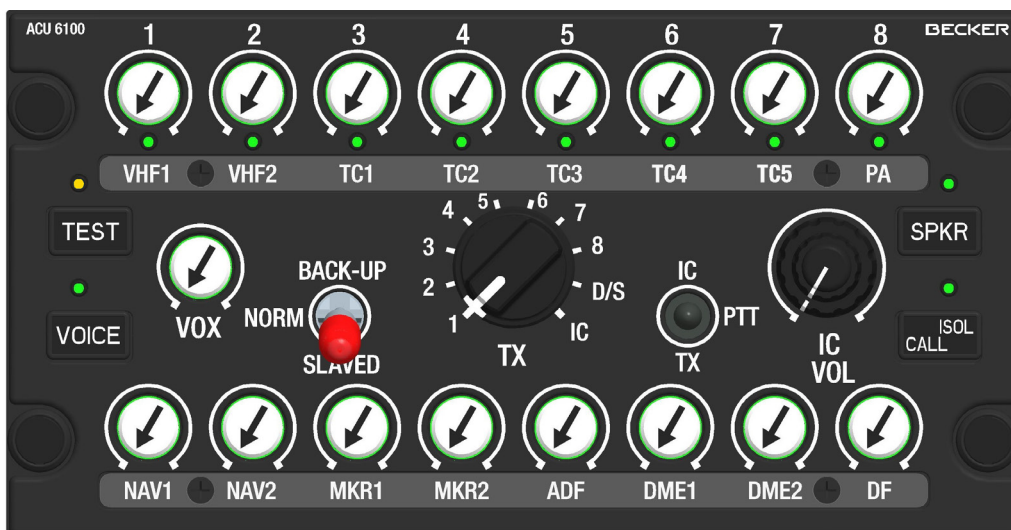

Figure 3-18 Special Version Audio Control Unit ACU6100-X-(XXX0) Intercom /PTT Switch on ACU

3.13 Special Version Audio Control Unit ACU6100-X-(X9X) (RX Version)

The Audio Control Unit ACU6100-X-(X9X) (RX Version) is the same as the standard ACU6100-X-(XXX) but no mikeselector and no PTT switch is available. It allows control of:

- Monitoring of up to 16 receivers with a capability of individual volume control. The Voice filter functionality is only available on the lower RX row.

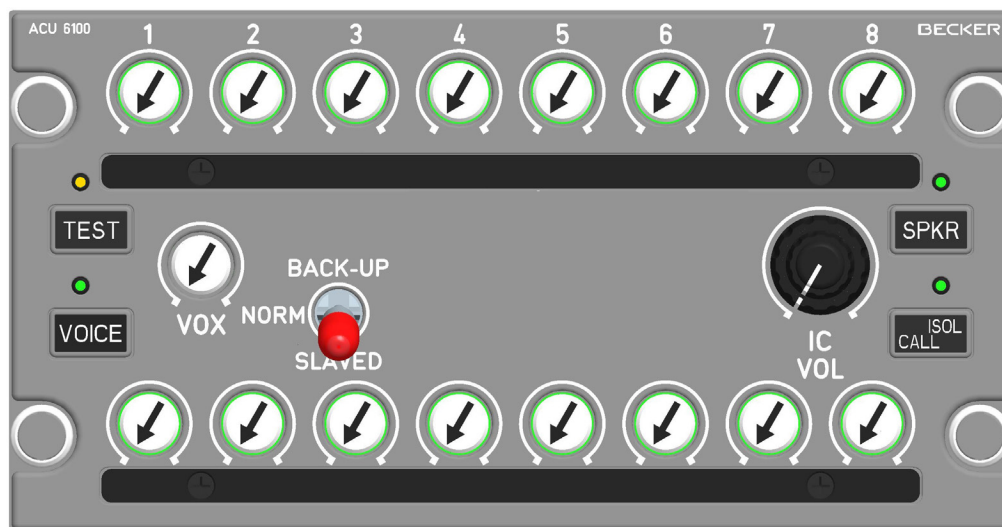- Aircraft intercommunication in VOX mode

Figure 3-19 Special Version Audio Control Unit ACU6100-X-(X9X) (RX Version)

The function of the operating controls and indicators are the same as the standard Version.

3.14   Selection of Relay Mode

The relay mode is pre-selected by turning the TX-selector rotary switch in position D/S. Two transceivers can be selected by push release the knob for relay operation. The correct selec- tion is indicated by a LED below the corresponding two transceivers. All LED indication will be "OFF" if more or less than two transceivers are selected (not allowed). The channels of radios, allowed for relay operation is predefined during configuration setup. Both selected transceivers will be ready for monitoring the audio. As soon one of the radios received a call automatically the other will be activated for transmit mode.

While relay mode is active the operator can still participating intercommunication with other crew members.

As long the transceivers selected for relay operation does not receive a call signal they can be used for transmit from all the other operators. If one of the transmitters will receive a call signal automatically the relay operation takes over the lead.
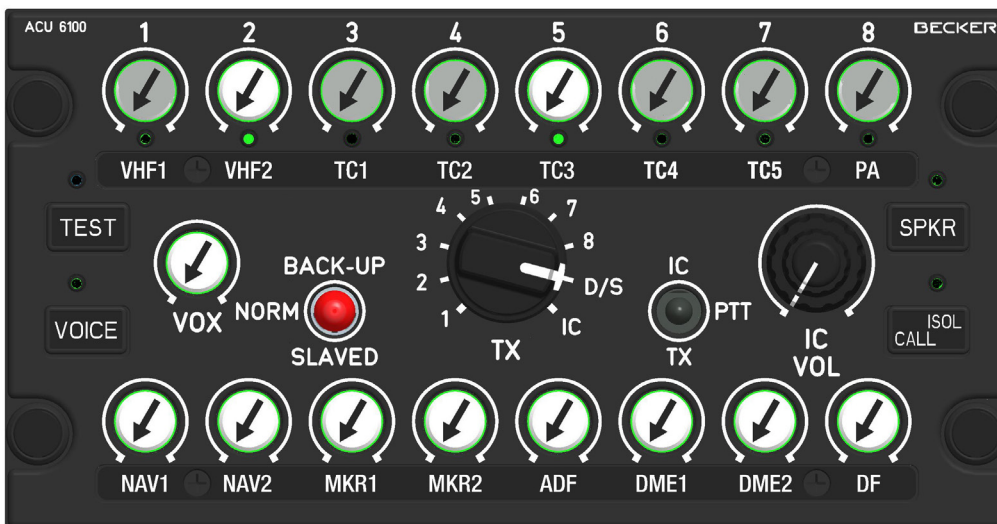

Figure 3-20 Transceiver 2 and 5 are selected for relay operation

3.15 Special Version Audio Control Unit ACU6100-X-(XXX5) Fixed Wing Version

Figure 3-21 Special Version Audio Control Unit ACU6100-X-(XXX5) Fixed Wing Version

The ACU variant ACU6100-X-(XXX5) supports a 2 state switch for "NORM" and "EMER" – mode, and a 2 state switch for "MIC" and "MASK" switch over. Both switches are with lever locking.

- "NORM" system in normal operation

- "EMER" selection activates the Backup mode (refer to the paragraph 3.11.2)

- "MIC" mike operation with headset or hand mike

- "MASK" oxygen mike operation. Switch activates an external relay to switch over between standard mike and oxygen mike operation. By selecting the MASK mike operation the speaker function is automatically activated. By briefly pressing the "SPKR" button speaker mode can be deactivated.

- Button "MKR/MUTE" activates the Marker receiver mute function (mute time = 30 sec.).

- Test (IBIT) can be activated by briefly pressing the button "MKR/MUTE" and the button "VOICE" at the same time. Details about the test function are described in paragraph 3.10.

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