FSG 90(X) ACCESSORY

Panel Module

fits all types of 2¼" FSG 90

Operator's Manual

applies for Panel Module, Article no F10319

Before installing and operating the radio please read this manual thoroughly!

Please observe the Safety Information!

Keep for further use!

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SAFETY INFORMATION

Every radio, when transmitting, radiates energy into the atmosphere that may, under certain conditions, cause the generation of sparks. All users of our Panel Module together with a VHF/AM airband radio should be aware of the following warning:

Do not operate this radio in an explosive atmosphere (petroleum fuels, solvents, dust, etc.)!

During normal use, the radio will subject you to radio energy substantially below the level where any kind of harm is reported.

TO ENSURE PERSONAL SAFETY, please observe the following simple rules:

- **Only persons entitled may operate the Panel Module together with an airband radio!**
- **DO NOT** transmit when the antenna is very close to, or touching, exposed parts of the body, especially the face and eyes.
- **DO NOT** transmit on a busy channel!
- **DO NOT** press the transmit (PTT) key when not actually desiring to transmit.
- **DO NOT** allow children to play with any radio equipment containing a transmitter.
- Always operate the radio with a suitable external antenna! Assure appropriate lightning protection where elevated outdoor antennas are used.
- Always switch OFF the radio when installing or removing the unit!
- Always switch OFF the radio when starting an engine or vehicle!
- Always power the Panel Module from 12 Vdc only. When the module has to be powered from a 24 Vdc source a suitable Voltage Converter 24 Vdc/12 Vdc of at least 4 Amps must be used!
- The Panel Module together with an airband radio may be used exclusively for communication on the airband frequencies.
- Unauthorized modifications and changes of the system **are forbidden**.
- When replacing defective parts use only original spare parts or standard parts recommended by the manufacturer!

Used Symbols

In this manual the following symbols are used:

DANGER!
describes an immediate threatening danger! Failing to observe the note may cause death or heaviest injuries.

CAUTION!
describes a special note for operation. Failing to observe the note may cause damage of the transceiver and/or stored data may be deleted!

IMPORTANT!
describes explanations and other useful hints. Failing to observe the note may cause degraded performance and/or unsatisfying operation!

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SECTION 1 GENERAL DESCRIPTION

1.1 Introduction

This Operator's Manual BA 151.01-E contains instructions and descriptions for application, installation and operation of the Panel Module together with a VHF/AM airband transceiver **FSG 90(X)** of Walter Dittel GmbH, D-86899 Landsberg, Germany.

1.2 Application & Description of the Panel Module

The Panel Module was designed to operate every 2¼" round front panel **FSG 90(X)** VHF/AM airband radio out of the **FSG 90 System** as stationary unit and to fulfil the requirements of air traffic control.

The Panel Module (19"-cassette) is intended to be installed into an operator's desk or a 19"-rack - as main or back-up unit.

Supplying the radio from a 12 Vdc accumulator of sufficient capacity in connection with an automatic battery charger allows independent operation from mains for a certain time.

The 6 Watt Dual Mode radio **FSG 90**, article no F10185, is working within the airband frequency range of 118.000 MHz to 136.975 MHz in either combined 8.33 kHz/25 kHz increments (2,278 channels) or "25 kHz only" increments (760 channels). The unit features 99 non-volatile channel memories in each mode.

The 10 Watt Dual Mode radio **FSG 90-H1**, article no F10302, is working within the airband frequency range of 118.000 MHz to 136.975 MHz in either combined 8.33 kHz/25 kHz increments (2,278 channels) or "25 kHz only" increments (760 channels). The unit features 99 non-volatile channel memories in each mode.

For all **FSG 90** types, the operating mode is Simplex, i.e. transmitting or receiving only in turns. With an RF output power of 6 or 10 Watt and high receiver sensitivity, these radios are excellently suitable for base operation.

The Panel Module unit features at the front a PTT key, a "CHANNEL BUSY" indicator, a frequency display illumination switch (ON/OFF), a 5-pole jack to connect a dynamic microphone with or without PTT key, headphone or headset; and a speaker with an ON/OFF switch. At the rear four twist-lock sockets are located to connect 12 Vdc supply, battery charger, Voice Recorder, and a remote audio panel. Interfacing to the radio is done via cable harness and 25-pole SUB-D receptacle, the antenna is plugged to the **FSG 90**'s antenna BNC-jack.

1.3 Equipment required but not supplied

- VHF/AM COM airband transceiver **FSG 90(X)**, 2¼" round front panel
- VHF antenna in the frequency range of at least 118 to 137 MHz, 50 Ohm. We recommend our weatherproof glass-fiber reinforced folded-top roof antenna, UHF-connector, article no W00013,
- Antenna cable RG-213/U, low-loss, UHF- and BNC plug,
- Dynamic microphone 30 to 600 Ohm, e.g. handheld microphone with PTT key, article no F10346, or a Standard carbon microphone with or without PTT key (notice separate microphone inputs for dynamic and carbon/amplified microphone)
- Power supply 12 Vdc of sufficient capacity, e.g. Battery Power Supply 12 Vdc/ 6.5 Ah, article no F10023,
- Interconnecting cable, 0.8 m/2.6 ft, to connect Battery Power Supply to Panel Module, article no F10216,
- Mating plugs, to connect remote audio panel, Voice recorder, etc., as required
- Automatic battery charger , e.g. DL-50, article no F10130.
- **When operating the station on a 24 Vdc source a suitable 24 Vdc/12 Vdc converter of at least 4 Amps must be used!**

1.4 Operating License

IMPORTANT!

- ***Ground operation always requires an individual operating license. Depending on national regulations, such license must be applied for at appropriate National Authorities, using suitable application forms.***
- ***If required, state radio type, Serial number, JTSO number No. LBA.O.10.911/98 JTSO, and Reg TP number A132937J.***

1.5 System and Type Approval Information

The Dual Mode VHF/AM Airband Transceivers **FSG 90** and **FSG 90-H1** comply for both, the combined 8.33 kHz/25 kHz as well as 25 kHz channel spacing with all applicable National and International Type Approval requirements, for any airborne and ground operations.

- JTSO Authorization LBA.O.10.911/98 JTSO (LBA Luftfahrtbundesamt) based on *EUROCAE ED-23B Airborne requirement is met besides 8.33 kHz requirements also for the 25 kHz ONLY channel spacing.
  This also includes Immunity according to ICAO ANNEX 10 against FM Broadcast Interference.
  This also includes fulfillment of specific audio filtering required in areas with CLIMAX operation in 25 kHz channel spacing.
  * Associated EUROCAE ED-14C / RTCA DO-160C Environmental requirements.
  * Associated EUROCAE ED-12B Software requirements based on ED-23B.
- Reg TP No. A132937J, stringent German Type Approval requirements Reg TP 321 ZV 034 (airborne) and Reg TP 321 ZV 039 (ground).
- DFS (Deutsche Flugsicherung) No. B-7850/97 (ground) German Type Approval requirements.
- BZT No. B132705J, CE Conformity,
  * Associated with DIN/ISO 7637-1 DC supply in 12 V vehicle.

IMPORTANT!

- ***For the first time after one year, then every 2nd year, ground application using 8.33 kHz channel spacing requires checking of the high precision reference frequency (tolerance less than ± 1.5 ppm) and recalibration, if necessary!***
- ***Every 4th year, airborne application using 8.33 kHz channel spacing requires checking of the high precision reference frequency (tolerance less than ± 5 ppm) and recalibration, if necessary!***
- ***All applications in the 25 kHz channel spacing require no recalibration (frequency tolerance less than ± 20 ppm).***
- ***All tolerances include the full operating temperature range of -20°C ... +55°C / -4°F ... +131°F.***
- ***Checking and recalibration must be performed by the equipment manufacturer or through authorized and approved avionics services. This requires use of specified test equipment as well as applicable test procedures (software) released by the manufacturer.***

1.6 Optional Accessories

Article-No.	Description
W00043	Magnet mount vehicle rod antenna, incl. 4 m cable, and PL-259 connector
W00066	Mobile Whip Antenna, 118 - 137 MHz, incl. 5 m cable, and PL-259 plug
W00013	Roof mounted weatherproof folded-top fiberglass antenna, UHF-connector, anti static, 1" mount
E08943	UHF antenna plug PL-259 for antenna cable RG-213/U
B01116	Antenna cable RG-213/U, low loss, for roof antenna W00013, please state length (in meters)
F10041	Dynamic hand-held microphone incl. PTT-switch, coiled cord and 5-pole twist-lock plug
F10042	Dynamic hand-microphone/loudspeaker with PTT-switch, coiled cord and 5-pole twist-lock plug
F10125	Inline PTT-switch (U-94 A/U), coiled cord, 5-pole twist-lock plug, to connect headset W00048, clip allows attaching to clothing
W00048	Dynamic headset with PJ-plug, fits inline PTT-switch
F10216	Interconnecting cable with two 2-pole twist-lock plugs, to connect "BATTERY" socket of Panel Module and 2-pole socket of Battery Power Supply, length 0.8 m / 2.6 ft.
F10023	Battery Power Supply, 12 Vdc/6.5 Ah lead calcium battery, gastight, complete with rugged steel/aluminum case, circuit breaker, 5-LED test set, 2-pole socket, mounting bracket.
F10026	Cigar Lighter Cable, coiled cord, incl. 2-pole plug to supply station from 12 Vdc car battery (fits cigar lighter socket, minus on common ground)
F10130	Automatic Battery Charger DL-50, 115/230 Vac. Output: 13.8 Vdc/600 mA. Cable and plug to fit into "CHARGER" socket of Panel Module.
S20000	Converter 24 Vdc to 12 Vdc, 4 Amps, to operate the base station from 24 Vdc sources like truck batteries etc.
E08833	2-pole twist-lock plug, to fit into "CHARGER" and "BATTERY" socket of Panel Module.
E08834	5-pole twist-lock plug, to fit into "VOICE RECORDER" and "AUX. CONTROL" socket of Panel Module.

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SECTION 2 INSTALLATION

2.1 General

This section contains instructions and suggestions to install a VHF/AM radio **FSG 90** into a Panel Module, and to wire the equipment.

2.2 Unpacking and Inspecting Equipment

Unpack the equipment carefully and inspect each item for evidence of damage incurred during shipment. Model numbers and serial numbers must comply with relevant details mentioned in Airworthiness Approval Tag and/or delivery note details attached to the shipment.

If a damage claim must be filed, save the shipping container and all packing materials to substantiate your claim. The claim should be filed with the transportation company as soon as possible.

If a damage is noted after the first test, notify the transportation company in writing with advance phone or fax advice about hidden transport damage.

A copy of such a claim including all information from the type label has to be forwarded without delay also to Walter Dittel GmbH.

2.3 Transceiver Installation

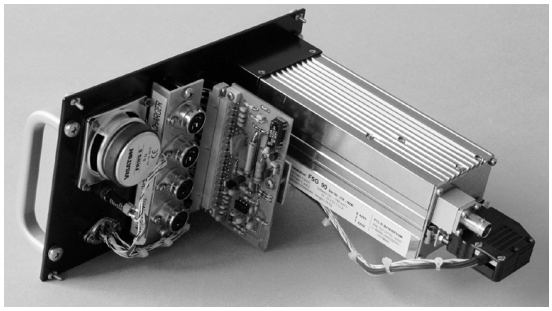
Panel opening and fixing holes of the Panel Module are suitable for all 2¼" round front panel radios **FSG 90**. The radio is mounted from the rear side of the Panel Module and fixed by 4 cross recessed Pan head screws M 4 × 12 mm (supplied with the radio).

Make sure, the radio is turned OFF.

Connect the wire harness of the panel module via 25-pole SUB-D plug to the receptacle of your radio. Secure the plug by the sliding lock retainer to avoid unwanted connector loosening.

The Panel Module together with transceiver is ready for installation.

Illustration shows Panel Module + **FSG 90**



Rear view with radio connected

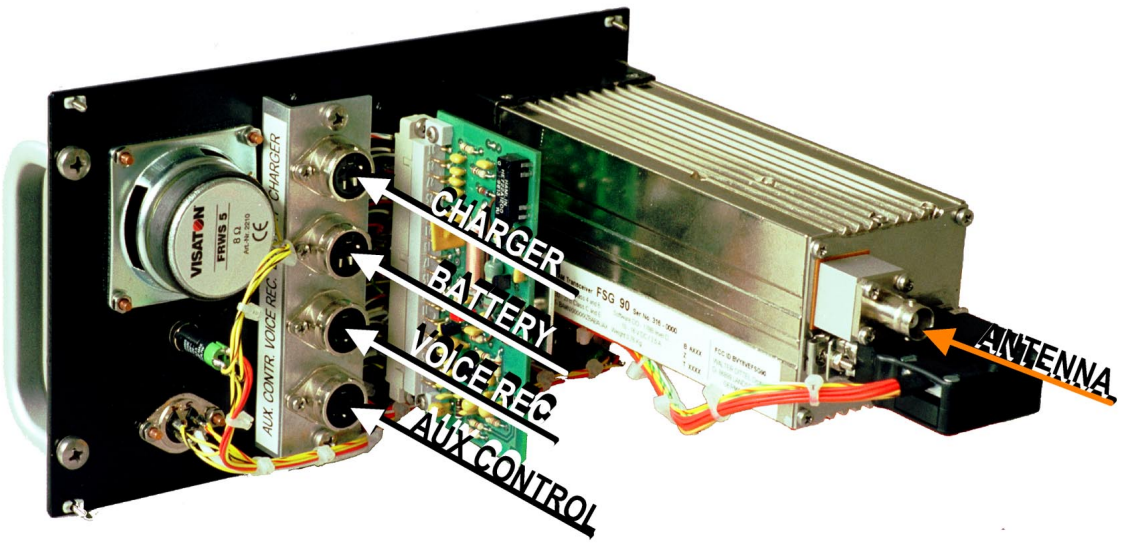
2.4 Panel Module Installation

CAUTION!

- ***The Panel Module as well as the transceiver must be operated only on a 12 Vdc/14 Vdc source!***
- ***Interconnection to a 28 Vdc supply requires a capable voltage converter of at least 4 amperes. Wiring shall be according to instructions of the DC converter manufacturer!***

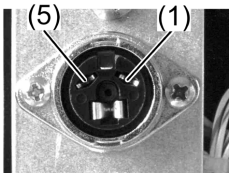
2.4.1 Electrical Connection

All connections to the electrical environment are easy to handle due to plug and socket connections.



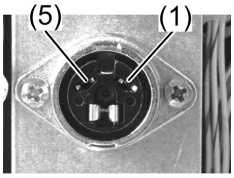
CAUTION!

- ***NEVER mix up connections when plugging the battery CHARGER and/or the BATTERY! The inputs are <u>not</u> simply connected parallel!***



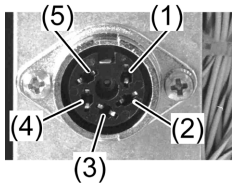
2-pole CHARGER Socket
to connect a 12 Vdc battery charger, e.g. Automatic lead battery charger **DL-50**, 115/230 Vac, output 13.8 Vdc/600 mA, ready to connect, article no F10130.
If another battery charger is used a mating plug, PREH, 2-pole, twist-lock, article no E08833, may be required.

1 Plus 12 Vdc
5 Minus 12 Vdc



2-pole BATTERY Socket
to connect a 12 Vdc source of sufficient capacity, e.g. Power supply, 12 Vdc/6.5 Ah sealed lead calcium battery, rugged steel/aluminum case, circuit breaker, 5-LED test set, 2-pole socket, mounting bracket, article no F10023.
If another 12 Vdc battery is used a mating plug, PREH, 2-pole, twist-lock, article no E08833, may be required.

1 Plus 12 Vdc
5 Minus 12 Vdc (ground)



5-pole VOICE REC. Socket

to connect a suitable voice recorder. Records transmitted as well as received communication.

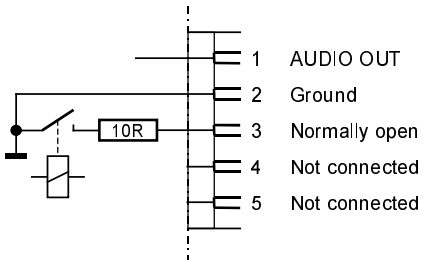
Mating plug: PREH, 5-pole, twist-lock, article no E08834.

During Receive and Transmit an AF signal of approximately 0.5 V is fed to contact 1 of voice recorder socket. The audio level is independent on volume adjust and/or audio sidetone control setting.

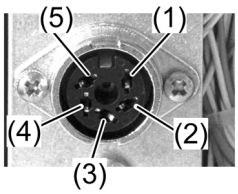
The recorder may be started by a relay contact. The relay is energized when communication takes place. Simultaneously the green "CH BUSY"-LED at the front lights up.

NOTICE: When the transceiver's Squelch is OFF (only noise audible), the relay is also energized and RX noise is recorded.

Terminate audio shield at one end only!



1 AF Audio OUT
2 AF Ground
3 Relay Contact NO
4 Not connected
5 Not connected

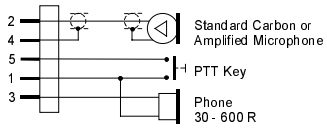


5-pole AUX. CONTR. Socket

to connect a suitable remote audio console or a two-wire gateway.

Mating plug. PREH, 5-pole, twist-lock, article no E08834.

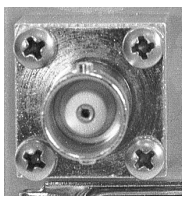
NOTICE: This microphone input is only suitable for standard carbon microphones or amplified microphones like Electret types! Dynamic microphones without amp will not work!



For distances up to 50 m (160 ft) a remote audio console may contain an amplified/carbon microphone.

When remote controlling the radio by a two-wire gateway (manufacturer: "FUNKTRONIC") refer to the instructions supplied by "FUNKTRONIC".

1 Common Ground
2 Amplified/carbon microphone IN
3 Headphone/Audio OUT
4 Microphone Ground
5 PTT key



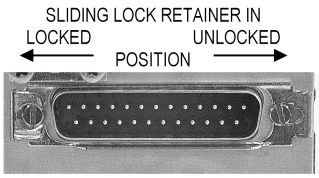
50 Ω BNC Antenna Jack, at FSG 90

Mating plug: BNC plug, UG-88/CU

Connects a suitable vertically polarized VHF COM 50 Ω broad-band antenna with a frequency range of at least 118 - 137 MHz. Use high quality - low loss antenna cable, e.g. RG-213/U, avoid any sharp cable bend (radius > 50 mm), and any excessive coax cable length.

When an elevated outdoor antenna is used assure appropriate lightning protection/grounded antenna mast!

REMEMBER: A good antenna is the best RF amplifier!



25-pole SUB-D receptacle of FSG 90, male, with sliding lock retainer

mating plug: 25-pole SUB-D, female,

to connect the wire harness of the Panel Module.

Ground Terminal, located at the back side, right hand

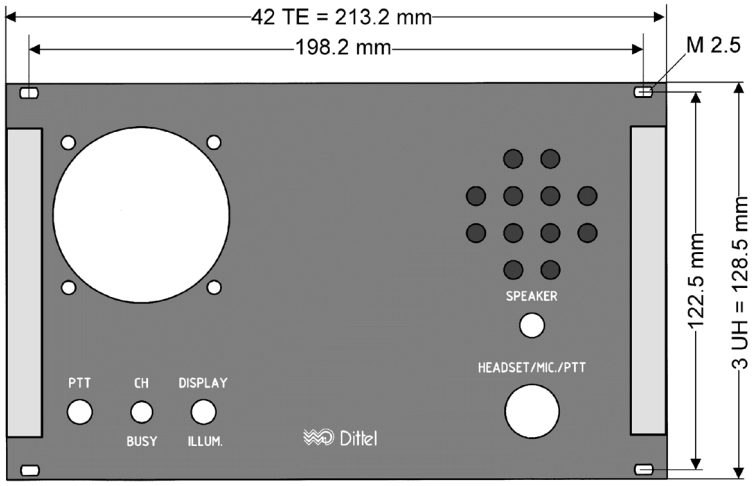
To reduce electrical interference, grounding the Panel Module is mandatory.

Mating contact: 6.3 mm FASTON receptacle (not supplied)

- The bonding strap (not supplied) should be as short as possible, the cross section as big as possible, and connected to the local ground (earth).
- Use FASTON receptacle and cable lug for high-quality connection

2.4.2 Mechanical Installation

Before installing the unit please check the seats of all twist-lock plugs, BNC-antenna plug, and position of sliding lock retainer (locked position!).



The Panel Module (19"-cassette) is designed to be installed into 19"-systems (3 units in height, 42 TE), fixing is carried out by four recessed collar head-screws, M 2.5 × 11.

To mount the module into a front panel a cut-out of 210 mm × 112 mm is required.

Select a Panel Module location at the air traffic operator's desk or 19"-rack distant to heat sources. Sufficient room behind front panel (at least 240 mm/9.5 in.) must be left for wiring accommodation.

SECTION 3 FUNCTIONAL DESCRIPTION

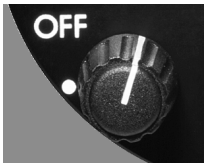
3.1 Introduction

This section includes a functional description of each switch, push button, knob, socket, indicator and display located at the front of the Panel Module equipped with a **FSG 90**, together with operating instructions.

3.2 Operator's Controls and Indicators

A front and rear view of the Panel Module equipped with a **FSG 90** is given on the last page of this manual. Please fold out the back flap when reading the operating instructions. Each position number of a control, knob, switch, etc., corresponds to the number of control, knob, switch, etc., given below.

(1) **ON/OFF-VOL**



Rotary step control with switch

To turn ON the radio together with the Panel Module, rotate the **ON/OFF-VOL** knob clockwise from the OFF position (dot). When power is activated all segments of the display are momentarily visible. The automatic squelch is activated, the display shows the frequency/channel name in the operating mode stored in the non-volatile memory before last time turning OFF.

Rotating the **ON/OFF-VOL** knob clockwise increases, turning counter-clockwise decreases the audio volume audible in the built-in loudspeaker (Receive only) or connected headphone (TX Sidetone and Receive).

To turn OFF the radio together with the Panel Module, rotate the **ON/OFF-VOL** knob fully counter-clockwise (ccw) to the OFF position (dot). Blank display. All lit push-buttons - if some - go off.

(2) **STO**

Push button

With the Dual Mode COM **FSG 90(X)**, up to 99 frequencies/channel names in each operating mode (combined 8.33/25 kHz mode or '25 kHz only' mode) may be stored in a non-volatile memory.

The channel memory numbers (1 …99) are user programmable.

Programming a frequency:

1. Set the frequency or channel name to be stored in the upper line at the display!
2. Initialize storage by pressing the **STO** button.
3. The last used channel memory number is displayed in the lower line.
4. A flashing "**CH**" shows "ready to store".
5. Select appropriate (new) channel memory number (1 to 99) by rotating the **F/CH** knob.
6. On a free channel memory an additional "**F**" (free) is displayed (CH 5 to 99).

(2) **STO**
continued

7. To enter the new frequency/channel name press the **STO**-button. The frequency/channel name will be stored under the adjusted channel memory number.
8. A previously stored frequency/ channel name will be overwritten.
9. The last used display mode is displayed.

Programming in the SET-UP mode:
In the SET-UP mode all settings must individually be confirmed by pressing the **STO** button. Otherwise the settings are not permanently stored.

(3) **SQ (SQUELCH)**

Push button
After turning ON the radio the automatic squelch is always active.
Momentarily pressing the **SQ**-Button

- puts the radio in the SQ-OFF mode (overrides the automatic squelch). Basic receiving noise is also audible during standby. Maximum receiving range. Increased current consumption.
- 'TX Disabled' is inactive, i.e. transmitting is possible even if the channel is busy.

Momentarily pressing the **SQ**-Button once more

- puts the radio in the standard display mode, automatic squelch is active. No receiving noise during standby. Only reception of signals above SQ threshold to be heard.
- When the squelch is active 'TX Disabled' is active, i.e. transmitting is only possible if the channel is not busy.

Note: For certain purposes 'TX Disabled' may be permanently switched OFF during SET-UP procedure.

(4) **MD**

Push button
Repeatedly pressing the **MD** (mode)-button alters the display mode and display respectively:

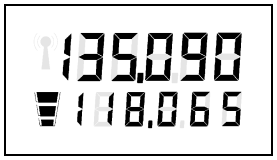
Use/STBY Mode:	upper line	USE frequency
	lower line	STBY frequency
Channel Mode:	upper line	USE frequency
	lower line	channel memory number
Direct Tune Mode:	upper line	USE frequency
	lower line	blank

(5) Frequency Display

5-digit or 6-digit liquid crystal display (LCD), two lines, may be back-lit by pressing the white "DISPLAY ILLUM." button.
IMPORTANT!

- ***When the* FSG 90 *is operating in the combined 8.33/25 kHz mode the channel name is displayed with 6 digits.***
- ***When the* FSG 90 *is operating in the '25 kHz only' mode the frequency is displayed with 5 digits.***
- ***Display of frequency and channel name corresponds to ICAO recommendations!***

Examples:



Transceiver operates in the combined **8.33/25 kHz mode (6-digit display)**

Upper line:	USE channel name (display 135.090 = 135.0916 MHz transmit and receive frequency)
Lower line:	STBY channel name (display 118.065 = 118.0666 MHz transmit and receive frequency)
Supply indicator:	3 segments: ≥ 12.7 Vdc, supply OK
TX indicator:	OFF, radio receives.

Transceiver operates in the **'25 kHz only' mode (5-digit display)**

Upper line:	USE frequency (display 135.87 = 135.875 MHz transmit and receive frequency)
Lower line:	STBY frequency (display 118.02 = 118.025 MHz transmit and receive frequency)
Supply indicator:	3 segments: ≥ 12.7 Vdc, supply OK
TX indicator:	OFF, radio receives.

Transceiver operates in the combined **8.33/25 kHz mode (6-digit display)**

Upper line:	USE channel name (display 127.460 = 127.4583 MHz transmit and receive frequency)
Lower line:	Channel memory number (19) associated with the above USE channel name
Supply indicator:	2 segments: ≥ 12.0 Vdc, battery ½ full
TX indicator:	**ON**, radio transmits.

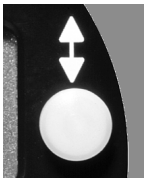
Transceiver operates in the **'25 kHz only' mode (5-digit display)**

Upper line:	USE frequency (display 124.77 = 124.775 MHz transmit and receive frequency)
Lower line:	Channel memory number (75) associated with the above USE frequency
Supply indicator:	2 segments: ≥ 12.0 Vdc, battery ½ charged
TX indicator:	**ON**, radio transmits.

STO button got pressed.
Upper line: Channel name to be stored
Lower line: Free channel memory number **07** (**CH** is flashing)
After pressing the **STO** button once more the channel name 121.875 (= 121.875 MHz) will be stored in the channel memory **07**.
The last used display mode is displayed.

STO button got pressed.
Upper line: Channel name to be stored
Lower line: Channel memory number **17** (**CH** is flashing)
After pressing the **STO** button once more the channel name 121.375 (= 121.375 MHz) will be stored in the channel memory **17**. A previously stored channel name will be overwritten.
The last used display mode is displayed.

(6) **TRANSFER**



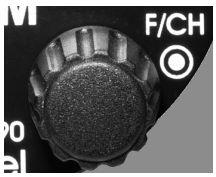
Push button
Momentarily pressing the Transfer button

- while in CHANNEL or DIRECT TUNE mode, will return the radio to USE/STBY mode, **or**
- while in USE/STBY mode, the last USE frequency will become the new STBY frequency, and the last STBY frequency will become the new USE frequency, **or**
- while in the SET-UP mode, will return the radio to the operation mode used before without turning off. Only programmed settings stored previously by pressing the STO-button will be active.

(7) Fixing screws

Four cross recessed screws, M 4 × 12, to fix the **FSG 90** transceiver in the Panel Module.

(8) **F/CH**



Rotary control and push-button = dual function
Momentarily pressing the F/CH knob

- while in the USE/STBY or DIRECT TUNE mode, changes the access from **kHz** to **MHz** or vice versa.
- If there is no activity for 30 seconds the F/CH knob will return to the kHz access.
- While in the CHANNEL mode pressing the F/CH knob is without function.

Rotating the F/CH knob

- while in the **USE/STBY** mode, will increment or decrement the MHz or kHz portion of the STBY frequency with rollover at each band edge,
- while in the **CHANNEL** mode, changes the channel memory number and corresponding frequency. Only channel numbers which were programmed before will appear,
- while in the **DIRECT TUNE** mode, will increment or decrement the MHz or kHz portion of the USE frequency with rollover at each band edge.

(9) **PTT**

Red push-button key, illuminated, Push-To-Talk key.
On a free channel ("CH BUSY" LED OFF), pressing and holding the PTT-key switches the transceiver from the receive mode into the transmit mode. The red PTT push-button lights up and the **Transmit Indicator** appears.
Releasing the PTT key ends the transmission and switches the transceiver back into the receive mode. The lighting PTT push-button goes out and **Transmit Indicator** disappears.

NOTICE: **If a PTT key is pressed (no matter at the mike or remote console) the key-lamp lights always red!**
Observe the Transmit Indicator, whether the radio is actually transmitting or not. This depends on set-up of "BLOC" and/or Squelch Circuit ON or OFF.

(10) **CH BUSY**

Green LED
As long as "CH BUSY" LED lights green:

- either receive or transmit takes place on the frequency channel adjusted at the transceiver (channel busy). Communication should be audible or PTT key is pressed. Relay contact of "VOICE REC." connector is energized and Audio supplied, or
- the Squelch circuit is switched OFF (RX noise audible). Relay contact of "VOICE REC." connector is also energized and Audio supplied.

"CH BUSY" LED does not light:

- on a free channel (no communication)! The Voice Recorder relay is not energized and no Audio is supplied, or
- the Panel Module is turned OFF by the **FSG 90 ON/OFF-VOL** switch.

(11) **DISPLAY ILLUM.**

White push-button switch, not illuminated

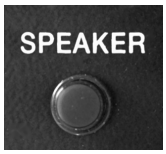
Pressing the "DISPLAY ILLUM." switch turns ON the transceiver's frequency display illumination.

Pressing the switch again turns OFF the display illumination.

(12) Loudspeaker

8 Ohm, 3 Watt, tropics-proof.
To make received signals audible. Volume is adjustable with **ON/OFF-VOL** control (1).
Speaker may be turned ON or OFF by pressing the "SPEAKER" push-button (13).

(13) **SPEAKER**

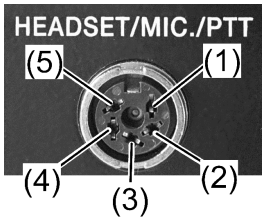


Green push-button switch, not illuminated

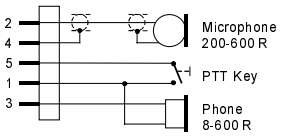
Pressing the "SPEAKER" switch turns ON the built-in loudspeaker. Communication audible via speaker, volume adjustable with **ON/OFF-VOL**-control (1).

Pressing again the switch turns OFF the speaker. Communication only audible via headset or headphone via connector "HEADSET/MIC./PTT" (14).

(14) **HEADSET/MIC./PTT**



5-pole twist-lock socket to connect headphone and/or dynamic microphone and/or PTT key.
Mating plug. PREH, 5-pole, twist-lock, article no E08834.
Any dynamic microphone (200 to 600 Ω), headphone (ca. 300 Ω), push-to-talk key, or dynamic type headset can be connected to this socket.



1 Common Ground (PTT key/Headphone)
2 Dynamic microphone IN
3 Headphone OUT
4 Dynamic Microphone Ground
5 Push-To-Talk key

(15) Fixing screws

Four recessed collar head-screws, M 2.5 × 11, to fix the Panel Module into 19"-systems.

SECTION 4 OPERATION

4.1 Introduction

This section contains a basic operation procedure for the Panel Module together with a Dual Mode **FSG 90** transceiver. This instruction is only applicable for a radio which is already optimized by the Set-Up procedure, connected to a 12 Vdc source and all installations done.

DANGER!

- ***DO NOT OPERATE THIS RADIO WHEN THE ANTENNA IS IN AN EXPLOSIVE ATMOSPHERE (PETROLEUM FUELS, SOLVENTS, DUST, ETC.).***

A front and rear view of the Panel Module together with a **FSG 90** is given on the last page of this manual. Please fold out the back flap when reading the operation instructions.

4.2 Antenna - BNC Antenna Jack UG-290

CAUTION!

- ***Always operate the radio with a suitable external antenna!***
- ***NEVER OPERATE the radio without any antenna!***

REMEMBER: A good antenna is the best RF amplifier!

Any vertically polarized VHF 50 Ω antenna with BNC type UG-88C/U cable plug and a minimum frequency range of 118 … 137 MHz can be connected to the BNC jack of the transceiver.

For long range operation a base station folded-top antenna, grounded for lightning protection, is recommended.

To operate the radio in aircraft or ground vehicles a suitable external antenna should always be used.

- Ensure the plug of your antenna cable is securely tightened.

4.3 Microphone - Headset - PTT key

Any dynamic microphone (200 to 600 Ohms) with or without PTT switch or a headset for dynamic microphone type systems with additional PTT switch can be connected to the socket "HEADSET/MIC./PTT" at the front (mating 5-pole plug: Article-No. E08834, for wiring refer to paragraph 3.2, position (14).

Any amplified or carbon microphone with or without PTT switch, or a headset for amplified type systems with additional PTT switch, or a remote audio console with amp microphone and PTT key can be connected to the socket "AUX. CONTR." at the rear (mating 5-pole plug: Article-No. E08834, for wiring refer to paragraph 2.4.1, AUX. CONTR. Socket).

- Connect equipment, ensure the plugs are secured by twist-lock caps.

4.4 Supply Indicator

The supply voltage is permanently monitored when the built-in radio **FSG 90** is turned ON. It is indicated at the frequency display (5) of the radio by a3-bar **Supply Indicator**.

Usually the Panel Module together with the radio is powered by a battery which is constantly kept fully charged by an automatic charger. In case of mains failure the station is powered only by the battery.

	3 segments visible	≥ 12.7 Vdc	Supply OK, battery fully charged
	2 segments visible	≥ 12.0 Vdc	Battery approx. ½ charged, reduced operating time
	1 segment visible	≥ 11.0 Vdc	Battery almost empty, cease transmitting!
	3 segments flashing	10 - 11 Vdc	**Emergency operation**
	continuous flashing symbol during STBY	8.5 - 9.5 Vdc	**Radio will soon switch OFF itself!**

IMPORTANT!

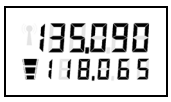
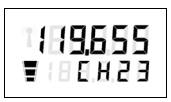
- *These transitions are fluent. Recovery effect after load reduction may be possible.*
- *If the **Supply Indicator** even blinks continuously in STANDBY mode it indicates a discharged battery. The radio should then be switched OFF at once and the battery recharged as soon as possible.*
- *The battery must always be recharged immediately after an extensive discharge because this incurs the risk of deterioration and permanent damage - this risk is increased if a discharged battery is stored in that state.*

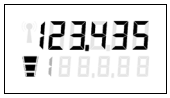
4.5 Switching ON - Selecting Frequency/Channel Name - Volume

IMPORTANT!

- ***»Frequency« (25 kHz spacing) and »Channel Name« (combined 8.33 kHz/25 kHz spacing) are ICAO terms (refer to Section 6)!***
- ***Frequent transmissions as well as large receiving volume reduce the operating time when the radio is only powered by a battery without opportunity to recharge!***

- Turn ON the Panel Module together with transceiver **FSG 90** by rotating the **ON/OFF-VOL** knob (1) clockwise.
- Momentarily all segments of the radio's display are visible. Last used display mode and frequency/channel name are displayed.
- A warm-up period for the transmitter is not required. However, at temperatures of -20°C, the LC display needs approximately one second until it is fully visible when the frequency or display mode is changed.
- To change the display mode: Push once or twice the **MD** button (4).
- Selecting the appropriate USE (active) frequency/channel name depends on display mode:

EXAMPLE:  	**STANDARD: USE/STBY (Standby) Mode** Upper line: USE/active frequency/channel name Lower line: Standby frequency/channel name **Selecting another frequency/channel name than indicated:** At the lower line select appropriate **kHz** portion by **rotating F/CH**-knob (8). A clockwise rotation will increment the previous frequency while a counter-clockwise rotation will decrement the previous frequency with rollover at each band edge. **Push F/CH** knob (8); this changes the access to MHz. At the lower line select appropriate **MHz** portion by **rotating F/CH**-knob (8). A clockwise rotation will increment the previous frequency while a counter-clockwise rotation will decrement the previous frequency with rollover at each band edge. **Push** the Transfer Button ⇳ (6). The last standby frequency/channel name (lower line) will become the new active frequency/channel name (upper line) and the last active frequency/ channel name will become the new STBY frequency/channel name (lower line). **IMPORTANT: If there is no activity for 30 seconds the F/CH knob will return to the kHz access.**
EXAMPLE:  	**Channel Mode:** Upper line: USE/active frequency/channel name Lower line: Channel memory number, associated **Selecting another frequency/channel name than indicated:** **IMPORTANT:** The appropriate operating frequency/channel name must be stored already in a channel memory (refer to paragraph **4.8, STORING A NEW FREQUENCY/ CHANNEL NAME**). Select appropriate channel memory number together with the associated frequency/channel name by **rotating** the **F/CH** knob (8).

EXAMPLE:	**Direct tune Mode:**
	Upper line: USE/active frequency/channel name Lower line: blank **Selecting another frequency/channel name than indicated:** Select appropriate kHz portion by **rotating F/CH**-knob (8). A clockwise rotation will increment the previous frequency while a counter-clockwise rotation will decrement the previous frequency with rollover at each band edge. **Push F/CH** knob (8); this changes the access to MHz. Select appropriate MHz portion by **rotating F/CH**-knob (8). A clockwise rotation will increment the previous frequency while a counter-clockwise rotation will decrement the previous frequency with rollover at each band edge. The setting is the new active frequency/channel name. **IMPORTANT: If there is no activity for 30 seconds the F/CH knob will return to the kHz access.**

- Rotate **ON/OFF-VOL** knob (1) clockwise, about half way.

Continue with either Receive or Transmit Operation.

4.6 Receive (Listen) Operation

- After turning ON the radio the automatic squelch is always ON.
- If the display mode shall be changed: Push once or twice the **MD**-button (4).
- If the active frequency shall be changed: refer to paragraph **4.5, SWITCHING ON - SELECTING FREQUENCY/ CHANNEL NAME - VOLUME**
- **DO NOT** press the PTT (Push-To-Talk) key if you want to receive! Transmit Indicator at the display **must not** appear!
- Normal signals are received, weak signals and interfering pulses are disabled.
- If no communication takes place (no transmit, no receive), the green "CH BUSY" may not light.
- If communication is heard set the volume of the built-in loudspeaker or headphone to a comfortable level by rotating **ON/OFF-VOL** knob (1). The green "CH BUSY" LED (10) should light.
- Weak signals can be received if the squelch circuit is switched OFF by pushing the **SQ** button (3). Then - on a free channel - typical RX noise with steady volume should be audible. The green "CH BUSY" LED (10) should light.
  Pushing the **SQ** button (3) switches the squelch circuit ON again.

IMPORTANT!

- ***Switching OFF the squelch only makes sense if long range reception shall take place. Thus the radio is noisy during Standby operation, but no weak signals are suppressed and the full receiving range is available! The voice recorder - if applicable - is active as long as squelch is OFF.***
- ***Notice increased current consumption when Squelch is switched OFF!***