



FCC ID:
BVYFSG90

FAA: TSO C37d
TSO C38d

No. LBA.O.10.911/98 JTSC
replaced by:

ETSO: EASA.210.1305

DFS-No.: B-7850/97

KBA: e1
03 5042



NOTICE: Illustration shows FSG 90EPS (extended frequency range)

FSG 90PS

Dual Mode VHF/AM
FIXED/PORTABLE/MOBILE
AIRBAND TRANSCEIVER

6 W / 10 W 118.000 ... 136.

Operator's Manual

Before operating the transceiver, please
read this manual thoroughly!

Please observe the Safety Information!

Keep for further use!

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Dittel Messtechnik GmbH is certified to DIN EN ISO 9001:2000 and DIN EN ISO 14001:2005. It is an accredited manufacturer of aeronautical equipment DE.21G.0100, maintenance facility DE.145.0245, and development facility ETSO-2C37e/ETSO-2C38e.



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The information in this Operator's Manual does not profess to include all the details of design, production, or variation of the equipment, or to cover all the possible contingencies which may arise during operation or maintenance. We welcome your comments concerning this Manual. Although every effort has been made to keep it free of errors, some may occur. When reporting a specific problem, please describe it briefly and include the Operator's Manual article number, paragraph or figure number, and the page number.

Send your comments to Publications Department
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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 radios 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 FSG 90PS!
- 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 transmit in closed vehicles, aircraft or inside buildings with the spring steel band antenna. This may cause malfunction of the avionics, trigger the airbag or confuse electronic equipment! Always operate the radio with a suitable external antenna! Assure appropriate lightning protection where elevated outdoor antennas are used.
- 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.
- DO NOT operate the radio whilst driving. It should also be noticed that the use of a hand-held microphone while driving could constitute an offence under the Road Traffic Regulations.
- DO NOT dispose worn out lead batteries with the household garbage.
- Always turn OFF the radio before plugging or unplugging the receptacle!
- Always turn OFF the radio first when starting an engine or vehicle!
- When operating the FSG 90PS on an external 24 Vdc source a suitable Voltage Converter 24 Vdc to 12 Vdc of at least 4 Amps must be used!
- The FSG 90PS 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!

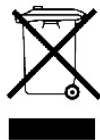
describes a special note for operation. Failing to observe the note may cause damage of the transceiver and/or stored data may be deleted!



IMPORTANT!

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

Environmental Protection



After the implementation of the European Directive 2002/96/EU in the national legal system, the following applies:

Electrical and electronic devices may not be disposed of with domestic waste. Consumers are obliged by law to return electrical and electronic devices at the end of their service lives to the public collecting points set up for this purpose or point of sale. Details to this are defined by the national law of the respective country. This symbol on the product, the instruction manual or the package indicates that a product is subject to these regulations. By recycling, reusing the materials or other forms of utilizing old devices, you are making an important contribution to protecting our environment.



- The portable airband transceiver FSG 90PS contains a sealed lead-acid battery (identification "Pb").
- In most countries it is illegal to discard a lead-acid battery except by delivery to a retailer, a distributor, a manufacturer, or a collection, recycling, or smelting facility approved by the department.
- NEVER dispose worn out lead-acid batteries with the household garbage.



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1 General Description

1.1 Introduction

This operator's manual contains operating instructions for the fixed / portable / mobile VHF/AM Airband Transceiver FSG 90PS of Dittel Messtechnik GmbH, D-86899 Landsberg am Lech, Germany.

1.2 Application & Description of the FSG 90PS

The portable battery powered VHF/AM Airband Transceiver FSG 90PS allows independent operation as an airborne or ground radio. Stationary, portable or mobile applications are possible. It consists of a carrying case PS and either a Dual Mode VHF/AM COM Transceiver FSG 90 (6 Watt model) or a FSG 90-H1 (10 Watt model), which can be simply inserted and positioned.

Those radios are 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 operating mode is Simplex, i.e. transmitting or receiving only in turns.

The built-in rechargeable battery allows an independent operation of up to 85 hours (refer to paragraph 3.15, Battery Operating Times). Continuous operation is possible by supplying externally from a vehicle or aircraft DC source. Microphone and antenna are plugged via twist locked and screwed cap connectors. External antennas, too, can be advantageously used.

The unit features 99 non-volatile channel memories each in combined 8.33/25 kHz and in '25 kHz only' operation, 3 display modes, true Sidetone via headphone, TX and supply voltage indicator at the back-lit display, TX time-out timer (2 minutes), a battery supply test, and a built-in loudspeaker. The lock-in type carrying handle completes our robust PS unit.



1.3 Equipment required but not supplied

- Vertically polarized VHF airband antenna, frequency range at least 118 to 137 MHz, 50 Ohm, e.g., spring steel band antenna, article no F10345.
- Dynamic microphone 30 to 600 Ohm, e.g., handheld microphone with PTT key, coiled cord, 5-pole plug, article no F10346.
- Automatic battery charger, e.g. DL-50, 115 Vac/230 Vac, output 13.8 Vdc/600 mA, article no F10130

When operating the unit on 24 Vdc sources a suitable 24 Vdc/12 Vdc Converter of at least 5 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.

1.5 System and Type Approval Information

The Dual Mode VHF/AM Airband Transceiver FSG 90(X) complies 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 JTSO Authorisation was replaced by ETSO Authorization EASA.210.1305 in July 2009. 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 Vdc vehicle.
- FCC Compliance with Part 15 (receiver) and Part 87 (transmitter).
- EC-Type-Approval of a type of component with regard to Directive 72/245/EEC, as last amended by Directive 2006/28/EG.

**IMPORTANT!**

- For the first time after one year, then every 2nd year, ground applications using 8.33 kHz channel spacing require checking of the high precision reference frequency (tolerance less than ± 1.5 ppm) and recalibration, if necessary!
- Every 4th year, airborne applications using 8.33 kHz channel spacing require 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 accuracy tolerance less than ± 20 ppm).
- All tolerances include the full operating temperature range of $-20^{\circ}\text{C} \dots +55^{\circ}\text{C}$ / $-4^{\circ}\text{F} \dots +131^{\circ}\text{F}$.
- 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
F10130	Automatic lead battery charger, DL-50A, input: 115 Vac/230 Vac, output: 13.8 Vdc/600 mA, cable and 5-pole plug
F10345	Spring steel band antenna 118-137 MHz, swivel type, UHF connector PL-259
W00043	Magnet mount vehicle rod antenna 118-137 MHz, incl. 4 m/13 ft cable, and UHF connector PL-259
W00114	Mobile Whip Antenna 118 - 137 MHz with shock spring, incl. 5 m/16.5 ft cable, w/out UHF connector
F10314	Balloon antenna, 118-137 MHz, weatherproof - flexible - high efficiency, including 3 m/10 ft cable and UHF connector PL-259
W00013	Roof mounted weatherproof folded-top fiberglass antenna 118-137 MHz, UHF-connector, anti static, 1" mount
E57328	UHF antenna connector 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)
F10346	Dynamic hand-held microphone incl. PTT-switch, coiled cord and 5-pole plug
F10042	Dynamic hand-microphone-loudspeaker with PTT-switch, coiled cord and 5-pole plug
F10125	Inline PTT-switch (U-94 A/U), coiled cord, 5-pole plug, to connect headset W00048, clip allows attaching to clothing
W00048	Dynamic headset with PJ-plug, fits inline PTT-switch
F10393	Car Cable, coiled cord, incl. 3-pole plug to supply station from 12 Vdc car battery (fits cigarette lighter socket, minus = ground)
S20000	Converter 24 Vdc to 12 Vdc, 4 Amps, to operate the base station from 24 Vdc sources like truck batteries etc.
E61933	3-pole twist-lock Connector, to fit into 12 Vdc. socket of carrying case PS.
E08834	5-pole twist-lock Connector, to fit into MIC socket of carrying case PS.
E58411	Sealed lead accumulator, nominal 7.2 Ah, 12 VDC



2 Functional Description

2.1 Introduction

This section includes a functional description of each switch, push button, knob, socket, indicator and display located on the front of the FSG 90PS, together with operating instructions.

2.2 Operator's Controls and Indicators

A front view of the FSG 90PS 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 switch

To turn ON the radio 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 that operating mode, which was used before last 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 rotate the **ON/OFF-VOL** knob fully counterclockwise (ccw) to the OFF position (dot). Blank display.

(2) STO



Push button

With the VHF/AM COM Transceiver 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.



(2) STO
continued



Programming a frequency:

1. Set the frequency or channel name to be stored in the upper line at the display!
2. Initialize storing 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.
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 FSG 90(X) 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

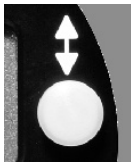


Push button

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) TRANSFER

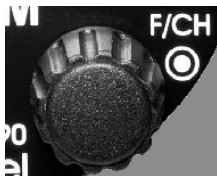


Push button

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 power down. Only programmed settings stored previously by pressing the STO-button will be active.

(6) 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.



- (7) Frequency Display 5-digit or 6-digit liquid crystal display (LCD), two lines, may be back-lit by pressing the "Test" button.



IMPORTANT!

- When the FSG 90(X) is operating in the combined 8.33/25 kHz mode the channel name is displayed with 6 digits.
- When the FSG 90(X) 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 $\frac{1}{2}$ charged

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 $\frac{1}{2}$ charged

TX indicator: ON, radio transmits.



STO button was 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 was pressed.

Upper line: Channel name to be stored

Lower line: Channel memory number 17 (CH is flashing)

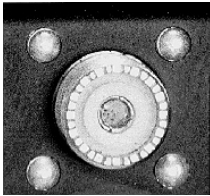
After pressing the STO button once more the channel name 121.375 (= 121.375 MHz) will be stored in the channel memory 17. A previously stored channel name will be overwritten.

The last used display mode is displayed.

- | | | |
|-----|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (8) | Fixing screws | Two cross recessed screws, M 4 × 8, to fix the transceiver in the case. |
| (9) | Loudspeaker | 8 Ohm, 3 Watt, tropics-proof.
To make received signals audible; volume adjustable with ON/OFF-VOL control (1). Is <u>not</u> switched OFF when using a headset connected to (13). |



(10) Antenna socket



DANGER!

NEVER TRANSMIT inside airplanes, vehicles or buildings without external antenna! Otherwise electronic equipment can be interfered.



CAUTION!

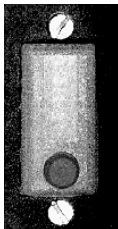
NEVER operate the radio without any antenna!

UHF type antenna socket SO 239, 50 Ω .

Every 50 Ohms antenna with UHF type cable plug PL-259 and a frequency range of 118 ... 137 MHz minimum may be connected to this antenna jack.

- For portable use in the open field we recommend our spring steel band antenna.
- In aircraft or ground vehicles, an external antenna must always be used.
- For long range operation a base station folded top antenna, grounded for lightning protection, is recommended.

(11) DC supply Indicator



LED indicator to check the capacity of the built-in battery or external DC supply.

When the red push-button is pressed

- at least 3 LEDs should light up to indicate sufficient capacity of the battery or DC supply.
- and only two or less LEDs light up either the battery should be recharged or the station should be powered by an external DC source of sufficient capacity (e.g. vehicle battery).
- the display of the transceiver is illuminated.

(12) DC Fuse



CAUTION!

Always turn OFF radio and disconnect battery charger when replacing fuses!

Fuse to protect the transceiver in case of heavy current.

Contains 1 glass cartridge fuse, $\varnothing 5 \times 20$ mm,
6.3 Amps, quick acting.



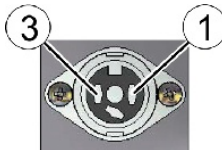
- (13) Microphone socket 5-pole twist-lock socket to connect microphone, headphone and PTT key.



Every dynamic microphone (200 to 600 Ω), headphone (ca. 300 Ω), push-to-talk key, or dynamic type head-set can be connected to this socket. Wiring refer to section 6, "70 PS, Circuit Diagram".

- 1 Common Ground (PTT key/Headphone)
- 2 Dynamic microphone
- 3 Headphone
- 4 Microphone Ground
- 5 Push-to-talk key

- (14) NEW SOCKET! External Supply 3-pole twist-lock socket to charge the built-in battery or to supply the radio by external 12 Vdc sources.



Mating plug article No. E61933

The capacity of the built-in battery may not be adequate due to frequent transmitting operations or very long operating times without possibility to recharge. Radio operation can be enabled through an external 12 Vdc power source such as an automobile battery via our Car Cable F10393 which fits into the cigarette lighter socket of most cars (minus on common ground).

- 1 Plus 12 Vdc
- 3 Minus 12 Vdc (Ground)





3 Set-up Procedure

This section contains a description of the Set-Up procedure to be carried out only once by an experienced avionics technician. To carry out the Set-Up procedure the radio must be installed into the Carrying Case PS and ready to use.



DANGER!







- NEVER carry out a SET-UP during flight, important missions or applications!
- During SET-UP procedure the radio can neither receive nor transmit!










IMPORTANT!

- The FSG 90(X) is factory pre-set for check and testing purposes. To achieve maximum performance it is therefore absolutely necessary to optimize the radio and to adapt the accessories used.
- Set-up should be performed only by an experienced technician.
- To carry out the set-up the radio must be ready for operation (antenna connected, power supply OK, operational microphone).
- If headsets are used turn volume control to maximum, if applicable.
- All frequencies, channel names, channel memory numbers etc., shown in the following illustrations, are examples!

The following settings can be selected or adjusted (order):

1.  Adjusting the automatic squelch threshold
2.  Adjusting the microphone sensitivity
3.  Adjusting the Intercom volume (headset)
4.  Adjusting the Transmit Sidetone volume (headset)
5.  Adjusting the headset volume (during Receive independent from speaker volume)
6.  Selecting '25 kHz only' channel spacing or combined 8.33/25 kHz channel spacing. Confirmation with **STO** starts new mode at once.



7.  Deleting occupied channel memories (one after the other)
8.  Selecting AF External via loudspeaker ON = 1 or OFF = 0.
9.  Selecting 'CHANNEL MODE' only = 1 or 'FREE FREQUENCY SELECTION' = 0
10.  Selecting 'TX disabled' ON = 1 or OFF = 0 during receive
11.  Service, ON = 1 or OFF = 0
12.  Optional module, ON = 1 or OFF = 0
13.  Entering a password: protects against unauthorized changes of the radio parameters.



3.1 Calling SET-UP without password

Calling the SET-UP procedure without password is possible:

- a) at factory-new radios FSG 90(X), or
 - b) at radios which are reset to a factory basic setting (refer to § 3.4.14, RESET), or
 - c) at radios which are not protected by a password against unauthorized changes of the set-up adjustments.
- ▷ Turn OFF the radio (**ON/OFF-VOL** knob fully ccw).
 - ▷ PRESS AND HOLD both MD and STO buttons, then turn ON the radio (rotate **ON/OFF-VOL** knob clockwise, approximately mid position).
 - ▷ All segments of the display appear for a short moment then the display gets blank.
 - ▷ Release the buttons.



- After releasing the buttons the display shows in the upper line alternately »FSG90« and »SET-UP«.
- If there is no activity for 60 seconds the radio will return to the mode used before.
- Momentarily pressing the MD button once will open the set-up menu to adjust the squelch threshold.
- Repeatedly pressing the MD button will open all other set-up menus in the order described before.

3.2 Calling SET-UP with password

Calling the SET-UP procedure with password must be carried out at radios which are protected by a password against unauthorized changes of the set-up adjustments.

- ▷ Turn OFF the radio (**ON/OFF-VOL** knob fully ccw).
- ▷ PRESS AND HOLD both MD and STO buttons, then turn ON the radio (rotate **ON/OFF-VOL** knob clockwise, approximately mid position).
- ▷ All segments of the display appear for a short moment then the display gets blank.
- ▷ Release the buttons.



- ▷ After releasing the buttons the display shows in the upper line alternately »FSG90« and »SET-UP«, in the lower line 5 dashes.
- ▷ If there is no activity for 60 seconds the radio will return to the mode used before.
- ▷ With the F/CH knob set the first digit of your password (the first dash changes to digit). Confirm the first digit by pressing the F/CH knob. The second digit is ready to be adjusted.
- ▷ With the F/CH knob set the second digit of your password (the second dash changes to digit). Confirm the second digit by pressing the F/CH knob.
- ▷ Continue till all five digits of your password are entered.
- ▷ Confirm the last digit input by pressing the STO button. This will open the set-up menu to adjust the squelch threshold. Repeatedly pressing the MD button will open all other set-up menus in the order described before.
- ▷ Entering a wrong password will return the set-up to the initial status (5 dashes).
- ▷ After the fourth attempt to open the set-up with a wrong password the radio returns to the operation mode used before trying to open the set-up. The FSG 90(X) is operational.

3.3 Interrupt the SET-UP procedure

The SET-UP procedure may be interrupted any time:

- ▷ Usually by turning OFF the power (**ON/OFF-VOL** knob fully ccw). All changed and individually stored adjustments (by pressing the STO button) are permanently stored and effective after turning ON the radio again.
- ▷ or by pressing the Transfer button (↕). The radio returns to the operation mode used before. All changed and individually stored adjustments up to now (by pressing the STO button) are permanently stored and effective.

3.4 SET-UP procedure



IMPORTANT!

- The settings can be done in any order!
- Repeatedly pressing the MD button opens the menus step by step.
- Only settings confirmed by finally pressing the STO key are permanently stored and effective.
- When pressing the STO button the upper segment of the Onboard supply indicator will light up to confirm storing visually.

3.4.1 Adjusting the automatic squelch threshold



The display shows in the upper line alternately »SET« and »SQUEL«, in the lower line »LO«, »MED1«, »MED2« or »HI«.

▷ Adjust by rotating the F/CH knob the squelch threshold as required. The lower line shows:

LO ca. 1.0 μ V / -107 dBm (Standard setting)

MED1 ca. 2.5 μ V / -99 dBm

MED2 ca. 5.0 μ V / -93 dBm

HI ca. 8.0 μ V / -89 dBm (this setting exceeds the required minimum sensitivity; adjust only for test purposes at very strong interference levels!)

- ▷ Confirm your adjustment by pressing the STO button!
- ▷ If you want to carry on with the SET-UP procedure press once or repeatedly the MD button till the desired menu appears.

3.4.2 Adjusting the microphone sensitivity



IMPORTANT!

This adjustment is important particularly when FSG 90PS is used in noisy environment like turboprop airplanes or vehicles:

- ▷ Turn your radio OFF (**ON/OFF-VOL** knob fully ccw).
- ▷ The FSG 90(X) should be turned ON only after engine or motor start-up.
- ▷ Select a free frequency/channel name (no communication audible).
- ▷ Then call the SET-UP procedure.
- During this adjustment the transmitter is in operation. Carry out adjustment quickly!
- Up to two microphones of the same type may be connected parallel to the MIC input (dynamic type).



- Parallel operated microphones must have the same specifications.
- This adjustment has to be repeated when changing microphones (brand, type or number)



The display shows in the upper line alternately »SET« and »MICRO«.

- ONLY FOR ENGINE POWERED AIRPLANES AND VEHICLES:
RUN THE ENGINE IN IDLE (because of noise level).



- ▷ Press and hold the PTT key. Talk in a loud, clear voice with the microphone one or two inches from your lips.
- ▷ While talking the microphone level is measured. By turning the F/CH knob left or right set the upper dash line to three to four segments (the lower dash line shows only informative the actual range).



- ▷ Release the PTT key and stop talking.
- ▷ RUN THE ENGINE IN CRUISING SPEED.
- ▷ Press and hold the PTT key for at least 5 seconds, do not talk!

The upper dash line should show not more than one segment.

If the display shows more than one segment the mic input is too sensitive. Repeat adjustment with less sensitivity (only two to three segments visible when talking).

- ▷ Confirm your adjustment by pressing the STO button!
- ▷ If you want to carry on with the SET-UP procedure press once or repeatedly the MD button till the desired menu appears.

3.4.3 Adjusting the Intercom volume



NOT APPLICABLE WHEN THE FSG 90(X) IS OPERATED IN A CARRYING CASE PS!



3.4.4 Adjusting the Sidetone volume



IMPORTANT!

- Sidetone audible during transmit is only possible via headphones (if applicable set maximum volume at the headset)
- During this adjustment the transmitter is in operation. Carry out adjustment quickly!
- The microphone(s) sensitivity has to be adjusted properly (refer to paragraph 3.4.2)



The display shows in the upper line alternately »SET« and »SIDE«.

- ▷ Press and hold PTT key, Talk in a loud, clear voice with the microphone one or two inches from your lips.
- ▷ While talking adjust with the F/CH knob a convenient volume in your headphone (the segments show the actual range). If more than four segments are shown overmodulation occurs.
- ▷ Release the PTT key.
- ▷ Confirm your adjustment by pressing the STO button!
- ▷ If you want to carry on with the SET-UP procedure press once or repeatedly the MD button till the desired menu appears.

3.4.5 Adjusting the headset volume (receive)



IMPORTANT!

- Receiving is possible via built-in loudspeaker and headphone.
- First set with the **ON/OFF-VOL** knob loudspeaker volume to a convenient level, and then adjust with the set-up procedure a suitable headphone volume.



The display shows in the upper line alternately »SET« and »PHONE«.

With the speaker noise or communication is audible.

- ▷ With the **ON/OFF-VOL** knob set speaker output to a convenient level, leave **ON/OFF-VOL** knob as it is.
- ▷ Put on headphone.
- ▷ By rotating the F/CH knob adjust headphone level to a suitable volume. The dashes show the range.
- ▷ If the adjustment range is not sufficient increase or decrease with the **ON/OFF-VOL** knob.
- ▷ Confirm your adjustment by pressing the STO button!
- ▷ If you want to carry on with the SET-UP procedure press once or repeatedly the MD button till the desired menu appears.



3.4.6 Selecting '25 kHz only' or combined 8.33/25 kHz channel spacing



The display shows flashing in the upper line »SET«, in the lower line either »25« or »8.33«.

▷ By rotating the F/CH knob select the required channel spacing:
»25« = '25 kHz only' channel spacing



»8.33« = combined 8.33 and 25 kHz channel spacing.



IMPORTANT!

- Confirm the new channel spacing by pressing the STO button! The selected channel spacing becomes active and simultaneously SET-UP procedure will automatically be finished. The radio returns to the last used display mode and the settings confirmed with the STO button became effective.
- If you want to carry on with the SET-UP procedure call again SET-UP. Press once or repeatedly the MD button till the required menu appears.

3.4.7 Deleting occupied channel memories



IMPORTANT!

- Only channel memory numbers from 5 ... 99 can be deleted. Channel memories 1 to 4 may only be overwritten.
- On an occupied channel memory the channel memory number is displayed in the upper line, the associated frequency/channel name in the lower line.
- On a free channel memory the channel memory number is displayed in the upper line, the lower line shows »FREE«.



EXAMPLE:

The display shows in the upper line alternately »CLR 05« and »CH 05« and in the lower line the associated frequency.



EXAMPLE: Channel memory number »39« (with the channel name 132.765) should be deleted.

▷ By rotating the F/CH knob adjust the channel memory number »39« at the display.



If this channel memory should really be deleted confirm by pressing the STO button. In the lower line the frequency/channel name disappears, it appears »FREE«.



- ▷ If further memory channels should be deleted adjust with the F/CH knob the channel memory number concerned and delete each by pressing the STO button.
- ▷ If you want to carry on with the SET-UP procedure press once or repeatedly the MD button till the desired menu appears.

3.4.8 Selecting AF EXTERNAL (ON/OFF)



NOT APPLICABLE IF FSG 90(X) IS OPERATED IN A CARRYING CASE PS!

3.4.9 Selecting 'CHANNEL MODE ONLY' or 'NO RESTRICTION'



IMPORTANT!

- For certain applications (usually ground operation only) selecting all frequencies by the operator may be restricted. Then transmitting and receiving is only possible in the CHANNEL MODE, pre-programmed before by authorized personnel.



The display shows in the upper line alternately »SET« and »FREQ«, in the lower line »0« or »1«.

- ▷ Adjust by rotating the F/CH knob lower line to "0" or "1".
 - 0 = Standard operation, no restriction.
 - 1 = CHANNEL MODE only, no other frequencies/channel names adjustable by operator.
- ▷ Confirm your adjustment by pressing the STO button!
- ▷ Carry on with the SET-UP procedure by pressing once or repeatedly the MD button till the desired menu appears.



3.4.10 Selecting 'TX disabled' during receive (ON/OFF)



IMPORTANT!

- Whenever 'TX disabled' is ON and squelch is ON transmitting is disabled as long as the frequency/channel name is busy (communication audible). In addition TX Sidetone is OFF.
- Whenever the squelch is OFF the 'TX disabled' is OFF and transmitting is possible even on a busy channel.



The display shows in the upper line alternately »SET« and »BLOC«, in the lower line »0« or »1«.

▷ Adjust by rotating the F/CH knob the lower line to »0« or »1«.

0 = 'TX disabled' is OFF. Transmitting is always possible, even on a busy channel.

1 = 'TX disabled' is ON. With squelch ON transmitting is only possible on a free channel.

▷ Confirm your adjustment by pressing the STO button!

▷ Carry on with the SET-UP procedure by pressing once or repeatedly the MD button till the desired menu appears.

3.4.11 Service (ON/OFF)



IMPORTANT!

- For approved Avionics Shops only! No regular operation in this mode!



The display shows in the upper line alternately »SET« and »SERV«, in the lower line »0«.

0 = STANDARD MODE, Service OFF.

▷ If required, confirm adjustment by pressing the STO button!

▷ Carry on with the SET-UP procedure by pressing the MD button.

3.4.12 Optional module (ON/OFF)



IMPORTANT!

- In this radio without function.



The display shows in the upper line alternately »SET« and »OPTI«, in the lower line »0«.

0 = STANDARD MODE, Optional module OFF.

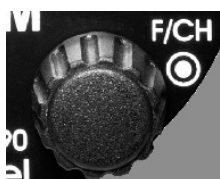
▷ Carry on with the SET-UP procedure by pressing the MD button.



3.4.13 Entering a password

**IMPORTANT!**

- When the SET-UP of your radio is protected by a password it cannot be changed by any unauthorized persons without knowledge of the password.
- Your password consists of five digits!



The display shows in the upper line alternately »SET« and »PASS«, in the lower line »00000«.

If you don't want to enter a password and your SET-UP procedure is finished leave the SET-UP menu by pressing the TRANSFER (↕) button, or turn OFF the radio (**ON/OFF-VOL** knob).

If you want to enter a password proceed as follows:

- ▷ Rotate the F/CH knob. Adjust the first digit (0 9). Confirm the first digit by pressing the F/CH knob.
- ▷ Adjust the second digit of your password by rotating the F/CH knob. Confirm again by pressing the F/CH knob.
- ▷ The third digit is ready now. Continue as described above for the third, fourth and fifth digit.
- ▷ Make sure the complete password corresponds to your idea.
- ▷ Confirm the password by pressing the STO button!

From now on a new SET-UP may be called only after entering the password first!



3.4.14 Reset



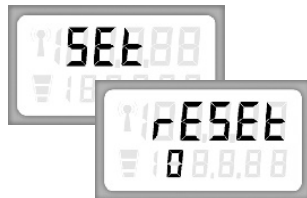
CAUTION!

Every RESET to the factory setting

- deletes all your pre-set memory channels 5 to 99 (in both 8.33/25 kHz and 25 kHz only mode)! Memory channels 1 - 4 get programmed with 118.00 or 118.005 respectively
- deletes your password!
- delete all your individual SET-UP adjustments!

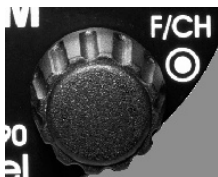
To reset all adjustments proceed as follows:

- ▷ Turn OFF the radio (**ON/OFF-VOL** knob fully ccw).
- ▷ PRESS AND HOLD simultaneously the buttons MD, STO and SQ, then turn ON the radio (rotate **ON/OFF-VOL** knob clockwise, approximately mid position).
- ▷ All segments of the display appear for a short moment then the display gets blank.
- ▷ Release the buttons.



After releasing the three buttons the display shows in the upper line alternately »SET« and »RESET«, in the lower line »0«.

If there is no activity for 60 seconds the radio will return to the mode used before.



- ▷ With the F/CH knob set lower line to "1".

- ▷ Confirm RESET by pressing the STO button.

The upper segment of the Onboard Supply Indicator will light up momentarily.



- The VHF radio FSG 90(X) is now operable in the factory setting.



4 Operation

4.1 Introduction

This section contains a basic operation procedure for the FSG 90PS transceiver. This instruction is only applicable for a radio which is already optimized by the set-up procedure (refer to section 3, SET-UP PROCEDURE).



DANGER!

DO NOT OPERATE THIS RADIO IN AN EXPLOSIVE ATMOSPHERE (PETROLEUM FUELS, SOLVENTS, DUST, ETC.).

A front view of a FSG 90PS is given on the last page of this manual. Please fold out the back flap when reading the operation instructions,

4.2 Battery Check






- ▷ If applicable, disconnect charger from External Supply Socket (14) first, before checking the battery supply.
- ▷ Press the red test button of the battery indicator (11).

The LED indicators (11) will light up.

- ➔ 5 LEDs ON = battery fully charged, supply OK!
- ➔ 3 to 4 LEDs ON = battery partially discharged; reduced operation time when powered only from the battery.
- ➔ 2 or less LEDs ON = battery discharged. The battery should be recharged or the radio should be powered by an external 12 Vdc source of adequate capacity (e.g. automobile battery).



Additionally the supply is permanently monitored when the radio is switched ON:

	3 segments	$\geq 12.7 \text{ Vdc}$	Battery fully charged
	2 segments	$\geq 12.0 \text{ Vdc}$	Battery charged approx. $\frac{1}{2}$, reduced operating time
	1 segment	$\geq 11.0 \text{ Vdc}$	Battery almost empty, cease transmitting!
	3 segments flashing	10 - 11 Vdc	Emergency operation
	Continuous flashing during STBY	8 . 5 – 9 . 5 Vdc	Radio will soon switch OFF itself!



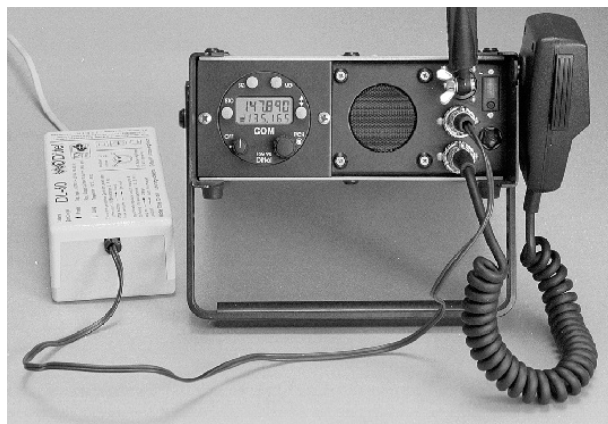
IMPORTANT!

- 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.
- These transitions are fluent. Recovery effect after load reduction may be 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.

4.3 Battery Charging

To recharge the built-in 7.2 Ah accumulator we recommend our automatic battery charger DL-50A.

Charging should be done within the ambient temperature range of +10°C to +40°C.



The charger DL-50A is designed for connecting to 115 Vac or 230 Vac, 50 to 60 Hz mains. For operation, check that the unit's operating voltage is identical with your local mains supply. If required, set the voltage selector switch by means of a suitable tool to the respective voltage, changing of the fuses is not required (DL-50 is factory pre-set to 230 Vac).

- ▷ For charging the internal battery, connect charger cable of DL-50A to 3-pole socket (14) of carrying case PS.
- ▷ Plug the mains cable into a suitable wall outlet. The red pilot lamp (POWER) lights up.

Charging - yellow pilot lamp lights

Charging lasts up to 30 hours depending on the state of the battery (for 7.2 Ah battery). When the switch-off voltage is reached the charger switches automatically to trickle charge. The capacity at the end of charging is about 90% of the full rated capacity.

Trickle charge - yellow pilot lamp goes off

The built-in lead battery is now continuously charged on low current. The full capacity of the battery is thus guaranteed. Overcharging the battery is not possible due to automatic controlled charging function, even if the trickle charge is maintained over a long period.

- The transceiver may be operated while charging.
- For trickle charging or buffer operation the charger can be left unattended continuously connected to mains.
- A fully charged battery can be stored for several months.



4.4 Antenna - Antenna Socket SO-239



CAUTION!

- NEVER TRANSMIT in closed vehicles, aircraft or inside buildings with the spring steel band antenna, always operate the radio with a suitable external antenna!
- NEVER OPERATE the radio without any antenna!



IMPORTANT!

- A good antenna is the best RF amplifier!
- Your radio is only as good as the antenna!

Every vertically polarized VHF 50 Ω antenna with UHF type PL-259 cable plug and a minimum frequency range of 118 ... 137 MHz can be connected to the antenna jack (10).

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

- Ensure the antenna plug of your antenna or antenna cable is securely tightened.
- If the spring steel band antenna is used adjust it in a vertical position by tightening the screwed cap and wing screw.

4.5 Microphone Socket

The hand-held dynamic microphone with Push-To-Talk (PTT) key (Article-No. F10346) can be replaced by every other dynamic microphone (200 to 600 Ohms) with PTT key or a head-set with dynamic type system and additional, inline, PTT key (wiring to 5-pole plug refer to section 6, Circuit Diagram 70 PS).

▷ Connect equipment; ensure the plug is secured by twist-lock cap.



4.6 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 5)!
 - The FSG 90PS should be turned ON after engine start-up. This is a simple precaution which helps protect the solid state circuitry and extends the operating life of your avionics equipment.
 - 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 radio FSG 90(X) by rotating the **ON/OFF-VOL** knob (1) clockwise. Momentarily all segments of the radio's display are visible.

Depending on last used display mode, channel memory number and/or frequency/channel name is displayed and active.

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 (6). A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency with rollover at each band edge.

Push F/CH knob (6); this changes the access to MHz.

At the lower line select appropriate MHz portion by rotating F/CH-knob (6). A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency with rollover at each band edge.

Push the Transfer Button  (5).

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 4.9, Storing a new Frequency/ Channel Name).

- ▷ Select appropriate channel memory number together with the associated frequency/channel name by rotating the F/CH knob (6).

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 (6). A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency with rollover at each band edge.
- ▷ Push F/CH knob (6); this changes the access to MHz. Select appropriate MHz portion by rotating F/CH-knob. A clockwise rotation will increment the previous frequency while a counterclockwise 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



4.7 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 USE/active frequency/channel name shall be changed: refer to paragraph 4.6, 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.
- ▷ When communication is heard set the volume of the built-in loudspeaker (9) or headphone to a comfortable level by rotating **ON/OFF-VOL** knob (1).
- ▷ Weak signals can be received when the squelch circuit is switched OFF by pressing the SQ button (3). Then - on a free channel - typical RX noise with steady volume should be audible. Pressing 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!
- Notice increased current consumption when SQ is switched OFF!



4.8 Transmit (Talk) Operation



DANGER!

Every radio, when transmitting, radiates energy into the atmosphere, therefore:

- Do not operate this radio when the antenna is in an explosive atmosphere (petroleum fuels, solvents, dust, etc.)! Danger by generation of sparks.
- NEVER TRANSMIT in vehicles, aircraft or inside buildings with a rod antenna! This may cause malfunction of the avionics, trigger the airbag or confuse domestic electronic equipment!
- Never place the antenna such as the antenna gets very close to, or touching, exposed parts of the body, especially the face, shoulder or the eyes.



IMPORTANT!

- Please keep radio discipline!
- Transmit only on a clear channel.
- Care for an all-round obstacle free location of your antenna; the called station should be within "line-of-sight" distance.
- Volume is very important. Increasing speaking levels while the lips are facing the microphone (distance 1" to 2") will increase clarity. Talk slow, make each word a precise and individual entity.
- The radio is equipped with a TX time-out-timer (2 minutes). This is used to limit the duration of transmissions and to guard against accidental PTT locking.

If the display mode
shall be changed:

Push once or twice the MD-button (4).

If the active frequency
shall be changed:

Refer to 4.6 Switching ON - Selecting Frequency/Channel Name - Volume.

Transmitting is only possible on a free channel (no communication audible).

- ▷ If you have to transmit (e.g. in case of emergency) although the channel is busy, the Transmit Disabled circuit may be turned OFF by pressing the SQ button (3).
- ▷ Press and hold the PTT (push to talk) key of your microphone. The receiver is switched off and the transmitter is switched on. The radio is ready to transmit. As long as a PTT key is pressed the **Transmit Indicator** at the radio's display appears.
- ▷ Hold the microphone near to the lips (one to two inches) in order to reduce environmental noise. Speak loud, slow, clear and at



constant loudness. Make each transmission as brief as possible.

- ▷ Release the PTT key to end the transmission and to open the channel for reception; the **Transmit Indicator** must disappear.

Switch Squelch ON again, if applicable.

The radio is equipped with a TX time-out-timer (TOT). This is used to limit the duration of transmissions to two minutes. When the transmitter is keyed continuously longer than 2 minutes the display of the FSG 90 starts flashing and transmission is disabled. If you have to make calls longer than 2 minutes momentarily release the PTT key and press again. The TX time-out-timer starts for another 2 minutes.

Should the TOT disable the transmitter accidentally (e.g. stuck PTT switch) and you have to transmit turn radio OFF and ON again. This allows another 2 minutes to transmit.



4.9 Storing a new Frequency/Channel Name

In each active operating mode (8.33/25 kHz mode or '25 kHz only' mode) up to 99 non-volatile channel memories can be user programmed. Channel memories of the non-active mode remain stored in the background. They are accessible after calling up the respective mode.



IMPORTANT!

- Free selection of frequencies/channel names and new storing may be restricted due to Set-Up adjustment (refer to paragraph 3.4.9)!
 - Channel memories 1 to 4 are always pre-set and may be used when called. They can only be changed but not deleted. Ex works and after Master Reset channel memories 1 to 4 are pre-set with either 118.00 MHz or 118.005 MHz!
 - Storing can be initialized in all three display modes.
 - The USE frequency/channel name in the upper line of the display can be stored to any of the 99 channel memories.
- ▷ Set the frequency or channel name to be stored in the upper line at the display!
- ▷ Initialize storing by pressing the STO button (2).
- ▷ The last used channel memory number appears, "CH" flashes.
- ▷ Select appropriate channel memory number (1 to 99) by turning the F/CH knob (8). On a free memory channel a "F" appears before "CH" and the memory number.
- ▷ To enter the new frequency/channel name press the STO-button (2). The frequency/channel name will be stored under the selected channel memory number. A previously stored frequency/channel name will be overwritten.

4.10 Recall of stored frequencies/channel names

- ▷ By pushing once or twice the MD-button (4) select the CHANNEL mode.
- ▷ By rotating the F/CH knob (6) set appropriate channel memory number with its associated frequency/channel name at the display. Only channel numbers that have been programmed before will appear.

Now the radio operates on that frequency/channel name indicated at the display.



4.11 Lighting the Frequency Display

- ▷ Lighting the frequency display (7) is activated by pressing and holding the red test button of the battery indicator (11).

4.12 Turning OFF the radio

- ▷ Always turn OFF the radio after use by rotating the **ON/OFF-VOL** switch (1) to the fully ccw position to prevent unnecessary discharge of the battery.
- ▷ During standby or carrying, the handheld microphone (article no F10346) can be hung onto the right flange of the case.

4.13 External Power Supply

Mating plug: article no. E61933.

The capacity of the built-in battery may not be adequate due to frequent transmitting operations or very long operating times without possibility to recharge. Radio operation can be enabled through an external 12 Vdc power source such as an automobile battery via our Car Cable F10393 which fits into the cigarette lighter socket of most cars (minus on common ground).

4.14 Removing & Installing the Transceiver

IMPORTANT!

Switch OFF the radio first! This is a simple precaution which helps protect the solid state circuitry and extends the operating life of your avionics equipment.

- ▷ To dismount the transceiver FSG 90(X) from its case, remove the two cross-recessed screws (8) and lift off the matching plate. After removing the only cheese head screw on the rear panel the transceiver together with the adapter plate and wire harness can be pulled out carefully from its case. Unplug wire harness (open sliding lock) and antenna plug.
- ▷ To install the transceiver carefully pull out the wire harness of the case, connect the receptacle and secure it by the sliding lock. Plug antenna cable and secure it by twisting the BNC plug. Slowly insert transceiver into the case. Put on the matching plate and fix it by the two cross-recessed screws (8). Fix antenna plug through the rear panel by a cheese head screw M 3 x 5. Check fixing and function.



4.15 Operating Times of an FSG 90 (6 Watt version) supplied from a 12 V battery only

Prerequisite: Maximum RX audio volume

Max. current drain	0.11 A	2.5 A	1.0 A	0.11 A	2.5 A	1.0 A	0.11 A	2.5 A	1.0 A	0.11 A
Lead Accumulator 12 Volts 7.2 Ah	STBY, w/out RX	5% TX	5% RX	90% STBY	10% TX	20% RX	70% STBY	20% TX	40% RX	40% STBY
Temperature -20°C	38 h	12.30 h			6.00 h			3.10 h		
Temperature +20°C	62 h	20.10 h			10.00 h			5.20 h		
Temperature +50°C	66 h	22.10 h			11.10 h			6.00 h		

Prerequisite: Minimum RX audio volume

Max. current drain	0,08 A	2,5 A	0,25 A	0,08 A	2,5 A	0,25 A	0,08 A	2,5 A	0,25 A	0,08 A
Lead Accumulator 12 Volts 7.2 Ah	STBY, w/out RX	5% TX	5% RX	90% STBY	10% TX	20% RX	70% STBY	20% TX	40% RX	40% STBY
Temperature -20°C	57 h	15.50 h			8.50 h			4.40 h		
Temperature +20°C	85 h	26.10 h			14.30 h			7.50 h		
Temperature +50°C	90 h	28.40 h			16.20 h			8.40 h		

4.16 Siting

The radio operates in the VHF frequency band, this is a Line-Of-Sight (LOS) frequency; therefore, siting of the radio greatly affects its operating range. The longest range is normally obtained when a direct LOS is maintained between the radios. Use of hilltop, roof or tower locations will increase the LOS range. Location in valleys with intervening hills, behind vehicles or buildings or in dense woods may reduce or prevent communications. If possible, avoid antenna locations near electrical interference sources, such as computers, power and telephone lines, radar, welders and electrical generators.

4.17 Base Operation

To operate the radio as a base station, a weather-proof anti static and lightning protected folded-top antenna is ideally suited. The antenna should be mounted vertically and elevated as high as possible on a roof, horizontally free of obstacles. The antenna mast has to be grounded and anchored, as necessary. For a distance of up to 15 m the antenna cable may be a RG 58 C/U type, for longer distances always use the cable type RG 213/U (low loss).

In general, the antenna cable should not be longer than necessary.



4.18 Functional Checks

If the transceiver FSG 90PS does not operate correctly, check the following:

- Is the required frequency/channel name visible in the upper line? Adjust required frequency/channel name!
- Is battery supply sufficient? Observe onboard supply indicator particularly during transmit, at least one segment must be shown!
- Weak RX signal? Press SQ button = switch OFF squelch circuit!
- Weak TX signal? Check microphone, MIC SET-UP, radio, or antenna system! Is the voice volume too low? Speak loud and clear while the lips are facing the microphone! Try another location!
- Make sure that transceiver's antenna is vertically positioned and is not screened by nearby placed metallic objects or buildings.
- Singing during transmit? Adjust Sidetone more quietly; put on headset; keep microphone in other position!
- Rattles when receiving? Metal propellers between transmitting airborne radio and ground station antenna!
- Called station hears carrier, but no voice? Check microphone and contacts on microphone jack!
- Noisy - distorted - garbled? Suppress electrical interference of motorized aircraft or vehicle (generator, regulator), check antenna system; check antenna-, microphone- and radio- connector for proper seat! Change location!
- Flashing display, transmitter switches off itself? PTT key sticks! Check PTT key and cables. Transmitter was keyed longer than 2 minutes. Release PTT key, normal operating is possible again.
In case of emergency turn radio OFF and switch ON again, permits another two minutes to transmit.

In case of doubt, compare operation of the transceiver with another transceiver on the same location or call another station. If service is necessary please consult your authorized dealer or an approved avionics workshop.





5 ICAO Frequency / Channel Name Assignment in the combined 8.33 kHz / 25 kHz Operation

The following table shows transmit and receive frequency, the respective channel spacing and the associated display of the FSG 90(X) in the range from 118.000 MHz to 118.1000 MHz. This assignment also applies of course to all other frequencies between 118.1000 MHz and 136.9750 MHz.

Transmit and Receive frequency (MHz)	Channel spacing (kHz)	8.33/25 kHz Mode Channel Name = Display at FSG 90(X)	25 kHz Mode Frequency = Display at FSG 90(X)
118.0000	25	118.000	118.00
118.0000	8.33	118.005	
118.0083	8.33	118.010	
118.0166	8.33	118.015	
118.0250	25	118.025	118.02
118.0250	8.33	118.030	
118.0333	8.33	118.035	
118.0416	8.33	118.040	
118.0500	25	118.050	118.05
118.0500	8.33	118.055	
118.0583	8.33	118.060	
118.0666	8.33	118.065	
118.0750	25	118.075	118.07
118.0750	8.33	118.080	
118.0833	8.33	118.085	
118.0916	8.33	118.090	
118.1000	25	118.100	118.10
118.1000	8.33	118.105	
and so on		etc	etc





6 Technical Data FSG 90PS

6.1 General

Frequency Range	: 118.000 MHz ... 136.975 MHz, 8.33 and/or 25 kHz increments
Number of Channels	: 2.278 in the combined 8.33 kHz/25 kHz channel spacing, free selectable <u>or</u> 760 in the '25 kHz only' channel spacing, free selectable
Transmitter Output FSG 90	: ≥ 6 Watt / 50 Ω ; ca 20 W PEP @ 13.8 Vdc : ≥ 5 Watt / 50 Ω ; ca 16 W PEP @ 12.0 Vdc
Transmitter Output FSG 90-H1	: ≥ 10 Watt / 50 Ω ; ca 30 W PEP @ 14.0 Vdc : ≥ 8 Watt / 50 Ω ; ca 25 W PEP @ 12.0 Vdc
Receiver Sensitivity, m = 30%/ 1 kHz	: ≤ 2.0 μ V EMF / ≤ 107 dBm / 50 Ohms for 6 dB (S+N/N)
Frequency Accuracy	: $< \pm 1$ ppm at 0°C ... +40°C, $< \pm 1.5$ ppm at -20°C ... +55°C
AF Output (K $\leq 10\%$)	: ≥ 2 Watts into 8 Ohms and ≥ 100 mW into 600 Ohms
Nominal Voltage Transceiver	: 11 ... 16.5 Vdc, Emergency 10 Vdc ... 11 Vdc less 9 Vdc automatic disabling
Built-in Battery	: Sealed lead accumulator, 12 Vdc / 7.2 Ah
Power Consumption	: Stand-by: 85 mA (typical) Receive (Voice): less than 1 A Transmit (Voice): less than 2.5 A / 4.0 A Illumination and Supply Check: 30 mA additional
Duty Cycle	: 2 min Transmit (time out timer)
Operating Temperature	: -20°C ... +55°C / +70°C
Dimensions	: 218 mm \times 89 mm \times 336 mm (incl. handle)
Weight	: 5.2 kg incl. microphone & spring steel band antenna

ADDITIONAL FEATURES

	: 99 user-programmable, non-volatile memory channels each in combined 8.33/25 kHz and in '25 kHz only' operation; true Sidetone via headphone; time out timer; TX disabled when channel busy
Sockets to connect	: External DC Supply, automatic battery charger DL-50, Dynamic Microphone, Push-to-talk key, Headphone, Headset, 50 Ohms Antenna,
Lighting of frequency display	: By two LEDs, built-in
Fusing	: DC: 1 x 6.3 amps, quick acting



IMPORTANT!

The portable ground station FSG 90PS may only be used after permission by the respective authorities.



6.2 Approvals, applies for Transceiver FSG 90(X)

Ground Operation (Regulatory Authority For Telecommunications and Posts)	" E C T y p e - E x a m i n a t i o n C e r t i f i c a t e " n o . A 1 3 2 7 0 5 J , a n d " T Y P E - E X A M I N A T I O N C E R T I F I C A T E " n o . A 1 3
Ground Operation (DFS)	No. B-7850/97
Requirements for ground operated radios	Reg TP 321 ZV 039 (issue March 1998) ETSI ETS 300 676 (8.33 kHz CH spacing, ground operation) DIN / ISO 6737-1 (12 V Vehicle Power System)
Airborne Radio (Regulatory Authority For Telecommunications and Posts)	" E C T y p e - E x a m i n a t i o n C e r t i f i c a t e " n o . A 1 3 2 7 0 5 J , a n d " T Y P E - E X A M I N A T I O N C E R T I F I C A T E " n o . A 1 3
Airborne Radio (Regulatory Authority For Telecommunications and Posts, and LBA)	Reg TP 321 ZV 034 (issue July 1998) EUROCAE ED-23B: Receiver Class C 25 kHz spacing CLIMAX operation, and Receiver Class E 8,33 kHz spacing Transmitter Class 4 100 NM with 25 kHz spacing, and Transmitter Class 6 100 NM with 8.33 kHz spacing Environmental Requirements EUROCAE ED-14C / RTCA DO-160C: Categories D1-AA(BMN)XXXXXXZBBBATZXXXX
JTSO-Authorization (LBA, airborne)	JTSO-2C37e and JTSO-2C38e No. LBA.O.10.911/98 JTSO, replaced by EASA.210.1305
Software	EUROCAE ED-12B / RTCA DO-178B, Level D

6.3 Detailed Receiver Characteristics

Receiver Type	Dual Superhet
IF Frequencies	First IF 10.0 MHz, second IF 455 kHz, high injection
Sensitivity (m = 30% / 1,000 Hz)	$\leq 2 \mu\text{V EMF } (\leq -107 \text{ dBm}/50 \Omega)$ for 6 dB S+N/N
Selectivity	Condition: 1 kHz SINAD decreased from 12 dB to 6 dB a) Reference level m = 60%/1,000 Hz for 12 dB SINAD $\leq 6 \text{ dB}$ for $\pm 8 \text{ kHz}$ (25 kHz CH spacing) $\geq 60 \text{ dB}$ for $\pm 17 \text{ kHz}$ (25 kHz CH spacing) $\geq 70 \text{ dB}$ for $\pm 25 \text{ kHz}$ (25 kHz CH spacing) b) Interference level m = 60%/400 Hz (additional) $\leq 6 \text{ dB}$ for $\pm 3 \text{ kHz}$ (8,33 kHz CH spacing) $\geq 60 \text{ dB}$ for $\pm 7.37 \text{ kHz}$ (8,33 kHz CH spacing)
Squelch Type	Automatic (FM/AM), adjustable (SETUP); manual override.
AGC Characteristic	$\leq 6 \text{ dB}$, $2 \mu\text{V EMF } (-107 \text{ dBm}) \dots 2 \text{ V EMF } (+13 \text{ dBm}/50 \Omega)$, m = 30%/1,000 Hz
AGC Delay (RX)	$\leq 0.1 \text{ sec}$, $200 \text{ mV EMF } (-1 \text{ dBm}) \dots 2 \mu\text{V EMF } (-107 \text{ dBm} / 50 \Omega)$, m = 30%/1,000 Hz
AGC Recovery after TX	$\leq 0.1 \text{ sec}$ at $10 \mu\text{V EMF } (-93 \text{ dBm} / 50 \Omega)$, after TX end
Transfer time TX / RX	$\leq 50 \text{ msec}$
Modulation distortion (AF Processor OFF)	$\leq 10\%$, 350 ... 2,500 Hz (m = 85%)



Audio Frequency Response / AF Fidelity	$\leq +2 \text{ dB and } -4 \text{ dB}$, 350 ... 2,500 Hz, 25 kHz CH spacing $\geq -20 \text{ dB}$, 4,000 Hz, 25 kHz CH spacing (Climax Offset Operation)
Audio Frequency AGC	$\leq 1.5 \text{ dB}$, m = 30% ... 90%
Nominal AF Output (Speaker)	$\geq 4 \text{ Watt} / 4 \Omega$, or $\geq 8 \text{ Watt} / 2 \Omega$ (at 13.75 Vdc) $\geq 1.5 \text{ Watt} / 4 \Omega$ (at 10 Vdc)
Nominal AF Output (Phone)	$\geq 100 \text{ mW} / 600 \Omega$ (at 13.75 Vdc) $\geq 50 \text{ mW} / 600 \Omega$ (at 10 Vdc)
AF Noise Level	$\geq 40 \text{ dB}$, m = 30%/1,000 Hz 200 μV EMF (-67 dBm/50 Ω) ... 10 mV EMF (-33 dBm/50 Ω)
AF External Input	$\leq 1 \text{ Volt}$ into 600 Ω for rated AF output (13.75 Vdc supply)
Spurious Response	$\geq 10 \text{ mV}$ EMF (-33 dBm), m = 30%/1 kHz, for S+N/N $\leq 6 \text{ dB}$ a) 108 - 156 MHz (of any Test Channel $\leq \pm 8 \text{ kHz}$), at other than the assigned channel and the adjacent channels b) 50 kHz - 1,215 MHz (except 108 - 156 MHz)
Cross Modulation (AF Processor OFF)	Max. AF output level $\geq 10 \text{ dB below}$ nominal AF output level: a) Wanted signal 20 μV EMF (-87 dBm) ... 500 μV EMF (-59 dBm/50 Ω), unmodulated at RX frequency, additional b) Unwanted signal 10 mV EMF (-33 dBm), m = 30%/1,000 Hz, frequency 100 - 156 MHz (frequency $\leq \pm 2 \text{ RX channels}$)
Intermodulation (AF Processor OFF)	$\leq 6 \text{ dB}$ AF Quieting (-5 dBm/50 Ω , 87.5 - 107.9 MHz), 2 signals
Desensitization	Wanted signal 20 μV EMF (-87 dBm), m = 30%/1,000 Hz, at RX frequency, for S+N/N $\geq 6 \text{ dB}$, in the presence of Unwanted signal <u>A</u> 10 mV EMF (-33 dBm/50 Ω), unmodulated, frequency 108 ... 156 MHz, except used CH, but includes $\geq 1 \text{ RX CH}$, or Unwanted signal <u>B</u> 200 mV EMF (-7 dBm/50 Ω); minimum 10 mV EMF (-87 dBm), unmodulated, frequency 1,215 MHz, except 87.5 MHz ... 156 MHz, or Unwanted signal <u>C</u> 250 mV EMF (-5 dBm), unmodulated, frequency 87.5 ... 107.9 MHz
Receiver Spurious Emission	$\leq 400 \text{ pW} / -64 \text{ dBm}$ (50 kHz ... 1,215 MHz)
Channel Selection Time	$\leq 0.4 \text{ sec}$, AF level within 3 dB, max. 99 Channel memories
Receiver Muting, Squelch (CLIMAX)	Simultaneous input at RX frequency: a) Wanted Signal A: 10 μV EMF (-93 dBm) +8 kHz (m = 30%/1,000 Hz), Squelch is open. b) Unwanted Signal B: More than 24 μV EMF (-85 dBm), m = 30% / 1,000 Hz, vary this frequency slowly from -8 kHz to +4 kHz. Squelch must remain open.



6.4 Detailed Transmitter Characteristics

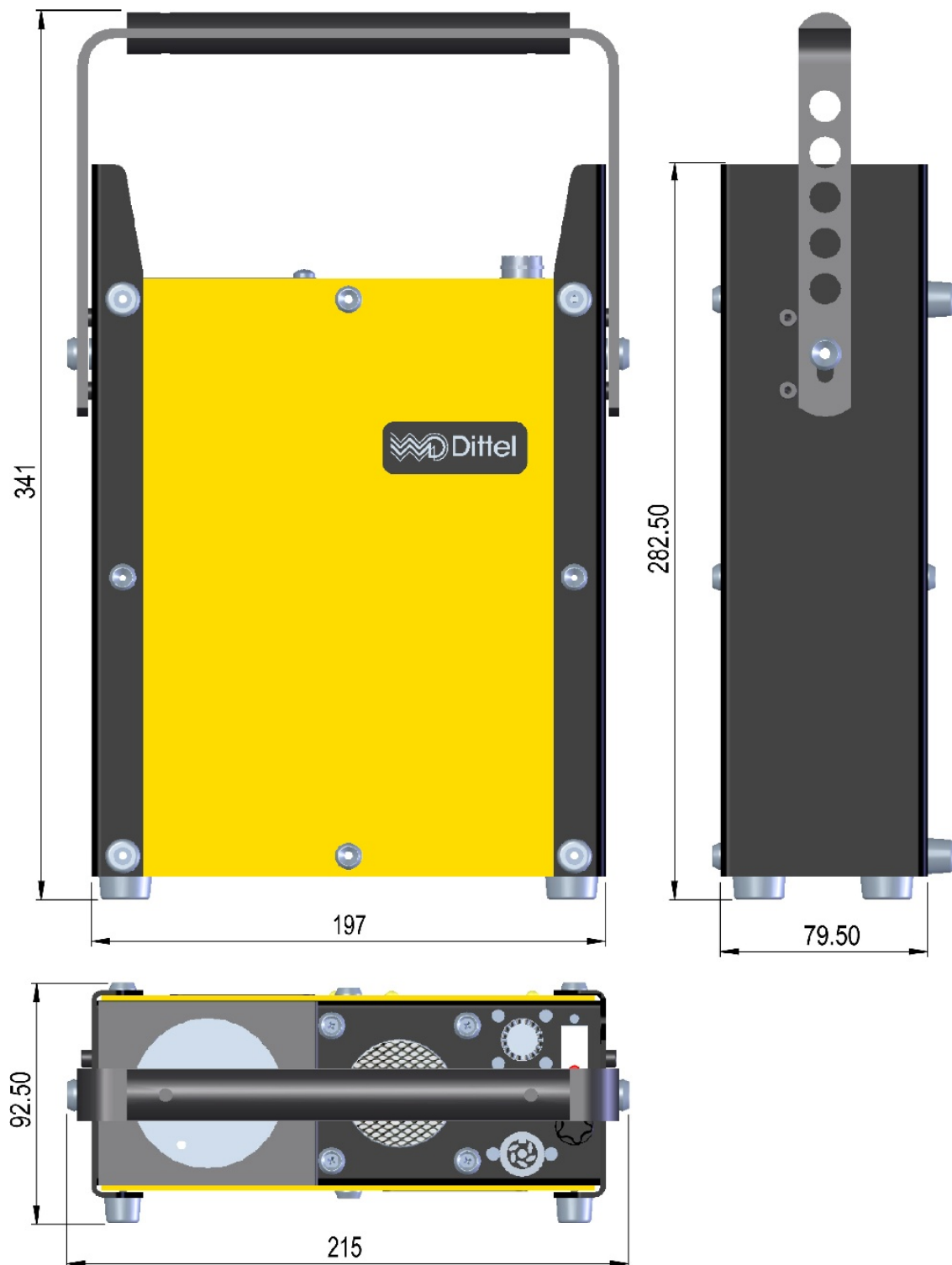
FSG 90: Nominal TX RF Output Power (normal operation)	≥ 6 Watt / 50Ω (carrier), ≥ 20 Watt PEP, @ 13.75 Vdc
FSG 90: Nominal TX RF Output Power (emergency operation)	≥ 1.5 Watt / 50Ω (carrier) @ 10 Vdc supply
FSG 90-H1: Nominal TX RF Output Power (normal operation)	≥ 10 Watt / 50Ω (carrier), ≥ 30 Watt PEP, @ 14.0 Vdc
FSG 90-H1: Nominal TX RF Output Power (emergency operation)	≥ 3.5 Watt / 50Ω (carrier) @ 10 Vdc supply
TX Duty Cycle	1 : 4 (1 minute TX / 4 minutes RX)
TX Time Out Timer	After 2 minutes continuous TX. Transmitter is unkeyed automatically and the radio display flashes as a warning.
Modulation	Amplitude modulation, AM (A3E)
Depth of Modulation	$\geq 75\%$ (Voice processor with dynamic compression)
Modulation Distortion	$\leq 10\%$ (m = 70% / 1,000 Hz) $\leq 15\%$ (m = 70% / 350 ... 2,500 Hz)
Modulation Audio Frequency Response	$\leq +2$ dB and -4 dB (350 ... 2,500 Hz)
Modulation AF Input for m = 70%	Dynamic Microphone: ≤ 0.5 ... 10 mV symmetrical, sensitivity adjustable in SETUP.
True Transmit Sidetone (derived from modulated TX RF signal)	≥ 100 mW / 600Ω (at 13.75 Vdc supply), ≥ 50 mW / 600Ω (at 10 Vdc), volume adjustable in SETUP, independent from speaker volume
Carrier Noise Level	≥ 45 dB (m = 70%/1,000 Hz)
Emission of RF Energy (≤ 1000 MHz)	$\leq 0,25 \mu\text{W}$ (-36 dBm) / 71 dB μV / 3.54 mV / 50Ω ≤ 4 nW (-54 dBm) / 53 dB μV / 446 μV / 50Ω , from 47 ... 68, 87.5 ... 137, 162 ... 244, 328 ... 336, 470 ... 862 MHz
Emission of RF Energy (≥ 1000 MHz)	$\ll 1 \mu\text{W}$ / $\ll -30$ dBm / $\ll 77$ dB μV / $\ll 7$ mV / 50Ω
Transmitter Spectrum Mask	Max. $+2$ / -4 dB at 350 ... 2,500 Hz (8.33 kHz spacing) ≥ 45 dB at 3,200 Hz modulation (8.33 kHz spacing) ≥ 60 dB at $\geq 5,000$ Hz modulation (8.33 kHz spacing)
Channel Selection Time	≤ 0.5 sec
Frequency Tolerance	≤ 1 ppm (0°C ... $+40^\circ\text{C}$ / 32°F ... 104°F), ≤ 1.5 ppm (-20°C ... $+55^\circ\text{C}$ / -4°F ... $+131^\circ\text{F}$)
Unwanted FM (Frequency modulation)	≤ 1.0 kHz at m = 70% / 1,000 Hz
TX Intermodulation	≥ 45 dB
Antenna Mismatching	VSWR $\leq 3 : 1$, normal operation At VSWR 3 : 1 the requirements for modulation distortion, spurious and harmonics output as well as frequency stability are met. In addition, the RF output is $\geq 40\%$ / FSG 90: ≥ 2.4 Watt into 50Ω at 13.75 Vdc. FSG 90-H1: ≥ 6 Watt into 50Ω at 14.0 Vdc. At VSWR $\leq 5 : 1$ still functional.



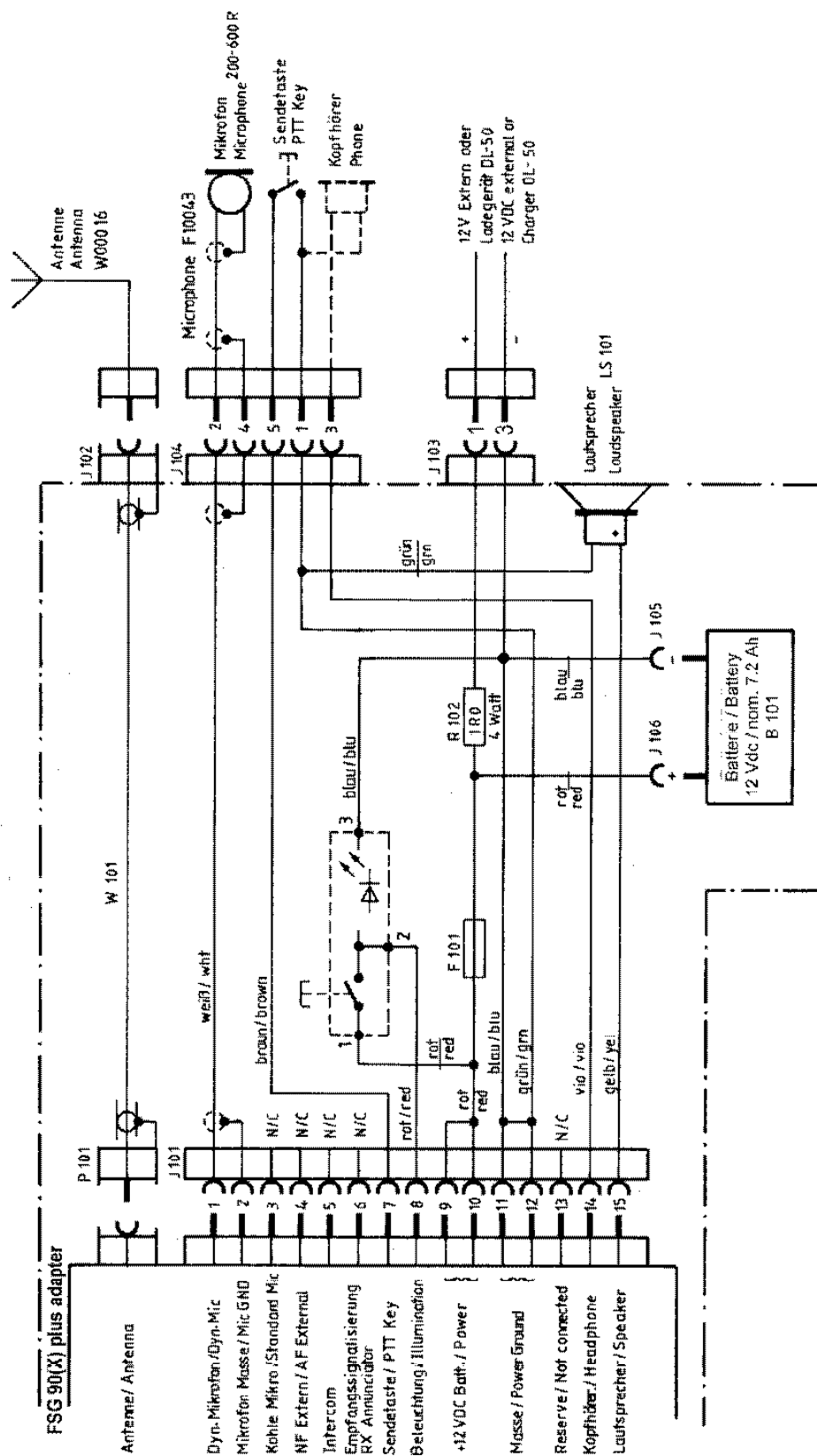
6.5 Environmental Performance Classification (Transceiver only)

Compliance measurements according to EUROCAE ED-14C / RTCA DO-160 C were performed and the following Environmental Categories fulfilled.

Environmental Conditions	ED-14C DO-160C	Description of conducted tests	Category
Temperature and Altitude	4.0	Equipment tested to category	D1
• Low Temperature	4.5.1	Operation -20°C (-4°F) Storage -55°C (-67°F)	
• High Temperature	4.5.2	Operation +55°C (131°F) Storage +85°C (185°F)	
• in-flight Loss of Cooling	4.5.3	No auxiliary cooling required	-
• Low Pressure (Altitude)	4.6.1	50,000 ft /15,240 m	
• Decompression	4.6.2	No test required in category D1	
• High Pressure	4.6.3	No test required in category D1	
Temperature Variation	5.0	10°C/min (18°F/min), Equipment tested to category	A
Humidity	6.0	Equipment tested to category	A
Shock	7.0	Equipment tested to	
• Operational shocks	7.2	6 g	
• Crash safety	7.3	15 g	
Vibration	8.0	Equipment tested to category	BMN
Explosion	9.0	No test required	X
Waterproofness	10.0	No test required	X
Fluids Susceptibility	11.0	No test required	X
Sand and Dust	12.0	No test required	X
Fungus	13.0	No test required	X
Salt Spray	14.0	No test required	X
Magnetic Effect	15.0	≤ 13 cm/1°, Equipment tested to category	Z
Power Input	16.0	Equipment tested to category	B
Voltage Spike	17.0	Equipment tested to category	B
Audio Frequency Susceptibility	18.0	Equipment tested to category	B
Induced Signal Susceptibility	19.0	Equipment tested to category	A
Radio Frequency Susceptibility	20.0	Equipment tested to category	T
Radio Frequency Emission	21.0	Equipment tested to category	Z
Lightning Induced Susceptibility	22.0	Equipment tested to category	A3C2X
Lightning effects	23.0	No test required	X
Icing	24.0	No test required	X
Other Test	---	No test required	X




Carrying Case PS
Dimensions

Carrying Case PS
Circuit Diagram



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 **European Aviation Safety Agency**

**EUROPEAN TECHNICAL STANDARD ORDER
(ETSO) AUTHORISATION**

EASA.210.1305

This European Technical Standard Order (ETSO) Authorisation is issued by EASA, acting in accordance with Regulation (EC) No. 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation, subject to conditions specified below, to

Dittel Messtechnik GmbH
Erpfinger Straße 36
86899 Landsberg/Lech
Germany

In accordance with Commission Regulation (EC) No. 1702/2003, Part 21, Section A, Subpart O and JTSO 2C37e, 2C38e*

for

FSG90(X) and FSG90(X)-H1 VHF Communication Transceiver Families
P/N FSG90(X), FSG90(X)-H1
DDP No. 031.00 or Subsequent Revisions

Remarks:
*) Accepted under Regulation (EC) 1702/2003 Article 2 No. 13. which states: "Approvals of parts and appliances issued by a Member State and valid on 28 September 2003 shall be deemed to have been issued in accordance with this Regulation." This Certificate replaces the Luftfahrtbundesamt approval No. LBA.O.10.911/98 JTSO issued 27/10/1999 due to change of ownership from Walter Dittel GmbH to Dittel Messtechnik GmbH.

Conditions

1. The above ETSO Authorisation holder is only authorised to identify an Article with this ETSO marking whilst remaining in compliance with the conditions retained for the Issue of this Authorisation.
2. This ETSOA does not constitute an installation approval. It is the responsibility of those installing this article to determine that the aircraft installation conditions are within the ETSO standards.

This Authorisation shall remain valid until surrendered or revoked.

**For the European Aviation Safety Agency,
Date of Issue: July 17, 2009**


Catherine GANDOLFI
Project Certification Manager
Parts & Appliances

EASA Form 92, Issue 1

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FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

GRANT OF EQUIPMENT AUTHORIZATION

Certification

Walter Dittel GmbH
Erpfinger Strabe 36, Postfach 260
8910 Landsberg/Lech 1 W Germany

Date of Grant: 11/27/02

Application Dated: 9/14/01

Attention: Fritz Moessinger

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for
the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER
Name of Grantee

BVYFSG90

Walter Dittel GmbH

Equipment Class : Licensed Non-Broadcast Station Transmitter

Notes: VHF/AM aviation analogue voice COMM transceiver

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	87	118 - 136.975	6	1.5 PPM	25K0A3E
	87	118 - 136.975	10	1.5 PPM	25K0A3E
	87	118 - 136.975	6	1.5 PPM	8K00A3E
	87	118 - 136.975	10	1.5 PPM	8K00A3E
	87	118 - 149.975	6	1.5 PPM	25K0A3E
	87	118 - 149.975	10	1.5 PPM	25K0A3E
	87	118 - 149.975	6	1.5 PPM	8K00A3E
	87	118 - 149.975	10	1.5 PPM	8K00A3E

Notes: Emission 8K00A3E is listed pursuant to waiver of Section 87.173(b)

This application was originally granted on 06/04/2002.

EA102416

FCC ID: BVYFSG90
Grantee: Walter Dittel GmbH

In correspondence concerning this grant, please refer
to the FCC IDENTIFIER and the date of grant.

Page 1 of 1
FCC 731A


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DITTEL	
Mediennutzen zur effizienten Nutzung des Funkfrequenzspektrums members of the efficient use of the radio frequency spectrum	
<input checked="" type="checkbox"/> Lufschichtstelle bei Funkanlagen gemäß § 3(2) (Artikel 3(2)) Air interface case for the radio path contained in § 3(2) (Article 3(2))	
harmonisierte Normen ... harmonised standards ...	Einhaltung der grundlegenden Anforderungen auf andere Art und Weise ... other means of demonstrating conformity with the essential requirements ...
Harmonized Standard EN 301 489-1 V1.6.1 EN 301 489-22 V1.3.1	EN 301 489-1 V1.6.1 EN 301 489-22 V1.3.1
Non Harmonized Standard EN 300 676	EN 300 676
Test Bericht Nr. 2-4253-01-0306-v23.10.2006	2-4253-01-0306-v23.10.2006
Ort, Datum Landenberg, den 26.10.2006	
Name und Unterschrift Peter Blaser Frank Oser Entwickler	

DITTEL PRODUKTBEREICH FLUGFUNK ERPTINGER STRASSE 36 • D-66599 LANDEBERG AM LECH TELEFON +49 (0)819 / 3351-0 • FAX +49 (0)819 / 3351-49 E-MAIL: INFO@DITTEL.COM • INTERNET: WWW.DITTEL.COM	
Konformitätserklärung gemäß dem Gesetz über Funkanlagen und Telekommunikationsendeinrichtungen (FTEG) und der Richtlinie 1999/5/EG (R&TTE) Declaration of Conformity appropriate to the law of radio and telecom terminal equipment	
Walter Dittel GmbH Luftfahrtgerätebau / Peter Blaser/Dipl.-Ing. Frank Oser Hersteller / Verantwortliche Person / Manufacturer / responsible person	
erklärt, dass das Produkt FLUGFUNKGERÄT / VHF/UHF voice communications Transceiver declares that the product	
Type (ggf. Anlagenspezifische Angabe der Module): FSG 9090/200/300/1/9001/900F-111/ Type (if applicable, configuration including the modules) 9090 HL 900F-EH	
<input type="checkbox"/> Telekommunikations-Telekommunikations- telecommunications terminal equipment	<input checked="" type="checkbox"/> Funkanlage radio equipment
Rodenfunkstelle tragbar, stationär, mobil, Ground based Transceiver portable, fixed, base, mobile Verwendungszweck, intended purpose II Geräteklasse, use pursuant to class	
bei bestimmungsgemäßer Verwendung des grundlegenden Anforderungen des § 3 und den übrigen entsprechenden Bestimmungen des FTEG entspricht when used for its intended purpose	
Gesundheit und Sicherheit gemäß § 3 (1) 1, (Artikel 3 (1) a)) Health and Safety requirements contained in § 3 (1) 1, (Article 3 (1) a))	Einhaltung der grundlegenden Anforderungen auf andere Art und Weise other means of demonstrating conformity with the essential requirements
harmonisierte Normen ... harmonised standards ...	
Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit § 3 (1) 2, Artikel 3 (1) b) Protection requirements with respect to electromagnetic compatibility § 3 (1) 2, (Article 3 (1) b))	
harmonisierte Normen ... harmonised standards ...	



**Kraftfahrt-Bundesamt**
DE-24932 Flensburg

EG-TYPGENEHMIGUNGSBOGEN
EC TYPE-APPROVAL CERTIFICATE

Benachrichtigung über
- die Erweiterung der Typgenehmigung

eines Bauteiltyps gemäß der Richtlinie 72/245/EWG, zuletzt geändert durch die
Richtlinie 2006/28/EG

Communication concerning the
- extension of type-approval


of a type of component with regard to Directive 72/245/EEC, as last amended by
Directive 2006/28/EC

Typgenehmigungsnummer: e1*72/245*2006/28*5042*01
Type-approval No.:

Grund für die Erweiterung:
Reason for extension:
der Name des Herstellers und der Fertigungsstätte wurden geändert
the manufacturer's name and the name of the assembly plant were changed


die Fabrikmarke wurde geändert
the make was changed

An der EUR anzubringendes EG-Typgenehmigungszeichen:
EC type-approval mark to be affixed on ESA:



ABSCHNITT I
SECTION I

0.1. Fabrikmarke (Firmenname des Herstellers):
Make (trade name of manufacturer):
Dittel Messtechnik GmbH

**Kraftfahrt-Bundesamt**
DE-24932 Flensburg

2

Nummer der Genehmigung: e1*72/245*2006/28*5042*01
Approval No.:

0.2. Typ:
Type:
FSG 90

in den Ausführungen - versions:
FSG 90 PC
FSG 90-H1 PC

0.3. Merkmale zur Typidentifizierung, sofern am Bauteil vorhanden:
Means of identification of type, if marked on the component:
Typbezeichnung
type designation

0.3.1. Anbringungsstelle dieser Merkmale:
Location of that marking:
auf der Rückseite des Gehäuses
on the rear side of the housing


0.5. Name und Anschrift des Herstellers:
Name and address of manufacturer:
Dittel Messtechnik GmbH
DE- 86899 Landsberg am Lech

0.7. Bei Bauteilen und selbstständigen technischen Einheiten, Lage und Anbringungsart des
EG-Genehmigungszeichens:
In the case of components and separate technical units, location and method of affixing
of the EC approval-mark:
Aufkleber auf der Rückseite des Gehäuses
stick-on label on the rear side of the housing

0.8. Anschrift(en) der Fertigungsstätte(n):
Address(es) of assembly plant(s):
Dittel Messtechnik GmbH
DE- 86899 Landsberg am Lech

ABSCHNITT II
SECTION II

1. Zusätzliche Angaben (erforderlichenfalls):
Additional information (where applicable):
siehe Anlage
see appendix

**Kraftfahrt-Bundesamt**
DE-24932 Flensburg

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Nummer der Genehmigung: e1*72/245*2006/28*5042*01
Approval No.:

2. Für die Durchführung der Prüfungen zuständiger technischer Dienst:
Technical service responsible for carrying out the tests:
CETECOM ICT Services GmbH
DE-56117 Saarbrücken

3. Datum des Prüfprotokolls:
Date of test report:
entfällt
not applicable

4. Nummer des Prüfprotokolls:
Number of test report:
entfällt
not applicable

5. Gegebenenfalls Bemerkungen:
Remarks (if any):
Die Verwender der Geräte sind in geeigneter Weise auf folgendes hinzuweisen:
1. Die erteilte Typgenehmigung berücksichtigt nur Anforderungen hinsichtlich
der elektromagnetischen Verträglichkeit.
2. Die Installation der Geräte muss so erfolgen, dass alle für das auszurüstende
Fahrzeug, unter Beachtung anderer Richtlinien und Regelungen,
anzuwendenden technischen Vorschriften weiterhin erfüllt werden.
3. Die Hinweise der Fahrzeughersteller über den Einbau von Funkausrüstungen
in ihren Fahrzeugen sind zu beachten.
4. Bei der Installation und Benutzung der Geräte sind jeweils die national
gültigen Vorschriften und Verhaltensregeln zu beachten.


The users of this device have to be informed about the following items in an
appropriate way:

1. This type approval follows the specifications regarding the electromagnetic
compatibility only.

2. The devices have to be installed in such a manner that all applicable technical
rules and also observing other technical directives and regulations, for the
vehicle to be modified still apply.

3. The instructions of the vehicle makers regarding the installation of wireless
equipment in their vehicles have to be observed.

4. The national regulations and behavioural rules have to be observed when
installing and using the device.

**Kraftfahrt-Bundesamt**
DE-24932 Flensburg


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Nummer der Genehmigung: e1*72/245*2006/28*5042*01
Approval No.:

6. Ort:
Place:
DE-24932 Flensburg

7. Datum:
Date:
15.05.2009

8. Unterschrift:
Signature:
Im Auftrag


Melanie Friedrichsen



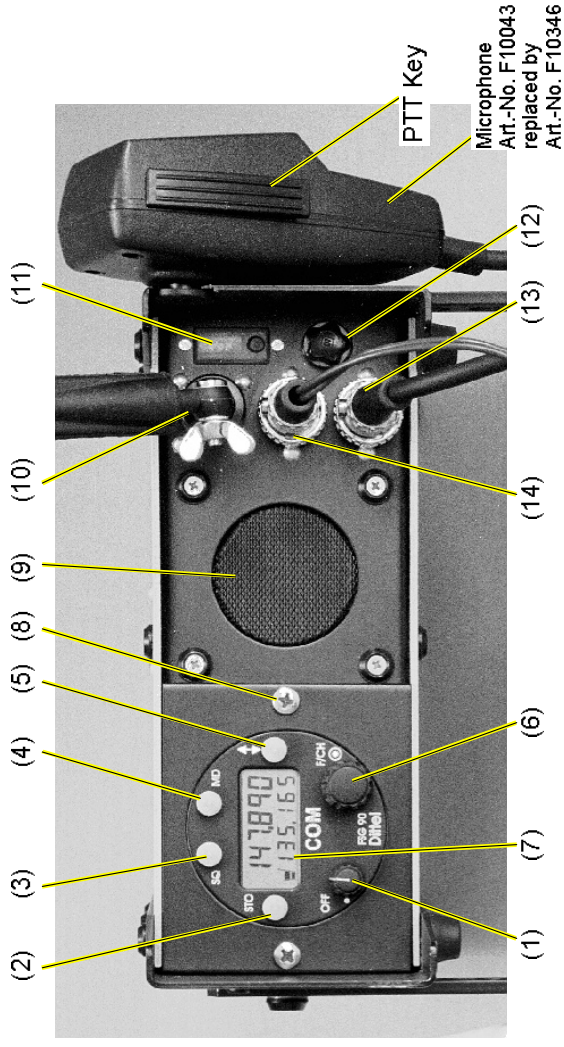
9. Die Typgenehmigungsunterlagen, hinterlegt bei der zuständigen Behörde, die die
Typgenehmigung erteilt hat, sind auf Anfrage erhältlich.
The type-approval file deposited at the Administrative Service having delivered the type-
approval, may be obtained.

Verzeichnis:
List of documents:

1. Anlage zum EG-Typgenehmigungsbogen
Appendix to the EC type-approval certificate

2. Inhaltsverzeichnis zu den Beschreibungsunterlagen
Index to the information package

3. Beschreibungsunterlagen
Information package



NOTICE: Illustration shows FSG **90E PS** (extended frequency range) and required, but not supplied accessories!

FSG 90PS

Operation