FSG 90(X) ACCESSORY

NOTICE: Illustration shows Desktop Base Station with mounted **FSG 90** and hand-held microphone F10346

Desktop Base Station

fits all types of 2¼" FSG 90

Operator's Manual

applies for Desktop Base Station, article no F10320

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

Please observe the Safety Information!

Keep for further use!

Date of Issue November 1999

Document no.: BA 151.00-E Article no D10012

Certified ISO 9001 Zertifiziert

Walter DITTEL GmbH Luftfahrtgerätebau

Avionics Division

Erpftinger Strasse 36 ★ D-86899 Landsberg ★ Germany

Telephone +49 8191/3351-0 ★ Fax +49 8191/3351-49

e-mail: firma@dittel.com ★ **Internet:** http://www.dittel.com

WARRANTY - COPYRIGHT - SERVICE

Warranty

The details and data in this operator's manual correspond to the respective state of technology on the day of printing. We reserve our right to change without prior notice due to new technological design or corresponding new production technology.

Walter Dittel GmbH takes no guarantee for these documents with respect to application and interpretation.

Walter Dittel GmbH ("Warrantor") warrants to the purchaser of new radio equipment of the warrantor's manufacture that such equipment shall be free from defects in material and workmanship for a period of 24 month from the date of delivery. Equipment and accessory items not manufactured by the Warrantor carry the standard warranty (12 month) of the manufacturer thereof.

This warranty does not cover equipment which has been

1. **damaged or not maintained as reasonable and necessary,**
2. **modified in any way,**
3. **improperly installed,**
4. **repaired by someone other than the warrantor or an authorized warranty avionics workshop, or**
5. **used in a manner or purpose for which the equipment was not intended.**

This warranty shall not extend to incidental or consequential damages arising from operation of the equipment or from any claimed breach of this warranty.

Service Information

Should any unusual problem arise or further information be desired, please contact your nearest Walter Dittel representative or the Walter Dittel GmbH Avionics Department, Erpftinger Strasse 36, D-86899 Landsberg, Germany.
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
Publication Department
Walter Dittel GmbH
Erpftinger Strasse 36
D-86899 Landsberg am Lech
Germany
or via e-mail to: guggenmos@dittel.com

Subject to technical changes Printed in Germany 07.05.01

TABLE OF CONTENT

TABLE OF CONTENT

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 Desktop Base Station should be aware of the following warning:

Do not operate this radio when the antenna is 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 Desktop Base Station!**
- **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 a rod antenna. This may cause malfunction of the avionics, trigger the airbag or confuse domestic 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 in certain countries.
- **DO NOT** dispose worn out lead batteries with the household garbage.
- Always turn OFF the radio when installing or removing the unit!
- Always turn OFF the radio when starting nearby engines or vehicles!
- The Desktop Base Station may be supplied by external 12 Vdc. When the unit has to be powered by external 24 Vdc sources a suitable Voltage Converter 24 Vdc to 12 Vdc of at least 4 Amps must be used!
- The Desktop Base Station 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!

ABBREVIATIONS AND ACRONYMS

A/C	Aircraft
A/N	Article Number (Walter Dittel)
AGC	Automatic Gain Control
Ah	Ampere hour
AM	Amplitude Modulation
ANT	Antenna
Ass'y	Assembly
AWG	American Wire Gauge
ccw	Counterclockwise (turn left ↺)
CH	Channel
CTS	Ready-to-Transmit
cw	Clockwise (turn right ↻)
dB	Decibel
dia.	Diameter
EMF	Electromotive Force (voltage of an open circuit)
F/CH	Frequency/Channel
FL	Flight Level
g	Acceleration due to gravity
GND	Ground
HI	High Power
Hz	Hertz
ICAO	International Civil Aviation Organization
IF	Intermediate Frequency
kHz	Kilohertz
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LO	Low Power
LOS	Line-Of-Sight
m	Modulation
mA	Milliamperes
MD	Mode
MHz	Megahertz
MIC	Microphone
mW	Milliwatt
NM	Nautical miles
nW	Nanowatt (10^{-9})
PEP	Peak Envelope Power
PLL	Phase-Locked Loop
ppm	parts per million
PTT	Push-To-Talk
pW	Picowatt (10^{-12})
PWR	Power
RF	Radio Frequency
rms	Effective value (root mean square)
RTS	Invitation to send
RX	Receive
RxD	Receive data
S+N/N	Signal-to-Noise Ratio
SINAD	Ratio: $\frac{\text{Signal} + \text{noise} + \text{distortion}}{\text{noise} + \text{distortion}}$
SPKR	Loudspeaker
SQ	Squelch
STBY	Standby
STO	Store
SWR	Standing-Wave Ratio
TOT	Time out timer
TX	Transmit
TxD	Transmit data
VCO	Voltage-Controlled Oscillator
Vdc	Volts, direct current
VHF	Very-High Frequency
VOL	Volume
VSWR	Voltage Standing-Wave Ratio
W	Watt
Ω	Ohm
°C	Degrees Centigrade
°F	Degrees Fahrenheit

SECTION 1 GENERAL DESCRIPTION

1.1 Introduction

This Operator's Manual BA 151.00-E contains instructions and descriptions for application, installation and operation of the Desktop Base Station together with a VHF/AM airband transceiver **FSG 90(X)** of Walter Dittel GmbH, D-86899 Landsberg, Germany.

1.2 Application & Description of the Desktop Base Station

The battery powered Desktop Base Station was designed to operate all 2¼" round front panel **FSG 90** VHF/AM airband radios as stationary or mobile units and to fulfil the requirements of air traffic control.

The Desktop Base Station (19"-cassette) is intended to be placed onto an air controller's desk or used at the airstrip - as main or back-up unit.

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. Three display modes, true Sidetone via headphone, TX and supply voltage indicator at the back-lit display, TX time-out-timer (2 minutes), and Transmit Blocking protection complete these radios.

The Desktop Base Station 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 three twist-lock sockets are located to connect a 12 Vdc battery charger/external 12 Vdc source, Voice Recorder, and a remote audio panel. The antenna is plugged to an UHF type antenna jack.

The built-in rechargeable battery allows an independent operation of up to 85 hours (refer to paragraph 4.15, Battery Operating Times). Continuous operation is possible by supplying externally from a vehicle DC source, or if mains is available, by an automatic battery charger.

1.3 Equipment required but not supplied

- VHF/AM COM airband transceiver **FSG 90(X)**, 2¼" round front panel (if not ordered already with mounted transceiver)
- Vertically polarized VHF antenna in the frequency range of at least 118 to 137 MHz, 50 Ohm. For stationary operation we recommend our weatherproof glass-fiber reinforced folded-top roof antenna, UHF-connector, article no W00013,
- Antenna cable RG-213/U, low-loss, UHF 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)
- 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 an external 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.***

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 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°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
F10345	Spring steel band antenna, swivel type, PL-259 plug
W00043	Magnet mount vehicle rod antenna, incl. 4 m cable, and PL-259 plug
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)
F10346	Dynamic hand-held microphone with PTT-switch, coiled cord and 5-pole twist-lock plug (fits mic hanger)
F10042	Dynamic hand-microphone/loudspeaker with PTT-switch, coiled cord and 5-pole twist-lock plug (fits mic hanger)
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
F10026	Cigar Lighter Cable, coiled cord, incl. 2-pole twist-lock plug to supply station from 12 Vdc car battery (fits cigar lighter socket, minus = ground)
F10130	Automatic Lead Battery Charger DL-50, input: 115/230 Vac. Output: 13.8 Vdc/600 mA. Cable and 5-pole plug, fits "CHARGER" socket of Desktop Base Station.
S20000	Converter 24 Vdc / 12 Vdc, 4 Amps, to operate the base station from 24 Vdc sources like truck batteries etc.
E08833	2-pole twist-lock plug, fits into "CHARGER" socket of Desktop Base Station.
E08834	5-pole twist-lock plug, fits into "VOICE RECORDER" and "AUXILIARY CONTROL" socket of Desktop Base Station.

SECTION 2 INSTALLATION

2.1 General

This section contains instructions and suggestions to install a VHF/AM radio **FSG 90(X)** into a Desktop Base Station, 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 - if applicable

All 2¼" round front panel radios **FSG 90(X)** can be mounted rigidly in the Desktop Base Station.

To install the radio upper lid and front panel of the Desktop Base Station have to be opened. Slide off the four caps at the upper lid of the protecting angles using a small screwdriver. Remove 4 screws M 4 × 12 mm, lift off lid and pull off safety earth wire. Remove 4 screws on each corner of the front plate and pull out carefully. Feed radio to the rear side of the front panel, align fixing holes and mount by 4 cross recessed Pan head screws M 4 × 12 mm (supplied with the radio).

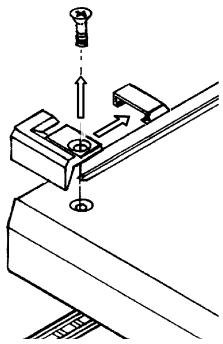
Make sure, the radio is turned OFF, then connect

- wire harness of the Desktop Base Station via 25-pole SUB-D plug to the receptacle,
- antenna cable of the unit to the BNC jack of the radio.

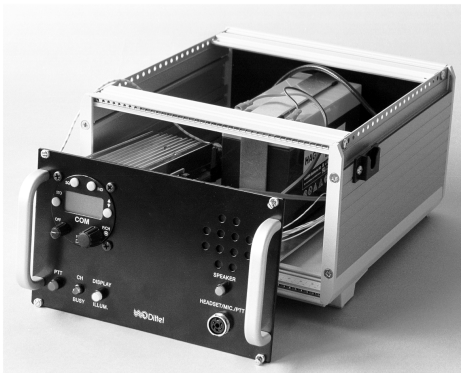
Secure SUB-D plug by sliding lock retainer to avoid unwanted connector loosening.

Carefully insert front panel together with radio. Fix the front panel by the 4 screws. Connect pulled off safety earth wire to lid. Put on lid and protecting angles, fix both with 4 screws M 4 × 12. Slide on the four caps.

The Desktop Base Station together with transceiver is ready for use.



Slide off cap to get access to the hidden screws of the lid



Open unit with **FSG 90** installed

SECTION 3 FUNCTIONAL DESCRIPTION

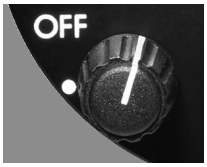
3.1 Introduction

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

3.2 Operator's Controls and Indicators

A front and rear view of the Desktop Base Station 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 switch

To turn ON the radio together with the Desktop Base Station, 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, which was used before last time turned 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 Desktop Base Station, rotate the **ON/OFF-VOL** knob fully counter-clockwise (ccw) to the OFF position (dot). Blank display. All lighted push-buttons - if any - go off.

(2) **STO**

Push button

With the Dual Mode COM **FSG 90** and **FSG 90-H1**, 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 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.

(2) **STO**
continued

6. On a free channel memory an additional "**F**" (free) is displayed (CH 5 to 99).
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:

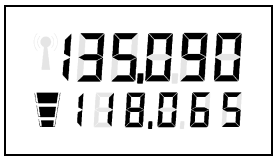
Use/STBY Mode:	upper line	USE frequency
	lower line	STBY frequency
Channel Mode:	upper line	USE frequency
	lower line	channel memory number
Direct Tune Mode:	upper line	USE frequency
	lower line	blank

(5) Frequency Display — 5-digit or 6-digit liquid crystal display (LCD), two lines, may be back-lighted by pressing the white "DISPLAY ILLUM." 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 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)

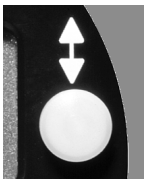
After pressing the **STO** button once more the channel name 121.875 (= 121.875 MHz) will be stored in the channel memory **07**.
The last used display mode is displayed.

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

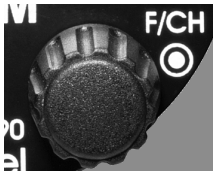
Momentarily pressing the Transfer button

- 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(X)** transceiver in the Desktop Base Station.

(8) **F/CH**



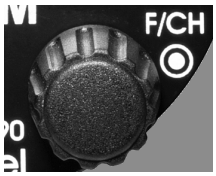
Rotary control and push-button = dual function

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.

(8) **F/CH**

continued



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 Desktop Base Station is turned OFF by the **FSG 90(X) ON/OFF-VOL** switch.

(11) **DISPLAY ILLUM.**

White push-button switch, not illuminated

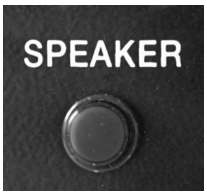
Pressing the "DISPLAY ILLUM." switch turns ON the transceiver's frequency display illumination.

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**

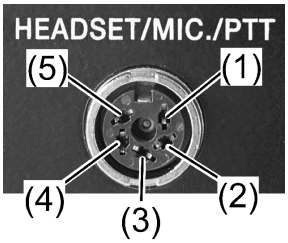


Green push-button switch, not illuminated

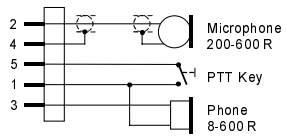
Pressing the "SPEAKER" switch turns ON the built-in loudspeaker. Communication audible via speaker, volume adjustable with **ON/OFF-VOL**-control (1).

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.



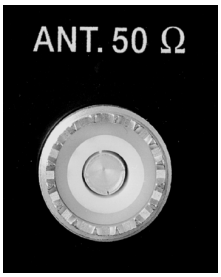
1 Common Ground (PTT key/Headphone)
2 Dynamic microphone IN
3 Headphone OUT
4 Dynamic Microphone Ground
5 Push-To-Talk key

(15) Fixing screws

Four recessed collar head-screws, M 2.5 × 11, to fix the front panel.

Back Side:

(16) ANT. 50 Ω



DANGER!

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

CAUTION!

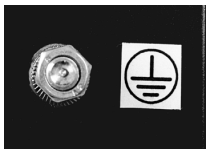
- ***NEVER operate the radio without any antenna!***

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 is recommended. 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 grounded antenna mast and appropriate lightning protection!

REMEMBER: A good antenna is the best RF amplifier!

(17)



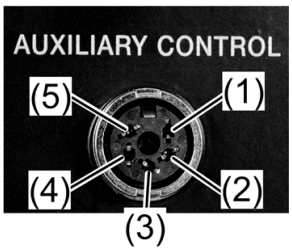
Ground Terminal, M 5 stud and nut

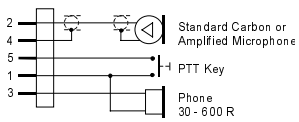
To reduce electrical interference, bonding the Desktop Base Station through the ground terminal is mandatory.

- 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 cable lugs for high-quality connection.

(18) AUXILIARY CONTROL





5-pole AUX. CONTR. Socket

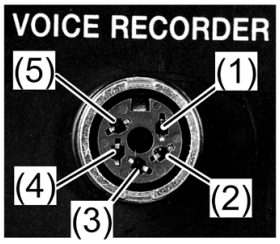
to connect a suitable remote audio console or a two-wire gateway.
Mating plug. PREH, 5-pole, twist-lock, article no E08834.

NOTICE: This microphone input is only suitable for standard carbon microphones or amplified microphones like Electret types! Dynamic microphones without amplifier won't work! Use only high qualitative and shielded microphone cables!

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

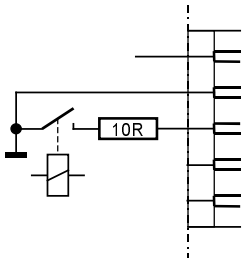
(19) VOICE RECORDER **5-pole VOICE REC. Socket**



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 (10) at the front lights up.

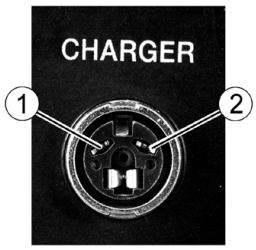
NOTICE: When the transceiver's Squelch is OFF (only noise audible), the relay is also energized and RX noise is recorded.

Terminate audio shield at one end only!



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

(20) CHARGER **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

SECTION 4 OPERATION

4.1 Introduction

This section contains a basic operation procedure for the Desktop Base Station together with a Dual Mode **FSG 90** or **FSG 90-H1** 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 Desktop Base Station 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 - 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!*

Any 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 (16).

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

- Ensure the plug of your 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.

4.3 Microphone - Headset - PTT key

Any dynamic microphone (200 to 600 Ohms) with or without PTT switch or a head-set 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 head-set 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 "AUXILIARY CONTROL" (18) at the back panel (mating 5-pole plug: Article-No. E08834). For wiring refer to paragraph 3.2, position (18).

- 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(X)** is turned ON. It is indicated at the frequency display (5) of the radio by a 3-bar **Supply Indicator**.

Usually the Desktop Base Station together with the radio is powered by a battery which is constantly kept fully charged by an automatic charger. In case of mains failure or outdoor operation, 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 Battery Charging

To recharge the built-in 6.5 Ah accumulator we recommend our automatic battery charger **DL-50**.

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

The charger DL-50 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-50** to 2-pole socket (20) of the Desktop Base Station.
- 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 6.5 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 month.

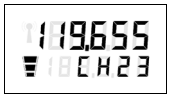
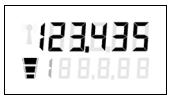
4.6 Switching ON - Selecting Frequency/Channel Name - Volume

IMPORTANT!

- ***»Frequency« (25 kHz spacing) and »Channel Name« (combined 8.33 kHz/25 kHz spacing) are ICAO terms (refer to Section 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 Desktop Base Station together with transceiver **FSG 90(X)** 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 **4.9, STORING A NEW FREQUENCY/ CHANNEL NAME**). Select appropriate channel memory number together with the associated frequency/channel name by **rotating** the **F/CH** knob (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.

4.7 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 active frequency 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.
- 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!***

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 ("CH BUSY" LED OFF).*
- *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.*

1. If the display mode shall be changed: Push once or twice the **MD**-button (4).
2. If the USE frequency/channel name shall be changed: refer to paragraph **4.6, SWITCHING ON - SELECTING FREQUENCY/CHANNEL NAME - VOLUME.**
3. Transmitting is only possible on a free channel (no communication audible, "CH BUSY" LED OFF).
4. 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).
5. Press and hold the PTT (Push-To-Talk) key at the mike, or at Desktop Base Station (9), or at remote audio console. Then 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 display appears, and the "PTT" button at the Desktop Base Station (9) lights red.
6. Hold or adjust 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.
7. Release the PTT key to end the transmission and to open the channel for reception; the **Transmit Indicator** must disappear, the red "PTT" key-light goes off. Switch Squelch ON again, if applicable.
8. 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(X)** 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.