

# FSG 2T ACCESSORY

**FSG 2T:**

**CE 0682** ⓘ

**FC** FCC ID: BVYFSG2T

LBA.O.10.911/103 JTSO

replaced by:

ESTO: EASA.21O.1304

FAA: TSO C37d

TSO C38d

DFS-No.: D - 0002/2002

KBA: e1  
03 2777



**NOTICE:** Illustration shows Desktop Base Station with mounted **FSG 2T** and hand-held microphone F10346

## Desktop Base Station fits a 2¼" FSG 2T

## Operator's Manual

applies for Desktop Base Station, Article no F10383

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

*Please observe the Safety Information!*

*Keep for further use!*

Date of Issue:

March 2010

Revision:

1

Document no.: OM 150.30-EN

Article no D10073



**DITTEL MESSTECHNIK GMBH AVIONICS DIVISION**  
ERPFTINGER STRASSE 36 ★ 86899 LANDSBERG ★ GERMANY  
TELEPHONE +49 (0)8191 / 3351-0 ★ FAX +49 (0)8191 / 3351-49  
E-MAIL: [INFO@DITTEL.COM](mailto:INFO@DITTEL.COM) ★ INTERNET: [WWW.DITTEL.COM](http://WWW.DITTEL.COM)

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.



## Manual Revision History

**MANUAL**      **OM 150.30-EN**  
**REVISION**    **1**

Retain this list in the front of the Operator's Manual as a **RECORD OF REVISIONS**.

Revision	REASONS FOR CHANGE	Date
-	Created	January 2004
1	Company's name changed into "Dittel Messtechnik GmbH", new ESTO document, 2-pole DC connector changed into 3-pole DC connector due to ceased production; resulting in new article numbers	March 2010



## Table of Content

	Page
<b>Manual Revision History .....</b>	<b>2</b>
<b>Table of Content .....</b>	<b>3</b>
<b>Abbreviations and Acronyms .....</b>	<b>5</b>
<b>Safety Information .....</b>	<b>7</b>
Used Symbols .....	9
<b>Section 1, General Description .....</b>	<b>11</b>
1.1 Introduction .....	11
1.2 Application & Description of the Desktop Base Station .....	11
1.3 Equipment required but not supplied .....	12
1.4 Operating License .....	12
1.5 Optional Accessories .....	13
<b>Section 2, Installation .....</b>	<b>15</b>
2.1 General .....	15
2.2 Unpacking and Inspecting Equipment .....	15
2.3 Transceiver Installation - if applicable .....	15
<b>Section 3, Functional Description .....</b>	<b>17</b>
3.1 Introduction .....	17
3.2 Operator's Controls and Indicators .....	17
3.3 Frequency Display .....	24
3.4 Error Codes .....	25
<b>Section 4, Operation .....</b>	<b>27</b>
4.1 Introduction .....	27
4.2 Antenna - Antenna Socket SO 239 .....	27
4.3 Microphone - Headset - PTT key .....	28
4.4 Supply Indicator .....	28
4.5 Battery Charging .....	29
4.6 Switching ON - Frequency Selection - Volume .....	30
4.7 Receive (Listen) Operation .....	32
4.8 Transmit (Talk) Operation .....	33
4.9 Memory Programming .....	35
4.9.1 Programming while in Direct tune mode: .....	35
4.9.2 Programming while in CHANNEL MODE: .....	36
4.10 Backlighting .....	36
4.11 Voice Recorder Operation .....	37
4.12 External Power Supply .....	38
4.13 Battery Operating Times .....	38
4.14 Emergency Operation .....	39



4.15	Turning OFF the Desktop Base Station .....	39
4.16	Siting .....	39
4.17	Functional Checks.....	40
<b>Section 5, Technical Summary.....</b>		<b>41</b>
5.1	Desktop Base Station containing <b>FSG 2T</b> : .....	41
5.2	Technical Data Transceiver <b>FSG 2T</b> .....	42
5.2.1	General .....	42
5.2.2	Dimensions, Weight .....	42
5.2.3	Power Supply, Fuses .....	42
5.2.4	Receiver Specification.....	43
5.2.5	Transmitter Specification.....	44
5.3	Environmental Performance Classification.....	45
<b>Certificates.....</b>		<b>47</b>



## Abbreviations

$\Omega$	Ohm	MD	Mode
$^{\circ}\text{C}$	Degrees Centigrade	MHz	Megahertz ( $10^6$ Hz)
$^{\circ}\text{F}$	Degrees Fahrenheit	MIC	Microphone
A/C	Aircraft	mW	Milliwatt
A/N	Article Number (Dittel Messtechnik GmbH)	NM	Nautical miles (1.852 km)
AGC	Automatic Gain Control	nW	Nanowatt ( $10^{-9}$ )
Ah	Ampere hour	PEP	Peak Envelope Power
AM	Amplitude Modulation	PLL	Phase-Locked Loop
ANT	Antenna	ppm	Parts per million
Ass'y	Assembly	PTT	Push-To-Talk
AWG	American Wire Gauge	pW	Picowatt ( $10^{-12}$ )
ccw	Counter-clockwise (turn left $\curvearrowleft$ )	RF	Radio Frequency
CH	Channel	rms	Effective value (root mean square)
cw	Clockwise (turn right $\curvearrowright$ )	RX	Receive
dB	Decibel	S+N/N	Signal-to-Noise Ratio
dia.	Diameter	SINAD	Ratio: $\frac{\text{Signal} + \text{noise} + \text{distortion}}{\text{noise} + \text{distortion}}$
EMF	Electromotive Force (voltage of an open circuit)	SPKR	Loudspeaker
F/CH	Frequency/Channel	SQ	Squelch
FL	Flight Level	STBY	Standby
g	Acceleration due to gravity	STO	Store
GHz	Gigahertz ( $10^9$ Hz)	SWR	Standing-Wave Ratio
GND	Ground	THD	Total Harmonic Distortion
HI	High Power	TOT	Time out timer
Hz	Hertz	TX	Transmit
ICAO	International Civil Aviation Organization	VA	Volt-ampere, apparent power
IF	Intermediate Frequency	Vac	Volts, alternating current
kHz	Kilohertz ( $10^3$ Hz)	VCO	Voltage-Controlled Oscillator
LCD	Liquid Crystal Display	Vdc	Volts, direct current
LED	Light Emitting Diode	VFO	Variable-frequency oscillator
LO	Low Power	VHF	Very-High Frequency
LOS	Line-Of-Sight	VOL	Volume
m	Modulation	VSWR	Voltage Standing-Wave Ratio
mA	Milliampere	W	Watt, real power





## 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 frequency energy substantially below the level where any kind of harm is reported.

**There are no user replaceable parts inside the FSG 2T! If the radio fails it must be returned to a Dittel Messtechnik GmbH approved repair facility!**

The licensee of a radio station is responsible at all times for the proper operation of the station. Radio operators should use the following guidelines to make this radio a useful tool for safe and efficient flight:

- **DO NOT** transmit when the antenna is very close to, or touching, exposed parts of the body, especially the face and eyes. Persons with pacemakers should be aware that proper functioning may be affected when in the vicinity of the antenna!
- **DO NOT** transmit without antenna connected.
- **DO NOT** operate the radio on an unprotected power supply. Replace a blown fuse only against correct type with specified nominal value. Investigate the **cause**.
- **DO NOT** transmit on a busy channel.
- **DO NOT** press the transmit (PTT) key when not actually desiring to transmit.
- **DO NOT** transmit with the antenna inside aircraft or vehicle. This may cause malfunction of onboard avionics, trigger the vehicle airbag or interfere onboard instruments! Always operate the radio **FSG 2T** on a suitable outdoor / external antenna! Assure appropriate lightning protection / grounding where (elevated) outdoor antennas are used.
- **DO NOT** allow children to play with any radio equipment containing a transmitter.
- **DO NOT** use a radio **FSG 2T** for airborne operation which is marked as "Chann. ONLY Mode":

Phone/ Kopfhörer	OFF	OFF	V	OFF	OFF	V	Level / Page	Consult Manual / Einbauhandbuch beachten!	<input type="radio"/> AF EXTERN Mode
Ex factory setting: 2mA 8mA D				2mA 8mA D			Mic 1 Mic 2	2 independent inputs / 2 unabhängige Eingänge:	
Mic1=Only set Mic2=V								D = Dynamic; nonamplified, ohne Verstärker	
								V = Amplified / Verstärker Microphone	<input checked="" type="radio"/> Chann. ONLY Mode
								10 mA, 8 mA, 2 mA, or OFF no current / OFF kein Strom	



- Always switch OFF the radio first when installing the unit into vehicles, aircraft or carrying cases, or when removing from it!
- Always switch OFF the radio before starting an aircraft or vehicle engine!
- The **FSG 2T** should be used exclusively for aviation related communication purposes.
- Unauthorized modifications and changes of the system are **forbidden**.
- Sufficient speech volume is very important. While the lips are very close and facing the microphone, speak loud and clear. Proper speech level is indicated by the yellow flickering LED on the **FSG 2T** front panel.
- Push-to-Talk keys may stick occasionally.  
The transmission signaling RED or flickering YELLOW LED shall be turn to CLEAR or GREEN when releasing the PTT key.  
However, after more than two minutes continuous transmitting (by stuck button or operator caused), the built-in transmit time-out-timer disables the transmitter in order to avoid continuous channel blocking. A continuously flashing display warns the user. Refer to appropriate hints in this manual.
- The Desktop Base Station may be supplied by external 12 Vdc. When the unit has to be powered by a 24 Vdc source, a suitable 24 Vdc to 12 Vdc Voltage Converter of at least 4 Amps must be used!
- The Desktop Base Station 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!
- **This Desktop Base Station 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.







## Used Symbols

In this manual the following symbols are used:



**WARNING!**

*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!*





## Section 1      **General Description**

### **1.1      Introduction**

This Operator's Manual OM 150.30-EN contains instructions and descriptions for application, installation and operation of the Desktop Base Station together with a VHF/AM airband transceiver **FSG 2T** of Dittel Messtechnik GmbH, D-86899 Landsberg, Germany.

### **1.2      Application & Description of the Desktop Base Station**

The battery powered Desktop Base Station was designed to operate a VHF/AM airband radio **FSG 2T** as stationary or mobile unit and to fulfill 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 radio **FSG 2T** is working within the airband frequency range of 118.000 MHz to 136.975 MHz in 25 kHz increments (760 channels). 20 out of 760 channels can be preset by the operator and permanently stored in a non-volatile memory.

The operating mode is Simplex, i.e. transmitting or receiving only in turns. With an RF output power of 5 Watts and high receiver sensitivity, this radio is excellently suitable for base operation.

The Desktop Base Station features at the front a PTT key, a "CHANNEL BUSY" indicator, a frequency display illumination switch (ON/OFF), a 5-pin 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, a 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 55 hours (refer to paragraph 4.14, 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 2T** (if Desktop Base Station is not ordered already with a 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- and BNC plug,
- Dynamic microphone 30 to 600 Ohm, e.g. handheld microphone with PTT key, article no F10346, or a Standard carbon microphone with or without PTT key (notice separate microphone inputs for dynamic and carbon/amplified microphone)
- Mating plugs, to connect remote control panel, Voice recorder, etc.,
- Automatic battery charger, e.g. **DL-50A**, article no F10385.
- When operating the station on an external 24 Vdc source, a suitable 24 Vdc to 12 Vdc converter of at least 4 Amps must be used!

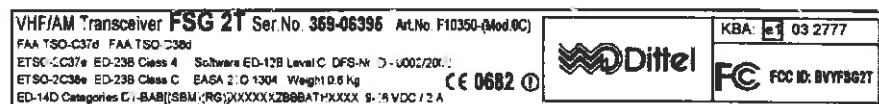
### 1.4 Operating License



#### IMPORTANT!

- Depending on national regulations, VHF/AM ground and / or VHF/AM airborne operation may require an individual national operating license. Such license is usually granted by the responsible National Telecommunications Authority, through suitable application forms.
- Aircraft registration, operator's name, address and operating license payment details, radio type / model, Serial number, ESTO number EASA.210.1304, and DFS number D-0002/2002, or, when applicable, the FCC ID number BVIYFSG2T.

Example:





## **1.5 Optional Accessories and Spare Parts**

Article-No.	Description
F10345	Spring steel band antenna 118-137 MHz, swivel type, UHF connector PL-259
W00043	Magnet mount vehicle rod antenna 118-137 MHz, complete with 4 m/ 13 ft cable, and UHF connector PL-259
W00114	Mobile Whip Antenna 118-137 MHz, complete with 5 m/16.5 ft cable, w/out 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)
F10041	Dynamic hand-held microphone with PTT-switch, coiled cord and 5-pin twist-lock plug
F10042	Dynamic hand-microphone/loudspeaker with PTT-switch, coiled cord and 5-pin twist-lock plug
F10125	Inline PTT-switch (U-94 A/U), coiled cord, 5-pin twist-lock 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-pin twist-lock plug to supply station from 12 Vdc car battery (fits cigarette lighter socket, minus = ground)
F10385	Automatic Lead Battery Charger DL-50A, 115/230 Vac. Output: 13.8 Vdc/ 600 mA. Cable and 3-pin plug, fits into "CHARGER" socket of Desktop Base Station.
S20000	Converter 24/28 Vdc to 12 Vdc, 4 Amps, to operate the Desktop Base Station from 24/28 Vdc sources like truck batteries etc.
E61933	3-pin twist-lock plug, fits into "CHARGER" socket of Desktop Base Station.
E08834	5-pin twist-lock plug, fits into "VOICE RECORDER" and "AUXILIARY CONTROL" socket of Desktop Base Station.
E61181	Sealed lead acid battery, 12 Vdc, rated capacity 7.2 Ah





## **Section 2      Installation**

### **2.1      General**

This section contains instructions and suggestions to install a VHF/AM radio **FSG 2T** 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 Dittel Messtechnik GmbH.

### **2.3      Transceiver Installation - if applicable**

An airband radio **FSG 2T** 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 × 20 mm (supplied with the radio).

**Make sure, the radio and Desktop Base Station is turned OFF, and then connect**

- wire harness of the Desktop Base Station via 15-pin SUB-D plug to the receptacle,
- antenna cable of the Desktop Base Station to the BNC jack of the radio.

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

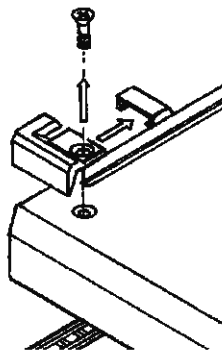


### IMPORTANT!

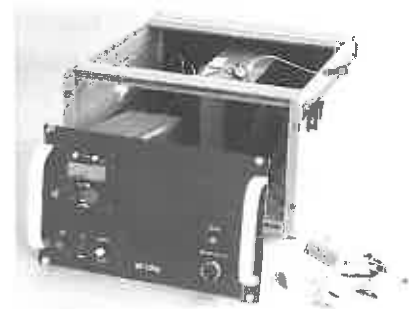
If a Voice Recorder should be operated together with the Desktop Base Station, refer to paragraph 4.11, Voice Recorder Operation!

Carefully insert the 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 × 20. Slide on the four caps.

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



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



Open unit with **FSG 2T** 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 2T**, together with operating instructions.

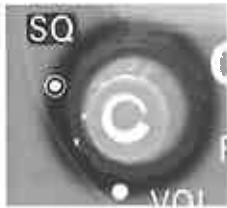
### 3.2 Operator's Controls and Indicators

A front and rear view of the Desktop Base Station equipped with a **FSG 2T** 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.

Control	Description / Function
① <b>VOL</b> 	<p>Rotary switch and control (inner knob)</p> <ul style="list-style-type: none"><li>▷ To turn ON the radio, rotate the <b>VOL</b> knob clockwise from the OFF position (dot). When power is activated<ul style="list-style-type: none"><li>• the front panel TX/RX LED lights up green momentarily, then</li><li>• all segments of the display are visible for a short time, to verify their operation.</li><li>• The display shows the firmware version and then</li><li>• the operating mode, which was used before last turning OFF or Power OFF: The radio is now ready for use.</li></ul></li><li>▷ Rotating the <b>VOL</b> knob clockwise (cw) increases - turning counter-clockwise (ccw) decreases the audio volume of the A/C loudspeaker (Receive and AF External) or of the plugged headphone (Receive, AF External and Intercom audio, <u>not</u> TX Sidetone).</li><li>▷ To turn OFF the radio rotate the <b>VOL</b> knob fully counter-clockwise (ccw) to the OFF position (dot). Blank display.</li></ul>



② **SQ (SQUELCH)** Rotary control (outer ring)



After turning ON the radio **FSG 2T** the automatic squelch is active depending on the **SQ** knob position.

**Standard Operating Mode:**

- ▷ Set the **SQ** knob to the dot ● position, the Squelch (mute) threshold is approximately 1  $\mu$ V. No Receiver noise should be audible during Standby. Only received signals above the **SQ** threshold are audible.
- ▷ Rotating the **SQ** knob fully counter-clockwise (ccw) puts the radio into the **SQ-OFF** mode (overrides the automatic squelch). Basic receiving noise is then audible during Standby. This adjustment gives maximum receiving range. Slightly increased current consumption.
- ▷ Rotating the **SQ** knob clockwise (cw) achieves Receiver muting.
- ▷ To eliminate ignition noise or RF interference adjust the **SQ** knob up to the full clockwise (cw) position. This gradually increases the required RF signal to exceed the **SQ** threshold (max. threshold 5  $\mu$ V / -93 dBm).

③ **STO (STORE)** Push button



When pressing the **STO** button (within approx. one minute)

- storing of a frequency in one of the memory channels is initiated, or
- storing of a frequency is confirmed (at least 1 sec)

20 frequencies may be programmed in non-volatile memory channels. The channel memory numbers (1 ...20) are user programmable.

When the **FSG 2T** is set to 'CH ONLY' Mode this **STO** button is without function!



④

**TX/RX LED**



The TX/RX 3-color Status LED on the front panel indicates the following:

**CLEAR**..... indicates a Standby condition or radio is OFF.

**STEADY RED**..... indicates a Transmit condition without or too low modulation.

**FLICKERING**

**YELLOW** ..... indicates a Transmit condition with proper microphone signal / modulation.

**STEADY**

**YELLOW** ..... indicates a Transmit condition with too much modulation or background noise (microphone sensitivity too high)

**STEADY GREEN** ..... indicates a Receive condition, Squelch is open automatically (or set OFF manually).

**STEADY GREEN** ..... indicates a sufficient microphone level while in the Intercom condition

⑤

**F/CH Button**



Push button

When pressing the F/CH button

- while in **DIRECT TUNE MODE** (MHz or kHz is underscored), this will change the radio into **CHANNEL MODE**, or
- while in **CHANNEL MODE** (Channel number is underscored), this will change the radio into **DIRECT TUNE MODE**.

⑥

**Fixing screws**

Four cross recessed screws, M 4 × 20, to fix the transceiver in the Desktop Base Station.

⑦

**F/CH Knob**



Rotary control and push button = dual function

**Pressing the F/CH knob once**

- while in the **DIRECT TUNE MODE** changes the access from **kHz** to **MHz** or vice versa from **MHz** to **kHz**. The active access to MHz or kHz is underscored by a cursor.
- While in the **CHANNEL MODE** pressing the F/CH knob is without function.

**Rotating the F/CH knob**

- while in the **DIRECT TUNE MODE** will increment or decrement the MHz or kHz portion of the active frequency with rollover at each band edge.
- while in the **CHANNEL MODE** changes the channel memory number and associated frequency. All channel numbers (1 to 20) can be used.



**IMPORTANT!**

- Only **ONE** control element may be operated at a time. If more than one element is operated simultaneously, function change is blocked.

⑧

**PTT**



Red push-button key, illuminated, push-to-talk key.

Pressing and holding the PTT-key switches the transceiver from the receive mode into the transmit mode. The red PTT push-button and the TX LED (10) light up.

Releasing the PTT key ends the transmission and switches the transceiver back into the receive mode. The lighting PTT push-button and TX LED (10) go out.

⑨

**CH BUSY**



Green LED

**As long as "CH BUSY" LED lights up 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 RECORDER" connector is energized and Audio supplied, or
- the Squelch circuit is switched OFF (RX noise audible). Relay contact of "VOICE RECORDER" connector is also energized and Audio supplied, or
- the Desktop Base Station is still powered, but transceiver is turned OFF!

**"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 external Master Switch.

⑩

**DISPLAY ILLUM.**



White push-button switch, not illuminated



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



Pressing again the switch turns OFF the display illumination.

⑪

**Loudspeaker**

8 Ohm, 3 Watt, tropics-proof.

To make received signals audible. Volume is adjustable with VOL control (1).

Speaker may be turned ON or OFF by pressing the "SPEAKER" push-button (15).

⑫

**SPEAKER**

Green push-button switch, not illuminated



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



Pressing again the switch turns OFF the speaker. Communication only audible via headset or headphone via connector "HEADSET/MIC./PTT" (16).

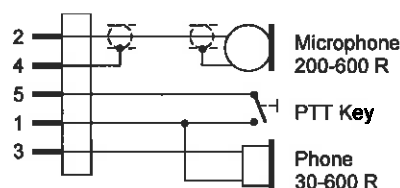
**13 HEADSET/MIC/PTT 5-pin twist-lock socket**



to connect headphone and/or dynamic microphone and/or PTT key.

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

Any dynamic microphone (200 to 600  $\Omega$ ), headphone (ca. 300  $\Omega$ ), 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

**14 Fixing screws** Four recessed collar head screws, M 2.5  $\times$  11, to fix the front panel.

**Back Side:**

**18 ON - OFF MASTER SWITCH**



**NOTICE:** With the master switch the complete station is turned ON or OFF. The radio's switch turns only on or off the radio itself. Charging the battery is always possible, independent from master switch setting.

**19 Ground Terminal, M 5 stud and nut**



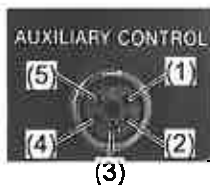
To reduce electrical interference bonding the Desktop Base Station through the ground terminal is mandatory.

- 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.



20

### AUXILIARY CONTROL



#### 5-pin DIN socket

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

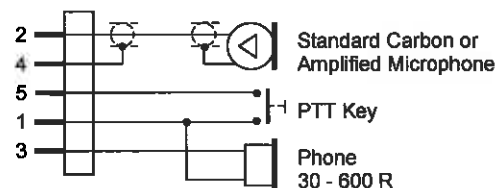
Mating DIN plug: 5-pin, twist-lock, DITTEL article no E08834.

**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

21

### VOICE RECORDER



#### 5-pin twist-lock socket

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

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

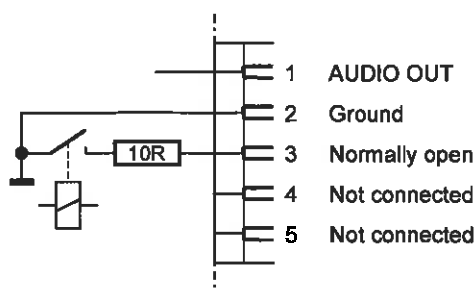
During Receive and Transmit an audio signal of approximately 0.5 V is fed to contact 1 of voice recorder socket. The audio level depends on audio phone control setting (refer to paragraph 4.11).

The recorder may be started by a relay contact. The relay is energized when communication takes place.

Simultaneously the green "CH BUSY"-LED at the front lights up.

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

**Terminate audio shield at one end only!**



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

②

## NEW SOCKET! CHARGER



### 3-pin twist-lock socket

to connect a 12 Vdc battery charger, e.g. Automatic lead battery charger **DL-50A**, 115/230 Vac, output 13.8 Vdc/600 mA, ready to connect, article no F10385.

If another battery charger is used a mating plug, PREH, 3-pin, twist-lock, article no E61933, may be required.

- 1 Plus 12 Vdc
- 3 Minus 12 Vdc

②

ANT. 50  $\Omega$

ANT. 50  $\Omega$



### 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!

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 appropriate lightning protection!

**REMEMBER:** Your radio is only as good as your antenna!



### 3.3 Frequency Display

Frequency display complies with ICAO rules.

5-digit liquid crystal display (LCD), may be back-lit by pressing the "DISPLAY ILLUM" button (10).

a) **Initial boot at Switch-ON / Power ON**

- Displays all segments for 2 seconds
  - Clear Display for 0.5 seconds
  - Shows Firmware Version for 0.5 seconds
- Goes to last user setting

b) **DIRECT TUNE MODE, Normal Operation:**



Example:

Display shows an active frequency of 129.350 MHz. Turning the F/CH knob will either increase or decrease the MHz-portion of the frequency.

Normal on-board Supply 13.8 Vdc (11 ... 16 Vdc)

c) **CHANNEL MODE, Normal Operation:**



Example:

Display shows Channel no. 3 with its associated active frequency of 126.275 MHz. Turning the F/CH knob will either increase or decrease the Channel number.

d) **DIRECT TUNE MODE (continuously flashing Dc value, Emergency Operation):**



Example:

Display shows an active frequency of 134.800 MHz. Turning the F/CH knob will either increase or decrease the MHz-portion of the frequency.

**Low-voltage:** 9.7 Vdc (indicator is flashing!)

e) **CHANNEL MODE, Emergency Operation:**

Steady display for  
25 seconds:



Example:

Display shows Channel No. 4 with an active frequency of 118.975 MHz.

**Low-voltage:** 9.9 Vdc, indicator is flashing!

Flashing supply  
indicator for 5 seconds:



**IMPORTANT!**

- During Emergency Operation (low voltage) no storing of frequency is possible!





### 3.4 Error Codes

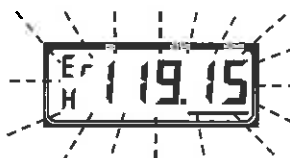
#### Display in all Modes!



**High Voltage:** Continuously slightly too high supply voltage changes value indication into 'HI' (above 16.1 Vdc / below 16.5 Vdc).

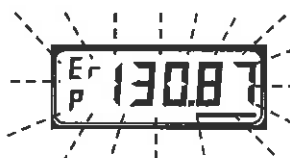
Above approximately 16.5 Vdc, the radio automatically switches OFF itself, at no display indication.

When supply is reduced to between 16 Vdc and 10.5 Vdc, the **FSG 2T** comes back into operation.



**Temperature Error:** The whole LC display flashes. Temperature of the Transmitter Power Amplifier is too high. The keyed transmitter will be disabled.

Switch OFF the radio, wait a few seconds and switch ON again.



**Process Error:** The whole LC display flashes. A severe process error must have occurred.

Try to revive the radio by switching OFF and ON again.

If the same error occurs contact a DITTEL approved repair facility!



**Out-Of-Lock Error:** The whole LC display flashes. A severe frequency error must have occurred.

Try to revive the radio by switching OFF and ON again.

If the same error occurs contact a DITTEL approved repair facility!



**2 Minutes TOT Time-Out-Timer:** After two minutes continuous transmitting the transmitter of the **FSG 2T** switches OFF itself and the whole LC display flashes as long as the PTT key is pressed.

When the PTT key stuck accidentally it can be received with the adjusted frequency although the display is flashing. After switching the radio OFF and ON again it can be transmitted for another 2 minutes followed by receive mode.





## Section 4 Operation

### 4.1 Introduction

This section contains a basic operation procedure for the Desktop Base Station together with a **FSG 2T** transceiver. This instruction is only applicable for a radio which is ready for use (antenna, microphone, accessories connected, battery charged).



#### **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 2T** 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 a whip or rod 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  $\Omega$  antenna with UHF type PL-259 cable plug and a minimum frequency range of 118 ... 137 MHz can be connected to the antenna jack (23).

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

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

- ▷ Ensure the plug of your antenna cable is securely tightened.
- ▷ If the 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 type systems with additional PTT switch can be connected to the socket "HEADSET/MIC./PTT" at the front (mating 5-pin plug: Article-No. E08834, wiring refers to section 3, position (13).

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" (20) at the rear (mating 5-pin plug: Article-No. E08834) Wiring refers to paragraph 3.2, position (20).

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

### 4.4 Supply Indicator

The transceiver **FSG 2T** includes a 3 digit display of the actual onboard supply voltage level. At dc levels below 11 V the voltage digit value starts automatically flashing for low supply warning!

When operated stationary the built-in battery of the Desktop Base Station usually is constantly kept fully charged by an automatic charger. In case of power failure or outdoor use, the station is powered only by the battery.

#### **Radio supplied from a 12 Vdc / 7.2 Ah battery:**

The following operating times may be obtained depending on battery's capacity and transmitter duty cycle:

Reference:	Approximately +20°C / +68°F, battery 7.2 Ah, only radio is supplied.
Duty cycle:	10% Transmit, 20% Receive, 70% STBY
Flashing Dc value only in Transmit:	ca. 4 hrs left
Flashing Dc value also during Receive:	ca. 45 min. left. <b>Recommendation:</b> Reduce utmost transmitting!
Short-time flashing Dc value during Standby (SQ ON, clear channel)	ca. 45 min. left in Standby. <b>Cease transmitting!</b>
Continuous flashing Dc value during Standby (SQ ON, clear channel)	Radio will soon switch OFF itself! Recharge battery as soon as possible (refer to § 4.14, Emergency Operation)



**IMPORTANT!**

- The transitions for a), b), c), and d) 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.

## **4.5 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. First 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-50A is factory pre-set to 230 Vac).

- For charging the internal battery, connect charger cable of **DL-50A** to 3-pin socket (22) 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 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 is**

**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.



## 4.6 Switching ON - Frequency Selection - Volume



### IMPORTANT!

- 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!
  - The Desktop Base Station together with the radio should be turned ON or OFF with the Master Switch only!
- ▷ Turn ON the Desktop Base Station's Master Switch (18). When the transceiver is OFF, the green "CH BUSY" LED (9) lights up.
- ▷ If applicable, turn the radio **FSG 2T** ON by rotating the VOL knob (1) clockwise. For a short time the TX/RX LED lights up green and all segments of the display are visible to verify their operation. After indicating the Firmware version, the last used operating mode and frequency are displayed. The "CH BUSY" LED (9) goes off.
- No warm-up period is required. However, at temperatures of approx. -20°C / -4°F, the LC display needs approximately one second until it is fully visible when the frequency or operating mode is changed.
- ▷ To change the operating mode and therefore the display: Press the F/CH button (5).

Example:



### STANDARD: DIRECT TUNE MODE

After switching ON the radio, either the MHz portion or the kHz portion of the displayed frequency is underscored. The underscore indicates accessibility to this portion.

Assume the MHz is underscored: Select the appropriate **MHz** portion by **rotating** the F/CH knob (7). A clockwise rotation will increment the previous frequency in 1 MHz steps (130, 131, 132 etc.) while a counter-clockwise rotation will decrement the previous frequency in 1 MHz steps (128, 127, 126 etc.) with rollover at each band edge (118.XX → 136.XX or 136.XX → 118.XX).

- ▷ **Press** the F/CH knob (7) once, the cursor will jump to underscore the kHz portion.



The underscored kHz portion of the frequency indicates accessibility to kHz selection.

Select the appropriate **kHz** portion by **rotating** the F/CH knob (7). A clockwise rotation will increment the previous frequency in 25 kHz steps (37, 40, 42 etc.) while a counter-clockwise rotation will decrement the previous frequency in 25 kHz steps (32, 30, 27 etc.) with rollover at each MHz and band edge (121.97 → 122.00 or 121.00 → 121.97).

This is the new **active frequency**!



EXAMPLE:



**CHANNEL MODE or CH ONLY:**

**Important:** The appropriate operating frequency must be stored already in a memory channel (refer to § 4.9 Memory Programming).

Select appropriate channel memory number together with the associated frequency by **rotating** the F/CH knob (7). A clockwise rotation will increment (4, 5, 6 etc.) while a counter-clockwise rotation will decrement (2, 1, 20 etc.) the previous channel number with rollover at each edge.

This is the **new active frequency** and its associated channel memory number!

▷ Rotate VOL knob (1) clockwise, about half way.

**Continue with either**

- 4.7 Receive (Listen) Operation, or**
- 4.8 Transmit Operation**
- 4.9 Memory Programming**



## **4.7 Receive (Listen) Operation**

- After turning the radio ON the automatic squelch is either ON or OFF depending on **SQ** knob position (2).
- Squelch ON means that – without received signal – the receiver noise is blocked, the **TX/RX** LED (4) is clear. When normal signals are received, the **TX/RX** LED (4) turns to green, weak signals and interfering pulses are disabled.
- If no communication takes place (no transmit, no receive), the green "CH BUSY" LED (9) may not light.
- If communication is audible set the RX volume of the loudspeaker (11) or earphone to a comfortable level by rotating the **VOL** knob (1). The green "CH BUSY" LED (12) should light.
- Weak signals can be received if the squelch circuit is switched OFF by rotating the **SQ** knob (2) fully counter-clockwise. Then typical RX noise is continuously heard during communication breaks.
- Rotating the **SQ** knob (2) more cw clockwise switches the squelch circuit ON again.
- **DO NOT** press the PTT (Push-To-Talk) key (8) if you want to receive! During RX the **TX/RX** LED **must not** light RED or flicker YELLOW!

This radio contains an audio-leveling circuit. So if you change the frequency or you receive another station you should get an almost constant audio volume (the received signal must be at least modulated by 30% AM).



### **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 that the voice recorder - if applicable - is active as long as the "CH BUSY" LED lights and the squelch is OFF.**
- **Notice increased current consumption when battery operated!**





## 4.8 Transmit (Talk) Operation



### **DANGER!**

- **DO NOT** operate this portable radio in an explosive atmosphere (petroleum fuels, solvents, dust, etc.)! Risk due to generation of sparks!
- **DO NOT** transmit with the steel band antenna inside aircraft or vehicle. This may cause malfunction of onboard avionics, trigger the vehicle airbag or interfere onboard instruments! Always operate the Desktop Base Station with a suitable outdoor / external antenna! Assure appropriate lightning protection / grounding where (elevated) outdoor antennas are used.
- **Never** place the radio such as the antenna gets very close to, or touching, exposed parts of the body, especially the face, shoulder or the eyes. Persons with pacemakers should be aware that proper functioning may be affected when in the vicinity of the antenna!
- **DO NOT** transmit on 121.50 MHz as this is the international civilian aircraft emergency frequency!



### **IMPORTANT!**

- Please keep radio discipline!
- Transmit only on a clear channel ("CH BUSY" LED OFF).
- 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.

If the operating mode

shall be changed: ▷ Push the F/CH button (7).

If the active frequency

shall be changed: ▷ Refer to § 4.6 Switching ON - Frequency Selection - Volume.

Transmitting is normally performed on a clear channel (no communication audible).

- ▷ Press and hold the PTT (Push-To-Talk) key at the mike, at the Desktop Base Station (8), or at a remote audio console. Then the receiver is switched OFF and the transmitter is switched ON. The radio is ready to transmit.
- ▷ Talk in a loud, clear voice with the microphone opening 2 to 4 cm (1" - 2") from your lips in order to cancel environmental noise. Make each transmission as brief as possible. As long as the PTT key is pressed, the "PTT" button at the Base Station (8) and the



TX/RX LED (4) at the front lights red! When modulated properly, the red TX/RX LED (4) turns to flickering yellow.

- ▷ Release the PTT key to end transmission and to clear the channel for reception; the TX/RX LED (4) must turn to clear (Standby) or green (Receive / Intercom) and the red "PTT" key-light (8) goes off.



**IMPORTANT!**

- The radio is equipped with a transmit TOT time out timer. This is used to limit the duration of transmissions to approximately 2 minutes. When the transmitter is keyed continuously longer than 2 minutes the display of the **FSG 2T** starts flashing and transmission is disabled. Although the display is flashing receiving on the displayed frequency is possible!
- If you have to make calls longer than 2 minutes, momentarily release the PTT key and press again.
- Should the TOT disable the transmitter accidentally (e.g. stuck PTT key) and you have to transmit, **turn radio OFF and ON again**. This allows another 2 minutes to transmit.



## 4.9 Memory Programming



### IMPORTANT!

- Memory programming is disabled for all FSG 2T radios which are marked **CH ONLY!**
- Memory programming is disabled at a supply voltage below 11 Vdc.
- When storing a frequency into a memory the "old" frequency will be overwritten without warning!

Up to 20 non-volatile memories can be user-programmed. They are accessible after calling up the respective **CHANNEL MODE**.

### 4.9.1 Programming while in the DIRECT TUNE MODE:

Example:



- ▷ Turn the F/CH knob to change the underscored portion of the frequency to the desired frequency.



- ▷ Press the same knob once and note that the cursor has jumped to underscore the other portion of the frequency.

- ▷ Turn the F/CH knob to select the desired frequency.



- ▷ Press the **STO** button to initialize storing.



- ▷ Release the **STO** button. The "dc" display disappears, a flashing "CH" together with the underscored last used channel number is shown. The active frequency is now ready within 1 minute to be stored in any of the 20 memory channels. Use the F/CH knob to select the desired memory location.



- ▷ Press and hold the **STO** button for at least 1 second. The flashing "CH" should change to steady "St" and the underscore disappears indicating that it has been stored into memory successfully.



- ▷ Release the **STO** button and the radio returns to **DIRECT TUNE MODE**. The stored frequency is now the active frequency.



#### 4.9.2 Programming while in the CHANNEL MODE:



**IMPORTANT!**

- While in the **CHANNEL MODE** only pre-programmed Channel Numbers with its corresponding frequencies can be stored in other memory locations!

Example:



- ▷ Turn the **F/CH** knob to change the underscored Channel Number to the desired Channel Number to be stored in another memory location.



- ▷ Press the **STO** button to initialize storing.



- ▷ Release the **STO** button. A flashing "CH" is shown. The active Channel Number and its frequency is now ready within 1 minute to be stored in any of the other 19 memory channels. Turn the **F/CH** knob to select the desired memory location.



- ▷ Press and hold the **STO** button for at least 1 second. The flashing "CH" should change to steady "St" and the underscore disappears indicating that it has been stored into the new memory successfully.



- ▷ Release the **STO** button and the radio returns to **CHANNEL MODE**. The stored Channel Number is now the active Channel Number with its corresponding frequency.

#### 4.10 Backlighting

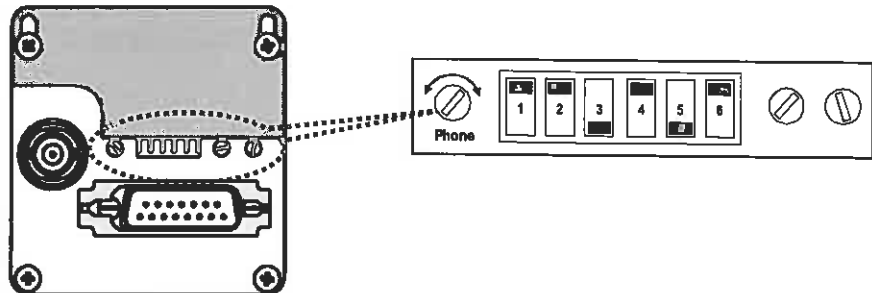
- ▷ Lighting the frequency display as well as the radio's front panel (night-design) is activated by pressing the "DISPLAY ILLUM." push-button (10) of the Desktop Base Station.
- ▷ Pressing again the push-button turns OFF the display illumination.



## 4.11 Voice Recorder Operation

**Prerequisite:** To obtain satisfactory recordings the Audio output level has to be adjusted first to approximately 0.5 V.

- ▷ During reception set the volume of the built-in speaker or headphone to a comfortable level by rotating the VOL-knob (1).
- ▷ Loosen the upper cross-recessed screws of the rear panel and move up cover to get access to the potentiometers and DIL Switches.



- ▷ With a small screwdriver adjust the Audio Phone Control on the **FSG 2T** till an AF voltage of 0.5 V is obtained at contact 1 of socket "VOICE RECORDER".

- Operation:**
- ▷ Make sure the voice recorder is connected according manufacturer's specification and ready for operation.
  - ▷ Whenever communication takes place (either transmit or receive) a relay is energized and should start the voice recorder. Also audio output is supplied via connector "VOICE RECORDER", contact 1. This is indicated by a lighting "CH BUSY" LED (9) on the front panel. Adjust recording level, if necessary.
  - ▷ At the end of a transmission or reception and if no other noise is audible the voice recorder should stop automatically!



### **IMPORTANT!**

- If the transceiver's adjustable Squelch circuit is switched OFF (basic receiver noise audible) the voice recorder is continuously recording!



## 4.12 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 coiled cord F10393 which fits into the cigarette lighter socket of most cars (minus on common ground) and "CHARGER" socket (22).

When supplying the station from an external 24/28 Vdc source, e.g. a truck battery, a suitable 24/28 Vdc to 12 Vdc converter of at least 4 Amps must be used!

## 4.13 Battery Operating Times

The following duty cycle of Transmit (TX), Receive (RX) and Standby (STBY) results in available operating time (hours). Both the worst and the most favorable operation conditions are considered, e.g. maximum receiver volume combined with maximum speaker load.

Higher current consumption will degrade the nominally available battery capability, as well as lower temperatures. The following tables show significant time differences depending on current consumption during Receive, and at temperatures.

### Condition: only headset operated

Max. current drain	.05A	1.35A	.26A	.05A	1.35A	.26A	.05A	1.35A	.26A	.05A
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/-4°F	76 hrs	30 hrs			16 hrs			9 hrs		
Temperature +20°C/+68°F	131 hrs	52 hrs			29 hrs			16 hrs		
Temperature +50°C/+122°F	139 hrs	55 hrs			30 hrs			16 hrs		

### Condition: maximum RX audio volume (Loudspeaker)

Max. current drain	.05A	1.35A	.8A	.05A	1.35A	.8A	.05A	1.35A	.8A	.05A
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/-4°F	76 hrs	25 hrs			11 hrs			6 hrs		
Temperature +20°C/+68°F	131 hrs	44 hrs			20 hrs			10.5 hrs		
Temperature +50°C/+122°F	139 hrs	46 hrs			21 hrs			11 hrs		



#### **4.14 Emergency Operation**

Without degradation the **FSG 2T** can be operated on a dc source between 11 Vdc and nearly 9 Volts. This however will **NOT** reduce the TX output level, RX sensitivity, and audio output power, due to internal supply regulation. Below 11 Volts the dc indicator flashes continuously as a low supply warning.

Since the current drawn from battery will increase with lowered Dc supply voltage, the automatic shut-down will speed-up.

If the supply voltage drops below 9 Vdc the **FSG 2T** switches OFF itself. This automatic feature avoids battery damage due to deep discharging, even if the radio is left switched ON for months! This is true for all types of 12 Vdc batteries.

If the battery recovers and voltage exceeds approximately 10.3 Vdc, the radio returns to operation with the last used setting.

#### **4.15 Turning OFF the Desktop Base Station**

- ▷ Always turn OFF the complete Base Station with the Master Switch **(18)** to prevent unnecessary discharge of the battery when the unit is powered only from the battery!

NO light or display should be visible!

A turned OFF Master Switch does not prevent battery charging.

#### **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 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 locations near electrical interference sources, such as power and telephone lines, radar, welders and electrical generators.



## **4.17 Functional Checks**

If the Desktop Base Station containing a transceiver **FSG 2T** does not operate correctly, check the following:

- Is the required frequency visible in the display? Adjust required frequency!
- Is battery supply sufficient? If the radio's display is blinking particularly during receive recharge battery as soon as possible!
- Weak RX signal? Switch OFF squelch circuit!
- Weak TX signal? Check microphone, adjustment of microphone gain potentiometer, radio, or antenna system! Is the voice volume too low? Speak loud and clear while the lips are facing the microphone!
- Make sure that the 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 base station antenna!
- Called station hears carrier, but no voice? Check microphone and contacts on microphone jack!
- Noisy - distorted - garbled? Suppress interference of motor aircraft or vehicle (generator, regulator), check antenna system; check antenna-, microphone- and radio- connector for proper seat! Change location!

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.





## Section 5 Technical Summary

### 5.1 Desktop Base Station containing FSG 2T:

Frequency Range	: 118.000 MHz ... 136.975 MHz, 25 kHz increments
Number of Channels, <b>FSG 2T</b>	: 760, of which 20 channels may be free programmed and permanently stored, panel selected
Transmitter Output	: 5 Watts max. into 50 Ohms at 12 Vdc battery supply
Receiver Sensitivity	: $\leq 1.0 \mu\text{V}/50 \text{ Ohms}$ for 6 dB (S+N/N), m = 30%/1 kHz
Frequency Tolerance	: $\leq 10 \text{ ppm}$ ( $-20^{\circ}\text{C}$ ... $+55^{\circ}\text{C}$ / $-4^{\circ}\text{F}$ ... $131^{\circ}\text{F}$ )
AF Output ( $K \leq 10\%$ )	: at least 4 Watt into 4 Ohms
Nominal Voltage Transceiver	: 13.8 Vdc, normal 11 ... 16 Vdc, Emergency 9.7 Vdc ... 11 Vdc
Built-in Battery	: Sealed Lead Accumulator 12 Vdc/7.2 Ah
Battery Charging	: By external 12 Vdc Battery Charger
Power Consumption	: Stand-by: 50 mA (typical) Receive (Voice): 260 mA (typical) Transmit (Voice): 1.35 A (typical) Backlighting: 60 mA additional
Operating Times, reference: 7.2 Ah battery	: 100% Stand-by: 131 hours 70% Stand-by } 20% Receive } 20 hours 10% Transmit } 40% Stand-by } 40% Receive } 10.5 hours 20% Transmit }
Temperature Range	: $-20^{\circ}\text{C}$ ... $+55^{\circ}\text{C}$ Operation, $+10^{\circ}\text{C}$ ... $+40^{\circ}\text{C}$ Charging
Overall Dimensions	: Width: 244 mm, height: 155 mm, depth: 300 mm, allow at least 50 mm for mating plugs
Weight (without microphone)	: fitted with <b>FSG 2T</b> : 7.3 kg / 16 lb

#### ADDITIONAL FEATURES:

Sockets to connect: External battery charger, Voice recorder, dynamic microphone, standard carbon microphone, push-to-talk key, headphone, headset, 50 Ohms antenna.

Self-contained, rechargeable battery, PTT key, "Channel Busy" indicator, built-in loudspeaker, speaker switch, illumination switch.

Fusing at control p.c. board	: DC: 3.0 amps, time-lag, self-healing
------------------------------	--



## 5.2 Technical Data Transceiver FSG 2T

### 5.2.1 General

Type:	<b>FSG 2T</b> , article-number F10350 Amplitude modulated (AM) VHF Avionics Transceiver
Frequency range:	118.000 ... 136.975 MHz
Channels:	760 channels, 25 kHz spacing
Frequency selection:	VFO, digital
Frequency display:	5 digit 7-segment LCD display (backlit)
Frequency control:	PLL frequency synthesizer, microprocessor controlled
Memories	20, stored in non-volatile EPROM

### 5.2.2 Dimensions, Weight

Exposed dial face	57 mm / 2 1/4 inches dia, fits into standard instrument hole
Overall dimensions	Width = 63 mm, Height = 61 mm, Length = 227 mm W = 2.48 H = 2.4 L 8.9 inches
Installation depth behind panel	241 mm / 9.5 inches incl. 50 mm / 2 inches for harness
Weight	600 grams / 1.32 pounds, without harness and mating plugs

### 5.2.3 Power Supply, Fuses

Power supply voltage	Nominal 13.8 Vdc (normal 11.0 ... 16.1 Vdc)									
Emergency Operation	9 Vdc ... 11 Vdc (flashing display), no performance degradation									
Automatic Turn-OFF	At approx. 8.5 ... 9 Vdc, comes back at approx. 10.3 Vdc									
Current Consumption at:	9 Vdc		11 Vdc		13.8 Vdc		16 Vdc			
Squelch ON, no AF volume	80 mA		65 mA		50 mA		40 mA			
Receive, Intercom and / or AF External, Headphone	400 mA		330 mA		260 mA		210 mA			
Receive, max. volume, Loudspeaker (30% ... 85% AM)	1400 mA		1150 mA		800 mA		600 mA			
Transmit Mode (carrier /70% AM)	1.8 A	2.2 A	1.45 A	1.7 A	1.1 A	1.35 A	0.9 A	1.2 A		
Backlighting	add 60 mA									
Dc supply voltage metering status	≥ 12.7 Vdc		Battery full							
	≥ 12.0 Vdc		Battery ca. ½ capacity							
Emergency operation	< 11.0 Vdc		Battery is nearly flat, display starts flashing between 11 V and 9 Vdc supply							
External Fuse	Cartridge fuse 3.15 Amp, quick acting, or automatic circuit breaker 3 Amp									
Internal Fuse, protects switched Dc Output	315 mAmp, medium time lag, auto-reset fuse									



## 5.2.4 Receiver Specification

Receiver Type	Single Superhet
IF Frequency	IF 21.4 MHz, high injection
Sensitivity (m = 30% / 1,000 Hz)	$\leq 1 \mu\text{V}$ ( $\leq -107 \text{ dBm} / 50 \Omega$ ) for 6 dB S+N/N
Selectivity (AGC method)	$\leq 6 \text{ dB}$ at $\pm 8 \text{ kHz}$ $\geq 60 \text{ dB}$ at $\pm 17 \text{ kHz}$ $\geq 70 \text{ dB}$ at $\pm 25 \text{ kHz}$
Squelch Type, manual override	Automatic (FM noise /Carrier override), adjustable on front panel
AGC (m = 30% / 1 kHz)	$\leq 6 \text{ dB}$ , $1 \mu\text{V}$ (-107 dBm) to $1 \text{ V}$ (+13 dBm / 50 $\Omega$ )
AGC Delay (RX), m = 30%/1 kHz	$\leq 0.2 \text{ sec}$ , $5 \text{ mV}$ (-33 dBm) to $5 \mu\text{V}$ (-93 dBm / 50 $\Omega$ )
AGC Recovery after TX	$\leq 0.1 \text{ sec}$ at $5 \mu\text{V}$ (-93 dBm / 50 $\Omega$ ), after TX end
Transfer time RX to TX	$\leq 50 \text{ msec}$
Modulation distortion	$\leq 10\%$ , 350 ... 3,400 Hz (m = 85%)
Audio Frequency Response / AF Fidelity	$\leq 6 \text{ dB}$ (+2 dB / -4 dB), 350 ... 3,400 Hz, $\geq -20 \text{ dB}$ at 4 kHz, 25 kHz Ch spacing (Climax Offset Operation)
Nominal AF Output (Speaker)	$\geq 4 \text{ Watt}$ into 4 $\Omega$ (at 9 Vdc ... 16.1 Vdc supply)
Nominal AF Output (Phone)	$\geq 50 \text{ mW}$ into 300 $\Omega$ (at 9 Vdc ... 16.1 Vdc supply)
AF Noise Level, normal operation (under environmental conditions)	$\geq 35 \text{ dB}$ ( $\geq 25 \text{ dB}$ ), m = 30% / 1,000 Hz at $100 \mu\text{V}$ to $5 \text{ mV}$ / -67 dBm to -33 dBm / 50 $\Omega$
AF External Input (OPTION)	ca. 1 Volt into 600 $\Omega$ for rated AF output
Receiver Immunity Spurious Response for $\leq 6 \text{ dB}$ S+N/N (m = 30% / 1 kHz)	$\geq 5 \text{ mV}$ (-33 dBm / 50 $\Omega$ ) a) 108 - 156 MHz (any 25 kHz Test Channel $\leq \pm 8 \text{ kHz}$ ), except assigned channel and adjacent channels b) 50 kHz – 1,215 MHz, except 108 - 156 MHz
Cross Modulation	Max. AF output level $\geq 10 \text{ dB}$ below nominal AF output level: a) Wanted signal $10 \mu\text{V}$ (-87 dBm) to $250 \mu\text{V}$ (-59 dBm / 50 $\Omega$ ), unmodulated at assigned RX channel, plus additional b) Unwanted signal $5 \text{ mV}$ (-33 dBm), m = 30% / 1000 Hz, frequency 100 - 156 MHz (assigned channel $\pm 2 \text{ RX}$ channels)
Intermodulation (FM Immunity)	$\leq 6 \text{ dB}$ AF Quieting (-5 dBm / 50 $\Omega$ , 87.5 - 107.9 MHz), 2 signals
RF Intermodulation within the VHF Frequency Band	$\geq 70 \text{ dB}$ , for 6 dB AF Quieting (unmodulated test signals) Any VHF / AM Ch +1/+2 Ch, -1/-2 Ch, +1/+2 MHz, -1/-2 MHz
Desensitization	$\geq 6 \text{ dB}$ S+N/N, at wanted signal $10 \mu\text{V}$ (-87 dBm), at RX frequency, m = 30% / 1,000 Hz, in the presence of: Unwanted signal <u>A</u> $5 \text{ mV}$ (-33 dBm / 50 $\Omega$ ), unmodulated, any frequency 108 ... 156 MHz, except used CH and $\pm 1 \text{ RX}$ CH, <u>or</u> Unwanted signal <u>B</u> $100 \text{ mV}$ (-7 dBm / 50 $\Omega$ ); minimum $5 \text{ mV}$ (-87 dBm), unmodulated, frequency 50 kHz – 1,215 MHz, except 87.5 MHz ... 156 MHz, <u>or</u> Unwanted signal <u>C</u> $125 \text{ mV}$ (-5 dBm), unmodulated, frequency 87.5 ... 156 MHz
Receiver Spurious Emission	$\leq 141 \mu\text{V}$ / 400 pW / -64 dBm (50 kHz ... 8 GHz)
Channel Selection Time	$\leq 0.4 \text{ sec}$ , AF level within 3 dB, max. 20 Memory Channels
Receiver Muting, Squelch (CLIMAX RX Operation)	Simultaneous input of: a) Wanted Signal <u>A</u> : $5 \mu\text{V}$ (-93 dBm) +8 kHz (m = 30% / 1,000 Hz), Squelch is open. b) Unwanted Signal <u>B</u> : More than $12 \mu\text{V}$ (-85 dBm), m = 30% / 1000 Hz. While this channel frequency is varied slowly from -8 kHz to +4 kHz, Squelch must remain open.



### 5.2.5 Transmitter Specification

TX RF Output Power (also during emergency operation)	approximately 5 Watts / 50 $\Omega$ (carrier), 18 Watts PEP, at 9 Vdc ... 16.1 Vdc, -0.5 dB ... +1,5 dB
TX Duty Cycle	1 : 4 (1 minute TX / 4 minutes RX)
Frequency Tolerance	$\leq 10$ ppm (-20°C ... +55°C / -4°F ... +131°F) $\leq 5$ ppm (0°C ... +40°C / +32°F ... +104°F)
Modulation	Amplitude modulation, AM (7K00A3EJN)
Depth of Modulation	85% $\pm$ 2%, approx. 60-70% AM <u>average</u> with Voice modulation
Modulation Distortion	$\leq 10\%$ , m = 70% / 1,000 Hz $\leq 15\%$ , m = 70% / 350 ... 3,400 Hz
Modulation Audio Frequency Response	$\leq 6$ dB (+2 dB / -4 dB), 350 ... 3,400 Hz
Modulation AF Input for m = 70% Located at the rear panel DIL switches and potentiometers allow proper customized microphone type selection and proper modulation adjustment for each MIC input	Standard factory setting: Mike 1: Dynamic Microphone: $\leq 1$ ... 10 mV symmetrical, sensitivity adjustable. Mike 2: Amplified / Carbon Microphone: $\leq 80$ ... 500 mV unsymmetrical, sensitivity adjustable. <b>Note:</b> One, or two <u>identical</u> , dynamic or Standard Carbon microphone(s) may be used on each mike input. For Standard Carbon Microphone(s) the supply current can be set to 2 mA, 8 mA, 10 mA, or none.
Transmit Audio Sidetone	$\geq 50$ mW into 300 $\Omega$ (at 9 Vdc ... 16.1 Vdc supply) average phone volume is adjustable on equipment's rear side
Carrier Noise Level	$\geq 35$ dB (m = 70% / 1000 Hz)
Emission of RF Energy ( $\leq 1$ GHz)	$\leq 0.25$ $\mu$ W (-36 dBm) / 71 dB $\mu$ V / 3.54 mV / 50 $\Omega$ $\leq 25$ nW (-46 dBm) / 61 dB $\mu$ V / 1.12 mV / 50 $\Omega$ , from 47 ... 68, 87.5 ... 108, 162 ... 244, 328 ... 336, 470 ... 862 MHz
Emission of RF Energy ( $\geq 1$ GHz)	$\ll 1$ $\mu$ W / $\ll -30$ dBm / $\ll 77$ dB $\mu$ V / $\ll 7$ mV / 50 $\Omega$
Transmitter Spectrum Mask	$\geq 70$ dB attenuation at 1,250 Hz modulation / m = 60%, + 10 dB
Channel Selection Time	$\leq 0.1$ sec
Unwanted Frequency Modulation	$\leq 1.0$ kHz at m = 70% / 1000 Hz
TX Intermodulation	$\geq 45$ dB
TX Time-Out-Timer (TOT)	After 2 minutes in continuous transmit Mode the transmitter is disabled. The LC display flashes as time-out warning. RX now possible.
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 $\geq 40$ % / $\geq 2$ Watt into 50 $\Omega$ At VSWR $\leq 5 : 1$ Transmitter is still functional.



### 5.3 Environmental Performance Classification

**Statement of the Level of Compliance with appropriate JAR TSO.**

EUROCAE ED-14D / RTCA DO-160D (29 July 1997), including Change 1 December 2000.  
ENVIRONMENTAL CONDITIONS AND TEST PROCEDURES FOR AIRBORNE  
EQUIPMENT PERFORMANCE STANDARD.

**NOTE:** The following information provides examples only. It is not intended to be a comprehensive listing of all test conditions.


Conditions	Section	Description of Conducted Tests	Category
<b>Temperature and Altitude</b>	4.3	Equipment tested to Category	D1
Low Temperature	4.5.1	Operation - 20°C / Storage -55°C	
High Temperature	4.5.2	Operation +55°C / Storage +85°C	
In-flight Loss of Cooling	4.5.4	No auxiliary cooling required	—
Altitude	4.6.1	50,000 ft / 15,240 m	
Decompression	4.6.2	No test required in Category D1	
Over Pressure	4.6.3	No test required in Category D1	
<b>Temperature Variation</b>	5.2	Equipment tested to Category, 5°C / min.	B
<b>Humidity</b>	6.0	Equipment tested to Standard Category	A
<b>Shock</b>	7.1.1 7.2 7.3	Equipment tested to Category Operational shocks 6g Crash Safety 20g without damage	B
<b>Vibration</b> (for Helicopter use, the vibration testing included 4 sets of Unknown Frequencies of Cat. U).	8.5.1 8.5.2 8.8.1	Equipment tested to <b>Fixed Wing</b> Aircraft Category Equipment tested to <b>Fixed Wing</b> Aircraft Category Equipment tested to <b>Helicopter</b> Aircraft Category	S Curve B S Curve M R Curve G
<b>Explosion</b>	9.0	No test required	X
<b>Waterproofness</b>	10.0	No test required	X
<b>Fluids Susceptibility</b>	11.0	No test required	X
<b>Sand and Dust</b>	12.0	No test required	X
<b>Fungus</b>	13.0	No test required	X
<b>Salt Spray</b>	14.0	No test required	X
<b>Magnetic Effect</b>	15.0	Equipment tested to Category	Z
<b>Power Input</b>	16.0	Equipment tested to Category	B
<b>Voltage Spike</b>	17.0	Equipment tested to Category	B
<b>Audio Frequency Susceptibility</b>	18.0	Equipment tested to Category	B
<b>Induced Signal Susceptibility</b>	19.0	Equipment tested to Category	A
<b>Radio Frequency Susceptibility</b>	20.0	Equipment tested to Category	T
<b>Radio Frequency Emission</b>	21.0	Equipment tested to Category	H
<b>Lightning Induced Susceptibility</b>	22.0	No test required	X
<b>Lightning Effects</b>	23.0	No test required	X
<b>Icing</b>	24.0	No test required	X
<b>Other Test</b>	---	No test required	X



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## FSG 2T Certificates

 **WALTER DITTEL GmbH**  
LUDWIGSTRASSE 36 \* D-85089 LANDSBERG AM LECH  
TELEFON +49 (0)8191/3531-0 \* FAX +49 (0)8191/3531-49  
E-MAIL: INFO@DITTEL.GBMH \* INTERNET: WWW.DITTEL.GBMH

**Maßnahmen zur effizienten Nutzung des Funkfrequenzspektrums**  
Measures for the efficient use of the radio frequency spectrum

☒ **Laufschleife für Funkanlagen gemäß § 3(2) (Artikel 3(2))**  
Air interface specific to the radio path contained in § 3(2) (Article 3(2))

harmonisierte Normen ...  
harmonized standards ...

Einhaltung der grundlegenden Anforderungen auf  
andere Art und Weise ...  
other means of demonstrating conformity with the essential  
requirements ...


EN 301 489-1  
EN 301 489-22  
EN 300 676

**Harmonized Standard**  
**Non Harmonized Standard**

Ort, Datum: Landsberg, 25. Mai 2003  
Place & date of issue

Name und Unterschrift:  
W. Walter

7/13

 **WALTER DITTEL GmbH** PRODUKTIONEN FÜR FUNK  
EXPERTISEN STRASSE 36 \* D-85089 LANDSBERG AM LECH  
TELEFON +49 (0)8191/3531-0 \* FAX +49 (0)8191/3531-49  
E-MAIL: INFO@DITTEL.GBMH \* INTERNET: WWW.DITTEL.GBMH

**Konformitätserklärung**

**gemäß dem Gesetz über Funkanlagen und Telekommunikationsmittel (FTEG) und  
der Richtlinie 1999/5/EG (R&TTE)**  
In accordance with the German Law on Radio Equipment and Telecommunications (FTEG) and  
Directive 1999/5/EC (R&TTE Directive)

**Walter Dittel GmbH Luftfahrtgerätebau / Ing. Werner Walter**  
Hersteller / Verantwortliche Person / Manufacturer / responsible person

schüler, das das Produkt FLUGDUNKGERÄT / VHF/AM voice communications Transceiver  
describes the product

Type (ggf. Anlagenkonfiguration mit Angabe der Module): FSG 2T  
Type (if applicable, configuration including the modules)

☐ Telekommunikations-Telefonfunktionsgerät  
telecommunications terminal equipment

☒ Funkanlage  
radio equipment

Radiogeräte in ihrer, statischer, mobiler, Grundband Transceiver, portable, fixed, base, mobile  
Verwendungszweck, intended purpose

bei bestimmungsgemäßer Verwendung der grundlegenden Anforderungen des § 3 und den übrigen  
entsprechenden Bestimmungen des FTEG (Artikel 3 der R&TTE) entspricht.  
When used in its intended purpose, the equipment complies with the essential requirements of § 3 and the other relevant provisions of the FTEG (Article 3 of the R&TTE Directive).

**Gesamtheit und Sicherheit gemäß § 3 (1) 1, (Artikel 3 (1) a))**  
Safety and safety requirements contained in § 3 (1) 1, (Article 3 (1) a))

harmonisierte Normen ...  
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Einhaltung der grundlegenden Anforderungen auf  
andere Art und Weise ...  
other means of demonstrating conformity with the essential  
requirements ...

Schutzanforderungen in Bezug auf die elektromagnetische Verträglichkeit § 3 (1) 2, (Artikel 3 (1) b))  
Protection requirements with regard to electromagnetic compatibility § 3 (1) 2, (Article 3 (1) b))

harmonisierte Normen ...  
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Einhaltung der grundlegenden Anforderungen auf  
andere Art und Weise ...  
other means of demonstrating conformity with the essential  
requirements ...

1/22



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

EASA.210.1304

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 conflict as specified below, to

**Dittel Messtechnik GmbH**  
Erpfinger Straße 36  
86899 Landsberg/Lech  
Germany

in accordance with Commission Regulation (EC) No 1701/2002, Part 21, Section A, Subpart O and JTSO 7C37e, 2C38e.

for  
HF Transceiver F5G 2T  
P/N F10350-( )

ODP No. 035.1.00 Issue A or Subsequent Revisions

[illegible]

### Conditions

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2. The ETSO does not consider an installment auction. It is the responsibility of the institution, this and its conditions, that the first installment condition is with the ETSO and the Auction.

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

**Catherine GANDOLFI**  
Project Certification Manager  
Early & Associates

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**CETECOM ICT Services GmbH**

**CITECOM™**  
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# CERTIFICATE OF CONFORMITY

Number of annexes: —

Registration No. F8129840-CC

**Walter DITTEL GmbH**  
Luftfahrzeugzellebau  
Erslinger Str. 36

D-86899 Landisberg

Product Designation  
FSG 2T

## Product Description

Product Manufacturer:  
Walter DITTEL GmbH

Erpfinger Str. 36

Specifications and test reports		
Test report no. & date	Name of test laboratory	Notes
2-5693-01 02/01 dated 10/11/2001	CH 35CON C/T	conform
2-5693-01 dated 03/09/2001	CITECON C/T	conform

### Statement

This equipment fulfills the requirements or parts thereof in the above mentioned specifications.

By decree Vig. 28/2000, issued in the Official Journal 4/2000 of the Regulierungsbehörde für Telekommunikation und Post, CITECOM ICT Services is authorized to act as Notified Body in accordance with the R&TTE Directive 1999/5/EC of 09. March 1999

Control No. 18.03.02  
Place Date of Issue

5/6, 1961 by Emma Hirsinger,  
Mortimer Gandy



TECOM ICT Services GmbH, Industriestraße 10, 1110 Berlin, Germany. E-mail: [info@tecom-ict.com](mailto:info@tecom-ict.com)





# Desktop Base Station fits FSG 2T

Annex 1 of the Certificate "EXPERT OPINION"  
Registration no.: EN 128940-EO Dated: 18.03.02  
Page 1 of 1

**Product Characteristics:**  
Mobile, portable or fixed VHF/AM air band transceiver (analog voice communication) for ground based applications

Frequency Characteristics : 118.000 – 138.975 MHz

RF-Output Power (concluded) : 5 W

ITU-Designation : 7K00A3E

Number of Channels : 760

Channel Spacing : 25 kHz

Antenna-Access : RF-connector (load 50 Ω)

**Conformity Details:**

Standard	test report number, date & laboratory
EN 301 488-1, Aug. 2000	EN 301 488-22, Dec. 2000
EN 301 488-22, Dec. 2000	Test Report 2-2003-01-0201 issued 20.11.2001 by CETECOM ICT
Radio spectrum	EN 300 675, May 2000
	Test Report 2-2003-AP1 issued 02.08.2001 by CETECOM ICT

**Miscellaneous:**  
- TCF according to the application dated 06.03.2002

**CETECOM ICT Services GmbH**  
EC Identification number 0682  
certification for the Common Certification

with decree Vfg 21.2001 issued in the Official Journal L6099  
of the European Communities for Telecommunications and Post,  
as an official body in accordance with the R&TTE Directive 1999/5/EC of 19 March 1999

**CERTIFICATE  
EXPERT OPINION**

Registration No. EN128940-EO  
Certificate Holder: Walter DITTEL GmbH  
Lauterbachstraße 16  
Friedrichshagen 12555  
D-80899 Landsberg

Product Designation: FSG 2T  
Product Description: VHF/AM Transceiver for conventional mobile service

Product Manufacturer: Walter DITTEL GmbH  
Lauterbachstraße 16  
Friedrichshagen 12555  
D-80899 Landsberg

Essential requirements	Specifications / Documents	Result
EMC	EN 301 488-1 Aug 2000	conform
FSG 2, (T) 2	EN 301 488-22, Dec 2000	conform
Radio spectrum	EN 300 675, May 2000	conform

Model: The product shall be signed with CE, and certified body name and the Class II certificate (Expert opinion) as shown right.

Marking: The range of the certificate relates to the subject of approval only.  
The certificate is only valid in conjunction with the technical product of origin.

Number of units: 1  
Qualification: 18.03.02  
Place: Date of Issue.

Signed by: [Signature]  
Verified By: [Signature]

CETECOM ICT Services GmbH Lauterbachstraße 16, D-80899 Landsberg, Germany  
http://www.cetecom.de

[illegible][illegible]



### Wichtige Auflagen

1. Jede Anlage oder jedes Gerät des Typs FSG 2T, das mit der Zulassungsnummer D-00022002 versehen ist, muss in seinen mechanischen und elektrischen Charakteristika sowie in der Softwarekonfiguration mit dem vom Flugsicherungsunternehmen geprüften Muster übereinstimmen.
2. Das Betreiben von Geräten des Typs FSG 2T als Bodenstation ist nur zulässig, wenn dieses Gerät entweder fest installiert oder in einem Tragegerät untergebracht ist.
3. Jede Änderung oder Ergänzung des Aufbaus oder der Schaltung der Anlage des Gerätes sowie der Softwarekonfiguration gegenüber dem Muster macht eine Nachprüfung durch das Flugsicherungsunternehmen erforderlich.
4. Das Flugsicherungsunternehmen kann die Einhaltung der Anforderungen gemäß § 4 Flugsicherungs-Anlagen und Geräte-Musterrückmeldung-Verordnung durch Produktkontrollen überprüfen (§ 9 FSL-MusterzV).
5. Diese Urkunde allein berechtigt nicht zum Betrieb einer Anlage oder eines Gerätes. Das Einrichten, Erhalten und Betreiben einer Anlage unter Verwendung dieser Anlage oder des Gerätes, auch wenn es sich um eine Vorführung handelt, ist vom Vorhandensein einer Frequenzzulassung der Regulierungsbehörde für Telekommunikation und Post abhängig.
6. Diese Zulassung befreit nicht von der Verpflichtung zur Abnahme flugsicherungsrechtlicher Einrichtungen durch das Flugsicherungsunternehmen gemäß § 27c LuftVergabegesetz.
7. Aus dieser Zulassung können keine Ansprüche auf Zulassung gegenüber anderen Zertifizierungsstellen abgeleitet werden.
8. Aus der Ausstellung dieser Urkunde können keine Forderungen patentrechtlicher Art hergeleitet werden. Sie befreit in keinem Fall von der Beschäftigung fremder Schutzrechte und stellt keinen Rechtsschutz, ähnlich dem im Patentrecht vorgesehenen, dar.



DFG Deutsche Flugsicherung

### Urkunde

Ein(e) Bodenstation des beweglichen Flugsicherungsnetzes

Typ FSG 2T

Frequenzbereich 118,00 – 136,975 MHz

der Firma Walter Dittl GmbH  
Erfolger Straße 36  
88089 Landsberg

bestehend aus Sender/Empfänger mit Stromversorgung aus dem Gleichspannungsnetz oder Batterien

für die Betriebsart A3E

Ist auf Einhaltung der Anforderungen an Anlagen und Geräte für Zwecke der Flugsicherung gemäß § 4 der Flugsicherungs-Anlagen und Geräte-Musterrückmeldung-Verordnung (FS-MusterzV) geprüft worden.

Die Anlage oder das Gerät entspricht damit den Festlegungen des Bundesministeriums für Verkehr, Bau- und Wohnungswesen hinsichtlich Art, Umfang und Beschränktheit von flugsicherungsrechtlichen Einrichtungen gemäß § 32 des Luftverkehrsgesetzes (LuftVG) und den Richtlinien und Empfehlungen der Internationalen Zivilluftfahrt-Organisation (ICAO).

Es wird daher mit dem uneingeschränkt aufgeführten Auflagen als Muster in der Bundesrepublik Deutschland zugelassen.

Der Gerätetyp hat die Zulassungsnummer D-00022002 erhalten.

DFG Deutsche Flugsicherung GmbH  
Langen, den 28.10.2002

Urkunde

IA W. Steiner  
Referent Musterzulassung

IA H. Mehnert  
Leiter Übertragungsnetz

Unit of Transport  
Policy  
Federal Aviation  
Administration

September 26, 2002

In reply to: W-CD-44-009142-0096-02

M. Melkert, Commissioner  
Lullbach, Bundesamt  
für zivile Luftfahrt  
D-50509 Bonn  
Germany

Dear Mr. Commissioner:

This letter refers to Walter Dittus GmbH letter dated July 16, 2002, by which they made application for Technical Standard Order (TSO) design approval. This letter acknowledges receipt of Walter Dittus GmbH's statement of Compliance dated July 15, 2002 and of LBA letter REF. M421-02-2701. David A. Jones, 1201, certified in accordance with FAR 21.617, as the VHF transmitter FPG221, support a new compliance with the requirements of TSO C134 and -C135, as indicated in FAR 21.629(a).

Based on the LBA certificate and receipt of the required data, we hereby specify: Walter Dittus GmbH's TSO design approval is limited to "HF Channel 1" of FPG221 listed below for manufacture at Walter Dittus GmbH, located at Frouden 11031, D-56882 Landerbach, Lohr, Germany.

Part Number  
P7M F103361

Doc. n° 614  
V.34 - Transmitter FPG221


This letter TSO design approval, together with the LBA Certificate of Approval, may be Exported and used by: Walter Dittus GmbH, in itself; the VHF Transmitter FPG221 with a TSO marking requirement described in FAR 21.607(b) and in TSO C134 and TSO C135 and is issued in accordance with FAR 21.617, governing issuance of TSO design approval (B). The item must be accompanied by a Certificate of Approval for Export issued by the LBA or a duly authorized and designated person (FAR 21.629(b)).

Any derivatives from the standardized design approval should be accomplished in accordance with FAR 21.606. The request for approval to derive, together with a performance standard, should be submitted by the manufacturer to the Federal Aviation Administration (FAA) through the LBA and should be approved by the LBA. The manufacturer is empowered to sign letters providing an equivalent level of safety.

AIRCRAFT CERTIFICATION STAFF  
European Aviation  
Administration  
B-4003 Brussels, Belgium



# Desktop Base Station fits FSG 2T

 **Kraftfahrt-Bundesamt**  
DE-24932 Flensburg

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**EG-TYPGENEHMIGUNGSBOGEN**  
**EC TYPE-APPROVAL CERTIFICATE**

Benennung über:  
- die Erweiterung der Typgenehmigung

Ein neues Basistyp gemäß der EU-Richtlinie 72/24/EEWG, zuletzt geändert durch die Richtlinie 2006/28/EG

Communication concerning the:  
- extension of type-approval


It is a type of component with regard to Directive 72/24/EEC, as last amended by Directive 2006/28/EC

Typgenehmigungsnummer: e1172246/2006/28/2777/02  
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

Als der EUB anerkennendes EG-Typgenehmigungsschilder:  
EC type-approval mark to be affixed on TBA:

  
02 2777

**ABSCHNITT I**  
**SECTION I**

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

 **Kraftfahrt-Bundesamt**  
DE-24932 Flensburg

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Nummer der Genehmigung: e1172246/2006/28/2777/02  
Approval No.:

0.2 Typ:  
Type:  
FSG 2T

0.3 Merkmale zur Typidentifizierung, sofern am Bauteil vorhanden:  
Means of identification of type, if marked on the component:  
Typenbezeichnung  
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- 98899 Landsberg am Lech


0.7 Bei Bauteilen und selbstständigen technischen Einheiten, Lage und Anbringungsart des EG-Genehmigungsschilders:  
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  
sticker on the rear side of the housing

0.8 Anschrift(en) der Fertigungsstätte(n):  
Address(es) of assembly plant(s):  
Dittel Messtechnik GmbH  
DE- 98899 Landsberg am Lech

**ABSCHNITT II**  
**SECTION II**

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

2. ☐ Die Durchführung der Prüfungen auslängender technischer Dienst:  
Technical service responsible for carrying out the tests:  
CETECOM ICT Services GmbH  
DE-80117 Bambrücken

 **Kraftfahrt-Bundesamt**  
DE-24932 Flensburg

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Nummer der Genehmigung: e1172246/2006/28/2777/02  
Approval No.:

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):  
siehe Anlage  
see appendix


6. Ort:  
Place:  
DE-24932 Flensburg

7. Datum:  
Date:  
18.06.2009

8. Unterschrift:  
Signature:  
im Auftrag

  
Michael Friedrich



 **Kraftfahrt-Bundesamt**  
DE-24932 Flensburg

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Nummer der Genehmigung: e1172246/2006/28/2777/02  
Approval No.:

Die Typgenehmigungsschilder, die anliegt bei der zuständigen Behörde, die die Typgenehmigung erteilt hat, sind auf Anfrage erhältlich.  
The type-approval certificates, which are deposited at the Administrative Service having delivered the type-approval, may be obtained.

Verzeichnis:  
List of documents:

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

2. Informationsblatt zu den Beschreibungsmaterialien  
Sheet to the information package

3. Beschreibungsmaterialien  
Information package

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SYSTEM**

Sehen Sie sich  
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für die Zukunft.

**WALTER DITTEL GMBH**  
Ludwigstraße 30  
D-7460 Crailsheim  
Telefon 07141 14-110  
Telefax 07141 14-110  
Deutschland

**BR. 02.02.2003**

Dokumenten-Nr.  
100 000000

Teil-Nr. von 0000  
00000001

Unter-Zeichen  
00000001

Rechnungsnummer  
1000

## Notifikation einer Furlanfrage

Sehr geehrte Damen und Herren

Im Anschluss an die im Namen von

**WALTER DITTEL GMBH**  
Eggenhof-Campus 35  
7460 Crailsheim / Lich  
Deutschland

am 17.01.2003 erfolgte Notifikation der Furlanfrage.  
**FLUGPLÄNNEGERÄT**

Typ:

PHO 37

Hersteller:

**WALTER DITTEL GMBH**, Ludwigsb. / Lich, D

Anwendung der  
Anfrage:

Flugplatz-Bodenverkehrsleuchte, stationäre, Peripherie, Modell (P72)



## Copyright - Service

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Dittel Messtechnik GmbH

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### Service Information

Should any unusual problem arise or further information be desired, please contact your nearest DITTEL representative or the Dittel Messtechnik GmbH, Avionics Department, Erpfinger Strasse 36, 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 Publications Department  
**Dittel Messtechnik GmbH**  
Erpfinger Strasse 36  
86899 Landsberg am Lech  
Germany

or by e-mail to: [info@dittel.com](mailto:info@dittel.com)



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