

FSG 2T ACCESSORY

FSG 2T:

CE 0682 !

FCC ID: BVYFSG2T

LBA.O.10.911/103 JTSO

replaced by:

ESTO: EASA.210.1304

FAA: TSO C37d
TSO C38d

DFS-Nr.: D - 0002/2002

KBA: e1
03 2777



NOTICE: Illustration shows Backup Panel with mounted FSG 2T

Backup Panel

fits a 2¼" FSG 2T

Operator's Manual

applies for Backup Panel, article no F10389

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

Please observe the Safety Information!

Keep for further use!

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1

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



Manual Revision History

MANUAL **OM 150.2T-EN**
REVISION **1**

This list gives you a RECORD OF REVISIONS of the «**Operator's Manual**» due to new hardware, mistakes or errors.

Revision	DESCRIPTION/REASON FOR CHANGE	Date
-	Created	February 2004
1	Company's name changed from "Walter Dittel GmbH" into "Dittel Messtechnik GmbH", new ESTO document, 2-pole DC connector replaced by 3-pole DC connector due to ceased production	May 2010



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Abbreviations

Ω	Ohm	MD	Mode
$^{\circ}\text{C}$	Degrees Centigrade	MHz	Megahertz (1,000,000 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} W)
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} W)
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	GHz (1,000,000,000 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	Voltampere, apparent power
IF	Intermediate Frequency	Vac	Volts, alternating current
kHz	Kilohertz (1,000 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





1 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":

Phoner / 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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2 independent inputs / 2 unabhängige Eingänge:	<input checked="" type="checkbox"/> Chann. ONLY Mode
Mic1=Donly: set Mic2=V	Mic 1	Mic 2	Mic 1	Mic 2	Mic 1	Mic 2		D = Dynamic; nonamplified, ohne Verstärker	
								V = Amplified / Verstärker Microphone	
								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 Backup Panel 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 Backup Panel 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 Backup Panel may contain 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.



1.1 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!





2 General Description

2.1 Introduction

This Operator's Manual OM 151.2T-EN contains instructions and descriptions for application, installation and operation of the Backup Panel together with a VHF/AM airband transceiver **FSG 2T** of Dittell Messtechnik GmbH, D-86899 Landsberg, Germany.

2.2 Application & Description of the Backup Panel

The Backup Panel was designed to operate a 2¼" round front panel VHF/AM airband radio **FSG 2T** as stationary unit and to fulfil the requirements of air traffic control.

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

Supplying the radio from a 12 Vdc accumulator of sufficient capacity (e.g. DITTEL Battery Box) in connection with an automatic battery charger (e.g. DITTEL **DL-50**) allows independent operation from mains for a certain time.

The 5 Watt Radio **FSG 2T**, DITTEL article no F10350, is working within the airband frequency range of 118.000 MHz to 136.975 MHz in 25 kHz increments (760 channels). The unit features 20 non-volatile channel memories.

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

For ground application two standard display modes are user selectable:

FREQUENCY MODE: Active Frequency and actual supply voltage are shown at the display. Turning / pushing the F/CH knob changes Frequency.

CHANNEL MODE: Active Channel Number (1 ... 20) and associated Frequency are shown at the display. Turning the F/CH knob changes preset Channel Number and associated Frequency. Reprogramming without restriction.

CH ONLY Mode: Optionally a particular mode can be set where the operation is limited to use only preset channels. To set this mode the radio has to be opened. **This may only be performed by an approved avionics facility!**

The radio features 20 non-volatile channel memories, 2 display modes, Sidetone via headphone, three color status LED, supply



voltage indication at the back-lit display and a TX time-out timer (2 minutes).

The Backup Panel unit features at the front a PTT key, a "CHANNEL BUSY" indicator, a frequency display illumination switch (ON/OFF), a 5-pole DIN jack to connect a dynamic microphone with or without PTT key, headphone or headset; and a speaker with an ON/OFF switch. At the rear four twist-lock DIN sockets are located to connect 12 Vdc supply, battery charger, Voice Recorder, and a remote audio panel. Interfacing to the radio is done via cable harness and 15-pole SUB-D receptacle, the antenna is plugged to the **FSG 2T**'s antenna BNC-jack.

2.3 Equipment required but not supplied

- VHF/AM COM airband transceiver **FSG 2T**, 2¼" round front panel
- Master Switch, single pole, ON/OFF, minimum rating 24 Vdc / 4 amps.
- VHF antenna in the frequency range of at least 118 to 137 MHz, 50 Ohm. We recommend a weatherproof glass-fiber reinforced folded-top roof antenna with UHF-connector, Antenna cable RG-213/U, low-loss, UHF- and BNC plug,
- Dynamic microphone 30 to 600 Ohm, e.g. handheld microphone with PTT key, DITTEL article no F10346, or a Standard carbon microphone with or without PTT key (notice separate microphone inputs for dynamic and carbon/amplified microphone)
- Power supply 12 Vdc of sufficient capacity, e.g. **BATTERY BOX** 12 Vdc/ 7.2 Ah, DITTEL article no F10382,
- Interconnecting cable, 0.8 m/2.6 ft, to connect **BATTERY BOX** to Backup Panel, DITTEL article no F10394,
- Mating DIN plugs, to connect remote audio panel, Voice recorder, etc., as required
- Automatic battery charger, e.g. **DL-50**, DITTEL article no F10385.
- When operating the station on a 24 Vdc source a suitable 24 Vdc/12 Vdc converter of at least 4 Amps must be used!



2.4 System and Type Approval Information

The VHF/AM Airband Transceiver **FSG 2T** complies with ICAO 25 kHz channel spacing and also meets applicable National and International Type Approval requirements, for any airborne and ground operation:

- JTSO Authorization LBA.O.10.911/103 ETSO (LBA Luftfahrt-Bundesamt), replaced by ETSO Autorization EASA.21O.1304, is based on EUROCAE ED-23B Airborne requirement (25 kHz ONLY CH spacing).
- FM Immunity requirements according to ICAO ANNEX 10 against FM Broadcast RF Interference.
- Audio filtering required in areas with CLIMAX operation in 25 kHz channel spacing.
- Associated EUROCAE ED-14D / RTCA DO-160D Environmental requirements for Fixed Wing and Helicopter aircraft.
- Associated EUROCAE ED-12B Software requirements based on ED-12B, Level C.
- Type Approval requirements for ground operation, meeting ETSI EN 300 676.
- CE Conformity requirements for ground operation, meeting ETSI EN 301 489-1 and -22.
- DFS (Deutsche Flugsicherung) No. D - 0002/2002 German (ground) Type Approval.
- DIN / ISO 7637-1 Dc supply in 12 Vdc vehicles.
- FCC Compliance with Part 15 (receiver) and Part 87 (transmitter).
- FAA / TSO Authorization

2.5 Re-calibration Information



IMPORTANT!

- For airborne applications, no frequency re-calibration is necessary, since applications in the 25 kHz channel spacing require a frequency accuracy tolerance of less than ± 20 ppm.
- For the first time after three years, FSG 2T equipment for ground applications requires checking and re-calibration of the high precision reference frequency (tolerance better than ± 10 ppm).
- All tolerances include the full operating temperature range of $-20^{\circ}\text{C} \dots +55^{\circ}\text{C} / -4^{\circ}\text{F} \dots +131^{\circ}\text{F}$.
- Checking and re-calibration must be performed by the equipment manufacturer or through authorized and approved avionics services!







2.6 Operating License



IMPORTANT!

- **Depending on national regulations, VHF/AM airborne and / or VHF/AM ground operation may require an individual national operating license. Such license is usually granted by the responsible National Telecommunications Authority, through suitable application forms.**
- **Besides aircraft registration, operator's name, address and operating license payment details, state radio type / model, Serial number, ETSO number EASA.210.1304, and DFS number D - 0002/2002, or, when applicable, the FCC ID number BVYFSG2T.**

Example:

VHF/AM Transceiver FSG 2T Ser.No. 359-06395 Art.No. F10350-(Mod.0C)				KBA:  03 2777
FAA TSO-C37d FAA TSO-C38d				 FCC ID: BVYFSG2T
ETSO-2C37e ED-23B Class 4 Software ED-12B Level C DFS-Nr D - 0002/2002				
ETSO-2C38e ED-23B Class C EASA 210 1304 Weight 0.6 Kg				
ED-14D Categories D1-BAB[(SBM)](RG)[XXXXXXZBBATHXXXX 9-16 VDC / 2 A				
		CE 0682 		



2.7 Optional Accessories

DITTEL article no	Description
W00043	Magnet mount vehicle rod antenna, incl. 4 m/13 ft cable, and PL-259 connector
W00114	Mobile Whip Antenna with shock spring, 118 - 137 MHz, incl. 5 m/16.5 ft cable, w/out PL-259 plug
W00013	Roof mounted weatherproof folded-top fiberglass antenna, UHF-connector, anti static, 1" mount
E57328	UHF antenna plug PL-259 for antenna cable RG-213/U
B01116	Antenna cable RG-213/U, low loss, for roof antenna W00013, please state length (in meters)
F10041	Dynamic hand-held microphone incl. PTT-switch, coiled cord and 5-pole twist-lock DIN plug
F10042	Dynamic hand-microphone/loudspeaker with PTT-switch, coiled cord and 5-pole twist-lock DIN plug
F10125	Inline PTT-switch (U-94 A/U), coiled cord, 5-pole twist-lock DIN plug, to connect headset W00048, clip allows attaching to clothing
W00048	Dynamic headset with PJ-plug, fits inline PTT-switch
F10394	Interconnecting cable with two 3-pole twist-lock DIN plugs, to connect "BATTERY" socket of Backup Panel and 3-pole socket of BATTERY BOX , length 0.8 m / 2.6 ft.
F10382	BATTERY BOX , sturdy steel/aluminum construction, containing a high quality 12 Vdc/7.2 Ah valve-regulated lead-acid battery, built in circuit breaker, 5-LED battery indicator, 3-pole DIN socket. Mounting base can easily bolted to any surface.
F10393	Cigar Lighter Cable, coiled cord, incl. 3-pole plug to supply station from 12 Vdc car battery (fits cigar lighter socket, minus on common ground)
F10385	Automatic Lead-Battery Charger DL-50 , 115/230 Vac. Output: 13.8 Vdc/ 600 mA. Cable and plug to fit into "CHARGER" socket of Backup Panel.
S20000	Converter 24 Vdc to 12 Vdc, 4 Amps, to operate the base station from 24 Vdc sources like truck batteries etc.
E61933	3-pole twist-lock DIN plug, to fit into "CHARGER" and "BATTERY" socket of Backup Panel.
E08834	5-pole twist-lock DIN plug, to fit into "VOICE RECORDER" and "AUX. CONTROL" socket of Backup Panel.





3 Installation

3.1 General

This section contains instructions and suggestions to install a VHF/AM radio **FSG 2T** into a Backup Panel, and to wire the equipment.

3.2 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.

3.3 Transceiver Installation

Panel opening and fixing holes of the Backup Panel are suitable for a 2¼" round front panel radio **FSG 2T**. The radio is mounted from the rear side of the Backup Panel and fixed by 4 cross recessed Pan head screws M 4 × 20 mm (supplied with the radio).

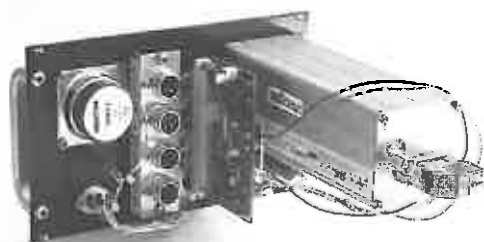
Make sure, the radio is turned OFF.

Connect the wire harness of the Backup Panel via 15-pole SUB-D plug to the receptacle of your radio. Secure the plug by the sliding lock retainer to avoid unwanted connector loosening.

The Backup Panel together with transceiver is ready for installation.



Illustration shows Backup Panel + **FSG 2T**



Rear view with radio connected

3.4 Backup Panel Installation

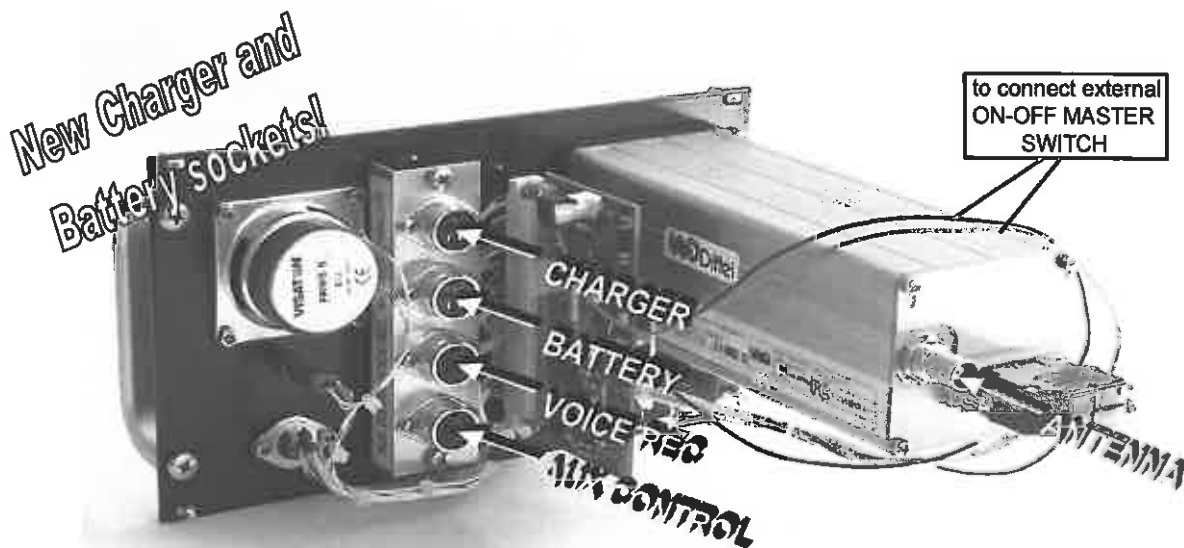


CAUTION!

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

3.4.1 Electrical Connection

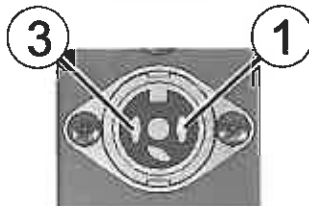
All connections to the electrical environment are easy to handle due to plug and socket connections.



CAUTION!

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

New CHARGER-Socket!



3-pole CHARGER Socket

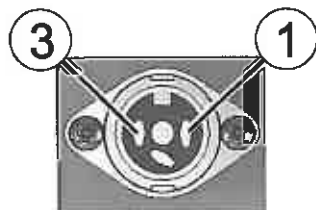
to connect a 12 Vdc battery charger, e.g. Automatic lead-acid Battery Charger **DL-50**, 115/230 Vac, output 13.8 Vdc, 600 mA, ready to connect, DITTEL article no F10385.

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

- 1 Plus 12 Vdc
- 3 Minus 12 Vdc



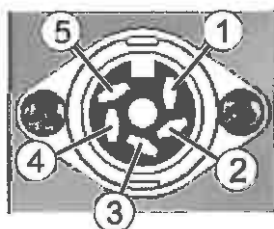
New BATTERY-Socket! 3-pole BATTERY Socket



to connect a 12 Vdc source of sufficient capacity, e.g. **DITTEL BATTERY BOX**, 12 Vdc/7.2 Ah valve-regulated lead-acid battery, sturdy steel/aluminum case, circuit breaker, 5-LED battery indicator, 3-pole DIN socket, mounting bracket, DITTEL article no F10382.

If another 12 Vdc battery is used a mating plug, PREH, 3-pole, twist-lock, DITTEL article no E61933, may be required.

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



5-pole VOICE REC. Socket

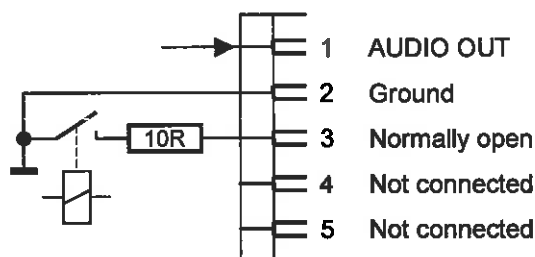
to connect a suitable voice recorder. Records transmitted as well as received communication.

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

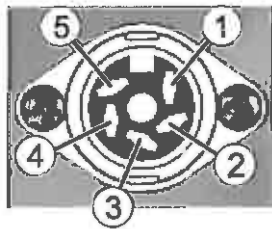
During Receive and Transmit an AF signal of approximately 0.5 V is fed to contact 1 of Voice Recorder socket. The audio level is independent on volume adjust and/or audio sidetone control setting.

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.

- When the transceiver's Squelch is turned OFF (only noise audible), the relay is also energized and RX noise is recorded.
- Terminate audio shield at one end only!



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



5-pole AUX. CONTR. Socket

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

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

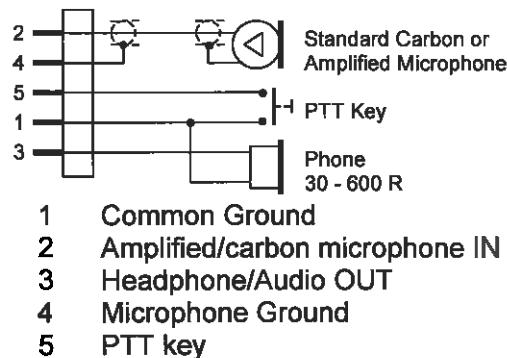


IMPORTANT!

- ***This microphone input is only suitable for carbon microphones or amplified microphones like Electret types! Dynamic microphones without amp will not work!***
- ***For microphone level adjust refer to § 4.4.***

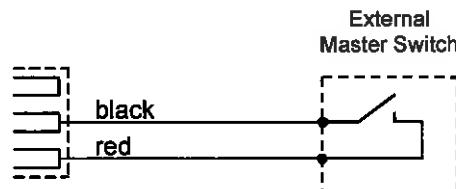
For distances up to 50 m (160 ft) a remote audio console may contain an amplified/carbon microphone.

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



EXTERNAL MASTER SWITCH (not supplied)

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



The Backup Panel requires an ON-OFF switch (not supplied), minimum rating: 24 Vdc/4 amps. Wiring to the Backup Panel control p.c. board is done by a 3-pin connector and a 2-conductor cable (supplied), length ca 40 cm (16"). Extend cables, if required. Insulate joints carefully!



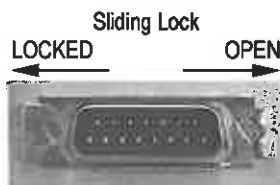
50 Ω BNC Antenna Jack of FSG 2T

Mating plug: BNC plug, UG-88/CU

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

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

REMEMBER: A good antenna is the best RF amplifier!



15-pole SUB-D receptacle of FSG 2T, male, with sliding lock retainer

mating plug: 15-pole SUB-D, female,

to connect the wire harness of the Backup Panel.



Ground Terminal, located at the back side, right hand

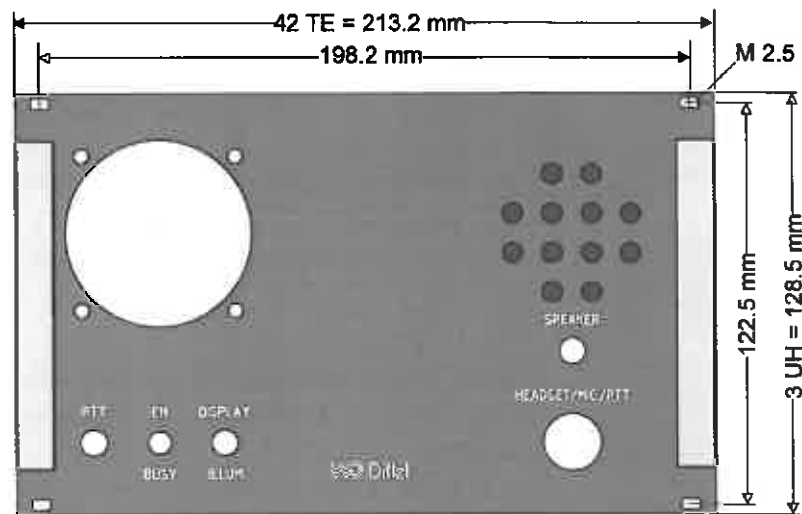
To reduce electrical interference, grounding the Backup Panel is mandatory.

Mating contact: 6.3 mm FASTON receptacle (not supplied)

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

3.5 Mechanical Installation

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



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

To mount the module into a front panel an opening of 210 mm × 112 mm is required.

Select a Backup Panel location at the air traffic operator's desk or 19"-rack distant to heat sources. Sufficient room behind front panel (at least 220 mm/8.7 in.) must be left for wiring accommodation.




4 Functional Description

4.1 Introduction

This section includes a functional description of each switch, push button, knob, socket, indicator and display located at the front of the Backup Panel equipped with a **FSG 2T**, together with operating instructions.

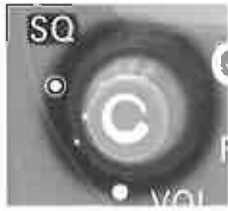
4.2 Operator's Controls and Indicators

A front and rear view of the Backup Panel 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
<div>①</div> <div></div>	<p>Rotary switch and control (inner knob)</p> <ul style="list-style-type: none">▷ To turn ON the radio, rotate the VOL knob clockwise from the OFF position (dot). When power is activated<ul style="list-style-type: none">• the front panel TX/RX LED ④ lights up green momentarily, then• all segments of the display ⑥ are visible for a short time, to verify their operation.• The display shows the firmware version and then• the operating mode, which was used before last turning OFF or Power OFF: The radio is now ready for use.▷ Rotating the VOL 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).▷ To turn OFF the radio rotate the VOL knob fully counter-clockwise (ccw) to the OFF position (dot). Blank display.



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 μ 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 μ 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:

CLEARindicates a Standby condition or radio is OFF.

STEADY REDindicates 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 GREENindicates a Receive condition; Squelch is open automatically (or set OFF manually).



- 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**.
- The last used frequency in each mode remains. This allows toggling between two operational frequencies by just pressing the F/CH button. If the **FSG 2T** is set to 'CH ONLY' Mode pressing the F/CH button will show the DC supply voltage for 5 seconds (instead of continuous channel number).
- ⑥ **Frequency Display**
'DIRECT TUNE MODE'
- 
- 'CHANNEL MODE' or 'CH ONLY'**
- 
- Frequency Display**, the 5-digit Liquid Crystal Display (LCD) can be back-lit.
- Frequency display complies with ICAO rules.**
- 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 (operating mode and frequency).
- 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 **Fixing screws** Four cross recessed screws, M 4 x 20, to fix the transceiver in the Backup Panel.



⑨

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 ④ light up.

Releasing the PTT key used ends the transmission and switches the transceiver back into the receive mode. The red PTT key-light goes off and the TX/RX LED ④ lights either green (receive) or goes off (standby).

NOTICE: If the radio transmits, i.e. a PTT key is pressed (no matter at the mike or remote console) the key-lamp lights red!

⑩

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.

⑪

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.

⑫

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 ⑬.

⑬

SPEAKER

Green push-button switch, not illuminated



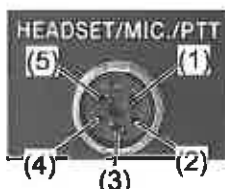
Pressing the "SPEAKER" switch turns ON the built-in loudspeaker. Communication audible via speaker, volume adjustable with VOL-control ①.



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-pin twist-lock socket

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

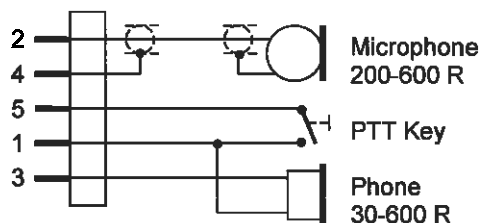
Mating plug. PREH, 5-pin, twist-lock, article no E08834.

Any dynamic microphone (200 to 600 Ω), headphone (ca. 300 Ω), push-to-talk key, or dynamic type headset can be connected to this socket.



IMPORTANT!

- ***This microphone input is only suitable for non-amplified dynamic microphones! Amplified microphones or Standard Carbon microphones will dramatically over-modulate the transceiver!***
- ***For microphone level adjust refer to § 4.5.***



- 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 \times 11, to fix the Backup Panel into 19"-systems.



4.3 Frequency Display

Frequency display complies with ICAO rules.

5-digit liquid crystal display (LCD), may be back-lit by pressing the "DISPLAY ILLUM" button (11).

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:



Flashing supply
indicator for 5 seconds:



Example:

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

Low-voltage: 9.9 Vdc, indicator is flashing!

The flashing low-voltage warning is shown automatically every 25 seconds for 5 seconds when the supply is between 9 Vdc and 11 Vdc.



IMPORTANT!

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



4.4 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.



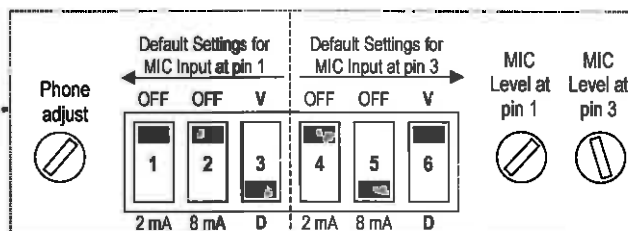
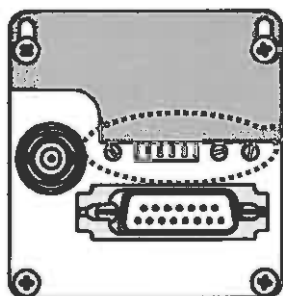
4.5 Microphone level setting

The transceiver **FSG 2T** offers two separate adjustable MIC inputs. You have the choice of connecting one dynamic (non-amplified) microphone via socket "HEADSET/MIC./PTT" (front) and/or one Standard Carbon (amplified) microphone via socket "AUX. CONTR." (rear) to the Backup Panel.



IMPORTANT!

- **When using a DITTEL Dynamic Microphone no adjustment of the MIC level is necessary!**
- **When using a Standard Carbon Microphone via socket "AUX. CONTR." or a non-DITTEL Dynamic Microphone set the best MIC level as follows:**
 - Turn the radio **FSG 2T** ON by rotating the **VOL** knob 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.
 - Select an appropriate (test) frequency, e.g. 122.90 MHz.
 - Check the **SQ** control. From the full counter-clockwise position (RX noise, signaling **TX/RX** LED lights GREEN) rotate the **SQ** knob until the noise stops and – without received signal – the **TX/RX** LED turns clear. When receiving air traffic communication the **TX/RX** LED stays GREEN. Set the RX volume of the loudspeaker or headphone to a convenient level by rotating the **VOL** knob.
- **At the FSG 2T loosen the upper cross-recessed screws of the rear panel and move up cover to get access to the potentiometers and DIL Switches**





4.5.1 Set-up of a non-amplified Dynamic Microphone at socket "HEADSET/MIC/PTT"

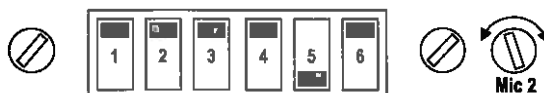
- Verify the settings of the DIL switches at the rear of the radio (DIL switch "Mic 1" set to D, DIL switch "Mic 2" to V, all others "OFF").



- Press the PTT key. The TX/RX LED should light steady RED. Speak loud, clear and close into the microphone. Observe the TX/RX LED, it should flicker YELLOW.
- **IF NOT**, turn with a suitable screwdriver "Level Mic 1" potentiometer till the TX/RX LED flickers YELLOW while transmitting and speaking. When you stop talking the TX/RX LED should light steady RED!
- Release the PTT key, the TX/RX LED must turn to clear (no reception) or to GREEN (RX signal).

4.5.2 Set-up of an amp lified / Standard Carbon Microphone at socket "AUX. CONTR."

- **This test must be performed with headphone(s) to evaluate the volume/quality of the MIC signal via Transmit Sidetone.**
- Verify the settings of the DIL switches at the rear of the radio (DIL switch "Mic 1" set to V, DIL switch "Mic 2" to V, DIL switches 1, 2 and 4 to "OFF", DIL switch 5 to "8mA").



- Press the PTT key. The TX/RX LED should light steady RED. Speak loud, clear and close into the microphone. Observe the TX/RX LED, it should flicker YELLOW. Listen to the TX Sidetone in your headphone, it should be clear and undistorted.
- **If no Sidetone is audible or TX Sidetone is distorted** try to increase audio quality and volume by switching DIL switches "Mic 2" either to "2mA" or to 10 mA ("2mA" + "8mA").
- **IF the TX/RX LED does not flicker**, turn with a suitable screwdriver "Level Mic 2" potentiometer till the TX/RX LED flickers YELLOW while transmitting and speaking. When you stop talking the TX/RX LED should light steady RED!
- Release the PTT key, the TX/RX LED must turn to clear (no reception) or to GREEN (RX signal).



IMPORTANT!

- *After finishing all settings move cover to its place and fix the screws!*
- *This shielding is absolutely necessary because of required immunity against high energy RF interference!*



5 Operation

5.1 Introduction

This section contains a basic operation procedure for the Backup Panel together with a VHF/AM **FSG 2T** transceiver. This instruction is only applicable for a Backup Panel radio which is 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 Backup Panel 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.

5.2 Antenna - BNC Antenna Jack UG-290



CAUTION!

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

REMEMBER: A good antenna is the best RF amplifier!

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

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

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

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

5.3 Microphone - Headset - PTT key

Any dynamic microphone (200 to 600 Ohms) with or without PTT switch or a headset for dynamic microphone type systems with additional PTT switch can be connected to the socket "HEADSET/MIC/PTT" at the front (mating 5-pole DIN plug: DITTEL article no E08834, for wiring refer to paragraph 4.2, position ⑭).

Any amplified or carbon microphone with or without PTT switch, or a headset for amplified type systems with additional PTT switch, or a remote audio console with amp microphone and PTT key can be connected to the socket "AUX. CONTR." at the rear (mating 5-pole DIN plug: DITTEL article no E08834, for wiring refer to paragraph 3.4.1,



AUX. CONTR. Socket).

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

5.4 Monitoring the Supply Voltage

The transceiver **FSG 2T** includes a 3 digit display of the actual supply voltage level. At dc levels below 11 V the voltage digit value starts automatically flashing for low supply warning! Usually the Backup Panel together with the radio is powered by a battery which is constantly kept fully charged by an automatic charger. In case of mains failure the station is powered only by the battery.

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 Backup Panel and Radio 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. Recommendation: Reduce utmost transmitting!
Short-time flashing Dc value during Standby (SQ ON, clear channel)	ca. 45 min. left in Standby. Cease transmitting!
Continuous flashing Dc value during Standby (SQ ON, clear channel)	Radio will soon switch OFF itself! Recharge battery as soon as possible



IMPORTANT!

- *These transitions are fluent. Recovery effect after load reduction may be possible.*
- *Low battery temperature reduces operation time.*
- *If the DC value indication even flashes 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.*



5.5 Switching ON - Selecting Frequency - Audio Volume



IMPORTANT!

- *Frequent transmissions as well as loud receiving reduce the operating time when the radio is only powered by a battery without opportunity to recharge!*
- *The Backup Panel together with the radio should be turned ON or OFF with the Master Switch only!*

- ▷ Turn ON the Backup Panel's external Master Switch. When the transceiver is OFF, the green "CH BUSY" LED (10) lights up.
- ▷ If applicable, turn ON the transceiver FSG 2T by rotating the VOL knob (1) clockwise. For a short time the TX/RX LED (4) 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 (10) 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).



Example:



This is the new **active frequency**!

CHANNEL MODE or CH ONLY:

Important: *The appropriate operating frequency must be stored already in a memory channel (refer to § 5.8 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 clockwise, about half way.

Continue with either

- 5.6 Receive (Listen) Operation, or**
- 5.7 Transmit (Talk) Operation**
- 5.8 Memory Programming**



5.6 Receive (Listen) Operation

- After turning the radio ON the automatic squelch is either ON or OFF depending on SQ knob (2) position.
- 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" (10) may not light.
- If communication is heard set the RX volume of the built-in loudspeaker (12) or earphone to a comfortable level by rotating the VOL knob (1). The green "CH BUSY" LED (10) 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. The green "CH BUSY" LED (10) should light.
- Rotating the SQ knob (2) more cw clockwise switches the squelch circuit ON again.
- **DO NOT** press the PTT (Push-To-Talk) key if you want to receive! During RX the TX/RX LED (4) **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!**



5.7 Transmit (Talk) Operation



WARNING!

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! Always operate the Backup Panel on a suitable outdoor / external antenna! Assure appropriate lightning protection / grounding where (elevated) outdoor antennas are used.*
- ***Never place the antenna such as it 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!***



IMPORTANT!

- ***Please keep radio discipline!***
- ***DO NOT transmit on a busy channel ("CH BUSY" LED OFF)!***
- ***DO NOT transmit on 121.50 MHz as this is the international civilian aircraft emergency frequency!***

If the operating mode
shall be changed: ▷ Push the F/CH button (5).

If the active frequency
shall be changed: ▷ Refer to § 5.5 Turning ON - Selecting Frequency - Audio Volume.



Transmitting is normally performed on a clear channel (no communication audible, "CH BUSY" LED OFF).

- ▷ Hold or adjust the microphone near to the lips (one to max. two inches) in order to reduce environmental noise.
- ▷ Press and hold the PTT (Push-To-Talk) key at the mike, or Backup Panel (9), or remote audio console. Then the receiver is switched off and the transmitter is switched on. The radio is ready to transmit. As long as the PTT key is pressed the TX/RX LED at the **FSG 2T** front lights red as well as the "PTT" button (9) at the Backup Panel!
- ▷ Speak loud, slow, clear and at constant loudness. Make each transmission as brief as possible. 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 must turn to clear (Standby) or green (Receive / Intercom), the red "PTT" key-light 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.*



5.8 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**.

5.8.1 Programming while in the DIRECT TUNE MODE:

Example:



- ▷ Turn the F/CH knob (7) 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 (7) to select the desired frequency.



- ▷ Press the **STO** button (3) 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 (7) to select the desired memory location.



- ▷ Press and hold the **STO** button (3) 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.



5.8.2 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 (7) to change the underscored Channel Number to the desired Channel Number to be stored in another memory location.



- ▷ Press the STO button (3) once to initialize storing.



- ▷ Release the STO button (3). 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 (7) to select the desired memory location.



- ▷ Press and hold the STO button (3) 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.

5.9 Lighting the Frequency Display

- ▷ Lighting the frequency display (6) is activated by pressing the "DISPLAY ILLUM." push-button (11) of the Backup Panel.
- ▷ Pressing again the push-button turns OFF the display illumination.

5.10 Turning OFF the Backup Panel



IMPORTANT!

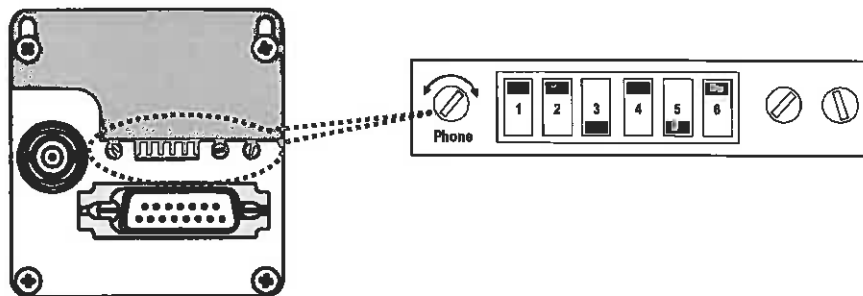
- The Backup Panel together with the radio should be turned OFF with the Master Switch only!
- This prevents unnecessary discharge of the battery!
- NO light or display may be visible!



5.11 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 ⑩ 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!***



5.12 Siting

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

5.13 Functional Checks

If the Backup Panel together with a transceiver **FSG 2T** does not operate correctly, check the following:

- Is the required frequency visible? Adjust required frequency or channel number!
- Is battery supply sufficient? Observe supply indicator particularly during transmit, at least 11 Vdc must be shown!
- Weak RX signal? Adjust **SQ** control counter-clockwise!
- Weak TX signal? Check microphone, mic setting, radio, or antenna system! Lights **TX/RX** LED RED while speaking? The voice volume is too low, check MIC setting. Speak loud and clear while the lips are facing the microphone! The **TX/RX** LED must flicker YELLOW!
- Singing during transmit? Put on your headset, adjust sidetone more quietly; keep microphone in other position!
- Rattles when transmitting? Metal propellers between antenna and ground station!
- Called station hears carrier, but no voice? Check **TX/RX** LED (red or yellow?), microphone and contacts on microphone jack!
- Noisy - distorted - garbled? Suppress electrical interference of nearby motors (generator, regulator), check antenna-, microphone- and radio- connector for proper **seat**!
- Flashing display, transmitter switches off itself? PTT key sticks! Check PTT key and cables. Transmitter was keyed longer than 2 minutes. Release PTT key, normal operating is possible again. In case of emergency turn radio OFF and switch ON again, this permits another two minutes to transmit "blind".

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.





Appendix A Technical Summary (Backup Panel plus 5 Watt FSG 2T)

A1 General

Type:	FSG 2T , A/N F10350, and Backup Panel , A/N F10389
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

A2 Dimensions, Weight

Exposed dial face of FSG 2T	57 mm / 2¼ inches dia, fits into standard instrument hole
Dimensions incl. transceiver	Width: 213.2 mm, height: 128.5 mm, depth behind panel: 180 mm, allow at least 40 mm for wiring.
Weight	ca. 1.7 kg / 3.75 lb

A3 Additional Features

	True sidetone via headphone; TX time-out-timer, PTT key, "Channel Busy" indicator, built-in loudspeaker, speaker switch, illumination switch.
Sockets to connect	External battery charger, external 12 Vdc power supply, Voice recorder, dynamic microphone, standard carbon microphone, Push-to-talk key, headphone, headset, 50 Ohms antenna,

A4 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. 10.5 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 ≥ 12.0 Vdc		Battery full Battery ca. ½ capacity					
Emergency operation	< 11.0 Vdc		Battery is nearly flat, display starts flashing between 11 V and 9 Vdc supply					
Internal Fuse, protects switched Dc Output	315 mAmp, medium time lag, auto-reset fuse							
Fusing on control p.c. board	DC: 3.0 amps, time-lag, self-healing							



A5 FSG 2T 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 V (+13 dBm / 50 Ω)
AGC Delay (RX), m = 30%/1 kHz	$\leq 0.2 \text{ sec}$, 5 mV (-33 dBm) to $5 \mu\text{V}$ (-93 dBm / 50 Ω)
AGC Recovery after TX	$\leq 0.1 \text{ sec}$ at $5 \mu\text{V}$ (-93 dBm / 50 Ω), 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 Ω (at 9 Vdc ... 16.1 Vdc supply)
Nominal AF Output (Phone)	$\geq 50 \text{ mW}$ into 300 Ω (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 μV to 5 mV / -67 dBm to -33 dBm / 50 Ω
AF External Input (OPTION)	ca. 1 Volt into 600 Ω 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 Ω) 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 Ω), unmodulated at assigned RX channel, plus additional b) Unwanted signal 5 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 Ω , 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 A 5 mV (-33 dBm / 50 Ω), unmodulated, any frequency 108 ... 156 MHz, except used CH and $\pm 1 \text{ RX CH}$, <u>or</u> Unwanted signal B 100 mV (-7 dBm / 50 Ω); minimum 5 mV (-87 dBm), unmodulated, frequency 50 kHz - 1,215 MHz, except 87.5 MHz ... 156 MHz, <u>or</u> Unwanted signal C 125 mV (-5 dBm), unmodulated, frequency 87.5 ... 156 MHz
Receiver Spurious Emission	$\leq 141 \mu\text{V} / 400 \text{ pW} / -64 \text{ dBm}$ (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 A : $5 \mu\text{V}$ (-93 dBm) +8 kHz (m = 30% / 1,000 Hz), Squelch is open. b) Unwanted Signal B : 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.



A6 FSG 2T Transmitter Specification

TX RF Output Power (also during emergency operation)	approximately 5 Watts / 50 Ω (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	≤ 10 ppm (-20°C ... +55°C / -4°F ... +131°F) ≤ 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	≤ 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: ≤ 1 ... 10 mV symmetrical, sensitivity adjustable. Mike 2: Amplified / Carbon Microphone: ≤ 80 ... 500 mV unsymmetrical, sensitivity adjustable. Note: One, or two <u>identical</u> , dynamic <u>or</u> 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	≥ 50 mW into 300 Ω (at 9 Vdc ... 16.1 Vdc supply) average phone volume is adjustable on equipment's rear side
Carrier Noise Level	≥ 35 dB (m = 70% / 1000 Hz)
Emission of RF Energy (≤ 1 GHz)	≤ 0.25 μ W (-36 dBm) / 71 dB μ V / 3.54 mV / 50 Ω ≤ 25 nW (-46 dBm) / 61 dB μ V / 1.12 mV / 50 Ω , from 47 ... 68, 87.5 ... 108, 162 ... 244, 328 ... 336, 470 ... 862 MHz
Emission of RF Energy (≥ 1 GHz)	$\ll 1$ μ W / $\ll -30$ dBm / $\ll 77$ dB μ V / $\ll 7$ mV / 50 Ω
Transmitter Spectrum Mask	≥ 70 dB attenuation at 1,250 Hz modulation / m = 60%, + 10 dB
Channel Selection Time	≤ 0.1 sec
Unwanted Frequency Modulation	≤ 1.0 kHz at m = 70% / 1000 Hz
TX Intermodulation	≥ 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 $\geq 40\%$ / ≥ 2 Watt into 50 Ω At VSWR $\leq 5 : 1$ Transmitter is still functional.



IMPORTANT!

The transceiver FSG 2T together with a Backup Panel may only be used after permission by the respective authorities.



Appendix B 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
Temperature and Altitude	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	
Temperature Variation	5.2	Equipment tested to Category, 5°C / min.	B
Humidity	6.0	Equipment tested to Standard Category	A
Shock	7.1.1 7.2 7.3	Equipment tested to Category Operational shocks 6g Crash Safety 20g without damage	B
Vibration (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 Fixed Wing Aircraft Category Equipment tested to Fixed Wing Aircraft Category Equipment tested to Helicopter Aircraft Category	S Curve B S Curve M R Curve G
Explosion	9.0	No test required	X
Waterproofness	10.0	No test required	X
Fluids Susceptibility	11.0	No test required	X
Sand and Dust	12.0	No test required	X
Fungus	13.0	No test required	X
Salt Spray	14.0	No test required	X
Magnetic Effect	15.0	Equipment tested to Category	Z
Power Input	16.0	Equipment tested to Category	B
Voltage Spike	17.0	Equipment tested to Category	B
Audio Frequency Susceptibility	18.0	Equipment tested to Category	B
Induced Signal Susceptibility	19.0	Equipment tested to Category	A
Radio Frequency Susceptibility	20.0	Equipment tested to Category	T
Radio Frequency Emission	21.0	Equipment tested to Category	H
Lightning Induced Susceptibility	22.0	No test required	X
Lightning Effects	23.0	No test required	X
Icing	24.0	No test required	X
Other Test	—	No test required	X



Appendix C Certificates


WALTER DITTEL GMBH
L. FRANKFURT / AM MAIN

Notation zur effizienten Nutzung des Funkfrequenzspektrums
note of the efficient use of the radio frequency spectrum

☒ Luftschiffschiff bei Funkanlagen gemäß § 3(2) (Artikel 3(2))
Air services vessel of the radio post combined in § 3(2) (Article 3(2))


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

harmonisierte Normen ...
harmonized standards ...


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

Harmonized Standard
New Harmonized Standard

Ort, Datum: Lemförde, 29. Mai 2003
Place & date: 29.05.2003

Name und Unterschrift:
Name and signature:

W. Walter

2 (3)


WALTER DITTEL GMBH
KRAFTWERKE KUMMER
KRAFTWERKE BRUNNEN 35 * D-68899 LAMBERSHAGEN
TELEFON +49 (0)6191 / 3331-0 * FAX +49 (0)6191 / 3331-49
E-MAIL: INFO@DITTEL.GMBH * INTERNET: WWW.DITTEL.GMBH

Konformitätsbescheinigung
Certificate of conformity

gemäß dem Gesetz über Funkanlagen und Telekommunikationsdienstleistungen (FunkTfG) und
der Richtlinie 1999/5/EG (R&TTE)
in accordance with the Law on Radio and Telecommunications Services (Telecom Act) (FRTG) and
Directive 1999/5/EC (R&TTE Directive)

Walter Dittel GmbH Luftfahrttechnik / Ing. Werner Weller
Hersteller / Verantwortliche Person / Manufacturer / responsible person

erkläre, dass das Produkt FLUGFUNKGERÄT / VHF/UHF voice communications Transceiver
conforms with the product

Type (gült. Anlagengattungen mit Angabe des Modells): FSG 2T
Type (if applicable, conf. / cert. including the model)

☐ Telekommunikations- / Funkanlage
Telecommunications / radio equipment

☒ Funkanlage
radio equipment

Rechtsfunktion: tragbar, stationär, mobil; Grundband Transceiver portable, fixed base, mobile
Verwendungszweck: landmobil, seeländisch
In: Certificate, equipment class

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

Gesundheit und Sicherheit gemäß § 3 (1) 1. (Artikel 3 (1) a)
Health and safety requirements covered in § 3 (1) 1. (Article 3 (1) a)

harmonisierte Normen ...
harmonized standards ...

Einrichtung 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 ...
harmonized standards ...

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

1 (3)



European Aviation Safety Agency



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

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 33 of that Regulation, subject to conditions specified below, to

Dittel Messtechnik GmbH
Eppinger Straße 36
86899 Landsberg/Lech
Germany

In accordance with Commission Regulation (EC) No. 1702/2003, Part 21, Section A, Subpart C and ETSO 2C37e, 2C78a*

VHP Transceiver FSG 2T
P/N F10350-1
DDP No. 035.1.00 Issue A or Subsequent Revisions

Remarks:
*) Except of under Regulation (EC) 1702/2003 Article 2 No. 13, which states: "Approvals of rules of application issued by a Member State and valid on 28 September 2003 shall be deemed to be valid in accordance with the provisions of this Regulation." The Commission Decision of 10 October 2003 (2003/1103/EC) states that the Commission Decision of 27 October 2002 due to change of ownership from VHP Dittel GmbH to Dittel Messtechnik GmbH.

Conditions

1. The above ETSO authorisation holder is only authorised to identify an Article with this ETSO marking when remaining in compliance with the conditions relating to the issue of this Authorisation.
2. This ETSO does not constitute an installation approval. It is the responsibility of those installing the Article to determine that the aircraft installation conditions are within the ETSO standard.

This Authorisation shall remain valid until it is replaced or revoked.

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

Catherine GANDQI
Catherine GANDQI
Project Certification Manager
Part 21 Applications

001/01/01/01

CETECOM ICT Services GmbH



CERTIFICATE OF CONFORMITY

Number of analysis: ...

Registration No.:

Walter DITTEL GmbH
Luftfahrtgerätekau
Eppinger Str. 36
D-86899 Landsberg

Certificate Holder:

Product Designation:

VHP/AM Air Band Transceiver for ground based applications

Product Manufacturer:

Walter DITTEL GmbH
Luftfahrtgerätekau
Eppinger Str. 36
D-86899 Landsberg

Specifications and test reports

Specification	Test report no. & date	Name of test laboratory	Notes
EN 301 492-1, Aug. 2000	2-2803-01-0201 dated 10.11.2001	CETECOM ICT	radiofon
EN 301 492-2, Dec. 2000			
EN 300 676, May 2000	2-2803-01-0101 dated 09.09.2001	CETECOM ICT	radiofon

Statement: The equipment fulfils the requirements of parts thereof in the above mentioned specifications.

By decree Vg 282906, issued in the Official Journal L 2400 of the Regulationsschreiben für Telekommunikation und Post, CETECOM ICT Services is authorised to act as Notified Body in accordance with the RACTE Directive 1999/5/EC of 06. March 1999

Marked on: 18.03.02
Place, Date of issue

Walter Dittel
Walter Dittel
Notified Body

CETECOM ICT Services GmbH, Untere Hühnerstr. 5a, D-86117 Landsberg, Germany





Annex 1 of the Certificate "EXPERT OPINION"
Registration no.: E3128040-EO Date: 18.03.02
Page 1 of 1

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

Frequency Characteristics
118.000 – 135.975 MHz

RF-Output Power (conducted)
5 W

ITU-Designation
7K00A3E

Number of Channels
760

Channel Spacing
25 kHz

Antenna-Access
RF-connector (load 50 Ω)

Conformity Details:

Evaluated Requirements	Standard, test report number, date & laboratory
Regulation	EN 301 423-1, Aug. 2000 EN 301 485-22, Dec. 2000
EMC	Test Report 2-802-01-02/01 issued 20.11.2001 by DETECOM ICT
Radio spectrum	EN 300 676, May 2000 Test Report 2-802-4/01 issued 03.09.2001 by DETECOM ICT

Miscellaneous:
TCF according to the application dated 08.03.2002

CETECOM ICT Services GmbH
EC Identification Number 0682
certified by the German Government

with decree Vg 262/89, based on the Official Journal L269
of the Regulations concerning the Telecommunications and Post,
in order to be notified under the MTRG Directive (Council of the EU, 1999)

**CERTIFICATE
EXPERT OPINION**

Registration-No
E3128040-EO

Certificate Holder
Walter DITTEL GmbH
Leibnizstraße 10
Erpfingen Str. 36
D-94099 Landshut

Product Designation
FSG 21

Product Description
VHF/UHF Transceiver for terrestrial mobile service

Product Manufacturer
Walter DITTEL GmbH
Leibnizstraße 10
Erpfingen Str. 36
D-94099 Landshut

Essential requirements	Specifications / Standards	Submitted documents	Result
EMC	EN 301 485-1, Aug. 2000 EN 301 485-22, Dec. 2000	Test Report	conform
Radio spectrum	EN 300 676, May 2000	Test Report	conform

Marking: The product shall be marked with CE, our certified body number and the Class II certificate (certification) as shown right here!

The scope of the evaluation refers to the submitted documents only!
The certificate is valid in conformity with the following conditions of use:
Number of functions: 1
Serial number: 18 of 00
Date of issue: 18.03.02

Signature: [Signature]
Verified Body

CE 0682

CETECOM ICT Services GmbH, Utenstraße 17, 46117 Krefeld, Germany
http://www.cetecom.de



RegTP
Regulatorische Technische
Regulierungsbehörde für
Telekommunikation und Post

RegTP-Postfach 0110 01 80000 RegTP-Postfach 0110 01 80000
Walter Dietel GmbH
Erfolger Straße 36
D-88089 Landsberg/Lech

In Zeichen des Beschlusses vom 18.08.01
Ing. Walter Dietel
24.08.02
70556-01
Merkmal: keine Nachschub vom 18.08.01
93 30-574
01.08.02

Mitteilung über die Inverkehrnahme von Funkanlagen nach § 10 (4) des Gesetzes über
Funkanlagen und Telekommunikationsanlagen (FTEG)

Sehr geehrte Damen und Herren,

Ihre Mitteilung ist am 26.08.02 bei uns eingegangen und wurde wie folgt registriert:

Vorgangsnummer	70556-01	Typenbezeichnung	FSG 2T	Inverkehrnehmer	Walter Dietel GmbH Erfolger Straße 36 D-88089 Landsberg/Lech
----------------	----------	------------------	--------	-----------------	--------------------------------------------------------------------

Zum Betrieb der Funkanlage ist vom Betreiber die Einreichung von Prospekten bei der
zuständigen Aufsichtsbehörde für die Ausstellung von Funkanlagen und Post zu
beantragen.

Geben Sie bitte bei weiteren Mitteilungen, zu dieser Typenbezeichnung immer die oben
genannte Vorgangsnummer an.

Mit freundlichen Grüßen

Im Auftrag
Walter Dietel
Walter Dietel

Bezeichnung: FSG 2T
Baujahr: 2001
Seriennummer: 0110 01 80000
RegTP-Postfach 0110 01 80000
RegTP-Postfach 0110 01 80000

FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, DC 20541

GRANT OF EQUIPMENT AUTHORIZATION

Walter Dietel GmbH
Erfolger Straße 36
88089 Landsberg/Lech, Germany

Date of Grant: 11/28/02
Application Date: 3/9/02

Station: Fritz Moershofer

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby granted to the holder of this grant and is valid only for the equipment and station identified herein for use under the Commission's rules and regulations listed below.

FCC IDENTIFIER
Name of Grantee: Walter Dietel GmbH

Equipment Class
Licensee: Non-Broadcast Station Transmitter FSG 2T

Notes

Grant No.	AG	FCC Rule Part	97	Frequency	144.000 MHz	Output	100W	Modulation	FM	Frequency	144.000 MHz	Output	100W	Modulation	FM
-----------	----	---------------	----	-----------	-------------	--------	------	------------	----	-----------	-------------	--------	------	------------	----

AG: Applicable for airborne mobile stations and fixed stations operating in the following channel frequency band.

to automatically reset to:

FEDERAL COMMUNICATIONS COMMISSION

Page 1 of 1
FCC 251A

250 DE IN-11/02
Grant: Fritz Moershofer

In compliance with the grant, the holder of this grant shall file a report with the FCC on the date of grant.



DFS Deutsche Flugsicherung

Urkunde

Ein(e) Bodenfunkstelle des beweglichen Flugfunkdienstes

Typ FSG 2T

Frequenzbereich 118,00 – 136,975 MHz

der Firma Welber Dittel GmbH
Erpfinger Straße 38
82388 Landsberg

bestehend aus Sende/Empfänger mit Stromversorgung aus dem
Gleichspannungsgernetz oder Batterien

für die Betriebsart A 3 E

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

Die Anlage oder das Gerät entspricht damit den Festlegungen des
Bundesmusters für Verkehr, Bee- und Hörsysteme im Frequenzbereich
118,00 und 136,975 MHz, die in der Musterzulassung des Bundesmusters
gemäß § 24 Abs. 1 der Musterzulassungs-Verordnung (FSMusterzulV) und
der Internationalen Zivilluftfahrt-Organisation (ICAO),

Es wird daher mit den unselbst aufgeführten Auflagen als Master in der
Bundesrepublik Deutschland zugelassen.

Der Gerätetyp hat die Zulassungsnummer D - 0002/2002 erhalten.

DFS Deutsche Flugsicherung GmbH
Langen, den 26.10.2002

Urkunde

W. Beitz
LA W. Starnau
Referent Musterzulassung

H. Hehinger
LA H. Hehinger
Leiter Überwachungsstelle

Wichtige Auflagen

1. Jede Anlage oder jedes Gerät des Typs FSG 2T, das mit der Zulassungsnummer D - 0002/2002 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 Bodenfunkstelle ist nur zulässig, wenn dieses Gerät entweder fest installiert oder in einem Traggerät eingebaut ist.
3. Jede Änderung oder Ergänzung des Aufbaus oder der Schaltung der Anlage/des Gerätes sowie der Softwarekonfiguration gegenüber dem Master macht eine Nachprüfung durch das Flugsicherungsunternehmen erforderlich.
4. Das Flugsicherungsunternehmen kann die Einhaltung der Anforderungen gemäß § 4 Flugsicherungs-Anlagen- und Geräte-Musterzulassungs-Verordnung durch Produktkontrollen überprüfen (§ 8 FSMusterzulV).
5. Diese Urkunde allein berechtigt nicht zum Betrieb einer Anlage oder eines Gerätes. Das Einrichten, Erhalten und Betreiben einer Funkstelle unter Verwendung dieser Anlage oder des Gerätes, auch wenn es sich um eine Vorführung handelt, ist vom Vorhandensein einer Frequenzzuteilung der Regulierungsbehörde für Telekommunikation und Post abhängig.
6. Diese Zulassung berechtigt nicht von der Verpflichtung zur Abnahme flugsicherungsbezogener Einrichtungen durch das Flugsicherungsunternehmen gemäß § 27a Luftverkehrsgesetz.
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 berechtigt in keinem Fall zur Bezeichnung fremder Schutzrechte und stellt keinen Nachschutzzschutz dar, obwohl dem im Falle der Not vorgesehen, der.

Department of Transportation
Federal Aviation Administration

AIRCRAFT STAFFING STAFF
of the American Embassy
in Bonn, Germany
B-100 Bonnstadt, Belgium

September 28, 1992

In reply ref. in: G7-44/09/26/02: 0038-2.

Mr. M. von Ockenfels
Lufthansa-Stam
Postfach 3054
Postfach 3054
Postfach 3054
Germany

De: Mr. Chatterjee:

This letter is in a letter dated July 16, 1992, by which your main application for Technical Standard Order (TSO) design approval. This letter also acknowledges receipt of Walter Dinkel GmbH's letter dated July 16, 1992, and of LBA letter Ref. A41-02-271, dated August 12, 1992, certifying in accordance with FAR 21.101, that the VHF transceiver TSO design letter complies with the requirements in of TSO C74 and TSO C75, as designated in FAR 21.101(b).

On the LBA case, validation and rec.: the required data, we hereby accept Walter Dinkel GmbH's TSO design approval to include the VHF transceiver P8022T listed below for main use in G7-44/09/26/02: 0038-2, Lufthansa, Lufthansa, Germany.


Ref Number
PN P70361

Description
VHF Transceiver P8022T

This letter of TSO design approval, together with the LBA Certificate of Validation, will indicate to Walter Dinkel GmbH, to certify the VHF transceiver P8022T with the TSO marking requirements described in FAR 21.101(b) and TSO C74 and TSO C75 and is issued in accordance with FAR 21.101, covering issuance of TSO design approval for import appliances. Herein must be accompanied by a Certificate of Authorization for Export issued by the LBA on a dry basis and a Certificate of Authorization for Export issued by the LBA on a dry basis.

Any deviations from the established design approval should be accompanied in accordance with FAR 21.101, this request for approval to deviate, together with all pertinent data, should be submitted to the Federal Aviation Administration (FAA) through the LBA, and should contain information to show that the deviation is compensated for by failure or design features providing an equivalent level of safety.



 **Kraftfahrt-Bundesamt**
DE-24532 Flensburg

EG-TYPGENEHMIGUNGSBOGEN
EC TYPE-APPROVAL CERTIFICATE

Beschönertigung über
• die Erweiterung der Typgenehmigung

Das Bauteil ist gemäß der Richtlinie 72/245/EWG, zuletzt geändert durch die Richtlinie 2000/26/EG

Communication concerning the
- extension of type-approval


of a type of component(s) regard to Directive 72/245/EEC, as last amended by Directive 2000/26/EC

Typgenehmigungsnummer: e1172245/2008/28/2777-02
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 Fahrtenkarte wurde geändert
the make was changed

An der EUB anzubringendes EG-Typgenehmigungszeichen:
EC type-approval mark to be affixed on EEC:


02 2777

ABSCHNITT I
SECTION I

0.1 Fabrikmarke (im Name des Herstellers)
Make (under name of manufacturer):
Dittel Messtechnik GmbH

 **Kraftfahrt-Bundesamt**
DE-24532 Flensburg

Nummer der Genehmigung: e1172245/2008/28/2777-02
Approval No.:

0.2 Typ:
Type:
FSG 2T

0.3 Merkmale zur Typidentifizierung, sofern am Bauteil vorhanden:
Marks 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

0.6 Name und Anschrift des Herstellers:
Name and address of manufacturer:
Dittel Messtechnik GmbH
DE-88889 Landsberg am Lech


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

0.8 Anschrift(en) der Fertigungsstätte(n):
Address(es) of assembly plant(s):
Dittel Messtechnik GmbH
DE-88889 Landsberg am Lech

ABSCHNITT II
SECTION II

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

2. Für die Durchführung der Prüfungen zuständiger technischer Dienst:
Technical services responsible for carrying out the tests:
CETECOM ICT Service GmbH
DE-69117 Saarbrücken

 **Kraftfahrt-Bundesamt**
DE-24532 Flensburg

3

Nr. inner der Genehmigung: e1172245/2008/28/2777-02
Approval No.:

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

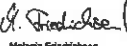
4 Nr. inner des Prüfprotokolls:
Number of test report:
entfällt
not applicable


5 Gegebenenfalls Bemerkungen:
Remarks (if any):
siehe Anlage
see appendix


6 Ort:
Place:
DE-24532 Flensburg

7 Datum:
Date:
15.06.2009

8 Unterschrift:
Signature:
Im Auftrag


Merten Friedrichsen



 **Kraftfahrt-Bundesamt**
DE-24532 Flensburg

4

Nummer der Genehmigung: e1172245/2008/28/2777-02
Approval No.:

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

Vorschriften:
List of documents:

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

2 Inhaltsverzeichnis zu den Beschreibungsdokumenten
Index to the information package

3 Beschreibungsdokumente
Information package

[illegible]



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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, Erpftinger 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.

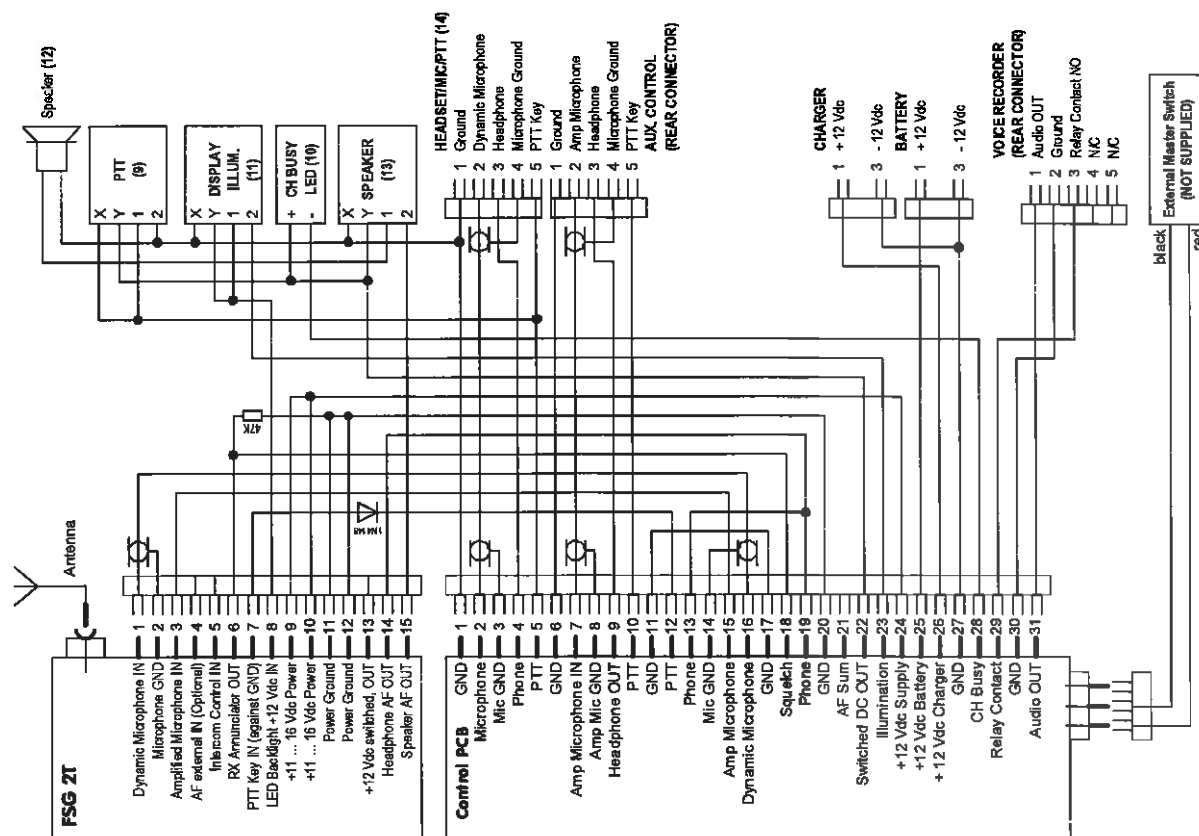
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or by e-mail to: info@dittel.com

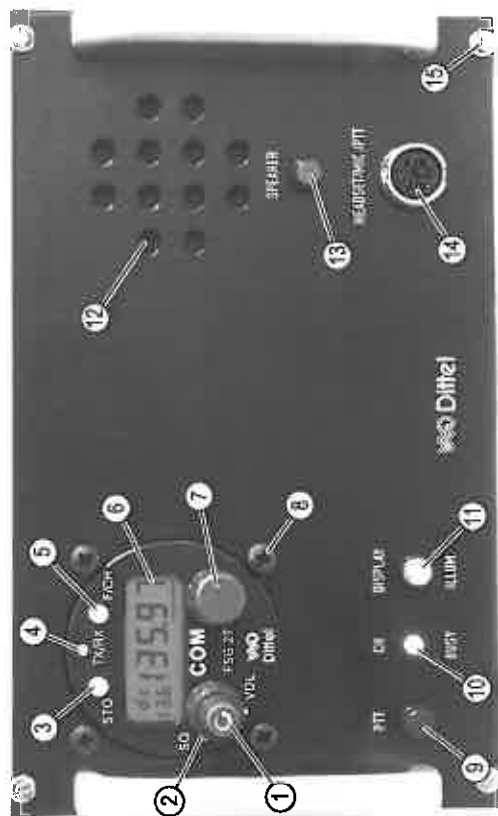




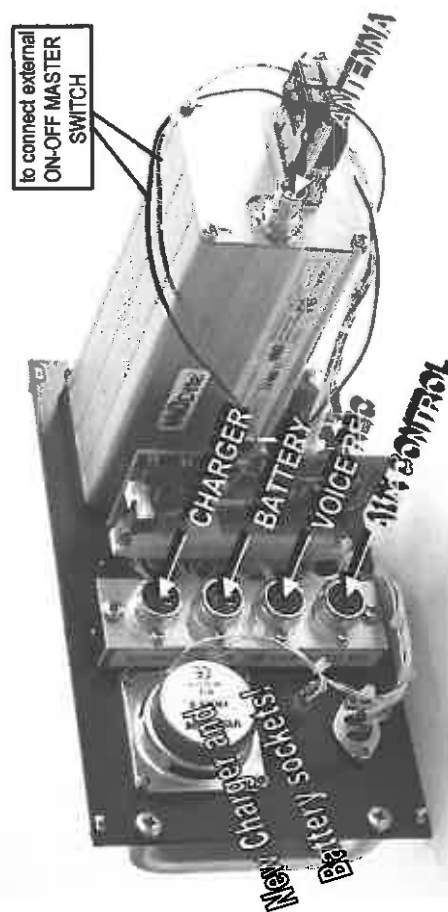
Backup Panel for FSG 2T



Backup Panel FSG 2T
Circuit diagram



Operator's Controls and Indicators



Backup Panel
Front and rear view
with transceiver **FSG 2T** installed

