

FSG 40S

VHF-COMM-Transceiver

for Aviation

Manual

Installation and Operation

English Edition

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Test Report Sheet of FSG 40 System

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Circuit diagr. FSG 40 S Mod.A	November 1976		

II. Technical Information

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2.1 GENERAL

2.1.1 Application

The COM-TRANSCEIVER FSG 40 S is the most advanced design of modern technology and it is all-solid state with 720 channels in the VHF-Range from 118.000 MHz to 135.975 MHz for transmitting and receiving.

The unit has been developed especially for the use in gliders and powered gliders.

An Inter-Com system (IC) has been incorporated to eliminate additional equipment.

The FSG 40 S has an output of >2 Watt .

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2.1.2 TECHNICAL DATA FSG 40 S

2.1.2.1 General

Supply Voltage	:	13.75 VDC ± 10 %
Current (Amperes)	:	Receiving 0.075 to 0.6A/14 VDC Transmitting 0.5 to 1.0A/14 VDC
External Fuse FSG 40 S	:	2.5 A quick-acting
Temperatur Range	:	-40° C to +55° C
Altitude (max.)	:	45.000 ft / 15.000 m
Vibration	:	5 g / 500 Hz
Frontpanel	:	80 x 60 mm
Depth	:	187 mm
Weight	:	10.2 N (1.0 Kp)
Dimensions	:	79 x 56 x 217 mm

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2.1.2.2 Electrical Data for Receiver

Type of Receiver : Superheterodyne
Frequency Range : 118.000 MHz to 135.975 MHz
Number of Channels : 720
Channel Spacing : 25 KHz
Sensitivity : $\leq 3 \mu\text{V}$ (RMS) for 6 dB SN/N
(Modulation 1000 Hz/m = 0.3)
Bandwidth : ± 10.5 KHz at 6 dB
Selectivity : > 70 dB at ± 25 KHz
Squelch : opens automatically at $1 \mu\text{V}$
AGC - Response
10 μV to 200 mV/EMF : ≤ 3 dB
2 μV to 1 V/EMF : ≤ 6 dB
Side-Band Suppression : > 60 dB
Radiation of Inter-
ference signals : $< 4 \times 10^{-10}$ Watt
Distortion/m = 85 % : ≤ 5 %
Frequency Response : < 6 dB/350 Hz to 2500 Hz
 > 20 dB at 4 KHz
IF - Frequency : 10.0 MHz
Nominal Output power: 3 Watts into 4 OHMS
80 mW into 200 OHMS

2.1.2.3 Electrical Data for Transmitter

Frequency Range : 118.000 MHz to 135.975 MHz
Number of Channels : 720
Transmitting Power : >2 Watt
Type of Modulation : Amplitude Modulation A 3
Type of Operation : Single Channel Simplex (SCS)
Modulation Factor : max. 0.95
Modulation Control : Modulation Regulator
Frequency Deviation : $<2.5 \times 10^{-5}$
Harmonics/Spurious : $<2 \times 10^{-5}$ W
Spurious of
108 MHz to 118 MHz : $<2 \times 10^{-7}$ W
1015 MHz to 1045 MHz : $<2 \times 10^{-8}$ W
Frequency Response : <6 dB/350 Hz to 2500 Hz
Distortion/m = 85 % : <10 %
S/N-Ratio : >40 dB

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2.1.2.4 Brief Description

The COMM-TRANSCEIVER FSG 40 S is designed as a single block unit for easy installation in an instrument panel or console of an aircraft. All solid state circuit groups for transmitting and receiving are in one housing.

For a board supply voltage of 28 VDC, an additional converter/regulator (SR 14/2) is necessary.

All function controls and switches are located on the frontpanel. At the rear of FSG 40 S are the antenna jack and the connector for the board inter-connection. Two lids (upper/lower) provide an access for service.

The electronic of the FSG 40 S consists of four (4) sub-assemblies, three (3) of it are removable for faster and better service.

The receiver of the FSG 40 S operates in a superheterodyne mode and covers 720 channels from 118 MHz to 135.975 MHz.

The Wide-Band-Transmitter is tuned from 118 MHz to 136 MHz and delivers an output of >2 Watt.

The generation of the frequencies for the transmitter and the receiver are derived from a frequency synthesizer network in digital operation.

A special Narrow-Band filter (Climax Filter) is already incorporated for suppression of the ground/air whistling effect near airports.

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2.1.2.5	<u>Order Program</u>	<u>Order No.</u>
	COMM-TRANSCEIVER 40 S with manual "Installation and Operation"	013.FG.00.001
	<u>Accessories</u>	
	Slide-in support with connectors and cable set (2.5 m long)	013.ZT.00.001
	Manual "Maintenance and Repair"	013.HB.00.000
	Manual "Installation and Operation"	013.HB.00.001
	<u>Recommended Accessories</u>	
	Speaker, Cabinet and Microphone Jack	013.ZT.00.002
	Swan's neck Microphone with cable and Connector	013.ZT.00.010
	Transmitting key and cable (2.5 m length) for mounting in control stick	013.ZT.00.004
	Dyn. Handmicrophone with key, cable and connector	013.ZT.00.005
	Dyn. Headset	013.ZT.00.006
	Half-Wave-Dipol for mounting in the rudder, 6.5 m cable length without connector	013.ZT.00.007
	Rod-Antenna with counter-balance; with antenna-cable	013.ZT.00.008
	SR 14/2 voltage stabilization for connection to 27.5 VDC-supply	013.ZT.00.012
	Back plate for ES 15-slide-in- support for conversion of FSG 15/16- support to fit FSG 40 S	013.ZT.00.013
	Div. Special-Accumulators	
	Div. Charging units	
	<u>Options (at extra cost):</u>	
	NFF (AF-External-Input)	
	BEL (Illumination)	
	VEM (Amplifier-Microphone-Input)	

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2.2 INSTALLATION

2.2.1 Pre-Installation-Test

The main functions of the COMM-TRANSCIVER should be tested before installation in an aircraft to eliminate any damage caused during transportation:

- Connect unit to the test-set-up and a supply voltage of 14 VDC (see Fig. 2.2-1).
- Switch ON and turn clockwise the volume control to about middle position. Press "SQ-Test-Button".
A typical receiver noise should be audible on all channels (118.000 MHz to 135.975 MHz).
The receiver sensitivity must be according to the technical data (check 118.000 MHz, 125.950 MHz and 135.200 MHz).
- Release Test-Button, vary VHF-generator-output and check the operating point of the squelch-switching-stages, (ca. 0.5 μ V to 2 μ V depending on adjustment).
- Connect VHF-power meter with an HF-load to the antenna output.
Operate transmitter and note power output (2 Watt).
- Connect an audio generator to the microphone input across voltage divider.
A full modulation of 85 % of the transmitter should be obtained with an input level of ca. ~ 2.5 mV_{RMS} .
Increasing the input to 10 VDC shall not overmodulate the system (observe modulation envelope).
- With a proper microphone and an average voice level (mike held near the lips), a modulation factor of 85 % should be obtained.
The monitor control (see Fig. 2.2-7) should be adjusted in a way that the communication can be heard quietly but clear.

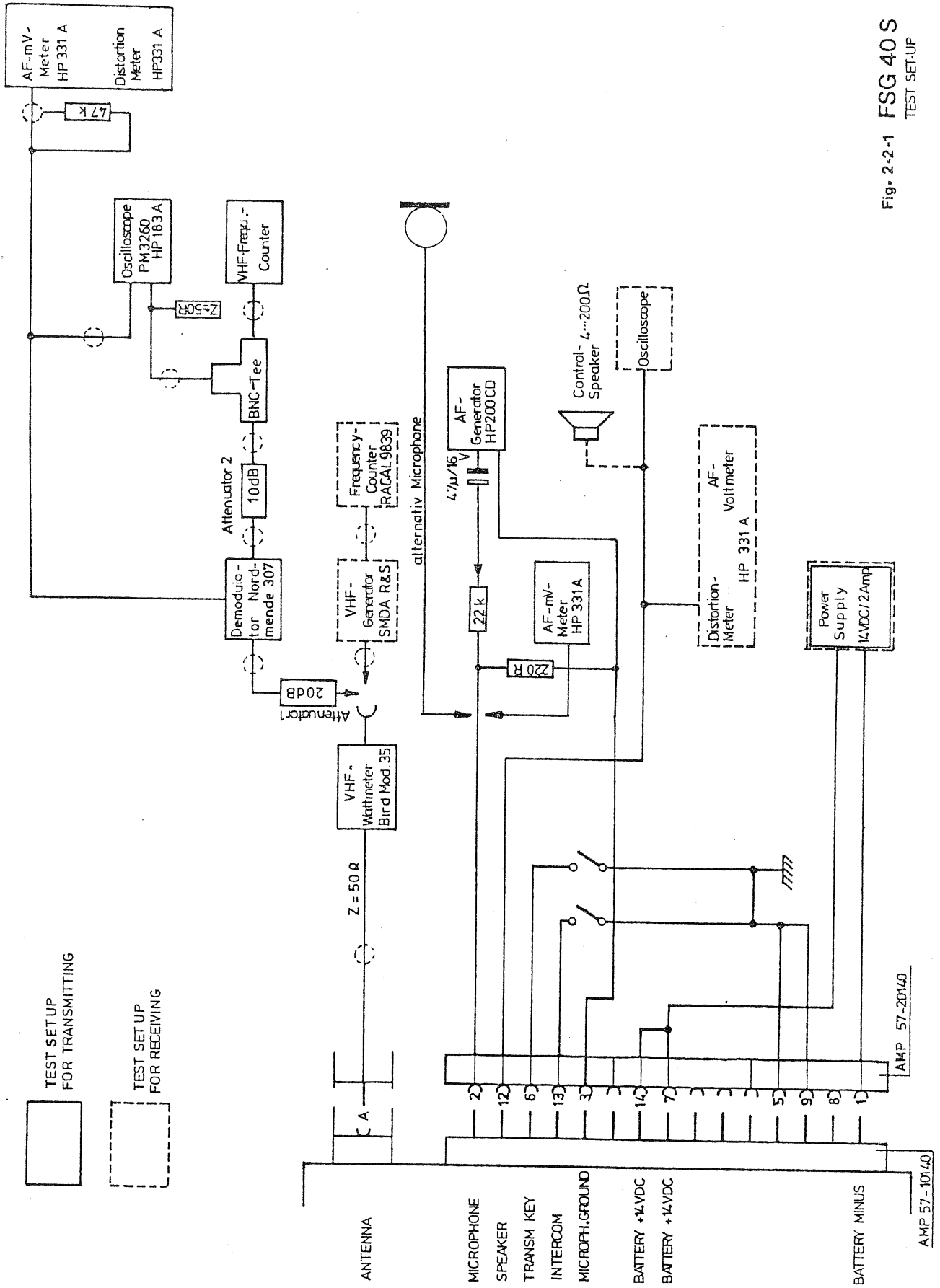


Fig. 2-2-1 FSG 40 S
TEST SET-UP

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2.2.2 Mechanical Installation

The COMM-TRANSCEIVER FSG 40 S is designed for an installation in any type of aircraft in the instrument panel or a control console. The mounting of the Slide-in support is illustrated in Fig. 2.2-3 and shows all necessary dimensions.

In aircrafts without an appropriate knock-out panel, an opening according to the dimensions seen in Fig. 2.2-3 has to be cut.

2.2.2.1 Installation into the Slide-in-support

- Push locking plate down into the slot, if it's up.
- Slide in unit until frontplate is flush with the mounting case/instrument panel. The connectors are automatically engaged.
- Tighten larger screw clockwise (upper right hand corner), to engage the locking plate mechanism by means of interlocking the unit to the mounting frame.
- Check whether unit is locked.

2.2.2.2 Use of FSG 40 S in Slide-in-support ES 15 of FSG 15/16

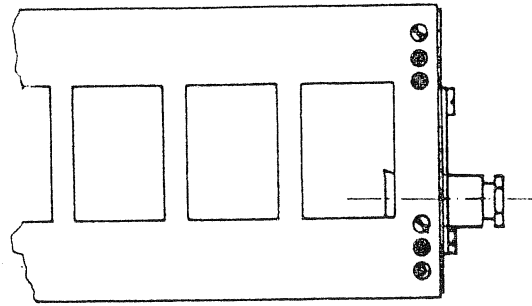
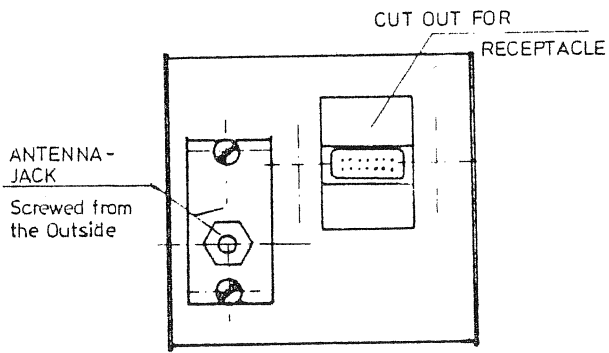
For using the FSG 40 S in the slide-in-support ES 15 of FSG 15/16 a conversion backplate with the respective cut-outs for the connectors is obtainable. The conversion of the slide-in-support has to be done as follows:

1. Disconnect battery.
Remove old unit by loosen the clamping screw.
2. Dismounting of slide-in-support from instrument panel. Loose the 4 front screws and, if installed, the back support.
Back support, if not yet installed, is recommended.
3. Loosening of cable supporting loop.
4. Remove screws of main connector. Take out main connector backwards through cut-out.
Take care of screws and spring washers!
5. Unscrew supporting plate of antenna plug (loose only the two larger screws, the two small ones remain). Remove whole plug plate.

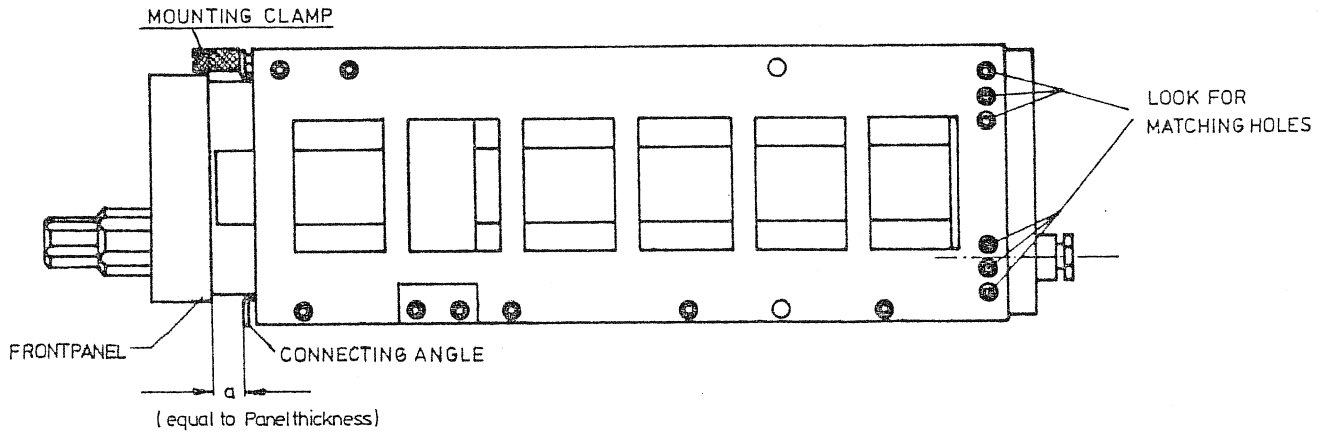
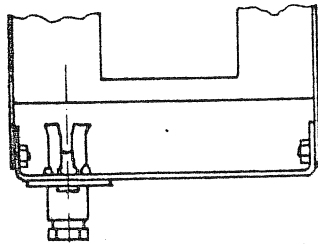
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6. Loose lateral screws of rearplate (counter by use of spanner 5 mm) and remove rearplate.
7. Ascertain panel thickness (a).
Move FSG 40 S unit so far into the support, that distance between frontplate and connection angle of slide-in-support is equal to the panel thickness (a). (See Fig. 2.2-2)
Fix unit with clamping screw.
8. Take new rear plate, put main connector through the respective cut-out (see Fig. 2.2-2) and fasten it by screws. (Keep screw socket tight!)
9. The antenna plug has to be fixed from the inside by using the two big screws. The thread housings are already mounted correctly.
10. Fix cable assembly at supporting loop.
11. Mount prepared rear plate so in support that connectors snap in.
Ascertain which fastening holes (for the rear plate) fit. Mark them.
Remove rear plate again, loose clamping screw, pull out unit.
Mount rear plate in the frame and bring marked holes one upon another.
12. In any case the screws must be mounted into the four matching holes (otherwise no exact socket connections will be the result!).
Put on nuts and spring washers from inside and fasten the screws by using spanner 5 mm as counter.
13. Mount slide-in-support into panel (see 2., back support is recommended).
14. Now the FSG 40 S can slid into the support.
Move unit till latch and fasten clamping screw.
Connect battery.

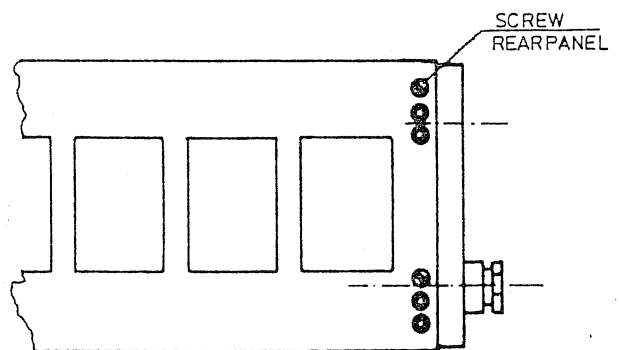
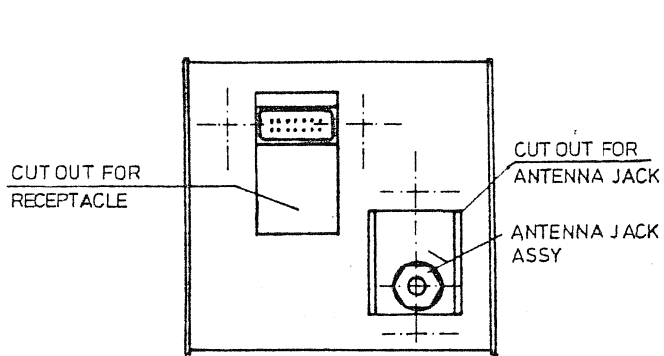
Now the FSG 40 S, fixed in slide-in-support ES 15 of FSG 15/16, is ready for operation.



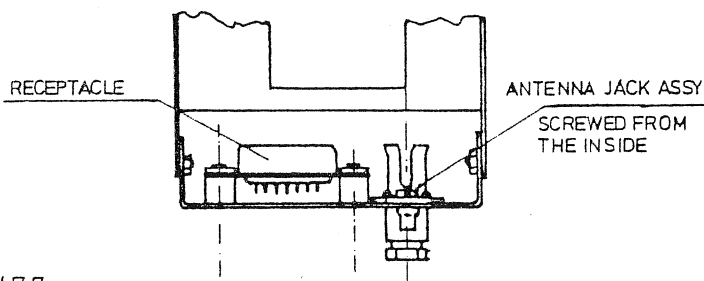
REAR PANEL OF FSG15/16 SLIDE-IN-SUPPORT



ADJUSTMENT OF REARPANEL



REARPANEL ES 15 AFTER CONVERSION TO FIT FSG40S



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Fig. 2.2-2 CONVERSION OF ES 15

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2.2.2.3 Dismounting of the unit

- Turn the larger inner-hexagon screw counter-clockwise in the upper right hand corner until screw moves slightly forwards and backwards. This assures that the locking plate is out and free of the inter-locking position.
- Pull out the unit and make sure that the locking plate will not be turned-up again.

2.2.3 Board - Interconnection

The illustration Fig. 2.2-4 shows the wiring-chart of the COMM-TRANSCEIVER FSG 40 S. It should be pointed out that the wire size to be used to Pin 7, 8 and 14 of the connector AMP 57-20140 shall be 0.75 mm² (AWG 20).

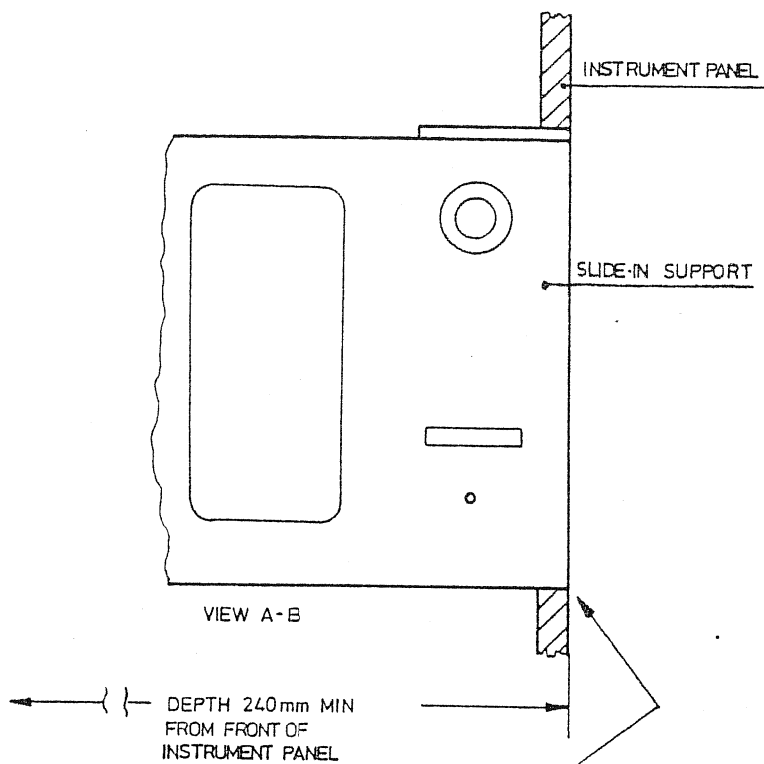
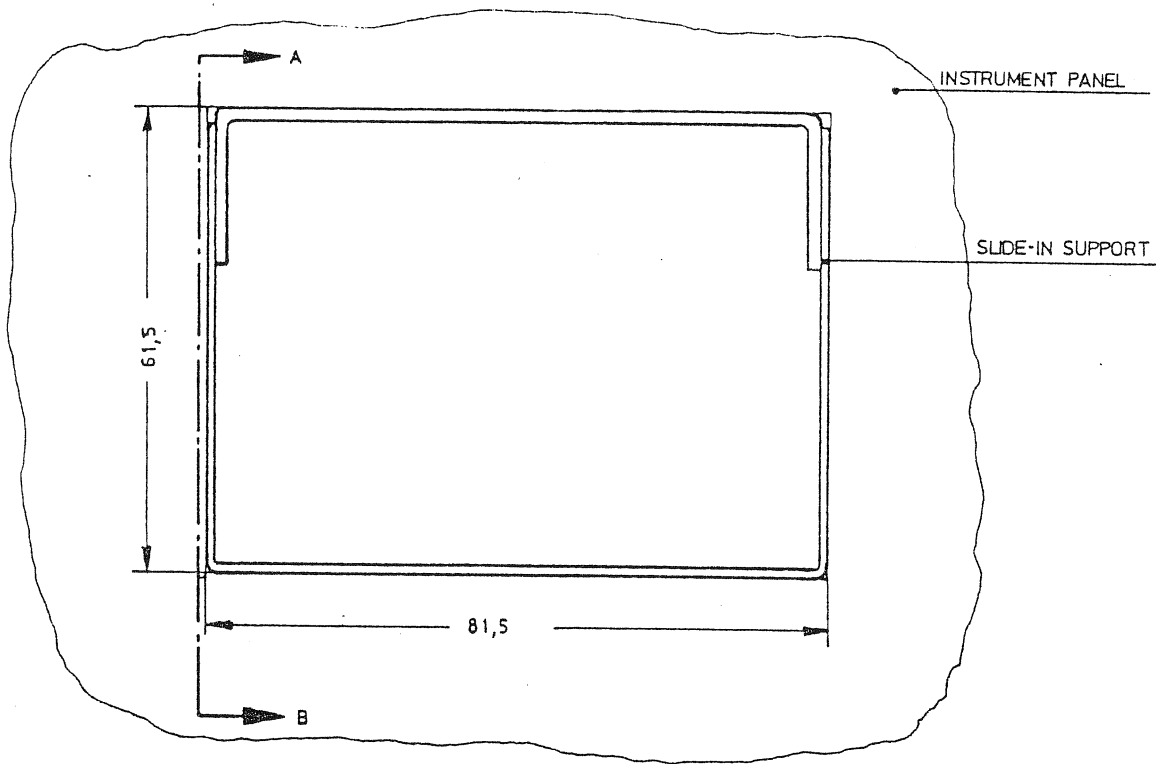
If an inter-com system is desired, the connection Pin12 has to be removed and Pin 13 has to be switched to ground by the IC-switch.

The antenna cable (RG 58 C/U) has to be connected to the antenna-plug as seen in Fig. 2.2-6.

2.2.4 Microphone Connection

The FSG 40 S is designed for a dynamic microphone (200 Ohms) input. However, the unit will handle max. two mikes (Pilot and Co-Pilot).

After a small modification on the audio amplifier p.c. board (mount 2 resistors, remove one short-circuit bridge) also standard aircraft microphones (Amplifier-Microphones) can be used.



NOTICE : MAKE SURE THAT THE SLIDE-IN SUPPORT IS FLUSH WITH THE INSTRUMENT PANEL

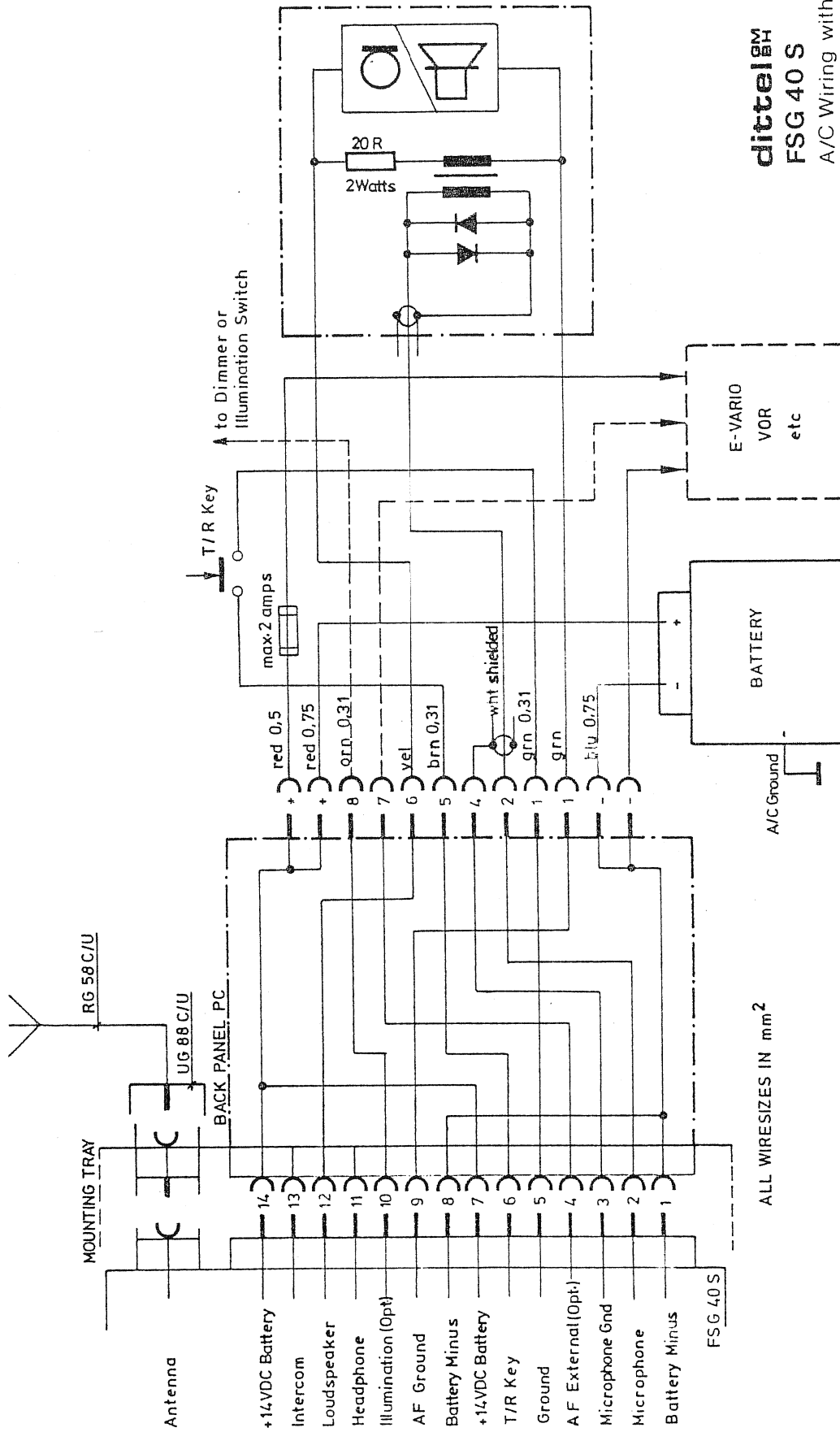
ALL DIMENSIONS IN MILLIMETERS

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Fig.2.2-3 FSG40S
MOUNTING DIMENSIONS

Supplement

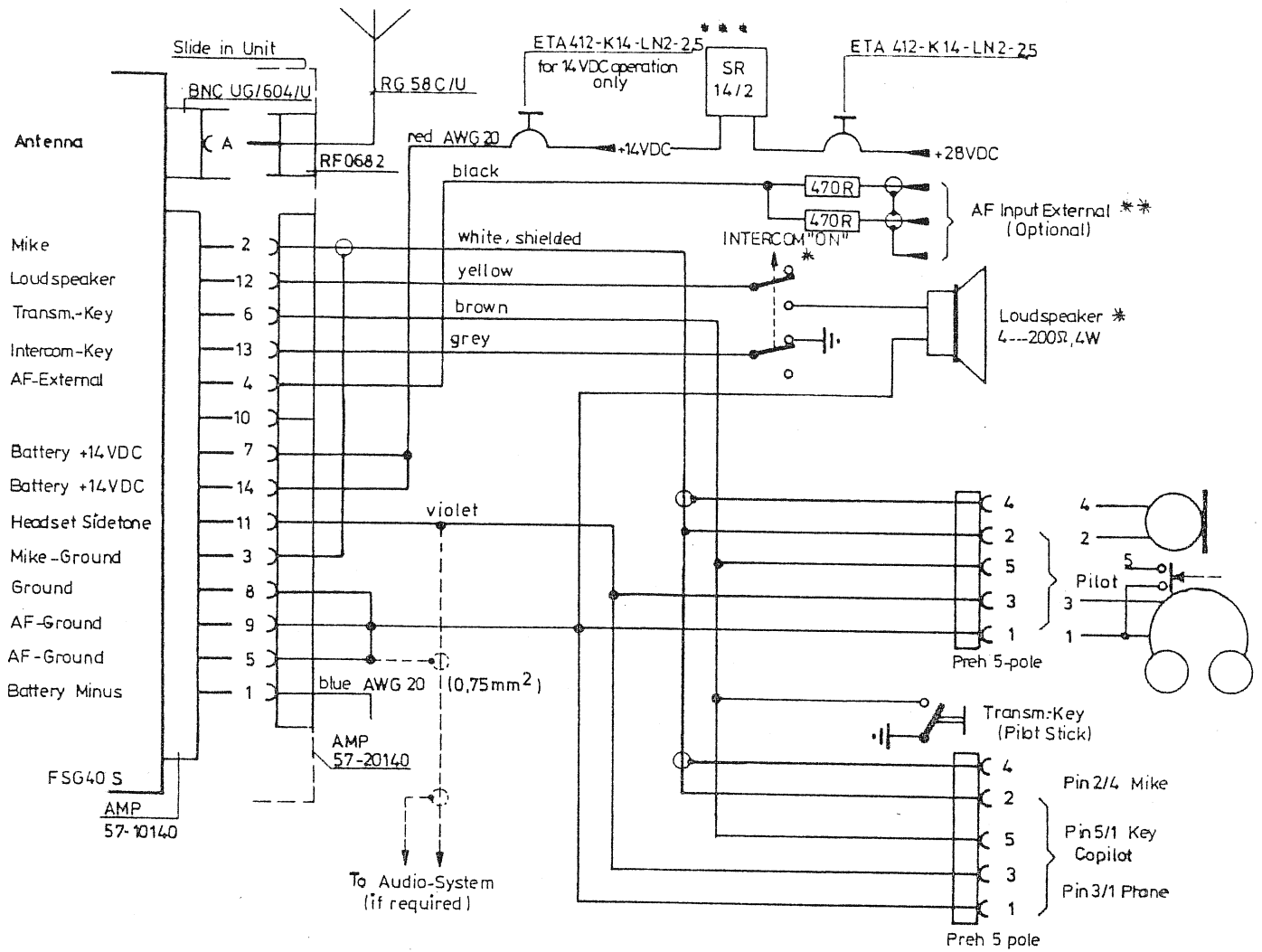
(Valid only for Mounting Tray with Back Panel PCB and Microphone - Loudspeaker - Combination)



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A/C Wiring with
Microphone - Loudspeaker -
Combination
(one set only)

ALL WIRE SIZES IN mm²



Wires not indicated AWG 22 $\hat{=}$ 0,31mm²

- * Connect speaker to pin 9 and 12 if Intercomm is not required
- ** The input "AF-External" (Option NFF) can also be installed additionally
- *** or wire fuse G 2.5A

Fig. 2.2-4 FSG 40 S

INSTALLATION WIRING
DIAGRAM

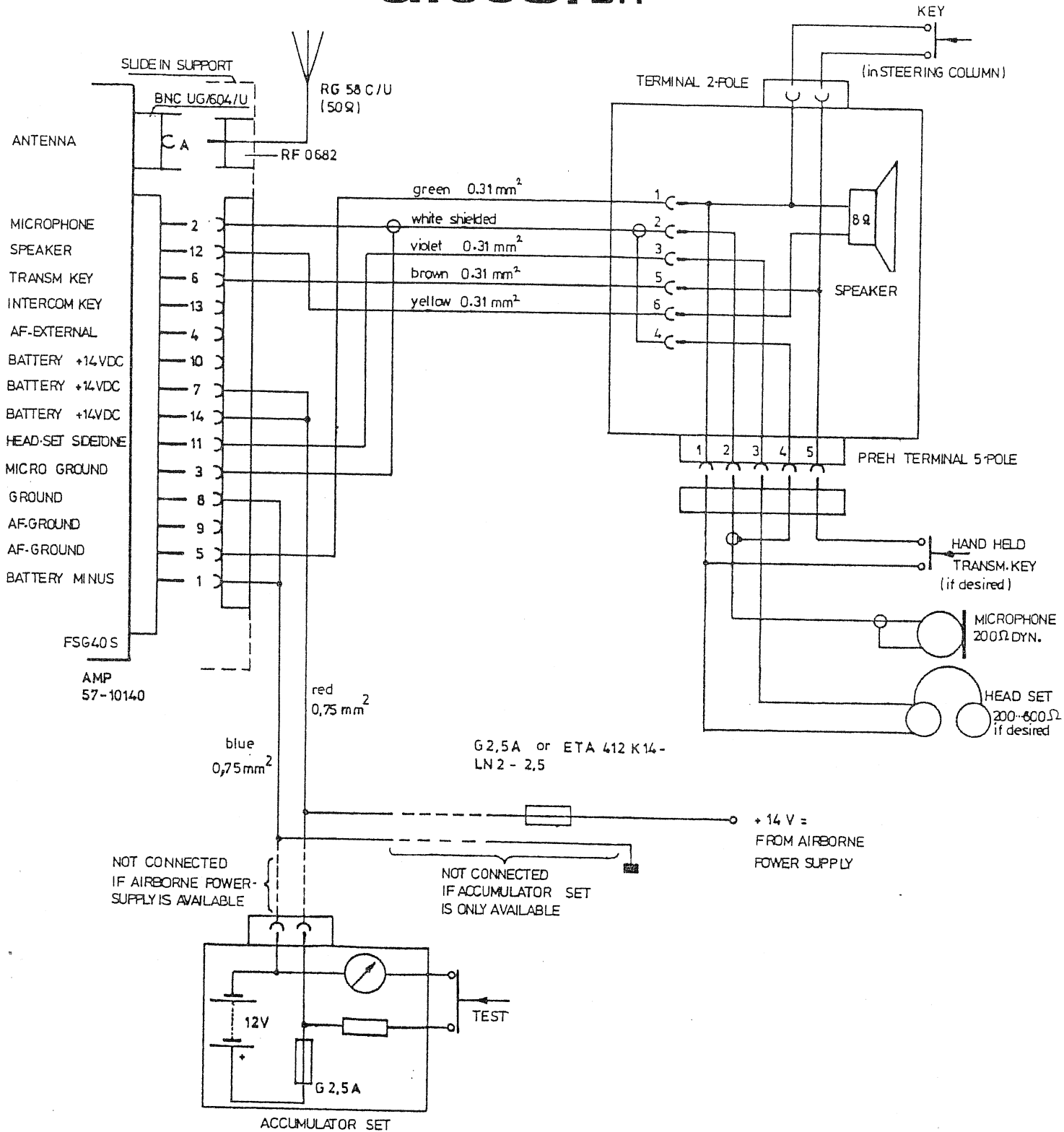
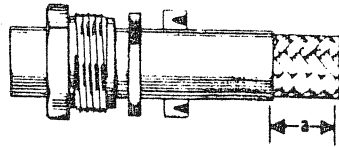


Fig-2-2-5 FSG 40 S

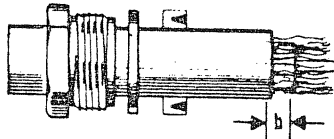
INTERCONNECTION FOR SINGLE-SEATED AIRCRAFTS

2.2.5 Antenna Cable Connection



a = 10,75 mm

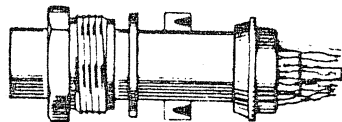
Cut end of cable sharp and square, put over the cable in order: Nut - washer - Silicon washer. Cut off jacket to length indicated.



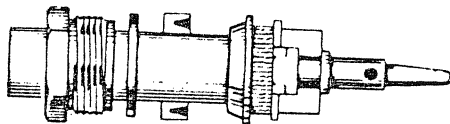
b = 4,75 mm

Comb out braid and fold out, cut off cable dielectric to dimensions as shown. Cut has to be sharp and square.

CAUTION: Do not cut/damage the centre conductor!

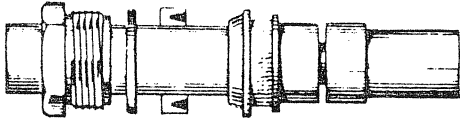


Pull braid wires forward and towards centre conductor and slide clamp over braid.



Fold back braid wires as shown, trim to proper length and evenly form over clamp as shown. Tin exposed centre conductor using min. amount of heat.

Do not distort dielectric so as to prevent proper mating with bushing and rear insulator. Slide on bushing, rear insulator and contact. These parts must butt, as shown. Solder contact to centre conductor. Remove flux and and excess solder from contact.



Cool down solder joint
and slide front insulator
over contact and butt against
contact shoulder as shown.
Do not reverse direction of
insulator.

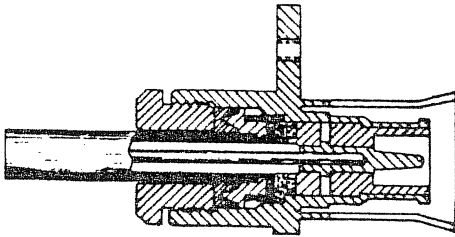


Fig. 2-2-6

The cable can now be inserted
into conductor body and
tightened with the nut holding
body stationary.
Correct assembling is
important.

Note: Do not damage any plastic
parts through excessive
heat!

Make sure that the parts
are assembled the right
way!

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2.2.6 Audio-Input (External)

A special input (Pin 4 of AMP-10140) has been provided for connection of headset outputs from other units (i.e. NAV-Receiver) to be amplified and made audible through the AF-Amplifier of FSG 40 S. This possibility of connecting two units will be needed especially in those aircrafts, which for example have only one COMM-Transceiver and only one NAV-Receiver. The headset output of a NAV-Receiver can be directly switched to the Audio-Input External of FSG 40 S. Therefore both receiver can be monitored with a common headset or loudspeaker.

An audio signal level of ca. 1 V_{RMS} is necessary to drive the amplifier of the transceiver FSG 40 S.

The audio input (external) -if desired- must be ordered as option, but can also build-in later.

2.2.7 Mode "Intercom"

With the FSG 40 S Intercommunication between pilot and co-pilot is possible without an additional unit. Only a "Intercom"-switch has to be connected into the board-wiring-system.

As it is seen from the interconnection-chart (Fig. 2.2-4) a double-pole switch connects Pin 13 to ground and disconnects the loudspeaker, if it is switched to "Intercom".

(Disconnection of the loudspeaker is necessary during IC-operation to prevent acoustical feedback.)

2.2.8 Sidetone-Monitoring

Incorporated in the unit FSG 40 S is a special feature to "Monitor the Transmitting Output". Part of the modulation signal during transmitting periods is fed to the "Output Headset" and the volume can be adjusted accordingly (see Fig. 2.2-7).

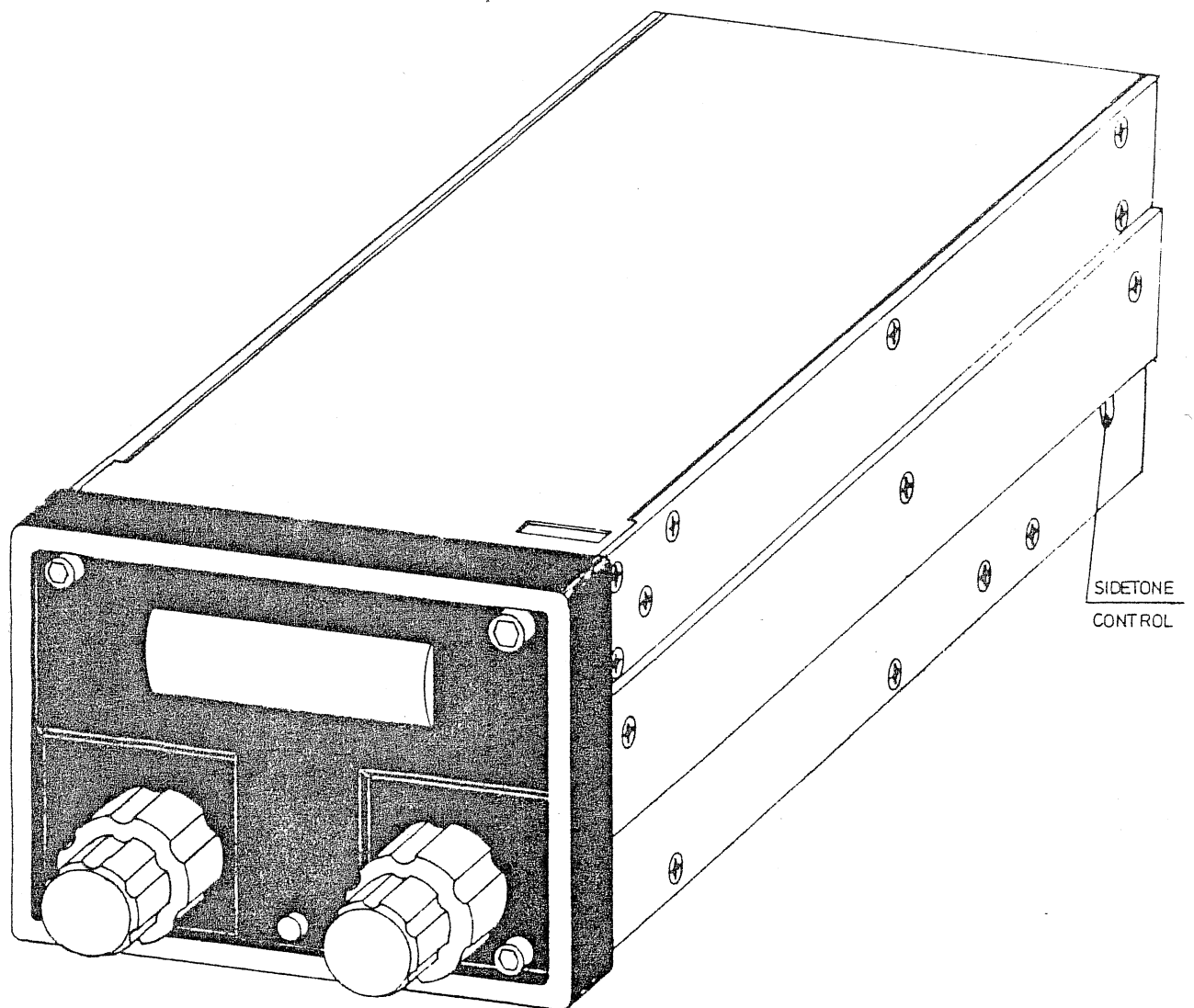


Fig.2.2-7 FSG 40 S

LOCATION OF SIDETONE CONTROL

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2.2.9 Testing after Installation

2.2.9.1 Ground-Test, while Engine "OFF"

After installation of the unit a reflection test of the coax-cable has to be made between the antenna termination point and the connection side of the transceiver (use a voltage-standing-wave-ratio-meter or a direction-sensitiv-wattmeter).

Over the entire frequency range the SWR shall be 2 : 1 or better (reflected power $\leq 10\%$ of the foreward power). Higher values indicate a mismatch in:

- Improper or false electro-magnetic counter-EMF
- Bad contacts
- False antenna length

A communication test with the tower shall complete the antenna measurement procedure.

2.2.9.2 Ground-Test, while Engine "RUNNING"

Running the engine, the board supply voltage has to be in permissable tolerances 14 VDC or 28 VDC. All tests have to be done at normal touring RPM's.

The communication with the ground station should be tested at the most possible distance.

The engine noise at touring RPM should be transmitted as low as possible for a clear understanding.

The hand-held mike should be kept close to the mouth to reduce the transmission of cabin noise in comparison to the volume level.

Noise effects, caused only by running engines and which increase at higher RPM's can be generated by a defective ignition system, generator/regulator or a ripple of air-borne supply (>1.5 Vpp).

An easy way to determine high frequency from low frequency interference is by disconnecting the antenna connector. HF-interference, mostly generated from ignition systems will disappear. Ripple of the board supply can be traced easily with a scope, the common reason is mostly the generator in connection with a weak battery or bad wiring (bad contacts, defect switches, low cross-section-areas).

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2.3 OPERATING INSTRUCTIONS

(see Fig. 2.3-1)

2.3.1 Communications

1. Turn Vol-Knob clockwise to switch on the transceiver.
2. Set frequency selection switches to desired frequency.
3. Depress Test-Button, a typical receiver noise should be noticeable in the headset or speaker.
4. After depressing the push-to-talk-key the ground-station (tower) can be called. Keep the microphone close to the mouth when talking.
5. During reply of the ground-station, adjust VOL-control to normal level.
6. Note:
The COMM-TRANSCEIVER FSG 40 S has incorporated a fully electronic noise discriminator network. Therefore a squelch adjustment is not necessary. The basic adjustment for the automatic is done at the manufacturer.

2.3.2 Inter-Communication (IC)

If the board interconnection of the FSG 40 S is adapted for Intercommunication, the operation is as follows:

1. IC-switch "ON"
2. Board inter-com and monitoring of the other units is possible.
3. Transmission can be done without switching OFF the IC-switch.
4. Releasing the push-to-talk-key (non-transmitting state), the system automatically is in the inter-com condition.

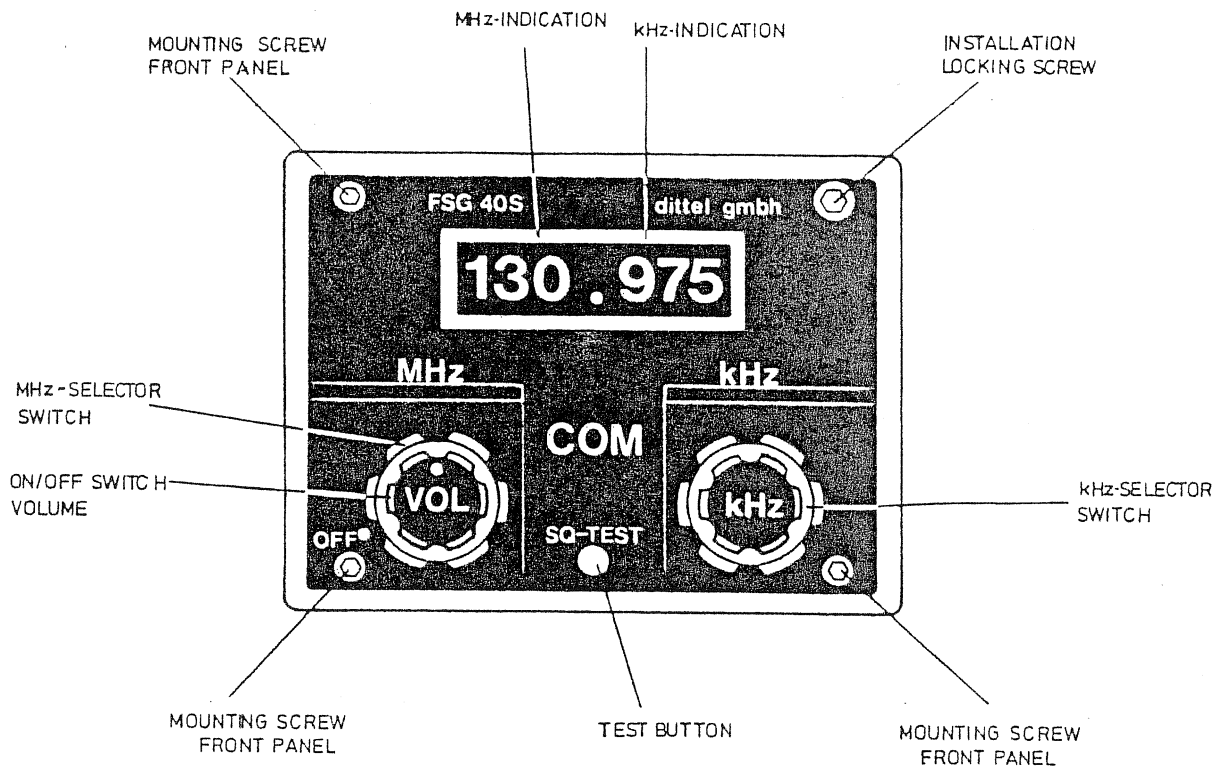
2.3.3 AF-Input (External)

A special input of the FSG 40 S and its AF-Amplifier has been provided to connect and monitor a second or third unit (NAV-Receiver) etc.

Making use of this interconnection special attention has to be given to the loudness setting of the auxiliary equipment at the external locations. The signals should be adjusted for clear and distinguished understanding. The volume control of the FSG 40 S does not control the external units or vice versa.

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OPERATING PART	DESCRIPTION	FUNCTION
VOL	Potentiometer with ON/OFF-Switch	Volume Control ON/OFF-Switch
MHz-Frequency Switch	18-Position Rotary Switch	Switches in 1 MHz-Steps
kHz-Frequency Switch	40-Position Rotary Switch	Switches in 25 kHz-Steps
SQ-Test	Push-Button	In Receiving Mode: Button pressed, typ. RX-noise

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2.4 THEORY OF OPERATION

2.4.1 Preface

The electrical operation of the COMM-TRANSCEIVER FSG 40 S will be discussed in conjunction with the block diagram Fig. 2.4-1.

The unit is divided into six electrical function groups:

- Frequency Synthesizer
- Receiver
- Audio Amplifier
- Transmitter
- Stabilization Circuit
- Control Circuit

2.4.2 Function Description (according to block diagram Fig. 2.4-1)

2.4.2.1 Frequency Synthesizer

In the digital frequency synthesis the transmitting and mixing frequencies are generated for all channel frequencies of:

118.000 MHz to 135.975 MHz in 25 KHz steps

To gain this a voltage controlled oscillator (VCO) is used which tuning is done by a control loop.

The output of the voltage controlled oscillator is fed through a separation amplifier and divider to a mixer stage.

Injected into the mixer are the two crystal frequencies of 80 MHz resp. 75 MHz.

For channel-frequencies between 118.000 and 127.975 MHz the mixing is done with 75 MHz and for channel-frequencies between 128.000 and 137.975 MHz the mixing is done with 80 MHz, so that the difference-frequency is always between 11 and 16 MHz.

The difference-frequency is coupled over a divider (1 : 4) through an interface circuit to a programmable counter. The program command is given by two rotary switches in 25 KHz steps which are coupled mechanically with the indicator dials on the frontplate.

The output-frequency of the program divider is fed to a phase-comparator and compared with a crystal stabilized reference frequency of 3.125 KHz.

The output-voltage of the phase-comparator passes a charge-pump as well as a low-pass network and is fed to the tuning input of the voltage controlled oscillator (VCO). Herewith the control-loop is closed. (See block diagram Fig. 2.4-1)

2.4.2.2 Receiver

The receiving section of the FSG 40 S consists of a single superheterodyne receiver with four variable capacitive diode tuned input circuits, FET-mixer, monolithic crystal filter (IF=10.000 MHz), automatic gain control (AGC) by 3 Pin diodes and an automatic noise suppression circuit.

The gain-control is delayed and starts at a signal level of ca. 100 μ V providing a sufficient signal/noise ratio is present. A wide-band, fixed tuned antenna filter cuts off interference with signals > 200 MHz.

The antenna filter is used by the transmitter as a harmonic filter.

An automatic Noise-Suppression-Circuit opens the squelch-point according to interference level (normal at 1 μ V). The test switch (located on the frontpanel) can be operated manually (manual squelch override).

The demodulated audio signal is fed over the volume control to the audio amplifier.

All active stages of the receiver are supplied with a stabilized voltage of 10.0 VDC which will be disconnected during transmitting. In addition, the responding regulating diodes (varactors) block immediately the receiver input during transmitting.

2.4.2.3 Audio Amplifier

The Audio Amplifier contains different switching stages, a modulation control with FET, a low-noise input-amplifier, an active low-pass-filter 3rd order for suppression of heterodyne whistle, which can be generated from ground stations working with incovering systems (CLIMAX-Units), as well as an integrated power amplifier.

The amplification of the microphone amplifier can be adapted for microphone voltages of 2 ... 20 mV.

The switching stages work as follows:
During receiving the auxiliary Audio-Input is in operation, the audio-receiver-input will only be in operation when the squelch line (SQ) has a voltage of 0 ... 1 VDC. This can be gained by pushing the squelch-test-button at the frontpanel or when an effective signal of sufficient level is at the receiver-input. The microphone input will only be in operation if the inter-com line (by the Inter-Com - switch) is connected to ground.

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During transmitting the microphone in-put is switched to the audio-amplifier, all other inputs remain blocked.

The threshold of the modulation control can be varied between $m = 0.3 \dots 1.0$ continuously.

2.4.2.4 Transmitter

The amplifier of the transmitter has a wide-band characteristic and consists of four stages:

- a) Buffer amplifier
- b) Pre-amplifier with base modulation
- c) Driver stage
- d) Final stage with collector modulation.

The stages are coupled with wide-band ferrite-transformer.

A Zenerdiode prevents overvoltage which could destruct transistors.

The antennafilter (harmonic suppressor) is used also by the receiver.

A relay determines the switching function of the antenna connection either transmitting or receiving.

Further contacts of this relay cause the switch-over of the supply voltage (+ 10 VDC) of small-signal-stages as well as the switch-over of the AF-power amplifier as a loudspeaker amplifier (receiving) or as a modulation amplifier (transmitting).

2.4.2.5 Supply, Regulation- and Control Circuits

The FSG 40 S operates from a source of + 14 VDC. At a board supply voltage of + 27.5 VDC, a voltage regulator (SR 14/2) has to be incorporated (external) for conversion to the required + 14 VDC.

The input supply is protected with a diode against wrong polarity. Wrong polarity will blow the fuse 2.5 A.

The connection of the supply voltages is wired over the ON/OFF-switch to a filter with a frequency limitation of approx. 150 Hz, to suppress interference from the air-borne supply.

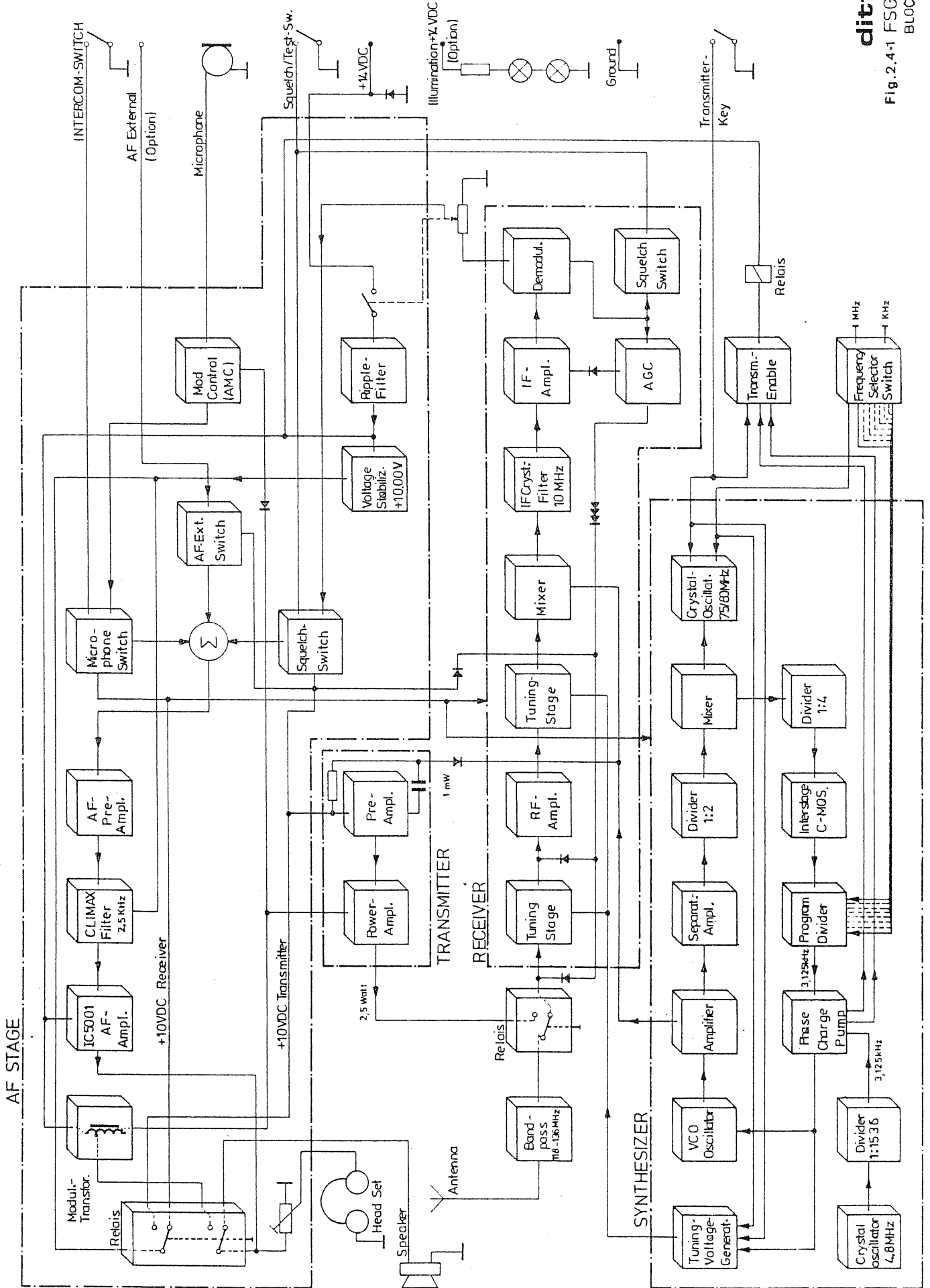
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The filtered voltage then supplies directly the output stage of the audio amplifier, the switching relay of the transmitter and the amplifier and the voltage regulation circuit.

The output of the voltage regulation circuit is + 10.0 VDC independent of load or temperature changes.

The distribution of the regulated voltage to transmitter- or receiver stages is switched by the relay of the audio amplifier.

The frequency synthesis requires ca. 30 msec to stabilize by switching from receive to transmit. During this period, electronically no transmitting of random frequencies will be permitted because of employment of a special phase-lock-detector. Only after the transmitter-frequency is totally stabilized and exactly present, the switching-relay will be activated.



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 Fig. 2.4-1 FSG 40 S
 BLOCK DIAGRAM

Performance-Test	
ANNUAL CHECK	

Type: FSG 40..... Category:..... Serial-No..... Year of Manuf.....

Supply voltage for all measurements: 13.75 + 0.25 VDC

Stab. Voltage:VDC (10 ± 0.06 VDC)

Rest Current: mA (135 ± 15 mA FSG40A; 75 ± 10 mA FSG40S)

1. Transmitter Measurements: (P ≥ 15 W ≙ FSG 40A; P ≥ 2 W ≙ FSG 40S; Δf ≤ 1.5 kHz)

f(MHz)	P(Watt)	Δf(kHz)	f(kHz)	P(Watt)	Δf(kHz)	f(kHz)	P(Watt)	Δf(kHz)
118.000			.025			.525		
119.000			.050			.550		
120.000			.075			.575		
121.000			.100			.600		
122.000			.125			.625		
123.000			.150			.650		
124.000			.175			.675		
125.000			.200			.700		
126.000			.225			.725		
127.000			.250			.750		
128.000			.275			.775		
129.000			.300			.800		
130.000			.325			.825		
131.000			.350			.850		
132.000			.375			.875		
133.000			.400			.900		
134.000			.425			.925		
135.000			.450			.950		
			.475			.975		
			.500					(< 1.5 kHz)

Mike-DC-Voltage:VDC (3.6 ± 0.4 VDC on 100 Ohms Ampl.-Mike)

Mod-Frequ.-Response: db (< 6db at m=0.3/ 350-2500 Hz)

: db (> 18db at m=0.3/ 4000 Hz)

Mod-Voltage:mV (for m=0.85 at 1kHz)

Mod-Factor: m = (1kHz; 10mV dyn. Mike; 1V Amp-Mike; m ≤ 0.95)

Distortion:% (m=0.85; 1kHz; < 10%)

Monitor-Volt.:V (m=0.85; 1kHz; ≈ 3V)

Current Cons.:/.....A (m= 0 ; m=0.85; 1kHz)

2. Receiver Measurements:

HF-Voltages on 50 Ohms

f(MHz)	118.000	122.500	127.975	128.000	132.300	135.975	
SQ							(≈ 1 μV)
$\frac{S+N}{N}$ (db)							(> 6db/1.5 μV)

Amplification:μV (< 2.5μV at 1kHz; m=0.3; 4W ≙ FSG-40A/3W ≙ FSG 40S)

Bandwidth:kHz/.....kHz (≥ 10.0kHz; 6db at 118.000MHz; m=0.3; 1kHz)

AGC:db (< 3db; 5μV-200mV; m=0.3; 1kHz)

Selectivity:db/.....db (-25kHz/+25kHz at 118.000MHz; m=0.3; 1kHz)

AF-Response:db (< 6db at m=0.3; 350-2500Hz; 100μV HF)

:db (> 18 db at m=0.3; 4000Hz; 100μV HF)

Distortion:% (< 10% at m=0.85; 1kHz; 20μV HF; nominal output)

AF External:

Inter-Com:

Pulse stop:

Illumination:

DATE:

Sign. of Controller: