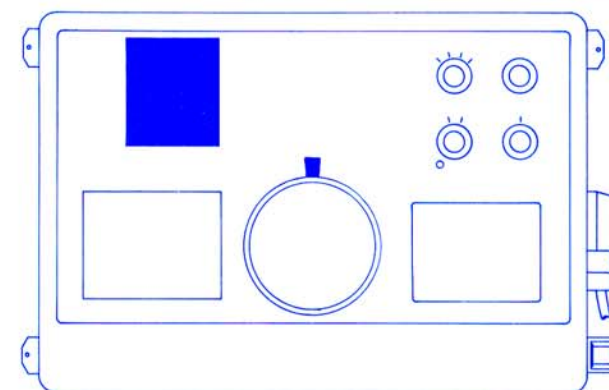


**NAGRA KUDELSKI**

OPERATING INSTRUCTIONS

**FAXDM**



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**NAGRAFAX**

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## FAXDM OPERATING INSTRUCTIONS

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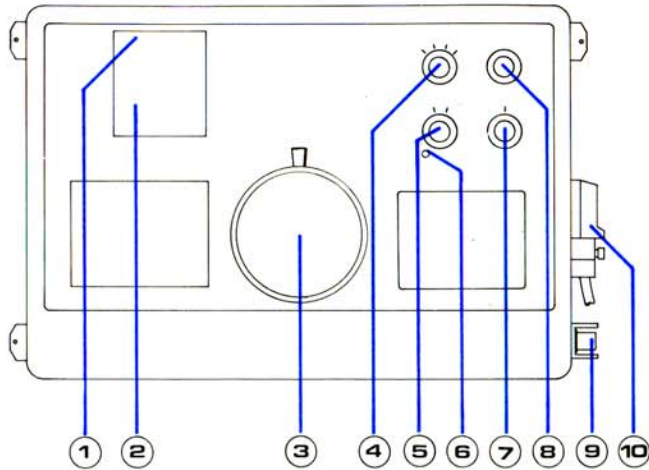
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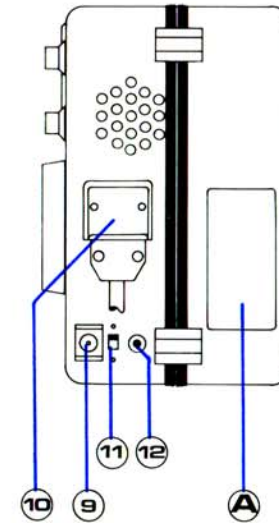
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1	PRESENTATION	page 2
2	DISPLAYS	page 4
3	OPERATION	page 6
4	CHANNELS	page 8
5	ANTENNA	page 10
6	EARTH	page 12
7	PERFORMANCES	page 16
8	BLOCK DIAGRAM	page 18
9	SPECIFICATIONS	page 20

# 1 PRESENTATION



- 1 Antenna input level monitor LEDs
- 2 Frequency centring control LEDs
- 3 Channel selector
- 4 On/Off switch for FAXDM
- 5 Antenna input attenuator
- 6 Input circuits saturation LED
- 7 Fine frequency centring adjustment
- 8 Monitoring loudspeaker volume adjustment
- 9 Floating antenna input (BNC)
- 10 Video signals output
- 11 Antenna cable screen earthing switch
- 12 Earth connector



Connector 10 Descriptive plate A

Video signals output and power supply input

Direct connection to input 14 on the FAXTHF

Connector 9 Descriptive plate A

Floating antenna input. Unbalanced input when 11 is switched "On"

Direct connection of cable from FAAD

Connector 12 Descriptive plate A  
Earth connection

Direct connection to an external earth

Several simple-to-use adjusting devices on the FAXDM are used to optimize the reception quality.

#### Antenna input level monitor ①

The input level is read from left to right. When the extreme right LED is illuminated, the input level is maximum and can be reduced by 20 dB by operating switch ⑤

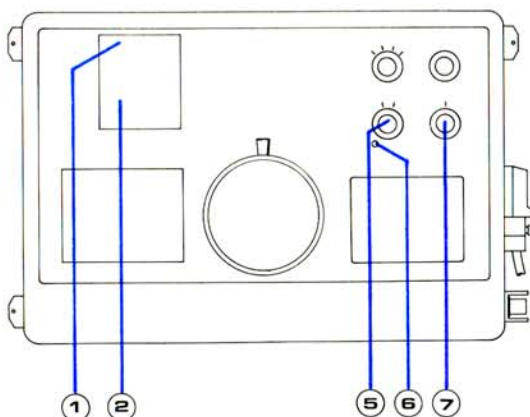
#### Antenna input attenuator ⑤

This attenuator is used to isolate the fac-simile signal by reducing the affect of intermodulation products due to unwanted adjacent transmissions.

#### Input saturation LED ⑥

LED lights when a powerful transmitter is transmitting on a near frequency so that it saturates the input circuit. In this case switch ⑤ to -20 dB position.

#### Antenna input



#### Frequency centring

#### Frequency centring control LEDs ②

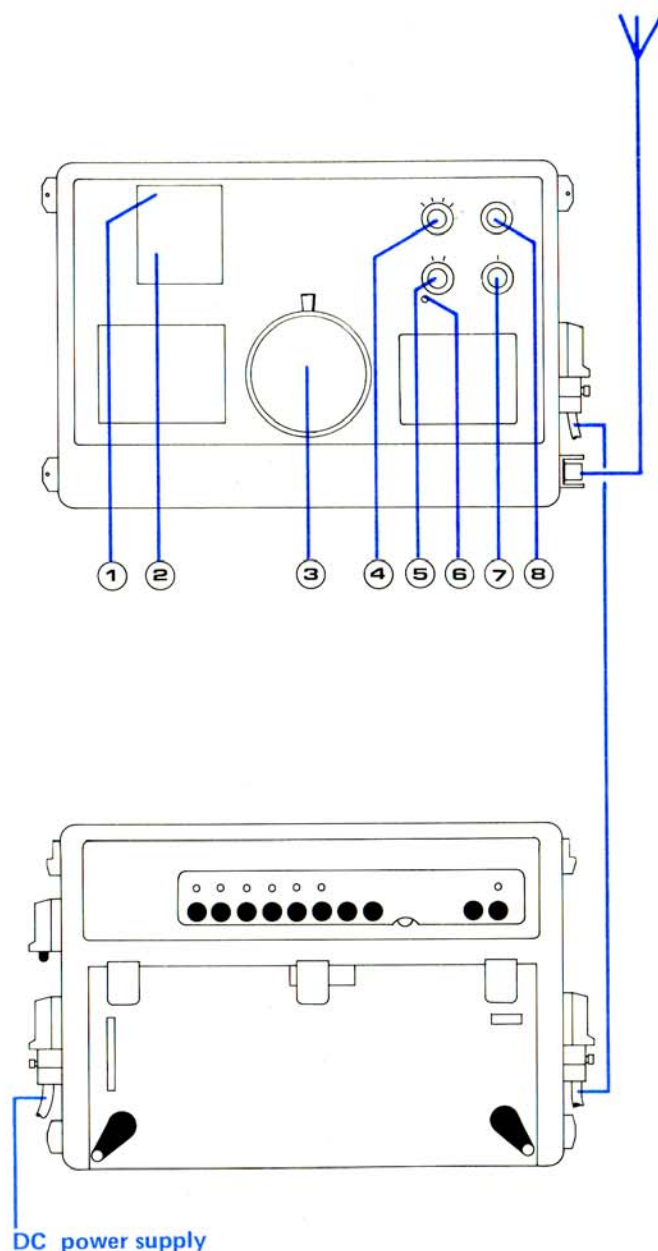
The facsimile signal is composed of two pure notes, the high note corresponds to a "white" signal and the low note to a "black" signal.

Usually, the sound emitted from the loudspeaker between two chart transmissions corresponds to a "white" signal. At the beginning of each chart transmission, the sound passes alternately from the high (white) to the low (black) note, and during transmission of the chart the sound emitted is composed of the high note on which a crackling sound is superimposed: the recurrence of the latter corresponds to the scanning speed of the styli (60, 90, 120 or 240 rpm).

The display ② is a visual monitor of sound signals. The two LEDs marked black (on the left) and white (on the right) allow the illuminated LED to correspond to the kind of signal received. Taking the same examples as above, at the beginning of a chart the "black" LED and the "white" LED will light up alternately (phasing signals); while the chart is being transmitted the "white" LED remains lit and there is a rapid displacement of brightness towards the "black" LED.

In practice, this means that if a "white" signal is being received the potentiometer ⑦ should be regulated so that the "white" LED is illuminated. Similarly, during the transmission of a chart, the brightest LED should, by the same process, be made to correspond with the "white" LED. If reception is bad, several LED will be illuminated at the same time: in this case it is the brightest which should be considered as the "white" LED.





Connect up the equipment as on the opposite drawing.

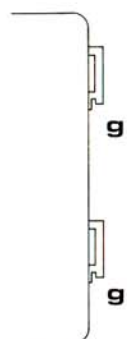
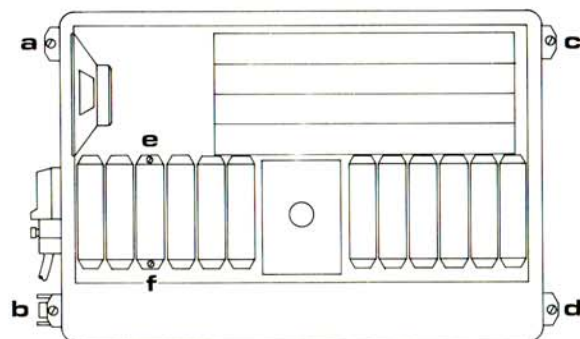
- Switch antenna input attenuator ⑤ to 0 dB
- Switch ④ to "On + Display + Loudspeaker"
- Switch the FAXTHF "On"
- Select a channel with ③
- Adjust loudspeaker volume with ⑧
- Look at the antenna input level display ① . If the signal level is insufficient, select another channel. If the signal level is good but disturbed by other transmissions switch ⑤ to -20 dB
- Look at saturation LED ⑥ . If it lights up switch ⑤ to -20 dB
- Look now at frequency centring display and centre the frequency by turning ⑦ (see page 4 )
- If a chart is in the process of transmission, centre the frequency and refer to the chapter 3 of FAXTHF operating instruction to pick up the chart
- Once all adjustments have been carried out, switch ④ to "On + Display" to switch off the loudspeaker or to "On" to save maximum power.

FAXDM channels are plugged in inside the box in order to ensure very good performance even in a humid atmosphere.

### General

They are plugged in in ascending order from left to right, as on the selector. They have no specific place so that they can be plugged in anywhere in the FAXDM without malfunction.

Replacement of a channel must be carried out in a dry place with dry hands.



- Operation**
- Disconnect the FAXDM
  - Place the FAXDM on its front panel
  - Unscrew (a), (b), (c), (d) screws securing the two box shell
  - Remove the rear shell
  - Identify the channel to be changed and unscrew the corresponding fixing screws (e) and (f)
  - Take out the channel vertically
  - Remove the screws and place it on the new channel
  - Position the channel and screw down the fixing screws a little
  - Gently ease the channel until it is plugged
  - Screw home (e) and (f)
  - Replace the rear shell taking care that the slots (g) of the fixing brackets are downwards.
  - Screw home (a), (b), (c), (d).

Reception of good copy depends mainly on the quality and care taken when installing the antenna and earth.

A simple wire of 2 mm<sup>2</sup> section is sufficient. The section can be increased if the wire is subject to high mechanical strains. A plastic sheathed wire will decrease the disturbance due to rain but on the other hand increase of wind loading and ice loading in cold areas should be taken into consideration. The wire must have a length between 5 and 20 m, if longer it will introduce intermodulation noises in the receiver.

For a length between  $\lambda/10$  and  $2\lambda$  ( $\lambda$  = wavelength to be received) the antenna characteristic impedance may vary from a few Ohms to 200 Ohms. For higher wave length the impedance increases continuously and is similar to a grounded 100 pF capacitance.

Two antenna installations are possible depending on whether the FAXDM is equipped with VLF and HF channels or with HF channels only.

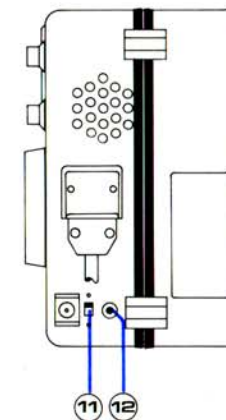
For a FAXDM fitted with HF and VLF channels the FAAD antenna adapter must be used. The FAAD converts the antenna high impedance (5'000 Ohms or more) into about 50 Ohms, and also enables the cable length to be increased up to 100 m without interference due to the coaxial distributed capacitance which can load the antenna. The FAAD must be directly connected to the antenna wire and be as near as possible to it. However to avoid direct injection of tracing sparks

#### Antenna wire

#### Installation

in the antenna the FAAD must be installed at least at 3 m from the FAXDM.

For a FAXDM fitted only with HF channels the use of the FAAD is not necessary. The antenna wire can be directly connected to the FAXDM or relayed by means of a short length of 50 Ohms coaxial cable.



#### Earthing

The FAXDM is fitted with an isolating transformer on the antenna input so that antenna downlead is floating with respect to the receiver ground. The switch 11 is used to connect the coaxial shielding of the downlead to the receiver ground.

Three earthing solutions are then possible:

- Ideal: direct earthing by means of the sleeve on the FAAD (drawings 1 page 12 and 2 page 13) 11 switched off.
- Correct: earthing by means of a copper wire fitted with a banana plug plugged on 12 (drawing 3 page 14) 11 switched off.
- Borderline: if no suitable earth is available near the equipment, earthing through power supply (drawing 4 page 14) with 11 switched on.



Aircraft	The fuselage	Earth selection
Buildings	The best earthing is made using a 1m <sup>2</sup> copper or galvanized plate put under 1m. of humid soil. Since is not often possible an earthing using plumbing or heating installation can be made. Do not use mains connector earth or neutral terminal as they are often disturbed	
Boats	The hull if metallic even polyester protected (5 mm or more). A ground plate with a 1m <sup>2</sup> effective surface, as already installed if the boat is equipped with an SSB receiver. Do not use motor frame or screw.	

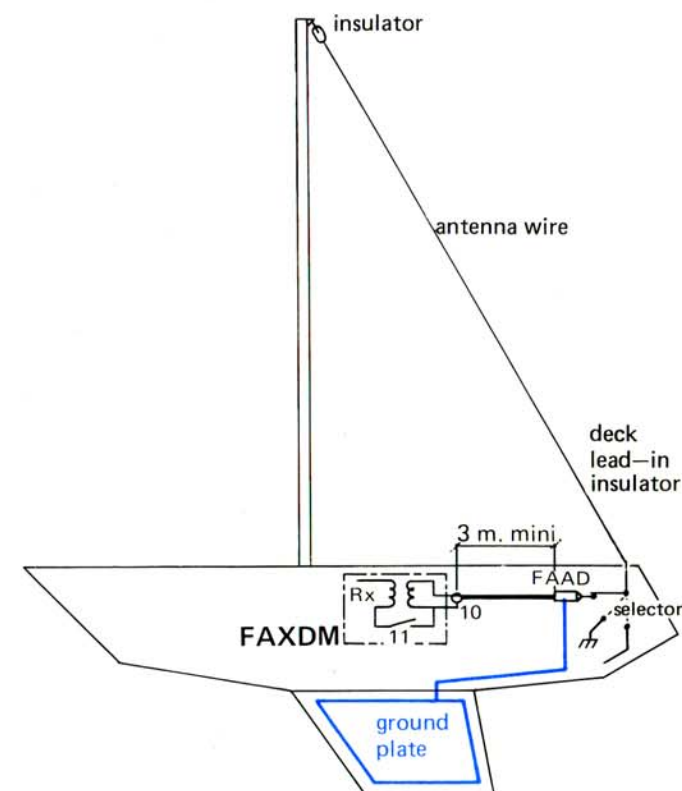
The earth connection wire should be insulated and have a section of about 7 mm<sup>2</sup>

Note: Do not connect any other earthing wire to the FAXDM earthing

Antenna and earth installations are sometimes more difficult on board boats. That is the reason why we have analysed some cases below.

①

Ideal solution  
with one mast

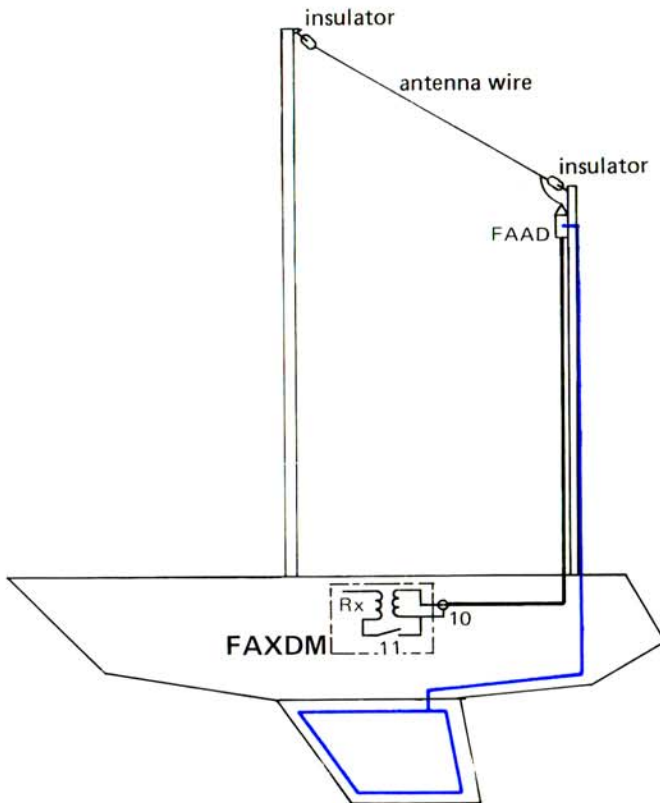


earth connection on the FAAD  
switch 11 on the FAXDM to "Off"



②

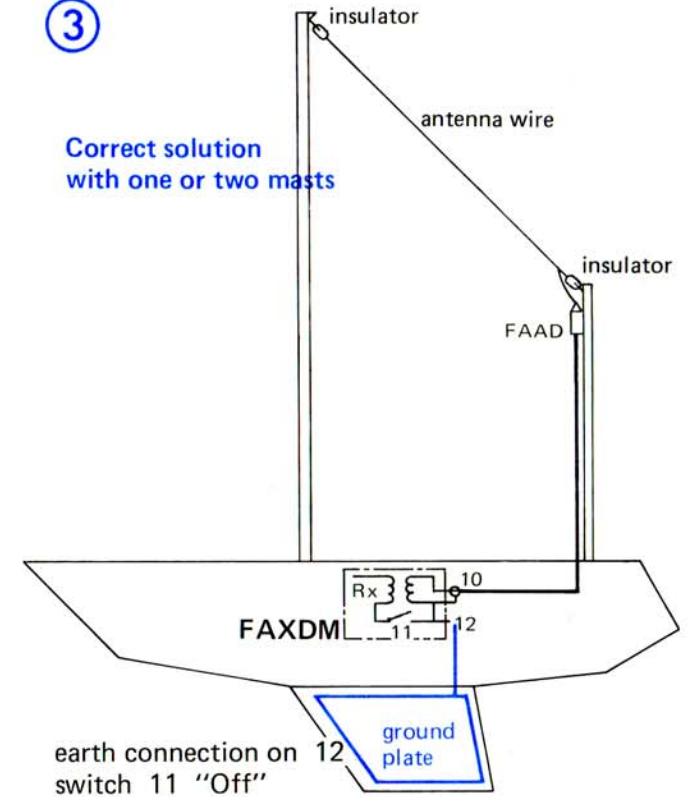
Ideal solution  
with two masts



earth connection on the FAAD  
switch 11 "Off"

③

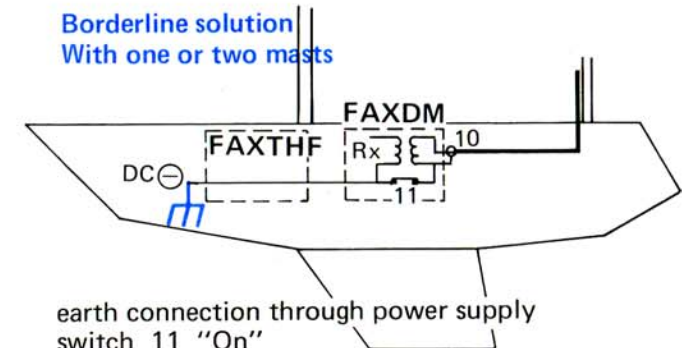
Correct solution  
with one or two masts



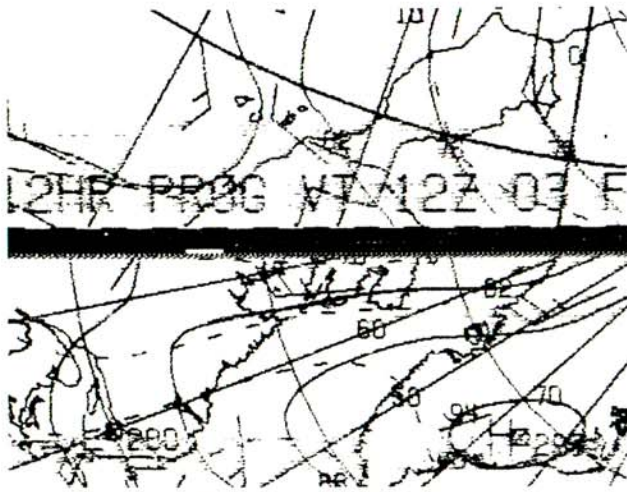
earth connection on switch 12  
"On"

④

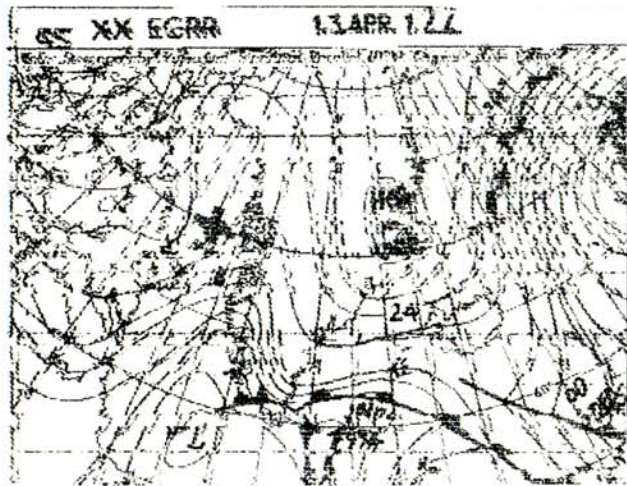
Borderline solution  
With one or two masts



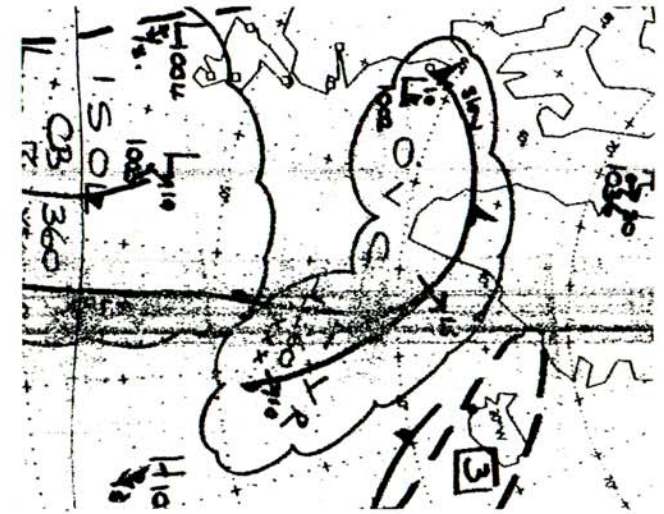
earth connection through power supply  
switch 11 "On"



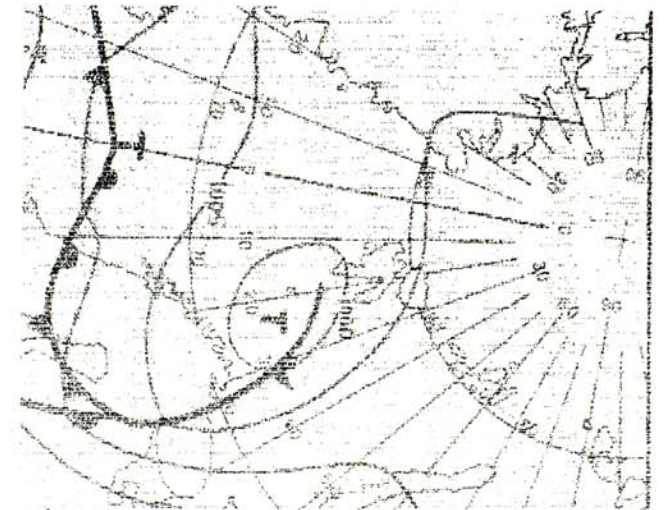
The short whiskers on the left of a character result from the reinjection of tracing sparks. They are induced whether by a bad earthing or by the antenna installed too near from the FAXTHF.



The discontinuity in vertical lines (approx. 2 to 3 mm) results from wave reverberation between earth and ionosphere. The reverberation possibilities are multiple and perhaps, in this area, either wave path is better received alternatively. No remedy at the reception level.

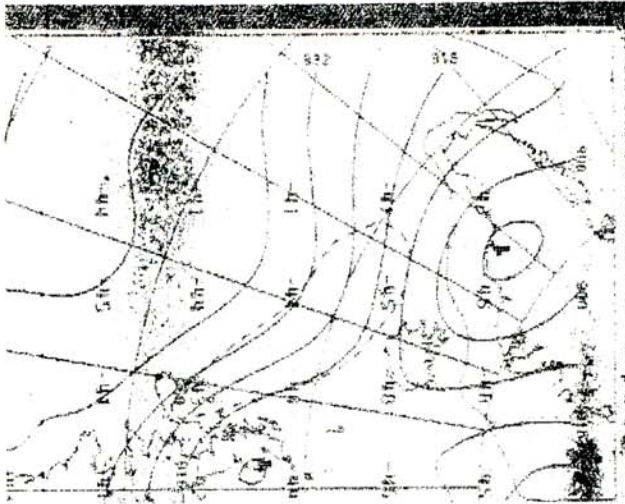


Contrary to VLF reception HF reception is subject to fading. Thus at certain times the drawing can disappear. No remedy at the reception level.



A lot of small disturbances appear on the whole chart resulting probably from an equipment aboard like motor ignition or household appliances. If FAXDM earthing installation is good a shielding of the noise source must be carried out.

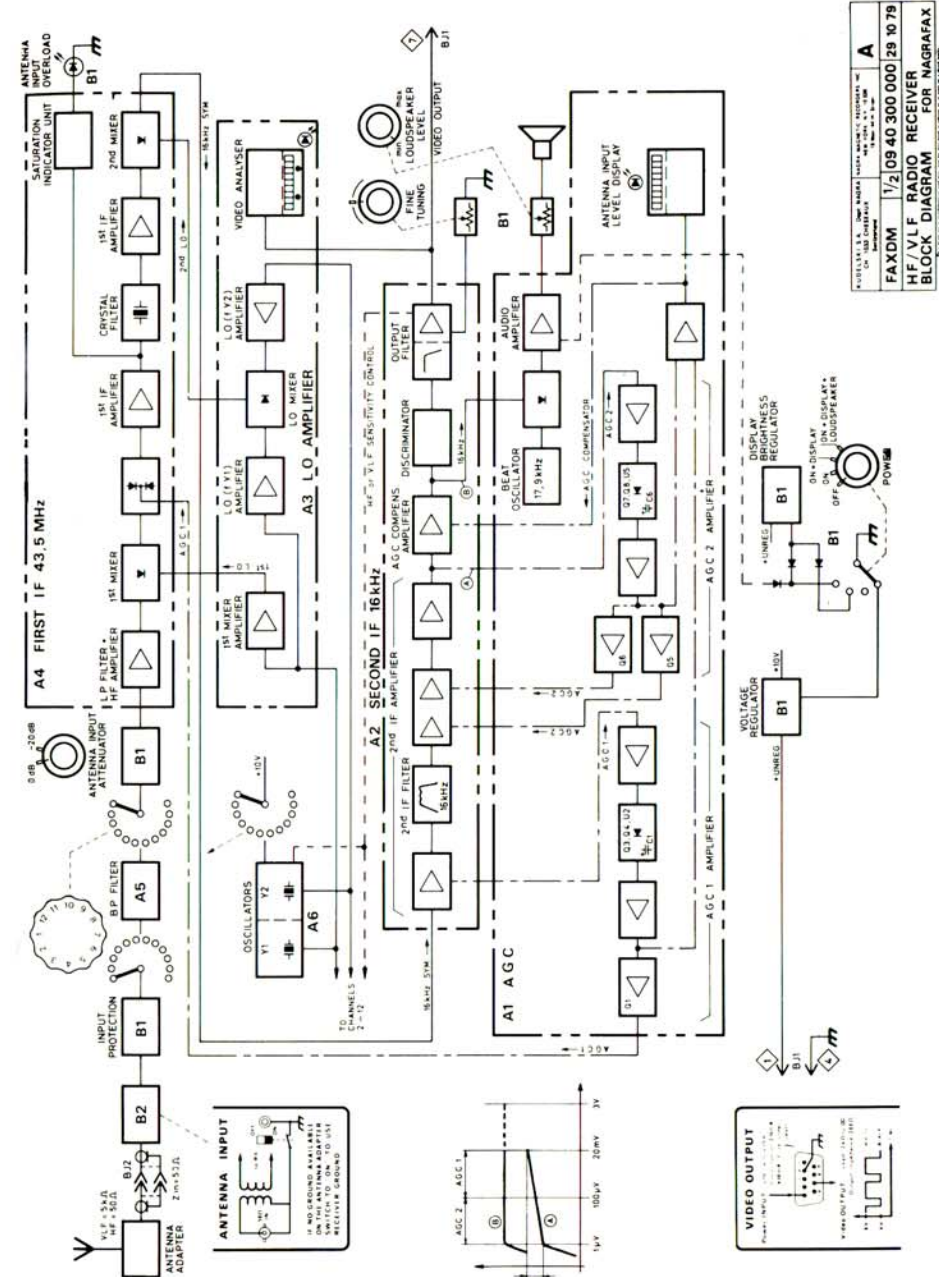




Large black areas spread from the margin to the centre. They result from a defective chart illumination at the transmitter and cannot be eliminated at the receiver.



Sometimes charts are received distorted. Margins are oblique. This results from an instability of transmitter installation. No remedy at the reception level.



Dimensions 320 x 230 x 131 mm. **RECEIVER**

Weight 3.8 kg. (without plug-ins)

Weight of one plug-in 0.130 kg.

Power supply 10.7 V to 35 V DC direct through FAXTHF tracer

Consumption 230 mA max.  
150 mA min.

#### Antenna input

50 Ohms on BNC plug, floating or earthed through a built-in switch. Protected against electrostatic discharges. Built-in -20 dB attenuator

**Video output** Continuous on two sensitivities, with automatic switching

VLF  $f_0 + 150 \text{ Hz}$   $V_{\text{out}} = 6 \text{ V}$   
 $f_0 - 150 \text{ Hz}$   $V_{\text{out}} = 4 \text{ V}$

HF  $f_0 + 400 \text{ Hz}$   $V_{\text{out}} = 6 \text{ V}$   
 $f_0 - 400 \text{ Hz}$   $V_{\text{out}} = 4 \text{ V}$

Z load  $> 2 \text{ kOhms}$

#### Channels

Quartz crystal controlled. Input filter has bandwidth equal to  $\pm 7 \%$  of centre frequency. At frequencies removed from the centre frequency by  $\pm 15 \%$  the attenuation is at least 40 dB.

**Bandwidth after demodulation** 900 Hz

**Input voltage**  $1 \mu\text{V}$  for SNR=20dB at video output

#### Intermodulation

Two in-band signals each of 7 mV input level, one 20 kHz above selected frequency and one 40 kHz above, will produce intermodulation products equivalent to a wanted signal of  $1 \mu\text{V}$  input at selected frequency.  $V_{\text{in}} = 7 \text{ mV}$

#### Saturation indicator

Lights up when an input signal of more than 40 mV is present, outside of the receiver bandwidth, but inside of the input selector filter

#### First IF Breakthrough

An input level of 81 mV at 43.5 MHz (first IF) is required to produce the same output as a  $1 \mu\text{V}$  signal at selected frequency.  $V_{\text{in}} = 81 \text{ mV}$

**Fine tuning**  $\pm 1.5 \text{ V}$  at video output

**Monitoring** Beat of 1.9 kHz in relation to the reception

#### ANTENNA ADAPTOR

Input Unbalanced

Impedance

VLF 5 kOhms approx.

HF 200 Ohms approx.

Output 50 Ohms