

User's handbook
Analog Synthesized
Microwave Radio Links
EK-ES2G/13 EK-ES5G/12
EK-ES7G/12 EK-ES10G/11
EK-ES12G/11 EK-ES13G/11
EK-ES14G/11





Warning!

The socket utilized for the unit power-supply must have the appropriate ground conductor.

The connection of the unit, to a socket without the ground conductor, will keep the whole equipment dangerous for people safety.

About the repair of the units refer to specialized personnel only.

Inside the apparatus there are voltages which could be dangerous for person.
Before opening the cover, switch off the unit, disconnect the connection and the supply cable.

In case of electrical shock follow the instructions of first aid collected on page 3

Substitute the fuses interrupted with others of the same type and value.



The waste disposal of the devices must be executed in the respect of the enforced laws in the country uses.

Eurotek not assumed responsibility for waste disposal in contrast with enforced laws.

LIFE SUPPORT APPLICATIONS.

Eurotek's products are not designed for use as critical components in life support devices or system without the express written approval of the Eurotek S.r.l. As used herein.

- Life support devices or system are devices or system which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
- A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

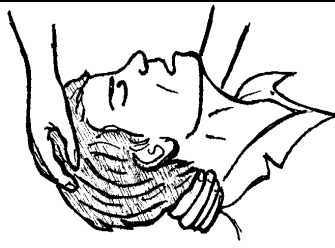


The information given in this documentation could have variations without forewarning.

The firm Eurotek S.r.l. does not give any guaranty about this documentation.

The firm Eurotek S.r.l. does not consider itself responsible for the possible mistakes which could be present in this documentation.



First aid: artificial breathing(mouth to mouth)

1	<p>In case of electric shock you have to ensure the first aids to the patient, but to do this you have to consider two very important things:</p> <ul style="list-style-type: none"> - interrupt immediately the electric circuit; - until the circuit has not been interrupted, do not touch the patient with bare hands; <p>After doing this, without delay contact the nearest mobile unit of first aid and practice to the patient, in case of loss of consciousness, the breathing mouth to mouth is described following.</p>	
2	<ul style="list-style-type: none"> - Put the patient lying on his back with the arms parallel to the body, ensure that he does not have the breathing tracts obstructed (chewing-gum, dental prosthesis, etc.), otherwise set him free from foreign bodies. -Kneel near the patient's head and putting a hand under his neck, incline as possible the head backwards. 	
3	<ul style="list-style-type: none"> - Going on with keeping the patient's head inclined with a hand, use the other one to occlude the nostrils, if the breathing is done through the oral cavity, or the mouth if you want to do it through the nasal cavity. - While you are doing these steps begin with deep breathing in the auto oxygenation - Then practice the artificial breathing blowing in the chosen cavity beginning with ten expirations each minute to go on with twelve and fifteen. 	
4	<ul style="list-style-type: none"> - During the execution of breathing you have to control observing that the patient's chest dilates, otherwise change cavity in which you blow the air because it could be obstructed. 	
5	<p>Do not ever stop the artificial breathing until the patient has recovered or has come the first aid unit.</p>	

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I – GENERAL NOTES

The radio links in frequency modulation EK-ESxG/11 EK-ESxG/12 EK-ESxG/13 have been designed and realized to have audio-video connections point to point.

The selectivity of the apparatus is guaranteed by working in double frequency conversion (triple for EK-ES10G/11, EK-ES12G/11, EK-ES13G/11, EK-ES14G/11), with first intermediate frequency at 1000 MHz (EK-ES2G/13, EK-ES10G/11, EK-ES12G/11, EK-ES13G/11, EK-ES14G/11); 1189 MHz (EK-ES5G/12); 1540 MHz (EK-ES7G/12), obtained using auto-tuning oscillators to improve frequency stability, and by the use of STRIPLINE filters and Surface Acoustic Wave (SAW) filters.

The main requirements of the user which utilizes a radio link telecommunication system are the availability on time of the connection and naturally its quality :

- the necessity to be able to have reliable connections is ensured through the use of quality components and of solid state devices (in detail GaAs) for microwave parts (the low noise preamplifier uses last generation HEMT devices), the only components with mechanical motion parts are the relays used for monitoring guarantying the necessary galvanic insulation; the design of the apparatus has been moreover oriented to determine working points for the different devices which keep themselves in electrical and climatic conditions well inside the guaranteed working limits.

- the quality of signals taken by the radio links EK-ESxG/11 EK-ESxG/12 EK-ESxG/13 is defined by chosen components which exploit completely the latest technologies as for the amplification chains at solid state as for conversion devices; the inevitable phase distortions due to filters, necessarily put on signals way, have been balanced with suitable equalizers partially accessible from outside.

Expressly realized following the recommendations of CCIR and Ministry of Communications Superior Institute of communications and information technologies, the frequency modulation radio links EK-ESxG/11 EK-ESxG/12 EK-ESxG/13, give an interconnection with different devices and with existing communication nets respecting levels, modulations and impedances.

The modem circuits have been made using PLL (phase locked loop) technique which consent working stability over wide thermal excursions, while the employment of many integrated circuits rather than discrete components reduce the units encumbrance and consumption. A particular care has been taken in monitoring and controlling, letting a careful apparatus check during its normal working allowing so a quick verification of possible anomalies. The possibility to make light external regulations of phase/frequency and amplitude/frequency responses of the net FI, allows the compensation of little distortions due to external factors of the apparatus itself.

The indications about controls and external connections together with the presence of leds which show the state of the net, allows an easy inspection also by non specialized personnel.

The realization in sub-rack EIA 19" 1 unit allows integration with existing telecommunication systems and a very low encumbrance.

I.1 – DEVICE COMPOSITION 2-5-7GHz

[illegible]

I.2 – DEVICE COMPOSITION 10-12 GHz

[illegible]

I.3 – DEVICE COMPOSITION 13-14 GHz

[illegible]

II - CHARACTERISTICS**II.1 – Net section performances:**

Frequency band	2300 ÷ 2700 MHz	(EK-ES2G/13)
	5200 ÷ 5500 MHz	(EK-ES5G/12)
	6430 ÷ 7060 MHz	(EK-ES7G/12)
	10300 ÷ 10680 MHz	(EK-ES10G/11)
	11100 ÷ 11400 MHz	(EK-ES12G/11)
	12700 ÷ 13300 MHz	(EK-ES13G/11)
	14260 ÷ 14500 MHz	(EK-ES14G/11)
Output power (tolerance +/- 1 dB)	+ 35 dBm	(EK-ES2G/13)
	+ 33 dBm	(EK-ES5G/12)
	+ 33 dBm	(EK-ES7G/12)
	+ 30 dBm	(EK-ES10G/11)
	+ 30 dBm	(EK-ES12G/11)
	+ 30 dBm	(EK-ES13G/11)
	+ 30 dBm	(EK-ES14G/11)
Noise Figure	better than 6 dB at - 40 dBm	
Video channel band	from 25Hz to 5MHz within 0,5 dB	
Video channel deviation	8 MHz p.p.	
Differential gain	2 %	
Differential phase	2 degrees	
Video emphasis	CCIR 405-1 (disconnectable)	
Video interface	1 V p.p. 75 Ohm	conn. 1,6/5,6
Audio channels band	80 Hz at 14,5 KHz +/-0,5 dB	
Deviation on subcarriers	1 channel 300KHz eff.	
	2 or more channels 200 KHz eff.	
Audio subcarrier deviation	70 KHz eff +9 dBm 600 Ohm	
Audio subcarrier frequency*	7020 and 7500 KHz or 8065 and 8590 KHz or 7500 and 8065KHz	
Audio emphasis	50 µS (disconnectable)	
FI band	from 60 to 80 MHz +/- 0.5 dB	
	from 62 to 78 MHz within 3 nS	
FI connections	+5 dBm at 75 Ohm	
Output interface	“N” female connector	
	(EK-ES2T/13 EK-ES5R/1)	
	“N” female connector or UDR70 WR137	
	(EK-ES5T/12 EK-ES5R/1) (EK-ES7T/12 EK-ES7R/1)	
	UDR120 WR75	
	(EK-ES10T/11) (EK-ES10R/1) (EK-ES12T/11)	(EK-ES12R/1)
	(EK-ES13T/11) (EK-ES13R/1) (EK-ES14T/11)	(EK-ES14R/1)

*Note: you can choose audio sub-carriers frequencies among those listed; in a sub-rack EIA 19” are available only two audio channels, for further two audio channels another sub-rack EIA 19” is necessary.

II.2 – Working climatic conditions for InDoor Unit (IDU):

Working climatic conditions for indoor unit are:

Normal: From +5° to +40° Celsius

Extreme: From –5° to +45° Celsius

II.3 – Working climatic conditions for OutDoor Unit (ODU):

Working climatic conditions for outdoor unit are:

Normal: From -20° to +40° Celsius

Extreme: From –30° to +50° Celsius

II.4 – Power supplies:

Power supply section of each devices has two different inputs: one in alternate current (see fig. on page 16 letter “N”) and another one for direct current (see fig. on page 16 letter “M”).

In this way it's possible to supply our radio links using at the same time, either with normal voltage 230V or with a voltage in direct current at 24V as for example the one of batteries plug, so that in the case of a fail of one of two supplies, the devices will continue working with the one that it still on (redundant power supply circuit); when this is happens, the commutation from one supply to another changes automatically.

The switch on button (see fig. on page 16 letter “O”), works only on the alternate current power supply (line 110/230V), while for the use in direct current it is only necessary that it is present in the special connector (see fig. on page 16 letter “M”), in the case that both the power supply parts are available, a device placed inside absorbs power from the 230V line.

Power supply characteristics are reported here below.



TRANSMITTER:	line	110/230Vca +/-10% 50Hz 45W
	battery	24 Vcc -20%/+30% negative on ground
RECEIVER:	line	110/230 Vca +/-10% 50Hz 30W
	battery	24 Vcc 3A -20%/+30% negative on ground

The earth of the radio link is continuously connected to ground through a terminal inside the connection of the protection circuit.

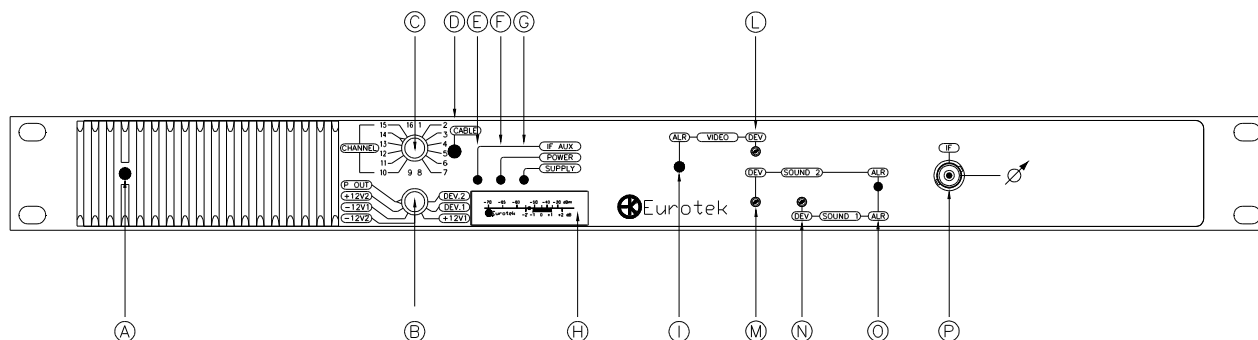
II.5 – Mechanical specifications:

		IDU	ODU
Height:		44 mm (1U)	300 mm
Width:		482 mm (19 ")	ø110 mm
Depth:		312 mm	-
Weight	<i>TRANSMITTER:</i>	2,7 Kg	2,1 Kg
Weight	<i>RECEIVER:</i>	2,8 Kg	2 Kg



III –DESCRIPTION

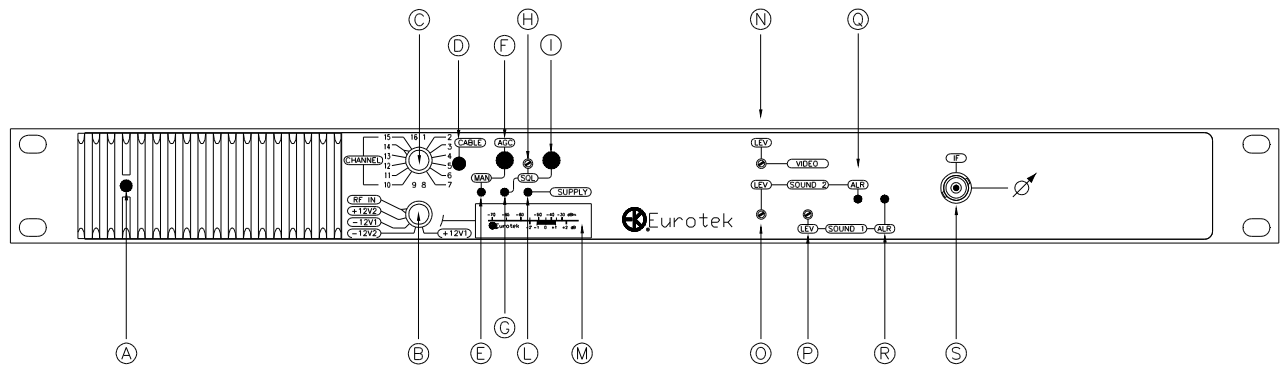
III.1 – Front view of transmitting IDU:



III.2 – Description of transmitter IDU front-panel:

- A) Power supply indicator (green Led)
- B) Reading device selector (H) (see paragraph III.9)
- C) Selector for choice of transmission channel
- D) Led for communication fault between IDU and ODU
- E) Input auxiliary IF indicator selected (yellow Led)
- F) Power transmitter alarm indicator: -3dB compared with nominal power (red Led)
- G) Power supply alarm indicator (red Led)
- H) Indicator device (see paragraph III.9)
- I) Unlock PLL modulator 70 MHz indication (red Led)
- L) Sensibility of modulation adjustment of 70 MHz modulator
- M) Sensibility of modulation adjustment of modulator subcarrier audio 2
- N) Sensibility of modulation adjustment of modulator subcarrier audio 1
- O) Unlock of at least one of two audio sub-carriers indication (red Led)
- P) Monitory FI 70 MHz at modulator output (+5 dBm)

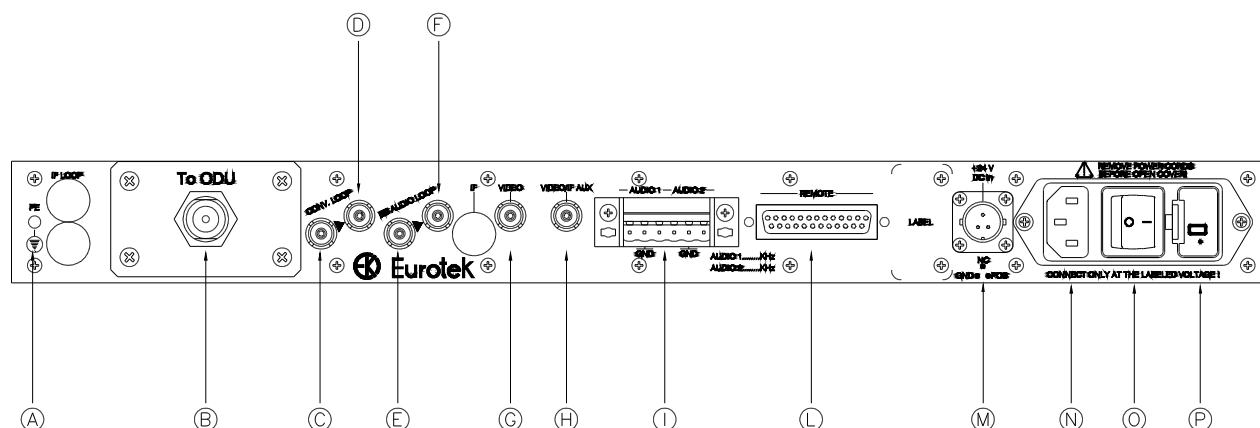
III.3 – Front view of receiving IDU:



III.4 – Description of receiving IDU front-panel:

- A) Power supply indicator (green Led)
- B) Reading device selector (M) (see paragraph III.12)
- C) Selector for choice of reception channel (with ODU arranged only)
- D) Communication fault between IDU and ODU (red Led)
- E) IF gain manual adjustment indicator (yellow Led)
- F) IF gain manual/automatic control selection
- G) Receiver in squelch indication (red Led)
- H) Squelch level adjustment
- I) Enable/disable squelch circuit
- L) Power supply alarm indicator (red Led)
- M) Indicator device (see paragraph III.12)
- N) Video level output adjustment
- O) Audio 2 level output adjustment
- P) Audio 1 level output adjustment
- Q) Alarm sub-carrier 2 indication (red Led)
- R) Alarm sub-carrier 1 indication (red Led)
- S) Monitory FI received (+5 dBm)

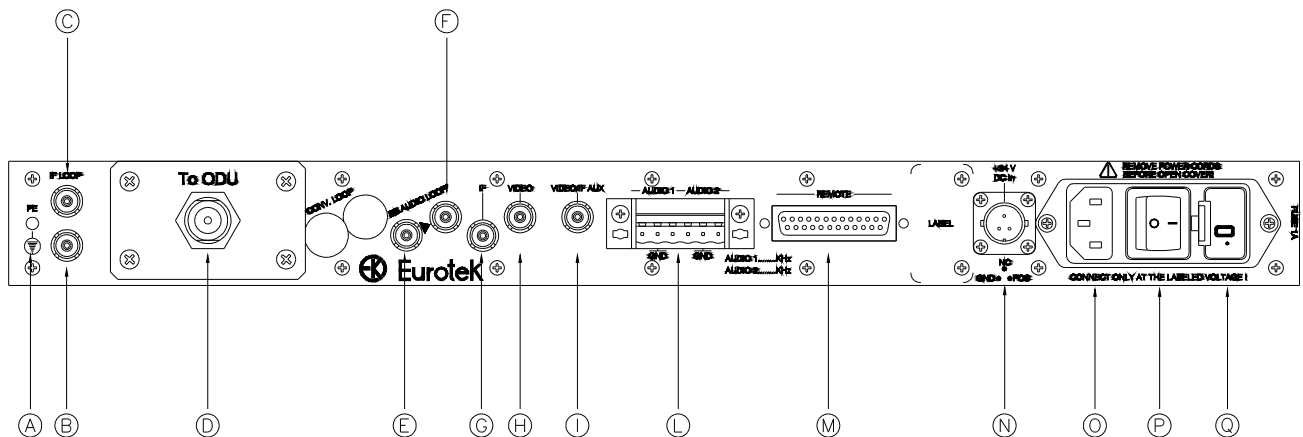
III.5 – Back view of transmitting IDU:



III.6 – Description of connections on the back-panel of the transmitting IDU:

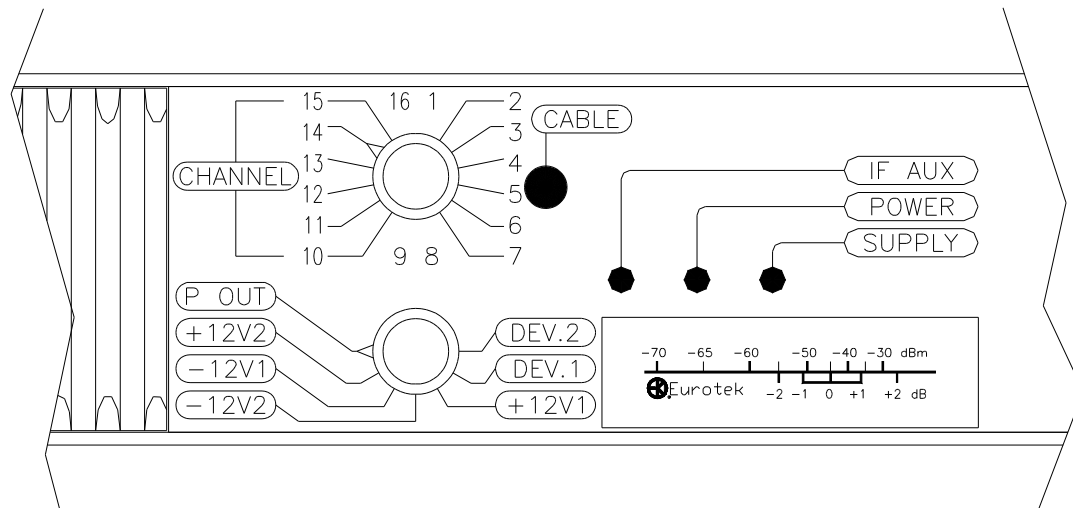
- A) Ground clamp (4MA)
- B) Link to ODU through type "N" connector
- C) IF output modulator for converter IF>RF
- D) External unit IF input
- E) Base band output from audio modulators
- F) Base band input for audio modulators
- G) Video input
- H) Auxiliary IF input
- I) Balanced audio inputs
- L) Remote interface connector (see page 45)
- M) Direct current input supply (24V with negative not galvanic insulated)
- N) Alternate current input supply (110/230V)
- O) Alternate current supply switch
- P) Fuses site (n°2 fuses - 1A) and 110/230V selector.

III.7 – Back view of receiving IDU:



III.8 - Description of connections on the back-panel of the receiving IDU:

- A) Ground clamp (4MA)
- B) ODU IF output through type "N" connector
- C) IF input from modulator
- D) Link to ODU
- E) Base band output for audio demodulators
- F) Base band input for audio demodulators
- G) Auxiliary IF output
- H) Video output
- I) Video output
- L) Balanced audio outputs
- M) Remote interface connector (see page 45)
- N) Direct current input supply (24V with negative not galvanic insulated)
- O) Alternate current input supply (110/230V)
- P) Alternate current supply switch
- Q) Fuses site (n°2 fuses - 1A) and 110/230V selector.

III.9 - Measures that can be carried out with transmitting IDU device indicator:

Note: reading the device measure points is possible to control the state of the apparatus; through the knob you can select the following checks:

P OUT: SELECTION OF POWER READING

During standard working, the device indicator has to go into the green label between -1 and +1.

+12V2: VERIFY OF POSITIVE SUPPLY ON POWER SUPPLY 2 *[NOT ACTIVE]*

During standard working, the device indicator has to go into the green label between -1 and +1.

-12V1: VERIFY OF NEGATIVE SUPPLY ON POWER SUPPLY 1

During standard working, the device indicator has to go into the green label between -1 and +1.

-12V2: VERIFY OF NEGATIVE SUPPLY ON POWER SUPPLY 2 *[NOT ACTIVE]*

During standard working, the device indicator has to go into the green label between -1 and +1.

+12V1: VERIFY OF POSITIVE SUPPLY ON POWER SUPPLY 1

During standard working, the device indicator has to go into the green label between -1 and +1.

DEV.1: INDICATION OF DEVIATION LEVEL AUDIO CHANNEL 1

To have a deviation of 70KHz *eff.* the device indicator has to go on 0.

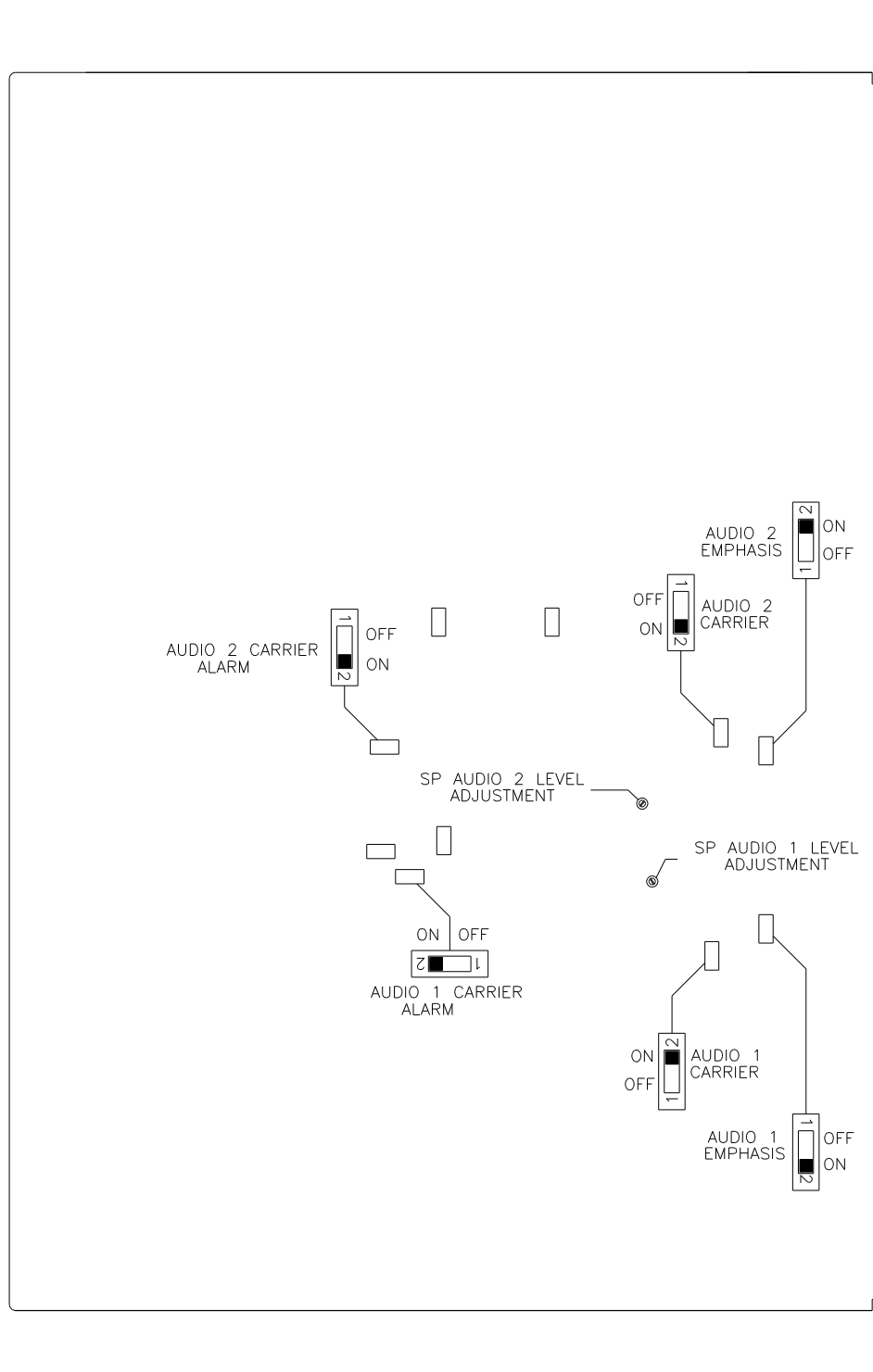
DEV.2: INDICATION OF DEVIATION LEVEL AUDIO CHANNEL 2

To have a deviation of 70KHz *eff.* the device indicator has to go on 0.



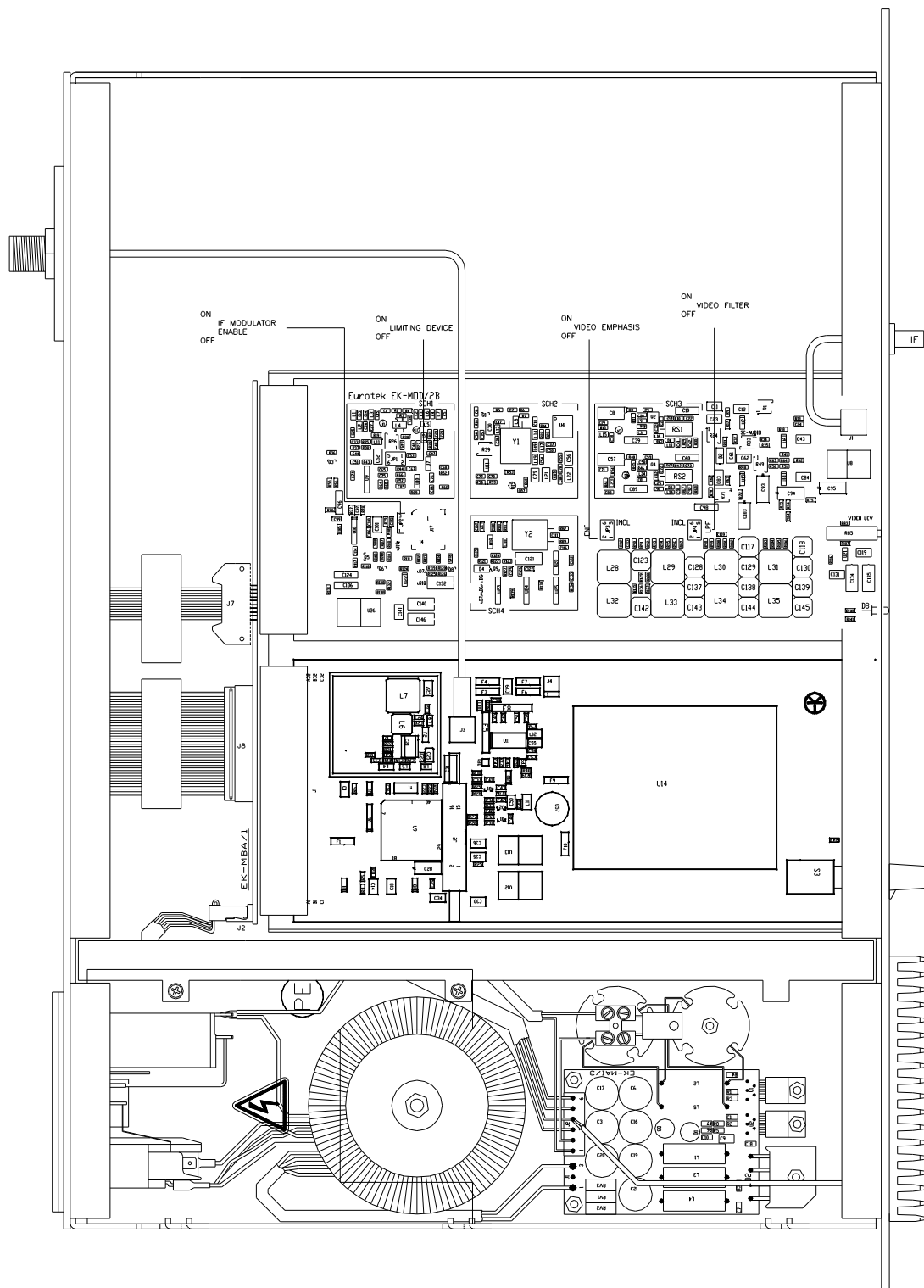
III.10 - Position diagram of jumpers on the transmitting IDU:

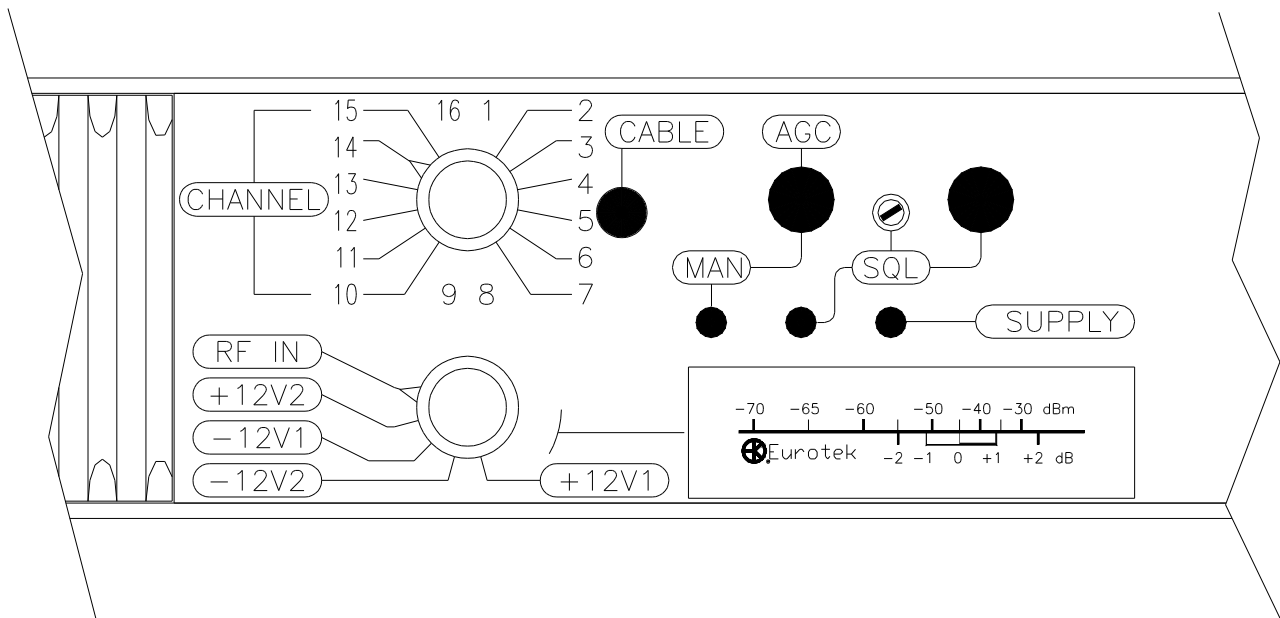
Note: Remember to switch OFF audio alarm when the respective audio carrier is out.



III.11 - Internal lay-out of transmitting IDU:

Note: remove the cover to change the jumpers position



III.12 - Measures that can be carried out with receiving IDU device indicator:

Note: reading the device measure points it's possible to control the state of the apparatus; through the knob you can select the following checks

RF IN: INDICATION OF THE VALUE OF THE RECEIVED FIELD

During standard working in the device scale between -70 and -30 dBm will be indicated the value of the received field.

+12V2: VERIFY OF POSITIVE SUPPLY ON POWER SUPPLY 2 **[NOT ACTIVE]**

During standard working, the device indicator has to go into the green label between -1 and +1.

-12V1: VERIFY OF NEGATIVE SUPPLY ON POWER SUPPLY 1

During standard working, the device indicator has to go into the green label between -1 and +1.

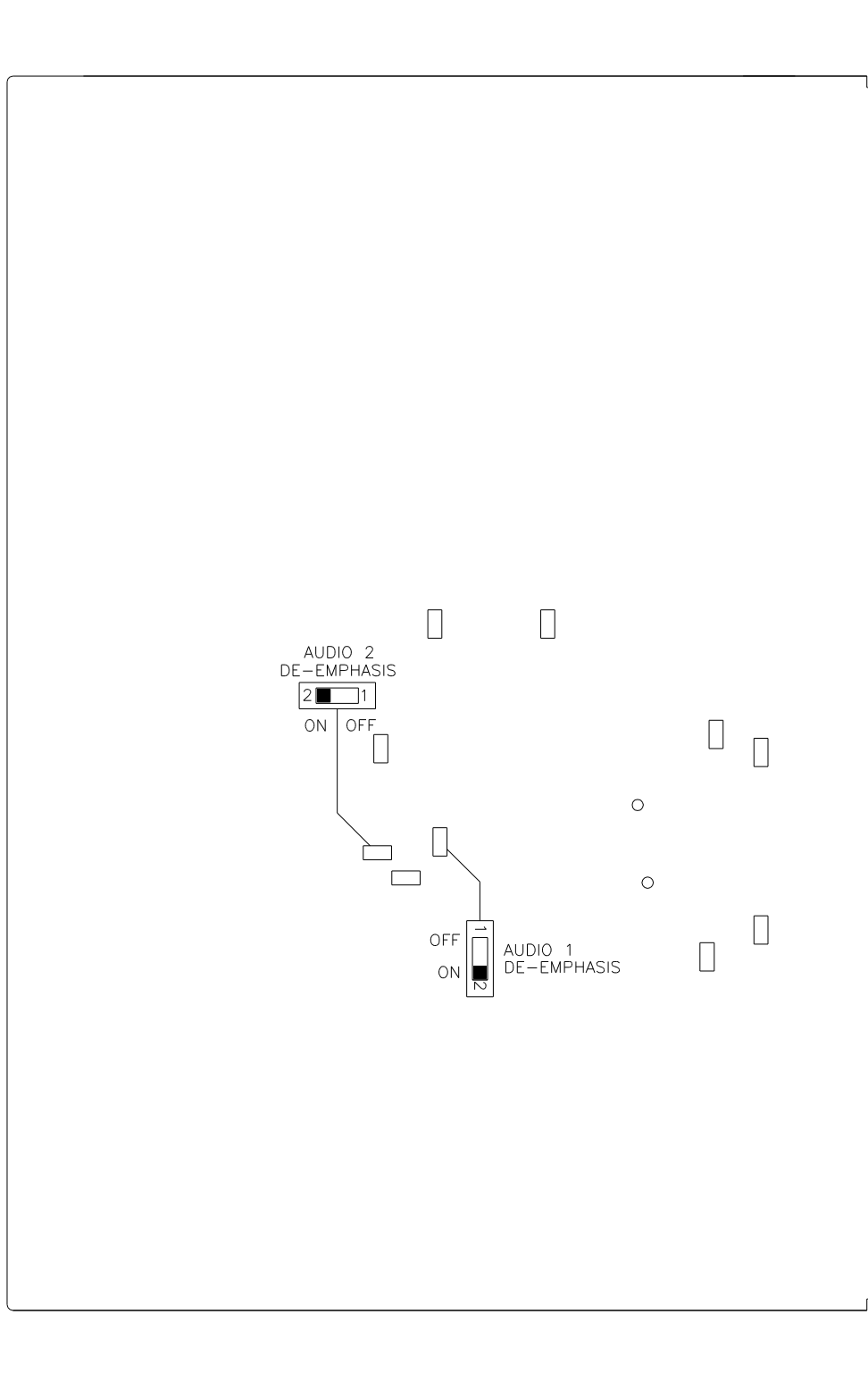
-12V2: VERIFY OF NEGATIVE SUPPLY ON POWER SUPPLY 2 **[NOT ACTIVE]**

During standard working, the device indicator has to go into the green label between -1 and +1.

+12V1: VERIFY OF POSITIVE SUPPLY ON POWER SUPPLY 1

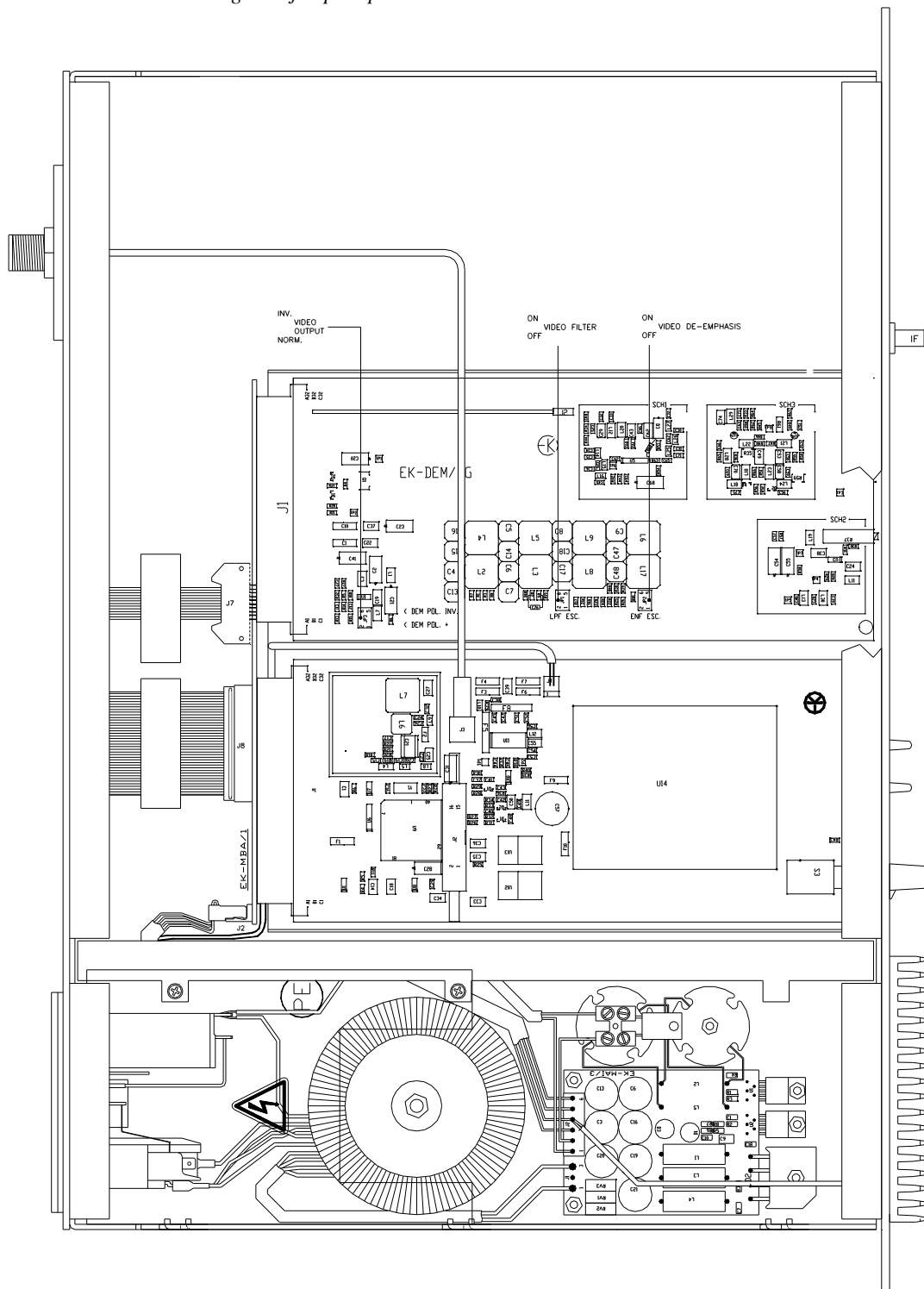
During standard working, the device indicator has to go into the green label between -1 and +1.

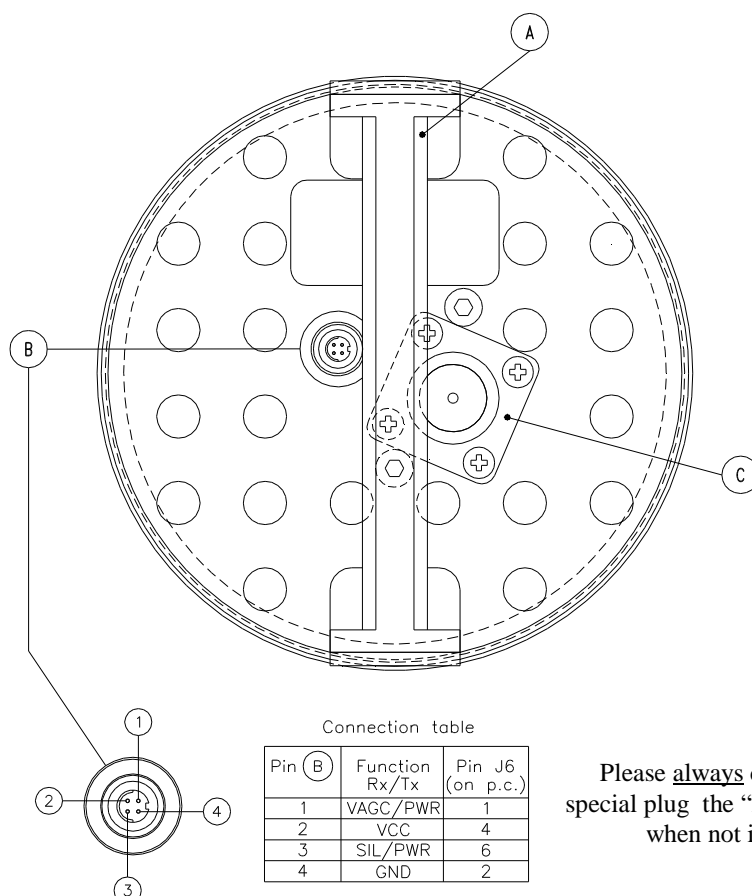
III.13 - Position diagram of jumpers on the receiving IDU:



III.14 - Internal lay-out of receiving IDU:

Note: remove the cover to change the jumpers position.



III.15 - Rear description suitable for receiving and transmitting ODU:

A) ODU¹ support handle

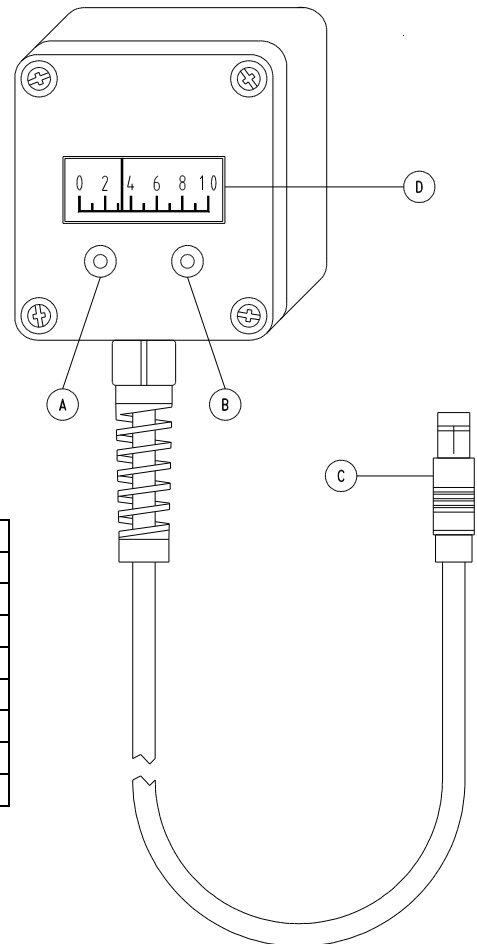
B) Link connector to measurement unit EK-TMS/1

C) Link connector to IDU(receiver or transmitter)

1 – Waveguide orientation in output (when it is present), is parallel to the handle “A”; so pay attention, during the installation, that the handles of two ODU, either the receiving or the transmitting, are oriented in the same way. This in case that the Units are linked to antenna’s systems with direct connection to feed in round waveguide.

III.16 - Measurement unit EK-TMS/1 description:

DEVICE READING (D)			
Rx FUNCTION		TX FUNCTION	
READ VALUE	dBm	READ VALUE	POWER OUT
9	-40	9 ÷ 10	Nominal Power
8	-50	7 ÷ 8	-2 dB
6	-60	5 ÷ 6	-3 dB
4	-70		
1	-80		
0	-90		



- A)** red LED indicating:
- in the receiving ODU, the system in squelch
 - in the transmitting ODU, the alarm relative to a power loss
- B)** green LED indicating the presence of ODU power supply
- C)** Link connector to ODU (see letter B page 24)
- D)** Device indicating:
- in the receiving ODU, the received field intensity
 - in the transmitting ODU, the transmitted power

IV - MOUNTING INSTRUCTIONS

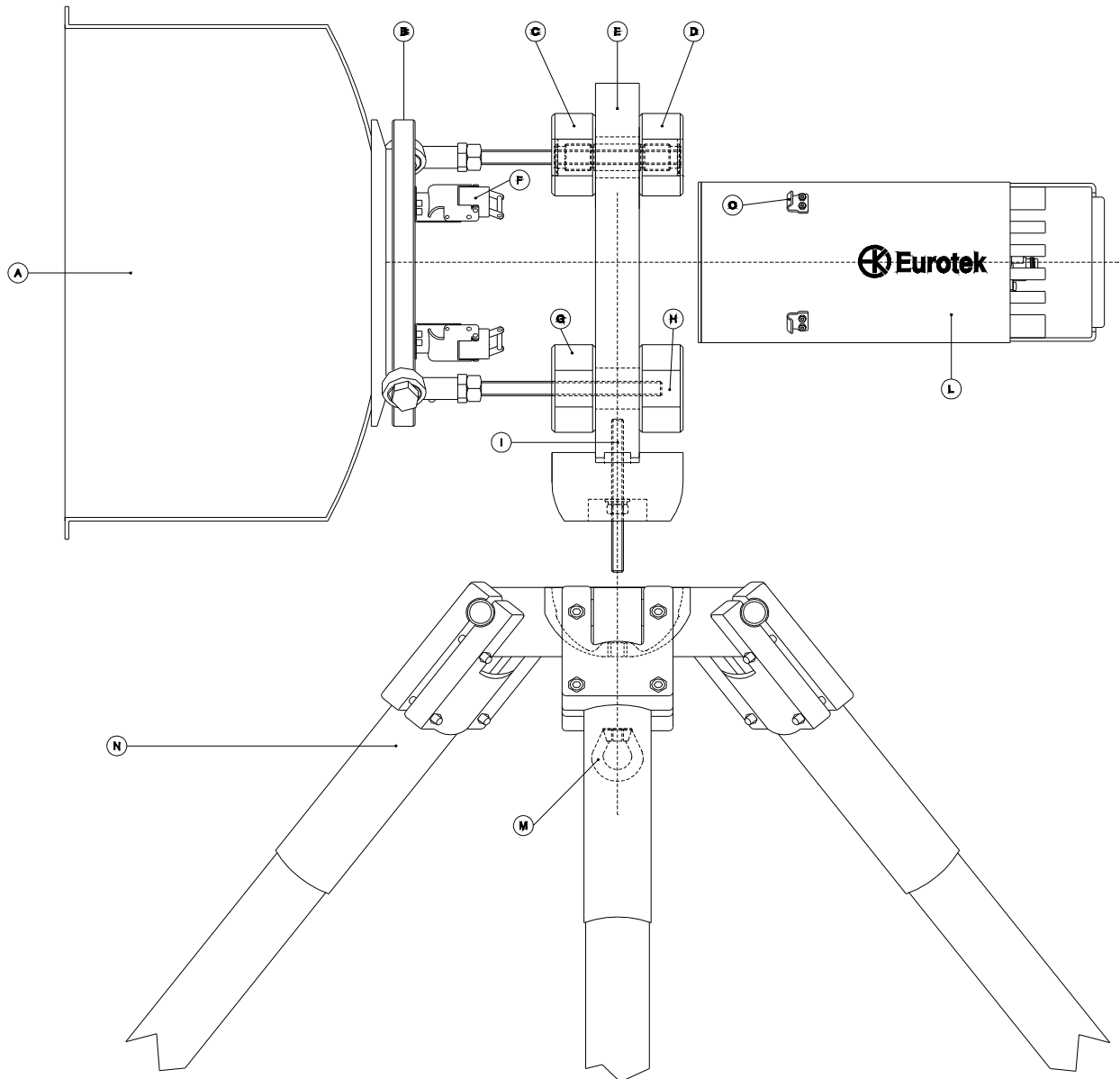
IV.1 - ODU assembling and supply configuration:

The ODU assembling and supply configuration are the following:

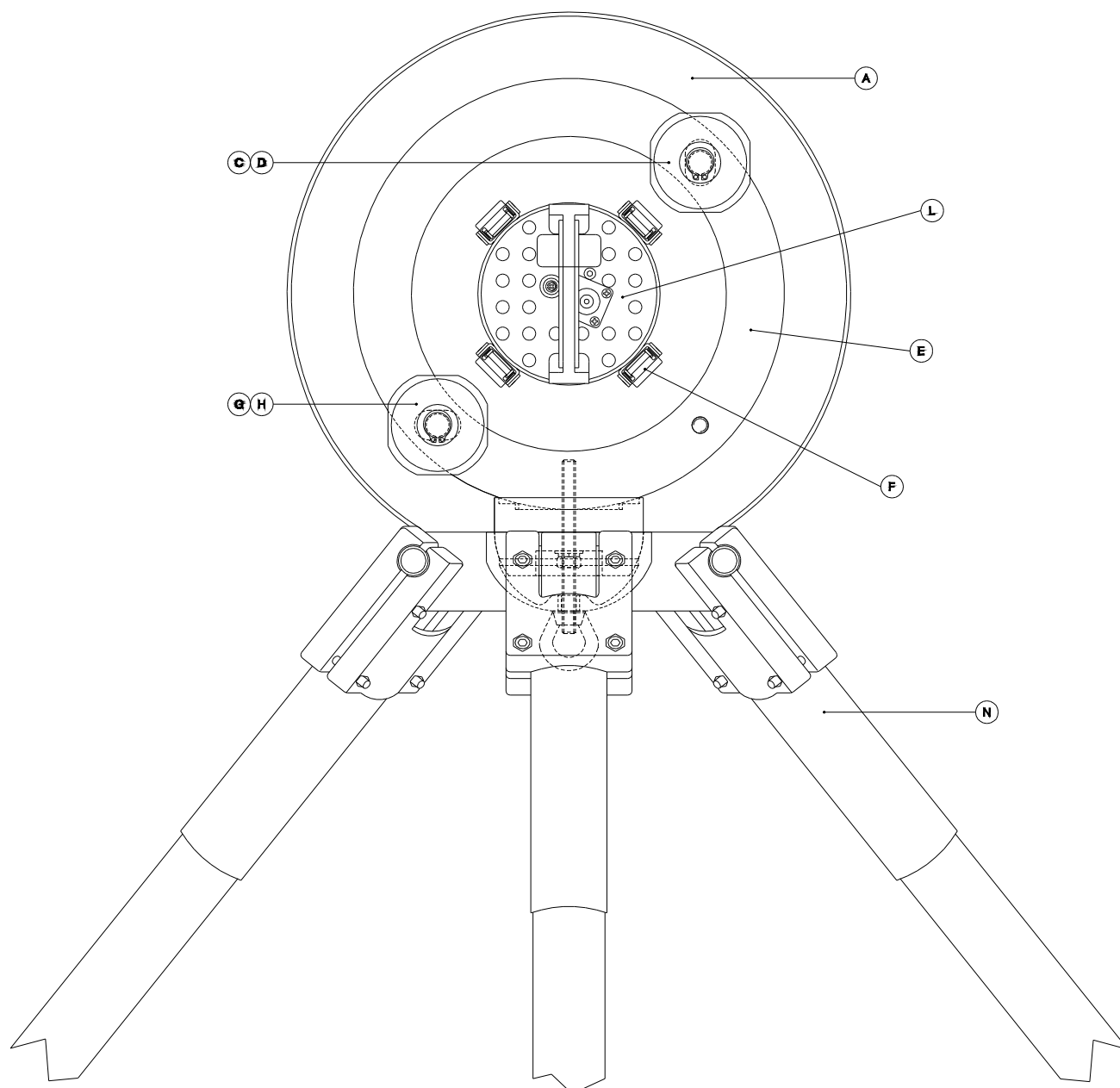
- 1) Mobile post assembling (only for EK-ES10G/11)
- 2) Resident post assembling (on pole) with 335 or 600mm parabolic reflector (only for EK-ES10G/11)
- 3) Resident post assembling (on pole) with arrangement to the flexible waveguide link only

IV.2 - ODU assembling configuration in mobile post:

Side view:



Rear view (fully assembled):



LEGEND Fig. on page 27-28	
A	Parabolic reflector
B	Circle for parabolic reflector support
C-D	Knobs for high-azimuth orientation
E	Ring for parabolic reflector support
F	Spring toggle latch
G-H	Knobs for latitude orientation
I	Fastening pivot on tripod N
L	OutDoor Unit (ODU)
M	Fastening eyebolt to the pivot L
N	Complete ODU support tripod
O	Fastening hook on ODU

Parabolic reflector assembling shall be carry out as follows:

- 1) The overall of parabolic reflector (see fig. page 27) is supplied already assembled and complete in every its own parts (from the letter A to the letter I);
- 2) Subsequently, shall be arranged the ODU (L), to the parabolic reflector (A), hooking the four bolts (F) to the four hooks (O) on the ODU, as shown in the figure on page 27.
- 3) Now, the overall has to be fasten to the support tripod (N), putting the fastening pivot (I) in the special hole into the base of the tripod as shown in fig. on page 27, and finishing to assemble putting the eyebolt (M) screwing down it on the pivot itself, as shown in the figures on page 27 and 28.

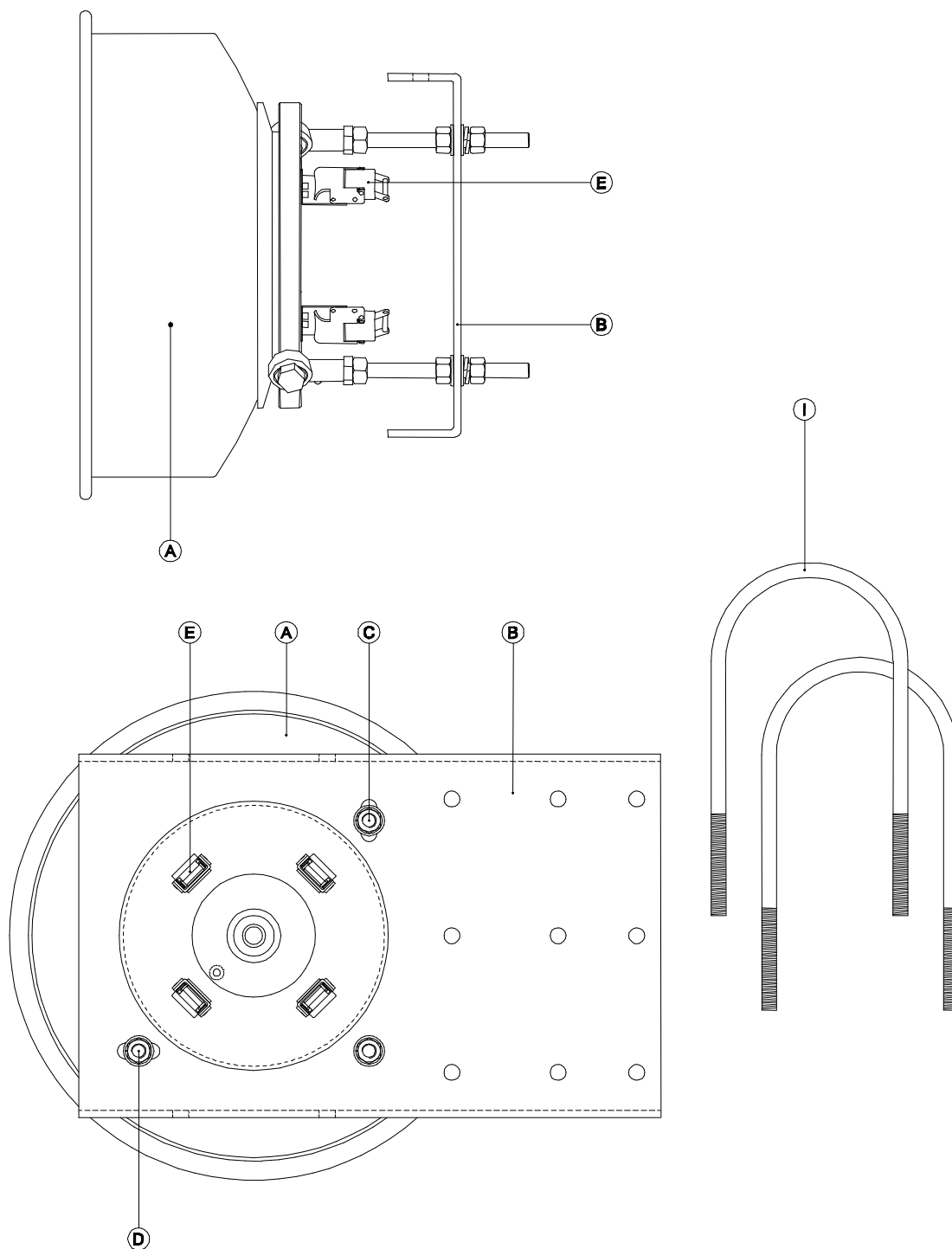
To secure a greater stability to the overall so achieved, it is advisable to hang a weight (30Kg max.) at the eyebolt (M).

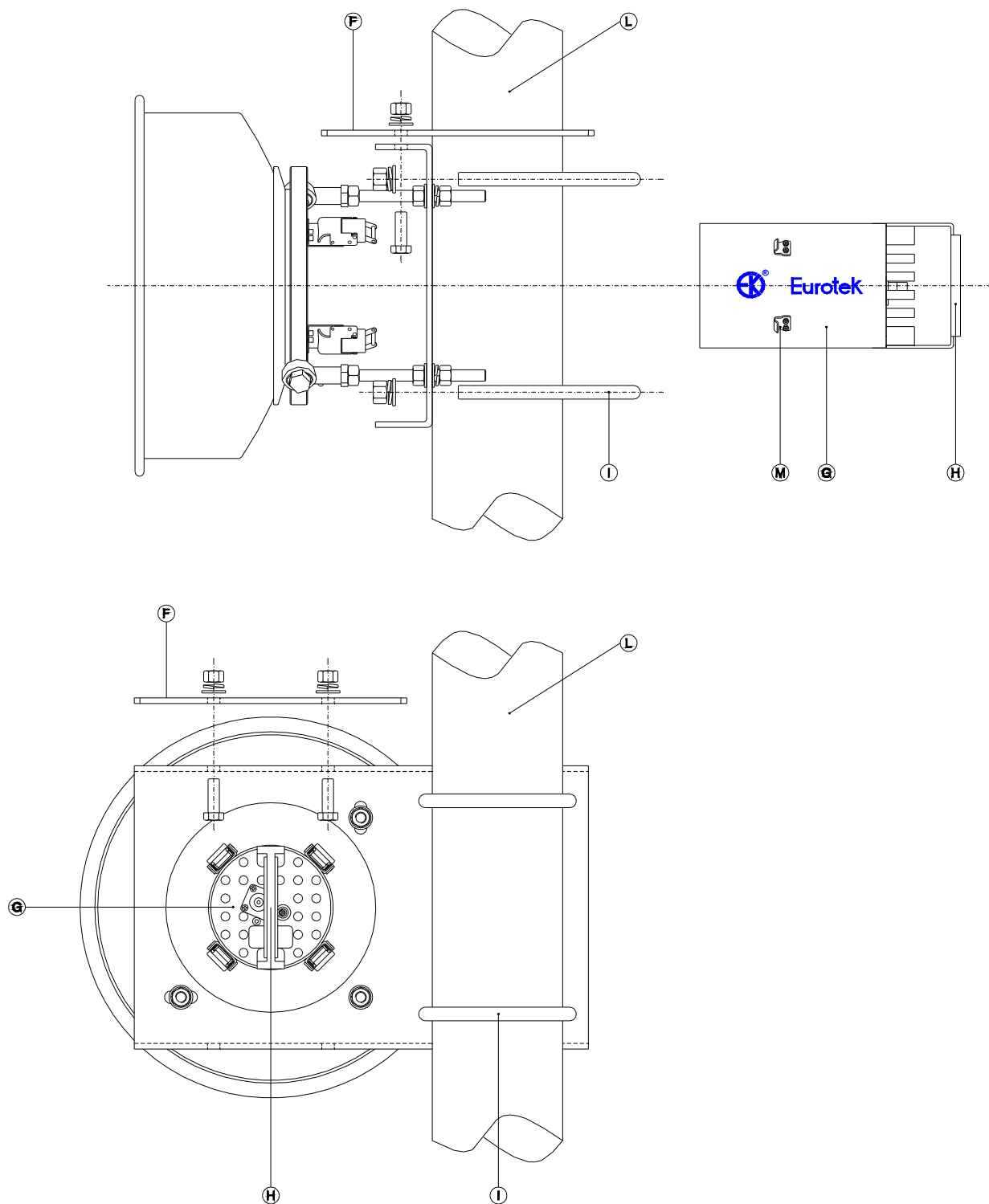
VERY IMPORTANT!

The polarization of the radiated and received electric field, is right-angled to the handle “H”; so pay attention that the handles of two units, the receiving one and the transmitting one, are oriented in the same way.

IV.3 - ODU in resident post assembling configuration with parabolic reflector:

The parabolic reflector is supplied already assembled and complete with every parts indicated in the picture here below





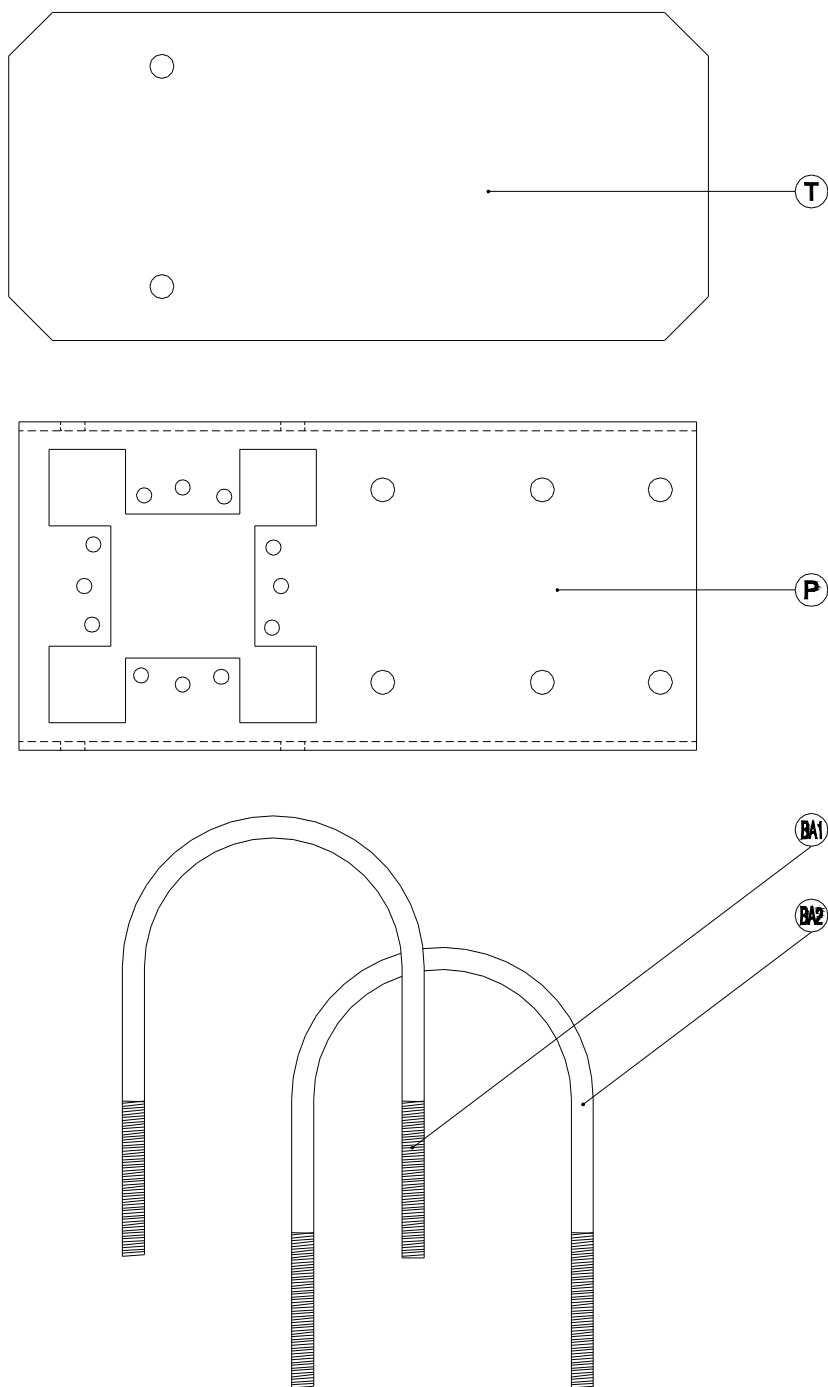
LEGEND Fig. page 30-31	
A	Parabolic reflector
B	Support plate of parabolic reflector
C	High-azimuth orientation
D	Latitude orientation
E	Spring toggle latch
F	Protection plate
G	Outdoor Unit (ODU)
H	ODU support handle
I	Fixing “U” bar
L	Support pole
M	Fastening hook on ODU

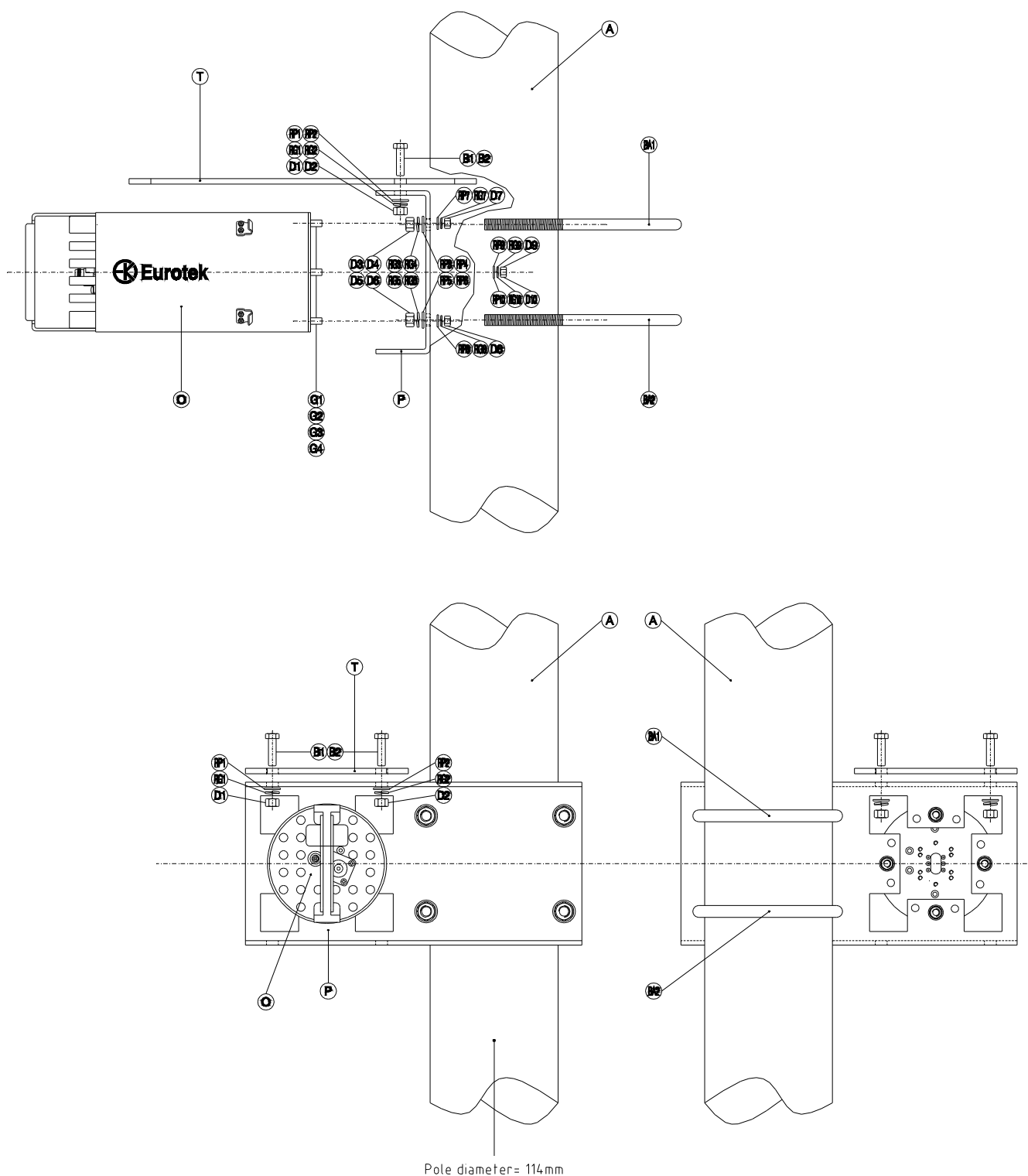
To assembling the parabolic reflector, please proceed as follows:

- 1) The overall of the parabolic reflector (A fig. page 30) together with the support plate (B fig. page 30), has to be fastened to the support pole (L fig. page 31) by the two “U” bars (I fig. page 30), with relative nuts and washers (flat + grower) $\varnothing 10$, as shown in fig. on page 31;
- 2) Subsequently, has to be arranged the protection plate (F fig. page 31), by relative nuts and bolts M10x30 included in the supply, as shown as ever in fig. on page 31;
- 3) Now, we proceed linking the ODU (G fig. page 31) to the parabolic reflector (A), hooking the four latches (E fig. page 30) to the four hooks on the ODU (M), as shown in fig. on page 31.

IV.4 - ODU in resident post assembling configuration without parabolic reflector:

The resident post without parabolic reflector is composed of the parts represented here below;





LEGEND Fig. page 33-34	
B1,B2	Bolt M10 x 25
BA1,BA2	“U” bar ø10mm with threaded M10 extremities
D1,D2,D3,D4,D5,D6	Nut M10
D7,D8,D9,D10	Nut M6
G1,G2,G3,G4	Stud M6x30mm for fastening to plate “P”
O	OutDoor Unit (ODU)
P	ODU support plate
PA	Support pole
RG1,RG2,RG3,RG4,RG5,RG6	Grower washer ø10
RG7,RG8,RG9,RG10	Grower washer ø6
RP1,RP2,RP3,RP4,RP5,RP6	Flat washer ø10
RP7,RP8,RP9,RP10	Flat washer ø6
T	Roof for ODU support plate

The post assembling shall be done as follows:

Please join the cover plate (T) for the ODU to the support plate (P) by the nuts, the washers (flat and grower) and bolts ø10, fitting the holes on to the plates. (see fig. page 34).

Then, please fasten the overall composed by the plates (P)+(T) to the support pole (PA) by the “U” bars (BA1&BA2) and relative four nuts and washers (flat and grower) ø10. (see fig. page 34).

Now, we have to fasten the ODU (O) to the support plate (P) fitting the four studs (G1÷G4) with the special holes by the four nuts and washers (flat and grower) ø6.

By the position of the holes on the support plate (P), it's possible to put the ODU (O) either in horizontal position or in vertical position.

IV.5 - Pointing procedure of parabolic reflector in mobile post configuration:

About the pointing of parabolic reflector, please proceed as follows:

- 1) The high-azimuth orientation (high-low), can be carried out in this way:
 - placed ourselves behind the parabolic reflector, please rotate at the same time the knob D (fig. page 27) in anti-clockwise direction and the C one (fig. page 26) in a clockwise direction only, until to reach the end stroke
 - at this point, rotate the knob D freely in a clockwise direction or in anti-clockwise direction, until to reach the requested position with the parabolic reflector
 - rotate at the same time the knob D in a clockwise direction and the C one in anti-clockwise direction until to clench them strongly to the ring E (fig. page 27)
- 2) The latitude orientation (right-left), can be carried out in this way:
 - placed ourselves behind the parabolic reflector, please rotate at the same time the knob H (fig. page 27) in anti-clockwise direction and the G one (fig. page 27) in a clockwise direction only, until to reach the end stroke
 - at this point, rotate the knob H freely in a clockwise direction or in anti-clockwise direction until to reach the requested position with the parabolic reflector
 - rotate at the same time the knob H in a clockwise direction and the G one in anti-clockwise direction until to clench them strongly to the ring E (fig. page 27)

IV.6 - Pointing procedure of parabolic reflector in resident post configuration:

About the pointing of parabolic reflector, please proceed as follows:

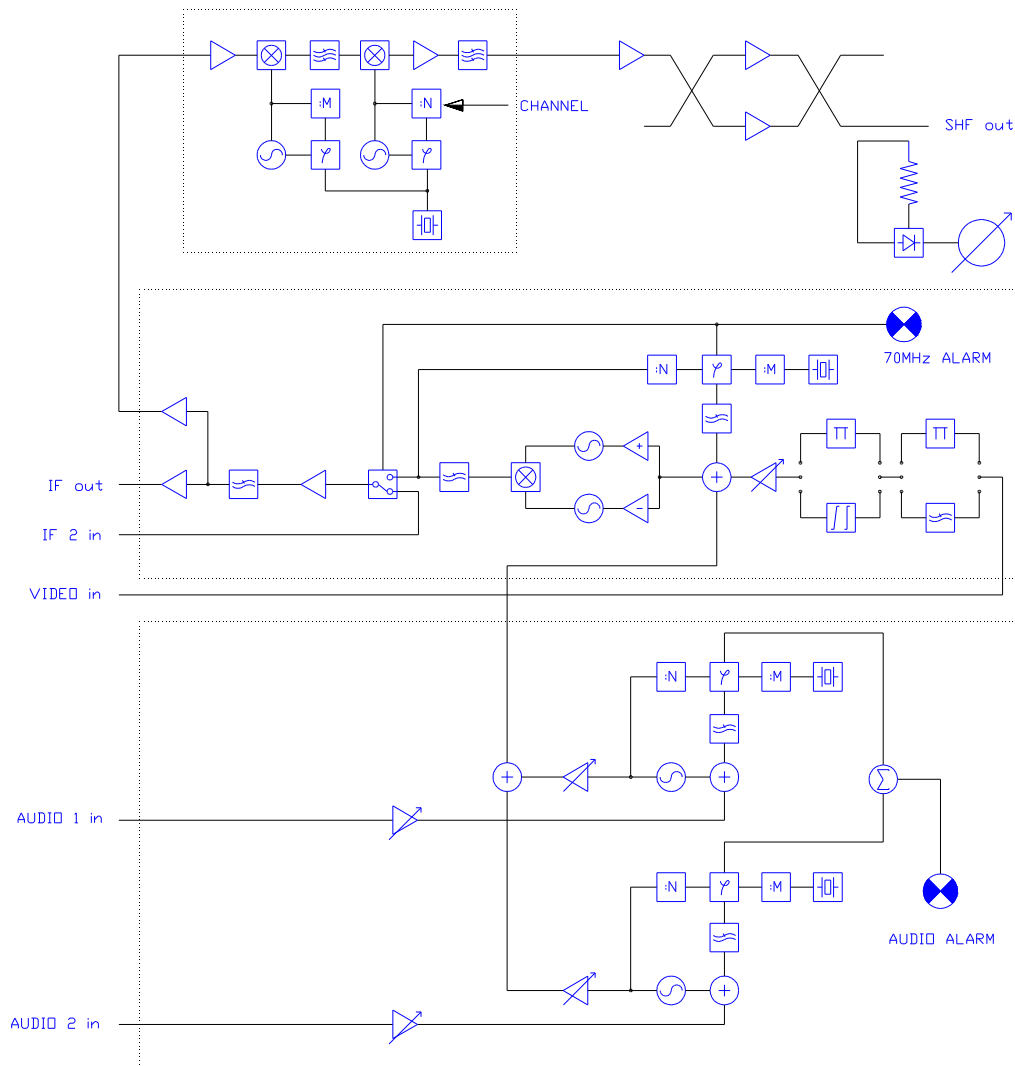
- 1) The high-azimuth orientation (high-low), can be carried out acting opportunely on two fastening nuts (C page 30) of the parabolic reflector (A page 30) to the support plate (B page 30) only; **all** the others fastening nuts have to be fully clenched.
- 2) The latitude orientation (right-left), can be carried out acting opportunely on two fastening nuts (D page 30) of the parabolic reflector (A) to the support plate (B) only; **all** the others fastening nuts have to be fully clenched.

VERY IMPORTANT!

To the end of fixing and pointing operations of the parabolic antenna, it's important to be sure that all the nuts are fully clenched, to avoid that sudden gusts or any other, can compromise the correct pointing and/or the assembly safety.

V - WORKING DESCRIPTION

V.1 – IDU-ODU transmitting block diagram:



V.2 – Transmitting working description (EK-ES2G/13; EK-ES5G/12; EK-ES7G/12):

Video signal in input is filtered to limit its bandwidth to 5,5 MHz and, if opportunely selected, emphasized according to CCIR 405-1 recommendation; a trimmer on the front panel allows to adjust video modulation sensitivity.

Then video signal is mixed with sub-carriers of FDM system modulated by audio signals and stabilized in frequency using phase-locked loop circuits; it is possible to set an emphasis at 50 μ S.

Audio modulation sensitivity is adjustable using a trimmer placed in the front panel.

The base-band signal is sent to two amplifiers, an inverting one and a non-inverting one, that drive two oscillators; output signals from oscillators are mixed and filtered to obtain a carrier at 70 MHz modulated by base-band signal.

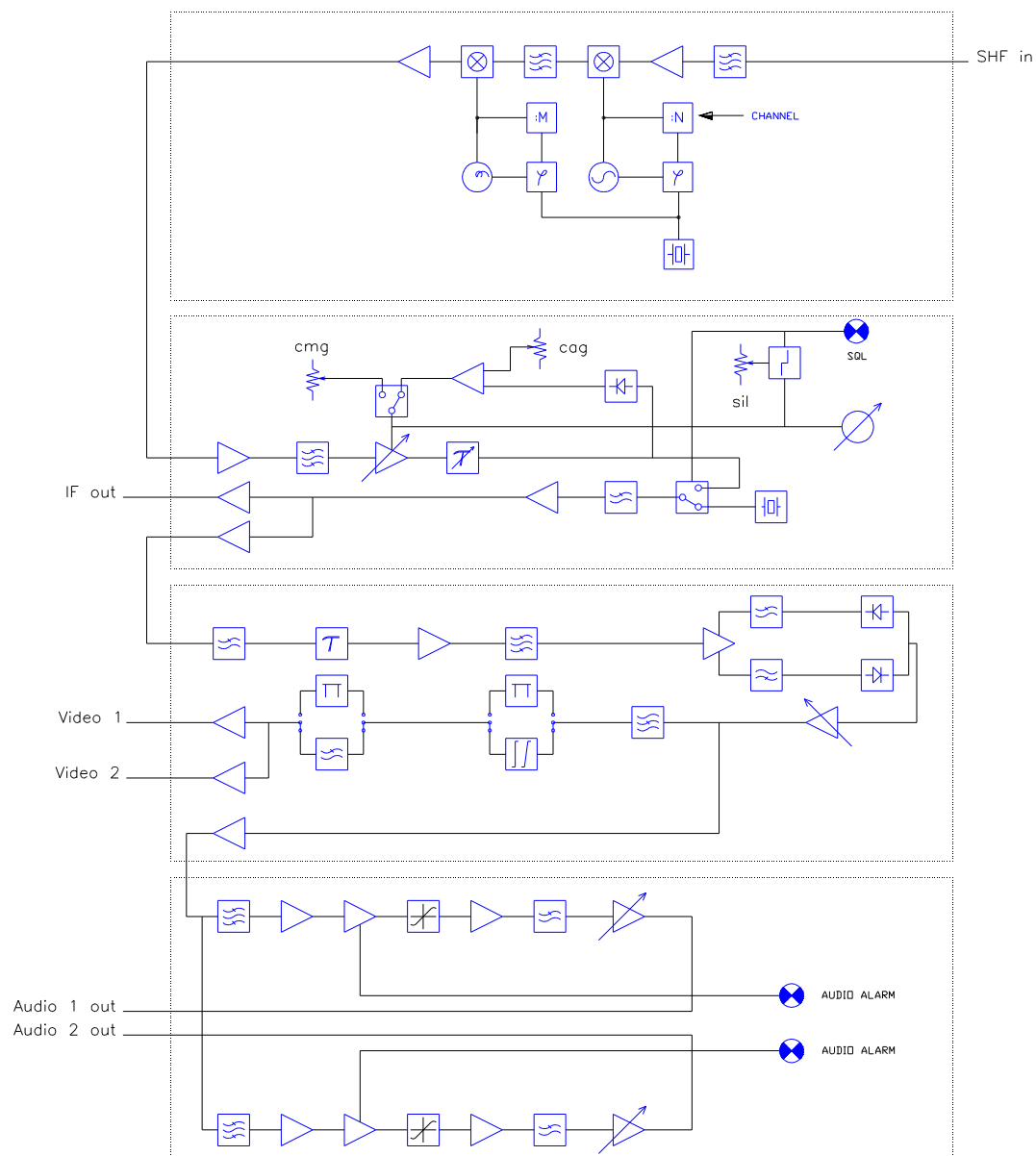
It is also available an auxiliary IF input at 70 MHz that, if its power level is upper than -6 dBm, is carried out automatically at IF output port,(we must connect the pin 10 with the pin 1 of the remote connector) replacing modulator output signal; to indicate that auxiliary IF signal is carried out, a yellow led is alight on the front panel.

IF signal is amplified and sent to an auxiliary output port; through a 75 Ohm coaxial cable the signal at 70 MHz is sent to ODU to a double conversion synthesized converter; here the signal is mixed and filtered to obtain an intermediate frequency of 1000 MHz (EK-ES2G/13, EK-ES10G/11); 1189 MHz (EK-ES5G/12); 1540 MHz (EK-ES7G/12) and then again mixed with a signal generated by a local oscillator at $3312 \div 3687$ MHz (EK-ES2G/13), $4076 \div 4246$ (EK-ES5G/12), $6442 \div 7044$ MHz (EK-ES7G/12) whose working frequency is set by the channel knob on IDU front panel, to obtain the output frequency band of $2,3 \div 2,7$ GHz (EK-ES2G/13), $5,2 \div 5,5$ GHz (EK-ES5G/12), $6,4 \div 7$ GHz (EK-ES7G/12) now the signal is filtered and sent to the power amplifier.

A detector on power amplifier output allows to see output power level on the front panel indicator and a red led is a light when output power is 3 dB lower than the nominal one.

The right working of all parts of the transmitter is checked by a microprocessor that keeps in memory channels frequencies and manages the synthesized converter.

V.3 – IDU-ODU receiving block diagram:



V.4 - Receiving working description (EK-ES2G/13; EK-ES5G/12; EK-ES7G/12):

The received signal is frequency limited by input filter of the synthesized converter at double conversion; then the signal is firstly mixed with the signal generated by a local oscillator at $3312 \div 3687$ MHz (EK-ES2G/13), $4076 \div 4246$ MHz (EK-ES5G/12), $6442 \div 7044$ MHz (EK-ES7G/12), whose working frequency is set by the channel knob on IDU front panel, to obtain the intermediate frequency of 1000 MHz (EK-ES2G/13, EK-ES10G/11); 1189 MHz (EK-ES5G/12); 1540 MHz (EK-ES7G/12). The signal is filtered and mixed with the signal generated by a local oscillator at 1070 MHz (EK-ES2G/13, EK-ES10G/11); 1119 MHz (EK-ES5G/12); 1470 MHz (EK-ES7G/12), to obtain the output IF signal at 70 MHz.

Using a SAW filter (Surface Acoustic Wave) is marked the selectivity of the radio link; there are also equalization cells for group delay due to filters.

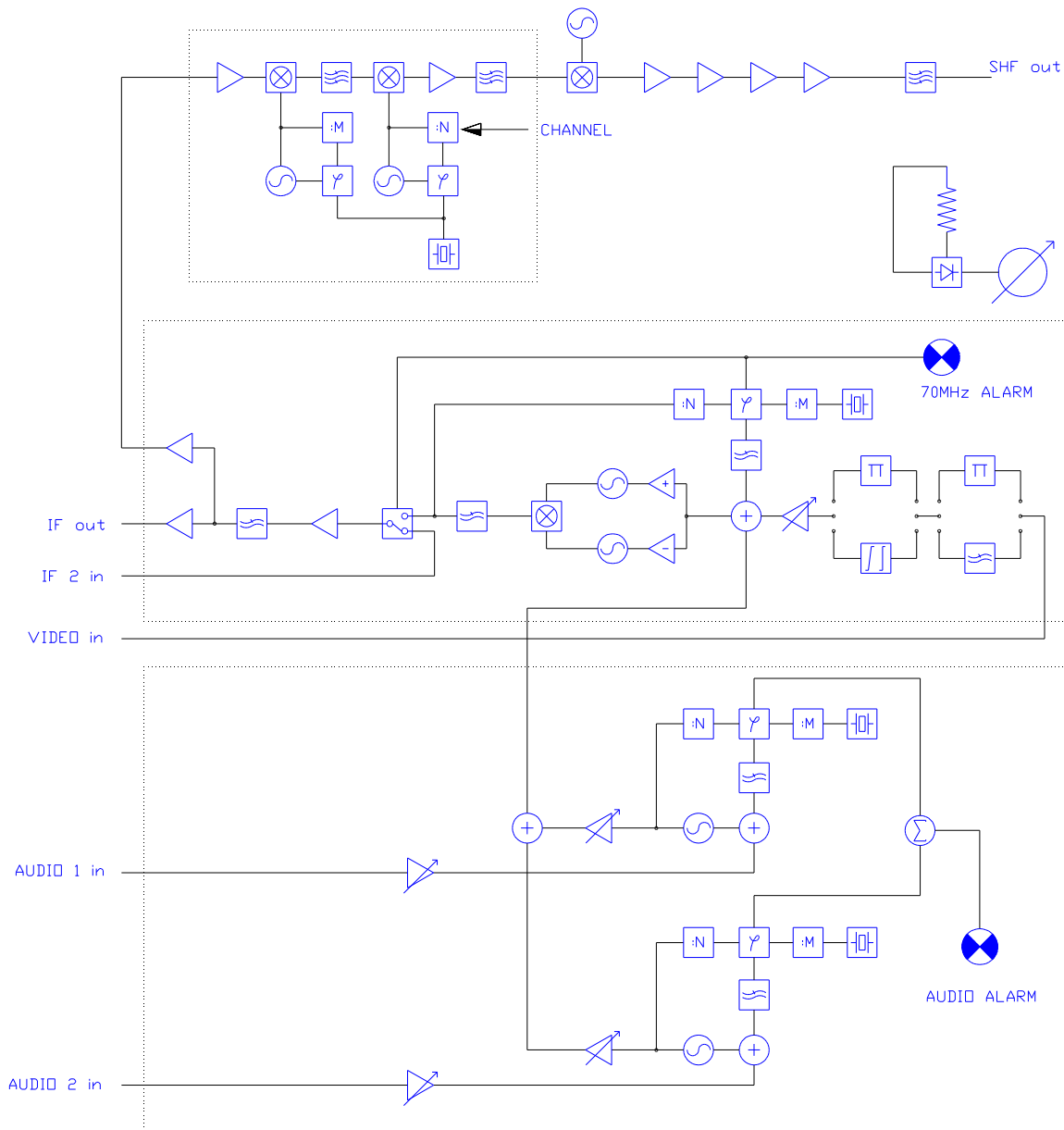
The amplification chain with variable gain compensates the fluctuation of RF attenuation and keeps at the nominal power level the IF output one.

IF signal is amplitude limited before to arrive to the discriminator; from its output the base-band signal is sent to an amplifier, to a de-emphasizer and filtered to eliminate the FDM audio part.

The audio sub-carriers are filtered and then demodulated to be available at their output ports.



V.5 – IDU-ODU transmitting block diagram:



V.6 – Transmitting working description (EK-ES10G/11, EK-ES12G/11, EK-ES13G/11 EK-ES14G/11,):

Video signal in input is filtered to limit its bandwidth to 5,5 MHz and, if opportunely selected, emphasized according to CCIR 405-1 recommendation; a trimmer on the front panel allows to adjust video modulation sensitivity.

Then video signal is mixed with sub-carrier of FDM system modulated by audio signals and stabilized in frequency using phase-locked loop circuits; it is possible to set an emphasis at 50 μ s. Audio modulation sensitivity is adjustable using a trimmer placed in the front panel.

The base-band signal is sent to two amplifiers, an inverting one and a non-inverting one, that drive two oscillators; output signals from oscillators are mixed and filtered to obtain a carrier at 70 MHz modulated by base-band signal.

It is also available an auxiliary IF input at 70 MHz that, if its power level is upper than -6 dBm, is carried out automatically at IF output port, (we must connect the pin 10 with the pin 1 of the remote connector) replacing modulator output signal; to indicate that auxiliary IF signal is carried out, a yellow led is alight on the front panel.

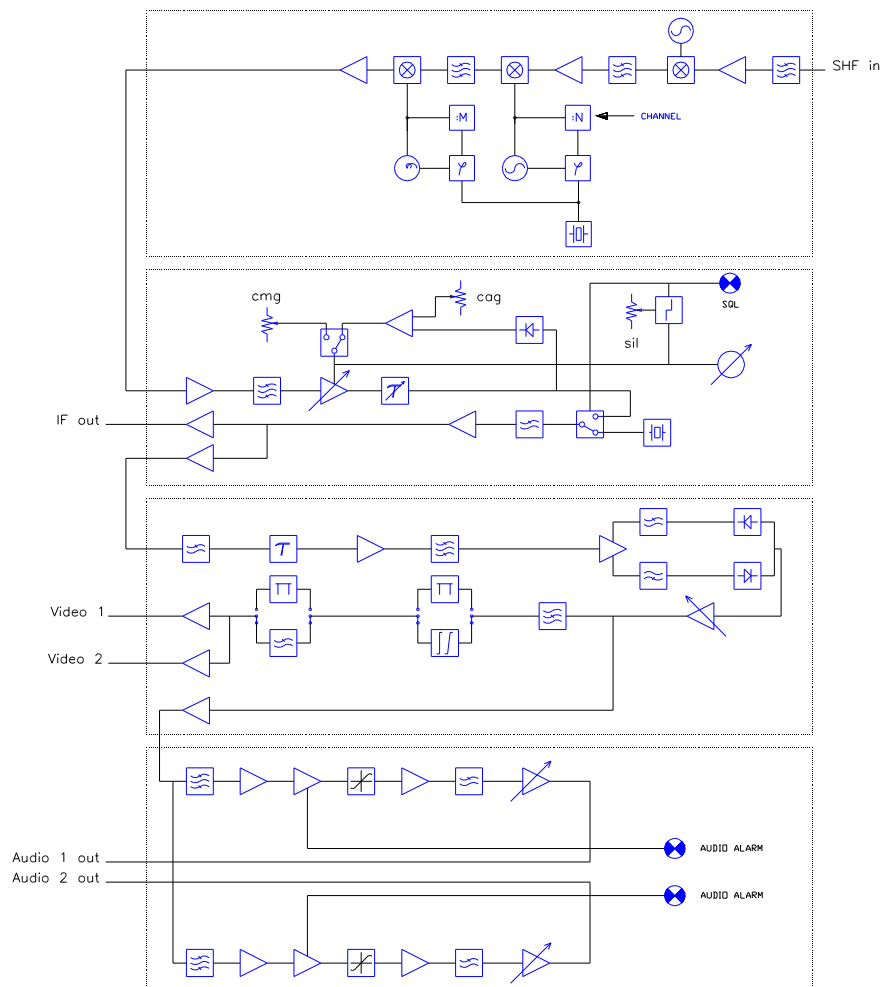
IF signal is amplified and sent to an auxiliary output port; through a 75 Ohm coaxial cable the signal at 70 MHz is sent to ODU to a triple conversion synthesized converter; here the signal is mixed and filtered to obtain an intermediate frequency of 1 GHz and then again mixed with a signal generated by a local oscillator at $3,3 \div 3,7$ GHz, whose working frequency is set by the channel knob on IDU front panel, to obtain the output frequency band of $2,3 \div 2,7$ GHz, this signal is again mixed with a signal generated by a fixed local oscillator at 13 GHz to obtain the output frequency band of $10,3 \div 10,7$ GHz; now the signal is sent to the power amplifier and filtered.

A detector on power amplifier output allows to monitor output power level on the front panel indicator and a red led is light when output power is 3 dB lower than the nominal one.

The right working of all parts of the transmitter is checked by a microprocessor that keep in memory channels frequencies and manages the synthesized converter.



V.7 – IDU-ODU receiving block diagram:



V.8 – Receiving working description (EK-ES10G/11, EK-ES12G/11, EK-ES13G/11 EK-ES14G/11,):

The received signal is frequency limited by a six cavity filter; then the signal is firstly low-noise preamplified and subsequently again filtered by a two cavity filter to delete the noise that is present on the image-frequency. Now the signal is mixed by a local oscillator at 13 GHz, to obtain the frequency band at $2,3 \div 2,7$ GHz, and sent to a synthesized converter.

Here the signal is firstly mixed by a local synthesized oscillator at $3,3 \div 3,7$ GHz to obtain the intermediate frequency of 1 GHz. The signal at 1 GHz is filtered and mixed with the signal generated by a local oscillator at 1,070 GHz to obtain the output IF signal at 70 MHz.

Using a SAW filter (Surface Acoustic Wave) is marked the selectivity of the radio link; there are also equalization cells for group delay due to filters.

The amplification chain with variable gain compensates the fluctuation of RF attenuation and keeps at the nominal power level the IF output one.

IF signal is amplitude limited before to arrive to the discriminator; from its output the base-band signal is sent to an amplifier, to a de-emphasizer and filtered to eliminate the FDM audio part.

The audio sub-carriers are filtered and then demodulated to be available at their output ports.



VI - INSTALLATION ARRANGEMENTS

VI.1 – Thermal dissipation:

To favour thermal exchange between IDU part and environment, it is necessary to place each unit spacing out it as far as a rack 1U height both above and under it, always placing the apparatus horizontally.

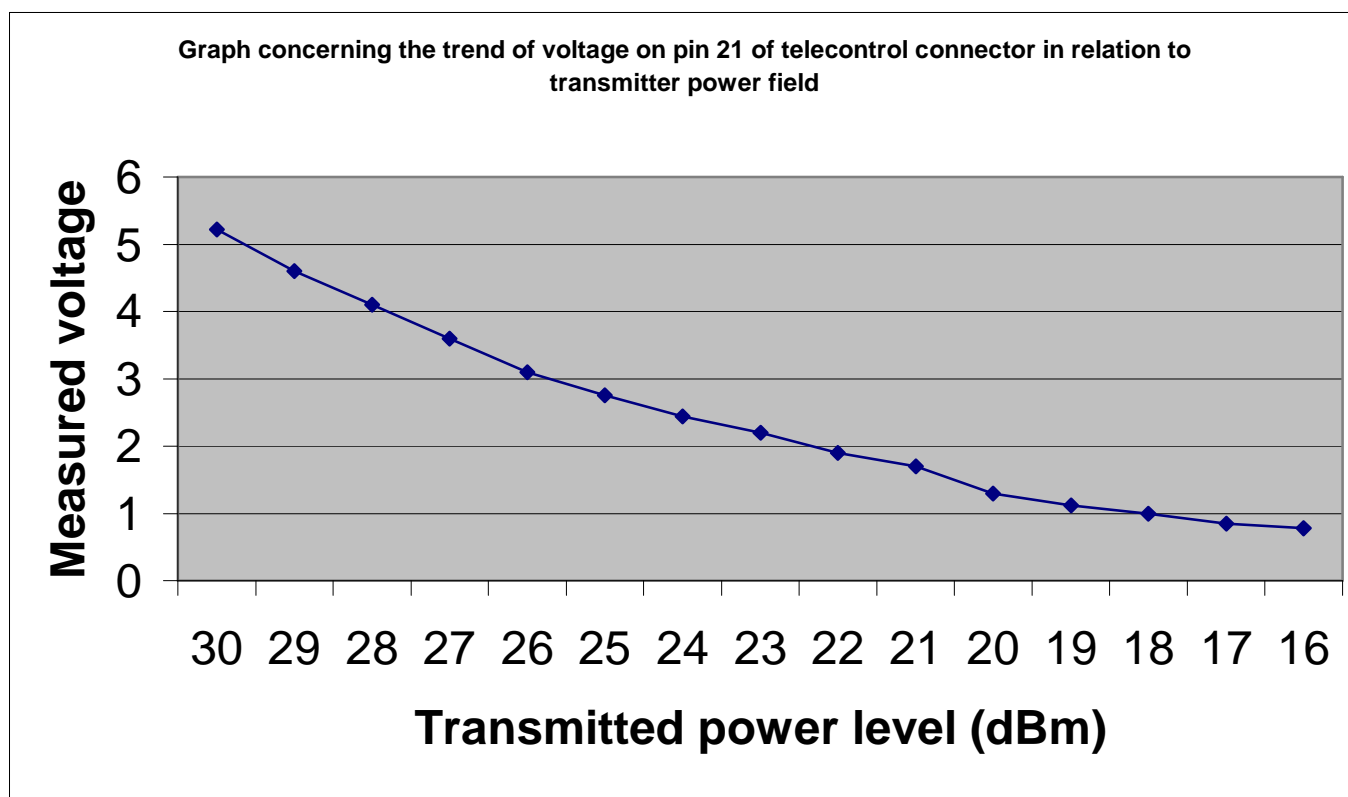
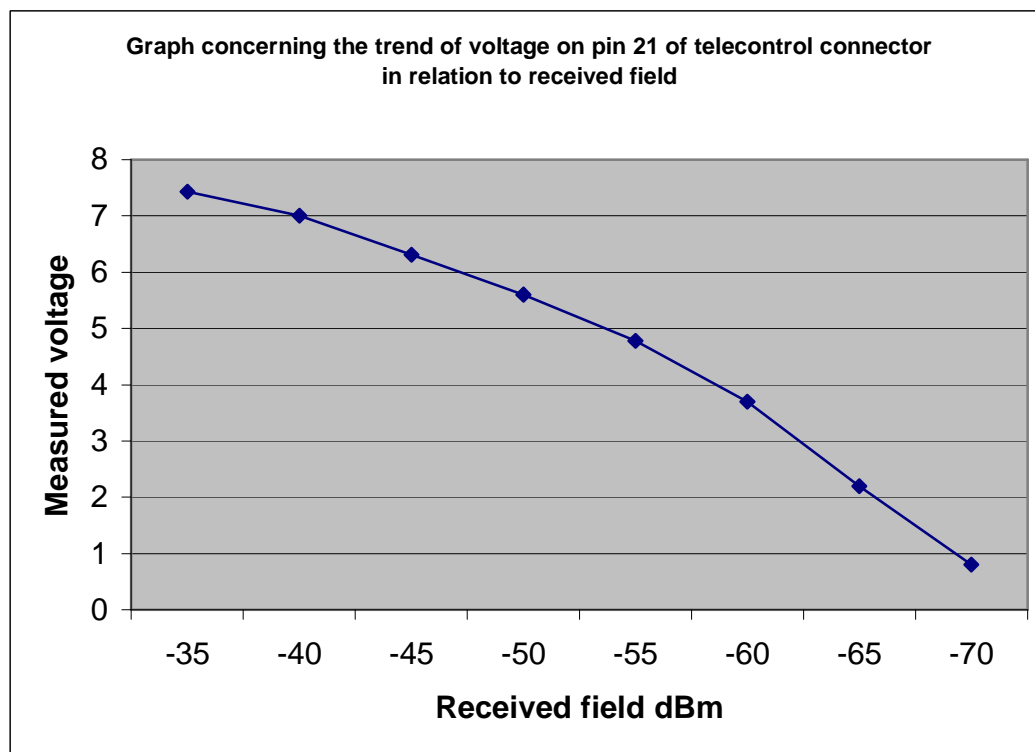
VI.2 – Pins of telecontrol connector:

Pin	Tx function	Rx function	Contact type
1	GND	GND	GND
2		Manual	N.A.
3	IF2		N.A.
4	Not connected	Not connected	Not connected
5	Mod. unlock		N.A.
6	Not connected	Not connected	Not connected
7	Audio all.	Audio all.	N.C.
8	Pwr out	Squelch	N.C.
9	Pwr supply	Pwr supply	N.A.
10	IF2	Not connected	Command O.C.
11	Relais common	Relais common	Relais common
12	+ 12 V2	+ 12 V2	+ 12 V2
13	- 12 V2	- 12 V2	- 12 V2
14	GND	GND	GND
15		Manual	N.C.
16	IF2		N.C.
17	Not connected	Not connected	Not connected
18	Mod. unlock		N.C.
19	Audio all.	Audio all.	N.A.
20	Pwr out	Squelch	N.A.
21	Power indication	Field indication	See graph.pag 46
22	+ 12 V1	+ 12 V1	+ 12 V1
23		Not connected	Not connected
24	Relais common	Relais common	Relais common
25	- 12 V1	- 12 V1	- 12 V1

N.A. = normally open contact

N.C. = normally closed contact

O.C. = active open collector closed on ground



VI.3 – ODU IDU CONNECTION

VERY IMPORTANT!

In place where high emissions of low frequencies signal are present(ex. FM), he is advisable to use a cable type CELLFLEX in order to connect ODU and IDU

VII - CANALIZATION**VII.1 - EK-ES2G/13**

CHANNEL	RF	OL 1	OL 2
1	2312	1070	3312
2	2337	1070	3337
3	2362	1070	3362
4	2387	1070	3387
5	2412	1070	3412
6	2437	1070	3437
7	2462	1070	3462
8	2487	1070	3487
9	2512	1070	3512
10	2537	1070	3537
11	2562	1070	3562
12	2587	1070	3587
13	2612	1070	3612
14	2637	1070	3637
15	2662	1070	3662
16	2687	1070	3687

VII.2 - EK-ES5G/12

CHANNEL	RF	OL 1	OL 2
1	5265	1119	4076
2	5293	1119	4104
3	5321	1119	4132
4	5379	1119	4190
5	5407	1119	4288
6	5435	1119	4246

VII.3 - EK-ES7G/12

TYPE of BAND	CHANNEL	RF	OL 1	OL 2
LOW BAND	1	6442	1470	4972
	2	6484	1470	5014
	3	6526	1470	5056
	4	6568	1470	5098
	5	6610	1470	5140
	6	6652	1470	5182
	7	6694	1470	5524
	8	6736	1470	5266
HIGH BAND	9	6778	1470	5308
	10	6820	1470	5350
	11	6862	1470	5392
	12	6904	1470	5434
	13	6946	1470	5476
	14	6988	1470	5518
	15	7030	1470	5490
	16	7072	1470	5532

VII.4 -EK-ES10G/11

CHANNEL	RF	OL 1	OL 2	OL 3
1	10310	1070	3690	13000
2	10330	1070	3670	13000
3	10350	1070	3650	13000
4	10370	1070	3630	13000
5	10390	1070	3610	13000
6	10410	1070	3590	13000
7	10430	1070	3570	13000
8	10450	1070	3550	13000
9	10520	1070	3480	13000
10	10540	1070	3460	13000
11	10560	1070	3440	13000
12	10580	1070	3420	13000
13	10600	1070	3400	13000
14	10620	1070	3380	13000
15	10640	1070	3360	13000
16	10660	1070	3340	13000

VII.5 -EK-ES12G/11

CHANNEL	RF	OL 1	OL 2	OL 3
1	11112	1070	3648	13760
2	11128	1070	3632	13760
3	11148	1070	3612	13760
4	11168	1070	3592	13760
5	11188	1070	3572	13760
6	11208	1070	3552	13760
7	11228	1070	3532	13760
8	11248	1070	3512	13760
9	11268	1070	3492	13760
10	11288	1070	3472	13760
11	11308	1070	3452	13760
12	11328	1070	3432	13760
13	11348	1070	3412	13760
14	11368	1070	3392	13760
15	11388	1070	3372	13760
16	11408	1070	3352	13760

VII.6 -EK-ES14G/11

CHANNEL	RF	OL 1	OL 2	OL 3
1	14260	1070	3385	11875
2	14280	1070	3405	11875
3	14300	1070	3425	11875
4	14320	1070	3445	11875
5	14340	1070	3465	11875
6	14360	1070	3485	11875
7	14390	1070	3515	11875
8	14410	1070	3535	11875
9	14430	1070	3555	11875
10	14450	1070	3575	11875
11	14470	1070	3595	11875
12	14490	1070	3615	11875
13	14260	1070	3385	11875
14	14280	1070	3405	11875
15	14300	1070	3425	11875
16	14320	1070	3445	11875

VII.7 -EK-ES13G/11

Canalizations not available. Please contact EUROTEK offices.



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